GW - 199

MONITORING REPORTS

DATE:

1999

■ CHAMPION TECHNOLOGIES

More tests scheduled in cleanup plan

DANIEL RUSSELL
HOBBS NEWS-SUN

Champion Technologies will do more testing at its Hobbs office to check for levels of chromium and other metals, according to state documents filed with the N.M. Oil Conservation Division.

The OCD in Santa Fe sent the Houston-based oilfield servicing firm on April 26 a notice of violation listing 14 possible violations involving the improper storage of waste drums and possible chemical spills at Champion's yard in south Hobbs at 4001 S. Highway 18.

While Champion took immediate corrective action by a May 10 deadline, it had to file an abatement plan by June 25. An abatement plan explains to the OCD what further clean-up steps the company will take to solve any spills or contamination.

The OCD in its notice of violation indicated concern about unreported spills and possible contamination of the soil and ground water, especially involving chromium.

Because the OCD just received the abatement plan and began reviewing the plan last week, Roger Anderson of the OCD environmental division said he could not state if OCD was satisfied with Champion's response. But if any deficiencies or questions arise during the abatement plan review, OCD will ask for further clarification from Champion, he said.

Champion is promising more testing to determine the extent of any spills.

"An independent consultant will do the sampling and summary report," Champion Technologies environmental specialist, Ralph Corry, wrote in the four-page abatement plan dated June 22.

Corry states the plan is "stage one" of abatement. Among the areas the independent consultant will focus on is yellow-stained soil in the yard.

"The yellow-stained soil area which had excess chromium, according to the OCD, will be resampled for EPA (Environmental Protection Agency) RCRA (Resource Conservation Recovery Act) constituents for metals. In addition, lead, chromium, manganese, nickel, chloride and soluble sulfates that exceed the standards for groundwater will be checked," Corry wrote.

Champion plans to take samples on the surface of the stained area, a sample 12 inches underneath the soil at the same spot and a sample five feet outside the area.

As to the concerns about possible violations of the state's Water Quality Control Commission standards, Corry stated the well located in Champion's yard shows results found in similar wells in the area concerning chlorides.

"It is our understanding that other wells in this area have been sampled by the OCD and the results show that the TDS (total dissolved solids) and chloride background levels are consistent with our well," Corry wrote.

A spokesman for Champion could not be reached for further comment.

The OCD notice of violation in April came just weeks after the N.M. Environment Department notified Champion it had "adequately addressed" a notice of violation letter from the Environment

Post-it® Fax Note 7671	Date	# of pages ▶
To Wayne/Roger	From Daniel	
Co./Dept. OCD	Co. News-Sun	
Phone #	Phone #	
Fax #	Fax #	

action by a May 10 deadline, it had to file an abatement plan by June 25. An abatement plan explains to the OCD what further clean-up steps the company will take to solve any spills or contamination.

The OCD in its notice of violation indicated concern about unreported spills and possible contamination of the soil and ground water, especially involving chromium.

Because the OCD just received the abatement plan and began reviewing the plan last week, Roger Anderson of the OCD environmental division said he could not state if OCD was satisfied with Champion's response. But if any deficiencies or questions arise during the abatement plan review, OCD will ask for further clarification from Champion, he said.

Champion is promising more testing to determine the extent of any spills.

"An independent consultant will do the sampling and summary report," Champion Technologies environmental specialist, Ralph Corry, wrote in the four-page abatement plan dated June 22.

Corry states the plan is "stage one" of abatement. Among the areas the independent consultant will focus on is yellow-stained soil in the yard.

"The yellow-stained soil area which had excess chromium, according to the OCD, will be resampled for EPA (Environmental Protection Agency) RCRA (Resource Conservation Recovery Act) constituents for metals. In addition, lead, chromium, manganese, nickel, chloride and soluble sulfates that exceed the standards for groundwater will be checked," Corry wrote.

Champion plans to take samples on the surface of the stained area, a sample 12 inches underneath the soil at the same spot and a sample five feet outside the area.

As to the concerns about possible violations of the state's Water Quality Control Commission standards, Corry stated the well located in Champion's yard shows results found in similar wells in the area concerning chlorides.

"It is our understanding that other wells in this area have been sampled by the OCD and the results show that the TDS (total dissolved solids) and chloride background levels are consistent with our well," Corry wrote.

A spokesman for Champion could not be reached for further comment.

The OCD notice of violation in April came just weeks after the N.M. Environment Department notified Champion it had "adequately addressed" a notice of violation letter from the Environment Department dated on Jan. 30, 1998.

Champion has occupied the seven acre plot for approximately 25 years. Prior to Champion, the yard was used by a trucking company.

Readers can e-mail their comments to Daniel Russell at biznews@leaco.net or call him at 397-4556, ext. 138.

er lengthy illness

ekins

Instead of paying a fine, he often had the offender write an essay.

"It seemed to work pretty good," Clampitt said. "It was real effective."

Meekins said in 1974 when he instituted the program he thought too many parents were simply paying the fines, eliminating any punishment for the young offenders. He thought writing a theme would impact the teenagers

Please see JUDGE, Page 5

2709-D Pan American Freeway, NE
Albuquerque, New Mexico 87107
Phone (505) 344-3777
Fax (505) 344-4413

PINNACLE LABORATORIES

Pinnacle Lab ID number **905080**
July 01, 1999

NMOCD
2040 S. PACHECO
SANTA FE, NM 87505

Project Name GOLDSTAR HOBBS YARD
Project Number WATER WELL

Attention: BILL OLSON

On 5/21/99 Pinnacle Laboratories, Inc. Inc., (ADHS License No. AZ0592), received a request to analyze **aqueous** samples. The samples were analyzed with EPA methodology or equivalent methods. The results of these analyses and the quality control data, which follow each set of analyses, are enclosed.

EPA methods 150.1 and 8260 were performed by Pinnacle Laboratories, Inc., Albuquerque, NM.

Metals were analyzed by Barringer Laboratories, Inc., Golden, Co.

All other parameters were performed by ESL (OR) Inc., Portland, OR.

If you have any questions or comments, please do not hesitate to contact us at (505)344-3777.

Kimberly D. McNeill
Project Manager

H. Mitchell Rubenstein, Ph. D.
General Manager

MR: mt

Enclosure

2709-D Pan American Freeway NE
Albuquerque, New Mexico 87107
Phone (505) 344-3777
Fax (505) 344-4413

PINNACLE LABORATORIES

CLIENT	: NMOCD	PINNACLE ID	: 905080
PROJECT #	: WATER WELL	DATE RECEIVED	: 5/21/99
PROJECT NAME	: GOLDSTAR HOBBS YARD	REPORT DATE	: 7/1/99

PIN ID. #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
01	9905201000	AQUEOUS	5/20/99
02	TRIP BLANK	AQUEOUS	5/19/99

5709-D San Antonio Road, NE
Albuquerque, New Mexico 87107
Phone (505) 344-3777
Fax (505) 344-4413

PINNACLE LABORATORIES

GENERAL CHEMISTRY RESULTS

CLIENT	: NMOCD	PINNACLE I.D.	: 905080
PROJECT #	: WATER WELL	DATE RECEIVED	: 5/21/99
PROJECT NAME	: GOLDSTAR HOBBS YARD		

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE ANALYZED
01	9905201000	AQUEOUS	5/20/99	5/24/99

PARAMETER	UNITS	9905201000
PH (150.1)	UNITS	7.56

CHEMIST NOTES:
N/A

2709-D Pan American Freeway NE
Albuquerque, New Mexico 87107
Phone (505) 344-3777
Fax (505) 344-4413

PINNACLE LABORATORIES

GENERAL CHEMISTRY - QUALITY CONTROL

CLIENT	: NMOCD	PINNACLE I.D.	: 905080
PROJECT #	: WATER WELL	SAMPLE MATRIX	: AQUEOUS
PROJECT NAME	: GOLDSTAR HOBBS YARD		

PARAMETER	UNITS	PINNACLE I.D.	SAMPLE RESULT	DUP. RESULT	% RPD
PH	UNITS	905080-01	7.56	7.59	0.40

CHEMIST NOTES:
N/A

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative Percent Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

2709-D Pan American Freeway NE
Albuquerque, New Mexico 87107
Phone (505) 344-3777
Fax (505) 344-4413

PINNACLE LABORATORIES

GC/MS RESULTS

TEST	: VOLATILE ORGANICS EPA METHOD 8260		
CLIENT	: NMOCD	PINNACLE I.D. :	905080
PROJECT #	: WATER WELL	DATE RECEIVED :	5/21/99
PROJECT NAME	: GOLDSTAR WATER WELL		

SAMPLE ID #	CLIENT ID	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
905080-01	9905201000	AQUEOUS	5/20/99	N/A	06/02/99	1

PARAMETER	DET. LIMIT		UNITS
Dichlorodifluoromethane	1.0	< 1.0	ug/L
Chloromethane	1.0	< 1.0	ug/L
Vinyl Chloride	1.0	< 1.0	ug/L
Bromomethane	1.0	< 1.0	ug/L
Chloroethane	1.0	< 1.0	ug/L
Trichlorofluoromethane	1.0	< 1.0	ug/L
Acetone	10	< 10	ug/L
Acrolein	5.0	< 5.0	ug/L
1,1-Dichloroethene	1.0	< 1.0	ug/L
Iodomethane	1.0	< 1.0	ug/L
Methylene Chloride	1.0	< 1.0	ug/L
Acrylonitrile	5.0	< 5.0	ug/L
cis-1,2-Dichloroethene	1.0	< 1.0	ug/L
Methyl-t-butyl Ether	1.0	< 1.0	ug/L
1,1,2,1,2,2-Trichlorotrifluoroethane	1.0	< 1.0	ug/L
1,1-Dichloroethane	1.0	< 1.0	ug/L
trans-1,2-Dichloroethene	1.0	< 1.0	ug/L
2-Butanone	10	< 10	ug/L
Carbon Disulfide	1.0	< 1.0	ug/L
Bromochloromethane	1.0	< 1.0	ug/L
Chloroform	1.0	< 1.0	ug/L
2,2-Dichloropropane	1.0	< 1.0	ug/L
1,2-Dichloroethane	1.0	< 1.0	ug/L
Vinyl Acetate	1.0	< 1.0	ug/L
1,1,1-Trichloroethane	1.0	< 1.0	ug/L
1,1-Dichloropropene	1.0	< 1.0	ug/L
Carbon Tetrachloride	1.0	< 1.0	ug/L
Benzene	1.0	< 1.0	ug/L
1,2-Dichloropropane	1.0	< 1.0	ug/L
Trichloroethene	1.0	< 1.0	ug/L
Bromodichloromethane	1.0	< 1.0	ug/L
2-Chloroethyl Vinyl Ether	10	< 10	ug/L
cis-1,3-Dichloropropene	1.0	< 1.0	ug/L
trans-1,3-Dichloropropene	1.0	< 1.0	ug/L
1,1,2-Trichloroethane	1.0	< 1.0	ug/L
1,3-Dichloropropane	1.0	< 1.0	ug/L
Dibromomethane	1.0	< 1.0	ug/L
Toluene	1.0	< 1.0	ug/L
1,2-Dibromoethane	1.0	< 1.0	ug/L
4-Methyl-2-Pentanone	10	< 10	ug/L
2-Hexanone	10	< 10	ug/L
Dibromochloromethane	1.0	< 1.0	ug/L
Tetrachloroethene	1.0	< 1.0	ug/L
Chlorobenzene	1.0	< 1.0	ug/L
Ethylbenzene	1.0	< 1.0	ug/L

2709-D Pan American Fwy NE
Albuquerque, New Mexico 87107
Phone (505) 344-3777
Fax (505) 344-4413

PINNACLE LABORATORIES

GC/MS RESULTS

TEST : VOLATILE ORGANICS EPA METHOD 8260
CLIENT : NMOCD PINNACLE I.D. : 905080
PROJECT # : WATER WELL DATE RECEIVED : 5/21/99
PROJECT NAME : GOLDSTAR WATER WELL

SAMPLE ID #	CLIENT ID	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
905080-01	9905201000	AQUEOUS	5/20/99	N/A	06/02/99	1

PARAMETER	DET. LIMIT		UNITS
1,1,1,2-Tetrachloroethane	1.0	< 1.0	ug/L
m&p Xylenes	1.0	< 1.0	ug/L
o-Xylene	1.0	< 1.0	ug/L
Styrene	1.0	< 1.0	ug/L
Bromoform	1.0	< 1.0	ug/L
1,1,2,2-Tetrachloroethane	1.0	< 1.0	ug/L
1,2,3-Trichloropropane	1.0	< 1.0	ug/L
Isopropyl Benzene	1.0	< 1.0	ug/L
Bromobenzene	1.0	< 1.0	ug/L
trans-1,4-Dichloro-2-Butene	1.0	< 1.0	ug/L
n-Propylbenzene	1.0	< 1.0	ug/L
2-Chlorotoluene	1.0	< 1.0	ug/L
4-Chlorotoluene	1.0	< 1.0	ug/L
1,3,5-Trimethylbenzene	1.0	< 1.0	ug/L
tert-Butylbenzene	1.0	< 1.0	ug/L
1,2,4-Trimethylbenzene	1.0	< 1.0	ug/L
sec-Butylbenzene	1.0	< 1.0	ug/L
1,3-Dichlorobenzene	1.0	< 1.0	ug/L
1,4-Dichlorobenzene	1.0	< 1.0	ug/L
p-Isopropyltoluene	1.0	< 1.0	ug/L
1,2-Dichlorobenzene	1.0	< 1.0	ug/L
n-Butylbenzene	1.0	< 1.0	ug/L
1,2-Dibromomo-3-chloropropane	1.0	< 1.0	ug/L
1,2,4-Trichlorobenzene	1.0	< 1.0	ug/L
Naphthalene	1.0	< 1.0	ug/L
Hexachlorobutadiene	1.0	< 1.0	ug/L
1,2,3-Trichlorobenzene	1.0	< 1.0	ug/L

SURROGATE % RECOVERY		
1,2-Dichloroethane-d4	102	(80 - 120)
Toluene-d8	102	(88 - 110)
Bromofluorobenzene	97	(86 - 115)

2709-D Pan American Freeway NE
Albuquerque, New Mexico 87107
Phone (505) 344-3777
Fax (505) 344-4413

PINNACLE LABORATORIES

GC/MS RESULTS

TEST	: VOLATILE ORGANICS EPA METHOD 8260		
CLIENT	: NMOCD	PINNACLE I.D. :	905080
PROJECT #	: WATER WELL	DATE RECEIVED :	5/21/99
PROJECT NAME	: GOLDSTAR WATER WELL		

SAMPLE ID #	CLIENT ID	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
905080-02	TRIP BLANK	AQUEOUS	5/19/99	N/A	06/02/99	1

PARAMETER	DET. LIMIT		UNITS
Dichlorodifluoromethane	1.0	< 1.0	ug/L
Chloromethane	1.0	< 1.0	ug/L
Vinyl Chloride	1.0	< 1.0	ug/L
Bromomethane	1.0	< 1.0	ug/L
Chloroethane	1.0	< 1.0	ug/L
Trichlorofluoromethane	1.0	< 1.0	ug/L
Acetone	10	< 10	ug/L
Acrolein	5.0	< 5.0	ug/L
1,1-Dichloroethene	1.0	< 1.0	ug/L
Iodomethane	1.0	< 1.0	ug/L
Methylene Chloride	1.0	< 1.0	ug/L
Acrylonitrile	5.0	< 5.0	ug/L
cis-1,2-Dichloroethene	1.0	< 1.0	ug/L
Methyl-t-butyl Ether	1.0	< 1.0	ug/L
1,1,2,1,2,2-Trichlorotrifluoroethane	1.0	< 1.0	ug/L
1,1-Dichloroethane	1.0	< 1.0	ug/L
trans-1,2-Dichloroethene	1.0	< 1.0	ug/L
2-Butanone	10	< 10	ug/L
Carbon Disulfide	1.0	< 1.0	ug/L
Bromochloromethane	1.0	< 1.0	ug/L
Chloroform	1.0	< 1.0	ug/L
2,2-Dichloropropane	1.0	< 1.0	ug/L
1,2-Dichloroethane	1.0	< 1.0	ug/L
Vinyl Acetate	1.0	< 1.0	ug/L
1,1,1-Trichloroethane	1.0	< 1.0	ug/L
1,1-Dichloropropene	1.0	< 1.0	ug/L
Carbon Tetrachloride	1.0	< 1.0	ug/L
Benzene	1.0	< 1.0	ug/L
1,2-Dichloropropane	1.0	< 1.0	ug/L
Trichloroethene	1.0	< 1.0	ug/L
Bromodichloromethane	1.0	< 1.0	ug/L
2-Chloroethyl Vinyl Ether	10	< 10	ug/L
cis-1,3-Dichloropropene	1.0	< 1.0	ug/L
trans-1,3-Dichloropropene	1.0	< 1.0	ug/L
1,1,2-Trichloroethane	1.0	< 1.0	ug/L
1,3-Dichloropropane	1.0	< 1.0	ug/L
Dibromomethane	1.0	< 1.0	ug/L
Toluene	1.0	< 1.0	ug/L
1,2-Dibromoethane	1.0	< 1.0	ug/L
4-Methyl-2-Pentanone	10	< 10	ug/L
2-Hexanone	10	< 10	ug/L
Dibromochloromethane	1.0	< 1.0	ug/L
Tetrachloroethene	1.0	< 1.0	ug/L
Chlorobenzene	1.0	< 1.0	ug/L
Ethylbenzene	1.0	< 1.0	ug/L

2709-D Pan Amer
Albuquerque, New Mexico 87107
Phone (505) 344-3777
Fax (505) 344-4413

PINNACLE LABORATORIES

GC/MS RESULTS

TEST : VOLATILE ORGANICS EPA METHOD 8260
CLIENT : NMOCD PINNACLE I.D. : 905080
PROJECT # : WATER WELL DATE RECEIVED : 5/21/99
PROJECT NAME : GOLDSTAR WATER WELL

SAMPLE ID #	CLIENT ID	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
905080-02	TRIP BLANK	AQUEOUS	5/19/99	N/A	06/02/99	1

PARAMETER	DET. LIMIT		UNITS
1,1,1,2-Tetrachloroethane	1.0	< 1.0	ug/L
m&p Xylenes	1.0	< 1.0	ug/L
o-Xylene	1.0	< 1.0	ug/L
Styrene	1.0	< 1.0	ug/L
Bromoform	1.0	< 1.0	ug/L
1,1,2,2-Tetrachloroethane	1.0	< 1.0	ug/L
1,2,3-Trichloropropane	1.0	< 1.0	ug/L
Isopropyl Benzene	1.0	< 1.0	ug/L
Bromobenzene	1.0	< 1.0	ug/L
trans-1,4-Dichloro-2-Butene	1.0	< 1.0	ug/L
n-Propylbenzene	1.0	< 1.0	ug/L
2-Chlorotoluene	1.0	< 1.0	ug/L
4-Chlorotoluene	1.0	< 1.0	ug/L
1,3,5-Trimethylbenzene	1.0	< 1.0	ug/L
tert-Butylbenzene	1.0	< 1.0	ug/L
1,2,4-Trimethylbenzene	1.0	< 1.0	ug/L
sec-Butylbenzene	1.0	< 1.0	ug/L
1,3-Dichlorobenzene	1.0	< 1.0	ug/L
1,4-Dichlorobenzene	1.0	< 1.0	ug/L
p-Isopropyltoluene	1.0	< 1.0	ug/L
1,2-Dichlorobenzene	1.0	< 1.0	ug/L
n-Butylbenzene	1.0	< 1.0	ug/L
1,2-Dibromomo-3-chloropropane	1.0	< 1.0	ug/L
1,2,4-Trichlorobenzene	1.0	< 1.0	ug/L
Naphthalene	1.0	< 1.0	ug/L
Hexachlorobutadiene	1.0	< 1.0	ug/L
1,2,3-Trichlorobenzene	1.0	< 1.0	ug/L

SURROGATE % RECOVERY		
1,2-Dichloroethane-d4	108	(80 - 120)
Toluene-d8	105	(88 - 110)
Bromofluorobenzene	101	(86 - 115)

2709-D Pan American [illegible] NE
Albuquerque, New Mexico 87107
Phone (505) 344-3777
Fax (505) 344-4413

PINNACLE LABORATORIES

GC/MS RESULTS

TEST : VOLATILE ORGANICS EPA METHOD 8260
CLIENT : NMOCD PINNACLE I.D. : 905080
PROJECT # : WATER WELL
PROJECT NAME : GOLDSTAR HOBBS YARD

SAMPLE ID #	BATCH	MATRIX	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
REAGENT BLANK	060299	AQUEOUS	N/A	06/02/99	1

PARAMETER	DET. LIMIT		UNITS
Dichlorodifluoromethane	1.0	< 1.0	ug/L
Chloromethane	1.0	< 1.0	ug/L
Vinyl Chloride	1.0	< 1.0	ug/L
Bromomethane	1.0	< 1.0	ug/L
Chloroethane	1.0	< 1.0	ug/L
Trichlorofluoromethane	1.0	< 1.0	ug/L
Acetone	10	< 10	ug/L
Acrolein	5.0	< 5.0	ug/L
1,1-Dichloroethene	1.0	< 1.0	ug/L
Iodomethane	1.0	< 1.0	ug/L
Methylene Chloride	1.0	< 1.0	ug/L
Acrylonitrile	5.0	< 5.0	ug/L
cis-1,2-Dichloroethene	1.0	< 1.0	ug/L
Methyl-t-butyl Ether	1.0	< 1.0	ug/L
1,1,2,1,2,2-Trichlorotrifluoroethane	1.0	< 1.0	ug/L
1,1-Dichloroethane	1.0	< 1.0	ug/L
trans-1,2-Dichloroethene	1.0	< 1.0	ug/L
2-Butanone	10	< 10	ug/L
Carbon Disulfide	1.0	< 1.0	ug/L
Bromochloromethane	1.0	< 1.0	ug/L
Chloroform	1.0	< 1.0	ug/L
2,2-Dichloropropane	1.0	< 1.0	ug/L
1,2-Dichloroethane	1.0	< 1.0	ug/L
Vinyl Acetate	1.0	< 1.0	ug/L
1,1,1-Trichloroethane	1.0	< 1.0	ug/L
1,1-Dichloropropene	1.0	< 1.0	ug/L
Carbon Tetrachloride	1.0	< 1.0	ug/L
Benzene	1.0	< 1.0	ug/L
1,2-Dichloropropane	1.0	< 1.0	ug/L
Trichloroethene	1.0	< 1.0	ug/L
Bromodichloromethane	1.0	< 1.0	ug/L
2-Chloroethyl Vinyl Ether	10	< 10	ug/L
cis-1,3-Dichloropropene	1.0	< 1.0	ug/L
trans-1,3-Dichloropropene	1.0	< 1.0	ug/L
1,1,2-Trichloroethane	1.0	< 1.0	ug/L
1,3-Dichloropropane	1.0	< 1.0	ug/L
Dibromomethane	1.0	< 1.0	ug/L
Toluene	1.0	< 1.0	ug/L
1,2-Dibromoethane	1.0	< 1.0	ug/L
4-Methyl-2-Pentanone	10	< 10	ug/L
2-Hexanone	10	< 10	ug/L
Dibromochloromethane	1.0	< 1.0	ug/L
Tetrachloroethene	1.0	< 1.0	ug/L
Chlorobenzene	1.0	< 1.0	ug/L
Ethylbenzene	1.0	< 1.0	ug/L

2709-D Pan American Freeway NE
Albuquerque, New Mexico 87107
Phone (505) 344-3777
Fax (505) 344-4413

PINNACLE LABORATORIES

GC/MS RESULTS

TEST : VOLATILE ORGANICS EPA METHOD 8260
CLIENT : NMOCD PINNACLE I.D. : 905080
PROJECT # : WATER WELL
PROJECT NAME : GOLDSTAR HOBBS YARD

SAMPLE ID #	BATCH	MATRIX	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
REAGENT BLANK	060299	AQUEOUS	N/A	06/02/99	1

PARAMETER	DET. LIMIT		UNITS
1,1,1,2-Tetrachloroethane	1.0	< 1.0	ug/L
m&p Xylenes	1.0	< 1.0	ug/L
o-Xylene	1.0	< 1.0	ug/L
Styrene	1.0	< 1.0	ug/L
Bromoform	1.0	< 1.0	ug/L
1,1,2,2-Tetrachloroethane	1.0	< 1.0	ug/L
1,2,3-Trichloropropane	1.0	< 1.0	ug/L
Isopropyl Benzene	1.0	< 1.0	ug/L
Bromobenzene	1.0	< 1.0	ug/L
trans-1,4-Dichloro-2-Butene	1.0	< 1.0	ug/L
n-Propylbenzene	1.0	< 1.0	ug/L
2-Chlorotoluene	1.0	< 1.0	ug/L
4-Chlorotoluene	1.0	< 1.0	ug/L
1,3,5-Trimethylbenzene	1.0	< 1.0	ug/L
tert-Butylbenzene	1.0	< 1.0	ug/L
1,2,4-Trimethylbenzene	1.0	< 1.0	ug/L
sec-Butylbenzene	1.0	< 1.0	ug/L
1,3-Dichlorobenzene	1.0	< 1.0	ug/L
1,4-Dichlorobenzene	1.0	< 1.0	ug/L
p-Isopropyltoluene	1.0	< 1.0	ug/L
1,2-Dichlorobenzene	1.0	< 1.0	ug/L
n-Butylbenzene	1.0	< 1.0	ug/L
1,2-Dibromomo-3-chloropropane	1.0	< 1.0	ug/L
1,2,4-Trichlorobenzene	1.0	< 1.0	ug/L
Naphthalene	1.0	< 1.0	ug/L
Hexachlorobutadiene	1.0	< 1.0	ug/L
1,2,3-Trichlorobenzene	1.0	< 1.0	ug/L

SURROGATE % RECOVERY

1,2-Dichloroethane-d4	108	(80 - 120)
Toluene-d8	109	(88 - 110)
Bromofluorobenzene	106	(86 - 115)

2709-D Pan American Freeway NE
Albuquerque, New Mexico 87107
Phone (505) 344-3777
Fax (505) 344-4413

PINNACLE LABORATORIES

MATRIX SPIKE/MATRIX SPIKE DUPLICATE RESULTS

TEST	: VOLATILE ORGANICS EPA METHOD 8260	PINNACLE I.D.	: 905080
SPIKED SAMPLE	: 905076-01	DATE ANALYZED	: 6/2/99
CLIENT	: NMOCD	UNITS	: ug/L (PPB)
PROJECT #	: WATER WELL		
PROJECT NAME	: GOLDSTAR HOBBS YARD		

COMPOUND	SAMPLE CONC.	SPIKE ADDED	MS RESULT	MSD RESULT	MS %REC	MSD %REC	RPD	QC LIMITS RPD	QC LIMITS %RECOVERY
1,1-DICHLOROETHENE	<1.0	50.0	52.4	51.7	105	103	1	14	61-145
BENZENE	<1.0	50.0	52.1	51.5	104	103	1	11	76-127
TRICHLOROETHENE	<1.0	50.0	50.8	50.4	102	101	1	14	71-120
TOLUENE	<1.0	50.0	50.9	51.5	102	103	1	13	76-125
CHLOROBENZENE	<1.0	50.0	50.0	52.0	100	104	4	13	75-130

BARRINGER LABORATORIES, INC.
15000 W. 6TH AVE., SUITE 300 GOLDEN, CO 80401 (303) 277-1687 FAX (303) 277-1689

3-Jun-99

Kimberly D. McNeill
PINNACLE LABORATORIES INC.
2709-D Pan American Freeway, NE
Albuquerque, NM 87107

Attn:
Project: 905080 PO #:

Received: 25-May-99 09:00

Job: 992196E Status: Final

ANALYTICAL REPORT PACKAGE

BARRINGER LABORATORIES, INC.
15000 W. 6TH AVE., SUITE 300 GOLDEN, CO 80401 (303) 277-1687 FAX (303) 277-1689

3-Jun-99

Kimberly D. McNeill
PINNACLE LABORATORIES INC.
2709-D Pan American Freeway, NE
Albuquerque, NM 87107

Attn:
Project: 905080 PO #:

Received: 25-May-99 09:00

Job: 992196E Status: Final

CASE NARRATIVE

A total of 1 Water sample was received on 25-May-99. As stated in the chain of custody, the sample was run for the following analyses: Al, Sb, As, Ba, Be, B, Cd, Cr, Ca, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Si, Ag, Na, Tl, V and Zn. A table, to cross reference your sample ID to ours, is attached. Our procedures are summarized on the Quality Control Data Sheet.

Quality control standards for organic and inorganic analyses followed the appropriate SW-846 or EPA methodology. Quality control standards for radiochemistry followed our standard operating procedures or contractual requirements.

Signed: 6/4/99
Inorganic
Laboratory

Signed:
Project Review 6/4/99

BARRINGER LABORATORIES, INC.
15000 W. 6TH AVE., SUITE 300 GOLDEN, CO 80401 (303) 277-1687 FAX (303) 277-1689

3-Jun-99

Kimberly D. McNeill
PINNACLE LABORATORIES INC.
2709-D Pan American Freeway, NE
Albuquerque, NM 87107

Attn:
Project: 905080

Received: 25-May-99 09:00
PO #:

Job: 992196E

Status: Final

Lab-ID	Matrix	Client Sample ID	Sampled
992196-1	Water	905080-01	20-May-99

BARRINGER LABORATORIES, INC.
15000 W. 6TH AVE., SUITE 300 GOLDEN, CO 80401 (303) 277-1687 FAX (303) 277-1689

Job: 992196E
Status: Final

PINNACLE LABORATORIES INC.

Sample Id: 905080-01
Lab Id: 992196-1 **Project: 905080**
Date Sampled: 20-May-99 **Matrix: Water**

Analyte	Fraction	Method	Concentration	MDL	Date Analyzed
Aluminum	Total	200.7	U mg/l	0.05	1-Jun-99
Antimony	Total	200.7	U mg/l	0.05	1-Jun-99
Arsenic	Total	200.7	U mg/l	0.1	1-Jun-99
Barium	Total	200.7	0.06 mg/l	0.02	1-Jun-99
Beryllium	Total	200.7	U mg/l	0.004	1-Jun-99
Boron	Total	200.7	0.4 mg/l	0.1	1-Jun-99
Cadmium	Total	200.7	U mg/l	0.005	1-Jun-99
Chromium	Total	200.7	U mg/l	0.01	1-Jun-99
Calcium	Total	200.7	165 mg/l	0.2	1-Jun-99
Cobalt	Total	200.7	U mg/l	0.01	1-Jun-99
Copper	Total	200.7	U mg/l	0.01	1-Jun-99
Iron	Total	200.7	U mg/l	0.1	1-Jun-99
Lead	Total	200.7	U mg/l	0.05	1-Jun-99
Magnesium	Total	200.7	30.7 mg/l	0.1	1-Jun-99
Manganese	Total	200.7	U mg/l	0.005	1-Jun-99
Molybdenum	Total	200.7	U mg/l	0.01	1-Jun-99
Nickel	Total	200.7	U mg/l	0.04	1-Jun-99
Potassium	Total	200.7	U mg/l	5	1-Jun-99
Selenium	Total	200.7	U mg/l	0.1	1-Jun-99
Silicon	Total	200.7	31.5 mg/l	0.5	1-Jun-99
Silver	Total	200.7	U mg/l	0.01	1-Jun-99
Sodium	Total	200.7	102 mg/l	1	1-Jun-99
Thallium	Total	200.7	U mg/l	0.1	1-Jun-99
Vanadium	Total	200.7	0.06 mg/l	0.01	1-Jun-99
Zinc	Total	200.7	0.07 mg/l	0.02	1-Jun-99

BARRINGER LABORATORIES, INC.
15000 W. 6TH AVE., SUITE 300 GOLDEN, CO 80401 (303) 277-1687 FAX (303) 277-1689

PINNACLE LABORATORIES INC.

QUALITY CONTROL REPORT

Sample Id	Aluminum Total mg/l	Antimony Total mg/l	Arsenic Total mg/l	Barium Total mg/l	Beryllium Total mg/l
Blank	U	U	U	U	U
LCS (True)	1.00	2.00	5.00	10.0	1.00
LCS (Found)	1.01	1.96	4.90	10.6	1.00
LCS % Rec	101	98.0	98.0	106	100
Duplicate	4.10	0.97	4.2	4.28	0.101
Duplicate	4.12	1.03	4.1	4.25	0.100
RPD	0.4	6.0	1.0	0.8	0.7
Spike % Rec	102	97.4	104	106	101

Sample Id	Boron Total mg/l	Cadmium Total mg/l	Chromium Total mg/l	Calcium Total mg/l	Cobalt Total mg/l
Blank	U	U	U	U	U
LCS (True)	1.00	1.00	2.00	20.0	5.00
LCS (Found)	1.03	0.98	2.06	20.2	5.06
LCS % Rec	103	98.3	103	101	101
Duplicate	2.5	0.089	0.41	163	1.00
Duplicate	2.5	0.092	0.41	166	1.00
RPD	0.2	3.3	0.7	1.5	0.0
Spike % Rec	105	89.3	103	NA	100

Sample Id	Copper Total mg/l	Iron Total mg/l	Lead Total mg/l	Magnesium Total mg/l	Manganese Total mg/l
Blank	U	U	U	U	U
LCS (True)	2.00	10.0	5.00	20.0	1.00
LCS (Found)	2.08	10.6	5.03	20.8	1.05
LCS % Rec	104	106	101	104	105
Duplicate	0.52	2.2	1.03	30.2	1.05
Duplicate	0.52	2.1	1.04	30.6	1.05
RPD	0.2	1.4	0.3	1.3	0.1
Spike % Rec	105	108	103	NA	105

BARRINGER LABORATORIES, INC.
15000 W. 6TH AVE., SUITE 300 GOLDEN, CO 80401 (303) 277-1687 FAX (303) 277-1689

PINNACLE LABORATORIES INC.

QUALITY CONTROL REPORT

Sample Id	Molybdenum Total mg/l	Nickel Total mg/l	Potassium Total mg/l	Selenium Total mg/l	Silicon Total mg/l
Blank	U	U	U	U	U
LCS (True)	1.00	5.00	20.0	5.00	2.00
LCS (Found)	1.03	5.18	22.9	5.19	2.16
LCS % Rec	103	104	114	104	108
Duplicate	2.02	1.02	U	4.3	35.0
Duplicate	2.01	1.01	U	4.1	35.6
RPD	0.6	0.1	NC	3.8	1.7
Spike % Rec	101	NA	NA	107	(1)

Sample Id	Silver Total mg/l	Sodium Total mg/l	Thallium Total mg/l	Vanadium Total mg/l	Zinc Total mg/l
Blank	U	U	U	U	U
LCS (True)	1.00	20.0	5.00	5.00	1.00
LCS (Found)	0.98	22.6	5.15	5.10	1.00
LCS % Rec	98.0	113	103	102	99.5
Duplicate	0.11	100	4.1	1.06	1.08
Duplicate	0.11	108	4.0	1.06	1.09
RPD	2.8	8.7	1.0	0.1	0.6
Spike % Rec	109	NA	102	100	101

BARRINGER LABORATORIES, INC.
15000 W. 6TH AVE., SUITE 300 GOLDEN, CO 80401 (303) 277-1687 FAX (303) 277-1689

3-Jun-99

Kimberly D. McNeill
PINNACLE LABORATORIES INC.
2709-D Pan American Freeway, NE
Albuquerque, NM 87107

Attn:
Project: 905080 PO #:

Received: 25-May-99 09:00

Job: 992196E Status: Final

Abbreviations:

Units:

mg/l	: milligrams per liter

Quality codes:

(1)	: Sample > 4 times spike
NA	: Not Analyzed
U	: Undetected at reported limit
NC	: Not Calculated

BARRINGER LABORATORIES, INC.
15000 W. 6TH AVE., SUITE 300 GOLDEN, CO 80401 (303) 277-1687 FAX (303) 277-1689

3-Jun-99
Page: Q-4

Kimberly D. McNeill
PINNACLE LABORATORIES INC.
2709-D Pan American Freeway, NE
Albuquerque, NM 87107

Attn:
Project: 905080 PO #:

Received: 25-May-99 09:00

Job: 992196E Status: Final

QUALITY CONTROL DATA SHEET

Received by: kz Via: Fed Ex

Sample Container Type: 500mL pl
Additional Lab Preparation: None

Parameter	Method	Preservative	Init	Analysis Dates
Al	200.7	HNO3	SLM	06/01
Sb	200.7	HNO3	SLM	06/01
As	200.7	HNO3	SLM	06/01
Ba	200.7	HNO3	SLM	06/01
Be	200.7	HNO3	SLM	06/01
B	200.7	HNO3	SLM	06/01
Cd	200.7	HNO3	SLM	06/01
Cr	200.7	HNO3	SLM	06/01
Ca	200.7	HNO3	SLM	06/01
Co	200.7	HNO3	SLM	06/01
Cu	200.7	HNO3	SLM	06/01
Fe	200.7	HNO3	SLM	06/01
Pb	200.7	HNO3	SLM	06/01
Mg	200.7	HNO3	SLM	06/01
Mn	200.7	HNO3	SLM	06/01
Mo	200.7	HNO3	SLM	06/01
Ni	200.7	HNO3	SLM	06/01
K	200.7	HNO3	SLM	06/01
Se	200.7	HNO3	SLM	06/01
Si	200.7	HNO3	SLM	06/01
Ag	200.7	HNO3	SLM	06/01
Na	200.7	HNO3	SLM	06/01
Tl	200.7	HNO3	SLM	06/01
V	200.7	HNO3	SLM	06/01
Zn	200.7	HNO3	SLM	06/01

BARRINGER LABORATORIES, INC.
15000 W. 6TH AVE., SUITE 300 Ggolden, CO 80401 (303) 277-1687 FAX (303) 277-1689

3-Jun-99

Kimberly D. McNeill
PINNACLE LABORATORIES INC.
2709-D Pan American Freeway, NE
Albuquerque, NM 87107

Attn:
Project: 905080

Received: 25-May-99 09:00
PO #:

Job: 992196E

Status: Final

Barringer Laboratories, Inc. will return or dispose of your samples 30 days from the date your final report is mailed, unless otherwise specified by contract. Barringer Laboratories, Inc. reserves the right to return samples prior to the 30 days if radioactive levels exceed our license.

Pinnacle Laboratories, Inc. **Interlab Chain of Custody** Date: 5/24 Page: 1 of 1

Network Project Manager: Kimberly D. McNeill

Pinnacle Laboratories, Inc.
2709-D Pan American Freeway, NE
Albuquerque, New Mexico 87107
(505) 344-3777 Fax (505) 344-4413

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	Metals (8) RCRA	RCRA TCLP METALS	Metals-13 PP List	Al, Sb, As, Ba, Be, B, Cd, Cr, Ca	Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni	K, Se, Si, Ag, Na, Tl, V, Zn	TOC	Gen Chemistry		Oil and Grease	Volatile Organics GC/MS (8260)	BOD	COD	PESTICIDES/PCB (608/8080)	8270 BY GC/MS	PNA (8310)	8240 (TCLP 1311) ZHE	Herbicides (615/8150)	Base/Neutral Acid Compounds GC/MS (625/8270)	URANIUM	RADIUM 226+228	Gross Alpha/Beta	TO-14	NUMBER OF CONTAINERS
905080-01	5/20	1000	AQ					X	X	X																		

PROJECT INFORMATION		SAMPLE RECEIPT		SAMPLES SENT TO:		RELINQUISHED BY: 1.	RELINQUISHED BY: 2.
PROJECT #:	905080	Total Number of Containers		PENSACOLA - STL-FL		Signature: Time: Francine Tonno 1700	Signature: Time:
PROJ. NAME:	NMO	Chain of Custody Seals		PORTLAND - ESL-OR		Printed Name: Date: Francine Tonno 5/24/99	Printed Name: Date:
QC LEVEL:	(STD.) IV	Received Intact?		STL - CT		Pinnacle Laboratories, Inc.	Company
QC REQUIRED:	(STANDARD) MS MSD BLANK	Received Good Cond./Cold		STL- NEW JERSEY		**RECEIVED BY: 1.**	**RECEIVED BY: 2**
TAT:	(STANDARD) RUSH!!	LAB NUMBER:		N. CREEK		Signature: Time: 0900	Signature: Time:
DUE DATE:	6/4	COMMENTS:		BARRINGER	X	Printed Name: Date: Kevin Zahlee 5/25/99	Printed Name: Date:
RUSH SURCHARGE:	—			SEQUOIA		Company BLE	Company
CLIENT DISCOUNT:	—						
SPECIAL CERTIFICATION REQUIRED: YES (NO)							

Environmental Services Laboratory, Inc. E S L

17400 SW Upper Boones Ferry Road • Suite 270 • Portland, OR 97224 • (503) 670-8520

June 29, 1999

Kim McNeill
Pinnacle Laboratories
2709-D Pan American Fwy NE

Albuquerque, NM 87107

TEL: 505-344-3777
FAX (505) 344-4413

RE: 905080/NMO/Goldstar Hobbs Yard Order No.: 9905120

Dear Kim McNeill,

Environmental Services Laboratory received 1 sample on 05/25/99 for the analyses presented in the following report.

The Samples were analyzed for the following tests:

Alkalinity (Alkalinity)
BNA Semi-Vol Organics, Aqueous (SW8270B)
Bromide (Bromide)
CHLORIDE (Chloride)
CONDUCTANCE (E120.1)
Fluoride (fluoride)
ICP Metals (ICPMET)
MERCURY (Mercury)
Sulfate (Sulfate)
TOTAL DISSOLVED SOLIDS (E160.1)

There were no problems with the analyses and all data for associated QC met EPA or laboratory specifications except where noted in the Case Narrative. Results apply only to the samples analyzed. Reproduction of this report is permitted only in its entirety, without the written approval from the Laboratory.

If you have any questions regarding these tests results, please feel free to call.

Sincerely,

Kimberly Hill

Technical Review

ANALYTICAL SERVICES FOR THE ENVIRONMENT

Environmental Services Laboratory

Date: *29-Jun-99*

CLIENT:	Pinnacle Laboratories	**Client Sample ID:**	905080-01
Lab Order:	9905120	**Tag Number:**	
Project:	905080/NMO/Goldstar Hobbs Yard	**Collection Date:**	05/20/99
Lab ID:	9905120-01A	**Matrix:**	AQUEOUS

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ALKALINITY		**EPA 310.0**				Analyst: **sld**
Alkalinity, Bicarbonate (As CaCO3)	210	5		mg/L CaCO3	1	05/25/99
Alkalinity, Carbonate (As CaCO3)	ND	5		mg/L CaCO3	1	05/25/99
Alkalinity, Total (As CaCO3)	210	5		mg/L CaCO3	1	05/25/99
BROMIDE		**4500 B**				Analyst: **sld**
Bromide	1.6	0.1		mg/L	2	06/10/99
CHLORIDE		**EPA 325.3**				Analyst: **kfl**
Chloride	260	25		mg/L	50	05/26/99
CONDUCTANCE		**EPA 120.1**				Analyst: **sld**
Specific Conductance	1400	1		µmhos/cm	1	05/25/99
FLUORIDE		**EPA 340.2**				Analyst: **sld**
Fluoride	2	0.2		mg/L	1	06/08/99
SULFATE		**EPA 375.4**				Analyst: **sld**
Sulfate	160	62		mg/L	12.5	05/27/99
TOTAL DISSOLVED SOLIDS		**EPA 160.1**				Analyst: **kfl**
Total Dissolved Solids (Residue, Filterable)	1000	10		mg/L	1	05/25/99
MERCURY		**SW 7470 / EPA 245.**				Analyst: **btn**
Mercury	ND	0.0002		mg/L	1	06/13/99
ICP METALS		**SW 6010 / EPA 200.**				Analyst: **btn**
Calcium	180	0.05		mg/L	1	06/18/99
Magnesium	29	0.05		mg/L	1	06/18/99
Potassium	3.7	0.2		mg/L	1	06/18/99
Sodium	103	0.2		mg/L	1	06/18/99

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Services Laboratory

Date: *29-Jun-99*

CLIENT:	Pinnacle Laboratories	**Client Sample ID:**	905080-01
Lab Order:	9905120	**Tag Number:**	
Project:	905080/NMO/Goldstar Hobbs Yard	**Collection Date:**	05/20/99
Lab ID:	9905120-01A	**Matrix:**	AQUEOUS

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
BNA SEMI-VOL ORGANICS, AQUEOUS		**SW 8270B**				Analyst: **keh**
1,2,4,5-Tetrachlorobenzene	ND	5		µg/L	1	05/28/99
1,2,4-Trichlorobenzene	ND	5		µg/L	1	05/28/99
1,2-Dichlorobenzene	ND	5		µg/L	1	05/28/99
1,2-Diphenylhydrazine	ND	5		µg/L	1	05/28/99
1,3-Dichlorobenzene	ND	5		µg/L	1	05/28/99
1,4-Dichlorobenzene	ND	5		µg/L	1	05/28/99
2,3,4,6-Tetrachlorophenol	ND	5		µg/L	1	05/28/99
2,4,5-Trichlorophenol	ND	5		µg/L	1	05/28/99
2,4,6-Trichlorophenol	ND	5		µg/L	1	05/28/99
2,4-Dichlorophenol	ND	5		µg/L	1	05/28/99
2,4-Dimethylphenol	ND	5		µg/L	1	05/28/99
2,4-Dinitrophenol	ND	10		µg/L	1	05/28/99
2,4-Dinitrotoluene	ND	5		µg/L	1	05/28/99
2,6-Dichlorophenol	ND	5		µg/L	1	05/28/99
2,6-Dinitrotoluene	ND	5		µg/L	1	05/28/99
2-Chloronaphthalene	ND	5		µg/L	1	05/28/99
2-Chlorophenol	ND	5		µg/L	1	05/28/99
2-Methylnaphthalene	ND	5		µg/L	1	05/28/99
2-Methylphenol	ND	5		µg/L	1	05/28/99
2-Nitroaniline	ND	5		µg/L	1	05/28/99
2-Nitrophenol	ND	5		µg/L	1	05/28/99
2-Picoline	ND	10		µg/L	1	05/28/99
3-Methylcholanthrene	ND	5		µg/L	1	05/28/99
3-Methylphenol	ND	5		µg/L	1	05/28/99
3-Nitroaniline	ND	5		µg/L	1	05/28/99
4,6-Dinitro-2-methylphenol	ND	5		µg/L	1	05/28/99
4-Aminobiphenyl	ND	50		µg/L	1	05/28/99
4-Bromophenyl phenyl ether	ND	5		µg/L	1	05/28/99
4-Chloro-3-methylphenol	ND	5		µg/L	1	05/28/99
4-Chlorophenyl phenyl ether	ND	5		µg/L	1	05/28/99
4-Methylphenol	ND	5		µg/L	1	05/28/99
4-Nitroaniline	ND	5		µg/L	1	05/28/99
4-Nitrophenol	ND	5		µg/L	1	05/28/99
7,12-Dimethylbenz(a)anthracene	ND	5		µg/L	1	05/28/99
Acenaphthene	ND	5		µg/L	1	05/28/99
Acenaphthylene	ND	5		µg/L	1	05/28/99
Acetophenone	ND	5		µg/L	1	05/28/99
Aniline	ND	5		µg/L	1	05/28/99
Anthracene	ND	5		µg/L	1	05/28/99
Benz(a)anthracene	ND	5		µg/L	1	05/28/99

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Services Laboratory

Date: *29-Jun-99*

CLIENT:	Pinnacle Laboratories	**Client Sample ID:**	905080-01
Lab Order:	9905120	**Tag Number:**	
Project:	905080/NMO/Goldstar Hobbs Yard	**Collection Date:**	05/20/99
Lab ID:	9905120-01A	**Matrix:**	AQUEOUS

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
Benzo(a)pyrene	ND	5		µg/L	1	05/28/99
Benzo(b)fluoranthene	ND	5		µg/L	1	05/28/99
Benzo(g,h,i)perylene	ND	5		µg/L	1	05/28/99
Benzo(k)fluoranthene	ND	5		µg/L	1	05/28/99
Benzyl alcohol	ND	5		µg/L	1	05/28/99
Bis(2-chloroethoxy)methane	ND	5		µg/L	1	05/28/99
Bis(2-chloroethyl)ether	ND	5		µg/L	1	05/28/99
Bis(2-chloroisopropyl)ether	ND	5		µg/L	1	05/28/99
Bis(2-ethylhexyl)phthalate	ND	5		µg/L	1	05/28/99
Butyl benzyl phthalate	ND	5		µg/L	1	05/28/99
Chrysene	ND	5		µg/L	1	05/28/99
Di-n-butyl phthalate	ND	5		µg/L	1	05/28/99
Di-n-octyl phthalate	ND	5		µg/L	1	05/28/99
Dibenz(a,h)anthracene	ND	5		µg/L	1	05/28/99
Dibenzofuran	ND	5		µg/L	1	05/28/99
Diethyl phthalate	ND	5		µg/L	1	05/28/99
Dimethyl phthalate	ND	5		µg/L	1	05/28/99
Ethyl methanesulfonate	ND	5		µg/L	1	05/28/99
Fluoranthene	ND	5		µg/L	1	05/28/99
Fluorene	ND	5		µg/L	1	05/28/99
Hexachlorobenzene	ND	5		µg/L	1	05/28/99
Hexachlorobutadiene	ND	5		µg/L	1	05/28/99
Hexachlorocyclopentadiene	ND	5		µg/L	1	05/28/99
Hexachloroethane	ND	5		µg/L	1	05/28/99
Indeno(1,2,3-cd)pyrene	ND	5		µg/L	1	05/28/99
Isophorone	ND	5		µg/L	1	05/28/99
Methyl methanesulfonate	ND	5		µg/L	1	05/28/99
N-Nitroso-di-n-butylamine	ND	5		µg/L	1	05/28/99
N-Nitrosodi-n-propylamine	ND	5		µg/L	1	05/28/99
N-Nitrosodiphenylamine	ND	5		µg/L	1	05/28/99
N-Nitrosopiperidine	ND	5		µg/L	1	05/28/99
Naphthalene	ND	5		µg/L	1	05/28/99
Nitrobenzene	ND	5		µg/L	1	05/28/99
p-Dimethylaminoazobenzene	ND	5		µg/L	1	05/28/99
Pentachlorobenzene	ND	5		µg/L	1	05/28/99
Pentachloronitrobenzene	ND	5		µg/L	1	05/28/99
Pentachlorophenol	ND	5		µg/L	1	05/28/99
Phenacetin	ND	5		µg/L	1	05/28/99
Phenanthrene	ND	5		µg/L	1	05/28/99
Phenol	ND	5		µg/L	1	05/28/99
Pyrene	ND	5		µg/L	1	05/28/99

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Services Laboratory

Date: *29-Jun-99*

CLIENT:	Pinnacle Laboratories	**Client Sample ID:**	905080-01
Lab Order:	9905120	**Tag Number:**	
Project:	905080/NMO/Goldstar Hobbs Yard	**Collection Date:**	05/20/99
Lab ID:	9905120-01A	**Matrix:**	AQUEOUS

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
Surr: 2,4,6-Tribromophenol	85.1	10-123		%REC	1	05/28/99
Surr: 2-Fluorobiphenyl	71.8	43-116		%REC	1	05/28/99
Surr: 2-Fluorophenol	35.5	21-100		%REC	1	05/28/99
Surr: 4-Terphenyl-d14	75.6	33-141		%REC	1	05/28/99
Surr: Nitrobenzene-d5	65.8	35-114		%REC	1	05/28/99
Surr: Phenol-d5	21.9	10-94		%REC	1	05/28/99

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

CLIENT: Pinnacle Laboratories
Work Order: 9905120
Project: 905080/NMO/Goldstar Hobbs Yard

QC SUMMARY REPORT
Method Blank

Sample ID: **MBlank** Batch ID: **01 ALK A-6/1/** Test Code: **Alkalinity** Units: **mg/L CaCO3** Analysis Date **04/19/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990419A** SeqNo: **9643**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	ND	5									
Alkalinity, Carbonate (As CaCO3)	ND	5									
Alkalinity, Total (As CaCO3)	ND	5									

Sample ID: **MBlank** Batch ID: **01 ALK A-6/1/** Test Code: **Alkalinity** Units: **mg/L CaCO3** Analysis Date **05/25/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990525A** SeqNo: **9907**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	ND	5									
Alkalinity, Carbonate (As CaCO3)	ND	5									
Alkalinity, Total (As CaCO3)	ND	5									

Sample ID: **MBlank** Batch ID: **01 ALK A-6/1/** Test Code: **Alkalinity** Units: **mg/L CaCO3** Analysis Date **05/03/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990503B** SeqNo: **11150**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	ND	5									
Alkalinity, Carbonate (As CaCO3)	ND	5									
Alkalinity, Total (As CaCO3)	ND	5									

Sample ID: **MBlank** Batch ID: **01 ALK A-6/1/** Test Code: **Alkalinity** Units: **mg/L CaCO3** Analysis Date **05/10/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990510C** SeqNo: **11173**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	ND	5									
Alkalinity, Carbonate (As CaCO3)	ND	5									
Alkalinity, Total (As CaCO3)	ND	5									

Qualifiers: ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905120
Project: 905080/NMO/Goldstar Hobbs Yard

QC SUMMARY REPORT
Method Blank

Sample ID: **MBlank** Batch ID: **01 ALK A-6/1/** Test Code: **Alkalinity** Units: **mg/L CaCO3** Analysis Date **05/11/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990511C** SeqNo: **11182**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	ND	5									
Alkalinity, Carbonate (As CaCO3)	ND	5									
Alkalinity, Total (As CaCO3)	ND	5									

Sample ID: **MBlank** Batch ID: **01 ALK A-6/1/** Test Code: **Alkalinity** Units: **mg/L CaCO3** Analysis Date **05/14/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990514B** SeqNo: **11226**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	ND	5									
Alkalinity, Carbonate (As CaCO3)	ND	5									
Alkalinity, Total (As CaCO3)	ND	5									

Sample ID: **MBlank** Batch ID: **01 BR A-6/11/** Test Code: **Bromide** Units: **mg/L** Analysis Date **06/10/99** Prep Date:
Client ID: **9905120** Run ID: **HIT MAN_990610A** SeqNo: **13710**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Bromide	ND	5									

Sample ID: **MBlank** Batch ID: **01 CL A-6/1/9** Test Code: **Chloride** Units: **mg/L** Analysis Date **05/26/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990526A** SeqNo: **9937**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	ND	0.5									

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905120
Project: 905080/NMO/Goldstar Hobbs Yard

QC SUMMARY REPORT
Method Blank

Sample ID: **MBlank** Batch ID: **01 CL A-6/1/9** Test Code: **Chloride** Units: **mg/L** Analysis Date **05/07/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990507B** SeqNo: **11086**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	ND	0.5									

Sample ID: **MBlank** Batch ID: **01 CL A-6/1/9** Test Code: **Chloride** Units: **mg/L** Analysis Date **05/17/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990517C** SeqNo: **11134**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	ND	0.5									

Sample ID: **MBlank** Batch ID: **01 COND-06/** Test Code: **E120.1** Units: **µmhos/cm** Analysis Date **04/21/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990421A** SeqNo: **10312**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Specific Conductance	ND	1									

Sample ID: **MBlank** Batch ID: **01 COND-06/** Test Code: **E120.1** Units: **µmhos/cm** Analysis Date **05/10/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990510A** SeqNo: **10347**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Specific Conductance	ND	1									

Sample ID: **MBlank** Batch ID: **01 COND-06/** Test Code: **E120.1** Units: **µmhos/cm** Analysis Date **05/20/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990520A** SeqNo: **10364**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Specific Conductance	ND	1									

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905120
Project: 905080/NMO/Goldstar Hobbs Yard

QC SUMMARY REPORT
Method Blank

Sample ID: **MBlank** Batch ID: **01 COND-06/** Test Code: **E120.1** Units: **µmhos/cm** Analysis Date **05/25/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990525E** SeqNo: **10384**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Specific Conductance	ND	1									

Sample ID: **MBlank** Batch ID: **01 FL A-6/9/9** Test Code: **fluoride** Units: **mg/L** Analysis Date **06/08/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990608B** SeqNo: **13057**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Fluoride	ND	0.2									

Sample ID: **MBlank** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **05/21/99** Prep Date:
Client ID: **9905120** Run ID: **HIT MAN_990521B** SeqNo: **9661**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	ND	5									

Sample ID: **MBlank** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **05/27/99** Prep Date:
Client ID: **9905120** Run ID: **HIT MAN_990527A** SeqNo: **9765**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	ND	5									

Sample ID: **MBlank** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **04/29/99** Prep Date:
Client ID: **9905120** Run ID: **HIT MAN_990429A** SeqNo: **10621**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	ND	5									

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905120
Project: 905080/NMO/Goldstar Hobbs Yard

QC SUMMARY REPORT
Method Blank

Sample ID: **MBlank** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **05/12/99** Prep Date:
Client ID: **9905120** Run ID: **HIT MAN_990512B** SeqNo: **10869**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	ND	5									

Sample ID: **MBlank** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **05/20/99** Prep Date:
Client ID: **9905120** Run ID: **HIT MAN_990520A** SeqNo: **10997**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	ND	5									

Sample ID: **MBlank** Batch ID: **01 TDS-6/1/99** Test Code: **E160.1** Units: **mg/L** Analysis Date **05/25/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990525C** SeqNo: **10233**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Dissolved Solids (Residue, Filtera	ND	10									

Sample ID: **MBlank** Batch ID: **01 TDS-6/1/99** Test Code: **E160.1** Units: **mg/L** Analysis Date **05/26/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990526C** SeqNo: **10284**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Dissolved Solids (Residue, Filtera	ND	10									

Sample ID: **MBlank** Batch ID: **01 TDS-6/1/99** Test Code: **E160.1** Units: **mg/L** Analysis Date **04/28/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990428C** SeqNo: **11254**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Dissolved Solids (Residue, Filtera	ND	10									

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905120
Project: 905080/NMO/Goldstar Hobbs Yard

QC SUMMARY REPORT
Method Blank

Sample ID: MBlank	Batch ID: 01 TDS-6/1/99	Test Code: E160.1	Units: mg/L	Analysis Date 05/05/99	Prep Date:
Client ID:	9905120	Run ID: NO INST_990505B		SeqNo: 11272	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Dissolved Solids (Residue, Filtera	ND	10									

Sample ID: MBlank	Batch ID: 01 TDS-6/1/99	Test Code: E160.1	Units: mg/L	Analysis Date 05/11/99	Prep Date:
Client ID:	9905120	Run ID: NO INST_990511D		SeqNo: 11287	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Dissolved Solids (Residue, Filtera	ND	10									

Sample ID: MBlank	Batch ID: 01 TDS-6/1/99	Test Code: E160.1	Units: mg/L	Analysis Date 05/18/99	Prep Date:
Client ID:	9905120	Run ID: NO INST_990518B		SeqNo: 11307	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Dissolved Solids (Residue, Filtera	ND	10									

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905120
Project: 905080/NMO/Goldstar Hobbs Yard

QC SUMMARY REPORT
Method Blank

Sample ID: **MB-480** Batch ID: **480** Test Code: **SW8270B** Units: **µg/L** Analysis Date **05/27/99** Prep Date: **05/24/99**
Client ID: **9905120** Run ID: **MANFREDD_990527A** SeqNo: **9970**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,2,4,5-Tetrachlorobenzene	ND	5									
1,2,4-Trichlorobenzene	ND	5									
1,2-Dichlorobenzene	ND	5									
1,2-Diphenylhydrazine	ND	5									
1,3-Dichlorobenzene	ND	5									
1,4-Dichlorobenzene	ND	5									
2,3,4,6-Tetrachlorophenol	ND	5									
2,4,5-Trichlorophenol	ND	5									
2,4,6-Trichlorophenol	ND	5									
2,4-Dichlorophenol	ND	5									
2,4-Dimethylphenol	ND	5									
2,4-Dinitrophenol	ND	10									
2,4-Dinitrotoluene	ND	5									
2,6-Dichlorophenol	ND	5									
2,6-Dinitrotoluene	ND	5									
2-Chloronaphthalene	ND	5									
2-Chlorophenol	ND	5									
2-Methylnaphthalene	ND	5									
2-Methylphenol	ND	5									
2-Nitroaniline	ND	5									
2-Nitrophenol	ND	5									
2-Picoline	ND	10									
3-Methylcholanthrene	ND	5									
3-Methylphenol	ND	5									
3-Nitroaniline	ND	5									
4,6-Dinitro-2-methylphenol	ND	5									
4-Aminobiphenyl	ND	50									
4-Bromophenyl phenyl ether	ND	5									
4-Chloro-3-methylphenol	ND	5									

Qualifiers: ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905120
Project: 905080/NMO/Goldstar Hobbs Yard

QC SUMMARY REPORT
Method Blank

4-Chlorophenyl phenyl ether	ND	5
4-Methylphenol	ND	5
4-Nitroaniline	ND	5
4-Nitrophenol	ND	5
7,12-Dimethylbenz(a)anthracene	ND	5
Acenaphthene	ND	5
Acenaphthylene	ND	5
Acetophenone	ND	5
Aniline	ND	5
Anthracene	ND	5
Benz(a)anthracene	ND	5
Benzo(a)pyrene	ND	5
Benzo(b)fluoranthene	ND	5
Benzo(g,h,i)perylene	ND	5
Benzo(k)fluoranthene	ND	5
Benzyl alcohol	ND	5
Bis(2-chloroethoxy)methane	ND	5
Bis(2-chloroethyl)ether	ND	5
Bis(2-chloroisopropyl)ether	ND	5
Bis(2-ethylhexyl)phthalate	ND	5
Butyl benzyl phthalate	ND	5
Chrysene	ND	5
Di-n-butyl phthalate	ND	5
Di-n-octyl phthalate	ND	5
Dibenz(a,h)anthracene	ND	5
Dibenzofuran	ND	5
Diethyl phthalate	ND	5
Dimethyl phthalate	ND	5
Ethyl methanesulfonate	ND	5
Fluoranthene	ND	5
Fluorene	ND	5
Hexachlorobenzene	ND	5
Hexachlorobutadiene	ND	5

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

Hexachlorocyclopentadiene	ND	5
Hexachloroethane	ND	5
Indeno(1,2,3-cd)pyrene	ND	5
Isophorone	ND	5
Methyl methanesulfonate	ND	5
N-Nitroso-di-n-butylamine	ND	5
N-Nitrosodi-n-propylamine	ND	5
N-Nitrosodiphenylamine	ND	5
N-Nitrosopiperidine	ND	5
Naphthalene	ND	5
Nitrobenzene	ND	5
p-Dimethylaminoazobenzene	ND	5
Pentachlorobenzene	ND	5
Pentachloronitrobenzene	ND	5
Pentachlorophenol	ND	5
Phenacetin	ND	5
Phenanthrene	ND	5
Phenol	ND	5
Pyrene	ND	5

CLIENT: Pinnacle Laboratories
Work Order: 9905120
Project: 905080/NMO/Goldstar Hobbs Yard

QC SUMMARY REPORT
Method Blank

Sample ID: **MB-480** Batch ID: **480** Test Code: **SW8270B** Units: **µg/L** Analysis Date **05/28/99** Prep Date: **05/24/99**
Client ID: **9905120** Run ID: **MANFREDD_990528A** SeqNo: **11673**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,2,4,5-Tetrachlorobenzene	ND	5									
1,2,4-Trichlorobenzene	ND	5									
1,2-Dichlorobenzene	ND	5									
1,2-Diphenylhydrazine	ND	5									
1,3-Dichlorobenzene	ND	5									
1,4-Dichlorobenzene	ND	5									
2,3,4,6-Tetrachlorophenol	ND	5									
2,4,5-Trichlorophenol	ND	5									
2,4,6-Trichlorophenol	ND	5									
2,4-Dichlorophenol	ND	5									
2,4-Dimethylphenol	ND	5									
2,4-Dinitrophenol	ND	10									
2,4-Dinitrotoluene	ND	5									
2,6-Dichlorophenol	ND	5									
2,6-Dinitrotoluene	ND	5									
2-Chloronaphthalene	ND	5									
2-Chlorophenol	ND	5									
2-Methylnaphthalene	ND	5									
2-Methylphenol	ND	5									
2-Nitroaniline	ND	5									
2-Nitrophenol	ND	5									
2-Picoline	ND	10									
3-Methylcholanthrene	ND	5									
3-Methylphenol	ND	5									
3-Nitroaniline	ND	5									
4,6-Dinitro-2-methylphenol	ND	5									
4-Aminobiphenyl	ND	50									
4-Bromophenyl phenyl ether	ND	5									
4-Chloro-3-methylphenol	ND	5									

Qualifiers: ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

4-Chlorophenyl phenyl ether	ND	5
4-Methylphenol	ND	5
4-Nitroaniline	ND	5
4-Nitrophenol	ND	5
7,12-Dimethylbenz(a)anthracene	ND	5
Acenaphthene	ND	5
Acenaphthylene	ND	5
Acetophenone	ND	5
Aniline	ND	5
Anthracene	ND	5
Benz(a)anthracene	ND	5
Benzo(a)pyrene	ND	5
Benzo(b)fluoranthene	ND	5
Benzo(g,h,i)perylene	ND	5
Benzo(k)fluoranthene	ND	5
Benzyl alcohol	ND	5
Bis(2-chloroethoxy)methane	ND	5
Bis(2-chloroethyl)ether	ND	5
Bis(2-chloroisopropyl)ether	ND	5
Bis(2-ethylhexyl)phthalate	ND	5
Butyl benzyl phthalate	ND	5
Chrysene	ND	5
Di-n-butyl phthalate	ND	5
Di-n-octyl phthalate	ND	5
Dibenz(a,h)anthracene	ND	5
Dibenzofuran	ND	5
Diethyl phthalate	ND	5
Dimethyl phthalate	ND	5
Ethyl methanesulfonate	ND	5
Fluoranthene	ND	5
Fluorene	ND	5
Hexachlorobenzene	ND	5
Hexachlorobutadiene	ND	5

Hexachlorocyclopentadiene	ND	5
Hexachloroethane	ND	5
Indeno(1,2,3-cd)pyrene	ND	5
Isophorone	ND	5
Methyl methanesulfonate	ND	5
N-Nitroso-di-n-butylamine	ND	5
N-Nitrosodi-n-propylamine	ND	5
N-Nitrosodiphenylamine	ND	5
N-Nitrosopiperidine	ND	5
Naphthalene	ND	5
Nitrobenzene	ND	5
p-Dimethylaminoazobenzene	ND	5
Pentachlorobenzene	ND	5
Pentachloronitrobenzene	ND	5
Pentachlorophenol	ND	5
Phenacetin	ND	5
Phenanthrene	ND	5
Phenol	ND	5
Pyrene	ND	5

Sample ID: **MB-535** Batch ID: **535** Test Code: **Mercury** Units: **mg/L** Analysis Date **06/13/99** Prep Date: **06/11/99**

Client ID: **9905120** Run ID: **MERC_990613B** SeqNo: **13903**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	ND	0.0002									
Mercury, TCLP	ND	0.0002									

CLIENT: Pinnacle Laboratories
Work Order: 9905120
Project: 905080/NMO/Goldstar Hobbs Yard

QC SUMMARY REPORT
Method Blank

Sample ID: **MB-548** Batch ID: **548** Test Code: **ICPMET** Units: **mg/L** Analysis Date **06/18/99** Prep Date: **06/16/99**
Client ID: **9905120** Run ID: **ICP_990618B** SeqNo: **15580**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	ND	0.005									
Arsenic	ND	0.005									
Barium	ND	0.005									
Beryllium	ND	0.002									
Cadmium	ND	0.002									
Calcium	ND	0.05									
Chromium	ND	0.005									
Copper	ND	0.005									
Hardness	ND	0.33									
Iron	ND	0.015									
Lead	ND	0.005									
Magnesium	ND	0.05									
Manganese	ND	0.005									
Nickel	ND	0.005									
Potassium	ND	0.2									
Selenium	ND	0.005									
Silver	ND	0.005									
Sodium	ND	0.2									
Thallium	ND	0.01									
Zinc	ND	0.005									

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905120
Project: 905080/NMO/Goldstar Hobbs Yard

QC SUMMARY REPORT

Sample Duplicate

Sample ID: **9904055-08A DUP** Batch ID: **01 ALK A-6/1/** Test Code: **Alkalinity** Units: **mg/L CaCO3** Analysis Date **04/19/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990419A** SeqNo: **9656**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	150	5	0	0	0.0%	0	0	150	0.0%	20	
Alkalinity, Carbonate (As CaCO3)	ND	5	0	0	0.0%	0	0	0	0.0%	20	
Alkalinity, Total (As CaCO3)	150	5	0	0	0.0%	0	0	150	0.0%	20	

Sample ID: **9904114-04A DUP** Batch ID: **01 ALK A-6/1/** Test Code: **Alkalinity** Units: **mg/L CaCO3** Analysis Date **05/03/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990503B** SeqNo: **11153**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	100	5	0	0	0.0%	0	0	95	5.1%	20	
Alkalinity, Carbonate (As CaCO3)	ND	5	0	0	0.0%	0	0	0	0.0%	20	
Alkalinity, Total (As CaCO3)	100	5	0	0	0.0%	0	0	95	5.1%	20	

Sample ID: **9905011-03A DUP** Batch ID: **01 ALK A-6/1/** Test Code: **Alkalinity** Units: **mg/L CaCO3** Analysis Date **05/10/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990510C** SeqNo: **11179**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	200	5	0	0	0.0%	0	0	210	4.9%	20	
Alkalinity, Carbonate (As CaCO3)	ND	5	0	0	0.0%	0	0	0	0.0%	20	
Alkalinity, Total (As CaCO3)	200	5	0	0	0.0%	0	0	210	4.9%	20	

Sample ID: **9905029-01A DUP** Batch ID: **01 ALK A-6/1/** Test Code: **Alkalinity** Units: **mg/L CaCO3** Analysis Date **05/11/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990511C** SeqNo: **11187**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	170	5	0	0	0.0%	0	0	170	0.0%	20	
Alkalinity, Carbonate (As CaCO3)	ND	5	0	0	0.0%	0	0	0	0.0%	20	
Alkalinity, Total (As CaCO3)	170	5	0	0	0.0%	0	0	170	0.0%	20	

Qualifiers: ND - Not Detected at the Reporting Limit; S - Spike Recovery outside accepted recovery limits; B - Analyte detected in the associated Method Blank
J - Analyte detected below quantitation limits; R - RPD outside accepted recovery limits

CLIENT: Pinnacle Laboratories
Work Order: 9905120
Project: 905080/NMO/Goldstar Hobbs Yard

QC SUMMARY REPORT
Sample Duplicate

Sample ID: **9905053-02A DUP** Batch ID: **01 ALK A-6/1/** Test Code: **Alkalinity** Units: **mg/L CaCO3** Analysis Date **05/14/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990514B** SeqNo: **11231**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	130	5	0	0	0.0%	0	0	120	8.0%	20	
Alkalinity, Carbonate (As CaCO3)	ND	5	0	0	0.0%	0	0	0	0.0%	20	
Alkalinity, Total (As CaCO3)	130	5	0	0	0.0%	0	0	120	8.0%	20	

Sample ID: **9905087-01A DUP** Batch ID: **01 ALK A-6/1/** Test Code: **Alkalinity** Units: **mg/L CaCO3** Analysis Date **05/25/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990525A** SeqNo: **9910**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Total (As CaCO3)	410	5	0	0	0.0%	0	0	450	9.3%	20	

Sample ID: **9905120-01A DUP** Batch ID: **01 ALK A-6/1/** Test Code: **Alkalinity** Units: **mg/L CaCO3** Analysis Date **05/25/99** Prep Date:
Client ID: **905080-01** **9905120** Run ID: **NO INST_990525A** SeqNo: **9928**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	220	5	0	0	0.0%	0	0	210	4.7%	20	
Alkalinity, Carbonate (As CaCO3)	ND	5	0	0	0.0%	0	0	0	0.0%	20	
Alkalinity, Total (As CaCO3)	220	5	0	0	0.0%	0	0	210	4.7%	20	

Sample ID: **9906014-02A DUP** Batch ID: **01 BR A-6/11/** Test Code: **Bromide** Units: **mg/L** Analysis Date **06/10/99** Prep Date:
Client ID: **9905120** Run ID: **HIT MAN_990610A** SeqNo: **13716**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Bromide	.32	0.1	0	0	0.0%	0	0	0.11	97.7%	20	R,T

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905120
Project: 905080/NMO/Goldstar Hobbs Yard

QC SUMMARY REPORT
Sample Duplicate

Sample ID: **9904166-01A DUP** Batch ID: **01 CL A-6/1/9** Test Code: **Chloride** Units: **mg/L** Analysis Date **05/07/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990507B** SeqNo: **11108**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	38	5	0	0	0.0%	0	0	40	5.1%	20	

Sample ID: **9904166-02A DUP** Batch ID: **01 CL A-6/1/9** Test Code: **Chloride** Units: **mg/L** Analysis Date **05/07/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990507B** SeqNo: **11112**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	32	5	0	0	0.0%	0	0	35	9.0%	20	

Sample ID: **9905030-01A DUP** Batch ID: **01 CL A-6/1/9** Test Code: **Chloride** Units: **mg/L** Analysis Date **05/17/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990517C** SeqNo: **11137**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	140	5	0	0	0.0%	0	0	130	7.4%	20	

Sample ID: **9905097-02A DUP** Batch ID: **01 CL A-6/1/9** Test Code: **Chloride** Units: **mg/L** Analysis Date **05/26/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990526A** SeqNo: **9944**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride, Diss	5	0.5	0	0	0.0%	0	0	5.25	4.9%	20	

Sample ID: **9905133-05A DUP** Batch ID: **01 CL A-6/1/9** Test Code: **Chloride** Units: **mg/L** Analysis Date **05/26/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990526A** SeqNo: **9959**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride, Diss	17.5	5	0	0	0.0%	0	0	17.5	0.0%	20	

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905120
Project: 905080/NMO/Goldstar Hobbs Yard

QC SUMMARY REPORT
Sample Duplicate

Sample ID: 9904085-01A DUP	Batch ID: 01 COND-06/	Test Code: E120.1	Units: µmhos/cm	Analysis Date 04/21/99	Prep Date:
Client ID:	9905120	Run ID: NO INST_990421A		SeqNo: 10315	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Specific Conductance	2280	1	0	0	0.0%	0	0	2340	2.6%	20	

Sample ID: 9904146-01A DUP	Batch ID: 01 COND-06/	Test Code: E120.1	Units: µmhos/cm	Analysis Date 05/10/99	Prep Date:
Client ID:	9905120	Run ID: NO INST_990510A		SeqNo: 10350	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Specific Conductance	512	1	0	0	0.0%	0	0	517	1.0%	20	

Sample ID: 9905047-01A DUP	Batch ID: 01 COND-06/	Test Code: E120.1	Units: µmhos/cm	Analysis Date 05/20/99	Prep Date:
Client ID:	9905120	Run ID: NO INST_990520A		SeqNo: 10370	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Specific Conductance	170	1	0	0	0.0%	0	0	171	0.6%	20	

Sample ID: 9905101-01A DUP	Batch ID: 01 COND-06/	Test Code: E120.1	Units: µmhos/cm	Analysis Date 05/25/99	Prep Date:
Client ID:	9905120	Run ID: NO INST_990525E		SeqNo: 10395	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Specific Conductance	860	1	0	0	0.0%	0	0	830	3.6%	20	

Sample ID: 9906027-03A DUP	Batch ID: 01 FL A-6/9/9	Test Code: fluoride	Units: mg/L	Analysis Date 06/08/99	Prep Date:
Client ID:	9905120	Run ID: NO INST_990608B		SeqNo: 13068	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Fluoride	ND	0.2	0	0	0.0%	0	0	0	0.0%	20	

Qualifiers: ND - Not Detected at the Reporting Limit; J - Analyte detected below quantitation limits; S - Spike Recovery outside accepted recovery limits; R - RPD outside accepted recovery limits; B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905120
Project: 905080/NMO/Goldstar Hobbs Yard

QC SUMMARY REPORT
Sample Duplicate

Sample ID: **9904111-01A DUP** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **04/29/99** Prep Date:
Client ID: **9905120** Run ID: **HIT MAN_990429A** SeqNo: **10624**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	59.02	12	0	0	0.0%	80	120	56.18	4.9%	20	

Sample ID: **9904157-03A DUP** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **04/29/99** Prep Date:
Client ID: **9905120** Run ID: **HIT MAN_990429A** SeqNo: **10662**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	233.1	62	0	0	0.0%	80	120	203.9	13.4%	20	
Sulfate, Diss	ND	62	0	0	0.0%	80	120	0	0.0%	20	

Sample ID: **9904166-01A DUP** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **05/12/99** Prep Date:
Client ID: **9905120** Run ID: **HIT MAN_990512B** SeqNo: **10872**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	126.9	62	0	0	0.0%	80	120	130.2	2.6%	20	

Sample ID: **9905045-01A DUP** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **05/20/99** Prep Date:
Client ID: **9905120** Run ID: **HIT MAN_990520A** SeqNo: **11008**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	134.4	25	0	0	0.0%	80	120	121	10.5%	20	

Sample ID: **9905078-01A DUP** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **05/21/99** Prep Date:
Client ID: **9905120** Run ID: **HIT MAN_990521B** SeqNo: **9668**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	574.8	120	0	0	0.0%	80	120	494	15.1%	20	

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905120
Project: 905080/NMO/Goldstar Hobbs Yard

QC SUMMARY REPORT
Sample Duplicate

Sample ID: **9905097-02A DUP** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **05/27/99** Prep Date:
Client ID: **9905120** Run ID: **HIT MAN_990527A** SeqNo: **9769**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate, Diss	13	5	0	0	0.0%	80	120	13	0.0%	20	

Sample ID: **9904140-04A DUP** Batch ID: **01 TDS-6/1/99** Test Code: **E160.1** Units: **mg/L** Analysis Date **04/28/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990428C** SeqNo: **11267**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Dissolved Solids (Residue, Filtera	510	10	0	0	0.0%	0	0	480	6.1%	20	

Sample ID: **9905011-03A DUP** Batch ID: **01 TDS-6/1/99** Test Code: **E160.1** Units: **mg/L** Analysis Date **05/05/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990505B** SeqNo: **11286**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Dissolved Solids (Residue, Filtera	470	10	0	0	0.0%	0	0	470	0.0%	20	

Sample ID: **9905026-01A DUP** Batch ID: **01 TDS-6/1/99** Test Code: **E160.1** Units: **mg/L** Analysis Date **05/11/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990511D** SeqNo: **11290**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Dissolved Solids (Residue, Filtera	430	10	0	0	0.0%	0	0	420	2.4%	20	

Sample ID: **9905053-01A DUP** Batch ID: **01 TDS-6/1/99** Test Code: **E160.1** Units: **mg/L** Analysis Date **05/18/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990518B** SeqNo: **11310**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Dissolved Solids (Residue, Filtera	440	10	0	0	0.0%	0	0	420	4.7%	20	

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905120
Project: 905080/NMO/Goldstar Hobbs Yard

QC SUMMARY REPORT
Sample Duplicate

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sample ID: 9905098-01A DUP Batch ID: **01 TDS-6/1/99** Test Code: **E160.1** Units: **mg/L** Analysis Date **05/25/99** Prep Date:											
Client ID: **9905120** Run ID: **NO INST_990525C** SeqNo: **10238**											
Total Dissolved Solids (Residue, Filtera	15	10	0	0	0.0%	0	0	34	77.6%	20	R,T
Sample ID: 9905133-03A DUP Batch ID: **01 TDS-6/1/99** Test Code: **E160.1** Units: **mg/L** Analysis Date **05/26/99** Prep Date:											
Client ID: **9905120** Run ID: **NO INST_990526C** SeqNo: **10287**											
Total Dissolved Solids (Residue, Filtera	110	10	0	0	0.0%	0	0	130	16.7%	20	
Sample ID: 9906049-01A DUP Batch ID: **535** Test Code: **Mercury** Units: **mg/L** Analysis Date **06/13/99** Prep Date: **06/11/99**											
Client ID: **9905120** Run ID: **MERC_990613B** SeqNo: **13906**											
Mercury	ND	0.0002	0	0	0.0%	0	0	0	0.0%	20	
Mercury, TCLP	ND	0.0002	0	0	0.0%	0	0	0	0.0%	20	

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905120
Project: 905080/NMO/Goldstar Hobbs Yard

QC SUMMARY REPORT
Sample Duplicate

Sample ID: **9905144-01A DUP** Batch ID: **548** Test Code: **ICPMET** Units: **mg/L** Analysis Date **06/18/99** Prep Date: **06/16/99**
Client ID: **9905120** Run ID: **ICP_990618B** SeqNo: **15582**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	ND	0.005	0	0	0.0%	0	0	0	0.0%	20	
Arsenic	ND	0.005	0	0	0.0%	0	0	0	0.0%	20	
Barium	.02084	0.005	0	0	0.0%	0	0	0.02096	0.6%	20	
Beryllium	ND	0.002	0	0	0.0%	0	0	0	0.0%	20	
Cadmium	ND	0.002	0	0	0.0%	0	0	0	0.0%	20	
Calcium	5.545	0.05	0	0	0.0%	0	0	5.657	2.0%	20	
Chromium	ND	0.005	0	0	0.0%	0	0	0	0.0%	20	
Copper	ND	0.005	0	0	0.0%	0	0	0	0.0%	20	
Hardness	18.92	0.33	0	0	0.0%	0	0	19.28	1.9%	20	
Iron	.04548	0.015	0	0	0.0%	0	0	0.02719	50.3%	20	R
Lead	ND	0.005	0	0	0.0%	0	0	0	0.0%	20	
Magnesium	1.233	0.05	0	0	0.0%	0	0	1.252	1.5%	20	
Manganese	.007505	0.005	0	0	0.0%	0	0	0.007559	0.7%	20	
Nickel	ND	0.005	0	0	0.0%	0	0	0	0.0%	20	
Potassium	.5463	0.2	0	0	0.0%	0	0	0.533	2.5%	20	
Selenium	ND	0.005	0	0	0.0%	0	0	0	0.0%	20	
Silver	ND	0.005	0	0	0.0%	0	0	0	0.0%	20	
Sodium	6.094	0.2	0	0	0.0%	0	0	6.104	0.2%	20	
Thallium	ND	0.01	0	0	0.0%	0	0	0	0.0%	20	
Zinc	ND	0.005	0	0	0.0%	0	0	0	0.0%	20	

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905120
Project: 905080/NMO/Goldstar Hobbs Yard

QC SUMMARY REPORT
Sample Matrix Spike

Sample ID: **9906014-02A MS**	Batch ID: **01 BR A-6/11/**	Test Code: **Bromide**	Units: **mg/L**	Analysis Date **06/10/99**	Prep Date:
Client ID:	**9905120**	Run ID: **HIT MAN_990610A**		SeqNo: **13717**	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Bromide	16.7	0.1	50	0.11	33.2%	75	125	0			S,H

Sample ID: **9906014-02A MSD**	Batch ID: **01 BR A-6/11/**	Test Code: **Bromide**	Units: **mg/L**	Analysis Date **06/10/99**	Prep Date:
Client ID:	**9905120**	Run ID: **HIT MAN_990610A**		SeqNo: **13718**	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Bromide	16.4	0.1	50	0.11	32.6%	75	125	16.7	1.8%	20	S,H

Sample ID: **9904166-01A MS**	Batch ID: **01 CL A-6/1/9**	Test Code: **Chloride**	Units: **mg/L**	Analysis Date **05/07/99**	Prep Date:
Client ID:	**9905120**	Run ID: **NO INST_990507B**		SeqNo: **11109**	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	82	5	50	40	84.0%	75	125	0			

Sample ID: **9904166-01A MSD**	Batch ID: **01 CL A-6/1/9**	Test Code: **Chloride**	Units: **mg/L**	Analysis Date **05/07/99**	Prep Date:
Client ID:	**9905120**	Run ID: **NO INST_990507B**		SeqNo: **11110**	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	85	5	50	40	90.0%	75	125	82	3.6%	20	

Sample ID: **9904166-02A MS**	Batch ID: **01 CL A-6/1/9**	Test Code: **Chloride**	Units: **mg/L**	Analysis Date **05/07/99**	Prep Date:
Client ID:	**9905120**	Run ID: **NO INST_990507B**		SeqNo: **11113**	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	90	5	50	35	110.0%	75	125	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905120
Project: 905080/NMO/Goldstar Hobbs Yard

QC SUMMARY REPORT
Sample Matrix Spike Duplicate

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sample ID: **9904166-02A MSD** Batch ID: **01 CL A-6/1/9** Test Code: **Chloride** Units: **mg/L** Analysis Date **05/07/99** Prep Date:											
Client ID: **9905120** Run ID: **NO INST_990507B** SeqNo: **11114**											
Chloride	80	5	50	35	90.0%	75	125	90	11.8%	20	
Sample ID: **9905030-01A MS** Batch ID: **01 CL A-6/1/9** Test Code: **Chloride** Units: **mg/L** Analysis Date **05/17/99** Prep Date:											
Client ID: **9905120** Run ID: **NO INST_990517C** SeqNo: **11138**											
Chloride	240	5	100	130	110.0%	75	125	0			
Sample ID: **9905030-01A MSD** Batch ID: **01 CL A-6/1/9** Test Code: **Chloride** Units: **mg/L** Analysis Date **05/17/99** Prep Date:											
Client ID: **9905120** Run ID: **NO INST_990517C** SeqNo: **11139**											
Chloride	230	5	100	130	100.0%	75	125	240	4.3%	20	
Sample ID: **9905097-02A MS** Batch ID: **01 CL A-6/1/9** Test Code: **Chloride** Units: **mg/L** Analysis Date **05/26/99** Prep Date:											
Client ID: **9905120** Run ID: **NO INST_990526A** SeqNo: **9945**											
Chloride, Diss	16	0.5	10	5.25	107.5%	75	125	0			
Sample ID: **9905097-02A MSD** Batch ID: **01 CL A-6/1/9** Test Code: **Chloride** Units: **mg/L** Analysis Date **05/26/99** Prep Date:											
Client ID: **9905120** Run ID: **NO INST_990526A** SeqNo: **9946**											
Chloride, Diss	15	0.5	10	5.25	97.5%	75	125	16	6.5%	20	

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905120
Project: 905080/NMO/Goldstar Hobbs Yard

QC SUMMARY REPORT
Sample Matrix Spike

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sample ID: 9905133-05A MS Batch ID: **01 CL A-6/1/9** Test Code: **Chloride** Units: **mg/L** Analysis Date **05/26/99** Prep Date:											
Client ID: **9905120** Run ID: **NO INST_990526A** SeqNo: **9960**											
Chloride, Diss	122.5	5	100	17.5	105.0%	75	125	0			
Sample ID: 9905133-05A MSD Batch ID: **01 CL A-6/1/9** Test Code: **Chloride** Units: **mg/L** Analysis Date **05/26/99** Prep Date:											
Client ID: **9905120** Run ID: **NO INST_990526A** SeqNo: **9961**											
Chloride, Diss	117.5	5	100	17.5	100.0%	75	125	122.5	4.2%	20	
Sample ID: 9906027-03A MS Batch ID: **01 FL A-6/9/9** Test Code: **fluoride** Units: **mg/L** Analysis Date **06/08/99** Prep Date:											
Client ID: **9905120** Run ID: **NO INST_990608B** SeqNo: **13069**											
Fluoride	7.8	0.2	7	0	111.4%	75	125	0			
Sample ID: 9906027-03A MSD Batch ID: **01 FL A-6/9/9** Test Code: **fluoride** Units: **mg/L** Analysis Date **06/08/99** Prep Date:											
Client ID: **9905120** Run ID: **NO INST_990608B** SeqNo: **13070**											
Fluoride	7.7	0.2	7	0	110.0%	75	125	7.8	1.3%	20	
Sample ID: 9904111-01A MS Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **04/29/99** Prep Date:											
Client ID: **9905120** Run ID: **HIT MAN_990429A** SeqNo: **10625**											
Sulfate	96.15	25	50	56.18	80.0%	75	125	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905120
Project: 905080/NMO/Goldstar Hobbs Yard

QC SUMMARY REPORT
Sample Matrix Spike Duplicate

Sample ID: **9904111-01A MSD** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **04/29/99** Prep Date:
Client ID: **9905120** Run ID: **HIT MAN_990429A** SeqNo: **10626**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	96.15	25	50	56.18	80.0%	75	125	96.15	0.0%	20	

Sample ID: **9904157-03A MS** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **04/29/99** Prep Date:
Client ID: **9905120** Run ID: **HIT MAN_990429A** SeqNo: **10663**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Sample ID: **9904157-03A MSD** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **04/29/99** Prep Date:
Client ID: **9905120** Run ID: **HIT MAN_990429A** SeqNo: **10664**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Sample ID: **9904166-01A MS** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **05/12/99** Prep Date:
Client ID: **9905120** Run ID: **HIT MAN_990512B** SeqNo: **10873**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	1064	500	800	130.2	116.7%	75	125	0			

Sample ID: **9904166-01A MSD** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **05/12/99** Prep Date:
Client ID: **9905120** Run ID: **HIT MAN_990512B** SeqNo: **10874**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	1063	500	800	130.2	116.6%	75	125	1064	0.1%	20	

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905120
Project: 905080/NMO/Goldstar Hobbs Yard

QC SUMMARY REPORT
Sample Matrix Spike

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sample ID: 9905045-01A MS Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **05/20/99** Prep Date:											
Client ID: **9905120** Run ID: **HIT MAN_990520A** SeqNo: **11010**											
Sulfate	98.85	42	66	121	-33.6%	75	125	0			S,H
Sample ID: 9905045-01A MSD Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **05/20/99** Prep Date:											
Client ID: **9905120** Run ID: **HIT MAN_990520A** SeqNo: **11012**											
Sulfate	99.02	42	66	121	-33.3%	75	125	98.85	0.2%	20	S,H
Sample ID: 9905078-01A MS Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **05/21/99** Prep Date:											
Client ID: **9905120** Run ID: **HIT MAN_990521B** SeqNo: **9669**											
Sulfate	839.8	120	300	494	115.3%	75	125	0			
Sample ID: 9905078-01A MSD Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **05/21/99** Prep Date:											
Client ID: **9905120** Run ID: **HIT MAN_990521B** SeqNo: **9670**											
Sulfate	803	120	300	494	103.0%	75	125	839.8	4.5%	20	
Sample ID: 9905097-02A MS Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **05/27/99** Prep Date:											
Client ID: **9905120** Run ID: **HIT MAN_990527A** SeqNo: **9770**											
Sulfate, Diss	20.2	5	8	13	90.0%	75	125	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905120
Project: 905080/NMO/Goldstar Hobbs Yard

QC SUMMARY REPORT
Sample Matrix Spike Duplicate

Sample ID: **9905097-02A MSD** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **05/27/99** Prep Date:
Client ID: **9905120** Run ID: **HIT MAN_990527A** SeqNo: **9771**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate, Diss	20.3	5	8	13	91.3%	75	125	20.2	0.5%	20	

Sample ID: **9906049-01A MS** Batch ID: **535** Test Code: **Mercury** Units: **mg/L** Analysis Date **06/13/99** Prep Date: **06/11/99**
Client ID: **9905120** Run ID: **MERC_990613B** SeqNo: **13907**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	.00093	0.0002	0.001	0	93.0%	75	125	0			
Mercury, TCLP	.00093	0.0002	0.001	0	93.0%	75	125	0			

Sample ID: **9906049-01A MSD** Batch ID: **535** Test Code: **Mercury** Units: **mg/L** Analysis Date **06/13/99** Prep Date: **06/11/99**
Client ID: **9905120** Run ID: **MERC_990613B** SeqNo: **13908**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	.00089	0.0002	0.001	0	89.0%	75	125	0.00093	4.4%	20	
Mercury, TCLP	.00089	0.0002	0.001	0	89.0%	75	125	0.00093	4.4%	20	

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905120
Project: 905080/NMO/Goldstar Hobbs Yard

QC SUMMARY REPORT
Sample Matrix Spike

Sample ID: **9905144-01A MS** Batch ID: **548** Test Code: **ICPMET** Units: **mg/L** Analysis Date **06/18/99** Prep Date: **06/16/99**
Client ID: **9905120** Run ID: **ICP_990618B** SeqNo: **15583**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	.52	0.005	0.5	0	104.0%	80	120	0			
Arsenic	.4881	0.005	0.5	0	97.6%	80	120	0			
Barium	.4826	0.005	0.5	0.02096	92.3%	80	120	0			
Beryllium	.5088	0.002	0.5	0	101.8%	80	120	0			
Cadmium	.4927	0.002	0.5	0	98.5%	80	120	0			
Calcium	10.57	0.05	5	5.657	98.2%	80	120	0			
Chromium	.5141	0.005	0.5	0	102.8%	80	120	0			
Copper	.4855	0.005	0.5	0	97.1%	80	120	0			
Hardness	50.93	0.33	33.1	19.28	95.6%	80	120	0			
Iron	5.03	0.015	5	0.02719	100.1%	80	120	0			
Lead	.4903	0.005	0.5	0	98.1%	80	120	0			
Magnesium	5.959	0.05	5	1.252	94.1%	80	120	0			
Manganese	.4931	0.005	0.5	0.007559	97.1%	80	120	0			
Nickel	.4905	0.005	0.5	0	98.1%	80	120	0			
Potassium	5.21	0.2	5	0.533	93.6%	80	120	0			
Selenium	.4733	0.005	0.5	0	94.7%	80	120	0			
Silver	.4802	0.005	0.5	0	96.0%	80	120	0			
Sodium	10.61	0.2	5	6.104	90.2%	80	120	0			
Thallium	.6168	0.01	0.5	0	123.4%	80	120	0			S
Zinc	.496	0.005	0.5	0	99.2%	80	120	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905120
Project: 905080/NMO/Goldstar Hobbs Yard

QC SUMMARY REPORT
Sample Matrix Spike Duplicate

Sample ID: **9905144-01A MSD** Batch ID: **548** Test Code: **ICPMET** Units: **mg/L** Analysis Date **06/18/99** Prep Date: **06/16/99**
Client ID: **9905120** Run ID: **ICP_990618B** SeqNo: **15584**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	.5171	0.005	0.5	0	103.4%	80	120	0.52	0.6%	20	
Arsenic	.4866	0.005	0.5	0	97.3%	80	120	0.4881	0.3%	20	
Barium	.4811	0.005	0.5	0.02096	92.0%	80	120	0.4826	0.3%	20	
Beryllium	.5077	0.002	0.5	0	101.5%	80	120	0.5088	0.2%	20	
Cadmium	.492	0.002	0.5	0	98.4%	80	120	0.4927	0.2%	20	
Calcium	10.66	0.05	5	5.657	100.0%	80	120	10.57	0.9%	20	
Chromium	.5122	0.005	0.5	0	102.4%	80	120	0.5141	0.4%	20	
Copper	.4839	0.005	0.5	0	96.8%	80	120	0.4855	0.3%	20	
Hardness	51.31	0.33	33.1	19.28	96.8%	80	120	50.93	0.7%	20	
Iron	5.052	0.015	5	0.02719	100.5%	80	120	5.03	0.4%	20	
Lead	.4895	0.005	0.5	0	97.9%	80	120	0.4903	0.2%	20	
Magnesium	5.996	0.05	5	1.252	94.9%	80	120	5.959	0.6%	20	
Manganese	.4943	0.005	0.5	0.007559	97.3%	80	120	0.4931	0.2%	20	
Nickel	.4899	0.005	0.5	0	98.0%	80	120	0.4905	0.1%	20	
Potassium	5.201	0.2	5	0.533	93.4%	80	120	5.21	0.2%	20	
Selenium	.4714	0.005	0.5	0	94.3%	80	120	0.4733	0.4%	20	
Silver	.4806	0.005	0.5	0	96.1%	80	120	0.4802	0.1%	20	
Sodium	10.67	0.2	5	6.104	91.2%	80	120	10.61	0.5%	20	
Thallium	.6169	0.01	0.5	0	123.4%	80	120	0.6168	0.0%	20	S
Zinc	.4962	0.005	0.5	0	99.2%	80	120	0.496	0.1%	20	

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905120
Project: 905080/NMO/Goldstar Hobbs Yard

QC SUMMARY REPORT

Laboratory Control Spike - generic

Sample ID: **LCS**	Batch ID: **01 ALK A-6/1/**	Test Code: **Alkalinity**	Units: **mg/L CaCO3**	Analysis Date **04/19/99**	Prep Date:
Client ID:	**9905120**	Run ID: **NO INST_990419A**		SeqNo: **9644**	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Total (As CaCO3)	130	5	126	0	103.2%	85	115	0			

Sample ID: **LCS**	Batch ID: **01 ALK A-6/1/**	Test Code: **Alkalinity**	Units: **mg/L CaCO3**	Analysis Date **05/25/99**	Prep Date:
Client ID:	**9905120**	Run ID: **NO INST_990525A**		SeqNo: **9908**	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Total (As CaCO3)	123	5	126	0	97.6%	85	115	0			

Sample ID: **LCS**	Batch ID: **01 ALK A-6/1/**	Test Code: **Alkalinity**	Units: **mg/L CaCO3**	Analysis Date **05/03/99**	Prep Date:
Client ID:	**9905120**	Run ID: **NO INST_990503B**		SeqNo: **11151**	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Total (As CaCO3)	120	5	126	0	95.2%	85	115	0			

Sample ID: **LCS**	Batch ID: **01 ALK A-6/1/**	Test Code: **Alkalinity**	Units: **mg/L CaCO3**	Analysis Date **05/10/99**	Prep Date:
Client ID:	**9905120**	Run ID: **NO INST_990510C**		SeqNo: **11174**	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Total (As CaCO3)	135	5	126	0	107.1%	85	115	0			

Sample ID: **LCS**	Batch ID: **01 ALK A-6/1/**	Test Code: **Alkalinity**	Units: **mg/L CaCO3**	Analysis Date **05/11/99**	Prep Date:
Client ID:	**9905120**	Run ID: **NO INST_990511C**		SeqNo: **11183**	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Total (As CaCO3)	135	5	126	0	107.1%	85	115	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905120
Project: 905080/NMO/Goldstar Hobbs Yard

QC SUMMARY REPORT
Laboratory Control Spike - generic

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sample ID: **LCS** Batch ID: **01 ALK A-6/1/** Test Code: **Alkalinity** Units: **mg/L CaCO3** Analysis Date **05/14/99** Prep Date:											
Client ID: **9905120** Run ID: **NO INST_990514B** SeqNo: **11227**											
Alkalinity, Total (As CaCO3)	130	5	126	0	103.2%	85	115	0			
Sample ID: **LCS** Batch ID: **01 BR A-6/11/** Test Code: **Bromide** Units: **mg/L** Analysis Date **06/10/99** Prep Date:											
Client ID: **9905120** Run ID: **HIT MAN_990610A** SeqNo: **13711**											
Bromide	.504	0.1	0.5	0	100.8%	85	115	0			
Sample ID: **LCS** Batch ID: **01 CL A-6/1/9** Test Code: **Chloride** Units: **mg/L** Analysis Date **05/26/99** Prep Date:											
Client ID: **9905120** Run ID: **NO INST_990526A** SeqNo: **9938**											
Chloride	10	0.5	10	0	100.0%	85	115	0			
Sample ID: **LCS** Batch ID: **01 CL A-6/1/9** Test Code: **Chloride** Units: **mg/L** Analysis Date **05/07/99** Prep Date:											
Client ID: **9905120** Run ID: **NO INST_990507B** SeqNo: **11087**											
Chloride	9.5	0.5	10	0	95.0%	85	115	0			
Sample ID: **LCS** Batch ID: **01 CL A-6/1/9** Test Code: **Chloride** Units: **mg/L** Analysis Date **05/17/99** Prep Date:											
Client ID: **9905120** Run ID: **NO INST_990517C** SeqNo: **11135**											
Chloride	10.3	0.5	10	0	103.0%	85	115	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905120
Project: 905080/NMO/Goldstar Hobbs Yard

QC SUMMARY REPORT
Laboratory Control Spike - generic

Sample ID: **LCS** Batch ID: **01 COND-06/** Test Code: **E120.1** Units: **µmhos/cm** Analysis Date **04/21/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990421A** SeqNo: **10313**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Sample ID: **LCS** Batch ID: **01 COND-06/** Test Code: **E120.1** Units: **µmhos/cm** Analysis Date **05/10/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990510A** SeqNo: **10348**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Sample ID: **LCS** Batch ID: **01 COND-06/** Test Code: **E120.1** Units: **µmhos/cm** Analysis Date **05/20/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990520A** SeqNo: **10366**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Sample ID: **LCS** Batch ID: **01 COND-06/** Test Code: **E120.1** Units: **µmhos/cm** Analysis Date **05/25/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990525E** SeqNo: **10385**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Specific Conductance	972	1	1000	0	97.2%	85	115	0			

Sample ID: **LCS** Batch ID: **01 FL A-6/9/9** Test Code: **fluoride** Units: **mg/L** Analysis Date **06/08/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990608B** SeqNo: **13058**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Fluoride	8.5	0.2	8	0	106.3%	85	115	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905120
Project: 905080/NMO/Goldstar Hobbs Yard

QC SUMMARY REPORT
Laboratory Control Spike - generic

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sample ID: **LCS** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **05/21/99** Prep Date:											
Client ID: **9905120** Run ID: **HIT MAN_990521B** SeqNo: **9662**											
Sulfate	12	5	12	0	100.0%	85	115	0			
Sample ID: **LCS** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **05/27/99** Prep Date:											
Client ID: **9905120** Run ID: **HIT MAN_990527A** SeqNo: **9766**											
Sulfate	7.816	5	8	0	97.7%	85	115	0			
Sample ID: **LCS** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **04/29/99** Prep Date:											
Client ID: **9905120** Run ID: **HIT MAN_990429A** SeqNo: **10622**											
Sulfate	10	5	10	0	100.0%	85	115	0			
Sample ID: **LCS** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **05/12/99** Prep Date:											
Client ID: **9905120** Run ID: **HIT MAN_990512B** SeqNo: **10870**											
Sulfate	7.43	5	8	0	92.9%	85	115	0			
Sample ID: **LCS** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **05/20/99** Prep Date:											
Client ID: **9905120** Run ID: **HIT MAN_990520A** SeqNo: **10999**											
Sulfate	7.03	5	8	0	87.9%	85	115	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905120
Project: 905080/NMO/Goldstar Hobbs Yard

QC SUMMARY REPORT
Laboratory Control Spike - generic

Sample ID: LCS	Batch ID: 01 TDS-6/1/99	Test Code: E160.1	Units: mg/L	Analysis Date 05/25/99	Prep Date:
Client ID:	9905120	Run ID: NO INST_990525C		SeqNo: 10234	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Dissolved Solids (Residue, Filtera	3674	10	3966	0	92.6%	85	115	0			

Sample ID: LCS	Batch ID: 01 TDS-6/1/99	Test Code: E160.1	Units: mg/L	Analysis Date 05/26/99	Prep Date:
Client ID:	9905120	Run ID: NO INST_990526C		SeqNo: 10285	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Dissolved Solids (Residue, Filtera	4080	10	3966	0	102.9%	85	115	0			

Sample ID: LCS	Batch ID: 01 TDS-6/1/99	Test Code: E160.1	Units: mg/L	Analysis Date 04/28/99	Prep Date:
Client ID:	9905120	Run ID: NO INST_990428C		SeqNo: 11255	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Dissolved Solids (Residue, Filtera	3550	10	3966	0	89.5%	85	115	0			

Sample ID: LCS	Batch ID: 01 TDS-6/1/99	Test Code: E160.1	Units: mg/L	Analysis Date 05/05/99	Prep Date:
Client ID:	9905120	Run ID: NO INST_990505B		SeqNo: 11273	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Dissolved Solids (Residue, Filtera	3490	10	3966	0		85	115	0			

Sample ID: LCS	Batch ID: 01 TDS-6/1/99	Test Code: E160.1	Units: mg/L	Analysis Date 05/11/99	Prep Date:
Client ID:	9905120	Run ID: NO INST_990511D		SeqNo: 11288	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Dissolved Solids (Residue, Filtera	3630	10	3966	0	91.5%	85	115	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905120
Project: 905080/NMO/Goldstar Hobbs Yard

QC SUMMARY REPORT
Laboratory Control Spike - generic

Sample ID: LCS	Batch ID: 01 TDS-6/1/99	Test Code: E160.1	Units: mg/L	Analysis Date 05/18/99	Prep Date:
Client ID:	9905120	Run ID: NO INST_990518B		SeqNo: 11308	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Dissolved Solids (Residue, Filtera	3610	10	3966	0		85	115	0			

Sample ID: LCS-480	Batch ID: 480	Test Code: SW8270B	Units: µg/L	Analysis Date 05/27/99	Prep Date: 05/24/99
Client ID:	9905120	Run ID: MANFREDD_990527A		SeqNo: 9972	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,2,4-Trichlorobenzene	35.5	5	50	0	71.0%	44	142	0			
1,4-Dichlorobenzene	31.6	5	50	0	63.2%	20	124	0			
2,4-Dinitrotoluene	41.4	5	50	0	82.8%	39	139	0			
2-Chlorophenol	61.5	5	100	0	61.5%	23	134	0			
4-Chloro-3-methylphenol	67.9	5	100	0	67.9%	22	147	0			
4-Nitrophenol	24.7	5	100	0	24.7%	1	132	0			
Acenaphthene	35.4	5	50	0	70.8%	47	145	0			
N-Nitrosodi-n-propylamine	33.6	5	50	0	67.2%	1	230	0			
Pentachlorophenol	68.4	5	100	0	68.4%	14	176	0			
Phenol	25	5	100	0	25.0%	5	112	0			
Pyrene	35.7	5	50	0	71.4%	52	115	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905120
Project: 905080/NMO/Goldstar Hobbs Yard

QC SUMMARY REPORT
Laboratory Control Spike Duplicate

Sample ID: **LCSD-480** Batch ID: **480** Test Code: **SW8270B** Units: **µg/L** Analysis Date **05/27/99** Prep Date: **05/24/99**
Client ID: **9905120** Run ID: **MANFREDD_990527A** SeqNo: **9973**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,2,4-Trichlorobenzene	36.5	5	50	0	73.0%	44	142	35.5	2.8%	28	
1,4-Dichlorobenzene	32.4	5	50	0	64.8%	20	124	31.6	2.5%	32	
2,4-Dinitrotoluene	43	5	50	0	86.0%	39	139	41.4	3.8%	22	
2-Chlorophenol	63.6	5	100	0	63.6%	23	134	61.5	3.4%	29	
4-Chloro-3-methylphenol	71.3	5	100	0	71.3%	22	147	67.9	4.9%	37	
4-Nitrophenol	26.6	5	100	0	26.6%	1	132	24.7	7.4%	47	
Acenaphthene	36.8	5	50	0	73.6%	47	145	35.4	3.9%	28	
N-Nitrosodi-n-propylamine	34.5	5	50	0	69.0%	1	230	33.6	2.6%	55	
Pentachlorophenol	71.8	5	100	0	71.8%	14	176	68.4	4.9%	49	
Phenol	24.9	5	100	0	24.9%	5	112	25	0.4%	23	
Pyrene	36	5	50	0	72.0%	52	115	35.7	0.8%	25	

Sample ID: **LCS-535** Batch ID: **535** Test Code: **Mercury** Units: **mg/L** Analysis Date **06/13/99** Prep Date: **06/11/99**
Client ID: **9905120** Run ID: **MERC_990613B** SeqNo: **13904**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	.00083	0.0002	0.001	0	83.0%	80	120	0			
Mercury, TCLP	.00083	0.0002	0.001	0	83.0%	80	120	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905120
Project: 905080/NMO/Goldstar Hobbs Yard

QC SUMMARY REPORT
Laboratory Control Spike - generic

Sample ID: **LCS-548** Batch ID: **548** Test Code: **ICPMET** Units: **mg/L** Analysis Date **06/18/99** Prep Date: **06/16/99**
Client ID: **9905120** Run ID: **ICP_990618B** SeqNo: **15579**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	.5062	0.005	0.5	0	101.2%	80	120	0			
Arsenic	.4966	0.005	0.5	0	99.3%	80	120	0			
Barium	.4618	0.005	0.5	0	92.4%	80	120	0			
Beryllium	.4966	0.002	0.5	0	99.3%	80	120	0			
Cadmium	.4821	0.002	0.5	0	96.4%	80	120	0			
Calcium	5.032	0.05	5	0	100.6%	80	120	0			
Chromium	.5027	0.005	0.5	0	100.5%	80	120	0			
Copper	.4862	0.005	0.5	0	97.2%	80	120	0			
Hardness	32.11	0.33	33.1	0	97.0%	80	120	0			
Iron	5.023	0.015	5	0	100.5%	80	120	0			
Lead	.4812	0.005	0.5	0	96.2%	80	120	0			
Magnesium	4.745	0.05	5	0	94.9%	80	120	0			
Manganese	.4871	0.005	0.5	0	97.4%	80	120	0			
Nickel	.4796	0.005	0.5	0	95.9%	80	120	0			
Potassium	4.655	0.2	5	0	93.1%	80	120	0			
Selenium	.4622	0.005	0.5	0	92.4%	80	120	0			
Silver	.4894	0.005	0.5	0	97.9%	80	120	0			
Sodium	4.985	0.2	5	0	99.7%	80	120	0			
Thallium	.5995	0.01	0.5	0	119.9%	80	120	0			
Zinc	.4814	0.005	0.5	0	96.3%	80	120	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

Environmental Services Laboratory

Date: *29-Jun-99*

CLIENT: Pinnacle Laboratories
Work Order: 9905120
Project: 905080/NMO/Goldstar Hobbs Yard

QC SUMMARY REPORT

Continuing Calibration Verification Standard

Sample ID: **CCV** Batch ID: **480** Test Code: **SW8270B** Units: **µg/L** Analysis Date **05/28/99** Prep Date:
Client ID: **9905120** Run ID: **MANFREDD_990528A** SeqNo: **11674**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,4-Dichlorobenzene	51	5									
2,4,6-Trichlorophenol	56.4	5									
2,4-Dichlorophenol	55.7	5									
2-Nitrophenol	51.4	5									
4-Chloro-3-methylphenol	53.7	5									
Acenaphthene	47.7	5									
Benzo(a)pyrene	51.7	5									
Di-n-octyl phthalate	46	5									
Fluoranthene	52.4	5									
Hexachlorobutadiene	55.4	5									
N-Nitrosodiphenylamine	49.8	5									
Pentachlorophenol	54.5	5									
Phenol	49.5	5									
2,4,6-Tribromophenol	59.8	5	50	0	119.6%	80	120				
2-Fluorobiphenyl	50.7	5	50	0	101.4%	80	120				
2-Fluorophenol	51.1	5	50	0	102.2%	80	120				
4-Terphenyl-d14	49.7	5	50	0	99.4%	80	120				
Nitrobenzene-d5	49.4	5	50	0	98.8%	80	120				
Phenol-d5	50.3	5	50	0	100.6%	80	120				

Sample ID: **ICV** Batch ID: **535** Test Code: **Mercury** Units: **mg/L** Analysis Date **06/13/99** Prep Date: **06/11/99**
Client ID: **9905120** Run ID: **MERC_990613B** SeqNo: **13943**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	.00202	0.0002	0.002	0	101.0%	90	110	0			
Mercury, TCLP	.00202	0.0002	0.002	0	101.0%	90	110	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905120
Project: 905080/NMO/Goldstar Hobbs Yard

QC SUMMARY REPORT

Minerals ICV for ICP

Sample ID: **ICVHI** Batch ID: **548** Test Code: **ICPMET** Units: **mg/L** Analysis Date **06/18/99** Prep Date:

Client ID: **9905120** Run ID: **ICP_990618B** SeqNo: **15555**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aluminum, 200.7	23.83	0.05	25	0	95.3%	95	105	0			
Calcium	24.43	0.05	25	0	97.7%	90	110	0			
Hardness	159	0.33	165	0	96.3%	90	110	0			
Magnesium	23.79	0.05	25	0	95.2%	90	110	0			
Sodium	4.816	0.2	5	0	96.3%	90	110	0			

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905120
Project: 905080/NMO/Goldstar Hobbs Yard

QC SUMMARY REPORT
Initial Calibration Verification Standard

Sample ID: **ICVLOW** Batch ID: **548** Test Code: **ICPMET** Units: **mg/L** Analysis Date **06/18/99** Prep Date:
Client ID: **9905120** Run ID: **ICP_990618B** SeqNo: **15556**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	.5074	0.005	0.5	0	101.5%	90	110	0			
Arsenic, 200.7	.4982	0.005	0.5	0	99.6%	95	105	0			
Barium	.4804	0.005	0.5	0	96.1%	90	110	0			
Beryllium	.4884	0.002	0.5	0	97.7%	90	110	0			
Cadmium, 200.7	.4857	0.002	0.5	0	97.1%	95	105	0			
Chromium, 200.7	.4906	0.005	0.5	0	98.1%	95	105	0			
Cobalt	.4694	0.005	0.5	0	93.9%	90	110	0			
Copper, 200.7	.4941	0.005	0.5	0	98.8%	95	105	0			
Iron, 200.7	.5094	0.01	0.5	0	101.9%	95	105	0			
Lead, 200.7	.4951	0.005	0.5	0	99.0%	95	105	0			
Manganese	.4799	0.005	0.5	0	96.0%	90	110	0			
Nickel, 200.7	.4782	0.005	0.5	0	95.6%	95	105	0			
Potassium	4.903	0.2	5	0	98.1%	90	110	0			
Selenium	.489	0.005	0.5	0	97.8%	90	110	0			
Silver, 200.7	.4859	0.005	0.5	0	97.2%	95	105	0			
Thallium	.5069	0.01	0.5	0	101.4%	90	110	0			
Vanadium	.4911	0.005	0.5	0	98.2%	90	110	0			
Zinc, 200.7	.4855	0.005	0.5	0	97.1%	95	105	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

Pinnacle Laboratories, Inc.

Interlab Chain of Custody

Date: 5/24 Page: 1 of 1 9905.

Network Project Manager: Kimberly D. McNeill

Pinnacle Laboratories, Inc.
2709-D Pan American Freeway, NE
Albuquerque, New Mexico 87107
(505) 344-3777 Fax (505) 344-4413

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	Metals (8) RCRA	RCRA TCLP METALS	Metals-13 PP List	Metals-TAL	Ca, Na, Mg, K, Hg	TOX	~~TOC~~ Conductivity	Gen Chemistry: Cl, F, Br, SO4, TDS	Alk. + Bicarb.	Carb.	Oil and Grease	Volatile Organics GC/MS (8260)	BOD	COD	PESTICIDES/PCB (608/8080)	8270 BY GC/MS	PNA (8310)	8240 (TCLP 1311) ZHE	Herbicides (615/8150)	Base/Neutral Acid Compounds GC/MS (625/8270)	URANIUM	RADIUM 226+228	Gross Alpha/Beta	TO-14	NUMBER OF CONTAINERS
905080-01	5/20	1000	AQ	01					X		X	X	X							X								

PROJECT INFORMATION		SAMPLE RECEIPT		SAMPLES SENT TO:	
PROJECT #:	905080	Total Number of Containers		PENSACOLA - STL-FL	
PROJ. NAME:	NMO	Chain of Custody Seals		PORTLAND - ESL-OR	X
QC LEVEL:	(STD.) IV	Received Intact?		STL - CT	
QC REQUIRED:	MS MSD BLANK	Received Good Cond./Cold		STL- NEW JERSEY	
TAT:	(STANDARD) RUSH!!	LAB NUMBER:		N. CREEK	
				BARRINGER	
				SEQUOIA	

DUE DATE:	6/4	COMMENTS:	RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	
RUSH SURCHARGE:	—		Signature: Francine Tonno Time: 1700	Signature: Time:	
CLIENT DISCOUNT:	—		Printed Name: Francine Tonno Date: 5/24/99	Printed Name: Date:	
SPECIAL CERTIFICATION REQUIRED: YES (NO)			Pinnacle Laboratories, Inc.	Company	
			RECEIVED BY: 1.	RECEIVED BY: 2	
			Signature: Time:	Signature: Time:	
			Printed Name: Date: 5/25/99	Printed Name: Date:	
			Company	Company	

PINNACLE LABORATORIES

Pinnacle Laboratories Inc.

CHAIN OF CUSTODY

DATE: 05-20-99 PAGE: 1 OF 1

PLI Accession #: 905080

SHADED AREAS ARE FOR LAB USE ONLY.

PLEASE FILL THIS FORM IN COMPLETELY.

PROJECT MANAGER: Bill Olson Wed 5/21/99

COMPANY: ~~GoldSTAR~~ NMOCD

ADDRESS: ~~Eunice Hwy / Sunrise~~ ~~Hobbs NM 88240~~

PHONE: ~~(505) 394-2504~~

FAX: ~~(505) 394-2510~~

BILL TO: Wayne Price

COMPANY: OCD

ADDRESS: 2040 S. Pacheco

Santa Fe, New Mexico 87505

SAMPLE ID	DATE	TIME	MATRIX	LAB I.D.
990520 1000	05-20-99	10:00 A.M.	WATER	01
TB	5/19/99	1240	water	02

ANALYSIS REQUEST

	01	02	NUMBER OF CONTAINERS
Petroleum Hydrocarbons (418.1) TRPH			
(MOD.8015) Diesel/Direct Inject	X		
Se+Hg by AA			
(M8015) Gas/Purge & Trap			
8021 (BTEX)/8015 (Gasoline) MTBE			
8021 (BTEX) ☐ MTBE ☐ TMB ☐ PCE			
8021 (TCL)			
8021 (EDX)			
8021 (HALO)			
8021 (CUST)			
504.1 EDB ☐ / DBCP ☐			
8270	2		2
8260 (TCL) Volatile Organics	2		2
8260 (Full) Volatile Organics	2	1	3
8260 (CUST) Volatile Organics			
8260 (Landfill) Volatile Organics			
Pesticides /PCB (608/8081/8082)			
Herbicides (615/8151)			
Base/Neutral/Acid Compounds GC/MS (625/8270)			
Polynuclear Aromatics (610/8310/8270-SIMS)			
General Chemistry:	1		1
PH	1		1
Priority Pollutant Metals (13)			
Target Analyte List Metals (23)			
RCRA Metals (8)			
RCRA Metals by TCLP (Method 1311)			
Metals: OCD List # 24	1		1
Bromide	1		1
NUMBER OF CONTAINERS	8	1	9

PROJECT INFORMATION

PROJ. NO.: Water Well

PROJ. NAME: GoldStar Hobbs Yard

P.O. NO.:

SHIPPED VIA:

SAMPLE RECEIPT

NO. CONTAINERS	9
CUSTODY SEALS	(Y)N/NA
RECEIVED INTACT	Yes
BLUE ICE/ICE	6°C

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS

(RUSH) ☐ 24hr ☐ 48hr ☐ 72hr ☐ 1 WEEK (NORMAL) ☒

CERTIFICATION REQUIRED: ☐ NM ☐ SDWA ☐ OTHER

METHANOL PRESERVATION ☐

COMMENTS: FIXED FEE ☐

Sample taken From water well spigot - well purged 10 min. before Sampling

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.
Signature:	Signature:
Time: 16:30	Time: 0920
Printed Name: Wayne Price	Printed Name: William Olson
Date: 5/20/99	Date: 5/21/99
Company: NMOCD	Company: NMOCD
See reverse side (Force Magure)	
RECEIVED BY: 1.	**RECEIVED BY: (LAB) 2.**
Signature:	Signature:
Time: 1630	Time: 0920
Printed Name: William Olson	Printed Name: John Caldwell
Date: 5/20/99	Date: 5/21/99
Company: NMOCD	Pinnacle Laboratories Inc.

PINNACLE LABORATORIES

2709-D Pan American Freeway NE
Albuquerque, New Mexico 87107
Phone (505) 344-3777
Fax (505) 344-4413

Pinnacle Lab ID number **905079**
July 01, 1999

NMOCD
2040 S. PACHECO
SANTA FE, NM 87505

Project Name CASTILLO WELL
Project Number WATER WELL

Attention: BILL OLSON

On 5/21/99 Pinnacle Laboratories, Inc. Inc., (ADHS License No. AZ0592), received a request to analyze **aqueous** samples. The samples were analyzed with EPA methodology or equivalent methods. The results of these analyses and the quality control data, which follow each set of analyses, are enclosed.

EPA methods 150.1 and 8260 were performed by Pinnacle Laboratories, Inc., Albuquerque, NM.

Metals were analyzed by Barringer Laboratories, Inc., Golden, Co.

All other parameters were performed by ESL (OR) Inc., Portland, OR.

If you have any questions or comments, please do not hesitate to contact us at (505)344-3777.

Kimberly D. McNeill
Project Manager

H. Mitchell Rubenstein, Ph. D.
General Manager

MR: mt

Enclosure

2709-D Pan American Freeway NE
Albuquerque, New Mexico 87107
Phone (505) 344-3777
Fax (505) 344-4413

PINNACLE LABORATORIES

CLIENT	: NMOCD	PINNACLE ID	: 905079
PROJECT #	: WATER WELL	DATE RECEIVED	: 5/21/99
PROJECT NAME	: CASTILLO WELL	REPORT DATE	: 7/1/99

PIN ID. #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
01	9905201100	AQUEOUS	5/20/99
02	TRIP BLANK	AQUEOUS	5/19/99

2709-D Pan American Freeway NE
Albuquerque, New Mexico 87107
Phone (505) 344-3777
Fax (505) 344-4413

PINNACLE LABORATORIES

GENERAL CHEMISTRY RESULTS

CLIENT	: NMOCD	PINNACLE I.D.	: 905079
PROJECT #	: WATER WELL	DATE RECEIVED	: 5/21/99
PROJECT NAME	: CASTILLO WELL		

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE ANALYZED
01	9905201100	AQUEOUS	5/20/99	5/24/99

PARAMETER	UNITS	9905201100
PH (150.1)	UNITS	7.75

CHEMIST NOTES:
N/A

2709-D Pan American Freeway, NE
Albuquerque, New Mexico 87107
Phone (505) 344-3777
Fax (505) 344-4413

PINNACLE LABORATORIES

GENERAL CHEMISTRY - QUALITY CONTROL

CLIENT	: NMOCD	PINNACLE I.D.	: 905079
PROJECT #	: WATER WELL	SAMPLE MATRIX	: AQUEOUS
PROJECT NAME	: CASTILLO WELL		

PARAMETER	UNITS	PINNACLE I.D.	SAMPLE RESULT	DUP. RESULT	% RPD
PH	UNITS	905080-01	7.56	7.59	0.40

CHEMIST NOTES:
N/A

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative Percent Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

2709-D Pan American Freeway NE
Albuquerque, New Mexico 87107
Phone (505) 344-3777
Fax (505) 344-4413

PINNACLE LABORATORIES

GC/MS RESULTS

TEST	: VOLATILE ORGANICS EPA METHOD 8260		
CLIENT	: NMOCD	PINNACLE I.D. :	905079
PROJECT #	: WATER WELL	DATE RECEIVED :	5/21/99
PROJECT NAME	: CASTILLO WELL		

SAMPLE ID #	CLIENT ID	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
905079-01	9905201100	AQUEOUS	5/20/99	N/A	06/02/99	1

PARAMETER	DET. LIMIT		UNITS
Dichlorodifluoromethane	1.0	< 1.0	ug/L
Chloromethane	1.0	< 1.0	ug/L
Vinyl Chloride	1.0	< 1.0	ug/L
Bromomethane	1.0	< 1.0	ug/L
Chloroethane	1.0	< 1.0	ug/L
Trichlorofluoromethane	1.0	< 1.0	ug/L
Acetone	10	< 10	ug/L
Acrolein	5.0	< 5.0	ug/L
1,1-Dichloroethene	1.0	< 1.0	ug/L
Iodomethane	1.0	< 1.0	ug/L
Methylene Chloride	1.0	< 1.0	ug/L
Acrylonitrile	5.0	< 5.0	ug/L
cis-1,2-Dichloroethene	1.0	< 1.0	ug/L
Methyl-t-butyl Ether	1.0	< 1.0	ug/L
1,1,2,1,2,2-Trichlorotrifluoroethane	1.0	< 1.0	ug/L
1,1-Dichloroethane	1.0	< 1.0	ug/L
trans-1,2-Dichloroethene	1.0	< 1.0	ug/L
2-Butanone	10	< 10	ug/L
Carbon Disulfide	1.0	< 1.0	ug/L
Bromochloromethane	1.0	< 1.0	ug/L
Chloroform	1.0	< 1.0	ug/L
2,2-Dichloropropane	1.0	< 1.0	ug/L
1,2-Dichloroethane	1.0	< 1.0	ug/L
Vinyl Acetate	1.0	< 1.0	ug/L
1,1,1-Trichloroethane	1.0	< 1.0	ug/L
1,1-Dichloropropene	1.0	< 1.0	ug/L
Carbon Tetrachloride	1.0	< 1.0	ug/L
Benzene	1.0	< 1.0	ug/L
1,2-Dichloropropane	1.0	< 1.0	ug/L
Trichloroethene	1.0	< 1.0	ug/L
Bromodichloromethane	1.0	< 1.0	ug/L
2-Chloroethyl Vinyl Ether	10	< 10	ug/L
cis-1,3-Dichloropropene	1.0	< 1.0	ug/L
trans-1,3-Dichloropropene	1.0	< 1.0	ug/L
1,1,2-Trichloroethane	1.0	< 1.0	ug/L
1,3-Dichloropropane	1.0	< 1.0	ug/L
Dibromomethane	1.0	< 1.0	ug/L
Toluene	1.0	< 1.0	ug/L
1,2-Dibromoethane	1.0	< 1.0	ug/L
4-Methyl-2-Pentanone	10	< 10	ug/L
2-Hexanone	10	< 10	ug/L
Dibromochloromethane	1.0	< 1.0	ug/L
Tetrachloroethene	1.0	< 1.0	ug/L
Chlorobenzene	1.0	< 1.0	ug/L
Ethylbenzene	1.0	< 1.0	ug/L

2709-D Pan American Freeway NE
Albuquerque, New Mexico 87107
Phone (505) 344-3777
Fax (505) 344-4413

PINNACLE LABORATORIES

GC/MS RESULTS

TEST : VOLATILE ORGANICS EPA METHOD 8260
CLIENT : NMOCD PINNACLE I.D. : 905079
PROJECT # : WATER WELL DATE RECEIVED : 5/21/99
PROJECT NAME : CASTILLO WELL

SAMPLE ID #	CLIENT ID	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
905079-01	9905201100	AQUEOUS	5/20/99	N/A	06/02/99	1

PARAMETER	DET. LIMIT		UNITS
1,1,1,2-Tetrachloroethane	1.0	< 1.0	ug/L
m&p Xylenes	1.0	< 1.0	ug/L
o-Xylene	1.0	< 1.0	ug/L
Styrene	1.0	< 1.0	ug/L
Bromoform	1.0	< 1.0	ug/L
1,1,2,2-Tetrachloroethane	1.0	< 1.0	ug/L
1,2,3-Trichloropropane	1.0	< 1.0	ug/L
Isopropyl Benzene	1.0	< 1.0	ug/L
Bromobenzene	1.0	< 1.0	ug/L
trans-1,4-Dichloro-2-Butene	1.0	< 1.0	ug/L
n-Propylbenzene	1.0	< 1.0	ug/L
2-Chlorotoluene	1.0	< 1.0	ug/L
4-Chlorotoluene	1.0	< 1.0	ug/L
1,3,5-Trimethylbenzene	1.0	< 1.0	ug/L
tert-Butylbenzene	1.0	< 1.0	ug/L
1,2,4-Trimethylbenzene	1.0	< 1.0	ug/L
sec-Butylbenzene	1.0	< 1.0	ug/L
1,3-Dichlorobenzene	1.0	< 1.0	ug/L
1,4-Dichlorobenzene	1.0	< 1.0	ug/L
p-Isopropyltoluene	1.0	< 1.0	ug/L
1,2-Dichlorobenzene	1.0	< 1.0	ug/L
n-Butylbenzene	1.0	< 1.0	ug/L
1,2-Dibromomo-3-chloropropane	1.0	< 1.0	ug/L
1,2,4-Trichlorobenzene	1.0	< 1.0	ug/L
Naphthalene	1.0	< 1.0	ug/L
Hexachlorobutadiene	1.0	< 1.0	ug/L
1,2,3-Trichlorobenzene	1.0	< 1.0	ug/L

SURROGATE % RECOVERY		
1,2-Dichloroethane-d4	104	(80 - 120)
Toluene-d8	102	(88 - 110)
Bromofluorobenzene	94	(86 - 115)

2709-D Pan American Freeway NE
Albuquerque, New Mexico 87107
Phone (505) 344-3777
Fax (505) 344-4413

PINNACLE LABORATORIES

GC/MS RESULTS

TEST : VOLATILE ORGANICS EPA METHOD 8260
CLIENT : NMOCD PINNACLE I.D. : 905079
PROJECT # : WATER WELL DATE RECEIVED : 5/21/99
PROJECT NAME : CASTILLO WELL

SAMPLE ID #	CLIENT ID	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
905079-02	TRIP BLANK	AQUEOUS	5/19/99	N/A	06/02/99	1

PARAMETER	DET. LIMIT		UNITS
Dichlorodifluoromethane	1.0	< 1.0	ug/L
Chloromethane	1.0	< 1.0	ug/L
Vinyl Chloride	1.0	< 1.0	ug/L
Bromomethane	1.0	< 1.0	ug/L
Chloroethane	1.0	< 1.0	ug/L
Trichlorofluoromethane	1.0	< 1.0	ug/L
Acetone	10	< 10	ug/L
Acrolein	5.0	< 5.0	ug/L
1,1-Dichloroethene	1.0	< 1.0	ug/L
Iodomethane	1.0	< 1.0	ug/L
Methylene Chloride	1.0	< 1.0	ug/L
Acrylonitrile	5.0	< 5.0	ug/L
cis-1,2-Dichloroethene	1.0	< 1.0	ug/L
Methyl-t-butyl Ether	1.0	< 1.0	ug/L
1,1,2,1,2,2-Trichlorotrifluoroethane	1.0	< 1.0	ug/L
1,1-Dichloroethane	1.0	< 1.0	ug/L
trans-1,2-Dichloroethene	1.0	< 1.0	ug/L
2-Butanone	10	< 10	ug/L
Carbon Disulfide	1.0	< 1.0	ug/L
Bromochloromethane	1.0	< 1.0	ug/L
Chloroform	1.0	< 1.0	ug/L
2,2-Dichloropropane	1.0	< 1.0	ug/L
1,2-Dichloroethane	1.0	< 1.0	ug/L
Vinyl Acetate	1.0	< 1.0	ug/L
1,1,1-Trichloroethane	1.0	< 1.0	ug/L
1,1-Dichloropropene	1.0	< 1.0	ug/L
Carbon Tetrachloride	1.0	< 1.0	ug/L
Benzene	1.0	< 1.0	ug/L
1,2-Dichloropropane	1.0	< 1.0	ug/L
Trichloroethene	1.0	< 1.0	ug/L
Bromodichloromethane	1.0	< 1.0	ug/L
2-Chloroethyl Vinyl Ether	10	< 10	ug/L
cis-1,3-Dichloropropene	1.0	< 1.0	ug/L
trans-1,3-Dichloropropene	1.0	< 1.0	ug/L
1,1,2-Trichloroethane	1.0	< 1.0	ug/L
1,3-Dichloropropane	1.0	< 1.0	ug/L
Dibromomethane	1.0	< 1.0	ug/L
Toluene	1.0	< 1.0	ug/L
1,2-Dibromoethane	1.0	< 1.0	ug/L
4-Methyl-2-Pentanone	10	< 10	ug/L
2-Hexanone	10	< 10	ug/L
Dibromochloromethane	1.0	< 1.0	ug/L
Tetrachloroethene	1.0	< 1.0	ug/L
Chlorobenzene	1.0	< 1.0	ug/L
Ethylbenzene	1.0	< 1.0	ug/L

2709-D Pan American Freeway NE
Albuquerque, New Mexico 87107
Phone (505) 344-3777
Fax (505) 344-4413

PINNACLE LABORATORIES

GC/MS RESULTS

TEST	: VOLATILE ORGANICS EPA METHOD 8260		
CLIENT	: NMOCD	PINNACLE I.D. :	905079
PROJECT #	: WATER WELL	DATE RECEIVED :	5/21/99
PROJECT NAME	: CASTILLO WELL		

SAMPLE ID #	CLIENT ID	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
905079-02	TRIP BLANK	AQUEOUS	5/19/99	N/A	06/02/99	1

PARAMETER	DET. LIMIT		UNITS
1,1,1,2-Tetrachloroethane	1.0	< 1.0	ug/L
m&p Xylenes	1.0	< 1.0	ug/L
o-Xylene	1.0	< 1.0	ug/L
Styrene	1.0	< 1.0	ug/L
Bromoform	1.0	< 1.0	ug/L
1,1,2,2-Tetrachloroethane	1.0	< 1.0	ug/L
1,2,3-Trichloropropane	1.0	< 1.0	ug/L
Isopropyl Benzene	1.0	< 1.0	ug/L
Bromobenzene	1.0	< 1.0	ug/L
trans-1,4-Dichloro-2-Butene	1.0	< 1.0	ug/L
n-Propylbenzene	1.0	< 1.0	ug/L
2-Chlorotoluene	1.0	< 1.0	ug/L
4-Chlorotoluene	1.0	< 1.0	ug/L
1,3,5-Trimethylbenzene	1.0	< 1.0	ug/L
tert-Butylbenzene	1.0	< 1.0	ug/L
1,2,4-Trimethylbenzene	1.0	< 1.0	ug/L
sec-Butylbenzene	1.0	< 1.0	ug/L
1,3-Dichlorobenzene	1.0	< 1.0	ug/L
1,4-Dichlorobenzene	1.0	< 1.0	ug/L
p-Isopropyltoluene	1.0	< 1.0	ug/L
1,2-Dichlorobenzene	1.0	< 1.0	ug/L
n-Butylbenzene	1.0	< 1.0	ug/L
1,2-Dibromomo-3-chloropropane	1.0	< 1.0	ug/L
1,2,4-Trichlorobenzene	1.0	< 1.0	ug/L
Naphthalene	1.0	< 1.0	ug/L
Hexachlorobutadiene	1.0	< 1.0	ug/L
1,2,3-Trichlorobenzene	1.0	< 1.0	ug/L

SURROGATE % RECOVERY		
1,2-Dichloroethane-d4	108	(80 - 120)
Toluene-d8	105	(88 - 110)
Bromofluorobenzene	101	(86 - 115)

2709-D Pan American Freeway NE
Albuquerque, New Mexico 87107
Phone (505) 344-3777
Fax (505) 344-4413

PINNACLE LABORATORIES

GC/MS RESULTS

TEST : VOLATILE ORGANICS EPA METHOD 8260
CLIENT : NMOCD PINNACLE I.D. : 905079
PROJECT # : WATER WELL
PROJECT NAME : CASTILLO WELL

SAMPLE ID #	BATCH	MATRIX	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
REAGENT BLANK	060299	AQUEOUS	N/A	06/02/99	1

PARAMETER	DET. LIMIT		UNITS
Dichlorodifluoromethane	1.0	< 1.0	ug/L
Chloromethane	1.0	< 1.0	ug/L
Vinyl Chloride	1.0	< 1.0	ug/L
Bromomethane	1.0	< 1.0	ug/L
Chloroethane	1.0	< 1.0	ug/L
Trichlorofluoromethane	1.0	< 1.0	ug/L
Acetone	10	< 10	ug/L
Acrolein	5.0	< 5.0	ug/L
1,1-Dichloroethene	1.0	< 1.0	ug/L
Iodomethane	1.0	< 1.0	ug/L
Methylene Chloride	1.0	< 1.0	ug/L
Acrylonitrile	5.0	< 5.0	ug/L
cis-1,2-Dichloroethene	1.0	< 1.0	ug/L
Methyl-t-butyl Ether	1.0	< 1.0	ug/L
1,1,2,1,2,2-Trichlorotrifluoroethane	1.0	< 1.0	ug/L
1,1-Dichloroethane	1.0	< 1.0	ug/L
trans-1,2-Dichloroethene	1.0	< 1.0	ug/L
2-Butanone	10	< 10	ug/L
Carbon Disulfide	1.0	< 1.0	ug/L
Bromochloromethane	1.0	< 1.0	ug/L
Chloroform	1.0	< 1.0	ug/L
2,2-Dichloropropane	1.0	< 1.0	ug/L
1,2-Dichloroethane	1.0	< 1.0	ug/L
Vinyl Acetate	1.0	< 1.0	ug/L
1,1,1-Trichloroethane	1.0	< 1.0	ug/L
1,1-Dichloropropene	1.0	< 1.0	ug/L
Carbon Tetrachloride	1.0	< 1.0	ug/L
Benzene	1.0	< 1.0	ug/L
1,2-Dichloropropane	1.0	< 1.0	ug/L
Trichloroethene	1.0	< 1.0	ug/L
Bromodichloromethane	1.0	< 1.0	ug/L
2-Chloroethyl Vinyl Ether	10	< 10	ug/L
cis-1,3-Dichloropropene	1.0	< 1.0	ug/L
trans-1,3-Dichloropropene	1.0	< 1.0	ug/L
1,1,2-Trichloroethane	1.0	< 1.0	ug/L
1,3-Dichloropropane	1.0	< 1.0	ug/L
Dibromomethane	1.0	< 1.0	ug/L
Toluene	1.0	< 1.0	ug/L
1,2-Dibromoethane	1.0	< 1.0	ug/L
4-Methyl-2-Pentanone	10	< 10	ug/L
2-Hexanone	10	< 10	ug/L
Dibromochloromethane	1.0	< 1.0	ug/L
Tetrachloroethene	1.0	< 1.0	ug/L
Chlorobenzene	1.0	< 1.0	ug/L
Ethylbenzene	1.0	< 1.0	ug/L

2709-D Pan American Freeway NE
Albuquerque, New Mexico 87107
Phone (505) 344-3777
Fax (505) 344-4413

PINNACLE LABORATORIES

GC/MS RESULTS

TEST : VOLATILE ORGANICS EPA METHOD 8260
CLIENT : NMOCD PINNACLE I.D. : 905079
PROJECT # : WATER WELL
PROJECT NAME : CASTILLO WELL

SAMPLE ID #	BATCH	MATRIX	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
REAGENT BLANK	060299	AQUEOUS	N/A	06/02/99	1

PARAMETER	DET. LIMIT		UNITS
1,1,1,2-Tetrachloroethane	1.0	< 1.0	ug/L
m&p Xylenes	1.0	< 1.0	ug/L
o-Xylene	1.0	< 1.0	ug/L
Styrene	1.0	< 1.0	ug/L
Bromoform	1.0	< 1.0	ug/L
1,1,2,2-Tetrachloroethane	1.0	< 1.0	ug/L
1,2,3-Trichloropropane	1.0	< 1.0	ug/L
Isopropyl Benzene	1.0	< 1.0	ug/L
Bromobenzene	1.0	< 1.0	ug/L
trans-1,4-Dichloro-2-Butene	1.0	< 1.0	ug/L
n-Propylbenzene	1.0	< 1.0	ug/L
2-Chlorotoluene	1.0	< 1.0	ug/L
4-Chlorotoluene	1.0	< 1.0	ug/L
1,3,5-Trimethylbenzene	1.0	< 1.0	ug/L
tert-Butylbenzene	1.0	< 1.0	ug/L
1,2,4-Trimethylbenzene	1.0	< 1.0	ug/L
sec-Butylbenzene	1.0	< 1.0	ug/L
1,3-Dichlorobenzene	1.0	< 1.0	ug/L
1,4-Dichlorobenzene	1.0	< 1.0	ug/L
p-Isopropyltoluene	1.0	< 1.0	ug/L
1,2-Dichlorobenzene	1.0	< 1.0	ug/L
n-Butylbenzene	1.0	< 1.0	ug/L
1,2-Dibromomo-3-chloropropane	1.0	< 1.0	ug/L
1,2,4-Trichlorobenzene	1.0	< 1.0	ug/L
Naphthalene	1.0	< 1.0	ug/L
Hexachlorobutadiene	1.0	< 1.0	ug/L
1,2,3-Trichlorobenzene	1.0	< 1.0	ug/L

SURROGATE % RECOVERY		
1,2-Dichloroethane-d4	108	(80 - 120)
Toluene-d8	109	(88 - 110)
Bromofluorobenzene	106	(86 - 115)

2709-D Pan American Freeway NE
Albuquerque, New Mexico 87107
Phone (505) 344-3777
Fax (505) 344-4413

PINNACLE LABORATORIES

MATRIX SPIKE/MATRIX SPIKE DUPLICATE RESULTS

TEST	: VOLATILE ORGANICS EPA METHOD 8260	PINNACLE I.D.	: 905079
SPIKED SAMPLE	: 905076-01	DATE ANALYZED	: 6/2/99
CLIENT	: NMOCD	UNITS	: ug/L (PPB)
PROJECT #	: WATER WELL		
PROJECT NAME	: CASTILLO WATER WELL		

COMPOUND	SAMPLE CONC.	SPIKE ADDED	MS RESULT	MSD RESULT	MS %REC	MSD %REC	RPD	QC LIMITS RPD	QC LIMITS %RECOVERY
1,1-DICHLOROETHENE	<1.0	50.0	52.4	51.7	105	103	1	14	61-145
BENZENE	<1.0	50.0	52.1	51.5	104	103	1	11	76-127
TRICHLOROETHENE	<1.0	50.0	50.8	50.4	102	101	1	14	71-120
TOLUENE	<1.0	50.0	50.9	51.5	102	103	1	13	76-125
CHLOROBENZENE	<1.0	50.0	50.0	52.0	100	104	4	13	75-130

BARRINGER LABORATORIES, INC.
15000 W. 6TH AVE., SUITE 300 GOLDEN, CO 80401 (303) 277-1687 FAX (303) 277-1689

3-Jun-99

Kimberly D. McNeill
PINNACLE LABORATORIES INC.
2709-D Pan American Freeway, NE
Albuquerque, NM 87107

Attn:
Project: 905079 PO #:

Received: 25-May-99 09:00

Job: 992197E Status: Final

ANALYTICAL REPORT PACKAGE

BARRINGER LABORATORIES, INC.
15000 W. 6TH AVE., SUITE 300 GOLDEN, CO 80401 (303) 277-1687 FAX (303) 277-1689

3-Jun-99

Kimberly D. McNeill
PINNACLE LABORATORIES INC.
2709-D Pan American Freeway, NE
Albuquerque, NM 87107

Attn:
Project: 905079 PO #:

Received: 25-May-99 09:00

Job: 992197E Status: Final

CASE NARRATIVE

A total of 1 Water sample was received on 25-May-99. As stated in the chain of custody, the sample was run for the following analyses: Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, K, Ni, Se, Si, Ag, Na, Tl, V and Zn. A table, to cross reference your sample ID to ours, is attached. Our procedures are summarized on the Quality Control Data Sheet.

Quality control standards for organic and inorganic analyses followed the appropriate SW-846 or EPA methodology. Quality control standards for radiochemistry followed our standard operating procedures or contractual requirements.

Signed: 6/4/99
Inorganic
Laboratory

Signed:
Project Review 6/4/99

BARRINGER LABORATORIES, INC.
15000 W. 6TH AVE., SUITE 300 GOLDEN, CO 80401 (303) 277-1687 FAX (303) 277-1689

3-Jun-99

Kimberly D. McNeill
PINNACLE LABORATORIES INC.
2709-D Pan American Freeway, NE
Albuquerque, NM 87107

Attn:
Project: 905079

Received: 25-May-99 09:00
PO #:

Job: 992197E

Status: Final

Lab-ID	Matrix	Client Sample ID	Sampled
992197-1	Water	905079-01	20-May-99

BARRINGER LABORATORIES, INC.
15000 W. 6TH AVE., SUITE 300 GOLDEN, CO 80401 (303) 277-1687 FAX (303) 277-1689

PINNACLE LABORATORIES INC.

Sample Id: 905079-01
Lab Id: 992197-1 **Project: 905079**
Date Sampled: 20-May-99 **Matrix: Water**

Analyte	Fraction	Method	Concentration	MDL	Date Analyzed
Aluminum	Total	200.7	U mg/l	0.05	1-Jun-99
Antimony	Total	200.7	U mg/l	0.05	1-Jun-99
Arsenic	Total	200.7	U mg/l	0.1	1-Jun-99
Barium	Total	200.7	0.05 mg/l	0.02	1-Jun-99
Beryllium	Total	200.7	U mg/l	0.004	1-Jun-99
Boron	Total	200.7	0.4 mg/l	0.1	1-Jun-99
Cadmium	Total	200.7	U mg/l	0.005	1-Jun-99
Calcium	Total	200.7	104 mg/l	0.2	1-Jun-99
Chromium	Total	200.7	0.01 mg/l	0.01	1-Jun-99
Cobalt	Total	200.7	U mg/l	0.01	1-Jun-99
Copper	Total	200.7	U mg/l	0.01	1-Jun-99
Iron	Total	200.7	0.3 mg/l	0.1	1-Jun-99
Lead	Total	200.7	U mg/l	0.05	1-Jun-99
Magnesium	Total	200.7	20.7 mg/l	0.1	1-Jun-99
Manganese	Total	200.7	U mg/l	0.005	1-Jun-99
Molybdenum	Total	200.7	U mg/l	0.01	1-Jun-99
Potassium	Total	200.7	U mg/l	5	1-Jun-99
Nickel	Total	200.7	U mg/l	0.04	1-Jun-99
Selenium	Total	200.7	U mg/l	0.1	1-Jun-99
Silicon	Total	200.7	31.7 mg/l	0.5	1-Jun-99
Silver	Total	200.7	U mg/l	0.01	1-Jun-99
Sodium	Total	200.7	137 mg/l	1	1-Jun-99
Thallium	Total	200.7	U mg/l	0.1	1-Jun-99
Vanadium	Total	200.7	0.06 mg/l	0.01	1-Jun-99
Zinc	Total	200.7	0.06 mg/l	0.02	1-Jun-99

BARRINGER LABORATORIES, INC.
15000 W. 6TH AVE., SUITE 300 GOLDEN, CO 80401 (303) 277-1687 FAX (303) 277-1689

PINNACLE LABORATORIES INC.

QUALITY CONTROL REPORT

Sample Id	Aluminum Total mg/l	Antimony Total mg/l	Arsenic Total mg/l	Barium Total mg/l	Beryllium Total mg/l
Blank	U	U	U	U	U
LCS (True)	10.0	2.00	5.00	10.0	1.00
LCS (Found)	10.1	1.96	4.90	10.6	1.00
LCS % Rec	101	98.0	98.0	106	100
Duplicate	4.10	0.97	4.2	4.28	0.101
Duplicate	4.12	1.03	4.1	4.25	0.100
RPD	0.4	6.0	1.0	0.8	0.7
Spike % Rec	102	97.4	104	106	101

Sample Id	Boron Total mg/l	Cadmium Total mg/l	Calcium Total mg/l	Chromium Total mg/l	Cobalt Total mg/l
Blank	U	U	U	U	U
LCS (True)	1.00	1.00	20.0	2.00	5.00
LCS (Found)	1.03	0.98	20.2	2.06	5.06
LCS % Rec	103	98.3	101	103	101
Duplicate	2.5	0.089	163	0.41	1.00
Duplicate	2.5	0.092	166	0.41	1.00
RPD	0.2	3.3	1.5	0.7	0.0
Spike % Rec	105	89.3	NA	103	100

Sample Id	Copper Total mg/l	Iron Total mg/l	Lead Total mg/l	Magnesium Total mg/l	Manganese Total mg/l
Blank	U	U	U	U	U
LCS (True)	2.00	10.0	5.00	20.0	1.00
LCS (Found)	2.08	10.6	5.03	20.8	1.05
LCS % Rec	104	106	101	104	105
Duplicate	0.52	2.2	1.03	30.2	1.05
Duplicate	0.52	2.1	1.04	30.6	1.05
RPD	0.2	1.4	0.3	1.3	0.1
Spike % Rec	105	108	103	NA	105

BARRINGER LABORATORIES, INC.
15000 W. 6TH AVE., SUITE 300 GOLDEN, CO 80401 (303) 277-1687 FAX (303) 277-1689

PINNACLE LABORATORIES INC.

QUALITY CONTROL REPORT

Sample Id	Molybdenum Total mg/l	Potassium Total mg/l	Nickel Total mg/l	Selenium Total mg/l	Silicon Total mg/l
Blank	U	U	U	U	U
LCS (True)	1.00	20.0	5.00	5.00	2.00
LCS (Found)	1.03	22.9	5.18	5.19	2.16
LCS % Rec	103	114	104	104	108
Duplicate	2.02	U	1.02	4.3	35.0
Duplicate	2.01	U	1.01	4.1	35.6
RPD	0.6	NC	0.1	3.8	1.7
Spike % Rec	101	NA	102	107	(1)

Sample Id	Silver Total mg/l	Sodium Total mg/l	Thallium Total mg/l	Vanadium Total mg/l	Zinc Total mg/l
Blank	U	U	U	U	U
LCS (True)	1.00	20.0	5.00	5.00	1.00
LCS (Found)	0.98	22.6	5.15	5.10	1.00
LCS % Rec	98.0	113	103	102	99.5
Duplicate	0.11	100	4.1	1.06	1.08
Duplicate	0.11	108	4.0	1.06	1.09
RPD	2.8	8.7	1.0	0.1	0.6
Spike % Rec	109	NA	102	100	101

BARRINGER LABORATORIES, INC.
15000 W. 6TH AVE., SUITE 300 GOLDEN, CO 80401 (303) 277-1687 FAX (303) 277-1689

3-Jun-99

Kimberly D. McNeill
PINNACLE LABORATORIES INC.
2709-D Pan American Freeway, NE
Albuquerque, NM 87107

Attn:
Project: 905079 PO #:

Received: 25-May-99 09:00

Job: 992197E Status: Final

Abbreviations:

Units:

mg/l	: milligrams per liter

Quality codes:

(1)	: Sample > 4 times spike
NA	: Not Analyzed
U	: Undetected at reported limit
NC	: Not Calculated

BARRINGER LABORATORIES, INC.
15000 W. 6TH AVE., SUITE 300 Ggolden, CO 80401 (303) 277-1687 FAX (303) 277-1689

3-Jun-99
Page: Q-4

Kimberly D. McNeill
PINNACLE LABORATORIES INC.
2709-D Pan American Freeway, NE
Albuquerque, NM 87107

Attn:
Project: 905079 PO #:

Received: 25-May-99 09:00

Job: 992197E Status: Final

QUALITY CONTROL DATA SHEET

Received by: kz Via: Fed Ex

Sample Container Type: 500mL pl
Additional Lab Preparation: None

Parameter	Method	Preservative	Init	Analysis Dates
Al	200.7	HNO3	SLM	06/01
Sb	200.7	HNO3	SLM	06/01
As	200.7	HNO3	SLM	06/01
Ba	200.7	HNO3	SLM	06/01
Be	200.7	HNO3	SLM	06/01
B	200.7	HNO3	SLM	06/01
Cd	200.7	HNO3	SLM	06/01
Ca	200.7	HNO3	SLM	06/01
Cr	200.7	HNO3	SLM	06/01
Co	200.7	HNO3	SLM	06/01
Cu	200.7	HNO3	SLM	06/01
Fe	200.7	HNO3	SLM	06/01
Pb	200.7	HNO3	SLM	06/01
Mg	200.7	HNO3	SLM	06/01
Mn	200.7	HNO3	SLM	06/01
Mo	200.7	HNO3	SLM	06/01
K	200.7	HNO3	SLM	06/01
Ni	200.7	HNO3	SLM	06/01
Se	200.7	HNO3	SLM	06/01
Si	200.7	HNO3	SLM	06/01
Ag	200.7	HNO3	SLM	06/01
Na	200.7	HNO3	SLM	06/01
Tl	200.7	HNO3	SLM	06/01
V	200.7	HNO3	SLM	06/01
Zn	200.7	HNO3	SLM	06/01

BARRINGER LABORATORIES, INC.
15000 W. 6TH AVE., SUITE 300 GOLDEN, CO 80401 (303) 277-1687 FAX (303) 277-1689

3-Jun-99

Kimberly D. McNeill
PINNACLE LABORATORIES INC.
2709-D Pan American Freeway, NE
Albuquerque, NM 87107

Attn:
Project: 905079 PO #:

Received: 25-May-99 09:00

Job: 992197E Status: Final

Barringer Laboratories, Inc. will return or dispose of your samples 30 days from the date your final report is mailed, unless otherwise specified by contract. Barringer Laboratories, Inc. reserves the right to return samples prior to the 30 days if radioactive levels exceed our license.

Pinnacle Laboratories, Inc. **Interlab Chain of Custody** Date: 5/24 Page: 1 of 1

Network Project Manager: Kimberly D. McNeill

Pinnacle Laboratories, Inc.
2709-D Pan American Freeway, NE
Albuquerque, New Mexico 87107
(505) 344-3777 Fax (505) 344-4413

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	Metals (8) RCRA	RCRA TCLP METALS	Metals-13 PP List	Al, Sb, As, Ba, Be, B, Cd, Ca, Cr	Co, Cu, Fe, Pb, Mg, Mn, Mo, K	Ni, Se, Si, Ag, Na, Tl, V, Zn	TOC	Gen Chemistry		Oil and Grease	Volatile Organics GC/MS (8260)	BOD	COD	PESTICIDES/PCB (608/8080)	8270 BY GC/MS	PNA (8310)	8240 (TCLP 1311) ZHE	Herbicides (615/8150)	Base/Neutral Acid Compounds GC/MS (625/8270)	URANIUM	RADIUM 226+228	Gross Alpha/Beta	TO-14	NUMBER OF CONTAINERS
905079-01	5/20	1100	AQ					X	X	X																		

PROJECT INFORMATION		SAMPLE RECEIPT		SAMPLES SENT TO:		RELINQUISHED BY: 1.	RELINQUISHED BY: 2.
PROJECT #:	905079	Total Number of Containers		PENSACOLA - STL-FL		Signature: Francine Tonno Time: 1700	Signature: Time:
PROJ. NAME:	NMO	Chain of Custody Seals		PORTLAND - ESL-OR		Printed Name: Francine Tonno Date: 5/24/99	Printed Name: Date:
QC LEVEL:	(STD.) IV	Received Intact?		STL - CT		Pinnacle Laboratories, Inc.	Company
QC REQUIRED:	MS MSD BLANK	Received Good Cond./Cold		STL- NEW JERSEY		RECEIVED BY: 1.	RECEIVED BY: 2
TAT:	(STANDARD) RUSH!!	LAB NUMBER:		N. CREEK		Signature: Time: 0900	Signature: Time:
DUE DATE:	6/4	COMMENTS:		BARRINGER	X	Printed Name: Kevin Zahller Date: 5/25/99	Printed Name: Date:
RUSH SURCHARGE:	—			SEQUOIA		Company BLI	Company
CLIENT DISCOUNT:	—						
SPECIAL CERTIFICATION REQUIRED:	YES (NO)						

Environmental Services Laboratory, Inc. E S L

17400 SW Upper Boones Ferry Road • Suite 270 • Portland, OR 97224 • (503) 670-8520

June 29, 1999

Kim McNeill
Pinnacle Laboratories
2709-D Pan American Fwy NE

Albuquerque, NM 87107

TEL: 505-344-3777
FAX (505) 344-4413

RE: 905079/NMO/Custillo Well Order No.: 9905119

Dear Kim McNeill,

Environmental Services Laboratory received 1 sample on 05/25/99 for the analyses presented in the following report.

The Samples were analyzed for the following tests:

Alkalinity (Alkalinity)
BNA Semi-Vol Organics, Aqueous (SW8270B)
Bromide (Bromide)
CHLORIDE (Chloride)
CONDUCTANCE (E120.1)
Fluoride (fluoride)
ICP Metals (ICPMET)
MERCURY (Mercury)
Sulfate (Sulfate)
TOTAL DISSOLVED SOLIDS (E160.1)

There were no problems with the analyses and all data for associated QC met EPA or laboratory specifications except where noted in the Case Narrative. Results apply only to the samples analyzed. Reproduction of this report is permitted only in its entirety, without the written approval from the Laboratory.

If you have any questions regarding these tests results, please feel free to call.

Sincerely,

Kimberly Hill

Keith Hunter
Technical Review

Environmental Services Laboratory

Date: *29-Jun-99*

CLIENT:	Pinnacle Laboratories	**Client Sample ID:**	905079-01
Lab Order:	9905119	**Tag Number:**	
Project:	905079/NMO/Custillo Well	**Collection Date:**	05/20/99
Lab ID:	9905119-01A	**Matrix:**	AQUEOUS

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ALKALINITY		**EPA 310.0**				Analyst: **sld**
Alkalinity, Bicarbonate (As CaCO3)	220	5		mg/L CaCO3	1	05/25/99
Alkalinity, Carbonate (As CaCO3)	ND	5		mg/L CaCO3	1	05/25/99
Alkalinity, Total (As CaCO3)	220	5		mg/L CaCO3	1	05/25/99
BROMIDE		**4500 B**				Analyst: **sld**
Bromide	1.6	0.1		mg/L	2	06/10/99
CHLORIDE		**EPA 325.3**				Analyst: **kfl**
Chloride	240	5		mg/L	10	05/26/99
CONDUCTANCE		**EPA 120.1**				Analyst: **sld**
Specific Conductance	1100	1		µmhos/cm	1	05/25/99
FLUORIDE		**EPA 340.2**				Analyst: **sld**
Fluoride	2.8	0.2		mg/L	1	06/08/99
SULFATE		**EPA 375.4**				Analyst: **sld**
Sulfate	150	120		mg/L	25	05/27/99
TOTAL DISSOLVED SOLIDS		**EPA 160.1**				Analyst: **kfl**
Total Dissolved Solids (Residue, Filterable)	750	10		mg/L	1	05/25/99
MERCURY		**SW 7470 / EPA 245.**				Analyst: **btn**
Mercury	ND	0.0002		mg/L	1	06/08/99
ICP METALS		**SW 6010 / EPA 200.**				Analyst: **btn**
Calcium	110	0.05		mg/L	1	06/18/99
Magnesium	20	0.05		mg/L	1	06/18/99
Potassium	3.6	0.2		mg/L	1	06/18/99
Sodium	126	0.2		mg/L	1	06/18/99

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Services Laboratory

Date: *29-Jun-99*

CLIENT:	Pinnacle Laboratories	**Client Sample ID:**	905079-01
Lab Order:	9905119	**Tag Number:**	
Project:	905079/NMO/Custillo Well	**Collection Date:**	05/20/99
Lab ID:	9905119-01A	**Matrix:**	AQUEOUS

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
BNA SEMI-VOL ORGANICS, AQUEOUS		**SW 8270B**				Analyst: **keh**
1,2,4,5-Tetrachlorobenzene	ND	5		µg/L	1	05/28/99
1,2,4-Trichlorobenzene	ND	5		µg/L	1	05/28/99
1,2-Dichlorobenzene	ND	5		µg/L	1	05/28/99
1,2-Diphenylhydrazine	ND	5		µg/L	1	05/28/99
1,3-Dichlorobenzene	ND	5		µg/L	1	05/28/99
1,4-Dichlorobenzene	ND	5		µg/L	1	05/28/99
2,3,4,6-Tetrachlorophenol	ND	5		µg/L	1	05/28/99
2,4,5-Trichlorophenol	ND	5		µg/L	1	05/28/99
2,4,6-Trichlorophenol	ND	5		µg/L	1	05/28/99
2,4-Dichlorophenol	ND	5		µg/L	1	05/28/99
2,4-Dimethylphenol	ND	5		µg/L	1	05/28/99
2,4-Dinitrophenol	ND	10		µg/L	1	05/28/99
2,4-Dinitrotoluene	ND	5		µg/L	1	05/28/99
2,6-Dichlorophenol	ND	5		µg/L	1	05/28/99
2,6-Dinitrotoluene	ND	5		µg/L	1	05/28/99
2-Chloronaphthalene	ND	5		µg/L	1	05/28/99
2-Chlorophenol	ND	5		µg/L	1	05/28/99
2-Methylnaphthalene	ND	5		µg/L	1	05/28/99
2-Methylphenol	ND	5		µg/L	1	05/28/99
2-Nitroaniline	ND	5		µg/L	1	05/28/99
2-Nitrophenol	ND	5		µg/L	1	05/28/99
2-Picoline	ND	10		µg/L	1	05/28/99
3-Methylcholanthrene	ND	5		µg/L	1	05/28/99
3-Methylphenol	ND	5		µg/L	1	05/28/99
3-Nitroaniline	ND	5		µg/L	1	05/28/99
4,6-Dinitro-2-methylphenol	ND	5		µg/L	1	05/28/99
4-Aminobiphenyl	ND	50		µg/L	1	05/28/99
4-Bromophenyl phenyl ether	ND	5		µg/L	1	05/28/99
4-Chloro-3-methylphenol	ND	5		µg/L	1	05/28/99
4-Chlorophenyl phenyl ether	ND	5		µg/L	1	05/28/99
4-Methylphenol	ND	5		µg/L	1	05/28/99
4-Nitroaniline	ND	5		µg/L	1	05/28/99
4-Nitrophenol	ND	5		µg/L	1	05/28/99
7,12-Dimethylbenz(a)anthracene	ND	5		µg/L	1	05/28/99
Acenaphthene	ND	5		µg/L	1	05/28/99
Acenaphthylene	ND	5		µg/L	1	05/28/99
Acetophenone	ND	5		µg/L	1	05/28/99
Aniline	ND	5		µg/L	1	05/28/99
Anthracene	ND	5		µg/L	1	05/28/99
Benz(a)anthracene	ND	5		µg/L	1	05/28/99

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Services Laboratory

Date: *29-Jun-99*

CLIENT:	Pinnacle Laboratories	**Client Sample ID:**	905079-01
Lab Order:	9905119	**Tag Number:**	
Project:	905079/NMO/Custillo Well	**Collection Date:**	05/20/99
Lab ID:	9905119-01A	**Matrix:**	AQUEOUS

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
Benzo(a)pyrene	ND	5		µg/L	1	05/28/99
Benzo(b)fluoranthene	ND	5		µg/L	1	05/28/99
Benzo(g,h,i)perylene	ND	5		µg/L	1	05/28/99
Benzo(k)fluoranthene	ND	5		µg/L	1	05/28/99
Benzyl alcohol	ND	5		µg/L	1	05/28/99
Bis(2-chloroethoxy)methane	ND	5		µg/L	1	05/28/99
Bis(2-chloroethyl)ether	ND	5		µg/L	1	05/28/99
Bis(2-chloroisopropyl)ether	ND	5		µg/L	1	05/28/99
Bis(2-ethylhexyl)phthalate	ND	5		µg/L	1	05/28/99
Butyl benzyl phthalate	ND	5		µg/L	1	05/28/99
Chrysene	ND	5		µg/L	1	05/28/99
Di-n-butyl phthalate	ND	5		µg/L	1	05/28/99
Di-n-octyl phthalate	ND	5		µg/L	1	05/28/99
Dibenz(a,h)anthracene	ND	5		µg/L	1	05/28/99
Dibenzofuran	ND	5		µg/L	1	05/28/99
Diethyl phthalate	ND	5		µg/L	1	05/28/99
Dimethyl phthalate	ND	5		µg/L	1	05/28/99
Ethyl methanesulfonate	ND	5		µg/L	1	05/28/99
Fluoranthene	ND	5		µg/L	1	05/28/99
Fluorene	ND	5		µg/L	1	05/28/99
Hexachlorobenzene	ND	5		µg/L	1	05/28/99
Hexachlorobutadiene	ND	5		µg/L	1	05/28/99
Hexachlorocyclopentadiene	ND	5		µg/L	1	05/28/99
Hexachloroethane	ND	5		µg/L	1	05/28/99
Indeno(1,2,3-cd)pyrene	ND	5		µg/L	1	05/28/99
Isophorone	ND	5		µg/L	1	05/28/99
Methyl methanesulfonate	ND	5		µg/L	1	05/28/99
N-Nitroso-di-n-butylamine	ND	5		µg/L	1	05/28/99
N-Nitrosodi-n-propylamine	ND	5		µg/L	1	05/28/99
N-Nitrosodiphenylamine	ND	5		µg/L	1	05/28/99
N-Nitrosopiperidine	ND	5		µg/L	1	05/28/99
Naphthalene	ND	5		µg/L	1	05/28/99
Nitrobenzene	ND	5		µg/L	1	05/28/99
p-Dimethylaminoazobenzene	ND	5		µg/L	1	05/28/99
Pentachlorobenzene	ND	5		µg/L	1	05/28/99
Pentachloronitrobenzene	ND	5		µg/L	1	05/28/99
Pentachlorophenol	ND	5		µg/L	1	05/28/99
Phenacetin	ND	5		µg/L	1	05/28/99
Phenanthrene	ND	5		µg/L	1	05/28/99
Phenol	ND	5		µg/L	1	05/28/99
Pyrene	ND	5		µg/L	1	05/28/99

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Services Laboratory

Date: *29-Jun-99*

CLIENT:	Pinnacle Laboratories	**Client Sample ID:**	905079-01
Lab Order:	9905119	**Tag Number:**	
Project:	905079/NMO/Custillo Well	**Collection Date:**	05/20/99
Lab ID:	9905119-01A	**Matrix:**	AQUEOUS

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
Surr: 2,4,6-Tribromophenol	76.1	10-123		%REC	1	05/28/99
Surr: 2-Fluorobiphenyl	62.2	43-116		%REC	1	05/28/99
Surr: 2-Fluorophenol	30.4	21-100		%REC	1	05/28/99
Surr: 4-Terphenyl-d14	68.2	33-141		%REC	1	05/28/99
Surr: Nitrobenzene-d5	57.6	35-114		%REC	1	05/28/99
Surr: Phenol-d5	18.0	10-94		%REC	1	05/28/99

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

CLIENT: Pinnacle Laboratories
Work Order: 9905119
Project: 905079/NMO/Custillo Well

QC SUMMARY REPORT
Method Blank

Sample ID: **MBlank** Batch ID: **01 ALK A-6/1/** Test Code: **Alkalinity** Units: **mg/L CaCO3** Analysis Date **04/19/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990419A** SeqNo: **9643**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	ND	5									
Alkalinity, Carbonate (As CaCO3)	ND	5									
Alkalinity, Total (As CaCO3)	ND	5									

Sample ID: **MBlank** Batch ID: **01 ALK A-6/1/** Test Code: **Alkalinity** Units: **mg/L CaCO3** Analysis Date **05/25/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990525A** SeqNo: **9907**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	ND	5									
Alkalinity, Carbonate (As CaCO3)	ND	5									
Alkalinity, Total (As CaCO3)	ND	5									

Sample ID: **MBlank** Batch ID: **01 ALK A-6/1/** Test Code: **Alkalinity** Units: **mg/L CaCO3** Analysis Date **05/03/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990503B** SeqNo: **11150**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	ND	5									
Alkalinity, Carbonate (As CaCO3)	ND	5									
Alkalinity, Total (As CaCO3)	ND	5									

Sample ID: **MBlank** Batch ID: **01 ALK A-6/1/** Test Code: **Alkalinity** Units: **mg/L CaCO3** Analysis Date **05/10/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990510C** SeqNo: **11173**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	ND	5									
Alkalinity, Carbonate (As CaCO3)	ND	5									
Alkalinity, Total (As CaCO3)	ND	5									

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905119
Project: 905079/NMO/Custillo Well

QC SUMMARY REPORT
Method Blank

Sample ID: **MBlank** Batch ID: **01 ALK A-6/1/** Test Code: **Alkalinity** Units: **mg/L CaCO3** Analysis Date **05/11/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990511C** SeqNo: **11182**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	ND	5									
Alkalinity, Carbonate (As CaCO3)	ND	5									
Alkalinity, Total (As CaCO3)	ND	5									

Sample ID: **MBlank** Batch ID: **01 ALK A-6/1/** Test Code: **Alkalinity** Units: **mg/L CaCO3** Analysis Date **05/14/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990514B** SeqNo: **11226**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	ND	5									
Alkalinity, Carbonate (As CaCO3)	ND	5									
Alkalinity, Total (As CaCO3)	ND	5									

Sample ID: **MBlank** Batch ID: **01 BR A-6/11/** Test Code: **Bromide** Units: **mg/L** Analysis Date **06/10/99** Prep Date:
Client ID: **9905119** Run ID: **HIT MAN_990610A** SeqNo: **13710**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Bromide	ND	5									

Sample ID: **MBlank** Batch ID: **01 CL A-6/1/9** Test Code: **Chloride** Units: **mg/L** Analysis Date **05/26/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990526A** SeqNo: **9937**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	ND	0.5									

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905119
Project: 905079/NMO/Custillo Well

QC SUMMARY REPORT
Method Blank

Sample ID: MBlank	Batch ID: 01 CL A-6/1/9	Test Code: Chloride	Units: mg/L	Analysis Date 05/07/99	Prep Date:
Client ID:	9905119	Run ID: NO INST_990507B		SeqNo: 11086	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	ND	0.5									

Sample ID: MBlank	Batch ID: 01 CL A-6/1/9	Test Code: Chloride	Units: mg/L	Analysis Date 05/17/99	Prep Date:
Client ID:	9905119	Run ID: NO INST_990517C		SeqNo: 11134	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	ND	0.5									

Sample ID: MBlank	Batch ID: 01 COND-06/	Test Code: E120.1	Units: µmhos/cm	Analysis Date 04/21/99	Prep Date:
Client ID:	9905119	Run ID: NO INST_990421A		SeqNo: 10312	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Specific Conductance	ND	1									

Sample ID: MBlank	Batch ID: 01 COND-06/	Test Code: E120.1	Units: µmhos/cm	Analysis Date 05/10/99	Prep Date:
Client ID:	9905119	Run ID: NO INST_990510A		SeqNo: 10347	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Specific Conductance	ND	1									

Sample ID: MBlank	Batch ID: 01 COND-06/	Test Code: E120.1	Units: µmhos/cm	Analysis Date 05/20/99	Prep Date:
Client ID:	9905119	Run ID: NO INST_990520A		SeqNo: 10364	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Specific Conductance	ND	1									

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905119
Project: 905079/NMO/Custillo Well

QC SUMMARY REPORT
Method Blank

Sample ID: **MBlank** Batch ID: **01 COND-06/** Test Code: **E120.1** Units: **µmhos/cm** Analysis Date **05/25/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990525E** SeqNo: **10384**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Specific Conductance	ND	1									

Sample ID: **MBlank** Batch ID: **01 FL A-6/9/9** Test Code: **fluoride** Units: **mg/L** Analysis Date **06/08/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990608B** SeqNo: **13057**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Fluoride	ND	0.2									

Sample ID: **MBlank** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **05/21/99** Prep Date:
Client ID: **9905119** Run ID: **HIT MAN_990521B** SeqNo: **9661**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	ND	5									

Sample ID: **MBlank** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **05/27/99** Prep Date:
Client ID: **9905119** Run ID: **HIT MAN_990527A** SeqNo: **9765**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	ND	5									

Sample ID: **MBlank** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **04/29/99** Prep Date:
Client ID: **9905119** Run ID: **HIT MAN_990429A** SeqNo: **10621**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	ND	5									

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905119
Project: 905079/NMO/Custillo Well

QC SUMMARY REPORT
Method Blank

Sample ID: MBlank	Batch ID: 01 SULFATE	Test Code: Sulfate	Units: mg/L	Analysis Date 05/12/99	Prep Date:
Client ID:	9905119	Run ID: HIT MAN_990512B		SeqNo: 10869	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	ND	5									

Sample ID: MBlank	Batch ID: 01 SULFATE	Test Code: Sulfate	Units: mg/L	Analysis Date 05/20/99	Prep Date:
Client ID:	9905119	Run ID: HIT MAN_990520A		SeqNo: 10997	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	ND	5									

Sample ID: MBlank	Batch ID: 01 TDS-6/1/99	Test Code: E160.1	Units: mg/L	Analysis Date 05/25/99	Prep Date:
Client ID:	9905119	Run ID: NO INST_990525C		SeqNo: 10233	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Dissolved Solids (Residue, Filtera	ND	10									

Sample ID: MBlank	Batch ID: 01 TDS-6/1/99	Test Code: E160.1	Units: mg/L	Analysis Date 05/26/99	Prep Date:
Client ID:	9905119	Run ID: NO INST_990526C		SeqNo: 10284	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Dissolved Solids (Residue, Filtera	ND	10									

Sample ID: MBlank	Batch ID: 01 TDS-6/1/99	Test Code: E160.1	Units: mg/L	Analysis Date 04/28/99	Prep Date:
Client ID:	9905119	Run ID: NO INST_990428C		SeqNo: 11254	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Dissolved Solids (Residue, Filtera	ND	10									

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905119
Project: 905079/NMO/Custillo Well

QC SUMMARY REPORT
Method Blank

Sample ID: **MBlank**	Batch ID: **01 TDS-6/1/99**	Test Code: **E160.1**	Units: **mg/L**	Analysis Date **05/05/99**	Prep Date:
Client ID:	**9905119**	Run ID: **NO INST_990505B**		SeqNo: **11272**	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Dissolved Solids (Residue, Filtera	ND	10									

Sample ID: **MBlank**	Batch ID: **01 TDS-6/1/99**	Test Code: **E160.1**	Units: **mg/L**	Analysis Date **05/11/99**	Prep Date:
Client ID:	**9905119**	Run ID: **NO INST_990511D**		SeqNo: **11287**	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Dissolved Solids (Residue, Filtera	ND	10									

Sample ID: **MBlank**	Batch ID: **01 TDS-6/1/99**	Test Code: **E160.1**	Units: **mg/L**	Analysis Date **05/18/99**	Prep Date:
Client ID:	**9905119**	Run ID: **NO INST_990518B**		SeqNo: **11307**	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Dissolved Solids (Residue, Filtera	ND	10									

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905119
Project: 905079/NMO/Custillo Well

QC SUMMARY REPORT
Method Blank

Sample ID: **MB-480** Batch ID: **480** Test Code: **SW8270B** Units: **µg/L** Analysis Date **05/27/99** Prep Date: **05/24/99**
Client ID: **9905119** Run ID: **MANFREDD_990527A** SeqNo: **9970**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,2,4,5-Tetrachlorobenzene	ND	5									
1,2,4-Trichlorobenzene	ND	5									
1,2-Dichlorobenzene	ND	5									
1,2-Diphenylhydrazine	ND	5									
1,3-Dichlorobenzene	ND	5									
1,4-Dichlorobenzene	ND	5									
2,3,4,6-Tetrachlorophenol	ND	5									
2,4,5-Trichlorophenol	ND	5									
2,4,6-Trichlorophenol	ND	5									
2,4-Dichlorophenol	ND	5									
2,4-Dimethylphenol	ND	5									
2,4-Dinitrophenol	ND	10									
2,4-Dinitrotoluene	ND	5									
2,6-Dichlorophenol	ND	5									
2,6-Dinitrotoluene	ND	5									
2-Chloronaphthalene	ND	5									
2-Chlorophenol	ND	5									
2-Methylnaphthalene	ND	5									
2-Methylphenol	ND	5									
2-Nitroaniline	ND	5									
2-Nitrophenol	ND	5									
2-Picoline	ND	10									
3-Methylcholanthrene	ND	5									
3-Methylphenol	ND	5									
3-Nitroaniline	ND	5									
4,6-Dinitro-2-methylphenol	ND	5									
4-Aminobiphenyl	ND	50									
4-Bromophenyl phenyl ether	ND	5									
4-Chloro-3-methylphenol	ND	5									

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

4-Chlorophenyl phenyl ether	ND	5
4-Methylphenol	ND	5
4-Nitroaniline	ND	5
4-Nitrophenol	ND	5
7,12-Dimethylbenz(a)anthracene	ND	5
Acenaphthene	ND	5
Acenaphthylene	ND	5
Acetophenone	ND	5
Aniline	ND	5
Anthracene	ND	5
Benz(a)anthracene	ND	5
Benzo(a)pyrene	ND	5
Benzo(b)fluoranthene	ND	5
Benzo(g,h,i)perylene	ND	5
Benzo(k)fluoranthene	ND	5
Benzyl alcohol	ND	5
Bis(2-chloroethoxy)methane	ND	5
Bis(2-chloroethyl)ether	ND	5
Bis(2-chloroisopropyl)ether	ND	5
Bis(2-ethylhexyl)phthalate	ND	5
Butyl benzyl phthalate	ND	5
Chrysene	ND	5
Di-n-butyl phthalate	ND	5
Di-n-octyl phthalate	ND	5
Dibenz(a,h)anthracene	ND	5
Dibenzofuran	ND	5
Diethyl phthalate	ND	5
Dimethyl phthalate	ND	5
Ethyl methanesulfonate	ND	5
Fluoranthene	ND	5
Fluorene	ND	5
Hexachlorobenzene	ND	5
Hexachlorobutadiene	ND	5

Hexachlorocyclopentadiene	ND	5
Hexachloroethane	ND	5
Indeno(1,2,3-cd)pyrene	ND	5
Isophorone	ND	5
Methyl methanesulfonate	ND	5
N-Nitroso-di-n-butylamine	ND	5
N-Nitrosodi-n-propylamine	ND	5
N-Nitrosodiphenylamine	ND	5
N-Nitrosopiperidine	ND	5
Naphthalene	ND	5
Nitrobenzene	ND	5
p-Dimethylaminoazobenzene	ND	5
Pentachlorobenzene	ND	5
Pentachloronitrobenzene	ND	5
Pentachlorophenol	ND	5
Phenacetin	ND	5
Phenanthrene	ND	5
Phenol	ND	5
Pyrene	ND	5

CLIENT: Pinnacle Laboratories
Work Order: 9905119
Project: 905079/NMO/Custillo Well

QC SUMMARY REPORT
Method Blank

Sample ID: **MB-480** Batch ID: **480** Test Code: **SW8270B** Units: **µg/L** Analysis Date **05/28/99** Prep Date: **05/24/99**
Client ID: **9905119** Run ID: **MANFREDD_990528A** SeqNo: **11673**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,2,4,5-Tetrachlorobenzene	ND	5									
1,2,4-Trichlorobenzene	ND	5									
1,2-Dichlorobenzene	ND	5									
1,2-Diphenylhydrazine	ND	5									
1,3-Dichlorobenzene	ND	5									
1,4-Dichlorobenzene	ND	5									
2,3,4,6-Tetrachlorophenol	ND	5									
2,4,5-Trichlorophenol	ND	5									
2,4,6-Trichlorophenol	ND	5									
2,4-Dichlorophenol	ND	5									
2,4-Dimethylphenol	ND	5									
2,4-Dinitrophenol	ND	10									
2,4-Dinitrotoluene	ND	5									
2,6-Dichlorophenol	ND	5									
2,6-Dinitrotoluene	ND	5									
2-Chloronaphthalene	ND	5									
2-Chlorophenol	ND	5									
2-Methylnaphthalene	ND	5									
2-Methylphenol	ND	5									
2-Nitroaniline	ND	5									
2-Nitrophenol	ND	5									
2-Picoline	ND	10									
3-Methylcholanthrene	ND	5									
3-Methylphenol	ND	5									
3-Nitroaniline	ND	5									
4,6-Dinitro-2-methylphenol	ND	5									
4-Aminobiphenyl	ND	50									
4-Bromophenyl phenyl ether	ND	5									
4-Chloro-3-methylphenol	ND	5									

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905119
Project: 905079/NMO/Custillo Well

QC SUMMARY REPORT
Method Blank

4-Chlorophenyl phenyl ether	ND	5
4-Methylphenol	ND	5
4-Nitroaniline	ND	5
4-Nitrophenol	ND	5
7,12-Dimethylbenz(a)anthracene	ND	5
Acenaphthene	ND	5
Acenaphthylene	ND	5
Acetophenone	ND	5
Aniline	ND	5
Anthracene	ND	5
Benz(a)anthracene	ND	5
Benzo(a)pyrene	ND	5
Benzo(b)fluoranthene	ND	5
Benzo(g,h,i)perylene	ND	5
Benzo(k)fluoranthene	ND	5
Benzyl alcohol	ND	5
Bis(2-chloroethoxy)methane	ND	5
Bis(2-chloroethyl)ether	ND	5
Bis(2-chloroisopropyl)ether	ND	5
Bis(2-ethylhexyl)phthalate	ND	5
Butyl benzyl phthalate	ND	5
Chrysene	ND	5
Di-n-butyl phthalate	ND	5
Di-n-octyl phthalate	ND	5
Dibenz(a,h)anthracene	ND	5
Dibenzofuran	ND	5
Diethyl phthalate	ND	5
Dimethyl phthalate	ND	5
Ethyl methanesulfonate	ND	5
Fluoranthene	ND	5
Fluorene	ND	5
Hexachlorobenzene	ND	5
Hexachlorobutadiene	ND	5

Qualifiers: ND - Not Detected at the Reporting Limit; S - Spike Recovery outside accepted recovery limits; B - Analyte detected in the associated Method Blank
J - Analyte detected below quantitation limits; R - RPD outside accepted recovery limits

Hexachlorocyclopentadiene	ND	5
Hexachloroethane	ND	5
Indeno(1,2,3-cd)pyrene	ND	5
Isophorone	ND	5
Methyl methanesulfonate	ND	5
N-Nitroso-di-n-butylamine	ND	5
N-Nitrosodi-n-propylamine	ND	5
N-Nitrosodiphenylamine	ND	5
N-Nitrosopiperidine	ND	5
Naphthalene	ND	5
Nitrobenzene	ND	5
p-Dimethylaminoazobenzene	ND	5
Pentachlorobenzene	ND	5
Pentachloronitrobenzene	ND	5
Pentachlorophenol	ND	5
Phenacetin	ND	5
Phenanthrene	ND	5
Phenol	ND	5
Pyrene	ND	5

Sample ID: **MB-513** Batch ID: **513** Test Code: **Mercury** Units: **mg/L** Analysis Date **06/08/99** Prep Date: **06/07/99**

Client ID: **9905119** Run ID: **MERC_990608A** SeqNo: **13237**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	ND	0.0002									

CLIENT: Pinnacle Laboratories
Work Order: 9905119
Project: 905079/NMO/Custillo Well

QC SUMMARY REPORT
Method Blank

Sample ID: **MB-548** Batch ID: **548** Test Code: **ICPMET** Units: **mg/L** Analysis Date **06/18/99** Prep Date: **06/16/99**
Client ID: **9905119** Run ID: **ICP_990618B** SeqNo: **15580**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	ND	0.005									
Arsenic	ND	0.005									
Barium	ND	0.005									
Beryllium	ND	0.002									
Cadmium	ND	0.002									
Calcium	ND	0.05									
Chromium	ND	0.005									
Copper	ND	0.005									
Hardness	ND	0.33									
Iron	ND	0.015									
Lead	ND	0.005									
Magnesium	ND	0.05									
Manganese	ND	0.005									
Nickel	ND	0.005									
Potassium	ND	0.2									
Selenium	ND	0.005									
Silver	ND	0.005									
Sodium	ND	0.2									
Thallium	ND	0.01									
Zinc	ND	0.005									

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905119
Project: 905079/NMO/Custillo Well

QC SUMMARY REPORT
Sample Duplicate

Sample ID: **9904055-08A DUP** Batch ID: **01 ALK A-6/1/** Test Code: **Alkalinity** Units: **mg/L CaCO3** Analysis Date **04/19/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990419A** SeqNo: **9656**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	150	5	0	0	0.0%	0	0	150	0.0%	20	
Alkalinity, Carbonate (As CaCO3)	ND	5	0	0	0.0%	0	0	0	0.0%	20	
Alkalinity, Total (As CaCO3)	150	5	0	0	0.0%	0	0	150	0.0%	20	

Sample ID: **9904114-04A DUP** Batch ID: **01 ALK A-6/1/** Test Code: **Alkalinity** Units: **mg/L CaCO3** Analysis Date **05/03/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990503B** SeqNo: **11153**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	100	5	0	0	0.0%	0	0	95	5.1%	20	
Alkalinity, Carbonate (As CaCO3)	ND	5	0	0	0.0%	0	0	0	0.0%	20	
Alkalinity, Total (As CaCO3)	100	5	0	0	0.0%	0	0	95	5.1%	20	

Sample ID: **9905011-03A DUP** Batch ID: **01 ALK A-6/1/** Test Code: **Alkalinity** Units: **mg/L CaCO3** Analysis Date **05/10/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990510C** SeqNo: **11179**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	200	5	0	0	0.0%	0	0	210	4.9%	20	
Alkalinity, Carbonate (As CaCO3)	ND	5	0	0	0.0%	0	0	0	0.0%	20	
Alkalinity, Total (As CaCO3)	200	5	0	0	0.0%	0	0	210	4.9%	20	

Sample ID: **9905029-01A DUP** Batch ID: **01 ALK A-6/1/** Test Code: **Alkalinity** Units: **mg/L CaCO3** Analysis Date **05/11/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990511C** SeqNo: **11187**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	170	5	0	0	0.0%	0	0	170	0.0%	20	
Alkalinity, Carbonate (As CaCO3)	ND	5	0	0	0.0%	0	0	0	0.0%	20	
Alkalinity, Total (As CaCO3)	170	5	0	0	0.0%	0	0	170	0.0%	20	

Qualifiers: ND - Not Detected at the Reporting Limit; S - Spike Recovery outside accepted recovery limits; B - Analyte detected in the associated Method Blank
J - Analyte detected below quantitation limits; R - RPD outside accepted recovery limits

CLIENT: Pinnacle Laboratories
Work Order: 9905119
Project: 905079/NMO/Custillo Well

QC SUMMARY REPORT
Sample Duplicate

Sample ID: **9905053-02A DUP** Batch ID: **01 ALK A-6/1/** Test Code: **Alkalinity** Units: **mg/L CaCO3** Analysis Date **05/14/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990514B** SeqNo: **11231**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	130	5	0	0	0.0%	0	0	120	8.0%	20	
Alkalinity, Carbonate (As CaCO3)	ND	5	0	0	0.0%	0	0	0	0.0%	20	
Alkalinity, Total (As CaCO3)	130	5	0	0	0.0%	0	0	120	8.0%	20	

Sample ID: **9905087-01A DUP** Batch ID: **01 ALK A-6/1/** Test Code: **Alkalinity** Units: **mg/L CaCO3** Analysis Date **05/25/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990525A** SeqNo: **9910**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Total (As CaCO3)	410	5	0	0	0.0%	0	0	450	9.3%	20	

Sample ID: **9905120-01A DUP** Batch ID: **01 ALK A-6/1/** Test Code: **Alkalinity** Units: **mg/L CaCO3** Analysis Date **05/25/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990525A** SeqNo: **9928**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	220	5	0	0	0.0%	0	0	210	4.7%	20	
Alkalinity, Carbonate (As CaCO3)	ND	5	0	0	0.0%	0	0	0	0.0%	20	
Alkalinity, Total (As CaCO3)	220	5	0	0	0.0%	0	0	210	4.7%	20	

Sample ID: **9906014-02A DUP** Batch ID: **01 BR A-6/11/** Test Code: **Bromide** Units: **mg/L** Analysis Date **06/10/99** Prep Date:
Client ID: **9905119** Run ID: **HIT MAN_990610A** SeqNo: **13716**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Bromide	.32	0.1	0	0	0.0%	0	0	0.11	97.7%	20	R,T

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905119
Project: 905079/NMO/Custillo Well

QC SUMMARY REPORT
Sample Duplicate

Sample ID: **9904166-01A DUP** Batch ID: **01 CL A-6/1/9** Test Code: **Chloride** Units: **mg/L** Analysis Date **05/07/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990507B** SeqNo: **11108**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	38	5	0	0	0.0%	0	0	40	5.1%	20	

Sample ID: **9904166-02A DUP** Batch ID: **01 CL A-6/1/9** Test Code: **Chloride** Units: **mg/L** Analysis Date **05/07/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990507B** SeqNo: **11112**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	32	5	0	0	0.0%	0	0	35	9.0%	20	

Sample ID: **9905030-01A DUP** Batch ID: **01 CL A-6/1/9** Test Code: **Chloride** Units: **mg/L** Analysis Date **05/17/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990517C** SeqNo: **11137**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	140	5	0	0	0.0%	0	0	130	7.4%	20	

Sample ID: **9905097-02A DUP** Batch ID: **01 CL A-6/1/9** Test Code: **Chloride** Units: **mg/L** Analysis Date **05/26/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990526A** SeqNo: **9944**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride, Diss	5	0.5	0	0	0.0%	0	0	5.25	4.9%	20	

Sample ID: **9905133-05A DUP** Batch ID: **01 CL A-6/1/9** Test Code: **Chloride** Units: **mg/L** Analysis Date **05/26/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990526A** SeqNo: **9959**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride, Diss	17.5	5	0	0	0.0%	0	0	17.5	0.0%	20	

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905119
Project: 905079/NMO/Custillo Well

QC SUMMARY REPORT
Sample Duplicate

Sample ID: **9904085-01A DUP** Batch ID: **01 COND-06/** Test Code: **E120.1** Units: **µmhos/cm** Analysis Date **04/21/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990421A** SeqNo: **10315**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Specific Conductance	2280	1	0	0	0.0%	0	0	2340	2.6%	20	

Sample ID: **9904146-01A DUP** Batch ID: **01 COND-06/** Test Code: **E120.1** Units: **µmhos/cm** Analysis Date **05/10/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990510A** SeqNo: **10350**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Specific Conductance	512	1	0	0	0.0%	0	0	517	1.0%	20	

Sample ID: **9905047-01A DUP** Batch ID: **01 COND-06/** Test Code: **E120.1** Units: **µmhos/cm** Analysis Date **05/20/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990520A** SeqNo: **10370**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Specific Conductance	170	1	0	0	0.0%	0	0	171	0.6%	20	

Sample ID: **9905101-01A DUP** Batch ID: **01 COND-06/** Test Code: **E120.1** Units: **µmhos/cm** Analysis Date **05/25/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990525E** SeqNo: **10395**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Specific Conductance	860	1	0	0	0.0%	0	0	830	3.6%	20	

Sample ID: **9906027-03A DUP** Batch ID: **01 FL A-6/9/9** Test Code: **fluoride** Units: **mg/L** Analysis Date **06/08/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990608B** SeqNo: **13068**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Fluoride	ND	0.2	0	0	0.0%	0	0	0	0.0%	20	

Qualifiers: ND - Not Detected at the Reporting Limit; J - Analyte detected below quantitation limits; S - Spike Recovery outside accepted recovery limits; R - RPD outside accepted recovery limits; B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905119
Project: 905079/NMO/Custillo Well

QC SUMMARY REPORT
Sample Duplicate

Sample ID: **9904111-01A DUP** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **04/29/99** Prep Date:
Client ID: **9905119** Run ID: **HIT MAN_990429A** SeqNo: **10624**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	59.02	12	0	0	0.0%	80	120	56.18	4.9%	20	

Sample ID: **9904157-03A DUP** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **04/29/99** Prep Date:
Client ID: **9905119** Run ID: **HIT MAN_990429A** SeqNo: **10662**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	233.1	62	0	0	0.0%	80	120	203.9	13.4%	20	
Sulfate, Diss	ND	62	0	0	0.0%	80	120	0	0.0%	20	

Sample ID: **9904166-01A DUP** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **05/12/99** Prep Date:
Client ID: **9905119** Run ID: **HIT MAN_990512B** SeqNo: **10872**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	126.9	62	0	0	0.0%	80	120	130.2	2.6%	20	

Sample ID: **9905045-01A DUP** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **05/20/99** Prep Date:
Client ID: **9905119** Run ID: **HIT MAN_990520A** SeqNo: **11008**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	134.4	25	0	0	0.0%	80	120	121	10.5%	20	

Sample ID: **9905078-01A DUP** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **05/21/99** Prep Date:
Client ID: **9905119** Run ID: **HIT MAN_990521B** SeqNo: **9668**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	574.8	120	0	0	0.0%	80	120	494	15.1%	20	

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905119
Project: 905079/NMO/Custillo Well

QC SUMMARY REPORT
Sample Duplicate

Sample ID: **9905097-02A DUP** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **05/27/99** Prep Date:
Client ID: **9905119** Run ID: **HIT MAN_990527A** SeqNo: **9769**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate, Diss	13	5	0	0	0.0%	80	120	13	0.0%	20	

Sample ID: **9904140-04A DUP** Batch ID: **01 TDS-6/1/99** Test Code: **E160.1** Units: **mg/L** Analysis Date **04/28/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990428C** SeqNo: **11267**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Dissolved Solids (Residue, Filtera	510	10	0	0	0.0%	0	0	480	6.1%	20	

Sample ID: **9905011-03A DUP** Batch ID: **01 TDS-6/1/99** Test Code: **E160.1** Units: **mg/L** Analysis Date **05/05/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990505B** SeqNo: **11286**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Dissolved Solids (Residue, Filtera	470	10	0	0	0.0%	0	0	470	0.0%	20	

Sample ID: **9905026-01A DUP** Batch ID: **01 TDS-6/1/99** Test Code: **E160.1** Units: **mg/L** Analysis Date **05/11/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990511D** SeqNo: **11290**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Dissolved Solids (Residue, Filtera	430	10	0	0	0.0%	0	0	420	2.4%	20	

Sample ID: **9905053-01A DUP** Batch ID: **01 TDS-6/1/99** Test Code: **E160.1** Units: **mg/L** Analysis Date **05/18/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990518B** SeqNo: **11310**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Dissolved Solids (Residue, Filtera	440	10	0	0	0.0%	0	0	420	4.7%	20	

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905119
Project: 905079/NMO/Custillo Well

QC SUMMARY REPORT
Sample Duplicate

Sample ID: **9905098-01A DUP** Batch ID: **01 TDS-6/1/99** Test Code: **E160.1** Units: **mg/L** Analysis Date **05/25/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990525C** SeqNo: **10238**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Dissolved Solids (Residue, Filtera	15	10	0	0	0.0%	0	0	34	77.6%	20	R,T

Sample ID: **9905133-03A DUP** Batch ID: **01 TDS-6/1/99** Test Code: **E160.1** Units: **mg/L** Analysis Date **05/26/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990526C** SeqNo: **10287**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Dissolved Solids (Residue, Filtera	110	10	0	0	0.0%	0	0	130	16.7%	20	

Sample ID: **9906044-12A DUP** Batch ID: **513** Test Code: **Mercury** Units: **mg/L** Analysis Date **06/08/99** Prep Date: **06/07/99**
Client ID: **9905119** Run ID: **MERC_990608A** SeqNo: **13240**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	ND	0.0002	0	0	0.0%	0	0	0	0.0%	20	

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905119
Project: 905079/NMO/Custillo Well

QC SUMMARY REPORT
Sample Duplicate

Sample ID: **9905144-01A DUP** Batch ID: **548** Test Code: **ICPMET** Units: **mg/L** Analysis Date **06/18/99** Prep Date: **06/16/99**
Client ID: **9905119** Run ID: **ICP_990618B** SeqNo: **15582**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	ND	0.005	0	0	0.0%	0	0	0	0.0%	20	
Arsenic	ND	0.005	0	0	0.0%	0	0	0	0.0%	20	
Barium	.02084	0.005	0	0	0.0%	0	0	0.02096	0.6%	20	
Beryllium	ND	0.002	0	0	0.0%	0	0	0	0.0%	20	
Cadmium	ND	0.002	0	0	0.0%	0	0	0	0.0%	20	
Calcium	5.545	0.05	0	0	0.0%	0	0	5.657	2.0%	20	
Chromium	ND	0.005	0	0	0.0%	0	0	0	0.0%	20	
Copper	ND	0.005	0	0	0.0%	0	0	0	0.0%	20	
Hardness	18.92	0.33	0	0	0.0%	0	0	19.28	1.9%	20	
Iron	.04548	0.015	0	0	0.0%	0	0	0.02719	50.3%	20	R
Lead	ND	0.005	0	0	0.0%	0	0	0	0.0%	20	
Magnesium	1.233	0.05	0	0	0.0%	0	0	1.252	1.5%	20	
Manganese	.007505	0.005	0	0	0.0%	0	0	0.007559	0.7%	20	
Nickel	ND	0.005	0	0	0.0%	0	0	0	0.0%	20	
Potassium	.5463	0.2	0	0	0.0%	0	0	0.533	2.5%	20	
Selenium	ND	0.005	0	0	0.0%	0	0	0	0.0%	20	
Silver	ND	0.005	0	0	0.0%	0	0	0	0.0%	20	
Sodium	6.094	0.2	0	0	0.0%	0	0	6.104	0.2%	20	
Thallium	ND	0.01	0	0	0.0%	0	0	0	0.0%	20	
Zinc	ND	0.005	0	0	0.0%	0	0	0	0.0%	20	

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905119
Project: 905079/NMO/Custillo Well

QC SUMMARY REPORT

Sample Matrix Spike

Sample ID: **9906014-02A MS**	Batch ID: **01 BR A-6/11/**	Test Code: **Bromide**	Units: **mg/L**	Analysis Date **06/10/99**	Prep Date:
Client ID:	**9905119**	Run ID: **HIT MAN_990610A**		SeqNo: **13717**	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Bromide	16.7	0.1	50	0.11	33.2%	75	125	0			S,H

Sample ID: **9906014-02A MSD**	Batch ID: **01 BR A-6/11/**	Test Code: **Bromide**	Units: **mg/L**	Analysis Date **06/10/99**	Prep Date:
Client ID:	**9905119**	Run ID: **HIT MAN_990610A**		SeqNo: **13718**	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Bromide	16.4	0.1	50	0.11	32.6%	75	125	16.7	1.8%	20	S,H

Sample ID: **9904166-01A MS**	Batch ID: **01 CL A-6/1/9**	Test Code: **Chloride**	Units: **mg/L**	Analysis Date **05/07/99**	Prep Date:
Client ID:	**9905119**	Run ID: **NO INST_990507B**		SeqNo: **11109**	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	82	5	50	40	84.0%	75	125	0			

Sample ID: **9904166-01A MSD**	Batch ID: **01 CL A-6/1/9**	Test Code: **Chloride**	Units: **mg/L**	Analysis Date **05/07/99**	Prep Date:
Client ID:	**9905119**	Run ID: **NO INST_990507B**		SeqNo: **11110**	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	85	5	50	40	90.0%	75	125	82	3.6%	20	

Sample ID: **9904166-02A MS**	Batch ID: **01 CL A-6/1/9**	Test Code: **Chloride**	Units: **mg/L**	Analysis Date **05/07/99**	Prep Date:
Client ID:	**9905119**	Run ID: **NO INST_990507B**		SeqNo: **11113**	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	90	5	50	35	110.0%	75	125	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905119
Project: 905079/NMO/Custillo Well

QC SUMMARY REPORT
Sample Matrix Spike Duplicate

Sample ID: **9904166-02A MSD** Batch ID: **01 CL A-6/1/9** Test Code: **Chloride** Units: **mg/L** Analysis Date **05/07/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990507B** SeqNo: **11114**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	80	5	50	35	90.0%	75	125	90	11.8%	20	

Sample ID: **9905030-01A MS** Batch ID: **01 CL A-6/1/9** Test Code: **Chloride** Units: **mg/L** Analysis Date **05/17/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990517C** SeqNo: **11138**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	240	5	100	130	110.0%	75	125	0			

Sample ID: **9905030-01A MSD** Batch ID: **01 CL A-6/1/9** Test Code: **Chloride** Units: **mg/L** Analysis Date **05/17/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990517C** SeqNo: **11139**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	230	5	100	130	100.0%	75	125	240	4.3%	20	

Sample ID: **9905097-02A MS** Batch ID: **01 CL A-6/1/9** Test Code: **Chloride** Units: **mg/L** Analysis Date **05/26/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990526A** SeqNo: **9945**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride, Diss	16	0.5	10	5.25	107.5%	75	125	0			

Sample ID: **9905097-02A MSD** Batch ID: **01 CL A-6/1/9** Test Code: **Chloride** Units: **mg/L** Analysis Date **05/26/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990526A** SeqNo: **9946**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride, Diss	15	0.5	10	5.25	97.5%	75	125	16	6.5%	20	

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905119
Project: 905079/NMO/Custillo Well

QC SUMMARY REPORT
Sample Matrix Spike

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sample ID: 9905133-05A MS Batch ID: **01 CL A-6/1/9** Test Code: **Chloride** Units: **mg/L** Analysis Date **05/26/99** Prep Date:											
Client ID: **9905119** Run ID: **NO INST_990526A** SeqNo: **9960**											
Chloride, Diss	122.5	5	100	17.5	105.0%	75	125	0			
Sample ID: 9905133-05A MSD Batch ID: **01 CL A-6/1/9** Test Code: **Chloride** Units: **mg/L** Analysis Date **05/26/99** Prep Date:											
Client ID: **9905119** Run ID: **NO INST_990526A** SeqNo: **9961**											
Chloride, Diss	117.5	5	100	17.5	100.0%	75	125	122.5	4.2%	20	
Sample ID: 9906027-03A MS Batch ID: **01 FL A-6/9/9** Test Code: **fluoride** Units: **mg/L** Analysis Date **06/08/99** Prep Date:											
Client ID: **9905119** Run ID: **NO INST_990608B** SeqNo: **13069**											
Fluoride	7.8	0.2	7	0	111.4%	75	125	0			
Sample ID: 9906027-03A MSD Batch ID: **01 FL A-6/9/9** Test Code: **fluoride** Units: **mg/L** Analysis Date **06/08/99** Prep Date:											
Client ID: **9905119** Run ID: **NO INST_990608B** SeqNo: **13070**											
Fluoride	7.7	0.2	7	0	110.0%	75	125	7.8	1.3%	20	
Sample ID: 9904111-01A MS Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **04/29/99** Prep Date:											
Client ID: **9905119** Run ID: **HIT MAN_990429A** SeqNo: **10625**											
Sulfate	96.15	25	50	56.18	80.0%	75	125	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905119
Project: 905079/NMO/Custillo Well

QC SUMMARY REPORT
Sample Matrix Spike Duplicate

Sample ID: **9904111-01A MSD** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **04/29/99** Prep Date:
Client ID: **9905119** Run ID: **HIT MAN_990429A** SeqNo: **10626**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	96.15	25	50	56.18	80.0%	75	125	96.15	0.0%	20	

Sample ID: **9904157-03A MS** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **04/29/99** Prep Date:
Client ID: **9905119** Run ID: **HIT MAN_990429A** SeqNo: **10663**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Sample ID: **9904157-03A MSD** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **04/29/99** Prep Date:
Client ID: **9905119** Run ID: **HIT MAN_990429A** SeqNo: **10664**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Sample ID: **9904166-01A MS** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **05/12/99** Prep Date:
Client ID: **9905119** Run ID: **HIT MAN_990512B** SeqNo: **10873**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	1064	500	800	130.2	116.7%	75	125	0			

Sample ID: **9904166-01A MSD** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **05/12/99** Prep Date:
Client ID: **9905119** Run ID: **HIT MAN_990512B** SeqNo: **10874**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	1063	500	800	130.2	116.6%	75	125	1064	0.1%	20	

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905119
Project: 905079/NMO/Custillo Well

QC SUMMARY REPORT
Sample Matrix Spike

Sample ID: **9905045-01A MS**	Batch ID: **01 SULFATE**	Test Code: **Sulfate**	Units: **mg/L**	Analysis Date **05/20/99**	Prep Date:
Client ID:	**9905119**	Run ID: **HIT MAN_990520A**		SeqNo: **11010**	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	98.85	42	66	121	-33.6%	75	125	0			S,H

Sample ID: **9905045-01A MSD**	Batch ID: **01 SULFATE**	Test Code: **Sulfate**	Units: **mg/L**	Analysis Date **05/20/99**	Prep Date:
Client ID:	**9905119**	Run ID: **HIT MAN_990520A**		SeqNo: **11012**	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	99.02	42	66	121	-33.3%	75	125	98.85	0.2%	20	S,H

Sample ID: **9905078-01A MS**	Batch ID: **01 SULFATE**	Test Code: **Sulfate**	Units: **mg/L**	Analysis Date **05/21/99**	Prep Date:
Client ID:	**9905119**	Run ID: **HIT MAN_990521B**		SeqNo: **9669**	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	839.8	120	300	494	115.3%	75	125	0			

Sample ID: **9905078-01A MSD**	Batch ID: **01 SULFATE**	Test Code: **Sulfate**	Units: **mg/L**	Analysis Date **05/21/99**	Prep Date:
Client ID:	**9905119**	Run ID: **HIT MAN_990521B**		SeqNo: **9670**	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	803	120	300	494	103.0%	75	125	839.8	4.5%	20	

Sample ID: **9905097-02A MS**	Batch ID: **01 SULFATE**	Test Code: **Sulfate**	Units: **mg/L**	Analysis Date **05/27/99**	Prep Date:
Client ID:	**9905119**	Run ID: **HIT MAN_990527A**		SeqNo: **9770**	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate, Diss	20.2	5	8	13	90.0%	75	125	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905119
Project: 905079/NMO/Custillo Well

QC SUMMARY REPORT
Sample Matrix Spike Duplicate

Sample ID: **9905097-02A MSD**	Batch ID: **01 SULFATE**	Test Code: **Sulfate**	Units: **mg/L**	Analysis Date **05/27/99**	Prep Date:
Client ID:	**9905119**	Run ID: **HIT MAN_990527A**		SeqNo: **9771**	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate, Diss	20.3	5	8	13	91.3%	75	125	20.2	0.5%	20	

Sample ID: **9906044-12A MS**	Batch ID: **513**	Test Code: **Mercury**	Units: **mg/L**	Analysis Date **06/08/99**	Prep Date: **06/07/99**
Client ID:	**9905119**	Run ID: **MERC_990608A**		SeqNo: **13241**	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	.00217	0.0002	0.002	0	108.5%	75	125	0			

Sample ID: **9906044-12A MSD**	Batch ID: **513**	Test Code: **Mercury**	Units: **mg/L**	Analysis Date **06/08/99**	Prep Date: **06/07/99**
Client ID:	**9905119**	Run ID: **MERC_990608A**		SeqNo: **13242**	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	.00216	0.0002	0.002	0	108.0%	75	125	0.00217	0.5%	20	

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905119
Project: 905079/NMO/Custillo Well

QC SUMMARY REPORT
Sample Matrix Spike

Sample ID: **9905144-01A MS** Batch ID: **548** Test Code: **ICPMET** Units: **mg/L** Analysis Date **06/18/99** Prep Date: **06/16/99**
Client ID: **9905119** Run ID: **ICP_990618B** SeqNo: **15583**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	.52	0.005	0.5	0	104.0%	80	120	0			
Arsenic	.4881	0.005	0.5	0	97.6%	80	120	0			
Barium	.4826	0.005	0.5	0.02096	92.3%	80	120	0			
Beryllium	.5088	0.002	0.5	0	101.8%	80	120	0			
Cadmium	.4927	0.002	0.5	0	98.5%	80	120	0			
Calcium	10.57	0.05	5	5.657	98.2%	80	120	0			
Chromium	.5141	0.005	0.5	0	102.8%	80	120	0			
Copper	.4855	0.005	0.5	0	97.1%	80	120	0			
Hardness	50.93	0.33	33.1	19.28	95.6%	80	120	0			
Iron	5.03	0.015	5	0.02719	100.1%	80	120	0			
Lead	.4903	0.005	0.5	0	98.1%	80	120	0			
Magnesium	5.959	0.05	5	1.252	94.1%	80	120	0			
Manganese	.4931	0.005	0.5	0.007559	97.1%	80	120	0			
Nickel	.4905	0.005	0.5	0	98.1%	80	120	0			
Potassium	5.21	0.2	5	0.533	93.6%	80	120	0			
Selenium	.4733	0.005	0.5	0	94.7%	80	120	0			
Silver	.4802	0.005	0.5	0	96.0%	80	120	0			
Sodium	10.61	0.2	5	6.104	90.2%	80	120	0			
Thallium	.6168	0.01	0.5	0	123.4%	80	120	0			S
Zinc	.496	0.005	0.5	0	99.2%	80	120	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905119
Project: 905079/NMO/Custillo Well

QC SUMMARY REPORT
Sample Matrix Spike Duplicate

Sample ID: **9905144-01A MSD** Batch ID: **548** Test Code: **ICPMET** Units: **mg/L** Analysis Date **06/18/99** Prep Date: **06/16/99**
Client ID: **9905119** Run ID: **ICP_990618B** SeqNo: **15584**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	.5171	0.005	0.5	0	103.4%	80	120	0.52	0.6%	20	
Arsenic	.4866	0.005	0.5	0	97.3%	80	120	0.4881	0.3%	20	
Barium	.4811	0.005	0.5	0.02096	92.0%	80	120	0.4826	0.3%	20	
Beryllium	.5077	0.002	0.5	0	101.5%	80	120	0.5088	0.2%	20	
Cadmium	.492	0.002	0.5	0	98.4%	80	120	0.4927	0.2%	20	
Calcium	10.66	0.05	5	5.657	100.0%	80	120	10.57	0.9%	20	
Chromium	.5122	0.005	0.5	0	102.4%	80	120	0.5141	0.4%	20	
Copper	.4839	0.005	0.5	0	96.8%	80	120	0.4855	0.3%	20	
Hardness	51.31	0.33	33.1	19.28	96.8%	80	120	50.93	0.7%	20	
Iron	5.052	0.015	5	0.02719	100.5%	80	120	5.03	0.4%	20	
Lead	.4895	0.005	0.5	0	97.9%	80	120	0.4903	0.2%	20	
Magnesium	5.996	0.05	5	1.252	94.9%	80	120	5.959	0.6%	20	
Manganese	.4943	0.005	0.5	0.007559	97.3%	80	120	0.4931	0.2%	20	
Nickel	.4899	0.005	0.5	0	98.0%	80	120	0.4905	0.1%	20	
Potassium	5.201	0.2	5	0.533	93.4%	80	120	5.21	0.2%	20	
Selenium	.4714	0.005	0.5	0	94.3%	80	120	0.4733	0.4%	20	
Silver	.4806	0.005	0.5	0	96.1%	80	120	0.4802	0.1%	20	
Sodium	10.67	0.2	5	6.104	91.2%	80	120	10.61	0.5%	20	
Thallium	.6169	0.01	0.5	0	123.4%	80	120	0.6168	0.0%	20	S
Zinc	.4962	0.005	0.5	0	99.2%	80	120	0.496	0.1%	20	

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905119
Project: 905079/NMO/Custillo Well

QC SUMMARY REPORT

Laboratory Control Spike - generic

Sample ID: LCS	Batch ID: 01 ALK A-6/1/	Test Code: Alkalinity	Units: mg/L CaCO3	Analysis Date 04/19/99	Prep Date:
Client ID:	9905119	Run ID: NO INST_990419A		SeqNo: 9644	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Total (As CaCO3)	130	5	126	0	103.2%	85	115	0			

Sample ID: LCS	Batch ID: 01 ALK A-6/1/	Test Code: Alkalinity	Units: mg/L CaCO3	Analysis Date 05/25/99	Prep Date:
Client ID:	9905119	Run ID: NO INST_990525A		SeqNo: 9908	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Total (As CaCO3)	123	5	126	0	97.6%	85	115	0			

Sample ID: LCS	Batch ID: 01 ALK A-6/1/	Test Code: Alkalinity	Units: mg/L CaCO3	Analysis Date 05/03/99	Prep Date:
Client ID:	9905119	Run ID: NO INST_990503B		SeqNo: 11151	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Total (As CaCO3)	120	5	126	0	95.2%	85	115	0			

Sample ID: LCS	Batch ID: 01 ALK A-6/1/	Test Code: Alkalinity	Units: mg/L CaCO3	Analysis Date 05/10/99	Prep Date:
Client ID:	9905119	Run ID: NO INST_990510C		SeqNo: 11174	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Total (As CaCO3)	135	5	126	0	107.1%	85	115	0			

Sample ID: LCS	Batch ID: 01 ALK A-6/1/	Test Code: Alkalinity	Units: mg/L CaCO3	Analysis Date 05/11/99	Prep Date:
Client ID:	9905119	Run ID: NO INST_990511C		SeqNo: 11183	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Total (As CaCO3)	135	5	126	0	107.1%	85	115	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905119
Project: 905079/NMO/Custillo Well

QC SUMMARY REPORT
Laboratory Control Spike - generic

Sample ID: LCS	Batch ID: 01 ALK A-6/1/	Test Code: Alkalinity	Units: mg/L CaCO3	Analysis Date 05/14/99	Prep Date:
Client ID:	9905119	Run ID: NO INST_990514B		SeqNo: 11227	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Total (As CaCO3)	130	5	126	0	103.2%	85	115	0			

Sample ID: LCS	Batch ID: 01 BR A-6/11/	Test Code: Bromide	Units: mg/L	Analysis Date 06/10/99	Prep Date:
Client ID:	9905119	Run ID: HIT MAN_990610A		SeqNo: 13711	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Bromide	.504	0.1	0.5	0	100.8%	85	115	0			

Sample ID: LCS	Batch ID: 01 CL A-6/1/9	Test Code: Chloride	Units: mg/L	Analysis Date 05/26/99	Prep Date:
Client ID:	9905119	Run ID: NO INST_990526A		SeqNo: 9938	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	10	0.5	10	0	100.0%	85	115	0			

Sample ID: LCS	Batch ID: 01 CL A-6/1/9	Test Code: Chloride	Units: mg/L	Analysis Date 05/07/99	Prep Date:
Client ID:	9905119	Run ID: NO INST_990507B		SeqNo: 11087	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	9.5	0.5	10	0	95.0%	85	115	0			

Sample ID: LCS	Batch ID: 01 CL A-6/1/9	Test Code: Chloride	Units: mg/L	Analysis Date 05/17/99	Prep Date:
Client ID:	9905119	Run ID: NO INST_990517C		SeqNo: 11135	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	10.3	0.5	10	0	103.0%	85	115	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905119
Project: 905079/NMO/Custillo Well

QC SUMMARY REPORT
Laboratory Control Spike - generic

Sample ID: LCS	Batch ID: 01 COND-06/	Test Code: E120.1	Units: µmhos/cm	Analysis Date 04/21/99	Prep Date:
Client ID:	9905119	Run ID: NO INST_990421A		SeqNo: 10313	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Sample ID: LCS	Batch ID: 01 COND-06/	Test Code: E120.1	Units: µmhos/cm	Analysis Date 05/10/99	Prep Date:
Client ID:	9905119	Run ID: NO INST_990510A		SeqNo: 10348	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Sample ID: LCS	Batch ID: 01 COND-06/	Test Code: E120.1	Units: µmhos/cm	Analysis Date 05/20/99	Prep Date:
Client ID:	9905119	Run ID: NO INST_990520A		SeqNo: 10366	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Sample ID: LCS	Batch ID: 01 COND-06/	Test Code: E120.1	Units: µmhos/cm	Analysis Date 05/25/99	Prep Date:
Client ID:	9905119	Run ID: NO INST_990525E		SeqNo: 10385	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Specific Conductance	972	1	1000	0	97.2%	85	115	0			

Sample ID: LCS	Batch ID: 01 FL A-6/9/9	Test Code: fluoride	Units: mg/L	Analysis Date 06/08/99	Prep Date:
Client ID:	9905119	Run ID: NO INST_990608B		SeqNo: 13058	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Fluoride	8.5	0.2	8	0	106.3%	85	115	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905119
Project: 905079/NMO/Custillo Well

QC SUMMARY REPORT
Laboratory Control Spike - generic

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sample ID: **LCS** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **05/21/99** Prep Date:											
Client ID: **9905119** Run ID: **HIT MAN_990521B** SeqNo: **9662**											
Sulfate	12	5	12	0	100.0%	85	115	0			
Sample ID: **LCS** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **05/27/99** Prep Date:											
Client ID: **9905119** Run ID: **HIT MAN_990527A** SeqNo: **9766**											
Sulfate	7.816	5	8	0	97.7%	85	115	0			
Sample ID: **LCS** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **04/29/99** Prep Date:											
Client ID: **9905119** Run ID: **HIT MAN_990429A** SeqNo: **10622**											
Sulfate	10	5	10	0	100.0%	85	115	0			
Sample ID: **LCS** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **05/12/99** Prep Date:											
Client ID: **9905119** Run ID: **HIT MAN_990512B** SeqNo: **10870**											
Sulfate	7.43	5	8	0	92.9%	85	115	0			
Sample ID: **LCS** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **05/20/99** Prep Date:											
Client ID: **9905119** Run ID: **HIT MAN_990520A** SeqNo: **10999**											
Sulfate	7.03	5	8	0	87.9%	85	115	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905119
Project: 905079/NMO/Custillo Well

QC SUMMARY REPORT
Laboratory Control Spike - generic

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sample ID: LCS Batch ID: 01 TDS-6/1/99 Test Code: E160.1 Units: mg/L Analysis Date 05/25/99 Prep Date:											
Client ID: 9905119 Run ID: NO INST_990525C SeqNo: 10234											
Total Dissolved Solids (Residue, Filtera	3674	10	3966	0	92.6%	85	115	0			
Sample ID: LCS Batch ID: 01 TDS-6/1/99 Test Code: E160.1 Units: mg/L Analysis Date 05/26/99 Prep Date:											
Client ID: 9905119 Run ID: NO INST_990526C SeqNo: 10285											
Total Dissolved Solids (Residue, Filtera	4080	10	3966	0	102.9%	85	115	0			
Sample ID: LCS Batch ID: 01 TDS-6/1/99 Test Code: E160.1 Units: mg/L Analysis Date 04/28/99 Prep Date:											
Client ID: 9905119 Run ID: NO INST_990428C SeqNo: 11255											
Total Dissolved Solids (Residue, Filtera	3550	10	3966	0	89.5%	85	115	0			
Sample ID: LCS Batch ID: 01 TDS-6/1/99 Test Code: E160.1 Units: mg/L Analysis Date 05/05/99 Prep Date:											
Client ID: 9905119 Run ID: NO INST_990505B SeqNo: 11273											
Total Dissolved Solids (Residue, Filtera	3490	10	3966	0		85	115	0			
Sample ID: LCS Batch ID: 01 TDS-6/1/99 Test Code: E160.1 Units: mg/L Analysis Date 05/11/99 Prep Date:											
Client ID: 9905119 Run ID: NO INST_990511D SeqNo: 11288											
Total Dissolved Solids (Residue, Filtera	3630	10	3966	0	91.5%	85	115	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905119
Project: 905079/NMO/Custillo Well

QC SUMMARY REPORT
Laboratory Control Spike - generic

Sample ID: LCS	Batch ID: 01 TDS-6/1/99	Test Code: E160.1		Units: mg/L		Analysis Date 05/18/99			Prep Date:		
Client ID:	9905119	Run ID: NO INST_990518B				SeqNo: 11308					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Dissolved Solids (Residue, Filtera	3610	10	3966	0		85	115	0			

Sample ID: LCS-480	Batch ID: 480	Test Code: SW8270B		Units: µg/L		Analysis Date 05/27/99			Prep Date: 05/24/99		
Client ID:	9905119	Run ID: MANFREDD_990527A				SeqNo: 9972					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,2,4-Trichlorobenzene	35.5	5	50	0	71.0%	44	142	0			
1,4-Dichlorobenzene	31.6	5	50	0	63.2%	20	124	0			
2,4-Dinitrotoluene	41.4	5	50	0	82.8%	39	139	0			
2-Chlorophenol	61.5	5	100	0	61.5%	23	134	0			
4-Chloro-3-methylphenol	67.9	5	100	0	67.9%	22	147	0			
4-Nitrophenol	24.7	5	100	0	24.7%	1	132	0			
Acenaphthene	35.4	5	50	0	70.8%	47	145	0			
N-Nitrosodi-n-propylamine	33.6	5	50	0	67.2%	1	230	0			
Pentachlorophenol	68.4	5	100	0	68.4%	14	176	0			
Phenol	25	5	100	0	25.0%	5	112	0			
Pyrene	35.7	5	50	0	71.4%	52	115	0			

Qualifiers: ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905119
Project: 905079/NMO/Custillo Well

QC SUMMARY REPORT
Laboratory Control Spike Duplicate

Sample ID: **LCSD-480** Batch ID: **480** Test Code: **SW8270B** Units: **µg/L** Analysis Date **05/27/99** Prep Date: **05/24/99**
Client ID: **9905119** Run ID: **MANFREDD_990527A** SeqNo: **9973**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,2,4-Trichlorobenzene	36.5	5	50	0	73.0%	44	142	35.5	2.8%	28	
1,4-Dichlorobenzene	32.4	5	50	0	64.8%	20	124	31.6	2.5%	32	
2,4-Dinitrotoluene	43	5	50	0	86.0%	39	139	41.4	3.8%	22	
2-Chlorophenol	63.6	5	100	0	63.6%	23	134	61.5	3.4%	29	
4-Chloro-3-methylphenol	71.3	5	100	0	71.3%	22	147	67.9	4.9%	37	
4-Nitrophenol	26.6	5	100	0	26.6%	1	132	24.7	7.4%	47	
Acenaphthene	36.8	5	50	0	73.6%	47	145	35.4	3.9%	28	
N-Nitrosodi-n-propylamine	34.5	5	50	0	69.0%	1	230	33.6	2.6%	55	
Pentachlorophenol	71.8	5	100	0	71.8%	14	176	68.4	4.9%	49	
Phenol	24.9	5	100	0	24.9%	5	112	25	0.4%	23	
Pyrene	36.	5	50	0	72.0%	52	115	35.7	0.8%	25	

Sample ID: **LCS-513** Batch ID: **513** Test Code: **Mercury** Units: **mg/L** Analysis Date **06/08/99** Prep Date: **06/07/99**
Client ID: **9905119** Run ID: **MERC_990608A** SeqNo: **13238**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	.00101	0.0002	0.001	0	101.0%	80	120	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905119
Project: 905079/NMO/Custillo Well

QC SUMMARY REPORT
Laboratory Control Spike - generic

Sample ID: **LCS-548** Batch ID: **548** Test Code: **ICPMET** Units: **mg/L** Analysis Date **06/18/99** Prep Date: **06/16/99**
Client ID: **9905119** Run ID: **ICP_990618B** SeqNo: **15579**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	.5062	0.005	0.5	0	101.2%	80	120	0			
Arsenic	.4966	0.005	0.5	0	99.3%	80	120	0			
Barium	.4618	0.005	0.5	0	92.4%	80	120	0			
Beryllium	.4966	0.002	0.5	0	99.3%	80	120	0			
Cadmium	.4821	0.002	0.5	0	96.4%	80	120	0			
Calcium	5.032	0.05	5	0	100.6%	80	120	0			
Chromium	.5027	0.005	0.5	0	100.5%	80	120	0			
Copper	.4862	0.005	0.5	0	97.2%	80	120	0			
Hardness	32.11	0.33	33.1	0	97.0%	80	120	0			
Iron	5.023	0.015	5	0	100.5%	80	120	0			
Lead	.4812	0.005	0.5	0	96.2%	80	120	0			
Magnesium	4.745	0.05	5	0	94.9%	80	120	0			
Manganese	.4871	0.005	0.5	0	97.4%	80	120	0			
Nickel	.4796	0.005	0.5	0	95.9%	80	120	0			
Potassium	4.655	0.2	5	0	93.1%	80	120	0			
Selenium	.4622	0.005	0.5	0	92.4%	80	120	0			
Silver	.4894	0.005	0.5	0	97.9%	80	120	0			
Sodium	4.985	0.2	5	0	99.7%	80	120	0			
Thallium	.5995	0.01	0.5	0	119.9%	80	120	0			
Zinc	.4814	0.005	0.5	0	96.3%	80	120	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

Environmental Services Laboratory

Date: *29-Jun-99*

CLIENT: Pinnacle Laboratories
Work Order: 9905119
Project: 905079/NMO/Custillo Well

QC SUMMARY REPORT
Continuing Calibration Verification Standard

Sample ID: **CCV** Batch ID: **480** Test Code: **SW8270B** Units: **µg/L** Analysis Date **05/28/99** Prep Date:

Client ID: **9905119** Run ID: **MANFREDD_990528A** SeqNo: **11674**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,4-Dichlorobenzene	51	5									
2,4,6-Trichlorophenol	56.4	5									
2,4-Dichlorophenol	55.7	5									
2-Nitrophenol	51.4	5									
4-Chloro-3-methylphenol	53.7	5									
Acenaphthene	47.7	5									
Benzo(a)pyrene	51.7	5									
Di-n-octyl phthalate	46	5									
Fluoranthene	52.4	5									
Hexachlorobutadiene	55.4	5									
N-Nitrosodiphenylamine	49.8	5									
Pentachlorophenol	54.5	5									
Phenol	49.5	5									
2,4,6-Tribromophenol	59.8	5	50	0	119.6%	80	120				
2-Fluorobiphenyl	50.7	5	50	0	101.4%	80	120				
2-Fluorophenol	51.1	5	50	0	102.2%	80	120				
4-Terphenyl-d14	49.7	5	50	0	99.4%	80	120				
Nitrobenzene-d5	49.4	5	50	0	98.8%	80	120				
Phenol-d5	50.3	5	50	0	100.6%	80	120				

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

Environmental Services Laboratory

Date: *29-Jun-99*

CLIENT: Pinnacle Laboratories
Work Order: 9905119
Project: 905079/NMO/Custillo Well

QC SUMMARY REPORT
Initial Calibration Verification Standard

Sample ID: **ICV** Batch ID: **513** Test Code: **Mercury** Units: **mg/L** Analysis Date **06/08/99** Prep Date: **06/07/99**
Client ID: **9905119** Run ID: **MERC_990608A** SeqNo: **13260**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	.00216	0.0002	0.002	0	108.0%	90	110	0			

Sample ID: **ICVHI** Batch ID: **548** Test Code: **ICPMET** Units: **mg/L** Analysis Date **06/18/99** Prep Date:
Client ID: **9905119** Run ID: **ICP_990618B** SeqNo: **15555**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aluminum, 200.7	23.83	0.05	25	0	95.3%	95	105	0			
Calcium	24.43	0.05	25	0	97.7%	90	110	0			
Hardness	159	0.33	165	0	96.3%	90	110	0			
Magnesium	23.79	0.05	25	0	95.2%	90	110	0			
Sodium	4.816	0.2	5	0	96.3%	90	110	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905119
Project: 905079/NMO/Custillo Well

QC SUMMARY REPORT
Initial Calibration Verification Standard

Sample ID: **ICVLOW** Batch ID: **548** Test Code: **ICPMET** Units: **mg/L** Analysis Date **06/18/99** Prep Date:
Client ID: **9905119** Run ID: **ICP_990618B** SeqNo: **15556**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	.5074	0.005	0.5	0	101.5%	90	110	0			
Arsenic, 200.7	.4982	0.005	0.5	0	99.6%	95	105	0			
Barium	.4804	0.005	0.5	0	96.1%	90	110	0			
Beryllium	.4884	0.002	0.5	0	97.7%	90	110	0			
Cadmium, 200.7	.4857	0.002	0.5	0	97.1%	95	105	0			
Chromium, 200.7	.4906	0.005	0.5	0	98.1%	95	105	0			
Cobalt	.4694	0.005	0.5	0	93.9%	90	110	0			
Copper, 200.7	.4941	0.005	0.5	0	98.8%	95	105	0			
Iron, 200.7	.5094	0.01	0.5	0	101.9%	95	105	0			
Lead, 200.7	.4951	0.005	0.5	0	99.0%	95	105	0			
Manganese	.4799	0.005	0.5	0	96.0%	90	110	0			
Nickel, 200.7	.4782	0.005	0.5	0	95.6%	95	105	0			
Potassium	4.903	0.2	5	0	98.1%	90	110	0			
Selenium	.489	0.005	0.5	0	97.8%	90	110	0			
Silver, 200.7	.4859	0.005	0.5	0	97.2%	95	105	0			
Thallium	.5069	0.01	0.5	0	101.4%	90	110	0			
Vanadium	.4911	0.005	0.5	0	98.2%	90	110	0			
Zinc, 200.7	.4855	0.005	0.5	0	97.1%	95	105	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

Pinnacle Laboratories, Inc. **Interlab Chain of Custody** Date: 5/24 Page: 1 of 1 9905119

Network Project Manager: Kimberly D. McNeill

Pinnacle Laboratories, Inc.
2709-D Pan American Freeway, NE
Albuquerque, New Mexico 87107
(505) 344-3777 Fax (505) 344-4413

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	Metals (8) RCRA	RCRA TCLP METALS	Metals-13 PP List	Metals-TAL	Ca, K, Mg, Na, Hg	TOX	~~Tot~~ Conductivity	Gen Chemistry: Cl, F, SO4, TDS	Br, Alk, Bicarb/Carb.	Oil and Grease	Volatile Organics GC/MS (8260)	BOD	COD	PESTICIDES/PCB (608/8080)	8270 BY GC/MS	PNA (8310)	8240 (TCLP 1311) ZHE	Herbicides (615/8150)	Base/Neutral Acid Compounds GC/MS (625/8270)	URANIUM	RADIUM 226+228	Gross Alpha/Beta	TO-14	NUMBER OF CONTAINERS
905079-01	5/20	1100	AQ	01					X		X	X	X						X									

PROJECT INFORMATION	SAMPLE RECEIPT	SAMPLES SENT TO:	RELINQUISHED BY: 1.	RELINQUISHED BY: 2.
PROJECT #: 905079	Total Number of Containers	PENSACOLA - STL-FL	Signature:	Signature: Time:
PROJ. NAME: NMO	Chain of Custody Seals	PORTLAND - ESL-OR X	Time: Francine Tonno 1700	
QC LEVEL: (STD.) IV	Received Intact?	STL - CT	Printed Name: Date:	Printed Name: Date:
QC REQUIRED: MS MSD BLANK	Received Good Cond./Cold	STL- NEW JERSEY	Francine Tonno 5/24/99	
TAT: (STANDARD) RUSH!!	LAB NUMBER:	N. CREEK	Pinnacle Laboratories, Inc.	Company
		BARRINGER	RECEIVED BY: 1.	RECEIVED BY: 2
DUE DATE: 6/4	COMMENTS:	SEQUOIA	Signature: Time:	Signature: Time:
RUSH SURCHARGE: —			Kimberly McNeill 10A	
CLIENT DISCOUNT: —			Printed Name: Date: 5/25/99	Printed Name: Date:
SPECIAL CERTIFICATION REQUIRED: YES (NO)			Company	Company

PINNACLE LABORATORIES

Pinnacle Laboratories Inc.

CHAIN OF CUSTODY

DATE: 5-20-99 PAGE: 1 OF 1

PLI Accession #: 905079

SHADED AREAS ARE FOR LAB USE ONLY.

PLEASE FILL THIS FORM IN COMPLETELY.

PROJECT MANAGER: Bill Olson WO 5/21/99

COMPANY: ~~Connie Castillo~~ NMOCD

ADDRESS: ~~4027 S. Eunice Hwy~~ ~~Hobbs NM 88240~~

PHONE: ~~(505) 393-8032~~

FAX: N/A

BILL TO: Wayne Price

COMPANY: OCD

ADDRESS: 2040 S. Pacheco Santa Fe, NM 87505

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB I.D.
990520 1100	5-20-99	11:00 AM	Water	01
TB	5/19/99	1240	water	02

	SAMPLE ID	LAB I.D.
Petroleum Hydrocarbons (418.1) TRPH		
(MOD.8015) Diesel/Direct Inject		
(M8015) Gas/Purge & Trap	Se + Hg by AA	
8021 (BTEX)/8015 (Gasoline) MTBE		
8021 (BTEX) ☐ MTBE ☐ TMB ☐ PCE		
8021 (TCL)		
8021 (EDX)		
8021 (HALO)		
8021 (CUST)		
504.1 EDB ☐ / DBCP ☐		
8270	2	2
8260 (TCL) Volatile Organics		
8260 (Full) Volatile Organics	2	1
8260 (CUST) Volatile Organics		
8260 (Landfill) Volatile Organics		
Pesticides /PCB (608/8081/8082)		
Herbicides (615/8151)		
Base/Neutral/Acid Compounds GC/MS (625/8270)		
Polynuclear Aromatics (610/8310/8270-SIMS)		
General Chemistry:		1
PH		1
Priority Pollutant Metals (13)		
Target Analyte List Metals (23)		
RCRA Metals (8)		
RCRA Metals by TCLP (Method 1311)		
Metals: OCD List + Iron #24		1
Bromide		1
NUMBER OF CONTAINERS		8
		1

PROJECT INFORMATION

PROJ. NO.: Water Well

PROJ. NAME: Castillo Well

P.O. NO.:

SHIPPED VIA:

SAMPLE RECEIPT

NO. CONTAINERS	9
CUSTODY SEALS	(Y) N / NA
RECEIVED INTACT	Yes
BLUE ICE/ICE	6°C

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS

(RUSH) [ ] 24hr [ ] 48hr ☐ 72hr ☐ 1 WEEK (NORMAL) X

CERTIFICATION REQUIRED: ☐ NM ☐ SDWA ☐ OTHER

METHANOL PRESERVATION ☐

COMMENTS: FIXED FEE ☐

Sample Taken From Water Well Spigot. - Well ~~pumped~~ Purged 15 min. before Sampling. Spigot Located Back yard Next to House.

RELINQUISHED BY: 1.

Signature: Time: 16:30

Printed Name: WAYNE PRICE Date: 5/20/99

Company: NMOCD

See reverse side (Force Magure)

RECEIVED BY: 1.

Signature: Time: 1630

Printed Name: William Olson Date: 5/20/99

Company: NMOCD

RELINQUISHED BY: 2.

Signature: Time: 0920

Printed Name: William Olson Date: 5/21/99

Company: NMOCD

RECEIVED BY: (LAB) 2.

Signature: Time: 0920

Printed Name: John Caldwell Date: 5/21/99

Pinnacle Laboratories Inc.

NEW MEXICO ENERGY, MINERALS
& NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION
2040 South Pacheco Street
Santa Fe, New Mexico 87505
(505) 827-7131

July 20, 1999

CERTIFIED MAIL
RETURN RECEIPT NO. Z 357 870 130

Mr. Royce Crowell, Jr.
Goldstar -Hobbs Yard
P.O. Box 1480
Eunice, NM 88231

Re: Analytical Results from Sampling Water Well on 5/20/99
Goldstar - Hobbs Yard.

Dear Mr. Crowell:

Please find enclosed the analytical results for your water well. The results of this sampling event revealed two water contaminants that met or exceeded the New Mexico Water Quality Control (WQCC) Commission Regulations Human Health Standards. These contaminants were Total Dissolved Solids at 1000 mg/l and Chlorides at 260 mg/l. At the time of sampling it was noted that the water was clear with no apparent odors. The New Mexico Oil Conservation Division (NMOCD) will continue its investigation concerning this issue. If for some reason you have your water well worked on or repaired, the NMOCD would appreciate a notice so we may have an opportunity to re-sample the well directly from the well bore casing.

If you require any further information or assistance please do not hesitate to write or call me at (505-827-7155).

Sincerely Yours,

Wayne Price-Environmental Bureau

cc: OCD Hobbs Office

PINNACLE LABORATORIES

Remit to: **Pinnacle Laboratories, Inc.**
P.O. Box 36720
Albuquerque, NM 87176-6720
Phone: (505) 344-3777 Fax: (505) 344-4413

Bill To: N.M. Oil Conservation Division
2040 South Pacheco
Santa Fe, NM 87505

Client #: 810-134

Date	Invoice
7/ 1/99	79136

Project #: Water Well
ProjName: Goldstar Hobbs Yard

Original
BALANCE DUE: 840.00

PO Number	Terms	Project
	Net 30	PIN ALB-810

Quantity	Description	Rate	Amount
1	Volatile Organics GC/MS: Method 8260	180.00	180.00
1	Semivolatile Organics GC/MS: Method 8270	300.00	300.00
1	F, Br, Ca, K, Mg, Na, Alk.Group, Cl, SO4, TDS, Cation/Anion Balance, Conductivity, pH	160.00	160.00
1	Metals by ICAP Method 6010: Al, Sb, As, Ba Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn Mo, Ni, K, Se, Si, Ag, Na, Tl, V, Zn	200.00	200.00

OK FOR PAYMENT
BY: W PRICE JP
7/20/99

Accession #: 905080
Authorized By: Bill Olson

TOTAL: 840.00

A finance charge of 11/2% will be charged on balances 30 days past due
PLEASE PAY FROM THIS INVOICE. NO OTHER INVOICE SHALL BE SENT.

PINNACLE LABORATORIES

2709-D Pan American Freeway NE
Albuquerque, New Mexico 87107
Phone (505) 344-3777
Fax (505) 344-4413

Pinnacle Lab ID number **905080**
July 01, 1999

NMOCD
2040 S. PACHECO
SANTA FE, NM 87505

Project Name GOLDSTAR HOBBS YARD
Project Number WATER WELL

Attention: BILL OLSON

On 5/21/99 Pinnacle Laboratories, Inc. Inc., (ADHS License No. AZ0592), received a request to analyze **aqueous** samples. The samples were analyzed with EPA methodology or equivalent methods. The results of these analyses and the quality control data, which follow each set of analyses, are enclosed.

EPA methods 150.1 and 8260 were performed by Pinnacle Laboratories, Inc., Albuquerque, NM.

Metals were analyzed by Barringer Laboratories, Inc., Golden, Co.

All other parameters were performed by ESL (OR) Inc., Portland, OR.

If you have any questions or comments, please do not hesitate to contact us at (505)344-3777.

Kimberly D. McNeill
Project Manager

H. Mitchell Rubenstein, Ph. D.
General Manager

MR: mt

Enclosure

PINNACLE LABORATORIES

2709-D Pan American Freeway NE
Albuquerque, New Mexico 87107
Phone (505) 344-3777
Fax (505) 344-4413

CLIENT	: NMOCD	PINNACLE ID	: 905080
PROJECT #	: WATER WELL	DATE RECEIVED	: 5/21/99
PROJECT NAME	: GOLDSTAR HOBBS YARD	REPORT DATE	: 7/1/99

PIN ID. #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
01	9905201000	AQUEOUS	5/20/99
02	TRIP BLANK	AQUEOUS	5/19/99

PINNACLE LABORATORIES

2709-D Pan American Freeway NE
Albuquerque, New Mexico 87107
Phone (505) 344-3777
Fax (505) 344-4413

GENERAL CHEMISTRY RESULTS

CLIENT	: NMOCD	PINNACLE I.D.	: 905080
PROJECT #	: WATER WELL	DATE RECEIVED	: 5/21/99
PROJECT NAME	: GOLDSTAR HOBBS YARD		

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE ANALYZED
01	9905201000	AQUEOUS	5/20/99	5/24/99

PARAMETER	UNITS	9905201000
PH (150.1)	UNITS	7.56

CHEMIST NOTES:
N/A

PINNACLE LABORATORIES

2709-D Pan American Freeway NE
Albuquerque, New Mexico 87107
Phone (505) 344-3777
Fax (505) 344-4413

GENERAL CHEMISTRY - QUALITY CONTROL

CLIENT	: NMOCD	PINNACLE I.D.	: 905080
PROJECT #	: WATER WELL	SAMPLE MATRIX	: AQUEOUS
PROJECT NAME	: GOLDSTAR HOBBS YARD		

PARAMETER	UNITS	PINNACLE I.D.	SAMPLE RESULT	DUP. RESULT	% RPD
PH	UNITS	905080-01	7.56	7.59	0.40

CHEMIST NOTES:
N/A

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative Percent Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

PINNACLE LABORATORIES

2709-D Pan American Freeway NE
Albuquerque, New Mexico 87107
Phone (505) 344-3777
Fax (505) 344-4413

GC/MS RESULTS

TEST : VOLATILE ORGANICS EPA METHOD 8260
CLIENT : NMOCD PINNACLE I.D. : 905080
PROJECT # : WATER WELL DATE RECEIVED : 5/21/99
PROJECT NAME : GOLDSTAR WATER WELL

SAMPLE ID #	CLIENT ID	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
905080-01	9905201000	AQUEOUS	5/20/99	N/A	06/02/99	1

PARAMETER	DET. LIMIT		UNITS
Dichlorodifluoromethane	1.0	< 1.0	ug/L
Chloromethane	1.0	< 1.0	ug/L
Vinyl Chloride	1.0	< 1.0	ug/L
Bromomethane	1.0	< 1.0	ug/L
Chloroethane	1.0	< 1.0	ug/L
Trichlorofluoromethane	1.0	< 1.0	ug/L
Acetone	10	< 10	ug/L
Acrolein	5.0	< 5.0	ug/L
1,1-Dichloroethene	1.0	< 1.0	ug/L
Iodomethane	1.0	< 1.0	ug/L
Methylene Chloride	1.0	< 1.0	ug/L
Acrylonitrile	5.0	< 5.0	ug/L
cis-1,2-Dichloroethene	1.0	< 1.0	ug/L
Methyl-t-butyl Ether	1.0	< 1.0	ug/L
1,1,2,1,2,2-Trichlorotrifluoroethane	1.0	< 1.0	ug/L
1,1-Dichloroethane	1.0	< 1.0	ug/L
trans-1,2-Dichloroethene	1.0	< 1.0	ug/L
2-Butanone	10	< 10	ug/L
Carbon Disulfide	1.0	< 1.0	ug/L
Bromochloromethane	1.0	< 1.0	ug/L
Chloroform	1.0	< 1.0	ug/L
2,2-Dichloropropane	1.0	< 1.0	ug/L
1,2-Dichloroethane	1.0	< 1.0	ug/L
Vinyl Acetate	1.0	< 1.0	ug/L
1,1,1-Trichloroethane	1.0	< 1.0	ug/L
1,1-Dichloropropene	1.0	< 1.0	ug/L
Carbon Tetrachloride	1.0	< 1.0	ug/L
Benzene	1.0	< 1.0	ug/L
1,2-Dichloropropane	1.0	< 1.0	ug/L
Trichloroethene	1.0	< 1.0	ug/L
Bromodichloromethane	1.0	< 1.0	ug/L
2-Chloroethyl Vinyl Ether	10	< 10	ug/L
cis-1,3-Dichloropropene	1.0	< 1.0	ug/L
trans-1,3-Dichloropropene	1.0	< 1.0	ug/L
1,1,2-Trichloroethane	1.0	< 1.0	ug/L
1,3-Dichloropropane	1.0	< 1.0	ug/L
Dibromomethane	1.0	< 1.0	ug/L
Toluene	1.0	< 1.0	ug/L
1,2-Dibromoethane	1.0	< 1.0	ug/L
4-Methyl-2-Pentanone	10	< 10	ug/L
2-Hexanone	10	< 10	ug/L
Dibromochloromethane	1.0	< 1.0	ug/L
Tetrachloroethene	1.0	< 1.0	ug/L
Chlorobenzene	1.0	< 1.0	ug/L
Ethylbenzene	1.0	< 1.0	ug/L

PINNACLE LABORATORIES

2709-D Pan American Freeway NE
Albuquerque, New Mexico 87107
Phone (505) 344-3777
Fax (505) 344-4413

GC/MS RESULTS

TEST : VOLATILE ORGANICS EPA METHOD 8260
CLIENT : NMOCD — PINNACLE I.D. : 905080
PROJECT # : WATER WELL — DATE RECEIVED : 5/21/99
PROJECT NAME : GOLDSTAR WATER WELL

SAMPLE ID #	CLIENT ID	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
905080-01	9905201000	AQUEOUS	5/20/99	N/A	06/02/99	1

PARAMETER	DET. LIMIT		UNITS
1,1,1,2-Tetrachloroethane	1.0	< 1.0	ug/L
m&p Xylenes	1.0	< 1.0	ug/L
o-Xylene	1.0	< 1.0	ug/L
Styrene	1.0	< 1.0	ug/L
Bromoform	1.0	< 1.0	ug/L
1,1,2,2-Tetrachloroethane	1.0	< 1.0	ug/L
1,2,3-Trichloropropane	1.0	< 1.0	ug/L
Isopropyl Benzene	1.0	< 1.0	ug/L
Bromobenzene	1.0	< 1.0	ug/L
trans-1,4-Dichloro-2-Butene	1.0	< 1.0	ug/L
n-Propylbenzene	1.0	< 1.0	ug/L
2-Chlorotoluene	1.0	< 1.0	ug/L
4-Chlorotoluene	1.0	< 1.0	ug/L
1,3,5-Trimethylbenzene	1.0	< 1.0	ug/L
tert-Butylbenzene	1.0	< 1.0	ug/L
1,2,4-Trimethylbenzene	1.0	< 1.0	ug/L
sec-Butylbenzene	1.0	< 1.0	ug/L
1,3-Dichlorobenzene	1.0	< 1.0	ug/L
1,4-Dichlorobenzene	1.0	< 1.0	ug/L
p-Isopropyltoluene	1.0	< 1.0	ug/L
1,2-Dichlorobenzene	1.0	< 1.0	ug/L
n-Butylbenzene	1.0	< 1.0	ug/L
1,2-Dibromomo-3-chloropropane	1.0	< 1.0	ug/L
1,2,4-Trichlorobenzene	1.0	< 1.0	ug/L
Naphthalene	1.0	< 1.0	ug/L
Hexachlorobutadiene	1.0	< 1.0	ug/L
1,2,3-Trichlorobenzene	1.0	< 1.0	ug/L

SURROGATE % RECOVERY		
1,2-Dichloroethane-d4	102	(80 - 120)
Toluene-d8	102	(88 - 110)
Bromofluorobenzene	97	(86 - 115)

PINNACLE LABORATORIES

2709-D Pan American Freeway NE
Albuquerque, New Mexico 87107
Phone (505) 344-3777
Fax (505) 344-4413

GC/MS RESULTS

TEST : VOLATILE ORGANICS EPA METHOD 8260
CLIENT : NMOCD PINNACLE I.D. : 905080
PROJECT # : WATER WELL DATE RECEIVED : 5/21/99
PROJECT NAME : GOLDSTAR WATER WELL

SAMPLE ID #	CLIENT ID	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
905080-02	TRIP BLANK	AQUEOUS	5/19/99	N/A	06/02/99	1

PARAMETER	DET. LIMIT		UNITS
Dichlorodifluoromethane	1.0	< 1.0	ug/L
Chloromethane	1.0	< 1.0	ug/L
Vinyl Chloride	1.0	< 1.0	ug/L
Bromomethane	1.0	< 1.0	ug/L
Chloroethane	1.0	< 1.0	ug/L
Trichlorofluoromethane	1.0	< 1.0	ug/L
Acetone	10	< 10	ug/L
Acrolein	5.0	< 5.0	ug/L
1,1-Dichloroethene	1.0	< 1.0	ug/L
Iodomethane	1.0	< 1.0	ug/L
Methylene Chloride	1.0	< 1.0	ug/L
Acrylonitrile	5.0	< 5.0	ug/L
cis-1,2-Dichloroethene	1.0	< 1.0	ug/L
Methyl-t-butyl Ether	1.0	< 1.0	ug/L
1,1,2,1,2,2-Trichlorotrifluoroethane	1.0	< 1.0	ug/L
1,1-Dichloroethane	1.0	< 1.0	ug/L
trans-1,2-Dichloroethene	1.0	< 1.0	ug/L
2-Butanone	10	< 10	ug/L
Carbon Disulfide	1.0	< 1.0	ug/L
Bromochloromethane	1.0	< 1.0	ug/L
Chloroform	1.0	< 1.0	ug/L
2,2-Dichloropropane	1.0	< 1.0	ug/L
1,2-Dichloroethane	1.0	< 1.0	ug/L
Vinyl Acetate	1.0	< 1.0	ug/L
1,1,1-Trichloroethane	1.0	< 1.0	ug/L
1,1-Dichloropropene	1.0	< 1.0	ug/L
Carbon Tetrachloride	1.0	< 1.0	ug/L
Benzene	1.0	< 1.0	ug/L
1,2-Dichloropropane	1.0	< 1.0	ug/L
Trichloroethene	1.0	< 1.0	ug/L
Bromodichloromethane	1.0	< 1.0	ug/L
2-Chloroethyl Vinyl Ether	10	< 10	ug/L
cis-1,3-Dichloropropene	1.0	< 1.0	ug/L
trans-1,3-Dichloropropene	1.0	< 1.0	ug/L
1,1,2-Trichloroethane	1.0	< 1.0	ug/L
1,3-Dichloropropane	1.0	< 1.0	ug/L
Dibromomethane	1.0	< 1.0	ug/L
Toluene	1.0	< 1.0	ug/L
1,2-Dibromoethane	1.0	< 1.0	ug/L
4-Methyl-2-Pentanone	10	< 10	ug/L
2-Hexanone	10	< 10	ug/L
Dibromochloromethane	1.0	< 1.0	ug/L
Tetrachloroethene	1.0	< 1.0	ug/L
Chlorobenzene	1.0	< 1.0	ug/L
Ethylbenzene	1.0	< 1.0	ug/L

PINNACLE LABORATORIES

2709-D Pan American Freeway NE
Albuquerque, New Mexico 87107
Phone (505) 344-3777
Fax (505) 344-4413

GC/MS RESULTS

TEST : VOLATILE ORGANICS EPA METHOD 8260
CLIENT : NMOCD — PINNACLE I.D. : 905080
PROJECT # : WATER WELL — DATE RECEIVED : 5/21/99
PROJECT NAME : GOLDSTAR WATER WELL

SAMPLE ID #	CLIENT ID	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
905080-02	TRIP BLANK	AQUEOUS	5/19/99	N/A	06/02/99	1

PARAMETER	DET. LIMIT		UNITS
1,1,1,2-Tetrachloroethane	1.0	< 1.0	ug/L
m&p Xylenes	1.0	< 1.0	ug/L
o-Xylene	1.0	< 1.0	ug/L
Styrene	1.0	< 1.0	ug/L
Bromoform	1.0	< 1.0	ug/L
1,1,2,2-Tetrachloroethane	1.0	< 1.0	ug/L
1,2,3-Trichloropropane	1.0	< 1.0	ug/L
Isopropyl Benzene	1.0	< 1.0	ug/L
Bromobenzene	1.0	< 1.0	ug/L
trans-1,4-Dichloro-2-Butene	1.0	< 1.0	ug/L
n-Propylbenzene	1.0	< 1.0	ug/L
2-Chlorotoluene	1.0	< 1.0	ug/L
4-Chlorotoluene	1.0	< 1.0	ug/L
1,3,5-Trimethylbenzene	1.0	< 1.0	ug/L
tert-Butylbenzene	1.0	< 1.0	ug/L
1,2,4-Trimethylbenzene	1.0	< 1.0	ug/L
sec-Butylbenzene	1.0	< 1.0	ug/L
1,3-Dichlorobenzene	1.0	< 1.0	ug/L
1,4-Dichlorobenzene	1.0	< 1.0	ug/L
p-Isopropyltoluene	1.0	< 1.0	ug/L
1,2-Dichlorobenzene	1.0	< 1.0	ug/L
n-Butylbenzene	1.0	< 1.0	ug/L
1,2-Dibromomo-3-chloropropane	1.0	< 1.0	ug/L
1,2,4-Trichlorobenzene	1.0	< 1.0	ug/L
Naphthalene	1.0	< 1.0	ug/L
Hexachlorobutadiene	1.0	< 1.0	ug/L
1,2,3-Trichlorobenzene	1.0	< 1.0	ug/L

SURROGATE % RECOVERY		
1,2-Dichloroethane-d4	108	(80 - 120)
Toluene-d8	105	(88 - 110)
Bromofluorobenzene	101	(86 - 115)

PINNACLE LABORATORIES

2709-D Pan American Freeway NE
Albuquerque, New Mexico 87107
Phone (505) 344-3777
Fax (505) 344-4413

GC/MS RESULTS

TEST	: VOLATILE ORGANICS EPA METHOD 8260		
CLIENT	: NMOCD	PINNACLE I.D. :	905080
PROJECT #	: WATER WELL		
PROJECT NAME	: GOLDSTAR HOBBS YARD		

SAMPLE ID #	BATCH	MATRIX	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
REAGENT BLANK	060299	AQUEOUS	N/A	06/02/99	1

PARAMETER	DET. LIMIT		UNITS
Dichlorodifluoromethane	1.0	< 1.0	ug/L
Chloromethane	1.0	< 1.0	ug/L
Vinyl Chloride	1.0	< 1.0	ug/L
Bromomethane	1.0	< 1.0	ug/L
Chloroethane	1.0	< 1.0	ug/L
Trichlorofluoromethane	1.0	< 1.0	ug/L
Acetone	10	< 10	ug/L
Acrolein	5.0	< 5.0	ug/L
1,1-Dichloroethene	1.0	< 1.0	ug/L
Iodomethane	1.0	< 1.0	ug/L
Methylene Chloride	1.0	< 1.0	ug/L
Acrylonitrile	5.0	< 5.0	ug/L
cis-1,2-Dichloroethene	1.0	< 1.0	ug/L
Methyl-t-butyl Ether	1.0	< 1.0	ug/L
1,1,2,1,2,2-Trichlorotrifluoroethane	1.0	< 1.0	ug/L
1,1-Dichloroethane	1.0	< 1.0	ug/L
trans-1,2-Dichloroethene	1.0	< 1.0	ug/L
2-Butanone	10	< 10	ug/L
Carbon Disulfide	1.0	< 1.0	ug/L
Bromochloromethane	1.0	< 1.0	ug/L
Chloroform	1.0	< 1.0	ug/L
2,2-Dichloropropane	1.0	< 1.0	ug/L
1,2-Dichloroethane	1.0	< 1.0	ug/L
Vinyl Acetate	1.0	< 1.0	ug/L
1,1,1-Trichloroethane	1.0	< 1.0	ug/L
1,1-Dichloropropene	1.0	< 1.0	ug/L
Carbon Tetrachloride	1.0	< 1.0	ug/L
Benzene	1.0	< 1.0	ug/L
1,2-Dichloropropane	1.0	< 1.0	ug/L
Trichloroethene	1.0	< 1.0	ug/L
Bromodichloromethane	1.0	< 1.0	ug/L
2-Chloroethyl Vinyl Ether	10	< 10	ug/L
cis-1,3-Dichloropropene	1.0	< 1.0	ug/L
trans-1,3-Dichloropropene	1.0	< 1.0	ug/L
1,1,2-Trichloroethane	1.0	< 1.0	ug/L
1,3-Dichloropropane	1.0	< 1.0	ug/L
Dibromomethane	1.0	< 1.0	ug/L
Toluene	1.0	< 1.0	ug/L
1,2-Dibromoethane	1.0	< 1.0	ug/L
4-Methyl-2-Pentanone	10	< 10	ug/L
2-Hexanone	10	< 10	ug/L
Dibromochloromethane	1.0	< 1.0	ug/L
Tetrachloroethene	1.0	< 1.0	ug/L
Chlorobenzene	1.0	< 1.0	ug/L
Ethylbenzene	1.0	< 1.0	ug/L

PINNACLE LABORATORIES

2709-D Pan American Freeway NE
Albuquerque, New Mexico 87107
Phone (505) 344-3777
Fax (505) 344-4413

GC/MS RESULTS

TEST : VOLATILE ORGANICS EPA METHOD 8260
CLIENT : NMOCD PINNACLE I.D. : 905080
PROJECT # : WATER WELL
PROJECT NAME : GOLDSTAR HOBBS YARD

SAMPLE ID #	BATCH	MATRIX	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
REAGENT BLANK	060299	AQUEOUS	N/A	06/02/99	1

PARAMETER	DET. LIMIT		UNITS
1,1,1,2-Tetrachloroethane	1.0	< 1.0	ug/L
m&p Xylenes	1.0	< 1.0	ug/L
o-Xylene	1.0	< 1.0	ug/L
Styrene	1.0	< 1.0	ug/L
Bromoform	1.0	< 1.0	ug/L
1,1,2,2-Tetrachloroethane	1.0	< 1.0	ug/L
1,2,3-Trichloropropane	1.0	< 1.0	ug/L
Isopropyl Benzene	1.0	< 1.0	ug/L
Bromobenzene	1.0	< 1.0	ug/L
trans-1,4-Dichloro-2-Butene	1.0	< 1.0	ug/L
n-Propylbenzene	1.0	< 1.0	ug/L
2-Chlorotoluene	1.0	< 1.0	ug/L
4-Chlorotoluene	1.0	< 1.0	ug/L
1,3,5-Trimethylbenzene	1.0	< 1.0	ug/L
tert-Butylbenzene	1.0	< 1.0	ug/L
1,2,4-Trimethylbenzene	1.0	< 1.0	ug/L
sec-Butylbenzene	1.0	< 1.0	ug/L
1,3-Dichlorobenzene	1.0	< 1.0	ug/L
1,4-Dichlorobenzene	1.0	< 1.0	ug/L
p-Isopropyltoluene	1.0	< 1.0	ug/L
1,2-Dichlorobenzene	1.0	< 1.0	ug/L
n-Butylbenzene	1.0	< 1.0	ug/L
1,2-Dibromomo-3-chloropropane	1.0	< 1.0	ug/L
1,2,4-Trichlorobenzene	1.0	< 1.0	ug/L
Naphthalene	1.0	< 1.0	ug/L
Hexachlorobutadiene	1.0	< 1.0	ug/L
1,2,3-Trichlorobenzene	1.0	< 1.0	ug/L

SURROGATE % RECOVERY		
1,2-Dichloroethane-d4	108	(80 - 120)
Toluene-d8	109	(88 - 110)
Bromofluorobenzene	106	(86 - 115)

PINNACLE LABORATORIES

2709-D Pan American Freeway NE
Albuquerque, New Mexico 87107
Phone (505) 344-3777
Fax (505) 344-4413

MATRIX SPIKE/MATRIX SPIKE DUPLICATE RESULTS

TEST	: VOLATILE ORGANICS EPA METHOD 8260	PINNACLE I.D.	: 905080
SPIKED SAMPLE	: 905076-01	DATE ANALYZED	: 6/2/99
CLIENT	: NMOCD	UNITS	: ug/L (PPB)
PROJECT #	: WATER WELL		
PROJECT NAME	: GOLDSTAR HOBBS YARD		

COMPOUND	SAMPLE CONC.	SPIKE ADDED	MS RESULT	MSD RESULT	MS %REC	MSD %REC	RPD	QC LIMITS RPD	QC LIMITS %RECOVERY
1,1-DICHLOROETHENE	<1.0	50.0	52.4	51.7	105	103	1	14	61-145
BENZENE	<1.0	50.0	52.1	51.5	104	103	1	11	76-127
TRICHLOROETHENE	<1.0	50.0	50.8	50.4	102	101	1	14	71-120
TOLUENE	<1.0	50.0	50.9	51.5	102	103	1	13	76-125
CHLOROBENZENE	<1.0	50.0	50.0	52.0	100	104	4	13	75-130

BARRINGER LABORATORIES, INC.
15000 W. 6TH AVE., SUITE 300 GOLDEN, CO 80401 (303) 277-1687 FAX (303) 277-1689

3-Jun-99

Kimberly D. McNeill
PINNACLE LABORATORIES INC.
2709-D Pan American Freeway, NE
Albuquerque, NM 87107

Attn:
Project: 905080

Received: 25-May-99 09:00
PO #:

Job: 992196E

Status: Final

ANALYTICAL REPORT PACKAGE

BARRINGER LABORATORIES, INC.
15000 W. 6TH AVE., SUITE 300 GOLDEN, CO 80401 (303) 277-1687 FAX (303) 277-1689

3-Jun-99

Kimberly D. McNeill
PINNACLE LABORATORIES INC.
2709-D Pan American Freeway, NE
Albuquerque, NM 87107

Attn:
Project: 905080 PO #:

Received: 25-May-99 09:00

Job: 992196E Status: Final

CASE NARRATIVE

A total of 1 Water sample was received on 25-May-99. As stated in the chain of custody, the sample was run for the following analyses: Al, Sb, As, Ba, Be, B, Cd, Cr, Ca, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Si, Ag, Na, Tl, V and Zn. A table, to cross reference your sample ID to ours, is attached. Our procedures are summarized on the Quality Control Data Sheet.

Quality control standards for organic and inorganic analyses followed the appropriate SW-846 or EPA methodology. Quality control standards for radiochemistry followed our standard operating procedures or contractual requirements.

Signed: 6/4/99
Inorganic
Laboratory

Signed:
Project Review 6/4/99

BARRINGER LABORATORIES, INC.
15000 W. 6TH AVE., SUITE 300 GOLDEN, CO 80401 (303) 277-1687 FAX (303) 277-1689

3-Jun-99

Kimberly D. McNeill
PINNACLE LABORATORIES INC.
2709-D Pan American Freeway, NE
Albuquerque, NM 87107

Attn:
Project: 905080

Received: 25-May-99 09:00
PO #:

Job: 992196E

Status: Final

Lab-ID	Matrix	Client Sample ID	Sampled
992196-1	Water	905080-01	20-May-99

BARRINGER LABORATORIES, INC.
15000 W. 6TH AVE., SUITE 300 GOLDEN, CO 80401 (303) 277-1687 FAX (303) 277-1689

PINNACLE LABORATORIES INC.

Sample Id: 905080-01
Lab Id: 992196-1 **Project: 905080**
Date Sampled: 20-May-99 **Matrix: Water**

Analyte	Fraction	Method	Concentration	MDL	Date Analyzed
Aluminum	Total	200.7	U mg/l	0.05	1-Jun-99
Antimony	Total	200.7	U mg/l	0.05	1-Jun-99
Arsenic	Total	200.7	U mg/l	0.1	1-Jun-99
Barium	Total	200.7	0.06 mg/l	0.02	1-Jun-99
Beryllium	Total	200.7	U mg/l	0.004	1-Jun-99
Boron	Total	200.7	0.4 mg/l	0.1	1-Jun-99
Cadmium	Total	200.7	U mg/l	0.005	1-Jun-99
Chromium	Total	200.7	U mg/l	0.01	1-Jun-99
Calcium	Total	200.7	165 mg/l	0.2	1-Jun-99
Cobalt	Total	200.7	U mg/l	0.01	1-Jun-99
Copper	Total	200.7	U mg/l	0.01	1-Jun-99
Iron	Total	200.7	U mg/l	0.1	1-Jun-99
Lead	Total	200.7	U mg/l	0.05	1-Jun-99
Magnesium	Total	200.7	30.7 mg/l	0.1	1-Jun-99
Manganese	Total	200.7	U mg/l	0.005	1-Jun-99
Molybdenum	Total	200.7	U mg/l	0.01	1-Jun-99
Nickel	Total	200.7	U mg/l	0.04	1-Jun-99
Potassium	Total	200.7	U mg/l	5	1-Jun-99
Selenium	Total	200.7	U mg/l	0.1	1-Jun-99
Silicon	Total	200.7	31.5 mg/l	0.5	1-Jun-99
Silver	Total	200.7	U mg/l	0.01	1-Jun-99
Sodium	Total	200.7	102 mg/l	1	1-Jun-99
Thallium	Total	200.7	U mg/l	0.1	1-Jun-99
Vanadium	Total	200.7	0.06 mg/l	0.01	1-Jun-99
Zinc	Total	200.7	0.07 mg/l	0.02	1-Jun-99

BARRINGER LABORATORIES, INC.
15000 W. 6TH AVE., SUITE 300 GOLDEN, CO 80401 (303) 277-1687 FAX (303) 277-1689

PINNACLE LABORATORIES INC.

QUALITY CONTROL REPORT

Sample Id	Aluminum Total mg/l	Antimony Total mg/l	Arsenic Total mg/l	Barium Total mg/l	Beryllium Total mg/l
Blank	U	U	U	U	U
LCS (True)	1.00	2.00	5.00	10.0	1.00
LCS (Found)	1.01	1.96	4.90	10.6	1.00
LCS % Rec	101	98.0	98.0	106	100
Duplicate	4.10	0.97	4.2	4.28	0.101
Duplicate	4.12	1.03	4.1	4.25	0.100
RPD	0.4	6.0	1.0	0.8	0.7
Spike % Rec	102	97.4	104	106	101

Sample Id	Boron Total mg/l	Cadmium Total mg/l	Chromium Total mg/l	Calcium Total mg/l	Cobalt Total mg/l
Blank	U	U	U	U	U
LCS (True)	1.00	1.00	2.00	20.0	5.00
LCS (Found)	1.03	0.98	2.06	20.2	5.06
LCS % Rec	103	98.3	103	101	101
Duplicate	2.5	0.089	0.41	163	1.00
Duplicate	2.5	0.092	0.41	166	1.00
RPD	0.2	3.3	0.7	1.5	0.0
Spike % Rec	105	89.3	103	NA	100

Sample Id	Copper Total mg/l	Iron Total mg/l	Lead Total mg/l	Magnesium Total mg/l	Manganese Total mg/l
Blank	U	U	U	U	U
LCS (True)	2.00	10.0	5.00	20.0	1.00
LCS (Found)	2.08	10.6	5.03	20.8	1.05
LCS % Rec	104	106	101	104	105
Duplicate	0.52	2.2	1.03	30.2	1.05
Duplicate	0.52	2.1	1.04	30.6	1.05
RPD	0.2	1.4	0.3	1.3	0.1
Spike % Rec	105	108	103	NA	105

BARRINGER LABORATORIES, INC.
15000 W. 6TH AVE., SUITE 300 GOLDEN, CO 80401 (303) 277-1687 FAX (303) 277-1689

PINNACLE LABORATORIES INC.

QUALITY CONTROL REPORT

Sample Id	Molybdenum Total mg/l	Nickel Total mg/l	Potassium Total mg/l	Selenium Total mg/l	Silicon Total mg/l
Blank	U	U	U	U	U
LCS (True)	1.00	5.00	20.0	5.00	2.00
LCS (Found)	1.03	5.18	22.9	5.19	2.16
LCS % Rec	103	104	114	104	108
Duplicate	2.02	1.02	U	4.3	35.0
Duplicate	2.01	1.01	U	4.1	35.6
RPD	0.6	0.1	NC	3.8	1.7
Spike % Rec	101	NA	NA	107	(1)

Sample Id	Silver Total mg/l	Sodium Total mg/l	Thallium Total mg/l	Vanadium Total mg/l	Zinc Total mg/l
Blank	U	U	U	U	U
LCS (True)	1.00	20.0	5.00	5.00	1.00
LCS (Found)	0.98	22.6	5.15	5.10	1.00
LCS % Rec	98.0	113	103	102	99.5
Duplicate	0.11	100	4.1	1.06	1.08
Duplicate	0.11	108	4.0	1.06	1.09
RPD	2.8	8.7	1.0	0.1	0.6
Spike % Rec	109	NA	102	100	101

BARRINGER LABORATORIES, INC.
15000 W. 6TH AVE., SUITE 300 Ggolden, CO 80401 (303) 277-1687 FAX (303) 277-1689

3-Jun-99

Kimberly D. McNeill
PINNACLE LABORATORIES INC.
2709-D Pan American Freeway, NE
Albuquerque, NM 87107

Attn:
Project: 905080

Received: 25-May-99 09:00
PO #:

Job: 992196E

Status: Final

Abbreviations:

Units:

mg/l	: milligrams per liter

Quality codes:

(1)	: Sample > 4 times spike
NA	: Not Analyzed
U	: Undetected at reported limit
NC	: Not Calculated

BARRINGER LABORATORIES, INC.
15000 W. 6TH AVE., SUITE 300 Ggolden, CO 80401 (303) 277-1687 FAX (303) 277-1689

3-Jun-99
Page: Q-4

Kimberly D. McNeill
PINNACLE LABORATORIES INC.
2709-D Pan American Freeway, NE
Albuquerque, NM 87107

Attn:
Received: 25-May-99 09:00
Project: 905080 PO #:

Job: 992196E Status: Final

QUALITY CONTROL DATA SHEET

Received by: kz Via: Fed Ex

Sample Container Type: 500mL pl
Additional Lab Preparation: None

Parameter	Method	Preservative	Init	Analysis Dates
Al	200.7	HNO3	SLM	06/01
Sb	200.7	HNO3	SLM	06/01
As	200.7	HNO3	SLM	06/01
Ba	200.7	HNO3	SLM	06/01
Be	200.7	HNO3	SLM	06/01
B	200.7	HNO3	SLM	06/01
Cd	200.7	HNO3	SLM	06/01
Cr	200.7	HNO3	SLM	06/01
Ca	200.7	HNO3	SLM	06/01
Co	200.7	HNO3	SLM	06/01
Cu	200.7	HNO3	SLM	06/01
Fe	200.7	HNO3	SLM	06/01
Pb	200.7	HNO3	SLM	06/01
Mg	200.7	HNO3	SLM	06/01
Mn	200.7	HNO3	SLM	06/01
Mo	200.7	HNO3	SLM	06/01
Ni	200.7	HNO3	SLM	06/01
K	200.7	HNO3	SLM	06/01
Se	200.7	HNO3	SLM	06/01
Si	200.7	HNO3	SLM	06/01
Ag	200.7	HNO3	SLM	06/01
Na	200.7	HNO3	SLM	06/01
Tl	200.7	HNO3	SLM	06/01
V	200.7	HNO3	SLM	06/01
Zn	200.7	HNO3	SLM	06/01

BARRINGER LABORATORIES, INC.
15000 W. 6TH AVE., SUITE 300 GOLDEN, CO 80401 (303) 277-1687 FAX (303) 277-1689

3-Jun-99

Kimberly D. McNeill
PINNACLE LABORATORIES INC.
2709-D Pan American Freeway, NE
Albuquerque, NM 87107

Attn:
Project: 905080

Received: 25-May-99 09:00
PO #:

Job: 992196E

Status: Final

Barringer Laboratories, Inc. will return or dispose of your samples 30 days from the date your final report is mailed, unless otherwise specified by contract. Barringer Laboratories, Inc. reserves the right to return samples prior to the 30 days if radioactive levels exceed our license.

Pinnacle Laboratories, Inc. **Interlab Chain of Custody** Date: 5/24 Page: 1 of 1

Network Project Manager: Kimberly D. McNeill

Pinnacle Laboratories, Inc.
2709-D Pan American Freeway, NE
Albuquerque, New Mexico 87107
(505) 344-3777 Fax (505) 344-4413

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	Metals (8) RCRA	RCRA TCLP METALS	Metals-13 PP List	Al, Sb, As, Ba, Be, B, Cd, Cr, Ca	Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni	K, Se, Si, Ag, Na, Tl, V, Zn	TOC	Gen Chemistry		Oil and Grease	Volatile Organics GC/MS (8260)	BOD	COD	PESTICIDES/PCB (608/8080)	8270 BY GC/MS	PNA (8310)	8240 (TCLP 1311) ZHE	Herbicides (615/8150)	Base/Neutral Acid Compounds GC/MS (625/8270)	URANIUM	RADIUM 226+228	Gross Alpha/Beta	TO-14	NUMBER OF CONTAINERS
905080-01	5/20	1000	AQ					X	X	X																		

PROJECT INFORMATION		SAMPLE RECEIPT		SAMPLES SENT TO:		RELINQUISHED BY: 1.	RELINQUISHED BY: 2.
PROJECT #: 905080		Total Number of Containers		PENSACOLA - STL-FL		Signature: Time: Francine Tonno 1700	Signature: Time:
PROJ. NAME: NMO		Chain of Custody Seals		PORTLAND - ESL-OR		Printed Name: Date: Francine Tonno 5/24/99	Printed Name: Date:
QC LEVEL: (STD.) IV		Received Intact?		STL - CT		Pinnacle Laboratories, Inc.	Company
QC REQUIRED: (STANDARD) MS MSD BLANK		Received Good Cond./Cold		STL- NEW JERSEY		**RECEIVED BY:** 1.	**RECEIVED BY:** 2
TAT: (STANDARD) RUSH!!		LAB NUMBER:		N. CREEK		Signature: Time: 0900	Signature: Time:
DUE DATE: 6/4	COMMENTS:			BARRINGER	X	Printed Name: Date: Kevin Zahlee 5/25/99	Printed Name: Date:
RUSH SURCHARGE: —				SEQUOIA		Company BLE	Company
CLIENT DISCOUNT: —							
SPECIAL CERTIFICATION REQUIRED: YES (NO)							

Environmental Services Laboratory, Inc. E S L

17400 SW Upper Boones Ferry Road • Suite 270 • Portland, OR 97224 • (503) 670-8520

June 29, 1999

Kim McNeill
Pinnacle Laboratories
2709-D Pan American Fwy NE

Albuquerque, NM 87107

TEL: 505-344-3777
FAX (505) 344-4413

RE: 905080/NMO/Goldstar Hobbs Yard Order No.: 9905120

Dear Kim McNeill,

Environmental Services Laboratory received 1 sample on 05/25/99 for the analyses presented in the following report.

The Samples were analyzed for the following tests:

Alkalinity (Alkalinity)
BNA Semi-Vol Organics, Aqueous (SW8270B)
Bromide (Bromide)
CHLORIDE (Chloride)
CONDUCTANCE (E120.1)
Fluoride (fluoride)
ICP Metals (ICPMET)
MERCURY (Mercury)
Sulfate (Sulfate)
TOTAL DISSOLVED SOLIDS (E160.1)

There were no problems with the analyses and all data for associated QC met EPA or laboratory specifications except where noted in the Case Narrative. Results apply only to the samples analyzed. Reproduction of this report is permitted only in its entirety, without the written approval from the Laboratory.

If you have any questions regarding these tests results, please feel free to call.

Sincerely,

Kimberly Hill

Technical Review

Environmental Services Laboratory

Date: *29-Jun-99*

CLIENT:	Pinnacle Laboratories	**Client Sample ID:**	905080-01
Lab Order:	9905120	**Tag Number:**	
Project:	905080/NMO/Goldstar Hobbs Yard	**Collection Date:**	05/20/99
Lab ID:	9905120-01A	**Matrix:**	AQUEOUS

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ALKALINITY		**EPA 310.0**				Analyst: **sld**
Alkalinity, Bicarbonate (As CaCO3)	210	5		mg/L CaCO3	1	05/25/99
Alkalinity, Carbonate (As CaCO3)	ND	5		mg/L CaCO3	1	05/25/99
Alkalinity, Total (As CaCO3)	210	5		mg/L CaCO3	1	05/25/99
BROMIDE		**4500 B**				Analyst: **sld**
Bromide	1.6	0.1		mg/L	2	06/10/99
CHLORIDE		**EPA 325.3**				Analyst: **kfl**
Chloride	260	25		mg/L	50	05/26/99
CONDUCTANCE		**EPA 120.1**				Analyst: **sld**
Specific Conductance	1400	1		µmhos/cm	1	05/25/99
FLUORIDE		**EPA 340.2**				Analyst: **sld**
Fluoride	2	0.2		mg/L	1	06/08/99
SULFATE		**EPA 375.4**				Analyst: **sld**
Sulfate	160	62		mg/L	12.5	05/27/99
TOTAL DISSOLVED SOLIDS		**EPA 160.1**				Analyst: **kfl**
Total Dissolved Solids (Residue, Filterable)	1000	10		mg/L	1	05/25/99
MERCURY		**SW 7470 / EPA 245.**				Analyst: **btn**
Mercury	ND	0.0002		mg/L	1	06/13/99
ICP METALS		**SW 6010 / EPA 200.**				Analyst: **btn**
Calcium	180	0.05		mg/L	1	06/18/99
Magnesium	29	0.05		mg/L	1	06/18/99
Potassium	3.7	0.2		mg/L	1	06/18/99
Sodium	103	0.2		mg/L	1	06/18/99

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Services Laboratory

Date: *29-Jun-99*

CLIENT:	Pinnacle Laboratories	**Client Sample ID:**	905080-01
Lab Order:	9905120	**Tag Number:**	
Project:	905080/NMO/Goldstar Hobbs Yard	**Collection Date:**	05/20/99
Lab ID:	9905120-01A	**Matrix:**	AQUEOUS

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
BNA SEMI-VOL ORGANICS, AQUEOUS		**SW 8270B**				Analyst: **keh**
1,2,4,5-Tetrachlorobenzene	ND	5		µg/L	1	05/28/99
1,2,4-Trichlorobenzene	ND	5		µg/L	1	05/28/99
1,2-Dichlorobenzene	ND	5		µg/L	1	05/28/99
1,2-Diphenylhydrazine	ND	5		µg/L	1	05/28/99
1,3-Dichlorobenzene	ND	5		µg/L	1	05/28/99
1,4-Dichlorobenzene	ND	5		µg/L	1	05/28/99
2,3,4,6-Tetrachlorophenol	ND	5		µg/L	1	05/28/99
2,4,5-Trichlorophenol	ND	5		µg/L	1	05/28/99
2,4,6-Trichlorophenol	ND	5		µg/L	1	05/28/99
2,4-Dichlorophenol	ND	5		µg/L	1	05/28/99
2,4-Dimethylphenol	ND	5		µg/L	1	05/28/99
2,4-Dinitrophenol	ND	10		µg/L	1	05/28/99
2,4-Dinitrotoluene	ND	5		µg/L	1	05/28/99
2,6-Dichlorophenol	ND	5		µg/L	1	05/28/99
2,6-Dinitrotoluene	ND	5		µg/L	1	05/28/99
2-Chloronaphthalene	ND	5		µg/L	1	05/28/99
2-Chlorophenol	ND	5		µg/L	1	05/28/99
2-Methylnaphthalene	ND	5		µg/L	1	05/28/99
2-Methylphenol	ND	5		µg/L	1	05/28/99
2-Nitroaniline	ND	5		µg/L	1	05/28/99
2-Nitrophenol	ND	5		µg/L	1	05/28/99
2-Picoline	ND	10		µg/L	1	05/28/99
3-Methylcholanthrene	ND	5		µg/L	1	05/28/99
3-Methylphenol	ND	5		µg/L	1	05/28/99
3-Nitroaniline	ND	5		µg/L	1	05/28/99
4,6-Dinitro-2-methylphenol	ND	5		µg/L	1	05/28/99
4-Aminobiphenyl	ND	50		µg/L	1	05/28/99
4-Bromophenyl phenyl ether	ND	5		µg/L	1	05/28/99
4-Chloro-3-methylphenol	ND	5		µg/L	1	05/28/99
4-Chlorophenyl phenyl ether	ND	5		µg/L	1	05/28/99
4-Methylphenol	ND	5		µg/L	1	05/28/99
4-Nitroaniline	ND	5		µg/L	1	05/28/99
4-Nitrophenol	ND	5		µg/L	1	05/28/99
7,12-Dimethylbenz(a)anthracene	ND	5		µg/L	1	05/28/99
Acenaphthene	ND	5		µg/L	1	05/28/99
Acenaphthylene	ND	5		µg/L	1	05/28/99
Acetophenone	ND	5		µg/L	1	05/28/99
Aniline	ND	5		µg/L	1	05/28/99
Anthracene	ND	5		µg/L	1	05/28/99
Benz(a)anthracene	ND	5		µg/L	1	05/28/99

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Services Laboratory

Date: *29-Jun-99*

CLIENT:	Pinnacle Laboratories	**Client Sample ID:**	905080-01
Lab Order:	9905120	**Tag Number:**	
Project:	905080/NMO/Goldstar Hobbs Yard	**Collection Date:**	05/20/99
Lab ID:	9905120-01A	**Matrix:**	AQUEOUS

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
Benzo(a)pyrene	ND	5		µg/L	1	05/28/99
Benzo(b)fluoranthene	ND	5		µg/L	1	05/28/99
Benzo(g,h,i)perylene	ND	5		µg/L	1	05/28/99
Benzo(k)fluoranthene	ND	5		µg/L	1	05/28/99
Benzyl alcohol	ND	5		µg/L	1	05/28/99
Bis(2-chloroethoxy)methane	ND	5		µg/L	1	05/28/99
Bis(2-chloroethyl)ether	ND	5		µg/L	1	05/28/99
Bis(2-chloroisopropyl)ether	ND	5		µg/L	1	05/28/99
Bis(2-ethylhexyl)phthalate	ND	5		µg/L	1	05/28/99
Butyl benzyl phthalate	ND	5		µg/L	1	05/28/99
Chrysene	ND	5		µg/L	1	05/28/99
Di-n-butyl phthalate	ND	5		µg/L	1	05/28/99
Di-n-octyl phthalate	ND	5		µg/L	1	05/28/99
Dibenz(a,h)anthracene	ND	5		µg/L	1	05/28/99
Dibenzofuran	ND	5		µg/L	1	05/28/99
Diethyl phthalate	ND	5		µg/L	1	05/28/99
Dimethyl phthalate	ND	5		µg/L	1	05/28/99
Ethyl methanesulfonate	ND	5		µg/L	1	05/28/99
Fluoranthene	ND	5		µg/L	1	05/28/99
Fluorene	ND	5		µg/L	1	05/28/99
Hexachlorobenzene	ND	5		µg/L	1	05/28/99
Hexachlorobutadiene	ND	5		µg/L	1	05/28/99
Hexachlorocyclopentadiene	ND	5		µg/L	1	05/28/99
Hexachloroethane	ND	5		µg/L	1	05/28/99
Indeno(1,2,3-cd)pyrene	ND	5		µg/L	1	05/28/99
Isophorone	ND	5		µg/L	1	05/28/99
Methyl methanesulfonate	ND	5		µg/L	1	05/28/99
N-Nitroso-di-n-butylamine	ND	5		µg/L	1	05/28/99
N-Nitrosodi-n-propylamine	ND	5		µg/L	1	05/28/99
N-Nitrosodiphenylamine	ND	5		µg/L	1	05/28/99
N-Nitrosopiperidine	ND	5		µg/L	1	05/28/99
Naphthalene	ND	5		µg/L	1	05/28/99
Nitrobenzene	ND	5		µg/L	1	05/28/99
p-Dimethylaminoazobenzene	ND	5		µg/L	1	05/28/99
Pentachlorobenzene	ND	5		µg/L	1	05/28/99
Pentachloronitrobenzene	ND	5		µg/L	1	05/28/99
Pentachlorophenol	ND	5		µg/L	1	05/28/99
Phenacetin	ND	5		µg/L	1	05/28/99
Phenanthrene	ND	5		µg/L	1	05/28/99
Phenol	ND	5		µg/L	1	05/28/99
Pyrene	ND	5		µg/L	1	05/28/99

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Services Laboratory

Date: *29-Jun-99*

CLIENT:	Pinnacle Laboratories	**Client Sample ID:**	905080-01
Lab Order:	9905120	**Tag Number:**	
Project:	905080/NMO/Goldstar Hobbs Yard	**Collection Date:**	05/20/99
Lab ID:	9905120-01A	**Matrix:**	AQUEOUS

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
Surr: 2,4,6-Tribromophenol	85.1	10-123		%REC	1	05/28/99
Surr: 2-Fluorobiphenyl	71.8	43-116		%REC	1	05/28/99
Surr: 2-Fluorophenol	35.5	21-100		%REC	1	05/28/99
Surr: 4-Terphenyl-d14	75.6	33-141		%REC	1	05/28/99
Surr: Nitrobenzene-d5	65.8	35-114		%REC	1	05/28/99
Surr: Phenol-d5	21.9	10-94		%REC	1	05/28/99

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

CLIENT: Pinnacle Laboratories
Work Order: 9905120
Project: 905080/NMO/Goldstar Hobbs Yard

QC SUMMARY REPORT
Method Blank

Sample ID: **MBlank** Batch ID: **01 ALK A-6/1/** Test Code: **Alkalinity** Units: **mg/L CaCO3** Analysis Date **04/19/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990419A** SeqNo: **9643**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	ND	5									
Alkalinity, Carbonate (As CaCO3)	ND	5									
Alkalinity, Total (As CaCO3)	ND	5									

Sample ID: **MBlank** Batch ID: **01 ALK A-6/1/** Test Code: **Alkalinity** Units: **mg/L CaCO3** Analysis Date **05/25/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990525A** SeqNo: **9907**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	ND	5									
Alkalinity, Carbonate (As CaCO3)	ND	5									
Alkalinity, Total (As CaCO3)	ND	5									

Sample ID: **MBlank** Batch ID: **01 ALK A-6/1/** Test Code: **Alkalinity** Units: **mg/L CaCO3** Analysis Date **05/03/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990503B** SeqNo: **11150**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	ND	5									
Alkalinity, Carbonate (As CaCO3)	ND	5									
Alkalinity, Total (As CaCO3)	ND	5									

Sample ID: **MBlank** Batch ID: **01 ALK A-6/1/** Test Code: **Alkalinity** Units: **mg/L CaCO3** Analysis Date **05/10/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990510C** SeqNo: **11173**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	ND	5									
Alkalinity, Carbonate (As CaCO3)	ND	5									
Alkalinity, Total (As CaCO3)	ND	5									

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905120
Project: 905080/NMO/Goldstar Hobbs Yard

QC SUMMARY REPORT
Method Blank

Sample ID: **MBlank** Batch ID: **01 ALK A-6/1/** Test Code: **Alkalinity** Units: **mg/L CaCO3** Analysis Date **05/11/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990511C** SeqNo: **11182**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	ND	5									
Alkalinity, Carbonate (As CaCO3)	ND	5									
Alkalinity, Total (As CaCO3)	ND	5									

Sample ID: **MBlank** Batch ID: **01 ALK A-6/1/** Test Code: **Alkalinity** Units: **mg/L CaCO3** Analysis Date **05/14/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990514B** SeqNo: **11226**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	ND	5									
Alkalinity, Carbonate (As CaCO3)	ND	5									
Alkalinity, Total (As CaCO3)	ND	5									

Sample ID: **MBlank** Batch ID: **01 BR A-6/11/** Test Code: **Bromide** Units: **mg/L** Analysis Date **06/10/99** Prep Date:
Client ID: **9905120** Run ID: **HIT MAN_990610A** SeqNo: **13710**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Bromide	ND	5									

Sample ID: **MBlank** Batch ID: **01 CL A-6/1/9** Test Code: **Chloride** Units: **mg/L** Analysis Date **05/26/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990526A** SeqNo: **9937**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	ND	0.5									

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905120
Project: 905080/NMO/Goldstar Hobbs Yard

QC SUMMARY REPORT
Method Blank

Sample ID: MBlank	Batch ID: 01 CL A-6/1/9	Test Code: Chloride	Units: mg/L	Analysis Date 05/07/99	Prep Date:
Client ID:	9905120	Run ID: NO INST_990507B		SeqNo: 11086	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	ND	0.5									

Sample ID: MBlank	Batch ID: 01 CL A-6/1/9	Test Code: Chloride	Units: mg/L	Analysis Date 05/17/99	Prep Date:
Client ID:	9905120	Run ID: NO INST_990517C		SeqNo: 11134	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	ND	0.5									

Sample ID: MBlank	Batch ID: 01 COND-06/	Test Code: E120.1	Units: µmhos/cm	Analysis Date 04/21/99	Prep Date:
Client ID:	9905120	Run ID: NO INST_990421A		SeqNo: 10312	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Specific Conductance	ND	1									

Sample ID: MBlank	Batch ID: 01 COND-06/	Test Code: E120.1	Units: µmhos/cm	Analysis Date 05/10/99	Prep Date:
Client ID:	9905120	Run ID: NO INST_990510A		SeqNo: 10347	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Specific Conductance	ND	1									

Sample ID: MBlank	Batch ID: 01 COND-06/	Test Code: E120.1	Units: µmhos/cm	Analysis Date 05/20/99	Prep Date:
Client ID:	9905120	Run ID: NO INST_990520A		SeqNo: 10364	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Specific Conductance	ND	1									

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905120
Project: 905080/NMO/Goldstar Hobbs Yard

QC SUMMARY REPORT
Method Blank

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sample ID: MBlank Batch ID: **01 COND-06/** Test Code: **E120.1** Units: **µmhos/cm** Analysis Date **05/25/99** Prep Date:											
Client ID: **9905120** Run ID: **NO INST_990525E** SeqNo: **10384**											
Specific Conductance	ND	1									
Sample ID: MBlank Batch ID: **01 FL A-6/9/9** Test Code: **fluoride** Units: **mg/L** Analysis Date **06/08/99** Prep Date:											
Client ID: **9905120** Run ID: **NO INST_990608B** SeqNo: **13057**											
Fluoride	ND	0.2									
Sample ID: MBlank Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **05/21/99** Prep Date:											
Client ID: **9905120** Run ID: **HIT MAN_990521B** SeqNo: **9661**											
Sulfate	ND	5									
Sample ID: MBlank Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **05/27/99** Prep Date:											
Client ID: **9905120** Run ID: **HIT MAN_990527A** SeqNo: **9765**											
Sulfate	ND	5									
Sample ID: MBlank Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **04/29/99** Prep Date:											
Client ID: **9905120** Run ID: **HIT MAN_990429A** SeqNo: **10621**											
Sulfate	ND	5									

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905120
Project: 905080/NMO/Goldstar Hobbs Yard

QC SUMMARY REPORT
Method Blank

Sample ID: **MBlank** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **05/12/99** Prep Date:
Client ID: **9905120** Run ID: **HIT MAN_990512B** SeqNo: **10869**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	ND	5									

Sample ID: **MBlank** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **05/20/99** Prep Date:
Client ID: **9905120** Run ID: **HIT MAN_990520A** SeqNo: **10997**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	ND	5									

Sample ID: **MBlank** Batch ID: **01 TDS-6/1/99** Test Code: **E160.1** Units: **mg/L** Analysis Date **05/25/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990525C** SeqNo: **10233**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Dissolved Solids (Residue, Filtera	ND	10									

Sample ID: **MBlank** Batch ID: **01 TDS-6/1/99** Test Code: **E160.1** Units: **mg/L** Analysis Date **05/26/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990526C** SeqNo: **10284**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Dissolved Solids (Residue, Filtera	ND	10									

Sample ID: **MBlank** Batch ID: **01 TDS-6/1/99** Test Code: **E160.1** Units: **mg/L** Analysis Date **04/28/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990428C** SeqNo: **11254**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Dissolved Solids (Residue, Filtera	ND	10									

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905120
Project: 905080/NMO/Goldstar Hobbs Yard

QC SUMMARY REPORT
Method Blank

Sample ID: MBlank	Batch ID: 01 TDS-6/1/99	Test Code: E160.1	Units: mg/L	Analysis Date 05/05/99	Prep Date:
Client ID:	9905120	Run ID: NO INST_990505B		SeqNo: 11272	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Dissolved Solids (Residue, Filtera	ND	10									

Sample ID: MBlank	Batch ID: 01 TDS-6/1/99	Test Code: E160.1	Units: mg/L	Analysis Date 05/11/99	Prep Date:
Client ID:	9905120	Run ID: NO INST_990511D		SeqNo: 11287	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Dissolved Solids (Residue, Filtera	ND	10									

Sample ID: MBlank	Batch ID: 01 TDS-6/1/99	Test Code: E160.1	Units: mg/L	Analysis Date 05/18/99	Prep Date:
Client ID:	9905120	Run ID: NO INST_990518B		SeqNo: 11307	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Dissolved Solids (Residue, Filtera	ND	10									

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905120
Project: 905080/NMO/Goldstar Hobbs Yard

QC SUMMARY REPORT
Method Blank

Sample ID: **MB-480** Batch ID: **480** Test Code: **SW8270B** Units: **µg/L** Analysis Date **05/27/99** Prep Date: **05/24/99**
Client ID: **9905120** Run ID: **MANFREDD_990527A** SeqNo: **9970**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,2,4,5-Tetrachlorobenzene	ND	5									
1,2,4-Trichlorobenzene	ND	5									
1,2-Dichlorobenzene	ND	5									
1,2-Diphenylhydrazine	ND	5									
1,3-Dichlorobenzene	ND	5									
1,4-Dichlorobenzene	ND	5									
2,3,4,6-Tetrachlorophenol	ND	5									
2,4,5-Trichlorophenol	ND	5									
2,4,6-Trichlorophenol	ND	5									
2,4-Dichlorophenol	ND	5									
2,4-Dimethylphenol	ND	5									
2,4-Dinitrophenol	ND	10									
2,4-Dinitrotoluene	ND	5									
2,6-Dichlorophenol	ND	5									
2,6-Dinitrotoluene	ND	5									
2-Chloronaphthalene	ND	5									
2-Chlorophenol	ND	5									
2-Methylnaphthalene	ND	5									
2-Methylphenol	ND	5									
2-Nitroaniline	ND	5									
2-Nitrophenol	ND	5									
2-Picoline	ND	10									
3-Methylcholanthrene	ND	5									
3-Methylphenol	ND	5									
3-Nitroaniline	ND	5									
4,6-Dinitro-2-methylphenol	ND	5									
4-Aminobiphenyl	ND	50									
4-Bromophenyl phenyl ether	ND	5									
4-Chloro-3-methylphenol	ND	5									

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905120
Project: 905080/NMO/Goldstar Hobbs Yard

QC SUMMARY REPORT
Method Blank

4-Chlorophenyl phenyl ether	ND	5
4-Methylphenol	ND	5
4-Nitroaniline	ND	5
4-Nitrophenol	ND	5
7,12-Dimethylbenz(a)anthracene	ND	5
Acenaphthene	ND	5
Acenaphthylene	ND	5
Acetophenone	ND	5
Aniline	ND	5
Anthracene	ND	5
Benz(a)anthracene	ND	5
Benzo(a)pyrene	ND	5
Benzo(b)fluoranthene	ND	5
Benzo(g,h,i)perylene	ND	5
Benzo(k)fluoranthene	ND	5
Benzyl alcohol	ND	5
Bis(2-chloroethoxy)methane	ND	5
Bis(2-chloroethyl)ether	ND	5
Bis(2-chloroisopropyl)ether	ND	5
Bis(2-ethylhexyl)phthalate	ND	5
Butyl benzyl phthalate	ND	5
Chrysene	ND	5
Di-n-butyl phthalate	ND	5
Di-n-octyl phthalate	ND	5
Dibenz(a,h)anthracene	ND	5
Dibenzofuran	ND	5
Diethyl phthalate	ND	5
Dimethyl phthalate	ND	5
Ethyl methanesulfonate	ND	5
Fluoranthene	ND	5
Fluorene	ND	5
Hexachlorobenzene	ND	5
Hexachlorobutadiene	ND	5

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905120
Project: 905080/NMO/Goldstar Hobbs Yard

QC SUMMARY REPORT
Method Blank

Hexachlorocyclopentadiene	ND	5
Hexachloroethane	ND	5
Indeno(1,2,3-cd)pyrene	ND	5
Isophorone	ND	5
Methyl methanesulfonate	ND	5
N-Nitroso-di-n-butylamine	ND	5
N-Nitrosodi-n-propylamine	ND	5
N-Nitrosodiphenylamine	ND	5
N-Nitrosopiperidine	ND	5
Naphthalene	ND	5
Nitrobenzene	ND	5
p-Dimethylaminoazobenzene	ND	5
Pentachlorobenzene	ND	5
Pentachloronitrobenzene	ND	5
Pentachlorophenol	ND	5
Phenacetin	ND	5
Phenanthrene	ND	5
Phenol	ND	5
Pyrene	ND	5

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905120
Project: 905080/NMO/Goldstar Hobbs Yard

QC SUMMARY REPORT
Method Blank

Sample ID: **MB-480** Batch ID: **480** Test Code: **SW8270B** Units: **µg/L** Analysis Date **05/28/99** Prep Date: **05/24/99**
Client ID: **9905120** Run ID: **MANFREDD_990528A** SeqNo: **11673**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,2,4,5-Tetrachlorobenzene	ND	5									
1,2,4-Trichlorobenzene	ND	5									
1,2-Dichlorobenzene	ND	5									
1,2-Diphenylhydrazine	ND	5									
1,3-Dichlorobenzene	ND	5									
1,4-Dichlorobenzene	ND	5									
2,3,4,6-Tetrachlorophenol	ND	5									
2,4,5-Trichlorophenol	ND	5									
2,4,6-Trichlorophenol	ND	5									
2,4-Dichlorophenol	ND	5									
2,4-Dimethylphenol	ND	5									
2,4-Dinitrophenol	ND	10									
2,4-Dinitrotoluene	ND	5									
2,6-Dichlorophenol	ND	5									
2,6-Dinitrotoluene	ND	5									
2-Chloronaphthalene	ND	5									
2-Chlorophenol	ND	5									
2-Methylnaphthalene	ND	5									
2-Methylphenol	ND	5									
2-Nitroaniline	ND	5									
2-Nitrophenol	ND	5									
2-Picoline	ND	10									
3-Methylcholanthrene	ND	5									
3-Methylphenol	ND	5									
3-Nitroaniline	ND	5									
4,6-Dinitro-2-methylphenol	ND	5									
4-Aminobiphenyl	ND	50									
4-Bromophenyl phenyl ether	ND	5									
4-Chloro-3-methylphenol	ND	5									

Qualifiers: ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905120
Project: 905080/NMO/Goldstar Hobbs Yard

QC SUMMARY REPORT
Method Blank

4-Chlorophenyl phenyl ether	ND	5
4-Methylphenol	ND	5
4-Nitroaniline	ND	5
4-Nitrophenol	ND	5
7,12-Dimethylbenz(a)anthracene	ND	5
Acenaphthene	ND	5
Acenaphthylene	ND	5
Acetophenone	ND	5
Aniline	ND	5
Anthracene	ND	5
Benz(a)anthracene	ND	5
Benzo(a)pyrene	ND	5
Benzo(b)fluoranthene	ND	5
Benzo(g,h,i)perylene	ND	5
Benzo(k)fluoranthene	ND	5
Benzyl alcohol	ND	5
Bis(2-chloroethoxy)methane	ND	5
Bis(2-chloroethyl)ether	ND	5
Bis(2-chloroisopropyl)ether	ND	5
Bis(2-ethylhexyl)phthalate	ND	5
Butyl benzyl phthalate	ND	5
Chrysene	ND	5
Di-n-butyl phthalate	ND	5
Di-n-octyl phthalate	ND	5
Dibenz(a,h)anthracene	ND	5
Dibenzofuran	ND	5
Diethyl phthalate	ND	5
Dimethyl phthalate	ND	5
Ethyl methanesulfonate	ND	5
Fluoranthene	ND	5
Fluorene	ND	5
Hexachlorobenzene	ND	5
Hexachlorobutadiene	ND	5

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

Hexachlorocyclopentadiene	ND	5
Hexachloroethane	ND	5
Indeno(1,2,3-cd)pyrene	ND	5
Isophorone	ND	5
Methyl methanesulfonate	ND	5
N-Nitroso-di-n-butylamine	ND	5
N-Nitrosodi-n-propylamine	ND	5
N-Nitrosodiphenylamine	ND	5
N-Nitrosopiperidine	ND	5
Naphthalene	ND	5
Nitrobenzene	ND	5
p-Dimethylaminoazobenzene	ND	5
Pentachlorobenzene	ND	5
Pentachloronitrobenzene	ND	5
Pentachlorophenol	ND	5
Phenacetin	ND	5
Phenanthrene	ND	5
Phenol	ND	5
Pyrene	ND	5

Sample ID: **MB-535** Batch ID: **535** Test Code: **Mercury** Units: **mg/L** Analysis Date **06/13/99** Prep Date: **06/11/99**

Client ID: **9905120** Run ID: **MERC_990613B** SeqNo: **13903**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	ND	0.0002									
Mercury, TCLP	ND	0.0002									

CLIENT: Pinnacle Laboratories
Work Order: 9905120
Project: 905080/NMO/Goldstar Hobbs Yard

QC SUMMARY REPORT
Method Blank

Sample ID: **MB-548** Batch ID: **548** Test Code: **ICPMET** Units: **mg/L** Analysis Date **06/18/99** Prep Date: **06/16/99**
Client ID: **9905120** Run ID: **ICP_990618B** SeqNo: **15580**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	ND	0.005									
Arsenic	ND	0.005									
Barium	ND	0.005									
Beryllium	ND	0.002									
Cadmium	ND	0.002									
Calcium	ND	0.05									
Chromium	ND	0.005									
Copper	ND	0.005									
Hardness	ND	0.33									
Iron	ND	0.015									
Lead	ND	0.005									
Magnesium	ND	0.05									
Manganese	ND	0.005									
Nickel	ND	0.005									
Potassium	ND	0.2									
Selenium	ND	0.005									
Silver	ND	0.005									
Sodium	ND	0.2									
Thallium	ND	0.01									
Zinc	ND	0.005									

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905120
Project: 905080/NMO/Goldstar Hobbs Yard

QC SUMMARY REPORT

Sample Duplicate

Sample ID: **9904055-08A DUP** Batch ID: **01 ALK A-6/1/** Test Code: **Alkalinity** Units: **mg/L CaCO3** Analysis Date **04/19/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990419A** SeqNo: **9656**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	150	5	0	0	0.0%	0	0	150	0.0%	20	
Alkalinity, Carbonate (As CaCO3)	ND	5	0	0	0.0%	0	0	0	0.0%	20	
Alkalinity, Total (As CaCO3)	150	5	0	0	0.0%	0	0	150	0.0%	20	

Sample ID: **9904114-04A DUP** Batch ID: **01 ALK A-6/1/** Test Code: **Alkalinity** Units: **mg/L CaCO3** Analysis Date **05/03/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990503B** SeqNo: **11153**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	100	5	0	0	0.0%	0	0	95	5.1%	20	
Alkalinity, Carbonate (As CaCO3)	ND	5	0	0	0.0%	0	0	0	0.0%	20	
Alkalinity, Total (As CaCO3)	100	5	0	0	0.0%	0	0	95	5.1%	20	

Sample ID: **9905011-03A DUP** Batch ID: **01 ALK A-6/1/** Test Code: **Alkalinity** Units: **mg/L CaCO3** Analysis Date **05/10/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990510C** SeqNo: **11179**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	200	5	0	0	0.0%	0	0	210	4.9%	20	
Alkalinity, Carbonate (As CaCO3)	ND	5	0	0	0.0%	0	0	0	0.0%	20	
Alkalinity, Total (As CaCO3)	200	5	0	0	0.0%	0	0	210	4.9%	20	

Sample ID: **9905029-01A DUP** Batch ID: **01 ALK A-6/1/** Test Code: **Alkalinity** Units: **mg/L CaCO3** Analysis Date **05/11/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990511C** SeqNo: **11187**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	170	5	0	0	0.0%	0	0	170	0.0%	20	
Alkalinity, Carbonate (As CaCO3)	ND	5	0	0	0.0%	0	0	0	0.0%	20	
Alkalinity, Total (As CaCO3)	170	5	0	0	0.0%	0	0	170	0.0%	20	

Qualifiers: ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905120
Project: 905080/NMO/Goldstar Hobbs Yard

QC SUMMARY REPORT
Sample Duplicate

Sample ID: **9905053-02A DUP** Batch ID: **01 ALK A-6/1/** Test Code: **Alkalinity** Units: **mg/L CaCO3** Analysis Date **05/14/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990514B** SeqNo: **11231**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	130	5	0	0	0.0%	0	0	120	8.0%	20	
Alkalinity, Carbonate (As CaCO3)	ND	5	0	0	0.0%	0	0	0	0.0%	20	
Alkalinity, Total (As CaCO3)	130	5	0	0	0.0%	0	0	120	8.0%	20	

Sample ID: **9905087-01A DUP** Batch ID: **01 ALK A-6/1/** Test Code: **Alkalinity** Units: **mg/L CaCO3** Analysis Date **05/25/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990525A** SeqNo: **9910**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Total (As CaCO3)	410	5	0	0	0.0%	0	0	450	9.3%	20	

Sample ID: **9905120-01A DUP** Batch ID: **01 ALK A-6/1/** Test Code: **Alkalinity** Units: **mg/L CaCO3** Analysis Date **05/25/99** Prep Date:
Client ID: **905080-01** **9905120** Run ID: **NO INST_990525A** SeqNo: **9928**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	220	5	0	0	0.0%	0	0	210	4.7%	20	
Alkalinity, Carbonate (As CaCO3)	ND	5	0	0	0.0%	0	0	0	0.0%	20	
Alkalinity, Total (As CaCO3)	220	5	0	0	0.0%	0	0	210	4.7%	20	

Sample ID: **9906014-02A DUP** Batch ID: **01 BR A-6/11/** Test Code: **Bromide** Units: **mg/L** Analysis Date **06/10/99** Prep Date:
Client ID: **9905120** Run ID: **HIT MAN_990610A** SeqNo: **13716**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Bromide	.32	0.1	0	0	0.0%	0	0	0.11	97.7%	20	R,T

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905120
Project: 905080/NMO/Goldstar Hobbs Yard

QC SUMMARY REPORT
Sample Duplicate

Sample ID: **9904166-01A DUP** Batch ID: **01 CL A-6/1/9** Test Code: **Chloride** Units: **mg/L** Analysis Date **05/07/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990507B** SeqNo: **11108**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	38	5	0	0	0.0%	0	0	40	5.1%	20	

Sample ID: **9904166-02A DUP** Batch ID: **01 CL A-6/1/9** Test Code: **Chloride** Units: **mg/L** Analysis Date **05/07/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990507B** SeqNo: **11112**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	32	5	0	0	0.0%	0	0	35	9.0%	20	

Sample ID: **9905030-01A DUP** Batch ID: **01 CL A-6/1/9** Test Code: **Chloride** Units: **mg/L** Analysis Date **05/17/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990517C** SeqNo: **11137**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	140	5	0	0	0.0%	0	0	130	7.4%	20	

Sample ID: **9905097-02A DUP** Batch ID: **01 CL A-6/1/9** Test Code: **Chloride** Units: **mg/L** Analysis Date **05/26/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990526A** SeqNo: **9944**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride, Diss	5	0.5	0	0	0.0%	0	0	5.25	4.9%	20	

Sample ID: **9905133-05A DUP** Batch ID: **01 CL A-6/1/9** Test Code: **Chloride** Units: **mg/L** Analysis Date **05/26/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990526A** SeqNo: **9959**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride, Diss	17.5	5	0	0	0.0%	0	0	17.5	0.0%	20	

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905120
Project: 905080/NMO/Goldstar Hobbs Yard

QC SUMMARY REPORT
Sample Duplicate

Sample ID: **9904085-01A DUP** Batch ID: **01 COND-06/** Test Code: **E120.1** Units: **µmhos/cm** Analysis Date **04/21/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990421A** SeqNo: **10315**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Specific Conductance	2280	1	0	0	0.0%	0	0	2340	2.6%	20	

Sample ID: **9904146-01A DUP** Batch ID: **01 COND-06/** Test Code: **E120.1** Units: **µmhos/cm** Analysis Date **05/10/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990510A** SeqNo: **10350**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Specific Conductance	512	1	0	0	0.0%	0	0	517	1.0%	20	

Sample ID: **9905047-01A DUP** Batch ID: **01 COND-06/** Test Code: **E120.1** Units: **µmhos/cm** Analysis Date **05/20/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990520A** SeqNo: **10370**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Specific Conductance	170	1	0	0	0.0%	0	0	171	0.6%	20	

Sample ID: **9905101-01A DUP** Batch ID: **01 COND-06/** Test Code: **E120.1** Units: **µmhos/cm** Analysis Date **05/25/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990525E** SeqNo: **10395**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Specific Conductance	860	1	0	0	0.0%	0	0	830	3.6%	20	

Sample ID: **9906027-03A DUP** Batch ID: **01 FL A-6/9/9** Test Code: **fluoride** Units: **mg/L** Analysis Date **06/08/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990608B** SeqNo: **13068**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Fluoride	ND	0.2	0	0	0.0%	0	0	0	0.0%	20	

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905120
Project: 905080/NMO/Goldstar Hobbs Yard

QC SUMMARY REPORT
Sample Duplicate

Sample ID: **9904111-01A DUP** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **04/29/99** Prep Date:
Client ID: **9905120** Run ID: **HIT MAN_990429A** SeqNo: **10624**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	59.02	12	0	0	0.0%	80	120	56.18	4.9%	20	

Sample ID: **9904157-03A DUP** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **04/29/99** Prep Date:
Client ID: **9905120** Run ID: **HIT MAN_990429A** SeqNo: **10662**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	233.1	62	0	0	0.0%	80	120	203.9	13.4%	20	
Sulfate, Diss	ND	62	0	0	0.0%	80	120	0	0.0%	20	

Sample ID: **9904166-01A DUP** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **05/12/99** Prep Date:
Client ID: **9905120** Run ID: **HIT MAN_990512B** SeqNo: **10872**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	126.9	62	0	0	0.0%	80	120	130.2	2.6%	20	

Sample ID: **9905045-01A DUP** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **05/20/99** Prep Date:
Client ID: **9905120** Run ID: **HIT MAN_990520A** SeqNo: **11008**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	134.4	25	0	0	0.0%	80	120	121	10.5%	20	

Sample ID: **9905078-01A DUP** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **05/21/99** Prep Date:
Client ID: **9905120** Run ID: **HIT MAN_990521B** SeqNo: **9668**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	574.8	120	0	0	0.0%	80	120	494	15.1%	20	

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905120
Project: 905080/NMO/Goldstar Hobbs Yard

QC SUMMARY REPORT
Sample Duplicate

Sample ID: **9905097-02A DUP** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **05/27/99** Prep Date:
Client ID: **9905120** Run ID: **HIT MAN_990527A** SeqNo: **9769**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate, Diss	13	5	0	0	0.0%	80	120	13	0.0%	20	

Sample ID: **9904140-04A DUP** Batch ID: **01 TDS-6/1/99** Test Code: **E160.1** Units: **mg/L** Analysis Date **04/28/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990428C** SeqNo: **11267**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Dissolved Solids (Residue, Filtera	510	10	0	0	0.0%	0	0	480	6.1%	20	

Sample ID: **9905011-03A DUP** Batch ID: **01 TDS-6/1/99** Test Code: **E160.1** Units: **mg/L** Analysis Date **05/05/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990505B** SeqNo: **11286**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Dissolved Solids (Residue, Filtera	470	10	0	0	0.0%	0	0	470	0.0%	20	

Sample ID: **9905026-01A DUP** Batch ID: **01 TDS-6/1/99** Test Code: **E160.1** Units: **mg/L** Analysis Date **05/11/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990511D** SeqNo: **11290**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Dissolved Solids (Residue, Filtera	430	10	0	0	0.0%	0	0	420	2.4%	20	

Sample ID: **9905053-01A DUP** Batch ID: **01 TDS-6/1/99** Test Code: **E160.1** Units: **mg/L** Analysis Date **05/18/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990518B** SeqNo: **11310**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Dissolved Solids (Residue, Filtera	440	10	0	0	0.0%	0	0	420	4.7%	20	

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905120
Project: 905080/NMO/Goldstar Hobbs Yard

QC SUMMARY REPORT
Sample Duplicate

Sample ID: **9905098-01A DUP** Batch ID: **01 TDS-6/1/99** Test Code: **E160.1** Units: **mg/L** Analysis Date **05/25/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990525C** SeqNo: **10238**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Dissolved Solids (Residue, Filtera	15	10	0	0	0.0%	0	0	34	77.6%	20	R,T

Sample ID: **9905133-03A DUP** Batch ID: **01 TDS-6/1/99** Test Code: **E160.1** Units: **mg/L** Analysis Date **05/26/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990526C** SeqNo: **10287**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Dissolved Solids (Residue, Filtera	110	10	0	0	0.0%	0	0	130	16.7%	20	

Sample ID: **9906049-01A DUP** Batch ID: **535** Test Code: **Mercury** Units: **mg/L** Analysis Date **06/13/99** Prep Date: **06/11/99**
Client ID: **9905120** Run ID: **MERC_990613B** SeqNo: **13906**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	ND	0.0002	0	0	0.0%	0	0	0	0.0%	20	
Mercury, TCLP	ND	0.0002	0	0	0.0%	0	0	0	0.0%	20	

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905120
Project: 905080/NMO/Goldstar Hobbs Yard

QC SUMMARY REPORT
Sample Duplicate

Sample ID: **9905144-01A DUP** Batch ID: **548** Test Code: **ICPMET** Units: **mg/L** Analysis Date **06/18/99** Prep Date: **06/16/99**
Client ID: **9905120** Run ID: **ICP_990618B** SeqNo: **15582**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	ND	0.005	0	0	0.0%	0	0	0	0.0%	20	
Arsenic	ND	0.005	0	0	0.0%	0	0	0	0.0%	20	
Barium	.02084	0.005	0	0	0.0%	0	0	0.02096	0.6%	20	
Beryllium	ND	0.002	0	0	0.0%	0	0	0	0.0%	20	
Cadmium	ND	0.002	0	0	0.0%	0	0	0	0.0%	20	
Calcium	5.545	0.05	0	0	0.0%	0	0	5.657	2.0%	20	
Chromium	ND	0.005	0	0	0.0%	0	0	0	0.0%	20	
Copper	ND	0.005	0	0	0.0%	0	0	0	0.0%	20	
Hardness	18.92	0.33	0	0	0.0%	0	0	19.28	1.9%	20	
Iron	.04548	0.015	0	0	0.0%	0	0	0.02719	50.3%	20	R
Lead	ND	0.005	0	0	0.0%	0	0	0	0.0%	20	
Magnesium	1.233	0.05	0	0	0.0%	0	0	1.252	1.5%	20	
Manganese	.007505	0.005	0	0	0.0%	0	0	0.007559	0.7%	20	
Nickel	ND	0.005	0	0	0.0%	0	0	0	0.0%	20	
Potassium	.5463	0.2	0	0	0.0%	0	0	0.533	2.5%	20	
Selenium	ND	0.005	0	0	0.0%	0	0	0	0.0%	20	
Silver	ND	0.005	0	0	0.0%	0	0	0	0.0%	20	
Sodium	6.094	0.2	0	0	0.0%	0	0	6.104	0.2%	20	
Thallium	ND	0.01	0	0	0.0%	0	0	0	0.0%	20	
Zinc	ND	0.005	0	0	0.0%	0	0	0	0.0%	20	

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905120
Project: 905080/NMO/Goldstar Hobbs Yard

QC SUMMARY REPORT
Sample Matrix Spike

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sample ID: 9906014-02A MS Batch ID: **01 BR A-6/11/** Test Code: **Bromide** Units: **mg/L** Analysis Date **06/10/99** Prep Date:											
Client ID: **9905120** Run ID: **HIT MAN_990610A** SeqNo: **13717**											
Bromide	16.7	0.1	50	0.11	33.2%	75	125	0			S,H
Sample ID: 9906014-02A MSD Batch ID: **01 BR A-6/11/** Test Code: **Bromide** Units: **mg/L** Analysis Date **06/10/99** Prep Date:											
Client ID: **9905120** Run ID: **HIT MAN_990610A** SeqNo: **13718**											
Bromide	16.4	0.1	50	0.11	32.6%	75	125	16.7	1.8%	20	S,H
Sample ID: 9904166-01A MS Batch ID: **01 CL A-6/1/9** Test Code: **Chloride** Units: **mg/L** Analysis Date **05/07/99** Prep Date:											
Client ID: **9905120** Run ID: **NO INST_990507B** SeqNo: **11109**											
Chloride	82	5	50	40	84.0%	75	125	0			
Sample ID: 9904166-01A MSD Batch ID: **01 CL A-6/1/9** Test Code: **Chloride** Units: **mg/L** Analysis Date **05/07/99** Prep Date:											
Client ID: **9905120** Run ID: **NO INST_990507B** SeqNo: **11110**											
Chloride	85	5	50	40	90.0%	75	125	82	3.6%	20	
Sample ID: 9904166-02A MS Batch ID: **01 CL A-6/1/9** Test Code: **Chloride** Units: **mg/L** Analysis Date **05/07/99** Prep Date:											
Client ID: **9905120** Run ID: **NO INST_990507B** SeqNo: **11113**											
Chloride	90	5	50	35	110.0%	75	125	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905120
Project: 905080/NMO/Goldstar Hobbs Yard

QC SUMMARY REPORT
Sample Matrix Spike Duplicate

Sample ID: **9904166-02A MSD** Batch ID: **01 CL A-6/1/9** Test Code: **Chloride** Units: **mg/L** Analysis Date **05/07/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990507B** SeqNo: **11114**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	80	5	50	35	90.0%	75	125	90	11.8%	20	

Sample ID: **9905030-01A MS** Batch ID: **01 CL A-6/1/9** Test Code: **Chloride** Units: **mg/L** Analysis Date **05/17/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990517C** SeqNo: **11138**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	240	5	100	130	110.0%	75	125	0			

Sample ID: **9905030-01A MSD** Batch ID: **01 CL A-6/1/9** Test Code: **Chloride** Units: **mg/L** Analysis Date **05/17/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990517C** SeqNo: **11139**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	230	5	100	130	100.0%	75	125	240	4.3%	20	

Sample ID: **9905097-02A MS** Batch ID: **01 CL A-6/1/9** Test Code: **Chloride** Units: **mg/L** Analysis Date **05/26/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990526A** SeqNo: **9945**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride, Diss	16	0.5	10	5.25	107.5%	75	125	0			

Sample ID: **9905097-02A MSD** Batch ID: **01 CL A-6/1/9** Test Code: **Chloride** Units: **mg/L** Analysis Date **05/26/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990526A** SeqNo: **9946**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride, Diss	15	0.5	10	5.25	97.5%	75	125	16	6.5%	20	

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905120
Project: 905080/NMO/Goldstar Hobbs Yard

QC SUMMARY REPORT
Sample Matrix Spike

Sample ID: **9905133-05A MS** Batch ID: **01 CL A-6/1/9** Test Code: **Chloride** Units: **mg/L** Analysis Date **05/26/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990526A** SeqNo: **9960**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride, Diss	122.5	5	100	17.5	105.0%	75	125	0			

Sample ID: **9905133-05A MSD** Batch ID: **01 CL A-6/1/9** Test Code: **Chloride** Units: **mg/L** Analysis Date **05/26/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990526A** SeqNo: **9961**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride, Diss	117.5	5	100	17.5	100.0%	75	125	122.5	4.2%	20	

Sample ID: **9906027-03A MS** Batch ID: **01 FL A-6/9/9** Test Code: **fluoride** Units: **mg/L** Analysis Date **06/08/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990608B** SeqNo: **13069**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Fluoride	7.8	0.2	7	0	111.4%	75	125	0			

Sample ID: **9906027-03A MSD** Batch ID: **01 FL A-6/9/9** Test Code: **fluoride** Units: **mg/L** Analysis Date **06/08/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990608B** SeqNo: **13070**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Fluoride	7.7	0.2	7	0	110.0%	75	125	7.8	1.3%	20	

Sample ID: **9904111-01A MS** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **04/29/99** Prep Date:
Client ID: **9905120** Run ID: **HIT MAN_990429A** SeqNo: **10625**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	96.15	25	50	56.18	80.0%	75	125	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905120
Project: 905080/NMO/Goldstar Hobbs Yard

QC SUMMARY REPORT
Sample Matrix Spike Duplicate

Sample ID: **9904111-01A MSD** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **04/29/99** Prep Date:
Client ID: **9905120** Run ID: **HIT MAN_990429A** SeqNo: **10626**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	96.15	25	50	56.18	80.0%	75	125	96.15	0.0%	20	

Sample ID: **9904157-03A MS** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **04/29/99** Prep Date:
Client ID: **9905120** Run ID: **HIT MAN_990429A** SeqNo: **10663**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Sample ID: **9904157-03A MSD** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **04/29/99** Prep Date:
Client ID: **9905120** Run ID: **HIT MAN_990429A** SeqNo: **10664**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Sample ID: **9904166-01A MS** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **05/12/99** Prep Date:
Client ID: **9905120** Run ID: **HIT MAN_990512B** SeqNo: **10873**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	1064	500	800	130.2	116.7%	75	125	0			

Sample ID: **9904166-01A MSD** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **05/12/99** Prep Date:
Client ID: **9905120** Run ID: **HIT MAN_990512B** SeqNo: **10874**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	1063	500	800	130.2	116.6%	75	125	1064	0.1%	20	

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905120
Project: 905080/NMO/Goldstar Hobbs Yard

QC SUMMARY REPORT
Sample Matrix Spike

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sample ID: **9905045-01A MS** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **05/20/99** Prep Date:											
Client ID: **9905120** Run ID: **HIT MAN_990520A** SeqNo: **11010**											
Sulfate	98.85	42	66	121	-33.6%	75	125	0			S,H
Sample ID: **9905045-01A MSD** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **05/20/99** Prep Date:											
Client ID: **9905120** Run ID: **HIT MAN_990520A** SeqNo: **11012**											
Sulfate	99.02	42	66	121	-33.3%	75	125	98.85	0.2%	20	S,H
Sample ID: **9905078-01A MS** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **05/21/99** Prep Date:											
Client ID: **9905120** Run ID: **HIT MAN_990521B** SeqNo: **9669**											
Sulfate	839.8	120	300	494	115.3%	75	125	0			
Sample ID: **9905078-01A MSD** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **05/21/99** Prep Date:											
Client ID: **9905120** Run ID: **HIT MAN_990521B** SeqNo: **9670**											
Sulfate	803	120	300	494	103.0%	75	125	839.8	4.5%	20	
Sample ID: **9905097-02A MS** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **05/27/99** Prep Date:											
Client ID: **9905120** Run ID: **HIT MAN_990527A** SeqNo: **9770**											
Sulfate, Diss	20.2	5	8	13	90.0%	75	125	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905120
Project: 905080/NMO/Goldstar Hobbs Yard

QC SUMMARY REPORT
Sample Matrix Spike Duplicate

Sample ID: **9905097-02A MSD** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **05/27/99** Prep Date:
Client ID: **9905120** Run ID: **HIT MAN_990527A** SeqNo: **9771**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate, Diss	20.3	5	8	13	91.3%	75	125	20.2	0.5%	20	

Sample ID: **9906049-01A MS** Batch ID: **535** Test Code: **Mercury** Units: **mg/L** Analysis Date **06/13/99** Prep Date: **06/11/99**
Client ID: **9905120** Run ID: **MERC_990613B** SeqNo: **13907**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	.00093	0.0002	0.001	0	93.0%	75	125	0			
Mercury, TCLP	.00093	0.0002	0.001	0	93.0%	75	125	0			

Sample ID: **9906049-01A MSD** Batch ID: **535** Test Code: **Mercury** Units: **mg/L** Analysis Date **06/13/99** Prep Date: **06/11/99**
Client ID: **9905120** Run ID: **MERC_990613B** SeqNo: **13908**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	.00089	0.0002	0.001	0	89.0%	75	125	0.00093	4.4%	20	
Mercury, TCLP	.00089	0.0002	0.001	0	89.0%	75	125	0.00093	4.4%	20	

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905120
Project: 905080/NMO/Goldstar Hobbs Yard

QC SUMMARY REPORT
Sample Matrix Spike

Sample ID: **9905144-01A MS** Batch ID: **548** Test Code: **ICPMET** Units: **mg/L** Analysis Date **06/18/99** Prep Date: **06/16/99**
Client ID: **9905120** Run ID: **ICP_990618B** SeqNo: **15583**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	.52	0.005	0.5	0	104.0%	80	120	0			
Arsenic	.4881	0.005	0.5	0	97.6%	80	120	0			
Barium	.4826	0.005	0.5	0.02096	92.3%	80	120	0			
Beryllium	.5088	0.002	0.5	0	101.8%	80	120	0			
Cadmium	.4927	0.002	0.5	0	98.5%	80	120	0			
Calcium	10.57	0.05	5	5.657	98.2%	80	120	0			
Chromium	.5141	0.005	0.5	0	102.8%	80	120	0			
Copper	.4855	0.005	0.5	0	97.1%	80	120	0			
Hardness	50.93	0.33	33.1	19.28	95.6%	80	120	0			
Iron	5.03	0.015	5	0.02719	100.1%	80	120	0			
Lead	.4903	0.005	0.5	0	98.1%	80	120	0			
Magnesium	5.959	0.05	5	1.252	94.1%	80	120	0			
Manganese	.4931	0.005	0.5	0.007559	97.1%	80	120	0			
Nickel	.4905	0.005	0.5	0	98.1%	80	120	0			
Potassium	5.21	0.2	5	0.533	93.6%	80	120	0			
Selenium	.4733	0.005	0.5	0	94.7%	80	120	0			
Silver	.4802	0.005	0.5	0	96.0%	80	120	0			
Sodium	10.61	0.2	5	6.104	90.2%	80	120	0			
Thallium	.6168	0.01	0.5	0	123.4%	80	120	0			S
Zinc	.496	0.005	0.5	0	99.2%	80	120	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905120
Project: 905080/NMO/Goldstar Hobbs Yard

QC SUMMARY REPORT
Sample Matrix Spike Duplicate

Sample ID: **9905144-01A MSD** Batch ID: **548** Test Code: **ICPMET** Units: **mg/L** Analysis Date **06/18/99** Prep Date: **06/16/99**
Client ID: **9905120** Run ID: **ICP_990618B** SeqNo: **15584**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	.5171	0.005	0.5	0	103.4%	80	120	0.52	0.6%	20	
Arsenic	.4866	0.005	0.5	0	97.3%	80	120	0.4881	0.3%	20	
Barium	.4811	0.005	0.5	0.02096	92.0%	80	120	0.4826	0.3%	20	
Beryllium	.5077	0.002	0.5	0	101.5%	80	120	0.5088	0.2%	20	
Cadmium	.492	0.002	0.5	0	98.4%	80	120	0.4927	0.2%	20	
Calcium	10.66	0.05	5	5.657	100.0%	80	120	10.57	0.9%	20	
Chromium	.5122	0.005	0.5	0	102.4%	80	120	0.5141	0.4%	20	
Copper	.4839	0.005	0.5	0	96.8%	80	120	0.4855	0.3%	20	
Hardness	51.31	0.33	33.1	19.28	96.8%	80	120	50.93	0.7%	20	
Iron	5.052	0.015	5	0.02719	100.5%	80	120	5.03	0.4%	20	
Lead	.4895	0.005	0.5	0	97.9%	80	120	0.4903	0.2%	20	
Magnesium	5.996	0.05	5	1.252	94.9%	80	120	5.959	0.6%	20	
Manganese	.4943	0.005	0.5	0.007559	97.3%	80	120	0.4931	0.2%	20	
Nickel	.4899	0.005	0.5	0	98.0%	80	120	0.4905	0.1%	20	
Potassium	5.201	0.2	5	0.533	93.4%	80	120	5.21	0.2%	20	
Selenium	.4714	0.005	0.5	0	94.3%	80	120	0.4733	0.4%	20	
Silver	.4806	0.005	0.5	0	96.1%	80	120	0.4802	0.1%	20	
Sodium	10.67	0.2	5	6.104	91.2%	80	120	10.61	0.5%	20	
Thallium	.6169	0.01	0.5	0	123.4%	80	120	0.6168	0.0%	20	S
Zinc	.4962	0.005	0.5	0	99.2%	80	120	0.496	0.1%	20	

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905120
Project: 905080/NMO/Goldstar Hobbs Yard

QC SUMMARY REPORT

Laboratory Control Spike - generic

Sample ID: LCS	Batch ID: 01 ALK A-6/1/	Test Code: Alkalinity	Units: mg/L CaCO3	Analysis Date 04/19/99	Prep Date:
Client ID: 9905120	Run ID: NO INST_990419A			SeqNo: 9644	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Total (As CaCO3)	130	5	126	0	103.2%	85	115	0			

Sample ID: LCS	Batch ID: 01 ALK A-6/1/	Test Code: Alkalinity	Units: mg/L CaCO3	Analysis Date 05/25/99	Prep Date:
Client ID: 9905120	Run ID: NO INST_990525A			SeqNo: 9908	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Total (As CaCO3)	123	5	126	0	97.6%	85	115	0			

Sample ID: LCS	Batch ID: 01 ALK A-6/1/	Test Code: Alkalinity	Units: mg/L CaCO3	Analysis Date 05/03/99	Prep Date:
Client ID: 9905120	Run ID: NO INST_990503B			SeqNo: 11151	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Total (As CaCO3)	120	5	126	0	95.2%	85	115	0			

Sample ID: LCS	Batch ID: 01 ALK A-6/1/	Test Code: Alkalinity	Units: mg/L CaCO3	Analysis Date 05/10/99	Prep Date:
Client ID: 9905120	Run ID: NO INST_990510C			SeqNo: 11174	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Total (As CaCO3)	135	5	126	0	107.1%	85	115	0			

Sample ID: LCS	Batch ID: 01 ALK A-6/1/	Test Code: Alkalinity	Units: mg/L CaCO3	Analysis Date 05/11/99	Prep Date:
Client ID: 9905120	Run ID: NO INST_990511C			SeqNo: 11183	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Total (As CaCO3)	135	5	126	0	107.1%	85	115	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905120
Project: 905080/NMO/Goldstar Hobbs Yard

QC SUMMARY REPORT
Laboratory Control Spike - generic

Sample ID: **LCS** Batch ID: **01 ALK A-6/1/** Test Code: **Alkalinity** Units: **mg/L CaCO3** Analysis Date **05/14/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990514B** SeqNo: **11227**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Total (As CaCO3)	130	5	126	0	103.2%	85	115	0			

Sample ID: **LCS** Batch ID: **01 BR A-6/11/** Test Code: **Bromide** Units: **mg/L** Analysis Date **06/10/99** Prep Date:
Client ID: **9905120** Run ID: **HIT MAN_990610A** SeqNo: **13711**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Bromide	.504	0.1	0.5	0	100.8%	85	115	0			

Sample ID: **LCS** Batch ID: **01 CL A-6/1/9** Test Code: **Chloride** Units: **mg/L** Analysis Date **05/26/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990526A** SeqNo: **9938**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	10	0.5	10	0	100.0%	85	115	0			

Sample ID: **LCS** Batch ID: **01 CL A-6/1/9** Test Code: **Chloride** Units: **mg/L** Analysis Date **05/07/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990507B** SeqNo: **11087**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	9.5	0.5	10	0	95.0%	85	115	0			

Sample ID: **LCS** Batch ID: **01 CL A-6/1/9** Test Code: **Chloride** Units: **mg/L** Analysis Date **05/17/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990517C** SeqNo: **11135**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	10.3	0.5	10	0	103.0%	85	115	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905120
Project: 905080/NMO/Goldstar Hobbs Yard

QC SUMMARY REPORT
Laboratory Control Spike - generic

Sample ID: LCS	Batch ID: 01 COND-06/	Test Code: E120.1	Units: µmhos/cm	Analysis Date 04/21/99	Prep Date:
Client ID:	9905120	Run ID: NO INST_990421A		SeqNo: 10313	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Sample ID: LCS	Batch ID: 01 COND-06/	Test Code: E120.1	Units: µmhos/cm	Analysis Date 05/10/99	Prep Date:
Client ID:	9905120	Run ID: NO INST_990510A		SeqNo: 10348	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Sample ID: LCS	Batch ID: 01 COND-06/	Test Code: E120.1	Units: µmhos/cm	Analysis Date 05/20/99	Prep Date:
Client ID:	9905120	Run ID: NO INST_990520A		SeqNo: 10366	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Sample ID: LCS	Batch ID: 01 COND-06/	Test Code: E120.1	Units: µmhos/cm	Analysis Date 05/25/99	Prep Date:
Client ID:	9905120	Run ID: NO INST_990525E		SeqNo: 10385	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Specific Conductance	972	1	1000	0	97.2%	85	115	0			

Sample ID: LCS	Batch ID: 01 FL A-6/9/9	Test Code: fluoride	Units: mg/L	Analysis Date 06/08/99	Prep Date:
Client ID:	9905120	Run ID: NO INST_990608B		SeqNo: 13058	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Fluoride	8.5	0.2	8	0	106.3%	85	115	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905120
Project: 905080/NMO/Goldstar Hobbs Yard

QC SUMMARY REPORT
Laboratory Control Spike - generic

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sample ID: **LCS** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **05/21/99** Prep Date:											
Client ID: **9905120** Run ID: **HIT MAN_990521B** SeqNo: **9662**											
Sulfate	12	5	12	0	100.0%	85	115	0			
Sample ID: **LCS** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **05/27/99** Prep Date:											
Client ID: **9905120** Run ID: **HIT MAN_990527A** SeqNo: **9766**											
Sulfate	7.816	5	8	0	97.7%	85	115	0			
Sample ID: **LCS** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **04/29/99** Prep Date:											
Client ID: **9905120** Run ID: **HIT MAN_990429A** SeqNo: **10622**											
Sulfate	10	5	10	0	100.0%	85	115	0			
Sample ID: **LCS** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **05/12/99** Prep Date:											
Client ID: **9905120** Run ID: **HIT MAN_990512B** SeqNo: **10870**											
Sulfate	7.43	5	8	0	92.9%	85	115	0			
Sample ID: **LCS** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **05/20/99** Prep Date:											
Client ID: **9905120** Run ID: **HIT MAN_990520A** SeqNo: **10999**											
Sulfate	7.03	5	8	0	87.9%	85	115	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905120
Project: 905080/NMO/Goldstar Hobbs Yard

QC SUMMARY REPORT
Laboratory Control Spike - generic

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sample ID: LCS Batch ID: 01 TDS-6/1/99 Test Code: E160.1 Units: mg/L Analysis Date 05/25/99 Prep Date:											
Client ID: 9905120 Run ID: NO INST_990525C SeqNo: 10234											
Total Dissolved Solids (Residue, Filtera	3674	10	3966	0	92.6%	85	115	0			
Sample ID: LCS Batch ID: 01 TDS-6/1/99 Test Code: E160.1 Units: mg/L Analysis Date 05/26/99 Prep Date:											
Client ID: 9905120 Run ID: NO INST_990526C SeqNo: 10285											
Total Dissolved Solids (Residue, Filtera	4080	10	3966	0	102.9%	85	115	0			
Sample ID: LCS Batch ID: 01 TDS-6/1/99 Test Code: E160.1 Units: mg/L Analysis Date 04/28/99 Prep Date:											
Client ID: 9905120 Run ID: NO INST_990428C SeqNo: 11255											
Total Dissolved Solids (Residue, Filtera	3550	10	3966	0	89.5%	85	115	0			
Sample ID: LCS Batch ID: 01 TDS-6/1/99 Test Code: E160.1 Units: mg/L Analysis Date 05/05/99 Prep Date:											
Client ID: 9905120 Run ID: NO INST_990505B SeqNo: 11273											
Total Dissolved Solids (Residue, Filtera	3490	10	3966	0		85	115	0			
Sample ID: LCS Batch ID: 01 TDS-6/1/99 Test Code: E160.1 Units: mg/L Analysis Date 05/11/99 Prep Date:											
Client ID: 9905120 Run ID: NO INST_990511D SeqNo: 11288											
Total Dissolved Solids (Residue, Filtera	3630	10	3966	0	91.5%	85	115	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905120
Project: 905080/NMO/Goldstar Hobbs Yard

QC SUMMARY REPORT
Laboratory Control Spike - generic

Sample ID: **LCS** Batch ID: **01 TDS-6/1/99** Test Code: **E160.1** Units: **mg/L** Analysis Date **05/18/99** Prep Date:
Client ID: **9905120** Run ID: **NO INST_990518B** SeqNo: **11308**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Dissolved Solids (Residue, Filtera	3610	10	3966	0		85	115	0			

Sample ID: **LCS-480** Batch ID: **480** Test Code: **SW8270B** Units: **µg/L** Analysis Date **05/27/99** Prep Date: **05/24/99**
Client ID: **9905120** Run ID: **MANFREDD_990527A** SeqNo: **9972**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,2,4-Trichlorobenzene	35.5	5	50	0	71.0%	44	142	0			
1,4-Dichlorobenzene	31.6	5	50	0	63.2%	20	124	0			
2,4-Dinitrotoluene	41.4	5	50	0	82.8%	39	139	0			
2-Chlorophenol	61.5	5	100	0	61.5%	23	134	0			
4-Chloro-3-methylphenol	67.9	5	100	0	67.9%	22	147	0			
4-Nitrophenol	24.7	5	100	0	24.7%	1	132	0			
Acenaphthene	35.4	5	50	0	70.8%	47	145	0			
N-Nitrosodi-n-propylamine	33.6	5	50	0	67.2%	1	230	0			
Pentachlorophenol	68.4	5	100	0	68.4%	14	176	0			
Phenol	25	5	100	0	25.0%	5	112	0			
Pyrene	35.7	5	50	0	71.4%	52	115	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905120
Project: 905080/NMO/Goldstar Hobbs Yard

QC SUMMARY REPORT
Laboratory Control Spike Duplicate

Sample ID: **LCSD-480** Batch ID: **480** Test Code: **SW8270B** Units: **µg/L** Analysis Date **05/27/99** Prep Date: **05/24/99**
Client ID: **9905120** Run ID: **MANFREDD_990527A** SeqNo: **9973**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,2,4-Trichlorobenzene	36.5	5	50	0	73.0%	44	142	35.5	2.8%	28	
1,4-Dichlorobenzene	32.4	5	50	0	64.8%	20	124	31.6	2.5%	32	
2,4-Dinitrotoluene	43	5	50	0	86.0%	39	139	41.4	3.8%	22	
2-Chlorophenol	63.6	5	100	0	63.6%	23	134	61.5	3.4%	29	
4-Chloro-3-methylphenol	71.3	5	100	0	71.3%	22	147	67.9	4.9%	37	
4-Nitrophenol	26.6	5	100	0	26.6%	1	132	24.7	7.4%	47	
Acenaphthene	36.8	5	50	0	73.6%	47	145	35.4	3.9%	28	
N-Nitrosodi-n-propylamine	34.5	5	50	0	69.0%	1	230	33.6	2.6%	55	
Pentachlorophenol	71.8	5	100	0	71.8%	14	176	68.4	4.9%	49	
Phenol	24.9	5	100	0	24.9%	5	112	25	0.4%	23	
Pyrene	36	5	50	0	72.0%	52	115	35.7	0.8%	25	

Sample ID: **LCS-535** Batch ID: **535** Test Code: **Mercury** Units: **mg/L** Analysis Date **06/13/99** Prep Date: **06/11/99**
Client ID: **9905120** Run ID: **MERC_990613B** SeqNo: **13904**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	.00083	0.0002	0.001	0	83.0%	80	120	0			
Mercury, TCLP	.00083	0.0002	0.001	0	83.0%	80	120	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905120
Project: 905080/NMO/Goldstar Hobbs Yard

QC SUMMARY REPORT
Laboratory Control Spike - generic

Sample ID: **LCS-548** Batch ID: **548** Test Code: **ICPMET** Units: **mg/L** Analysis Date **06/18/99** Prep Date: **06/16/99**
Client ID: **9905120** Run ID: **ICP_990618B** SeqNo: **15579**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	.5062	0.005	0.5	0	101.2%	80	120	0			
Arsenic	.4966	0.005	0.5	0	99.3%	80	120	0			
Barium	.4618	0.005	0.5	0	92.4%	80	120	0			
Beryllium	.4966	0.002	0.5	0	99.3%	80	120	0			
Cadmium	.4821	0.002	0.5	0	96.4%	80	120	0			
Calcium	5.032	0.05	5	0	100.6%	80	120	0			
Chromium	.5027	0.005	0.5	0	100.5%	80	120	0			
Copper	.4862	0.005	0.5	0	97.2%	80	120	0			
Hardness	32.11	0.33	33.1	0	97.0%	80	120	0			
Iron	5.023	0.015	5	0	100.5%	80	120	0			
Lead	.4812	0.005	0.5	0	96.2%	80	120	0			
Magnesium	4.745	0.05	5	0	94.9%	80	120	0			
Manganese	.4871	0.005	0.5	0	97.4%	80	120	0			
Nickel	.4796	0.005	0.5	0	95.9%	80	120	0			
Potassium	4.655	0.2	5	0	93.1%	80	120	0			
Selenium	.4622	0.005	0.5	0	92.4%	80	120	0			
Silver	.4894	0.005	0.5	0	97.9%	80	120	0			
Sodium	4.985	0.2	5	0	99.7%	80	120	0			
Thallium	.5995	0.01	0.5	0	119.9%	80	120	0			
Zinc	.4814	0.005	0.5	0	96.3%	80	120	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

Environmental Services Laboratory

Date: *29-Jun-99*

CLIENT: Pinnacle Laboratories
Work Order: 9905120
Project: 905080/NMO/Goldstar Hobbs Yard

QC SUMMARY REPORT
Continuing Calibration Verification Standard

Sample ID: **CCV** Batch ID: **480** Test Code: **SW8270B** Units: **µg/L** Analysis Date **05/28/99** Prep Date:
Client ID: **9905120** Run ID: **MANFREDD_990528A** SeqNo: **11674**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,4-Dichlorobenzene	51	5									
2,4,6-Trichlorophenol	56.4	5									
2,4-Dichlorophenol	55.7	5									
2-Nitrophenol	51.4	5									
4-Chloro-3-methylphenol	53.7	5									
Acenaphthene	47.7	5									
Benzo(a)pyrene	51.7	5									
Di-n-octyl phthalate	46	5									
Fluoranthene	52.4	5									
Hexachlorobutadiene	55.4	5									
N-Nitrosodiphenylamine	49.8	5									
Pentachlorophenol	54.5	5									
Phenol	49.5	5									
2,4,6-Tribromophenol	59.8	5	50	0	119.6%	80	120				
2-Fluorobiphenyl	50.7	5	50	0	101.4%	80	120				
2-Fluorophenol	51.1	5	50	0	102.2%	80	120				
4-Terphenyl-d14	49.7	5	50	0	99.4%	80	120				
Nitrobenzene-d5	49.4	5	50	0	98.8%	80	120				
Phenol-d5	50.3	5	50	0	100.6%	80	120				

Sample ID: **ICV** Batch ID: **535** Test Code: **Mercury** Units: **mg/L** Analysis Date **06/13/99** Prep Date: **06/11/99**
Client ID: **9905120** Run ID: **MERC_990613B** SeqNo: **13943**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	.00202	0.0002	0.002	0	101.0%	90	110	0			
Mercury, TCLP	.00202	0.0002	0.002	0	101.0%	90	110	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

Environmental Services Laboratory

Date: *29-Jun-99*

CLIENT: Pinnacle Laboratories
Work Order: 9905120
Project: 905080/NMO/Goldstar Hobbs Yard

QC SUMMARY REPORT

Minerals ICV for ICP

Sample ID: **ICVHI** Batch ID: **548** Test Code: **ICPMET** Units: **mg/L** Analysis Date **06/18/99** Prep Date:

Client ID: **9905120** Run ID: **ICP_990618B** SeqNo: **15555**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aluminum, 200.7	23.83	0.05	25	0	95.3%	95	105	0			
Calcium	24.43	0.05	25	0	97.7%	90	110	0			
Hardness	159	0.33	165	0	96.3%	90	110	0			
Magnesium	23.79	0.05	25	0	95.2%	90	110	0			
Sodium	4.816	0.2	5	0	96.3%	90	110	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905120
Project: 905080/NMO/Goldstar Hobbs Yard

QC SUMMARY REPORT
Initial Calibration Verification Standard

Sample ID: **ICVLOW** Batch ID: **548** Test Code: **ICPMET** Units: **mg/L** Analysis Date **06/18/99** Prep Date:
Client ID: **9905120** Run ID: **ICP_990618B** SeqNo: **15556**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	.5074	0.005	0.5	0	101.5%	90	110	0			
Arsenic, 200.7	.4982	0.005	0.5	0	99.6%	95	105	0			
Barium	.4804	0.005	0.5	0	96.1%	90	110	0			
Beryllium	.4884	0.002	0.5	0	97.7%	90	110	0			
Cadmium, 200.7	.4857	0.002	0.5	0	97.1%	95	105	0			
Chromium, 200.7	.4906	0.005	0.5	0	98.1%	95	105	0			
Cobalt	.4694	0.005	0.5	0	93.9%	90	110	0			
Copper, 200.7	.4941	0.005	0.5	0	98.8%	95	105	0			
Iron, 200.7	.5094	0.01	0.5	0	101.9%	95	105	0			
Lead, 200.7	.4951	0.005	0.5	0	99.0%	95	105	0			
Manganese	.4799	0.005	0.5	0	96.0%	90	110	0			
Nickel, 200.7	.4782	0.005	0.5	0	95.6%	95	105	0			
Potassium	4.903	0.2	5	0	98.1%	90	110	0			
Selenium	.489	0.005	0.5	0	97.8%	90	110	0			
Silver, 200.7	.4859	0.005	0.5	0	97.2%	95	105	0			
Thallium	.5069	0.01	0.5	0	101.4%	90	110	0			
Vanadium	.4911	0.005	0.5	0	98.2%	90	110	0			
Zinc, 200.7	.4855	0.005	0.5	0	97.1%	95	105	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

Pinnacle Laboratories, Inc.

Interlab Chain of Custody

Date: 5/24 Page: 1 of 1 9905.

Network Project Manager: Kimberly D. McNeill

Pinnacle Laboratories, Inc.
2709-D Pan American Freeway, NE
Albuquerque, New Mexico 87107
(505) 344-3777 Fax (505) 344-4413

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	Metals (8) RCRA	RCRA TCLP METALS	Metals-13 PP List	Metals-TAL	Ca, Na, Mg, K, Hg	TOX	~~TOC~~ Conductivity	Gen Chemistry: Cl, F, Br, SO4, TDS	Alk. + Bicarb.	Carb.	Oil and Grease	Volatile Organics GC/MS (8260)	BOD	COD	PESTICIDES/PCB (608/8080)	8270 BY GC/MS	PNA (8310)	8240 (TCLP 1311) ZHE	Herbicides (615/8150)	Base/Neutral Acid Compounds GC/MS (625/8270)	URANIUM	RADIUM 226+228	Gross Alpha/Beta	TO-14	NUMBER OF CONTAINERS
905080-01	5/20	1000	AQ	01					X		X	X	X							X								

PROJECT INFORMATION		SAMPLE RECEIPT		SAMPLES SENT TO:		RELINQUISHED BY: 1.	RELINQUISHED BY: 2.
PROJECT #: 905080		Total Number of Containers		PENSACOLA - STL-FL		Signature: Time: Francine Tonno 1700	Signature: Time:
PROJ. NAME: NMO		Chain of Custody Seals		PORTLAND - ESL-OR	X	Printed Name: Date: Francine Tonno 5/24/99	Printed Name: Date:
QC LEVEL: (STD.) IV		Received Intact?		STL - CT		Pinnacle Laboratories, Inc.	Company
QC REQUIRED: MS MSD BLANK		Received Good Cond./Cold		STL- NEW JERSEY		RECEIVED BY: 1.	RECEIVED BY: 2
TAT: (STANDARD) RUSH!!		LAB NUMBER:		N. CREEK		Signature: Time: Kimberly A. McNeill	Signature: Time:
DUE DATE: 6/4	COMMENTS:			BARRINGER		Printed Name: Date: 5/25/99	Printed Name: Date:
RUSH SURCHARGE: —				SEQUOIA		Company	Company
CLIENT DISCOUNT: —							
SPECIAL CERTIFICATION REQUIRED: YES (NO)							

PINNACLE LABORATORIES

Pinnacle Laboratories Inc.

CHAIN OF CUSTODY

DATE: 05-20-99 PAGE: 1 OF 1

PLI Accession #: 905080

SHADED AREAS ARE FOR LAB USE ONLY.

PLEASE FILL THIS FORM IN COMPLETELY.

PROJECT MANAGER: Bill Olson Well 5/21/99

COMPANY: ~~GoldSTAR~~ NMOCD

ADDRESS: ~~Eunice Hwy / Sunrise~~

~~Hobbs NM 88240~~

PHONE: ~~(505) 394-2504~~

FAX: ~~(505) 394-2510~~

BILL TO: Wayne Price

COMPANY: OCD

ADDRESS: 2040 S. Pacheco

Santa Fe, New Mexico 87505

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB I.D.	Petroleum Hydrocarbons (418.1) TRPH	(MOD.8015) Diesel/Direct Inject	8015 Gas/Purge & Trap	(M8015) Gas/Purge & Trap	8021 (BTEX)/8015 (Gasoline) MTBE	8021 (BTEX) ☐ MTBE ☐ TMB ☐ PCE	8021 (TCL)	8021 (EDX)	8021 (HALO)	8021 (CUST)	504.1 EDB ☐ / DBCP ☐	8270	8260 (TCL) Volatile Organics	8260 (Full) Volatile Organics	8260 (CUST) Volatile Organics	8260 (Landfill) Volatile Organics	Pesticides /PCB (608/8081/8082)	Herbicides (615/8151)	Base/Neutral/Acid Compounds GC/MS (625/8270)	Polynuclear Aromatics (610/8310/8270-SIMS)	General Chemistry:	PH	Priority Pollutant Metals (13)	Target Analyte List Metals (23)	RCRA Metals (8)	RCRA Metals by TCLP (Method 1311)	Metals: OCD List + #2	Bromide	NUMBER OF CONTAINERS
990520 1000	05-20-99	10:00 A.M.	WATER	01			X									2		2							1	1					1	1	8
TB	5/19/99	1240	water	02														1															1

PROJECT INFORMATION

PROJ. NO.: Water Well

PROJ. NAME: GoldStar Hobbs Yard

P.O. NO.:

SHIPPED VIA:

SAMPLE RECEIPT

NO. CONTAINERS	9
CUSTODY SEALS	Y/N/NA
RECEIVED INTACT	Yes
BLUE ICE/ICE	6°C

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS

(RUSH) ☐ 24hr ☐ 48hr ☐ 72hr ☐ 1 WEEK (NORMAL) ☒

CERTIFICATION REQUIRED: ☐ NM ☐ SDWA ☐ OTHER

METHANOL PRESERVATION ☐

COMMENTS: FIXED FEE ☐

Sample taken From water well spigot - well purged 10 min. before Sampling

RELINQUISHED BY: 1.

Signature: Time: 16:30

Printed Name: Wayne Price Date: 5/20/99

Company: NMOCD

See reverse side (Force Magure)

RECEIVED BY: 1.

Signature: Time: 1630

Printed Name: William Olson Date: 5/20/99

Company: NMOCD

RELINQUISHED BY: 2.

Signature: Time: 0920

Printed Name: William Olson Date: 5/21/99

Company: NMOCD

RECEIVED BY: (LAB) 2.

Signature: Time: 0900

Printed Name: John Caldwell Date: 5/21/99

Pinnacle Laboratories Inc.

NEW MEXICO ENERGY, MINERALS
& NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION
2040 South Pacheco Street
Santa Fe, New Mexico 87505
(505) 827-7131

July 20, 1999

CERTIFIED MAIL
RETURN RECEIPT NO. Z 357 870 127

Ms. Connie Castillo
4027 S. Eunice Hwy.
Hobbs, NM 88240

Re: Analytical Results from Sampling Water Well on 5/20/99.

Dear Ms. Castillo:

Please find enclosed the analytical results for your water well. The results of this sampling event did not reveal any water contaminants that exceeded New Mexico Water Quality Control (WQCC) Commission Regulations Human Health Standards. At the time of sampling it was noted that the water was clear with no apparent odors. The analytical results revealed a trace amount of Chromium (.01 mg/l), but at levels well below the health standard of .05 mg/l. The New Mexico Oil Conservation Division (NMOCD) will continue its investigation concerning the Chromium issue. If for some reason you have your water well worked on or repaired, the NMOCD would appreciate a notice so we may have an opportunity to re-sample the well directly from the well bore casing.

If you require any further information or assistance please do not hesitate to write or call me at (505-827-7155).

Sincerely Yours,

Wayne Price-Environmental Bureau

cc: OCD Hobbs Office

PINNACLE LABORATORIES

Remit to: **Pinnacle Laboratories, Inc.**
P.O. Box 36720
Albuquerque, NM 87176-6720
Phone: (505) 344-3777 Fax: (505) 344-4413

Bill To: N.M. Oil Conservation Division
2040 South Pacheco
Santa Fe, NM 87505

Client #: 810-134

Date	Invoice
7/ 1/99	79135

Project #: Water Well
Project Name: Castillo Well

Original
BALANCE DUE: 840.00

PO Number	Terms	Project
	Net 30	PIN ALB-810

Quantity	Description	Rate	Amount
1	Volatile Organics GC/MS: Method 8260	180.00	180.00
1	Semivolatile Organics GC/MS: Method 8270	300.00	300.00
1	Metals by ICAP Method 6010: Al, Sb, As, Ba Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn Mo, Ni, K, Se, Si, Ag, Na, Tl, V, Zn	200.00	200.00
1	F, Br, Ca, K, Mg, Na, Alk.Group, Cl, SO4, TDS, Cation/Anion Balance, Conductivity, pH	160.00	160.00

OK For Payment
By: W Price
7/20/99

Accession #: 905079
Authorized By: Bill Olson

TOTAL: 840.00

A finance charge of 11/2% will be charged on balances 30 days past due
PLEASE PAY FROM THIS INVOICE. NO OTHER INVOICE SHALL BE SENT.

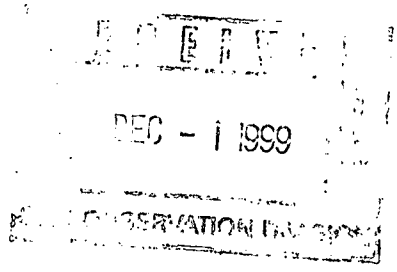
Champion Technologies

P.O. BOX 450499
HOUSTON, TEXAS 77245-0499

Telephone (281) 431-2561
Fax (281) 431-1655

CERTIFIED RETURN RECEIPT NO. Z 381 884 974

November 29, 1999



Mr. Roger Anderson
New Mexico – Oil Conservation Division
2040 South Pacheco
P.O. Box 6429
Santa Fe, NM 87505-5472

Subject: Notice of Deficiency - Letter dated October 26, 1999
Abatement Plan AP-14
Hobbs, NM Facility

Dear Mr. Anderson:

Champion Technologies, Inc. received your Second Notice of Deficiency letter dated October 26, 1999. Find enclosed a revised Stage I Abatement Plan for Champion's Hobbs, New Mexico Facility. This addresses all questions of concern in your Second Notice of Deficiency letter.

If there are any questions, please call me at 281-431-2561.

Sincerely yours,

Ralph Corry

Ralph Corry
Environmental Specialist
Environmental, Health and Safety Department

RC/ms

CC: Braddock, Rick w/o Plan
Childs, Allan w/o Plan
Davis, Mel w/o Plan
Edwards, Mike w/o Plan
Finley, Richard w/o Plan
Moran, Mike w/o Plan
Meyer, Clarence
Morrison, Tommy
OCD – Hobbs, NM office Certified Return Receipt # Z 381 884 975

CHAMPION TECHNOLOGIES, INC.
4001 SOUTH HIGHWAY 18
HOBBS, NEW MEXICO

ABATEMENT PLAN PROPOSAL

November 29, 1999

Submitted to: Champion Technologies, Inc.
3130 FM 521
Fresno, Texas 77545

Prepared by: Enercon Services, Inc.
8866 Gulf Freeway, Suite 380
Houston, TX 77017

CHAMPION TECHNOLOGIES, INC.
4001 SOUTH HIGHWAY 18
HOBBS, NEW MEXICO

ABATEMENT PLAN PROPOSAL

November 29, 1999

Submitted to: Champion Technologies, Inc.
3130 FM 521
Fresno, Texas 77545

Prepared by: Enercon Services, Inc.
8866 Gulf Freeway, Suite 380
Houston, TX 77017

TABLE OF CONTENTS

LIST OF APPENDICES

LIST OF FIGURES

LIST OF TABLES

1.0 OBJECTIVES

Enercon Services, Inc. (Enercon) has been retained to prepare an Abatement Plan Proposal (APP) for the Champion Technologies, Inc. (Champion) facility located at 4001 South Hwy. 18 in Hobbs, New Mexico. This APP is prepared pursuant to the Notice of Violation issued by the New Mexico Energy, Minerals & Natural Resources Department on April 26, 1999.

This APP will focus on determining the nature and extent of potentially hazardous waste contamination near the warehouse building.

The APP describes the procedures that will be used to evaluate the potential impact at the site. The APP contains the following:

1. A detailed description of the site;

2. A site and project background;

3. A detailed sampling plan;

4. A schedule for implementation of the APP and submittal of a Site Investigation Report (SIR) that will be an addendum to the APP; and

5. A description of the contents of the SIR.

The objectives of the site investigation are to evaluate the nature, extent and degree of potentially hazardous waste impacts to the site, if any. This objective will be accomplished through the following activities:

1. Reviewing relevant documents to the site and vicinity; and

2. Developing and executing a soil sampling program in the area near the warehouse to identify any potential impact to the site.

The data obtained from the site investigation will be used to present recommendations, if warranted, for future investigations and remedial actions at the site. A work plan for any further investigations that may be deemed necessary, based on the results of the site assessment, will be prepared as an addendum to this APP.

Project Contacts

The following is a reference list of project contacts:

Client:

Champion Technologies, Inc.
Mr. Melvin Davis
(281) 431-2561

Champion Technologies Project Manager:	Mr. Ralph Corry (281) 431-2561
Enercon Services, Inc. Project Manager:	Mr. Michael Amabisco (713) 941-0401

2.0 SITE DESRIPTION AND BACKGROUND

2.1 Site Location and Description

The Champion facility's physical address is 4001 South Highway 18 in Hobbs, New Mexico. The location of the property is NE/4 of SE/4, Section 15, Township 19 South, Range 38 East, West Hobbs Quadrangle (Appendix A, Figure 1.)

The Champion facility produces and manufactures chemicals for the petroleum industry. The property is rectangular in shape, approximately 500 feet by 640 feet, or an estimated 7 acres. The facility consists of an office building, manufacturing, and storage areas, as well as parking and undeveloped areas (Appendix A, Figure 2.). The site is enclosed by a fence, with a gate along South Highway 18. The facility uses a septic system for sanitary purposes and water is supplied by an on site domestic well. The site is generally flat with a slight gradient in the westerly direction. There are no bodies of surface water on the site.

The facility is bordered by the highway on the east side, residential and undeveloped property to the south, undeveloped land on the west side, and an oil field service company to the north.

2.1.1 Regional Geologic Setting

The geology of the Southern High Plains of Texas and New Mexico consists of the Tertiary Ogallala Formation which is overlain by Quaternary eolian, fluvial, and lacustrine sediments. The Quaternary deposits range in age from 1.4 million years old to recent, and extend to a maximum depth of 80 feet below ground surface regionally. The Tertiary Ogallala Formation contains coarse fluvial conglomerates, sandstone, and fine grained eolian siltstone and clay. The depositional environment of the Ogallala Formation and overlying Quaternary deposits produce overlapping alluvial fans. Exposed along dry riverbeds in the region, the Quaternary alluvium deposits consist of sands, silts, and gravels. Locally, a resistant calcitic layer known as caprock overlies the Ogallala Formation. The caprock is exposed along the northwestern portion of Lea County.

2.1.2 Regional Hydrogeology

The Ogallala aquifer is the primary drinking water and irrigation source for the Southern High Plains of Texas and Eastern New Mexico. The Ogallala aquifer occurs within the Tertiary Ogallala Formation which is composed of terrigenous sediments such as sands, gravels, and finer sediments. The aquifer is covered by Quaternary deposits and

unconformably overlies Cretaceous, Triassic, and Permian rocks. Water table elevations approximately parallel the regional land surface, which dips southeasterly. The general hydraulic conductivity (K) for the aquifer is approximately 200 gal/day/ft^2 with a porosity of 43% and a specific yield of 23% for fined grained sands. However, at the time of this abatement plan proposal, the local hydraulic conductivity, storativity, and transmissivity have not been determined at the site.

2.2 SITE BACKGROUND

2.2.1 Site History and Usage

Champion Technologies, Inc. has occupied the 4001 South Highway location for approximately 10 years. In that time, the site has been used for the manufacturing, production, and distribution of chemicals used in the petroleum industry.

Previous soil sampling was performed 1996 in connection with modification to the septic system. Soil sampling was also performed in April 1998 in regards to removal of contaminated soils near drum storage areas and product tanks. All actions were addressed and approved by the New Mexico Environmental Department.

In 1995 a new water well was constructed at the site. Water quality samples were collected and analyzed. Analytical results from the sampling are included in Appendix B. Results showed elevated concentrations of chloride and total dissolved solids.

On December 8, 1998, the New Mexico Energy, Minerals & Natural Resources Department conducted an inspection at the Hobbs facility. During the inspection, Department personnel collected a soil sample from a "yellow stained" area and a water sample from a faucet inside one of the buildings. Analytical results from these samples showed concentrations of lead, chromium, manganese, nickel, chloride, and soluble sulfates that exceeded groundwater standards. The soil sample analytical results also showed detected concentrations of polyaromatic hydrocarbon compounds.

2.2.2 Chemical List

Chemicals of primary concern in regards to the APP are used in processes on the site. A list of process related chemicals is included in Appendix A, Table 1.

2.2.3 Summary of Soil Sample Analytical Results

On December 8, 1998 the New Mexico Energy, Minerals & Natural Resources Department collected a soil sample from a yellow stained area. A summary of detected concentrations are presented in Appendix A, Table 2. The location of the sample collection was reportedly 105 feet west of the concrete pad adjacent to the warehouse and 71 feet south of the north fence line.

2.2.4 Summary of Groundwater Sample Analytical Results

On December 8, 1998 the New Mexico Energy, Minerals & Natural Resources Department collected a water sample from a faucet in the break room in the office building. A summary of detected concentrations is presented in Appendix A, Table 3.

3.0 SAMPLE LOCATIONS AND RATIONALE

3.1 Soil Sampling

Soil samples will be collected in the yellow stained area, which is approximately 100 feet west of the concrete pad associated with the warehouse building. Four locations will be sampled in the yellow stained and surrounding area. Sample locations will be placed to delineate the lateral extent of potential soil impact. Soil samples will be collected at 0 to 6 inches below ground surface (bgs) and 30 to 36 inches bgs. The soils on the site are characterized by sands, silts, and caliche. The caliche and silt materials are likely to impede the migration of any potential surface impact, so samples will be collected at a maximum depth of 36 inches bgs. Additionally, three background samples will be collected. These samples will be collected from areas on the site that have not have been impacted by any facility processes. These samples will be collected from the ground surface to 2 inches bgs. Analyses for each sample location are summarized in Appendix A, Table 4. All sample locations will be backfilled with native material. Proposed soil sample locations are shown in Appendix A, Figure 3.

3.2 Groundwater Sampling

Groundwater samples will be collected from the existing well on the site. The analytical results will be compared with results acquired from water well inventory survey (Section 3.3) to determine the source of elevated chloride and total dissolved solids concentrations. These results will be incorporated into the SIR to determine the need for further action. Proposed groundwater sample location is shown in Appendix A, Figure 3.

3.3 Water Well Inventory

In an effort to better understand the local subsurface geology and hydrogeology, a water well inventory survey will be conducted for a one mile radius from the site. The survey will include geologic and hydrogeologic properties and characteristics in the area, groundwater gradients, groundwater chemistry, and well usage in the area. Information collected and reviewed from this survey will be incorporated in the SIR.

4.0 SAMPLING PROCEDURES AND EQUIPMENT

4.1 Sample Collection Technique

Soil samples will be collected from two zones which include 0 to 6 inches bgs and 30 to 36 inches bgs. These depths are optimal depths for each zone and may not be attainable due to bedrock, cobbles, gravels, or other obstructions preventing the sampler from

due to bedrock, cobbles, gravels, or other obstructions preventing the sampler from reaching the target depth. All depth intervals sampled will be recorded on the Field Data Form (Appendix E). Samples will be collected in accordance with ASTM Standard D 4700-91: *Standard Guide for Sampling From the Vadose Zone* (Appendix D), as well as the procedures described below.

- A decontaminated trowel will be used to collect the 0 to 6-inch bgs sample.
- A deconaminated hand-held barrel auger will be used to collect samples from the 30 to 36-inch bgs zone. A decontaminated trowel or shovel may be used to collect subsurface samples if obstructions do not permit adequate sampling with the hand-held barrel auger.
- Soil samples will be placed in 8-oz. glass jars, sealed, labeled, and placed in a cooler prior to laboratory delivery.
- A Field Data Form (Appendix E) will be utilized at each sample location, and completed during sample preparation.

4.2 Groundwater Sampling Techniques

Samples will be collected from the wellhead through a sample port. Samples will be collected directly into sample containers.

4.3 Soil Sample Identifier

All soil samples will be assigned a unique sample identifier. Each identifier will be comprised of a numeric sample location, a four number depth descriptor, and an alpha character sample type descriptor. The components of the sample designations are described below.

- *Sample Location.* This component consists of a single number unique to each sample location. These numbers will start at 1, and increase sequentially at each sample location.
- *Sample Depth Zone.* The sample depth descriptor consists of four numbers. The first two numbers signify the top of the sample zone (inches bgs), and the last two numbers signify the bottom of the sample zone (inches bgs).
- *Sample Type.* The letter designation and its associated sample type are as follows:

  -A unique

  -B duplicate/replicate

  -C equipment blank

For example, the designation of a unique sample collected at Location No. 1 from 30 to 36 inches bgs would be 1-3036-A.

4.4 Groundwater Sample Identifier

All soil samples will be assigned a unique sample identifier. Samples collected from the water well on the west side of the site will be designated GW1.

4.5 Equipment Decontamination

All field sampling equipment and sample preparation equipment will be decontaminated between samples using a non-phosphatic detergent wash, tap water rinse, and a deionized water rinse and the guidance given in ASTM Standard D 5088-90: *Standard Practice for Decontamination of Field Equipment Used at Nonradioactive Waste Sites* (Appendix E).

5.0 SAMPLE ANALYSIS AND HANDLING

5.1 Analytical Methods

Analytical methods used for soil samples will be in accordance with USEPA SW-846 prescribed or comparable methodologies. The constituents to be analyzed and the appropriate analytical methods to be used are summarized in Appendix A, Table 4, and analytical protocols are included in Appendix D.

Soil samples will be analyzed for the following: lead, chromium, manganese, nickel, chlorides, and soluble sulfates. Additionally, soil samples will be analyzed using EPA Method 8270 (Semivolatile Organic Compounds).

Groundwater samples will be analyzed for chlorides and total dissolved solids.

The analytical work for this project will be conducted by Quanterra Analytical Laboratories, and will be managed by Ms. Katren Jenkins. Her address is as follows:

Quanterra Analytical Laboratories
5514 Decker Drive
Baytown, TX 77520
(281) 424-3008 (Phone)
(281) 424-5161 (Fax)

Ms. Jenkins will be the main contact for analytical results, sample tracking, sample container order, courier requests, turnaround time requests, and explanation of reports. Ms. Jenkins will be responsible for tracking the analytical work of the project throughout the laboratory and ensuring the efficient transition of samples through sample control.

5.2 Sample Containers, Preservatives, and Shipping

Sample containers and preservatives will be provided by the laboratory. All container preparation by the laboratory will be done in a designated area. Containers will be labeled to indicate the added preservative. Sample containers, preservatives, and holding times are summarized in Appendix A, Table 4. Preparation is accomplished using the following Standard Operating Procedures (SOPs) for bottle preservation:

- Bottles for analyses will be provided by the laboratory. These will be purchased from suppliers who certify the containers to have been cleaned by protocols as prescribed by the EPA.
- Coolers, blue ice, and applicable Chain-of-Custody forms will also be provided by the laboratory.
- All sample containers will be delivered at least 1 day before sample collection.
- After a sample is collected and labeled, it will be stored in a plastic ice chest.
- All samples will be wrapped in plastic packing when necessary to avoid breakage, and will be clearly labeled and sealed to prevent tampering.
- All samples will have a label containing (at a minimum) the following information.
  - sample designation ;
  - project name and number;
  - date and time of collection; and
  - Comments - These may include parameters to be analyzed.

5.3 Chain of Custody

Chain-of-custody procedures will include:

- Samples collected by field personnel will be accompanied by a Chain-of-Custody Record Form (Appendix E), which will include date and time of collection, container type, preservatives used, number of samples, sample descriptions, and others.
- Sample identification labels and Chain-of-Custody Records will be completed with waterproof ink, and placed in a waterproof bag for shipment.
- Chain-of-Custody documentation will be completed at each sample location prior to sampling at the next site.

- The integrity of the samples will be examined, and the final signature on the Chain-of-Custody Form will be completed by a receiving agent of the selected laboratory.

5.4 Quality Assurance/Quality Control (QA/QC)

Analytical methods and Standard Operating Procedures, in accordance with EPA will be consistently maintained by the laboratory to satisfy the required level of QA/QC protocol. One solid sample will be subjected to duplicate or replicate analysis. One equipment blank from soil sampling equipment will be submitted for analysis.

All of the samples will be analyzed under a QC package which includes a case narrative, field identification/laboratory sample number cross-reference summary, analytical results, method blank results, laboratory control sample recoveries, matrix spike/spike duplicate recoveries, and Chain-of-Custody Record.

5.5 Data Management

Field and laboratory data management, data review, protocols, and procedures are provided to create a centralized working system and to maintain data quality. The following includes a discussion of field and laboratory data management and data review.

Field Data Management. Field data and completed Chain-of-Custody Forms will be completed in the field for each sampling location. These records will be produced, copied, and filed under the appropriate site location nomenclature for each selected site location. These forms will be forwarded by the Field Manager to the Project Manager at the conclusion of each sampling round.

The following field documentation will be completed.

- Completed field data forms, and Chain-of-Custody forms (Appendix F); and
- Samples will be described in the field according to procedures established in this document.

Laboratory Data Management. Analytical results and QC data relating to analytical precision and accuracy will be obtained from the laboratory. Laboratory data forms will specify sampling location and method of analysis. Chain-of-Custody Forms will be filed with the laboratory reports.

Data Review. Field data will be reviewed for measurements collected during sampling, order of sample collection, and the observations and notes recorded during the course of the sampling day. Laboratory data forms will be reviewed for the completion of required measurements, including parameter results, limits of detection, and dilution factors. Validity of both the field and laboratory data will be determined by evaluating the completeness of the data for the required parameters as documented on the Chain-of-Custody Form. The following data will also be reviewed.

- use of EPA or SW methods with detection limits below aquifer standards, where applicable;
- chemical data of control matrix blanks, control matrix spikes, standards, control matrix duplicates; and
- confirmation of sample analyses within specific holding times.

6.0 SITE SAFETY HEALTH PLAN

Enercon personnel will review the Site Safety Health Plan (SSHP) prior to initiation of the sampling events. The SSHP for conducting this APP is on file at the Enercon office in Houston and is attached here as Appendix F. One copy of this plan will be carried by each Field Team during the sampling program.

7.0 SCHEDULE

Enercon anticipates that the New Mexico Energy, Minerals & Natural Resources Department, will require approximately 10 working days to review and approve the APP. A schedule for the implementation of the site investigation is included in Appendix A, Table 5. The New Mexico Energy, Minerals & Natural Resources Department will be notified at least 2 days in advance of any investigative work that will be performed at the site.

8.0 REPORTING

A SIR outlining the results of the soil and groundwater sampling, as well as the findings from the water well inventory survey will be submitted to the New Mexico Energy, Minerals, & Natural Resources Department as per the schedule presented in Section 7.0. The SIR will include the following:

1. Discussion of review of regulatory files related to the site and vicinity;
2. Field methods and procedures;
3. Soil and groundwater analytical results, QA/QC results;
4. Copies of Chain-of-Custody records;
5. Site plan showing the final locations of the soil and groundwater sampling locations;
6. Findings of the water well inventory survey; and
7. Findings and recommendations for remedial/closure activities at the site.

9.0 REFERENCES

University of Texas Bulletin #3232, Geology of Texas, Austin, TX 1932

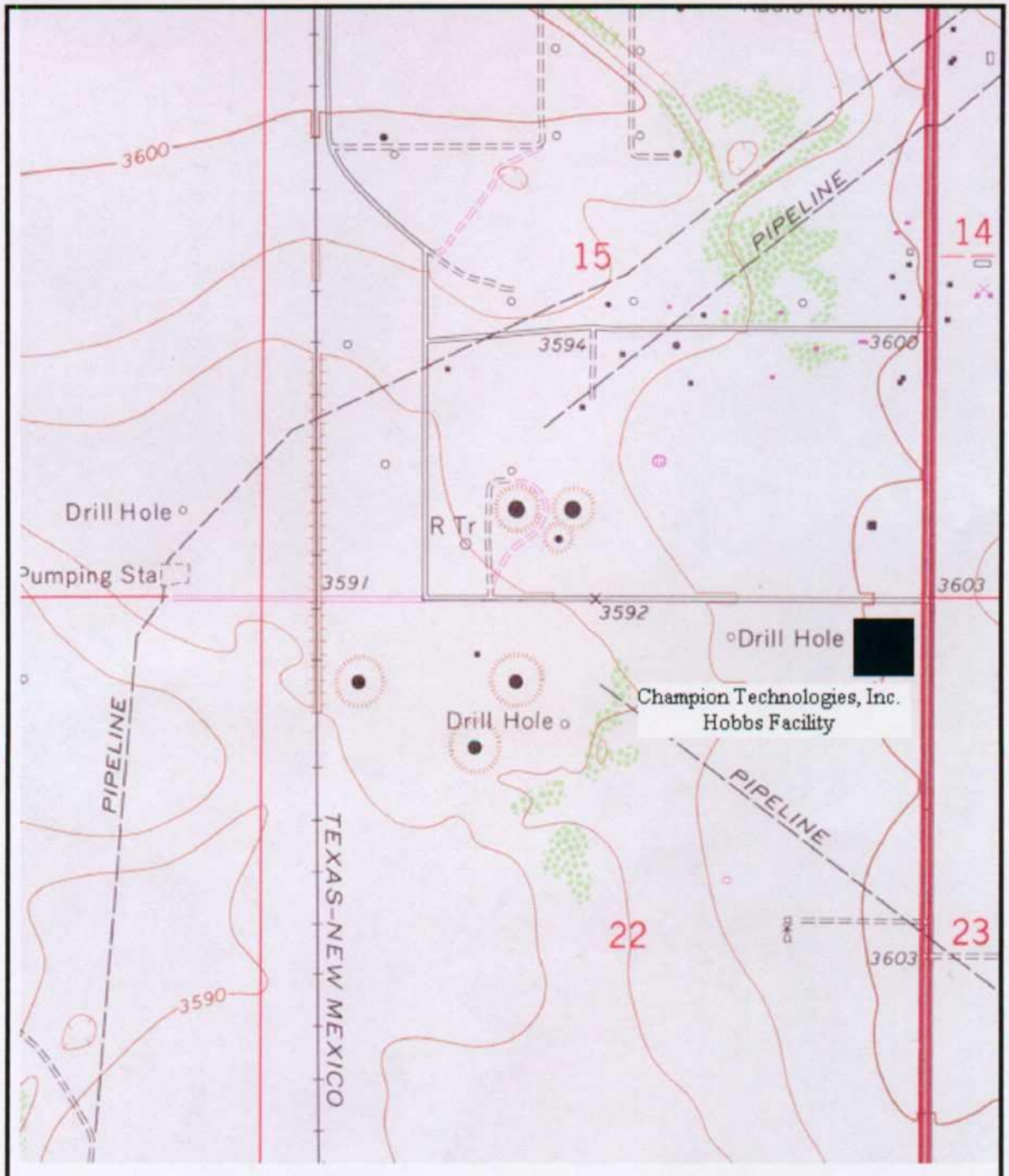
USEPA. *Preparation of Soil Sampling Protocols: Sampling Techniques and Strategies.* Office of Research and Development, Washington, D.C. 1992. EPA/600/R-92/128.

USEPA. *Soil Screening Guidance. User's Guide.* Office of Emergency and Remedial Response. Washington, D.C. 1996. EPA/540/R-96/018.

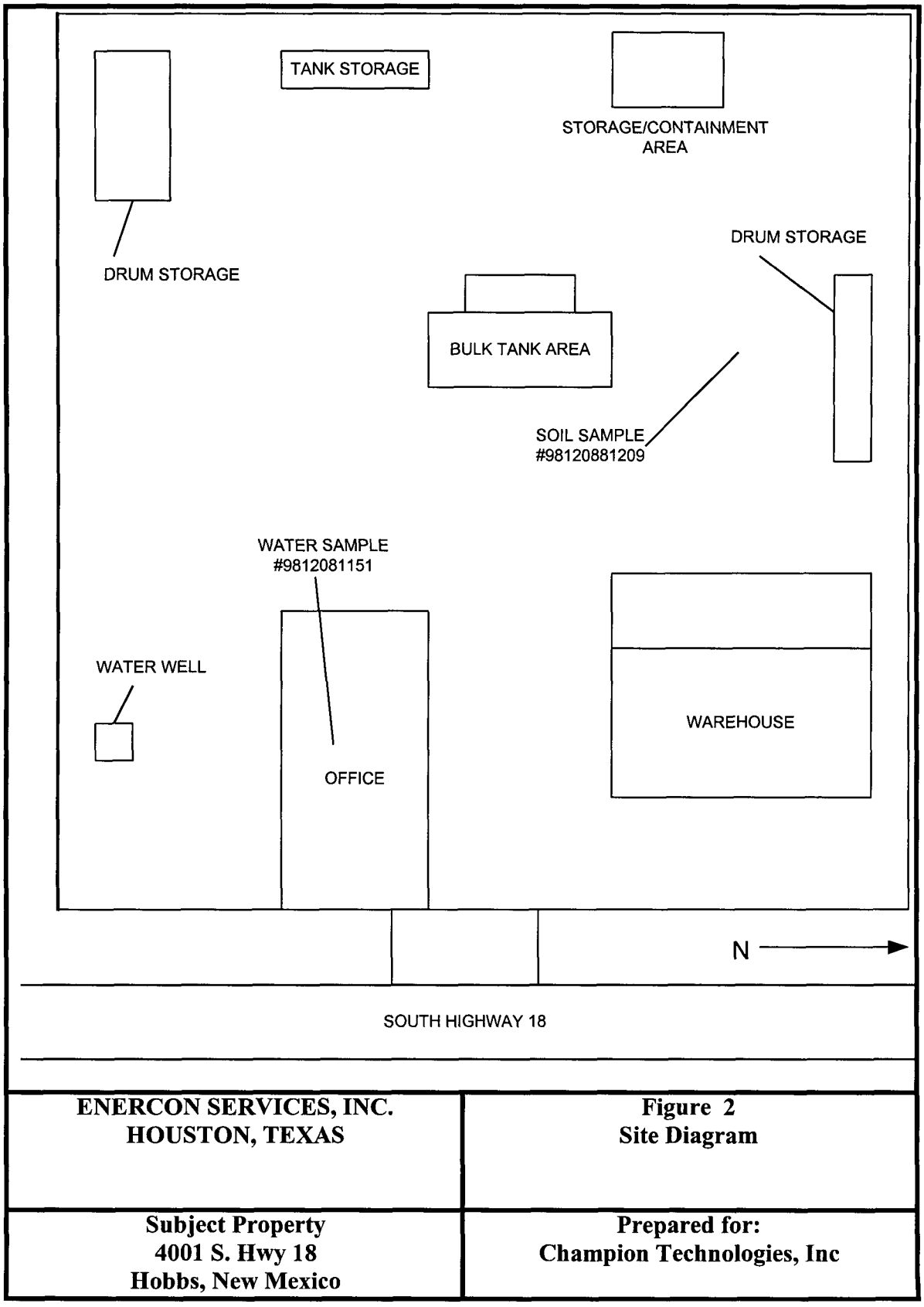
USEPA. *Test Methods for Evaluating Solids Waste, Physical/Chemical Methods.* Publication SW-846, 1996

APPENDIX A

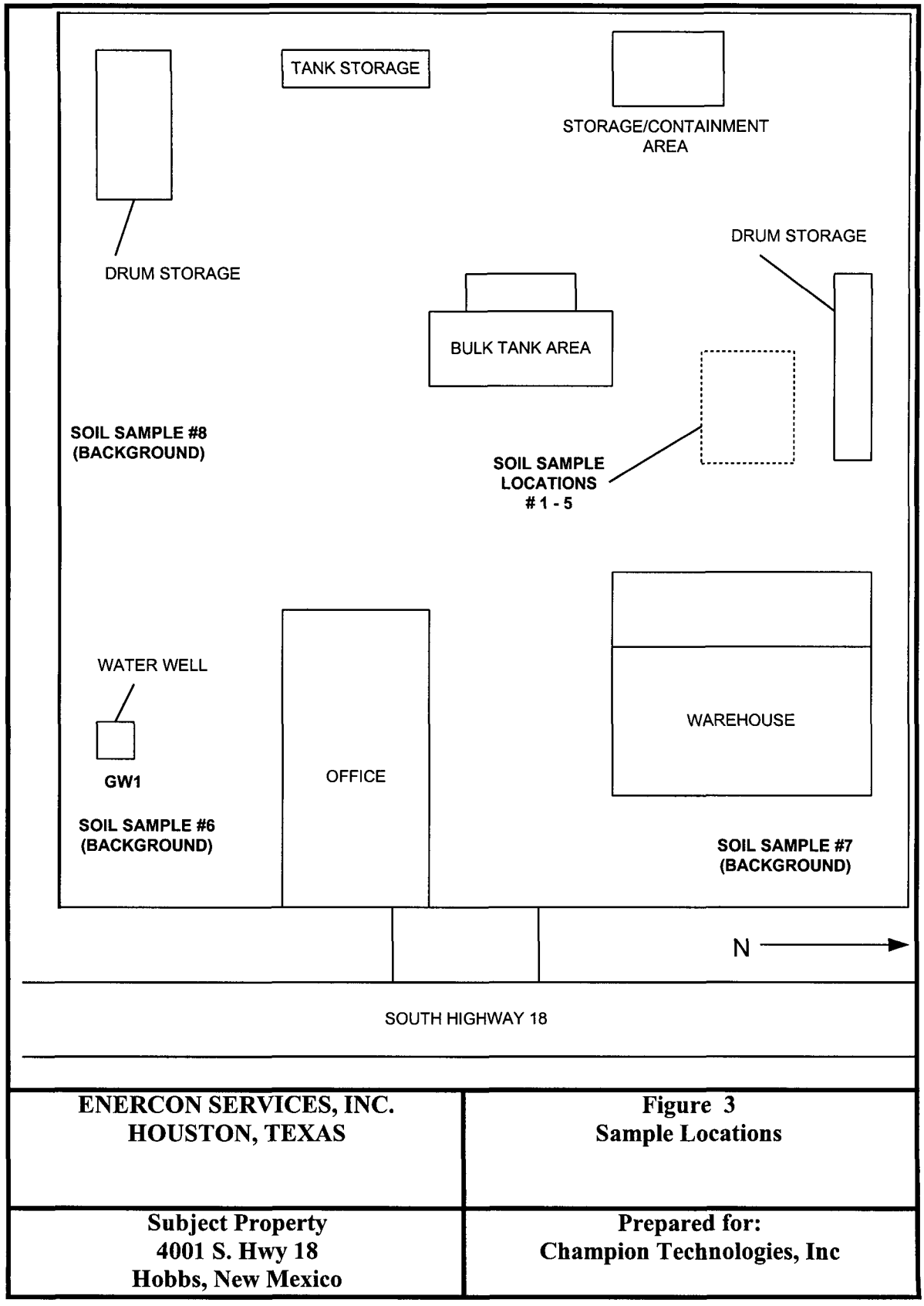
FIGURES AND TABLES



ENERCON SERVICES, INC. **HOUSTON, TEXAS**	**Figure 1** **Topographic Map**
Subject Property **4001 South Hwy. 18** **Hobbs, New Mexico**	**Prepared for:** **Champion Technologies, Inc.**



ENERCON SERVICES, INC. **HOUSTON, TEXAS**	**Figure 2** **Site Diagram**
Subject Property **4001 S. Hwy 18** **Hobbs, New Mexico**	**Prepared for:** **Champion Technologies, Inc**



ENERCON SERVICES, INC. **HOUSTON, TEXAS**	**Figure 3** **Sample Locations**
Subject Property **4001 S. Hwy 18** **Hobbs, New Mexico**	**Prepared for:** **Champion Technologies, Inc**

Table 1. Production Chemicals Stored at the Facility Champion Technologies, Inc. Hobbs, New Mexico	
Description of Chemicals	
Name	**Description**
Cortrons	Corrosion inhibitors for the oilfield that normally consists of Imadazolines, amines, fatty acids, and various organic solvents. Sometimes the solvent is water. The organic solvents are usually mixed alcohols or heavy aromatic naphthas.
Scortrons	Combination scale and corrosion inhibitors that normally consist of the same things found in corrosion with the addition of phosphonates, amides, and bisulfites.
Gyptrons	Scale treating compounds for the oilfield that are used either to prevent scale from forming or removing it. This line normally consiss of products based on water soluble phosphonates either in the neutralized or unneutralized form.
Emulsotrons	Chemicals for treating oilfield oil and water emulsions will normally consist of surfactants in an organic solvent such as heavy aromatic naphtha.
Flexoils	Paraffin treating compounds for the oilfield. Normally consists of high molecular weight polymers in an organic solvent such as xylene, toluene, or heavy aromatic naphtha.
Flotrons	Paraffin treating compounds for the oilfield that generally consist of surfactants in either aqueous or organic solvent. Solvents for organic blends are heavy aromatic naphtha or xylene, etc. Aqueous blends consist of water, methanol, or isporopanol as the solvent system.
Gas Treat	Amine based chemicals for treating sour gas
Foamatrons	Blends much like Surfatrons chemistry
Defoamers	Organic solvent based chemicals for preventing or removing foam problems in the oilfield
Bactrons	Bacteriocides for treating oilfield corrosion problems. These normally consist of aldehyde or quaternary amine chemistry.
Cleartrons	Used for water clarification in the oilfield to remove residual amounts of oil from water. These chemicals normally consist of polymers in an aqueous solvent system.
Xylene & Han	Oil base hydrocarbons used as solvents in oilfield chemical treatment mixtures
Methanol & IPA	Alcohol used as solvents in oilfield treatment mixtures

Table 2. Summary of Detected Concentrations, Soil – December 8, 1998 Champion Technologies, Inc. Hobbs, New Mexico			
Sample No.	**Constituent**	**Test Method**	**Result**
9812081209	Benzo (a) pyrene	EPA 8310	63 ug/Kg
	Benzo (b) fluoranthene		54 ug/Kg
	Benzo (k) fluoranthene		100 ug/Kg
	Chrysene		61 ug/Kg
	Dibenzo (a,h) anthracene		20 ug/Kg
	Fluorene		32 ug/Kg
	Naphthalene		22 ug/Kg
	Pyrene		22 ug/Kg
	1-Methylnaphthalene		73 ug/Kg
	Bis (2-ethylhexyl) phthalate	EPA 8270C	630 ug/Kg
	Aluminum	EPA 6010	5,500 mg/Kg
	Arsenic		3.2 mg/Kg
	Barium		600 mg/Kg
	Calcium		120,000 mg/kg
	Chromium		1,600 mg/Kg
	Cobalt		2.7 mg/Kg
	Copper		4.9 mg/Kg
	Iron		5,500 mg/Kg
	Lead		8.4 mg/Kg
	Magnesium		2,400 mg/Kg
	Manganese		120 mg/Kg
	Nickel		5.0 mg/Kg
	Potassium		2,000 mg/Kg
	Sodium		2,600 mg/Kg
	Vanadium		7.5 mg/Kg
	Zinc		61 mg/Kg
	Chloride	EPA 325.3	600 mg/Kg
	Nitrate	SM 4500-NO	4.3 mg/Kg
	Nitrite		0.64 mg/Kg
	Silica	EPA 370.1	12 mg/Kg
	Sulfate, soluble	EPA 375.4	800 mg/Kg
	Barium	TCLP	0.36 mg/L
	Chromium	TCLP	33 mg/L

Table 3. Summary of Detected Concentrations, Groundwater – December 8, 1998 Champion Technologies, Inc. Hobbs, New Mexico			
Sample No.	**Constituent**	**Test Method**	**Result**
9812081151	Alkalinity, bicarb	SM 2320B	225 mg/L
	Alkalinity, total	EPA 310.1	225 mg/L
	Bromide	SM 4500-Br	1.7 mg/L
	Chloride	EPA 300.0	400 mg/L
	Conductivity	EPA 120.1	1,800 umho
	Fluoride, total	EPA 340.2	1.5 mg/L
	Nitrate	EPA 353.1	2.2 mg/L
	Silica	EPA 370.1	26 mg/L
	Total dissolved solids	EPA 160.1	1,300 mg/L
	Calcium	EPA 200.7	160 mg/L
	Magnesium		30 mg/L
	Potassium		7.5 mg/L
	Sodium		140 mg/L

Table 4. Summary of Sample Identifiers and Analysis
Champion Technologies, Inc., Hobbs, New Mexico

Sample ID	Media	Constituents	Test Method	Container	Preservative	Hold Time
1-0006-A	Soil	Metals Suite[1]	EPA 6010/7000	8-oz glass	Ice	180 days
		Soluble Sulfates	EPA 300.0			28 days
		Chloride	EPA 300.0			28 days
1-3036-A		SVOC	EPA 8270	8-oz glass	Ice	14 days
		Metals Suite[1]	EPA 6010/7000			180 days
		Soluble Sulfates	EPA 300.0			28 days
		Chloride	EPA 300.0			28 days
2-0006-A		Metals Suite[1]	EPA 6010/7000	8-oz glass	Ice	180 days
		Soluble Sulfates	EPA 300.0			28 days
		Chloride	EPA 300.0			28 days
2-3036-A		SVOC	EPA 8270	8-oz glass	Ice	14 days
		Metals Suite[1]	EPA 6010/7000			180 days
		Soluble Sulfates	EPA 300.0			28 days
		Chloride	EPA 300.0			28 days
3-0006-A		Metals Suite[1]	EPA 6010/7000	8-oz glass	Ice	180 days
		Soluble Sulfates	EPA 300.0			28 days
		Chloride	EPA 300.0			28 days
3-0006-B		Metals Suite[1]	EPA 6010/7000	8-oz glass	Ice	180 days
		Soluble Sulfates	EPA 300.0			28 days
		Chloride	EPA 300.0			28 days
3-3036-A		SVOC	EPA 8270	8-oz glass	Ice	14 days
		Metals Suite[1]	EPA 6010/7000			180 days
		Soluble Sulfates	EPA 300.0			28 days
		Chloride	EPA 300.0			28 days
4-0006-A		Metals Suite[1]	EPA 6010/7000	8-oz glass	Ice	180 days
		Soluble Sulfates	EPA 300.0			28 days
		Chloride	EPA 300.0			28 days
4-3036-A		SVOC	EPA 8270	8-oz glass	Ice	14 days
		Metals Suite[1]	EPA 6010/7000			180 days
		Soluble Sulfates	EPA 300.0			28 days
		Chloride	EPA 300.0			28 days
5-0006-A		Metals Suite[1]	EPA 6010/7000	8-oz glass	Ice	180 days
		Soluble Sulfates	EPA 300.0			28 days
		Chloride	EPA 300.0			28 days
5-3036-A		SVOC	EPA 8270	8-oz glass	Ice	14 days
		Metals Suite[1]	EPA 6010/7000			180 days
		Soluble Sulfates	EPA 300.0			28 days
		Chloride	EPA 300.0			28 days
6-0002-A		Metals Suite[1]	EPA 6010/7000	8-oz glass	Ice	180 days
		Soluble Sulfates	EPA 300.0			28 days
		Chloride	EPA 300.0			28 days
7-0002-A		Metals Suite[1]	EPA 6010/7000	8-oz glass	Ice	180 days
		Soluble Sulfates	EPA 300.0			28 days
		Chloride	EPA 300.0			28 days
8-0002-A		Metals Suite[1]	EPA 6010/7000	8-oz glass	Ice	180 days
		Soluble Sulfates	EPA 300.0			28 days
		Chloride	EPA 300.0			28 days
4-0006-C	Water	SVOC	EPA 8270	2-L glass	Ice	7 days
		Metals Suite	EPA 6010/7000	500 ml plastic	HNO_3, ice	180 days
		Soluble Sulfates	EPA 300.0	1-L plastic	Ice	28 days
		Chloride	EPA 300.0	1-L plastic	Ice	28 days
GW1	GW[2]	Chloride	EPA 300.0	1-L plastic	Ice	28 days
		TDS[3]	EPA 160.1	1-L plastic	Ice	7 days

Notes:

1 Metals Suite consists of lead, chromium, manganese, and nickel.
2 Groundwater
3 Total dissolved solids

Table 5. Anticipated Schedule, Implementation of Site Investigation Champion Technologies, Inc. Hobbs, New Mexico		
Item	**Description**	**Schedule**
1	Submittal of Abatement Plan Proposal to New Mexico Energy, Minerals, & Natural Resources Department	November 29, 1999
2	Approval of Abatement Plan Proposal by New Mexico Energy, Minerals, & Natural Resources Department	December 13, 1999
3	Conduct Soil and Groundwater Sampling, Hobbs, New Mexico	December 16, 1999
4	Submit SIR to New Mexico Energy, Minerals, & Natural Resources Department	January 28, 2000

APPENDIX B

WATER WELL ANALYTICAL RESULT

P. O. BOX 1468
MONAHANS, TEXAS 79756
PH. 943-3234 OR 563-1040

Martin Water Laboratories, Inc.

709 W. INDIANA
MIDLAND, TEXAS 79701
PHONE 683-4521

RESULT OF WATER ANALYSES

LABORATORY NO. 495145
SAMPLE RECEIVED 4-24-95
RESULTS REPORTED 4-26-95

TO: Mr. Robert Middleton
P. O. Box 2187, Hobbs, NM 88240

COMPANY Champion Technologies, Inc. LEASE
FIELD OR POOL
SECTION BLOCK SURVEY COUNTY Lea STATE NM
SOURCE OF SAMPLE AND DATE TAKEN:
NO. 1 Drinking water - taken @ Hobbs laboratory.
NO. 2
NO. 3
NO. 4
REMARKS:

CHEMICAL AND PHYSICAL PROPERTIES	NO. 1	NO. 2	NO. 3	NO. 4
Specific Gravity at 60° F.	1.0025			
pH When Sampled				
pH When Received	7.00			
Bicarbonate as HCO_3	244			
Supersaturation as $CaCO_3$				
Undersaturation as $CaCO_3$				
Total Hardness as $CaCO_3$	520			
Calcium as Ca	168			
Magnesium as Mg	24			
Sodium and/or Potassium	138			
Sulfate as SO_4	86			
Chloride as Cl	376			
Iron as Fe	0.04			
Barium as Ba				
Turbidity, Electric				
Color as Pt				
Total Solids, Calculated	1,036			
Temperature °F.				
Carbon Dioxide, Calculated				
Dissolved Oxygen,				
Hydrogen Sulfide	0.0			
Resistivity, ohms/m at 77° F.	6.11			
Suspended Oil				
Filtrable Solids as mg/l				
Volume Filtered, ml				
Nitrate, as N	1.4			

Results Reported As Milligrams Per Liter

Additional Determinations And Remarks The undersigned certifies the above to be true and correct to the best of his knowledge and belief.

Form No. 3

By
Waylan C. Martin, M.A.

APPENDIX C

ANALYTICAL METHODS

METHOD 6010B

INDUCTIVELY COUPLED PLASMA-ATOMIC EMISSION SPECTROMETRY

1.0 SCOPE AND APPLICATION

1.1 Inductively coupled plasma-atomic emission spectrometry (ICP-AES) determines trace elements, including metals, in solution. The method is applicable to all of the elements listed in Table 1. All matrices, excluding filtered groundwater samples but including ground water, aqueous samples, TCLP and EP extracts, industrial and organic wastes, soils, sludges, sediments, and other solid wastes, require digestion prior to analysis. Groundwater samples that have been prefiltered and acidified will not need acid digestion. Samples which are not digested must either use an internal standard or be matrix matched with the standards. Refer to Chapter Three for the appropriate digestion procedures.

1.2 Table 1 lists the elements for which this method is applicable. Detection limits, sensitivity, and the optimum and linear concentration ranges of the elements can vary with the wavelength, spectrometer, matrix and operating conditions. Table 1 lists the recommended analytical wavelengths and estimated instrumental detection limits for the elements in clean aqueous matrices. The instrument detection limit data may be used to estimate instrument and method performance for other sample matrices. Elements and matrices other than those listed in Table 1 may be analyzed by this method if performance at the concentration levels of interest (see Section 8.0) is demonstrated.

1.3 Users of the method should state the data quality objectives prior to analysis and must document and have on file the required initial demonstration performance data described in the following sections prior to using the method for analysis.

1.4 Use of this method is restricted to spectroscopists who are knowledgeable in the correction of spectral, chemical, and physical interferences described in this method.

2.0 SUMMARY OF METHOD

2.1 Prior to analysis, samples must be solubilized or digested using appropriate Sample Preparation Methods (e.g. Chapter Three). When analyzing groundwater samples for dissolved constituents, acid digestion is not necessary if the samples are filtered and acid preserved prior to analysis.

2.2 This method describes multielemental determinations by ICP-AES using sequential or simultaneous optical systems and axial or radial viewing of the plasma. The instrument measures characteristic emission spectra by optical spectrometry. Samples are nebulized and the resulting aerosol is transported to the plasma torch. Element-specific emission spectra are produced by a radio-frequency inductively coupled plasma. The spectra are dispersed by a grating spectrometer, and the intensities of the emission lines are monitored by photosensitive devices. Background correction is required for trace element determination. Background must be measured adjacent to analyte lines on samples during analysis. The position selected for the background-intensity measurement, on either or both sides of the analytical line, will be determined by the complexity of the spectrum adjacent to the analyte line. In one mode of analysis the position used should be as free as possible from spectral interference and should reflect the same change in background

intensity as occurs at the analyte wavelength measured. Background correction is not required in cases of line broadening where a background correction measurement would actually degrade the analytical result. The possibility of additional interferences named in Section 3.0 should also be recognized and appropriate corrections made; tests for their presence are described in Section 8.5. Alternatively, users may choose multivariate calibration methods. In this case, point selections for background correction are superfluous since whole spectral regions are processed.

3.0 INTERFERENCES

3.1 Spectral interferences are caused by background emission from continuous or recombination phenomena, stray light from the line emission of high concentration elements, overlap of a spectral line from another element, or unresolved overlap of molecular band spectra.

3.1.1 Background emission and stray light can usually be compensated for by subtracting the background emission determined by measurements adjacent to the analyte wavelength peak. Spectral scans of samples or single element solutions in the analyte regions may indicate when alternate wavelengths are desirable because of severe spectral interference. These scans will also show whether the most appropriate estimate of the background emission is provided by an interpolation from measurements on both sides of the wavelength peak or by measured emission on only one side. The locations selected for the measurement of background intensity will be determined by the complexity of the spectrum adjacent to the wavelength peak. The locations used for routine measurement must be free of off-line spectral interference (interelement or molecular) or adequately corrected to reflect the same change in background intensity as occurs at the wavelength peak. For multivariate methods using whole spectral regions, background scans should be included in the correction algorithm. Off-line spectral interferences are handled by including spectra on interfering species in the algorithm.

3.1.2 To determine the appropriate location for off-line background correction, the user must scan the area on either side adjacent to the wavelength and record the apparent emission intensity from all other method analytes. This spectral information must be documented and kept on file. The location selected for background correction must be either free of off-line interelement spectral interference or a computer routine must be used for automatic correction on all determinations. If a wavelength other than the recommended wavelength is used, the analyst must determine and document both the overlapping and nearby spectral interference effects from all method analytes and common elements and provide for their automatic correction on all analyses. Tests to determine spectral interference must be done using analyte concentrations that will adequately describe the interference. Normally, 100 mg/L single element solutions are sufficient; however, for analytes such as iron that may be found at high concentration, a more appropriate test would be to use a concentration near the upper analytical range limit.

3.1.3 Spectral overlaps may be avoided by using an alternate wavelength or can be compensated by equations that correct for interelement contributions. Instruments that use equations for interelement correction **require** the interfering elements be analyzed at the same time as the element of interest. When operative and uncorrected, interferences will produce false positive determinations and be reported as analyte concentrations. More extensive information on interferant effects at various wavelengths and resolutions is available in reference wavelength tables and books. Users may apply interelement

correction equations determined on their instruments with tested concentration ranges to compensate (off line or on line) for the effects of interfering elements. Some potential spectral interferences observed for the recommended wavelengths are given in Table 2. For multivariate methods using whole spectral regions, spectral interferences are handled by including spectra of the interfering elements in the algorithm. The interferences listed are only those that occur between method analytes. Only interferences of a direct overlap nature are listed. These overlaps were observed with a single instrument having a working resolution of 0.035 nm.

3.1.4 When using interelement correction equations, the interference may be expressed as analyte concentration equivalents (i.e. false analyte concentrations) arising from 100 mg/L of the interference element. For example, assume that As is to be determined (at 193.696 nm) in a sample containing approximately 10 mg/L of Al. According to Table 2, 100 mg/L of Al would yield a false signal for As equivalent to approximately 1.3 mg/L. Therefore, the presence of 10 mg/L of Al would result in a false signal for As equivalent to approximately 0.13 mg/L. The user is cautioned that other instruments may exhibit somewhat different levels of interference than those shown in Table 2. The interference effects must be evaluated for each individual instrument since the intensities will vary.

3.1.5 Interelement corrections will vary for the same emission line among instruments because of differences in resolution, as determined by the grating, the entrance and exit slit widths, and by the order of dispersion. Interelement corrections will also vary depending upon the choice of background correction points. Selecting a background correction point where an interfering emission line may appear should be avoided when practical. Interelement corrections that constitute a major portion of an emission signal may not yield accurate data. Users should not forget that some samples may contain uncommon elements that could contribute spectral interferences.

3.1.6 The interference effects must be evaluated for each individual instrument whether configured as a sequential or simultaneous instrument. For each instrument, intensities will vary not only with optical resolution but also with operating conditions (such as power, viewing height and argon flow rate). When using the recommended wavelengths, the analyst is required to determine and document for each wavelength the effect from referenced interferences (Table 2) as well as any other suspected interferences that may be specific to the instrument or matrix. The analyst is encouraged to utilize a computer routine for automatic correction on all analyses.

3.1.7 Users of sequential instruments must verify the absence of spectral interference by scanning over a range of 0.5 nm centered on the wavelength of interest for several samples. The range for lead, for example, would be from 220.6 to 220.1 nm. This procedure must be repeated whenever a new matrix is to be analyzed and when a new calibration curve using different instrumental conditions is to be prepared. Samples that show an elevated background emission across the range may be background corrected by applying a correction factor equal to the emission adjacent to the line or at two points on either side of the line and interpolating between them. An alternate wavelength that does not exhibit a background shift or spectral overlap may also be used.

3.1.8 If the correction routine is operating properly, the determined apparent analyte(s) concentration from analysis of each interference solution should fall within a specific concentration range around the calibration blank. The concentration range is calculated by multiplying the concentration of the interfering element by the value of the correction factor being tested and divided by 10. If after the subtraction of the calibration blank the apparent analyte concentration falls outside of this range in either a positive or negative direction, a change in the correction factor of more than 10% should be suspected. The cause of the change should be determined and corrected and the correction factor updated. The interference check solutions should be analyzed more than once to confirm a change has occurred. Adequate rinse time between solutions and before analysis of the calibration blank will assist in the confirmation.

3.1.9 When interelement corrections are applied, their accuracy should be verified, daily, by analyzing spectral interference check solutions. If the correction factors or multivariate correction matrices tested on a daily basis are found to be within the 20% criteria for 5 consecutive days, the required verification frequency of those factors in compliance may be extended to a weekly basis. Also, if the nature of the samples analyzed is such they do not contain concentrations of the interfering elements at ± one reporting limit from zero, daily verification is not required. All interelement spectral correction factors or multivariate correction matrices must be verified and updated every six months or when an instrumentation change, such as in the torch, nebulizer, injector, or plasma conditions occurs. Standard solution should be inspected to ensure that there is no contamination that may be perceived as a spectral interference.

3.1.10 When interelement corrections are <u>not</u> used, verification of absence of interferences is required.

3.1.10.1 One method is to use a computer software routine for comparing the determinative data to limits files for notifying the analyst when an interfering element is detected in the sample at a concentration that will produce either an apparent false positive concentration, (i.e., greater than) the analyte instrument detection limit, or false negative analyte concentration, (i.e., less than the lower control limit of the calibration blank defined for a 99% confidence interval).

3.1.10.2 Another method is to analyze an Interference Check Solution(s) which contains similar concentrations of the major components of the samples (>10 mg/L) on a continuing basis to verify the absence of effects at the wavelengths selected. These data must be kept on file with the sample analysis data. If the check solution confirms an operative interference that is $\geq$ 20% of the analyte concentration, the analyte must be determined using (1) analytical and background correction wavelengths (or spectral regions) free of the interference, (2) by an alternative wavelength, or (3) by another documented test procedure.

3.2 Physical interferences are effects associated with the sample nebulization and transport processes. Changes in viscosity and surface tension can cause significant inaccuracies, especially in samples containing high dissolved solids or high acid concentrations. If physical interferences are present, they must be reduced by diluting the sample or by using a peristaltic pump, by using an internal standard or by using a high solids nebulizer. Another problem that can occur with high dissolved solids is salt buildup at the tip of the nebulizer, affecting aerosol flow rate

and causing instrumental drift. The problem can be controlled by wetting the argon prior to nebulization, using a tip washer, using a high solids nebulizer or diluting the sample. Also, it has been reported that better control of the argon flow rate, especially to the nebulizer, improves instrument performance: this may be accomplished with the use of mass flow controllers. The test described in Section 8.5.1 will help determine if a physical interference is present.

3.3 Chemical interferences include molecular compound formation, ionization effects, and solute vaporization effects. Normally, these effects are not significant with the ICP technique, but if observed, can be minimized by careful selection of operating conditions (incident power, observation position, and so forth), by buffering of the sample, by matrix matching, and by standard addition procedures. Chemical interferences are highly dependent on matrix type and the specific analyte element.

3.4 Memory interferences result when analytes in a previous sample contribute to the signals measured in a new sample. Memory effects can result from sample deposition on the uptake tubing to the nebulizer and from the build up of sample material in the plasma torch and spray chamber. The site where these effects occur is dependent on the element and can be minimized by flushing the system with a rinse blank between samples. The possibility of memory interferences should be recognized within an analytical run and suitable rinse times should be used to reduce them. The rinse times necessary for a particular element must be estimated prior to analysis. This may be achieved by aspirating a standard containing elements at a concentration ten times the usual amount or at the top of the linear dynamic range. The aspiration time for this sample should be the same as a normal sample analysis period, followed by analysis of the rinse blank at designated intervals. The length of time required to reduce analyte signals to within a factor of two of the method detection limit should be noted. Until the required rinse time is established, this method suggests a rinse period of at least 60 seconds between samples and standards. If a memory interference is suspected, the sample must be reanalyzed after a rinse period of sufficient length. Alternate rinse times may be established by the analyst based upon their DQOs.

3.5 Users are advised that high salt concentrations can cause analyte signal suppressions and confuse interference tests. If the instrument does not display negative values, fortify the interference check solution with the elements of interest at 0.5 to 1 mg/L and measure the added standard concentration accordingly. Concentrations should be within 20% of the true spiked concentration or dilution of the samples will be necessary. In the absence of measurable analyte, overcorrection could go undetected if a negative value is reported as zero.

3.6 The dashes in Table 2 indicate that no measurable interferences were observed even at higher interferant concentrations. Generally, interferences were discernible if they produced peaks, or background shifts, corresponding to 2 to 5% of the peaks generated by the analyte concentrations.

4.0 APPARATUS AND MATERIALS

4.1 Inductively coupled argon plasma emission spectrometer:

4.1.1 Computer-controlled emission spectrometer with background correction.

4.1.2 Radio-frequency generator compliant with FCC regulations.

4.1.3 Optional mass flow controller for argon nebulizer gas supply.

4.1.4 Optional peristaltic pump.

4.1.5 Optional Autosampler.

4.1.6 Argon gas supply - high purity.

4.2 Volumetric flasks of suitable precision and accuracy.

4.3 Volumetric pipets of suitable precision and accuracy.

5.0 REAGENTS

5.1 Reagent or trace metals grade chemicals shall be used in all tests. Unless otherwise indicated, it is intended that all reagents shall conform to the specifications of the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available. Other grades may be used, provided it is first ascertained that the reagent is of sufficiently high purity to permit its use without lessening the accuracy of the determination. If the purity of a reagent is in question analyze for contamination. If the concentration of the contamination is less than the MDL then the reagent is acceptable.

5.1.1 Hydrochloric acid (conc), HCl.

5.1.2 Hydrochloric acid (1:1), HCl. Add 500 mL concentrated HCl to 400 mL water and dilute to 1 liter in an appropriately sized beaker.

5.1.3 Nitric acid (conc), HNO_3.

5.1.4 Nitric acid (1:1), HNO_3. Add 500 mL concentrated HNO_3 to 400 mL water and dilute to 1 liter in an appropriately sized beaker.

5.2 Reagent Water. All references to water in the method refer to reagent water unless otherwise specified. Reagent water will be interference free. Refer to Chapter One for a definition of reagent water.

5.3 Standard stock solutions may be purchased or prepared from ultra- high purity grade chemicals or metals (99.99% pure or greater). All salts must be dried for 1 hour at 105°C, unless otherwise specified.

Note: This section does not apply when analyzing samples that have been prepared by Method 3040.

CAUTION: Many metal salts are extremely toxic if inhaled or swallowed. Wash hands thoroughly after handling.

Typical stock solution preparation procedures follow. Concentrations are calculated based upon the weight of pure metal added, or with the use of the element fraction and the weight of the metal salt added.

For metals:

$$\text{Concentration (ppm)} = \frac{\text{weight (mg)}}{\text{volume (L)}}$$

For metal salts:

$$\text{Concentration (ppm)} = \frac{\text{weight (mg) x mole fraction}}{\text{volume (L)}}$$

5.3.1 Aluminum solution, stock, 1 mL = 1000 µg Al: Dissolve 1.000 g of aluminum metal, weighed accurately to at least four significant figures, in an acid mixture of 4.0 mL of (1:1) HCl and 1.0 mL of concentrated $HN0_3$ in a beaker. Warm beaker slowly to effect solution. When dissolution is complete, transfer solution quantitatively to a 1-liter flask, add an additional 10.0 mL of (1:1) HCl and dilute to volume with reagent water.

NOTE: Weight of analyte is expressed to four significant figures for consistency with the weights below because rounding to two decimal places can contribute up to 4 % error for some of the compounds.

5.3.2 Antimony solution, stock, 1 mL = 1000 µg Sb: Dissolve 2.6673 g $K(SbO)C_4H_4O_6$ (element fraction Sb = 0.3749), weighed accurately to at least four significant figures, in water, add 10 mL (1:1) HCl, and dilute to volume in a 1,000 mL volumetric flask with water.

5.3.3 Arsenic solution, stock, 1 mL = 1000 µg As: Dissolve 1.3203 g of As_2O_3 (element fraction As = 0.7574), weighed accurately to at least four significant figures, in 100 mL of water containing 0.4 g NaOH. Acidify the solution with 2 mL concentrated HNO_3 and dilute to volume in a 1,000 mL volumetric flask with water.

5.3.4 Barium solution, stock, 1 mL = 1000 µg Ba: Dissolve 1.5163 g $BaCl_2$ (element fraction Ba = 0.6595), dried at 250°C for 2 hours, weighed accurately to at least four significant figures, in 10 mL water with 1 mL (1:1) HCl. Add 10.0 mL (1:1) HCl and dilute to volume in a 1,000 mL volumetric flask with water.

5.3.5 Beryllium solution, stock, 1 mL = 1000 µg Be: Do not dry. Dissolve 19.6463 g $BeSO_4{\cdot}4H_2O$ (element fraction Be = 0.0509), weighed accurately to at least four significant figures, in water, add 10.0 mL concentrated HNO_3, and dilute to volume in a 1,000 mL volumetric flask with water.

5.3.6 Boron solution, stock, 1 mL = 1000 µg B: Do not dry. Dissolve 5.716 g anhydrous H_3BO_3 (B fraction = 0.1749), weighed accurately to at least four significant figures, in reagent water and dilute in a 1-L volumetric flask with reagent water. Transfer immediately after mixing in a clean polytetrafluoroethylene (PTFE) bottle to minimize any leaching of boron from the glass volumetric container. Use of a non-glass volumetric flask is recommended to avoid boron contamination from glassware.

5.3.7 Cadmium solution, stock, 1 mL = 1000 µg Cd: Dissolve 1.1423 g CdO (element fraction Cd = 0.8754), weighed accurately to at least four significant figures, in a

minimum amount of (1:1) HNO_3. Heat to increase rate of dissolution. Add 10.0 mL concentrated HNO_3 and dilute to volume in a 1,000 mL volumetric flask with water.

5.3.8 Calcium solution, stock, 1 mL = 1000 µg Ca: Suspend 2.4969 g $CaCO_3$ (element Ca fraction = 0.4005), dried at 180°C for 1 hour before weighing, weighed accurately to at least four significant figures, in water and dissolve cautiously with a minimum amount of (1:1) HNO_3. Add 10.0 mL concentrated HNO_3 and dilute to volume in a 1,000 mL volumetric flask with water.

5.3.9 Chromium solution, stock, 1 mL = 1000 µg Cr: Dissolve 1.9231 g CrO_3 (element fraction Cr = 0.5200), weighed accurately to at least four significant figures, in water. When solution is complete, acidify with 10 mL concentrated HNO_3 and dilute to volume in a 1,000 mL volumetric flask with water.

5.3.10 Cobalt solution, stock, 1 mL = 1000 µg Co: Dissolve 1.00 g of cobalt metal, weighed accurately to at least four significant figures, in a minimum amount of (1:1) HNO_3. Add 10.0 mL (1:1) HCl and dilute to volume in a 1,000 mL volumetric flask with water.

5.3.11 Copper solution, stock, 1 mL = 1000 µg Cu: Dissolve 1.2564 g CuO (element fraction Cu = 0.7989), weighed accurately to at least four significant figures), in a minimum amount of (1:1) HNO_3. Add 10.0 mL concentrated HNO_3 and dilute to volume in a 1,000 mL volumetric flask with water.

5.3.12 Iron solution, stock, 1 mL = 1000 µg Fe: Dissolve 1.4298 g Fe_2O_3 (element fraction Fe = 0.6994), weighed accurately to at least four significant figures, in a warm mixture of 20 mL (1:1) HCl and 2 mL of concentrated HNO_3. Cool, add an additional 5.0 mL of concentrated HNO_3, and dilute to volume in a 1,000 mL volumetric flask with water.

5.3.13 Lead solution, stock, 1 mL = 1000 µg Pb: Dissolve 1.5985 g $Pb(NO_3)_2$ (element fraction Pb = 0.6256), weighed accurately to at least four significant figures, in a minimum amount of (1:1) HNO_3. Add 10 mL (1:1) HNO_3 and dilute to volume in a 1,000 mL volumetric flask with water.

5.3.14 Lithium solution, stock, 1 mL = 1000 µg Li: Dissolve 5.3248 g lithium carbonate (element fraction Li = 0.1878), weighed accurately to at least four significant figures, in a minimum amount of (1:1) HCl and dilute to volume in a 1,000 mL volumetric flask with water.

5.3.15 Magnesium solution, stock, 1 mL = 1000 µg Mg: Dissolve 1.6584 g MgO (element fraction Mg = 0.6030), weighed accurately to at least four significant figures, in a minimum amount of (1:1) HNO_3. Add 10.0 mL (1:1) concentrated HNO_3 and dilute to volume in a 1,000 mL volumetric flask with water.

5.3.16 Manganese solution, stock, 1 mL = 1000 µg Mn: Dissolve 1.00 g of manganese metal, weighed accurately to at least four significant figures, in acid mixture (10 mL concentrated HCl and 1 mL concentrated HNO_3) and dilute to volume in a 1,000 mL volumetric flask with water.

5.3.17 Mercury solution, stock, 1 mL = 1000 µg Hg: Do not dry, highly toxic element. Dissolve 1.354 g $HgCl_2$ (Hg fraction = 0.7388) in reagent water. Add 50.0 mL concentrated HNO_3 and dilute to volume in 1-L volumetric flask with reagent water.

5.3.18 Molybdenum solution, stock, 1 mL = 1000 µg Mo: Dissolve 1.7325 g $(NH_4)_6Mo_7O_{24}.4H_2O$ (element fraction Mo = 0.5772), weighed accurately to at least four significant figures, in water and dilute to volume in a 1,000 mL volumetric flask with water.

5.3.19 Nickel solution, stock, 1 mL = 1000 µg Ni: Dissolve 1.00 g of nickel metal, weighed accurately to at least four significant figures, in 10.0 mL hot concentrated HNO_3, cool, and dilute to volume in a 1,000 mL volumetric flask with water.

5.3.20 Phosphate solution, stock, 1 mL = 1000 µg P: Dissolve 4.3937 g anhydrous KH_2PO_4 (element fraction P = 0.2276), weighed accurately to at least four significant figures, in water. Dilute to volume in a 1,000 mL volumetric flask with water.

5.3.21 Potassium solution, stock, 1 mL = 1000 µg K: Dissolve 1.9069 g KCl (element fraction K = 0.5244) dried at 110°C, weighed accurately to at least four significant figures, in water, and dilute to volume in a 1,000 mL volumetric flask with water.

5.3.22 Selenium solution, stock, 1 mL = 1000 µg Se: Do not dry. Dissolve 1.6332 g H_2SeO_3 (element fraction Se = 0.6123), weighed accurately to at least four significant figures, in water and dilute to volume in a 1,000 mL volumetric flask with water.

5.3.23 Silica solution, stock, 1 mL = 1000 µg SiO_2: Do not dry. Dissolve 2.964 g NH_4SiF_6, weighed accurately to at least four significant figures, in 200 mL (1:20) HCl with heating at 85°C to effect dissolution. Let solution cool and dilute to volume in a 1-L volumetric flask with reagent water.

5.3.24 Silver solution, stock, 1 mL = 1000 µg Ag: Dissolve 1.5748 g $AgNO_3$ (element fraction Ag = 0.6350), weighed accurately to at least four significant figures, in water and 10 mL concentrated HNO_3. Dilute to volume in a 1,000 mL volumetric flask with water.

5.3.25 Sodium solution, stock, 1 mL = 1000 µg Na: Dissolve 2.5419 g NaCl (element fraction Na = 0.3934), weighed accurately to at least four significant figures, in water. Add 10.0 mL concentrated HNO_3 and dilute to volume in a 1,000 mL volumetric flask with water.

5.3.26 Strontium solution, stock, 1 mL = 1000 µg Sr: Dissolve 2.4154 g of strontium nitrate ($Sr(NO_3)_2$) (element fraction Sr = 0.4140), weighed accurately to at least four significant figures, in a 1-liter flask containing 10 mL of concentrated HCl and 700 mL of water. Dilute to volume in a 1,000 mL volumetric flask with water.

5.3.27 Thallium solution, stock, 1 mL = 1000 µg Tl: Dissolve 1.3034 g $TlNO_3$ (element fraction Tl = 0.7672), weighed accurately to at least four significant figures, in water. Add 10.0 mL concentrated HNO_3 and dilute to volume in a 1,000 mL volumetric flask with water.

5.3.28 Tin solution, stock, 1 mL = 1000 µg Sn: Dissolve 1.000 g Sn shot, weighed accurately to at least 4 significant figures, in 200 mL (1:1) HCl with heating to effect dissolution. Let solution cool and dilute with (1:1) HCl in a 1-L volumetric flask.

5.3.29 Vanadium solution, stock, 1 mL = 1000 µg V: Dissolve 2.2957 g NH_4VO_3 (element fraction V = 0.4356), weighed accurately to at least four significant figures, in a minimum amount of concentrated HNO_3. Heat to increase rate of dissolution. Add 10.0 mL concentrated HNO_3 and dilute to volume in a 1,000 mL volumetric flask with water.

5.3.30 Zinc solution, stock, 1 mL = 1000 µg Zn: Dissolve 1.2447 g ZnO (element fraction Zn = 0.8034), weighed accurately to at least four significant figures, in a minimum amount of dilute HNO_3. Add 10.0 mL concentrated HNO_3 and dilute to volume in a 1,000 mL volumetric flask with water.

5.4 Mixed calibration standard solutions - Prepare mixed calibration standard solutions by combining appropriate volumes of the stock solutions in volumetric flasks (see Table 3). Add the appropriate types and volumes of acids so that the standards are matrix matched with the sample digestates. Prior to preparing the mixed standards, each stock solution should be analyzed separately to determine possible spectral interference or the presence of impurities. Care should be taken when preparing the mixed standards to ensure that the elements are compatible and stable together. Transfer the mixed standard solutions to FEP fluorocarbon or previously unused polyethylene or polypropylene bottles for storage. Fresh mixed standards should be prepared, as needed, with the realization that concentration can change on aging. Some typical calibration standard combinations are listed in Table 3.

NOTE: If the addition of silver to the recommended acid combination results in an initial precipitation, add 15 mL of water and warm the flask until the solution clears. Cool and dilute to 100 mL with water. For this acid combination, the silver concentration should be limited to 2 mg/L. Silver under these conditions is stable in a tap-water matrix for 30 days. Higher concentrations of silver require additional HCl.

5.5 Two types of blanks are required for the analysis for samples prepared by any method other than 3040. The calibration blank is used in establishing the analytical curve, and the method blank is used to identify possible contamination resulting from varying amounts of the acids used in the sample processing.

5.5.1 The calibration blank is prepared by acidifying reagent water to the same concentrations of the acids found in the standards and samples. Prepare a sufficient quantity to flush the system between standards and samples. The calibration blank will also be used for all initial and continuing calibration blank determinations (see Sections 7.3 and 7.4).

5.5.2 The method blank must contain all of the reagents in the same volumes as used in the processing of the samples. The method blank must be carried through the complete procedure and contain the same acid concentration in the final solution as the sample solution used for analysis.

5.6 The Initial Calibration Verification (ICV) is prepared by the analyst by combining compatible elements from a standard source different than that of the calibration standard and at concentrations within the linear working range of the instrument (see Section 8.6.1 for use).

5.7 The Continuing Calibration Verification (CCV)) should be prepared in the same acid matrix using the same standards used for calibration at a concentration near the mid-point of the calibration curve (see Section 8.6.1 for use).

5.8 The interference check solution is prepared to contain known concentrations of interfering elements that will provide an adequate test of the correction factors. Spike the sample with the elements of interest, particularly those with known interferences at 0.5 to 1 mg/L. In the absence of measurable analyte, overcorrection could go undetected because a negative value could be reported as zero. If the particular instrument will display overcorrection as a negative number, this spiking procedure will not be necessary.

6.0 SAMPLE COLLECTION, PRESERVATION, AND HANDLING

6.1 See the introductory material in Chapter Three, Inorganic Analytes, Sections 3.1 through 3.3.

7.0 PROCEDURE

7.1 Preliminary treatment of most matrices is necessary because of the complexity and variability of sample matrices. Groundwater samples which have been prefiltered and acidified will not need acid digestion. Samples which are not digested must either use an internal standard or be matrix matched with the standards. Solubilization and digestion procedures are presented in Sample Preparation Methods (Chapter Three, Inorganic Analytes).

7.2 Set up the instrument with proper operating parameters established as detailed below. The instrument must be allowed to become thermally stable before beginning (usually requiring at least 30 minutes of operation prior to calibration). Operating conditions - The analyst should follow the instructions provided by the instrument manufacturer.

7.2.1 Before using this procedure to analyze samples, there must be data available documenting initial demonstration of performance. The required data document the selection criteria of background correction points; analytical dynamic ranges, the applicable equations, and the upper limits of those ranges; the method and instrument detection limits; and the determination and verification of interelement correction equations or other routines for correcting spectral interferences. This data must be generated using the same instrument, operating conditions and calibration routine to be used for sample analysis. These documented data must be kept on file and be available for review by the data user or auditor.

7.2.2 Specific wavelengths are listed in Table 1. Other wavelengths may be substituted if they can provide the needed sensitivity and are corrected for spectral interference. Because of differences among various makes and models of spectrometers, specific instrument operating conditions cannot be provided. The instrument and operating conditions utilized for determination must be capable of providing data of acceptable quality to the program and data user. The analyst should follow the instructions provided by the instrument manufacturer unless other conditions provide similar or better performance for

a task. Operating conditions for aqueous solutions usually vary from 1100 to 1200 watts forward power, 14 to 18 mm viewing height, 15 to 19 liters/min argon coolant flow, 0.6 to 1.5 L/min argon nebulizer flow, 1 to 1.8 mL/min sample pumping rate with a 1 minute preflush time and measurement time near 1 second per wavelength peak for sequential instruments and 10 seconds per sample for simultaneous instruments. For an axial plasma, the conditions will usually vary from 1100-1500 watts forward power, 15-19 liters/min argon coolant flow, 0.6-1.5 L/min argon nebulizer flow, 1-1.8 mL/min sample pumping rate with a 1 minute preflush time and measurement time near 1 second per wavelength peak for sequential instruments and 10 seconds per sample for simultaneous instruments. Reproduction of the Cu/Mn intensity ratio at 324.754 nm and 257.610 nm respectively, by adjusting the argon aerosol flow has been recommended as a way to achieve repeatable interference correction factors.

7.2.3 The plasma operating conditions need to be optimized prior to use of the instrument. This routine is not required on a daily basis, but only when first setting up a new instrument or following a change in operating conditions. The following procedure is recommended or follow manufacturer's recommendations. The purpose of plasma optimization is to provide a maximum signal to background ratio for some of the least sensitive elements in the analytical array. The use of a mass flow controller to regulate the nebulizer gas flow or source optimization software greatly facilitates the procedure.

7.2.3.1 Ignite the radial plasma and select an appropriate incident RF power. Allow the instrument to become thermally stable before beginning, about 30 to 60 minutes of operation. While aspirating a 1000 ug/L solution of yttrium, follow the instrument manufacturer's instructions and adjust the aerosol carrier gas flow rate through the nebulizer so a definitive blue emission region of the plasma extends approximately from 5 to 20 mm above the top of the load coil. Record the nebulizer gas flow rate or pressure setting for future reference. The yttrium solution can also be used for coarse optical alignment of the torch by observing the overlay of the blue light over the entrance slit to the optical system.

7.2.3.2 After establishing the nebulizer gas flow rate, determine the solution uptake rate of the nebulizer in mL/min by aspirating a known volume of calibration blank for a period of at least three minutes. Divide the volume aspirated by the time in minutes and record the uptake rate; set the peristaltic pump to deliver the rate in a steady even flow.

7.2.3.3 Profile the instrument to align it optically as it will be used during analysis. The following procedure can be used for both horizontal and vertical optimization in the radial mode, but is written for vertical. Aspirate a solution containing 10 ug/L of several selected elements. These elements can be As, Se, Tl or Pb as the least sensitive of the elements and most needing to be optimize or others representing analytical judgement (V, Cr, Cu, Li and Mn are also used with success). Collect intensity data at the wavelength peak for each analyte at 1 mm intervals from 14 to 18 mm above the load coil. (This region of the plasma is referred to as the analytical zone.) Repeat the process using the calibration blank. Determine the net signal to blank intensity ratio for each analyte for each viewing height setting. Choose the height for viewing the plasma that provides the best net intensity ratios for the elements analyzed or the highest intensity ratio for the least

sensitive element. For optimization in the axial mode, follow the instrument manufacturer's instructions.

7.2.3.4 The instrument operating condition finally selected as being optimum should provide the lowest reliable instrument detection limits and method detection limits.

7.2.3.5 If either the instrument operating conditions, such as incident power or nebulizer gas flow rate are changed, or a new torch injector tube with a different orifice internal diameter is installed, the plasma and viewing height should be re-optimized.

7.2.3.6 After completing the initial optimization of operating conditions, but before analyzing samples, the laboratory must establish and initially verify an interelement spectral interference correction routine to be used during sample analysis. A general description concerning spectral interference and the analytical requirements for background correction in particular are discussed in the section on interferences. Criteria for determining an interelement spectral interference is an apparent positive or negative concentration for the analyte that falls within ± one reporting limit from zero. The upper control limit is the analyte instrument detection limit. Once established the entire routine must be periodically verified every six months. Only a portion of the correction routine must be verified more frequently or on a daily basis. Initial and periodic verification of the routine should be kept on file. Special cases where continual verification is required are described elsewhere.

7.2.3.7 Before daily calibration and after the instrument warmup period, the nebulizer gas flow rate must be reset to the determined optimized flow. If a mass flow controller is being used, it should be set to the recorded optimized flow rate, In order to maintain valid spectral interelement correction routines the nebulizer gas flow rate should be the same (< 2% change) from day to day.

7.2.4 For operation with organic solvents, use of the auxiliary argon inlet is recommended, as are solvent-resistant tubing, increased plasma (coolant) argon flow, decreased nebulizer flow, and increased RF power to obtain stable operation and precise measurements.

7.2.5 Sensitivity, instrumental detection limit, precision, linear dynamic range, and interference effects must be established for each individual analyte line on each particular instrument. All measurements must be within the instrument linear range where the correction equations are valid.

7.2.5.1 Method detection limits must be established for all wavelengths utilized for each type of matrix commonly analyzed. The matrix used for the MDL calculation must contain analytes of known concentrations within 3-5 times the anticipated detection limit. Refer to Chapter One for additional guidance on the performance of MDL studies.

7.2.5.2 Determination of limits using reagent water represent a best case situation and do not represent possible matrix effects of real world samples.

7.2.5.3 If additional confirmation is desired, reanalyze the seven replicate aliquots on two more non consecutive days and again calculate the method detection limit values for each day. An average of the three values for each analyte may provide for a more appropriate estimate. Successful analysis of samples with added analytes or using method of standard additions can give confidence in the method detection limit values determined in reagent water.

7.2.5.4 The upper limit of the linear dynamic range must be established for each wavelength utilized by determining the signal responses from a minimum for three, preferably five, different concentration standards across the range. One of these should be near the upper limit of the range. The ranges which may be used for the analysis of samples should be judged by the analyst from the resulting data. The data, calculations and rationale for the choice of range made should be documented and kept on file. The upper range limit should be an observed signal no more than 10% below the level extrapolated from lower standards. Determined analyte concentrations that are above the upper range limit must be diluted and reanalyzed. The analyst should also be aware that if an interelement correction from an analyte above the linear range exists, a second analyte where the interelement correction has been applied may be inaccurately reported. New dynamic ranges should be determined whenever there is a significant change in instrument response. For those analytes that periodically approach the upper limit, the range should be checked every six months. For those analytes that are known interferences, and are present at above the linear range, the analyst should ensure that the interelement correction has not been inaccurately applied.

NOTE: Many of the alkali and alkaline earth metals have non-linear response curves due to ionization and self absorption effects. These curves may be used if the instrument allows; however the effective range must be checked and the second order curve fit should have a correlation coefficient of 0.995 or better. Third order fits are not acceptable. These non-linear response curves should be revalidated and recalculated every six months. These curves are much more sensitive to changes in operating conditions than the linear lines and should be checked whenever there have been moderate equipment changes.

7.2.6 The analyst must (1) verify that the instrument configuration and operating conditions satisfy the analytical requirements and (2) maintain quality control data confirming instrument performance and analytical results.

7.3 Profile and calibrate the instrument according to the instrument manufacturer's recommended procedures, using the typical mixed calibration standard solutions described in Section 5.4. Flush the system with the calibration blank (Section 5.5.1) between each standard or as the manufacturer recommends. (Use the average intensity of multiple exposures for both standardization and sample analysis to reduce random error.) The calibration curve must consist of a minimum of a blank and a standard.

7.4 For all analytes and determinations, the laboratory must analyze an ICV (Section 5.6), a calibration blank (Section 5.5.1), and a continuing calibration verification (CCV) (Section 5.7) immediately following daily calibration. A calibration blank and either a calibration verification (CCV) or an ICV must be analyzed after every tenth sample and at the end of the sample run. Analysis of

the check standard and calibration verification must verify that the instrument is within ± 10% of calibration with relative standard deviation < 5% from replicate (minimum of two) integrations. If the calibration cannot be verified within the specified limits, the sample analysis must be discontinued, the cause determined and the instrument recalibrated. All samples following the last acceptable ICV, CCV or check standard must be reanalyzed. The analysis data of the calibration blank, check standard, and ICV or CCV must be kept on file with the sample analysis data.

7.5 Rinse the system with the calibration blank solution (Section 5.5.1) before the analysis of each sample. The rinse time will be one minute. Each laboratory may establish a reduction in this rinse time through a suitable demonstration.

7.6 Calculations: If dilutions were performed, the appropriate factors must be applied to sample values. All results should be reported with up to three significant figures.

7.7 The MSA should be used if an interference is suspected or a new matrix is encountered. When the method of standard additions is used, standards are added at one or more levels to portions of a prepared sample. This technique compensates for enhancement or depression of an analyte signal by a matrix. It will not correct for additive interferences, such as contamination, interelement interferences, or baseline shifts. This technique is valid in the linear range when the interference effect is constant over the range, the added analyte responds the same as the endogenous analyte, and the signal is corrected for additive interferences. The simplest version of this technique is the single addition method. This procedure calls for two identical aliquots of the sample solution to be taken. To the first aliquot, a small volume of standard is added; while to the second aliquot, a volume of acid blank is added equal to the standard addition. The sample concentration is calculated by: multiplying the intensity value for the unfortified aliquot by the volume (Liters) and concentration (mg/L or mg/kg) of the standard addition to make the numerator; the difference in intensities for the fortified sample and unfortified sample is multiplied by the volume (Liters) of the sample aliquot for the denominator. The quotient is the sample concentration.

For more than one fortified portion of the prepared sample, linear regression analysis can be applied using a computer or calculator program to obtain the concentration of the sample solution.

NOTE: Refer to Method 7000 for a more detailed discussion of the MSA.

7.8 An alternative to using the method of standard additions is the internal standard technique. Add one or more elements not in the samples and verified not to cause an interelement spectral interference to the samples, standards and blanks; yttrium or scandium are often used. The concentration should be sufficient for optimum precision but not so high as to alter the salt concentration of the matrix. The element intensity is used by the instrument as an internal standard to ratio the analyte intensity signals for both calibration and quantitation. This technique is very useful in overcoming matrix interferences especially in high solids matrices.

8.0 QUALITY CONTROL

8.1 All quality control data should be maintained and available for easy reference or inspection. All quality control measures described in Chapter One should be followed.

8.2 Dilute and reanalyze samples that exceed the linear calibration range or use an alternate, less sensitive line for which quality control data is already established.

8.3 Employ a minimum of one method blank per sample batch to determine if contamination or any memory effects are occurring. A method blank is a volume of reagent water carried through the same preparation process as a sample (refer to Chapter One).

8.4 Analyze matrix spiked duplicate samples at a frequency of one per matrix batch. A matrix duplicate sample is a sample brought through the entire sample preparation and analytical process in duplicate.

8.4.1.1 The relative percent difference between spiked matrix duplicate determinations is to be calculated as follows:

$$RPD = \frac{|D_1 - D_2|}{(|D_1 + D_2|)/2} \times 100$$

where:

RPD = relative percent difference.
D_1 = first sample value.
D_2 = second sample value (replicate).

(A control limit of ± 20% RPD or within the documented historical acceptance limits for each matrix shall be used for sample values greater than ten times the instrument detection limit.)

8.4.1.2 The spiked sample or spiked duplicate sample recovery is to be within ± 25% of the actual value or within the documented historical acceptance limits for each matrix.

8.5 It is recommended that whenever a new or unusual sample matrix is encountered, a series of tests be performed prior to reporting concentration data for analyte elements. These tests, as outlined in Sections 8.5.1 and 8.5.2, will ensure that neither positive nor negative interferences are operating on any of the analyte elements to distort the accuracy of the reported values.

8.5.1 Dilution Test: If the analyte concentration is sufficiently high (minimally, a factor of 10 above the instrumental detection limit after dilution), an analysis of a 1:5 dilution should agree within ± 10% of the original determination. If not, a chemical or physical interference effect should be suspected.

8.5.2 Post Digestion Spike Addition: An analyte spike added to a portion of a prepared sample, or its dilution, should be recovered to within 75% to 125% of the known value. The spike addition should produce a minimum level of 10 times and a maximum of 100 times the instrumental detection limit. If the spike is not recovered within the specified limits, a matrix effect should be suspected.

CAUTION: If spectral overlap is suspected, use of computerized compensation, an alternate wavelength, or comparison with an alternate method is recommended.

8.6 Check the instrument standardization by analyzing appropriate QC samples as follows.

8.6.1 Verify calibration with the Continuing Calibration Verification (CCV) Standard immediately following daily calibration, after every ten samples, and at the end of an analytical run. Check calibration with an ICV following the initial calibration (Section 5.6). At the laboratory's discretion, an ICV may be used in lieu of the continuing calibration verifications. If used in this manner, the ICV should be at a concentration near the mid-point of the calibration curve. Use a calibration blank (Section 5.5.1) immediately following daily calibration, after every 10 samples and at the end of the analytical run.

8.6.1.1 The results of the ICV and CCVs are to agree within 10% of the expected value; if not, terminate the analysis, correct the problem, and recalibrate the instrument.

8.6.1.2 The results of the check standard are to agree within 10% of the expected value; if not, terminate the analysis, correct the problem, and recalibrate the instrument.

8.6.1.3 The results of the calibration blank are to agree within three times the IDL. If not, repeat the analysis two more times and average the results. If the average is not within three standard deviations of the background mean, terminate the analysis, correct the problem, recalibrate, and reanalyze the previous 10 samples. If the blank is less than 1/10 the concentration of the action level of interest, and no sample is within ten percent of the action limit, analyses need not be rerun and recalibration need not be performed before continuation of the run.

8.6.2 Verify the interelement and background correction factors at the beginning of each analytical run. Do this by analyzing the interference check sample (Section 5.8). Results should be within ± 20% of the true value.

9.0 METHOD PERFORMANCE

9.1 In an EPA round-robin Phase 1 study, seven laboratories applied the ICP technique to acid-distilled water matrices that had been spiked with various metal concentrates. Table 4 lists the true values, the mean reported values, and the mean percent relative standard deviations.

9.2 Performance data for aqueous solutions and solid samples from a multilaboratory study (9) are provided in Tables 5 and 6.

10.0 REFERENCES

1. Boumans, P.W.J.M. Line Coincidence Tables for Inductively Coupled Plasma Atomic Emission Spectrometry, 2nd Edition. Pergamon Press, Oxford, United Kingdom, 1984.

2. Sampling and Analysis Methods for Hazardous Waste Combustion; U.S. Environmental Protection Agency; Air and Energy Engineering Research Laboratory, Office of Research and Development: Research Triangle Park, NC, 1984; Prepared by Arthur D. Little, Inc.

3. Rohrbough, W.G.; et al. Reagent Chemicals, American Chemical Society Specifications, 7th ed.; American Chemical Society: Washington, DC, 1986.

4. 1985 Annual Book of ASTM Standards, Vol. 11.01; "Standard Specification for Reagent Water"; ASTM: Philadelphia, PA, 1985; D1193-77.

5. Jones, C.L. et al. An Interlaboratory Study of Inductively Coupled Plasma Atomic Emission Spectroscopy Method 6010 and Digestion Method 3050. EPA-600/4-87-032, U.S. Environmental Protection Agency, Las Vegas, Nevada, 1987.

TABLE 1
RECOMMENDED WAVELENGTHS AND ESTIMATED INSTRUMENTAL DETECTION LIMITS

Detection Element	Wavelength[a] (nm)	Estimated IDL[b] (µg/L)
Aluminum	308.215	30
Antimony	206.833	21
Arsenic	193.696	35
Barium	455.403	0.87
Beryllium	313.042	0.18
Boron	249.678x2	3.8
Cadmium	226.502	2.3
Calcium	317.933	6.7
Chromium	267.716	4.7
Cobalt	228.616	4.7
Copper	324.754	3.6
Iron	259.940	4.1
Lead	220.353	28
Lithium	670.784	2.8
Magnesium	279.079	20
Manganese	257.610	0.93
Mercury	194.227x2	17
Molybdenum	202.030	5.3
Nickel	231.604x2	10
Phosphorus	213.618	51
Potassium	766.491	See note c
Selenium	196.026	50
Silica (SiO_2)	251.611	17
Silver	328.068	4.7
Sodium	588.995	19
Strontium	407.771	0.28
Thallium	190.864	27
Tin	189.980x2	17
Titanium	334.941	5.0
Vanadium	292.402	5.0
Zinc	213.856x2	1.2

[a]The wavelengths listed (where x2 indicates second order) are recommended because of their sensitivity and overall acceptance. Other wavelengths may be substituted (e.g., in the case of an interference) if they can provide the needed sensitivity and are treated with the same corrective techniques for spectral interference (see Section 3.1). In time, other elements may be added as more information becomes available and as required.

[b]The estimated instrumental detection limits shown are provided as a guide for an instrumental limit. The actual method detection limits are sample dependent and may vary as the sample matrix varies.

[c]Highly dependent on operating conditions and plasma position.

TABLE 2
POTENTIAL INTERFERENCES
ANALYTE CONCENTRATION EQUIVALENTS ARISING FROM
INTERFERENCE AT THE 100-mg/L LEVEL[c]

Analyte	Wavelength (nm)	Interferant[a,b] Al	Ca	Cr	Cu	Fe	Mg	Mn	Ni	Ti	V
Aluminum	308.215	--	--	--	--	--	--	0.21	--	--	1.4
Antimony	206.833	0.47	--	2.9	--	0.08	--	--	--	0.25	0.45
Arsenic	193.696	1.3	--	0.44	--	--	--	--	--	--	1.1
Barium	455.403	--	--	--	--	--	--	--	--	--	--
Beryllium	313.042	--	--	--	--	--	--	--	--	0.04	0.05
Cadmium	226.502	--	--	--	--	0.03	--	--	0.02	--	--
Calcium	317.933	--	--	0.08	--	0.01	0.01	0.04	--	0.03	0.03
Chromium	267.716	--	--	--	--	0.003	--	0.04	--	--	0.04
Cobalt	228.616	--	--	0.03	--	0.005	--	--	0.03	0.15	--
Copper	324.754	--	--	--	--	0.003	--	--	--	0.05	0.02
Iron	259.940	--	--	--	--	--	--	0.12	--	--	--
Lead	220.353	0.17	--	--	--	--	--	--	--	--	--
Magnesium	279.079	--	0.02	0.11	--	0.13	--	0.25	--	0.07	0.12
Manganese	257.610	0.005	--	0.01	--	0.002	0.002	--	--	--	--
Molybdenum	202.030	0.05	--	--	--	0.03	--	--	--	--	--
Nickel	231.604	--	--	--	--	--	--	--	--	--	--
Selenium	196.026	0.23	--	--	--	0.09	--	--	--	--	--
Sodium	588.995	--	--	--	--	--	--	--	--	0.08	--
Thallium	190.864	0.30	--	--	--	--	--	--	--	--	--
Vanadium	292.402	--	--	0.05	--	0.005	--	--	--	0.02	--
Zinc	213.856	--	--	--	0.14	--	--	--	0.29	--	--

[a] Dashes indicate that no interference was observed even when interferents were introduced at the following levels:

Al -	1000 mg/L	Mg -	1000 mg/L
Ca -	1000 mg/L	Mn -	200 mg/L
Cr -	200 mg/L	Tl -	200 mg/L
Cu -	200 mg/L	V -	200 mg/L
Fe -	1000 mg/L		

[b] The figures recorded as analyte concentrations are not the actual observed concentrations; to obtain those figures, add the listed concentration to the interferant figure.

[c] Interferences will be affected by background choice and other interferences may be present.

TABLE 3
MIXED STANDARD SOLUTIONS

Solution	Elements
I	Be, Cd, Mn, Pb, Se and Zn
II	Ba, Co, Cu, Fe, and V
III	As, Mo
IV	Al, Ca, Cr, K, Na, Ni,Li, and Sr
V	Ag (see "NOTE" to Section 5.4), Mg, Sb, and Tl
VI	P

TABLE 4. ICP PRECISION AND ACCURACY DATA[a]

Element	Sample No. 1				Sample No. 2				Sample No. 3			
	True Conc. (ug/L)	Mean Conc. (ug/L)	RSD[b] (%)	Accuracy[d] (%)	True Conc. (ug/L)	Mean Conc. (ug/L)	RSD[b]	Accuracy[d] (%)	True Conc. (ug/L)	Mean Conc. (ug/L)	RSD[b] (%)	Accuracy[d] (%)
Be	750	733	6.2	98	20	20	9.8	100	180	176	5.2	98
Mn	350	345	2.7	99	15	15	6.7	100	100	99	3.3	99
V	750	749	1.8	100	70	69	2.9	99	170	169	1.1	99
As	200	208	7.5	104	22	19	23	86	60	63	17	105
Cr	150	149	3.8	99	10	10	18	100	50	50	3.3	100
Cu	250	235	5.1	94	11	11	40	100	70	67	7.9	96
Fe	600	594	3.0	99	20	19	15	95	180	178	6.0	99
Al	700	696	5.6	99	60	62	33	103	160	161	13	101
Cd	50	48	12	96	2.5	2.9	16	116	14	13	16	93
Co	700	512	10	73	20	20	4.1	100	120	108	21	90
Ni	250	245	5.8	98	30	28	11	93	60	55	14	92
Pb	250	236	16	94	24	30	32	125	80	80	14	100
Zn	200	201	5.6	100	16	19	45	119	80	82	9.4	102
Se[c]	40	32	21.9	80	6	8.5	42	142	10	8.5	8.3	85

[a] Not all elements were analyzed by all laboratories.
[b] RSD = relative standard deviation.
[c] Results for Se are from two laboratories.
[d] Accuracy is expressed as the mean concentration divided by the true concentration times 100.

TABLE 5

ICP-AES PRECISION AND ACCURACY FOR AQUEOUS SOLUTIONS[a]

Element	Mean Conc. (mg/L)	N[b]	RSD[b] (%)	Accuracy[c] (%)
Al	14.8	8	6.3	100
Sb	15.1	8	7.7	102
As	14.7	7	6.4	99
Ba	3.66	7	3.1	99
Be	3.78	8	5.8	102
Cd	3.61	8	7.0	97
Ca	15.0	8	7.4	101
Cr	3.75	8	8.2	101
Co	3.52	8	5.9	95
Cu	3.58	8	5.6	97
Fe	14.8	8	5.9	100
Pb	14.4	7	5.9	97
Mg	14.1	8	6.5	96
Mn	3.70	8	4.3	100
Mo	3.70	8	6.9	100
Ni	3.70	7	5.7	100
K	14.1	8	6.6	95
Se	15.3	8	7.5	104
Ag	3.69	6	9.1	100
Na	14.0	8	4.2	95
Tl	15.1	7	8.5	102
V	3.51	8	6.6	95
Zn	3.57	8	8.3	96

[a]these performance values are independent of sample preparation because the labs analyzed portions of the same solutions

[b]N = Number of measurements for mean and relative standard deviation (RSD).

[c]Accuracy is expressed as a percentage of the nominal value for each analyte in acidified, multi-element solutions.

TABLE 6

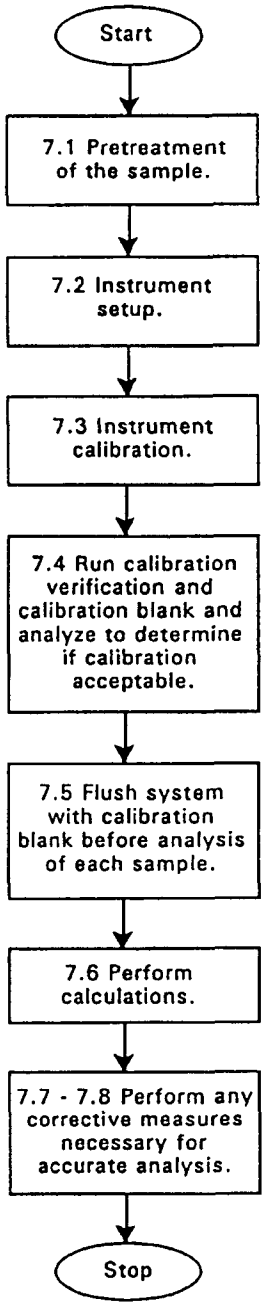
ICP-AES PRECISION AND BIAS FOR SOLID WASTE DIGESTS[a]

Element	Spiked Coal Fly Ash (NIST-SRM 1633a) Mean Conc. (mg/L)	N[b]	RSD[b] (%)	Bias[c] (%AAS)	Spiked Electroplating Sludge Mean Conc. (mg/L)	N[b]	RSD[b] (%)	Bias[c] (%AAS)
Al	330	8	16	104	127	8	13	110
Sb	3.4	6	73	96	5.3	7	24	120
As	21	8	83	270	5.2	7	8.6	87
Ba	133	8	8.7	101	1.6	8	20	58
Be	4.0	8	57	460	0.9	7	9.9	110
Cd	0.97	6	5.7	101	2.9	7	9.9	90
Ca	87	6	5.6	208	954	7	7.0	97
Cr	2.1	7	36	106	154	7	7.8	93
Co	1.2	6	21	94	1.0	7	11	85
Cu	1.9	6	9.7	118	156	8	7.8	97
Fe	602	8	8.8	102	603	7	5.6	98
Pb	4.6	7	22	94	25	7	5.6	98
Mg	15	8	15	110	35	8	20	84
Mn	1.8	7	14	104	5.9	7	9.6	95
Mo	891	8	19	105	1.4	7	36	110
Ni	1.6	6	8.1	91	9.5	7	9.6	90
K	46	8	4.2	98	51	8	5.8	82
Se	6.4	5	16	73	8.7	7	13	101
Ag	1.4	3	17	140	0.75	7	19	270
Na	20	8	49	130	1380	8	9.8	95
Tl	6.7	4	22	260	5.0	7	20	180
V	1010	5	7.5	100	1.2	6	11	80
Zn	2.2	6	7.6	93	266	7	2.5	101

[a]These performance values are independent of sample preparation because the labs analyzed portions of the same digests.

[b]N = Number of measurements for mean and relative standard deviation (RSD).

[c]Bias for the ICP-AES data is expressed as a percentage of atomic absorption spectroscopy (AA) data for the same digests.


Start
7.1 Pretreatment of the sample.
7.2 Instrument setup.
7.3 Instrument calibration.
7.4 Run calibration verification and calibration blank and analyze to determine if calibration acceptable.
7.5 Flush system with calibration blank before analysis of each sample.
7.6 Perform calculations.
7.7 - 7.8 Perform any corrective measures necessary for accurate analysis.
Stop

METHOD 7000A

ATOMIC ABSORPTION METHODS

1.0 SCOPE AND APPLICATION

1.1 Metals in solution may be readily determined by atomic absorptio n spectroscopy. The method is simple, rapid, and applicable to a large number of metals in drinking, surface, and saline waters and domestic and industria l wastes. While drinking water free of particulate matter may be analyzed directly , ground water, other aqueous samples, EP extracts, industrial wastes, soils , sludges, sediments, and other solid wastes require digestion prior to analysis for both total and acid leachable metals. Analysi s for dissolved elements does not require digestion if the sample has been filtered and acidified.

1.2 Detection limits, sensitivity, and optimum ranges of the metals wil l vary with the matrices and models of atomic absorption spectrophotometers. The data shown in Table 1 provide some indication of the detection limits obtainabl e by direct aspiration and by furnace techniques. For clean aqueous samples, the detection limits shown in the table by direct aspiration may be extended downwar d with scale expansion and upward by using a less sensitive wavelength or b y rotating the burner head. Detection limits by direct aspiration may also b e extended through concentration of the sample and/or through solvent extraction techniques. For certain samples, lower concentrations may also be determine d using the furnace techniques. The detection limits given in Table 1 are somewha t dependent on equipment (such as the type of spectrophotometer and furnac e accessory, the energy source, the degree of electrical expansion of the output signal), and are greatly dependent on sample matrix. Detection limits should b e established, empirically, for each matrix type analyzed. When using furnac e techniques, however, the analyst should be cautioned as to possible chemica l reactions occurring at elevated temperatures which may result in eithe r suppression or enhancement of the analysis element. To ensure valid data wit h furnace techniques, the analyst must examine each matrix for interference effect s (see Step 3.2.1) and, if detected, treat them accordingly, using eithe r successive dilution, matrix modification, or method of standard additions (see Step 8.7).

1.3 Where direct-aspiration atomic absorption techniqu es do not provide adequate sensitivity, reference is made to specialized procedures (in addition to the furnace procedure) such as the gaseous-hydride method for arsenic an d selenium and the cold-vapor technique for mercury.

2.0 SUMMARY OF METHOD

2.1 Although methods have been reported for the analysis of solids b y atomic absorption spectroscopy, the technique gene rally is limited to metals in solution or solubilized through some form of sample processing.

2.2 Preliminary treatment of waste water, ground water, EP extracts, an d industrial waste is always necessary because of the complexity and variability of sample matrix. Solids, slurries, and suspended material must be subjected to

a solubilization process before analysis. This process may vary because of the metals to be determined and the nature of the samp le being analyzed. Solubilization and digestion procedures are presented in Step 3.2 (Sample Preparatio n Methods).

2.3 In direct-aspiration atomic absorption spectroscopy, a sample i s aspirated and atomized in a flame. A light beam from a hollow cathode lamp or a n electrodeless discharge lamp is directed through the flame into a monochromator , and onto a detector that measures the amount of absorbed light. Absorptio n depends upon the presence of free unexcited ground-state atoms in the flame . Because the wavelength of the light beam is characteristic of only the meta l being determined, the light energy absorbed by the flame is a measure of th e concentration of that metal in the sample. This principle is the basis of atomi c absorption spectroscopy.

2.4 When using the furnace technique in conjunction with an atomi c absorption spectrophotometer, a representative ali quot of a sample is placed in the graphite tube in the furnace, evaporated to dr yness, charred, and atomized. As a greater percentage of available analyte atoms is vaporized and dissociated for absorption in the tube rather than the flame, the use of smaller sampl e volumes or detection of lower concentrations of elements is possible. Th e principle is essentially the same as with direct aspiration atomic absorption, except that a furnace, rather than a flame, is used to atomize the sample . Radiation from a given excited element is passed through the vapor containin g ground-state atoms of that element. The intensity of the transmitted radiation decreases in proportion to the amount of the groun d-state element in the vapor. The metal atoms to be measured are placed in the beam of radiation by increasin g the temperature of the furnace, thereby causing the injected specimen to b e volatilized. A monochromator isolates the characteristic radiation from th e hollow cathode lamp or electrodeless discharge lamp, and a photosensitive devic e measures the attenuated transmitted radiation.

3.0 INTERFERENCES

3.1 Direct aspiration

3.1.1 The most troublesome type of interference in atomi c absorption spectrophotometry is usually termed "chemical" and is caused b y lack of absorption of atoms bound in molecular combination in the flame. This phenomenon can occur when the flame is not sufficiently hot t o dissociate the molecule, as in the case of phosphate interference wit h magnesium, or when the dissociated atom is immediately oxidized to a compound that will not dissociate further at the temperature of the flame . The addition of lanthanum will overcome phosphate interference i n magnesium, calcium, and barium determinations. Similarly, silic a interference in the determination of manganese can be eliminated by th e addition of calcium.

3.1.2 Chemical interferences may also be elimina ted by separating the metal from the interfering material. Although complexing agents ar e employed primarily to increase the sensitivity of the analysis, they may also be used to eliminate or reduce interferences.

3.1.3 The presence of high dissolved solids in the sample may result in an interference from nonatomic absorbance such as light scattering. If background correction is not available, a nonabsorbing wavelength should be checked. Preferably, samples containing high solids should be extracted.

3.1.4 Ionization interferences occur when the flame temperature is sufficiently high to generate the removal of an electron from a neutral atom, giving a positively charged ion. This type of interference can generally be controlled by the addition, to both standard and sample solutions, of a large excess (1,000 mg/L) of an easily ionized element such as K, Na, Li or Cs.

3.1.5 Spectral interference can occur when an absorbing wavelength of an element present in the sample but not being determined falls within the width of the absorption line of the element of interest. The results of the determination will then be erroneously high, due to the contribution of the interfering element to the atomic absorption signal. Interference can also occur when resonant energy from another element in a multielement lamp, or from a metal impurity in the lamp cathode, falls within the bandpass of the slit setting when that other metal is present in the sample. This type of interference may sometimes be reduced by narrowing the slit width.

3.1.6 Samples and standards should be monitored for viscosity differences that may alter the aspiration rate.

3.1.7 All metals are not equally stable in the digestate, especially if it contains only nitric acid, not nitric acid and hydrochloric acid. The digestate should be analyzed as soon as possible, with preference given to Sn, Sb, Mo, Ba, and Ag.

3.2 Furnace procedure

3.2.1 Although the problem of oxide formation is greatly reduced with furnace procedures because atomization occurs in an inert atmosphere, the technique is still subject to chemical interferences. The composition of the sample matrix can have a major effect on the analysis. It is those effects which must be determined and taken into consideration in the analysis of each different matrix encountered. To help verify the absence of matrix or chemical interference, the serial dilution technique (see Step 8.6) may be used. Those samples which indicate the presence of interference should be treated in one or more of the following ways:

1. Successively dilute and reanalyze the samples to eliminate interferences.

2. Modify the sample matrix either to remove interferences or to stabilize the analyte. Examples are the addition of ammonium nitrate to remove alkali chlorides and the addition of ammonium phosphate to retain cadmium. The mixing of hydrogen with the inert purge gas has also been used to suppress chemical interference. The hydrogen acts as a reducing agent and aids in molecular dissociation.

3. Analyze the sample by method of standard additions whil e noticing the precautions and limitations of its us e (see Step 8.7.2).

3.2.2 Gases generated in the furnace during atomization may have molecular absorption bands encompassing the analytical wavelength. Whe n this occurs, use either background correction or choose an alternat e wavelength. Background correction may also compensate for nonspecifi c broad-band absorption interference.

3.2.3 Continuum background correction cannot correct for all type s of background interference. When the background interference cannot b e compensated for, chemically remove the analyte or use an alternate form o f background correction, e.g., Zeeman background correction.

3.2.4 Interference from a smoke-producing sample matrix ca n sometimes be reduced by extending the charring time at a highe r temperature or utilizing an ashing cycle in the presence of air. Car e must be taken, however, to prevent loss of the analyte.

3.2.5 Samples containing large amounts of organic materials shoul d be oxidized by conventional acid digestion before being placed in th e furnace. In this way, broad-band absorption will be minimized.

3.2.6 Anion interference studies in the graphite furnace indicate that, under conditions other than isothermal, the nitrate anion i s preferred. Therefore, nitric acid is preferable for any digestion o r solubilization step. If another acid in addition to nitric acid i s required, a minimum amount should be used. This applies particularly t o hydrochloric and, to a lesser extent, to sulfuric and phosphoric acids.

3.2.7 Carbide formation resulting from the chemical environment o f the furnace has been observed. Molybdenum may be cited as an example. Whe n carbides form, the metal is released very slowly f rom the resulting metal carbide as atomization continues. Molybdenum may require 30 seconds o r more atomization time before the signal returns to baseline levels . Carbide formation is greatly reduced and the sensitivity increased wit h the use of pyrolytically coated graphite. Elements that readily for m carbides are noted with the symbol (p) in Table 1.

3.2.8 For comments on spectral interference, see Step 3.1.5.

3.2.9 Cross-contamination and contamination of the sample can be major sources of error because of the extreme sens itivities achieved with the furnace. The sample preparation work area shou ld be kept scrupulously clean. All glassware should be cleaned as directed in Step 4.8. Pipe t tips are a frequent source of contamination. If su spected, they should be acid soaked with 1:5 nitric acid and rinsed thoroughly with tap an d reagent water. The use of a better grade of pipet tip can greatly reduce this problem. Special attention should be given to reagent blanks in both analysis and in the correction of analytical results. Lastly, pyrolyti c graphite, because of the production process and handling, can becom e contaminated. As many as five to ten high-temperature burns may b e required to clean the tube before use.

4.0 APPARATUS AND MATERIALS

4.1 Atomic absorption spectrophotometer - Single- or dual-channel, single- or double-beam instrument having a grating monochromator, photomultiplier detector, adjustable slits, a wavelength range of 190 to 800 nm, and provisions for interfacing with a graphical display.

4.2 Burner - The burner recommended by the particular instrument manufacturer should be used. For certain elements the nitrous oxide burner is required.

4.3 Hollow cathode lamps - Single-element lamps are preferred but multielement lamps may be used. Electrodeless discharge lamps may also be used when available. Other types of lamps meeting the performance criteria of this method may be used.

4.4 Graphite furnace - Any furnace device capable of reaching the specified temperatures is satisfactory.

4.5 Graphical display and recorder - A recorder is recommended for furnace work so that there will be a permanent record and that any problems with the analysis such as drift, incomplete atomization, losses during charring, changes in sensitivity, peak shape, etc., can be easily recognized.

4.6 Pipets - Microliter, with disposable tips. Sizes can range from 5 to 100 uL as required. Pipet tips should be checked as a possible source of contamination prior to their use. The accuracy of automatic pipets must be verified daily. Class A pipets can be used for the measurement of volumes larger than 1 mL.

4.7 Pressure-reducing valves - The supplies of fuel and oxidant should be maintained at pressures somewhat higher than the controlled operating pressure of the instrument by suitable valves.

4.8 Glassware - All glassware, polypropylene, or Teflon containers, including sample bottles, flasks and pipets, should be washed in the following sequence: detergent, tap water, 1:1 nitric acid, tap water, 1:1 hydrochloric acid, tap water, and reagent water. (Chromic acid should not be used as a cleaning agent for glassware if chromium is to be included in the analytical scheme.) If it can be documented through an active analytical quality control program using spiked samples and reagent blanks that certain steps in the cleaning procedure are not required for routine samples, those steps may be eliminated from the procedure.

5.0 REAGENTS

5.1 Reagent grade chemicals shall be used in all tests. Unless otherwise indicated, it is intended that all reagents shall conform to the specifications of the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available. Other grades may be used, provided it is first

ascertained that the reagent is of sufficiently high purity to permit its use without lessening the accuracy of the determination. All reagents should be analyzed to provide proof that all constituents are below the MDLs.

5.2 Reagent water. All references to water in this method refer to reagent water unless otherwise specified. Reagent grade water will be of at least 16 Mega Ohm quality.

5.3 Nitric acid (concentrated), HNO_3. Use a spectrograde acid certified for AA use. Prepare a 1:1 dilution with water by adding the concentrated acid to an equal volume of water. If the reagent blank is less than the IDL, the acid may be used.

5.4 Hydrochloric acid (1:1), HCl. Use a spectrograde acid certified for AA use. Prepare a 1:1 dilution with water by adding the concentrated acid to an equal volume of water. If the reagent blank is less than the IDL, the acid may be used.

5.5 Fuel and oxidant - High purity acetylene is generally acceptable. Air may be supplied from a compressed air line, a laboratory compressor, or a cylinder of compressed air and should be clean and dry. Nitrous oxide is also required for certain determinations. Standard, commercially available argon and nitrogen are required for furnace work.

5.6 Stock standard metal solutions - Stock standard solutions are prepared from high purity metals, oxides, or nonhygroscopic salts using water and redistilled nitric or hydrochloric acids. (See individual methods for specific instructions.) Sulfuric or phosphoric acids should be avoided as they produce an adverse effect on many elements. The stock solutions are prepared at concentrations of 1,000 mg of the metal per liter. Commercially available standard solutions may also be used. Where the sample viscosity, surface tension, and components cannot be accurately matched with standards, the method of standard addition (MSA) may be used (see Step 8.7).

5.7 Calibration standards - For those instruments which do not read out directly in concentration, a calibration curve is prepared to cover the appropriate concentration range. Usually, this means the preparation of standards which produce an absorbance of 0.0 to 0.7. Calibration standards are prepared by diluting the stock metal solutions at the time of analysis. For best results, calibration standards should be prepared fresh each time a batch of samples is analyzed. Prepare a blank and at least three calibration standards in graduated amounts in the appropriate range of the linear part of the curve. The calibration standards should be prepared using the same type of acid or combination of acids and at the same concentration as will result in the samples following processing. Beginning with the blank and working toward the highest standard, aspirate the solutions and record the readings. Repeat the operation with both the calibration standards and the samples a sufficient number of times to secure a reliable average reading for each solution. Calibration standards for furnace procedures should be prepared as described on the individual sheets for that metal. Calibration curves are always required.

6.0 SAMPLE COLLECTION, PRESERVATION, AND HANDLING

6.1 See the introductory material in Chapter Three, Metallic Analytes.

7.0 PROCEDURE

7.1 Preliminary treatment of waste water, ground water, EP extracts, and industrial waste is always necessary because of the complexity and variability of sample matrices. Solids, slurries, and suspended material must be subjected to a solubilization process before analysis. This process may vary because of the metals to be determined and the nature of the sample being analyzed. Solubilization and digestion procedures are presented in Chapter Three, Step 3.2, Sample Preparation Methods. Samples which are to be analyzed for dissolved constituents need not be digested if they have been filtered and acidified.

7.2 Direct aspiration (flame) procedure

7.2.1 Differences between the various makes and models of satisfactory atomic absorption spectrophotometers prevent the formulation of detailed instructions applicable to every instrument. The analyst should follow the manufacturer's operating instructions for a particular instrument. In general, after choosing the proper lamp for the analysis, allow the lamp to warm up for a minimum of 15 minutes, unless operated in a double-beam mode. During this period, align the instrument, position the monochromator at the correct wavelength, select the proper monochromator slit width, and adjust the current according to the manufacturer's recommendation. Subsequently, light the flame and regulate the flow of fuel and oxidant. Adjust the burner and nebulizer flow rate for maximum percent absorption and stability. Balance the photometer. Run a series of standards of the element under analysis. Construct a calibration curve by plotting the concentrations of the standards against absorbances. Set the curve corrector of a direct reading instrument to read out the proper concentration. Aspirate the samples and determine the concentrations either directly or from the calibration curve. Standards must be run each time a sample or series of samples is run.

7.3 Furnace procedure

7.3.1 Furnace devices (flameless atomization) are a most useful means of extending detection limits. Because of differences between various makes and models of satisfactory instruments, no detailed operating instructions can be given for each instrument. Instead, the analyst should follow the instructions provided by the manufacturer of a particular instrument.

7.3.2 Background correction is important when using flameless atomization, especially below 350 nm. Certain samples, when atomized, may absorb or scatter light from the lamp. This can be caused by the presence of gaseous molecular species, salt particles, or smoke in the sample beam. If no correction is made, sample absorbance will be greater than it should be, and the analytical result will be erroneously high. Zeeman background correction is effective in overcoming composition or structured background

interferences. It is particularly useful when analyzing for As in the presence of Al and when analyzing for Se in the presence of Fe.

7.3.3 Memory effects occur when the analyte is not totally volatilized during atomization. This condition depends on several factors: volatility of the element and its chemical form, whether pyrolytic graphite is used, the rate of atomization, and furnace design. This situation is detected through blank burns. The tube should be cleaned by operating the furnace at full power for the required time period, as needed, at regular intervals during the series of determinations.

7.3.4 Inject a measured microliter aliquot of sample into the furnace and atomize. If the concentration found is greater than the highest standard, the sample should be diluted in the same acid matrix and reanalyzed. The use of multiple injections can improve accuracy and help detect furnace pipetting errors.

7.3.5 To verify the absence of interference, follow the serial dilution procedure given in Step 8.6.

7.3.6 A check standard should be run after approximately every 10 sample injections. Standards are run in part to monitor the life and performance of the graphite tube. Lack of reproducibility or significant change in the signal for the standard indicates that the tube should be replaced. Tube life depends on sample matrix and atomization temperature. A conservative estimate would be that a tube will last at least 50 firings. A pyrolytic coating will extend that estimated life by a factor of three.

7.4 Calculation

7.4.1 For determination of metal concentration by direct aspiration and furnace: Read the metal value from the calibration curve or directly from the read-out system of the instrument.

7.4.2 If dilution of sample was required:

$$\text{ug/L metal in sample} = A \left(\frac{C + B}{C} \right)$$

where:

A = ug/L of metal in diluted aliquot from calibration curve.
B = Acid blank matrix used for dilution, mL.
C = Sample aliquot, mL.

7.4.3 For solid samples, report all concentrations in consistent units based on wet weight. Hence:

$$\text{ug metal/kg sample} = \frac{A \times V}{W}$$

where:

A = ug/L of metal in processed sample from calibration curve.
V = Final volume of the processed sample, mL.
W = Weight of sample, grams.

7.4.4 Different injection volumes must not be used for samples and standards. Instead, the sample should be diluted and the same size injection volume be used for both samples and standards. If dilution of the sample was required:

$$\text{ug/L of metal in sample} = Z \left(\frac{C + B}{C} \right)$$

where:

Z = ug/L of metal read from calibration curve or read- out system.
B = Acid blank matrix used for dilution mL.
C = Sample aliquot, mL.

8.0 QUALITY CONTROL

8.1 All quality control data should be maintained and available for easy reference or inspection.

8.2 A calibration curve must be prepared each day with a minimum of a calibration blank and three standards. After calib ration, the calibration curve must be verified by use of at least a calibration blank and a calibration check standard (made from a reference material or other independent standard material) at or near the mid-range. The calibration reference standard must be measure d within 10 % of it's true value for the curve to be considered valid.

8.3 If more than 10 samples per day are analyzed, the working standar d curve must be verified by measuring satisfactorily a mid-range standard o r reference standard after every 10 samples. This sa mple value must be within 20% of the true value, or the previous ten samples need to be reanalyzed.

8.4 At least one matrix spike and one matrix spike duplicate sample shal l be included in each analytical batch. A laboratory control sample shall also b e processed with each sample batch. Refer to Chapter One for more information.

8.5 Where the sample matrix is so complex that viscosity, surface tension , and components cannot be accurately matched with standards, the method o f standard addition (MSA) is recommended (see Section 8.7 below). Section 8. 6 provides tests to evaluate the need for using the MSA.

8.6 Interference tests

8.6.1 Dilution test - For each analytical batch select one typical sampl e for serial dilution to determine whether interferences are present. Th e concentration of the analyte should be at least 25 times the estimated detectio n limit. Determine the apparent concentration in the undiluted sample. Dilute the sample by a minimum of five fold (1+4) and reanaly ze. If all of the samples in the batch are below 10 times the detection limits, perform the spike recover y analysis described below. Agreement within 10% between the concentration for th e undiluted sample and five times the concentration for the diluted sampl e indicates the absence of interferences, and such samples may be analyzed without using the method of standard additions.

8.6.2 Recovery test - If results from the dilution test do not agree, a matrix interference may be suspected and a spiked sample should be analyzed to help confirm the finding from the dilution test. Withdraw another aliquot of th e test sample and add a known amount of analyte to b ring the concentration of the analyte to 2 to 5 times the original concentration. If all of the samples in th e batch have analyte concentrations below the detect ion limit, spike the selected sample at 20 times the detection limit. Analyze the spiked sample and calculat e the spike recovery. If the recovery is less than 85% or greater than 115%, the method of standard additions shall be used for all samples in the batch.

8.7 Method of standard additions - The standard addition techniqu e involves adding known amounts of standard to one or more aliquots of th e processed sample solution. This technique compensates for a sample constituent that enhances or depresses the analyte signal, thu s producing a different slope from that of the calibration standards. It will not correct for additiv e interferences which cause a baseline shift. The method of standard addition s shall be used for analysis of all EP extracts, on all analyses submitted as par t of a delisting petition, and whenever a new sample matrix is being analyzed.

8.7.1 The simplest version of this technique is the single-additio n method, in which two identical aliquots of the sample solution, each o f volume V_x, are taken. To the first (labeled A) is added a known volume V_s of a standard analyte solutio n of concentration C_s. To the second aliquot (labeled B) is added the same volume V_s of the solvent. The analytica l signals of A and B are measured and corrected for nonanalyte signals. The unknown sample concentration C_x is calculated:

$$C_x = \frac{S_B V_s C_s}{(S_A - S_B) V_x}$$

where S_A and S_B are the analytical signals (corrected for the blank) o f solutions A and B, respectively. V_s and C_s should be chosen so that S_A is roughly twice S_B on the average, avoiding excess dilution of the sample . If a separation or concentration step is used, the additions are best mad e first and carried through the entire procedure.

8.7.2 Improved results can be obtained by employing a series o f standard additions. To equal volumes of the sample are added a series of standard solutions containing different known quantities of the analyte, and all solutions are diluted to the same final volume. For example , addition 1 should be prepared so that the resulting concentration i s approximately 50 percent of the expected absorbance from the endogenou s analyte in the sample. Additions 2 and 3 should be prepared so that th e concentrations are approximately 100 and 150 percent of the expecte d endogenous sample absorbance. The absorbance of each solution i s determined and then plotted on the vertical axis of a graph, with th e concentrations of the known standards plotted on the horizontal axis. Whe n the resulting line is extrapolated to zero absorbance, the point o f interception of the abscissa is the endogenous concentration of th e analyte in the sample. The abscissa on the left of the ordinate is scaled

the same as on the right side, but in the opposite direction from th e ordinate. An example of a plot so obtained is shown in Figure 1. A linear regression program may be used to obtain the intercept concentration.

8.7.3 For the results of this MSA technique to be valid, th e following limitations must be taken into consideration:

1. The apparent concentrations from the calibration curve must be linear over the concentration range of concern. For the best results, the slope of the MSA plot should be nearly the same as the slope of the standard curve. If the slope i s significantly different (greater than 20%), cautio n should be exercised.

2. The effect of the interference should not vary as the ratio o f analyte concentration to sample matrix changes, and th e standard addition should respond in a similar manner as th e analyte.

3. The determination must be free of spectral interference an d corrected for nonspecific background interference.

8.8 All quality control measures described in Chapter One should b e followed.

9.0 METHOD PERFORMANCE

9.1 See individual methods.

10.0 REFERENCES

1. Methods for Chemical Analysis of Water and Wastes; U.S. Environmenta l Protection Agency. Office of Research and Developm ent. Environmental Monitoring and Support Laboratory. ORD Publication Offices of Center for Environmenta l Research Information: Cincinnati, OH, 1983; EPA-600/4-79-020.

2. Rohrbough, W.G.; et al. Reagent Chemicals, American Chemical Societ y Specifications, 7th ed.; American Chemical Society: Washington, DC, 1986.

3. 1985 Annual Book of ASTM Standards, Vol. 11.01; "Standard Specification fo r Reagent Water"; ASTM: Philadelphia, PA, 1985; D1193-77.

TABLE 1.
ATOMIC ABSORPTION CONCENTRATION RANGES

Metal	Direct Aspiration		Furnace Procedure [a,c]
	Detection Limit (mg/L)	Sensitivity (mg/L)	Detection Limit (ug/L)
Aluminum	0.1	1	--
Antimony	0.2	0.5	3
Arsenic[b]	0.002	--	1
Barium	0.1	0.4	2
Beryllium	0.005	0.025	0.2
Cadmium	0.005	0.025	0.1
Calcium	0.01	0.08	--
Chromium	0.05	0.25	1
Cobalt	0.05	0.2	1
Copper	0.02	0.1	1
Iron	0.03	0.12	1
Lead	0.1	0.5	1
Lithium	0.002	0.04	--
Magnesium	0.001	0.007	--
Manganese	0.01	0.05	0.2
Mercury[d]	0.0002	--	--
Molybdenum(p)	0.1	0.4	1
Nickel	0.04	0.15	--
Osmium	0.03	1	--
Potassium	0.01	0.04	--
Selenium[b]	0.002	--	2
Silver	0.01	0.06	0.2
Sodium	0.002	0.015	--
Strontium	0.03	0.15	--
Thallium	0.1	0.5	1
Tin	0.8	4	--
Vanadium(p)	0.2	0.8	4
Zinc	0.005	0.02	0.05

NOTE: The symbol (p) indicates the use of pyrolytic graphite wit h the furnace procedure.

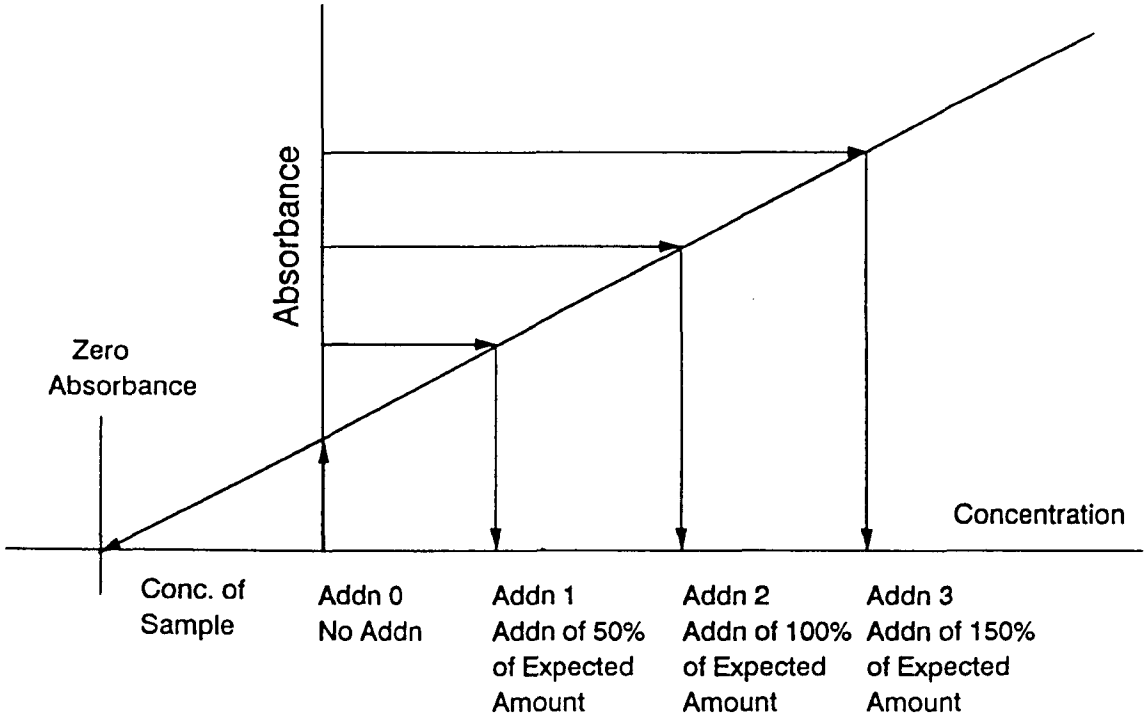
[a]For furnace sensitivity values, consult instrument operating manual.

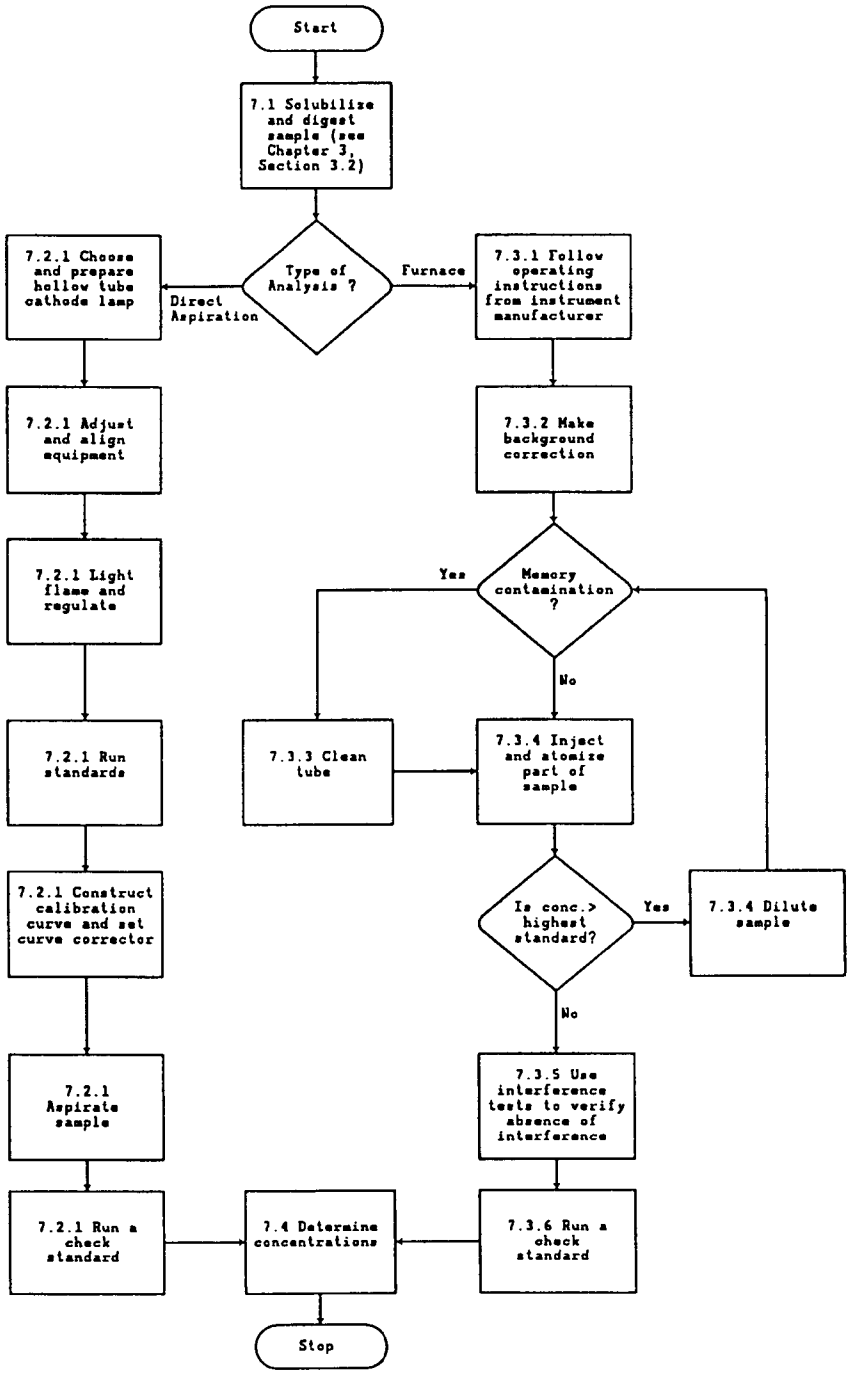
[b]Gaseous hydride method.

[c]The listed furnace values are those expected when using a 20-uL injection and normal gas flow, except in the cases of arsenic and selenium, where gas interrup t is used.

[d]Cold vapor technique.

FIGURE 1.
STANDARD ADDITION PLOT




Start
7.1 Solubilize and digest sample (see Chapter 3, Section 3.2)
Type of Analysis ?
Direct Aspiration
Furnace
7.2.1 Choose and prepare hollow tube cathode lamp
7.2.1 Adjust and align equipment
7.2.1 Light flame and regulate
7.2.1 Run standards
7.2.1 Construct calibration curve and set curve corrector
7.2.1 Aspirate sample
7.2.1 Run a check standard
7.3.1 Follow operating instructions from instrument manufacturer
7.3.2 Make background correction
Memory contamination ?
Yes
No
7.3.3 Clean tube
7.3.4 Inject and atomize part of sample
Is conc.> highest standard?
Yes
No
7.3.4 Dilute sample
7.3.5 Use interference tests to verify absence of interference
7.3.6 Run a check standard
7.4 Determine concentrations
Stop

METHOD 8270C

SEMIVOLATILE ORGANIC COMPOUNDS
BY GAS CHROMATOGRAPHY/MASS SPECTROMETRY (GC/MS)

1.0 SCOPE AND APPLICATION

1.1 Method 8270 is used to determine the concentration of semivolatile organic compounds in extracts prepared from many types of solid waste matrices, soils, air sampling media and water samples. Direct injection of a sample may be used in limited applications. The following compounds can be determined by this method:

		Appropriate Preparation Techniques[b]				
Compounds	CAS No[a]	3510	3520	3540/ 3541	3550	3580
Acenaphthene	83-32-9	X	X	X	X	X
Acenaphthene-d_{10} (IS)		X	X	X	X	X
Acenaphthylene	208-96-8	X	X	X	X	X
Acetophenone	98-86-2	X	ND	ND	ND	X
2-Acetylaminofluorene	53-96-3	X	ND	ND	ND	X
1-Acetyl-2-thiourea	591-08-2	LR	ND	ND	ND	LR
Aldrin	309-00-2	X	X	X	X	X
2-Aminoanthraquinone	117-79-3	X	ND	ND	ND	X
Aminoazobenzene	60-09-3	X	ND	ND	ND	X
4-Aminobiphenyl	92-67-1	X	ND	ND	ND	X
3-Amino-9-ethylcarbazole	132-32-1	X	X	ND	ND	ND
Anilazine	101-05-3	X	ND	ND	ND	X
Aniline	62-53-3	X	X	ND	X	X
o-Anisidine	90-04-0	X	ND	ND	ND	X
Anthracene	120-12-7	X	X	X	X	X
Aramite	140-57-8	HS(43)	ND	ND	ND	X
Aroclor 1016	12674-11-2	X	X	X	X	X
Aroclor 1221	11104-28-2	X	X	X	X	X
Aroclor 1232	11141-16-5	X	X	X	X	X
Aroclor 1242	53469-21-9	X	X	X	X	X
Aroclor 1248	12672-29-6	X	X	X	X	X
Aroclor 1254	11097-69-1	X	X	X	X	X
Aroclor 1260	11096-82-5	X	X	X	X	X
Azinphos-methyl	86-50-0	HS(62)	ND	ND	ND	X
Barban	101-27-9	LR	ND	ND	ND	LR
Benzidine	92-87-5	CP	CP	CP	CP	CP
Benzoic acid	65-85-0	X	X	ND	X	X
Benz(a)anthracene	56-55-3	X	X	X	X	X
Benzo(b)fluoranthene	205-99-2	X	X	X	X	X
Benzo(k)fluoranthene	207-08-9	X	X	X	X	X
Benzo(g,h,i)perylene	191-24-2	X	X	X	X	X
Benzo(a)pyrene	50-32-8	X	X	X	X	X

Compounds	CAS No[a]	Appropriate Preparation Techniques[b] 3510	3520	3540/ 3541	3550	3580
p-Benzoquinone	106-51-4	OE	ND	ND	ND	X
Benzyl alcohol	100-51-6	X	X	ND	X	X
α-BHC	319-84-6	X	X	X	X	X
β-BHC	319-85-7	X	X	X	X	X
δ-BHC	319-86-8	X	X	X	X	X
γ-BHC (Lindane)	58-89-9	X	X	X	X	X
Bis(2-chloroethoxy)methane	111-91-1	X	X	X	X	X
Bis(2-chloroethyl) ether	111-44-4	X	X	X	X	X
Bis(2-chloroisopropyl) ether	108-60-1	X	X	X	X	X
Bis(2-ethylhexyl) phthalate	117-81-7	X	X	X	X	X
4-Bromophenyl phenyl ether	101-55-3	X	X	X	X	X
Bromoxynil	1689-84-5	X	ND	ND	ND	X
Butyl benzyl phthalate	85-68-7	X	X	X	X	X
Captafol	2425-06-1	HS(55)	ND	ND	ND	X
Captan	133-06-2	HS(40)	ND	ND	ND	X
Carbaryl	63-25-2	X	ND	ND	ND	X
Carbofuran	1563-66-2	X	ND	ND	ND	X
Carbophenothion	786-19-6	X	ND	ND	ND	X
Chlordane (NOS)	57-74-9	X	X	X	X	X
Chlorfenvinphos	470-90-6	X	ND	ND	ND	X
4-Chloroaniline	106-47-8	X	ND	ND	ND	X
Chlorobenzilate	510-15-6	X	ND	ND	ND	X
5-Chloro-2-methylaniline	95-79-4	X	ND	ND	ND	X
4-Chloro-3-methylphenol	59-50-7	X	X	X	X	X
3-(Chloromethyl)pyridine hydrochloride	6959-48-4	X	ND	ND	ND	X
1-Chloronaphthalene	90-13-1	X	X	X	X	X
2-Chloronaphthalene	91-58-7	X	X	X	X	X
2-Chlorophenol	95-57-8	X	X	X	X	X
4-Chloro-1,2-phenylenediamine	95-83-0	X	X	ND	ND	ND
4-Chloro-1,3-phenylenediamine	5131-60-2	X	X	ND	ND	ND
4-Chlorophenyl phenyl ether	7005-72-3	X	X	X	X	X
Chrysene	218-01-9	X	X	X	X	X
Chrysene-d_{12} (IS)		X	X	X	X	X
Coumaphos	56-72-4	X	ND	ND	ND	X
p-Cresidine	120-71-8	X	ND	ND	ND	X
Crotoxyphos	7700-17-6	X	ND	ND	ND	X
2-Cyclohexyl-4,6-dinitro-phenol	131-89-5	X	ND	ND	ND	LR
4,4'-DDD	72-54-8	X	X	X	X	X
4,4'-DDE	72-55-9	X	X	X	X	X
4,4'-DDT	50-29-3	X	X	X	X	X
Demeton-O	298-03-3	HS(68)	ND	ND	ND	X
Demeton-S	126-75-0	X	ND	ND	ND	X
Diallate (cis or trans)	2303-16-4	X	ND	ND	ND	X

Compounds	CAS No[a]	Appropriate Preparation Techniques[b] 3510	3520	3540/ 3541	3550	3580
2,4-Diaminotoluene	95-80-7	DC,0E(42)	ND	ND	ND	X
Dibenz(a,j)acridine	224-42-0	X	ND	ND	ND	X
Dibenz(a,h)anthracene	53-70-3	X	X	X	X	X
Dibenzofuran	132-64-9	X	X	ND	X	X
Dibenzo(a,e)pyrene	192-65-4	ND	ND	ND	ND	X
1,2-Dibromo-3-chloropropane	96-12-8	X	X	ND	ND	ND
Di-n-butyl phthalate	84-74-2	X	X	X	X	X
Dichlone	117-80-6	OE	ND	ND	ND	X
1,2-Dichlorobenzene	95-50-1	X	X	X	X	X
1,3-Dichlorobenzene	541-73-1	X	X	X	X	X
1,4-Dichlorobenzene	106-46-7	X	X	X	X	X
1,4-Dichlorobenzene-d_4 (IS)		X	X	X	X	X
3,3'-Dichlorobenzidine	91-94-1	X	X	X	X	X
2,4-Dichlorophenol	120-83-2	X	X	X	X	X
2,6-Dichlorophenol	87-65-0	X	ND	ND	ND	X
Dichlorovos	62-73-7	X	ND	ND	ND	X
Dicrotophos	141-66-2	X	ND	ND	ND	X
Dieldrin	60-57-1	X	X	X	X	X
Diethyl phthalate	84-66-2	X	X	X	X	X
Diethylstilbestrol	56-53-1	AW,0S(67)	ND	ND	ND	X
Diethyl sulfate	64-67-5	LR	ND	ND	ND	LR
Dihydrosaffrole	56312-13-1	ND	ND	ND	ND	ND
Dimethoate	60-51-5	HE,HS(31)	ND	ND	ND	X
3,3'-Dimethoxybenzidine	119-90-4	X	ND	ND	ND	LR
Dimethylaminoazobenzene	60-11-7	X	ND	ND	ND	X
7,12-Dimethylbenz(a)-anthracene	57-97-6	CP(45)	ND	ND	ND	CP
3,3'-Dimethylbenzidine	119-93-7	X	ND	ND	ND	X
α,α-Dimethylphenethylamine	122-09-8	ND	ND	ND	ND	X
2,4-Dimethylphenol	105-67-9	X	X	X	X	X
Dimethyl phthalate	131-11-3	X	X	X	X	X
1,2-Dinitrobenzene	528-29-0	X	ND	ND	ND	X
1,3-Dinitrobenzene	99-65-0	X	ND	ND	ND	X
1,4-Dinitrobenzene	100-25-4	HE(14)	ND	ND	ND	X
4,6-Dinitro-2-methylphenol	534-52-1	X	X	X	X	X
2,4-Dinitrophenol	51-28-5	X	X	X	X	X
2,4-Dinitrotoluene	121-14-2	X	X	X	X	X
2,6-Dinitrotoluene	606-20-2	X	X	X	X	X
Dinocap	39300-45-3	CP,HS(28)	ND	ND	ND	CP
Dinoseb	88-85-7	X	ND	ND	ND	X
Dioxathion	78-34-2	ND	ND	ND	ND	ND
Diphenylamine	122-39-4	X	X	X	X	X
5,5-Diphenylhydantoin	57-41-0	X	ND	ND	ND	X
1,2-Diphenylhydrazine	122-66-7	X	X	X	X	X

Compounds	CAS No[a]	Appropriate Preparation Techniques[b] 3510	3520	3540/ 3541	3550	3580
Di-n-octyl phthalate	117-84-0	X	X	X	X	X
Disulfoton	298-04-4	X	ND	ND	ND	X
Endosulfan I	959-98-8	X	X	X	X	X
Endosulfan II	33213-65-9	X	X	X	X	X
Endosulfan sulfate	1031-07-8	X	X	X	X	X
Endrin	72-20-8	X	X	X	X	X
Endrin aldehyde	7421-93-4	X	X	X	X	X
Endrin ketone	53494-70-5	X	X	ND	X	X
EPN	2104-64-5	X	ND	ND	ND	X
Ethion	563-12-2	X	ND	ND	ND	X
Ethyl carbamate	51-79-6	DC(28)	ND	ND	ND	X
Ethyl methanesulfonate	62-50-0	X	ND	ND	ND	X
Famphur	52-85-7	X	ND	ND	ND	X
Fensulfothion	115-90-2	X	ND	ND	ND	X
Fenthion	55-38-9	X	ND	ND	ND	X
Fluchloralin	33245-39-5	X	ND	ND	ND	X
Fluoranthene	206-44-0	X	X	X	X	X
Fluorene	86-73-7	X	X	X	X	X
2-Fluorobiphenyl (surr)	321-60-8	X	X	X	X	X
2-Fluorophenol (surr)	367-12-4	X	X	X	X	X
Heptachlor	76-44-8	X	X	X	X	X
Heptachlor epoxide	1024-57-3	X	X	X	X	X
Hexachlorobenzene	118-74-1	X	X	X	X	X
Hexachlorobutadiene	87-68-3	X	X	X	X	X
Hexachlorocyclopentadiene	77-47-4	X	X	X	X	X
Hexachloroethane	67-72-1	X	X	X	X	X
Hexachlorophene	70-30-4	AW,CP(62)	ND	ND	ND	CP
Hexachloropropene	1888-71-7	X	ND	ND	ND	X
Hexamethylphosphoramide	680-31-9	X	ND	ND	ND	X
Hydroquinone	123-31-9	ND	ND	ND	ND	X
Indeno(1,2,3-cd)pyrene	193-39-5	X	X	X	X	X
Isodrin	465-73-6	X	ND	ND	ND	X
Isophorone	78-59-1	X	X	X	X	X
Isosafrole	120-58-1	DC(46)	ND	ND	ND	X
Kepone	143-50-0	X	ND	ND	ND	X
Leptophos	21609-90-5	X	ND	ND	ND	X
Malathion	121-75-5	HS(5)	ND	ND	ND	X
Maleic anhydride	108-31-6	HE	ND	ND	ND	X
Mestranol	72-33-3	X	ND	ND	ND	X
Methapyrilene	91-80-5	X	ND	ND	ND	X
Methoxychlor	72-43-5	X	ND	ND	ND	X
3-Methylcholanthrene	56-49-5	X	ND	ND	ND	X
4,4'-Methylenebis (2-chloroaniline)	101-14-4	OE,OS(0)	ND	ND	ND	LR

Compounds	CAS No[a]	Appropriate Preparation Techniques[b] 3510	3520	3540/ 3541	3550	3580
4,4'-Methylenebis (N,N-dimethylaniline)	101-61-1	X	X	ND	ND	ND
Methyl methanesulfonate	66-27-3	X	ND	ND	ND	X
2-Methylnaphthalene	91-57-6	X	X	ND	X	X
Methyl parathion	298-00-0	X	ND	ND	ND	X
2-Methylphenol	95-48-7	X	ND	ND	ND	X
3-Methylphenol	108-39-4	X	ND	ND	ND	X
4-Methylphenol	106-44-5	X	ND	ND	ND	X
Mevinphos	7786-34-7	X	ND	ND	ND	X
Mexacarbate	315-18-4	HE,HS(68)	ND	ND	ND	X
Mirex	2385-85-5	X	ND	ND	ND	X
Monocrotophos	6923-22-4	HE	ND	ND	ND	X
Naled	300-76-5	X	ND	ND	ND	X
Naphthalene	91-20-3	X	X	X	X	X
Naphthalene-d_8 (IS)		X	X	X	X	X
1,4-Naphthoquinone	130-15-4	X	ND	ND	ND	X
1-Naphthylamine	134-32-7	OS(44)	ND	ND	ND	X
2-Naphthylamine	91-59-8	X	ND	ND	ND	X
Nicotine	54-11-5	DE(67)	ND	ND	ND	X
5-Nitroacenaphthene	602-87-9	X	ND	ND	ND	X
2-Nitroaniline	88-74-4	X	X	ND	X	X
3-Nitroaniline	99-09-2	X	X	ND	X	X
4-Nitroaniline	100-01-6	X	X	ND	X	X
5-Nitro-o-anisidine	99-59-2	X	ND	ND	ND	X
Nitrobenzene	98-95-3	X	X	X	X	X
Nitrobenzene-d_5 (surr)		X	X	X	X	X
4-Nitrobiphenyl	92-93-3	X	ND	ND	ND	X
Nitrofen	1836-75-5	X	ND	ND	ND	X
2-Nitrophenol	88-75-5	X	X	X	X	X
4-Nitrophenol	100-02-7	X	X	X	X	X
5-Nitro-o-toluidine	99-55-8	X	X	ND	ND	X
Nitroquinoline-1-oxide	56-57-5	X	ND	ND	ND	X
N-Nitrosodi-n-butylamine	924-16-3	X	ND	ND	ND	X
N-Nitrosodiethylamine	55-18-5	X	ND	ND	ND	X
N-Nitrosodimethylamine	62-75-9	X	X	X	X	X
N-Nitrosomethylethylamine	10595-95-6	X	ND	ND	ND	X
N-Nitrosodiphenylamine	86-30-6	X	X	X	X	X
N-Nitrosodi-n-propylamine	621-64-7	X	X	X	X	X
N-Nitrosomorpholine	59-89-2	ND	ND	ND	ND	X
N-Nitrosopiperidine	100-75-4	X	ND	ND	ND	X
N-Nitrosopyrrolidine	930-55-2	X	ND	ND	ND	X
Octamethyl pyrophosphoramide	152-16-9	LR	ND	ND	ND	LR
4,4'-Oxydianiline	101-80-4	X	ND	ND	ND	X

Compounds	CAS No[a]	Appropriate Preparation Techniques[b] 3510	3520	3540/ 3541	3550	3580
Parathion	56-38-2	X	X	ND	ND	X
Pentachlorobenzene	608-93-5	X	ND	ND	ND	X
Pentachloronitrobenzene	82-68-8	X	ND	ND	ND	X
Pentachlorophenol	87-86-5	X	X	X	X	X
Perylene-d_{12} (IS)		X	X	X	X	X
Phenacetin	62-44-2	X	ND	ND	ND	X
Phenanthrene	85-01-8	X	X	X	X	X
Phenanthrene-d_{10} (IS)		X	X	X	X	X
Phenobarbital	50-06-6	X	ND	ND	ND	X
Phenol	108-95-2	DC(28)	X	X	X	X
Phenol-d_6 (surr)		DC(28)	X	X	X	X
1,4-Phenylenediamine	106-50-3	X	ND	ND	ND	X
Phorate	298-02-2	X	ND	ND	ND	X
Phosalone	2310-17-0	HS(65)	ND	ND	ND	X
Phosmet	732-11-6	HS(15)	ND	ND	ND	X
Phosphamidon	13171-21-6	HE(63)	ND	ND	ND	X
Phthalic anhydride	85-44-9	CP,HE(1)	ND	ND	ND	CP
2-Picoline (2-Methylpyridine)	109-06-8	X	X	ND	ND	ND
Piperonyl sulfoxide	120-62-7	X	ND	ND	ND	X
Pronamide	23950-58-5	X	ND	ND	ND	X
Propylthiouracil	51-52-5	LR	ND	ND	ND	LR
Pyrene	129-00-0	X	X	X	X	X
Pyridine	110-86-1	ND	ND	ND	ND	ND
Resorcinol	108-46-3	DC,OE(10)	ND	ND	ND	X
Safrole	94-59-7	X	ND	ND	ND	X
Strychnine	57-24-9	AW,0S(55)	ND	ND	ND	X
Sulfallate	95-06-7	X	ND	ND	ND	X
Terbufos	13071-79-9	X	ND	ND	ND	X
Terphenyl-d_{14}(surr)	1718-51-0	X	X	ND	X	X
1,2,4,5-Tetrachlorobenzene	95-94-3	X	ND	ND	ND	X
2,3,4,6-Tetrachlorophenol	58-90-2	X	ND	ND	ND	X
Tetrachlorvinphos	961-11-5	X	ND	ND	ND	X
Tetraethyl dithiopyrophosphate	3689-24-5	X	X	ND	ND	ND
Tetraethyl pyrophosphate	107-49-3	X	ND	ND	ND	X
Thionazine	297-97-2	X	ND	ND	ND	X
Thiophenol (Benzenethiol)	108-98-5	X	ND	ND	ND	X
Toluene diisocyanate	584-84-9	HE(6)	ND	ND	ND	X
o-Toluidine	95-53-4	X	ND	ND	ND	X
Toxaphene	8001-35-2	X	X	X	X	X
2,4,6-Tribromophenol (surr)	118-79-6	X	X	X	X	X
1,2,4-Trichlorobenzene	120-82-1	X	X	X	X	X
2,4,5-Trichlorophenol	95-95-4	X	X	ND	X	X
2,4,6-Trichlorophenol	88-06-2	X	X	X	X	X
Trifluralin	1582-09-8	X	ND	ND	ND	X

Compounds	CAS No[a]	Appropriate Preparation Techniques[b] 3510	3520	3540/ 3541	3550	3580
2,4,5-Trimethylaniline	137-17-7	X	ND	ND	ND	X
Trimethyl phosphate	512-56-1	HE(60)	ND	ND	ND	X
1,3,5-Trinitrobenzene	99-35-4	X	ND	ND	ND	X
Tris(2,3-dibromopropyl) phosphate	126-72-7	X	ND	ND	ND	LR
Tri-p-tolyl phosphate	78-32-0	X	ND	ND	ND	X
O,O,O-Triethyl phosphorothioate	126-68-1	X	ND	ND	ND	X

[a] Chemical Abstract Service Registry Number
[b] See Sec. 1.2 for other acceptable preparation methods.

KEY TO ANALYTE LIST

IS = This compound may be used as an internal standard.
surr = This compound may be used as a surrogate.
AW = Adsorption to walls of glassware during extraction and storage.
CP = Nonreproducible chromatographic performance.
DC = Unfavorable distribution coefficient (number in parenthesis is percent recovery).
HE = Hydrolysis during extraction accelerated by acidic or basic conditions (number in parenthesis is percent recovery).
HS = Hydrolysis during storage (number in parenthesis is percent stability).
LR = Low response.
ND = Not determined.
OE = Oxidation during extraction accelerated by basic conditions (number in parenthesis is percent recovery).
OS = Oxidation during storage (number in parenthesis is percent stability).
X = Greater than 70 percent recovery by this technique.

1.2 In addition to the sample preparation methods listed in the above analyte list, Method 3542 describes sample preparation for semivolatile organic compounds in air sampled by Method 0010 (Table 11 contains surrogate performance data), Method 3545 describes an automated solvent extraction device for semivolatiles in solids (Table 12 contains performance data), and Method 3561 describes a supercritical fluid extraction of solids for PAHs (see Tables 13, 14, and 15 for performance data).

1.3 Method 8270 can be used to quantitate most neutral, acidic, and basic organic compounds that are soluble in methylene chloride and capable of being eluted, without derivatization, as sharp peaks from a gas chromatographic fused-silica capillary column coated with a slightly polar silicone. Such compounds include polynuclear aromatic hydrocarbons, chlorinated hydrocarbons and pesticides, phthalate esters, organophosphate esters, nitrosamines, haloethers, aldehydes, ethers, ketones, anilines, pyridines, quinolines, aromatic nitro compounds, and phenols, including nitrophenols. See Table 1 for a list of compounds and their characteristic ions that have been evaluated.

In most cases, Method 8270 is not appropriate for the quantitation of multicomponent analytes, e.g., Aroclors, Toxaphene, Chlordane, etc., because of limited sensitivity for those analytes. When these analytes have been identified by another technique, Method 8270 is appropriate for confirmation of the presence of these analytes when concentration in the extract permits. Refer to Sec. 7.0 of Methods 8081 and 8082 for guidance on calibration and quantitation of multicomponent analytes such as the Aroclors, Toxaphene, and Chlordane.

1.4 The following compounds may require special treatment when being determined by this method:

1.4.1 Benzidine may be subject to oxidative losses during solvent concentration and its chromatographic behavior is poor.

1.4.2 Under the alkaline conditions of the extraction step from aqueous matrices, α-BHC, γ-BHC, Endosulfan I and II, and Endrin are subject to decomposition. Neutral extraction should be performed if these compounds are expected.

1.4.3 Hexachlorocyclopentadiene is subject to thermal decomposition in the inlet of the gas chromatograph, chemical reaction in acetone solution, and photochemical decomposition.

1.4.4 N-nitrosodimethylamine is difficult to separate from the solvent under the chromatographic conditions described.

1.4.5 N-nitrosodiphenylamine decomposes in the gas chromatographic inlet and cannot be separated from diphenylamine.

1.4.6 Pentachlorophenol, 2,4-dinitrophenol, 4-nitrophenol, benzoic acid, 4,6-dinitro-2-methylphenol, 4-chloro-3-methylphenol, 2-nitroaniline, 3-nitroaniline, 4-chloroaniline, and benzyl alcohol are subject to erratic chromatographic behavior, especially if the GC system is contaminated with high boiling material.

1.4.7 Pyridine may perform poorly at the GC injection port temperatures listed in the method. Lowering the injection port temperature may reduce the amount of degradation. The analyst needs to use caution if modifying the injection port temperature as the performance of other analytes may be adversely affected.

1.4.8 Toluene diisocyanate rapidly hydrolyses in water (half-life of less then 30 min.). Therefore, recoveries of this compound from aqueous matrices should not be expected. In addition, in solid matrices, toluene diisocyanate often reacts with alcohols and amines to produce urethane and ureas and consequently cannot usually coexist in a solution containing these materials.

1.4.9 In addition, analytes in the list provided above are flagged when there are limitations caused by sample preparation and/or chromatographic problems.

1.5 The estimated quantitation limit (EQL) of Method 8270 for determining an individual compound is approximately 660 µg/kg (wet weight) for soil/sediment samples, 1-200 mg/kg for wastes (dependent on matrix and method of preparation), and 10 µg/L for ground water samples (see Table 2). EQLs will be proportionately higher for sample extracts that require dilution to avoid saturation of the detector.

1.6 This method is restricted to use by or under the supervision of analysts experienced in the use of gas chromatograph/mass spectrometers and skilled in the interpretation of mass spectra. Each analyst must demonstrate the ability to generate acceptable results with this method.

2.0 SUMMARY OF METHOD

2.1 The samples are prepared for analysis by gas chromatography/mass spectrometry (GC/MS) using the appropriate sample preparation (refer to Method 3500) and, if necessary, sample cleanup procedures (refer to Method 3600).

2.2 The semivolatile compounds are introduced into the GC/MS by injecting the sample extract into a gas chromatograph (GC) with a narrow-bore fused-silica capillary column. The GC column is temperature-programmed to separate the analytes, which are then detected with a mass spectrometer (MS) connected to the gas chromatograph.

2.3 Analytes eluted from the capillary column are introduced into the mass spectrometer via a jet separator or a direct connection. Identification of target analytes is accomplished by comparing their mass spectra with the electron impact (or electron impact-like) spectra of authentic standards. Quantitation is accomplished by comparing the response of a major (quantitation) ion relative to an internal standard using a five-point calibration curve.

2.4 The method includes specific calibration and quality control steps that supersede the general requirements provided in Method 8000.

3.0 INTERFERENCES

3.1 Raw GC/MS data from all blanks, samples, and spikes must be evaluated for interferences. Determine if the source of interference is in the preparation and/or cleanup of the samples and take corrective action to eliminate the problem.

3.2 Contamination by carryover can occur whenever high-concentration and low-concentration samples are sequentially analyzed. To reduce carryover, the sample syringe must be rinsed with solvent between sample injections. Whenever an unusually concentrated sample is encountered, it should be followed by the analysis of solvent to check for cross-contamination.

4.0 APPARATUS AND MATERIALS

4.1 Gas chromatograph/mass spectrometer system

4.1.1 Gas chromatograph - An analytical system complete with a temperature-programmable gas chromatograph suitable for splitless injection and all required accessories, including syringes, analytical columns, and gases. The capillary column should be directly coupled to the source.

4.1.2 Column - 30 m x 0.25 mm ID (or 0.32 mm ID) 1 µm film thickness silicone-coated fused-silica capillary column (J&W Scientific DB-5 or equivalent).

4.1.3 Mass spectrometer

4.1.3.1 Capable of scanning from 35 to 500 amu every 1 sec or less, using 70 volts (nominal) electron energy in the electron impact ionization mode. The mass spectrometer must be capable of producing a mass spectrum for decafluorotriphenylphosphine (DFTPP) which meets the criteria in Table 3 when 1 µL of the GC/MS tuning standard is injected through the GC (50 ng of DFTPP).

4.1.3.2 An ion trap mass spectrometer may be used if it is capable of axial modulation to reduce ion-molecule reactions and can produce electron impact-like spectra that match those in the EPA/NIST Library. The mass spectrometer must be capable of producing a mass spectrum for DFTPP which meets the criteria in Table 3 when 5 or 50 ng are introduced.

4.1.4 GC/MS interface - Any GC-to-MS interface may be used that gives acceptable calibration points at 50 ng per injection for each compound of interest and achieves acceptable tuning performance criteria. For a narrow-bore capillary column, the interface is usually capillary-direct into the mass spectrometer source.

4.1.5 Data system - A computer system should be interfaced to the mass spectrometer. The system must allow the continuous acquisition and storage on machine-readable media of all mass spectra obtained throughout the duration of the chromatographic program. The computer should have software that can search any GC/MS data file for ions of a specific mass and that can plot such ion abundances versus time or scan number. This type of plot is defined as an Extracted Ion Current Profile (EICP). Software should also be available that allows integrating the abundances in any EICP between specified time or scan-number limits. The most recent version of the EPA/NIST Mass Spectral Library should also be available.

4.1.6 Guard column (optional) - (J&W Deactivated Fused Silica, 0.25 mm ID x 6 m, or equivalent) between the injection port and the analytical column joined with column joiners (Hewlett-Packard Catalog No. 5062-3556, or equivalent).

4.2 Syringe - 10-µL.

4.3 Volumetric flasks, Class A - Appropriate sizes with ground-glass stoppers.

4.4 Balance - Analytical, capable of weighing 0.0001 g.

4.5 Bottles - glass with polytetrafluoroethylene (PTFE)-lined screw caps or crimp tops.

5.0 REAGENTS

5.1 Reagent grade inorganic chemicals shall be used in all tests. Unless otherwise indicated, it is intended that all reagents shall conform to the specifications of the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available. Other grades may be used, provided it is first ascertained that the reagent is of sufficiently high purity to permit its use without lessening the accuracy of the determination.

5.2 Organic-free reagent water - All references to water in this method refer to organic-free reagent water, as defined in Chapter One.

5.3 Stock standard solutions (1000 mg/L) - Standard solutions can be prepared from pure standard materials or purchased as certified solutions.

5.3.1 Prepare stock standard solutions by accurately weighing about 0.0100 g of pure material. Dissolve the material in pesticide quality acetone or other suitable solvent and dilute to volume in a 10-mL volumetric flask. Larger volumes can be used at the convenience of the analyst. When compound purity is assayed to be 96% or greater, the weight may be used without correction to calculate the concentration of the stock standard. Commercially-prepared stock standards may be used at any concentration if they are certified by the manufacturer or by an independent source.

5.3.2 Transfer the stock standard solutions into bottles with PTFE-lined screw-caps. Store, protected from light, at -10°C or less or as recommended by the standard manufacturer. Stock standard solutions should be checked frequently for signs of degradation or evaporation, especially just prior to preparing calibration standards from them.

5.3.3 Stock standard solutions must be replaced after 1 year or sooner if comparison with quality control check samples indicates a problem.

5.3.4 It is recommended that nitrosamine compounds be placed together in a separate calibration mix and not combined with other calibration mixes. When using a premixed certified standard, consult the manufacturer's instructions for additional guidance.

5.3.5 Mixes with hydrochloride salts may contain hydrochloric acid, which can cause analytical difficulties. When using a premixed certified standard, consult the manufacturer's instructions for additional guidance.

5.4 Internal standard solutions - The internal standards recommended are 1,4-dichlorobenzene-d_4, naphthalene-d_8, acenaphthene-d_{10}, phenanthrene-d_{10}, chrysene-d_{12}, and perylene-d_{12} (see Table 5). Other compounds may be used as internal standards as long as the requirements given in Sec. 7.3.2 are met.

5.4.1 Dissolve 0.200 g of each compound with a small volume of carbon disulfide. Transfer to a 50 mL volumetric flask and dilute to volume with methylene chloride so that the final solvent is approximately 20% carbon disulfide. Most of the compounds are also soluble in small volumes of methanol, acetone, or toluene, except for perylene-d_{12}. The resulting solution will contain each standard at a concentration of 4,000 ng/µL. Each 1 mL sample extract undergoing analysis should be spiked with 10 µL of the internal standard solution, resulting in a concentration of 40 ng/µL of each internal standard. Store at -10°C or less when not in use. When using premixed certified solutions, store according to the manufacturer's documented holding time and storage temperature recommendations.

5.4.2 If a more sensitive mass spectrometer is employed to achieve lower detection levels, a more dilute internal standard solution may be required. Area counts of the internal standard peaks should be between 50-200% of the area of the target analytes in the mid-point calibration analysis.

5.5 GC/MS tuning standard - A methylene chloride solution containing 50 ng/µL of decafluorotriphenylphosphine (DFTPP) should be prepared. The standard should also contain 50 ng/µL each of 4,4'-DDT, pentachlorophenol, and benzidine to verify injection port inertness and GC column performance. Store at -10°C or less when not in use. If a more sensitive mass spectrometer is employed to achieve lower detection levels, a more dilute tuning solution may be necessary. When using premixed certified solutions, store according to the manufacturer's documented holding time and storage temperature recommendations.

5.6 Calibration standards - A minimum of five calibration standards should be prepared at five different concentrations. At least one of the calibration standards should correspond to a sample concentration at or below that necessary to meet the data quality objectives of the project. The remaining standards should correspond to the range of concentrations found in actual samples but should not exceed the working range of the GC/MS system. Each standard should contain each analyte for detection by this method.

5.6.1 It is the intent of EPA that all target analytes for a particular analysis be included in the calibration standard(s). These target analytes may not include the entire list of analytes (Sec. 1.1) for which the method has been demonstrated. However, the laboratory shall not report a quantitative result for a target analyte that was not included in the calibration standard(s).

5.6.2 Each 1-mL aliquot of calibration standard should be spiked with 10 µL of the internal standard solution prior to analysis. All standards should be stored at -10°C or less, and should be freshly prepared once a year, or sooner if check standards indicate a problem. The calibration verification standard should be prepared weekly and stored at 4°C. When using premixed certified solutions, store according to the manufacturer's documented holding time and storage temperature recommendations.

5.7 Surrogate standards - The recommended surrogates are phenol-d_6, 2-fluorophenol, 2,4,6-tribromophenol, nitrobenzene-d_5, 2-fluorobiphenyl, and p-terphenyl-d_{14}. See Method 3500 for instructions on preparing the surrogate solutions.

5.7.1 Surrogate Standard Check: Determine what the appropriate concentration should be for the blank extracts after all extraction, cleanup, and concentration steps. Inject this concentration into the GC/MS to determine recovery of surrogate standards. It is recommended that this check be done whenever a new surrogate spiking solution is prepared.

NOTE: Method 3561 (SFE Extraction of PAHs) recommends the use of bromobenzene and p-quaterphenyl to better cover the range of PAHs listed in the method.

5.7.2 If a more sensitive mass spectrometer is employed to achieve lower detection levels, a more dilute surrogate solution may be necessary.

5.8 Matrix spike and laboratory control standards - See Method 3500 for instructions on preparing the matrix spike standard. The same standard may be used as the laboratory control standard (LCS).

5.8.1 Matrix Spike Check: Determine what concentration should be in the blank extracts after all extraction, cleanup, and concentration steps. Inject this concentration into the GC/MS to determine recovery. It is recommended that this check be done whenever a new matrix spiking solution is prepared.

5.8.2 If a more sensitive mass spectrometer is employed to achieve lower detection levels, a more dilute matrix and LCS spiking solution may be necessary.

5.8.3 Some projects may require the spiking of the specific compounds of interest, since the spiking compounds listed in Method 3500 would not be representative of the compounds of interest required for the project. When this occurs, the matrix and LCS spiking

standards should be prepared in methanol, with each compound present at a concentration appropriate for the project.

5.9 Acetone, hexane, methylene chloride, isooctane, carbon disulfide, toluene, and other appropriate solvents - All solvents should be pesticide quality or equivalent.

6.0 SAMPLE COLLECTION, PRESERVATION, AND HANDLING

6.1 See the introductory material to this chapter, Organic Analytes, Sec. 4.1.

6.2 Store the sample extracts at -10°C, protected from light, in sealed vials (e.g., screw-cap vials or crimp-capped vials) equipped with unpierced PTFE-lined septa.

7.0 PROCEDURE

7.1 Sample preparation

7.1.1 Samples are normally prepared by one of the following methods prior to GC/MS analysis.

Matrix	Methods
Air	3542
Water	3510, 3520, 3535
Soil/sediment	3540, 3541, 3545, 3550, 3560, 3561
Waste	3540, 3541, 3545, 3550, 3560, 3561, 3580

7.1.2 In very limited applications, direct injection of the sample into the GC/MS system with a 10-µL syringe may be appropriate. The detection limit is very high (approximately 10,000 µg/L). Therefore, it is only permitted where concentrations in excess of 10,000 µg/L are expected.

7.2 Extract cleanup - Extracts may be cleaned up by any of the following methods prior to GC/MS analysis.

Analytes of interest	Methods
Aniline & aniline derivatives	3620
Phenols	3630, 3640, 8041[a]
Phthalate esters	3610, 3620, 3640
Nitrosamines	3610, 3620, 3640
Organochlorine pesticides & PCBs	3610, 3620, 3630, 3660, 3665
Nitroaromatics and cyclic ketones	3620, 3640
Polynuclear aromatic hydrocarbons	3611, 3630, 3640
Haloethers	3620, 3640
Chlorinated hydrocarbons	3620, 3640
Organophosphorus pesticides	3620

Analytes of interest	Methods
Petroleum waste	3611, 3650
All base, neutral, and acid priority pollutants	3640

[a] Method 8041 includes a derivatization technique followed by GC/ECD analysis, if interferences are encountered on GC/FID.

7.3 Initial calibration

Establish the GC/MS operating conditions, using the following recommendations as guidance.

Mass range:	35-500 amu
Scan time:	1 sec/scan
Initial temperature:	40°C, hold for 4 minutes
Temperature program:	40-270°C at 10°C/min
Final temperature:	270°C, hold until benzo[g,h,i]perylene elutes
Injector temperature:	250-300°C
Transfer line temperature:	250-300°C
Source temperature:	According to manufacturer's specifications
Injector:	Grob-type, splitless
Injection volume:	1-2 µL
Carrier gas:	Hydrogen at 50 cm/sec or helium at 30 cm/sec
Ion trap only:	Set axial modulation, manifold temperature, and emission current to manufacturer's recommendations

Split injection is allowed if the sensitivity of the mass spectrometer is sufficient.

7.3.1 The GC/MS system must be hardware-tuned using a 50 ng injection of DFTPP. Analyses must not begin until the tuning criteria are met.

7.3.1.1 In the absence of specific recommendations on how to acquire the mass spectrum of DFTPP from the instrument manufacturer, the following approach has been shown to be useful: Three scans (the peak apex scan and the scans immediately preceding and following the apex) are acquired and averaged. Background subtraction is required, and must be accomplished using a single scan acquired no more than 20 scans prior to the elution of DFTPP. The background subtraction should be designed only to eliminate column bleed or instrument background ions. Do not subtract part of the DFTPP peak.

7.3.1.2 Use the DFTPP mass intensity criteria in Table 3 as tuning acceptance criteria. Alternatively, other documented tuning criteria may be used (e.g. CLP, Method 525, or manufacturer's instructions), provided that method performance is not adversely affected.

NOTE: All subsequent standards, samples, MS/MSDs, and blanks associated with a DFTPP analysis must use the identical mass spectrometer instrument conditions.

7.3.1.3 The GC/MS tuning standard solution should also be used to assess GC column performance and injection port inertness. Degradation of DDT to DDE and DDD

should not exceed 20%. (See Sec. 8.0 of Method 8081 for the percent breakdown calculation). Benzidine and pentachlorophenol should be present at their normal responses, and no peak tailing should be visible.

7.3.1.4 If degradation is excessive and/or poor chromatography is noted, the injection port may require cleaning. It may also be necessary to break off the first 6-12 in. of the capillary column. The use of a guard column (Sec. 4.1.6) between the injection port and the analytical column may help prolong analytical column performance.

7.3.2 The internal standards selected in Sec. 5.4 should permit most of the components of interest in a chromatogram to have retention times of 0.80-1.20 relative to one of the internal standards. Use the base peak ion from the specific internal standard as the primary ion for quantitation (see Table 1). If interferences are noted, use the next most intense ion as the quantitation ion (i.e. for 1,4-dichlorobenzene-d_4, use 152 m/z for quantitation).

7.3.3 Analyze 1-2 µL of each calibration standard (containing internal standards) and tabulate the area of the primary characteristic ion against concentration for each target analyte (as indicated in Table 1). A set of at least five calibration standards is necessary (see Sec. 5.6 and Method 8000). The injection volume must be the same for all standards and sample extracts. Figure 1 shows a chromatogram of a calibration standard containing base/neutral and acid analytes.

Calculate response factors (RFs) for each target analyte relative to one of the internal standards as follows:

$$RF = \frac{A_s \times C_{is}}{A_{is} \times C_s}$$

where:

A_s = Peak area (or height) of the analyte or surrogate.
A_{is} = Peak area (or height) of the internal standard.
C_s = Concentration of the analyte or surrogate, in µg/L.
C_{is} = Concentration of the internal standard, in µg/L.

7.3.4 System performance check compounds (SPCCs)

7.3.4.1 A system performance check must be performed to ensure that minimum average RFs are met before the calibration curve is used. For semivolatiles, the System Performance Check Compounds (SPCCs) are: N-nitroso-di-n-propylamine; hexachlorocyclopentadiene; 2,4-dinitrophenol; and 4-nitrophenol.

7.3.4.2 The minimum acceptable average RF for these compounds is 0.050. These SPCCs typically have very low RFs (0.1-0.2) and tend to decrease in response as the chromatographic system begins to deteriorate or the standard material begins to deteriorate. They are usually the first to show poor performance. Therefore, they must meet the minimum requirement when the system is calibrated.

7.3.4.3 If the minimum response factors are not met, the system must be evaluated, and corrective action must be taken before sample analysis begins. Possible problems include standard mixture degradation, injection port inlet contamination, contamination at the front end of the analytical column, and active sites in the column or chromatographic system. This check must be met before sample analysis begins.

7.3.5 Calibration check compounds (CCCs)

7.3.5.1 The purpose of the CCCs are to evaluate the calibration from the standpoint of the integrity of the system. High variability for these compounds may be indicative of system leaks or reactive sites on the column. Meeting the CCC criteria is not a substitute for successful calibration of the target analytes using one of the approaches described in Section 7.0 of Method 8000.

7.3.5.2 Calculate the mean response factor and the relative standard deviation (RSD) of the response factors for each target analyte. The RSD should be less than or equal to 15% for each target analyte. However, the RSD for each individual CCC (see Table 4) must be less than or equal to 30%.

$$\text{mean RF} = \overline{RF} = \frac{\sum_{i=1}^{n} RF_i}{n} \qquad SD = \sqrt{\frac{\sum_{i=1}^{n} (RF_i - \overline{RF})^2}{n-1}}$$

$$RSD = \frac{SD}{\overline{RF}} \times 100$$

7.3.5.3 If the RSD of any CCC is greater than 30%, then the chromatographic system is too reactive for analysis to begin. Clean or replace the injector liner and/or capillary column, then repeat the calibration procedure beginning with Sec. 7.3.

7.3.5.4 If the CCCs are not included in the list of analytes for a project, and therefore not included in the calibration standards, refer to Sec. 7.0 of Method 8000.

7.3.6 Evaluation of retention times - The relative retention time (RRT) of each target analyte in each calibration standard should agree within 0.06 RRT units. Late-eluting target analytes usually have much better agreement.

7.3.7 Linearity of target analytes - If the RSD of any target analytes is 15% or less, then the relative response factor is assumed to be constant over the calibration range, and the average relative response factor may be used for quantitation (Sec. 7.6.2).

7.3.7.1 If the RSD of any target analyte is greater than 15%, refer to Sec. 7.0 in Method 8000 for additional calibration options. One of the options must be applied to GC/MS calibration in this situation, or a new initial calibration must be performed.

NOTE: Method 8000 designates a linearity criterion of 20% RSD. That criterion pertains to GC and HPLC methods other than GC/MS. Method 8270 requires 15% RSD as evidence of sufficient linearity to employ an average response factor.

7.3.7.2 When the RSD exceeds 15%, the plotting and visual inspection of a calibration curve can be a useful diagnostic tool. The inspection may indicate analytical problems, including errors in standard preparation, the presence of active sites in the chromatographic system, analytes that exhibit poor chromatographic behavior, etc.

7.4 GC/MS calibration verification - Calibration verification consists of three steps that are performed at the beginning of each 12-hour analytical shift.

7.4.1 Prior to the analysis of samples or calibration standards, inject 50 ng of the DFTPP standard into the GC/MS system. The resultant mass spectrum for DFTPP must meet the criteria given in Table 3 before sample analysis begins. These criteria must be demonstrated each 12-hour shift during which samples are analyzed.

7.4.2 The initial calibration (Sec. 7.3) for each compound of interest should be verified once every 12 hours prior to sample analysis, using the introduction technique and conditions used for samples. This is accomplished by analyzing a calibration standard at a concentration near the midpoint concentration for the calibrating range of the GC/MS. The results from the calibration standard analysis should meet the verification acceptance criteria provided in Secs. 7.4.4 through 7.4.7.

NOTE: The DFTPP and calibration verification standard may be combined into a single standard as long as both tuning and calibration verification acceptance criteria for the project can be met without interferences.

7.4.3 A method blank should be analyzed after the calibration standard, or at any other time during the analytical shift, to ensure that the total system (introduction device, transfer lines and GC/MS system) is free of contaminants. If the method blank indicates contamination, then it may be appropriate to analyze a solvent blank to demonstrate that the contamination is not a result of carryover from standards or samples. See Sec. 8.0 of Method 8000B for method blank performance criteria.

7.4.4 System performance check compounds (SPCCs)

7.4.4.1 A system performance check must be made during every 12-hour analytical shift. Each SPCC in the calibration verification standard must meet a minimum response factor of 0.050. This is the same check that is applied during the initial calibration.

7.4.4.2 If the minimum response factors are not met, the system must be evaluated, and corrective action must be taken before sample analysis begins. Possible problems include standard mixture degradation, injection port inlet contamination, contamination at the front end of the analytical column, and active sites in the column or chromatographic system. This check must be met before sample analysis begins.

7.4.5 Calibration check compounds (CCCs)

7.4.5.1 After the system performance check is met, the CCCs listed in Table 4 are used to check the validity of the initial calibration. Use percent difference when performing the average response factor model calibration. Use percent drift when calibrating using a regression fit model. Refer to Sec. 7.0 of Method 8000 for guidance on calculating percent difference and drift.

7.4.5.2 If the percent difference for each CCC is less than or equal to 20%, then the initial calibration is assumed to be valid. If the criterion is not met (i.e., greater than 20% difference or drift) for any one CCC, then corrective action must be taken prior to the analysis of samples. If the CCCs are not included in the list of analytes for a project,

and therefore not included in the calibration standards, then all analytes must meet the 20% difference or drift criterion.

7.4.5.3 Problems similar to those listed under SPCCs could affect the CCCs. If the problem cannot be corrected by other measures, a new initial calibration must be generated. The CCC criteria must be met before sample analysis begins.

7.4.6 Internal standard retention time - The retention times of the internal standards in the calibration verification standard must be evaluated immediately after or during data acquisition. If the retention time for any internal standard changes by more than 30 seconds from that in the mid-point standard level of the most recent initial calibration sequence, then the chromatographic system must be inspected for malfunctions and corrections must be made, as required. When corrections are made, reanalysis of samples analyzed while the system was malfunctioning is required.

7.4.7 Internal standard response - If the EICP area for any of the internal standards in the calibration verification standard changes by a factor of two (-50% to +100%) from that in the mid-point standard level of the most recent initial calibration sequence, the mass spectrometer must be inspected for malfunctions and corrections must be made, as appropriate. When corrections are made, reanalysis of samples analyzed while the system was malfunctioning is required.

7.5 GC/MS analysis of samples

7.5.1 It is highly recommended that sample extracts be screened on a GC/FID or GC/PID using the same type of capillary column used in the GC/MS system. This will minimize contamination of the GC/MS system from unexpectedly high concentrations of organic compounds.

7.5.2 Allow the sample extract to warm to room temperature. Just prior to analysis, add 10 µL of the internal standard solution to the 1-mL concentrated sample extract obtained from sample preparation.

7.5.3 Inject a 1-2 µL aliquot of the sample extract into the GC/MS system, using the same operating conditions that were used for the calibration (Sec. 7.3). The volume to be injected should contain 100 ng of base/neutral and 200 ng of acid surrogates (assuming 100% recovery), unless a more sensitive GC/MS system is being used and the surrogate solution is less concentrated then that listed in Sec. 5.7. The injection volume must be the same volume used for the calibration standards.

7.5.4 If the response for any quantitation ion exceeds the initial calibration range of the GC/MS system, the sample extract must be diluted and reanalyzed. Additional internal standard must be added to the diluted extract to maintain the same concentration as in the calibration standards (40 ng/µL, unless a more sensitive GC/MS system is being used).

NOTE: It may be a useful diagnostic tool to monitor internal standard retention times and responses (area counts) in all samples, spikes, blanks, and standards to effectively check drifting method performance, poor injection execution, and anticipate the need for system inspection and/or maintenance.

7.5.5 The use of selected ion monitoring (SIM) is acceptable for applications requiring detection limits below the normal range of electron impact mass spectrometry. However, SIM

may provide a lesser degree of confidence in the compound identification unless multiple ions are monitored for each compound.

7.6 Qualitative analysis

7.6.1 The qualitative identification of compounds determined by this method is based on retention time and on comparison of the sample mass spectrum, after background correction, with characteristic ions in a reference mass spectrum. The reference mass spectrum must be generated by the laboratory using the conditions of this method. The characteristic ions from the reference mass spectrum are defined as the three ions of greatest relative intensity, or any ions over 30% relative intensity, if less than three such ions occur in the reference spectrum. Compounds are identified when the following criteria are met.

7.6.1.1 The intensities of the characteristic ions of a compound must maximize in the same scan or within one scan of each other. Selection of a peak by a data system target compound search routine where the search is based on the presence of a target chromatographic peak containing ions specific for the target compound at a compound-specific retention time will be accepted as meeting this criterion.

7.6.1.2 The RRT of the sample component is within ± 0.06 RRT units of the RRT of the standard component.

7.6.1.3 The relative intensities of the characteristic ions agree within 30% of the relative intensities of these ions in the reference spectrum. (Example: For an ion with an abundance of 50% in the reference spectrum, the corresponding abundance in a sample spectrum can range between 20% and 80%.)

7.6.1.4 Structural isomers that produce very similar mass spectra should be identified as individual isomers if they have sufficiently different GC retention times. Sufficient GC resolution is achieved if the height of the valley between two isomer peaks is less than 25% of the sum of the two peak heights. Otherwise, structural isomers are identified as isomeric pairs. Diastereomeric pairs (e.g., Aramite and Isosafrol) that may be separable by the GC should be identified, quantitated and reported as the sum of both compounds by the GC.

7.6.1.5 Identification is hampered when sample components are not resolved chromatographically and produce mass spectra containing ions contributed by more than one analyte. When gas chromatographic peaks obviously represent more than one sample component (i.e., a broadened peak with shoulder(s) or a valley between two or more maxima), appropriate selection of analyte spectra and background spectra is important.

7.6.1.6 Examination of extracted ion current profiles of appropriate ions can aid in the selection of spectra and in qualitative identification of compounds. When analytes coelute (i.e., only one chromatographic peak is apparent), the identification criteria may be met, but each analyte spectrum will contain extraneous ions contributed by the coeluting compound.

7.6.2 For samples containing components not associated with the calibration standards, a library search may be made for the purpose of tentative identification. The necessity to perform this type of identification will be determined by the purpose of the

analyses being conducted. Data system library search routines should not use normalization routines that would misrepresent the library or unknown spectra when compared to each other.

For example, the RCRA permit or waste delisting requirements may require the reporting of non-target analytes. Only after visual comparison of sample spectra with the nearest library searches may the analyst assign a tentative identification. Guidelines for tentative identification are:

(1) Relative intensities of major ions in the reference spectrum (ions > 10% of the most abundant ion) should be present in the sample spectrum.

(2) The relative intensities of the major ions should agree within ± 20%. (Example: For an ion with an abundance of 50% in the standard spectrum, the corresponding sample ion abundance must be between 30 and 70%.)

(3) Molecular ions present in the reference spectrum should be present in the sample spectrum.

(4) Ions present in the sample spectrum but not in the reference spectrum should be reviewed for possible background contamination or presence of coeluting compounds.

(5) Ions present in the reference spectrum but not in the sample spectrum should be reviewed for possible subtraction from the sample spectrum because of background contamination or coeluting peaks. Data system library reduction programs can sometimes create these discrepancies.

7.7 Quantitative analysis

7.7.1 Once a compound has been identified, the quantitation of that compound will be based on the integrated abundance of the primary characteristic ion from the EICP.

7.7.2 If the RSD of a compound's response factor is 15% or less, then the concentration in the extract may be determined using the average response factor ($\overline{RF}$) from initial calibration data (Sec. 7.3.5). See Method 8000, Sec. 7.0, for the equations describing internal standard calibration and either linear or non-linear calibrations.

7.7.3 Where applicable, the concentration of any non-target analytes identified in the sample (Sec. 7.6.2) should be estimated. The same formulae should be used with the following modifications: The areas A_x and A_{is} should be from the total ion chromatograms, and the RF for the compound should be assumed to be 1.

7.7.4 The resulting concentration should be reported indicating: (1) that the value is an estimate, and (2) which internal standard was used to determine concentration. Use the nearest internal standard free of interferences.

7.7.5 Quantitation of multicomponent compounds (e.g., Toxaphene, Aroclors, etc.) is beyond the scope of Method 8270. Normally, quantitation is performed using a GC/ECD, by Methods 8081 or 8082. However, Method 8270 may be used to confirm the identification of these compounds, when the concentrations are at least 10 ng/µL in the concentrated sample extract.

7.7.6 Structural isomers that produce very similar mass spectra should be quantitated as individual isomers if they have sufficiently different GC retention times. Sufficient GC resolution is achieved if the height of the valley between two isomer peaks is less than 25% of the sum of the two peak heights. Otherwise, structural isomers are quantitated as isomeric pairs. Diastereomeric pairs (e.g., Aramite and Isosafrol) that may be separable by the GC should be summed and reported as the sum of both compounds.

8.0 QUALITY CONTROL

8.1 Refer to Chapter One and Method 8000 for specific quality control (QC) procedures. Quality control procedures to ensure the proper operation of the various sample preparation and/or sample introduction techniques can be found in Method 3500. Each laboratory should maintain a formal quality assurance program. The laboratory should also maintain records to document the quality of the data generated.

8.2 Quality control procedures necessary to evaluate the GC system operation are found in Sec. 7.0 of Method 8000 and include calibration verification and chromatographic analysis of samples. In addition, instrument QC requirements may be found in the following sections of Method 8270:

8.2.1 The GC/MS system must be tuned to meet the DFTPP criteria listed in Secs. 7.3.1 and 7.4.1.

8.2.2 There must be an initial calibration of the GC/MS system as described in Sec. 7.3.

8.2.3 The GC/MS system must meet the calibration verification acceptance criteria in Sec. 7.4, each 12 hours.

8.2.4 The RRT of the sample component must fall within the RRT window of the standard component provided in Sec. 7.6.1.

8.3 Initial Demonstration of Proficiency - Each laboratory must demonstrate initial proficiency with each sample preparation and determinative method combination it utilizes, by generating data of acceptable accuracy and precision for target analytes in a clean matrix. The laboratory must also repeat the following operations whenever new staff are trained or significant changes in instrumentation are made. See Method 8000, Sec. 8.0 for information on how to accomplish this demonstration.

8.4 Sample Quality Control for Preparation and Analysis - The laboratory must also have procedures for documenting the effect of the matrix on method performance (precision, accuracy, and detection limit). At a minimum, this includes the analysis of QC samples including a method blank, matrix spike, a duplicate, and a laboratory control sample (LCS) in each analytical batch and the addition of surrogates to each field sample and QC sample.

8.4.1 Before processing any samples, the analyst should demonstrate, through the analysis of a method blank, that interferences from the analytical system, glassware, and reagents are under control. Each time a set of samples is analyzed or there is a change in reagents, a method blank should be analyzed as a safeguard against chronic laboratory contamination. The blanks should be carried through all stages of sample preparation and measurement.

8.4.2 Documenting the effect of the matrix should include the analysis of at least one matrix spike and one duplicate unspiked sample or one matrix spike/matrix spike duplicate pair. The decision on whether to prepare and analyze duplicate samples or a matrix spike/matrix spike duplicate must be based on a knowledge of the samples in the sample batch. If samples are expected to contain target analytes, then laboratories may use one matrix spike and a duplicate analysis of an unspiked field sample. If samples are not expected to contain target analytes, laboratories should use a matrix spike and matrix spike duplicate pair.

8.4.3 A Laboratory Control Sample (LCS) should be included with each analytical batch. The LCS consists of an aliquot of a clean (control) matrix similar to the sample matrix and of the same weight or volume. The LCS is spiked with the same analytes at the same concentrations as the matrix spike. When the results of the matrix spike analysis indicate a potential problem due to the sample matrix itself, the LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.

8.4.4 See Method 8000, Sec. 8.0 for the details on carrying out sample quality control procedures for preparation and analysis.

8.5 Surrogate recoveries - The laboratory must evaluate surrogate recovery data from individual samples versus the surrogate control limits developed by the laboratory. See Method 8000, Sec. 8.0 for information on evaluating surrogate data and developing and updating surrogate limits.

8.6 The experience of the analyst performing GC/MS analyses is invaluable to the success of the methods. Each day that analysis is performed, the calibration verification standard should be evaluated to determine if the chromatographic system is operating properly. Questions that should be asked are: Do the peaks look normal? Is the response obtained comparable to the response from previous calibrations? Careful examination of the standard chromatogram can indicate whether the column is still performing acceptably, the injector is leaking, the injector septum needs replacing, etc. If any changes are made to the system (e.g., the column changed, a septum is changed), see the guidance in Sec 8.2 of Method 8000 regarding whether recalibration of the system must take place.

8.7 It is recommended that the laboratory adopt additional quality assurance practices for use with this method. The specific practices that are most productive depend upon the needs of the laboratory and the nature of the samples. Whenever possible, the laboratory should analyze standard reference materials and participate in relevant performance evaluation studies.

9.0 METHOD PERFORMANCE

9.1 Method 8250 (the packed column version of Method 8270) was tested by 15 laboratories using organic-free reagent water, drinking water, surface water, and industrial wastewaters spiked at six concentrations ranging from 5 to 1,300 µg/L. Single operator accuracy and precision, and method accuracy were found to be directly related to the concentration of the analyte and essentially independent of the sample matrix. Linear equations to describe these relationships are presented in Table 7. These values are presented as guidance only and are not intended as absolute acceptance criteria. Laboratories should generate their own acceptance criteria for capillary column method performance. (See Method 8000.)

9.2 Chromatograms from calibration standards analyzed with Day 0 and Day 7 samples were compared to detect possible deterioration of GC performance. These recoveries (using Method 3510 extraction) are presented in Table 8.

9.3 Method performance data (using Method 3541 Automated Soxhlet extraction) are presented in Table 9. Single laboratory accuracy and precision data were obtained for semivolatile organics in a clay soil by spiking at a concentration of 6 mg/kg for each compound. The spiking solution was mixed into the soil during addition and then allowed to equilibrate for approximately 1 hour prior to extraction. The spiked samples were then extracted by Method 3541 (Automated Soxhlet). Three determinations were performed and each extract was analyzed by gas chromatography/ mass spectrometry following Method 8270. The low recovery of the more volatile compounds is probably due to volatilization losses during equilibration. These data are listed in Table 10 and were taken from Reference 7.

9.4 Surrogate precision and accuracy data are presented in Table 11 from a field dynamic spiking study based on air sampling by Method 0010. The trapping media were prepared for analysis by Method 3542 and subsequently analyzed by Method 8270.

9.5 Single laboratory precision and bias data (using Method 3545 Accelerated Solvent Extraction) for semivolatile organic compounds are presented in Table 12. The samples were conditioned spiked samples prepared and certified by a commercial supplier that contained 57 semivolatile organics at three concentrations (250, 2500, and 12,500 µg/kg) on three types of soil (clay, loam and sand). Spiked samples were extracted both by the Dionex Accelerated Solvent Extraction system and by Perstorp Environmental Soxtec™ (automated Soxhlet). The data presented in Table 12 represents seven replicate extractions and analyses for each individual sample and were taken from reference 9. The average recoveries from the three matrices for all analytes and all replicates relative to the automated Soxhlet data are as follows: clay 96.8%, loam 98.7% and sand 102.1%. The average recoveries from the three concentrations also relative to the automated Soxhlet data are as follows: low-101.2%, mid-97.2% and high-99.2%.

9.6 Single laboratory precision and bias data (using Method 3561 SFE Extraction of PAHs with a variable restrictor and solid trapping material) were obtained for the method analytes by the extraction of two certified reference materials (one, EC-1, a lake sediment from Environment Canada and the other, HS-3, a marine sediment from the National Science and Engineering Research Council of Canada, both naturally-contaminated with PAHs). The SFE instrument used for these extractions was a Hewlett-Packard Model 7680. Analysis was by GC/MS. Average recoveries from six replicate extractions range from 85 to 148% (overall average of 100%) based on the certified value (or a Soxhlet value if a certified value was unavailable for a specific analyte) for the lake sediment. Average recoveries from three replicate extractions range from 73 to 133% (overall average of 92%) based on the certified value for the marine sediment. The data are found in Tables 13 and 14 and were taken from Reference 10.

9.7 Single laboratory precision and accuracy data (using Method 3561 SFE Extraction of PAHs with a fixed restrictor and liquid trapping) were obtained for twelve of the method analytes by the extraction of a certified reference material (a soil naturally contaminated with PAHs). The SFE instrument used for these extractions was a Dionex Model 703-M. Analysis was by GC/MS. Average recoveries from four replicate extractions range from 60 to 122% (overall average of 89%) based on the certified value. Following are the instrument conditions that were utilized to extract a 3.4 g sample: Pressure - 300 atm; Time - 60 min.; Extraction fluid - CO_2; Modifier - 10% 1:1 (v/v) methanol/methylene chloride; Oven temperature - 80°C; Restrictor temperature - 120°C; and, Trapping fluid - chloroform (methylene chloride has also been used). The data are found in Table 15 and were taken from Reference 11.

10.0 REFERENCES

1. Eichelberger, J.W., Harris, L.E., and Budde, W.L., "Reference Compound to Calibrate Ion Abundance Measurement in Gas Chromatography-Mass Spectrometry Systems", Analytical Chemistry, 47, 995-1000, 1975.

2. "Method Detection Limit for Methods 624 and 625", Olynyk, P., Budde, W.L., and Eichelberger, J.W., unpublished report, October 1980.

3. "Interlaboratory Method Study for EPA Method 625-Base/Neutrals, Acids, and Pesticides", Final Report for EPA Contract 68-03-3102.

4. Burke, J.A., "Gas Chromatography for Pesticide Residue Analysis: Some Practical Aspects", Journal of the Association of Official Analytical Chemists (AOAC), 48, 1037, 1965.

5. Lucas, S.V., Kornfeld, R.A., "GC-MS Suitability Testing of RCRA Appendix VIII and Michigan List Analytes ", U.S. Environmental Protection Agency, Environmental Monitoring and Support Laboratory, Cincinnati, OH 45268, February 20, 1987, Contract No. 68-03-3224.

6. Engel, T.M., Kornfeld, R.A., Warner, J.S., and Andrews, K.D., "Screening of Semivolatile Organic Compounds for Extractability and Aqueous Stability by SW-846, Method 3510", U.S. Environmental Protection Agency, Environmental Monitoring and Support Laboratory, Cincinnati, OH 45268, June 5, 1987, Contract 68-03-3224.

7. Lopez-Avila, V. (W. Beckert, Project Officer); "Development of a Soxtec Extraction Procedure for Extraction of Organic Compounds from Soils and Sediments"; U.S. Environmental Protection Agency, Environmental Monitoring and Support Laboratory, Las Vegas, NV, October 1991; EPA 600/X-91/140.

8. Bursey, J., Merrill, R., McAllister, R., and McGaughey, J., "Laboratory Validation of VOST and SemiVOST for Halogenated Hydrocarbons from the Clean Air Act Amendments List", Vol. 1 and 2, U.S. Environmental Protection Agency, EPA 600/R-93/123a and b, (NTIS PB 93-227163 and 93-27171), Research Triangle Park, NC, July 1993.

9. Richter, B., Ezzell, J., and Felix, D., "Single Laboratory Method Validation Report: Extraction of Target Compound List/Priority Pollutant List BNAs and Pesticides using Accelerated Solvent Extraction (ASE) with Analytical Validation by GC/MS and GC/ECD", Document 101124, Dionex Corporation, Salt Lake City, UT, June 16, 1994.

10. Lee, H.B., Peart, T.E., Hong-You, R.L., and Gere, D.R., "Supercritical Carbon Dioxide Extraction of Polycyclic Aromatic Hydrocarbons from Sediments", J. Chromatography, A 653 83-91 (1993).

11. Personal communication from Sue Warner, EPA Region 3, Central Regional Laboratory, 839 Bestgate Road, Annapolis, MD 21401.

TABLE 1

CHARACTERISTIC IONS FOR SEMIVOLATILE COMPOUNDS

Compound	Retention Time (min)	Primary Ion	Secondary Ion(s)
2-Picoline	3.75[a]	93	66,92
Aniline	5.68	93	66,65
Phenol	5.77	94	65,66
Bis(2-chloroethyl) ether	5.82	93	63,95
2-Chlorophenol	5.97	128	64,130
1,3-Dichlorobenzene	6.27	146	148,111
1,4-Dichlorobenzene-d_4 (IS)	6.35	152	150,115
1,4-Dichlorobenzene	6.40	146	148,111
Benzyl alcohol	6.78	108	79,77
1,2-Dichlorobenzene	6.85	146	148,111
N-Nitrosomethylethylamine	6.97	88	42,43,56
Bis(2-chloroisopropyl) ether	7.22	45	77,121
Ethyl carbamate	7.27	62	44,45,74
Thiophenol (Benzenethiol)	7.42	110	66,109,84
Methyl methanesulfonate	7.48	80	79,65,95
N-Nitrosodi-n-propylamine	7.55	70	42,101,130
Hexachloroethane	7.65	117	201,199
Maleic anhydride	7.65	54	98,53,44
Nitrobenzene	7.87	77	123,65
Isophorone	8.53	82	95,138
N-Nitrosodiethylamine	8.70	102	42,57,44,56
2-Nitrophenol	8.75	139	109,65
2,4-Dimethylphenol	9.03	122	107,121
p-Benzoquinone	9.13	108	54,82,80
Bis(2-chloroethoxy)methane	9.23	93	95,123
Benzoic acid	9.38	122	105,77
2,4-Dichlorophenol	9.48	162	164,98
Trimethyl phosphate	9.53	110	79,95,109,140
Ethyl methanesulfonate	9.62	79	109,97,45,65
1,2,4-Trichlorobenzene	9.67	180	182,145
Naphthalene-d_8 (IS)	9.75	136	68
Naphthalene	9.82	128	129,127
Hexachlorobutadiene	10.43	225	223,227
Tetraethyl pyrophosphate	11.07	99	155,127,81,109
Diethyl sulfate	11.37	139	45,59,99,111,125
4-Chloro-3-methylphenol	11.68	107	144,142
2-Methylnaphthalene	11.87	142	141
2-Methylphenol	12.40	107	108,77,79,90
Hexachloropropene	12.45	213	211,215,117,106,141
Hexachlorocyclopentadiene	12.60	237	235,272

TABLE 1
(continued)

Compound	Retention Time (min)	Primary Ion	Secondary Ion(s)
N-Nitrosopyrrolidine	12.65	100	41,42,68,69
Acetophenone	12.67	105	71,51,120
4-Methylphenol	12.82	107	108,77,79,90
2,4,6-Trichlorophenol	12.85	196	198,200
o-Toluidine	12.87	106	107,77,51,79
3-Methylphenol	12.93	107	108,77,79,90
2-Chloronaphthalene	13.30	162	127,164
N-Nitrosopiperidine	13.55	114	42,55,56,41
1,4-Phenylenediamine	13.62	108	80,53,54,52
1-Chloronaphthalene	13.65[a]	162	127,164
2-Nitroaniline	13.75	65	92,138
5-Chloro-2-methylaniline	14.28	106	141,140,77,89
Dimethyl phthalate	14.48	163	194,164
Acenaphthylene	14.57	152	151,153
2,6-Dinitrotoluene	14.62	165	63,89
Phthalic anhydride	14.62	104	76,50,148
o-Anisidine	15.00	108	80,123,52
3-Nitroaniline	15.02	138	108,92
Acenaphthene-d_{10} (IS)	15.05	164	162,160
Acenaphthene	15.13	154	153,152
2,4-Dinitrophenol	15.35	184	63,154
2,6-Dinitrophenol	15.47	162	164,126,98,63
4-Chloroaniline	15.50	127	129,65,92
Isosafrole	15.60	162	131,104,77,51
Dibenzofuran	15.63	168	139
2,4-Diaminotoluene	15.78	121	122,94,77,104
2,4-Dinitrotoluene	15.80	165	63,89
4-Nitrophenol	15.80	139	109,65
2-Naphthylamine	16.00[a]	143	115,116
1,4-Naphthoquinone	16.23	158	104,102,76,50,130
p-Cresidine	16.45	122	94,137,77,93
Dichlorovos	16.48	109	185,79,145
Diethyl phthalate	16.70	149	177,150
Fluorene	16.70	166	165,167
2,4,5-Trimethylaniline	16.70	120	135,134,91,77
N-Nitrosodi-n-butylamine	16.73	84	57,41,116,158
4-Chlorophenyl phenyl ether	16.78	204	206,141
Hydroquinone	16.93	110	81,53,55
4,6-Dinitro-2-methylphenol	17.05	198	51,105
Resorcinol	17.13	110	81,82,53,69
N-Nitrosodiphenylamine	17.17	169	168,167
Safrole	17.23	162	104,77,103,135

TABLE 1
(continued)

Compound	Retention Time (min)	Primary Ion	Secondary Ion(s)
Hexamethyl phosphoramide	17.33	135	44,179,92,42
3-(Chloromethyl)pyridine hydrochloride	17.50	92	127,129,65,39
Diphenylamine	17.54[a]	169	168,167
1,2,4,5-Tetrachlorobenzene	17.97	216	214,179,108,143,218
1-Naphthylamine	18.20	143	115,89,63
1-Acetyl-2-thiourea	18.22	118	43,42,76
4-Bromophenyl phenyl ether	18.27	248	250,141
Toluene diisocyanate	18.42	174	145,173,146,132,91
2,4,5-Trichlorophenol	18.47	196	198,97,132,99
Hexachlorobenzene	18.65	284	142,249
Nicotine	18.70	84	133,161,162
Pentachlorophenol	19.25	266	264,268
5-Nitro-o-toluidine	19.27	152	77,79,106,94
Thionazine	19.35	107	96,97,143,79,68
4-Nitroaniline	19.37	138	65,108,92,80,39
Phenanthrene-d_{10} (IS)	19.55	188	94,80
Phenanthrene	19.62	178	179,176
Anthracene	19.77	178	176,179
1,4-Dinitrobenzene	19.83	168	75,50,76,92,122
Mevinphos	19.90	127	192,109,67,164
Naled	20.03	109	145,147,301,79,189
1,3-Dinitrobenzene	20.18	168	76,50,75,92,122
Diallate (cis or trans)	20.57	86	234,43,70
1,2-Dinitrobenzene	20.58	168	50,63,74
Diallate (trans or cis)	20.78	86	234,43,70
Pentachlorobenzene	21.35	250	252,108,248,215,254
5-Nitro-o-anisidine	21.50	168	79,52,138,153,77
Pentachloronitrobenzene	21.72	237	142,214,249,295,265
4-Nitroquinoline-1-oxide	21.73	174	101,128,75,116
Di-n-butyl phthalate	21.78	149	150,104
2,3,4,6-Tetrachlorophenol	21.88	232	131,230,166,234,168
Dihydrosaffrole	22.42	135	64,77
Demeton-O	22.72	88	89,60,61,115,171
Fluoranthene	23.33	202	101,203
1,3,5-Trinitrobenzene	23.68	75	74,213,120,91,63
Dicrotophos	23.82	127	67,72,109,193,237
Benzidine	23.87	184	92,185
Trifluralin	23.88	306	43,264,41,290
Bromoxynil	23.90	277	279,88,275,168
Pyrene	24.02	202	200,203
Monocrotophos	24.08	127	192,67,97,109
Phorate	24.10	75	121,97,93,260

TABLE 1
(continued)

Compound	Retention Time (min)	Primary Ion	Secondary Ion(s)
Sulfallate	24.23	188	88,72,60,44
Demeton-S	24.30	88	60,81,89,114,115
Phenacetin	24.33	108	180,179,109,137,80
Dimethoate	24.70	87	93,125,143,229
Phenobarbital	24.70	204	117,232,146,161
Carbofuran	24.90	164	149,131,122
Octamethyl pyrophosphoramide	24.95	135	44,199,286,153,243
4-Aminobiphenyl	25.08	169	168,170,115
Dioxathion	25.25	97	125,270,153
Terbufos	25.35	231	57,97,153,103
α,α-Dimethylphenylamine	25.43	58	91,65,134,42
Pronamide	25.48	173	175,145,109,147
Aminoazobenzene	25.72	197	92,120,65,77
Dichlone	25.77	191	163,226,228,135,193
Dinoseb	25.83	211	163,147,117,240
Disulfoton	25.83	88	97,89,142,186
Fluchloralin	25.88	306	63,326,328,264,65
Mexacarbate	26.02	165	150,134,164,222
4,4'-Oxydianiline	26.08	200	108,171,80,65
Butyl benzyl phthalate	26.43	149	91,206
4-Nitrobiphenyl	26.55	199	152,141,169,151
Phosphamidon	26.85	127	264,72,109,138
2-Cyclohexyl-4,6-Dinitrophenol	26.87	231	185,41,193,266
Methyl parathion	27.03	109	125,263,79,93
Carbaryl	27.17	144	115,116,201
Dimethylaminoazobenzene	27.50	225	120,77,105,148,42
Propylthiouracil	27.68	170	142,114,83
Benz(a)anthracene	27.83	228	229,226
Chrysene-d_{12} (IS)	27.88	240	120,236
3,3'-Dichlorobenzidine	27.88	252	254,126
Chrysene	27.97	228	226,229
Malathion	28.08	173	125,127,93,158
Kepone	28.18	272	274,237,178,143,270
Fenthion	28.37	278	125,109,169,153
Parathion	28.40	109	97,291,139,155
Anilazine	28.47	239	241,143,178,89
Bis(2-ethylhexyl) phthalate	28.47	149	167,279
3,3'-Dimethylbenzidine	28.55	212	106,196,180
Carbophenothion	28.58	157	97,121,342,159,199
5-Nitroacenaphthene	28.73	199	152,169,141,115
Methapyrilene	28.77	97	50,191,71
Isodrin	28.95	193	66,195,263,265,147

TABLE 1
(continued)

Compound	Retention Time (min)	Primary Ion	Secondary Ion(s)
Captan	29.47	79	149,77,119,117
Chlorfenvinphos	29.53	267	269,323,325,295
Crotoxyphos	29.73	127	105,193,166
Phosmet	30.03	160	77,93,317,76
EPN	30.11	157	169,185,141,323
Tetrachlorvinphos	30.27	329	109,331,79,333
Di-n-octyl phthalate	30.48	149	167,43
2-Aminoanthraquinone	30.63	223	167,195
Barban	30.83	222	51,87,224,257,153
Aramite	30.92	185	191,319,334,197,321
Benzo(b)fluoranthene	31.45	252	253,125
Nitrofen	31.48	283	285,202,139,253
Benzo(k)fluoranthene	31.55	252	253,125
Chlorobenzilate	31.77	251	139,253,111,141
Fensulfothion	31.87	293	97,308,125,292
Ethion	32.08	231	97,153,125,121
Diethylstilbestrol	32.15	268	145,107,239,121,159
Famphur	32.67	218	125,93,109,217
Tri-p-tolyl phosphate[b]	32.75	368	367,107,165,198
Benzo(a)pyrene	32.80	252	253,125
Perylene-d_{12} (IS)	33.05	264	260,265
7,12-Dimethylbenz(a)anthracene	33.25	256	241,239,120
5,5-Diphenylhydantoin	33.40	180	104,252,223,209
Captafol	33.47	79	77,80,107
Dinocap	33.47	69	41,39
Methoxychlor	33.55	227	228,152,114,274,212
2-Acetylaminofluorene	33.58	181	180,223,152
4,4'-Methylenebis(2-chloroaniline)	34.38	231	266,268,140,195
3,3'-Dimethoxybenzidine	34.47	244	201,229
3-Methylcholanthrene	35.07	268	252,253,126,134,113
Phosalone	35.23	182	184,367,121,379
Azinphos-methyl	35.25	160	132,93,104,105
Leptophos	35.28	171	377,375,77,155,379
Mirex	35.43	272	237,274,270,239,235
Tris(2,3-dibromopropyl) phosphate	35.68	201	137,119,217,219,199
Dibenz(a,j)acridine	36.40	279	280,277,250
Mestranol	36.48	277	310,174,147,242
Coumaphos	37.08	362	226,210,364,97,109
Indeno(1,2,3-cd)pyrene	39.52	276	138,227
Dibenz(a,h)anthracene	39.82	278	139,279
Benzo(g,h,i)perylene	41.43	276	138,277
1,2:4,5-Dibenzopyrene	41.60	302	151,150,300

TABLE 1
(continued)

Compound	Retention Time (min)	Primary Ion	Secondary Ion(s)
Strychnine	45.15	334	334,335,333
Piperonyl sulfoxide	46.43	162	135,105,77
Hexachlorophene	47.98	196	198,209,211,406,408
Aldrin	--	66	263,220
Aroclor 1016	--	222	260,292
Aroclor 1221	--	190	224,260
Aroclor 1232	--	190	224,260
Aroclor 1242	--	222	256,292
Aroclor 1248	--	292	362,326
Aroclor 1254	--	292	362,326
Aroclor 1260	--	360	362,394
α-BHC	--	183	181,109
β-BHC	--	181	183,109
δ-BHC	--	183	181,109
γ-BHC (Lindane)	--	183	181,109
4,4'-DDD	--	235	237,165
4,4'-DDE	--	246	248,176
4,4'-DDT	--	235	237,165
Dieldrin	--	79	263,279
1,2-Diphenylhydrazine	--	77	105,182
Endosulfan I	--	195	339,341
Endosulfan II	--	337	339,341
Endosulfan sulfate	--	272	387,422
Endrin	--	263	82,81
Endrin aldehyde	--	67	345,250
Endrin ketone	--	317	67,319
2-Fluorobiphenyl (surr)	--	172	171
2-Fluorophenol (surr)	--	112	64
Heptachlor	--	100	272,274
Heptachlor epoxide	--	353	355,351
Nitrobenzene-d_5 (surr)	--	82	128,54
N-Nitrosodimethylamine	--	42	74,44
Phenol-d_6 (surr)	--	99	42,71
Terphenyl-d_{14} (surr)	--	244	122,212
2,4,6-Tribromophenol (surr)	--	330	332,141
Toxaphene	--	159	231,233

IS = internal standard
surr = surrogate
[a]Estimated retention times
[b]Substitute for the non-specific mixture, tricresyl phosphate

TABLE 2

ESTIMATED QUANTITATION LIMITS (EQLs) FOR SEMIVOLATILE ORGANICS

Compound	Estimated Quantitation Limits[a] Ground water µg/L	Low Soil/Sediment[b] µg/kg
Acenaphthene	10	660
Acenaphthylene	10	660
Acetophenone	10	ND
2-Acetylaminofluorene	20	ND
1-Acetyl-2-thiourea	1000	ND
2-Aminoanthraquinone	20	ND
Aminoazobenzene	10	ND
4-Aminobiphenyl	20	ND
Anilazine	100	ND
o-Anisidine	10	ND
Anthracene	10	660
Aramite	20	ND
Azinphos-methyl	100	ND
Barban	200	ND
Benz(a)anthracene	10	660
Benzo(b)fluoranthene	10	660
Benzo(k)fluoranthene	10	660
Benzoic acid	50	3300
Benzo(g,h,i)perylene	10	660
Benzo(a)pyrene	10	660
p-Benzoquinone	10	ND
Benzyl alcohol	20	1300
Bis(2-chloroethoxy)methane	10	660
Bis(2-chloroethyl) ether	10	660
Bis(2-chloroisopropyl) ether	10	660
4-Bromophenyl phenyl ether	10	660
Bromoxynil	10	ND
Butyl benzyl phthalate	10	660
Captafol	20	ND
Captan	50	ND
Carbaryl	10	ND
Carbofuran	10	ND
Carbophenothion	10	ND
Chlorfenvinphos	20	ND
4-Chloroaniline	20	1300
Chlorobenzilate	10	ND
5-Chloro-2-methylaniline	10	ND
4-Chloro-3-methylphenol	20	1300
3-(Chloromethyl)pyridine hydrochloride	100	ND
2-Chloronaphthalene	10	660

TABLE 2 (cont.)

Compound	Estimated Quantitation Limits[a] Ground water µg/L	Low Soil/Sediment[b] µg/kg
2-Chlorophenol	10	660
4-Chlorophenyl phenyl ether	10	660
Chrysene	10	660
Coumaphos	40	ND
p-Cresidine	10	ND
Crotoxyphos	20	ND
2-Cyclohexyl-4,6-dinitrophenol	100	ND
Demeton-O	10	ND
Demeton-S	10	ND
Diallate (cis or trans)	10	ND
Diallate (trans or cis)	10	ND
2,4-Diaminotoluene	20	ND
Dibenz(a,j)acridine	10	ND
Dibenz(a,h)anthracene	10	660
Dibenzofuran	10	660
Dibenzo(a,e)pyrene	10	ND
Di-n-butyl phthalate	10	ND
Dichlone	NA	ND
1,2-Dichlorobenzene	10	660
1,3-Dichlorobenzene	10	660
1,4-Dichlorobenzene	10	660
3,3'-Dichlorobenzidine	20	1300
2,4-Dichlorophenol	10	660
2,6-Dichlorophenol	10	ND
Dichlorovos	10	ND
Dicrotophos	10	ND
Diethyl phthalate	10	660
Diethylstilbestrol	20	ND
Diethyl sulfate	100	ND
Dimethoate	20	ND
3,3'-Dimethoxybenzidine	100	ND
Dimethylaminoazobenzene	10	ND
7,12-Dimethylbenz(a)anthracene	10	ND
3,3'-Dimethylbenzidine	10	ND
a,a-Dimethylphenethylamine	ND	ND
2,4-Dimethylphenol	10	660
Dimethyl phthalate	10	660
1,2-Dinitrobenzene	40	ND
1,3-Dinitrobenzene	20	ND
1,4-Dinitrobenzene	40	ND
4,6-Dinitro-2-methylphenol	50	3300
2,4-Dinitrophenol	50	3300

TABLE 2 (cont.)

Compound	Estimated Quantitation Limits[a] Ground water µg/L	Low Soil/Sediment[b] µg/kg
2,4-Dinitrotoluene	10	660
2,6-Dinitrotoluene	10	660
Dinocap	100	ND
Dinoseb	20	ND
5,5-Diphenylhydantoin	20	ND
Di-n-octyl phthalate	10	660
Disulfoton	10	ND
EPN	10	ND
Ethion	10	ND
Ethyl carbamate	50	ND
Bis(2-ethylhexyl) phthalate	10	660
Ethyl methanesulfonate	20	ND
Famphur	20	ND
Fensulfothion	40	ND
Fenthion	10	ND
Fluchloralin	20	ND
Fluoranthene	10	660
Fluorene	10	660
Hexachlorobenzene	10	660
Hexachlorobutadiene	10	660
Hexachlorocyclopentadiene	10	660
Hexachloroethane	10	660
Hexachlorophene	50	ND
Hexachloropropene	10	ND
Hexamethylphosphoramide	20	ND
Hydroquinone	ND	ND
Indeno(1,2,3-cd)pyrene	10	660
Isodrin	20	ND
Isophorone	10	660
Isosafrole	10	ND
Kepone	20	ND
Leptophos	10	ND
Malathion	50	ND
Maleic anhydride	NA	ND
Mestranol	20	ND
Methapyrilene	100	ND
Methoxychlor	10	ND
3-Methylcholanthrene	10	ND
4,4'-Methylenebis(2-chloroaniline)	NA	ND
Methyl methanesulfonate	10	ND
2-Methylnaphthalene	10	660
Methyl parathion	10	ND
2-Methylphenol	10	660
3-Methylphenol	10	ND

TABLE 2 (cont.)

Compound	Estimated Quantitation Limits[a] Ground water µg/L	Low Soil/Sediment[b] µg/kg
4-Methylphenol	10	660
Mevinphos	10	ND
Mexacarbate	20	ND
Mirex	10	ND
Monocrotophos	40	ND
Naled	20	ND
Naphthalene	10	660
1,4-Naphthoquinone	10	ND
1-Naphthylamine	10	ND
2-Naphthylamine	10	ND
Nicotine	20	ND
5-Nitroacenaphthene	10	ND
2-Nitroaniline	50	3300
3-Nitroaniline	50	3300
4-Nitroaniline	20	ND
5-Nitro-o-anisidine	10	ND
Nitrobenzene	10	660
4-Nitrobiphenyl	10	ND
Nitrofen	20	ND
2-Nitrophenol	10	660
4-Nitrophenol	50	3300
5-Nitro-o-toluidine	10	ND
4-Nitroquinoline-1-oxide	40	ND
N-Nitrosodi-n-butylamine	10	ND
N-Nitrosodiethylamine	20	ND
N-Nitrosodiphenylamine	10	660
N-Nitroso-di-n-propylamine	10	660
N-Nitrosopiperidine	20	ND
N-Nitrosopyrrolidine	40	ND
Octamethyl pyrophosphoramide	200	ND
4,4'-Oxydianiline	20	ND
Parathion	10	ND
Pentachlorobenzene	10	ND
Pentachloronitrobenzene	20	ND
Pentachlorophenol	50	3300
Phenacetin	20	ND
Phenanthrene	10	660
Phenobarbital	10	ND
Phenol	10	660
1,4-Phenylenediamine	10	ND
Phorate	10	ND
Phosalone	100	ND
Phosmet	40	ND
Phosphamidon	100	ND

TABLE 2 (cont.)

Compound	Estimated Quantitation Limits[a] Ground water µg/L	Low Soil/Sediment[b] µg/kg
Phthalic anhydride	100	ND
2-Picoline	ND	ND
Piperonyl sulfoxide	100	ND
Pronamide	10	ND
Propylthiouracil	100	ND
Pyrene	10	660
Pyridine	ND	ND
Resorcinol	100	ND
Safrole	10	ND
Strychnine	40	ND
Sulfallate	10	ND
Terbufos	20	ND
1,2,4,5-Tetrachlorobenzene	10	ND
2,3,4,6-Tetrachlorophenol	10	ND
Tetrachlorvinphos	20	ND
Tetraethyl pyrophosphate	40	ND
Thionazine	20	ND
Thiophenol (Benzenethiol)	20	ND
o-Toluidine	10	ND
1,2,4-Trichlorobenzene	10	660
2,4,5-Trichlorophenol	10	660
2,4,6-Trichlorophenol	10	660
Trifluralin	10	ND
2,4,5-Trimethylaniline	10	ND
Trimethyl phosphate	10	ND
1,3,5-Trinitrobenzene	10	ND
Tris(2,3-dibromopropyl) phosphate	200	ND
Tri-p-tolyl phosphate(h)	10	ND
O,O,O-Triethyl phosphorothioate	NT	ND

[a] Sample EQLs are highly matrix-dependent. The EQLs listed here are provided for guidance and may not always be achievable.

[b] EQLs listed for soil/sediment are based on wet weight. Normally, data are reported on a dry weight basis, therefore, EQLs will be higher based on the % dry weight of each sample. These EQLs are based on a 30-g sample and gel permeation chromatography cleanup.

ND = Not Determined
NA = Not Applicable
NT = Not Tested

Other Matrices	Factor[c]
High-concentration soil and sludges by ultrasonic extractor	7.5
Non-water miscible waste	75

[c]EQL = (EQL for Low Soil/Sediment given above in Table 2) x (Factor)

TABLE 3

DFTPP KEY IONS AND ION ABUNDANCE CRITERIA[a,b]

Mass	Ion Abundance Criteria
51	30-60% of mass 198
68	< 2% of mass 69
70	< 2% of mass 69
127	40-60% of mass 198
197	< 1% of mass 198
198	Base peak, 100% relative abundance
199	5-9% of mass 198
275	10-30% of mass 198
365	> 1% of mass 198
441	Present but less than mass 443
442	> 40% of mass 198
443	17-23% of mass 442

[a] Data taken from Reference 3.
[b] Alternate tuning criteria may be used, (e.g., CLP, Method 525, or manufacturers' instructions), provided that method performance is not adversely affected.

TABLE 4

CALIBRATION CHECK COMPOUNDS (CCC)

Base/Neutral Fraction	Acid Fraction
Acenaphthene	4-Chloro-3-methylphenol
1,4-Dichlorobenzene	2,4-Dichlorophenol
Hexachlorobutadiene	2-Nitrophenol
Diphenylamine	Phenol
Di-n-octyl phthalate	Pentachlorophenol
Fluoranthene	2,4,6-Trichlorophenol
Benzo(a)pyrene	

TABLE 5

SEMIVOLATILE INTERNAL STANDARDS WITH CORRESPONDING ANALYTES ASSIGNED FOR QUANTITATION

1,4-Dichlorobenzene-d_4	Naphthalene-d_8	Acenaphthene-d_{10}
Aniline	Acetophenone	Acenaphthene
Benzyl alcohol	Benzoic acid	Acenaphthylene
Bis(2-chloroethyl) ether	Bis(2-chloroethoxy)methane	1-Chloronaphthalene
Bis(2-chloroisopropyl) ether	4-Chloroaniline	2-Chloronaphthalene
2-Chlorophenol	4-Chloro-3-methylphenol	4-Chlorophenyl phenyl ether
1,3-Dichlorobenzene	2,4-Dichlorophenol	Dibenzofuran
1,4-Dichlorobenzene	2,6-Dichlorophenol	Diethyl phthalate
1,2-Dichlorobenzene	α,α-Dimethyl-phenethylamine	Dimethyl phthalate
Ethyl methanesulfonate	2,4-Dimethylphenol	2,4-Dinitrophenol
2-Fluorophenol (surr)	Hexachlorobutadiene	2,4-Dinitrotoluene
Hexachloroethane	Isophorone	2,6-Dinitrotoluene
Methyl methanesulfonate	2-Methylnaphthalene	Fluorene
2-Methylphenol	Naphthalene	2-Fluorobiphenyl (surr)
4-Methylphenol	Nitrobenzene	Hexachlorocyclo-pentadiene
N-Nitrosodimethylamine	Nitrobenzene-d_5 (surr)	1-Naphthylamine
N-Nitroso-di-n-propyl-amine	2-Nitrophenol	2-Naphthylamine
Phenol	N-Nitrosodi-n-butylamine	2-Nitroaniline
Phenol-d_6 (surr)	N-Nitrosopiperidine	3-Nitroaniline
2-Picoline	1,2,4-Trichlorobenzene	4-Nitroaniline
		4-Nitrophenol
		Pentachlorobenzene
		1,2,4,5-Tetra-chlorobenzene
		2,3,4,6-Tetra-chlorophenol
		2,4,6-Tribromo-phenol (surr)
		2,4,6-Trichloro-phenol
		2,4,5-Trichloro-phenol

(surr) = surrogate

TABLE 5
(continued)

Phenanthrene-d_{10}	Chrysene-d_{12}	Perylene-d_{12}
4-Aminobiphenyl	Benzidine	Benzo(b)fluor-anthene
Anthracene	Benzo(a)anthracene	Benzo(k)fluor-anthene
4-Bromophenyl phenyl ether	Bis(2-ethylhexyl) phthalate	Benzo(g,h,i)-perylene
Di-n-butyl phthalate	Butyl benzyl phthalate	Benzo(a)pyrene
4,6-Dinitro-2-methyl-phenol	Chrysene	Dibenz(a,j)acridine
Diphenylamine	3,3'-Dichlorobenzidine	Dibenz(a,h)-anthracene
Fluoranthene	p-Dimethylaminoazobenzene	
Hexachlorobenzene	Pyrene	
N-Nitrosodiphenylamine	Terphenyl-d_{14} (surr)	
Pentachlorophenol	7,12-Dimethylbenz-(a)anthracene	
Pentachloronitrobenzene	Di-n-octyl phthalate	
Phenacetin	Indeno(1,2,3-cd) pyrene	
Phenanthrene	3-Methylchol-anthrene	
Pronamide		

(surr) = surrogate

TABLE 6

MULTILABORATORY PERFORMANCE DATA[a]

Compound	Test conc. (µg/L)	Limit for s (µg/L)	Range for $\bar{x}$ (µg/L)	Range p, p_s (%)
Acenaphthene	100	27.6	60.1-132.3	47-145
Acenaphthylene	100	40.2	53.5-126.0	33-145
Aldrin	100	39.0	7.2-152.2	D-166
Anthracene	100	32.0	43.4-118.0	27-133
Benz(a)anthracene	100	27.6	41.8-133.0	33-143
Benzo(b)fluoranthene	100	38.8	42.0-140.4	24-159
Benzo(k)fluoranthene	100	32.3	25.2-145.7	11-162
Benzo(a)pyrene	100	39.0	31.7-148.0	17-163
Benzo(g,h,i)perylene	100	58.9	D-195.0	D-219
Benzyl butyl phthalate	100	23.4	D-139.9	D-152
β-BHC	100	31.5	41.5-130.6	24-149
δ-BHC	100	21.6	D-100.0	D-110
Bis(2-chloroethyl) ether	100	55.0	42.9-126.0	12-158
Bis(2-chloroethoxy)methane	100	34.5	49.2-164.7	33-184
Bis(2-chloroisopropyl) ether	100	46.3	62.8-138.6	36-166
Bis(2-ethylhexyl) phthalate	100	41.1	28.9-136.8	8-158
4-Bromophenyl phenyl ether	100	23.0	64.9-114.4	53-127
2-Chloronaphthalene	100	13.0	64.5-113.5	60-118
4-Chlorophenyl phenyl ether	100	33.4	38.4-144.7	25-158
Chrysene	100	48.3	44.1-139.9	17-168
4,4'-DDD	100	31.0	D-134.5	D-145
4,4'-DDE	100	32.0	19.2-119.7	4-136
4,4'-DDT	100	61.6	D-170.6	D-203
Dibenzo(a,h)anthracene	100	70.0	D-199.7	D-227
Di-n-butyl phthalate	100	16.7	8.4-111.0	1-118
1,2-Dichlorobenzene	100	30.9	48.6-112.0	32-129
1,3-Dichlorobenzene	100	41.7	16.7-153.9	D-172
1,4-Dichlorobenzene	100	32.1	37.3-105.7	20-124
3,3'-Dichlorobenzidine	100	71.4	8.2-212.5	D-262
Dieldrin	100	30.7	44.3-119.3	29-136
Diethyl phthalate	100	26.5	D-100.0	D-114
Dimethyl phthalate	100	23.2	D-100.0	D-112
2,4-Dinitrotoluene	100	21.8	47.5-126.9	39-139
2,6-Dinitrotoluene	100	29.6	68.1-136.7	50-158
Di-n-octyl phthalate	100	31.4	18.6-131.8	4-146
Endosulfan sulfate	100	16.7	D-103.5	D-107
Endrin aldehyde	100	32.5	D-188.8	D-209
Fluoranthene	100	32.8	42.9-121.3	26-137
Fluorene	100	20.7	71.6-108.4	59-121
Heptachlor	100	37.2	D-172.2	D-192

TABLE 6
(continued)

Compound	Test conc. (µg/L)	Limit for s (µg/L)	Range for $\bar{x}$ (µg/L)	Range p, p_s (%)
Heptachlor epoxide	100	54.7	70.9-109.4	26.155
Hexachlorobenzene	100	24.9	7.8-141.5	D-152
Hexachlorobutadiene	100	26.3	37.8-102.2	24-116
Hexachloroethane	100	24.5	55.2-100.0	40-113
Indeno(1,2,3-cd)pyrene	100	44.6	D-150.9	D-171
Isophorone	100	63.3	46.6-180.2	21-196
Naphthalene	100	30.1	35.6-119.6	21-133
Nitrobenzene	100	39.3	54.3-157.6	35-180
N-Nitrosodi-n-propylamine	100	55.4	13.6-197.9	D-230
Aroclor 1260	100	54.2	19.3-121.0	D-164
Phenanthrene	100	20.6	65.2-108.7	54-120
Pyrene	100	25.2	69.6-100.0	52-115
1,2,4-Trichlorobenzene	100	28.1	57.3-129.2	44-142
4-Chloro-3-methylphenol	100	37.2	40.8-127.9	22-147
2-Chlorophenol	100	28.7	36.2-120.4	23-134
2,4-Chlorophenol	100	26.4	52.5-121.7	39-135
2,4-Dimethylphenol	100	26.1	41.8-109.0	32-119
2,4-Dinitrophenol	100	49.8	D-172.9	D-191
2-Methyl-4,6-dinitrophenol	100	93.2	53.0-100.0	D-181
2-Nitrophenol	100	35.2	45.0-166.7	29-182
4-Nitrophenol	100	47.2	13.0-106.5	D-132
Pentachlorophenol	100	48.9	38.1-151.8	14-176
Phenol	100	22.6	16.6-100.0	5-112
2,4,6-Trichlorophenol	100	31.7	52.4-129.2	37-144

s = Standard deviation of four recovery measurements, in µg/L

$\bar{x}$ = Average recovery for four recovery measurements, in µg/L

p, p_s = Measured percent recovery

D = Detected; result must be greater than zero

[a] Criteria from 40 CFR Part 136 for Method 625, using a packed GC column. These criteria are based directly on the method performance data in Table 7. Where necessary, the limits for recovery have been broadened to assure applicability of the limits to concentrations below those used to develop Table 7. These values are for guidance only. Appropriate derivation of acceptance criteria for capillary columns should result in much narrower ranges. See Method 8000 for information on developing and updating acceptance criteria for method performance.

TABLE 7

METHOD ACCURACY AND PRECISION AS FUNCTIONS OF CONCENTRATION[a]

Compound	Accuracy, as recovery, x' (µg/L)	Single analyst precision, s_r' (µg/L)	Overall precision, S' (µg/L)
Acenaphthene	0.96C+0.19	0.15$\bar{x}$-0.12	0.21$\bar{x}$-0.67
Acenaphthylene	0.89C+0.74	0.24$\bar{x}$-1.06	0.26$\bar{x}$-0.54
Aldrin	0.78C+1.66	0.27$\bar{x}$-1.28	0.43$\bar{x}$+1.13
Anthracene	0.80C+0.68	0.21$\bar{x}$-0.32	0.27$\bar{x}$-0.64
Benz(a)anthracene	0.88C-0.60	0.15$\bar{x}$+0.93	0.26$\bar{x}$-0.21
Benzo(b)fluoranthene	0.93C-1.80	0.22$\bar{x}$+0.43	0.29$\bar{x}$+0.96
Benzo(k)fluoranthene	0.87C-1.56	0.19$\bar{x}$+1.03	0.35$\bar{x}$+0.40
Benzo(a)pyrene	0.90C-0.13	0.22$\bar{x}$+0.48	0.32$\bar{x}$+1.35
Benzo(g,h,i)perylene	0.98C-0.86	0.29$\bar{x}$+2.40	0.51$\bar{x}$-0.44
Benzyl butyl phthalate	0.66C-1.68	0.18$\bar{x}$+0.94	0.53$\bar{x}$+0.92
β-BHC	0.87C-0.94	0.20$\bar{x}$-0.58	0.30$\bar{x}$+1.94
δ-BHC	0.29C-1.09	0.34$\bar{x}$+0.86	0.93$\bar{x}$-0.17
Bis(2-chloroethyl) ether	0.86C-1.54	0.35$\bar{x}$-0.99	0.35$\bar{x}$+0.10
Bis(2-chloroethoxy)methane	1.12C-5.04	0.16$\bar{x}$+1.34	0.26$\bar{x}$+2.01
Bis(2-chloroisopropyl) ether	1.03C-2.31	0.24$\bar{x}$+0.28	0.25$\bar{x}$+1.04
Bis(2-ethylhexyl) phthalate	0.84C-1.18	0.26$\bar{x}$+0.73	0.36$\bar{x}$+0.67
4-Bromophenyl phenyl ether	0.91C-1.34	0.13$\bar{x}$+0.66	0.16$\bar{x}$+0.66
2-Chloronaphthalene	0.89C+0.01	0.07$\bar{x}$+0.52	0.13$\bar{x}$+0.34
4-Chlorophenyl phenyl ether	0.91C+0.53	0.20$\bar{x}$-0.94	0.30$\bar{x}$-0.46
Chrysene	0.93C-1.00	0.28$\bar{x}$+0.13	0.33$\bar{x}$-0.09
4,4'-DDD	0.56C-0.40	0.29$\bar{x}$-0.32	0.66$\bar{x}$-0.96
4,4'-DDE	0.70C-0.54	0.26$\bar{x}$-1.17	0.39$\bar{x}$-1.04
4,4'-DDT	0.79C-3.28	0.42$\bar{x}$+0.19	0.65$\bar{x}$-0.58
Dibenzo(a,h)anthracene	0.88C+4.72	0.30$\bar{x}$+8.51	0.59$\bar{x}$+0.25
Di-n-butyl phthalate	0.59C+0.71	0.13$\bar{x}$+1.16	0.39$\bar{x}$+0.60
1,2-Dichlorobenzene	0.80C+0.28	0.20$\bar{x}$+0.47	0.24$\bar{x}$+0.39
1,3-Dichlorobenzene	0.86C-0.70	0.25$\bar{x}$+0.68	0.41$\bar{x}$+0.11
1,4-Dichlorobenzene	0.73C-1.47	0.24$\bar{x}$+0.23	0.29$\bar{x}$+0.36
3,3'-Dichlorobenzidine	1.23C-12.65	0.28$\bar{x}$+7.33	0.47$\bar{x}$+3.45
Dieldrin	0.82C-0.16	0.20$\bar{x}$-0.16	0.26$\bar{x}$-0.07
Diethyl phthalate	0.43C+1.00	0.28$\bar{x}$+1.44	0.52$\bar{x}$+0.22
Dimethyl phthalate	0.20C+1.03	0.54$\bar{x}$+0.19	1.05$\bar{x}$-0.92
2,4-Dinitrotoluene	0.92C-4.81	0.12$\bar{x}$+1.06	0.21$\bar{x}$+1.50
2,6-Dinitrotoluene	1.06C-3.60	0.14$\bar{x}$+1.26	0.19$\bar{x}$+0.35
Di-n-octyl phthalate	0.76C-0.79	0.21$\bar{x}$+1.19	0.37$\bar{x}$+1.19
Endosulfan sulfate	0.39C+0.41	0.12$\bar{x}$+2.47	0.63$\bar{x}$-1.03
Endrin aldehyde	0.76C-3.86	0.18$\bar{x}$+3.91	0.73$\bar{x}$-0.62
Fluoranthene	0.81C+1.10	0.22$\bar{x}$-0.73	0.28$\bar{x}$-0.60
Fluorene	0.90C-0.00	0.12$\bar{x}$+0.26	0.13$\bar{x}$+0.61
Heptachlor	0.87C-2.97	0.24$\bar{x}$-0.56	0.50$\bar{x}$-0.23
Heptachlor epoxide	0.92C-1.87	0.33$\bar{x}$-0.46	0.28$\bar{x}$+0.64

TABLE 7
(continued)

Compound	Accuracy, as recovery, x' (µg/L)	Single analyst precision, s_r' (µg/L)	Overall precision, S' (µg/L)
Hexachlorobenzene	0.74C+0.66	0.18$\bar{x}$-0.10	0.43$\bar{x}$-0.52
Hexachlorobutadiene	0.71C-1.01	0.19$\bar{x}$+0.92	0.26$\bar{x}$+0.49
Hexachloroethane	0.73C-0.83	0.17$\bar{x}$+0.67	0.17$\bar{x}$+0.80
Indeno(1,2,3-cd)pyrene	0.78C-3.10	0.29$\bar{x}$+1.46	0.50$\bar{x}$-0.44
Isophorone	1.12C+1.41	0.27$\bar{x}$+0.77	0.33$\bar{x}$+0.26
Naphthalene	0.76C+1.58	0.21$\bar{x}$-0.41	0.30$\bar{x}$-0.68
Nitrobenzene	1.09C-3.05	0.19$\bar{x}$+0.92	0.27$\bar{x}$+0.21
N-Nitrosodi-n-propylamine	1.12C-6.22	0.27$\bar{x}$+0.68	0.44$\bar{x}$+0.47
Aroclor 1260	0.81C-10.86	0.35$\bar{x}$+3.61	0.43$\bar{x}$+1.82
Phenanthrene	0.87C+0.06	0.12$\bar{x}$+0.57	0.15$\bar{x}$+0.25
Pyrene	0.84C-0.16	0.16$\bar{x}$+0.06	0.15$\bar{x}$+0.31
1,2,4-Trichlorobenzene	0.94C-0.79	0.15$\bar{x}$+0.85	0.21$\bar{x}$+0.39
4-Chloro-3-methylphenol	0.84C+0.35	0.23$\bar{x}$+0.75	0.29$\bar{x}$+1.31
2-Chlorophenol	0.78C+0.29	0.18$\bar{x}$+1.46	0.28$\bar{x}$+0.97
2,4-Dichlorophenol	0.87C-0.13	0.15$\bar{x}$+1.25	0.21$\bar{x}$+1.28
2,4-Dimethylphenol	0.71C+4.41	0.16$\bar{x}$+1.21	0.22$\bar{x}$+1.31
2,4-Dinitrophenol	0.81C-18.04	0.38$\bar{x}$+2.36	0.42$\bar{x}$+26.29
2-Methyl-4,6-dinitrophenol	1.04C-28.04	0.10$\bar{x}$+42.29	0.26$\bar{x}$+23.10
2-Nitrophenol	0.07C-1.15	0.16$\bar{x}$+1.94	0.27$\bar{x}$+2.60
4-Nitrophenol	0.61C-1.22	0.38$\bar{x}$+2.57	0.44$\bar{x}$+3.24
Pentachlorophenol	0.93C+1.99	0.24$\bar{x}$+3.03	0.30$\bar{x}$+4.33
Phenol	0.43C+1.26	0.26$\bar{x}$+0.73	0.35$\bar{x}$+0.58
2,4,6-Trichlorophenol	0.91C-0.18	0.16$\bar{x}$+2.22	0.22$\bar{x}$+1.81

x' = Expected recovery for one or more measurements of a sample containing a concentration of C, in µg/L.

s_r' = Expected single analyst standard deviation of measurements at an average concentration of $\bar{x}$, in µg/L.

S' = Expected interlaboratory standard deviation of measurements at an average concentration found of $\bar{x}$, in µg/L.

C = True value for the concentration, in µg/L.

$\bar{x}$ = Average recovery found for measurements of samples containing a concentration of C, in µg/L.

[a] Criteria from 40 CFR Part 136 for Method 625, using a packed GC column. These criteria are based directly on the method performance data in Table 7. Where necessary, the limits for recovery have been broadened to assure applicability of the limits to concentrations below those used to develop Table 7. These values are for guidance only. Appropriate derivation of acceptance criteria for capillary columns should result in much narrower ranges. See Method 8000 for information on developing and updating acceptance criteria for method performance.

TABLE 8

EXTRACTION EFFICIENCY AND AQUEOUS STABILITY RESULTS

Compound	Percent Recovery on Day 0		Percent Recovery on Day 7	
	Mean	RSD	Mean	RSD
3-Amino-9-ethylcarbazole	80	8	73	3
4-Chloro-1,2-phenylenediamine	91	1	108	4
4-Chloro-1,3-phenylenediamine	84	3	70	3
1,2-Dibromo-3-chloropropane	97	2	98	5
Dinoseb	99	3	97	6
Parathion	100	2	103	4
4,4'-Methylenebis(N,N-dimethylaniline)	108	4	90	4
5-Nitro-o-toluidine	99	10	93	4
2-Picoline	80	4	83	4
Tetraethyl dithiopyrophosphate	92	7	70	1

Data taken from Reference 6.

TABLE 9

MEAN PERCENT RECOVERIES AND PERCENT RSD VALUES FOR SEMIVOLATILE ORGANICS FROM SPIKED CLAY SOIL AND TOPSOIL BY AUTOMATED SOXHLET EXTRACTION (METHOD 3541) WITH HEXANE-ACETONE (1:1)[a]

Compound	Clay Soil		Topsoil	
	Mean Recovery	RSD	Mean Recovery	RSD
1,3-Dichlorobenzene	0	--	0	--
1,2-Dichlorobenzene	0	--	0	--
Nitrobenzene	0	--	0	--
Benzal chloride	0	--	0	--
Benzotrichloride	0	--	0	--
4-Chloro-2-nitrotoluene	0	--	0	--
Hexachlorocyclopentadiene	4.1	15	7.8	23
2,4-Dichloronitrobenzene	35.2	7.6	21.2	15
3,4-Dichloronitrobenzene	34.9	15	20.4	11
Pentachlorobenzene	13.7	7.3	14.8	13
2,3,4,5-Tetrachloronitrobenzene	55.9	6.7	50.4	6.0
Benefin	62.6	4.8	62.7	2.9
alpha-BHC	58.2	7.3	54.8	4.8
Hexachlorobenzene	26.9	13	25.1	5.7
delta-BHC	95.8	4.6	99.2	1.3
Heptachlor	46.9	9.2	49.1	6.3
Aldrin	97.7	12	102	7.4
Isopropalin	102	4.3	105	2.3
Heptachlor epoxide	90.4	4.4	93.6	2.4
trans-Chlordane	90.1	4.5	95.0	2.3
Endosulfan I	96.3	4.4	101	2.2
Dieldrin	129	4.7	104	1.9
2,5-Dichlorophenyl-4-nitrophenyl ether	110	4.1	112	2.1
Endrin	102	4.5	106	3.7
Endosulfan II	104	4.1	105	0.4
p,p'-DDT	134	2.1	111	2.0
2,3,6-Trichlorophenyl-4'-nitrophenyl ether	110	4.8	110	2.8
2,3,4-Trichlorophenyl-4'-nitrophenyl ether	112	4.4	112	3.3
Mirex	104	5.3	108	2.2

[a] The operating conditions for the Soxtec apparatus were as follows: immersion time 45 min; extraction time 45 min; the sample size was 10 g; the spiking concentration was 500 ng/g, except for the surrogate compounds at 1000 ng/g, 2,5-Dichlorophenyl-4-nitrophenyl ether, 2,3,6-Trichlorophenyl-4-nitrophenyl ether, and 2,3,4-Trichlorophenyl-4-nitrophenyl ether at 1500 ng/g, Nitrobenzene at 2000 ng/g, and 1,3-Dichlorobenzene and 1,2-Dichlorobenzene at 5000 ng/g.

TABLE 10

SINGLE LABORATORY ACCURACY AND PRECISION DATA FOR THE EXTRACTION OF SEMIVOLATILE ORGANICS FROM SPIKED CLAY BY AUTOMATED SOXHLET (METHOD 3541)[a]

Compound	Mean Recovery	RSD
Phenol	47.8	5.6
Bis(2-chloroethyl)ether	25.4	13
2-Chlorophenol	42.7	4.3
Benzyl alcohol	55.9	7.2
2-Methylphenol	17.6	6.6
Bis(2-chloroisopropyl)ether	15.0	15
4-Methylphenol	23.4	6.7
N-Nitroso-di-n-propylamine	41.4	6.2
Nitrobenzene	28.2	7.7
Isophorone	56.1	4.2
2-Nitrophenol	36.0	6.5
2,4-Dimethylphenol	50.1	5.7
Benzoic acid	40.6	7.7
Bis(2-chloroethoxy)methane	44.1	3.0
2,4-Dichlorophenol	55.6	4.6
1,2,4-Trichlorobenzene	18.1	31
Naphthalene	26.2	15
4-Chloroaniline	55.7	12
4-Chloro-3-methylphenol	65.1	5.1
2-Methylnaphthalene	47.0	8.6
Hexachlorocyclopentadiene	19.3	19
2,4,6-Trichlorophenol	70.2	6.3
2,4,5-Trichlorophenol	26.8	2.9
2-Chloronaphthalene	61.2	6.0
2-Nitroaniline	73.8	6.0
Dimethyl phthalate	74.6	5.2
Acenaphthylene	71.6	5.7
3-Nitroaniline	77.6	5.3
Acenaphthene	79.2	4.0
2,4-Dinitrophenol	91.9	8.9
4-Nitrophenol	62.9	16
Dibenzofuran	82.1	5.9
2,4-Dinitrotoluene	84.2	5.4
2,6-Dinitrotoluene	68.3	5.8
Diethyl phthalate	74.9	5.4
4-Chlorophenyl-phenyl ether	67.2	3.2
Fluorene	82.1	3.4
4-Nitroaniline	79.0	7.9

TABLE 10
(continued)

Compound	Mean Recovery	RSD
4,6-Dinitro-2-methylphenol	63.4	6.8
N-Nitrosodiphenylamine	77.0	3.4
4-Bromophenyl-phenyl ether	62.4	3.0
Hexachlorobenzene	72.6	3.7
Pentachlorophenol	62.7	6.1
Phenanthrene	83.9	5.4
Anthracene	96.3	3.9
Di-n-butyl phthalate	78.3	40
Fluoranthene	87.7	6.9
Pyrene	102	0.8
Butyl benzyl phthalate	66.3	5.2
3,3'-Dichlorobenzidine	25.2	11
Benzo(a)anthracene	73.4	3.8
Bis(2-ethylhexyl) phthalate	77.2	4.8
Chrysene	76.2	4.4
Di-n-octyl phthalate	83.1	4.8
Benzo(b)fluoranthene	82.7	5.0
Benzo(k)fluoranthene	71.7	4.1
Benzo(a)pyrene	71.7	4.1
Indeno(1,2,3-cd)pyrene	72.2	4.3
Dibenzo(a,h)anthracene	66.7	6.3
Benzo(g,h,i)perylene	63.9	8.0
1,2-Dichlorobenzene	0	--
1,3-Dichlorobenzene	0	--
1,4-Dichlorobenzene	0	--
Hexachloroethane	0	--
Hexachlorobutadiene	0	--

[a] Number of determinations was three. The operating conditions for the Soxtec apparatus were as follows: immersion time 45 min; extraction time 45 min; the sample size was 10 g clay soil; the spike concentration was 6 mg/kg per compound. The sample was allowed to equilibrate 1 hour after spiking.

Data taken from Reference 7.

TABLE 11

PRECISION AND BIAS VALUES FOR METHOD 3542[1]

Compound	Mean Recovery	Standard Deviation	Relative Standard Deviation Percent
2-Fluorophenol	74.6	28.6	38.3
Phenol-d_5	77.8	27.7	35.6
Nitrobenzene-d_5	65.6	32.5	49.6
2-Fluorobiphenyl	75.9	30.3	39.9
2,4,6-Tribromophenol	67.0	34.0	50.7
Terphenyl-d_{14}	78.6	32.4	41.3

[1] The surrogate values shown in Table 11 represent mean recoveries for surrogates in all Method 0010 matrices in a field dynamic spiking study.

TABLE 12

ACCELERATED SOLVENT EXTRACTION (METHOD 3545) RECOVERY VALUES
AS PERCENT OF SOXTEC™

COMPOUND	CLAY			LOAM			SAND			AVE
	LOW	MID	HIGH	LOW	MID	HIGH	LOW	MID	HIGH	
Phenol	93.3	78.7	135.9	73.9	82.8	124.6	108.8	130.6	89.7	**102.0**
Bis(2-chloroethyl) ether	102.1	85.1	109.1	96.0	88.0	103.6	122.3	119.9	90.8	**101.9**
2-Chlorophenol	100.8	82.6	115.0	93.8	88.9	111.1	115.0	115.3	91.9	**101.6**
1,3-Dichlorobenzene	127.7	129.7	110.0	*364.2	129.9	119.0	*241.3	*163.7	107.1	**120.6**
1,4-Dichlorobenzene	127.9	127.0	110.5	*365.9	127.8	116.4	*309.6	*164.1	105.8	**119.2**
1,2-Dichlorobenzene	116.8	115.8	101.3	*159.2	113.4	105.5	*189.3	134.0	100.4	**112.5**
2-Methylphenol	98.9	82.1	119.7	87.6	89.4	111.0	133.2	128.0	92.1	**104.7**
Bis(2-chloroisopropyl)ether	109.4	71.5	108.0	81.8	81.0	88.6	118.1	148.3	94.8	**100.2**
o-Toluidine	100.0	89.7	117.2	100.0	*152.5	120.3	100.0	*199.5	102.7	**110.3**
N-Nitroso-di-n-propylamine	103.0	79.1	107.7	83.9	88.1	96.2	109.9	123.3	91.4	**98.1**
Hexachloroethane	97.1	125.1	111.0	*245.4	117.1	128.1	*566.7	147.9	103.7	**118.6**
Nitrobenzene	104.8	82.4	106.6	86.8	84.6	101.7	119.7	122.1	93.3	**100.2**
Isophorone	100.0	86.4	98.2	87.1	87.5	109.7	135.5	118.4	92.7	**101.7**
2,4-Dimethylphenol	100.0	104.5	140.0	100.0	114.4	123.1	100.0	*180.6	96.3	**109.8**
2-Nitrophenol	80.7	80.5	107.9	91.4	86.7	103.2	122.1	107.1	87.0	**96.3**
Bis(chloroethoxy)methane	94.4	80.6	94.7	86.5	84.4	99.6	130.6	110.7	93.2	**97.2**
2,4-Dichlorophenol	88.9	87.8	111.4	85.9	87.6	103.5	123.3	107.0	92.1	**98.6**
1,2,4-Trichlorobenzene	98.0	97.8	98.8	123.0	93.7	94.5	137.0	99.4	95.3	**104.2**
Naphthalene	101.7	97.2	123.6	113.2	102.9	129.5	*174.5	114.0	89.8	**106.1**
4-Chloroaniline	100.0	*150.2	*162.4	100.0	125.5	*263.6	100.0	*250.8	114.9	**108.1**
Hexachlorobutadiene	101.1	98.7	102.2	124.1	90.3	98.0	134.9	96.1	96.8	**104.7**
4-Chloro-3-methylphenol	90.4	80.2	114.7	79.0	85.2	109.8	131.6	116.2	90.1	**99.7**
2-Methylnaphthalene	93.2	89.9	94.6	104.1	92.2	105.9	146.2	99.1	93.3	**102.1**
Hexachlorocyclopentadiene	100.0	100.0	0.0	100.0	100.0	6.8	100.0	100.0	*238.3	**75.8**
2,4,6-Trichlorophenol	94.6	90.0	112.0	84.2	91.2	103.6	101.6	95.9	89.8	**95.9**
2,4,5-Trichlorophenol	84.4	91.9	109.6	96.1	80.7	103.6	108.9	83.9	87.9	**94.1**
2-Chloronaphthalene	100.0	91.3	93.6	97.6	93.4	98.3	106.8	93.0	92.0	**96.2**
2-Nitroaniline	90.0	83.4	97.4	71.3	88.4	89.9	112.1	113.3	87.7	**92.6**
2,6-Dinitrotoluene	83.1	90.6	91.6	86.4	90.6	90.3	104.3	84.7	90.9	**90.3**
Acenaphthylene	104.9	95.9	100.5	99.0	97.9	108.8	118.5	97.8	92.0	**101.7**
3-Nitroaniline	*224.0	115.6	97.6	100.0	111.8	107.8	0.0	111.7	99.0	**92.9**
Acenaphthene	102.1	92.6	97.6	97.2	96.9	104.4	114.2	92.0	89.0	**98.4**
4-Nitrophenol	0.0	93.2	121.5	18.1	87.1	116.6	69.1	90.5	84.5	**75.6**
2,4-Dinitrotoluene	73.9	91.9	100.2	84.7	93.8	98.9	100.9	84.3	87.3	**90.7**

TABLE 12 (cont.)

ACCELERATED SOLVENT EXTRACTION (METHOD 3545) RECOVERY VALUES
AS PERCENT OF SOXTEC™

COMPOUND	CLAY			LOAM			SAND			AVE
	LOW	MID	HIGH	LOW	MID	HIGH	LOW	MID	HIGH	
Dibenzofuran	89.5	91.7	109.3	98.5	92.2	111.4	113.8	92.7	90.4	**98.8**
4-Chlorophenyl phenyl ether	83.0	94.5	98.7	95.7	94.3	94.2	111.4	87.7	90.3	**94.4**
Fluorene	85.2	94.9	89.2	102.0	95.5	93.8	121.3	85.7	90.9	**95.4**
4-Nitroaniline	77.8	114.8	94.5	129.6	103.6	95.4	*154.1	89.3	87.5	**99.1**
N-Nitrosodiphenylamine	82.6	96.7	93.8	92.9	93.4	116.4	97.5	110.9	86.7	**96.8**
4-Bromophenyl phenyl ether	85.6	92.9	92.8	91.1	107.6	89.4	118.0	97.5	87.1	**95.8**
Hexachlorobenzene	95.4	91.7	92.3	95.4	93.6	83.7	106.8	94.3	90.0	**93.7**
Pentachlorophenol	68.2	85.9	107.7	53.2	89.8	88.1	96.6	59.8	81.3	**81.2**
Phenanthrene	92.1	93.7	93.3	100.0	97.8	113.3	124.4	101.0	89.9	**100.6**
Anthracene	101.6	95.0	93.5	92.5	101.8	118.4	123.0	94.5	90.6	**101.2**
Carbazole	94.4	99.3	96.6	105.5	96.7	111.4	115.7	83.2	88.9	**99.1**
Fluoranthene	109.9	101.4	94.3	111.6	96.6	109.6	123.2	85.4	92.7	**102.7**
Pyrene	106.5	105.8	107.6	116.7	90.7	127.5	103.4	95.5	93.2	**105.2**
3,3'-Dichlorobenzidine	100.0	*492.3	131.4	100.0	*217.6	*167.6	100.0	*748.8	100.0	**116.5**
Benzo(a)anthracene	98.1	107.0	98.4	119.3	98.6	104.0	105.0	93.4	89.3	**101.5**
Chrysene	100.0	108.5	100.2	116.8	93.0	117.0	106.7	93.6	90.2	**102.9**
Benzo(b)fluoranthene	106.6	109.9	75.6	121.7	100.7	93.9	106.9	81.9	93.6	**99.0**
Benzo(k)fluoranthene	102.4	105.2	88.4	125.5	99.4	95.1	144.7	89.2	78.1	**103.1**
Benzo(a)pyrene	107.9	105.5	80.8	122.3	97.7	104.6	101.7	86.2	92.0	**99.9**
Indeno(1,2,3-cd)pyrene	95.1	105.7	93.8	126.0	105.2	90.4	133.6	82.6	91.9	**102.7**
Dibenz(a,h)anthracene	85.0	102.6	82.0	118.8	100.7	91.9	142.3	71.0	93.1	**98.6**
Benzo(g,h,*i*)perylene	98.0	0.0	81.2	0.0	33.6	78.6	128.7	83.0	94.2	**66.4**
Average	**95.1**	**94.3**	**101.0**	**95.5**	**96.5**	**104.1**	**113.0**	**100.9**	**92.5**	

* Values greater than 150% were not used to determine the averages, but the 0% values were used.

TABLE 13

SINGLE LABORATORY ACCURACY AND PRECISION FOR THE EXTRACTION OF PAHs FROM A CERTIFIED REFERENCE SEDIMENT EC-1, USING METHOD 3561 (SFE - SOLID TRAP)

Compound	Certified Value (mg/kg)	SFE Value[a] (mg/kg)	Percent of Certified Value	SFE RSD
Naphthalene	(27.9)[b]	41.3 ± 3.6	(148)	8.7
Acenaphthylene	(0.8)	0.9 ± 0.1	(112)	11.1
Acenaphthene	(0.2)	0.2 ± 0.01	(100)	0.05
Fluorene	(15.3)	15.6 ± 1.8	(102)	11.5
Phenanthrene	15.8 ± 1.2	16.1 ± 1.8	102	11.2
Anthracene	(1.3)	1.1 ± 0.2	(88)	18.2
Fluoranthene	23.2 ± 2.0	24.1 ± 2.1	104	8.7
Pyrene	16.7 ± 2.0	17.2 ± 1.9	103	11.0
Benz(a)anthracene	8.7 ± 0.8	8.8 ± 1.0	101	11.4
Chrysene	(9.2)	7.9 ± 0.9	(86)	11.4
Benzo(b)fluoranthene	7.9 ± 0.9	8.5 ± 1.1	108	12.9
Benzo(k)fluoranthene	4.4 ± 0.5	4.1 ± 0.5	91	12.2
Benzo(a)pyrene	5.3 ± 0.7	5.1 ± 0.6	96	11.8
Indeno(1,2,3-cd)pyrene	5.7 ± 0.6	5.2 ± 0.6	91	11.5
Benzo(g,h,i)perylene	4.9 ± 0.7	4.3 ± 0.5	88	11.6
Dibenz(a,h)anthracene	(1.3)	1.1 ± 0.2	(85)	18.2

[a] Relative standard deviations for the SFE values are based on six replicate extractions.

[b] Values in parentheses were obtained from, or compared to, Soxhlet extraction results which were not certified.

Data are taken from Reference 10.

TABLE 14

SINGLE LABORATORY ACCURACY AND PRECISION FOR THE EXTRACTION OF PAHs FROM A CERTIFIED REFERENCE SEDIMENT HS-3, USING METHOD 3561 (SFE - SOLID TRAP)

Compound	Certified Value (mg/kg)	SFE Value[a] (mg/kg)	Percent of Certified Value	SFE RSD
Naphthalene	9.0 ± 0.7	7.4 ± 0.6	82	8.1
Acenaphthylene	0.3 ± 0.1	0.4 ± 0.1	133	25.0
Acenaphthene	4.5 ± 1.5	3.3 ± 0.3	73	9.0
Fluorene	13.6 ± 3.1	10.4 ± 1.3	77	12.5
Phenanthrene	85.0 ± 20.0	86.2 ± 9.5	101	11.0
Anthracene	13.4 ± 0.5	12.1 ± 1.5	90	12.4
Fluoranthene	60.0 ± 9.0	54.0 ± 6.1	90	11.3
Pyrene	39.0 ± 9.0	32.7 ± 3.7	84	11.3
Benz(a)anthracene	14.6 ± 2.0	12.1 ± 1.3	83	10.7
Chrysene	14.1 ± 2.0	12.0 ± 1.3	85	10.8
Benzo(b)fluoranthene	7.7 ± 1.2	8.4 ± 0.9	109	10.7
Benzo(k)fluoranthene	2.8 ± 2.0	3.2 ± 0.5	114	15.6
Benzo(a)pyrene	7.4 ± 3.6	6.6 ± 0.8	89	12.1
Indeno(1,2,3-cd)pyrene	5.0 ± 2.0	4.5 ± 0.6	90	13.3
Benzo(g,h,i)perylene	5.4 ± 1.3	4.4 ± 0.6	82	13.6
Dibenz(a,h)anthracene	1.3 ± 0.5	1.1 ± 0.3	85	27.3

[a] Relative standard deviations for the SFE values are based on three replicate extractions.

Data are taken from Reference 10.

TABLE 15

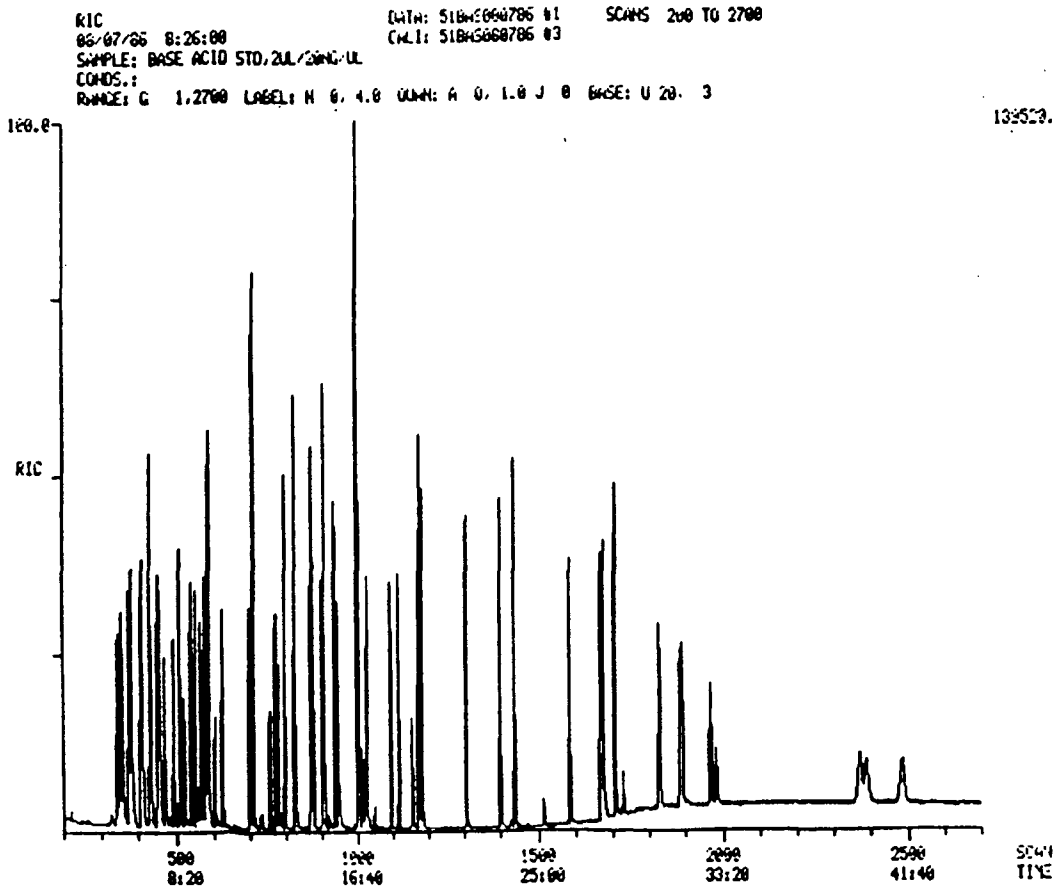
SINGLE LABORATORY ACCURACY AND PRECISION FOR THE EXTRACTION OF PAHs FROM A CERTIFIED REFERENCE SOIL SRS103-100, USING METHOD 3561 (SFE - LIQUID TRAP)

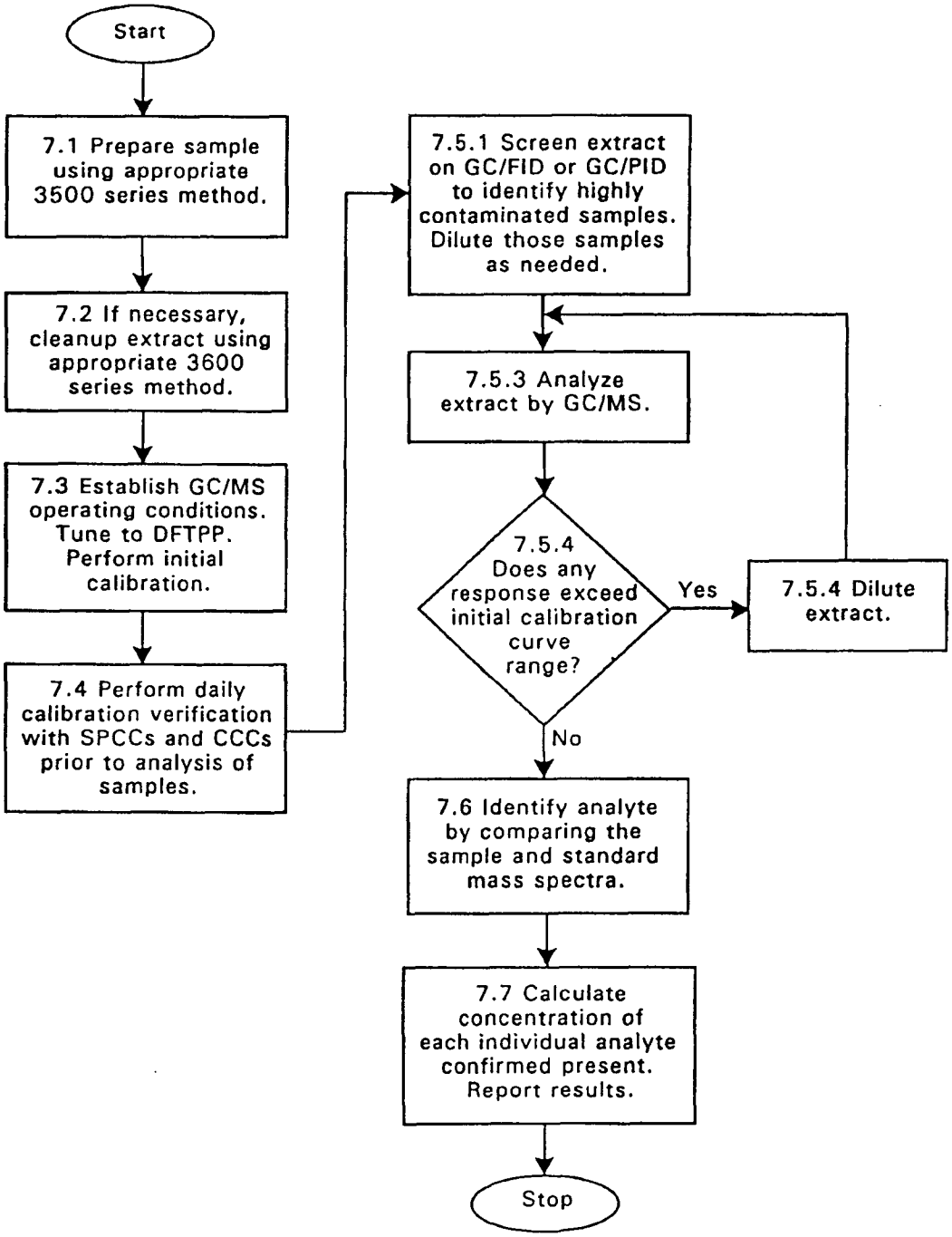
Compound	Certified Value (mg/kg)			SFE Value[a] (mg/kg)	Percent of Certified Value	SFE RSD
Naphthalene	32.4	±	8.2	29.55	91	10.5
2-Methylnaphthalene	62.1	±	11.5	76.13	122	2.0
Acenaphthene	632	±	105	577.28	91	2.9
Dibenzofuran	307	±	49	302.25	98	4.1
Fluorene	492	±	78	427.15	87	3.0
Phenanthrene	1618	±	340	1278.03	79	3.4
Anthracene	422	±	49	400.80	95	2.6
Fluoranthene	1280	±	220	1019.13	80	4.5
Pyrene	1033	±	285	911.82	88	3.1
Benz(a)anthracene	252	±	38	225.50	89	4.8
Chrysene	297	±	26	283.00	95	3.8
Benzo(b)fluoranthene + Benzo(k)fluoranthene	153	±	22	130.88	86	10.7
Benzo(a)pyrene	97.2	±	17.1	58.28	60	6.5

[a] Relative standard deviations for the SFE values are based on four replicate extractions.

Data are taken from Reference 11.

FIGURE 1
GAS CHROMATOGRAM OF BASE/NEUTRAL AND ACID CALIBRATION STANDARD




Start
7.1 Prepare sample using appropriate 3500 series method.
7.2 If necessary, cleanup extract using appropriate 3600 series method.
7.3 Establish GC/MS operating conditions. Tune to DFTPP. Perform initial calibration.
7.4 Perform daily calibration verification with SPCCs and CCCs prior to analysis of samples.
7.5.1 Screen extract on GC/FID or GC/PID to identify highly contaminated samples. Dilute those samples as needed.
7.5.3 Analyze extract by GC/MS.
7.5.4 Does any response exceed initial calibration curve range?
Yes
7.5.4 Dilute extract.
No
7.6 Identify analyte by comparing the sample and standard mass spectra.
7.7 Calculate concentration of each individual analyte confirmed present. Report results.
Stop

APPENDIX D

SOIL SAMPLING AND DECONTAMINATION PROCEDURES

Designation: D 5088 - 90

Standard Practice for Decontamination of Field Equipment Used at Nonradioactive Waste Sites[1]

This standard is issued under the fixed designation D 5088; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This practice covers the decontamination of field equipment used in the sampling of soils, soil gas, sludges, surface water, and ground water at waste sites which are to undergo both physical and chemical analyses.

1.2 This practice is applicable only at sites where chemical (organic and inorganic) wastes are a concern and is not intended for use at radioactive or mixed (chemical and radioactive) waste sites.

1.3 Procedures are included for the decontamination of equipment which comes into contact with the sample matrix (sample contacting equipment) and for ancillary equipment that has not contacted the portion of sample to be analyzed (non-sample contacting equipment).

1.4 This practice is based on recognized methods by which equipment may be decontaminated. When collecting environmental matrix samples, one should become familiar with the site specific conditions. Based on these conditions and the purpose of the sampling effort, the most suitable method of decontamination can be selected to maximize the integrity of analytical and physical testing results.

1.5 This practice is applicable to most conventional sampling equipment constructed of metallic and synthetic materials. The manufacturer of a specific sampling apparatus should be contacted if there is concern regarding the reactivity of a decontamination rinsing agent with the equipment.

1.6 *This standard does not purport to address the safety problems associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Document

2.1 *ASTM Standard:*

D 653 Terminology Relating to Soil, Rock, and Contained Fluids[2]

3. Terminology

3.1 *Definitions:*

3.1.1 *contaminant*—an undesirable substance not normally present or an unusually high concentration of a naturally occurring substance in water or soil.

3.1.2 *control rinse water*—water used for equipment washing and rinsing having a known chemistry.

3.1.3 *decontamination*—the process of removing or reducing to a known level undesirable physical or chemical constituents, or both, from a sampling apparatus to maximize the representativeness of physical or chemical analyses proposed for a given sample.

3.1.4 *non-sample contacting equipment*—related equipment associated with the sampling effort, but that does not directly contact the sample (for example, augers, drilling rods, excavations machinery).

3.1.5 *quality assurance/quality control (QA/QC)*—the efforts completed to evaluate the accuracy and precision of a sampling or testing procedure, or both.

3.1.6 *sample contacting equipment*—equipment that comes in direct contact with the sample or portion of sample that will undergo chemical analyses or physical testing (for example, ground water well bailer, split-spoon sampler, soil gas sampling probe).

3.1.7 For definitions of other terms used in this practice, see Terminology D 653.

4. Summary of Practice

4.1 Two different procedures are presented for the decontamination of sample-contacting and non-sample contacting equipment. The procedures have been developed based on a review of current state and federal guidelines, as well as a summary of commonly employed procedures. In general, sample contacting equipment should be washed with a detergent solution followed by a series of control water, desorbing agents and deionized water rinses. Nonsample contacting equipment should be washed with a detergent solution and rinsed with control water. Although such techniques may be difficult to perform in the field, they may be necessary to most accurately evaluate low concentrations of the chemical constituent(s) of interest.

4.2 Prior to initiating a field program that will involve equipment decontamination, a site specific equipment decontamination protocol should be prepared for distribution to the individuals involved with the particular sampling program. Information to be presented in the protocol should include:

4.2.1 Site location and description,

4.2.2 Statement of the sampling program objective and desired precision and accuracy, that is, is sampling effort for gross qualitative evaluation or for trace concentration, parameter specific evaluations,

4.2.3 Summary of available information regarding soil types, hydrogeology and anticipated chemistry of the materials to be sampled,

[1] This practice is under the jurisdiction of ASTM Committee D-18 on Soil and Rock and is the direct responsibility of Subcommittee D18.14 on Geotechnics of Waste Management.

Current edition approved June 29, 1990. Published September 1990.

[2] *Annual Book of ASTM Standards*, Vol 04.08.

4.2.4 Listing of equipment to be used for sampling and materials needed for decontamination,

4.2.5 Detailed step by step procedure for equipment decontamination for each piece or type of equipment to be utilized and procedures for rinse fluids containment and disposal as appropriate,

4.2.6 Summary of QA/QC procedures and QA/QC samples to be collected to document decontamination completeness including specific type of chemical analyses and their associated detection limit, and

4.2.7 Outline of equipment decontamination verification report.

5. Significance and Use

5.1 An appropriately developed, executed and documented equipment decontamination procedure is an integral and essential part of waste site investigations. The benefits of its use include:

5.1.1 Minimizing the spread of contaminants within a study area and from site to site,

5.1.2 Reducing the potential for worker exposure by means of contact with contaminated sampling equipment, and

5.1.3 Improved data quality and reliability.

5.2 This practice is not a substitute for a well-documented Quality Assurance/Quality Control (QA/QC) program. Because the ultimate test of a decontamination procedure is its ability to minimize erroneous data, a reasonable QA/QC program must be implemented.

5.3 This practice may not be applicable to all waste sites. When a sampling effort is completed to determine only the general range of chemical concentrations of interest less rigorous decontamination procedures can be adequate. Investigators should have the flexibility to modify the decontamination procedures with due consideration for the sampling objective or if QA/QC documentation supports alternative decontamination methods.

5.4 At sites where the reactivity of sampling equipment to decontamination washes creates concern for the generation of undesirable chemical by-products, the use of dedicated sampling equipment should be considered.

5.5 This practice, where applicable, should be used before, between, and after the completion of sampling events.

6. Reagents

6.1 *Detergent*, non-phosphate detergent solution.[3]

6.2 *Acid rinse (inorganic desorbing agent)*, 10 % nitric or hydrochloric acid solution-made from reagent grade nitric or hydrochloric acid and deionized water (1 % is to be applied to low-carbon steel equipment).

6.3 *Solvent rinse (organic desorbing agent)*, isopropanol, acetone, or methanol; pesticide grade.

6.4 *Control rinse water*, preferably from a water system of known chemical composition.

6.5 *Deionized water*, organic-free reagent grade.

7. Procedure for Sample Contacting Equipment

7.1 At a minimum, sample contacting equipment should be washed with a detergent solution and rinsed with control water.

7.2 For programs requiring more rigorous decontamination to meet the sampling or QA/QC objectives, the following procedures are indicated:

7.2.1 Wash with detergent solution, using a brush made of inert material to remove any particles or surface film.

7.2.1.1 For equipment that, because of internal mechanism or tubing cannot be adequately cleaned with a brush, the decontamination solutions should be circulated through the equipment.

7.2.2 Rinse thoroughly with control water.

7.2.3 Rinse with an inorganic desorbing agent (may be deleted if samples will not undergo inorganic chemical analysis).

7.2.4 Rinse with control water.

7.2.5 Rinse with organic desorbing agent (may be deleted if samples will not undergo organic chemical analyses).

7.2.6 Rinse with deionized water.

7.2.7 Allow equipment to air dry prior to next use.

7.2.8 Wrap equipment for transport with inert material (aluminum foil or plastic wrap) to direct contact with potentially contaminated material.

7.3 *Nonsample Contact Equipment:*

7.3.1 Clean the equipment with portable power washer or steam cleaning machine. Alternatively, hand wash with brush using detergent solution.

7.3.2 Rinse with control water.

7.3.3 The more rigorous decontamination procedures may be employed if necessary to meet sampling or QA/QC objectives.

7.4 Depending on site conditions, it may be appropriate to contain spent decontamination rinse fluids. If this is the case the appropriate vessel[4] for fluid containment should be used depending on the ultimate disposition of the material.

7.5 Depending on site conditions, it may be desirable to perform all equipment decontamination at a centralized location as opposed to the location where the equipment was used. If this is the case, care must be taken to transport the equipment to the decontamination area such that the spread of contaminants is minimized.

8. Quality Assurance/Quality Control

8.1 It is important to document the effectiveness of the decontamination procedure. To that end the projects QA/QC program should include provisions for the collection of samples to evaluate the completeness of a specific decontamination procedure. This could include:

8.1.1 Collection of rinse or wipe samples before the initial equipment decontamination prior to its use for sampling to establish a base line level of contaminants residing on or in the equipment,

8.1.2 Collection of final rinse or wipe samples after equipment decontamination following its use, and

8.1.3 The frequency of sampling to demonstrate the completeness of equipment decontamination is dependent upon objectives of the project as they relate to QA/QC. At a

[3] Alconox or Liquinox or similar solution has been found suitable for this purpose.

[4] A drum approved by the Department of Transportation or similar container has been found suitable for this purpose.

minimum it is recommended after every ten decontamination washings.

9. Report

9.1 The activities completed for each equipment decontamination should be documented in writing. Included in this report should be the following information:

9.1.1 Site location, date, time, and weather,

9.1.2 Sample location where equipment was employed,

9.1.3 Location where decontamination was performed,

9.1.4 Individuals performing the decontamination,

9.1.5 Decontamination procedures,

9.1.6 Source of materials (solutions) used for decontamination,

9.1.7 Handling of rinse fluids and accumulates solids, if any, and

9.1.8 QA/QC sampling performed and analytical results of QA/QC samples whether completed in the field or laboratory subsequent to sampling event.

10. Keywords

10.1 contaminant; decontamination; sampling; waste

Designation: D 4700 – 91

Standard Guide for Soil Sampling from the Vadose Zone[1]

This standard is issued under the fixed designation D 4700; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

Scope

1 This guide addresses procedures that may be used for taining soil samples from the vadose zone (unsaturated ·e). Samples can be collected for a variety of reasons uding the following:

1.1.1 Stratigraphic description,

1.1.2 Hydraulic conductivity testing,

1.3 Moisture content measurement,

1.4 Moisture release curve construction,

1.1.5 Geotechnical testing,

1.1.6 Soil gas analyses,

1.7 Microorganism extraction, or

1.8 Pore liquid and soils chemical analyses.

1.2 This guide focuses on methods that provide soil ples for chemical analyses of the soil or contained liquids ontaminants. However, comments on how methods may nodified for other objectives are included.

1.3 This guide does not describe sampling methods for fied deposits and rocks (for example, sandstone, shale, granite).

1.4 In general, it is prudent to perform all field work with least two people present. This increases safety and itates efficient data collection.

.5 The values stated in inch-pound units are to be arded as the standard. The SI units given in parentheses for information only.

6 *This standard does not purport to address all of the ety problems, if any, associated with its use. It is the ponsibility of the user of this standard to establish appro- te safety and health practices and determine the applica- y of regulatory limitations prior to use.*

Referenced Documents

2.1 *ASTM Standards:*

420 Practice for Investigating and Sampling Soil and Rock for Engineering Purposes[2]

)653 Terminology Relating to Soil, Rock, and Contained Fluids[2]

1452 Practice for Soil Investigation and Sampling by Auger Borings[2]

D 1586 Method for Penetration Test and Split-Barrel Sampling of Soils[2]

D 1587 Method for Thin-Walled Tube Sampling of Soils[2]

D 2488 Practice for Description and Identification of Soils (Visual-Manual Procedure)[2]

D 2607 Classification of Peats, Mosses, Humus, and Related Products[2]

D 3550 Method for Ring-Lined Barrel Sampling of Soils[2]

D 4083 Practice for Description of Frozen Soils (Visual-Manual Procedure)[2]

D 4220 Practice for Preserving and Transporting Soil Samples[2]

3. Terminology

3.1 *Definitions:*

3.1.1 Except where noted, all terms and symbols in this guide are in accordance with the following publications. In order of consideration they are:

3.1.1.1 Terminology D 653.

3.1.1.2 *Compilation of ASTM Standard Terminology*,[3] and

3.1.1.3 *Webster's New Collegiate Dictionary*.[4]

3.1.2 For definitions and classifications of soil related terms used, refer to Practice D 2488 and Terminology D 653. Additional terms that require clarification are defined in 3.2.

3.2 *Descriptions of Terms Specific to This Standard:*

3.2.1 *cascading water*—perched ground water that enters a well casing via cracks or uncovered perforations, trickling, or pouring down the inside of the casing.

3.2.2 *sludge*—a water charged sedimentary deposit.

3.2.2.1 *Discussion*—The water-formed sedimentary deposit may include all suspended solids carried by the water and trace elements that were in solution in the water. Sludge usually does not cohere sufficiently to retain its physical shape when mechanical means are used to remove it from the surface on which it deposits, but it may be baked in place and be adherent.

4. Summary of Guide

4.1 Sampling vadose zone soil involves inserting into the ground a device that retains and recovers a sample. Devices and systems for vadose zone sampling are divided into two general groups, namely the following: samplers used in conjunction with hand operated devices; and samplers used

---

This guide is under the jurisdiction of ASTM Committee D-18 on Soil and and is the direct responsibility of Subcommittee D18.21 on Ground Water Vadose Zone Investigations.

Current edition approved July 15, 1991. Published September 1991.

Annual Book of ASTM Standards, Vol 04.08.

[3] *Compilation of ASTM Standard Terminology*, Sixth edition, ASTM, 1916 Race St., Phila., PA 19103, 1986.

[4] *Webster's New Collegiate Dictionary*, Fifth edition, 1977.

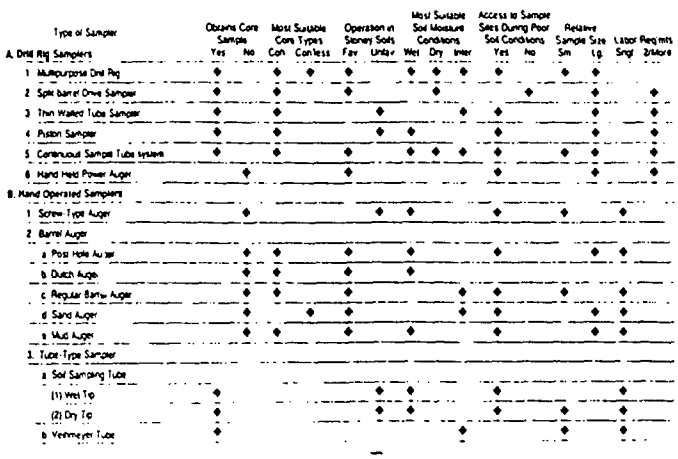


FIG. 1 Criteria for Selecting Soil Sampling Equipment

in conjunction with multipurpose or auger drill rigs. This guide discusses these groups and their associated practices.

4.2 The discussion of each device is organized into three sections, describing the device, describing sampling methods, and limitations and advantages of its use.

4.3 This guide identifies and describes a number of sampling methods and samplers. It is advisable to consult available site-specific geological and hydrological data to assist in determining the sampling method and sampler best suited for a specific project. It is also advisable to contact a local firm providing the services required as not all sampling and drilling methods described in this guide are available nationwide.

5. Significance and Use

5.1 Chemical analyses of liquids, solids, and gases from the vadose zone can provide information on the presence, possible source, migration route, and physical-chemical behavior of contaminants. Remedial or mitigating measures can be formulated based on this information. This guide describes devices and procedures that can be used to obtain vadose zone soil samples.

5.2 Soil sampling is useful for the reasons presented in Section 1. However, it should be recognized that the general method is destructive, and that resampling at an exact location is not possible. Therefore, if a long term monitoring program is being designed, other methods for obtaining samples should be considered.

6. Criteria for Selecting Soil Samplers

6.1 Important criteria to consider when selecting devices for vadose zone soil sampling include the following:

6.1.1 Type of sample: An encased core sample, an uncased core sample, a depth-specific representative sample, or a sample according to requirements of the analyses,

6.1.2 Sample size requirements,

6.1.3 Suitability for sampling various soil types,

6.1.4 Maximum sampling depth,

6.1.5 Suitability for sampling soils under various moisture conditions,

6.1.6 Ability to minimize cross contamination,

6.1.7 Accessibility to the sampling site, and

6.1.8 Personnel requirements.

6.2 The sampling devices described in this guide have been evaluated for these criteria. The results are summarized in Fig. 1.

7. Sampling with Hand Operated Devices

7.1 These devices, that have mostly been developed for agricultural purposes, include:

7.1.1 Screw-type augers,

7.1.2 Barrel augers,

7.1.3 Tube-type samplers,

7.1.4 Hand held power augers, and

7.1.5 Trench sampling with shovels in conjunction with machine excavations.

7.2 The advantages of using hand operated devices over drill rigs are the ease of equipment transport to locations with poor vehicle access, and the lower costs of setup and decontamination. However, a major disadvantage is that these devices are limited to shallower depths than drill rigs.

7.3 *Screw-Type Augers:*

7.3.1 *Description*—The screw or ship auger is essentially a small diameter (for example, 1.5 in. (3.81 cm)) wood auger from which the cutting side flanges and tip have been removed **(1)**[5] (see Fig. 2(*a*)). According to the Soil Survey Staff **(1)**, the spiral part of the auger should be about 7 in. (18 cm) long, with the distances between flights about the same as the diameter (for example, 1.5 in.) of the auger. This facilitates measuring the depth of penetration of the tool. Variations on this design include the closed spiral auger and the Jamaica open spiral auger **(2)** (see Fig. 2(*b*) and 1(*c*)). The

[5] The boldface numbers in parentheses refer to the list of references at the end of the text.

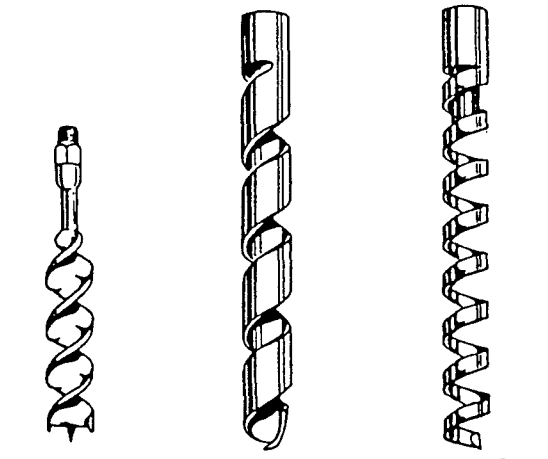


FIG. 2 Screw Type Augers

auger is welded onto a length of solid or tubular rod. The upper end of this rod is threaded, to accept a handle or extension rods. As many extensions are used as are required to reach the target sampling depth. The rod and the extensions are marked in even increments (for example, in 6-in. (15.24-cm) increments) above the base of the auger to aid in determining drilling depth. A wooden or metal handle fits into a tee-type coupling, screwed into the uppermost extension rod.

7.3.2 *Sampling Method*—For drilling, the auger is rotated manually. The operator may have to apply downward pressure to start and embed the auger; afterwards, the auger screws itself into the soil. The auger is advanced to its full length, and then pulled up and removed. Soil from the deepest interval penetrated by the auger is retained on the auger flights. A sample can be collected from the flights using a spatula. A foot pump operated hydraulic system has been developed to advance augers up to 4.5 in. (11.43 cm) in diameter. This larger diameter allows insertion of other sampling devices into the drill hole, once the auger is removed, if desired (3).[6]

7.3.3 *Comments*—Samples obtained with screw-type samplers are disturbed and are not truly core samples. Therefore, the samples are not suitable for tests requiring undisturbed samples, such as hydraulic conductivity tests. In addition, soil structures are disrupted and small scale lithologic features cannot be examined. Nevertheless, screw-type samplers are still suitable for use in collecting samples for the purpose of detecting contaminants. However, it is difficult to avoid transporting shallow soils downward when reentering a drill hole. When representative samples are desired from a discrete interval, the borehole must be made large enough to insert a sampler and extend it to the bottom of the borehole without touching the sides of the borehole. It is suggested that a larger diameter auger be used to advance and clear the borehole, then a smaller diameter auger sampler be used to obtain the sample. Screw-type augers work better in wet, cohesive soils than in dry, loose soils. Sampling in very dry (for example, powdery) soils may not be possible with these augers as soils will not be retained on the auger flights. Also, if the soil contains gravel or rock fragments larger than about one tenth of the hole diameter, drilling may not be possible (4).

7.4 *Barrel Augers:*

7.4.1 *Description*—The barrel auger consists of a bit with cutting edges welded to a short tube or barrel within which the soil sample is retained, welded in turn to shanks. The shanks are welded to a threaded rod at the other end. Extension rods are attached as required to reach the target sampling depth. Extensions are marked in increments above the base of the tool. The uppermost extension rod contains a tee-type coupling for a handle. The auger is available in carbon steel and stainless steel with hardened steel cutting edges (5, 6).

7.4.2 *Sampling Method*—The auger is rotated to advance the barrel into the ground. The operator may have to apply downward pressure to keep the auger advancing. When the barrel is filled, the unit is withdrawn from the soil cavity and a sample may be collected from the barrel.

[6] This reference is manufacturer's literature, and it has not been subjected to technical review.

7.4.3 *Comments*—Barrel augers generally provide larger samples than screw-type augers. The augers can penetrate shallow clays, silts, and fine grained sands (7).[6] The augers do not work well in gravelly soils, caliche, or semi-lithified deposits. Samples obtained with barrel augers are disturbed and are not core samples. Therefore, the samples are not suitable for tests requiring undisturbed samples, such as hydraulic conductivity tests. Nevertheless, the samplers are still suitable for use in collecting samples for the purpose of detecting contaminants. Because the sample is retained inside the barrel, there is less of a chance of mixing it with soil from a shallower interval during insertion or withdrawal of the sampler. The following are five common barrel augers:

7.4.3.1 Post-hole augers (also called Iwan-type augers),

7.4.3.2 Dutch-type augers,

7.4.3.3 Regular or general purpose barrel augers,

7.4.3.4 Sand augers, and

7.4.3.5 Mud augers.

7.4.4 *Post-Hole Augers*—The most readily available barrel auger is the post-hole auger (also called the Iwan-type auger) (8). As shown in Fig. 3, the barrel consists of two-part cylindrical leaves rather than a complete cylinder and is slightly tapered toward the cutting bit. The taper and the cupped bit help to retain soils within the barrel. The barrel is available with a 3 to 12-in. (7.62 to 30.48-cm) diameter. There are two types of drilling systems, one has a single rod and handle, and the other has two handles. In stable, cohesive soils, the auger can be advanced up to 25 ft (7.62 m) (8).

7.4.5 *Dutch-Type Augers*—The Dutch-type auger (commercially developed by Eijkelkamp) is a smaller variation of the post-hole auger design. As shown in Fig. 4, the pointed bit is continuous with two, narrow part-cylindrical barrel segments, welded onto the shanks. The barrel generally has a 3 in. (7.62 cm) outside diameter. This tool is best suited for sampling wet, clayey soils.

7.4.6 *Regular or General Purpose Barrel Augers*—A ver sion of the barrel auger commonly used by soil scientists an county agricultural agents is depicted in Fig. 5(*a*) and (*b*). A shown, the barrel is a complete cylinder. As with th post-hole auger, the cutting blades are cupped so that soil i loosened and forced into the barrel as the unit is rotated an pushed into the ground. Each filling of the barrel corre sponds to a depth of penetration of 3 to 5 in. (7.62 to 12.7 cm) (1). The most popular barrel diameter is 3.5 in. (8.8 cm), but sizes ranging from 1.5 to 7 in. (3.81 to 17.78 cm) ar available (6).[6] Plastic, stainless steel, PTFE (polytetra fluoroethylene) or aluminum liners can also be used (6). Extension rods are available in 4 ft (1.22 m) lengths. Th rods can be made from standard black pipe, from lightweigh conduit or from seamless steel tubing. The extensions hav evenly spaced marks to facilitate determining sample depth The regular barrel auger is suitable for use in loam type soils

7.4.7 *Sand Augers*—For dry, sandy soils it may be nece sary to use a variation of the regular barrel auger tha includes a specially-formed bit to retain the sample in th barrel (see Fig. 5(*c*)). Sand augers with 2, 3, or 4-in. (5.0 7.62, or 10.16-cm) diameters are available (5).[6]

7.4.8 *Mud Augers*—Another variation on the regula barrel auger design is available for sampling wet, clayey soils As shown in Fig. 5(*d*), the barrel is designed with open side to facilitate extraction of samples. The bits are the same a those used on the regular barrel auger (6).[6] Mud augers wit 2, 3, or 4-in. (5.08, 7.62, or 10.16-cm) diameters are availabl (5).[6]

7.5 *Tube-Type Samplers:*

7.5.1 Tube-type samplers generally have proportionall smaller diameters and greater body lengths than those barrel augers.

7.5.2 For sampling, these units are perched into the so causing the tube to fill with material from the interv penetrated. The assembly is then pulled to the surface and sample can be collected from the tube. Since the device is n

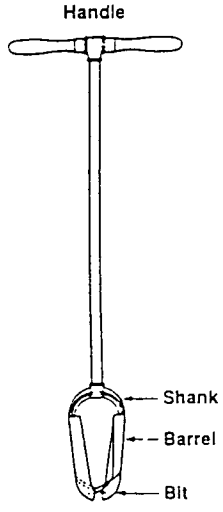


FIG. 3 Post-Hole Type Barrel Auger

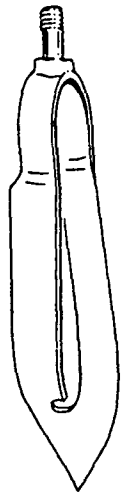
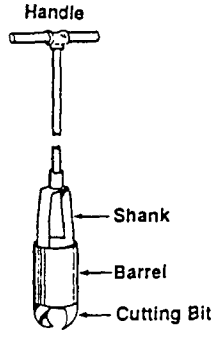
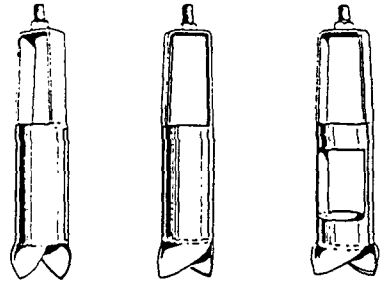


FIG. 4 Dutch Type Auger



(a) Regular Barrel Auger



(b) Regular Barrel Auger (c) Sand Auger (d) Mud Auger

FIG. 5 Barrel Auger Variations and Soil Moisture

rotated, a nearly undisturbed sample can be obtained. Commercial units are available with foot lever attachments, a hydraulic apparatus, or drop-hammers to aid in driving the sampler into the ground (5)[6]. Vibratory heads have also been developed to advance tube-type samplers (9).[6]

7.5.3 These units are not as suitable for sampling in compacted, gravelly soils as are the barrel augers. They are preferred if an undisturbed sample is required. Commonly used varieties of the tube type samplers include:

7.5.3.1 Soil sampling tubes (also called Lord samplers),

7.5.3.2 Veihmeyer tubes (also called King tubes),

7.5.3.3 Thin-walled tube samplers (also called Shelby tubes),

7.5.3.4 Ring-lined barrel samplers, and

7.5.3.5 Piston samplers.

7.5.4 *Soil Sampling Tubes:*

7.5.4.1 *Description*—As depicted in Fig. 6, the soil sampling tube consists of a hardened cutting tip, a cut-away barrel, and an uppermost threaded segment. The cut-away barrel allows textural examination and easy removal of soil samples. Generally, the tube is constructed from high strength alloy steel (10).[6] The samplers are available with 6, 12, 15, 18, and 24-in. (15.24, 30.48, 38.10, 45.72, 60.96-cm) lengths (5, 6). The tubes are available with 1.13 or 0.88-in. (2.87 or 2.22-cm) outside diameter. Two modified versions of the tip are available, for sampling in wet or dry soils. The

7.5.6.3 *Comments*—Shelby tubes are best used in clays, silts, and fine-grained sands. If the soils are cohesionless, they may not be retained in the tube. If firm to very hard soils are encountered, driving (hammering) the sampler may be required. However, this should be avoided as the tube may buckle under the drive stress.

7.5.7 *Ring-Lined Barrel Samplers:*

7.5.7.1 *Description*—As described in Practice D 3550, the ring-lined barrel sampler consists of a one piece barrel or two split barrel halves, a drive shoe, rings, and a sampler head (see Fig. 9). The rings, that are usually brass, fit snugly inside the barrel and are designed to be directly inserted into geotechnical testing apparatuses when removed from the barrel. Most samplers are designed to hold at least two rings. The barrel is commonly 3.5 in. (8.89 cm) inside diameter and 3.94 to 5.91 in. (10 to 15 cm) long (5).[6] With these lengths, the barrel can be fitted with a variety of liners ranging in length from 1 to 2.36 in. (2.54 to 6 cm).

7.5.7.2 *Sampling Method*—The ring-lined barrel sampler can be driven or pushed into soil. Once retrieved, the sampler is disassembled, and the sample-filled rings are removed. The rings are usually removed as one unit and placed into a capped container. Alternately, the individual soil-filled rings can be capped with plastic or PTFE and then sealed with wax or adhesive tape (refer to Practice D 4220).

7.5.7.3 *Comments*—Because barrel samplers are more rigid than thin-walled tubes, they can be driven into hard soils and soils containing sands and gravels that might damage thin-walled tubes. The sampler provides samples in rings which can be handled without further disturbance of the soil. Because of this, these devices are most often used when geotechnical or chemical analyses are to be performed.

7.5.8 *Piston Samplers:*

7.5.8.1 *Description*—Locally saturated (for example, by perched ground water), or cohesionless soils, and very soft soils or sludges may not be retained in most samplers, even when fitted with retainer baskets or flap valves. Piston samplers can be used in these situations. The sampler consists of a sampling tube, extension pipe attached to the tube, an internal piston, and rods connected to the piston and running through the extension pipe (see Fig. 10). These samplers are often built, as needed, out of common PVC (for use in sludge) or steel pipe fittings. The sampling tube commonly has a 0.75 to 3-in. (1.91 to 7.62-cm) inside diameter and is 8 in. to 9 ft (20.32 cm to 2.74 m) long (13). A variation designed for sampling peat has a cone shaped piston (8).

7.5.8.2 *Sampling Method*—The sampler can be pushed into the ground with the handle or driven into the ground with a drop hammer (13). As the tube is advanced, the piston is held stationary or pulled upward with the attached rods. Once the tube has been advanced through the sampling interval, it is rotated to break suction that might have developed between the soil and the outside wall of the tube. The sampler is then pulled to the surface keeping the piston rod fixed with respect to the extension pipe. The sample is retained because of suction that develops between the piston and the sample. Upon retrieval, the sample is extruded by

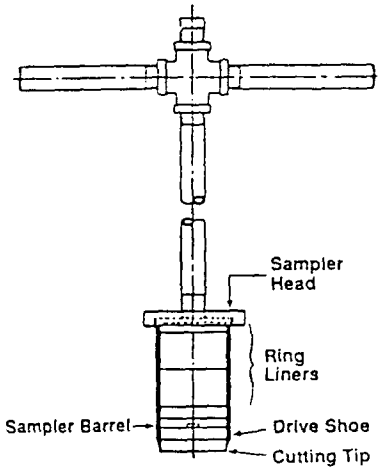


FIG. 9 Hand Operated Ring-Lined Barrel Sampler

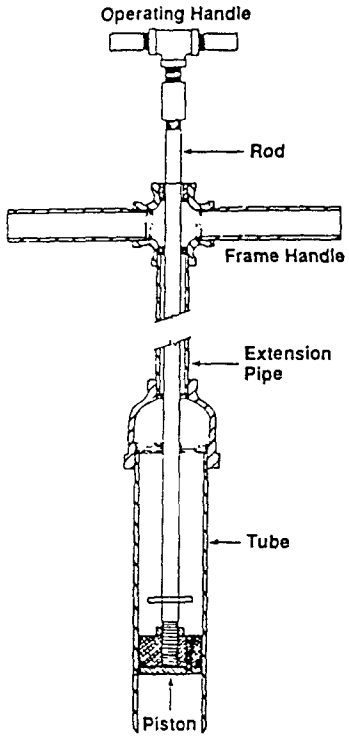


FIG. 10 Hand Operated Piston Sampler

using the piston to force the sample out of the tube. Sharma and De Dalta (**14**) described a cylindrical sampler for use in puddled soils that would flow back out of most samplers. The design includes a basal shutter that retains the sample while the sampler is withdrawn from the soil.

7.5.8.3 *Comments*—Because the sampler depends on development of suction between the sample and the piston, it may not work in unsaturated, coarse-grained sands and gravels. This is due to the high air permeability of such material that prevents the creation of high suction.

7.6 *Hand Held Power Augers:*

7.6.1 *Description*—A very simple, commercially available auger consists of a solid flight auger attached to and driven by a small air-cooled engine (see Fig. 11). Two handles on the head assembly allow two operators to guide the auger into the soil. Throttle and clutch controls are integrated into grips on the handles. Augers are available with diameters ranging from 2 to 16 in. (5.08 to 40.64 cm). The auger sections are commonly 3 ft (0.91 m) long.

7.6.2 *Sampling Method*—As the auger rotates into soil, cuttings advance up the flights and are discharged at the surface. Soil samples can be collected from the surface discharge, or from the auger flights after pulling the auger out of the ground. Alternatively, samples can be collected with other samplers (for example, a thin-walled tube) after auger removal.

7.6.3 *Comments*—As discussed in 7.3, if samples are collected from surface discharge or from the flights, they are disturbed and are not suitable for some uses. In addition, if samples are collected from surface discharge, it is difficult to

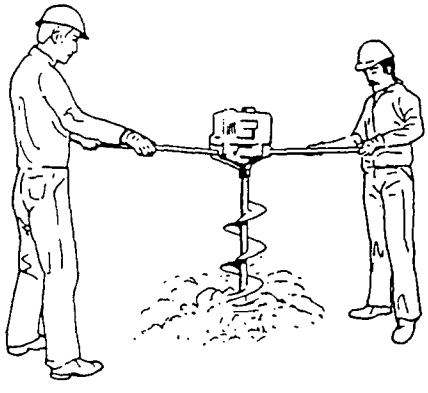


FIG. 11 Hand Held Power Auger

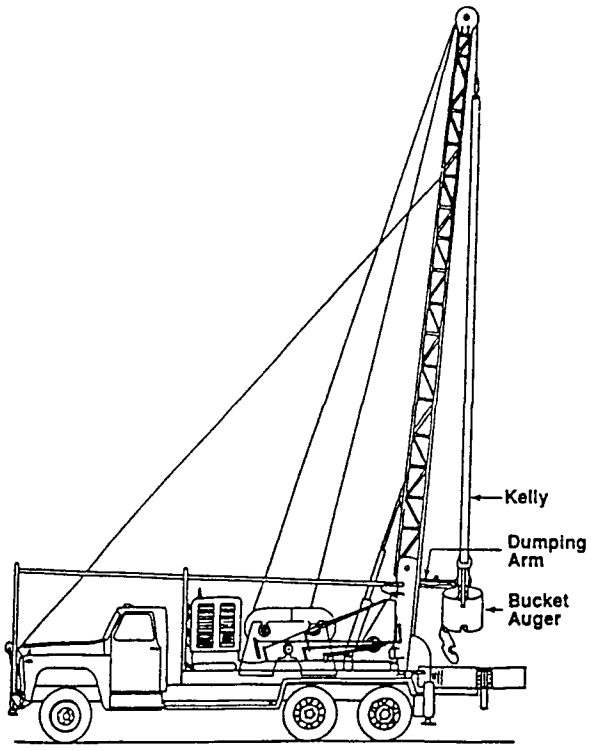


FIG. 13 Bucket Auger and Drilling Rig

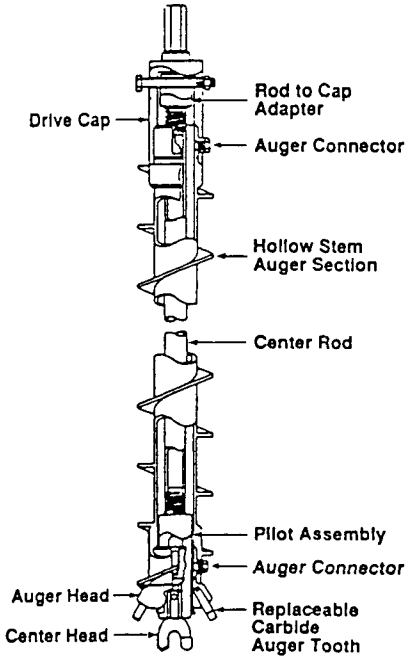


FIG. 14 Hollow-Stem Auger Components

column rotation. The cutting diameter is somewhat greater than the flighting diameter because of the protruding teeth. Auger sections are typically 5 ft (1.52 m) long and are interchangeable for assembly in an articulated but continuously flighted column. Drilling progresses in 5 ft (1.52 m) or shorter increments and sampling can be accomplished at any depth within that increment. Upon advancement of a 5 ft (1.52 m) increment, another 5 ft (1.52 m) section of hollow-stem auger and center rod is added. Hollow-stem augers are readily available with 2.25, 2.75, 3.25, 3.75, 4.25, 6.25, and 8.25-in. (5.72, 6.99, 8.26, 9.53, 10.80, 15.88, and 20.96-cm) inside diameters.

9.3.2 *Sampling Method*—The auger column and pilot assembly are advanced to the top of the desired sampling interval. Sampling is accomplished by removing the pilot assembly and center rod, if they are used, and inserting the sampler through the hollow stem of the auger column (see Fig. 15). The sampler may be lowered to the sampling depth by attaching it to center rods or by using a wireline assembly (12). When the sampler is attached to center rods, a sample is collected by pushing or driving the sampler into undisturbed soil with the rig hydraulic system or with a drop hammer. When a wireline is used, the sampler is locked into place ahead of the lower-most auger and advanced into the sampling interval by rotating the auger column (18).[6] Hollow stem augers with a 6.25-in. (15.88-cm) inside diameter allow the use of 5-in. (12.70-cm) outside diameter Shelby tubes and 4.5-in. (11.43-cm) outside diameter split barrel samplers (see 9.4).

9.3.3 *Comments*—The purpose of the center head (pilot) assembly is to prevent soils from entering the auger column as it is advanced (19). Driscoll (17) suggests that the assembly may be omitted when drilling through hard, silty and clayey soils as these materials will usually form a 2 to 4 in. (5.08 to 10.16 cm) long plug at the auger opening. However, Hackett (19) recommends that the pilot assembly be used when detailed samples are required. When perched water is encountered, "heaving sands" that move up into the auger column upon pilot assembly removal during sampling, may be a concern. Various one-way plugs that allow sampling, but that prevent sand from moving into the auger column, are described in Hackett (19). The important capability of being able to obtain samples that do not contain mixed material from shallow sources in the hole is enhanced by using the hollow-stem auger method. However, because the sections are hollow, decontamination of the auger interiors between holes to prevent cross contamination is difficult. High pressure steam cleaners are usually necessary to remove caked-on soils and contaminants. Hollow stem augers may advance rapidly through unconsolidated materials.

9.4 *Sampling Devices:*

9.4.1 Sampling devices used in conjunction with hollow stem augers and occasionally in holes advanced by solid stem augers include:

9.4.1.1 Thin-walled tube samplers (also called Shelby tubes),

9.4.1.2 Split-barrel drive samplers (also called Split spoons),

9.4.1.3 Ring-lined barrel samplers,

9.4.1.4 Continuous sample tube systems, and

9.4.1.5 Piston samplers.

9.4.2 These samplers are either pushed or driven in sequence with an increment of drilling or advanced simultaneously with the advance of a hollow stem auger column.

9.4.3 *Thin-Walled Tube Samplers:*

9.4.3.1 *Description*—The thin-walled tube sampler consists of a tube connected to a head with screws. The head is threaded to connect with standard drill rods. The head contains a ball check valve. Thin-walled tube (Shelby tube) samplers are readily available with 2, 3, and 5-in. (5.08, 7.62, and 12.70-cm) outside diameter and are commonly 30 in. (76.20 cm) long. The 3 by 30 in. (7.62 by 76.20 cm) outside diameter long sampler is most common. The advancing end of the sampler is constructed with an inward lip, machined to a cutting edge, that has a smaller diameter than the tube inside diameter. The cutting edge inside diameter reduction, defined as a "clearance ratio," is usually in the range of 0.0050 to 0.0150 or 0.50 to 1.50 % (refer to Practice D 1587). PTFE or plastic sealing caps and other sealing devices for use after sampling are readily available for the 2, 3, and 5-in. (5.08, 7.62 and 12.70-cm) diameter tubes (refer to Practice D 4220). Shelby tubes are commonly available in carbon steel but can be manufactured from other metal (see Fig. 8).

9.4.3.2 *Sampling Methods*—When a Shelby tube is pushed into soil, the length of the sample recovered is often less than the distance pushed, that is, the recovery ratio is less than 1.0 (see 7.5.6.2). In addition, a portion of the sample frequently remains in the borehole after retrieval of the sampler. This is due to suction that develops at the sampler-soil interface. This suction may be broken by twisting the

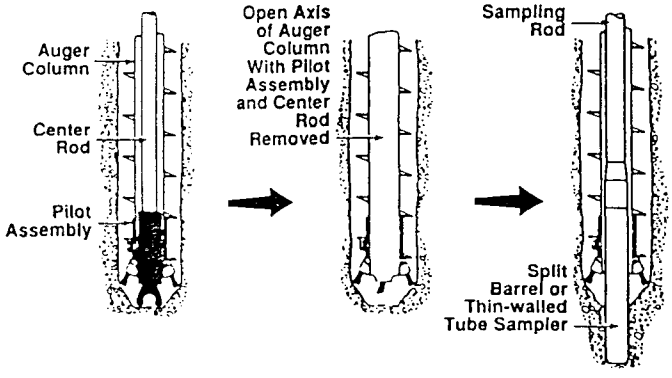


FIG. 15 Hollow-Stem Auger Sampling

sampler prior to retrieval or by advancing the auger column below the base of the sampler before retrieval (20). Samples are extruded from the Shelby tube with a hydraulic ram. As with all sampling devices, the portion of the sample in contact with the tube is considered disturbed and unrepresentative. Wilson et al. (12) developed a paring device to remove this outer layer of the core during extrusion.

9.4.3.3 *Comments*—The ball check valve was originally intended to provide a vent for drilling fluids when pushing the tube into soil, and also to prevent the column of fluid within the drill stem from forcing the sample out of the tube during retrieval. Since drilling fluids are not used when sampling in the vadose zone, these considerations are not important. However, the valve does provide a vent for air displaced as the sampler is pushed into soil. Shelby tubes are best used in clays, silts, and fine grained sands. They can be pushed with the hydraulic system of most drill rigs in fine grained sands that are loose to moderately consolidated or in clays and silts that are soft to firm. If the soils are cohesionless, they may not be retained in the tube. If consolidated or hard soils are encountered, driving the sampler may be required. However, some tubes may buckle under the drive stress. A spring-loaded barrel has been developed to protect the Shelby tube from buckling when sampling these soils (21).[6]

9.4.4 *Split-Barrel Drive Samplers:*

9.4.4.1 *Description*—The split-barrel drive sampler consists of two split-barrel halves, a drive shoe, and a sampler head containing a ball check valve, all of which are threaded together (see Fig. 15). The most common size has a 2-in. (5.08-cm) outside diameter and a 1.5-in. (3.81-cm) inside diameter split barrel with a 1.375-in. (3.49-cm) inside diameter drive shoe. This sampler is used extensively in geotechnical exploration (Refer to Method D 1586). When fitted with a 16 gage liner for encased cores, the sampler has a 1.375-in. (3.49-cm) inside diameter throughout. A 3-in. (7.62-cm) outside diameter by 2.5-in. (6.35-cm) inside diameter split-barrel sampler with a 2.375-in. (6.03-cm) inside diameter drive shoe is also available (22).[6] Other split-barrel samplers in the size range of 2.5-in. (6.35-cm) to 4.5-in. (11.43-cm) outside diameter are manufactured but are less common. A plastic or metal retainer basket, or a flap valve is often fitted into the drive shoe to prevent samples from falling out during retrieval.

9.4.4.2 *Sampling Method*—As described in Method D 1586 the sampler is threaded onto drilling rods and is lowered to the bottom of the boring. The sampler is then driven into the soil with blows from a drop hammer attached to the drill rig. The hammer usually weighs 140 lb and is operated by the driller. The sampler is extracted from the soil in a manner that will ensure maximum sample recovery. A

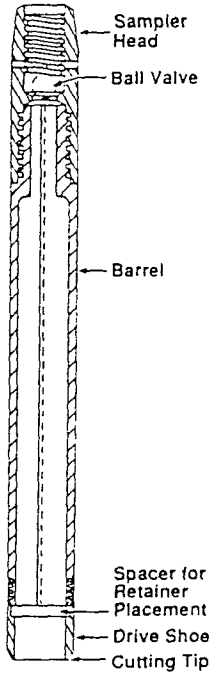


FIG. 16 Split-Barrel Drive Sampler

sample is obtained by disassembling the drive shoe and head, and splitting the barrel to expose the core of soil. Material disturbed by contact with the barrel can be scraped away, or a less disturbed interior portion collected with a spatula.

9.4.4.3 *Comments*—Split barrel drive samplers can be used in all soil types if the larger grain sizes can enter through the opening of the drive shoe. Because the sampler can be fitted with a retainer basket, it is typically used in place of thin-walled tubes when cohesionless soils are to be sampled.

9.4.5 *Ring-Lined Barrel Samplers:*

9.4.5.1 *Description*—As described in Practice D 3550, the ring-lined barrel sampler consists of a one piece barrel or two split-barrel halves, a drive shoe, rings, a waste barrel and a sampler head containing a ball check valve (see Fig. 17). The rings fit snugly inside the barrel and are designed to be directly inserted into geotechnical testing apparatus when removed from the barrel. Most samplers are designed to hold at least six rings. The waste barrel provides a space above the rings into which disturbed soil, originally at the bottom of the hole, can move. The samplers are commonly available with 2, 3, and 4-in. (5.08, 7.62, and 10.16-cm) outside diameter.

9.4.5.2 *Sampling Method*—The ring-lined barrel sampler can be driven or pushed into soil. It is important to insert the sampler deep enough to allow all disturbed soil to move through the rings and into the waste barrel. Once retrieved, the sampler is disassembled, and the sample filled rings are carefully removed. The rings are usually removed as one unit and placed into a capped container. Alternately, the individual soil filled rings can be capped with plastic or PTFE and even sealed with wax or adhesive tape (refer to Practice D 4220).

9.4.5.3 *Comments*—Because ring-lined barrel samplers are more rigid than thin-walled tubes, they can be driven into soils containing sands and gravels that might damage thin-walled tubes. The sampler provides samples in rings that can be handled without further disturbance of the soil. Because of this, these devices are most often used when geotechnical or chemical analyses are to be performed.

9.4.6 *Continuous Sample Tube System:*

9.4.6.1 *Description*—Continuous sample tube systems that fit within a hollow-stem auger column are readily available in North America. The barrel is typically 5 ft (1.52 m) long, and fits within the lead auger of the hollow auger column. The sampler is prevented from rotating as the auger column is turned (**20**). For many conditions the sampler provides continuous, 5-ft (1.52-m) samples (see Fig. 18). The assembly can be split- or solid-barrel and can be used with or without liners of various metallic and nonmetallic materials (**20**). Two clear, plastic, 30 in. (76.20 cm) long liners are often used. The sampler may also be fitted with a plastic or metal retainer basket, or a falp valve to prevent cohesionless soils from falling out of the sampler during retrieval (**20**).

9.4.6.2 *Sampling Method*—The sampler is locked in place inside the auger column with its open end protruding a short distance beyond the end of the column. While advancing the column, soil enters the non-rotating sampling barrel. After a 5-ft (1.52-m) advance, the sampler is withdrawn, and the liner (if used) is removed and capped.

9.4.6.3 *Comments*—The continuous sample tube system replaces the pilot head assembly in the hollow-stem auger column. Because of this, sampling speed is greatly increased since the pilot assembly does not have to be removed before taking a sample. The continuous sample tube system is best used in clays, silts, and in fine grained sands. It can be used to sample soils that are much more consolidated or harder than can be sampled with Shelby tubes.

9.4.7 *Piston Samplers:*

9.4.7.1 *Description*—Locally saturated (for example, perched ground water), or cohesionless soils, and very soft soils or sludges may not be retained in most samplers, even when they have been fitted with retainer baskets or flap valves. Piston samplers are often used under these conditions. The sampler consists of a sampling tube, an internal piston, and a drive head. The piston fits snugly inside the tube. The piston is attached to a rod assembly or a cable that leads to the surface. Tubes made of steel are available in 5.5 and 30-in. (13.97 and 76.20-cm) and 5-ft (1.5-m) lengths with 0.75, 2, 3, 4, and 5-in. (1.91, 5.08, 7.62, 10.16, and 12.70-cm) inside diameter (**22, 23**). When equipped with a hardened steel drive shoe, the tube can be fitted with a liner made of aluminum clear PVC, or another material (see Fig. 19) (**24**). A version of the sampler designed for peat sampling has a cone shaped piston (**8**).

9.4.7.2 *Sampling Method*—Prior to sampling, the piston is placed at the base (advancing end) of the tube. The sampler is then attached to drill rods and lowered down the borehole or hollow-stem auger column to the bottom of the hole (top of the sampling interval). The sampler is then pushed or driven into the sampling interval. As the tube

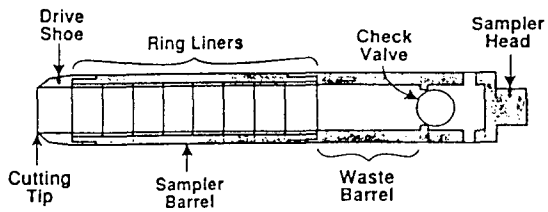


FIG. 17 Ring-Lined Barrel Sampler

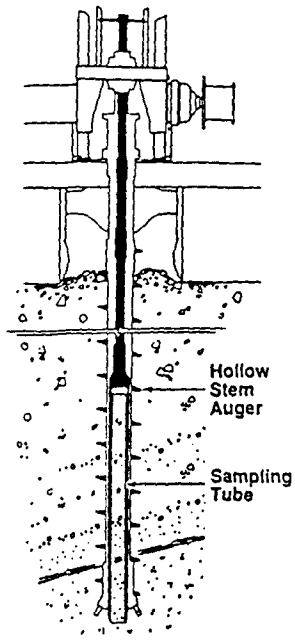


FIG. 18 Continuous Sample Tube System

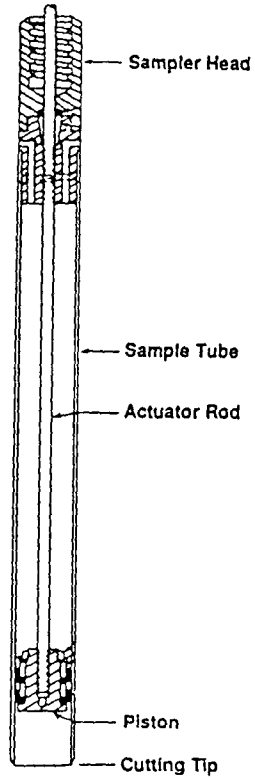


FIG. 19 Piston Sampler

moves downward, the piston remains stationary and in contact with the top of the soil sample. When the sampler is withdrawn, soil is retained because of suction that develops between the piston and the soil core within the sampler. This suction is stronger than the suction at the bottom of the sampler that would tend to extract soil from the sampler. [illegible] drill

and ensure that the sample will not be pulled ou sampler.

9.4.7.3 *Comments*—Average recovery ratios g 0.9 can be attained with this sampling too However, because the sampler depends on de suction between the sample and the piston, it in unsaturated, coarse grained sands and gra

creation of suction with the sampler. Samples collected with piston samplers are relatively undisturbed. Zapico et al. (24) described techniques for extracting fluid samples directly from liners, and for converting liners into permeameters.

REFERENCES

(1) Soil Survey Staff, *Soil Survey Manual*, U.S. Dept. of Agriculture, Superintendent of Documents, Washington, D.C., 1951.

(2) Acker, W. L., *Basic Procedures for Soil Sampling and Core Drilling*, Acker Drill Co. Inc., Scranton, Pa, 1974.

(3) Materials Testing Division, *Catalog of Products*, Soiltest Inc., Evanston, Illinois, 1983.

(4) Bureau of Reclamation, *Earth Manual*, U.S. Dept. of the Interior, United States Government Printing Office, Washington, D.C., 1974.

(5) Sales Division, *Catalog of Products*, Soilmoisture Equipment Corp., Santa Barbara, California, 1988.

(6) Sales Division, *Catalog of Products*, Art's Manufacturing and Supply, American Falls, Idaho, 1988.

(7) Sales Division, *Catalog of Products*, Brainard Kilman, Stone Mountain, Georgia, 1988.

(8) Everett, L. G., and Wilson, L. G., *Permit Guidance Manual on Unsaturated Zone Monitoring For Hazardous Waste Land Treatment Units*, EPA/530-SW-86-040, 1986.

(9) Sales Division, *Catalog of Products*, VI-COR Technologies Inc., Bellevue, Washington, 1988.

(10) Sales Division, *J.M.C. Soil Investigation Equipment, Catalog No. 6*, Clements Associates Inc.

(11) Hvorslev, M. J., *Subsurface Exploration and Sampling of Soils for Civil Engineering Purposes*, U.S. Army Corp of Engineers, Waterways Experiment Station, Vicksburg, Mississippi, 1949.

(12) Wilson, J. T., and McNabb, J. F., "Biological Transformation of Organic Pollutants in Ground Water," *EOS-Transactions*, AGU, Vol 64, pp. 505–507.

(13) Brakensiek, D. L., Osborn, H. B., and Rawls, W. L., *Field Manual for Research in Agricultural Hydrology, Agriculture Handbook No. 224*, Science and Education Administration, United States Dept. of Agriculture, Washington, D.C., 1979 (revised), pp. 258–275.

(14) Sharma, P. K., and DeDalta, S. K., "A Core Sampler for Puddled Soils," *Soil Science Society of America Journal*, Vol 49, 1985, pp. 1069–1070.

(15) Sales Division, *Catalog of Products*, Little Beaver Inc., Livingston, Texas, 1988.

(16) Scalf, M. R., McNabb, J. F., Dunlap, W. J., Cosby, R. L., and Fryberger, J., *Manual of Groundwater Sampling Procedures*, National Water Well Association, Dublin, Ohio, 1981.

(17) Driscoll, F. G., *Groundwater and Wells*, Johnson Division, St. Paul, Minnesota, (2nd ed.), 1986.

(18) Sales Division, *Catalog of Products*, Mobile Drilling Co. Inc., Indianapolis, Indiana, 1988.

(19) Hackett, G., "Drilling and Constructing Monitoring Wells with Hollow-Stem Augers Part 1: Drilling Considerations," *Ground Water Monitoring Review*, NWWA, Fall 1987, pp. 51–62.

(20) Riggs, C. O., "Soil Sampling in the Vadose Zone," *Proceedings of the NWWA/U.S. EPA Conference on Characterization and Monitoring of the Vadose Zone*, NWWA, Las Vegas, Nevada, 1983, pp. 611–622.

(21) Sales Division, *Product Literature*, Pitcher Drilling Co., Palo Alto, California, 1986.

(22) Sales Division, *Catalog of Products*, Diedrich Drilling Equipment, LaPorte, Indiana, 1988.

(23) Sales Division, *Instrumentation for Soil and Rocks, Catalog of Products*, Solinst, Burlington, Ontario, Canada, 1988.

(24) Zapico, M. M., Vales, S., and Cherry, J. A., "A Wireline Core Barrel for Sampling Cohesionless Sand and Gravel Below the Water Table," *Ground Water Monitoring Review*, NWWA, Spring 1987, pp. 75–82.

(25) Shuter, E., Teasdale, W. E., "Application of Drilling, Coring, and Sampling Techniques to Test Holes and Wells," *U.S. Geol. Survey Techniques of Water Resource Investigations*, Book 2, Chapter F-1, 1989.

APPENDIX E

FIELD DATA AND CHAIN-OF-CUSTODY FORMS

FIELD DATA FORM

Sample location:

Sample Location Sketch

Sample Designation:

Sample Date/Time:

Sampler(s):

Sample Depths:

Sample Collection Technique:

Field Preparation /Date

Sample Preservation:

Analysis:

Sample Location Description:

Soil Description/Classification:

CHAIN OF CUSTODY RECORD

Date: _____
Page: ____ of ____
Note: Samples will be disposed of after 30 days

Mobil Oil Consultant:	Station No./CITY:
Address:	Project Manager:
City: State: Zip:	Mobil Oil Engineer:
Tel: Fax.:	Sampler(s) (signature):

Sample I.D	Matrix	Date Sampled	Time	Preservation	Number of Containers	Type of Containers	BTEX - EPA 602/8020	BTEX -TPH EPA M602/8015/8020 (GAS)	TPH EPA Modified 8015 Gas ___ Diesel ___	Oil & Grease - EPA 413.2	TRPH - EPA 418.1	EPA 601/8010	EPA 624/8240	EPA 625/8270	Title 22 Metals EPA 6010/7000 TTLC ___ STLC ___	Lead Org./DHS ___ Lead Total ___	EDB-EPA 504	EDB/DBCP- EPA 504	pH	Bioassay-Title 22 Haz Waste (Screen - Pass/Fail)	Bioassay-Title 22 Haz Waste (Definitive -LC50)	Bioassay - Effluent (% Survival)	Bioassay - Effluent (Definitive LC50)

CODING
(check one)

Code 1 ___ Emergency Response
Code 2 ___ Site Assessment
Code 3 ___ Remediation (Plan Development)
Code 4 ___ Active Remediation (Installation/Start-up)
Code 5 ___ Active Remediation (O & M)
Code 6 ___ Passive Remediation/Monitoring
Code 7 ___ Closure
Code 8 ___ Construction
Code 9 ___ Litigation/Claims Fines

Relinquished by	Date/Time:	Received by:	Date/Time:
Relinquished by	Date/Time	Received by	Date/Time
Relinquished by	Date/Time	Received in Lab by	Date/Time
Remarks			

Turnaround Time (check one)

Normal	___	Same day	___
24 Hours	___	48 hours	___
5 Day	___	Emergency	___

Sample Integrity

Intact ___ On Ice ___

APPENDIX F

SITE SAFETY HEALTH PLAN

ENERCON SERVICES, INC.
SITE SAFETY AND HEALTH PLAN

For

CHAMPION TECHNOLOGIES, INC.
SITE INVESTIGATION PROJECT
HOBBS, NEW MEXICO

PROJECT NO. ES 444

Prepared by: Michael Amabisco Date: November 29, 1999

Reviewed/Approved by: Date: 11/29/99

Mr. Michael Amabisco
Project Manager

EFFECTIVE DATES: November 29, 1999 through May 29, 2000

ENERCON SERVICES, INC.
SITE SAFETY AND HEALTH PLAN

This site safety and health plan (SSHP) was prepared by Enercon Services, Inc. (Enercon) to address health and safety issues for Enercon work conducted for Champion Technologies, Inc. (Champion) facility in Hobbs, New Mexico. The majority of this work is associated with site investigation fieldwork. Environmental testing and investigation will be accomplished in accordance with applicable laws and regulations. Changes and amendments to this SSHP will be added in attached addenda. Field safety meetings should include review of changing conditions and addenda to the plan

1.0 SITE HISTORY

Champion Technologies, Inc. has occupied the 4001 South Highway location for approximately 10 years. In that time, the site has been used for the manufacturing, production, and distribution of chemicals used in the petroleum industry.

1.2 SITE DESCRIPTION

The Champion facility's physical address is 4001 South Highway 18 in Hobbs, New Mexico. The location of the property is NE/4 of SE/4, Section 15, Township 19 South, Range 38 East, West Hobbs Quadrangle (Figure 1.)

The Champion facility produces and manufactures chemicals for the petroleum industry. The property is rectangular in shape, approximately 500 feet by 640 feet, or an estimated 7 acres. The facility consists of an office building, manufacturing, and storage areas, as well as parking and undeveloped areas (Figure 2.). The site is enclosed by a fence, with a gate along South Highway 18. The facility uses a septic system for sanitary purposes and water is supplied by an on site domestic well. The site is generally flat with a slight gradient in the westerly direction. There are no bodies of surface water on the site.

The facility is bordered by the highway on the east side, residential and undeveloped property to the south, undeveloped land on the west side, and an oil field service company to the north.

1.3 PROJECT OBJECTIVES

Enercon's general field objective is to provide the services listed below.

1. Further environmental investigation to identify potential environmental problems to determine site need for remediation actions.
2. Sample collection to identify and assess chemical constituents potentially released into the subsurface during historic activities.

2.0 KEY PERSONNEL AND RESPONSIBILITIES

Mr. Mike Amabisco is project manager (PM) for the project. Mr. Paul Brodin is the Field Coordinator for the investigation portion of the project. Mr. Douglas Hagemeier is the Health and Safety Officer (HSO). Mr. Amabisco will also function as the site safety officer (SSO). All project field staff have completed 40 hours of comprehensive health and safety training which meets the requirements of 29 CFR 1910.120. A site safety officer (SSO) having completed the 1910.120 Supervisor Course and with the appropriate experience for the project will have the authority to monitor and correct health and safety problems as noticed on site will be appointed to each project. The SSO has the authority to monitor and correct health and safety problems as noticed on site.

2.1 PM RESPONSIBILITIES

The PM is responsible for generating, organizing, and compiling the SSHP which describes all planned field activities and potential hazards that may be encountered at the site. The PM is also responsible for assuring that adequate training and site safety briefing(s) are provided to the project field team. The PM has provided a copy of this SSHP to each member of the project field team and each subcontractor prior to field activities.

2.2 HSO RESPONSIBILITIES

For specific projects, the HSD is responsible for reviewing and approving the SSHP for accuracy and incorporating new information or guidelines which aid the PM and SSO in further definition and control of the potential health and safety hazards associated with the project.

2.3 SSO RESPONSIBILITIES

The SSO has on-site responsibility for ensuring that all team members comply with the SSHP. It is the SSO's responsibility to inform the subcontractor(s) and other field personnel of chemical and physical hazards as he/she becomes aware of them. Additional SSO responsibilities include:

1. Providing safety briefing and coordinating a site safety orientation meeting for team members.
2. Updating equipment or procedures to be used on site based on new information gathered during the site investigation.
3. Inspecting all personal protective equipment (PPE) prior to on-site use.
4. Assisting the PM in documenting compliance with the safety plan by completing the standard Enercon and OSHA forms.
5. Assisting in and evaluating the effectiveness of decontamination procedures for personnel, protective equipment, sampling equipment and containers, and heavy equipment and vehicles.

6. Enforcing the "buddy system" as appropriate for site activities.

7. Posting location and route to the nearest medical facility; arranging for emergency transportation to the nearest medical facility.

8. Posting the telephone numbers of local public emergency services; i.e., mine emergency personnel, police, and fire.

9. Stopping operations that threaten the health and safety of the field team or surrounding populace.

10. Entering the exclusion area in emergencies after he/she has notified emergency services.

11. Observing field team members for signs of exposure, stress, or other conditions related to pre-existing physical conditions or site work activities.

2.4 PROJECT FIELD STAFF RESPONSIBILITIES

The project field staff is responsible for ensuring that all data acquisition is performed in accordance with the work plan and SSHP, and that any deviations from the plans are based upon field conditions encountered and are well documented in the field notes. The project field staff's health and safety responsibilities include:

1. Following the SSHP.

2. Reporting to the SSO any unsafe conditions or practices.

3. Reporting to the SSO all facts pertaining to incidents which result in injury or exposure to toxic materials.

4. Reporting to the SSO equipment malfunctions or deficiencies.

2.5 PROJECT CONTACTS

The following is a reference list of project contacts:

Client:	Champion Technologies, Inc. Mr. Ralph Corry (281) 431-2561
Enercon PM:	Mike Amabisco (713) 941-0401
Field Manager:	Paul Brodin (713) 941-0401
Enercon HSO:	Douglas Hagemeier (713) 941-0401
Enercon SSO:	Mike Amabisco (713) 941-0401

2.6 EMERGENCY TELEPHONE NUMBERS

The following emergency telephone numbers will be used to call for assistance:

Fire/Ambulance:	911
Hospital:	Lea County Regional Hospital 5419 Lovington Hwy. Hobbs, NM **(505) 392-6581** Exit facility on Hwy 18. Head north on Hwy 18 for approximately 1.5 miles to hospital

A comprehensive listing of all of the emergency numbers for this project are listed in Appendix C.

2.7 SUBCONTRACTOR RESPONSIBILITIES

All subcontractors are responsible for their own health and safety program and the health and safety of their own employees. This requirement is based on OSHA regulations, which recognize the employer-to-employee responsibility for health and safety. A copy of their written program must be submitted for review to Enercon, if requested. In an effort to assist the subcontractors, and to comply with hazard communication requirements, Enercon will provide a copy of the SSHP for this project to each subcontractor for implementation by the subcontractor's employees.

3.0 HAZARD ANALYSIS

The potential hazards to personnel working at the subject site have been identified as chemical hazards and as physical hazards of uneven terrain, snakes, gila monsters, insects, cacti, severe thunder storms, and heat stress. Each potential chemical and physical hazard relative to the potential for exposure is described below.

3.1 CHEMICAL HAZARDS

Health hazards associated with potential chemical exposures at the sites include flammability and toxicity. Toxicity may occur following inhalation of chemical from dust or from vapors that could potentially be released from soil, and direct contact with soil that could potentially contain hazardous materials. Tables 1 through 3 present summaries of the chemical exposure limits and characteristics associated with fuels and related compounds, metals and metal ions, and oxygenated and halocarbon solvents. Material safety data sheets have been provided for additional information (Appendix A).

In order to understand the potential chemical hazards associated with this project, it is necessary to review what chemicals were used, and which, if any, chemicals may exist and pose a threat to workers. During its operation, a number of chemicals may have been used, transported, and stored at the site.

Based on the site history, past operational use, recent environmental assessments of similar properties, site visits and project briefings, a preliminary list of potential chemical hazards for this project are: fuels and related compounds such as gasoline, benzene, toluene, ethylbenzene, xylenes, and total petroleum hydrocarbon. The primary chemicals of concern are metals and metal ions such as manganese, lead, chromium, and nickel. Additional chemicals of concerns are: Bis (2-ethylhexyl) phthalate, benzo(a)pyrene, benzo(b)fluorathane, benzo(k)fluorathathane, chrysene, dibezo(a,h)anthracene, fluorene, naphthalene, pyrene, and 1-methylnaphthalene.

3.2 FUELS AND RELATED COMPOUNDS

3.2.1 Benzene, Toluene, Ethylbenzene and Xylenes (BTEX)

Benzene is regulated by OSHA as an occupational carcinogen and has been associated with leukemia. Acute health effects include irritation to the eyes, nose and respiratory system, headache, giddiness, nausea, and anorexia. Benzene exposure can also lead to disturbances in gait, dermatitis, and bone marrow depression.

The other BTEX compounds (toluene, ethylbenzene, and xylenes) may cause irritation to the eyes, nose and respiratory system, and dermatitis. Acute exposure can lead to central nervous system effects including headache, dizziness, confusion, and irritability. Exposure to toluene may also result in pupil dilatation, nervousness, insomnia and reproductive toxicity. Elevated concentrations of xylene isomers may lead to corneal damage, and gastrointestinal symptoms including abdominal pain, nausea and vomiting.

3.2.2 Gasoline Vapors (50 - 100 Octane)

Gasoline vapors (50-100 Octane) are moderately to highly toxic via inhalation. Inhalation of gasoline vapors can cause central nervous system (CNS) depression, pneumonitis, fatal pulmonary edema, and some addiction. The vapors are considered moderately toxic and may cause eye disturbances. The current Threshold Limit Value (TLV) for gasoline vapor in air is 300 ppm. OSHA has not established a PEL. Gasoline contains benzene.

Oils are not considered flammable, only combustible. Because of their low vapor pressure, they do not typically constitute an inhalation hazard unless working conditions include extremely hot temperatures or create excessive airborne oil-contaminated dust. These conditions are not anticipated.

3.2.3 Total Petroleum Hydrocarbons (TPH)

TPH refers to heavy hydrocarbons which may present a fire hazard in extreme circumstances, such as the presence of flame, excessive heat or strong oxidizers. An exposure limit for TPH has not been established due to the varied chemical composition. Presently, there are no known chronic health hazards associated with TPH.

Table 1. Chemical Exposure Limits and Characteristics for Fuels and Related Compounds

Chemical	IP[1]	OVA[2] Relative Response Percent	TLV-TWA[3] (ppm)	IDLH[4]Level (ppm)	Flammable Range Percent	Odor Threshold (ppm)	Note[5]
Benzene	9.24	150	1[6]	Ca	1.2 - 7.8	4.68	C, F
Toluene	8.82	110	50	500	1.1 - 7.1	0.17 - 40	T, F
Ethylbenzene	8.76	100	100	800	0.8 - 6.7	0.25 - 200	T, F
Xylenes	8.56	111	100	900	0.9 - 7 .0	0.05 - 200	T, F
Gasoline	?	?	300	Ca	1.4 - 7.6	low ppm	F, T

[1] Ionization potential in electron-volts (eV).

[2] Century Organic Vapor Analyzer relative response to the compound in percent.

[3] Threshold Limit Value as the airborne 8-hour time-weighted average (TWA) established by the American Conference of Governmental Industrial Hygienists (ACGIH), 1996.

[4] Immediately Dangerous to Life and Health level as published in the National Institute for Occupational Safety and Health (NIOSH), Pocket Guide to Chemical Hazards, 1994 edition. Ca = suspected carcinogen.

[5] C-Carcinogen; F-Flammable; T-Toxic.

[6] Airborne TWA established by the Occupational Safety and Health Administration (OSHA) and published in the NIOSH Pocket Guide to Chemical Hazards, 1994 edition.

3.3 METALS AND METAL IONS

Metal and metal ions present no volatility or flammability problems. They can present acute or chronic effects if the host material is inhaled in the form of a dust or fume. Metals such as chromium and cadmium and their ions can cause irritation of mucous membranes and lung tissues. To minimize inhalation of metals, host dusts should be minimized as much as possible. In addition, protective equipment and safe work practices will be used to limit exposure.

3.3.1 Manganese

Arsenic has toxic health effects which include irritation to eyes, nose, and throat, central nervous system disorder, mottling of lungs, and benign pneumoconiossis. The current PEL for manganese is 10 mg/m^3 as an 8-hour time-weighted average (TWA) airborne dust concentration. The regulatory action level is 0.2 mg/m^3 TWA dust concentration.

3.3.2 Nickel

Nickel has toxic health effects which include headaches, vertigo, nausea, vomiting, epigatric pain, cough, weakness, delerium, and convulsions. Nickel is a suspected carcinogen. The current PEL for nickel is 0.01 mg/m^3 as an 8-hour TWA airborne dust concentration.

3.3.3 Chromium

Chromium has toxic health effects which can range from allergic skin reactions to mild, and eventually severe, respiratory system irritation. Chromium may exist in one of three valence states in compounds (+2, +3, or +6). Toxic health effects are primarily associated with Cr+6 (hexavalent chromium) exposure. It is a suspected carcinogen as Cr+6. Symptoms of acute exposure include coughing, wheezing, painful deep inspiration, and fever. Pulmonary edema may persist after other symptoms subside. Other effects include dermatitis, ulceration of the skin, conjunctivitis and asthma. Chronic exposure may be associated with lung cancer. The current TLV for chromium as water-soluble Cr+6 is 0.05 mg/m^3 as an 8-hour TWA airborne dust concentration.

3.3.4 Lead

Lead in its elemental form is a heavy, ductile, soft gray metal. The PEL for lead is 0.05 mg/m^3 in air based on an 8-hour TWA. The regulatory action level is 0.005 mg/m^3 in air. Exposure may produce several symptoms including weakness, eye irritation, facial pallor, pale eyes, lassitude, insomnia, anemia, tremors, malnutrition, constipation, paralysis of the wrists and ankles, abdominal pain, colic, neuropathy, encephalopathy, gingival lead line, hypotension, anorexia, and weight loss. Target organs are the central nervous system, kidneys, eyes, blood, reproductive tissue, gingival tissue, and the gastrointestinal tract.

Table 2. Chemical Exposure Limits and Characteristics for Metals and Metal Ions

Chemical	OSHA PEL [1] (mg/m^3)	TLV TWA [2] (mg/m^3)	IDLH [3] Level (mg/m^3)	Physical Description	Note [4]
Manganese	1	0.2	None	metallic gray material	T
Nickel	1	1	None	Silver gay material	C
Chromium (VI)	0.1	0.05	15, Ca	appearance and odor vary depending upon the specific compound	C
Lead	0.05	0.05	100	heavy, ductile, soft, gray solid	T

[1] Airborne TWA established by the Occupational Safety and Health Administration (OSHA) and published in the NIOSH Pocket Guide to Chemical Hazards, 1994 edition.

[2] Threshold Limit Value as the airborne 8-hour time-weighted average (TWA) established by the American Conference of Governmental Industrial Hygienists (ACGIH), 1996.

[3] Immediately Dangerous to Life and Health level as published in the National Institute for Occupational Safety and Health (NIOSH), Pocket Guide to Chemical Hazards, 1994 edition. Ca = suspected carcinogen.

[4] C-Carcinogen; F-Flammable; T-Toxic.

3.4 SEMIVOLATILE ORGANIC COMPOUNDS

3.4.1 Bis (2-ethylhexyl) phthalate

Acute health effects include irritation to the eyes, nose, skin, and respiratory system.

3.4.2 Benzo (a) pyrene

Acute health effects include irritation to the eyes, nose, skin and respiratory system. Benzo (a) pyrene is recognized as a possible mutagen.

3.4.3 Benzo(b)fluorathene

Acute health effects include irritation to the eyes, nose, skin and respiratory system. Benzo (a) fluoranthene is recognized as an animal carcinogen.

3.4.4 Benzo(k)fluorathene

Acute health effects include irritation to the eyes, nose, skin and respiratory system. Benzo (a) fluoranthene is recognized as an animal carcinogen.

3.4.5 Chrysene

Acute health effects include irritation to the eyes, nose, skin and respiratory system. Crysene is recognized as an animal carcinogen.

3.4.6 Fluorene

Acute health effects include irritation to the eyes, nose, skin and respiratory system.

3.4.7 Naphthalene

Acute health effects include irritation to the eyes, nose, skin and respiratory system. Also includes nausea, headaches, diarrhea, and cramps.

3.4.8 Pyrene

Acute health effects include, hematopoietic changes, dermatitis, damage to skin and blood sysytems.

3.4.9 1-Methylnaphthalene

Acute health effects include irritation to the eyes, nose, skin and respiratory system.

Table 3. Chemical Exposure Limits and Characteristics for Semivolatile Organic Compounds

Chemical	TLV TWA[3] (ppm)	PEL[4] Level (ppm)	Flammable Range Percent	Note[5]
2-ethylhexyl) phthalate	5	5	N/A	N/A
o (a) pyrene	N/A	N/A	N/A	T
o (b) fluoranthene	N/A	N/A	N/A	C
o (k) fluoranthene	N/A	N/A	N/A	C
sene	N/A	0.2	N/A	C
nzo (a,h) anthracene	N/A	N/A	N/A	T
rene	N/A	N/A	N/A	T
thalene	10	10	N/A	T
ne	N/A	N/A	N/A	T
thylnaphthalene	N/A	N/A	N/A	T

1 Ionization potential in electron-volts (eV).

2 Century Organic Vapor Analyzer relative response to the compound in percent.

3 Threshold Limit Value as the airborne 8-hour time-weighted average (TWA) established by the American Conference of Governmental Industrial Hygienists (ACGIH), 1996.

4 Immediately Dangerous to Life and Health level as published in the National Institute for Occupational Safety and Health (NIOSH), Pocket Guide to Chemical Hazards, 1994 edition. Ca = suspected carcinogen.

5 C-Carcinogen; F-Flammable; T-Toxic.

6 Airborne TWA established by the Occupational Safety and Health Administration (OSHA) and published in the Federal Register, January 1997.

3.5 PHYSICAL HAZARDS

Accidents involving physical hazards can directly injure field personnel and can create additional hazards such as increased exposure to chemicals due to damaged protective equipment. Working at heights or in limited access areas, and around open excavations and heavy equipment present physical hazards. Field personnel should maintain awareness for potential safety hazards, and should immediately inform the SSO of any new hazards so that corrective measures can be taken.

3.5.1 Excavation/Trenching

Excavation and trenching work can present several significant physical hazards (e.g., trip/fall hazards, collapse of trench excavation walls, pinching or crushing from heavy equipment and tools, tipping hazards, oxygen deficiency). For this reason, all such work must be performed in compliance with the regulations on excavations, trenches and earthwork, 29 CFR 1926, Subpart P - Trenching and Excavation. Excavation/trenches are not expect during the initial site work. Permits are required for construction of trenches and excavations four feet or deeper into which a person is required to descend. The contractor performing the excavation must assure that the OSHA district office nearest the job site is notified prior to work commencement. An on-site "competent person" will be provided by Enercon and should be capable of identifying existing and predictable hazards in the surroundings or working conditions and have authorization to take prompt corrective measures to eliminate identified hazards. Be aware that the possibility of an oxygen-deficient or hazardous atmosphere could exist or occur in excavations, especially when excavating in previously-existing industrial areas. A trench could be a confined space where gases heavier than air can collect. It is not anticipated that the work conducted under this plan will require significant trenching or excavation and therefore monitoring will not be warranted.

The following general rules must be observed when working in trenches or excavation areas:

- no one should enter a trench or excavation without proper access, such as with ladders, ramps or stairs;
- there should be no more than 25 feet lateral distance in the trench/excavation between the worker and the nearest means of egress;
- a means of protection from collapse of trench/excavation walls must be provided for all workers either by sloping, benching, shoring, sheeting or by some other type of support system if excavation or trench is four feet or greater in depth;
- employees should not work in excavations where water has accumulated or is accumulating; adequate precautions (e.g., installation of special supports or shields, water removal equipment) must be taken to protect employees from the hazards of groundwater infiltration;
- employees should never enter a trench/excavation when parts or materials (e.g., pipes, valves) are being lifted/moved in the vicinity by heavy machinery; and

- daily inspections of the excavation area and protective systems should be performed by a competent person who can identify existing or potential unsanitary or hazardous conditions, and who has the authority to take prompt corrective measure to eliminate such conditions.

3.5.2 Limited Access Areas

Limited access areas can interfere with planned field operations and enhance the potential of physical hazards to personnel working in the field. Limited access areas include interior building spaces, sensitive manufacturing operations, access restrictions, and obstructions to digging or drilling such as subsurface and overhead interference's (utilities). These interference's must be clearly identified and marked prior to any digging or drilling operations.

3.5.3 Heavy Equipment

The SSO will be present on a regular during all drilling and excavation operations involving the use of heavy equipment to ensure that appropriate level of protection and safety procedures are utilized. Hard hats, steel-toed boots, ear and eye protection will be required at all times when working around heavy equipment. The proximity of chemical, water, sewer, and electrical lines will be identified before any digging or drilling is attempted. Additionally, hazards associated with working around heavy equipment can be effectively managed by the employee if a constant awareness of these hazards is maintained. These hazards include the risk of becoming physically entangled in the equipment or being run over, slipping and falling, impact injury to eyes, head and body, and injury from machinery operations. Constant visual or verbal contact with the equipment operator will facilitate such awareness.

3.5.4 Noise

Noise is a potential hazard in areas where heavy equipment including backhoes, power tools, pumps or generators are operated. Heavy equipment operation may produce noise levels that reach or exceed 85 decibels (dBA), the action level established by the OSHA. Elevated noise levels will be evaluated by the SSO when equipment is operated. Exposure to elevated noise levels can lead to temporary or permanent hearing loss. The SSO will ensure hearing protection is utilized when noise levels are elevated, e.g. when the excavator is in operation.

3.5.5 Sunburn

Working outdoors or on roofs on sunny days for extended periods of time can cause sunburn to the skin. Excessive exposure to sunlight is associated with the development of skin cancer. Field staff should take precautions to prevent sunburn by using sun-screen lotion and/or wearing hats and long-sleeved garments.

3.5.6 Heat Stress

The potential for heat stress is a concern when field activities are performed on warm, sunny days, and is accentuated when chemical protective clothing is worn. Heat stress prevention measures and monitoring will be implemented if ambient temperatures are above 70 degrees Fahrenheit (F).

General Precautions. Precautions to prevent heat stress will include: work/rest cycles so that rest periods are taken before excessive fatigue occurs; regular intake of water to replace that lost from sweating. Work/rest cycles will be based on monitoring the heart rate (pulse) of each individual worker. Rest breaks will be long enough to reduce the heart rate (HR) below levels calculated according to the following method:

1. Workers will initially determine their resting HR prior to starting work activities.

2. At the start of the first rest period, workers will determine their initial HR. This initial HR should not exceed the individual's age-adjusted maximum HR, which equals [(0.7)(220 - age in years)]. At 1 minute into the rest period, the recovery HR will be determined. The recovery HR should not exceed 110 beats per minute.

3. If the initial HR exceeds the age-adjusted maximum HR, or the 1-minute recovery HR is greater than 110 beats per minute, then the next work period will be decreased by 10 minutes.

An initial work/rest cycle of 1 hour work and 15 minutes rest is recommended for protection of staff when the heat stress hazard is high. The recommended cycle will be adjusted up or down based upon worker monitoring, environmental conditions, and the judgment of the SSO. At any time, field team members recognize the signs or symptoms of heat stress prior to a scheduled rest period, they will notify the SSO immediately in order that a rest period can be called.

Heat stress due to water loss can be prevented. To prevent dehydration, water intake must approximate sweat loss. Water intake guidelines are as follows:

1. The sense of thirst is not an adequate indicator of water replacement needs during heat exposure. Therefore, water must be replaced at prescribed intervals.

    a. Before work begins, drink two 8-ounce glasses of water.
    b. During each rest period, drink at least two 8-ounce glasses of water.

2. Plain water, served cool, is excellent. An adequate supply of drinking water (at least one gallon per person per day) and clean cups will be readily available (i.e., at the support vehicle) to provide water during rest periods.

3. Adding salt to water is not recommended. However, other fluids, in addition to water, could include fruit juices and diluted electrolyte replacement drinks (diluted 3:1 with water). **Do not use salt tablets!**

Heat stress, if not prevented, results in heat stress illnesses. Two critical illnesses, if not recognized and treated immediately, can become life-threatening. These are heat exhaustion and heat stroke. Heat exhaustion will result if the prevention measures described above are not implemented. Ignoring the signs and symptoms of heat exhaustion will lead to the development of heat stroke. Heat stroke is an immediate, life-threatening condition that results because the body's heat regulating mechanisms shut down, and the body cannot cool itself sufficiently. As heat is excessively stored in the body, brain damage can result causing permanent disability or death.

Heat Exhaustion. The signs and symptoms of heat exhaustion are headache; dizziness; nausea; weakness; fainting; profuse sweating; loss of appetite; approximately normal body temperature; dilated pupils; weak and rapid pulse; shallow and rapid breathing; possible cramps in abdomen and extremities; possible vomiting; difficulty walking; and **skin that is cool and sweaty to the touch with pale to ashen-gray coloring.**

First aid for heat exhaustion is as follows:

1. Immediately remove victim to the support area; if you are the victim, go to the support area.
2. Decontaminate, if practical, before entering support area.
3. Start cooling, but be careful not to cause a chill (i.e., rest in shade and apply wet towel to forehead; open up and/or remove clothing as much as practical, especially chemical-resistant clothing).
4. Drink cool water slowly, but only if conscious and not in shock.
5. If vomiting, and/or the signs and symptoms are not lessening within an hour, call for emergency help and/or transport the victim to emergency room.
6. It is likely that a heat exhaustion victim will be unable to work for the remainder of the day.

Heat Stroke (aka sun stroke). The signs and symptoms of heat stroke **are hot, dry skin to the touch with reddish coloring**; body temperature >105 degrees F; no sweating; mental confusion; deep, rapid breathing that sounds like snoring progressing to shallow, weak breathing; headache; dizziness; nausea; vomiting; weakness; dry mouth; convulsions; muscular twitching; sudden collapse; possible unconsciousness.

First aid for heat stroke is as follows:

1. Immediately remove the victim to the support area; prior to entering the support area, remove and dispose the victim's chemical-resistant clothing.

2. Cool the victim rapidly using whatever means are available, such as shade, opening up and/or removing clothing, soaking clothing/skin with water and fanning, placing victim in vehicle using air conditioning on maximum.
3. Do not give drinking water to victim.
4. Treat for shock, if needed.
5. **Transport** the victim **to the emergency room** or call for emergency help; **no exceptions** for heat stroke victim.

3.5.7 Lightning - Severe Storm Conditions

In the event of an electrical storm in which lightning is in and around the vicinity of the mine, all personnel should make the appropriate provisions to minimize and/or eliminate the potential for shock from a nearby or direct lightning strike. Personnel should proceed to:

- Turn off all electrical powered equipment and tools;
- Move to a safe location until the storm passes;
- Do not seek refuge under trees;
- Do not stand in an open area;
- Do not hold any type of metal tools in hands; and
- Do not go near electrical transformer, switch gear, or distribution boxes.

3.5.8 Slips, Trips, and Falls

Site activities pose a variety of slip, trip, and fall hazards due to the uneven and potentially slippery surfaces on which personnel will walk. Personnel should be cognizant at all times of their position and work activities in relation to other site activities. During activities that require personnel to walk on slippery or uneven surfaces, personnel need to be careful and should always wear a shoe with a non-slip bottom and good tread.

3.5.9 Ergonomic Hazards

Ergonomic injuries to muscles, joints, backs, tendons, etc., occur during lifting, moving heavy objects, maintaining static body positions or performing repetitive motions. Ergonomic injuries can be prevented by evaluating job activities before the start of work and assuming that adequate tools and equipment are available for the job. Particular attention should be paid to jobs requiring bending, squatting or kneeling positions, transporting heavy loads, exerting heavy forces or maintaining static positions. For further job analysis, contact the HSO.

3.5.10 Fires

There is a concern for possible entrapment by large brush fires which could sweep the entire area. Consideration needs to be given to a number of issues:

- The potential for excessive wild fire over the area;
- The amount of advance warning one could anticipate of a fire advancing;
- A place of refuge, safe from the advancing fire; and
- An alternative evacuation/escape route, if needed.

3.5.11 Animal/Insect/Reptile Bites

Since the potential exists for possible serious insect/reptile bites from rattlesnakes, scorpions, and gila monsters, care and preparation should be taken to handle the potential for injury to our employees. Also certain protection equipment should be on hand, such as individual snakebite kits for each person on site.

Snakes

The most common types of poisonous snakes in Arizona are the rattlesnakes (pit vipers) and coral snakes. Any snake that inflicts a bite should be precisely identified if possible. Many people are injured by unnecessary treatment for bites of nonpoisonous snakes. More significantly, a bite by a Mojave rattlesnake may produce very little reaction in the hours immediately after it occurs, when treatment is most effective. Only if the species of snake is known can optimal therapy be started without delay. Preferably the snake should be killed and brought to a medical center with the person who was bitten so that the exact species can be determined.

Snake bites are best avoided, not treated

Pit Vipers

Pit vipers are so named because they have a small pit located between the eye and the nostril, a feature found only in these poisonous species. The pit is an infrared sensing organ instrumental in detecting the small, warm-blooded animals these snakes eat. They have a characteristic triangle head and heavy body. Rattlesnakes in Arizona belong to the pit viper species. If fangs are present the snake is undoubtedly poisonous, however, searching for fangs is hazardous. If they have rattles they are obviously rattlesnakes and poisonous. However, the lack of rattles is not a good identifier since they can get broken off or even shed with the skin.

The reaction following the bite of a pit viper is one of the best indications that the snake was poisonous and is the only indication that envenomation has occurred and treatment may be needed. This reaction begins within minutes after the bite, but is usually less marked after other

pit viper bites. The reaction severity also varies depending on the species of snake. The earliest symptom is pain or burning at the site of the bite, although some people experience relatively little pain. Shortly afterward the area begins to swell as fluid pours into the tissues. Bleeding usually produces a purple or green discoloration, but this change may take several hours to appear.

Following moderate envenomation, the swelling and discoloration extend further from the site of the bite, large blisters that contain clear or bloody fluid appear, and the regional lymph nodes, particularly in the armpit or the inguinal crease, become enlarged and tender. Severe envenomation is heralded by the development of a systemic reaction. The subject becomes weak and dizzy and develops signs of shock, particularly cold, clammy skin and a weak pulse.

When a subject can be hospitalized within two hours time, the only treatment needed is limiting the spread of the venom and immobilizing the extremity. No other measures, particularly incision and suction, should be attempted. Tourniquets are not recommended to help reduce the spread of the venom because they are rarely applied correctly and commonly do more harm than good. The immobilized extremity should be kept at the same level as the heart, and the person should be transported to a hospital with as little effort on his part as possible. No other treatment should be attempted. Wrapping of the wound should not be applied unless envenomation is known to be moderate or severe.

Coral Snakes

Coral snakes are small, thin, brightly colored snakes with small heads. They can be identified by the adjacent red and yellow bands. The nonpoisonous king snakes and other harmless species with similar coloration have adjacent red and black bands. A helpful reminder is: "Red and Yellow--kill a fellow. Red and black--venom lack".

The Sonoran coral snake is found in a limited portion of southern Arizona. Coral snakes tend to bite and hang on, sometimes chewing for as long as a minute. The bites are rarely associated with the local reaction--severe pain and swelling--typical of pit viper bites. Some pain may be present and may radiate up the limb. Often the first sign of envenomation is painful enlargement of the regional lymph nodes. Severe envenomation may include numbness and weakness of the limb within one to two hours, or less. Antivenom is the only effective therapy for coral snake bites. The limb should be wrapped to immobilize the venom and should be splinted. The individual should be rapidly transported to a hospital with as little effort on his/her part as possible. Incision and suction or other forms of non-hospital treatment are of no value.

Spiders and Other Insects

Almost all spiders produce toxic venoms, but their fangs are too small and weak to penetrate the skin, the venom is too weak, or the volume of venom is too small to pose a significant threat to humans. The black widow is the only spider found in the US that is capable of routinely producing serious illness by its bite. The "tarantula" native to the US Southwest bites only after

extreme provocation. Its weak and ineffective fangs can only penetrate thin skin, such as that on the sides of the fingers; the effects of the bite are no worse than an insect sting.

The female black widow typically is coal black and has a prominent, spherical abdomen that may be as large as one-half inch in diameter. A red or orange marking resembling an hourglass shape is present on the underside of the abdomen. The black widow weaves a coarse, crudely constructed web in dark corners, both indoors and out. They exist in secluded areas beneath objects, under toilet seats, in dark corners of buildings, window sills, etc.

The black widow bite may feel like a pin prick, may produce a mild burning, or may not be noticed at all. Small puncture wounds, slight redness, or no visible marks may be found at the site of the bite. Within about 15 minutes painful muscle cramps develop at the point of the bite and rapidly spread to involve the entire body. Weakness and tremors may also be present.

Treatment for black widows consists of efforts to relieve the painful muscle spasms and antivenom for small children. No treatment at all should be directed to the site of the bite, with the possible exception of applying an ice cube to relieve pain. Incision and suction is damaging and useless, and should not be performed. Essentially, nothing can be done outside a hospital. This applies to other types of spider bites too.

Scorpion Stings

Scorpions are found throughout the US but the species lethal for man are limited to Arizona, New Mexico, Texas, southern California, and northern Mexico. The problems with scorpions in Arizona are clearly related to their tendency to live in the vicinity of human habitation where children are frequently playing. Stings can be avoided by exercising care when picking up stones, logs, or similar objects. Shoes and clothing should be shaken vigorously before dressing in the morning. Scorpions are nocturnal creatures.

The lethal species are typically yellow to greenish yellow color and can be distinguished from other species by a small, knob like projection at the base of their stingers. Adults measure about 3 inches in length and 3/8 inch in width. One subspecies has two irregular dark stripes down its back. Lethal scorpion bites are usually painful, but fatalities are generally limited to small children.

Symptoms of a scorpion sting include a pricking sensation initially, pain follows in 5 to 60 minutes and may be severe. The sting is sensitive to the touch. Tapping the site produces a painful tingling or burning sensation that travels up the extremity toward the body. Sensitivity may persist for up to 10 days.

Only a medical facility has the equipment and supplies necessary to monitor and deal with any complications that may arise. An ice cube may be applied to the site to help reduce pain, but no other therapy is possible outside a hospital.

3.5.12 Animal Droppings

Due to the fact that many buildings have been vacant and that some have become a haven for animals or birds, there may be a significant amount of droppings in some areas. In areas where there is evidence of particularly bird droppings, those persons entering should be equipped with and required to use dust type respirator or a PPE device. Unless the individual is not crawling or doing excessive hands-on touching in the area, there should not be a need for other protective clothing. If, however, there is excessive time, touching, sampling, or movement in the immediate area of the droppings, then gloves and coveralls should be used.

3.5.13 Hanta Virus

Enercon personnel and subcontractors working at the site where there is evidence of a rodent population, particularly the deer mouse, must be made aware of an increased level of concern regarding the transmission of "Hanta Virus" associated diseases. The Hanta Virus is believed to be associated with rodents, especially the deer mouse, which serves as a primary reservoir host, and can result in fatalities. The Hanta Virus is responsible for an increasing number of deaths in the Southwestern U.S.

The Hanta Virus can be spread by the saliva, urine, and feces of infected rodents. Human infection may occur when infected wastes are inhaled as aerosols produced directly from the animals, or as dried materials introduced into broken skin or onto mucous membranes. Known infections of humans occur mostly in adults and are associated with activities that provide contact with infected rodents in rural/semi-rural areas. Activities to be avoided are sweeping, dusting and other cleaning activities unless precautions are taken. Areas should be sprayed with a 5% solution of bleach and water, allowed to sit for a minimum of 15 minutes and then the debris may be swept up and thrown away. High hazard areas will be decontaminated by approved vendors prior to the entry of Enercon personnel.

Illness caused by the Hanta Virus begins with one or more flu-like symptoms (i.e., fever, muscle aches, headache and/or cough), and progresses rapidly to severe lung disease and may cause death. Early diagnosis and treatment are vital.

Field Precautions to Avoid Hanta Virus: Personnel entering areas where rodents and the presence of the Hanta Virus is known or suspected need to take proactive measures and notify the PM or HSD. If simply precautionary measures are needed, field personnel will wear respirators with P-100 filters, eye protection, chemical resistant coveralls, chemical resistant gloves and disposable boot covers if there is any potential for direct contact with rodents or their wastes. Strict decontamination requirements must be followed. When working in rural/semi-rural areas, the following risk reduction strategies should be implemented:

1. Eliminate rodents and reduce availability of food sources and nesting sites used by rodents.
2. Store trash/garbage in rodent-proof metal or thick plastic containers with tight lids.

3. Cut tall grass/underbrush in close proximity to buildings.

4. Prevent rodents from entering buildings.

3.5.14 Bloodborne Pathogens

While it is policy to provide first aid and CPR training to field workers, no employee is designated as a first aid provider. Emergency services will be summoned. Employees have the option to render aid until help arrives. First aid kits should include latex gloves, alcohol wipes, and CPR isolation devices. These devices should be used when rendering aid.

Should an employee provide first aid or CPR to an individual during the course of his/her duties, the incident must be reported immediately after the incident occurred. All such personnel will be offered the Hepatitis B vaccination and medical follow-up without cost. Recent medical developments may allow for intervention following contamination with the HIV virus that reduces the possibility of infection if received within hours of the incident.

4.0 TRAINING REQUIREMENTS

All Enercon staff working on site must have completed training in hazard recognition and basic health and safety issues as required by the occupational safety and health regulations contained in 29 CFR 1910.120 (e). This training is accomplished through an initial 40-hour classroom program, which includes hazard communication training, and 24-hour on-the-job training. The 8-hour refresher training is conducted annually. In addition, Enercon field personnel will be familiar with the requirements of this SSHP, and will participate in site activity and safety briefings provided by the project SSO, particularly on site-specific conditions and potential contaminants. The SSO and project manager have completed the required 8 hours of additional supervisory training for this project assignment.

Personnel performing oversight of asbestos abatement activities will also be required to have competent person training (EPA approved contractor/supervisor) and must remain on site during all removal activities.

5.0 PERSONAL PROTECTIVE EQUIPMENT

Based on the hazard analysis for this project, the following PPE will be required and used. Changes to these specified items of PPE will not be made without the approval of the SSO.

Level D is the minimum protection required for this job. Level D consists of hard hat, steel-toed work boots, long pants and shirt with sleeves. Work in the vicinity of the Smelter Stack requires Level C protection as described below. Safety glasses must be worn when chemical and/or eye hazards are present and must be American National Standards institute (ANSI) approved. Ear plugs will be worn if, at any time, verbal communication is difficult to comprehend within a radius of three feet. All respirator fit tests will be current within one year. Fit tests for asbestos will be accomplished on a semi-annual basis.

During any sampling activities involving site soils, the sampling area will be misted with a spray bottle to preclude fugitive dust emissions and unnecessary exposures to site soils. Gloves will be utilized during all sampling activities. All re-usable work clothes and footwear will be bagged at the end of each work shift to avoid potential for secondary exposures or cross-contamination. The clothes will then be either decontaminated (by approved laundering) or sampled to verify that no contamination exists.

If field conditions indicate potential exposure to amounts of dust not suppressed by the above-referenced methods, or if work is to accomplished in the vicinity of the smelter, PPE will be upgraded to Level C. Level C consists of Level D and the following items of PPE:

- Air Purifying Respirator (APR) half-masks with P100 particulate filters will be used. Additional filters that may be used in applicable situations will include acid/organic vapor cartridges. When using these devices, care shall be taken to follow device instructions carefully. In all cases, the equipment must be of the type approved by the National Institute of Occupational Safety and Health (NIOSH).

- Disposable Tyvek coveralls taped at the wrist and ankles, boot covers, and disposable latex examination gloves.

Field Precautions to Avoid Hanta Virus: Personnel entering areas where rodents and the presence of the Hanta Virus is known or suspected need to take personal proactive measures. Field personnel must contact the PM and HSD to determine the level of hazard involved and if a specialist should be contracted to clean the area prior to starting work. Personal protective equipment will include respirators with P100 particulate filters, eye protection, coveralls, latex gloves, and disposable boot covers .

6.0 ENVIRONMENTAL MONITORING PLAN

The potential hazards identified in the Hazard Analysis portion of this SSHP determined the need for initial and/or ongoing monitoring for assessment of exposure to the hazards as follows.

A no dust policy will be implemented for all activities being accomplished at the site, to include sampling demolition and excavation to ensure that potential exposure to contaminants identified in site soils is being controlled. If activities indicate elevated levels of dust, a real time dust monitor will be utilized to keep track of employee dust exposure.

If at any time during the sampling, it is suspected that a hazardous condition exists, or if sampling data, odors, symptoms or visual observations (i.e., staining) indicate the potential for exposure, or if visible dust is evident, and weather conditions do not allow for the suppression of dust during sampling, work will be stopped and monitoring efforts and personal protective equipment choices will be re-evaluated. Action levels and changes to this health and safety protocol for this site will be documented in addenda to this plan.

Heat stress and noise will be monitored as described in the Hazard Analysis portion of this SSHP.

7.0 MEDICAL SURVEILLANCE REQUIREMENTS

Medical surveillance is conducted as a routine program for Enercon field staff that meets the requirements of HAZWOPER regulation - 29 CFR 1910.120 (f) and Respiratory Protection regulations - 29 CFR 1910.134. Any additional test or examinations and Tetanus shots required for staff involved in this project will be performed on an as needed basis.

All subcontractor personnel directly involved with the field work must also meet the medical surveillance requirements of 29 CFR 1910.120.

8.0 SITE CONTROL MEASURES

This section describes the general facilities and site-specific control measures for this project. The potential chemical and physical hazards have been identified in this SSHP; however, should unexpected conditions arise, the SSO will stop all work at the site and notify the PM and HSO. Work will not resume until the SSHP and working conditions have been reevaluated and the SSHP revised accordingly.

Communication between field team members will consist of verbal communications, hand signals, and portable radios.

It is not anticipated that the PEL for any of the potential contaminants in this plan will be exceeded on site. However, if this does occur, a regulated area must be established and posted with warning signs, the language of which, is regulation specific. A no dust policy will be enforced during all site activities. If activities indicate the generation of dust, wetting procedures and real time dust monitoring will be initiated.

The nearest medical assistance is:

Lea County Regional Hospital
5419 Lovington Hwy.
Hobbs, NM
(505) 392-6581
Exit facility on Hwy 18. Head north on Hwy 18 for approximately 1.5 miles to hospital

8.1 SAFE WORK PRACTICES SITE ACTIVITIES

Safe work practices are part of assuring a safe and healthful working environment. These practices are standardized for all field activities, and it is the responsibility of Enercon employees to follow safe work practices when conducting field activities. Safe work practices to be employed during the entire progress of field work are as follows:

1. Set up, assemble, and check out all equipment for integrity and proper function prior to starting work activities.
2. Do not use faulty or suspect equipment.
3. Do not smoke, eat, drink or apply cosmetics while in the site work areas. Take breaks away from hazardous areas.
4. Wash hands, face, and arms prior to taking rest breaks, lunch break, and leaving the site at the end of the work day.
5. Check in and out with the SSO upon arrival and departure from the site.
6. Notify the SSO immediately if there is an accident that causes an injury or illness.
7. Use the buddy system when working in remote areas of the site.

8. Do not approach or enter an area where oxygen deficiency or toxic or explosive concentrations of airborne contaminants may exist without the proper personal protective equipment and appropriate support personnel.

9. Use respirators correctly and as required by the site; check the fit of the respirator with a negative or positive pressure test; do not wear respirator with facial hair or other conditions that prevent a face-to-facepiece seal; do not wear contact lenses when the use of a respirator is required; cartridge and filter units shall be checked and maintained in accordance with manufacturer instructions; the face piece shall be washed regularly.

Do not remove protective panels from energized electrical equipment such as transformers, junction boxes, power disconnect switches, or lighting fixtures without first securing the power source and then locking out and tagging out the source power. The same principles apply to inspection and access of energized mechanical or hydraulic equipment such as pumps and compressors. Contact Champion personnel to coordinate Lockout/Tagout of energized equipment.

9.0 DECONTAMINATION

A temporary decontamination line will be set up for each activity at each work zone at the site and decontamination of equipment and personnel will be conducted prior to leaving the site. A decontamination solution of Alconox and water will be used to clean if there are chemically contaminated items. A MSDS for Alconox is available on request. As described under Personal Protective Equipment, an alternative method of decontamination at the site includes bagging and approved laundering of work clothes and boots. Frequent laundering of clothing is advised. Tyuek suits, gloves, and boot covers will be properly disposed of. Handwashing before breaks, lunch, and leaving the site is mandatory.

Street clothes and food items must be stored in a clean area or in clean containers. Workers must wash their hands and face prior to eating. Eating will be permitted only in designated areas. While not indicated by preliminary data, showering immediately after the work shift is advised (weekly at minimum).

The temporary decontamination line should provide sufficient space to wash and rinse boots, gloves, and all sampling equipment prior to placing equipment into the support zone or a vehicle, as well as a place to discard used disposable items such as gloves and coveralls.

Depending on the decontamination option chosen, the decontamination station will include: glove/boot wash station, PPE disposal containers, potable water, and rest area.

10.0 EMERGENCY PROCEDURES

In the event of an emergency on site, the SSO will direct the course of action. It may be necessary for the SSO to depend on the other on-site personnel for assistance. The SSO will call for emergency assistance if needed. As soon as practical, the SSO will contact the PM and the HSO. All staff assigned to this project will be briefed on the emergency procedures and their responsibilities for implementation. A map showing the location and route to the hospital is included as Figure 1.

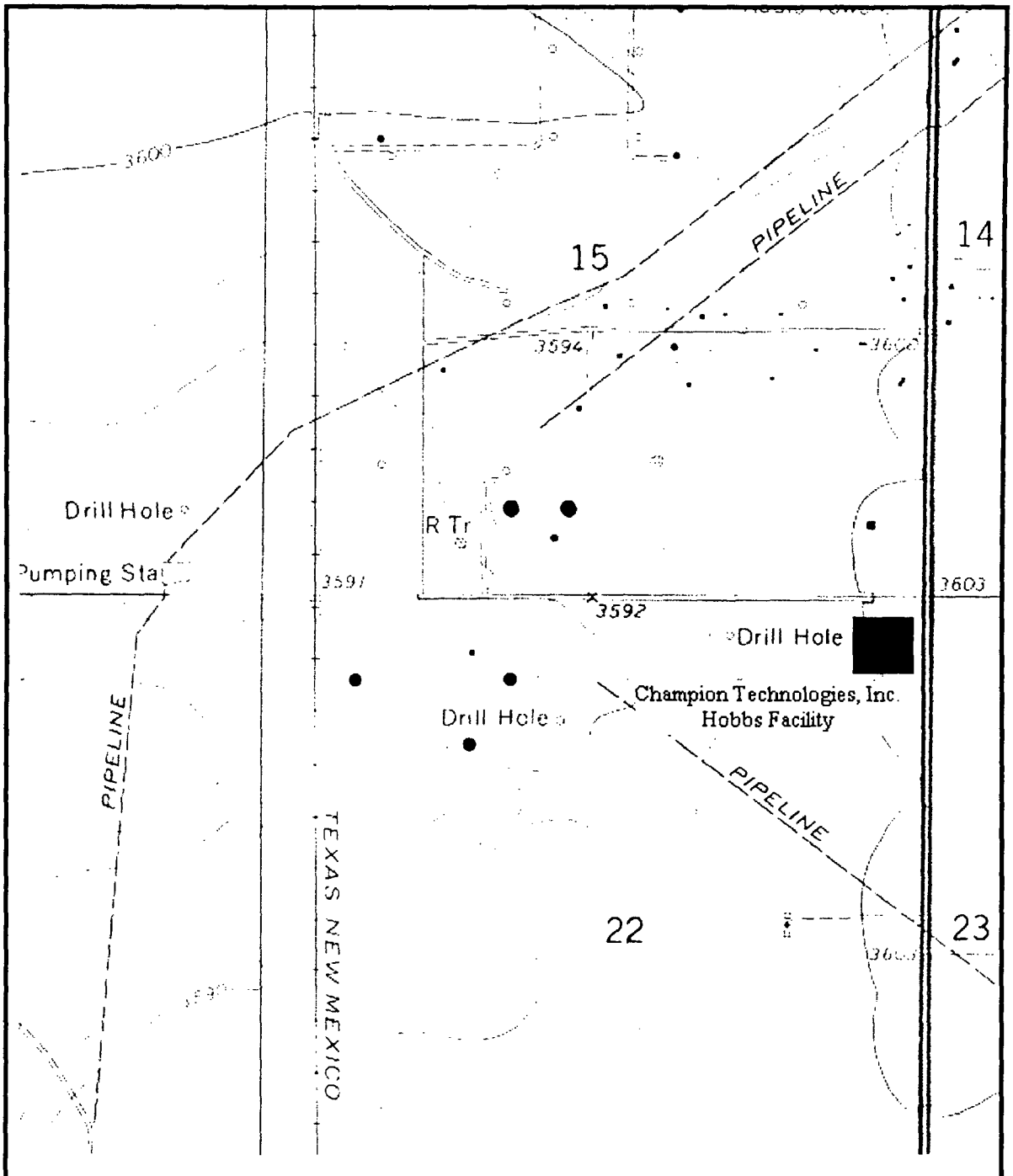
A first aid kit and fire extinguisher will be located in each support vehicle and project trailer. The nearest telephone is located in the support vehicle and the field office. The emergency telephone numbers to be used to call for assistance are listed in the section on Key Personnel and Responsibilities with the reference list of project contacts.

11.0 DOCUMENTATION

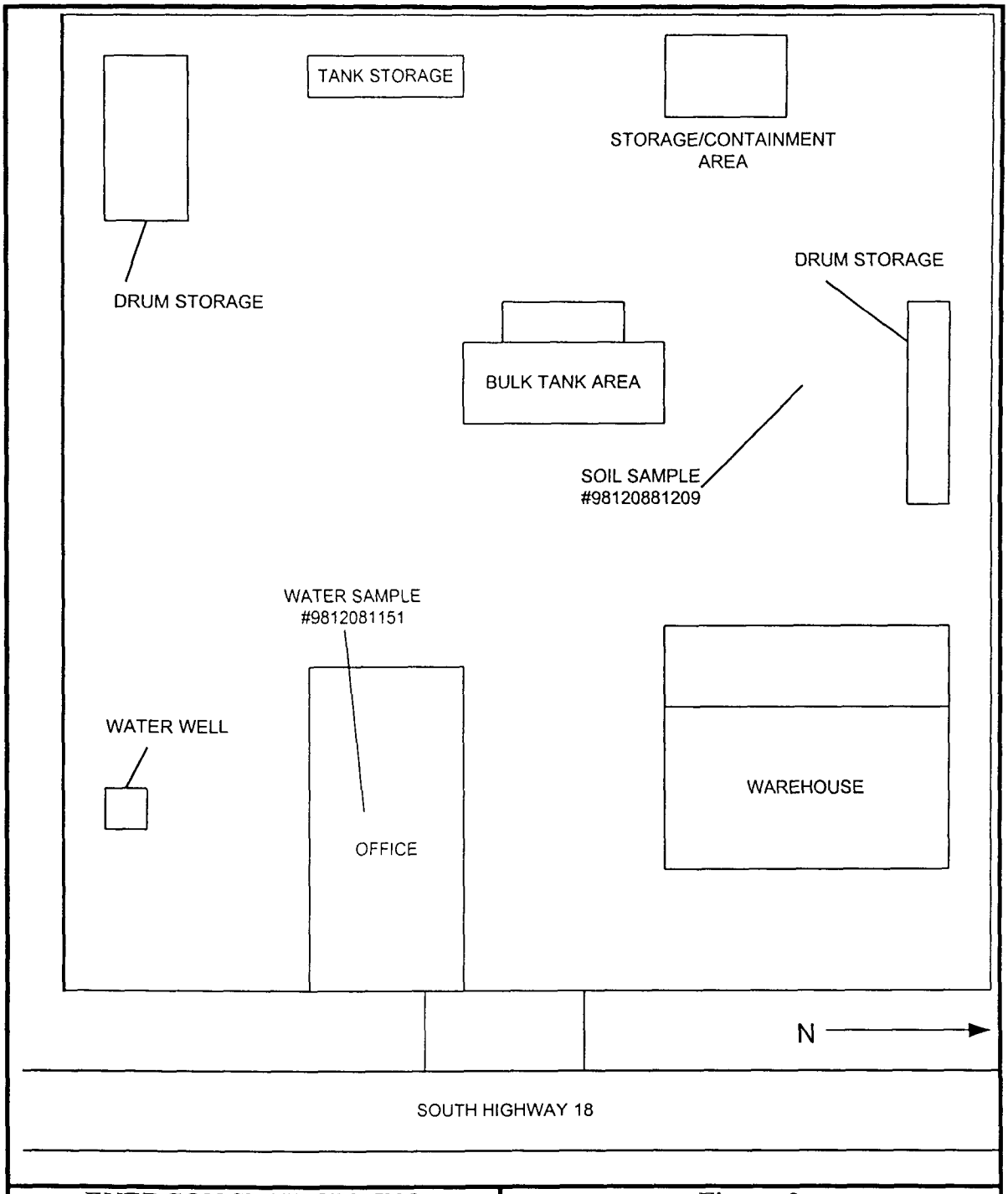
The implementation of the SSHP must be documented to assure employee participation and protection. In addition, the regulatory requirements must be met for record keeping on training, medical surveillance, injuries and illnesses, exposure monitoring, health risk information, and respirator fit-tests. Documentation of each employee's activities is maintained by the HSD in Pleasant Hill, California.

Documentation of the implementation of this plan will be accomplished using Attachments A through E. Copies of these forms are included as Appendix B. Attachment A must be completed by each Enercon employee at the initiation of field work for the project. The SSO is responsible for ensuring that each Enercon employee has completed this form, and for submitting copies to the HSO. The SSO is also responsible for completing the other attachments as required for a specific project. Copies should be maintained in the project file.

FIGURES



ENERCON SERVICES, INC. **HOUSTON, TEXAS**	**Figure 1** **Topographic Map**
Subject Property **4001 South Hwy. 18** **Hobbs, New Mexico**	**Prepared for:** **Champion Technologies, Inc.**



ENERCON SERVICES, INC. **HOUSTON, TEXAS**	**Figure 2** **Site Diagram**
Subject Property **4001 S. Hwy 18** **Hobbs, New Mexico**	**Prepared for:** **Champion Technologies, Inc**

APPENDIX A

MATERIAL SAFETY DATA SHEETS

Genium Publishing Corporation
One Genium Plaza
Schenectady, NY 12304-4690 USA
(518) 377-8854

Material Safety Data Sheets Collection:

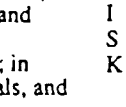
Sheet No. 318
Xylene ***(Mixed Isomers)***

Issued: 11/80 Revision: E, 9/92 Errata: 12/9

Section 1. Material Identification

Xylene (Mixed Isomers) (C_8H_{10}) Description: The commercial product is a blend of the three isomers [*ortho*-(*o*-), *meta*-(*m*-), *para*-(*p*-)] with the largest proportion being *m*- xylene. Xylene is obtained from coal tar, toluene by transalkylation, and pseudocumene. Used in the manufacture of dyes, resins, paints, varnishes, and other organics; as a general solvent for adhesives, a cleaning agent in microscope technique; as a solvent for Canada balsam microscopy; as a fuel component; in aviation gasoline, protective coatings, sterilizing catgut, hydrogen peroxide, perfumes, insect repellants, pharmaceuticals, and the leather industry; in the production of phthalic anhydride, isophthalic, and terephthalic acids and their dimethyl esters which are used in the manufacture of polyester fibers; and as an indirect food additive as a component of adhesives. Around the home, xylene is found as vehicles in paints, paint removers, degreasing cleaners, lacquers, glues and cements and as solvent/vehicles for pesticides.

R	1	NFP
I	2	
S	2	
K	3	



HMI
H
F
R
PPE
† Ch
Eff
‡ Sec

Other Designations: CAS No. 1330-20-7 [95-47-6; 108-38-3; 106-42-3 (*o*-, *m*-, *p*-isomers)], dimethylbenzene, methyltoluene, NCI-C55232, Violet 3, xylol.

Manufacturer: Contact your supplier or distributor. Consult latest *Chemical Week Buyers' Guide*(73) for a suppliers list.

Cautions: Xylene is an eye, skin, and mucous membrane irritant and may be narcotic in high concentrations. It is a dangerous fire hazard.

Section 2. Ingredients and Occupational Exposure Limits

Xylene (mixed isomers): the commercial product generally contains ~ 40% *m*-xylene; 20% each of *o*-xylene, *p*-xylene, and ethylbenzene; and sn quantities of toluene. Unpurified xylene may contain pseudocumene.

1991 OSHA PELs
8-hr TWA: 100 ppm (435 mg/m^3)
15-min STEL: 150 ppm (655 mg/m^3)

1990 IDLH Level
1000 ppm

1990 NIOSH RELs
TWA: 100 ppm (435 mg/m^3)
STEL: 150 ppm (655 mg/m^3)

1992-93 ACGIH TLVs
TWA: 100 ppm (434 mg/m^3)
STEL: 150 ppm (651 mg/m^3)
BEI (Biological Exposure Index): Methylhippuric acids in urine at end of shift: 1.5 g/g creatinine

1990 DFG (Germany) MAK
TWA: 100 ppm (440 mg/m^3)
Category II: Substances with systemic effects
Half-life: < 2 hr
Peak Exposure: 200 ppm, 30 min, average value, 4 peaks per shift

1985-86 Toxicity Data*
Human, inhalation, TC_{Lo}: 200 ppm produced olfaction effects, conjunctiva irritation, and other changes involving the lungs, thorax, or respiration
Man, inhalation, LC_{Lo}: 10000 ppm/6 hr; toxic effects not yet reviewed.
Human, oral, LD_{Lo}: 50 mg/kg; no toxic effect note
Rat, oral, LD_{50}: 4300 mg/kg; toxic effect not yet reviewed.
Rat, inhalation, LC_{50}: 5000 ppm/4 hr; toxic effects not yet reviewed.

* See NIOSH, *RTECS* (XE2100000), for additional toxicity data.

Section 3. Physical Data

Boiling Point Range: 279 to 284 °F (137 to 140 °C)*
Boiling Point: *ortho:* 291 °F (144 °C); *meta:* 281.8 °F (138.8 °C); *para:* 281.3 °F (138.5 °C)
Freezing Point/Melting Point: *ortho:* -13 °F (-25 °C); *meta:* -53.3 °F (- 47.4 °C); *para:* 55 to 57 °F (13 to 14 °C)
Vapor Pressure: 6.72 mm Hg at 70 °F (21 °C)
Saturated Vapor Density (Air = 1.2 kg/m^3): 1.23 kg/m^3, 0.077 lbs/ft^3

Appearance and Odor: Clear, sweet-smelling liquid.

Molecular Weight: 106.16
Specific Gravity: 0.864 at 20 °C/4 °C
Water Solubility: Practically insoluble
Other Solubilities: Miscible with absolute alcohol, ether, and many other organic liquids.
Octanol/Water Partition Coefficient: logKow = 3.12-3.20
Odor Threshold: 1 ppm
Viscosity: <32.6 SUS

* Materials with wider and narrower boiling ranges are commercially available.

Section 4. Fire and Explosion Data

Flash Point: 63 to 77 °F (17 to 25 °C) CC | **Autoignition Temperature:** 982 °F (527 °C) (*m*-) | **LEL:** 1.1 (*m*-, *p*-); 0.9 (*o*-) | **UEL:** 7.0 (*m*-, *p*-); 6.7

Extinguishing Media: For small fires, use dry chemical, carbon dioxide (CO_2), water spray or regular foam. For large fires, use water spray, fog o regular foam. Water may be ineffective. Use water spray to cool fire-exposed containers. **Unusual Fire or Explosion Hazards:** Xylene vapors or liquid (which floats on water) may travel to an ignition source and flash back. The heat of fire may cause containers to explode and/or produce irritating or poisonous decomposition products. Xylene may present a vapor explosion hazard indoors, outdoors, or in sewers. Accumulated static electricity may occur from vapor or liquid flow sufficient to cause ignition. **Special Fire-fighting Procedures:** Because fire may produce toxic thermal decomposition products, wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in pressure-demand or positive-pressure mode. Structural firefighter's protective clothing will provide limited protection. If feasible and without risk, move containers from fire are Otherwise, cool fire-exposed containers until well after fire is extinguished. Stay clear of tank ends. Use unmanned hose holder or monitor nozzles massive cargo fires. If impossible, withdraw from area and let fire burn. Withdraw immediately in case of any tank discoloration or rising sound fr venting safety device. Do not release runoff from fire control methods to sewers or waterways.

Section 5. Reactivity Data

Stability/Polymerization: Xylene is stable at room temperature in closed containers under normal storage and handling conditions. Hazardous polymerization cannot occur. Xylene is easily chlorinated, sulfonated, or nitrated. **Chemical Incompatibilities:** Incompatibilities include strong acids and oxidizers and 1,3-dichloro-5,5-dimethyl-2,4-imidazolidindione (dichlorohydrantoin). Xylene attacks some forms of plastics, rubber, and coatings. **Conditions to Avoid:** Avoid heat and ignition sources and incompatibles. **Hazardous Products of Decomposition:** Thermal oxidative decomposition of xylene can produce carbon dioxide, carbon monoxide, and various hydrocarbon products.

Section 6. Health Hazard Data

Carcinogenicity: The IARC,(164) NTP,(169) and OSHA(164) do not list xylene as a carcinogen. **Summary of Risks:** Xylene is an eye, mucous membrane, and respiratory tract irritant. Irritation starts at 200 ppm; severe breathing difficulties which may be delayed in onset can occur at high concentrations. It is a central nervous system (CNS) depressant and at high concentrations can cause coma. Kidney and liver damage can occur wit xylene exposure. With prolonged or repeated cutaneous exposure, xylene produces a defatting dermatitis. Chronic toxicity is not well defined, but it is less toxic than benzene. Prior to the 1950s, benzene was often found as a contaminant of xylene and the effects attributed to xylene such as blood dyscrasias are questionable. Since the late 1950s, xylenes have been virtually benzene-free and blood dyscrasias have not been associated with xylene. Chronic exposure to high concentrations of xylene in animal studies have demonstrated mild reversible decrease in red and white ce

Section 6. Health Hazard Data, *continued*

Menstrual irregularity was reported in association with workplace exposure to xylene perhaps due to effects on liver metabolism. Xylene crosses the human placenta, but does not appear to be teratogenic under conditions tested to date. **Medical Conditions Aggravated by Long-Term Exposure:** CNS, respiratory, eye, skin, gastrointestinal (GI) , liver and kidney disorders. **Target Organs:** CNS, eyes, GI tract, liver, kidneys, and skin. **Primary Entry Routes:** Inhalation, skin absorption (slight), eye contact, ingestion. **Acute Effects:** Inhalation of high xylene concentrations may cause dizziness; nausea, vomiting, and abdominal pain; eye, nose, and throat irritation; respiratory tract irritation leading to pulmonary edema (fluid in lung); drowsiness; and unconsciousness. Direct eye contact can result in conjunctivitis and corneal burns. Ingestion may cause a burning sensation in the oropharynx and stomach and transient CNS depression. **Chronic Effects:** Repeated or prolonged skin contact may cause drying and defatting of the skin leading to dermatitis. Repeated eye exposure to high vapor concentrations may cause reversible eye damage, peripheral and central neuropathy, and liver damage. Other symptoms of chronic exposure include headache, fatigue, irritability, chronic bronchitis, and GI disturbances such as nausea, loss of appetite, and gas.

FIRST AID *Emergency personnel should protect against exposure.* **Eyes:** *Do not* allow victim to rub or keep eyes tightly shut. Gently lift eyelids and flush immediately and continuously with flooding amounts of water until transported to an emergency medical facility. Consult a physician immediately. **Skin:** *Quickly* remove contaminated clothing. Rinse with flooding amounts of water for at least 15 min. Wash exposed area with soap and water. For reddened or blistered skin, consult a physician. Carefully dispose of contaminated clothing as it may pose a fire hazard. **Inhalation:** Remove exposed person to fresh air and support breathing as needed. Monitor exposed person for respiratory distress. **Ingestion:** Never give anything by mouth to an unconscious or convulsing person. Contact a poison control center and unless otherwise advised, *do not induce vomiting!* If spontaneous vomiting should occur, keep exposed person's head below the hips to prevent aspiration (breathing liquid xylene into the lungs). *Aspiration of a few millimeters of xylene can cause chemical pneumonitis, pulmonary edema, and hemorrhage.* **Note to Physicians:** Hippuric acid or the ether glucuronide of *ortho*-toluic acid may be useful in diagnosis of *meta-*, *para-* and *ortho*-xylene exposure, respectively. Consider gastric lavage if a large quantity of xylene was ingested. Proceed gastric lavage with protection of the airway from aspiration; consider endotracheal intubation with inflated cuff.

Section 7. Spill, Leak, and Disposal Procedures

Spill/Leak: Notify safety personnel, evacuate all unnecessary personnel, remove all heat and ignition sources, and ventilate spill area. Cleanup personnel should protect against vapor inhalation and skin or eye contact. If feasible and without undue risk, stop leak. Use appropriate foam to blanket release and suppress vapors. Water spray may reduce vapor, but does not prevent ignition in closed spaces. For small spills, absorb on paper and evaporate in appropriate exhaust hood or absorb with sand or some non-combustible absorbent and place in containers for later disposal. For large spills dike far ahead of liquid to contain. Do not allow xylene to enter a confined space such as sewers or drains. On land, dike to contain or divert to impermeable holding area. Apply water spray to control flammable vapor and remove material with pumps or vacuum equipment. On water, contain material with natural barriers, booms, or weirs; apply universal gelling agent; and use suction hoses to remove spilled material. Report any release in excess of 1000 lb. Follow applicable OSHA regulations (29 CFR 1910.120). **Environmental Transport:** Little bioconcentration is expected. Biological oxygen demand 5 (after 5 days at 20 °C): 0.64 (no stated isomer). **Ecotoxicity values:** LD_{50} Goldfish, 13 mg/L/24 hr, conditions of bioassay not specified, no specific isomer. **Environmental Degradation:** In the atmosphere, xylenes degrade by reacting with photochemically produced hydroxyl radicals with a half-life ranging from 1-1.7 hr. in the summer to 10-18 hr in winter or a typical loss of 67-86% per day. Xylenes are resistant to hydrolysis. **Soil Absorption/Mobility:** Xylenes have low to moderate adsorption to soil and when spilled on land, will volatilize and leach into groundwater. **Disposal:** As a hydrocarbon, xylene is a good candidate for controlled incineration. Contact your supplier or a licensed contractor for detailed recommendations. Follow applicable Federal, state, and local regulations.

EPA Designations

SARA Extremely Hazardous Substance (40 CFR 355): Not listed
Listed as a SARA Toxic Chemical (40 CFR 372.65)
Listed as a RCRA Hazardous Waste (40 CFR 261.33): No. U239, F003 (spent solvent)
Listed as a CERCLA Hazardous Substance* (40 CFR 302.4): Final Reportable Quantity (RQ), 1000 lb (454 kg) [* per Clean Water Act, Sec. 311(b)(4); per RCRA, Sec. 3001]

OSHA Designations

Listed as an Air Contaminant (29 CFR 1910.1000, Table Z-1-A)

Section 8. Special Protection Data

Goggles: Wear protective eyeglasses or chemical safety goggles, per OSHA eye- and face-protection regulations (29 CFR 1910.133). Because contact lens use in industry is controversial, establish your own policy. **Respirator:** Seek professional advice prior to respirator selection and use. Follow OSHA respirator regulations (29 CFR 1910.134) and, if necessary, wear a MSHA/NIOSH-approved respirator. For concentrations >1000 ppm, use any chemical cartridge respirator with organic vapor cartridges; any powered, air-purifying respirator with organic vapor cartridges; any supplied-air respirator; or any self-contained breathing apparatus. For emergency or nonroutine operations (cleaning spills, reactor vessels, or storage tanks), wear an SCBA.*Warning! Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.* **Other:** Wear chemically protective gloves, boots, aprons, and gauntlets to prevent all skin contact. With breakthrough times > 8 hr, consider polyvinyl alcohol and fluorocarbon rubber (Viton) as materials for PPE. **Ventilation:** Provide general and local exhaust ventilation systems to maintain airborne concentrations below the OSHA PELs (Sec. 2). Local exhaust ventilation is preferred because it prevents contaminant dispersion into the work area by controlling it at its source.[103] **Safety Stations:** Make available in the work area emergency eyewash stations, safety/quick-drench showers, and washing facilities. **Contaminated Equipment:** Separate contaminated work clothes from street clothes. Launder contaminated work clothing before wearing. Remove this material from your shoes and clean PPE. **Comments:** Never eat, drink, or smoke in work areas. Practice good personal hygiene after using this material, especially before eating, drinking, smoking, using the toilet, or applying cosmetics.

Section 9. Special Precautions and Comments

Storage Requirements: Store in clearly labelled, tightly closed, containers in a cool, well-ventilated place, away from strong oxidizing materials and heat and ignition sources. During transferring operations, electrically ground and bond metal containers. **Engineering Controls:** To reduce potential health hazards, use sufficient dilution or local exhaust ventilation to control airborne contaminants and to maintain concentrations at the lowest practical level. Use hermetically sealed equipment, transfer xylene in enclosed systems, avoid processes associated with open evaporating surfaces, and provide sources of gas release with enclosures and local exhaust ventilation. Use Class I, Group D electrical equipment. **Administrative Controls:** Establish air and biological monitoring programs and evaluate regularly. Consider preplacement and periodic medical examinations including a complete blood count, a routine urinalysis, and liver function tests. Consider hematologic studies if there is any significant contamination of the solvent with benzene. If feasible, consider the replacement of xylene by less toxic solvents such as petrol (motor fuel) or white spirit. Before carrying out maintenance and repair work, steam and flush all equipment to remove any xylene residues.

Transportation Data (49 CFR 172.101)

DOT Shipping Name: Xylenes
DOT Hazard Class: 3
ID No.: UN1307
DOT Packing Group: II
DOT Label: Flammable Liquid
Special Provisions (172.102): T1

Packaging Authorizations
a) Exceptions: 173.150
b) Nonbulk Packaging : 173.202
c) Bulk Packaging: 173.242

Quantity Limitations
a) Passenger, Aircraft, or Railcar: 5L
b) Cargo Aircraft Only: 60L

Vessel Stowage Requirements
a) Vessel Stowage: B
b) Other: –

MSDS Collection **References:** 26, 73, 89, 100, 101, 103, 124, 126, 127, 132, 133, 136, 139, 140, 148, 149, 153, 159, 163, 164, 167, 171, 174, 176, 180.
Prepared by: MJ Wurth, BS; **Industrial Hygiene Review:** PA Roy, MPH, CIH; **Medical Review:** W Silverman, MD

Genium Publishing Corporation
One Genium Plaza
Schenectady, NY 12304-4690 USA
(518) 377-8854

Section 1. Material Identification

Toluene ($C_6H_5CH_3$) **Description:** Derived from petroleum i.e., dehydrogenation of cycloparaffin fractions followed by the aromatization of saturated aromatic hydrocarbons or by fractional distillation of coal-tar light oil and purified by rectification. Used widely as a solvent (replacing benzene in many cases) for oils, resins, adhesives, natural rubber, coal tar, asphalt, pitch, acetyl celluloses, cellulose paints and varnishes; a diluent for photogravure inks, raw material for organic synthesis (benzoyl & benzilidene chlorides, saccharine, TNT, toluene diisocyanate, and many dyestuffs), in aviation and high octane automobile gasoline, as a nonclinical thermometer liquid and suspension solution for navigational instruments.

R 1
I 3
S 2*
K 3
* Skin absorption

Other Designations: CAS No. 108-88-3, Methacide, methylbenzene, methylbenzol, phenylmethane, toluol, Tolu-sol.

Manufacturer: Contact your supplier or distributor. Consult latest *Chemical Week Buyers' Guide*(73) for a suppliers list.

HMIS
H 2
F 3
R 0
PPE-s

Cautions: Toluene is an eye, skin, and respiratory tract irritant becoming narcotic at high centrations. Liver and kidney damage has occurred. Pregnant women chronically exposed to toluene have shown teratogenic effects. Toluene is highly flammable.

Section 2. Ingredients and Occupational Exposure Limits

Toluene, < 100%; may contain a small amount of benzene (~ 1%), xylene, and nonaromatic hydrocarbons.

1991 OSHA PELs
8-hr TWA: 100 ppm (375 mg/m³)
15-min STEL: 150 ppm (560 mg/m³)

1990 IDLH Level
2000 ppm

1990 NIOSH RELs
TWA: 100 ppm (375 mg/m³)
STEL: 150 ppm (560 mg/m³)

1992-93 ACGIH TLV (Skin)
TWA: 50 ppm (188 mg/m³)

1990 DFG (Germany) MAK*
TWA: 100 ppm (380 mg/m³)
Half-life: 2 hr to end of shift
Category II: Substances with systemic effects
Peak Exposure Limit: 500 ppm, 30 min average value, 2/shift

1985-86 Toxicity Data†
Man, inhalation, TC_{Lo}: 100 ppm caused hallucin. and changes in motor activity and changes in psychophysiological tests.
Human, oral, LD_{Lo}: 50 mg/kg; toxic effects not yet reviewed
Human, eye: 300 ppm caused irritation.
Rat, oral, LD_{50}: 5000 mg/kg
Rat, liver: 30 µmol/L caused DNA damage.

* Available information suggests damage to the developing fetus is probable.
†See NIOSH, *RTECS* (XS5250000), for additional irritation, mutation, reproductive, and toxicity data.

Section 3. Physical Data

Boiling Point: 232 °F (110.6 °C)
Melting Point: -139 °F (-95 °C)
Molecular Weight: 92.15
Density: 0.866 at 68 °F (20/4 °C)
Surface Tension: 29 dyne/cm at 68 °F (20 °C)
Viscosity: 0.59 cP at 68 °F (20 °C)
Refraction Index: 1.4967 at 20 °C/D

Water Solubility: Very slightly soluble, 0.6 mg/L at 68 °F (20 °C)
Other Solubilities: Soluble in acetone, alcohol, ether, benzene, chloroform, glacial ac. acid, petroleum ether, and carbon disulfide.
Vapor Pressure: 22 mm Hg at 68 °F (20 °C); 36.7 mm Hg at 86 °F (30 °C)
Saturated Vapor Density (Air = 0.075 lb/ft³ or 1.2 kg/m³): 0.0797 lb/ft³ or 1.2755 k
Odor Threshold (range of all referenced values): 0.021 to 69 ppm

Appearance and Odor: Colorless liquid with a sickly sweet odor.

Section 4. Fire and Explosion Data

Flash Point: 40 °F (4.4 °C) CC	Autoignition Temperature: 896 °F (480 °C)	LEL: 1.27% v/v	UEL: 7.0% v/v

Extinguishing Media: Toluene is a Class 1B flammable liquid. To fight fire, use dry chemical carbon dioxide, or 'alcohol-resistant' foam. V spray may be ineffective as toluene floats on water and may actually spread fire. **Unusual Fire or Explosion Hazards:** Concentrated vapors heavier than air and may travel to an ignition source and flash back. Container may explode in heat of fire. Toluenes' burning rate = 5.7 mm/ and its flame speed = 37 cm/sec. Vapor poses an explosion hazard indoors, outdoors, and in sewers. May accumulate static electricity. Specl **Fire-fighting Procedures:** Because fire may produce toxic thermal decomposition products, wear a self-contained breathing apparatus (SCE with a full facepiece operated in pressure-demand or positive-pressure mode. Structural firefighter's protective clothing provides only limited protection. Apply cooling water to sides of tanks until well after fire is out. Stay away from ends of tanks. For massive fire in cargo area, use monitor nozzles or unmanned hose holders; if impossible, withdraw from fire and let burn. Withdraw immediately if you hear a rising sound venting safety device or notice any tank discoloration due to fire because a BLEVE (boiling liquid expanding vapor explosion) may be immi Do not release runoff from fire control methods to sewers or waterways.

Section 5. Reactivity Data

Stability/Polymerization: Toluene is stable at room temperature in closed containers under normal storage and handling conditions. Hazardc polymerization can't occur. **Chemical Incompatibilities:** Strong oxidizers, concentrated nitric acid, nitric acid + sulfuric acid, dinitrogen tet silver perchlorate, bromine trifluoride, tetranitromethane, and 1,3-dichloro-5,5-dimethyl-2,4-imidazolididione. **Conditions to Avoid:** Contact heat, ignition sources, or incompatibles. **Hazardous Products of Decomposition:** Thermal oxidative decomposition of toluene can produce c dioxide, and acrid, irritating smoke.

Section 6. Health Hazard Data

Carcinogenicity: The IARC,(164) NTP,(169) and OSHA(164) do not list toluene as a carcinogen. **Summary of Risks:** Toluene is irritating to the nose, and respiratory tract. Inhalation of high concentrations produces a narcotic effect sometimes leading to coma as well as liver and kidney damage. 93% of inhaled toluene is retained in the body of which 80% is metabolized to benzoic acid, then to hippuric acid and excreted in ur The remainder is metabolized to *o*-cresol and excreted or exhaled unchanged. Toluene metabolism is inhibited by alcohol ingestion and is syr tic with benzene, asphalt fumes, or chlorinated hydrocarbons (i.e. perchloroethylene). Toluene is readily absorbed through the skin at 14 to 2 cm^2/hr. Toluene is absorbed quicker during exercise than at rest and appears to be retained longer in obese versus thin victims; presumably d lipid solubility. There is inconsistent data on toluene's ability to damage bone marrow; chronic poisoning has resulted in anemia and leucoper biopsy showing bone marrow hypo-plasia. These reports are few and some authorities argue that the effects may have been due to benzene co nants. Chronic inhalation during pregnancy has been associated with teratogenic effects on the fetus including microcephaly, CNS dysfunctio attentional deficits, developmental delay + language impairment, growth retardation, and physical defects including a small midface, short pa fissures, with deep-set eyes, low-set ears, flat nasal bridge with a small nose, micrognathia, and blunt fingertips. There is some evidence that

ction 6. Health Hazard Data

dical Conditions Aggravated by Long-Term Exposure: Alcoholism and CNS, kidney, skin, or liver disease. Target Organs: CNS, liver, kidney, skin. Primary Entry Routes: Inhalation, skin contact/absorption. Acute Effects: Vapor inhalation causes respiratory tract irritation, fatigue, weakness, confusion, dizziness, headache, dilated pupils, watering eyes, nervousness, insomnia, parasthesis, and vertigo progressing to narcotic coma. I ath may result from cardiac arrest due to ventricular fibrillation with catecholamines loss. Liquid splashed in the eye causes conjunctival irritation, t sient corneal damage and possible burns. Prolonged skin contact leads to drying and fissured dermatitis. Ingestion causes GI tract irritation and symptoms associated with inhalation. Chronic Effects: Symptoms include mucous membrane irritation, headache, vertigo, nausea, appetite loss and alcohol intolerance. Repeated heavy exposure may result in encephalopathies (cerebellar ataxia and cognitive dysfunction), liver enlargement, and ney dystrophy (wasting away). Symptoms usually appear at workdays end, worsen at weeks end and decrease or disappear over the weekend. RST AID Eyes: *Do not* allow victim to rub or keep eyes tightly shut. Gently lift eyelids and flush immediately and continuously with flooding ounts of water until transported to an emergency medical facility. Consult an ophthalmologist immediately. Skin: *Quickly* remove contaminated clothing. Rinse with flooding amounts of water for at least 15 min. Wash exposed area with soap and water. Inhalation: Remove exposed person to fresh air and support breathing as needed. Ingestion: Never give anything by mouth to an unconscious or convulsing person. Contact a poison control ter and unless otherwise advised, have that *conscious and alert* person drink 1 to 2 glasses of water to dilute. *Do not* induce vomiting because of ger of aspiration into the lungs. Gastric lavage may be indicated if large amounts are swallowed; potential toxicity needs to be weighed against aspiration risk when deciding for or against gastric lavage. Note to Physicians: Monitor cardiac function. If indicated, use epinephrine and other catecholamines carefully, because of the possibility of a lowered myocardial threshold to the arrhythmogenic effects of such substances. Obtain CBC, trolytes, and urinalysis. Monitor arterial blood gases. If toluene has > 0.02% (200 ppm) benzene, evaluate for potential benzene toxicity. BEI: puric acid in urine, sample at shift end (2.5 g/g creatinine); Toluene in venous blood, sample at shift end (1.0 mg/L).

Section 7. Spill, Leak, and Disposal Procedures

ill/Leak: Notify safety personnel, isolate and ventilate area, deny entry, and stay upwind. Cleanup personnel protect against inhalation and skin/eye tact. Use water spray to cool and disperse vapors but it may not prevent ignition in closed spaces. Cellosolve, hycar absorbent materials, and rocarbon water can also be used for vapor suppression/containment. Take up small spill with earth, sand, vermiculite, or other absorbent, noncombustible material. Dike far ahead of large spills for later reclamation or disposal. For water spills, (10 ppm or greater) apply activated carbon at 10X the spilled amount and remove trapped material with suction hoses or use mechanical dredges/lifts to remove immobilized masses of pollutants precipitates. Toluene can undergo fluidized bed incineration at 842 to 1796 °F (450 to 980 °C), rotary kiln incineration at 1508 to 2912 °F (820 to 0 °C), or liquid injection incineration at 1202 to 2912 °F (650 to 1600 °C). Follow applicable OSHA regulations (29 CFR 1910.120). Ecotoxicity Values: Blue gill, LC_{50} = 17 mg/L/24 hr; shrimp (*Crangonfracis coron*), LC_{50} = 4.3 ppm/96 hr; fathead minnow (*Pimephales promelas*), LC_{50} = 36.2 mg/L/96 hr. ~~Environmental Degradation: If released to land, toluene evaporates and undergoes microbial degradation. In water, toluene volatilizes~~ biodegrades with a half-life of days to several weeks. In air, toluene degrades by reaction with photochemically produced hydroxyl radicals. Disposal: Treat contaminated water by gravity separation of solids, followed by skimming of surface. Pass through dual media filtration and carbon absorption units (carbon ratio 1 kg to 10 kg soluble material). Return waste water from backwash to gravity separator. Contact your supplier or a licensed contractor for detailed recommendations. Follow applicable Federal, state, and local regulations.

FDA Designations

Listed as a RCRA Hazardous Waste (40 CFR 261.33): No. U220
SARA Extremely Hazardous Substance (40 CFR 355), TPQ: Not listed
Listed as a CERCLA Hazardous Substance* (40 CFR 302.4): Final Reportable Quantity (RQ), 1000 lb (454 kg)
[* per RCRA, Sec. 3001; CWA, Sec. 311 (b)(4); CWA, Sec. 307 (a)]
Listed as a SARA Toxic Chemical (40 CFR 372.65): Not listed

OSHA Designations

Listed as an Air Contaminant (29 CFR 1910.1000, Table Z-1-A)

Section 8. Special Protection Data

Goggles: Wear protective eyeglasses with shatter-resistant glass and side-shields or chemical safety goggles, per OSHA eye- and face-protection lations (29 CFR 1910.133). Because contact lens use in industry is controversial, establish your own policy. Respirator: Seek professional ice prior to respirator selection and use. Follow OSHA respirator regulations (29 CFR 1910.134) and, if necessary, wear a MSHA/NIOSH-approved respirator. For < 1000 ppm, use any chemical cartridge respirator with appropriate organic vapor cartridges, any supplied-air respirator SAR), or SCBA. For < 2000 ppm, use any SAR operated in continuous-flow mode, any SAR or SCBA with a full facepiece, or any air-purifying irator with a full facepiece having a chin-style, front or back mounted organic vapor canister. For emergency or nonroutine operations (cleaning ls, reactor vessels, or storage tanks), wear an SCBA. *Warning! Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.* espirators are used, OSHA requires a written respiratory protection program that includes at least: medical certification, training, fit-testing, eriodic environmental monitoring, maintenance, inspection, cleaning, and convenient, sanitary storage areas. Other: Wear chemically protective loves, boots, aprons, and gauntlets to prevent skin contact. Polyvinyl alcohol with a breakthrough time of > 8 hr, Teflon and Viton are recommended as suitable materials for PPE. Ventilation: Provide general and local exhaust ventilation systems to maintain airborne concentrations below OSHA PELs (Sec. 2). Local exhaust ventilation is preferred because it prevents contaminant dispersion into the work area by controlling it at its source.[103] Safety Stations: Make available in the work area emergency eyewash stations, safety/quick-drench showers, and washing facilities. Contaminated Equipment: Separate contaminated work clothes from street clothes and launder before reuse. Remove toluene from your shoes and n PPE. Comments: Never eat, drink, or smoke in work areas. Practice good personal hygiene after using this material, especially before eating, king, smoking, using the toilet, or applying cosmetics.

Section 9. Special Precautions and Comments

rage Requirements: Prevent physical damage to containers. Store in a cool, dry, well-ventilated area away from ignition sources and incombles. Outside or detached storage is preferred. If stored inside, use a standard flammable liquids warehouse, room, or cabinet. To prevent static ks, electrically ground and bond all equipment used with toluene. Do not use open lights in toluene areas. Install Class 1, Group D electrical quipment. Check that toluene is free of or contains < 1% benzene before use. Engineering Controls: To reduce potential health hazards, use fficient dilution or local exhaust ventilation to control airborne contaminants and to maintain concentrations at the lowest practical level. Administrative Controls: Adopt controls for confined spaces (29 CFR 1910.146) if entering areas of unknown toluene levels (holes, wells, storage tanks). sider preplacement and periodic medical exams of exposed workers that emphasize the CNS, liver, kidney, and skin. Include hemocytometric nd thrombocyte count in cases where benzene is a contaminant of toluene. Monitor air at regular intervals to ensure effective ventilation.

Transportation Data (49 CFR 172.101)

T Shipping Name: Toluene
T Hazard Class: 3
D No.: UN1294
OT Packing Group: II
T Label: Flammable Liquid
dal Provisions (172.102): T1

Packaging Authorizations
a) Exceptions: 150
b) Non-bulk Packaging: 202
c) Bulk Packaging: 242

Quantity Limitations
a) Passenger Aircraft or Railcar: 5L
b) Cargo Aircraft Only: 60L

Vessel Stowage Requirements
Vessel Stowage: B
Other: --

SDS Collection References: 26, 73, 100, 101, 103, 124, 126, 127, 132, 140, 148, 153, 159, 163, 164, 167, 169, 171, 174, 175, 176, 180.
Prepared by: M Gannon, BA; Industrial Hygiene Review: PA Roy, CIH, MPH; Medical Review: AC Darlington, MD, MPH

Genium Publishing Corporation
1145 Catalyn Street
Schenectady, NY 12303-1836 USA
(518) 377-8854

Material Safety Data Sheets Collection

Sheet No. 316
Benzene

Issued: 11/78 Revision: E, 8/90

Section 1. Material Identification

Benzene (C_6H_6) Description: Derived by fractional distillation of coal tar, hydrodealkylation of toluene or pyrolysis of gasoline, catalytic reforming of petroleum, and transalkylation of toluene by disproportionation reaction. Used as a fuel; a chemical reagent; a solvent for a large number of materials such as paints, plastics, rubber, inks, oils, and fats; in manufacturing phenol, ethylbenzene (for styrene monomer), nitrobenzene (for aniline), dodecylbenzene (for detergents), cyclohexane (for nylon), chlorobenzene, diphenyl, benzene hexachloride, maleic anhydride, benzene-sulfonic acid, artificial leather, linoleum, oil cloth, varnishes, and lacquers; for printing and lithography; in dry cleaning; in adhesives and coatings; for extraction and rectification; as a degreasing agent; in the tire industry; and in shoe factories. Benzene has been banned as an ingredient in products intended for household use and is no longer used in pesticides.

R 1 NI
I 4
S 2*
K 4
*Skin absorption

2

H
H
F
R
P
†

Other Designations: CAS No. 0071-43-2, benzol, carbon oil, coal naphtha, cyclohexatriene, mineral naphtha, nitration benzene, phene, phenyl hydride, pyrobenzol.
Manufacturer: Contact your supplier or distributor. Consult the latest *Chemicalweek Buyers' Guide*(7) for a suppliers list.

Cautions: Benzene is a confirmed *human carcinogen* by the IARC. *Chronic low-level exposure may cause cancer (leukemia) and bone marrow damage, with injury to blood-forming tissue.* It is also a dangerous fire hazard when exposed to heat or flame.

Section 2. Ingredients and Occupational Exposure Limits

Benzene, ca 100%*

1989 OSHA PELs
(29 CFR 1910.1000, Table Z-1-A)
8-hr TWA: 1 ppm, 3 mg/m³
15-min STEL: 5 ppm, 15 mg/m³

(29 CFR 1910.1000, Table Z-2)
8-hr TWA: 10 ppm
Acceptable Ceiling Concentration: 25 ppm
Acceptable Maximum Peak: 50 ppm (10 min)†

1989-90 ACGIH
TLV-TWA: 10 ppm, 32 mg/m³

1988 NIOSH RELs
TWA: 0.1 ppm, 0.3 mg/m³
Ceiling: 1 ppm, 3 mg/m³

1985-86 Toxicity Data‡
Man, oral, LD_{Lo}: 50 mg/kg; no toxic effect noted
Man, inhalation, TC_{Lo}: 150 ppm inhaled intermittently
1 yr in a number of discrete, separate doses affects th
blood (other changes) and nutritional and gross metab
lism (body temperature increase)
Rabbit, eye: 2 mg administered over 24 hr produces sev
irritation

* OSHA 29 CFR 1910.1000, Subpart Z, states that the final benzene standard in 29 CFR 1910.1028 applies to all occupational exposures to benzene except in subsegments of industry where exposures are consistently under the action level (i.e., distribution and sale of fuels, sealed containers and pipelines, coke produ oil and gas drilling and production, natural gas processing, and the percentage exclusion for liquid mixtures); for the excepted subsegments, the benzene limits Table Z-2 apply.
† Acceptable maximum peak above the acceptable ceiling concentration for an 8-hr shift.
‡ See NIOSH, *RTECS* (CY1400000), for additional irritative, mutative, reproductive, tumorigenic, and toxicity data.

Section 3. Physical Data

Boiling Point: 176 °F (80 °C)
Melting Point: 42 °F (5.5 °C)
Vapor Pressure: 100 mm Hg at 79 °F (26.1 °C)
Vapor Density (Air = 1): 2.7
Evaporation Rate (Ether = 1): 2.8

Molecular Weight: 78.11
Specific Gravity (15 °C/4 °C): 0.8787
Water Solubility: Slightly (0.180 g/100 g of H_2O at 25 °C)
% Volatile by Volume: 100
Viscosity: 0.6468 mPa at 20 °C

Appearance and Odor: A colorless liquid with a characteristic sweet, aromatic odor. The odor recognition threshold (100% of panel) is appr mately 5 ppm (unfatigued) in air. Odor *is not* an adequate warning of hazard.

Section 4. Fire and Explosion Data

Flash Point: 12 °F (-11.1 °C), CC	Autoignition Temperature: 928 °F (498 °C)	LEL: 1.3% v/v	UEL: 7.1% v/v

Extinguishing Media: Use dry chemical, foam, or carbon dioxide to extinguish benzene fires. Water may be ineffective as an extinguishing agent since it can scatter and spread the fire. Use water spray to cool fire-exposed containers, flush spills away from exposures, disperse benze vapor, and protect personnel attempting to stop an unignited benzene leak.
Unusual Fire or Explosion Hazards: Benzene is a Class 1B flammable liquid. A concentration exceeding 3250 ppm is considered a potentia fire explosion hazard. Benzene vapor is heavier than air and can collect in low lying areas or travel to an ignition source and flash back. Explo and flammable benzene vapor-air mixtures can easily form at room temperature. Eliminate all ignition sources where benzene is used, handled stored.
Special Fire-fighting Procedures: Isolate hazard area and deny entry. Since fire may produce toxic fumes, wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in the pressure-demand or positive-pressure mode and full protective equipment. Structural firefighter's protective clothing provides limited protection. Stay out of low areas. Be aware of runoff from fire control methods. Do not releas sewers or waterways. Runoff to sewer can create pollution, fire, and explosion hazard.

Section 5. Reactivity Data

Stability/Polymerization: Benzene is stable at room temperature in closed containers under normal storage and handling conditions. Hazardo polymerization cannot occur.
Chemical Incompatibilities: Benzene explodes on contact with diborane, permanganic acid, bromine pentafluoride, peroxodisulfuric acid, an peroxomonosulfuric acid. It ignites on contact with dioxygen difluoride, dioxygenyl tetrafluoroborate, iodine heptafluoride, and sodium perox + water. Benzene forms sensitive, explosive mixture with iodine pentafluoride, ozone, liquid oxygen, silver perchlorate, nitryl perchlorate, nitr acid, and arsenic pentafluoride + potassium methoxide (explodes above 30 °C). A vigorous or incandescent reaction occurs with bromine trifluoride, uranium hexafluoride, and hydrogen + Raney nickel [above 410 °F (210 °C)]. Benzene is incompatible with oxidizing materials.
Conditions to Avoid: Avoid heat and ignition sources.
Hazardous Products of Decomposition: Thermal oxidative decomposition of benzene can produce toxic gases and vapors such as carbon monoxide.

Section 6. Health Hazard Data

Carcinogenicity: The ACGIH, OSHA, and IARC list benzene as, respectively, a supected human carcinogen, a cancer hazard, and, based on sufficient human and animal evidence, a human carcinogen (Group 1).

Summary of Risks: Prolonged skin contact or excessive inhalation of benzene vapor may cause headache, weakness, appetite loss, and fatigue. The most important health hazards are cancer (leukemia) and bone marrow damage with injury to blood-forming tissue from chronic low-level exposure. Higher level exposures may irritate the respiratory tract and cause central nervous system (CNS) depression.

Medical Conditions Aggravated by Long-Term Exposure: Exposure may worsen ailments of the heart, lungs, liver, kidneys, blood, and CNS.

Target Organs: Blood, central nervous system, bone marrow, eyes, upper respiratory tract, and skin.

Primary Entry Routes: Inhalation, skin contact.

Acute Effects: Symptoms of acute overexposure include irritation of the eyes, nose, and respiratory tract, breathlessness, euphoria, nausea, drowsiness, headache, dizziness, and intoxication. Severe exposure may lead to convulsions and unconsciousness. Skin contact may cause a drying rash (dermatitis).

Chronic Effects: Long-term chronic exposure may result in many blood disorders ranging from aplastic anemia (an inability to form blood cells) to leukemia.

FIRST AID

Eyes: Gently lift the eyelids and flush immediately and continuously with flooding amounts of water until transported to an emergency medical facility. Consult a physician immediately.

Skin: *Quickly* remove contaminated clothing. Immediately rinse with flooding amounts of water for at least 15 min. For reddened or blistered skin, consult a physician. Wash affected area with soap and water.

Inhalation: Remove exposed person to fresh air. Emergency personnel should protect against inhalation exposure. Provide CPR to support breathing or circulation as necessary. Keep awake and transport to a medical facility.

Ingestion: Never give anything by mouth to an unconscious or convulsing person. If ingested, *do not induce vomiting* since aspiration may be fatal. Call a physician immediately.

After first aid, get appropriate in-plant, paramedic, or community medical support.

Physician's Note: Evaluate chronic exposure with a CBC, peripheral smear, and reticulocyte count for signs of myelotoxicity. Follow up any early indicators of leukemia with a bone marrow biopsy. Urinary phenol conjugates may be used for biological monitoring of recent exposure. Acute management is primarily supportive for CNS depression.

Section 7. Spill, Leak, and Disposal Procedures

Spill/Leak: *Design and practice a benzene spill control and countermeasure plan (SCCP).* Notify safety personnel, evacuate all unnecessary personnel, eliminate all heat and ignition sources, and provide adequate ventilation. Cleanup personnel should protect against vapor inhalation, eye contact, and skin absorption. Absorb as much benzene as possible with an inert, noncombustible material. For large spills, dike far ahead of spill and contain liquid. Use nonsparking tools to place waste liquid or absorbent into closable containers for disposal. Keep waste out of confined spaces such as sewers, watersheds, and waterways because of explosion danger. Follow applicable OSHA regulations (29 CFR 1910.120).

Disposal: Contact your supplier or a licensed contractor for detailed recommendations. Follow applicable Federal, state, and local regulations.

EPA Designations

Listed as a RCRA Hazardous Waste (40 CFR 261.33), Hazardous Waste No. U019

Listed as a CERCLA Hazardous Substance* (40 CFR 302.4), Reportable Quantity (RQ): 1000 lb (454 kg) [* per Clean Water Act, Sec. 307 (a), 311 (b)(4), 112; and per RCRA, Sec. 3001]

SARA Extremely Hazardous Substance (40 CFR 355): Not listed

Listed as SARA Toxic Chemical (40 CFR 372.65)

OSHA Designations

Listed as an Air Contaminant (29 CFR 1910.1000, Tables Z-1-A and Z-2)

Section 8. Special Protection Data

Goggles: Wear protective eyeglasses or chemical safety goggles, per OSHA eye- and face-protection regulations (29 CFR 1910.133).

Respirator: Seek professional advice prior to respirator selection and use. Follow OSHA respirator regulations (29 CFR 1910.134) and, if necessary, wear a NIOSH-approved respirator. For emergency or nonroutine operations (cleaning spills, reactor vessels, or storage tanks), wear an SCBA. *Warning! Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.*

Other: Wear impervious gloves, boots, aprons, and gauntlets to prevent skin contact.

Ventilation: Provide general and local explosion-proof ventilation systems to maintain airborne concentrations at least below the OSHA PELs (Sec. 2). Local exhaust ventilation is preferred since it prevents contaminant dispersion into the work area by controlling it at its source.[103]

Safety Stations: Make available in the work area emergency eyewash stations, safety/quick-drench showers, and washing facilities.

Contaminated Equipment: Never wear contact lenses in the work area: soft lenses may absorb, and all lenses concentrate, irritants. Remove this material from your shoes and equipment. Launder contaminated clothing before wearing.

Comments: Never eat, drink, or smoke in work areas. Practice good personal hygiene after using this material, especially before eating, drinking, smoking, using the toilet, or applying cosmetics.

Section 9. Special Precautions and Comments

Storage Requirements: Store in tightly closed containers in a cool, dry, well-ventilated area away from all heat and ignition sources and incompatible materials. *Caution! Benzene vapor may form explosive mixtures in air.* To prevent static sparks, electrically ground and bond all containers and equipment used in shipping, receiving, or transferring operations in production and storage areas. When opening or closing benzene containers, use nonsparking tools. Keep fire extinguishers readily available.

Engineering Controls: Because OSHA specifically regulates benzene (29 CFR 1910.1028), educate workers about its potential hazards and dangers. Minimize all possible exposures to carcinogens. If possible, substitute less toxic solvents for benzene; use this material with extreme caution and only if absolutely essential. Avoid vapor inhalation and skin and eye contact. Use only with adequate ventilation and appropriate personal protective gear. Institute a respiratory protection program that includes regular training, maintenance, inspection, and evaluation. Designate regulated areas of benzene use (see legend in the box below) and label benzene containers with "DANGER, CONTAINS BENZENE, CANCER HAZARD."

Other Precautions: Provide preplacement and periodic medical examinations with emphasis on a history of blood disease or previous exposure.

Transportation Data (49 CFR 172.101, .102)

DOT Shipping Name: Benzene (*benzol*)
DOT Hazard Class: Flammable liquid
ID No.: UN1114
DOT Label: Flammable liquid
DOT Packaging Exceptions: 173.118
DOT Packaging Requirements: 173.119

IMO Shipping Name: Benzene
IMO Hazard Class: 3.2
ID No.: UN1114
IMO Label: Flammable liquid
IMDG Packaging Group: II

DANGER
BENZENE
CANCER HAZARD
FLAMMABLE–NO SMOKING
AUTHORIZED PERSONNEL ONLY
RESPIRATOR REQUIRED

MSDS Collection References: 1, 2, 12, 26, 73, 84-94, 100, 101, 103, 109, 124, 126, 127, 132, 134, 136, 138, 139, 143

Prepared by: MJ Allison, BS; Industrial Hygiene Review: DJ Wilson, CIH; Medical Review: MJ Upfal, MD, MPH; Edited by: JR Stuart, MS

CHEM SERVICE -- BIS(2-ETHYLHEXYL)PHTHALATE, 0-516
MATERIAL SAFETY DATA SHEET
NSN: 681000N077996
Manufacturer's CAGE: 8Y898
Part No. Indicator: A
Part Number/Trade Name: BIS(2-ETHYLHEXYL)PHTHALATE, 0-516

General Information

Company's Name: CHEM SERVICE INC
Company's P. O. Box: 3108
Company's City: WEST CHESTER
Company's State: PA
Company's Country: US
Company's Zip Code: 19381
Company's Emerg Ph #: 610-692-3026
Company's Info Ph #: 610-692-3026
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Status: SMJ
Date MSDS Prepared: 25JAN95
Safety Data Review Date: 23JUL97
MSDS Serial Number: CFHCS

Ingredients/Identity Information

Proprietary: NO
Ingredient: PHTHALIC ACID, BIS(2-ETHYLHEXYL) ESTER; (BIS(2-ETHYLHEXYL) PHTHALATE) (SARA 313) (CERCLA). (ING 2)
Ingredient Sequence Number: 01
NIOSH (RTECS) Number: TI0350000
CAS Number: 117-81-7
OSHA PEL: 5 MG/M3
ACGIH TLV: 5 MG/M3

Proprietary: NO
Ingredient: ING 1:LD50:(ORAL,RAT) 31,000 MG/KG.
Ingredient Sequence Number: 02
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: N/K (FP N)
ACGIH TLV: N/K (FP N)

Proprietary: NO
Ingredient: SUPP DATA:OBTAINED FROM A POISON CONTROL CENTER.
Ingredient Sequence Number: 03
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Physical/Chemical Characteristics

Appearance And Odor: COLORLESS LIQUID.
Boiling Point: 729F,387C
Melting Point: -51F,-46C
Vapor Pressure (MM Hg/70 F): <0.01 @20C
Specific Gravity: 0.981
Solubility In Water: INSOL (IMMISCIBLE)

Fire and Explosion Hazard Data

Extinguishing Media: CARBON DIOXIDE OR DRY CHEMICAL POWDER. DO NOT USE WATER!
Special Fire Fighting Proc: USE NIOSH APPROVED SCBA & FULL PROTECTIVE

EQUIPMENT (FP N).
Unusual Fire And Expl Hazrds: NO EXPLOSION LIMITS ARE AVAILABLE FOR THIS COMPOUND.

Reactivity Data

Stability: YES
Cond To Avoid (Stability): NONE SPECIFIED BY MANUFACTURER.
Materials To Avoid: INCOMPATIBLE W/STRONG OXIDIZING AGENTS.
Hazardous Decomp Products: DECOMPOSITION LIBERATES TOXIC FUMES.
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NOT RELEVANT

Health Hazard Data

LD50-LC50 Mixture: SEE INGREDIENT 1.
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: ALL CHEMICALS SHOULD BE CONSIDERED HAZARDOUS - AVOID DIRECT PHYSICAL CONTACT! MAY BE HARMFUL IF INHALED, SWALLOWED OR ABSORBED THROUGH SKIN. DUST AND/OR VAPORS CAN CAUSE IRRITATION TO RESPIRATORY TRACT. CAN BE IRRITATING TO MUCOUS MEMBRANES. CAN CAUSE EYE AND SKIN IRRITATION. PROPOSITION 65 - THIS (EFTS OF OVEREXP)
Carcinogenicity - NTP: YES
Carcinogenicity - IARC: YES
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: PHTHALIC ACID, BIS(2-ETHYLHEXYL)ESTER:IARC MONOGRAPHS, SUPP, VOL 7, PG 56, 1989:GRP 2B. NTP 7TH ANNUAL RPT ON (SUPDAT)
Signs/Symptoms Of Overexp: HLTH HAZ:CHEMICAL IS CONSIDERED TO BE A CARCINOGEN BY THE STATE OF CALIFORNIA. THIS COMPOUND IS GENERALLY CONSIDERED TO BE NON-TOXIC.
Med Cond Aggravated By Exp: NONE SPECIFIED BY MANUFACTURER.
Emergency/First Aid Proc: INGEST:CALL MD IMMED (FP N). EYES:FLUSH CONTINUOUSLY W/WATER FOR AT LST 15-20 MINS. SKIN:FLUSH W/WATER FOR 15-20 MINS. IF NO BURNS HAVE OCCURRED-USE SOAP & WATER TO CLEANSE. DO NOT WEAR SHOES/CLTHG UNTIL ABSOLUTELY FREE OF ALL CHEM ODORS. INHAL:REMOVE PATIENT TO FRESH AIR. ADMIN OXYG IF PATIENT IS HAVING DFCLTY BRTHG. IF PATIENT HAS STOPPED BRTHG ADMIN ARTF RESP. IF PATIENT IS IN CARD (SUPP DATA)

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: EVACUATE AREA. WEAR APPROPRIATE OSHA REGULATED EQUIPMENT. VENTILATE AREA. ABSORB ON VERMICULITE OR SIMILAR MATERIAL. SWEEP UP & PLACE IN APPROPRIATE CONTAINER. HOLD FOR DISPOSAL. WASH CONTAMINATED SURFACES TO REMOVE ANY RESIDUES.
Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.
Waste Disposal Method: DISPOSAL MUST BE I/A/W FEDERAL, STATE & LOCAL REGULATIONS (FP N). BURN IN A CHEMICAL INCINERATOR EQUIPPED W/AFTERBURNER & SCRUBBER.
Precautions-Handling/Storing: AVOID CONTACT W/SKIN, EYES & CLOTHING. DO NOT BREATHE VAPORS. KEEP TIGHTLY CLOSED. STORE IN A COOL, DRY PLACE. STORE ONLY W/COMPATIBLE CHEMICALS.
Other Precautions: PERSONS NOT SPECIFICALLY & PROPERLY TRAINED SHOULD NOT HANDLE THIS CHEM/ITS CNTNR. THIS PROD IS FURNISHED FOR LAB USE ONLY! MFR'S PRODS MAY NOT BE USED AS DRUGS, COSMETICS, AGRICULTURAL/PESTICIDAL PRODS, FOOD ADDTIVES/AS HOUSEHOLD CHEMS.

Control Measures

Respiratory Protection: NIOSH APPROVED RESPIRATOR APPROPRIATE FOR EXPOSURE OF CONCERN (FP N).
Ventilation: THIS CHEMICAL SHOULD BE HANDLED ONLY IN A HOOD.
Protective Gloves: IMPERVIOUS GLOVES (FP N).

Eye Protection: ANSI APPROVED CHEM WORKERS GOGGS (FP N).
Other Protective Equipment: EYE WASH FOUNTAIN & DELUGE SHOWER WHICH MEET ANSI DESIGN CRITERIA (FP N). USE APPROPRIATE OSHA APPROVED SAFETY EQUIP.
Work Hygienic Practices: CONTACT LENSES SHOULD NOT BE WORN IN THE LABORATORY.
Suppl. Safety & Health Data: EXPLAN OF CARCIN:CARCINS, 1994:ANTIC TO BE CARCIN. ANIMAL:LIVER, TESTES. FIRST AID PROC:ARREST ADMIN CPR. CONTINUE LIFE SUPPORTING MEASURES UNTIL MED ASSISTANCE HAS ARRIVED. NOTE:AN ANTIDOTE IS A SUBSTANCE INTENDED TO COUNTERACT EFT OF A POIS. IT SHOULD BE ADMIN ONLY BY MD/TRAINED EMER PERS. MED ADVICE CAN BE (ING 3)

Transportation Data

Disposal Data

Label Data

Label Required: YES
Technical Review Date: 23JUL97
Label Date: 21JUL97
Label Status: G
Common Name: BIS(2-ETHYLHEXYL)PHTHALATE, 0-516
Chronic Hazard: YES
Signal Word: DANGER!
Acute Health Hazard-Severe: X
Contact Hazard-Moderate: X
Fire Hazard-None: X
Reactivity Hazard-None: X
Special Hazard Precautions: ACUTE:ALL CHEMICALS SHOULD BE CONSIDERED HAZARDOUS - AVOID DIRECT PHYSICAL CONTACT! MAY BE HARMFUL IF INHALED, SWALLOWED OR ABSORBED THROUGH SKIN. DUST AND/OR VAPORS CAN CAUSE IRRITATION TO RESPIRATORY TRACT. CAN BE IRRITATING TO MUCOUS MEMBRANES. CAN CAUSE EYE AND SKIN IRRITATION. CHRONIC:CANCER HAZARD. CONTAINS BIS(2-ETHYLHEXYL) PHTHALATE, WHICH IS LISTED AS AN ANIMAL LIVER CARCINOGEN (FP N).
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y
Label Name: CHEM SERVICE INC
Label P.O. Box: 3108
Label City: WEST CHESTER
Label State: PA
Label Zip Code: 19381
Label Country: US
Label Emergency Number: 610-692-3026

CHEM SERVICE -- F1003 BENZO(E)PYRENE
MATERIAL SAFETY DATA SHEET
NSN: 655000F037550
Manufacturer's CAGE: 8Y898
Part No. Indicator: A
Part Number/Trade Name: F1003 BENZO(E)PYRENE

General Information

Company's Name: CHEM SERVICE INC
Company's Street: 660 TOWER LN
Company's P. O. Box: 3108
Company's City: WEST CHESTER
Company's State: PA
Company's Country: US
Company's Zip Code: 19381-3108
Company's Emerg Ph #: 215-692-3026/800-452-9994
Company's Info Ph #: 215-692-3026/800-452-9994
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Status: SE
Date MSDS Prepared: 23OCT92
Safety Data Review Date: 29DEC94
Preparer's Company: CHEM SERVICE INC
Preparer's St Or P. O. Box: 660 TOWER LN
Preparer's City: WEST CHESTER
Preparer's State: PA
Preparer's Zip Code: 19381-3108
MSDS Serial Number: BWJHZ

Ingredients/Identity Information

Proprietary: NO
Ingredient: BENZOPYRENE
Ingredient Sequence Number: 01
NIOSH (RTECS) Number: DJ4200000
CAS Number: 192-97-2

Physical/Chemical Characteristics

Appearance And Odor: WHITE TO YELLOW/GREEN CRYSTALLINE SOLID.
Melting Point: (SEE SUPP)
Solubility In Water: INSOLUBLE

Fire and Explosion Hazard Data

Extinguishing Media: CO2, DRY CHEMICAL POWDER/SPRAY.

Reactivity Data

Stability: YES
Materials To Avoid: STRONG OXIDIZING AGENTS.
Hazardous Decomp Products: TOXIC FUMES.
Hazardous Poly Occur: NO

Health Hazard Data

Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: EYES: IRRITATION. SKIN: IRRITATION, HARMFUL IF ABSORBED. INGESTION: HARMFUL. INHALATION: HARMFUL, IRRITATION TO RESPIRATORY TRACT & MUCOUS MEMBRANES. POSSIBLE MUTAGEN-MAY CAUSE BIRTH

DEFECTS IN FUTURE GENERATIONS. POSSIBLE TERATOGEN-CAUSES EMBRYO-FETAL DAMAGE.
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: NONE
Signs/Symptoms Of Overexp: IRRITATION.
Emergency/First Aid Proc: EYES: FLUSH CONTINUOUSLY W/WATER FOR 15-20 MINS. SKIN: FLUSH W/WATER FOR 15-20 MINS. IF NOT BURNED, WASH W/SOAP & WATER. INHALATION: REMOVE TO FRESH AIR. GIVE CPR/OXYGEN IF NEEDED. KEEP WARM & QUIET. INGESTION: DON'T INDUCE VOMITING/GIVE LIQUIDS IF UNCONSCIOUS/ CONVULSIVE. IF VOMITING, WATCH CLOSELY FOR ANY AIRWAY OBSTRUCTION. OBTAIN MEDICAL ATTENTION IN ALL CASES.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: EVACUATE AREA. WEAR APPROPRIATE OSHA REGULATED EQUIPMENT. VENTILATE AREA. SWEEP UP & PLACE IN AN APPROPRIATE CONTAINER/HOLD FOR DISPOSAL. WASH CONTAMINATED SURFACES TO REMOVE ANY RESIDUES.
Waste Disposal Method: BURN IN A CHEMICAL INCINERATOR EQUIPPED W/AN AFTERBURNER & SCRUBBER IAW/FEDERAL, STATE & LOCAL REGULATIONS.
Precautions-Handling/Storing: STORE IN A COOL DRY PLACE ONLY W/COMPATIBLE CHEMICALS. KEEP TIGHTLY CLOSED. FOR LABORATORY USE ONLY.
Other Precautions: AVOID CONTACT W/SKIN, EYES & CLOTHING. DON'T BREATH VAPOR. CONTACT LENSES SHOULDN'T BE WORN IN LABORATORY. ALL CHEMICALS SHOULD BE CONSIDERED HAZARDOUS. AVOID DIRECT PHYSICAL CONTACT.

Control Measures

Respiratory Protection: WEAR APPROPRIATE OSHA/MSHA APPROVED SAFETY EQUIPMENT.
Ventilation: CHEMICAL SHOULD BE HANDLED ONLY IN A HOOD.
Eye Protection: EYE SHIELDS
Work Hygienic Practices: REMOVE/LAUNDER CONTAMINATED CLOTHING BEFORE REUSE.
Suppl. Safety & Health Data: MELTING POINT: 352.4-354.2F.

Transportation Data

Disposal Data

Label Data

Label Required: YES
Label Status: G
Common Name: F1003 BENZO(E)PYRENE
Special Hazard Precautions: EYES: IRRITATION. SKIN: IRRITATION, HARMFUL IF ABSORBED. INGESTION: HARMFUL. INHALATION: HARMFUL, IRRITATION TO RESPIRATORY TRACT & MUCOUS MEMBRANES. POSSIBLE MUTAGEN-MAY CAUSE BIRTH DEFECTS IN FUTURE GENERATIONS. POSSIBLE TERATOGEN-CAUSES EMBRYO-FETAL DAMAGE. IRRITATION.
Label Name: CHEM SERVICE INC
Label Street: 660 TOWER LN
Label P.O. Box: 3108
Label City: WEST CHESTER
Label State: PA
Label Zip Code: 19381-3108
Label Country: US
Label Emergency Number: 215-692-3026/800-452-9994

CORNELL PDC Planning Design & Construction

Material Safety Data Sheets

DOD Hazardous Material Information
July, 1998
For Cornell University Convenience Only

BENZO(B)FLUORANTHENE 50MG,CATALOG NO,48490

FSC: 6810
NIIN: 00N010747
NSN: 681000N0107475
MANUFACTURERS CAGE: 54968
PART NO INDICATOR: A
PART NUMBER TRADE NAME: BENZO(B)FLUORANTHENE 50MG,CATALOG NO,48490

General Information

ITEM NAME:
MANUFACTURERS NAME: SUPELCO,INC.
MANUFACTURERS STREET: SUPELCO PARK
MANUFACTURERS P O BOX:
MANUFACTURERS CITY: BELLEFONTE
MANUFACTURERS STATE: PA
MANUFACTURERS COUNTRY:
MANUFACTURERS ZIP CODE: 16823-0048
MANUFACTURERS EMERG PH: 814-359-3441
MANUFACTURERS INFO PH: 814-359-3441
DISTRIBUTOR VENDOR 1:
DISTRIBUTOR VENDOR 1 CAGE:
DISTRIBUTOR VENDOR 2:
DISTRIBUTOR VENDOR 2 CAGE:
DISTRIBUTOR VENDOR 3:
DISTRIBUTOR VENDOR 3 CAGE:
DISTRIBUTOR VENDOR 4:
DISTRIBUTOR VENDOR 4 CAGE:
SAFETY DATA ACTION CODE:
SAFETY FOCAL POINT: N
RECORD NO FOR SAFETY ENTRY: 001
TOT SAFETY ENTRIES THIS STK: 001
STATUS: SE
DATE MSDS PREPARED: 10MAR88
SAFETY DATA REVIEW DATE: 01MAR89
SUPPLY ITEM MANAGER:
MSDS PREPARERS NAME:
PREPARERS COMPANY:

PREPARERS ST OR P O BOX:
PREPARERS CITY:
PREPARERS STATE:
PREPARERS ZIP CODE:
OTHER MSDS NUMBER:
MSDS SERIAL NUMBER: BHGVP
SPECIFICATION NUMBER:
SPEC TYPE GRADE CLASS:
HAZARD CHARACTERISTIC CODE:
UNIT OF ISSUE: NK
UNIT OF ISSUE CONTAINER QTY: N/K
TYPE OF CONTAINER: N/K
NET UNIT WEIGHT:
NRC STATE LICENSE NUMBER:
NET EXPLOSIVE WEIGHT:
NET PROPELLANT WEIGHT AMMO:
COAST GUARD AMMUNITION CODE:

Physical & Chemical Characteristics

APPEARANCE AND ODOR: LIGHT YELLOW CRYSTALLINE SOLID.
BOILING POINT: N/A MFR
MELTING POINT: 334 F;168 C
VAPOR PRESSURE MM HG 70 F: N/A MFR
VAPOR DENSITY AIR 1: N/A MFR
SPECIFIC GRAVITY: N/A MFR
DECOMPOSITION TEMPERATURE: N/F FPN
EVAPORATION RATE AND REF: N/A MFR
SOLUBILITY IN WATER: N/A MFR
PERCENT VOLATILES BY VOLUME: N/AMFR
VISCOSITY:
PH: N/KFPN
RADIOACTIVITY:
FORM RADIOACTIVE MATL:
MAGNETISM MILLIGAUSS: N/P
CORROSION RATE IPY: N/K FPN
AUTOIGNITION TEMPERATURE:

Fire and Explosion Hazard Data

FLASH POINT: N/K FPN
FLASH POINT METHOD: N/P
LOWER EXPLOSIVE LIMIT: N/K FPN
UPPER EXPLOSIVE LIMIT: N/K FPN
EXTINGUISHING MEDIA: CO*2,DRY CHEMICAL
SPECIAL FIRE FIGHTING PROC: WEAR SELF CONTAINED BREATHING APPARATUS WHEN FIGHTING A CHEMICAL FIRE(MFR).USE NIOSH/MSHA APPROVED SCBA & FULL PROTECTIVE EQUIPMENT(FPN).
UNUSUAL FIRE AND EXPL HAZRDS: N/A MFR

Reactivity Data

STABILITY: YES
COND TO AVOID (STABILITY): N/A MFR

MATERIALS TO AVOID: N/A MFR
HAZARDOUS DECOMP PRODUCTS: N/A MFR
HAZARDOUS POLY OCCUR: NO
CONDITIONS TO AVOID POLY: WILL NOT OCCUR.

Health Hazard Data

LD50 LC50 MIXTURE: LD50 N/A MFR
ROUTE OF ENTRY INHALATION: YES
ROUTE OF ENTRY SKIN: NO
ROUTE OF ENTRY INGESTION: YES
HEALTH HAZ ACUTE AND CHRONIC: SEE SIGN & SYMPTOMS OF OVEREXPOSURE.
CARCINOGENICITY NTP: YES
CARCINOGENICITY IARC: YES
CARCINOGENICITY OSHA: NO
EXPLANATION CARCINOGENICITY: BENZO(B)FLUORANTHENE:NTP,MAY REASONABLY BE ANTICIPATED TO BE CARC.IARC,ANIMAL CARCINOGEN(FPN).RPTD ANIMAL (MFR).
SIGNS SYMPTOMS OF OVEREXP: REPORTED ANIMAL CARCINOGEN.
MED COND AGGRAVATED BY EXP: N/K FPN
EMERGENCY FIRST AID PROC: EYES:FLUSH WITH PLENTY OF POTABLE WATER FOR AT LEAST 15 MINUTES,THEN OBTAIN PROMPT MEDICAL ATTENTION (FPN).SKIN: PROMPTLY WASH SKIN WITH MILD SOAP & LARGE VOLUMES OF WATER REMOVE CONTAMINATED CLOTHING.CONTACT PHYSICIAN.INHAL:IMMEDIATELY MOVE TO FRESH AIR.CONTACT PHYSICIAN.INGEST:NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON,NEVER TRY TO MAKE AN UNCONSCIOUS PERSON VOMIT.IMMED CONTACT PHYS.

Precautions for Safe Handling and Use

STEPS IF MATL RELEASED SPILL: SWEEP UP MATERIAL.AVOID GENERATING DUST.
NEUTRALIZING AGENT: N/K FPN
WASTE DISPOSAL METHOD: COMPLY WITH ALL APPLICABLE FEDERAL,STATE,OR LOCAL REGULATIONS.
PRECAUTIONS HANDLING STORING: REFRIGERATE IN SEALED CONTAINER.AVOID GENERATING DUST.PROTECT FROM EXPOSURE TO LIGHT.
OTHER PRECAUTIONS: REPORTED CANCER HAZARD.AVOID EYE OR SKIN CONTACT.

Control Measures

RESPIRATORY PROTECTION: WEAR SELF CONTAINED BREATHING APPARATUS.NIOSH/MSHA APPROVED RESPIRATOR APPROPRIATE FOR EXPOSURE OF CONCERN (FPN).
VENTILATION: USE ONLY IN EXHAUST HOOD.
PROTECTIVE GLOVES: WEAR GLOVES
EYE PROTECTION: SAFETY GLASSES WITH SIDESHIELDS(FPN)
OTHER PROTECTIVE EQUIPMENT: N/A
WORK HYGIENIC PRACTICES: OBSERVE GOOD WORK HYGIENIC PRACTICES(FPN).
SUPPL SAFETY HEALTH DATA:

Transportation Data

TRANSPORTATION ACTION CODE:
TRANSPORTATION FOCAL POINT: N

TRANS DATA REVIEW DATE: 89101
DOT PSN CODE: LVM
DOT SYMBOL:
DOT PROPER SHIPPING NAME: POISONOUS SOLIDS, N.O.S.
DOT CLASS: 6.1
DOT ID NUMBER: UN2811
DOT PACK GROUP: III
DOT LABEL: KEEP AWAY FROM FOOD
DOT DOD EXEMPTION NUMBER: N/R
IMO PSN CODE: LYT
IMO PROPER SHIPPING NAME: POISONOUS SOLIDS, N.O.S.
IMO REG PAGE NUMBER: 6236
IMO UN NUMBER: 2811
IMO UN CLASS: 6.1
IMO SUBSID RISK LABEL: -
IATA PSN CODE: UKJ
IATA UN ID NUMBER: 2811
IATA PROPER SHIP NAME: POISONOUS SOLID, N.O.S.
IATA UN CLASS: 6.1
IATA SUBSID RISK CLASS:
IATA LABEL: KEEP AWAY FROM FOOD
AFI PSN CODE: UKJ
AFI SYMBOLS:
AFI PROP SHIPPING NAME: POISONOUS SOLIDS, N.O.S.
AFI CLASS: 6.1
AFI ID NUMBER: UN2811
AFI PACK GROUP: III
AFI LABEL: KEEP AWAY FROM FOOD
AFI SPECIAL PROV:
AFI BASIC PAC REF: 10-13
MMAC CODE:
N O S SHIPPING NAME:
ADDITIONAL TRANS DATA:

Disposal Data

DISPOSAL DATA ACTION CODE:
DISPOSAL DATA FOCAL POINT:
DISPOSAL DATA REVIEW DATE:
RECNUM FOR THIS DISP ENTR:
TOT DISP ENTRIES PER NSN:
LANDFILL BAN ITEM:
DISPOSAL SUPPLEMENTAL DAT:
EPAHAZWST 1ST CODE NEW:
EPAHAZWST 1ST NAME NEW:
EPAHAZWST 1ST CHAR NEW:
EPAACUTEHAZARD 1ST NEW:
EPAHAZWST 2ND CODE NEW:
EPAHAZWST 2ND NAME NEW:
EPAHAZWST 2ND CHAR NEW:
EPAACUTEHAZARD 2ND NEW:
EPAHAZWST 3RD CODE NEW:
EPAHAZWST 3RD NAME NEW:
EPAHAZWST 3RD CHAR NEW:
EPAACUTE 3RD HAZARD NEW:

Label Data

LABEL REQUIRED: YES
TECHNICAL REVIEW DATE:
LABEL DATE:
MFR NUMBER:
LABEL STATUS: F
COMMON NAME:
CHRONIC HAZARD: N/P
SIGNAL WORD:
ACUTE HEALTH HAZARD NONE:
ACUTE HEALTH HAZARD SLIGHT:
ACUTE HEALTH HAZARD MODERATE:
ACUTE HEALTH HAZARD SEVERE:
CONTACT HAZARD NONE:
CONTACT HAZARD SLIGHT:
CONTACT HAZARD MODERATE:
CONTACT HAZARD SEVERE:
FIRE HAZARD NONE:
FIRE HAZARD SLIGHT:
FIRE HAZARD MODERATE:
FIRE HAZARD SEVERE:
REACTIVITY HAZARD NONE:
REACTIVITY HAZARD SLIGHT:
REACTIVITY HAZARD MODERATE:
REACTIVITY HAZARD SEVERE:
SPECIAL HAZARD PRECAUTIONS: POISONOUS IF SWALLOWED. INHALATION OF DUST POISONOUS. FIRE MAY PRODUCE IRRITATING OR POISONOUS GASES. RUNOFF FROM FIRE CONTROL OR DILUTION WATER MAY CAUSE POLLUTION.
PROTECT EYE:
PROTECT SKIN:
PROTECT RESPIRATORY:
LABEL NAME: SUPELCO INC
LABEL STREET: SUPELCO PARK
LABEL P O BOX:
LABEL CITY: BELLEFONTE
LABEL STATE: PA
LABEL ZIP CODE: 16823
LABEL COUNTRY: US
LABEL EMERGENCY NUMBER:
YEAR PROCURED:

Page Created 11/24/98 12:09:56 PM

ULTRA SCIENTIFIC -- PAH MIXTURE, US-106
MATERIAL SAFETY DATA SHEET
NSN: 685000N041079
Manufacturer's CAGE: 0MU35
Part No. Indicator: A
Part Number/Trade Name: PAH MIXTURE, US-106

==========

General Information

==========

Company's Name: ULTRA SCIENTIFIC
Company's Street: 250 SMITH ST
Company's City: NO KINGSTOWN
Company's State: RI
Company's Country: US
Company's Zip Code: 02852
Company's Emerg Ph #: 401-294-9400
Company's Info Ph #: 401-294-9400
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Status: SMJ
Date MSDS Prepared: 17APR92
Safety Data Review Date: 06APR93
MSDS Serial Number: BSFFX
Hazard Characteristic Code: NK

==========

Ingredients/Identity Information

==========

Proprietary: NO
2136 MG/KG.
Ingredient Sequence Number: 01
Percent: 48.54
NIOSH (RTECS) Number: PA8050000
CAS Number: 75-09-2
OSHA PEL: 500 PPM;1000 PPM, C
ACGIH TLV: 50 PPM

Proprietary: NO
Ingredient: BENZENE (SARA III). LD50 (ORAL,RAT): 3320 MG/KG.
Ingredient Sequence Number: 02
Percent: 48.54
NIOSH (RTECS) Number: CY1400000
CAS Number: 71-43-2
OSHA PEL: 1 PPM;5 STEL
ACGIH TLV: 10 PPM

Proprietary: NO
Ingredient: ACENAPHTHENE (SARA III)
Ingredient Sequence Number: 03
Percent: 0.182
NIOSH (RTECS) Number: AB1000000
CAS Number: 83-32-9
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: ACENAPHTHYLENE (SARA III)
Ingredient Sequence Number: 04
Percent: 0.182
NIOSH (RTECS) Number: AB1254000
CAS Number: 208-96-8
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: ANTHRACENE (SARA III)
Ingredient Sequence Number: 05
Percent: 0.182
NIOSH (RTECS) Number: CA9350000
CAS Number: 120-12-7
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: BENZ[A]ANTHRACENE (SARA III)
Ingredient Sequence Number: 06
Percent: 0.182
NIOSH (RTECS) Number: CV9275000
CAS Number: 56-55-3
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: BENZ(E)ACEPHENANTHRYLENE; (BENZO[B]FLUORANTHENE) (SARA III)
Ingredient Sequence Number: 07
Percent: 0.182
NIOSH (RTECS) Number: CU1400000
CAS Number: 205-99-2
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: BENZO(K)FLUORANTHENE (SARA III)
Ingredient Sequence Number: 08
Percent: 0.182
NIOSH (RTECS) Number: DF6350000
CAS Number: 207-08-9
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: BENZO[GHI]PERYLENE (SARA III)
Ingredient Sequence Number: 09
Percent: 0.182
NIOSH (RTECS) Number: DI6200500
CAS Number: 191-24-2
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: BENZO[A]PYRENE (SARA III)
Ingredient Sequence Number: 10
Percent: 0.182
NIOSH (RTECS) Number: DJ3675000
CAS Number: 50-32-8
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: CHRYSENE (SARA III)
Ingredient Sequence Number: 11
Percent: 0.182
NIOSH (RTECS) Number: GC0700000
CAS Number: 218-01-9
OSHA PEL: 0.2 MG/M3
ACGIH TLV: NOT APPLICABLE

Proprietary: NO

Ingredient: DIBENZ[A,H]ANTHRACENE
Ingredient Sequence Number: 12
Percent: 0.182
NIOSH (RTECS) Number: HN2625000
CAS Number: 53-70-3
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: FLUORANTHENE (SARA III). LD50 (ORAL,RAT): 2000 MG/KG.
Ingredient Sequence Number: 13
Percent: 0.182
NIOSH (RTECS) Number: LL4025000
CAS Number: 206-44-0
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: FLUORENE (SARA III)
Ingredient Sequence Number: 14
Percent: 0.182
NIOSH (RTECS) Number: LL5670000
CAS Number: 86-73-7
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: INDENO[1,2,3-CD]PYRENE (SARA III)
Ingredient Sequence Number: 15
Percent: 0.182
NIOSH (RTECS) Number: NK9300000
CAS Number: 193-39-5
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: NAPHTHALENE (SARA III). LD50 (ORAL,RAT): 1780 MG/KG.
Ingredient Sequence Number: 16
Percent: 0.182
NIOSH (RTECS) Number: QJ0525000
CAS Number: 91-20-3
OSHA PEL: 10 PPM;15 PPM STEL
ACGIH TLV: 10 PPM;15 PPM STEL

Proprietary: NO
Ingredient: PHENANTHRENE (SARA III). LD50 (ORAL,RAT): 700 MG/KG.
Ingredient Sequence Number: 17
Percent: 0.182
NIOSH (RTECS) Number: SF7175000
CAS Number: 85-01-8
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: PYRENE (SARA III)
Ingredient Sequence Number: 18
Percent: 0.182
NIOSH (RTECS) Number: UR2450000
CAS Number: 129-00-0
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: SUPDAT: 207-08-9, AND 193-39-5, IARC VOL SUP7, P56, 1987 (FP

N).
Ingredient Sequence Number: 19
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: ING 19:BENZ(A)ANTHRACENE:IARC MONOGRAPHS, SUPPLEMENT, VOL 7, PG 56, 1987:GROUP 2A. NTP 7TH ANNUAL RPT ON (ING 19)
Ingredient Sequence Number: 20
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: ING 20:CARCINS, 1994:ANTIC TO BE CARCIN. BLENO(1,2,3-CO) PYRENE, BENZO(K)FLUORANTHENE, BEN(E)ACEPHENANTHYRYLENE: (ING 22)
Ingredient Sequence Number: 21
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: ING 21:IARC MONO, SUPP, VOL 7, PG56, 1987:GROUP 2B. NTP 7TH ANNUAL RPT ON CARCINS, 1994:ANTIC TO BE CARCIN.
Ingredient Sequence Number: 22
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Physical/Chemical Characteristics

Appearance And Odor: LIQUID

Fire and Explosion Hazard Data

Flash Point: NOT APPLICABLE
Lower Explosive Limit: N/A
Upper Explosive Limit: N/A
Extinguishing Media: CARBON DIOXIDE, DRY CHEMICAL POWDER, OR WATER SPRAY.
Special Fire Fighting Proc: WEAR NIOSH/MSHA APPROVED PRESSURE DEMAND SCBA AND FULL PROTECTIVE EQUIPMENT (FP N).
Unusual Fire And Expl Hazrds: THERMAL DECOMPOSITION PRODUCTS MAY INCLUDE HCL AND PHOSGENE (FP N).

Reactivity Data

Stability: YES
Cond To Avoid (Stability): NONE SPECIFIED BY MANUFACTURER.
Materials To Avoid: STRONG OXIDIZERS.
Hazardous Decomp Products: HCL, PHOSGENE (FP N).
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NOT RELEVANT.

Health Hazard Data

LD50-LC50 Mixture: SEE INGREDIENTS.
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: NO
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: CONTAINS CARCINOGEN(S) OR CANCER SUSPECT AGENT(S). TOXIC; IRRITANT. ALL CHEMS SHOULD BE CONSIDERED HAZARDOUS-DIRECT PHYSICAL CONTACT SHOULD BE AVOIDED. CHLOROCARBON MATERIALS HAVE PRODUCED SENSITIZATION OF MYOCARDIUM TO EPINEPHRINE IN LABORATORY ANIMALS AND COULD

HAVE SIMILAR EFFECT IN HUMANS. (EFTS OF OVEREXP)
Carcinogenicity - NTP: YES
Carcinogenicity - IARC: YES
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: METHYLENE CHLORIDE: CAS # 56-55-3, 205-99-2, 207-08-9, 50-32-8, 53-70-3, 193-39-5 ANTIC TO BE CARCINOGEN AND (SUPDAT)
Signs/Symptoms Of Overexp: HEALTH HAZARDS: ADRENOMIMETICS (E.G., EPINEPHRINE) MAY BE CONTRAINDICATED EXCEPT FOR LIFE-SUSTAINING USES IN HUMANS ACUTELY OR CHRONICALLY EXPOSED TO CHLOROCARBONS (FP N).
Med Cond Aggravated By Exp: NONE SPECIFIED BY MANUFACTURER.
Emergency/First Aid Proc: EYE: FLUSH WITH COPIOUS AMOUNTS OF WATER FOR AT REMOVE TO FRESH AIR. GIVE OXYGEN, IF NECESSARY. CONTACT PHYSICIAN. INGESTION: CALL MD IMMEDIATELY (FP N).

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: DUE TO SMALL QUANTITY INVOLVED, SPILLS OR LEAKS SHOULD NOT POSE A SIGNIFICANT PROBLEM. LEAKING BOTTLE MAY BE PLACED IN PLASTIC BAG AND NORMAL DISPOSAL PROCEDURES FOLLOWED. LIQUID SAMPLES MAY BE ABSORBED ON VERMICULITE OR SAND.
Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.
Waste Disposal Method: BURN IN A CHEMICAL INCINERATOR EQUIPPED WITH AN AFTERBURNER AND SCRUBBER. OBSERVE ALL FEDERAL, STATE, AND LOCAL LAWS CONCERNING DISPOSAL.
Precautions-Handling/Storing: KEEP TIGHTLY CLOSED, AND STORE IN A COOL, DRY PLACE.
Other Precautions: MATL SHOULD ONLY BE USED BY THOSE PERSONS TRAINED IN SAFE HNDLG OF HAZ CHEMS. NO SMOKING IN AREA OF USE. DO NOT USE IN GENERAL VICINITY OF ARC WELDING, OPEN FLAMES OR HOT SURFS. HEAT &/OR UV RADIA MAY CAUSE FORM OF HCL &/OR PHOSGENE (FP N).

Control Measures

Respiratory Protection: WEAR APPROPRIATE NIOSH/MSHA APPROVED RESPIRATOR.
Ventilation: GENERAL VENTILATION SUFFICIENT TO KEEP AIRBORNE CONCENTRATION BELOW CURRENT EXPOSURE LIMITS (FP N).
Protective Gloves: IMPERVIOUS GLOVES (FP N).
Eye Protection: ANSI APRV CHEM WORK GOG&FULL LGTH FCSHLD
Other Protective Equipment: CHEMICAL RESISTANT CLOTHING SUCH AS LABORATORY COAT AND/OR A RUBBER APRON TO PREVENT CONTACT WITH EYES, SKIN, & CLTHG.
Work Hygienic Practices: NONE SPECIFIED BY MANUFACTURER.
Suppl. Safety & Health Data: NONE SPECIFIED BY MANUFACTURER. CARCIN COMMENTS: SARCOMAGEN (NTP 6TH ANN RPT, 1991); GRP 2B (IARC), BENZENE: KNOWN CARCIN & LEUKEMOGEN (NTP 6TH ANN RPT, 1991); GRP 1 (IARC VOL SUP7, P120, '87), OSHA 29CFR11910.1028, JUL'92), GRP 2A (IARC), CAS #56-55-3, 50-32-8, 53-70-3, GRP 2B, (IARC) CAS #205-99-2, (ING 19)

Transportation Data

Disposal Data

Label Data

Label Required: YES
Technical Review Date: 06APR93
Label Date: 02APR93
Label Status: G
Common Name: PAH MIXTURE, US-106
Chronic Hazard: YES
Signal Word: WARNING!
Acute Health Hazard-Moderate: X
Contact Hazard-Moderate: X

Fire Hazard-None: X
Reactivity Hazard-None: X
Special Hazard Precautions: KEEP TIGHTLY CLOSED, AND STORE IN A COOL, DRY PLACE. ACUTE: TOXIC; IRRITANT. INHALATION OF VAPORS MAY CONTRIBUTE TO THE OCCURRENCE OF IRREGULAR HEARTBEATS (FP N). ALL CHEMS SHOULD BE CONSIDERED HAZARDOUS-DIRECT PHYSICAL CONTACT SHOULD BE AVOIDED. CHRONIC: CANCER HAZARD. METHYLENE CHLORIDE AND BENZENE, CAS #56-55-3, 205-99-2, 50-32-8, 53-70-3, AND 193-39-5, MAY CAUSE LUNG CANCER, SARCOMAS AND OTHER CANCERS (FP N).
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y
Label Name: ULTRA SCIENTIFIC
Label Street: 250 SMITH ST
Label City: NO KINGSTOWN
Label State: RI
Label Zip Code: 02852
Label Country: US
Label Emergency Number: 401-294-9400

CORNELL PDC Planning Design & Construction

Material Safety Data Sheets

DOD Hazardous Material Information July, 1998 For Cornell University Convenience Only

CHRYSENE 0.1G CATALOG NO 48565.

FSC: 6810
NIIN: 00N010748
NSN: 681000N0107485
MANUFACTURERS CAGE: 54968
PART NO INDICATOR: A
PART NUMBER TRADE NAME: CHRYSENE 0.1G CATALOG NO 48565.

General Information

ITEM NAME:
MANUFACTURERS NAME: SUPELCO,INC.
MANUFACTURERS STREET: SUPELO PARK
MANUFACTURERS P O BOX:
MANUFACTURERS CITY: BELLEFONTE
MANUFACTURERS STATE: PA
MANUFACTURERS COUNTRY:
MANUFACTURERS ZIP CODE: 16823-0048
MANUFACTURERS EMERG PH: 814-359-3441
MANUFACTURERS INFO PH: 814-359-3441
DISTRIBUTOR VENDOR 1:
DISTRIBUTOR VENDOR 1 CAGE:
DISTRIBUTOR VENDOR 2:
DISTRIBUTOR VENDOR 2 CAGE:
DISTRIBUTOR VENDOR 3:
DISTRIBUTOR VENDOR 3 CAGE:
DISTRIBUTOR VENDOR 4:
DISTRIBUTOR VENDOR 4 CAGE:
SAFETY DATA ACTION CODE:
SAFETY FOCAL POINT: N
RECORD NO FOR SAFETY ENTRY: 001
TOT SAFETY ENTRIES THIS STK: 001
STATUS: SE
DATE MSDS PREPARED: 10MAR88
SAFETY DATA REVIEW DATE: 01MAR89
SUPPLY ITEM MANAGER:
MSDS PREPARERS NAME:
PREPARERS COMPANY:

PREPARERS ST OR P O BOX:
PREPARERS CITY:
PREPARERS STATE:
PREPARERS ZIP CODE:
OTHER MSDS NUMBER:
MSDS SERIAL NUMBER: BHGVQ
SPECIFICATION NUMBER:
SPEC TYPE GRADE CLASS:
HAZARD CHARACTERISTIC CODE:
UNIT OF ISSUE: NK
UNIT OF ISSUE CONTAINER QTY: N/K
TYPE OF CONTAINER: N/K
NET UNIT WEIGHT:
NRC STATE LICENSE NUMBER:
NET EXPLOSIVE WEIGHT:
NET PROPELLANT WEIGHT AMMO:
COAST GUARD AMMUNITION CODE:

Physical & Chemical Characteristics

APPEARANCE AND ODOR: WHITE SOLID
BOILING POINT: 838 F;448 C
MELTING POINT: 489 F;254 C
VAPOR PRESSURE MM HG 70 F: N/A MFR
VAPOR DENSITY AIR 1: N/A MFR
SPECIFIC GRAVITY: N/A
DECOMPOSITION TEMPERATURE: N/K F=N
EVAPORATION RATE AND REF: N/A MFR
SOLUBILITY IN WATER: N/A MFR
PERCENT VOLATILES BY VOLUME: N/AMFR
VISCOSITY:
PH: N/KFPN
RADIOACTIVITY:
FORM RADIOACTIVE MATL:
MAGNETISM MILLIGAUSS: N/P
CORROSION RATE IPY: N/K FPN.
AUTOIGNITION TEMPERATURE:

Fire and Explosion Hazard Data

FLASH POINT: N/K FPN
FLASH POINT METHOD: N/P
LOWER EXPLOSIVE LIMIT: N/KFPN
UPPER EXPLOSIVE LIMIT: N/K FPN
EXTINGUISHING MEDIA: WATER,CO*2,DRY CHEMICAL,ALCOHOL FOAM.
SPECIAL FIRE FIGHTING PROC: WEAR SELF CONTAINED BREATHING APPARATUS WHEN FIGHTING A CHEMICAL FIRE(MFR).USE NIOSH/MSHA APPROVED SCBA & FULL PROTECTIVE EQUIPMENT(FPN).
UNUSUAL FIRE AND EXPL HAZRDS: N/A(MFR).

Reactivity Data

STABILITY: YES
COND TO AVOID (STABILITY): N/A.

MATERIALS TO AVOID: OXIDIZING AGENTS.
HAZARDOUS DECOMP PRODUCTS: N/A
HAZARDOUS POLY OCCUR: NO
CONDITIONS TO AVOID POLY: WILL NOT OCCUR.

Health Hazard Data

LD50 LC50 MIXTURE: LD50 NA.
ROUTE OF ENTRY INHALATION: YES
ROUTE OF ENTRY SKIN: YES
ROUTE OF ENTRY INGESTION: NO
HEALTH HAZ ACUTE AND CHRONIC: SEE SIGNS & SYMPTOMS OVEREXPOSURE.
CARCINOGENICITY NTP: NO
CARCINOGENICITY IARC: NO
CARCINOGENICITY OSHA: NO
EXPLANATION CARCINOGENICITY: CHRYSENE:ACGIH;SUSPECTED HUMAN CARCINOGEN(FPN).REPORTED ANIMAL CARCINOGEN (MFR).
SIGNS SYMPTOMS OF OVEREXP: REPORTED ANIMAL CARCINOGEN(MFR).
MED COND AGGRAVATED BY EXP: N/K FPN
EMERGENCY FIRST AID PROC: EYES:FLUSH WITH PLENTY OF POTABLE WATER FOR AT LEAST 15 MINUTES,THEN OBTAIN PROMPT MEDICAL ATTENTION (FPN).SKIN:PROMPTLY WASH SKIN WITH MILD SOAP AND LARGE VOLUMES OF WATER .REMOVE CONTAMINATED CLOTHING.INHALATION:IMMEDIATELY MOVE TO FRESH SAIR(MFR).SUPPORT BREATHING (GIVE O*2/ARTIFICAL RESPIRATION) (FPN).INGESTION:N/A(MFR).

Precautions for Safe Handling and Use

STEPS IF MATL RELEASED SPILL: SWEEP UP MATERIAL.FLUSH AREA WITH WATER.
NEUTRALIZING AGENT: N/K FPN.
WASTE DISPOSAL METHOD: COMPLY WITH APPLICABLE FEDERAL,STATE,OR LOCAL REGULATIONS.
PRECAUTIONS HANDLING STORING: STORE SEALED CONTAINER IN COOL,DRY LOCATION.
OTHER PRECAUTIONS: REPORTED CANCER HAZARD.AVOID EYE OR SKIN CONTACT.AVOID BREATHING VAPORS.

Control Measures

RESPIRATORY PROTECTION: N/A(MFR).NIOSH/MSHA APPROVED RESPIRATOR APPROPRIATE FOR EXPOSURE OF CONCERN(FPN).
VENTILATION: USE ONLY IN EXHAUST HOOD.
PROTECTIVE GLOVES: WEAR RUBBER GLOVES.
EYE PROTECTION: SAFETY GLASSES WITH SIDESHIELDS(FPN)
OTHER PROTECTIVE EQUIPMENT: N/A
WORK HYGIENIC PRACTICES: OBSERVE GOOD WORK HYGIENIC PRACTICES(FPN).
SUPPL SAFETY HEALTH DATA:

Transportation Data

TRANSPORTATION ACTION CODE:
TRANSPORTATION FOCAL POINT: N
TRANS DATA REVIEW DATE: 89101
DOT PSN CODE: LVM

DOT SYMBOL:
DOT PROPER SHIPPING NAME: POISONOUS SOLIDS, N.O.S.
DOT CLASS: 6.1
DOT ID NUMBER: UN2811
DOT PACK GROUP: III
DOT LABEL: KEEP AWAY FROM FOOD
DOT DOD EXEMPTION NUMBER: N/R
IMO PSN CODE: LYT
IMO PROPER SHIPPING NAME: POISONOUS SOLIDS, N.O.S.
IMO REG PAGE NUMBER: 6236
IMO UN NUMBER: 2811
IMO UN CLASS: 6.1
IMO SUBSID RISK LABEL: -
IATA PSN CODE: UKJ
IATA UN ID NUMBER: 2811
IATA PROPER SHIP NAME: POISONOUS SOLID, N.O.S.
IATA UN CLASS: 6.1
IATA SUBSID RISK CLASS:
IATA LABEL: KEEP AWAY FROM FOOD
AFI PSN CODE: UKJ
AFI SYMBOLS:
AFI PROP SHIPPING NAME: POISONOUS SOLIDS, N.O.S.
AFI CLASS: 6.1
AFI ID NUMBER: UN2811
AFI PACK GROUP: III
AFI LABEL: KEEP AWAY FROM FOOD
AFI SPECIAL PROV:
AFI BASIC PAC REF: 10-13
MMAC CODE:
N O S SHIPPING NAME:
ADDITIONAL TRANS DATA:

Disposal Data

DISPOSAL DATA ACTION CODE:
DISPOSAL DATA FOCAL POINT:
DISPOSAL DATA REVIEW DATE:
RECNUM FOR THIS DISP ENTR:
TOT DISP ENTRIES PER NSN:
LANDFILL BAN ITEM:
DISPOSAL SUPPLEMENTAL DAT:
EPAHAZWST 1ST CODE NEW:
EPAHAZWST 1ST NAME NEW:
EPAHAZWST 1ST CHAR NEW:
EPAACUTEHAZARD 1ST NEW:
EPAHAZWST 2ND CODE NEW:
EPAHAZWST 2ND NAME NEW:
EPAHAZWST 2ND CHAR NEW:
EPAACUTEHAZARD 2ND NEW:
EPAHAZWST 3RD CODE NEW:
EPAHAZWST 3RD NAME NEW:
EPAHAZWST 3RD CHAR NEW:
EPAACUTE 3RD HAZARD NEW:

Label Data

LABEL REQUIRED: YES
TECHNICAL REVIEW DATE:
LABEL DATE:
MFR NUMBER:
LABEL STATUS: F
COMMON NAME:
CHRONIC HAZARD: N/P
SIGNAL WORD:
ACUTE HEALTH HAZARD NONE:
ACUTE HEALTH HAZARD SLIGHT:
ACUTE HEALTH HAZARD MODERATE:
ACUTE HEALTH HAZARD SEVERE:
CONTACT HAZARD NONE:
CONTACT HAZARD SLIGHT:
CONTACT HAZARD MODERATE:
CONTACT HAZARD SEVERE:
FIRE HAZARD NONE:
FIRE HAZARD SLIGHT:
FIRE HAZARD MODERATE:
FIRE HAZARD SEVERE:
REACTIVITY HAZARD NONE:
REACTIVITY HAZARD SLIGHT:
REACTIVITY HAZARD MODERATE:
REACTIVITY HAZARD SEVERE:
SPECIAL HAZARD PRECAUTIONS: POISONOUS IF SWALLOWED. INHALATION OF DUST POISONOUS. FIRE MAY PRODUCE IRRITATING OR POISONOUS GASES. RUNOFF FROM FIRE CONTROL OR DILUTION WATER MAY CAUSE POLLUTION.
PROTECT EYE:
PROTECT SKIN:
PROTECT RESPIRATORY:
LABEL NAME: SUPELCO INC
LABEL STREET: SUPELCO PARK
LABEL P O BOX:
LABEL CITY: BELLEFONTE
LABEL STATE: PA
LABEL ZIP CODE: 16823
LABEL COUNTRY: US
LABEL EMERGENCY NUMBER:
YEAR PROCURED:

Page Created 11/24/98 12:09:56 PM

SUPELCO -- EPA 525, 545.1 INTERNAL STANDARD MIX, 48242
MATERIAL SAFETY DATA SHEET
NSN: 663000N066603
Manufacturer's CAGE: 54968
Part No. Indicator: A
Part Number/Trade Name: EPA 525, 545.1 INTERNAL STANDARD MIX, 48242

General Information

Company's Name: SUPELCO INC
Company's Street: SUPELCO PARK
Company's City: BELLEFONTE
Company's State: PA
Company's Country: US
Company's Zip Code: 16823-0048
Company's Emerg Ph #: 814-359-3441
Company's Info Ph #: 814-359-3441
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Status: SMJ
Date MSDS Prepared: 13JUL93
Safety Data Review Date: 19DEC95
MSDS Serial Number: BZSBL

Ingredients/Identity Information

Proprietary: NO
Ingredient: PHENANTHRENE; (PHENANTHRENE-D10) (MFR CAS #1517-22-)
Ingredient Sequence Number: 01
Percent: 0.05
NIOSH (RTECS) Number: SF7175000
CAS Number: 85-01-8
OSHA PEL: N/K (FP N)
ACGIH TLV: N/K (FP N)

Proprietary: NO
Ingredient: ACENAPHTHYLENE; (ACENAPHTHYLENE-D8, 1,2-DIDEUTERO, (ACENAPHTHENE D10)) (MFR CAS #15067-26-)
Ingredient Sequence Number: 02
Percent: 0.05
NIOSH (RTECS) Number: AB1000000
CAS Number: 83-32-9
OSHA PEL: N/K (FP N)
ACGIH TLV: N/K (FP N)

Proprietary: NO
Ingredient: CHRYSENE; (CHRYSENE D12) (MFR CAS #1719-03-)
Ingredient Sequence Number: 03
Percent: 0.05
NIOSH (RTECS) Number: GC0700000
CAS Number: 218-01-9
OSHA PEL: N/K (FP N)
ACGIH TLV: N/K (FP N)

Proprietary: NO
Ingredient: ACETONE (SARA 313) (CERCLA). LD50:(ORAL,RAT) 9750 MG/KG.
Ingredient Sequence Number: 04
Percent: 99-100
NIOSH (RTECS) Number: AL3150000
CAS Number: 67-64-1
OSHA PEL: 1000 PPM
ACGIH TLV: 750 PPM;1000 STEL

Physical/Chemical Characteristics

Appearance And Odor: CLEAR, COLORLESS LIQUID.
Boiling Point: 133F,56C
Melting Point: -139F,-95C
Vapor Pressure (MM Hg/70 F): 181 @ 20C
Vapor Density (Air=1): 2
Specific Gravity: 0.792 (H*2O=1)
Evaporation Rate And Ref: 14.4 (BUTYL ACETATE=1)
Solubility In Water: 100%
Percent Volatiles By Volume: 1

Fire and Explosion Hazard Data

Flash Point: -2F,-19C
Flash Point Method: CC
Lower Explosive Limit: 2.6%
Upper Explosive Limit: 13%
Extinguishing Media: DRY CHEMICAL, ALCOHOL FOAM. WATER MAY BE INEFFECTIVE.
Special Fire Fighting Proc: USE NIOSH/MSHA APPROVED SCBA & FULL PROTECTIVE EQUIPMENT (FP N).
Unusual Fire And Expl Hazrds: VAPORS FORM EXPLOSIVE MIXTURES W/AIR. CONTAINERS MAY EXPLODE UNDER FIRE CONDITIONS.

Reactivity Data

Stability: YES
Cond To Avoid (Stability): NOT APPLICABLE
Materials To Avoid: STRONG ACIDS, STRONG BASES, OXIDIZING AGENTS, AMINES, OXYGEN, ALKANOLAMINES, HALOGENS, ALDEHYDES, AMMONIA & (SUPP DATA)
Hazardous Decomp Products: NOT APPLICABLE
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NOT RELEVANT

Health Hazard Data

LD50-LC50 Mixture: SEE INGREDIENT 4.
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: BURNS EYES. IRRITATES RESPIRATORY TRACT. CONTAINS MATERIAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER. IRRITATES SKIN. DERMATITIS, HEADACHE, DIZZINESS, GASTROINTESTINAL DISTURBANCES. DEPRESSES CENTRAL NERVOUS SYSTEM. CONVULSIONS, ERYTHEMA, ECZEMA, CONJUNCTIVITIS & CORNEAL EROSION.
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: NOT RELEVANT
Signs/Symptoms Of Overexp: SEE HEALTH HAZARDS.
Med Cond Aggravated By Exp: NONE SPECIFIED BY MANUFACTURER.
Emergency/First Aid Proc: EYES:FLUSH W/WATER FOR AT LST 15 MINS. CONT MD. SKIN:PROMPTLY WASH W/MILD SOAP & LG VOLS OF WATER. REMOVE CONTAM CLTHG. INHAL:IMMED MOVE TO FRESH AIR. IF BRTHG STOPS, GIVE ARTF RESP. CONT MD. INGEST:NEVER GIVE ANYTHING BY MOUTH TO UNCON PERS. NEVER TRY TO MAKE UNCON PERS VOMIT. GIVE LG AMTS OF WATER. PRESS FINGERS TO BACK OF TONGUE TO INDUCE VOMIT. IMMED CONTACT MD.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: TAKE UP W/ABSORBENT MATERIAL. VENTILATE AREA. ELIMINATE ALL IGNITION SOURCES.
Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.
Waste Disposal Method: COMPLY W/ALL APPLICABLE FEDERAL, STATE & LOCAL

REGULATIONS. CONTAINERS OF THIS MATERIAL MAY BE HAZARDOUS WHEN EMPTIED. EMPTIED CONTAINERS RETAIN PRODUCT RESIDUE: HANDLE AS IF THEY WERE FULL.
Precautions-Handling/Storing: REFRIGERATE IN SEALED CONTAINER. KEEP AWAY FROM IGNITION SOURCES. AVOID EYE OR SKIN CONTACT. AVOID BREATHING VAPORS.
Other Precautions: THIS MATL IS INTENDED FOR R&D USE ONLY & MAY NOT BE USED FOR DRUG, HOUSEHOLD/OTHER PURPOSES. IN ADDN, BURDEN OF SAFE USE OF MATL RESTS W/YOU & THEREFORE, IT SHOULD BE HNDLD ONLY BY QUALIFIED PERS TRAINED IN LAB PROCS & GOOD SFTY PRACTICES.

Control Measures

Respiratory Protection: WEAR NIOSH/MSHA APPROVED SELF CONTAINED BREATHING APPARATUS.
Ventilation: USE ONLY IN EXHAUST HOOD.
Protective Gloves: IMPERVIOUS GLOVES.
Eye Protection: ANSI APPROVED CHEM WORKERS GOGGS (FP N).
Other Protective Equipment: EYE WASH FOUNTAIN & DELUGE SHOWER WHICH MEET ANSI DESIGN CRITERIA (FP N).
Work Hygienic Practices: NONE SPECIFIED BY MANUFACTURER.
Suppl. Safety & Health Data: MATLS TO AVOID:CHLORINATED COMPOUNDS.

Transportation Data

Disposal Data

Label Data

Label Required: YES
Technical Review Date: 19DEC95
Label Date: 16NOV95
Label Status: G
Common Name: EPA 525, 545.1 INTERNAL STANDARD MIX, 48242
Chronic Hazard: YES
Signal Word: DANGER!
Acute Health Hazard-Severe: X
Contact Hazard-Severe: X
Fire Hazard-Severe: X
Reactivity Hazard-None: X
Special Hazard Precautions: ACUTE/CHRONIC:BURNS EYES. IRRITATES RESPIRATORY TRACT. CONTAINS MATERIAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER. IRRITATES SKIN. DERMATITIS, HEADACHE, DIZZINESS, GASTROINTESTINAL DISTURBANCES. DEPRESSES CENTRAL NERVOUS SYSTEM. CONVULSIONS, ERYTHEMA, ECZEMA, CONJUNCTIVITIS AND CORNEAL EROSION.
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y
Label Name: SUPELCO INC
Label Street: SUPELCO PARK
Label City: BELLEFONTE
Label State: PA
Label Zip Code: 16823-0048
Label Country: US
Label Emergency Number: 814-359-3441

ALDRICH CHEMICAL -- FLUORENE, 98%, 12833-3
MATERIAL SAFETY DATA SHEET
NSN: 681000N014315
Manufacturer's CAGE: 60928
Part No. Indicator: A
Part Number/Trade Name: FLUORENE, 98%, 12833-3

General Information

Company's Name: ALDRICH CHEMICAL COMPANY
Company's P. O. Box: 355
Company's City: MILWAUKEE
Company's State: WI
Company's Country: US
Company's Zip Code: 53201
Company's Info Ph #: 414-273-3850
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Status: SMJ
Date MSDS Prepared: 03JAN90
Safety Data Review Date: 06JUL95
MSDS Serial Number: BKNBR
Hazard Characteristic Code: T3

Ingredients/Identity Information

Proprietary: NO
Ingredient: FLUORENE (SARA III)
Ingredient Sequence Number: 01
NIOSH (RTECS) Number: LL5670000
CAS Number: 86-73-7
OSHA PEL: NOT ESTABLISHED
ACGIH TLV: NOT ESTABLISHED

Physical/Chemical Characteristics

Appearance And Odor: WHITE CRYSTALLINE POWDER.
Boiling Point: 568F,298C
Melting Point: 237F,114C

Fire and Explosion Hazard Data

Extinguishing Media: WATER SPRAY. CO*2, DRY CHEMICAL POWDER, ALCOHOL OR POLYMER FOAM.
Special Fire Fighting Proc: WEAR NIOSH/MSHA APPROVED SCBA AND PROTECTIVE CLOTHING TO PREVENT CONTACT WITH SKIN AND EYES.
Unusual Fire And Expl Hazrds: NONE SPECIFIED BY MANUFACTURER.

Reactivity Data

Stability: YES
Cond To Avoid (Stability): NONE SPECIFIED BY MANUFACTURER.
Materials To Avoid: STRONG OXIDIZING AGENTS.
Hazardous Decomp Products: TOXIC FUMES OF: CO & CO*2.
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NOT RELEVANT

Health Hazard Data

LD50-LC50 Mixture: LD50: (IPR,MUS) 2 GM/KG.
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: NO
Route Of Entry - Ingestion: NO

Health Haz Acute And Chronic: ACUTE: MAY BE HARMFUL BY INHALATION OR INGESTION. MAY CAUSE EYE & SKIN IRRITATION.
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: YES
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: IARC
Signs/Symptoms Of Overexp: SEE HEALTH HAZARDS.
Med Cond Aggravated By Exp: NONE SPECIFIED BY MANUFACTURER.
Emergency/First Aid Proc: EYES: IMMEDIATELY FLUSH WITH COPIOUS AMOUNTS OF WATER FOR AT LEAST 15 MINUTES. SKIN: IMMEDIATELY FLUSH WITH SOAP & COPIOUS AMOUNTS OF WATER. WASH CONTAMINATED CLOTHING BEFORE REUSE. INHAL: REMOVE TO FRESH AIR. IF NOT BREATHING GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN. INGEST: WASH OUT MOUTH W/WATER PROVIDED PERSON IS CONSCIOUS. CALL MD.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: WEAR NIOSH/MSHA APPROVED SCBA, RUBBER BOOTS & HEAVY RUBBER GLOVES. SWEEP UP, PLACE IN A BAG & HOLD FOR WASTE DISPOSAL. AVOID RAISING DUST. VENTILATE AREA & WASH SPILL SITE AFTER MATERIAL PICKUP IS COMPLETE.
Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.
Waste Disposal Method: DISSOLVE OR MIX THE MATERIAL WITH A COMBUSTIBLE SOLVENT AND BURN IN A CHEMICAL INCINERATOR EQUIPPED WITH AN AFTERBURNER AND SCRUBBER. DISPOSE OF IN ACCORDANCE WITH FEDERAL, STATE AND LOCAL LAWS.
Precautions-Handling/Storing: DO NOT BREATHE DUST. KEEP TIGHTLY CLOSED. STORE IN A COOL DRY PLACE.
Other Precautions: DO NOT GET IN EYES, ON SKIN OR CLOTHING.

Control Measures

Respiratory Protection: NIOSH/MSHA APPROVED RESPIRATOR.
Ventilation: MECHANICAL EXHAUST REQUIRED.
Protective Gloves: RUBBER GLOVES.
Eye Protection: CHEMICAL SAFETY GOGGLES.
Other Protective Equipment: SAFETY SHOWER AND EYE BATH.
Work Hygienic Practices: WASH THOROUGHLY AFTER USE AND BEFORE EATING, DRINKING, SMOKING OR USING SANITARY FACILITIES (FP N).
Suppl. Safety & Health Data: NONE SPECIFIED BY MANUFACTURER.

Transportation Data

Trans Data Review Date: 91267
DOT PSN Code: ZZZ
DOT Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
IMO PSN Code: ZZZ
IMO Proper Shipping Name: NOT REGULATED FOR THIS MODE OF TRANSPORTATION
IATA PSN Code: ZZZ
IATA Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
AFI PSN Code: ZZZ
AFI Prop. Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
Additional Trans Data: NOT REGULATED FOR TRANSPORTATION

Disposal Data

Label Data

Label Required: YES
Technical Review Date: 06JUN91
Label Date: 06JUN91
Label Status: G
Common Name: FLUORENE, 98%, 12833-3
Chronic Hazard: NO

Signal Word: CAUTION!
Acute Health Hazard-Slight: X
Contact Hazard-Slight: X
Fire Hazard-None: X
Reactivity Hazard-None: X
Special Hazard Precautions: CAUTION: ACUTE: HARMFUL IF SWALLOWED OR INHALED. MAY CAUSE EYE AND SKIN IRRITATION. AVOID BREATHING DUST. AVOID CONTACT WITH SKIN, EYES AND CLOTHING. KEEP CONTAINER CLOSED. USE WITH ADEQUATE VENTILATION. WASH THOROUGHLY ATER HANDLING. FIRE HAZARD NOT DETERMINED.
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y
Label Name: ALDRICH CHEMICAL COMPANY
Label P.O. Box: 355
Label City: MILWAUKEE
Label State: WI
Label Zip Code: 53201
Label Country: US

CHEMISPHERE -- NAPHTHALENE, REFINED FLAKE - INSECTICIDE,NAPHTHALENE
MATERIAL SAFETY DATA SHEET
NSN: 6840005976111
Manufacturer's CAGE: CHEMI
Part No. Indicator: A
Part Number/Trade Name: NAPHTHALENE, REFINED FLAKE

General Information

Item Name: INSECTICIDE,NAPHTHALENE
Company's Name: CHEMISPHERE CORPORATION
Company's P. O. Box: 250
Company's City: BOONTON
Company's State: NJ
Company's Country: US
Company's Zip Code: 07005
Company's Emerg Ph #: 201-335-6972
Company's Info Ph #: 201-335-6972
Distributor/Vendor # 1: EMULTEC INDUSTRIAL PRODUCTS INC.
Distributor/Vendor # 1 Cage: 0WA27
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 003
Status: SM
Date MSDS Prepared: 01AUG92
Safety Data Review Date: 13JUL93
Supply Item Manager: CX
MSDS Serial Number: BRDJR
Specification Number: A-A-1812
Spec Type, Grade, Class: CLASS A
Hazard Characteristic Code: F7
Unit Of Issue: LB
Unit Of Issue Container Qty: UNKNOWN
Type Of Container: 4G BOX
Net Unit Weight: 1 POUND

Ingredients/Identity Information

Proprietary: NO
Ingredient: NAPHTHALENE (SARA III)
Ingredient Sequence Number: 01
Percent: 100
NIOSH (RTECS) Number: QJ0525000
CAS Number: 91-20-3
OSHA PEL: 10 PPM/15 STEL
ACGIH TLV: 10 PPM/15 STEL; 9293
Other Recommended Limit: NONE RECOMMENDED

Physical/Chemical Characteristics

Appearance And Odor: CRYSTALLINE SOLID
Boiling Point: 424F,218C
Melting Point: 172F,78C
Vapor Pressure (MM Hg/70 F): 0.032 MM
Vapor Density (Air=1): 4.4
Specific Gravity: 1.16
Decomposition Temperature: UNKNOWN
Evaporation Rate And Ref: UNKNOWN
Solubility In Water: INSOLUBLE
Corrosion Rate (IPY): UNKNOWN

Fire and Explosion Hazard Data

Flash Point: 174F,79C

Flash Point Method: OC
Lower Explosive Limit: 0.9
Upper Explosive Limit: 5.9
Extinguishing Media: FOAM, DRY CHEMICAL, CARBON DIOXIDE AND CONTENGENTLY ATOMIZED WATER. ZAVOID WATER IN LIQUID NAPHTHALENE TANK.
Special Fire Fighting Proc: MFR ?. HMIS:WEAR FIRE FIGHTING PROTECTIVE EQUIPMENT AND A FULL FACED SELF CONTAINED BREATHING APPARATUS. COOL FIRE EXPOSED CONTAINERS WITH WATER SPRAY.
Unusual Fire And Expl Hazrds: VAPORS & DUSTS CAN FORM EXPLOSIVE MIXTURES IN AIR.

Reactivity Data

Stability: YES
Cond To Avoid (Stability): NO INFORMATION GIVEN ON MSDS BY MFR.
Materials To Avoid: NO INFORMATION GIVEN ON MSDS BY MFR.
Hazardous Decomp Products: NO INFORMATION GIVEN ON MSDS BY MFR.
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NO INFORMATION GIVEN ON MSDS BY MFR.

Health Hazard Data

LD50-LC50 Mixture: ORAL LD50 (RAT) IS 178 MG/KGUNKNOWN
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: DUST AND SPATTERINGS AY CAUSE IRTRITATION TO EYES & SKIN. INHALATION MAY CAUSE NAUSEA, HEADACHES OR PERSPIRATION. SWALLOWING MAY CAUSE VOMITING, DIARRHEA AND CRAMPS.
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: THE COMPONENTS OF THIS PRODUCT HAVE NOT SHOWN ANY EVIDENCE OF BEING CARCINOGENIC.
Signs/Symptoms Of Overexp: DUST AND SPATTERINGS AY CAUSE IRTRITATION TO EYES & SKIN. INHALATION MAY CAUSE NAUSEA, HEADACHES OR PERSPIRATION. SWALLOWING MAY CAUSE VOMITING, DIARRHEA AND CRAMPS.
Med Cond Aggravated By Exp: NO INFORMATION GIVEN ON MSDS BY MFR.
Emergency/First Aid Proc: MFR GAVE ONLY SKELETAL INFO FOR EYE/SKIN CONTACT. HMIS: EYE:FLUSH W/WATER 15 MIN, HOLD LIDS OPEN. SKIN:WASH WITH SOAP & WATER. REMOVE CONTAMINATED CLOTHING AND LAUNDER BEFORE REUSE. DO NOT INDUCE VOMITING. GET IMMEDIATE MEDICAL CARE.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: NO INFORMATION GIVEN ON MSDS BY MFR.
Neutralizing Agent: NO INFORMATION GIVEN ON MSDS BY MFR.
Waste Disposal Method: "DISPOSE OF ALL WASTE I/A/W ALL FEDERAL, STATE AND LOCAL REGULATIONS."
Precautions-Handling/Storing: NO INFORMATION GIVEN ON MSDS BY MFR.
Other Precautions: NO INFORMATION GIVEN ON MSDS BY MFR.

Control Measures

Respiratory Protection: NO INFORMATION GIVEN ON MSDS BY MFR.
Ventilation: NO INFORMATION GIVEN ON MSDS BY MFR.
Protective Gloves: NO INFORMATION GIVEN ON MSDS BY MFR.
Eye Protection: NO INFORMATION GIVEN ON MSDS BY MFR.
Other Protective Equipment: NO INFORMATION GIVEN ON MSDS BY MFR.
Work Hygienic Practices: MFR: ? HMIS:USE GOOD CHEMICAL HYGIENE PRACTICE. AVOID UNNECESSARY CONTACT. WASH THOROUGHLY BEFORE EATING OR DRINKING.
Suppl. Safety & Health Data: KEY2:KT MANUFACTURER'S MSDS GAVE VERY LITTLE INFORMATION. IT DID NOT MEET THE OSHA HAZARD COMMUNICATION STANDARD.

Transportation Data

Trans Data Review Date: 93194
DOT PSN Code: JZV
DOT Proper Shipping Name: NAPHTHALENE, CRUDE OR NAPHTHALENE, REFINED
DOT Class: 4.1
DOT ID Number: UN1334
DOT Pack Group: III
DOT Label: FLAMMABLE SOLID
IMO PSN Code: KIT
IMO Proper Shipping Name: NAPHTHALENE,CRUDE OR REFINED
IMO Regulations Page Number: 4158
IMO UN Number: 1334
IMO UN Class: 4.1
IMO Subsidiary Risk Label: -
IATA PSN Code: ROK
IATA UN ID Number: 1334
IATA Proper Shipping Name: NAPHTHALENE, REFINED
IATA UN Class: 4.1
IATA Label: FLAMMABLE SOLID
AFI PSN Code: ROD
AFI Prop. Shipping Name: NAPHTHALENE, CRUDE OR REFINED
AFI Class: 4.1
AFI ID Number: UN1334
AFI Pack Group: III
AFI Special Prov: A1
AFI Basic Pac Ref: 8-7

Disposal Data

Label Data

Label Required: NO
Label Status: X
Common Name: LABEL COVERED UNDER EPA REGS - HAZCOM LABEL NOT AUTHORIZED

ALDRICH CHEMICAL -- PYRENE, 99%, 18551-5
MATERIAL SAFETY DATA SHEET
NSN: 685000N014585
Manufacturer's CAGE: 60928
Part No. Indicator: A
Part Number/Trade Name: PYRENE, 99%, 18551-5

General Information

Company's Name: ALDRICH CHEMICAL CO
Company's P. O. Box: 355
Company's City: MILWAUKEE
Company's State: WI
Company's Country: US
Company's Zip Code: 53201
Company's Info Ph #: 414-273-3850
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Status: SMJ
Date MSDS Prepared: 24JAN90
Safety Data Review Date: 25MAR91
MSDS Serial Number: BKPQW
Hazard Characteristic Code: N1

Ingredients/Identity Information

Proprietary: NO
Ingredient: PYRENE (SARA III)
Ingredient Sequence Number: 01
Percent: 99
NIOSH (RTECS) Number: UR2450000
CAS Number: 129-00-0
OSHA PEL: NOT ESTABLISHED
ACGIH TLV: NOT ESTABLISHED

Physical/Chemical Characteristics

Appearance And Odor: YELLOW CRYSTALS AND POWDER
Boiling Point: 739F,393C
Melting Point: 300F,149C
Vapor Pressure (MM Hg/70 F): VERY LOW
Vapor Density (Air=1): N/A
Specific Gravity: 1.271 (FP N)
Evaporation Rate And Ref: NOT APPLICABLE
Solubility In Water: INSOLUBLE (FP N)
pH: N/A

Fire and Explosion Hazard Data

Extinguishing Media: WATER SPRAY. CO*2, DRY CHEMICAL POWDER, ALCOHOL OR POLYMER FOAM.
Special Fire Fighting Proc: WEAR NIOSH/MSHA APPROVED SCBA AND FULL PROTECTIVE EQUIPMENT TO PREVENT CONTACT WITH SKIN AND EYES.
Unusual Fire And Expl Hazrds: NONE SPECIFIED BY MANUFACTURER.

Reactivity Data

Stability: YES
Cond To Avoid (Stability): NONE SPECIFIED BY MANUFACTURER.
Materials To Avoid: STRONG OXIDIZING AGENTS.
Hazardous Decomp Products: TOXIC FUMES OF: CO, CO*2
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NOT RELEVANT

Health Hazard Data

LD50-LC50 Mixture: SEE SUPP DATA
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: NO
Health Haz Acute And Chronic: ACUTE: HARMFUL IF SWALLOWED. MAY BE HARMFUL IF INHALED. MAY CAUSE EYE OR SKIN IRRITATION. INHALATION STUDIES IN ANIMALS HAVE CAUSED HEPATIC, PULMONARY & INTRAGASTRIC PATHOLOGIC CHANGES. NEUTROPHIL, LEUKOCYTE & ERYTHROCYTE LEVELS DECREASED. CUTANEOUS APPLICATION CAUSED HYPEREMIA, WEIGHT LOSS AND (SEE EFTS OF OVEREXP)
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: N/A
Signs/Symptoms Of Overexp: HLTH HAZ: HEMATOPOIETIC CHANGES AND DERMATITIS. PYRENE IS READILY ABSORBED THROUGH THE SKIN (FP N). CHRONIC: LEUKOCYTOSIS. DERMATITIS (FP N). TARGET ORGANS: LIVER, KIDNEY, LUNG, SKIN AND BLOOD SYSTEM (FP N).
Med Cond Aggravated By Exp: NONE SPECIFIED BY MANUFACTURER.
Emergency/First Aid Proc: EYES: IMMEDIATELY FLUSH WITH COPIOUS AMOUNTS OF WATER FOR AT LEAST 15 MINUTES. SKIN: IMMEDIATELY WASH WITH SOAP AND COPIOUS AMOUNTS OF WATER. INHAL: REMOVE TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN. CALL MD. WASH CONTAMINATED CLOTHING BEFORE REUSE.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: WEAR NIOSH/MSHA APPROVED SCBA, RUBBER BOOTS AND HEAVY RUBBER GLOVES. SWEEP UP, PLACE IN A BAG AND HOLD FOR WASTE DISPOSAL. AVOID RAISING DUST. VENTILATE AREA AND WASH SPILL SITE AFTER MATERIAL PICKUP IS COMPLETE.
Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.
Waste Disposal Method: DISSOLVE OR MIX THE MATERIAL WITH A COMBUSTIBLE SOLVENT AND BURN IN A CHEMICAL INCINERATOR EQUIPPED WITH AN AFTERBURNER AND SCRUBBER. DISPOSE I/A/W FEDERAL, STATE AND LOCAL LAWS.
Precautions-Handling/Storing: KEEP TIGHTLY CLOSED. STORE IN A COOL, DRY PLACE.
Other Precautions: AVOID INHALATION. DO NOT GET IN EYES, ON SKIN OR CLOTHING. AVOID PROLONGED OR REPEATED EXPOSURE. HARMFUL VAPOR.

Control Measures

Respiratory Protection: NIOSH/MSHA APPROVED RESPIRATOR.
Ventilation: MECHANICAL EXHAUST REQUIRED.
Protective Gloves: RUBBER GLOVES
Eye Protection: CHEMICAL WORKERS GOGGLES (FP N)
Other Protective Equipment: RUBBER BOOTS, SAFETY SHOWER AND EYE BATH
Work Hygienic Practices: WASH HANDS THOROUGHLY AFTER USE AND BEFORE EATING, DRINKING, SMOKING OR USING SANITARY FACILITIES (FP N).
Suppl. Safety & Health Data: LD50-LC50 MIX: LD50: (ORL/RAT)=2700 MG/KG, (ORL/MUS)=800 MG/KG, (IPR/MUS)=514 MG/KG.

Transportation Data

Trans Data Review Date: 91269
DOT PSN Code: ZZZ
DOT Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
IMO PSN Code: ZZZ
IMO Proper Shipping Name: NOT REGULATED FOR THIS MODE OF TRANSPORTATION
IATA PSN Code: ZZZ
IATA Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
AFI PSN Code: ZZZ

AFI Prop. Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
Additional Trans Data: NOT REGULATED FOR TRANSPORTATION

Disposal Data

Label Data

Label Required: YES
Technical Review Date: 25MAR91
Label Status: G
Common Name: PYRENE, 99%
Chronic Hazard: YES
Signal Word: WARNING!
Acute Health Hazard-Moderate: X
Contact Hazard-Slight: X
Fire Hazard-None: X
Reactivity Hazard-None: X
Special Hazard Precautions: ACUTE: MAY BE HARMFUL IF INGESTED OR INHALED. MAY CAUSE EYE & SKIN IRRITATION. AVOID BREATHING DUST. KEEP CONTAINER CLOSED. USE WITH ADEQUATE VENTILATION. AVOID CONTACT WITH EYES, SKIN AND CLOTHING. WASH THOROUGHLY AFTER HANDLING. FIRE HAZARD NOT DETERMINED. CHRONIC: POSSIBLE CANCER HAZARD BASED ON ANIMAL DATA. TARGET ORGANS: LIVER, KIDNEY, SKIN, LUNGS AND BLOOD SYSTEM.
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y
Label Name: ALDRICH CHEMICAL CO
Label P.O. Box: 355
Label City: MILWAUKEE
Label State: WI
Label Zip Code: 53201
Label Country: US

ALDRICH CHEMICAL -- 1-METHYLNAPHTHALENE, 98% M5680-8
MATERIAL SAFETY DATA SHEET
NSN: 681000N014689
Manufacturer's CAGE: 60928
Part No. Indicator: A
Part Number/Trade Name: 1-METHYLNAPHTHALENE, 98% M5680-8

General Information

Company's Name: ALDRICH CHEMICAL COMPANY
Company's P. O. Box: 355
Company's City: MILWAUKEE
Company's State: WI
Company's Country: US
Company's Zip Code: 53201
Company's Info Ph #: 414-273-3850
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Status: SMJ
Date MSDS Prepared: 03JAN91
Safety Data Review Date: 02APR91
MSDS Serial Number: BKNZM
Hazard Characteristic Code: F8

Ingredients/Identity Information

Proprietary: NO
Ingredient: NAPHTHALENE, 1-METHYL-;(1-METHYLNAPHTHALENE, 98%)
Ingredient Sequence Number: 01
Percent: 98
NIOSH (RTECS) Number: QJ9630000
CAS Number: 90-12-0
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Physical/Chemical Characteristics

Appearance And Odor: COLORLESS TO PALE-YELLOW LIQUID.
Boiling Point: 464F,240C
Melting Point: -8F,-22C
Specific Gravity: 1.001

Fire and Explosion Hazard Data

Flash Point: 180F,82C
Extinguishing Media: WATER SPRAY. CO2, DRY CHEMICAL POWDER, ALCOHOL OR POLYMER FOAM.
Special Fire Fighting Proc: USE NIOSH/MSHA APPROVED SCBA AND FULL PROTECTIVE EQUIPMENT (FP N). PREVENT CONTACT WITH SKIN AND EYES. COMBUSTIBLE LIQUID.
Unusual Fire And Expl Hazrds: EMITS TOXIC FUMES UNDER FIRE CONDITIONS.

Reactivity Data

Stability: YES
Cond To Avoid (Stability): NONE SPECIFIED BY MANUFACTURER.
Materials To Avoid: STRONG OXIDIZING AGENTS.
Hazardous Decomp Products: TOXIC FUMES OF: CO & CO2.
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NONE SPECIFIED BY MANUFACTURER.

Health Hazard Data

LD50-LC50 Mixture: LD50:(ORL,RAT) 1840 MG/KG.
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: ACUTE: MAY BE HARMFUL BY INHALATION, INGESTION, OR SKIN ABSORPTION. VAPOR OR MIST IS IRRITATING TO THE EYES, MUC MEMB & UPPER RESP TRACT. CAUSES SKIN IRRITATION. CAUSES PHOTOSENSITIVITY. EXPOS TO LIGHT CAN RESULT IN ALLERGIC RXN RESULTING IN DERMATOLOGIC LEISONS, WHICH CAN VARY FROM SUNBURNLIKE (SEE EFTS OF OVEREXP)
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: NONE.
Signs/Symptoms Of Overexp: HLTH HAZ: RESPONSES TO EDEMATOUS, VESICULATED LESIONS OR BULLAE.
Med Cond Aggravated By Exp: NONE SPECIFIED BY MANUFACTURER.
Emergency/First Aid Proc: IN CASE OF CONT, IMMED FLUSH EYES W/COPIOUS AMTS OF WATER FOR AT LEAST 15 MIN. IN CASE OF CONT, IMMED WASH SKIN W/SOAP & COPIOUS AMTS OF WATER. IF INHALED, REMOVE TO FRESH AIR. IF NOT BRTHG GIVE ARTF RESP. IF BRTHG IS DFCLT, GIVE OXYGEN. IF SWALLOWED, WASH OUT MOUTH WITH WATER PROVIDED PERSON IS CONSCIOUS. CALL MD. WASH CONTAM CLTHG BEFORE REUSE.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: WEAR NIOSH/MSHA APPROVED SCBA, RUBBER BOOTS AND HEAVY RUBBER GLOVES. COVER WITH DRY LIME OR SODA ASH, PICK UP, KEEP IN A CLOSED CONTAINER AND HOLD FOR WASTE DISPOSAL. VENTILATE AREA AND WASH SPILL SITE AFTER MATERIAL PICKUP IS COMPLETE.
Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.
Waste Disposal Method: THIS COMBUSTIBLE MATERIAL MAY BE BURNED IN A CHEMICAL INCINERATOR EQUIPPED WITH AN AFTERBURNER AND SCRUBBER. OBSERVE ALL FEDERAL, STATE & LOCAL LAWS.
Precautions-Handling/Storing: DO NOT BREATHE VAPOR. KEEP TIGHTLY CLOSED. KEEP AWAY FROM HEAT AND OPEN FLAME. STORE IN A COOL DRY PLACE.
Other Precautions: DO NOT GET IN EYES, ON SKIN AND CLOTHING. IRRITANT. PHOTOSENSITIZER.

Control Measures

Respiratory Protection: NIOSH/MSHA APPROVED RESPIRATOR.
Ventilation: MECHANICAL EXHAUST REQUIRED.
Protective Gloves: COMPATIBLE CHEMICAL RESISTANT GLOVES.
Eye Protection: CHEMICAL WORKERS GOGGLES (FP N).
Other Protective Equipment: SAFETY SHOWER AND EYE BATH.
Work Hygienic Practices: WASH THOROUGHLY AFTER HANDLING.
Suppl. Safety & Health Data: NONE SPECIFIED BY MANUFACTURER.

Transportation Data

Trans Data Review Date: 91273
DOT PSN Code: FST
DOT Proper Shipping Name: ENVIRONMENTALLY HAZARDOUS SUBSTANCES, LIQUID, N. O.S.
DOT Class: 9
DOT ID Number: UN3082
DOT Pack Group: III
DOT Label: CLASS 9
IMO PSN Code: GMW
IMO Proper Shipping Name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N. O.S. o
IMO Regulations Page Number: 9028
IMO UN Number: 3082
IMO UN Class: 9

IMO Subsidiary Risk Label: -
IATA PSN Code: KTV
IATA UN ID Number: 3082
IATA Proper Shipping Name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N. O.S. *
IATA UN Class: 9
IATA Label: MISCELLANEOUS
AFI PSN Code: KTV
AFI Prop. Shipping Name: ENVIRONMENTALLY HAZARDOUS SUBSTANCES, LIQUID, N.O.S.
AFI Class: 9
AFI ID Number: UN3082
AFI Pack Group: III
AFI Special Prov: 8
AFI Basic Pac Ref: 13-14

Disposal Data

Label Data

Label Required: YES
Technical Review Date: 10JUN91
Label Date: 10JUN91
Label Status: G
Common Name: 1-METHYLNAPHTHALENE, 98% M5680-8
Chronic Hazard: NO
Signal Word: WARNING!
Acute Health Hazard-Slight: X
Contact Hazard-Moderate: X
Fire Hazard-Moderate: X
Reactivity Hazard-None: X
Special Hazard Precautions: ACUTE: CAUSES EYE, SKIN, MUCOUS MEMBRANE AND UPPER RESPIRATORY TRACT IRRITATION. AVOID CONTACT WITH EYES, SKIN AND CLOTHING. WASH THOROUGHLY AFTER HANDLING. AVOID BREATHING VAPOR. KEEP CONTAINER CLOSED. USE WITH ADEQUATE VENTILATION. MAY CAUSE ALLERGIC SKIN REACTION. AVOID PROLONGED OR REPEATED CONTACT WITH SKIN. COMBUSTIBLE LIQUID AAND VAPOR. KEEP AWAY FROM HEAT AND FLAME.
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y
Label Name: ALDRICH CHEMICAL COMPANY
Label P.O. Box: 355
Label City: MILWAUKEE
Label State: WI
Label Zip Code: 53201
Label Country: US

APPENDIX B

ATTACHMENTS A - E

Attachment A—Site Safety & Health Plan Employee Acknowledgment

Employee Name

Project Name	Project Location	Project Number

Employee Statement of Acknowledgment

I hereby certify that I have read and that I understand the safety and health guidelines contained in Site Safety and Health Plan for the above-named project.

Employee Signature _____ Date _____

In the Case of an Emergency, contact::

	Name	Relationship	Phone No.
1.			
2.			

Name of Site Safety Officer Receiving This Form

Signature of Site Safety Officer	Date

Forward completed form to the Health and Safety Director. Place a copy in project file.

Attachment B—Site Safety & Health Plan
Site Activity and Safety Briefing

Project Name	Project Location	Project Number

Name of Site Safety Officer	Signature of Site Safety Officer

Who attended the briefing?

Names of BC Employees	Names of Subcontractor(s) employees

What items were discussed?

- ☐ Site Safety and Health Plan
- ☐ Specific Accident/Incident
- ☐ Protective Equipment To Be Used
- ☐ Emergency Hospital Route
- ☐ Other _____
- ☐ Hazardous Site Conditions/Activities
- ☐ Changes/Solutions to Specific Accident(s)
- ☐ Location of Emergency Telephone Number
- ☐ Work Schedule

Do any items require assistance from BC Health and Safety Staff? (If yes, describe the item and type of assistance required.)

☐ YES ☐ NO

Forward a copy of this form to Health & Safety Director. Place completed form in project file.

Attachment C—Site Safety & Health Plan
Safety Plan Implementation Checklist

Project Name	Project Location (city and state)	Date

Name of Site Safety Officer	Weather Conditions	Project Number

BC Staff Present Name Office

_____ _____

_____ _____

_____ _____

_____ _____

Indicate the status of each of the following.

1.	Is a copy of the Site Safety and Health Plan (SSHP) on site?	☐ YES	☐ NO	☐ N/A
2.	Is the personal protective equipment required by the SSHP available and being used correctly?	☐ YES	☐ NO	☐ N/A
3.	Have the work zones been delineated?	☐ YES	☐ NO	☐ N/A
4.	Has a decontamination station been set up as required by the SSHP?	☐ YES	☐ NO	☐ N/A
5.	Are the decontamination procedures being followed?	☐ YES	☐ NO	☐ N/A
6.	Is access to the exclusion zone being controlled?	☐ YES	☐ NO	☐ N/A
7.	Has the site activities briefing and tailgate safety meeting been provided?	☐ YES	☐ NO	☐ N/A
8.	Is the list of emergency telephone numbers posted at the support zone?	☐ YES	☐ NO	☐ N/A
9.	Are directions to nearest emergency medical assistance posted at the support zone?	☐ YES	☐ NO	☐ N/A
10.	Is emergency equipment available and functional, as required by the SSHP?	☐ YES	☐ NO	☐ N/A
11.	Has the nearest toilet facility been identified or a portable facility been set up?	☐ YES	☐ NO	☐ N/A
12.	Has an adequate supply of drinking water been provided?	☐ YES	☐ NO	☐ N/A
13.	Has water for decontamination been provided?	☐ YES	☐ NO	☐ N/A
14.	Have the instruments for environmental and exposure monitoring been calibrated and set up as required by the SSHP?	☐ YES	☐ NO	☐ N/A
15.	Are the instruments being used properly and periodically checked during the shift for battery charge status?	☐ YES	☐ NO	☐ N/A
16.	Have trenches and excavations been clearly marked?	☐ YES	☐ NO	☐ N/A
17.	Have trenches and excavations been shored or sloped as required by soil type and work activities?	☐ YES	☐ NO	☐ N/A
18.	Are dust suppression measures being used?	☐ YES	☐ NO	☐ N/A
19.	Is food and tobacco consumption being restricted to the support zone?	☐ YES	☐ NO	☐ N/A
20.	Has a confined space been identified as part of this project?	☐ YES	☐ NO	☐ N/A
21.	Are the confined space entry procedures being correctly implemented?	☐ YES	☐ NO	☐ N/A
22.	Has the work/rest cycle for the shift been established?	☐ YES	☐ NO	☐ N/A
	TIME ON (minutes): _____ TIME OFF (minutes): _____			
23.	Has a shaded rest area been set up in the support zone?	☐ YES	☐ NO	☐ N/A

Place completed form in project file

Attachment D
Notice of Unsafe Conditions

Contractor	Date
Project Name	**Project Number**

THIS NOTICE...

This notice is to advise you, the prime Contractor on the above-named Contract, that this Representative of the Owner of the above-mentioned Project has observed (on the date shown above) an unsafe condition on the Project.

These conditions are listed as follows:

ITEM	CONDITION

By this Notice, the Owner or its Representatives shall not assume any responsibility under the GENERAL CONDITIONS or assume any liability for the existence or correction thereof, for the unsafe conditions, or any others that may have been unnoticed.

These conditions shall be remedied as soon as possible within a safe working period. If these corrections are not made, the Owner will be forced to remove all field staff from the job. No payment shall be made for any work installed after this date without first examination of work in accordance with the GENERAL CONDITIONS.

Signature of Owner's Representative	Title	Date
Received by (Signature of Contractor's Representative)	**Title**	**Date**

Place a copy of completed form in project file.

Attachment E—Site Safety & Health Plan
Environmental Monitoring Documentation

Project Name	Project Number
Employee Name	**Project Location**

Equipment Used (check as appropriate)

	Calibrated	Date	Used	Date(s)
OVA (Organic Vapor Analyzer)/FID	☐	_____	☐	_____
OVM (Organic Vapor Monitor)/PID	☐	_____	☐	_____
HNU	☐	_____	☐	_____
TLV Sniffer	☐	_____	☐	_____
Photovac TIP	☐	_____	☐	_____
Combustible Gas Meter/Explosimeter	☐	_____	☐	_____
Other _____	☐	_____	☐	_____

Instrument	Date	Time	Readout Value	Area Monitored	Changes in PPE			User's Initials
					YES	NO	Type of PPE	

Place completed form in project file.

APPENDIX C

EMERGENCY CONTACT NUMBERS

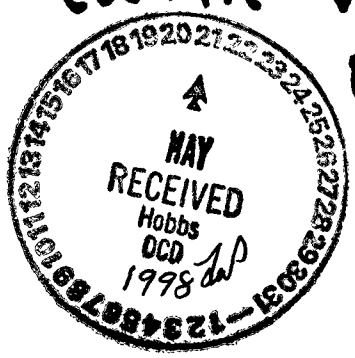
HOBBS, NEW MEXICO

4001 S. Hwy 18, 88240, District 30
(505) 393-7726

EMERGENCY NUMBER Request for Fire, Sheriff, and Paramedics	**911**
LEPC Lea County 300 N. Turner Hobbs, NM 88240 Attn: David Hooten	**(505) 397-9231**
FIRE DEPARTMENT: Hobbs Fire Department 301 E. White Street Hobbs, NM 88240	**911** **(505) 397-7252**
HOSPITAL: Lea County Regional Hospital 5419 Lovington Hwy. Hobbs, NM 88240	**(505) 392-6581**
NATIONAL RESPONSE CENTER	**(800) 424-8802**
EMERGENCY RESPONSE CENTER	
CHEMTREC	**(800) 424-9300**
CHEMICAL REFERRAL CENTER	**(800) 262-8200**
PLANT/DISTRICT CONTACTS: Allan Childs Robert Middleton 164 Stonecrest Court #50 Hobbs, NM 88240	 **(505) 392-1230**
SUGGESTED LOCAL NUMBERS: Vacuum Truck: AA Oilfield Service Rowland Truckin Wrecker: P&W Wrecker	 **(505) 392-2577** **(505) 397-4994** **(505) 393-3715**

GW-199 (with VHS tape)

September 20, 1997



To: John Tymkowych
P.O. Box 26110
Santa Fe, N.M. 87502
(505) 827-1557

I am writing this letter in reference to a phone conversation I had with you on 9-10-97. In that conversation I said that I wanted to report some safety hazards (under the Whistle Blowers Act) that my company is resoponsible for.

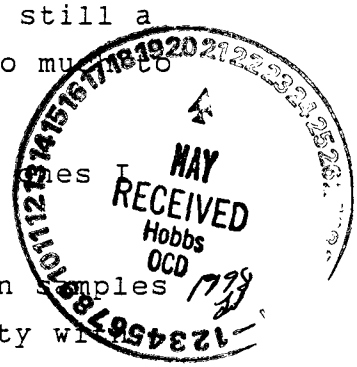
Following our phone conversation I faxed you a map with locations where illegal hazardous chemical had been buried in our yard. The name of the place of business is Champion Technologies Inc. in Hobbs, New Mexico. I will be glad to give you more information as you see fit.

Two of these pits were already in the yard when I started working there 12 years ago. I am currently the truck supervisor and have been knowing about this for some years now. For safety reasons for my drivers and the public I feel it's time to report this company.

The other pits were put there by past district managers; one who is now a regional manager in the Houston Texas area. These are the names: Jerry Skidmore, Dwight Yarbrough, and Isaac Husky who was truck supervisor at the time chemical was buried in the ground from spills including drums. I've reported this to past managers but nothing was ever done about it. I was told to keep quiet about it. In the past I have told the regional manager who was Mike Moran, now Vice President of Champion in Houston; Gary Spicer, one time regional manager, Jim Spradley, one time district manager, Allan Childs, our regional truck manager who up until two years ago was district manager. I've told head of safety in Houston Texas and no one has made any efforts to clean up the mess. There were other managers involved in the past, before I started work there.

I now feel that they will never clean this up, but is going to keep it a secret from now on. Our Head of Environmental Department Mel Davis, Gary Spicer, Richard Campbell, and now district manager, Tommy Morrison, met with me in the Hobbs office in

November or December of 1996. At that time they turned our old water well off because it was contaminated with something. I don't know what it is, but I know there is corrosion chemical, scale, pariffin, and emulsotron chemicals buried in the ground, and there is also chromate on top of the ground. One chromate location was cleaned up several years ago, but nothing was ever done about the other location. I wrote a letter in February of 1992, letting my district manager know that there was still a yellow substance on the ground. I was told it cost too much to clean up the last chromate and to just let it go.



I have given the pits a number so you will know which ones I am aware of, and also who was responsible for them.

#1&2 Was there when I started working there, I've seen samples out of these locations in the past. They are very nasty with some type of chemical that stinks very bad, but have been covered up so it won't be seen. I am sending a map of where they cored pit #1 while Jim Spradley was manager.

#3 There was gas tanks buried in this location at the time Jerry Skidmore was manager. New Mexico state law sent a letter stating that gas tanks could no longer be buried in the ground, and Jerry Skidmore had them dug up and removed. Instead of filling this location in correctly, he had the ground scraped up where there was spilled chemical where the old pad is and buried that chemical in the hole that the two gas tanks came out of. He was in on this as far as I know, by himself.

#4 Was dug up where chemical tanks once sit on top of the ground. That chemical was dumped somewhere I am not sure of. This information was given to me by Isaac Husky, truck supervisor at that time. The district manager was Dwight Yarbrough. This is also the time pit #7 was dug, while they were putting in the old pad out back.

#5 Chromate is still on top of the ground. It was never cleaned up. This location is what I reported to Jim Spradley when he was manager in 1992. I don't know where the chromate came from, but I was with Don Morris when he found both locations. He got samples from each spot and turned them in for lab work. He let me know it tested as chromate and came back later and did the clean-up on pit #6.

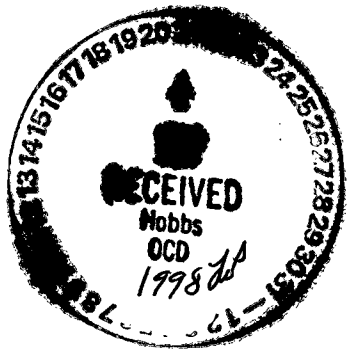
#6 Old chromate spot where it was cleaned up by Don Morris, past Safety Director in Houston.

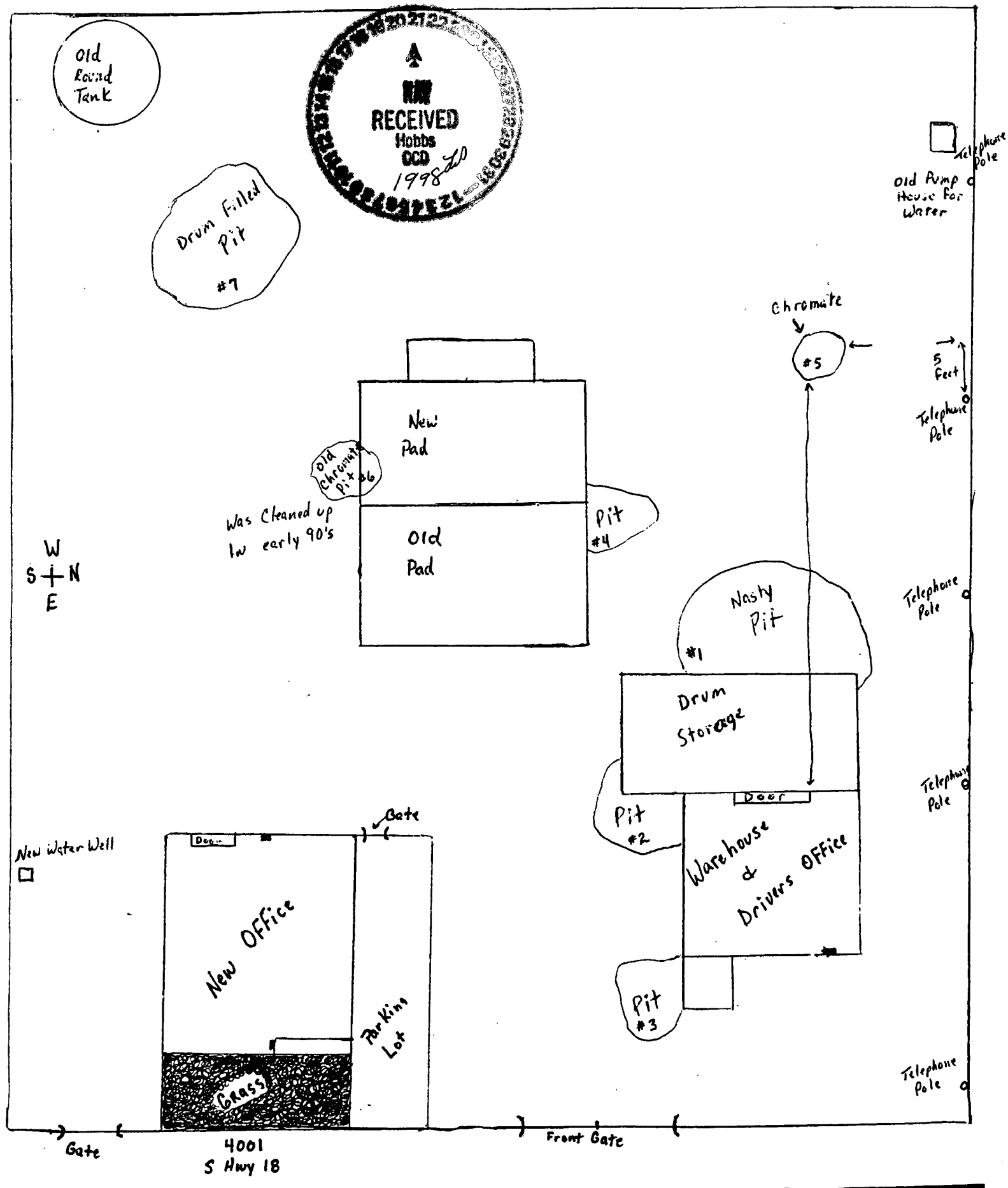
Jim Spradley was district manager at this time. According to Joe Edwards, our lab manager at that time, when they stopped digging, it was still possible that the chromate wasn't all gone.

#7 This pit was dug out back while Dwight Yarbrough was manager. Globe Construction did the digging. They were the company hired to do the work. There was a number of drums out in back of the yard when I went to work one morning. That afternoon I asked Isaac Husky what had happened to all the drums that were out there. He told me that they buried them in the hole that was dug out back. Kenny Kearney, a salesman in our office told me he was a driver for Globe Construction when they buried the drums out there.

This is my name and phone number listed below. I would like this to be kept confidential from Champion Technologies. Call me for any information you may need.

Willie Mackey
Willie Mackey
2533 N. Selman
Hobbs, N.M. 88240
(505) 392-8403




Old Round Tank
RECEIVED
Hobbs
OCD
1998
Drum Filled Pit #7
Telephone Pole
Old Pump House for Water
Chromate
#5
5 Feet
Telephone Pole
New Pad
Old Chromate Pit #6
Was Cleaned up in early 90's
Old Pad
Pit #4
W
S + N
E
Nasty Pit #1
Telephone Pole
Drum Storage
Door
Pit #2
Warehouse & Drivers Office
Telephone Pole
Gate
New Water Well
Door
New Office
Parking Lot
Grass
Pit #3
Telephone Pole
Gate
4001 S Hwy 18
Front Gate
Hwy 18
2 Miles South OF Hobbs

PINNACLE LABORATORIES

2709-D Pan American Freeway NE
Albuquerque, New Mexico 87107
Phone (505) 344-3777
Fax (505) 344-4413

Pinnacle Lab ID number **905079**
July 01, 1999

NMOCD
2040 S. PACHECO
SANTA FE, NM 87505

Project Name CASTILLO WELL
Project Number WATER WELL

Attention: BILL OLSON

On 5/21/99 Pinnacle Laboratories, Inc. Inc., (ADHS License No. AZ0592), received a request to analyze **aqueous** samples. The samples were analyzed with EPA methodology or equivalent methods. The results of these analyses and the quality control data, which follow each set of analyses, are enclosed.

EPA methods 150.1 and 8260 were performed by Pinnacle Laboratories, Inc., Albuquerque, NM.

Metals were analyzed by Barringer Laboratories, Inc., Golden, Co.

All other parameters were performed by ESL (OR) Inc., Portland, OR.

If you have any questions or comments, please do not hesitate to contact us at (505)344-3777.

Kimberly D. McNeill
Project Manager

H. Mitchell Rubenstein, Ph. D.
General Manager

MR: mt

Enclosure

PINNACLE LABORATORIES

2709-D Pan American Freeway NE
Albuquerque, New Mexico 87107
Phone (505) 344-3777
Fax (505) 344-4413

CLIENT	: NMOCD	PINNACLE ID	: 905079
PROJECT #	: WATER WELL	DATE RECEIVED	: 5/21/99
PROJECT NAME	: CASTILLO WELL	REPORT DATE	: 7/1/99

PIN ID. #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
01	9905201100	AQUEOUS	5/20/99
02	TRIP BLANK	AQUEOUS	5/19/99

PINNACLE LABORATORIES

2709-D Pan American Freeway NE
Albuquerque, New Mexico 87107
Phone (505) 344-3777
Fax (505) 344-4413

GENERAL CHEMISTRY RESULTS

CLIENT	: NMOCD	PINNACLE I.D.	: 905079
PROJECT #	: WATER WELL	DATE RECEIVED	: 5/21/99
PROJECT NAME	: CASTILLO WELL		

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE ANALYZED
01	9905201100	AQUEOUS	5/20/99	5/24/99

PARAMETER	UNITS	9905201100
PH (150.1)	UNITS	7.75

CHEMIST NOTES:
N/A

PINNACLE LABORATORIES

2709-D Pan American Freeway NE
Albuquerque, New Mexico 87107
Phone (505) 344-3777
Fax (505) 344-4413

GENERAL CHEMISTRY - QUALITY CONTROL

CLIENT	: NMOCD	PINNACLE I.D.	: 905079
PROJECT #	: WATER WELL	SAMPLE MATRIX	: AQUEOUS
PROJECT NAME	: CASTILLO WELL		

PARAMETER	UNITS	PINNACLE I.D.	SAMPLE RESULT	DUP. RESULT	% RPD
PH	UNITS	905080-01	7.56	7.59	0.40

CHEMIST NOTES:
N/A

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative Percent Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

PINNACLE LABORATORIES

2709-D Pan American Freeway NE
Albuquerque, New Mexico 87107
Phone (505) 344-3777
Fax (505) 344-4413

GC/MS RESULTS

TEST : VOLATILE ORGANICS EPA METHOD 8260
CLIENT : NMOCD — PINNACLE I.D. : 905079
PROJECT # : WATER WELL — DATE RECEIVED : 5/21/99
PROJECT NAME : CASTILLO WELL

SAMPLE ID #	CLIENT ID	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
905079-01	9905201100	AQUEOUS	5/20/99	N/A	06/02/99	1

PARAMETER	DET. LIMIT		UNITS
Dichlorodifluoromethane	1.0	< 1.0	ug/L
Chloromethane	1.0	< 1.0	ug/L
Vinyl Chloride	1.0	< 1.0	ug/L
Bromomethane	1.0	< 1.0	ug/L
Chloroethane	1.0	< 1.0	ug/L
Trichlorofluoromethane	1.0	< 1.0	ug/L
Acetone	10	< 10	ug/L
Acrolein	5.0	< 5.0	ug/L
1,1-Dichloroethene	1.0	< 1.0	ug/L
Iodomethane	1.0	< 1.0	ug/L
Methylene Chloride	1.0	< 1.0	ug/L
Acrylonitrile	5.0	< 5.0	ug/L
cis-1,2-Dichloroethene	1.0	< 1.0	ug/L
Methyl-t-butyl Ether	1.0	< 1.0	ug/L
1,1,2,1,2,2-Trichlorotrifluoroethane	1.0	< 1.0	ug/L
1,1-Dichloroethane	1.0	< 1.0	ug/L
trans-1,2-Dichloroethene	1.0	< 1.0	ug/L
2-Butanone	10	< 10	ug/L
Carbon Disulfide	1.0	< 1.0	ug/L
Bromochloromethane	1.0	< 1.0	ug/L
Chloroform	1.0	< 1.0	ug/L
2,2-Dichloropropane	1.0	< 1.0	ug/L
1,2-Dichloroethane	1.0	< 1.0	ug/L
Vinyl Acetate	1.0	< 1.0	ug/L
1,1,1-Trichloroethane	1.0	< 1.0	ug/L
1,1-Dichloropropene	1.0	< 1.0	ug/L
Carbon Tetrachloride	1.0	< 1.0	ug/L
Benzene	1.0	< 1.0	ug/L
1,2-Dichloropropane	1.0	< 1.0	ug/L
Trichloroethene	1.0	< 1.0	ug/L
Bromodichloromethane	1.0	< 1.0	ug/L
2-Chloroethyl Vinyl Ether	10	< 10	ug/L
cis-1,3-Dichloropropene	1.0	< 1.0	ug/L
trans-1,3-Dichloropropene	1.0	< 1.0	ug/L
1,1,2-Trichloroethane	1.0	< 1.0	ug/L
1,3-Dichloropropane	1.0	< 1.0	ug/L
Dibromomethane	1.0	< 1.0	ug/L
Toluene	1.0	< 1.0	ug/L
1,2-Dibromoethane	1.0	< 1.0	ug/L
4-Methyl-2-Pentanone	10	< 10	ug/L
2-Hexanone	10	< 10	ug/L
Dibromochloromethane	1.0	< 1.0	ug/L
Tetrachloroethene	1.0	< 1.0	ug/L
Chlorobenzene	1.0	< 1.0	ug/L
Ethylbenzene	1.0	< 1.0	ug/L

PINNACLE LABORATORIES

2709-D Pan American Freeway NE
Albuquerque, New Mexico 87107
Phone (505) 344-3777
Fax (505) 344-4413

GC/MS RESULTS

TEST : VOLATILE ORGANICS EPA METHOD 8260
CLIENT : NMOCD — PINNACLE I.D. : 905079
PROJECT # : WATER WELL — DATE RECEIVED : 5/21/99
PROJECT NAME : CASTILLO WELL

SAMPLE ID #	CLIENT ID	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
905079-01	9905201100	AQUEOUS	5/20/99	N/A	06/02/99	1

PARAMETER	DET. LIMIT		UNITS
1,1,1,2-Tetrachloroethane	1.0	< 1.0	ug/L
m&p Xylenes	1.0	< 1.0	ug/L
o-Xylene	1.0	< 1.0	ug/L
Styrene	1.0	< 1.0	ug/L
Bromoform	1.0	< 1.0	ug/L
1,1,2,2-Tetrachloroethane	1.0	< 1.0	ug/L
1,2,3-Trichloropropane	1.0	< 1.0	ug/L
Isopropyl Benzene	1.0	< 1.0	ug/L
Bromobenzene	1.0	< 1.0	ug/L
trans-1,4-Dichloro-2-Butene	1.0	< 1.0	ug/L
n-Propylbenzene	1.0	< 1.0	ug/L
2-Chlorotoluene	1.0	< 1.0	ug/L
4-Chlorotoluene	1.0	< 1.0	ug/L
1,3,5-Trimethylbenzene	1.0	< 1.0	ug/L
tert-Butylbenzene	1.0	< 1.0	ug/L
1,2,4-Trimethylbenzene	1.0	< 1.0	ug/L
sec-Butylbenzene	1.0	< 1.0	ug/L
1,3-Dichlorobenzene	1.0	< 1.0	ug/L
1,4-Dichlorobenzene	1.0	< 1.0	ug/L
p-Isopropyltoluene	1.0	< 1.0	ug/L
1,2-Dichlorobenzene	1.0	< 1.0	ug/L
n-Butylbenzene	1.0	< 1.0	ug/L
1,2-Dibromomo-3-chloropropane	1.0	< 1.0	ug/L
1,2,4-Trichlorobenzene	1.0	< 1.0	ug/L
Naphthalene	1.0	< 1.0	ug/L
Hexachlorobutadiene	1.0	< 1.0	ug/L
1,2,3-Trichlorobenzene	1.0	< 1.0	ug/L

SURROGATE % RECOVERY		
1,2-Dichloroethane-d4	104	(80 - 120)
Toluene-d8	102	(88 - 110)
Bromofluorobenzene	94	(86 - 115)

PINNACLE LABORATORIES

2709-D Pan American Freeway NE
Albuquerque, New Mexico 87107
Phone (505) 344-3777
Fax (505) 344-4413

GC/MS RESULTS

TEST : VOLATILE ORGANICS EPA METHOD 8260
CLIENT : NMOCD — PINNACLE I.D. : 905079
PROJECT # : WATER WELL — DATE RECEIVED : 5/21/99
PROJECT NAME : CASTILLO WELL

SAMPLE ID #	CLIENT ID	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
905079-02	TRIP BLANK	AQUEOUS	5/19/99	N/A	06/02/99	1

PARAMETER	DET. LIMIT		UNITS
Dichlorodifluoromethane	1.0	< 1.0	ug/L
Chloromethane	1.0	< 1.0	ug/L
Vinyl Chloride	1.0	< 1.0	ug/L
Bromomethane	1.0	< 1.0	ug/L
Chloroethane	1.0	< 1.0	ug/L
Trichlorofluoromethane	1.0	< 1.0	ug/L
Acetone	10	< 10	ug/L
Acrolein	5.0	< 5.0	ug/L
1,1-Dichloroethene	1.0	< 1.0	ug/L
Iodomethane	1.0	< 1.0	ug/L
Methylene Chloride	1.0	< 1.0	ug/L
Acrylonitrile	5.0	< 5.0	ug/L
cis-1,2-Dichloroethene	1.0	< 1.0	ug/L
Methyl-t-butyl Ether	1.0	< 1.0	ug/L
1,1,2,1,2,2-Trichlorotrifluoroethane	1.0	< 1.0	ug/L
1,1-Dichloroethane	1.0	< 1.0	ug/L
trans-1,2-Dichloroethene	1.0	< 1.0	ug/L
2-Butanone	10	< 10	ug/L
Carbon Disulfide	1.0	< 1.0	ug/L
Bromochloromethane	1.0	< 1.0	ug/L
Chloroform	1.0	< 1.0	ug/L
2,2-Dichloropropane	1.0	< 1.0	ug/L
1,2-Dichloroethane	1.0	< 1.0	ug/L
Vinyl Acetate	1.0	< 1.0	ug/L
1,1,1-Trichloroethane	1.0	< 1.0	ug/L
1,1-Dichloropropene	1.0	< 1.0	ug/L
Carbon Tetrachloride	1.0	< 1.0	ug/L
Benzene	1.0	< 1.0	ug/L
1,2-Dichloropropane	1.0	< 1.0	ug/L
Trichloroethene	1.0	< 1.0	ug/L
Bromodichloromethane	1.0	< 1.0	ug/L
2-Chloroethyl Vinyl Ether	10	< 10	ug/L
cis-1,3-Dichloropropene	1.0	< 1.0	ug/L
trans-1,3-Dichloropropene	1.0	< 1.0	ug/L
1,1,2-Trichloroethane	1.0	< 1.0	ug/L
1,3-Dichloropropane	1.0	< 1.0	ug/L
Dibromomethane	1.0	< 1.0	ug/L
Toluene	1.0	< 1.0	ug/L
1,2-Dibromoethane	1.0	< 1.0	ug/L
4-Methyl-2-Pentanone	10	< 10	ug/L
2-Hexanone	10	< 10	ug/L
Dibromochloromethane	1.0	< 1.0	ug/L
Tetrachloroethene	1.0	< 1.0	ug/L
Chlorobenzene	1.0	< 1.0	ug/L
Ethylbenzene	1.0	< 1.0	ug/L

PINNACLE LABORATORIES

2709-D Pan American Freeway NE
Albuquerque, New Mexico 87107
Phone (505) 344-3777
Fax (505) 344-4413

GC/MS RESULTS

TEST : VOLATILE ORGANICS EPA METHOD 8260
CLIENT : NMOCD PINNACLE I.D. : 905079
PROJECT # : WATER WELL DATE RECEIVED : 5/21/99
PROJECT NAME : CASTILLO WELL

SAMPLE ID #	CLIENT ID	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
905079-02	TRIP BLANK	AQUEOUS	5/19/99	N/A	06/02/99	1

PARAMETER	DET. LIMIT		UNITS
1,1,1,2-Tetrachloroethane	1.0	< 1.0	ug/L
m&p Xylenes	1.0	< 1.0	ug/L
o-Xylene	1.0	< 1.0	ug/L
Styrene	1.0	< 1.0	ug/L
Bromoform	1.0	< 1.0	ug/L
1,1,2,2-Tetrachloroethane	1.0	< 1.0	ug/L
1,2,3-Trichloropropane	1.0	< 1.0	ug/L
Isopropyl Benzene	1.0	< 1.0	ug/L
Bromobenzene	1.0	< 1.0	ug/L
trans-1,4-Dichloro-2-Butene	1.0	< 1.0	ug/L
n-Propylbenzene	1.0	< 1.0	ug/L
2-Chlorotoluene	1.0	< 1.0	ug/L
4-Chlorotoluene	1.0	< 1.0	ug/L
1,3,5-Trimethylbenzene	1.0	< 1.0	ug/L
tert-Butylbenzene	1.0	< 1.0	ug/L
1,2,4-Trimethylbenzene	1.0	< 1.0	ug/L
sec-Butylbenzene	1.0	< 1.0	ug/L
1,3-Dichlorobenzene	1.0	< 1.0	ug/L
1,4-Dichlorobenzene	1.0	< 1.0	ug/L
p-Isopropyltoluene	1.0	< 1.0	ug/L
1,2-Dichlorobenzene	1.0	< 1.0	ug/L
n-Butylbenzene	1.0	< 1.0	ug/L
1,2-Dibromomo-3-chloropropane	1.0	< 1.0	ug/L
1,2,4-Trichlorobenzene	1.0	< 1.0	ug/L
Naphthalene	1.0	< 1.0	ug/L
Hexachlorobutadiene	1.0	< 1.0	ug/L
1,2,3-Trichlorobenzene	1.0	< 1.0	ug/L

SURROGATE % RECOVERY

1,2-Dichloroethane-d4	108	(80 - 120)
Toluene-d8	105	(88 - 110)
Bromofluorobenzene	101	(86 - 115)

PINNACLE LABORATORIES

2709-D Pan American Freeway NE
Albuquerque, New Mexico 87107
Phone (505) 344-3777
Fax (505) 344-4413

GC/MS RESULTS

TEST : VOLATILE ORGANICS EPA METHOD 8260
CLIENT : NMOCD PINNACLE I.D. : 905079
PROJECT # : WATER WELL
PROJECT NAME : CASTILLO WELL

SAMPLE ID #	BATCH	MATRIX	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
REAGENT BLANK	060299	AQUEOUS	N/A	06/02/99	1

PARAMETER	DET. LIMIT		UNITS
Dichlorodifluoromethane	1.0	< 1.0	ug/L
Chloromethane	1.0	< 1.0	ug/L
Vinyl Chloride	1.0	< 1.0	ug/L
Bromomethane	1.0	< 1.0	ug/L
Chloroethane	1.0	< 1.0	ug/L
Trichlorofluoromethane	1.0	< 1.0	ug/L
Acetone	10	< 10	ug/L
Acrolein	5.0	< 5.0	ug/L
1,1-Dichloroethene	1.0	< 1.0	ug/L
Iodomethane	1.0	< 1.0	ug/L
Methylene Chloride	1.0	< 1.0	ug/L
Acrylonitrile	5.0	< 5.0	ug/L
cis-1,2-Dichloroethene	1.0	< 1.0	ug/L
Methyl-t-butyl Ether	1.0	< 1.0	ug/L
1,1,2,1,2,2-Trichlorotrifluoroethane	1.0	< 1.0	ug/L
1,1-Dichloroethane	1.0	< 1.0	ug/L
trans-1,2-Dichloroethene	1.0	< 1.0	ug/L
2-Butanone	10	< 10	ug/L
Carbon Disulfide	1.0	< 1.0	ug/L
Bromochloromethane	1.0	< 1.0	ug/L
Chloroform	1.0	< 1.0	ug/L
2,2-Dichloropropane	1.0	< 1.0	ug/L
1,2-Dichloroethane	1.0	< 1.0	ug/L
Vinyl Acetate	1.0	< 1.0	ug/L
1,1,1-Trichloroethane	1.0	< 1.0	ug/L
1,1-Dichloropropene	1.0	< 1.0	ug/L
Carbon Tetrachloride	1.0	< 1.0	ug/L
Benzene	1.0	< 1.0	ug/L
1,2-Dichloropropane	1.0	< 1.0	ug/L
Trichloroethene	1.0	< 1.0	ug/L
Bromodichloromethane	1.0	< 1.0	ug/L
2-Chloroethyl Vinyl Ether	10	< 10	ug/L
cis-1,3-Dichloropropene	1.0	< 1.0	ug/L
trans-1,3-Dichloropropene	1.0	< 1.0	ug/L
1,1,2-Trichloroethane	1.0	< 1.0	ug/L
1,3-Dichloropropane	1.0	< 1.0	ug/L
Dibromomethane	1.0	< 1.0	ug/L
Toluene	1.0	< 1.0	ug/L
1,2-Dibromoethane	1.0	< 1.0	ug/L
4-Methyl-2-Pentanone	10	< 10	ug/L
2-Hexanone	10	< 10	ug/L
Dibromochloromethane	1.0	< 1.0	ug/L
Tetrachloroethene	1.0	< 1.0	ug/L
Chlorobenzene	1.0	< 1.0	ug/L
Ethylbenzene	1.0	< 1.0	ug/L

PINNACLE LABORATORIES

2709-D Pan American Freeway NE
Albuquerque, New Mexico 87107
Phone (505) 344-3777
Fax (505) 344-4413

GC/MS RESULTS

TEST : VOLATILE ORGANICS EPA METHOD 8260
CLIENT : NMOCD PINNACLE I.D. : 905079
PROJECT # : WATER WELL
PROJECT NAME : CASTILLO WELL

SAMPLE ID #	BATCH	MATRIX	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
REAGENT BLANK	060299	AQUEOUS	N/A	06/02/99	1

PARAMETER	DET. LIMIT		UNITS
1,1,1,2-Tetrachloroethane	1.0	< 1.0	ug/L
m&p Xylenes	1.0	< 1.0	ug/L
o-Xylene	1.0	< 1.0	ug/L
Styrene	1.0	< 1.0	ug/L
Bromoform	1.0	< 1.0	ug/L
1,1,2,2-Tetrachloroethane	1.0	< 1.0	ug/L
1,2,3-Trichloropropane	1.0	< 1.0	ug/L
Isopropyl Benzene	1.0	< 1.0	ug/L
Bromobenzene	1.0	< 1.0	ug/L
trans-1,4-Dichloro-2-Butene	1.0	< 1.0	ug/L
n-Propylbenzene	1.0	< 1.0	ug/L
2-Chlorotoluene	1.0	< 1.0	ug/L
4-Chlorotoluene	1.0	< 1.0	ug/L
1,3,5-Trimethylbenzene	1.0	< 1.0	ug/L
tert-Butylbenzene	1.0	< 1.0	ug/L
1,2,4-Trimethylbenzene	1.0	< 1.0	ug/L
sec-Butylbenzene	1.0	< 1.0	ug/L
1,3-Dichlorobenzene	1.0	< 1.0	ug/L
1,4-Dichlorobenzene	1.0	< 1.0	ug/L
p-Isopropyltoluene	1.0	< 1.0	ug/L
1,2-Dichlorobenzene	1.0	< 1.0	ug/L
n-Butylbenzene	1.0	< 1.0	ug/L
1,2-Dibromomo-3-chloropropane	1.0	< 1.0	ug/L
1,2,4-Trichlorobenzene	1.0	< 1.0	ug/L
Naphthalene	1.0	< 1.0	ug/L
Hexachlorobutadiene	1.0	< 1.0	ug/L
1,2,3-Trichlorobenzene	1.0	< 1.0	ug/L

SURROGATE % RECOVERY		
1,2-Dichloroethane-d4	108	(80 - 120)
Toluene-d8	109	(88 - 110)
Bromofluorobenzene	106	(86 - 115)

PINNACLE LABORATORIES

2709-D Pan American Freeway NE
Albuquerque, New Mexico 87107
Phone (505) 344-3777
Fax (505) 344-4413

MATRIX SPIKE/MATRIX SPIKE DUPLICATE RESULTS

TEST	: VOLATILE ORGANICS EPA METHOD 8260	PINNACLE I.D.	: 905079
SPIKED SAMPLE	: 905076-01	DATE ANALYZED	: 6/2/99
CLIENT	: NMOCD	UNITS	: ug/L (PPB)
PROJECT #	: WATER WELL		
PROJECT NAME	: CASTILLO WATER WELL		

COMPOUND	SAMPLE CONC.	SPIKE ADDED	MS RESULT	MSD RESULT	MS %REC	MSD %REC	RPD	QC LIMITS RPD	QC LIMITS %RECOVERY
1,1-DICHLOROETHENE	<1.0	50.0	52.4	51.7	105	103	1	14	61-145
BENZENE	<1.0	50.0	52.1	51.5	104	103	1	11	76-127
TRICHLOROETHENE	<1.0	50.0	50.8	50.4	102	101	1	14	71-120
TOLUENE	<1.0	50.0	50.9	51.5	102	103	1	13	76-125
CHLOROBENZENE	<1.0	50.0	50.0	52.0	100	104	4	13	75-130

BARRINGER LABORATORIES, INC.
15000 W. 6TH AVE., SUITE 300 GOLDEN, CO 80401 (303) 277-1687 FAX (303) 277-1689

3-Jun-99

Kimberly D. McNeill
PINNACLE LABORATORIES INC.
2709-D Pan American Freeway, NE
Albuquerque, NM 87107

Attn:
Project: 905079

Received: 25-May-99 09:00
PO #:

Job: 992197E

Status: Final

ANALYTICAL REPORT PACKAGE

BARRINGER LABORATORIES, INC.
15000 W. 6TH AVE., SUITE 300 Ggolden, CO 80401 (303) 277-1687 FAX (303) 277-1689

3-Jun-99

Kimberly D. McNeill
PINNACLE LABORATORIES INC.
2709-D Pan American Freeway, NE
Albuquerque, NM 87107

Attn:
Project: 905079 PO #:

Received: 25-May-99 09:00

Job: 992197E Status: Final

CASE NARRATIVE

A total of 1 Water sample was received on 25-May-99. As stated in the chain of custody, the sample was run for the following analyses: Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, K, Ni, Se, Si, Ag, Na, Tl, V and Zn. A table, to cross reference your sample ID to ours, is attached. Our procedures are summarized on the Quality Control Data Sheet.

Quality control standards for organic and inorganic analyses followed the appropriate SW-846 or EPA methodology. Quality control standards for radiochemistry followed our standard operating procedures or contractual requirements.

Signed: 6/4/99
Inorganic
Laboratory

Signed:
Project Review 6/4/99

BARRINGER LABORATORIES, INC.
15000 W. 6TH AVE., SUITE 300 GOLDEN, CO 80401 (303) 277-1687 FAX (303) 277-1689

3-Jun-99

Kimberly D. McNeill
PINNACLE LABORATORIES INC.
2709-D Pan American Freeway, NE
Albuquerque, NM 87107

Attn:
Project: 905079

Received: 25-May-99 09:00
PO #:

Job: 992197E

Status: Final

Lab-ID	Matrix	Client Sample ID	Sampled
992197-1	Water	905079-01	20-May-99

BARRINGER LABORATORIES, INC.
15000 W. 6TH AVE., SUITE 300 Ggolden, CO 80401 (303) 277-1687 FAX (303) 277-1689

PINNACLE LABORATORIES INC.

Sample Id: 905079-01
Lab Id: 992197-1 **Project: 905079**
Date Sampled: 20-May-99 **Matrix: Water**

Analyte	Fraction	Method	Concentration	MDL	Date Analyzed
Aluminum	Total	200.7	U mg/l	0.05	1-Jun-99
Antimony	Total	200.7	U mg/l	0.05	1-Jun-99
Arsenic	Total	200.7	U mg/l	0.1	1-Jun-99
Barium	Total	200.7	0.05 mg/l	0.02	1-Jun-99
Beryllium	Total	200.7	U mg/l	0.004	1-Jun-99
Boron	Total	200.7	0.4 mg/l	0.1	1-Jun-99
Cadmium	Total	200.7	U mg/l	0.005	1-Jun-99
Calcium	Total	200.7	104 mg/l	0.2	1-Jun-99
Chromium	Total	200.7	0.01 mg/l	0.01	1-Jun-99
Cobalt	Total	200.7	U mg/l	0.01	1-Jun-99
Copper	Total	200.7	U mg/l	0.01	1-Jun-99
Iron	Total	200.7	0.3 mg/l	0.1	1-Jun-99
Lead	Total	200.7	U mg/l	0.05	1-Jun-99
Magnesium	Total	200.7	20.7 mg/l	0.1	1-Jun-99
Manganese	Total	200.7	U mg/l	0.005	1-Jun-99
Molybdenum	Total	200.7	U mg/l	0.01	1-Jun-99
Potassium	Total	200.7	U mg/l	5	1-Jun-99
Nickel	Total	200.7	U mg/l	0.04	1-Jun-99
Selenium	Total	200.7	U mg/l	0.1	1-Jun-99
Silicon	Total	200.7	31.7 mg/l	0.5	1-Jun-99
Silver	Total	200.7	U mg/l	0.01	1-Jun-99
Sodium	Total	200.7	137 mg/l	1	1-Jun-99
Thallium	Total	200.7	U mg/l	0.1	1-Jun-99
Vanadium	Total	200.7	0.06 mg/l	0.01	1-Jun-99
Zinc	Total	200.7	0.06 mg/l	0.02	1-Jun-99

BARRINGER LABORATORIES, INC.
15000 W. 6TH AVE., SUITE 300 GOLDEN, CO 80401 (303) 277-1687 FAX (303) 277-1689

PINNACLE LABORATORIES INC.

QUALITY CONTROL REPORT

Sample Id	Aluminum Total mg/l	Antimony Total mg/l	Arsenic Total mg/l	Barium Total mg/l	Beryllium Total mg/l
Blank	U	U	U	U	U
LCS (True)	10.0	2.00	5.00	10.0	1.00
LCS (Found)	10.1	1.96	4.90	10.6	1.00
LCS % Rec	101	98.0	98.0	106	100
Duplicate	4.10	0.97	4.2	4.28	0.101
Duplicate	4.12	1.03	4.1	4.25	0.100
RPD	0.4	6.0	1.0	0.8	0.7
Spike % Rec	102	97.4	104	106	101

Sample Id	Boron Total mg/l	Cadmium Total mg/l	Calcium Total mg/l	Chromium Total mg/l	Cobalt Total mg/l
Blank	U	U	U	U	U
LCS (True)	1.00	1.00	20.0	2.00	5.00
LCS (Found)	1.03	0.98	20.2	2.06	5.06
LCS % Rec	103	98.3	101	103	101
Duplicate	2.5	0.089	163	0.41	1.00
Duplicate	2.5	0.092	166	0.41	1.00
RPD	0.2	3.3	1.5	0.7	0.0
Spike % Rec	105	89.3	NA	103	100

Sample Id	Copper Total mg/l	Iron Total mg/l	Lead Total mg/l	Magnesium Total mg/l	Manganese Total mg/l
Blank	U	U	U	U	U
LCS (True)	2.00	10.0	5.00	20.0	1.00
LCS (Found)	2.08	10.6	5.03	20.8	1.05
LCS % Rec	104	106	101	104	105
Duplicate	0.52	2.2	1.03	30.2	1.05
Duplicate	0.52	2.1	1.04	30.6	1.05
RPD	0.2	1.4	0.3	1.3	0.1
Spike % Rec	105	108	103	NA	105

BARRINGER LABORATORIES, INC.
15000 W. 6TH AVE., SUITE 300 GOLDEN, CO 80401 (303) 277-1687 FAX (303) 277-1689

PINNACLE LABORATORIES INC.

QUALITY CONTROL REPORT

Sample Id	Molybdenum Total mg/l	Potassium Total mg/l	Nickel Total mg/l	Selenium Total mg/l	Silicon Total mg/l
Blank	U	U	U	U	U
LCS (True)	1.00	20.0	5.00	5.00	2.00
LCS (Found)	1.03	22.9	5.18	5.19	2.16
LCS % Rec	103	114	104	104	108
Duplicate	2.02	U	1.02	4.3	35.0
Duplicate	2.01	U	1.01	4.1	35.6
RPD	0.6	NC	0.1	3.8	1.7
Spike % Rec	101	NA	102	107	(1)

Sample Id	Silver Total mg/l	Sodium Total mg/l	Thallium Total mg/l	Vanadium Total mg/l	Zinc Total mg/l
Blank	U	U	U	U	U
LCS (True)	1.00	20.0	5.00	5.00	1.00
LCS (Found)	0.98	22.6	5.15	5.10	1.00
LCS % Rec	98.0	113	103	102	99.5
Duplicate	0.11	100	4.1	1.06	1.08
Duplicate	0.11	108	4.0	1.06	1.09
RPD	2.8	8.7	1.0	0.1	0.6
Spike % Rec	109	NA	102	100	101

BARRINGER LABORATORIES, INC.
15000 W. 6TH AVE., SUITE 300 Ggolden, CO 80401 (303) 277-1687 FAX (303) 277-1689

3-Jun-99

Kimberly D. McNeill
PINNACLE LABORATORIES INC.
2709-D Pan American Freeway, NE
Albuquerque, NM 87107

Attn:
Project: 905079

Received: 25-May-99 09:00
PO #:

Job: 992197E

Status: Final

Abbreviations:

Units:

mg/l	: milligrams per liter

Quality codes:

(1)	: Sample > 4 times spike
NA	: Not Analyzed
U	: Undetected at reported limit
NC	: Not Calculated

BARRINGER LABORATORIES, INC.
15000 W. 6TH AVE., SUITE 300 GOLDEN, CO 80401 (303) 277-1687 FAX (303) 277-1689

3-Jun-99

Kimberly D. McNeill
PINNACLE LABORATORIES INC.
2709-D Pan American Freeway, NE
Albuquerque, NM 87107

Attn:
Project: 905079 PO #:

Received: 25-May-99 09:00

Job: 992197E Status: Final

QUALITY CONTROL DATA SHEET

Received by: kz Via: Fed Ex

Sample Container Type: 500mL pl
Additional Lab Preparation: None

Parameter	Method	Preservative	Init	Analysis Dates
Al	200.7	HNO3	SLM	06/01
Sb	200.7	HNO3	SLM	06/01
As	200.7	HNO3	SLM	06/01
Ba	200.7	HNO3	SLM	06/01
Be	200.7	HNO3	SLM	06/01
B	200.7	HNO3	SLM	06/01
Cd	200.7	HNO3	SLM	06/01
Ca	200.7	HNO3	SLM	06/01
Cr	200.7	HNO3	SLM	06/01
Co	200.7	HNO3	SLM	06/01
Cu	200.7	HNO3	SLM	06/01
Fe	200.7	HNO3	SLM	06/01
Pb	200.7	HNO3	SLM	06/01
Mg	200.7	HNO3	SLM	06/01
Mn	200.7	HNO3	SLM	06/01
Mo	200.7	HNO3	SLM	06/01
K	200.7	HNO3	SLM	06/01
Ni	200.7	HNO3	SLM	06/01
Se	200.7	HNO3	SLM	06/01
Si	200.7	HNO3	SLM	06/01
Ag	200.7	HNO3	SLM	06/01
Na	200.7	HNO3	SLM	06/01
Tl	200.7	HNO3	SLM	06/01
V	200.7	HNO3	SLM	06/01
Zn	200.7	HNO3	SLM	06/01

BARRINGER LABORATORIES, INC.
15000 W. 6TH AVE., SUITE 300 GOLDEN, CO 80401 (303) 277-1687 FAX (303) 277-1689

3-Jun-99

Kimberly D. McNeill
PINNACLE LABORATORIES INC.
2709-D Pan American Freeway, NE
Albuquerque, NM 87107

Attn:
Project: 905079

Received: 25-May-99 09:00
PO #:

Job: 992197E

Status: Final

Barringer Laboratories, Inc. will return or dispose of your samples 30 days from the date your final report is mailed, unless otherwise specified by contract. Barringer Laboratories, Inc. reserves the right to return samples prior to the 30 days if radioactive levels exceed our license.

Pinnacle Laboratories, Inc. **Interlab Chain of Custody** Date: 5/24 Page: 1 of 1

Network Project Manager: Kimberly D. McNeill

Pinnacle Laboratories, Inc.
2709-D Pan American Freeway, NE
Albuquerque, New Mexico 87107
(505) 344-3777 Fax (505) 344-4413

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	Metals (8) RCRA	RCRA TCLP METALS	Metals-13 PP List	Al, Sb, As, Be, B, Cd, Ca, Cr	Co, Cu, Fe, Pb, Mg, Mn, Mo, K	Ni, Se, Si, Ag, Na, Tl, V, Zn	TOC	Gen Chemistry		Oil and Grease	Volatile Organics GC/MS (8260)	BOD	COD	PESTICIDES/PCB (608/8080)	8270 BY GC/MS	PNA (8310)	8240 (TCLP 1311) ZHE	Herbicides (615/8150)	Base/Neutral Acid Compounds GC/MS (625/8270)	URANIUM	RADIUM 226+228	Gross Alpha/Beta	TO-14	NUMBER OF CONTAINERS
905079-01	5/20	1100	AQ					X	X	X																		

PROJECT INFORMATION		SAMPLE RECEIPT		SAMPLES SENT TO:		RELINQUISHED BY: 1.	RELINQUISHED BY: 2.
PROJECT #:	905079	Total Number of Containers		PENSACOLA - STL-FL		Signature: Francine Tonno Time: 1700	Signature: Time:
PROJ. NAME:	NMO	Chain of Custody Seals		PORTLAND - ESL-OR		Printed Name: Francine Tonno Date: 5/24/99	Printed Name: Date:
QC LEVEL:	(STD.) IV	Received Intact?		STL - CT		Pinnacle Laboratories, Inc.	Company
QC REQUIRED:	(MS) MSD BLANK	Received Good Cond./Cold		STL- NEW JERSEY		RECEIVED BY: 1.	RECEIVED BY: 2
TAT:	(STANDARD) RUSH!!	LAB NUMBER:		N. CREEK		Signature: Time: 0900	Signature: Time:
DUE DATE:	6/4	COMMENTS:		BARRINGER	X	Printed Name: KEVIN ZAHLLA Date: 5/25/99	Printed Name: Date:
RUSH SURCHARGE:	—			SEQUOIA		Company BLI	Company
CLIENT DISCOUNT:	—						
SPECIAL CERTIFICATION REQUIRED: YES	(NO)						

Environmental Services Laboratory, Inc. E S L

17400 SW Upper Boones Ferry Road • Suite 270 • Portland, OR 97224 • (503) 670-8520

June 29, 1999

Kim McNeill
Pinnacle Laboratories
2709-D Pan American Fwy NE

Albuquerque, NM 87107

TEL: 505-344-3777
FAX (505) 344-4413

RE: 905079/NMO/Custillo Well Order No.: 9905119

Dear Kim McNeill,

Environmental Services Laboratory received 1 sample on 05/25/99 for the analyses presented in the following report.

The Samples were analyzed for the following tests:

Alkalinity (Alkalinity)
BNA Semi-Vol Organics, Aqueous (SW8270B)
Bromide (Bromide)
CHLORIDE (Chloride)
CONDUCTANCE (E120.1)
Fluoride (fluoride)
ICP Metals (ICPMET)
MERCURY (Mercury)
Sulfate (Sulfate)
TOTAL DISSOLVED SOLIDS (E160.1)

There were no problems with the analyses and all data for associated QC met EPA or laboratory specifications except where noted in the Case Narrative. Results apply only to the samples analyzed. Reproduction of this report is permitted only in its entirety, without the written approval from the Laboratory.

If you have any questions regarding these tests results, please feel free to call.

Sincerely,

Kimberly Hill

Keith Hunter

Kimberly Hill Technical Review

Environmental Services Laboratory

Date: *29-Jun-99*

CLIENT:	Pinnacle Laboratories	**Client Sample ID:**	905079-01
Lab Order:	9905119	**Tag Number:**	
Project:	905079/NMO/Custillo Well	**Collection Date:**	05/20/99
Lab ID:	9905119-01A	**Matrix:**	AQUEOUS

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ALKALINITY		**EPA 310.0**				Analyst: **sld**
Alkalinity, Bicarbonate (As CaCO3)	220	5		mg/L CaCO3	1	05/25/99
Alkalinity, Carbonate (As CaCO3)	ND	5		mg/L CaCO3	1	05/25/99
Alkalinity, Total (As CaCO3)	220	5		mg/L CaCO3	1	05/25/99
BROMIDE		**4500 B**				Analyst: **sld**
Bromide	1.6	0.1		mg/L	2	06/10/99
CHLORIDE		**EPA 325.3**				Analyst: **kfl**
Chloride	240	5		mg/L	10	05/26/99
CONDUCTANCE		**EPA 120.1**				Analyst: **sld**
Specific Conductance	1100	1		µmhos/cm	1	05/25/99
FLUORIDE		**EPA 340.2**				Analyst: **sld**
Fluoride	2.8	0.2		mg/L	1	06/08/99
SULFATE		**EPA 375.4**				Analyst: **sld**
Sulfate	150	120		mg/L	25	05/27/99
TOTAL DISSOLVED SOLIDS		**EPA 160.1**				Analyst: **kfl**
Total Dissolved Solids (Residue, Filterable)	750	10		mg/L	1	05/25/99
MERCURY		**SW 7470 / EPA 245.**				Analyst: **btn**
Mercury	ND	0.0002		mg/L	1	06/08/99
ICP METALS		**SW 6010 / EPA 200.**				Analyst: **btn**
Calcium	110	0.05		mg/L	1	06/18/99
Magnesium	20	0.05		mg/L	1	06/18/99
Potassium	3.6	0.2		mg/L	1	06/18/99
Sodium	126	0.2		mg/L	1	06/18/99

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Services Laboratory

Date: *29-Jun-99*

CLIENT:	Pinnacle Laboratories	**Client Sample ID:**	905079-01
Lab Order:	9905119	**Tag Number:**	
Project:	905079/NMO/Custillo Well	**Collection Date:**	05/20/99
Lab ID:	9905119-01A	**Matrix:**	AQUEOUS

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
BNA SEMI-VOL ORGANICS, AQUEOUS		**SW 8270B**				Analyst: **keh**
1,2,4,5-Tetrachlorobenzene	ND	5		µg/L	1	05/28/99
1,2,4-Trichlorobenzene	ND	5		µg/L	1	05/28/99
1,2-Dichlorobenzene	ND	5		µg/L	1	05/28/99
1,2-Diphenylhydrazine	ND	5		µg/L	1	05/28/99
1,3-Dichlorobenzene	ND	5		µg/L	1	05/28/99
1,4-Dichlorobenzene	ND	5		µg/L	1	05/28/99
2,3,4,6-Tetrachlorophenol	ND	5		µg/L	1	05/28/99
2,4,5-Trichlorophenol	ND	5		µg/L	1	05/28/99
2,4,6-Trichlorophenol	ND	5		µg/L	1	05/28/99
2,4-Dichlorophenol	ND	5		µg/L	1	05/28/99
2,4-Dimethylphenol	ND	5		µg/L	1	05/28/99
2,4-Dinitrophenol	ND	10		µg/L	1	05/28/99
2,4-Dinitrotoluene	ND	5		µg/L	1	05/28/99
2,6-Dichlorophenol	ND	5		µg/L	1	05/28/99
2,6-Dinitrotoluene	ND	5		µg/L	1	05/28/99
2-Chloronaphthalene	ND	5		µg/L	1	05/28/99
2-Chlorophenol	ND	5		µg/L	1	05/28/99
2-Methylnaphthalene	ND	5		µg/L	1	05/28/99
2-Methylphenol	ND	5		µg/L	1	05/28/99
2-Nitroaniline	ND	5		µg/L	1	05/28/99
2-Nitrophenol	ND	5		µg/L	1	05/28/99
2-Picoline	ND	10		µg/L	1	05/28/99
3-Methylcholanthrene	ND	5		µg/L	1	05/28/99
3-Methylphenol	ND	5		µg/L	1	05/28/99
3-Nitroaniline	ND	5		µg/L	1	05/28/99
4,6-Dinitro-2-methylphenol	ND	5		µg/L	1	05/28/99
4-Aminobiphenyl	ND	50		µg/L	1	05/28/99
4-Bromophenyl phenyl ether	ND	5		µg/L	1	05/28/99
4-Chloro-3-methylphenol	ND	5		µg/L	1	05/28/99
4-Chlorophenyl phenyl ether	ND	5		µg/L	1	05/28/99
4-Methylphenol	ND	5		µg/L	1	05/28/99
4-Nitroaniline	ND	5		µg/L	1	05/28/99
4-Nitrophenol	ND	5		µg/L	1	05/28/99
7,12-Dimethylbenz(a)anthracene	ND	5		µg/L	1	05/28/99
Acenaphthene	ND	5		µg/L	1	05/28/99
Acenaphthylene	ND	5		µg/L	1	05/28/99
Acetophenone	ND	5		µg/L	1	05/28/99
Aniline	ND	5		µg/L	1	05/28/99
Anthracene	ND	5		µg/L	1	05/28/99
Benz(a)anthracene	ND	5		µg/L	1	05/28/99

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Services Laboratory

Date: *29-Jun-99*

CLIENT:	Pinnacle Laboratories	**Client Sample ID:**	905079-01
Lab Order:	9905119	**Tag Number:**	
Project:	905079/NMO/Custillo Well	**Collection Date:**	05/20/99
Lab ID:	9905119-01A	**Matrix:**	AQUEOUS

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
Benzo(a)pyrene	ND	5		µg/L	1	05/28/99
Benzo(b)fluoranthene	ND	5		µg/L	1	05/28/99
Benzo(g,h,i)perylene	ND	5		µg/L	1	05/28/99
Benzo(k)fluoranthene	ND	5		µg/L	1	05/28/99
Benzyl alcohol	ND	5		µg/L	1	05/28/99
Bis(2-chloroethoxy)methane	ND	5		µg/L	1	05/28/99
Bis(2-chloroethyl)ether	ND	5		µg/L	1	05/28/99
Bis(2-chloroisopropyl)ether	ND	5		µg/L	1	05/28/99
Bis(2-ethylhexyl)phthalate	ND	5		µg/L	1	05/28/99
Butyl benzyl phthalate	ND	5		µg/L	1	05/28/99
Chrysene	ND	5		µg/L	1	05/28/99
Di-n-butyl phthalate	ND	5		µg/L	1	05/28/99
Di-n-octyl phthalate	ND	5		µg/L	1	05/28/99
Dibenz(a,h)anthracene	ND	5		µg/L	1	05/28/99
Dibenzofuran	ND	5		µg/L	1	05/28/99
Diethyl phthalate	ND	5		µg/L	1	05/28/99
Dimethyl phthalate	ND	5		µg/L	1	05/28/99
Ethyl methanesulfonate	ND	5		µg/L	1	05/28/99
Fluoranthene	ND	5		µg/L	1	05/28/99
Fluorene	ND	5		µg/L	1	05/28/99
Hexachlorobenzene	ND	5		µg/L	1	05/28/99
Hexachlorobutadiene	ND	5		µg/L	1	05/28/99
Hexachlorocyclopentadiene	ND	5		µg/L	1	05/28/99
Hexachloroethane	ND	5		µg/L	1	05/28/99
Indeno(1,2,3-cd)pyrene	ND	5		µg/L	1	05/28/99
Isophorone	ND	5		µg/L	1	05/28/99
Methyl methanesulfonate	ND	5		µg/L	1	05/28/99
N-Nitroso-di-n-butylamine	ND	5		µg/L	1	05/28/99
N-Nitrosodi-n-propylamine	ND	5		µg/L	1	05/28/99
N-Nitrosodiphenylamine	ND	5		µg/L	1	05/28/99
N-Nitrosopiperidine	ND	5		µg/L	1	05/28/99
Naphthalene	ND	5		µg/L	1	05/28/99
Nitrobenzene	ND	5		µg/L	1	05/28/99
p-Dimethylaminoazobenzene	ND	5		µg/L	1	05/28/99
Pentachlorobenzene	ND	5		µg/L	1	05/28/99
Pentachloronitrobenzene	ND	5		µg/L	1	05/28/99
Pentachlorophenol	ND	5		µg/L	1	05/28/99
Phenacetin	ND	5		µg/L	1	05/28/99
Phenanthrene	ND	5		µg/L	1	05/28/99
Phenol	ND	5		µg/L	1	05/28/99
Pyrene	ND	5		µg/L	1	05/28/99

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Services Laboratory

Date: *29-Jun-99*

CLIENT:	Pinnacle Laboratories	**Client Sample ID:**	905079-01
Lab Order:	9905119	**Tag Number:**	
Project:	905079/NMO/Custillo Well	**Collection Date:**	05/20/99
Lab ID:	9905119-01A	**Matrix:**	AQUEOUS

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
Surr: 2,4,6-Tribromophenol	76.1	10-123		%REC	1	05/28/99
Surr: 2-Fluorobiphenyl	62.2	43-116		%REC	1	05/28/99
Surr: 2-Fluorophenol	30.4	21-100		%REC	1	05/28/99
Surr: 4-Terphenyl-d14	68.2	33-141		%REC	1	05/28/99
Surr: Nitrobenzene-d5	57.6	35-114		%REC	1	05/28/99
Surr: Phenol-d5	18.0	10-94		%REC	1	05/28/99

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

CLIENT: Pinnacle Laboratories
Work Order: 9905119
Project: 905079/NMO/Custillo Well

QC SUMMARY REPORT
Method Blank

Sample ID: **MBlank** Batch ID: **01 ALK A-6/1/** Test Code: **Alkalinity** Units: **mg/L CaCO3** Analysis Date **04/19/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990419A** SeqNo: **9643**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	ND	5									
Alkalinity, Carbonate (As CaCO3)	ND	5									
Alkalinity, Total (As CaCO3)	ND	5									

Sample ID: **MBlank** Batch ID: **01 ALK A-6/1/** Test Code: **Alkalinity** Units: **mg/L CaCO3** Analysis Date **05/25/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990525A** SeqNo: **9907**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	ND	5									
Alkalinity, Carbonate (As CaCO3)	ND	5									
Alkalinity, Total (As CaCO3)	ND	5									

Sample ID: **MBlank** Batch ID: **01 ALK A-6/1/** Test Code: **Alkalinity** Units: **mg/L CaCO3** Analysis Date **05/03/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990503B** SeqNo: **11150**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	ND	5									
Alkalinity, Carbonate (As CaCO3)	ND	5									
Alkalinity, Total (As CaCO3)	ND	5									

Sample ID: **MBlank** Batch ID: **01 ALK A-6/1/** Test Code: **Alkalinity** Units: **mg/L CaCO3** Analysis Date **05/10/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990510C** SeqNo: **11173**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	ND	5									
Alkalinity, Carbonate (As CaCO3)	ND	5									
Alkalinity, Total (As CaCO3)	ND	5									

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905119
Project: 905079/NMO/Custillo Well

QC SUMMARY REPORT
Method Blank

Sample ID: **MBlank** Batch ID: **01 ALK A-6/1/** Test Code: **Alkalinity** Units: **mg/L CaCO3** Analysis Date **05/11/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990511C** SeqNo: **11182**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	ND	5									
Alkalinity, Carbonate (As CaCO3)	ND	5									
Alkalinity, Total (As CaCO3)	ND	5									

Sample ID: **MBlank** Batch ID: **01 ALK A-6/1/** Test Code: **Alkalinity** Units: **mg/L CaCO3** Analysis Date **05/14/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990514B** SeqNo: **11226**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	ND	5									
Alkalinity, Carbonate (As CaCO3)	ND	5									
Alkalinity, Total (As CaCO3)	ND	5									

Sample ID: **MBlank** Batch ID: **01 BR A-6/11/** Test Code: **Bromide** Units: **mg/L** Analysis Date **06/10/99** Prep Date:
Client ID: **9905119** Run ID: **HIT MAN_990610A** SeqNo: **13710**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Bromide	ND	5									

Sample ID: **MBlank** Batch ID: **01 CL A-6/1/9** Test Code: **Chloride** Units: **mg/L** Analysis Date **05/26/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990526A** SeqNo: **9937**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	ND	0.5									

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905119
Project: 905079/NMO/Custillo Well

QC SUMMARY REPORT
Method Blank

Sample ID: **MBlank**	Batch ID: **01 CL A-6/1/9**	Test Code: **Chloride**	Units: **mg/L**	Analysis Date **05/07/99**	Prep Date:
Client ID:	**9905119**	Run ID: **NO INST_990507B**		SeqNo: **11086**	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	ND	0.5									

Sample ID: **MBlank**	Batch ID: **01 CL A-6/1/9**	Test Code: **Chloride**	Units: **mg/L**	Analysis Date **05/17/99**	Prep Date:
Client ID:	**9905119**	Run ID: **NO INST_990517C**		SeqNo: **11134**	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	ND	0.5									

Sample ID: **MBlank**	Batch ID: **01 COND-06/**	Test Code: **E120.1**	Units: **µmhos/cm**	Analysis Date **04/21/99**	Prep Date:
Client ID:	**9905119**	Run ID: **NO INST_990421A**		SeqNo: **10312**	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Specific Conductance	ND	1									

Sample ID: **MBlank**	Batch ID: **01 COND-06/**	Test Code: **E120.1**	Units: **µmhos/cm**	Analysis Date **05/10/99**	Prep Date:
Client ID:	**9905119**	Run ID: **NO INST_990510A**		SeqNo: **10347**	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Specific Conductance	ND	1									

Sample ID: **MBlank**	Batch ID: **01 COND-06/**	Test Code: **E120.1**	Units: **µmhos/cm**	Analysis Date **05/20/99**	Prep Date:
Client ID:	**9905119**	Run ID: **NO INST_990520A**		SeqNo: **10364**	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Specific Conductance	ND	1									

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905119
Project: 905079/NMO/Custillo Well

QC SUMMARY REPORT
Method Blank

Sample ID: **MBlank** Batch ID: **01 COND-06/** Test Code: **E120.1** Units: **µmhos/cm** Analysis Date **05/25/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990525E** SeqNo: **10384**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Specific Conductance	ND	1									

Sample ID: **MBlank** Batch ID: **01 FL A-6/9/9** Test Code: **fluoride** Units: **mg/L** Analysis Date **06/08/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990608B** SeqNo: **13057**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Fluoride	ND	0.2									

Sample ID: **MBlank** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **05/21/99** Prep Date:
Client ID: **9905119** Run ID: **HIT MAN_990521B** SeqNo: **9661**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	ND	5									

Sample ID: **MBlank** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **05/27/99** Prep Date:
Client ID: **9905119** Run ID: **HIT MAN_990527A** SeqNo: **9765**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	ND	5									

Sample ID: **MBlank** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **04/29/99** Prep Date:
Client ID: **9905119** Run ID: **HIT MAN_990429A** SeqNo: **10621**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	ND	5									

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905119
Project: 905079/NMO/Custillo Well

QC SUMMARY REPORT
Method Blank

Sample ID: **MBlank** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **05/12/99** Prep Date:
Client ID: **9905119** Run ID: **HIT MAN_990512B** SeqNo: **10869**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	ND	5									

Sample ID: **MBlank** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **05/20/99** Prep Date:
Client ID: **9905119** Run ID: **HIT MAN_990520A** SeqNo: **10997**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	ND	5									

Sample ID: **MBlank** Batch ID: **01 TDS-6/1/99** Test Code: **E160.1** Units: **mg/L** Analysis Date **05/25/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990525C** SeqNo: **10233**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Dissolved Solids (Residue, Filtera	ND	10									

Sample ID: **MBlank** Batch ID: **01 TDS-6/1/99** Test Code: **E160.1** Units: **mg/L** Analysis Date **05/26/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990526C** SeqNo: **10284**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Dissolved Solids (Residue, Filtera	ND	10									

Sample ID: **MBlank** Batch ID: **01 TDS-6/1/99** Test Code: **E160.1** Units: **mg/L** Analysis Date **04/28/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990428C** SeqNo: **11254**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Dissolved Solids (Residue, Filtera	ND	10									

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905119
Project: 905079/NMO/Custillo Well

QC SUMMARY REPORT
Method Blank

Sample ID: **MBlank** Batch ID: **01 TDS-6/1/99** Test Code: **E160.1** Units: **mg/L** Analysis Date **05/05/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990505B** SeqNo: **11272**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Dissolved Solids (Residue, Filtera	ND	10									

Sample ID: **MBlank** Batch ID: **01 TDS-6/1/99** Test Code: **E160.1** Units: **mg/L** Analysis Date **05/11/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990511D** SeqNo: **11287**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Dissolved Solids (Residue, Filtera	ND	10									

Sample ID: **MBlank** Batch ID: **01 TDS-6/1/99** Test Code: **E160.1** Units: **mg/L** Analysis Date **05/18/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990518B** SeqNo: **11307**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Dissolved Solids (Residue, Filtera	ND	10									

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905119
Project: 905079/NMO/Custillo Well

QC SUMMARY REPORT
Method Blank

Sample ID: **MB-480** Batch ID: **480** Test Code: **SW8270B** Units: **µg/L** Analysis Date **05/27/99** Prep Date: **05/24/99**
Client ID: **9905119** Run ID: **MANFREDD_990527A** SeqNo: **9970**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,2,4,5-Tetrachlorobenzene	ND	5									
1,2,4-Trichlorobenzene	ND	5									
1,2-Dichlorobenzene	ND	5									
1,2-Diphenylhydrazine	ND	5									
1,3-Dichlorobenzene	ND	5									
1,4-Dichlorobenzene	ND	5									
2,3,4,6-Tetrachlorophenol	ND	5									
2,4,5-Trichlorophenol	ND	5									
2,4,6-Trichlorophenol	ND	5									
2,4-Dichlorophenol	ND	5									
2,4-Dimethylphenol	ND	5									
2,4-Dinitrophenol	ND	10									
2,4-Dinitrotoluene	ND	5									
2,6-Dichlorophenol	ND	5									
2,6-Dinitrotoluene	ND	5									
2-Chloronaphthalene	ND	5									
2-Chlorophenol	ND	5									
2-Methylnaphthalene	ND	5									
2-Methylphenol	ND	5									
2-Nitroaniline	ND	5									
2-Nitrophenol	ND	5									
2-Picoline	ND	10									
3-Methylcholanthrene	ND	5									
3-Methylphenol	ND	5									
3-Nitroaniline	ND	5									
4,6-Dinitro-2-methylphenol	ND	5									
4-Aminobiphenyl	ND	50									
4-Bromophenyl phenyl ether	ND	5									
4-Chloro-3-methylphenol	ND	5									

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905119
Project: 905079/NMO/Custillo Well

QC SUMMARY REPORT
Method Blank

4-Chlorophenyl phenyl ether	ND	5
4-Methylphenol	ND	5
4-Nitroaniline	ND	5
4-Nitrophenol	ND	5
7,12-Dimethylbenz(a)anthracene	ND	5
Acenaphthene	ND	5
Acenaphthylene	ND	5
Acetophenone	ND	5
Aniline	ND	5
Anthracene	ND	5
Benz(a)anthracene	ND	5
Benzo(a)pyrene	ND	5
Benzo(b)fluoranthene	ND	5
Benzo(g,h,i)perylene	ND	5
Benzo(k)fluoranthene	ND	5
Benzyl alcohol	ND	5
Bis(2-chloroethoxy)methane	ND	5
Bis(2-chloroethyl)ether	ND	5
Bis(2-chloroisopropyl)ether	ND	5
Bis(2-ethylhexyl)phthalate	ND	5
Butyl benzyl phthalate	ND	5
Chrysene	ND	5
Di-n-butyl phthalate	ND	5
Di-n-octyl phthalate	ND	5
Dibenz(a,h)anthracene	ND	5
Dibenzofuran	ND	5
Diethyl phthalate	ND	5
Dimethyl phthalate	ND	5
Ethyl methanesulfonate	ND	5
Fluoranthene	ND	5
Fluorene	ND	5
Hexachlorobenzene	ND	5
Hexachlorobutadiene	ND	5

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

Hexachlorocyclopentadiene	ND	5
Hexachloroethane	ND	5
Indeno(1,2,3-cd)pyrene	ND	5
Isophorone	ND	5
Methyl methanesulfonate	ND	5
N-Nitroso-di-n-butylamine	ND	5
N-Nitrosodi-n-propylamine	ND	5
N-Nitrosodiphenylamine	ND	5
N-Nitrosopiperidine	ND	5
Naphthalene	ND	5
Nitrobenzene	ND	5
p-Dimethylaminoazobenzene	ND	5
Pentachlorobenzene	ND	5
Pentachloronitrobenzene	ND	5
Pentachlorophenol	ND	5
Phenacetin	ND	5
Phenanthrene	ND	5
Phenol	ND	5
Pyrene	ND	5

CLIENT: Pinnacle Laboratories
Work Order: 9905119
Project: 905079/NMO/Custillo Well

QC SUMMARY REPORT
Method Blank

Sample ID: **MB-480** Batch ID: **480** Test Code: **SW8270B** Units: **µg/L** Analysis Date **05/28/99** Prep Date: **05/24/99**
Client ID: **9905119** Run ID: **MANFREDD_990528A** SeqNo: **11673**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,2,4,5-Tetrachlorobenzene	ND	5									
1,2,4-Trichlorobenzene	ND	5									
1,2-Dichlorobenzene	ND	5									
1,2-Diphenylhydrazine	ND	5									
1,3-Dichlorobenzene	ND	5									
1,4-Dichlorobenzene	ND	5									
2,3,4,6-Tetrachlorophenol	ND	5									
2,4,5-Trichlorophenol	ND	5									
2,4,6-Trichlorophenol	ND	5									
2,4-Dichlorophenol	ND	5									
2,4-Dimethylphenol	ND	5									
2,4-Dinitrophenol	ND	10									
2,4-Dinitrotoluene	ND	5									
2,6-Dichlorophenol	ND	5									
2,6-Dinitrotoluene	ND	5									
2-Chloronaphthalene	ND	5									
2-Chlorophenol	ND	5									
2-Methylnaphthalene	ND	5									
2-Methylphenol	ND	5									
2-Nitroaniline	ND	5									
2-Nitrophenol	ND	5									
2-Picoline	ND	10									
3-Methylcholanthrene	ND	5									
3-Methylphenol	ND	5									
3-Nitroaniline	ND	5									
4,6-Dinitro-2-methylphenol	ND	5									
4-Aminobiphenyl	ND	50									
4-Bromophenyl phenyl ether	ND	5									
4-Chloro-3-methylphenol	ND	5									

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905119
Project: 905079/NMO/Custillo Well

QC SUMMARY REPORT
Method Blank

4-Chlorophenyl phenyl ether	ND	5
4-Methylphenol	ND	5
4-Nitroaniline	ND	5
4-Nitrophenol	ND	5
7,12-Dimethylbenz(a)anthracene	ND	5
Acenaphthene	ND	5
Acenaphthylene	ND	5
Acetophenone	ND	5
Aniline	ND	5
Anthracene	ND	5
Benz(a)anthracene	ND	5
Benzo(a)pyrene	ND	5
Benzo(b)fluoranthene	ND	5
Benzo(g,h,i)perylene	ND	5
Benzo(k)fluoranthene	ND	5
Benzyl alcohol	ND	5
Bis(2-chloroethoxy)methane	ND	5
Bis(2-chloroethyl)ether	ND	5
Bis(2-chloroisopropyl)ether	ND	5
Bis(2-ethylhexyl)phthalate	ND	5
Butyl benzyl phthalate	ND	5
Chrysene	ND	5
Di-n-butyl phthalate	ND	5
Di-n-octyl phthalate	ND	5
Dibenz(a,h)anthracene	ND	5
Dibenzofuran	ND	5
Diethyl phthalate	ND	5
Dimethyl phthalate	ND	5
Ethyl methanesulfonate	ND	5
Fluoranthene	ND	5
Fluorene	ND	5
Hexachlorobenzene	ND	5
Hexachlorobutadiene	ND	5

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

Hexachlorocyclopentadiene	ND	5
Hexachloroethane	ND	5
Indeno(1,2,3-cd)pyrene	ND	5
Isophorone	ND	5
Methyl methanesulfonate	ND	5
N-Nitroso-di-n-butylamine	ND	5
N-Nitrosodi-n-propylamine	ND	5
N-Nitrosodiphenylamine	ND	5
N-Nitrosopiperidine	ND	5
Naphthalene	ND	5
Nitrobenzene	ND	5
p-Dimethylaminoazobenzene	ND	5
Pentachlorobenzene	ND	5
Pentachloronitrobenzene	ND	5
Pentachlorophenol	ND	5
Phenacetin	ND	5
Phenanthrene	ND	5
Phenol	ND	5
Pyrene	ND	5

Sample ID: **MB-513** Batch ID: **513** Test Code: **Mercury** Units: **mg/L** Analysis Date **06/08/99** Prep Date: **06/07/99**

Client ID: **9905119** Run ID: **MERC_990608A** SeqNo: **13237**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	ND	0.0002									

CLIENT: Pinnacle Laboratories
Work Order: 9905119
Project: 905079/NMO/Custillo Well

QC SUMMARY REPORT
Method Blank

Sample ID: **MB-548** Batch ID: **548** Test Code: **ICPMET** Units: **mg/L** Analysis Date **06/18/99** Prep Date: **06/16/99**
Client ID: **9905119** Run ID: **ICP_990618B** SeqNo: **15580**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	ND	0.005									
Arsenic	ND	0.005									
Barium	ND	0.005									
Beryllium	ND	0.002									
Cadmium	ND	0.002									
Calcium	ND	0.05									
Chromium	ND	0.005									
Copper	ND	0.005									
Hardness	ND	0.33									
Iron	ND	0.015									
Lead	ND	0.005									
Magnesium	ND	0.05									
Manganese	ND	0.005									
Nickel	ND	0.005									
Potassium	ND	0.2									
Selenium	ND	0.005									
Silver	ND	0.005									
Sodium	ND	0.2									
Thallium	ND	0.01									
Zinc	ND	0.005									

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905119
Project: 905079/NMO/Custillo Well

QC SUMMARY REPORT
Sample Duplicate

Sample ID: **9904055-08A DUP** Batch ID: **01 ALK A-6/1/** Test Code: **Alkalinity** Units: **mg/L CaCO3** Analysis Date **04/19/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990419A** SeqNo: **9656**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	150	5	0	0	0.0%	0	0	150	0.0%	20	
Alkalinity, Carbonate (As CaCO3)	ND	5	0	0	0.0%	0	0	0	0.0%	20	
Alkalinity, Total (As CaCO3)	150	5	0	0	0.0%	0	0	150	0.0%	20	

Sample ID: **9904114-04A DUP** Batch ID: **01 ALK A-6/1/** Test Code: **Alkalinity** Units: **mg/L CaCO3** Analysis Date **05/03/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990503B** SeqNo: **11153**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	100	5	0	0	0.0%	0	0	95	5.1%	20	
Alkalinity, Carbonate (As CaCO3)	ND	5	0	0	0.0%	0	0	0	0.0%	20	
Alkalinity, Total (As CaCO3)	100	5	0	0	0.0%	0	0	95	5.1%	20	

Sample ID: **9905011-03A DUP** Batch ID: **01 ALK A-6/1/** Test Code: **Alkalinity** Units: **mg/L CaCO3** Analysis Date **05/10/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990510C** SeqNo: **11179**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	200	5	0	0	0.0%	0	0	210	4.9%	20	
Alkalinity, Carbonate (As CaCO3)	ND	5	0	0	0.0%	0	0	0	0.0%	20	
Alkalinity, Total (As CaCO3)	200	5	0	0	0.0%	0	0	210	4.9%	20	

Sample ID: **9905029-01A DUP** Batch ID: **01 ALK A-6/1/** Test Code: **Alkalinity** Units: **mg/L CaCO3** Analysis Date **05/11/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990511C** SeqNo: **11187**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	170	5	0	0	0.0%	0	0	170	0.0%	20	
Alkalinity, Carbonate (As CaCO3)	ND	5	0	0	0.0%	0	0	0	0.0%	20	
Alkalinity, Total (As CaCO3)	170	5	0	0	0.0%	0	0	170	0.0%	20	

Qualifiers: ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905119
Project: 905079/NMO/Custillo Well

QC SUMMARY REPORT
Sample Duplicate

Sample ID: **9905053-02A DUP** Batch ID: **01 ALK A-6/1/** Test Code: **Alkalinity** Units: **mg/L CaCO3** Analysis Date **05/14/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990514B** SeqNo: **11231**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	130	5	0	0	0.0%	0	0	120	8.0%	20	
Alkalinity, Carbonate (As CaCO3)	ND	5	0	0	0.0%	0	0	0	0.0%	20	
Alkalinity, Total (As CaCO3)	130	5	0	0	0.0%	0	0	120	8.0%	20	

Sample ID: **9905087-01A DUP** Batch ID: **01 ALK A-6/1/** Test Code: **Alkalinity** Units: **mg/L CaCO3** Analysis Date **05/25/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990525A** SeqNo: **9910**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Total (As CaCO3)	410	5	0	0	0.0%	0	0	450	9.3%	20	

Sample ID: **9905120-01A DUP** Batch ID: **01 ALK A-6/1/** Test Code: **Alkalinity** Units: **mg/L CaCO3** Analysis Date **05/25/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990525A** SeqNo: **9928**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Bicarbonate (As CaCO3)	220	5	0	0	0.0%	0	0	210	4.7%	20	
Alkalinity, Carbonate (As CaCO3)	ND	5	0	0	0.0%	0	0	0	0.0%	20	
Alkalinity, Total (As CaCO3)	220	5	0	0	0.0%	0	0	210	4.7%	20	

Sample ID: **9906014-02A DUP** Batch ID: **01 BR A-6/11/** Test Code: **Bromide** Units: **mg/L** Analysis Date **06/10/99** Prep Date:
Client ID: **9905119** Run ID: **HIT MAN_990610A** SeqNo: **13716**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Bromide	.32	0.1	0	0	0.0%	0	0	0.11	97.7%	20	R,T

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905119
Project: 905079/NMO/Custillo Well

QC SUMMARY REPORT
Sample Duplicate

Sample ID: **9904166-01A DUP** Batch ID: **01 CL A-6/1/9** Test Code: **Chloride** Units: **mg/L** Analysis Date **05/07/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990507B** SeqNo: **11108**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	38	5	0	0	0.0%	0	0	40	5.1%	20	

Sample ID: **9904166-02A DUP** Batch ID: **01 CL A-6/1/9** Test Code: **Chloride** Units: **mg/L** Analysis Date **05/07/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990507B** SeqNo: **11112**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	32	5	0	0	0.0%	0	0	35	9.0%	20	

Sample ID: **9905030-01A DUP** Batch ID: **01 CL A-6/1/9** Test Code: **Chloride** Units: **mg/L** Analysis Date **05/17/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990517C** SeqNo: **11137**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	140	5	0	0	0.0%	0	0	130	7.4%	20	

Sample ID: **9905097-02A DUP** Batch ID: **01 CL A-6/1/9** Test Code: **Chloride** Units: **mg/L** Analysis Date **05/26/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990526A** SeqNo: **9944**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride, Diss	5	0.5	0	0	0.0%	0	0	5.25	4.9%	20	

Sample ID: **9905133-05A DUP** Batch ID: **01 CL A-6/1/9** Test Code: **Chloride** Units: **mg/L** Analysis Date **05/26/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990526A** SeqNo: **9959**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride, Diss	17.5	5	0	0	0.0%	0	0	17.5	0.0%	20	

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905119
Project: 905079/NMO/Custillo Well

QC SUMMARY REPORT
Sample Duplicate

Sample ID: **9904085-01A DUP** Batch ID: **01 COND-06/** Test Code: **E120.1** Units: **µmhos/cm** Analysis Date **04/21/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990421A** SeqNo: **10315**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Specific Conductance	2280	1	0	0	0.0%	0	0	2340	2.6%	20	

Sample ID: **9904146-01A DUP** Batch ID: **01 COND-06/** Test Code: **E120.1** Units: **µmhos/cm** Analysis Date **05/10/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990510A** SeqNo: **10350**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Specific Conductance	512	1	0	0	0.0%	0	0	517	1.0%	20	

Sample ID: **9905047-01A DUP** Batch ID: **01 COND-06/** Test Code: **E120.1** Units: **µmhos/cm** Analysis Date **05/20/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990520A** SeqNo: **10370**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Specific Conductance	170	1	0	0	0.0%	0	0	171	0.6%	20	

Sample ID: **9905101-01A DUP** Batch ID: **01 COND-06/** Test Code: **E120.1** Units: **µmhos/cm** Analysis Date **05/25/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990525E** SeqNo: **10395**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Specific Conductance	860	1	0	0	0.0%	0	0	830	3.6%	20	

Sample ID: **9906027-03A DUP** Batch ID: **01 FL A-6/9/9** Test Code: **fluoride** Units: **mg/L** Analysis Date **06/08/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990608B** SeqNo: **13068**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Fluoride	ND	0.2	0	0	0.0%	0	0	0	0.0%	20	

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905119
Project: 905079/NMO/Custillo Well

QC SUMMARY REPORT
Sample Duplicate

Sample ID: **9904111-01A DUP** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **04/29/99** Prep Date:
Client ID: **9905119** Run ID: **HIT MAN_990429A** SeqNo: **10624**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	59.02	12	0	0	0.0%	80	120	56.18	4.9%	20	

Sample ID: **9904157-03A DUP** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **04/29/99** Prep Date:
Client ID: **9905119** Run ID: **HIT MAN_990429A** SeqNo: **10662**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	233.1	62	0	0	0.0%	80	120	203.9	13.4%	20	
Sulfate, Diss	ND	62	0	0	0.0%	80	120	0	0.0%	20	

Sample ID: **9904166-01A DUP** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **05/12/99** Prep Date:
Client ID: **9905119** Run ID: **HIT MAN_990512B** SeqNo: **10872**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	126.9	62	0	0	0.0%	80	120	130.2	2.6%	20	

Sample ID: **9905045-01A DUP** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **05/20/99** Prep Date:
Client ID: **9905119** Run ID: **HIT MAN_990520A** SeqNo: **11008**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	134.4	25	0	0	0.0%	80	120	121	10.5%	20	

Sample ID: **9905078-01A DUP** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **05/21/99** Prep Date:
Client ID: **9905119** Run ID: **HIT MAN_990521B** SeqNo: **9668**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	574.8	120	0	0	0.0%	80	120	494	15.1%	20	

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905119
Project: 905079/NMO/Custillo Well

QC SUMMARY REPORT
Sample Duplicate

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sample ID: **9905097-02A DUP** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **05/27/99** Prep Date:											
Client ID: **9905119** Run ID: **HIT MAN_990527A** SeqNo: **9769**											
Sulfate, Diss	13	5	0	0	0.0%	80	120	13	0.0%	20	
Sample ID: **9904140-04A DUP** Batch ID: **01 TDS-6/1/99** Test Code: **E160.1** Units: **mg/L** Analysis Date **04/28/99** Prep Date:											
Client ID: **9905119** Run ID: **NO INST_990428C** SeqNo: **11267**											
Total Dissolved Solids (Residue, Filtera	510	10	0	0	0.0%	0	0	480	6.1%	20	
Sample ID: **9905011-03A DUP** Batch ID: **01 TDS-6/1/99** Test Code: **E160.1** Units: **mg/L** Analysis Date **05/05/99** Prep Date:											
Client ID: **9905119** Run ID: **NO INST_990505B** SeqNo: **11286**											
Total Dissolved Solids (Residue, Filtera	470	10	0	0	0.0%	0	0	470	0.0%	20	
Sample ID: **9905026-01A DUP** Batch ID: **01 TDS-6/1/99** Test Code: **E160.1** Units: **mg/L** Analysis Date **05/11/99** Prep Date:											
Client ID: **9905119** Run ID: **NO INST_990511D** SeqNo: **11290**											
Total Dissolved Solids (Residue, Filtera	430	10	0	0	0.0%	0	0	420	2.4%	20	
Sample ID: **9905053-01A DUP** Batch ID: **01 TDS-6/1/99** Test Code: **E160.1** Units: **mg/L** Analysis Date **05/18/99** Prep Date:											
Client ID: **9905119** Run ID: **NO INST_990518B** SeqNo: **11310**											
Total Dissolved Solids (Residue, Filtera	440	10	0	0	0.0%	0	0	420	4.7%	20	

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905119
Project: 905079/NMO/Custillo Well

QC SUMMARY REPORT
Sample Duplicate

Sample ID: **9905098-01A DUP** Batch ID: **01 TDS-6/1/99** Test Code: **E160.1** Units: **mg/L** Analysis Date **05/25/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990525C** SeqNo: **10238**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Dissolved Solids (Residue, Filtera	15	10	0	0	0.0%	0	0	34	77.6%	20	R,T

Sample ID: **9905133-03A DUP** Batch ID: **01 TDS-6/1/99** Test Code: **E160.1** Units: **mg/L** Analysis Date **05/26/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990526C** SeqNo: **10287**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Dissolved Solids (Residue, Filtera	110	10	0	0	0.0%	0	0	130	16.7%	20	

Sample ID: **9906044-12A DUP** Batch ID: **513** Test Code: **Mercury** Units: **mg/L** Analysis Date **06/08/99** Prep Date: **06/07/99**
Client ID: **9905119** Run ID: **MERC_990608A** SeqNo: **13240**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	ND	0.0002	0	0	0.0%	0	0	0	0.0%	20	

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905119
Project: 905079/NMO/Custillo Well

QC SUMMARY REPORT
Sample Duplicate

Sample ID: **9905144-01A DUP** Batch ID: **548** Test Code: **ICPMET** Units: **mg/L** Analysis Date **06/18/99** Prep Date: **06/16/99**
Client ID: **9905119** Run ID: **ICP_990618B** SeqNo: **15582**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	ND	0.005	0	0	0.0%	0	0	0	0.0%	20	
Arsenic	ND	0.005	0	0	0.0%	0	0	0	0.0%	20	
Barium	.02084	0.005	0	0	0.0%	0	0	0.02096	0.6%	20	
Beryllium	ND	0.002	0	0	0.0%	0	0	0	0.0%	20	
Cadmium	ND	0.002	0	0	0.0%	0	0	0	0.0%	20	
Calcium	5.545	0.05	0	0	0.0%	0	0	5.657	2.0%	20	
Chromium	ND	0.005	0	0	0.0%	0	0	0	0.0%	20	
Copper	ND	0.005	0	0	0.0%	0	0	0	0.0%	20	
Hardness	18.92	0.33	0	0	0.0%	0	0	19.28	1.9%	20	
Iron	.04548	0.015	0	0	0.0%	0	0	0.02719	50.3%	20	R
Lead	ND	0.005	0	0	0.0%	0	0	0	0.0%	20	
Magnesium	1.233	0.05	0	0	0.0%	0	0	1.252	1.5%	20	
Manganese	.007505	0.005	0	0	0.0%	0	0	0.007559	0.7%	20	
Nickel	ND	0.005	0	0	0.0%	0	0	0	0.0%	20	
Potassium	.5463	0.2	0	0	0.0%	0	0	0.533	2.5%	20	
Selenium	ND	0.005	0	0	0.0%	0	0	0	0.0%	20	
Silver	ND	0.005	0	0	0.0%	0	0	0	0.0%	20	
Sodium	6.094	0.2	0	0	0.0%	0	0	6.104	0.2%	20	
Thallium	ND	0.01	0	0	0.0%	0	0	0	0.0%	20	
Zinc	ND	0.005	0	0	0.0%	0	0	0	0.0%	20	

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

Environmental Services Laboratory

Date: *29-Jun-99*

CLIENT: Pinnacle Laboratories
Work Order: 9905119
Project: 905079/NMO/Custillo Well

QC SUMMARY REPORT
Sample Matrix Spike

Sample ID: **9906014-02A MS**	Batch ID: **01 BR A-6/11/**	Test Code: **Bromide**	Units: **mg/L**	Analysis Date **06/10/99**	Prep Date:
Client ID: **9905119**	Run ID: **HIT MAN_990610A**	SeqNo: **13717**			

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Bromide	16.7	0.1	50	0.11	33.2%	75	125	0			S,H

Sample ID: **9906014-02A MSD**	Batch ID: **01 BR A-6/11/**	Test Code: **Bromide**	Units: **mg/L**	Analysis Date **06/10/99**	Prep Date:
Client ID: **9905119**	Run ID: **HIT MAN_990610A**	SeqNo: **13718**			

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Bromide	16.4	0.1	50	0.11	32.6%	75	125	16.7	1.8%	20	S,H

Sample ID: **9904166-01A MS**	Batch ID: **01 CL A-6/1/9**	Test Code: **Chloride**	Units: **mg/L**	Analysis Date **05/07/99**	Prep Date:
Client ID: **9905119**	Run ID: **NO INST_990507B**	SeqNo: **11109**			

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	82	5	50	40	84.0%	75	125	0			

Sample ID: **9904166-01A MSD**	Batch ID: **01 CL A-6/1/9**	Test Code: **Chloride**	Units: **mg/L**	Analysis Date **05/07/99**	Prep Date:
Client ID: **9905119**	Run ID: **NO INST_990507B**	SeqNo: **11110**			

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	85	5	50	40	90.0%	75	125	82	3.6%	20	

Sample ID: **9904166-02A MS**	Batch ID: **01 CL A-6/1/9**	Test Code: **Chloride**	Units: **mg/L**	Analysis Date **05/07/99**	Prep Date:
Client ID: **9905119**	Run ID: **NO INST_990507B**	SeqNo: **11113**			

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	90	5	50	35	110.0%	75	125	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905119
Project: 905079/NMO/Custillo Well

QC SUMMARY REPORT
Sample Matrix Spike Duplicate

Sample ID: **9904166-02A MSD** Batch ID: **01 CL A-6/1/9** Test Code: **Chloride** Units: **mg/L** Analysis Date **05/07/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990507B** SeqNo: **11114**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	80	5	50	35	90.0%	75	125	90	11.8%	20	

Sample ID: **9905030-01A MS** Batch ID: **01 CL A-6/1/9** Test Code: **Chloride** Units: **mg/L** Analysis Date **05/17/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990517C** SeqNo: **11138**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	240	5	100	130	110.0%	75	125	0			

Sample ID: **9905030-01A MSD** Batch ID: **01 CL A-6/1/9** Test Code: **Chloride** Units: **mg/L** Analysis Date **05/17/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990517C** SeqNo: **11139**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	230	5	100	130	100.0%	75	125	240	4.3%	20	

Sample ID: **9905097-02A MS** Batch ID: **01 CL A-6/1/9** Test Code: **Chloride** Units: **mg/L** Analysis Date **05/26/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990526A** SeqNo: **9945**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride, Diss	16	0.5	10	5.25	107.5%	75	125	0			

Sample ID: **9905097-02A MSD** Batch ID: **01 CL A-6/1/9** Test Code: **Chloride** Units: **mg/L** Analysis Date **05/26/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990526A** SeqNo: **9946**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride, Diss	15	0.5	10	5.25	97.5%	75	125	16	6.5%	20	

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905119
Project: 905079/NMO/Custillo Well

QC SUMMARY REPORT
Sample Matrix Spike

Sample ID: **9905133-05A MS** Batch ID: **01 CL A-6/1/9** Test Code: **Chloride** Units: **mg/L** Analysis Date **05/26/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990526A** SeqNo: **9960**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride, Diss	122.5	5	100	17.5	105.0%	75	125	0			

Sample ID: **9905133-05A MSD** Batch ID: **01 CL A-6/1/9** Test Code: **Chloride** Units: **mg/L** Analysis Date **05/26/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990526A** SeqNo: **9961**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride, Diss	117.5	5	100	17.5	100.0%	75	125	122.5	4.2%	20	

Sample ID: **9906027-03A MS** Batch ID: **01 FL A-6/9/9** Test Code: **fluoride** Units: **mg/L** Analysis Date **06/08/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990608B** SeqNo: **13069**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Fluoride	7.8	0.2	7	0	111.4%	75	125	0			

Sample ID: **9906027-03A MSD** Batch ID: **01 FL A-6/9/9** Test Code: **fluoride** Units: **mg/L** Analysis Date **06/08/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990608B** SeqNo: **13070**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Fluoride	7.7	0.2	7	0	110.0%	75	125	7.8	1.3%	20	

Sample ID: **9904111-01A MS** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **04/29/99** Prep Date:
Client ID: **9905119** Run ID: **HIT MAN_990429A** SeqNo: **10625**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	96.15	25	50	56.18	80.0%	75	125	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905119
Project: 905079/NMO/Custillo Well

QC SUMMARY REPORT
Sample Matrix Spike Duplicate

Sample ID: **9904111-01A MSD** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **04/29/99** Prep Date:
Client ID: **9905119** Run ID: **HIT MAN_990429A** SeqNo: **10626**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	96.15	25	50	56.18	80.0%	75	125	96.15	0.0%	20	

Sample ID: **9904157-03A MS** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **04/29/99** Prep Date:
Client ID: **9905119** Run ID: **HIT MAN_990429A** SeqNo: **10663**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Sample ID: **9904157-03A MSD** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **04/29/99** Prep Date:
Client ID: **9905119** Run ID: **HIT MAN_990429A** SeqNo: **10664**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Sample ID: **9904166-01A MS** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **05/12/99** Prep Date:
Client ID: **9905119** Run ID: **HIT MAN_990512B** SeqNo: **10873**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	1064	500	800	130.2	116.7%	75	125	0			

Sample ID: **9904166-01A MSD** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **05/12/99** Prep Date:
Client ID: **9905119** Run ID: **HIT MAN_990512B** SeqNo: **10874**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	1063	500	800	130.2	116.6%	75	125	1064	0.1%	20	

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905119
Project: 905079/NMO/Custillo Well

QC SUMMARY REPORT
Sample Matrix Spike

Sample ID: 9905045-01A MS	Batch ID: 01 SULFATE	Test Code: Sulfate	Units: mg/L	Analysis Date 05/20/99	Prep Date:
Client ID: 9905119	Run ID: HIT MAN_990520A			SeqNo: 11010	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	98.85	42	66	121	-33.6%	75	125	0			S,H

Sample ID: 9905045-01A MSD	Batch ID: 01 SULFATE	Test Code: Sulfate	Units: mg/L	Analysis Date 05/20/99	Prep Date:
Client ID: 9905119	Run ID: HIT MAN_990520A			SeqNo: 11012	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	99.02	42	66	121	-33.3%	75	125	98.85	0.2%	20	S,H

Sample ID: 9905078-01A MS	Batch ID: 01 SULFATE	Test Code: Sulfate	Units: mg/L	Analysis Date 05/21/99	Prep Date:
Client ID: 9905119	Run ID: HIT MAN_990521B			SeqNo: 9669	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	839.8	120	300	494	115.3%	75	125	0			

Sample ID: 9905078-01A MSD	Batch ID: 01 SULFATE	Test Code: Sulfate	Units: mg/L	Analysis Date 05/21/99	Prep Date:
Client ID: 9905119	Run ID: HIT MAN_990521B			SeqNo: 9670	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	803	120	300	494	103.0%	75	125	839.8	4.5%	20	

Sample ID: 9905097-02A MS	Batch ID: 01 SULFATE	Test Code: Sulfate	Units: mg/L	Analysis Date 05/27/99	Prep Date:
Client ID: 9905119	Run ID: HIT MAN_990527A			SeqNo: 9770	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate, Diss	20.2	5	8	13	90.0%	75	125	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905119
Project: 905079/NMO/Custillo Well

QC SUMMARY REPORT
Sample Matrix Spike Duplicate

Sample ID: **9905097-02A MSD** Batch ID: **01 SULFATE** Test Code: **Sulfate** Units: **mg/L** Analysis Date **05/27/99** Prep Date:
Client ID: **9905119** Run ID: **HIT MAN_990527A** SeqNo: **9771**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate, Diss	20.3	5	8	13	91.3%	75	125	20.2	0.5%	20	

Sample ID: **9906044-12A MS** Batch ID: **513** Test Code: **Mercury** Units: **mg/L** Analysis Date **06/08/99** Prep Date: **06/07/99**
Client ID: **9905119** Run ID: **MERC_990608A** SeqNo: **13241**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	.00217	0.0002	0.002	0	108.5%	75	125	0			

Sample ID: **9906044-12A MSD** Batch ID: **513** Test Code: **Mercury** Units: **mg/L** Analysis Date **06/08/99** Prep Date: **06/07/99**
Client ID: **9905119** Run ID: **MERC_990608A** SeqNo: **13242**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	.00216	0.0002	0.002	0	108.0%	75	125	0.00217	0.5%	20	

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905119
Project: 905079/NMO/Custillo Well

QC SUMMARY REPORT
Sample Matrix Spike

Sample ID: **9905144-01A MS** Batch ID: **548** Test Code: **ICPMET** Units: **mg/L** Analysis Date **06/18/99** Prep Date: **06/16/99**
Client ID: **9905119** Run ID: **ICP_990618B** SeqNo: **15583**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	.52	0.005	0.5	0	104.0%	80	120	0			
Arsenic	.4881	0.005	0.5	0	97.6%	80	120	0			
Barium	.4826	0.005	0.5	0.02096	92.3%	80	120	0			
Beryllium	.5088	0.002	0.5	0	101.8%	80	120	0			
Cadmium	.4927	0.002	0.5	0	98.5%	80	120	0			
Calcium	10.57	0.05	5	5.657	98.2%	80	120	0			
Chromium	.5141	0.005	0.5	0	102.8%	80	120	0			
Copper	.4855	0.005	0.5	0	97.1%	80	120	0			
Hardness	50.93	0.33	33.1	19.28	95.6%	80	120	0			
Iron	5.03	0.015	5	0.02719	100.1%	80	120	0			
Lead	.4903	0.005	0.5	0	98.1%	80	120	0			
Magnesium	5.959	0.05	5	1.252	94.1%	80	120	0			
Manganese	.4931	0.005	0.5	0.007559	97.1%	80	120	0			
Nickel	.4905	0.005	0.5	0	98.1%	80	120	0			
Potassium	5.21	0.2	5	0.533	93.6%	80	120	0			
Selenium	.4733	0.005	0.5	0	94.7%	80	120	0			
Silver	.4802	0.005	0.5	0	96.0%	80	120	0			
Sodium	10.61	0.2	5	6.104	90.2%	80	120	0			
Thallium	.6168	0.01	0.5	0	123.4%	80	120	0			S
Zinc	.496	0.005	0.5	0	99.2%	80	120	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905119
Project: 905079/NMO/Custillo Well

QC SUMMARY REPORT
Sample Matrix Spike Duplicate

Sample ID: **9905144-01A MSD** Batch ID: **548** Test Code: **ICPMET** Units: **mg/L** Analysis Date **06/18/99** Prep Date: **06/16/99**
Client ID: **9905119** Run ID: **ICP_990618B** SeqNo: **15584**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	.5171	0.005	0.5	0	103.4%	80	120	0.52	0.6%	20	
Arsenic	.4866	0.005	0.5	0	97.3%	80	120	0.4881	0.3%	20	
Barium	.4811	0.005	0.5	0.02096	92.0%	80	120	0.4826	0.3%	20	
Beryllium	.5077	0.002	0.5	0	101.5%	80	120	0.5088	0.2%	20	
Cadmium	.492	0.002	0.5	0	98.4%	80	120	0.4927	0.2%	20	
Calcium	10.66	0.05	5	5.657	100.0%	80	120	10.57	0.9%	20	
Chromium	.5122	0.005	0.5	0	102.4%	80	120	0.5141	0.4%	20	
Copper	.4839	0.005	0.5	0	96.8%	80	120	0.4855	0.3%	20	
Hardness	51.31	0.33	33.1	19.28	96.8%	80	120	50.93	0.7%	20	
Iron	5.052	0.015	5	0.02719	100.5%	80	120	5.03	0.4%	20	
Lead	.4895	0.005	0.5	0	97.9%	80	120	0.4903	0.2%	20	
Magnesium	5.996	0.05	5	1.252	94.9%	80	120	5.959	0.6%	20	
Manganese	.4943	0.005	0.5	0.007559	97.3%	80	120	0.4931	0.2%	20	
Nickel	.4899	0.005	0.5	0	98.0%	80	120	0.4905	0.1%	20	
Potassium	5.201	0.2	5	0.533	93.4%	80	120	5.21	0.2%	20	
Selenium	.4714	0.005	0.5	0	94.3%	80	120	0.4733	0.4%	20	
Silver	.4806	0.005	0.5	0	96.1%	80	120	0.4802	0.1%	20	
Sodium	10.67	0.2	5	6.104	91.2%	80	120	10.61	0.5%	20	
Thallium	.6169	0.01	0.5	0	123.4%	80	120	0.6168	0.0%	20	S
Zinc	.4962	0.005	0.5	0	99.2%	80	120	0.496	0.1%	20	

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905119
Project: 905079/NMO/Custillo Well

QC SUMMARY REPORT

Laboratory Control Spike - generic

Sample ID: **LCS**	Batch ID: **01 ALK A-6/1/**	Test Code: **Alkalinity**	Units: **mg/L CaCO3**	Analysis Date **04/19/99**	Prep Date:
Client ID: **9905119**	Run ID: **NO INST_990419A**			SeqNo: **9644**	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Total (As CaCO3)	130	5	126	0	103.2%	85	115	0			

Sample ID: **LCS**	Batch ID: **01 ALK A-6/1/**	Test Code: **Alkalinity**	Units: **mg/L CaCO3**	Analysis Date **05/25/99**	Prep Date:
Client ID: **9905119**	Run ID: **NO INST_990525A**			SeqNo: **9908**	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Total (As CaCO3)	123	5	126	0	97.6%	85	115	0			

Sample ID: **LCS**	Batch ID: **01 ALK A-6/1/**	Test Code: **Alkalinity**	Units: **mg/L CaCO3**	Analysis Date **05/03/99**	Prep Date:
Client ID: **9905119**	Run ID: **NO INST_990503B**			SeqNo: **11151**	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Total (As CaCO3)	120	5	126	0	95.2%	85	115	0			

Sample ID: **LCS**	Batch ID: **01 ALK A-6/1/**	Test Code: **Alkalinity**	Units: **mg/L CaCO3**	Analysis Date **05/10/99**	Prep Date:
Client ID: **9905119**	Run ID: **NO INST_990510C**			SeqNo: **11174**	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Total (As CaCO3)	135	5	126	0	107.1%	85	115	0			

Sample ID: **LCS**	Batch ID: **01 ALK A-6/1/**	Test Code: **Alkalinity**	Units: **mg/L CaCO3**	Analysis Date **05/11/99**	Prep Date:
Client ID: **9905119**	Run ID: **NO INST_990511C**			SeqNo: **11183**	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Total (As CaCO3)	135	5	126	0	107.1%	85	115	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905119
Project: 905079/NMO/Custillo Well

QC SUMMARY REPORT
Laboratory Control Spike - generic

Sample ID: LCS	Batch ID: 01 ALK A-6/1/	Test Code: Alkalinity	Units: mg/L CaCO3	Analysis Date 05/14/99	Prep Date:
Client ID:	9905119	Run ID: NO INST_990514B		SeqNo: 11227	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Total (As CaCO3)	130	5	126	0	103.2%	85	115	0			

Sample ID: LCS	Batch ID: 01 BR A-6/11/	Test Code: Bromide	Units: mg/L	Analysis Date 06/10/99	Prep Date:
Client ID:	9905119	Run ID: HIT MAN_990610A		SeqNo: 13711	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Bromide	.504	0.1	0.5	0	100.8%	85	115	0			

Sample ID: LCS	Batch ID: 01 CL A-6/1/9	Test Code: Chloride	Units: mg/L	Analysis Date 05/26/99	Prep Date:
Client ID:	9905119	Run ID: NO INST_990526A		SeqNo: 9938	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	10	0.5	10	0	100.0%	85	115	0			

Sample ID: LCS	Batch ID: 01 CL A-6/1/9	Test Code: Chloride	Units: mg/L	Analysis Date 05/07/99	Prep Date:
Client ID:	9905119	Run ID: NO INST_990507B		SeqNo: 11087	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	9.5	0.5	10	0	95.0%	85	115	0			

Sample ID: LCS	Batch ID: 01 CL A-6/1/9	Test Code: Chloride	Units: mg/L	Analysis Date 05/17/99	Prep Date:
Client ID:	9905119	Run ID: NO INST_990517C		SeqNo: 11135	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	10.3	0.5	10	0	103.0%	85	115	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905119
Project: 905079/NMO/Custillo Well

QC SUMMARY REPORT
Laboratory Control Spike - generic

Sample ID: LCS	Batch ID: 01 COND-06/	Test Code: E120.1	Units: µmhos/cm	Analysis Date 04/21/99	Prep Date:
Client ID:	9905119	Run ID: NO INST_990421A		SeqNo: 10313	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Sample ID: LCS	Batch ID: 01 COND-06/	Test Code: E120.1	Units: µmhos/cm	Analysis Date 05/10/99	Prep Date:
Client ID:	9905119	Run ID: NO INST_990510A		SeqNo: 10348	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Sample ID: LCS	Batch ID: 01 COND-06/	Test Code: E120.1	Units: µmhos/cm	Analysis Date 05/20/99	Prep Date:
Client ID:	9905119	Run ID: NO INST_990520A		SeqNo: 10366	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Sample ID: LCS	Batch ID: 01 COND-06/	Test Code: E120.1	Units: µmhos/cm	Analysis Date 05/25/99	Prep Date:
Client ID:	9905119	Run ID: NO INST_990525E		SeqNo: 10385	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Specific Conductance	972	1	1000	0	97.2%	85	115	0			

Sample ID: LCS	Batch ID: 01 FL A-6/9/9	Test Code: fluoride	Units: mg/L	Analysis Date 06/08/99	Prep Date:
Client ID:	9905119	Run ID: NO INST_990608B		SeqNo: 13058	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Fluoride	8.5	0.2	8	0	106.3%	85	115	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905119
Project: 905079/NMO/Custillo Well

QC SUMMARY REPORT
Laboratory Control Spike - generic

Sample ID: LCS	Batch ID: 01 SULFATE	Test Code: Sulfate	Units: mg/L	Analysis Date 05/21/99	Prep Date:
Client ID:	9905119	Run ID: HIT MAN_990521B		SeqNo: 9662	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	12	5	12	0	100.0%	85	115	0			

Sample ID: LCS	Batch ID: 01 SULFATE	Test Code: Sulfate	Units: mg/L	Analysis Date 05/27/99	Prep Date:
Client ID:	9905119	Run ID: HIT MAN_990527A		SeqNo: 9766	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	7.816	5	8	0	97.7%	85	115	0			

Sample ID: LCS	Batch ID: 01 SULFATE	Test Code: Sulfate	Units: mg/L	Analysis Date 04/29/99	Prep Date:
Client ID:	9905119	Run ID: HIT MAN_990429A		SeqNo: 10622	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	10	5	10	0	100.0%	85	115	0			

Sample ID: LCS	Batch ID: 01 SULFATE	Test Code: Sulfate	Units: mg/L	Analysis Date 05/12/99	Prep Date:
Client ID:	9905119	Run ID: HIT MAN_990512B		SeqNo: 10870	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	7.43	5	8	0	92.9%	85	115	0			

Sample ID: LCS	Batch ID: 01 SULFATE	Test Code: Sulfate	Units: mg/L	Analysis Date 05/20/99	Prep Date:
Client ID:	9905119	Run ID: HIT MAN_990520A		SeqNo: 10999	

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfate	7.03	5	8	0	87.9%	85	115	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905119
Project: 905079/NMO/Custillo Well

QC SUMMARY REPORT
Laboratory Control Spike - generic

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sample ID: **LCS** Batch ID: **01 TDS-6/1/99** Test Code: **E160.1** Units: **mg/L** Analysis Date **05/25/99** Prep Date:											
Client ID: **9905119** Run ID: **NO INST_990525C** SeqNo: **10234**											
Total Dissolved Solids (Residue, Filtera	3674	10	3966	0	92.6%	85	115	0			
Sample ID: **LCS** Batch ID: **01 TDS-6/1/99** Test Code: **E160.1** Units: **mg/L** Analysis Date **05/26/99** Prep Date:											
Client ID: **9905119** Run ID: **NO INST_990526C** SeqNo: **10285**											
Total Dissolved Solids (Residue, Filtera	4080	10	3966	0	102.9%	85	115	0			
Sample ID: **LCS** Batch ID: **01 TDS-6/1/99** Test Code: **E160.1** Units: **mg/L** Analysis Date **04/28/99** Prep Date:											
Client ID: **9905119** Run ID: **NO INST_990428C** SeqNo: **11255**											
Total Dissolved Solids (Residue, Filtera	3550	10	3966	0	89.5%	85	115	0			
Sample ID: **LCS** Batch ID: **01 TDS-6/1/99** Test Code: **E160.1** Units: **mg/L** Analysis Date **05/05/99** Prep Date:											
Client ID: **9905119** Run ID: **NO INST_990505B** SeqNo: **11273**											
Total Dissolved Solids (Residue, Filtera	3490	10	3966	0		85	115	0			
Sample ID: **LCS** Batch ID: **01 TDS-6/1/99** Test Code: **E160.1** Units: **mg/L** Analysis Date **05/11/99** Prep Date:											
Client ID: **9905119** Run ID: **NO INST_990511D** SeqNo: **11288**											
Total Dissolved Solids (Residue, Filtera	3630	10	3966	0	91.5%	85	115	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905119
Project: 905079/NMO/Custillo Well

QC SUMMARY REPORT
Laboratory Control Spike - generic

Sample ID: **LCS** Batch ID: **01 TDS-6/1/99** Test Code: **E160.1** Units: **mg/L** Analysis Date **05/18/99** Prep Date:
Client ID: **9905119** Run ID: **NO INST_990518B** SeqNo: **11308**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Total Dissolved Solids (Residue, Filtera	3610	10	3966	0		85	115	0			

Sample ID: **LCS-480** Batch ID: **480** Test Code: **SW8270B** Units: **µg/L** Analysis Date **05/27/99** Prep Date: **05/24/99**
Client ID: **9905119** Run ID: **MANFREDD_990527A** SeqNo: **9972**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,2,4-Trichlorobenzene	35.5	5	50	0	71.0%	44	142	0			
1,4-Dichlorobenzene	31.6	5	50	0	63.2%	20	124	0			
2,4-Dinitrotoluene	41.4	5	50	0	82.8%	39	139	0			
2-Chlorophenol	61.5	5	100	0	61.5%	23	134	0			
4-Chloro-3-methylphenol	67.9	5	100	0	67.9%	22	147	0			
4-Nitrophenol	24.7	5	100	0	24.7%	1	132	0			
Acenaphthene	35.4	5	50	0	70.8%	47	145	0			
N-Nitrosodi-n-propylamine	33.6	5	50	0	67.2%	1	230	0			
Pentachlorophenol	68.4	5	100	0	68.4%	14	176	0			
Phenol	25	5	100	0	25.0%	5	112	0			
Pyrene	35.7	5	50	0	71.4%	52	115	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905119
Project: 905079/NMO/Custillo Well

QC SUMMARY REPORT
Laboratory Control Spike Duplicate

Sample ID: **LCSD-480** Batch ID: **480** Test Code: **SW8270B** Units: **µg/L** Analysis Date **05/27/99** Prep Date: **05/24/99**
Client ID: **9905119** Run ID: **MANFREDD_990527A** SeqNo: **9973**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,2,4-Trichlorobenzene	36.5	5	50	0	73.0%	44	142	35.5	2.8%	28	
1,4-Dichlorobenzene	32.4	5	50	0	64.8%	20	124	31.6	2.5%	32	
2,4-Dinitrotoluene	43	5	50	0	86.0%	39	139	41.4	3.8%	22	
2-Chlorophenol	63.6	5	100	0	63.6%	23	134	61.5	3.4%	29	
4-Chloro-3-methylphenol	71.3	5	100	0	71.3%	22	147	67.9	4.9%	37	
4-Nitrophenol	26.6	5	100	0	26.6%	1	132	24.7	7.4%	47	
Acenaphthene	36.8	5	50	0	73.6%	47	145	35.4	3.9%	28	
N-Nitrosodi-n-propylamine	34.5	5	50	0	69.0%	1	230	33.6	2.6%	55	
Pentachlorophenol	71.8	5	100	0	71.8%	14	176	68.4	4.9%	49	
Phenol	24.9	5	100	0	24.9%	5	112	25	0.4%	23	
Pyrene	36	5	50	0	72.0%	52	115	35.7	0.8%	25	

Sample ID: **LCS-513** Batch ID: **513** Test Code: **Mercury** Units: **mg/L** Analysis Date **06/08/99** Prep Date: **06/07/99**
Client ID: **9905119** Run ID: **MERC_990608A** SeqNo: **13238**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	.00101	0.0002	0.001	0	101.0%	80	120	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905119
Project: 905079/NMO/Custillo Well

QC SUMMARY REPORT
Laboratory Control Spike - generic

Sample ID: **LCS-548** Batch ID: **548** Test Code: **ICPMET** Units: **mg/L** Analysis Date **06/18/99** Prep Date: **06/16/99**
Client ID: **9905119** Run ID: **ICP_990618B** SeqNo: **15579**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	.5062	0.005	0.5	0	101.2%	80	120	0			
Arsenic	.4966	0.005	0.5	0	99.3%	80	120	0			
Barium	.4618	0.005	0.5	0	92.4%	80	120	0			
Beryllium	.4966	0.002	0.5	0	99.3%	80	120	0			
Cadmium	.4821	0.002	0.5	0	96.4%	80	120	0			
Calcium	5.032	0.05	5	0	100.6%	80	120	0			
Chromium	.5027	0.005	0.5	0	100.5%	80	120	0			
Copper	.4862	0.005	0.5	0	97.2%	80	120	0			
Hardness	32.11	0.33	33.1	0	97.0%	80	120	0			
Iron	5.023	0.015	5	0	100.5%	80	120	0			
Lead	.4812	0.005	0.5	0	96.2%	80	120	0			
Magnesium	4.745	0.05	5	0	94.9%	80	120	0			
Manganese	.4871	0.005	0.5	0	97.4%	80	120	0			
Nickel	.4796	0.005	0.5	0	95.9%	80	120	0			
Potassium	4.655	0.2	5	0	93.1%	80	120	0			
Selenium	.4622	0.005	0.5	0	92.4%	80	120	0			
Silver	.4894	0.005	0.5	0	97.9%	80	120	0			
Sodium	4.985	0.2	5	0	99.7%	80	120	0			
Thallium	.5995	0.01	0.5	0	119.9%	80	120	0			
Zinc	.4814	0.005	0.5	0	96.3%	80	120	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

Environmental Services Laboratory

Date: *29-Jun-99*

CLIENT: Pinnacle Laboratories
Work Order: 9905119
Project: 905079/NMO/Custillo Well

QC SUMMARY REPORT
Continuing Calibration Verification Standard

Sample ID: **CCV** Batch ID: **480** Test Code: **SW8270B** Units: **µg/L** Analysis Date **05/28/99** Prep Date:

Client ID: **9905119** Run ID: **MANFREDD_990528A** SeqNo: **11674**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,4-Dichlorobenzene	51	5									
2,4,6-Trichlorophenol	56.4	5									
2,4-Dichlorophenol	55.7	5									
2-Nitrophenol	51.4	5									
4-Chloro-3-methylphenol	53.7	5									
Acenaphthene	47.7	5									
Benzo(a)pyrene	51.7	5									
Di-n-octyl phthalate	46	5									
Fluoranthene	52.4	5									
Hexachlorobutadiene	55.4	5									
N-Nitrosodiphenylamine	49.8	5									
Pentachlorophenol	54.5	5									
Phenol	49.5	5									
2,4,6-Tribromophenol	59.8	5	50	0	119.6%	80	120				
2-Fluorobiphenyl	50.7	5	50	0	101.4%	80	120				
2-Fluorophenol	51.1	5	50	0	102.2%	80	120				
4-Terphenyl-d14	49.7	5	50	0	99.4%	80	120				
Nitrobenzene-d5	49.4	5	50	0	98.8%	80	120				
Phenol-d5	50.3	5	50	0	100.6%	80	120				

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905119
Project: 905079/NMO/Custillo Well

QC SUMMARY REPORT

Initial Calibration Verification Standard

Sample ID: **ICV** Batch ID: **513** Test Code: **Mercury** Units: **mg/L** Analysis Date **06/08/99** Prep Date: **06/07/99**
Client ID: **9905119** Run ID: **MERC_990608A** SeqNo: **13260**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	.00216	0.0002	0.002	0	108.0%	90	110	0			

Sample ID: **ICVHI** Batch ID: **548** Test Code: **ICPMET** Units: **mg/L** Analysis Date **06/18/99** Prep Date:
Client ID: **9905119** Run ID: **ICP_990618B** SeqNo: **15555**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aluminum, 200.7	23.83	0.05	25	0	95.3%	95	105	0			
Calcium	24.43	0.05	25	0	97.7%	90	110	0			
Hardness	159	0.33	165	0	96.3%	90	110	0			
Magnesium	23.79	0.05	25	0	95.2%	90	110	0			
Sodium	4.816	0.2	5	0	96.3%	90	110	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9905119
Project: 905079/NMO/Custillo Well

QC SUMMARY REPORT
Initial Calibration Verification Standard

Sample ID: **ICVLOW** Batch ID: **548** Test Code: **ICPMET** Units: **mg/L** Analysis Date **06/18/99** Prep Date:
Client ID: **9905119** Run ID: **ICP_990618B** SeqNo: **15556**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Antimony	.5074	0.005	0.5	0	101.5%	90	110	0			
Arsenic, 200.7	.4982	0.005	0.5	0	99.6%	95	105	0			
Barium	.4804	0.005	0.5	0	96.1%	90	110	0			
Beryllium	.4884	0.002	0.5	0	97.7%	90	110	0			
Cadmium, 200.7	.4857	0.002	0.5	0	97.1%	95	105	0			
Chromium, 200.7	.4906	0.005	0.5	0	98.1%	95	105	0			
Cobalt	.4694	0.005	0.5	0	93.9%	90	110	0			
Copper, 200.7	.4941	0.005	0.5	0	98.8%	95	105	0			
Iron, 200.7	.5094	0.01	0.5	0	101.9%	95	105	0			
Lead, 200.7	.4951	0.005	0.5	0	99.0%	95	105	0			
Manganese	.4799	0.005	0.5	0	96.0%	90	110	0			
Nickel, 200.7	.4782	0.005	0.5	0	95.6%	95	105	0			
Potassium	4.903	0.2	5	0	98.1%	90	110	0			
Selenium	.489	0.005	0.5	0	97.8%	90	110	0			
Silver, 200.7	.4859	0.005	0.5	0	97.2%	95	105	0			
Thallium	.5069	0.01	0.5	0	101.4%	90	110	0			
Vanadium	.4911	0.005	0.5	0	98.2%	90	110	0			
Zinc, 200.7	.4855	0.005	0.5	0	97.1%	95	105	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

Pinnacle Laboratories, Inc. — **Interlab Chain of Custody** — Date: 5/24 Page: 1 of 1 — 9905119

Network Project Manager: Kimberly D. McNeill

Pinnacle Laboratories, Inc.
2709-D Pan American Freeway, NE
Albuquerque, New Mexico 87107
(505) 344-3777 Fax (505) 344-4413

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	Metals (8) RCRA	RCRA TCLP METALS	Metals-13 PP List	Metals-TAL	TOX	Gen Chemistry	Oil and Grease	Volatile Organics GC/MS (8260)	BOD	COD	PESTICIDES/PCB (608/8080)	8270 BY GC/MS	PNA (8310)	8240 (TCLP 1311) ZHE	Herbicides (615/8150)	Base/Neutral Acid Compounds GC/MS (625/8270)	URANIUM	RADIUM 226+228	Gross Alpha/Beta	TO-14	NUMBER OF CONTAINERS
905079-01	5/20	1100	AQ	01					X Ca, K, Mg, Na, Hg	~~Tox~~ Conductivity	X Cl, F, SO4, TDS	X Br, Alk. tBicarb | Carb.				X									

PROJECT INFORMATION		SAMPLE RECEIPT		SAMPLES SENT TO:		RELINQUISHED BY: 1.	RELINQUISHED BY: 2.
PROJECT #: 905079		Total Number of Containers		PENSACOLA - STL-FL		Signature: — Time: Francine Tonno 1700	Signature: Time:
PROJ. NAME: NMO		Chain of Custody Seals		PORTLAND - ESL-OR	X	Printed Name: Francine Tonno Date: 5/24/99	Printed Name: Date:
QC LEVEL: (STD.) IV		Received Intact?		STL - CT		Pinnacle Laboratories, Inc.	Company
QC REQUIRED: (STANDARD) MS MSD BLANK		Received Good Cond./Cold		STL- NEW JERSEY		RECEIVED BY: 1.	RECEIVED BY: 2
TAT: (STANDARD) RUSH!!		LAB NUMBER:		N. CREEK		Signature: Time: Kimberly Ann, IOA	Signature: Time:
DUE DATE: 6/4	COMMENTS:			BARRINGER		Printed Name: Date: 5/25/99	Printed Name: Date:
RUSH SURCHARGE: —				SEQUOIA		Company	Company
CLIENT DISCOUNT: —							
SPECIAL CERTIFICATION REQUIRED: YES (NO)							

PINNACLE LABORATORIES

Pinnacle Laboratories Inc.

CHAIN OF CUSTODY

DATE: 5-20-99 PAGE: 1 OF 1

PLI Accession #: 905079

SHADED AREAS ARE FOR LAB USE ONLY.

PLEASE FILL THIS FORM IN COMPLETELY.

PROJECT MANAGER: Bill Olson WJ 5/21/99

COMPANY: ~~Connie Castillo~~ NMOCD

ADDRESS: ~~4027 S. Eunice Hwy~~ ~~Hobbs, NM 88240~~

PHONE: ~~(505) 393-8032~~

FAX: N/A

BILL TO: Wayne Price

COMPANY: OCD

ADDRESS: 2040 S. Pacheco Santa Fe, NM 87505

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB I.D.	Petroleum Hydrocarbons (418.1) TRPH	(MOD.8015) Diesel/Direct Inject	Se + Hg by AA	(M8015) Gas/Purge & Trap	8021 (BTEX)/8015 (Gasoline) MTBE	8021 (BTEX) ☐ MTBE ☐ TMB ☐ PCE	8021 (TCL)	8021 (EDX)	8021 (HALO)	8021 (CUST)	504.1 EDB ☐ / DBCP ☐	8270	8260 (TCL) Volatile Organics	8260 (Full) Volatile Organics	8260 (CUST) Volatile Organics	8260 (Landfill) Volatile Organics	Pesticides /PCB (608/8081/8082)	Herbicides (615/8151)	Base/Neutral/Acid Compounds GC/MS (625/8270)	Polynuclear Aromatics (610/8310/8270-SIMS)	General Chemistry:	PH	Priority Pollutant Metals (13)	Target Analyte List Metals (23)	RCRA Metals (8)	RCRA Metals by TCLP (Method 1311)	Metals: OCD List item #24	Bromide	NUMBER OF CONTAINERS
990520 1100	5-20-99	11:00 AM	Water	01			X									2		2						1	1					1	1	8
TB	5/19/99	1240	water	02														1														1

PROJECT INFORMATION

PROJ. NO.: Water well

PROJ. NAME: Castillo Well

P.O. NO.:

SHIPPED VIA:

SAMPLE RECEIPT

NO. CONTAINERS	9
CUSTODY SEALS	Y / N / NA
RECEIVED INTACT	Yes
BLUE ICE/ICE	6°C

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS

(RUSH) ☐ 24hr ☐ 48hr ☐ 72hr ☐ 1 WEEK (NORMAL) X

CERTIFICATION REQUIRED: ☐ NM ☐ SDWA ☐ OTHER

METHANOL PRESERVATION ☐

COMMENTS: FIXED FEE ☐

Sample Taken From water well Spigot. - Well ~~pumped~~ Purged 15 min. before sampling. Spigot located back yard next to house.

RELINQUISHED BY: 1.

Signature: [signature] Time: 16:30

Printed Name: Wayne Price Date: 5/20/99

Company: NMOCD

See reverse side (Force Magure)

RECEIVED BY: 1.

Signature: [signature] Time: 1630

Printed Name: William Olson Date: 5/20/99

Company: NMOCD

RELINQUISHED BY: 2.

Signature: [signature] Time: 0920

Printed Name: William Olson Date: 5/21/99

Company: NMOCD

RECEIVED BY: (LAB) 2.

Signature: [signature] Time: 0920

Printed Name: John Caldwell Date: 5/21/99

Pinnacle Laboratories Inc.

PINNACLE LABORATORIES

Remit to: **Pinnacle Laboratories, Inc.**
P.O. Box 36720
Albuquerque, NM 87176-6720
Phone: (505) 344-3777 Fax: (505) 344-4413

FEB 1 0 1999

Bill To: N.M. Oil Conservation Division
2040 South Pacheco
Santa Fe, NM 87505

Client #: 810-134

Date	Invoice
2/ 9/99	78593

Project #: GW-199
Project Name: Champion-Hobbs

Original
BALANCE DUE: 169.00

PO Number	Terms	Project
	Net 30	PIN ALB-810

Quantity	Description	Rate	Amount
1	RCRA 8 Metals by TCLP	169.00	169.00

OK Wayne Price 2/10/99 JJ

To: RCA
From: LAP

Accession #: 902026
Authorized By: Wayne Price

TOTAL: 169.00

A finance charge of 1 1/2% will be charged on balances 30 days past due
PLEASE PAY FROM THIS INVOICE. NO OTHER INVOICE SHALL BE SENT.

PINNACLE LABORATORIES

2709-D Pan American Freeway NE
Albuquerque, New Mexico 87107
Phone (505) 344-3777
Fax (505) 344-4413

PL I.D. **902026**

February 9, 1999

NMOCD
2040 S. Pacheco
Santa Fe, NM 87505

Project Name/Number: CHAMPION-HOBBS GW-199

Attention: Wayne Price

On **12/09/98**, Pinnacle Laborataories Inc., (ADHS License No. AZ0592), received a request to analyze **aqueous and non-aqueous** samples. The samples were analyzed with EPA methodology or equivalent methods. The results of these analyses and the quality control data, which follow each set of analyses, are enclosed.

This report is being reaccessioned under 902026 it was previously reported under accession number 812044.

All analyses were performed by Environmental Services Laboratory, Inc., Portland, OR.

If you have any questions or comments, please do not hesitate to contact us at (505) 344-3777.

Kimberly D. McNeill
Project Manager

H. Mitchell Rubenstein, Ph.D.
General Manager

MR:jt

Enclosure

2709-D Pan American Freeway NE
Albuquerque, New Mexico 87107
Phone (505) 344-3777
Fax (505) 344-4413

PINNACLE LABORATORIES

CLIENT	:NMOCD	DATE RECEIVED	:12/09/98
PROJECT #	:GW-199		
PROJECT NAME	:CHAMPION-HOBBS	REPORT DATE	:02/09/99

PL ID: 902026

	PINNACLE ID #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
01	902026-01	9812081151	AQUEOUS	12/08/98
02	902026-02	9812081209	NON-AQ	12/08/98
03	902026-03	TRIP BLANK	AQUEOUS	12/04/98

---TOTALS---

MATRIX	#SAMPLES
AQUEOUS	2
NON-AQ	1

Environmental Services Laboratory, Inc. E S L

17400 SW Upper Boones Ferry Road • Suite 270 • Portland, OR 97224 • (503) 670-8520

February 04, 1999

Kim McNeill
Pinnacle Laboratories
2709-D Pan American Fwy NE
Albuquerque, NM 87107
TEL: 505-344-3777
FAX (505) 344-4413

RE: 812044 / NMOCD Order No.: 9901097

Dear Kim McNeill,

Environmental Services Laboratory received 1 sample on 1/19/99 for the analyses presented in the following report.

The Samples were analyzed for the following tests:
ICP Metals (ICPMET)
MERCURY, Total (Mercury)

There were no problems with the analyses and all data for associated QC met EPA or laboratory specifications except where noted in the Case Narrative. Results apply only to the samples analyzed. Reproduction of this report is permitted only in its entirety, without the written approval from the Laboratory.

If you have any questions regarding these tests results, please feel free to call.

Sincerely,

Andi Hoevet
Project Manager

Technical Review

Environmental Services Laboratory

Date: *05-Feb-99*

CLIENT:	Pinnacle Laboratories	**Client Sample ID:**	812044-02
Lab Order:	9901097	**Tag Number:**	
Project:	812044 / NMOCD	**Collection Date:**	12/8/99
Lab ID:	9901097-01A	**Matrix:**	SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
MERCURY, TOTAL		**MERCURY**				Analyst: **jph**
Mercury, TCLP	ND	0.0002		mg/L	1	1/27/99
ICP METALS		**ICPMET**				Analyst: **jph**
Arsenic, TCLP	ND	0.05		mg/L	1	1/28/99
Barium, TCLP	0.36	0.05		mg/L	1	1/28/99
Cadmium, TCLP	ND	0.05		mg/L	1	1/28/99
Chromium, TCLP	33	0.05		mg/L	1	1/28/99
Lead, TCLP	ND	0.05		mg/L	1	1/28/99
Selenium, TCLP	ND	0.05		mg/L	1	1/28/99
Silver, TCLP	ND	0.05		mg/L	1	1/28/99

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

Environmental Services Laboratory

Date: *04-Feb-99*

CLIENT: Pinnacle Laboratories
Work Order: 9901097
Project: 812044 / NMOCD

QC SUMMARY REPORT
Method Blank

Sample ID: **MB-67** Batch ID: **67** Test Code: **ICPMET** Units: **mg/L** Analysis Date **1/28/99** Prep Date: **1/27/99**
Client ID: **9901097** Run ID: **ICP_990128A** SeqNo: **2203**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	ND	0.005									
Barium	ND	0.005									
Cadmium	ND	0.002									
Chromium	ND	0.005									
Copper, 200.7	ND	0.005									
Hardness	ND	0.33									
Lead, 200.7	ND	0.005									
Selenium	ND	0.005									
Silver	ND	0.005									
Zinc, 200.7	ND	0.005									

Sample ID: **MB-70** Batch ID: **70** Test Code: **Mercury** Units: **mg/L** Analysis Date **1/27/99** Prep Date: **1/27/99**
Client ID: **9901097** Run ID: **MERC_990127A** SeqNo: **1976**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	ND	0.0002									
Mercury, TCLP	ND	0.0002									

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

Environmental Services Laboratory

Date: *04-Feb-99*

CLIENT: Pinnacle Laboratories
Work Order: 9901097
Project: 812044 / NMOCD

QC SUMMARY REPORT
Sample Duplicate

Sample ID: **9901133-09A DUP** Batch ID: **67** Test Code: **ICPMET** Units: **mg/L** Analysis Date **1/28/99** Prep Date: **1/27/99**
Client ID: **9901097** Run ID: **ICP_990128A** SeqNo: **2208**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Cadmium	ND	0.002	0	0	0.0%	0	0	0	0.0%	20	
Lead	ND	0.005	0	0	0.0%	0	0	0	0.0%	20	

Sample ID: **9901115-01A DUP** Batch ID: **70** Test Code: **Mercury** Units: **mg/L** Analysis Date **1/27/99** Prep Date: **1/27/99**
Client ID: **9901097** Run ID: **MERC_990127A** SeqNo: **1982**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	ND	0.0002	0	0	0.0%	0	0	0	0.0%	20	
Mercury, TCLP	ND	0.0002	0	0	0.0%	0	0	0	0.0%	20	

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

Environmental Services Laboratory

Date: *04-Feb-99*

CLIENT: Pinnacle Laboratories
Work Order: 9901097
Project: 812044 / NMOCD

QC SUMMARY REPORT
Sample Matrix Spike

Sample ID: **9901133-09A MS** Batch ID: **67** Test Code: **ICPMET** Units: **mg/L** Analysis Date **1/28/99** Prep Date: **1/27/99**
Client ID: **9901097** Run ID: **ICP_990128A** SeqNo: **2204**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	.5144	0.005	0.5	0	102.9%	80	120	0			
Barium	.5142	0.005	0.5	0.02716	97.4%	80	120	0			
Cadmium	.508	0.002	0.5	0	101.6%	80	120	0			
Chromium	.5165	0.005	0.5	0	103.3%	80	120	0			
Copper, 200.7	.5281	0.005	0.5	0	105.6%	90	110	0			
Lead, 200.7	.5087	0.005	0.5	0	101.7%	90	110	0			
Selenium	.5077	0.005	0.5	0	101.5%	80	120	0			
Silver	.5139	0.005	0.5	0	102.8%	80	120	0			
Zinc, 200.7	.6245	0.005	0.5	0.0815	108.6%	90	110	0			

Sample ID: **9901133-09A MSD** Batch ID: **67** Test Code: **ICPMET** Units: **mg/L** Analysis Date **1/28/99** Prep Date: **1/27/99**
Client ID: **9901097** Run ID: **ICP_990128A** SeqNo: **2205**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	.5138	0.005	0.5	0	102.8%	80	120	0.5144	0.1%	20	
Barium	.5141	0.005	0.5	0.02716	97.4%	80	120	0.5142	0.0%	20	
Cadmium	.5103	0.002	0.5	0	102.1%	80	120	0.508	0.5%	20	
Chromium	.5194	0.005	0.5	0	103.9%	80	120	0.5165	0.6%	20	
Copper, 200.7	.5283	0.005	0.5	0	105.7%	90	110	0.5281	0.0%	20	
Lead, 200.7	.51	0.005	0.5	0	102.0%	90	110	0.5087	0.3%	20	
Selenium	.51	0.005	0.5	0	102.0%	80	120	0.5077	0.4%	20	
Silver	.5104	0.005	0.5	0	102.1%	80	120	0.5139	0.7%	20	
Zinc, 200.7	.5932	0.005	0.5	0.0815	102.3%	90	110	0.6245	5.1%	20	

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9901097
Project: 812044 / NMOCD

QC SUMMARY REPORT
Sample Matrix Spike

Sample ID: **9901115-01A MS** Batch ID: **70** Test Code: **Mercury** Units: **mg/L** Analysis Date **1/27/99** Prep Date: **1/27/99**
Client ID: **9901097** Run ID: **MERC_990127A** SeqNo: **1979**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	.00217	0.0002	0.002	0	108.5%	75	125	0			
Mercury, TCLP	.00217	0.0002	0.002	0	108.5%	75	125	0			

Sample ID: **9901115-01A MSD** Batch ID: **70** Test Code: **Mercury** Units: **mg/L** Analysis Date **1/27/99** Prep Date: **1/27/99**
Client ID: **9901097** Run ID: **MERC_990127A** SeqNo: **1980**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	.00217	0.0002	0.002	0	108.5%	75	125	0.00217	0.0%	20	
Mercury, TCLP	.00217	0.0002	0.002	0	108.5%	75	125	0.00217	0.0%	20	

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

Environmental Services Laboratory

Date: *04-Feb-99*

CLIENT: Pinnacle Laboratories
Work Order: 9901097
Project: 812044 / NMOCD

QC SUMMARY REPORT
Laboratory Control Spike - generic

Sample ID: **LCS-67**	Batch ID: **67**	Test Code: **ICPMET**	Units: **mg/L**	Analysis Date **1/28/99**	Prep Date: **1/27/99**
Client ID: **9901097**	Run ID: **ICP_990128A**	SeqNo: **2202**			

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	.5119	0.005	0.5	0	102.4%	90	110	0			
Barium	.4859	0.005	0.5	0	97.2%	90	110	0			
Cadmium	.5102	0.002	0.5	0	102.0%	90	110	0			
Chromium	.5133	0.005	0.5	0	102.7%	90	110	0			
Copper, 200.7	.5195	0.005	0.5	0	103.9%	90	110	0			
Hardness	34.52	0.33	33.1	0	104.3%	90	110	0			
Lead, 200.7	.5111	0.005	0.5	0	102.2%	90	110	0			
Selenium	.5083	0.005	0.5	0	101.7%	90	110	0			
Silver	.5095	0.005	0.5	0	101.9%	90	110	0			
Zinc, 200.7	.5214	0.005	0.5	0	104.3%	90	110	0			

Sample ID: **LCS-70**	Batch ID: **70**	Test Code: **Mercury**	Units: **mg/L**	Analysis Date **1/27/99**	Prep Date: **1/27/99**
Client ID: **9901097**	Run ID: **MERC_990127A**	SeqNo: **1977**			

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	.00102	0.0002	0.001	0	102.0%	80	120	0			
Mercury, TCLP	.00102	0.0002	0.001	0	102.0%	80	120	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

Pinnacle Laboratories, Inc. **Interlab Chain of Custody** Date: 12/9 Page: 1 of 1

Network Project Manager: Kimberly D. McNeill

innacle Laboratories, Inc.
709-D Pan American Freeway, NE
lbuquerque, New Mexico 87107
5) 344-3777 Fax (505) 344-4413

lease grind up the yellow rocks into fine owder and mix in with soil when analyzed. lease wear some sort of mask when doing his procedure. There might be high hits r Cr & Pb. Any questions call Francine.

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	Metals (8) RCRA	RCRA TCLP METALS	Metals Cu, K, Mg, Na, Bromide	Metals- Al, Sb, As, Ba, Be, B, Cd	Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo	Ni, K, Se, Si, Ag, Na, Tl, V, Zn, Hg	NO_2 & NO_3, Conductivity	Gen Chemistry: Cl, F, SO_4, TDS	Alkalinity (Bcarb/Carb)	Oil and Grease	Volatile Organics GC/MS (8260)	BOD	COD	PESTICIDES/PCB (608/8080)	8270 BY GC/MS	PNA (8310)	8240 (TCLP 1311) ZHE	Herbicides (615/8150)	Base/Neutral Acid Compounds GC/MS (625/8270)	URANIUM	RADIUM 226+228	Gross Alpha/Beta	TO-14	NUMBER OF CONTAINERS
812044-01	12/8	1151	AQ	10A83			X	X	X	X	X	X	X															4
-02	↓	1209	NAQ	10A84			X	X	X	X	X	X	X															2

98 01098

PROJECT INFORMATION				SAMPLE RECEIPT		SAMPLES SENT TO:		RELINQUISHED BY: 1.	RELINQUISHED BY: 2.
OJECT #: 812044				Total Number of Containers		PENSACOLA - STL-FL		Signature: Time: Francine Tonno 1705	Signature: Time:
OJ. NAME: NMOCD				Chain of Custody Seals		PORTLAND - ESL-OR	X	Printed Name: Date: Francine Tonno 12/9/98	Printed Name: Date:
LEVEL: (STD.) IV				Received Intact?		STL - CT		Pinnacle Laboratories, Inc.	Company
REQUIRED: MS MSD BLANK				Received Good Cond./Cold		STL- NEW JERSEY		RECEIVED BY: 1.	RECEIVED BY: 2
T: (STANDARD) RUSH!!				LAB NUMBER: 98.02385		N. CREEK		Signature: Time: 945	Signature: Time:
						BARRINGER		Printed Name: Date: 12/10/98	Printed Name: Date:
E DATE: 12/17				COMMENTS:		SEQUOIA		Company	Company
SH SURCHARGE: —				Please see original COC under comments section. for metals instruction for soil sample					
ENT DISCOUNT: —									
ECIAL CERTIFICATION QUIRED: YES (NO)									

American Environmental Network (NM), Inc.

CHAIN OF CUSTODY

DATE: 12/08/98 PAGE: 1 OF 1

AEN(NM) Accession #: 98120[illegible]

SHADED AREAS ARE FOR LAB USE ONLY.

PLEASE FILL THIS FORM IN COMPLETELY.

PROJECT MANAGER:

COMPANY: NMOCD
ADDRESS: 2040 South PACHECO
SANTA Fe NM 87505
PHONE: 505-827-7155
FAX:
BILL TO: S.A.B
COMPANY:
ADDRESS:

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB I.D.	Petroleum Hydrocarbons (418.1) TRPH	(MOD.8015) Diesel/Direct Inject	(M8015) Gas/Purge & Trap	8021 (BTEX)/8015 (Gasoline)	8021 (BTEX) ☐ MTBE ☐ TMB ☐ PCE	8021 (TCL)	8021 (EDX)	8021 (HALO)	8021 (CUST)	504.1 EDB ☐ / DBCP ☐	8260 (TCL) Volatile Organics	8260 (Full) Volatile Organics	8260 (CUST) Volatile Organics	8260 (Landfill) Volatile Organics	Pesticides /PCB (608/8081)	Herbicides (615/8151)	Base/Neutral/Acid Compounds GC/MS (625/8270)	Polynuclear Aromatics (610/8310)	General Chemistry: OCD + BR	PH	Priority Pollutant Metals (13)	Target Analyte List Metals (23)	RCRA Metals (8)	RCRA Metals by TCLP (Method 1311)	Metals: OCD + CAT + AWS	* MIX + GRIND Soil SAMPLE	NUMBER OF CONTAINERS
981208 1151	12/08/98	11:51 AM	WATER	01													X				X	X	X	X					X	*	3
981208 1209	12/08/98	12:09 PM	SOIL	02													X				X	X	X						X	*	5
Trip Blank	12/4	1245	AQ	03													X														1

PROJECT INFORMATION

PROJ. NO.: GW-199
PROJ. NAME: CHAMPION-HOBBS
P.O. NO.:
SHIPPED VIA:

SAMPLE RECEIPT

NO. CONTAINERS	18
CUSTODY SEALS	(Y) N / NA
RECEIVED INTACT	YES
BLUE ICE/ICE	ICE

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS:

(RUSH) ☐ 24hr ☐ 48hr ☐ 72hr ☐ 1 WEEK (NORMAL) X

CERTIFICATION REQUIRED: ☐ NM ☐ SDWA ☐ OTHER

METHANOL PRESERVATION ☐ ICE +

COMMENTS: FIXED FEE ☐

* MIX + GRIND SOIL SAMPLE (METALS) BEFORE SAMPLING! SMALL YELLOW ROCKS TO BE GROUND-UP!
RETAIN SAMPLE UNTIL OCD NOTIFIES!
1 soil sample recd wet, alternate soil sample used.

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.
Signature:	Signature:
Time: 3:00 PM	Time:
Printed Name: WAYNE PRICE	Printed Name:
Date: 12/08/98	Date:
Company: NMOCD	Company:
RECEIVED BY: 1.	**RECEIVED BY: (LAB) 2.**
Signature:	Signature: Time:
Time:	Printed Name: Date:
Printed Name:	Company: American Environmental Network (NM), Inc.
Date:	
Company:	

PINNACLE LABORATORIES

Remit to: Pinnacle Laboratories, Inc.
P.O. Box 36720
Albuquerque, NM 87176-6720
Phone: (505) 344-3777 Fax: (505) 344-4413

Bill To: N.M. Oil Conservation Division
2040 South Pacheco
Santa Fe, NM 87505

Client #: 810-134

Date	Invoice
1/19/99	78518

Project Name: Champion-Hobbs

Original
BALANCE DUE: 2,062.00

PO Number	Terms	Project
	Net 30	PIN ALB-810

Quantity	Description	Rate	Amount
2	EPA Method 8260	180.00	360.00
2	EPA Method 8270	300.00	600.00
2	EPA Method 8310	135.00	270.00
2	Mercury, CVAA	20.00	40.00
2	Item-24: Metals by ICAP Method 6010: Al, Sb As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Tl, V, Zn	200.00	400.00
2	F, Br, Ca, K, Mg, Na, Alk.Group, Cl, SO4, TDS, Cation/Anion Balance, Conductivity	160.00	320.00
2	Nitrate	36.00	72.00

OK FOR PAYMENT
By Wayne Price 1/22/99

Accession #: 812044
Authorized By: Wayne Price

TOTAL: 2,062.00

A finance charge of 11/2% will be charged on balances 30 days past due
PLEASE PAY FROM THIS INVOICE. NO OTHER INVOICE SHALL BE SENT.

2709-D Pan American Freeway NE
Albuquerque, New Mexico 87107
Phone (505) 344-3777
Fax (505) 344-4413

PINNACLE LABORATORIES

Pinnacle Lab ID number **812044**
January 19, 1999

NMOCD
2040 S. PACHECO
SANTA FE, NM 87505

Project Name CHAMPION-HOBBS
Project Number GW-199

Attention: WAYNE PRICE

On 12/9/98 Pinnacle Laboratories, Inc. Inc., (ADHS License No. AZ0592), received a request to analyze **aqueous and non-aq** samples. The samples were analyzed with EPA methodology or equivalent methods. The results of these analyses and the quality control data, which follow each set of analyses, are enclosed.

EPA methods 150.1 and 8260 were performed by Pinnacle Laboratories, Inc., Albuquerque, NM.

EPA methods 8270 and 8310 were performed by Severn Trent (FL) Inc., Pensacola, FL.

All other parameters were performed by ESL (OR) Inc., Portland, OR.

If you have any questions or comments, please do not hesitate to contact us at (505)344-3777.

Kimberly D. McNeill
Project Manager

H. Mitchell Rubenstein, Ph. D.
General Manager

MR: mt

Enclosure

PINNACLE LABORATORIES

2709-D Pan American Freeway NE
Albuquerque, New Mexico 87107
Phone (505) 344-3777
Fax (505) 344-4413

CLIENT	: NMOCD	PINNACLE ID	: 812044
PROJECT #	: GW-199	DATE RECEIVED	: 12/9/98
PROJECT NAME	: CHAMPION-HOBBS	REPORT DATE	: 1/19/99

AEN ID. #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
01	9812081151	AQUEOUS	12/8/98
02	9812081209	NON-AQ	12/8/98
03	TRIP BLANK	AQUEOUS	12/4/98

PINNACLE LABORATORIES

2709-D Pan American Freeway NE
Albuquerque, New Mexico 87107
Phone (505) 344-3777
Fax (505) 344-4413

GENERAL CHEMISTRY RESULTS

CLIENT	: NMOCD	PINNACLE I.D.	: 812044
PROJECT #	: GW-199	DATE RECEIVED	: 12/9/98
PROJECT NAME	: CHAMPION-HOBBS		

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE ANALYZED
01	9812081151	AQUEOUS	12/8/98	12/10/98

PARAMETER	UNITS	9812081151
PH (150.1)	UNITS	7.24

CHEMIST NOTES:
N/A

2709-D Pan American Freeway NE
Albuquerque, New Mexico 87107
Phone (505) 344-3777
Fax (505) 344-4413

PINNACLE LABORATORIES

GENERAL CHEMISTRY - QUALITY CONTROL

CLIENT	: NMOCD	PINNACLE I.D.	: 812044
PROJECT #	: GW-199	SAMPLE MATRIX	: AQUEOUS
PROJECT NAME	: CHAMPION-HOBBS		

PARAMETER	UNITS	PINNACLE I.D.	SAMPLE RESULT	DUP. RESULT	% RPD
PH	UNITS	812043-01	7.18	7.24	1

CHEMIST NOTES:
N/A

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative Percent Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

2709-D Pan American Freeway NE
Albuquerque, New Mexico 87107
Phone (505) 344-3777
Fax (505) 344-4413

PINNACLE LABORATORIES

GENERAL CHEMISTRY RESULTS

CLIENT	: NMOCD	PINNACLE I.D.	: 812044
PROJECT #	: GW-199	DATE RECEIVED	: 12/9/98
PROJECT NAME	: CHAMPION-HOBBS		

SAMPLE ID. #	CLIENT I.D.	MATRIX	DATE SAMPLED	DATE ANALYZED
02	9812081209	NON-AQ	12/8/98	12/18/98

PARAMETER	UNITS	9812081209
PH (ASTMD 4980-89)	UNITS	7.62

CHEMIST NOTES:
N/A

2709-D Pan American Freeway NE
Albuquerque, New Mexico 87107
Phone (505) 344-3777
Fax (505) 344-4413

PINNACLE LABORATORIES

GENERAL CHEMISTRY - QUALITY CONTROL

CLIENT	: NMOCD	PINNACLE I.D.	: 812044
PROJECT #	: GW-199	SAMPLE MATRIX	: NON-AQ
PROJECT NAME	: CHAMPION-HOBBS		

PARAMETER	UNITS	PINNACLE I.D.	SAMPLE RESULT	DUP. RESULT	% RPD
PH	UNITS	812044-02	7.62	7.64	0

CHEMIST NOTES:
N/A

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative Percent Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

2709-D Pan American Freeway NE
Albuquerque, New Mexico 87107
Phone (505) 344-3777
Fax (505) 344-4413

PINNACLE LABORATORIES

GC/MS RESULTS

TEST	: VOLATILE ORGANICS EPA METHOD 8260		
CLIENT	: NMOCD	PINNACLE I.D. :	812044
PROJECT #	: GW-199	DATE RECEIVED :	12/9/98
PROJECT NAME	: CHAMPION-HOBBS		

SAMPLE ID #	CLIENT ID	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
812044-01	9812081151	AQUEOUS	12/8/98	N/A	12/15/98	1

PARAMETER	DET. LIMIT		UNITS
Dichlorodifluoromethane	1.0	< 1.0	ug/L
Chloromethane	1.0	< 1.0	ug/L
Vinyl Chloride	1.0	< 1.0	ug/L
Bromomethane	1.0	< 1.0	ug/L
Chloroethane	1.0	< 1.0	ug/L
Trichlorofluoromethane	1.0	< 1.0	ug/L
Acetone	10	< 10	ug/L
Acrolein	5.0	< 5.0	ug/L
1,1-Dichloroethene	1.0	< 1.0	ug/L
Iodomethane	1.0	< 1.0	ug/L
Methylene Chloride	1.0	< 1.0	ug/L
Acrylonitrile	5.0	< 5.0	ug/L
cis-1,2-Dichloroethene	1.0	< 1.0	ug/L
Methyl-t-butyl Ether	1.0	< 1.0	ug/L
1,1,2,1,2,2-Trichlorotrifluoroethane	1.0	< 1.0	ug/L
1,1-Dichloroethane	1.0	< 1.0	ug/L
trans-1,2-Dichloroethene	1.0	< 1.0	ug/L
2-Butanone	10	< 10	ug/L
Carbon Disulfide	1.0	< 1.0	ug/L
Bromochloromethane	1.0	< 1.0	ug/L
Chloroform	1.0	< 1.0	ug/L
2,2-Dichloropropane	1.0	< 1.0	ug/L
1,2-Dichloroethane	1.0	< 1.0	ug/L
Vinyl Acetate	1.0	< 1.0	ug/L
1,1,1-Trichloroethane	1.0	< 1.0	ug/L
1,1-Dichloropropene	1.0	< 1.0	ug/L
Carbon Tetrachloride	1.0	< 1.0	ug/L
Benzene	1.0	< 1.0	ug/L
1,2-Dichloropropane	1.0	< 1.0	ug/L
Trichloroethene	1.0	< 1.0	ug/L
Bromodichloromethane	1.0	< 1.0	ug/L
2-Chloroethyl Vinyl Ether	10	< 10	ug/L
cis-1,3-Dichloropropene	1.0	< 1.0	ug/L
trans-1,3-Dichloropropene	1.0	< 1.0	ug/L
1,1,2-Trichloroethane	1.0	< 1.0	ug/L
1,3-Dichloropropane	1.0	< 1.0	ug/L
Dibromomethane	1.0	< 1.0	ug/L
Toluene	1.0	< 1.0	ug/L
1,2-Dibromoethane	1.0	< 1.0	ug/L
4-Methyl-2-Pentanone	10	< 10	ug/L
2-Hexanone	10	< 10	ug/L
Dibromochloromethane	1.0	< 1.0	ug/L
Tetrachloroethene	1.0	< 1.0	ug/L
Chlorobenzene	1.0	< 1.0	ug/L
Ethylbenzene	1.0	< 1.0	ug/L

2709-D Pan American Freeway NE
Albuquerque, New Mexico 87107
Phone (505) 344-3777
Fax (505) 344-4413

PINNACLE LABORATORIES

GC/MS RESULTS

TEST : VOLATILE ORGANICS EPA METHOD 8260
CLIENT : NMOCD — PINNACLE I.D. : 812044
PROJECT # : GW-199 — DATE RECEIVED : 12/9/98
PROJECT NAME : CHAMPION-HOBBS

SAMPLE ID #	CLIENT ID	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
812044-01	9812081151	AQUEOUS	12/8/98	N/A	12/15/98	1

PARAMETER	DET. LIMIT		UNITS
1,1,1,2-Tetrachloroethane	1.0	< 1.0	ug/L
m&p Xylenes	1.0	< 1.0	ug/L
o-Xylene	1.0	< 1.0	ug/L
Styrene	1.0	< 1.0	ug/L
Bromoform	1.0	< 1.0	ug/L
1,1,2,2-Tetrachloroethane	1.0	< 1.0	ug/L
1,2,3-Trichloropropane	1.0	< 1.0	ug/L
Isopropyl Benzene	1.0	< 1.0	ug/L
Bromobenzene	1.0	< 1.0	ug/L
trans-1,4-Dichloro-2-Butene	1.0	< 1.0	ug/L
n-Propylbenzene	1.0	< 1.0	ug/L
2-Chlorotoluene	1.0	< 1.0	ug/L
4-Chlorotoluene	1.0	< 1.0	ug/L
1,3,5-Trimethylbenzene	1.0	< 1.0	ug/L
tert-Butylbenzene	1.0	< 1.0	ug/L
1,2,4-Trimethylbenzene	1.0	< 1.0	ug/L
sec-Butylbenzene	1.0	< 1.0	ug/L
1,3-Dichlorobenzene	1.0	< 1.0	ug/L
1,4-Dichlorobenzene	1.0	< 1.0	ug/L
p-Isopropyltoluene	1.0	< 1.0	ug/L
1,2-Dichlorobenzene	1.0	< 1.0	ug/L
n-Butylbenzene	1.0	< 1.0	ug/L
1,2-Dibromomo-3-chloropropane	1.0	< 1.0	ug/L
1,2,4-Trichlorobenzene	1.0	< 1.0	ug/L
Naphthalene	1.0	< 1.0	ug/L
Hexachlorobutadiene	1.0	< 1.0	ug/L
1,2,3-Trichlorobenzene	1.0	< 1.0	ug/L

SURROGATE % RECOVERY		
1,2-Dichloroethane-d4	96	(80 - 120)
Toluene-d8	103	(88 - 110)
Bromofluorobenzene	98	(86 - 115)

2709-D Pan American Freeway NE
Albuquerque, New Mexico 87107
Phone (505) 344-3777
Fax (505) 344-4413

PINNACLE LABORATORIES

GC/MS RESULTS

TEST	: VOLATILE ORGANICS EPA METHOD 8260		
CLIENT	: NMOCD	PINNACLE I.D. :	812044
PROJECT #	: GW-199	DATE RECEIVED :	12/9/98
PROJECT NAME	: CHAMPION-HOBBS		

SAMPLE ID #	CLIENT ID	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
812044-03	TRIP BLANK	AQUEOUS	12/4/98	N/A	12/15/98	1

PARAMETER	DET. LIMIT		UNITS
Dichlorodifluoromethane	1.0	< 1.0	ug/L
Chloromethane	1.0	< 1.0	ug/L
Vinyl Chloride	1.0	< 1.0	ug/L
Bromomethane	1.0	< 1.0	ug/L
Chloroethane	1.0	< 1.0	ug/L
Trichlorofluoromethane	1.0	< 1.0	ug/L
Acetone	10	< 10	ug/L
Acrolein	5.0	< 5.0	ug/L
1,1-Dichloroethene	1.0	< 1.0	ug/L
Iodomethane	1.0	< 1.0	ug/L
Methylene Chloride	1.0	< 1.0	ug/L
Acrylonitrile	5.0	< 5.0	ug/L
cis-1,2-Dichloroethene	1.0	< 1.0	ug/L
Methyl-t-butyl Ether	1.0	< 1.0	ug/L
1,1,2,1,2,2-Trichlorotrifluoroethane	1.0	< 1.0	ug/L
1,1-Dichloroethane	1.0	< 1.0	ug/L
trans-1,2-Dichloroethene	1.0	< 1.0	ug/L
2-Butanone	10	< 10	ug/L
Carbon Disulfide	1.0	< 1.0	ug/L
Bromochloromethane	1.0	< 1.0	ug/L
Chloroform	1.0	< 1.0	ug/L
2,2-Dichloropropane	1.0	< 1.0	ug/L
1,2-Dichloroethane	1.0	< 1.0	ug/L
Vinyl Acetate	1.0	< 1.0	ug/L
1,1,1-Trichloroethane	1.0	< 1.0	ug/L
1,1-Dichloropropene	1.0	< 1.0	ug/L
Carbon Tetrachloride	1.0	< 1.0	ug/L
Benzene	1.0	< 1.0	ug/L
1,2-Dichloropropane	1.0	< 1.0	ug/L
Trichloroethene	1.0	< 1.0	ug/L
Bromodichloromethane	1.0	< 1.0	ug/L
2-Chloroethyl Vinyl Ether	10	< 10	ug/L
cis-1,3-Dichloropropene	1.0	< 1.0	ug/L
trans-1,3-Dichloropropene	1.0	< 1.0	ug/L
1,1,2-Trichloroethane	1.0	< 1.0	ug/L
1,3-Dichloropropane	1.0	< 1.0	ug/L
Dibromomethane	1.0	< 1.0	ug/L
Toluene	1.0	< 1.0	ug/L
1,2-Dibromoethane	1.0	< 1.0	ug/L
4-Methyl-2-Pentanone	10	< 10	ug/L
2-Hexanone	10	< 10	ug/L
Dibromochloromethane	1.0	< 1.0	ug/L
Tetrachloroethene	1.0	< 1.0	ug/L
Chlorobenzene	1.0	< 1.0	ug/L
Ethylbenzene	1.0	< 1.0	ug/L

2709-D Pan American Freeway NE
Albuquerque, New Mexico 87107
Phone (505) 344-3777
Fax (505) 344-4413

PINNACLE LABORATORIES

GC/MS RESULTS

TEST	: VOLATILE ORGANICS EPA METHOD 8260		
CLIENT	: NMOCD	PINNACLE I.D. :	812044
PROJECT #	: GW-199	DATE RECEIVED :	12/9/98
PROJECT NAME	: CHAMPION-HOBBS		

SAMPLE ID #	CLIENT ID	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
812044-03	TRIP BLANK	AQUEOUS	12/4/98	N/A	12/15/98	1

PARAMETER	DET. LIMIT		UNITS
1,1,1,2-Tetrachloroethane	1.0	< 1.0	ug/L
m&p Xylenes	1.0	< 1.0	ug/L
o-Xylene	1.0	< 1.0	ug/L
Styrene	1.0	< 1.0	ug/L
Bromoform	1.0	< 1.0	ug/L
1,1,2,2-Tetrachloroethane	1.0	< 1.0	ug/L
1,2,3-Trichloropropane	1.0	< 1.0	ug/L
Isopropyl Benzene	1.0	< 1.0	ug/L
Bromobenzene	1.0	< 1.0	ug/L
trans-1,4-Dichloro-2-Butene	1.0	< 1.0	ug/L
n-Propylbenzene	1.0	< 1.0	ug/L
2-Chlorotoluene	1.0	< 1.0	ug/L
4-Chlorotoluene	1.0	< 1.0	ug/L
1,3,5-Trimethylbenzene	1.0	< 1.0	ug/L
tert-Butylbenzene	1.0	< 1.0	ug/L
1,2,4-Trimethylbenzene	1.0	< 1.0	ug/L
sec-Butylbenzene	1.0	< 1.0	ug/L
1,3-Dichlorobenzene	1.0	< 1.0	ug/L
1,4-Dichlorobenzene	1.0	< 1.0	ug/L
p-Isopropyltoluene	1.0	< 1.0	ug/L
1,2-Dichlorobenzene	1.0	< 1.0	ug/L
n-Butylbenzene	1.0	< 1.0	ug/L
1,2-Dibromomo-3-chloropropane	1.0	< 1.0	ug/L
1,2,4-Trichlorobenzene	1.0	< 1.0	ug/L
Naphthalene	1.0	< 1.0	ug/L
Hexachlorobutadiene	1.0	< 1.0	ug/L
1,2,3-Trichlorobenzene	1.0	< 1.0	ug/L

SURROGATE % RECOVERY		
1,2-Dichloroethane-d4	93	(80 - 120)
Toluene-d8	97	(88 - 110)
Bromofluorobenzene	93	(86 - 115)

2709-D Pan American Freeway NE
Albuquerque, New Mexico 87107
Phone (505) 344-3777
Fax (505) 344-4413

PINNACLE LABORATORIES

GC/MS RESULTS

TEST : VOLATILE ORGANICS EPA METHOD 8260
CLIENT : NMOCD PINNACLE I.D. : 812044
PROJECT # : GW-199
PROJECT NAME : CHAMPION-HOBBS

SAMPLE ID #	BATCH	MATRIX	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
REAGENT BLANK	121598	AQUEOUS	N/A	12/15/98	1

PARAMETER	DET. LIMIT		UNITS
Dichlorodifluoromethane	1.0	< 1.0	ug/L
Chloromethane	1.0	< 1.0	ug/L
Vinyl Chloride	1.0	< 1.0	ug/L
Bromomethane	1.0	< 1.0	ug/L
Chloroethane	1.0	< 1.0	ug/L
Trichlorofluoromethane	1.0	< 1.0	ug/L
Acetone	10	< 10	ug/L
Acrolein	5.0	< 5.0	ug/L
1,1-Dichloroethene	1.0	< 1.0	ug/L
Iodomethane	1.0	< 1.0	ug/L
Methylene Chloride	1.0	< 1.0	ug/L
Acrylonitrile	5.0	< 5.0	ug/L
cis-1,2-Dichloroethene	1.0	< 1.0	ug/L
Methyl-t-butyl Ether	1.0	< 1.0	ug/L
1,1,2,1,2,2-Trichlorotrifluoroethane	1.0	< 1.0	ug/L
1,1-Dichloroethane	1.0	< 1.0	ug/L
trans-1,2-Dichloroethene	1.0	< 1.0	ug/L
2-Butanone	10	< 10	ug/L
Carbon Disulfide	1.0	< 1.0	ug/L
Bromochloromethane	1.0	< 1.0	ug/L
Chloroform	1.0	< 1.0	ug/L
2,2-Dichloropropane	1.0	< 1.0	ug/L
1,2-Dichloroethane	1.0	< 1.0	ug/L
Vinyl Acetate	1.0	< 1.0	ug/L
1,1,1-Trichloroethane	1.0	< 1.0	ug/L
1,1-Dichloropropene	1.0	< 1.0	ug/L
Carbon Tetrachloride	1.0	< 1.0	ug/L
Benzene	1.0	< 1.0	ug/L
1,2-Dichloropropane	1.0	< 1.0	ug/L
Trichloroethene	1.0	< 1.0	ug/L
Bromodichloromethane	1.0	< 1.0	ug/L
2-Chloroethyl Vinyl Ether	10	< 10	ug/L
cis-1,3-Dichloropropene	1.0	< 1.0	ug/L
trans-1,3-Dichloropropene	1.0	< 1.0	ug/L
1,1,2-Trichloroethane	1.0	< 1.0	ug/L
1,3-Dichloropropane	1.0	< 1.0	ug/L
Dibromomethane	1.0	< 1.0	ug/L
Toluene	1.0	< 1.0	ug/L
1,2-Dibromoethane	1.0	< 1.0	ug/L
4-Methyl-2-Pentanone	10	< 10	ug/L
2-Hexanone	10	< 10	ug/L
Dibromochloromethane	1.0	< 1.0	ug/L
Tetrachloroethene	1.0	< 1.0	ug/L
Chlorobenzene	1.0	< 1.0	ug/L
Ethylbenzene	1.0	< 1.0	ug/L

2709-D Pan American Freeway NE
Albuquerque, New Mexico 87107
Phone (505) 344-3777
Fax (505) 344-4413

PINNACLE LABORATORIES

GC/MS RESULTS

TEST : VOLATILE ORGANICS EPA METHOD 8260
CLIENT : NMOCD PINNACLE I.D. : 812044
PROJECT # : GW-199
PROJECT NAME : CHAMPION-HOBBS

SAMPLE ID #	BATCH	MATRIX	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
REAGENT BLANK	121598	AQUEOUS	N/A	12/15/98	1

PARAMETER	DET. LIMIT		UNITS
1,1,1,2-Tetrachloroethane	1.0	< 1.0	ug/L
m&p Xylenes	1.0	< 1.0	ug/L
o-Xylene	1.0	< 1.0	ug/L
Styrene	1.0	< 1.0	ug/L
Bromoform	1.0	< 1.0	ug/L
1,1,2,2-Tetrachloroethane	1.0	< 1.0	ug/L
1,2,3-Trichloropropane	1.0	< 1.0	ug/L
Isopropyl Benzene	1.0	< 1.0	ug/L
Bromobenzene	1.0	< 1.0	ug/L
trans-1,4-Dichloro-2-Butene	1.0	< 1.0	ug/L
n-Propylbenzene	1.0	< 1.0	ug/L
2-Chlorotoluene	1.0	< 1.0	ug/L
4-Chlorotoluene	1.0	< 1.0	ug/L
1,3,5-Trimethylbenzene	1.0	< 1.0	ug/L
tert-Butylbenzene	1.0	< 1.0	ug/L
1,2,4-Trimethylbenzene	1.0	< 1.0	ug/L
sec-Butylbenzene	1.0	< 1.0	ug/L
1,3-Dichlorobenzene	1.0	< 1.0	ug/L
1,4-Dichlorobenzene	1.0	< 1.0	ug/L
p-Isopropyltoluene	1.0	< 1.0	ug/L
1,2-Dichlorobenzene	1.0	< 1.0	ug/L
n-Butylbenzene	1.0	< 1.0	ug/L
1,2-Dibromomo-3-chloropropane	1.0	< 1.0	ug/L
1,2,4-Trichlorobenzene	1.0	< 1.0	ug/L
Naphthalene	1.0	< 1.0	ug/L
Hexachlorobutadiene	1.0	< 1.0	ug/L
1,2,3-Trichlorobenzene	1.0	< 1.0	ug/L

SURROGATE % RECOVERY		
1,2-Dichloroethane-d4	98	(80 - 120)
Toluene-d8	103	(88 - 110)
Bromofluorobenzene	100	(86 - 115)

2709-D Pan American Freeway NE
Albuquerque, New Mexico 87107
Phone (505) 344-3777
Fax (505) 344-4413

PINNACLE LABORATORIES

MATRIX SPIKE/MATRIX SPIKE DUPLICATE RESULTS

TEST	: VOLATILE ORGANICS EPA METHOD 8260	PINNACLE I.D.	: 812044
SPIKED SAMPLE	: 812030-01	DATE ANALYZED	: 12/15/98
CLIENT	: NMOCD	UNITS	: ug/L (PPB)
PROJECT #	: GW-199		
PROJECT NAME	: CHAMPION-HOBBS		

COMPOUND	SAMPLE CONC.	SPIKE ADDED	MS RESULT	MSD RESULT	MS %REC	MSD %REC	RPD	QC LIMITS RPD	QC LIMITS %RECOVERY
1,1-DICHLOROETHENE	<1.0	50.0	46.5	41.3	93	83	12	14	61-145
BENZENE	<1.0	50.0	51.8	51.5	104	103	1	11	76-127
TRICHLOROETHENE	<1.0	50.0	51.6	51.5	103	103	0	14	71-120
TOLUENE	<1.0	50.0	52.6	52.4	105	105	0	13	76-125
CHLOROBENZENE	<1.0	50.0	52.8	52.8	106	106	0	13	75-130

2709-D Pan American Freeway NE
Albuquerque, New Mexico 87107
Phone (505) 344-3777
Fax (505) 344-4413

PINNACLE LABORATORIES

GC/MS RESULTS

TEST	: VOLATILE ORGANICS EPA METHOD 8260		
CLIENT	: NMOCD	PINNACLE I.D. :	812044
PROJECT #	: GW-199	DATE RECEIVED :	12/9/98
PROJECT NAME	: CHAMPION-HOBBS		

SAMPLE ID #	CLIENT ID	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
812044-02	9812081209	SOIL	12/8/98	12/14/98	12/14/98	1

PARAMETER	DET. LIMIT		UNITS
Dichlorodifluoromethane	0.05	< 0.05	MG/KG
Chloromethane	0.05	< 0.05	MG/KG
Vinyl Chloride	0.05	< 0.05	MG/KG
Bromomethane	0.05	< 0.05	MG/KG
Chloroethane	0.05	< 0.05	MG/KG
Trichlorofluoromethane	0.05	< 0.05	MG/KG
Acetone	0.5	< 0.5	MG/KG
Acrolein	0.25	< 0.25	MG/KG
1,1-Dichloroethene	0.05	< 0.05	MG/KG
Iodomethane	0.05	< 0.05	MG/KG
Methylene Chloride	0.05	< 0.05	MG/KG
Acrylonitrile	0.25	< 0.25	MG/KG
cis-1,2-Dichloroethene	0.05	< 0.05	MG/KG
Methyl-t-butyl Ether	0.05	< 0.05	MG/KG
1,1,2,1,2,2-Trichlorotrifluoroethane	0.05	< 0.05	MG/KG
1,1-Dichloroethane	0.05	< 0.05	MG/KG
trans-1,2-Dichloroethene	0.05	< 0.05	MG/KG
2-Butanone	0.5	< 0.5	MG/KG
Carbon Disulfide	0.05	< 0.05	MG/KG
Bromochloromethane	0.05	< 0.05	MG/KG
Chloroform	0.05	< 0.05	MG/KG
2,2-Dichloropropane	0.05	< 0.05	MG/KG
1,2-Dichloroethane	0.05	< 0.05	MG/KG
Vinyl Acetate	0.05	< 0.05	MG/KG
1,1,1-Trichloroethane	0.05	< 0.05	MG/KG
1,1-Dichloropropene	0.05	< 0.05	MG/KG
Carbon Tetrachloride	0.05	< 0.05	MG/KG
Benzene	0.05	< 0.05	MG/KG
1,2-Dichloropropane	0.05	< 0.05	MG/KG
Trichloroethene	0.05	< 0.05	MG/KG
Bromodichloromethane	0.05	< 0.05	MG/KG
2-Chloroethyl Vinyl Ether	0.5	< 0.5	MG/KG
cis-1,3-Dichloropropene	0.05	< 0.05	MG/KG
trans-1,3-Dichloropropene	0.05	< 0.05	MG/KG
1,1,2-Trichloroethane	0.05	< 0.05	MG/KG
1,3-Dichloropropane	0.05	< 0.05	MG/KG
Dibromomethane	0.05	< 0.05	MG/KG
Toluene	0.05	< 0.05	MG/KG
1,2-Dibromoethane	0.05	< 0.05	MG/KG
4-Methyl-2-Pentanone	0.5	< 0.5	MG/KG
2-Hexanone	0.5	< 0.5	MG/KG
Dibromochloromethane	0.05	< 0.05	MG/KG
Tetrachloroethene	0.05	< 0.05	MG/KG
Chlorobenzene	0.05	< 0.05	MG/KG
Ethylbenzene	0.05	< 0.05	MG/KG

2709-D Pan American Freeway NE
Albuquerque, New Mexico 87107
Phone (505) 344-3777
Fax (505) 344-4413

PINNACLE LABORATORIES

GC/MS RESULTS

TEST : VOLATILE ORGANICS EPA METHOD 8260
CLIENT : NMOCD PINNACLE I.D. : 812044
PROJECT # : GW-199 DATE RECEIVED : 12/9/98
PROJECT NAME : CHAMPION-HOBBS

SAMPLE ID #	CLIENT ID	MATRIX	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
812044-02	9812081209	SOIL	12/8/98	12/14/98	12/14/98	1

PARAMETER	DET. LIMIT		UNITS
1,1,1,2-Tetrachloroethane	0.05	< 0.05	MG/KG
o-Xylene	0.05	< 0.05	MG/KG
m&p Xylenes	0.05	< 0.05	MG/KG
Styrene	0.05	< 0.05	MG/KG
Bromoform	0.05	< 0.05	MG/KG
1,1,2,2-Tetrachloroethane	0.05	< 0.05	MG/KG
1,2,3-Trichloropropane	0.05	< 0.05	MG/KG
Isopropyl Benzene	0.05	< 0.05	MG/KG
Bromobenzene	0.05	< 0.05	MG/KG
trans-1,4-Dichloro-2-Butene	0.05	< 0.05	MG/KG
n-Propylbenzene	0.05	< 0.05	MG/KG
2-Chlorotoluene	0.05	< 0.05	MG/KG
4-Chlorotoluene	0.05	< 0.05	MG/KG
1,3,5-Trimethylbenzene	0.05	< 0.05	MG/KG
tert-Butylbenzene	0.05	< 0.05	MG/KG
1,2,4-Trimethylbenzene	0.05	< 0.05	MG/KG
sec-Butylbenzene	0.05	< 0.05	MG/KG
1,3-Dichlorobenzene	0.05	< 0.05	MG/KG
1,4-Dichlorobenzene	0.05	< 0.05	MG/KG
p-Isopropyltoluene	0.05	< 0.05	MG/KG
1,2-Dichlorobenzene	0.05	< 0.05	MG/KG
n-Butylbenzene	0.05	< 0.05	MG/KG
1,2-Dibromomo-3-chloropropane	0.05	< 0.05	MG/KG
1,2,4-Trichlorobenzene	0.05	< 0.05	MG/KG
Napthalene	0.05	< 0.05	MG/KG
Hexachlorobutadiene	0.05	< 0.05	MG/KG
1,2,3-Trichlorobenzene	0.05	< 0.05	MG/KG

SURROGATE % RECOVERY	
1,2-Dichloroethane-d4	104 (80 - 120)
Toluene-d8	103 (81 - 117)
Bromofluorobenzene	93 (74 - 121)

2709-D Pan American Freeway NE
Albuquerque, New Mexico 87107
Phone (505) 344-3777
Fax (505) 344-4413

PINNACLE LABORATORIES

GC/MS RESULTS

TEST : VOLATILE ORGANICS EPA METHOD 8260
CLIENT : NMOCD
PROJECT # : GW-199
PROJECT NAME : CHAMPION-HOBBS

PINNACLE I.D. : 812044

SAMPLE ID #	BATCH	MATRIX	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
EXTRACTION BLANK	121498	SOIL	12/14/98	12/14/98	1

PARAMETER	DET. LIMIT		UNITS
Dichlorodifluoromethane	0.05	< 0.05	MG/KG
Chloromethane	0.05	< 0.05	MG/KG
Vinyl Chloride	0.05	< 0.05	MG/KG
Bromomethane	0.05	< 0.05	MG/KG
Chloroethane	0.05	< 0.05	MG/KG
Trichlorofluoromethane	0.05	< 0.05	MG/KG
Acetone	0.5	< 0.5	MG/KG
Acrolein	0.25	< 0.25	MG/KG
1,1-Dichloroethene	0.05	< 0.05	MG/KG
Iodomethane	0.05	< 0.05	MG/KG
Methylene Chloride	0.05	< 0.05	MG/KG
Acrylonitrile	0.25	< 0.25	MG/KG
cis-1,2-Dichloroethene	0.05	< 0.05	MG/KG
Methyl-t-butyl Ether	0.05	< 0.05	MG/KG
1,1,2,1,2,2-Trichlorotrifluoroethane	0.05	< 0.05	MG/KG
1,1-Dichloroethane	0.05	< 0.05	MG/KG
trans-1,2-Dichloroethene	0.05	< 0.05	MG/KG
2-Butanone	0.5	< 0.5	MG/KG
Carbon Disulfide	0.05	< 0.05	MG/KG
Bromochloromethane	0.05	< 0.05	MG/KG
Chloroform	0.05	< 0.05	MG/KG
2,2-Dichloropropane	0.05	< 0.05	MG/KG
1,2-Dichloroethane	0.05	< 0.05	MG/KG
Vinyl Acetate	0.05	< 0.05	MG/KG
1,1,1-Trichloroethane	0.05	< 0.05	MG/KG
1,1-Dichloropropene	0.05	< 0.05	MG/KG
Carbon Tetrachloride	0.05	< 0.05	MG/KG
Benzene	0.05	< 0.05	MG/KG
1,2-Dichloropropane	0.05	< 0.05	MG/KG
Trichloroethene	0.05	< 0.05	MG/KG
Bromodichloromethane	0.05	< 0.05	MG/KG
2-Chloroethyl Vinyl Ether	0.5	< 0.5	MG/KG
cis-1,3-Dichloropropene	0.05	< 0.05	MG/KG
trans-1,3-Dichloropropene	0.05	< 0.05	MG/KG
1,1,2-Trichloroethane	0.05	< 0.05	MG/KG
1,3-Dichloropropane	0.05	< 0.05	MG/KG
Dibromomethane	0.05	< 0.05	MG/KG
Toluene	0.05	< 0.05	MG/KG
1,2-Dibromoethane	0.05	< 0.05	MG/KG
4-Methyl-2-Pentanone	0.5	< 0.5	MG/KG
2-Hexanone	0.5	< 0.5	MG/KG
Dibromochloromethane	0.05	< 0.05	MG/KG
Tetrachloroethene	0.05	< 0.05	MG/KG
Chlorobenzene	0.05	< 0.05	MG/KG
Ethylbenzene	0.05	< 0.05	MG/KG

2709-D Pan American Freeway NE
Albuquerque, New Mexico 87107
Phone (505) 344-3777
Fax (505) 344-4413

PINNACLE LABORATORIES

GC/MS RESULTS

TEST	: VOLATILE ORGANICS EPA METHOD 8260		
CLIENT	: NMOCD	PINNACLE I.D. :	812044
PROJECT #	: GW-199	:	
PROJECT NAME	: CHAMPION-HOBBS		

SAMPLE ID #	BATCH	MATRIX	DATE EXTRACTED	DATE ANALYZED	DIL. FACTOR
EXTRACTION BLANK	121498	SOIL	12/14/98	12/14/98	1

PARAMETER	DET. LIMIT		UNITS
1,1,1,2-Tetrachloroethane	0.05	< 0.05	MG/KG
o-Xylene	0.05	< 0.05	MG/KG
m&p Xylenes	0.05	< 0.05	MG/KG
Styrene	0.05	< 0.05	MG/KG
Bromoform	0.05	< 0.05	MG/KG
1,1,2,2-Tetrachloroethane	0.05	< 0.05	MG/KG
1,2,3-Trichloropropane	0.05	< 0.05	MG/KG
Isopropyl Benzene	0.05	< 0.05	MG/KG
Bromobenzene	0.05	< 0.05	MG/KG
trans-1,4-Dichloro-2-Butene	0.05	< 0.05	MG/KG
n-Propylbenzene	0.05	< 0.05	MG/KG
2-Chlorotoluene	0.05	< 0.05	MG/KG
4-Chlorotoluene	0.05	< 0.05	MG/KG
1,3,5-Trimethylbenzene	0.05	< 0.05	MG/KG
tert-Butylbenzene	0.05	< 0.05	MG/KG
1,2,4-Trimethylbenzene	0.05	< 0.05	MG/KG
sec-Butylbenzene	0.05	< 0.05	MG/KG
1,3-Dichlorobenzene	0.05	< 0.05	MG/KG
1,4-Dichlorobenzene	0.05	< 0.05	MG/KG
p-Isopropyltoluene	0.05	< 0.05	MG/KG
1,2-Dichlorobenzene	0.05	< 0.05	MG/KG
n-Butylbenzene	0.05	< 0.05	MG/KG
1,2-Dibromomo-3-chloropropane	0.05	< 0.05	MG/KG
1,2,4-Trichlorobenzene	0.05	< 0.05	MG/KG
Napthalene	0.05	< 0.05	MG/KG
Hexachlorobutadiene	0.05	< 0.05	MG/KG
1,2,3-Trichlorobenzene	0.05	< 0.05	MG/KG

SURROGATE % RECOVERY	
1,2-Dichloroethane-d4	100
	(80 - 120)
Toluene-d8	98
	(81 - 117)
Bromofluorobenzene	88
	(74 - 121)

2709-D Pan American Freeway NE
Albuquerque, New Mexico 87107
Phone (505) 344-3777
Fax (505) 344-4413

PINNACLE LABORATORIES

MATRIX SPIKE/MATRIX SPIKE DUPLICATE RESULTS

TEST	: VOLATILE ORGANICS EPA METHOD 8260	PINNACLE I.D.	: 812044
SPIKED SAMPLE	: 812044-02	DATE ANALYZED	: 12/14/98
CLIENT	: NMOCD	UNITS	: mg/kg (PPM)
PROJECT #	: GW-199	MATRIX	: SOIL
PROJECT NAME	: CHAMPION-HOBBS		

COMPOUND	SAMPLE CONC.	SPIKE ADDED	MS RESULT	MSD RESULT	MS %REC	MSD %REC	RPD	QC LIMITS RPD	QC LIMITS %RECOVERY
1,1-DICHLOROETHENE	<0.05	2.50	2.12	2.07	85	98	2	14	61-145
BENZENE	<0.05	2.50	2.57	2.64	103	103	3	11	76-127
TRICHLOROETHENE	<0.05	2.50	2.53	2.62	101	104	3	14	71-120
TOLUENE	<0.05	2.50	2.59	2.66	104	103	3	13	76-125
CHLOROBENZENE	<0.05	2.50	2.63	2.71	105	103	3	13	75-130

Committed To *Your* Success

Severn Trent Laboratories
11 East Olive Road
Pensacola FL 32514

Tel: (850) 474-1001
Fax: (850) 474-4789

SIGNATURE PAGE

Reviewed by: _____
STL Project Manager

Client:	PINNACLE LABORATORIES ALBUQUERQUE, NEW MEXICO
Project Name:	NMOCD
Project Number:	812044
Project Location:	CHAMPION-HOBBS
Accession Number:	812171
Project Manager:	KIMBERLY D. MCNEILL
Sampled By:	N/S

Committed To *Your* Success

SEVERN TRENT LABORATORIES, INC. – PENSACOLA, FLORIDA
STATE CERTIFICATIONS

Alabama Department of Environmental Management, Laboratory ID No. 40150 (Drinking Water by Reciprocity with FL)

Arizona Department of Health Services, Lab ID No. AZ0589 (Hazardous Waste & Wastewater)

State of California, Department of Health Services, Laboratory ID No. I-2338 (Hazardous Waste and Wastewater)

State of Connecticut, Department of Health Services, Connecticut Lab Approval No. PH-0697 (Drinking Water, Hazardous Waste and Wastewater)

Delaware Health & Social Services, Division of Public Health, Laboratory ID No. FL094 (Drinking Water by Reciprocity with FL)

Florida DOH Laboratory ID No. 81142 (Drinking Water), Laboratory ID No. E81010 (Hazardous Waste and Wastewater)

Florida, Radioactive Materials License No. G0733-1

Foreign Soil Permit, Permit No. S-37599

Kansas Department of Health & Environment, Laboratory ID No. E10253 (Wastewater and Hazardous Waste)

Commonwealth of Kentucky, Natural Resources and Environmental Protection Cabinet, Laboratory ID No. 90043 (Drinking Water)

State of Louisiana, DHH, Office of Public Health Division of Laboratories, Laboratory ID No. 98-25 (Drinking Water)

State of Maryland, DH&MH Laboratory ID No. 233 (Drinking Water by Reciprocity with Florida)

Commonwealth of Massachusetts, DEP, Laboratory ID No. M-FL094 (Hazardous Waste and Wastewater)

State of Michigan, Bureau of E&OccH (No Laboratory ID No. assigned by state) (Drinking Water by Reciprocity with Florida)

New Hampshire DES, Laboratory ID No. 250598-A (Wastewater)

State of New Jersey, Department of Environmental Protection & Energy, Laboratory ID No. 49006 (Wastewater)

New York State, Department of Health, Laboratory ID No. 11503 (Wastewater and Solids/Hazardous Waste)

North Carolina Department of Environment, Health, & Natural Resources, Laboratory ID No. 314 (Hazardous Waste and Wastewater)

North Dakota DH&Consol Labs, Laboratory ID No. R-108 (Hazardous Waste and Wastewater by Reciprocity with California)

State of Oklahoma, Oklahoma Department of Environmental Quality, Laboratory ID No. 9810 (Hazardous Waste and Wastewater)

Commonwealth of Pennsylvania, Department of Environmental Resources, Laboratory ID No. 68-467 (Drinking Water)

South Carolina DH&EC, Laboratory ID No. 96026 (Wastewater by Reciprocity with FL and Solids/Hazardous Waste by Reciprocity with CA)

Tennessee Department of Health & Environment, Laboratory ID No. 02907 (Drinking Water)

Tennessee Division of Underground Storage Tanks Approved Laboratory

Virginia Department of General Services, Laboratory ID No. 00008 (Drinking Water by Reciprocity with FL)

State of Washington, Department of Ecology, Laboratory ID No. C282 (Hazardous Waste and Wastewater)

West Virginia Division of Environmental Protection, Office of Water Resources, Laboratory ID No. 136 (Hazardous Waste and Wastewater by Reciprocity with FL)

American Industrial Hygiene Association (AIHA) Accredited Laboratory, Laboratory ID No. 9133

SEVERN TRENT LABORATORIES 11 East Olive Road Pensacola, Florida 32514 (850) 474-1001

Analysis Report

Analysis: POLYNUCLEAR AROMATICS BY 8310

Accession:	812171
Client:	PINNACLE LABORATORIES
Project Number:	812044
Project Name:	NMOCD
Project Location:	CHAMPION-HOBBS
Department:	SEMI-VOLATILE FUELS

SEVERN TRENT LABORATORIES 11 East Olive Road Pensacola, Florida 32514 (850) 474-1001

"FINAL REPORT FORMAT - SINGLE"

Accession:	812171
Client:	PINNACLE LABORATORIES
Project Number:	812044
Project Name:	NMOCD
Project Location:	CHAMPION-HOBBS
Test:	POLYNUCLEAR AROMATICS BY 8310
Analysis Method:	8310/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Extraction Method:	3510/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Matrix:	WATER
QC Level:	II

Lab Id:	001		Sample Date/Time:	08-DEC-98 1151
Client Sample Id:	812044-01		Received Date:	10-DEC-98
Batch: PAW286			Extraction Date:	11-DEC-98
Blank: A	Dry Weight %:	N/A	Analysis Date:	18-DEC-98

Parameter:	Units:	Results:	Rpt Lmts:	Q:
ACENAPHTHENE	UG/L	ND	1	
ACENAPHTHYLENE	UG/L	ND	1	
ANTHRACENE	UG/L	ND	1	
BENZO(a)ANTHRACENE	UG/L	ND	1	
BENZO(a)PYRENE	UG/L	ND	1	
BENZO(b)FLUORANTHENE	UG/L	ND	1	
BENZO(g,h,i)PERYLENE	UG/L	ND	1	
BENZO(k)FLUORANTHENE	UG/L	ND	1	
CHRYSENE	UG/L	ND	1	
DIBENZO(a,h)ANTHRACENE	UG/L	ND	1	
FLUORANTHENE	UG/L	ND	1	
FLUORENE	UG/L	ND	1	
INDENO(1,2,3-cd)PYRENE	UG/L	ND	1	
NAPHTHALENE	UG/L	ND	1	
PHENANTHRENE	UG/L	ND	1	
PYRENE	UG/L	ND	1	
1-METHYLNAPHTHALENE	UG/L	ND	1	
2-METHYLNAPHTHALENE	UG/L	ND	1	
2-CHLOROANTHRACENE	%REC/SURR	88	28-138	
ANALYST	INITIALS	HAH		

Comments:

"FINAL REPORT FORMAT - SINGLE"

Accession:	812171
Client:	PINNACLE LABORATORIES
Project Number:	812044
Project Name:	NMOCD
Project Location:	CHAMPION-HOBBS
Test:	POLYNUCLEAR AROMATICS BY 8310
Analysis Method:	8310/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Extraction Method:	3550/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Matrix:	SOIL
QC Level:	II

Lab Id:	002	Sample Date/Time:	08-DEC-98 1209
Client Sample Id:	812044-02	Received Date:	10-DEC-98
Batch: PAS105		Extraction Date:	11-DEC-98
Blank: A	Dry Weight %: 96	Analysis Date:	18-DEC-98

Parameter:	Units:	Results:	Rpt Lmts:	Q:
ACENAPHTHENE	UG/KG	ND	10	
ACENAPHTHYLENE	UG/KG	ND	10	
ANTHRACENE	UG/KG	ND	10	
BENZO(a)ANTHRACENE	UG/KG	ND	10	
BENZO(a)PYRENE	UG/KG	63	10	
BENZO(b)FLUORANTHENE	UG/KG	54	10	
BENZO(g,h,i)PERYLENE	UG/KG	ND	10	
BENZO(k)FLUORANTHENE	UG/KG	100	10	
CHRYSENE	UG/KG	61	10	
DIBENZO(a,h)ANTHRACENE	UG/KG	20	10	
FLUORANTHENE	UG/KG	ND	10	
FLUORENE	UG/KG	32	10	
INDENO(1,2,3-cd)PYRENE	UG/KG	ND	10	
NAPHTHALENE	UG/KG	22	10	
PHENANTHRENE	UG/KG	ND	10	
PYRENE	UG/KG	22	10	
1-METHYLNAPHTHALENE	UG/KG	73	10	
2-METHYLNAPHTHALENE	UG/KG	ND	10	
2-CHLOROANTHRACENE	%REC/SURR	108	17-160	
ANALYST	INITIALS	HAH		

Comments:

"Method Report Summary"

Accession Number: 812171
Client: PINNACLE LABORATORIES
Project Number: 812044
Project Name: NMOCD
Project Location: CHAMPION-HOBBS
Test: POLYNUCLEAR AROMATICS BY 8310

Client Sample Id:	Parameter:	Unit:	Result:
812044-02	BENZO(a)PYRENE	UG/KG	63
	BENZO(b)FLUORANTHENE	UG/KG	54
	BENZO(k)FLUORANTHENE	UG/KG	100
	CHRYSENE	UG/KG	61
	DIBENZO(a,h)ANTHRACENE	UG/KG	20
	FLUORENE	UG/KG	32
	NAPHTHALENE	UG/KG	22
	PYRENE	UG/KG	22
	1-METHYLNAPHTHALENE	UG/KG	73

SEVERN TRENT LABORATORIES 11 East Olive Road Pensacola, Florida 32514 (850) 474-1001

Analysis Report

Analysis: ACID & BASE EXTRACTABLES (8270C)

Accession:	812171
Client:	PINNACLE LABORATORIES
Project Number:	812044
Project Name:	NMOCD
Project Location:	CHAMPION-HOBBS
Department:	ORGANIC/MS

SEVERN TRENT LABORATORIES 11 East Olive Road Pensacola, Florida 32514 (850) 474-1001

"FINAL REPORT FORMAT - SINGLE"

Accession: 812171
Client: PINNACLE LABORATORIES
Project Number: 812044
Project Name: NMOCD
Project Location: CHAMPION-HOBBS
Test: ACID & BASE EXTRACTABLES (8270C)
Analysis Method: 8270C/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Extraction Method: 3520C/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Matrix: WATER
QC Level: II

Lab Id: 001 Sample Date/Time: 08-DEC-98 1151
Client Sample Id: 812044-01 Received Date: 10-DEC-98

Batch: ALW154 Extraction Date: 15-DEC-98
Blank: A Dry Weight %: N/A Analysis Date: 21-DEC-98

Parameter:	Units:	Results:	Rpt Lmts:	Q:
BENZOIC ACID	UG/L	ND	50	
4-CHLORO-3-METHYLPHENOL	UG/L	ND	10	
2-CHLOROPHENOL	UG/L	ND	10	
2,4-DICHLOROPHENOL	UG/L	ND	10	
2,6-DICHLOROPHENOL	UG/L	ND	10	
2,4-DIMETHYLPHENOL	UG/L	ND	10	
4,6-DINITRO-2-METHYLPHENOL	UG/L	ND	50	
2,4-DINITROPHENOL	UG/L	ND	50	
2-METHYLPHENOL	UG/L	ND	10	
4-METHYLPHENOL	UG/L	ND	10	
2-NITROPHENOL	UG/L	ND	10	
4-NITROPHENOL	UG/L	ND	50	
PENTACHLOROPHENOL	UG/L	ND	50	
PHENOL	UG/L	ND	10	
2,3,4,6-TETRACHLOROPHENOL	UG/L	ND	10	
2,4,5-TRICHLOROPHENOL	UG/L	ND	50	
2,4,6-TRICHLOROPHENOL	UG/L	ND	10	
ACENAPHTHENE	UG/L	ND	10	
ACENAPHTHYLENE	UG/L	ND	10	
ACETOPHENONE	UG/L	ND	10	
4-AMINOBIPHENYL	UG/L	ND	10	
ANILINE	UG/L	ND	10	
ANTHRACENE	UG/L	ND	10	
BENZIDINE	UG/L	ND	10	
BENZO (A) ANTHRACENE	UG/L	ND	10	
BENZO (A) PYRENE	UG/L	ND	10	
BENZO (B) FLUORANTHENE	UG/L	ND	10	
BENZO (G,H,I) PERYLENE	UG/L	ND	10	
BENZO (K) FLUORANTHENE	UG/L	ND	10	
BENZYL ALCOHOL	UG/L	ND	10	
BIS(2-CHLOROETHOXY)METHANE	UG/L	ND	10	
BIS(2-CHLOROETHYL)ETHER	UG/L	ND	10	
BIS(2-CHLOROISOPROPYL)ETHER	UG/L	ND	10	
BIS(2-ETHYLHEXYL)PHTHALATE	UG/L	ND	10	
4-BROMOPHENYL PHENYL ETHER	UG/L	ND	10	
BUTYLBENZYL PHTHALATE	UG/L	ND	10	
4-CHLOROANILINE	UG/L	ND	10	
1-CHLORONAPHTHALENE	UG/L	ND	10	
2-CHLORONAPHTHALENE	UG/L	ND	10	
4-CHLOROPHENYL PHENYL ETHER	UG/L	ND	10	

"FINAL REPORT FORMAT - SINGLE"

Accession: 812171
Client: PINNACLE LABORATORIES
Project Number: 812044
Project Name: NMOCD
Project Location: CHAMPION-HOBBS
Test: ACID & BASE EXTRACTABLES (8270C)
Analysis Method: 8270C/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Extraction Method: 3520C/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Matrix: WATER
QC Level: II

Lab Id: 001 Sample Date/Time: 08-DEC-98 1151
Client Sample Id: 812044-01 Received Date: 10-DEC-98

Parameter:	Units:	Results:	Rpt Lmts:	Q:
CHRYSENE	UG/L	ND	10	
DIBENZ(A,J)ACRIDINE	UG/L	ND	10	
DIBENZO (A,H) ANTHRACENE	UG/L	ND	10	
DIBENZOFURAN	UG/L	ND	10	
1,2-DICHLOROBENZENE	UG/L	ND	10	
1,3-DICHLOROBENZENE	UG/L	ND	10	
1,4-DICHLOROBENZENE	UG/L	ND	10	
3,3'-DICHLOROBENZIDINE	UG/L	ND	50	
DIETHYLPHTHALATE	UG/L	ND	10	
P-DIMETHYLAMINOAZOBENZENE	UG/L	ND	10	
7,12-DIMETHYLBENZ(A)ANTHRACENE	UG/L	ND	10	
A-,A-DIMETHYLPHENETHYLAMINE	UG/L	ND	10	
DIMETHYLPHTHALATE	UG/L	ND	10	
DI-N-BUTYLPHTHALATE	UG/L	ND	10	
2,4-DINITROTOLUENE	UG/L	ND	10	
2,6-DINITROTOLUENE	UG/L	ND	10	
DI-N-OCTYLPHTHALATE	UG/L	ND	10	
DIPHENYLAMINE	UG/L	ND	10	
1,2-DIPHENYLHYDRAZINE	UG/L	ND	10	
FLUORANTHENE	UG/L	ND	10	
FLUORENE	UG/L	ND	10	
HEXACHLOROBENZENE	UG/L	ND	10	
HEXACHLOROBUTADIENE	UG/L	ND	10	
HEXACHLOROCYCLOPENTADIENE	UG/L	ND	10	
HEXACHLOROETHANE	UG/L	ND	10	
INDENO (1,2,3-CD) PYRENE	UG/L	ND	10	
ISOPHORONE	UG/L	ND	10	
3-METHYLCHOLANTHRENE	UG/L	ND	10	
2-METHYLNAPHTHALENE	UG/L	ND	10	
NAPHTHALENE	UG/L	ND	10	
1-NAPHTHYLAMINE	UG/L	ND	10	
2-NAPHTHYLAMINE	UG/L	ND	10	
2-NITROANILINE	UG/L	ND	10	
3-NITROANILINE	UG/L	ND	10	
4-NITROANILINE	UG/L	ND	10	
NITROBENZENE	UG/L	ND	10	
N-NITROSODIMETHYLAMINE	UG/L	ND	10	
N-NITROSODI-N-BUTYLAMINE	UG/L	ND	10	
N-NITROSODIPHENYLAMINE	UG/L	ND	10	
N-NITROSO-DI-N-PROPYLAMINE	UG/L	ND	10	
N-NITROSOPIPERIDINE	UG/L	ND	10	
PENTACHLOROBENZENE	UG/L	ND	10	
PENTACHLORONITROBENZENE (PCNB)	UG/L	ND	10	
PHENACETIN	UG/L	ND	10	
PHENANTHRENE	UG/L	ND	10	

"FINAL REPORT FORMAT - SINGLE"

Accession:	812171
Client:	PINNACLE LABORATORIES
Project Number:	812044
Project Name:	NMOCD
Project Location:	CHAMPION-HOBBS
Test:	ACID & BASE EXTRACTABLES (8270C)
Analysis Method:	8270C/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Extraction Method:	3520C/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Matrix:	WATER
QC Level:	II

Lab Id: 001 Sample Date/Time: 08-DEC-98 1151
Client Sample Id: 812044-01 Received Date: 10-DEC-98

Parameter:	Units:	Results:	Rpt Lmts:	Q:
2-PICOLINE	UG/L	ND	10	
PRONAMIDE	UG/L	ND	10	
PYRENE	UG/L	ND	10	
1,2,4,5-TETRACHLOROBENZENE	UG/L	ND	10	
1,2,4 TRICHLOROBENZENE	UG/L	ND	10	
2-FLUOROPHENOL	%REC/SURR	75	21-100	
PHENOL-D6	%REC/SURR	75	10-100	
2,4,6-TRIBROMOPHENOL	%REC/SURR	79	10-123	
2-FLUOROBIPHENYL	%REC/SURR	66	43-116	
NITROBENZENE-D5	%REC/SURR	62	35-114	
TERPHENYL-D14	%REC/SURR	105	33-124	
ANALYST	INITIALS	RW		

Comments:

"FINAL REPORT FORMAT - SINGLE"

Accession: 812171
Client: PINNACLE LABORATORIES
Project Number: 812044
Project Name: NMOCD
Project Location: CHAMPION-HOBBS
Test: ACID & BASE EXTRACTABLES (8270C)
Analysis Method: 8270C/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Extraction Method: 3550B/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Matrix: SOIL
QC Level: II

Lab Id: 002 Sample Date/Time: 08-DEC-98 1209
Client Sample Id: 812044-02 Received Date: 10-DEC-98

Batch: ALS089 Extraction Date: 11-DEC-98
Blank: A Dry Weight %: 96 Analysis Date: 15-DEC-98

Parameter:	Units:	Results:	Rpt Lmts:	Q:
BENZOIC ACID	UG/KG	ND	1700	
4-CHLORO-3-METHYLPHENOL	UG/KG	ND	350	
2-CHLOROPHENOL	UG/KG	ND	350	
2,4-DICHLOROPHENOL	UG/KG	ND	350	
2,6-DICHLOROPHENOL	UG/KG	ND	350	
2,4-DIMETHYLPHENOL	UG/KG	ND	350	
4,6-DINITRO-2-METHYLPHENOL	UG/KG	ND	1700	
2,4-DINITROPHENOL	UG/KG	ND	1700	
2-METHYLPHENOL	UG/KG	ND	350	
4-METHYLPHENOL	UG/KG	ND	350	
2-NITROPHENOL	UG/KG	ND	350	
4-NITROPHENOL	UG/KG	ND	1700	
PENTACHLOROPHENOL	UG/KG	ND	1700	
PHENOL	UG/KG	ND	350	
2,3,4,6-TETRACHLOROPHENOL	UG/KG	ND	350	
2,4,5-TRICHLOROPHENOL	UG/KG	ND	1700	
2,4,6-TRICHLOROPHENOL	UG/KG	ND	350	
ACENAPHTHENE	UG/KG	ND	350	
ACENAPHTHYLENE	UG/KG	ND	350	
ACETOPHENONE	UG/KG	ND	350	
4-AMINOBIPHENYL	UG/KG	ND	350	
ANILINE	UG/KG	ND	350	
ANTHRACENE	UG/KG	ND	350	
BENZIDINE	UG/KG	ND	350	
BENZO (A) ANTHRACENE	UG/KG	ND	350	
BENZO (A) PYRENE	UG/KG	ND	350	
BENZO (B) FLUORANTHENE	UG/KG	ND	350	
BENZO (G,H,I) PERYLENE	UG/KG	ND	350	
BENZO (K) FLUORANTHENE	UG/KG	ND	350	
BENZYL ALCOHOL	UG/KG	ND	350	
BIS(2-CHLOROETHOXY)METHANE	UG/KG	ND	350	
BIS(2-CHLOROETHYL)ETHER	UG/KG	ND	350	
BIS(2-CHLOROISOPROPYL)ETHER	UG/KG	ND	350	
BIS(2-ETHYLHEXYL)PHTHALATE	UG/KG	630	350	
4-BROMOPHENYL PHENYL ETHER	UG/KG	ND	350	
BUTYLBENZYL PHTHALATE	UG/KG	ND	350	
4-CHLOROANILINE	UG/KG	ND	350	
1-CHLORONAPHTHALENE	UG/KG	ND	350	
2-CHLORONAPHTHALENE	UG/KG	ND	350	
4-CHLOROPHENYL PHENYL ETHER	UG/KG	ND	350	

"FINAL REPORT FORMAT - SINGLE"

Accession: 812171
Client: PINNACLE LABORATORIES
Project Number: 812044
Project Name: NMOCD
Project Location: CHAMPION-HOBBS
Test: ACID & BASE EXTRACTABLES (8270C)
Analysis Method: 8270C/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Extraction Method: 3550B/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Matrix: SOIL
QC Level: II

Lab Id: 002 Sample Date/Time: 08-DEC-98 1209
Client Sample Id: 812044-02 Received Date: 10-DEC-98

Parameter:	Units:	Results:	Rpt Lmts:	Q:
CHRYSENE	UG/KG	ND	350	
DIBENZ(A,J)ACRIDINE	UG/KG	ND	350	
DIBENZO (A,H) ANTHRACENE	UG/KG	ND	350	
DIBENZOFURAN	UG/KG	ND	350	
1,2-DICHLOROBENZENE	UG/KG	ND	350	
1,3-DICHLOROBENZENE	UG/KG	ND	350	
1,4-DICHLOROBENZENE	UG/KG	ND	350	
3,3'-DICHLOROBENZIDINE	UG/KG	ND	1700	
DIETHYLPHTHALATE	UG/KG	ND	350	
P-DIMETHYLAMINOAZOBENZENE	UG/KG	ND	350	
7,12-DIMETHYLBENZ(A)ANTHRACENE	UG/KG	ND	350	
A-,A-DIMETHYLPHENETHYLAMINE	UG/KG	ND	350	
DIMETHYLPHTHALATE	UG/KG	ND	350	
DI-N-BUTYLPHTHALATE	UG/KG	ND	350	
2,4-DINITROTOLUENE	UG/KG	ND	350	
2,6-DINITROTOLUENE	UG/KG	ND	350	
DI-N-OCTYLPHTHALATE	UG/KG	ND	350	
DIPHENYLAMINE	UG/KG	ND	350	
1,2-DIPHENYLHYDRAZINE	UG/KG	ND	350	
FLUORANTHENE	UG/KG	ND	350	
FLUORENE	UG/KG	ND	350	
HEXACHLOROBENZENE	UG/KG	ND	350	
HEXACHLOROBUTADIENE	UG/KG	ND	350	
HEXACHLOROCYCLOPENTADIENE	UG/KG	ND	350	
HEXACHLOROETHANE	UG/KG	ND	350	
INDENO (1,2,3-CD) PYRENE	UG/KG	ND	350	
ISOPHORONE	UG/KG	ND	350	
3-METHYLCHOLANTHRENE	UG/KG	ND	350	
2-METHYLNAPHTHALENE	UG/KG	ND	350	
NAPHTHALENE	UG/KG	ND	350	
1-NAPHTHYLAMINE	UG/KG	ND	350	
2-NAPHTHYLAMINE	UG/KG	ND	350	
2-NITROANILINE	UG/KG	ND	350	
3-NITROANILINE	UG/KG	ND	350	
4-NITROANILINE	UG/KG	ND	350	
NITROBENZENE	UG/KG	ND	350	
N-NITROSODIMETHYLAMINE	UG/KG	ND	350	
N-NITROSODI-N-BUTYLAMINE	UG/KG	ND	350	
N-NITROSODIPHENYLAMINE	UG/KG	ND	350	
N-NITROSO-DI-N-PROPYLAMINE	UG/KG	ND	350	
N-NITROSOPIPERIDINE	UG/KG	ND	350	
PENTACHLOROBENZENE	UG/KG	ND	350	
PENTACHLORONITROBENZENE (PCNB)	UG/KG	ND	350	
PHENACETIN	UG/KG	ND	350	
PHENANTHRENE	UG/KG	ND	350	

"FINAL REPORT FORMAT - SINGLE"

Accession: 812171
Client: PINNACLE LABORATORIES
Project Number: 812044
Project Name: NMOCD
Project Location: CHAMPION-HOBBS
Test: ACID & BASE EXTRACTABLES (8270C)
Analysis Method: 8270C/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Extraction Method: 3550B/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Matrix: SOIL
QC Level: II

Lab Id: 002 Sample Date/Time: 08-DEC-98 1209
Client Sample Id: 812044-02 Received Date: 10-DEC-98

Parameter:	Units:	Results:	Rpt Lmts:	Q:
2-PICOLINE	UG/KG	ND	350	
PRONAMIDE	UG/KG	ND	350	
PYRENE	UG/KG	ND	350	
1,2,4,5-TETRACHLOROBENZENE	UG/KG	ND	350	
1,2,4 TRICHLOROBENZENE	UG/KG	ND	350	
2-FLUOROPHENOL	%REC/SURR	67	25-121	
PHENOL-D6	%REC/SURR	73	24-113	
2,4,6-TRIBROMOPHENOL	%REC/SURR	61	19-122	
2-FLUOROBIPHENYL	%REC/SURR	69	30-115	
NITROBENZENE-D5	%REC/SURR	77	23-120	
TERPHENYL-D14	%REC/SURR	68	18-137	
ANALYST	INITIALS	RW		

Comments:

SEVERN TRENT LABORATORIES 11 East Olive Road Pensacola, Florida 32514 (850) 474-1001

"Method Report Summary"

Accession Number: 812171
Client: PINNACLE LABORATORIES
Project Number: 812044
Project Name: NMOCD
Project Location: CHAMPION-HOBBS
Test: ACID & BASE EXTRACTABLES (8270C)

Client Sample Id:	Parameter:	Unit:	Result:
812044-02	BIS(2-ETHYLHEXYL)PHTHALATE	UG/KG	630

SEVERN TRENT LABORATORIES 11 East Olive Rd Pensacola, FL 32514 (850) 474-1001

Data Qualifiers for Final Report

STL-Pensacola Inorganic/Organic and AFCEE Projects (under QAPP)

J4	(For positive results)	Temperature limits exceeded (≤2°C or ≥ 6°C)
J5	(TICs)	The reported value is quantitated as a TIC; therefore, it is estimated
J6	(For positive results)	LCS or Surrogate %R is > upper control limit (UCL) or < lower control limit (LCL)
J7	(For positive results)	The reported value is > the laboratory MDL and < lowest calibration standards; therefore, the quantitation is an estimation.
J (AFCEE description)	The analyte was positively identified, the quantitation is an estimation	
R1	(For nondetects)	Temperature limits exceeded (≤2°C or ≥ 6°C)
R2	Improper preservation, no preservative present in sample upon receipt	
R3	Improper preservation, incorrect preservative present in sample upon receipt	
R4	Holding time exceeded	
R5	Collection requirements not met, improper container used for sample	
R6	LCS or surrogate %R is < LCL and analyte is not detected or surrogate %R is < 10% for detects/nondetects	
R7	Internal standard area outside –50% to +100% of initial calibration midpoint standard.	
R8	Second source calibration verification exceeds acceptance criteria.	
R (AFCEE description)	The data are unusable due to deficiencies in the ability to analyze the sample and meet QC criteria	
F	< laboratory or AFCEE RL and > laboratory MDL	
F (AFCEE description)	The analyte was positively identified but the associated numerical value is below the AFCEE or lab RL	
U2	≤ Laboratory MDL (value for result will be the MDL, never below the MDL)	
U (AFCEE description)	The analyte was analyzed for but not detected. The associated numerical value is at or below the MDL	
B (AFCEE description)	The analyte was found in the associated blank, as well as in the sample	
@	Adjusted reporting limit due to sample matrix (dilution prior to digestion and/or analysis)	
+	Elevated reporting limit due to dilution into calibration range	
*	Elevated reporting limit due to matrix interference (dilution prior to digestion and/or analysis)	
#	Elevated reporting limit due to insufficient sample size	
D	Diluted out	
M	A matrix effect was present (sample was analyzed twice to confirm or chromatogram had interfering peaks)	
S	Incorrect sample amount was submitted to the laboratory for analysis	

ND = Not Detected at or above the STL-Pensacola reporting limit (RL) N/S = Not Submitted N/A = Not Applicable
IDL = Laboratory Instrument Detection Limit MDL = Laboratory Method Detection Limit
RL = Reporting Limit (AFCEE RLs are listed in the AFCEE QAPP)

Any time a sample arrives at the laboratory improperly preserved (at improper pH or temperature) or after holding time has expired or prepared or analyzed after holding time, client must be notified in writing (i.e. case narrative)

Florida Projects Inorganic/Organic

Y1	Improper preservation, no preservative present in sample upon receipt
Y2	Improper preservation, incorrect preservative present in sample upon receipt
Y3	Improper preservation, sample temperature exceeded EPA temperature limits of 2-6°C upon receipt
Y (FL description)	The analysis was from an unpreserved or improperly preserved sample. Data may not be accurate
Q	Sample held beyond the accepted holding time
I	The reported value is < Laboratory RL and > laboratory MDL
U1	The reported value is ≤ Laboratory MDL (value for sample result is reported as the MDL)
U (FL description)	Indicates the compound was analyzed for but not detected
T	The reported value is < Laboratory MDL (value shall not be used for statistical analysis)
V	The analyte was detected in both the sample and the associated method blank
J1	Surrogate recovery limits have been exceeded
J2	The sample matrix interfered with the ability to make any accurate determinations
J3	The reported value failed to meet the established quality control criteria for either precision or accuracy
J (FL description)	Estimated value; not accurate

ICR Projects Inorganic/Organic

A1	Acceptable	R6	Rejected

Examples: ICR Flags
R6 = Laboratory extracted the sample but the refrigerator malfunctioned so the extract became warm and client was notified
R6 = Sample arrived in laboratory in good condition; however, the laboratory did not analyze it within EPA's established holding time limit

CLP and CLP-like Projects: Refer to referenced CLP Statement of Work (SOW) for explanation of data qualifiers

SEVERN TRENT LABORATORIES 11 East Olive Road Pensacola, Florida 32514 (850) 474-1001

Quality Control Report

Analysis: POLYNUCLEAR AROMATICS BY 8310

Accession:	812171
Client:	PINNACLE LABORATORIES
Project Number:	812044
Project Name:	NMOCD
Project Location:	CHAMPION-HOBBS
Department:	SEMI-VOLATILE FUELS

SEVERN TRENT LABORATORIES 11 East Olive Road Pensacola, Florida 32514 (850) 474-1001

"QC Report"

Title: Water Blank
Batch: PAW286
Analysis Method: 8310/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Extraction Method: 3510/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.

Blank Id: A Date Analyzed: 18-DEC-98 Date Extracted: 11-DEC-98

Parameters:	Units:	Results:	Reporting Limits:
ACENAPHTHENE	UG/L	ND	1
ACENAPHTHYLENE	UG/L	ND	1
ANTHRACENE	UG/L	ND	1
BENZO(a)ANTHRACENE	UG/L	ND	1
BENZO(a)PYRENE	UG/L	ND	1
BENZO(b)FLUORANTHENE	UG/L	ND	1
BENZO(g,h,i)PERYLENE	UG/L	ND	1
BENZO(k)FLUORANTHENE	UG/L	ND	1
CHRYSENE	UG/L	ND	1
DIBENZO(a,h)ANTHRACENE	UG/L	ND	1
FLUORANTHENE	UG/L	ND	1
FLUORENE	UG/L	ND	1
INDENO(1,2,3-cd)PYRENE	UG/L	ND	1
NAPHTHALENE	UG/L	ND	1
PHENANTHRENE	UG/L	ND	1
PYRENE	UG/L	ND	1
1-METHYLNAPHTHALENE	UG/L	ND	1
2-METHYLNAPHTHALENE	UG/L	ND	1
2-CHLOROANTHRACENE	%REC/SURR	84	28-138
ANALYST	INITIALS	HAH	

Comments:

SEVERN TRENT LABORATORIES 11 East Olive Road Pensacola, Florida 32514 (850) 474-1001

"QC Report"

Title: Soil Blank
Batch: PAS105
Analysis Method: 8310/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Extraction Method: 3550/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.

Blank Id: A Date Analyzed: 16-DEC-98 Date Extracted: 11-DEC-98

Parameters:	Units:	Results:	Reporting Limits:
ACENAPHTHENE	UG/KG	ND	10
ACENAPHTHYLENE	UG/KG	ND	10
ANTHRACENE	UG/KG	ND	10
BENZO(a)ANTHRACENE	UG/KG	ND	10
BENZO(a)PYRENE	UG/KG	ND	10
BENZO(b)FLUORANTHENE	UG/KG	ND	10
BENZO(g,h,i)PERYLENE	UG/KG	ND	10
BENZO(k)FLUORANTHENE	UG/KG	ND	10
CHRYSENE	UG/KG	ND	10
DIBENZO(a,h)ANTHRACENE	UG/KG	ND	10
FLUORANTHENE	UG/KG	ND	10
FLUORENE	UG/KG	ND	10
INDENO(1,2,3-cd)PYRENE	UG/KG	ND	10
NAPHTHALENE	UG/KG	ND	10
PHENANTHRENE	UG/KG	ND	10
PYRENE	UG/KG	ND	10
1-METHYLNAPHTHALENE	UG/KG	ND	10
2-METHYLNAPHTHALENE	UG/KG	ND	10
2-CHLOROANTHRACENE	%REC/SURR	70	17-160
ANALYST	INITIALS	HAH	

Comments:

"QC Report"

Title: Water LCS
Batch: PAW286
Analysis Method: 8310/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Extraction Method: 3510/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.

RS Date Analyzed: 18-DEC-98 RS Date Extracted: 11-DEC-98

Parameters:	Spike Added	Sample Conc	RS Conc	RS %Rec	Rec Lmts
ACENAPHTHYLENE	10.8	<1	8.3	77	45-127
BENZO(k)FLUORANTHENE	9.3	<1	8.4	90	68-131
CHRYSENE	9.7	<1	9.0	93	69-131
PHENANTHRENE	9.7	<1	8.1	84	63-124
PYRENE	9.5	<1	8.5	89	61-126
Surrogates:					
2-CHLOROANTHRACENE				89	28-138

Comments:

Notes:
N/S = NOT SUBMITTED N/A = NOT APPLICABLE D = DILUTED OUT
UG/L = PARTS PER BILLION. < = LESS THAN REPORTING LIMIT.
* = VALUES OUTSIDE OF QUALITY CONTROL LIMITS.
SOURCES FOR CONTROL LIMITS ARE INTERNAL LABORATORY QUALITY ASSURANCE PROGRAM AND REFERENCED METHOD.

"QC Report"

Title: Soil LCS
Batch: PAS105
Analysis Method: 8310/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Extraction Method: 3550/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.

RS Date Analyzed: 16-DEC-98 RS Date Extracted: 11-DEC-98

Parameters:	Spike Added	Sample Conc	RS Conc	RS %Rec	Rec Lmts
ACENAPHTHYLENE	10.8	<10	9.1	84	39-137
BENZO(k)FLUORANTHENE	9.3	<10	8.5	91	69-124
CHRYSENE	9.7	<10	8.9	92	65-132
PHENANTHRENE	9.7	<10	6.7	69	59-127
PYRENE	9.5	<10	6.8	72	61-120
Surrogates:					
2-CHLOROANTHRACENE				83	17-160

Comments:

Notes:
N/S = NOT SUBMITTED N/A = NOT APPLICABLE D = DILUTED OUT
UG/KG = PARTS PER BILLION. < = LESS THAN REPORTING LIMIT.
* = VALUES OUTSIDE OF QUALITY CONTROL LIMITS.
SOURCES FOR CONTROL LIMITS ARE INTERNAL LABORATORY QUALITY ASSURANCE PROGRAM AND REFERENCED METHOD.

"QC Report"

Title: Water Matrix Spike/Matrix Spike Duplicate
Batch: PAW286
Analysis Method: 8310/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Extraction Method: 3510/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.

Dry Weight %: N/A
Sample Spiked: 812171-1

MS Date Analyzed: 18-DEC-98
MSD Date Analyzed: 18-DEC-98

MS Date Extracted: 11-DEC-98
MSD Date Extracted: 11-DEC-98

Parameters:	Spike Added	Sample Conc	MS Conc	MS %Rec	MSD Conc	MSD %Rec	RPD	RPD Lmts	Rec Lmts
ACENAPHTHYLENE	10.8	<1	9.7	90	5.6	52	54*	51	18-146
BENZO(k)FLUORANTHENE	9.3	<1	5.2	56	4.5	48	15	40	26-137
CHRYSENE	9.7	<1	6.5	67	5.2	54	21	69	16-156
PHENANTHRENE	9.7	<1	7.9	81	6.7	69	16	36	30-145
PYRENE	9.5	<1	8.2	86	7.4	78	10	41	39-137
Surrogates:									
2-CHLOROANTHRACENE				84		76			28-138

Comments:
MATRIX SPIKE/MATRIX SPIKE DUPLICATE HAD RECOVERY(S) AND/OR RPD(S) OUTSIDE ACCEPTANCE LIMITS DUE TO MATRIX INTERFERENCE. REFER TO LCS DATA.

Notes:
N/S = NOT SUBMITTED N/A = NOT APPLICABLE D = DILUTED OUT
UG/L = PARTS PER BILLION. < = LESS THAN REPORTING LIMIT.
* = VALUES OUTSIDE OF QUALITY CONTROL LIMITS.
SOURCES FOR CONTROL LIMITS ARE INTERNAL LABORATORY QUALITY ASSURANCE PROGRAM AND REFERENCED METHOD.

"QC Report"

Title: Soil Matrix Spike/Matrix Spike Duplicate
Batch: PAS105
Analysis Method: 8310/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Extraction Method: 3550/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.

Dry Weight %: 93 MS Date Analyzed: 16-DEC-98 MS Date Extracted: 11-DEC-98
Sample Spiked: 812151-1 MSD Date Analyzed: 16-DEC-98 MSD Date Extracted: 11-DEC-98

Parameters:	Spike Added	Sample Conc	MS Conc	MS %Rec	MSD Conc	MSD %Rec	RPD	RPD Lmts	Rec Lmts
ACENAPHTHYLENE	390	<11	300	77	300	77	0	67	12-145
BENZO(k)FLUORANTHENE	332	<10.8	323	97	330	99	2	53	22-130
CHRYSENE	346	<10.8	339	98	341	99	1	45	27-140
PHENANTHRENE	347	<10.8	326	94	332	96	2	48	40-121
PYRENE	341	34.4	354	94	402	108	14	49	29-133
Surrogates:									
2-CHLOROANTHRACENE				93		109			17-160

Comments:

Notes:
N/S = NOT SUBMITTED N/A = NOT APPLICABLE D = DILUTED OUT
UG/KG = PARTS PER BILLION. < = LESS THAN REPORTING LIMIT.
* = VALUES OUTSIDE OF QUALITY CONTROL LIMITS.
SOURCES FOR CONTROL LIMITS ARE INTERNAL LABORATORY QUALITY ASSURANCE PROGRAM AND REFERENCED METHOD.

Common Notation for Organic Reporting

N/S = NOT SUBMITTED
N/A = NOT APPLICABLE
UG = MICROGRAMS
UG/L = PARTS PER BILLION
UG/KG = PARTS PER BILLION
MG/M3 = MILLIGRAM PER CUBIC METER
PPMV = PART PER MILLION BY VOLUME
MG/KG = PARTS PER MILLION
MG/L = PARTS PER MILLION
< = LESS THAN
ND = NOT DETECTED AT OR ABOVE THE STL-PENSACOLA REPORTING LIMIT (RL).
E = EXCEED THE CALIBRATION CURVE; THEREFORE, RESULTS ARE ESTIMATED.

SOURCES FOR CONTROL LIMITS ARE INTERNAL LABORATORY QUALITY ASSURANCE PROGRAM AND REFERENCED METHOD.

ORGANIC SOILS ARE REPORTED ON A DRYWEIGHT BASIS.

RPT LMTS = REPORTING LIMITS BASED ON METHOD DETECTION LIMIT STUDIES.

RPD = RELATIVE PERCENT DIFFERENCE (OR DEVIATION)

AEN/GC/FID
AEN GAS CHROMATOGRAPHIC METHOD EMPLOYING DIRECT INJECTION ON COLUMN WITH FLAME IONIZATION DETECTOR (FID).

AEN/GC/FIX
AEN GAS CHROMATOGRAPHIC METHOD FOR ANALYSIS OF FIXED GASES EMPLOYING DIRECT INJECTION ON COLUMN WITH THERMAL CONDUCTIVITY DETECTOR (TCD) AND FLAME IONIZATION DETECTOR (FID).

AEN/GC/FPD
AEN GAS CHROMATOGRAPHIC METHOD EMPLOYING DIRECT INJECTION ON COLUMN WITH FLAME PHOTOMETRIC DETECTOR (FPD) IN SULFUR-SPECIFIC MODE.

AEN/GC/PID
AEN GAS CHROMATOGRAPHIC METHOD EMPLOYING DIRECT INJECTION ON COLUMN WITH PHOTOIONIZATION DETECTOR (PID).

AEN/GC/TCD
AEN GAS CHROMATOGRAPHIC METHOD EMPLOYING DIRECT INJECTION ON COLUMN WITH THERMAL CONDUCTIVITY DETECTOR (TCD).

SW-846 METHOD 9020
PARTICULATE MATTER IS REMOVED BY ALLOWING PARTICULATES TO SETTLE IN THE SAMPLE CONTAINER AND DECANTING THE SUPERNATANT LIQUID. EXCESSIVE PARTICULATES ARE REMOVED BY FILTRATION OF THE SUPERNATANT LIQUID.

RSK 175
SAMPLE PREPARATION AND CALCULATIONS FOR DISSOLVED GAS ANALYSIS IN WATER SAMPLES USING A GC HEADSPACE EQUILIBRATION TECHNIQUE, RSK SOP-175, ROBERT S. KERR ENVIRONMENTAL RESEARCH LABORATORY, USEPA, AUGUST 11, 1994.

AEN-PN USES THE MOST CURRENT PROMULGATED METHODS CONTAINED IN THE REFERENCE MANUALS.

SW = STEVE WILHITE
RW = RITA WINGO
KS = KENDALL SMITH
LBL = LISA BIZZELL-LOWE
LP = LEVERNE PETERSON
PLD = PAULA DOUGHTY
DK = DARLENE KINCHEN
BT = BECKY TREMMEL
HAH = HOLLIE HOFFMAN
HC = HOLLIE CHAPMAN

SEVERN TRENT LABORATORIES 11 East Olive Road Pensacola, Florida 32514 (850) 474-1001

Quality Control Report

Analysis: ACID & BASE EXTRACTABLES (8270C)

Accession:	812171
Client:	PINNACLE LABORATORIES
Project Number:	812044
Project Name:	NMOCD
Project Location:	CHAMPION-HOBBS
Department:	ORGANIC/MS

"QC Report"

Title: Water Blank
Batch: ALW154
Analysis Method: 8270C/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Extraction Method: 3520C/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.

Blank Id: A Date Analyzed: 20-DEC-98 Date Extracted: 15-DEC-98

Parameters:	Units:	Results:	Reporting Limits:
P-CHLORO-M-CRESOL	UG/L	ND	10
2-CHLOROPHENOL	UG/L	ND	10
O-CRESOL	UG/L	ND	10
M,P CRESOL	UG/L	ND	10
2,4-DICHLOROPHENOL	UG/L	ND	10
2,6-DICHLOROPHENOL	UG/L	ND	10
2,4-DIMETHYLPHENOL	UG/L	ND	10
4,6-DINITRO-O-CRESOL	UG/L	ND	50
2,4-DINITROPHENOL	UG/L	ND	10
2-NITROPHENOL	UG/L	ND	10
4-NITROPHENOL	UG/L	ND	50
PENTACHLOROPHENOL	UG/L	ND	50
PHENOL	UG/L	ND	10
2,3,4,6-TETRACHLOROPHENOL	UG/L	ND	10
2,4,5-TRICHLOROPHENOL	UG/L	ND	50
2,4,6-TRICHLOROPHENOL	UG/L	ND	10
ACENAPHTHENE	UG/L	ND	10
ACENAPHTHYLENE	UG/L	ND	10
ACETOPHENONE	UG/L	ND	10
2-ACETYLAMINOFLUORENE	UG/L	ND	10
4-AMINOBIPHENYL	UG/L	ND	10
ANILINE	UG/L	ND	10
ANTHRACENE	UG/L	ND	10
ARAMITE	UG/L	ND	10
BENZO (A) ANTHRACENE	UG/L	ND	10
BENZO (A) PYRENE	UG/L	ND	10
BENZO (B) FLUORANTHENE	UG/L	ND	10
BENZO (G,H,I) PERYLENE	UG/L	ND	10
BENZO (K) FLUORANTHENE	UG/L	ND	10
BENZYL ALCOHOL	UG/L	ND	10
BIS(2-CHLORO-1-METHYLETHYL)ETHER	UG/L	ND	10
BIS(2-CHLOROETHOXY)METHANE	UG/L	ND	10
BIS(2-CHLOROETHYL)ETHER	UG/L	ND	10
BIS(2-ETHYLHEXYL)PHTHALATE	UG/L	ND	10
4-BROMOPHENYL PHENYL ETHER	UG/L	ND	10
BUTYLBENZYL PHTHALATE	UG/L	ND	10
P-CHLOROANILINE	UG/L	ND	10
CHLOROBENZILATE	UG/L	ND	10
2-CHLORONAPHTHALENE	UG/L	ND	10
4-CHLOROPHENYL PHENYL ETHER	UG/L	ND	10
CHRYSENE	UG/L	ND	10
DIALLATE	UG/L	ND	10
DIBENZO (A,H) ANTHRACENE	UG/L	ND	10
DIBENZOFURAN	UG/L	ND	10
1,2-DICHLOROBENZENE	UG/L	ND	10
1,3-DICHLOROBENZENE	UG/L	ND	10

"QC Report"

Title: Water Blank
Batch: ALW154
Analysis Method: 8270C/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Extraction Method: 3520C/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.

Parameters:	Units:	Results:	Reporting Limits:
1,4-DICHLOROBENZENE	UG/L	ND	10
3,3'-DICHLOROBENZIDINE	UG/L	ND	50
DIETHYLPHTHALATE	UG/L	ND	10
DIMETHOATE	UG/L	ND	10
P-DIMETHYLAMINOAZOBENZENE	UG/L	ND	10
7,12-DIMETHYLBENZ(A)ANTHRACENE	UG/L	ND	10
3,3'-DIMETHYLBENZIDINE	UG/L	ND	10
A,A-DIMETHYLPHENETHYLAMINE	UG/L	ND	10
DIMETHYLPHTHALATE	UG/L	ND	10
DI-N-BUTYLPHTHALATE	UG/L	ND	10
M-DINITROBENZENE	UG/L	ND	10
2,4-DINITROTOLUENE	UG/L	ND	10
2,6-DINITROTOLUENE	UG/L	ND	10
DI-N-OCTYLPHTHALATE	UG/L	ND	10
DIPHENYLAMINE	UG/L	ND	10
ETHYL METHANESULFONATE	UG/L	ND	10
FAMPHUR	UG/L	ND	10
FLUORANTHENE	UG/L	ND	10
FLUORENE	UG/L	ND	10
HEXACHLOROBENZENE	UG/L	ND	10
HEXACHLOROBUTADIENE	UG/L	ND	10
HEXACHLOROCYCLOPENTADIENE	UG/L	ND	10
HEXACHLOROETHANE	UG/L	ND	10
HEXACHLOROPHENE	UG/L	ND	10
HEXACHLOROPROPENE	UG/L	ND	10
INDENO (1,2,3-CD) PYRENE	UG/L	ND	10
ISODRIN	UG/L	ND	10
ISOPHORONE	UG/L	ND	10
ISOSAFROLE	UG/L	ND	10
KEPONE	UG/L	ND	10
METHAPYRILENE	UG/L	ND	10
3-METHYLCHOLANTHRENE	UG/L	ND	10
METHYL METHANESULFONATE	UG/L	ND	10
1-METHYLNAPHTHALENE	UG/L	ND	10
2-METHYLNAPHTHALENE	UG/L	ND	10
NAPHTHALENE	UG/L	ND	10
1,4-NAPHTHOQUINONE	UG/L	ND	10
1-NAPHTHYLAMINE	UG/L	ND	10
2-NAPHTHYLAMINE	UG/L	ND	10
2-NITROANILINE	UG/L	ND	50
3-NITROANILINE	UG/L	ND	50
4-NITROANILINE	UG/L	ND	50
NITROBENZENE	UG/L	ND	10
5-NITRO-O-TOLUIDINE	UG/L	ND	10
4-NITROQUINOLINE-1-OXIDE	UG/L	ND	10
N-NITROSODIETHYLAMINE	UG/L	ND	10
N-NITROSODIMETHYLAMINE	UG/L	ND	10

"QC Report"

Title: Water Blank
Batch: ALW154
Analysis Method: 8270C/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Extraction Method: 3520C/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.

Parameters:	Units:	Results:	Reporting Limits:
N-NITROSODI-N-BUTYLAMINE	UG/L	ND	10
N-NITROSODIPHENYLAMINE	UG/L	ND	10
N-NITROSOMETHYLETHYLAMINE	UG/L	ND	10
N-NITROSOMORPHOLINE	UG/L	ND	10
N-NITROSOPIPERIDINE	UG/L	ND	10
N-NITROSOPYRROLIDINE	UG/L	ND	10
PARATHION	UG/L	ND	10
PENTACHLOROBENZENE	UG/L	ND	10
PENTACHLOROETHANE	UG/L	ND	10
PENTACHLORONITROBENZENE	UG/L	ND	10
PHENACETIN	UG/L	ND	10
PHENANTHRENE	UG/L	ND	10
2-PICOLINE	UG/L	ND	10
P-PHENYLENEDIAMINE	UG/L	ND	10
PRONAMIDE	UG/L	ND	10
PYRENE	UG/L	ND	10
PYRIDINE	UG/L	ND	10
SAFROLE	UG/L	ND	10
SULFOTEPP	UG/L	ND	10
1,2,4,5-TETRACHLOROBENZENE	UG/L	ND	10
THIONAZIN	UG/L	ND	10
O-TOLUIDINE	UG/L	ND	10
1,2,4 TRICHLOROBENZENE	UG/L	ND	10
SYM-TRINITROBENZENE	UG/L	ND	10
O,O,O-TRIETHYL PHOSPHOROTHIATE	UG/L	ND	10
BENZIDINE	UG/L	ND	10
BIS(2-CHLOROISOPROPYL)ETHER	UG/L	ND	10
2-(SEC BUTYL)4,6-DINITRO-PHENOL(DINOSEB)	UG/L	ND	10
0~NITROSO-DI-N-PROPYLAMINE	UG/L	ND	10
6-METHYL CHRYSENE	UG/L	ND	20
INDENE	UG/L	ND	20
QUINOLINE	UG/L	ND	50
BENZENETHIOL	UG/L	ND	20
PARATOLIUDINE	UG/L	ND	50
TOLUENE DIISOCYANATE	UG/L	ND	50
TOLUENE DIAMINE	UG/L	ND	50
MONONITROTOLUENE	UG/L	ND	50
DIETHYLENE GLYCOL MONOBUTYL ETHER	UG/L	ND	10
2-FLUOROPHENOL	%REC/SURR	94	21-100
PHENOL-D6	%REC/SURR	89	10-100
2,4,6-TRIBROMOPHENOL	%REC/SURR	92	10-123
2-FLUOROBIPHENYL	%REC/SURR	83	43-116
NITROBENZENE-D5	%REC/SURR	79	35-114
TERPHENYL-D14	%REC/SURR	96	33-124
ANALYST	INITIALS	RW	

Comments:

"QC Report"

Title: Soil Blank
Batch: ALS089
Analysis Method: 8270C/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Extraction Method: 3550B/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.

Blank Id: A Date Analyzed: 15-DEC-98 Date Extracted: 11-DEC-98

Parameters:	Units:	Results:	Reporting Limits:
P-CHLORO-M-CRESOL	UG/KG	ND	10
2-CHLOROPHENOL	UG/KG	ND	10
O-CRESOL	UG/KG	ND	10
M,P CRESOL	UG/KG	ND	10
2,4-DICHLOROPHENOL	UG/KG	ND	10
2,6-DICHLOROPHENOL	UG/KG	ND	10
2,4-DIMETHYLPHENOL	UG/KG	ND	10
4,6-DINITRO-O-CRESOL	UG/KG	ND	50
2,4-DINITROPHENOL	UG/KG	ND	10
2-NITROPHENOL	UG/KG	ND	10
4-NITROPHENOL	UG/KG	ND	50
PENTACHLOROPHENOL	UG/KG	ND	50
PHENOL	UG/KG	ND	10
2,3,4,6-TETRACHLOROPHENOL	UG/KG	ND	10
2,4,5-TRICHLOROPHENOL	UG/KG	ND	50
2,4,6-TRICHLOROPHENOL	UG/KG	ND	10
ACENAPHTHENE	UG/KG	ND	10
ACENAPHTHYLENE	UG/KG	ND	10
ACETOPHENONE	UG/KG	ND	10
2-ACETYLAMINOFLUORENE	UG/KG	ND	10
4-AMINOBIPHENYL	UG/KG	ND	10
ANILINE	UG/KG	ND	10
ANTHRACENE	UG/KG	ND	10
ARAMITE	UG/KG	ND	10
BENZO (A) ANTHRACENE	UG/KG	ND	10
BENZO (A) PYRENE	UG/KG	ND	10
BENZO (B) FLUORANTHENE	UG/KG	ND	10
BENZO (G,H,I) PERYLENE	UG/KG	ND	10
BENZO (K) FLUORANTHENE	UG/KG	ND	10
BENZYL ALCOHOL	UG/KG	ND	10
BIS(2-CHLORO-1-METHYLETHYL)ETHER	UG/KG	ND	10
BIS(2-CHLOROETHOXY)METHANE	UG/KG	ND	10
BIS(2-CHLOROETHYL)ETHER	UG/KG	ND	10
BIS(2-ETHYLHEXYL)PHTHALATE	UG/KG	ND	10
4-BROMOPHENYL PHENYL ETHER	UG/KG	ND	10
BUTYLBENZYL PHTHALATE	UG/KG	ND	10
P-CHLOROANILINE	UG/KG	ND	10
CHLOROBENZILATE	UG/KG	ND	10
2-CHLORONAPHTHALENE	UG/KG	ND	10
4-CHLOROPHENYL PHENYL ETHER	UG/KG	ND	10
CHRYSENE	UG/KG	ND	10
DIALLATE	UG/KG	ND	10
DIBENZO (A,H) ANTHRACENE	UG/KG	ND	10
DIBENZOFURAN	UG/KG	ND	10
1,2-DICHLOROBENZENE	UG/KG	ND	10
1,3-DICHLOROBENZENE	UG/KG	ND	10

"QC Report"

Title: Soil Blank
Batch: ALS089
Analysis Method: 8270C/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Extraction Method: 3550B/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.

Parameters:	Units:	Results:	Reporting Limits:
1,4-DICHLOROBENZENE	UG/KG	ND	10
3,3'-DICHLOROBENZIDINE	UG/KG	ND	50
DIETHYLPHTHALATE	UG/KG	ND	10
DIMETHOATE	UG/KG	ND	10
P-DIMETHYLAMINOAZOBENZENE	UG/KG	ND	10
7,12-DIMETHYLBENZ(A)ANTHRACENE	UG/KG	ND	10
3,3'-DIMETHYLBENZIDINE	UG/KG	ND	10
A,A-DIMETHYLPHENETHYLAMINE	UG/KG	ND	10
DIMETHYLPHTHALATE	UG/KG	ND	10
DI-N-BUTYLPHTHALATE	UG/KG	ND	10
M-DINITROBENZENE	UG/KG	ND	10
2,4-DINITROTOLUENE	UG/KG	ND	10
2,6-DINITROTOLUENE	UG/KG	ND	10
DI-N-OCTYLPHTHALATE	UG/KG	ND	10
DIPHENYLAMINE	UG/KG	ND	10
ETHYL METHANESULFONATE	UG/KG	ND	10
FAMPHUR	UG/KG	ND	10
FLUORANTHENE	UG/KG	ND	10
FLUORENE	UG/KG	ND	10
HEXACHLOROBENZENE	UG/KG	ND	10
HEXACHLOROBUTADIENE	UG/KG	ND	10
HEXACHLOROCYCLOPENTADIENE	UG/KG	ND	10
HEXACHLOROETHANE	UG/KG	ND	10
HEXACHLOROPHENE	UG/KG	ND	10
HEXACHLOROPROPENE	UG/KG	ND	10
INDENO (1,2,3-CD) PYRENE	UG/KG	ND	10
ISODRIN	UG/KG	ND	10
ISOPHORONE	UG/KG	ND	10
ISOSAFROLE	UG/KG	ND	10
KEPONE	UG/KG	ND	10
METHAPYRILENE	UG/KG	ND	10
3-METHYLCHOLANTHRENE	UG/KG	ND	10
METHYL METHANESULFONATE	UG/KG	ND	10
1-METHYLNAPHTHALENE	UG/KG	ND	10
2-METHYLNAPHTHALENE	UG/KG	ND	10
NAPHTHALENE	UG/KG	ND	10
1,4-NAPHTHOQUINONE	UG/KG	ND	10
1-NAPHTHYLAMINE	UG/KG	ND	10
2-NAPHTHYLAMINE	UG/KG	ND	10
2-NITROANILINE	UG/KG	ND	50
3-NITROANILINE	UG/KG	ND	50
4-NITROANILINE	UG/KG	ND	50
NITROBENZENE	UG/KG	ND	10
5-NITRO-O-TOLUIDINE	UG/KG	ND	10
4-NITROQUINOLINE-1-OXIDE	UG/KG	ND	10
N-NITROSODIETHYLAMINE	UG/KG	ND	10
N-NITROSODIMETHYLAMINE	UG/KG	ND	10

"QC Report"

Title: Soil Blank
Batch: ALS089
Analysis Method: 8270C/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Extraction Method: 3550B/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.

Parameters:	Units:	Results:	Reporting Limits:
N-NITROSODI-N-BUTYLAMINE	UG/KG	ND	10
N-NITROSODIPHENYLAMINE	UG/KG	ND	10
N-NITROSOMETHYLETHYLAMINE	UG/KG	ND	10
N-NITROSOMORPHOLINE	UG/KG	ND	10
N-NITROSOPIPERIDINE	UG/KG	ND	10
N-NITROSOPYRROLIDINE	UG/KG	ND	10
PARATHION	UG/KG	ND	10
PENTACHLOROBENZENE	UG/KG	ND	10
PENTACHLOROETHANE	UG/KG	ND	10
PENTACHLORONITROBENZENE	UG/KG	ND	10
PHENACETIN	UG/KG	ND	10
PHENANTHRENE	UG/KG	ND	10
2-PICOLINE	UG/KG	ND	10
P-PHENYLENEDIAMINE	UG/KG	ND	10
PRONAMIDE	UG/KG	ND	10
PYRENE	UG/KG	ND	10
PYRIDINE	UG/KG	ND	10
SAFROLE	UG/KG	ND	10
SULFOTEPP	UG/KG	ND	10
1,2,4,5-TETRACHLOROBENZENE	UG/KG	ND	10
THIONAZIN	UG/KG	ND	10
O-TOLUIDINE	UG/KG	ND	10
1,2,4 TRICHLOROBENZENE	UG/KG	ND	10
SYM-TRINITROBENZENE	UG/KG	ND	10
O,O,O-TRIETHYL PHOSPHOROTHIATE	UG/KG	ND	10
BENZIDINE	UG/KG	ND	10
BIS(2-CHLOROISOPROPYL)ETHER	UG/KG	ND	10
2-(SEC BUTYL)4,6-DINITRO-PHENOL(DINOSEB)	UG/KG	ND	10
N-NITROSO-DI-N-PROPYLAMINE	UG/KG	ND	10
6-METHYL CHRYSENE	UG/KG	ND	20
INDENE	UG/KG	ND	20
QUINOLINE	UG/KG	ND	50
BENZENETHIOL	UG/KG	ND	20
PARATOLIUDINE	UG/KG	ND	50
TOLUENE DIISOCYANATE	UG/KG	ND	50
TOLUENE DIAMINE	UG/KG	ND	50
MONONITROTOLUENE	UG/KG	ND	50
DIETHYLENE GLYCOL MONOBUTYL ETHER	UG/KG	ND	10
2-FLUOROPHENOL	%REC/SURR	37	25-121
PHENOL-D6	%REC/SURR	45	24-113
2,4,6-TRIBROMOPHENOL	%REC/SURR	45	19-122
2-FLUOROBIPHENYL	%REC/SURR	45	30-115
NITROBENZENE-D5	%REC/SURR	49	23-120
TERPHENYL-D14	%REC/SURR	62	18-137
ANALYST	INITIALS	RW	

Comments:

"QC Report"

Title: Water LCS
Batch: ALW154
Analysis Method: 8270C/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Extraction Method: 3520C/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.

RS Date Analyzed: 21-DEC-98 RS Date Extracted: 15-DEC-98

Parameters:	Spike Added	Sample Conc	RS Conc	RS %Rec	Rec Lmts
PHENOL	200	<10	134	67	5-112
2-CHLOROPHENOL	200	<10	132	66	40-120
1,4-DICHLOROBENZENE	100	<10	58	58	32-119
N-NITRO-DI-N-PROPYLAMINE	100	<10	52	52	26-128
1,2,4 TRICHLOROBENZENE	100	<10	64	64	44-142
4-CHLORO-3-METHYLPHENOL	200	<10	152	76	30-128
ACENAPHTHENE	100	<10	62	62	47-145
4-NITROPHENOL	200	<50	140	70	1-132
2,4-DINITROTOLUENE	100	<10	66	66	39-138
PENTACHLOROPHENOL	200	<50	140	70	15-157
PYRENE	100	<10	80	80	52-115
Surrogates:					
NITROBENZENE-D5				68	35-114
2-FLUOROBIPHENYL				73	43-116
TERPHENYL-D14				95	33-124
PHENOL-D6				79	10-100
2-FLUOROPHENOL				75	21-100
2,4,6-TRIBROMOPHENOL				86	10-123

Comments:

Notes:
N/S = NOT SUBMITTED N/A = NOT APPLICABLE D = DILUTED OUT
UG/L = PARTS PER BILLION. < = LESS THAN REPORTING LIMIT.
* = VALUES OUTSIDE OF QUALITY CONTROL LIMITS.
SOURCES FOR CONTROL LIMITS ARE INTERNAL LABORATORY QUALITY ASSURANCE PROGRAM AND REFERENCED METHOD.

"QC Report"

Title: Soil LCS
Batch: ALS089
Analysis Method: 8270C/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Extraction Method: 3550B/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.

RS Date Analyzed: 15-DEC-98 RS Date Extracted: 11-DEC-98

Parameters:	Spike Added	Sample Conc	RS Conc	RS %Rec	Rec Lmts
PHENOL	3333	<330	2933	88	5-112
2-CHLOROPHENOL	3333	<330	2633	79	38-123
1,4-DICHLOROBENZENE	1667	<330	1400	84	50-111
N-NITRO-DI-N-PROPYLAMINE	1667	<330	1533	92	39-121
1,2,4 TRICHLOROBENZENE	1667	<330	1467	88	49-115
4-CHLORO-3-METHYLPHENOL	3333	<330	3167	95	37-128
ACENAPHTHENE	1667	<330	1433	86	53-115
4-NITROPHENOL	3333	<1700	2867	86	32-126
2,4-DINITROTOLUENE	1667	<330	1400	84	56-118
PENTACHLOROPHENOL	3333	<1700	2467	74	31-146
PYRENE	1667	<330	1267	76	52-115
Surrogates:					
NITROBENZENE-D5				103	23-120
2-FLUOROBIPHENYL				91	30-115
TERPHENYL-D14				92	18-137
PHENOL-D6				98	24-113
2-FLUOROPHENOL				97	25-121
2,4,6-TRIBROMOPHENOL				90	19-122

Comments:

Notes:
N/S = NOT SUBMITTED N/A = NOT APPLICABLE D = DILUTED OUT
UG/KG = PARTS PER BILLION. < = LESS THAN REPORTING LIMIT.
* = VALUES OUTSIDE OF QUALITY CONTROL LIMITS.
SOURCES FOR CONTROL LIMITS ARE INTERNAL LABORATORY QUALITY ASSURANCE PROGRAM AND REFERENCED METHOD.

"QC Report"

Title: Water Matrix Spike/Matrix Spike Duplicate
Batch: ALW154
Analysis Method: 8270C/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Extraction Method: 3520C/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.

Dry Weight %: N/A
Sample Spiked: 812171-1

MS Date Analyzed: 21-DEC-98
MSD Date Analyzed: 21-DEC-98

MS Date Extracted: 15-DEC-98
MSD Date Extracted: 15-DEC-98

Parameters:	Spike Added	Sample Conc	MS Conc	MS %Rec	MSD Conc	MSD %Rec	RPD	RPD Lmts	Rec Lmts
PHENOL	400	<10	224	56	220	55	2	38	5-112
2-CHLOROPHENOL	400	<10	232	58	232	58	0	25	38-120
1,4-DICHLOROBENZENE	200	<10	96	48	100	50	4	27	39-112
N-NITRO-DI-N-PROPYLAMINE	200	<10	104	52	104	52	0	30	32-125
1,2,4 TRICHLOROBENZENE	200	<10	112	56	112	56	0	30	44-118
4-CHLORO-3-METHYLPHENOL	400	<10	284	71	284	71	0	23	42-131
ACENAPHTHENE	200	<10	120	60	120	60	0	21	47-131
4-NITROPHENOL	400	<50	272	68	236	59	14	36	1-116
2,4-DINITROTOLUENE	200	<10	120	60	120	60	0	22	39-138
PENTACHLOROPHENOL	400	<50	288	72	264	66	9	36	14-164
PYRENE	200	<10	148	74	180	90	20	21	52-115
Surrogates:									
NITROBENZENE-D5				62		61			35-114
2-FLUOROBIPHENYL				66		64			43-116
TERPHENYL-D14				89		99			33-124
PHENOL-D6				71		70			10-100
2-FLUOROPHENOL				62		62			21-100
2,4,6-TRIBROMOPHENOL				88		81			10-123

Comments:

Notes:
N/S = NOT SUBMITTED N/A = NOT APPLICABLE D = DILUTED OUT
UG/L = PARTS PER BILLION. < = LESS THAN REPORTING LIMIT.
* = VALUES OUTSIDE OF QUALITY CONTROL LIMITS.
SOURCES FOR CONTROL LIMITS ARE INTERNAL LABORATORY QUALITY ASSURANCE PROGRAM AND REFERENCED METHOD.

"QC Report"

Title: Soil Matrix Spike/Matrix Spike Duplicate
Batch: ALS089
Analysis Method: 8270C/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.
Extraction Method: 3550B/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.

Dry Weight %: 96
Sample Spiked: 812171-2

MS Date Analyzed: 15-DEC-98
MSD Date Analyzed: 15-DEC-98

MS Date Extracted: 11-DEC-98
MSD Date Extracted: 11-DEC-98

Parameters:	Spike Added	Sample Conc	MS Conc	MS %Rec	MSD Conc	MSD %Rec	RPD	RPD Lmts	Rec Lmts
PHENOL	3472	<343.8	3889	112*	3716	107*	5	22	40-103
2-CHLOROPHENOL	3472	<343.8	3472	100	3299	95	5	27	39-104
1,4-DICHLOROBENZENE	1736	<343.8	1805	104	1701	98	6	27	43-109
N-NITRO-DI-N-PROPYLAMINE	1736	<343.8	2014	116	1909	110	5	27	29-117
1,2,4 TRICHLOROBENZENE	1736	<343.8	1979	114	1875	108	5	21	49-126
4-CHLORO-3-METHYLPHENOL	3472	<343.8	4341	125*	4236	122*	2	28	32-117
ACENAPHTHENE	1736	<343.8	1945	112	1945	112	0	20	47-126
4-NITROPHENOL	3472	<1771	3333	96	3403	98	2	42	1-124
2,4-DINITROTOLUENE	1736	<343.8	1805	104	1841	106	2	23	43-110
PENTACHLOROPHENOL	3472	<1771	2257	65	3229	93	35*	33	14-144
PYRENE	1736	<343.8	1909	110	1909	110	0	31	52-115
Surrogates:									
NITROBENZENE-D5				82		78			23-120
2-FLUOROBIPHENYL				75		71			30-115
TERPHENYL-D14				78		76			18-137
PHENOL-D6				78		74			24-113
2-FLUOROPHENOL				74		68			25-121
2,4,6-TRIBROMOPHENOL				70		70			19-122

Comments:
* MATRIX SPIKE/MATRIX SPIKE DUPLICATE HAD RECOVERY(S), RPD'S AND/OR SURROGATE(S) OUTSIDE ACCEPTANCE LIMITS.

Notes:
N/S = NOT SUBMITTED N/A = NOT APPLICABLE D = DILUTED OUT
UG/KG = PARTS PER BILLION. < = LESS THAN REPORTING LIMIT.
* = VALUES OUTSIDE OF QUALITY CONTROL LIMITS.
SOURCES FOR CONTROL LIMITS ARE INTERNAL LABORATORY QUALITY ASSURANCE PROGRAM AND REFERENCED METHOD.

Common notation for Organic reporting

N/S = NOT SUBMITTED
N/A = NOT APPLICABLE
UG/L = PARTS PER BILLION.
UG/KG = PARTS PER BILLION.
MG/KG = PARTS PER MILLION.
MG/L = PARTS PER MILLION.
MG/M3 = MILLIGRAMS PER CUBIC METER.
NG = NANOGRAMS.
UG = MICROGRAMS.
PPBV = PARTS PER BILLION/VOLUME.
< = LESS THAN.
ND = NOT DETECTED ABOVE REPORT LIMIT.
RPT LMTS = REPORTING LIMITS BASED ON METHOD DETECTION LIMIT STUDIES.
RPD = RELATIVE PERCENT DIFFERENCE (OR DEVIATION)
E = EXCEEDS THE CALIBRATION CURVE.

SOURCES FOR CONTROL LIMITS ARE INTERNAL LABORATORY QUALITY ASSURANCE PROGRAM AND REFERENCED METHOD.

ORGANIC SOILS ARE REPORTED ON A DRY WEIGHT BASIS.

DUE TO THE NATURE OF THE SAMPLE MATRIX, MATRIX SPIKE/MATRIX SPIKE DUPLICATE ANALYSIS CANNOT BE PERFORMED FOR AIR ANALYSIS.

CLP SOW 1991, USEPA CONTRACT LABORATORY PROGRAM, STATEMENT OF WORK FOR ORGANICS ANALYSIS, DOCUMENT NUMBER OLM01.8, AUGUST 1991.

AEN-PN USES THE MOST CURRENT PROMULGATED METHODS CONTAINED IN THE REFERENCE MANUALS.

LP = LEVERNE PETERSON	RW = RITA WINGO
LD = LARRY DILMORE	BDH = BRUCE D. HUNT
DWB = DAVID BOWERS	WD = WALTER DREW

Severn Trent Laboratories of Florida

PROJECT SAMPLE INSPECTION FORM

Lab Accession #: 812171 Date Received: 10-Dec-98

1.	Was there a Chain of Custody?	(Yes)	No*		
2.	Was Chain of Custody properly filled out and relinquished?	(Yes)	No*		
3.	Were samples received cold? (Criteria: 2° - 6°C: AEN-SOP 1055)	(Yes)	No*	N/A	
4.	Were all samples properly labeled and identified?	(Yes)	No*		
5.	Did samples require splitting? Req By: PM Client Other*	Yes*	(No)		
6.	Were samples received in proper containers for analysis requested?	(Yes)	No*		
7.	Were all sample containers received intact?	(Yes)	No*		
8.	Were samples checked for preservative? *(Check pH of all H_2O requiring preservative (AEN-PN SOP 917) except VOA vials that require zero headspace)+*	(Yes)	No*	(N/A) LKM	
9.	Is there sufficient volume for analysis requested?	(Yes)	No*		
10.	Were samples received within Holding Time? (REFER TO AEN-SOP 1040)	(Yes)	No*		
11.	Is Headspace visible > ¼" in diameter in VOA vials?* If any headspace is evident, comment in out-of-control	Yes*	No	(N/A)	
12.	If sent, were matrix spike bottles returned?	Yes	No*	(N/A)	
13.	Was Project Manager notified of problems? (initials:_____)	Yes	No*	(N/A)	

Airbill Number(s): _____ **Shipped By:** Fedx

Cooler Number(s): Thiers **Shipping Charges:** N/A

Cooler Weight(s): N/A **Cooler Temp(s) (°C):** 2.0°C

OCKi

(LIST THERMOMETER NUMBER(S) FOR VERIFICATION)

Out of Control Events and Inspection Comments:

(USE BACK OF PSIF FOR ADDITIONAL NOTES AND COMMENTS) ☞

Inspected By: LKM **Date:** 10-Dec-98 **Logged By:** LKM **Date:** 10-Dec-98

* *Note all Out-of-Control and/or questionable events on Comment Section of this form.*

♦ *Note who requested the splitting of samples on the Comment Section of this form.*

\+ *All preservatives for the State of North Carolina, the State of New York, and other requested samples are to be recorded on the sheet provided to record pH results (AEN-SOP 938, section 2.2.9).*

✱ *According to EPA, ¼" of headspace is allowed in 40 ml vials requiring volatile analysis, however, AEN makes it policy to record any headspace as out-of-control (AEN-SOP 938, section 2.2.12).*

Pinnacle Laboratories, Inc. **Interlab Chain of Custody** Date: 12/9 Page: 1 of 1

Network Project Manager: Kimberly D. McNeill

Pinnacle Laboratories, Inc.
2709-D Pan American Freeway, NE
Albuquerque, New Mexico 87107
(505) 344-3777 Fax (505) 344-4413

812171

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	Metals (8) RCRA	RCRA TCLP METALS	Metals-13 PP List	Metals-TAL		TOX	TOC	Gen Chemistry		Oil and Grease	Volatile Organics GC/MS (8260)	BOD	COD	PESTICIDES/PCB (608/8080)	8270 BY GC/MS	PNA (8310)	8240 (TCLP 1311) ZHE	Herbicides (615/8150)	Base/Neutral Acid Compounds GC/MS (625/8270)	URANIUM	RADIUM 226+228	Gross Alpha/Beta	TO-14	NUMBER OF CONTAINERS
812044-01	12/8	1151	AQ																X	X								
-02	↓	1209	NAQ																X	X								

ANALYSIS REQUEST

PROJECT INFORMATION		SAMPLE RECEIPT		SAMPLES SENT TO:		RELINQUISHED BY: 1.	RELINQUISHED BY: 2.
PROJECT #: 812044		Total Number of Containers		PENSACOLA - STL-FL	X	Signature: Time: Francine Tonno 1705	Signature: Time:
PROJ. NAME: NMOCD		Chain of Custody Seals		PORTLAND - ESL-OR		Printed Name: Date: Francine Tonno 12/9/98	Printed Name: Date:
QC LEVEL: (STD) IV		Received Intact?		STL - CT		Pinnacle Laboratories, Inc.	Company
QC REQUIRED: MS MSD BLANK		Received Good Cond./Cold		STL- NEW JERSEY		RECEIVED BY: 1.	RECEIVED BY: 2
TAT: (STANDARD) RUSH!!		LAB NUMBER:		N. CREEK		Signature: Time: Linda Kitt-Moore 0930	Signature: Time:
				BARRINGER		Printed Name: Date: Linda Kitt-Moore 12/10/98	Printed Name: Date:
DUE DATE: 12/23	COMMENTS:			SEQUOIA		Company STL/71	Company
RUSH SURCHARGE: —							
CLIENT DISCOUNT: —							
SPECIAL CERTIFICATION REQUIRED: YES (NO)							

Environmental Services Laboratory, Inc. E S L

17400 SW Upper Boones Ferry Road • Suite 270 • Portland, OR 97224 • (503) 670-8520

Kim McNeill
Pinnacle Laboratories
2709-D Pan American Fwy NE
Albuquerque, NM 87107

Date: 01/08/1999
ESL Account No.: 90147
ESL Job Number: 98.02385

Project: 812044 / NMOCD
Location: Champion - Hobbs

Sample analysis in support of the project referenced above has been completed and results are presented on the following pages. Should you have questions regarding procedures or results, please feel welcome to contact Client Services.

Due to the sample matrix on sample 107984/108348, alkalinity, TDS and conductivity analyses can not be performed on a soil sample.

Sample Number	Sample Description	Matrix Type	Date Taken	Date Received
107983	812044-001	Water	12/08/1998	12/10/1998
107984	812044-02	SOIL	12/08/1998	12/10/1998
108348	812044-02 K only	SOIL	12/08/1998	12/31/1998

Approved by:

Andi Hoevet
Project Manager
ESL, INC.

Technical Review
ESL, INC.

ANALYTICAL REPORT

Kim McNeill
Pinnacle Laboratories
2709-D Pan American Fwy NE
Albuquerque, NM 87107

01/08/1999
Job No.: 98.02385

Project Name: 812044 / NMOCD
Date Received: 12/10/1998

Sample Number	Sample Description
107983	812044-001

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
024 Metals by ICAP						
ICP/AA Digestion - Water	ICP	-			12/16/1998	
Aluminum, ICP 200.7	200.7	0.05	0.05	mg/L	12/16/1998	
Antimony, ICP 200.7	200.7	ND	0.005	mg/L	12/16/1998	
Arsenic, ICP 200.7	200.7	0.006	0.005	mg/L	12/16/1998	
Barium, ICP 200.7	200.7	0.088	0.005	mg/L	12/16/1998	
Beryllium, ICP 200.7	200.7	ND	0.002	mg/L	12/16/1998	
Boron, ICP 200.7	200.7	0.35	0.025	mg/L	12/16/1998	Q
Cadmium, ICP 200.7	200.7	ND	0.002	mg/L	12/16/1998	
Calcium, ICP 200.7	200.7	160	0.05	mg/L	12/16/1998	
Chromium, ICP 200.7	200.7	0.046	0.005	mg/L	12/16/1998	
Cobalt, ICP 200.7	200.7	ND	0.005	mg/L	12/16/1998	
Copper, ICP 200.7	200.7	0.093	0.005	mg/L	12/16/1998	
Iron, ICP 200.7	200.7	0.057	0.010	mg/L	12/16/1998	
Lead, ICP 200.7	200.7	ND	0.005	mg/L	12/16/1998	
Magnesium, ICP 200.7	200.7	30	0.05	mg/L	12/16/1998	
Manganese, ICP 200.7	200.7	ND	0.005	mg/L	12/16/1998	
Mercury Prep (W)		-			12/11/1998	
Mercury, CV	245.1	ND	0.0002	mg/L	12/14/1998	
Molybdenum, ICP 200.7	200.7	ND	0.005	mg/L	12/16/1998	
Nickel, ICP 200.7	200.7	ND	0.005	mg/L	12/16/1998	
Potassium, ICP 200.7	200.7	7.5	0.2	mg/L	12/16/1998	
Selenium, ICP 200.7	200.7	0.006	0.005	mg/L	12/16/1998	
Silver, ICP 200.7	200.7	ND	0.005	mg/L	12/16/1998	
Sodium, ICP 200.7	200.7	140	20.0	mg/L	12/16/1998	DIL,Q
Thallium, ICP 200.7	200.7	ND	0.01	mg/L	12/16/1998	
Vanadium, ICP 200.7	200.7	0.030	0.005	mg/L	12/16/1998	
Zinc, ICP 200.7	200.7	0.037	0.005	mg/L	12/16/1998	

A sample result of ND indicates the parameter was Not Detected at the reporting limit.
mg = ppm ug = ppb su = standard units

ANALYTICAL REPORT

Kim McNeill
Pinnacle Laboratories
2709-D Pan American Fwy NE
Albuquerque, NM 87107

01/08/1999
Job No.: 98.02385

Project Name: 812044 / NMOCD
Date Received: 12/10/1998

Sample Number: 107983 — Sample Description: 812044-001

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
025 Cations and Anions						
Alkalinity, Bicarb.(CaCO3)	SM 2320 B	225	5.0	mg/L	12/14/1998	
Alkalinity, Carb. (CaCO3)	SM 2320 B	ND	5.0	mg/L	12/14/1998	
Alkalinity, Total (CaCO3)	310.1	225	5.0	mg/L	12/14/1998	
Bromide	SM 4500-Br	1.7	0.40 mg/L	mg/L	12/18/1998	DIL
Chloride	EPA 300.0	400	50	mg/L	12/17/1998	DIL
Conductivity	120.1	1800	5.0	umho	01/08/1999	
Fluoride, Total	340.2	1.5	0.2	mg/L	12/17/1998	
Nitrogen, Nitrate (W)	353.1	2.2	0.50	mg/L	12/16/1998	DIL
Nitrogen, Nitrite	354.1	ND	0.50	mg/L	12/10/1998	
Silica	370.1	26	0.4 mg/L	mg/L	12/15/1998	DIL,MM
Solids, Total Dissolved	160.1	1300	10	mg/L	12/11/1998	
Sulfate	375.4	120	25	mg/L	12/18/1998	DIL
ICP/AA Digestion - Water	ICP	-			12/16/1998	
Calcium, ICP 200.7	200.7	160	0.05	mg/L	12/16/1998	
Magnesium, ICP 200.7	200.7	30	0.05	mg/L	12/16/1998	
Potassium, ICP 200.7	200.7	7.5	0.2	mg/L	12/16/1998	
Sodium, ICP 200.7	200.7	140	20.0	mg/L	12/16/1998	DIL,Q

Sample Number: 107984/108348 — Sample Description: 812044-02

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
024 Metals by ICAP						
ICP/AA Digestion - Soil	ICP	-	-		12/16/1998	
Aluminum, ICP	6010	5500	10	mg/Kg	12/16/1998	
Antimony, ICP	6010	ND	1.0	mg/Kg	12/16/1998	
Arsenic, ICP	6010	3.2	1.0	mg/Kg	12/16/1998	
Barium, ICP	6010	600	1.0	mg/Kg	12/16/1998	
Beryllium, ICP	6010	ND	1.0	mg/Kg	12/16/1998	
Boron, ICP	6010	ND	10	mg/Kg	12/16/1998	
Cadmium, ICP	6010	ND	1.0	mg/Kg	12/16/1998	
Calcium, ICP	6010	120000	100	mg/Kg	12/16/1998	DIL,Q
Chromium, ICP	6010	1600	10.0	mg/Kg	12/16/1998	DIL,Q
Cobalt, ICP	6010	2.7	1.0	mg/Kg	12/16/1998	
Copper, ICP	6010	4.9	1.0	mg/Kg	12/16/1998	
Iron, ICP	6010	5500	2.0	mg/Kg	12/16/1998	

A sample result of ND indicates the parameter was Not Detected at the reporting limit.
mg = ppm ug = ppb su = standard units

ANALYTICAL REPORT

Kim McNeill
Pinnacle Laboratories
2709-D Pan American Fwy NE
Albuquerque, NM 87107

01/08/1999
Job No.: 98.02385

Project Name: 812044 / NMOCD
Date Received: 12/10/1998

Sample Number 107984/108348 — Sample Description 812044-02

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
Lead, ICP	6010	8.4	1.0	mg/kg	12/16/1998	
Magnesium, ICP	6010	2400	10	mg/Kg	12/16/1998	
Manganese, ICP	6010	120	1.0	mg/Kg	12/16/1998	
Mercury Prep (S)	7471	-			12/11/1998	
Mercury, CVAA (S)	7471	ND	0.10	mg/Kg	12/15/1998	
Molybdenum, ICP	6010	ND	2.0	mg/Kg	12/16/1998	Q,MI
Nickel, ICP	6010	5.0	1.0	mg/Kg	12/16/1998	
Potassium, ICP	6010	2000	50	mg/Kg	12/30/1998	DIL,Q,MD
Selenium, ICP	6010	ND	1.0	mg/Kg	12/16/1998	
Silver, ICP	6010	ND	1.0	mg/Kg	12/16/1998	
Sodium, ICP	6010	2600	500	mg/Kg	12/16/1998	DIL,Q
Thallium, ICP	6010	ND	2.0	mg/Kg	12/16/1998	
Vanadium, ICP	6010	7.5	1.0	mg/Kg	12/16/1998	
Zinc, ICP	6010	61	1.0	mg/Kg	12/16/1998	

Sample Number 107984/108348 — Sample Description 812044-02

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
025 Cations and Anions						
Bromide	SM 4500-BR	ND		mg/Kg	12/18/1998	
Chloride	325.3	600	50	mg/Kg	12/17/1998	DIL
Fluoride	SM 4500-F	ND		mg/Kg	12/17/1998	
Nitrogen, Nitrate	SM 4500-NO	4.3	3.0	mg/Kg	12/18/1998	DIL
Nitrogen, Nitrite		0.64	0.20	mg/Kg	12/18/1998	DIL
Silica	370.1	12	0.1	mg/Kg	12/15/1998	DIL
Sulfate, Soluble	375.4	800	400	mg/Kg	12/11/1998	
ICP/AA Digestion - Soil	ICP	-	-		12/30/1998	
Calcium, ICP	6010	120000	100	mg/Kg	12/16/1998	DIL,Q
Magnesium, ICP	6010	2400	10	mg/Kg	12/16/1998	
Potassium, ICP	6010	2000	50	mg/Kg	12/30/1998	DIL,Q,MD
Sodium, ICP	6010	2600	500	mg/Kg	12/16/1998	DIL,Q

A sample result of ND indicates the parameter was Not Detected at the reporting limit.
mg = ppm ug = ppb su = standard units

QUALITY CONTROL REPORT
CONTINUING CALIBRATION VERIFICATION

Pinnacle Laboratories
2709-D Pan American Fwy NE
Albuquerque, NM 87107

Date: 01/08/1999

Job Number: 98.02385

Contact: Kim McNeill
Project: 812044 / NMOCD

Analyte	CCV True Concentration	Concentration Found	Percent Recovery	Date Analyzed
Alkalinity, Bicarb.(CaCO3)	4.0	4.0	100.0	12/14/1998
Bromide	0.60	0.521	86.8	12/18/1998
Chloride	10.0	10.5	105.0	12/17/1998
Fluoride, Total	7.0	7.7	110.0	12/17/1998
Nitrogen, Nitrate (W)	0.30	0.258	86.0	12/16/1998
Nitrogen, Nitrite	0.926	0.855	92.3	12/10/1998
Silica	10.0	10.5	105.0	12/15/1998
Solids, Total Dissolved	670	646	96.4	12/11/1998
Bromide	0.60	0.521	86.8	12/18/1998
Chloride	10.0	10.5	105.0	12/17/1998
Fluoride	7.0	7.7	110.0	12/17/1998
Nitrogen, Nitrite	0.926	0.95	102.6	12/18/1998
Silica	10.0	10.5	105.0	12/15/1998
Sulfate, Soluble	100	121	121.0	12/11/1998
Aluminum, ICP 200.7	25.0	23.9	95.6	12/16/1998
Antimony, ICP 200.7	0.500	0.508	101.6	12/16/1998
Arsenic, ICP 200.7	0.500	0.511	102.2	12/16/1998
Barium, ICP 200.7	0.500	0.500	100.0	12/16/1998
Beryllium, ICP 200.7	0.500	0.515	103.0	12/16/1998
Boron, ICP 200.7	0.500	0.490	98.0	12/16/1998
Cadmium, ICP 200.7	0.500	0.502	100.4	12/16/1998
Calcium, ICP 200.7	25.0	23.3	93.2	12/16/1998
Chromium, ICP 200.7	0.500	0.497	99.4	12/16/1998
Cobalt, ICP 200.7	0.500	0.501	100.2	12/16/1998
Copper, ICP 200.7	0.500	0.502	100.4	12/16/1998
Iron, ICP 200.7	0.500	0.508	101.6	12/16/1998
Lead, ICP 200.7	0.500	0.505	101.0	12/16/1998
Magnesium, ICP 200.7	25.0	23.9	95.6	12/16/1998
Manganese, ICP 200.7	0.500	0.502	100.4	12/16/1998
Mercury, CV	0.00200	0.00212	106.0	12/14/1998

CCV - Continuing Calibration Verification

Environmental Services Laboratory, Inc. (503)670-8520 (503)670-9243 FAX
17400 SW Upper Boones Ferry Rd., Suite 270, Portland, OR 97224

QUALITY CONTROL REPORT
CONTINUING CALIBRATION VERIFICATION

Pinnacle Laboratories
2709-D Pan American Fwy NE
Albuquerque, NM 87107

Date: 01/08/1999

Job Number: 98.02385

Contact: Kim McNeill
Project: 812044 / NMOCD

Analyte	CCV True Concentration	Concentration Found	Percent Recovery	Date Analyzed
Molybdenum, ICP 200.7	0.500	0.502	100.4	12/16/1998
Nickel, ICP 200.7	0.500	0.503	100.6	12/16/1998
Potassium, ICP 200.7	5.00	4.89	97.8	12/16/1998
Selenium, ICP 200.7	0.500	0.503	100.6	12/16/1998
Silver, ICP 200.7	0.500	0.498	99.6	12/16/1998
Sodium, ICP 200.7	5.00	4.70	94.0	12/16/1998
Thallium, ICP 200.7	0.500	0.488	97.6	12/16/1998
Vanadium, ICP 200.7	0.500	0.500	100.0	12/16/1998
Zinc, ICP 200.7	0.500	0.499	99.8	12/16/1998
Aluminum, ICP	25.0	23.9	95.6	12/16/1998
Antimony, ICP	0.500	0.508	101.6	12/16/1998
Arsenic, ICP	0.500	0.511	102.2	12/16/1998
Barium, ICP	0.500	0.500	100.0	12/16/1998
Beryllium, ICP	0.500	0.515	103.0	12/16/1998
Boron, ICP	0.500	0.490	98.0	12/16/1998
Cadmium, ICP	0.500	0.502	100.4	12/16/1998
Calcium, ICP	25.0	23.3	93.2	12/16/1998
Chromium, ICP	0.500	0.497	99.4	12/16/1998
Cobalt, ICP	0.500	0.501	100.2	12/16/1998
Copper, ICP	0.500	0.502	100.4	12/16/1998
Iron, ICP	0.500	0.508	101.6	12/16/1998
Lead, ICP	0.500	0.505	101.0	12/16/1998
Magnesium, ICP	25.0	23.9	95.6	12/16/1998
Manganese, ICP	0.500	0.502	100.4	12/16/1998
Mercury, CVAA (S)	1.00	1.095	109.5	12/15/1998
Molybdenum, ICP	0.500	0.502	100.4	12/16/1998
Nickel, ICP	0.500	0.503	100.6	12/16/1998
Potassium, ICP	5.0	4.6	92.0	12/30/1998
Selenium, ICP	0.500	0.503	100.6	12/16/1998
Silver, ICP	0.500	0.498	99.6	12/16/1998

CCV - Continuing Calibration Verification

QUALITY CONTROL REPORT
CONTINUING CALIBRATION VERIFICATION

Pinnacle Laboratories
2709-D Pan American Fwy NE
Albuquerque, NM 87107

Date: 01/08/1999

Job Number: 98.02385

Contact: Kim McNeill
Project: 812044 / NMOCD

Analyte	CCV True Concentration	Concentration Found	Percent Recovery	Date Analyzed
Sodium, ICP	5.00	4.70	94.0	12/16/1998
Thallium, ICP	0.500	0.488	97.6	12/16/1998
Vanadium, ICP	0.500	0.500	100.0	12/16/1998
Zinc, ICP	0.500	0.499	99.8	12/16/1998

CCV - Continuing Calibration Verification

Environmental Services Laboratory, Inc. (503)670-8520 (503)670-9243 FAX
17400 SW Upper Boones Ferry Rd., Suite 270, Portland, OR 97224

QUALITY CONTROL REPORT
LABORATORY CONTROL STANDARD

Pinnacle Laboratories
2709-D Pan American Fwy NE
Albuquerque, NM 87107

Date: 01/08/1999

Job Number: 98.02385

Contact: Kim McNeill
Project: 812044 / NMOCD

Analyte	LCS True Concentration	Concentration Found	LCS % Recovery	Flags	Date Analyzed
Sulfate	71.9	69.2	96.2		12/18/1998
Nitrogen, Nitrate	0.30	0.258	86.0		12/18/1998
Aluminum, ICP 200.7	5.00	4.98	99.6		12/16/1998
Antimony, ICP 200.7	0.500	0.494	98.8		12/16/1998
Arsenic, ICP 200.7	0.500	0.489	97.8		12/16/1998
Barium, ICP 200.7	0.500	0.499	99.8		12/16/1998
Beryllium, ICP 200.7	0.500	0.500	100.0		12/16/1998
Boron, ICP 200.7	0.500	0.499	99.8		12/16/1998
Cadmium, ICP 200.7	0.500	0.467	93.4		12/16/1998
Calcium, ICP 200.7	5.00	4.96	99.2		12/16/1998
Chromium, ICP 200.7	0.500	0.480	96.0		12/16/1998
Cobalt, ICP 200.7	0.500	0.465	93.0		12/16/1998
Copper, ICP 200.7	0.500	0.498	99.6		12/16/1998
Iron, ICP 200.7	2.00	2.18	109.0		12/16/1998
Lead, ICP 200.7	0.500	0.465	93.0		12/16/1998
Magnesium, ICP 200.7	5.00	5.07	101.4		12/16/1998
Manganese, ICP 200.7	0.500	0.477	95.4		12/16/1998
Mercury, CV	0.00100	0.00102	102.0		12/14/1998
Molybdenum, ICP 200.7	0.500	0.489	97.8		12/16/1998
Nickel, ICP 200.7	0.500	0.470	94.0		12/16/1998
Potassium, ICP 200.7	5.00	5.69	113.8		12/16/1998
Selenium, ICP 200.7	0.500	0.470	94.0		12/16/1998
Silver, ICP 200.7	0.500	0.484	96.8		12/16/1998
Sodium, ICP 200.7	5.00	4.41	88.2		12/16/1998
Thallium, ICP 200.7	0.500	0.470	94.0		12/16/1998
Vanadium, ICP 200.7	0.500	0.479	95.8		12/16/1998
Zinc, ICP 200.7	0.500	0.470	94.0		12/16/1998
Aluminum, ICP	500	481	96.2		12/16/1998
Antimony, ICP	50.0	47.3	94.6		12/16/1998
Arsenic, ICP	50.0	47.8	95.6		12/16/1998

LCS - Laboratory Control Standard

Environmental Services Laboratory, Inc. (503)670-8520 (503)670-9243 FAX
17400 SW Upper Boones Ferry Rd., Suite 270, Portland OR 97224

QUALITY CONTROL REPORT
LABORATORY CONTROL STANDARD

Pinnacle Laboratories
2709-D Pan American Fwy NE
Albuquerque, NM 87107

Date: 01/08/1999

Job Number: 98.02385

Contact: Kim McNeill
Project: 812044 / NMOCD

Analyte	LCS True Concentration	Concentration Found	LCS % Recovery	Flags	Date Analyzed
Barium, ICP	50.0	49.9	99.8		12/16/1998
Beryllium, ICP	50.0	49.5	99.0		12/16/1998
Boron, ICP	50	47.1	94.2		12/16/1998
Cadmium, ICP	50.0	46.1	92.2		12/16/1998
Calcium, ICP	500	479	95.8		12/16/1998
Chromium, ICP	50.0	48.1	96.2		12/16/1998
Cobalt, ICP	50.0	45.8	91.6		12/16/1998
Copper, ICP	50.0	49.6	99.2		12/16/1998
Iron, ICP	250	212	84.8		12/16/1998
Lead, ICP	50.0	46.7	93.4		12/16/1998
Magnesium, ICP	500	485	97.0		12/16/1998
Manganese, ICP	50.0	47.7	95.4		12/16/1998
Mercury, CVAA (S)	0.500	0.57	114.0		12/15/1998
Molybdenum, ICP	50.0	49.0	98.0		12/16/1998
Nickel, ICP	50.0	46.9	93.8		12/16/1998
Potassium, ICP	500	512	102.4		12/30/1998
Selenium, ICP	50.0	45.2	90.4		12/16/1998
Silver, ICP	50.0	45.6	91.2		12/16/1998
Sodium, ICP	500	454	90.8		12/16/1998
Thallium, ICP	50.0	46.6	93.2		12/16/1998
Vanadium, ICP	50.0	48.1	96.2		12/16/1998
Zinc, ICP	50.0	47.9	95.8		12/16/1998

LCS - Laboratory Control Standard

Environmental Services Laboratory, Inc. (503)670-8520 (503)670-9243 FAX
17400 SW Upper Boones Ferry Rd., Suite 270, Portland OR 97224

QUALITY CONTROL REPORT
MATRIX SPIKE/MATRIX SPIKE DUPLICATE

Pinnacle Laboratories
2709-D Pan American Fwy NE
Albuquerque, NM 87107

Date: 01/08/1999

Job Number: 98.02385

Contact: Kim McNeill
Project: 812044 / NMOCD

Analyte	Matrix Spike Result	Sample Result	Spike Amount	Units	Percent Recovery	MSD Result	MSD Spike Amount	Units	Percent Recovery	MS/MSD RPD	Flags
Bromide	0.608	ND	0.6	mg/L	101.3	0.515	0.6	mg/L	85.8	16.5	DIL,Q,
Chloride	35	24	10.0	mg/L	110.0	39	10.0	mg/L	150.0	30.8	DIL
Fluoride, Total	7.0	ND	6.0	mg/L	116.7	6.6	6.0	mg/L	110.0	5.9	
Nitrogen, Nitrate (W)	0.247	ND	0.30	mg/L	82.3	0.238	0.30	mg/L	79.3	3.7	
Nitrogen, Nitrite	0.130	ND	0.150	mg/L	86.7	0.128	0.150	mg/L	85.3	1.6	
Silica	29	26	5.0	mg/L	60.0	29	5.0	mg/L	60.0	0.0	DIL
Sulfate	560	480	50	mg/L	160.0	550	50	mg/L	140.0	13.3	DIL,MI
Bromide	0.608	ND	0.60	mg/Kg	101.3	0.515	0.60	mg/Kg	85.8	16.5	DIL,Q,
Chloride	35	24	10	mg/Kg	110.0	39	10	mg/Kg	150.0	30.8	MM
Fluoride	7.0	ND	6.0	mg/Kg	116.7	6.6	6.0	mg/Kg	110.0	5.9	
Nitrogen, Nitrate	0.247	ND	0.30	mg/Kg	82.3	0.238	0.30	mg/Kg	79.3	3.7	
Nitrogen, Nitrite	0.905	ND	0.926	mg/Kg	97.7	0.940	0.926	mg/Kg	101.5	3.7	
Silica	29	26	5	mg/Kg	60.0	29	5	mg/Kg	60.0	0.0	DIL,MM
Aluminum, ICP 200.7	5.03	0.06	5.00	mg/L	99.4	5.02	5.00	mg/L	99.2	0.2	
Antimony, ICP 200.7	0.510	ND	0.500	mg/L	102.0	0.509	0.500	mg/L	101.8	0.2	
Arsenic, ICP 200.7	0.509	0.008	0.500	mg/L	100.2	0.510	0.500	mg/L	100.4	0.2	
Barium, ICP 200.7	0.655	0.15	0.500	mg/L	101.0	0.654	0.500	mg/L	100.8	0.2	
Beryllium, ICP 200.7	0.508	ND	0.500	mg/L	101.6	0.507	0.500	mg/L	101.4	0.2	
Boron, ICP 200.7	0.768	0.26	0.500	mg/L	101.6	0.768	0.500	mg/L	101.6	0.0	Q
Cadmium, ICP 200.7	0.461	ND	0.500	mg/L	92.2	0.460	0.500	mg/L	92.0	0.2	
Calcium, ICP 200.7		99	5.00	mg/L			5.00	mg/L			MD

QC Sample:
107982

NOTE: Matrix Spike Samples may not be samples from this job.

MS = Matrix Spike
MSD = Matrix Spike Duplicate
RPD = Relative Percent Difference
dil.= Diluted Out

Environmental Services Laboratory,Inc. (503)670-8520 (503)670-9243 FAX
17400 SW Upper Boones Ferry Rd., Portland, OR 97224

QUALITY CONTROL REPORT
MATRIX SPIKE/MATRIX SPIKE DUPLICATE

Pinnacle Laboratories
2709-D Pan American Fwy NE
Albuquerque, NM 87107

Date: 01/08/1999

Job Number: 98.02385

Contact: Kim McNeill
Project: 812044 / NMOCD

Analyte	Matrix Spike Result	Sample Result	Spike Amount	Units	Percent Recovery	MSD Result	MSD Spike Amount	Units	Percent Recovery	MS/MSD RPD	Flags
Cobalt, ICP 200.7	0.458	ND	0.500	mg/L	91.6	0.456	0.500	mg/L	91.2	0.4	
Copper, ICP 200.7	0.514	ND	0.500	mg/L	102.8	0.512	0.500	mg/L	102.4	0.4	
Iron, ICP 200.7	3.31	1.2	2.00	mg/L	105.5	3.29	2.00	mg/L	104.5	1.0	
Lead, ICP 200.7	0.457	ND	0.500	mg/L	91.4	0.457	0.500	mg/L	91.4	0.0	
Magnesium, ICP 200.7	21.4	16	5.00	mg/L	108.0	21.4	5.00	mg/L	108.0	0.0	
Manganese, ICP 200.7	0.578	0.10	0.500	mg/L	95.6	0.577	0.500	mg/L	95.4	0.2	
Mercury, CV	0.00197	ND	0.0020	mg/L	98.5	0.0020	0.0020	mg/L	100.0	1.4	
Molybdenum, ICP 200.7	0.494	ND	0.500	mg/L	98.8	0.495	0.500	mg/L	99.0	0.2	
Nickel, ICP 200.7	0.461	ND	0.500	mg/L	92.2	0.459	0.500	mg/L	91.8	0.4	
Potassium, ICP 200.7	9.10	2.7	5.00	mg/L	128.0	11.5	9.08	mg/L	96.9	27.6	MI,DIL
Selenium, ICP 200.7	0.486	ND	0.500	mg/L	97.2	0.487	0.500	mg/L	97.4	0.2	
Silver, ICP 200.7	0.497	ND	0.500	mg/L	99.4	0.494	0.500	mg/L	98.8	0.6	
Sodium, ICP 200.7		50	5.00	mg/L			5.00	mg/L			MD,DIL
Thallium, ICP 200.7	0.470	ND	0.500	mg/L	94.0	0.468	0.500	mg/L	93.6	0.4	
Vanadium, ICP 200.7	0.511	0.023	0.500	mg/L	97.6	0.510	0.500	mg/L	97.4	0.2	
Zinc, ICP 200.7	0.535	0.063	0.500	mg/L	94.4	0.543	0.500	mg/L	96.0	1.7	
Aluminum, ICP		11000	500	mg/Kg			500	mg/Kg			MD
Antimony, ICP	16.7	ND	50.0	mg/Kg	33.4	17.9	50.0	mg/Kg	35.8	6.9	M,P
Arsenic, ICP	44.1	2.4	50.0	mg/Kg	83.4	44.3	50.0	mg/Kg	83.8	0.5	
Barium, ICP	192	160	50.0	mg/Kg	64.0	177	50.0	mg/Kg	34.0	61.2	M,P,MR
Beryllium, ICP	44.6	ND	50.0	mg/Kg	89.2	44.6	50.0	mg/Kg	89.2	0.0	

QC Sample:
108095

NOTE: Matrix Spike Samples may not be samples from this job.

MS = Matrix Spike
MSD = Matrix Spike Duplicate
RPD = Relative Percent Difference
dil.= Diluted Out

Environmental Services Laboratory,Inc. (503)670-8520 (503)670-9243 FAX
17400 SW Upper Boones Ferry Rd., Portland, OR 97224

QUALITY CONTROL REPORT
MATRIX SPIKE/MATRIX SPIKE DUPLICATE

Pinnacle Laboratories
2709-D Pan American Fwy NE
Albuquerque, NM 87107

Date: 01/08/1999

Job Number: 98.02385

Contact: Kim McNeill
Project: 812044 / NMOCD

Analyte	Matrix Spike Result	Sample Result	Spike Amount	Units	Percent Recovery	MSD Result	MSD Spike Amount	Units	Percent Recovery	MS/MSD RPD	Flags
Cadmium, ICP	39.4	ND	50.0	mg/Kg	78.8	39.3	50.0	mg/Kg	78.6	0.3	M,P
Calcium, ICP		9300	500	mg/Kg			500	mg/Kg			MD
Chromium, ICP	49.6	9.0	50.0	mg/Kg	81.2	51.3	50.0	mg/Kg	84.6	4.1	
Cobalt, ICP	45.2	6.2	50.0	mg/Kg	78.0	64.4	50.0	mg/Kg	116.4	39.4	M,P,MR
Copper, ICP	54.6	8.8	50.0	mg/Kg	91.6	54.7	50.0	mg/Kg	91.8	0.2	
Iron, ICP		17000	250	mg/Kg			250	mg/Kg			DIL,Q,
Lead, ICP	45.6	5.8	50.0	mg/kg	79.6	45.5	50.0	mg/kg	79.4	0.3	M,P
Magnesium, ICP		3800	500	mg/Kg			500	mg/Kg			MD
Manganese, ICP		280	50.0	mg/Kg			50.0	mg/Kg			MD
Mercury, CVAA (S)	1.12	ND	1.00	mg/Kg	112.0	1.10	1.00	mg/Kg	110.0	1.8	
Molybdenum, ICP	40.7	ND	50.0	mg/Kg	81.4	41.9	50.0	mg/Kg	83.8	2.9	
Nickel, ICP	47.8	8.0	50.0	mg/Kg	79.6	48.2	50.0	mg/Kg	80.4	1.0	M,P
Potassium, ICP		2000	200	mg/Kg			200	mg/Kg			DIL,Q,
Potassium, ICP		2000	200	mg/Kg			200	mg/Kg			DIL,Q,
Selenium, ICP	38.1	ND	50.0	mg/Kg	76.2	38.4	50.0	mg/Kg	76.8	0.8	M,P
Silver, ICP	42.8	ND	50.0	mg/Kg	85.6	42.9	50.0	mg/Kg	85.8	0.2	
Sodium, ICP	1100	630	500	mg/Kg	94.0	1100	500	mg/Kg	94.0	0.0	
Thallium, ICP	40.3	ND	50.00	mg/Kg	80.6	40.0	50.0	mg/Kg	80.0	0.7	
Vanadium, ICP	67.3	27	50.0	mg/Kg	80.6	71.3	50.0	mg/Kg	88.6	9.5	
Zinc, ICP	76.6	38	50.0	mg/Kg	77.2	77.9	50.0	mg/Kg	79.8	3.3	M,P

QC Sample:

NOTE: Matrix Spike Samples may not be samples from this job.

MS = Matrix Spike
MSD = Matrix Spike Duplicate
RPD = Relative Percent Difference
dil.= Diluted Out

Environmental Services Laboratory,Inc. (503)670-8520 (503)670-9243 FAX
17400 SW Upper Boones Ferry Rd., Portland, OR 97224

QUALITY CONTROL REPORT
BLANKS

Pinnacle Laboratories
2709-D Pan American Fwy NE
Albuquerque, NM 87107

Date: 01/08/1999

Job Number: 98.02385

Contact: Kim McNeill
Project: 812044 / NMOCD
Location: Champion - Hobbs

Analyte	Blank Analysis	Report Limit	Units	Date Analyzed
Alkalinity, Bicarb.(CaCO3)	ND	5.0	mg/L	12/14/1998
Bromide	ND	0.20	mg/L	12/18/1998
Chloride	ND	0.5	mg/L	12/17/1998
Fluoride, Total	ND	0.2	mg/L	12/17/1998
Nitrogen, Nitrate (W)	ND	0.05	mg/L	12/16/1998
Nitrogen, Nitrite	ND	0.03	mg/L	12/10/1998
Silica	ND	0.2 mg	mg/L	12/15/1998
Solids, Total Dissolved	ND	10	mg/L	12/11/1998
Sulfate	ND	5.0	mg/L	12/18/1998
Bromide	ND		mg/Kg	12/18/1998
Chloride	ND	10	mg/Kg	12/17/1998
Fluoride	ND		mg/Kg	12/17/1998
Nitrogen, Nitrate	ND	3.0	mg/Kg	12/18/1998
Nitrogen, Nitrite	ND		mg/Kg	12/18/1998
Silica	ND	0.2	mg/Kg	12/15/1998
Sulfate, Soluble	ND	10	mg/Kg	12/11/1998
Aluminum, ICP 200.7	ND	0.05	mg/L	12/16/1998
Antimony, ICP 200.7	ND	0.005	mg/L	12/16/1998
Arsenic, ICP 200.7	ND	0.005	mg/L	12/16/1998
Barium, ICP 200.7	ND	0.005	mg/L	12/16/1998
Beryllium, ICP 200.7	ND	0.002	mg/L	12/16/1998
Boron, ICP 200.7	ND	0.01	mg/L	12/16/1998
Cadmium, ICP 200.7	ND	0.002	mg/L	12/16/1998
Calcium, ICP 200.7	ND	0.05	mg/L	12/16/1998
Chromium, ICP 200.7	ND	0.005	mg/L	12/16/1998
Cobalt, ICP 200.7	ND	0.005	mg/L	12/16/1998

Environmental Services Laboratory, Inc.(503)670-8520 (503)670-9243 FAX
17400 SW Upper Boones Ferry Rd., Portland, OR 97224

QUALITY CONTROL REPORT
BLANKS

Pinnacle Laboratories
2709-D Pan American Fwy NE
Albuquerque, NM 87107

Date: 01/08/1999

Job Number: 98.02385

Contact: Kim McNeill
Project: 812044 / NMOCD
Location: Champion - Hobbs

Analyte	Blank Analysis	Report Limit	Units	Date Analyzed
Copper, ICP 200.7	ND	0.005	mg/L	12/16/1998
Iron, ICP 200.7	ND	0.01	mg/L	12/16/1998
Lead, ICP 200.7	ND	0.005	mg/L	12/16/1998
Magnesium, ICP 200.7	ND	0.05	mg/L	12/16/1998
Manganese, ICP 200.7	ND	0.005	mg/L	12/16/1998
Mercury, CV	ND	0.0002	mg/L	12/14/1998
Molybdenum, ICP 200.7	ND	0.005	mg/L	12/16/1998
Nickel, ICP 200.7	ND	0.005	mg/L	12/16/1998
Potassium, ICP 200.7	ND	0.2	mg/L	12/16/1998
Selenium, ICP 200.7	ND	0.005	mg/L	12/16/1998
Silver, ICP 200.7	ND	0.005	mg/L	12/16/1998
Sodium, ICP 200.7	ND	0.2	mg/L	12/16/1998
Thallium, ICP 200.7	ND	0.01	mg/L	12/16/1998
Vanadium, ICP 200.7	ND	0.005	mg/L	12/16/1998
Zinc, ICP 200.7	ND	0.005	mg/L	12/16/1998
Aluminum, ICP	ND	10	mg/Kg	12/16/1998
Antimony, ICP	ND	1.0	mg/Kg	12/16/1998
Arsenic, ICP	ND	1.0	mg/Kg	12/16/1998
Barium, ICP	ND	1.0	mg/Kg	12/16/1998
Beryllium, ICP	ND	1.0	mg/Kg	12/16/1998
Boron, ICP	ND	10	mg/Kg	12/16/1998
Cadmium, ICP	ND	1.0	mg/Kg	12/16/1998
Calcium, ICP	ND	10	mg/Kg	12/16/1998
Chromium, ICP	ND	1.0	mg/Kg	12/16/1998
Cobalt, ICP	ND	1.0	mg/Kg	12/16/1998
Copper, ICP	ND	1.0	mg/Kg	12/16/1998

QUALITY CONTROL REPORT
BLANKS

Pinnacle Laboratories
2709-D Pan American Fwy NE
Albuquerque, NM 87107

Date: 01/08/1999

Job Number: 98.02385

Contact: Kim McNeill
Project: 812044 / NMOCD
Location: Champion - Hobbs

Analyte	Blank Analysis	Report Limit	Units	Date Analyzed
Iron, ICP	ND	2.0	mg/Kg	12/16/1998
Lead, ICP	ND	1.0	mg/kg	12/16/1998
Magnesium, ICP	ND	10	mg/Kg	12/16/1998
Manganese, ICP	ND	1.0	mg/Kg	12/16/1998
Mercury, CVAA (S)	ND	0.10	mg/Kg	12/15/1998
Molybdenum, ICP	ND	1.0	mg/Kg	12/16/1998
Nickel, ICP	ND	1.0	mg/Kg	12/16/1998
Potassium, ICP	ND	5.0	mg/Kg	12/30/1998
Selenium, ICP	ND	1.0	mg/Kg	12/16/1998
Silver, ICP	ND	1.0	mg/Kg	12/16/1998
Sodium, ICP	ND	50	mg/Kg	12/16/1998
Thallium, ICP	ND	2.0	mg/Kg	12/16/1998
Vanadium, ICP	ND	1.0	mg/Kg	12/16/1998
Zinc, ICP	ND	1.0	mg/Kg	12/16/1998

QUALITY CONTROL REPORT
DUPLICATES

Pinnacle Laboratories
2709-D Pan American Fwy NE
Albuquerque, NM 87107

Date: 01/08/1999

Job Number: 98.02385

Contact: Kim McNeill
Project: 812044 / NMOCD

Analyte	Original Analysis	Duplicate Analysis	Units	RPD	Date Analyzed	Flag
Alkalinity, Bicarb.(CaCO3)	140	130	mg/L	7.4	12/14/1998	
Alkalinity, Carb. (CaCO3)	140	130	mg/L	7.4	12/14/1998	
Alkalinity, Total (CaCO3)	140	130	mg/L	7.4	12/14/1998	
Bromide	ND	ND	mg/L		12/18/1998	
Bromide	ND		mg/L		12/18/1998	
Chloride	24	24	mg/L	0.0	12/17/1998	DIL,MM
Fluoride, Total	ND	ND	mg/L		12/17/1998	
Nitrogen, Nitrate (W)	ND	ND	mg/L		12/16/1998	
Nitrogen, Nitrite	ND	ND	mg/L		12/10/1998	
Silica	26	25	mg/L	3.9	12/15/1998	DIL,MM
Solids, Total Dissolved	360	380	mg/L	5.4	12/11/1998	
Sulfate	480	450	mg/L	6.5	12/18/1998	DIL,MI
Bromide	ND	ND	mg/Kg		12/18/1998	DIL,Q
Chloride	24	24	mg/Kg	0.0	12/18/1998	
Fluoride	ND	ND	mg/Kg		12/17/1998	
Nitrogen, Nitrate	ND	ND	mg/Kg		12/18/1998	
Nitrogen, Nitrite	ND	ND	mg/Kg		12/18/1998	
Silica	26	25	mg/Kg	3.9	12/18/1998	DIL

NOTE: Duplicates may not be samples from this job.

RPD - Relative Percent Difference

FLAG GLOSSARY

A	This sample does not have a typical gasoline pattern.
B1	This sample does not have a typical diesel pattern.
B	Analyte found in the associated blank as well as the sample.
C	The sample contains a lighter hydrocarbon than gasoline.
CN	See case narrative
CS	Outside control limits or unusual matrix; see case narrative.
D	The sample extends to a heavier hydrocarbon range than gasoline.
d	Results on a dry weight basis
DIL	Result was calculated from dilution.
E	The sample extends to a lighter hydrocarbon range than diesel.
F	The sample extends to a heavier hydrocarbon range than diesel.
G	The positive result for gasoline is due to single component comtamination.
H	The sample extends to a lighter hydrocarbon range than oil.
I	The oil pattern for this sample is not typical.
J	The result for this compound is an estimated concentration.
L	The LCS recovery exceeded control limits. See the LCS page of this report.
LM	The LCS recovery exeeded control limits; the MS/MSD were in control validating the batch.
M	MS and/or MSD percent recovery exceeds control limits.
MD	Unable to calculate MS/MSD recovery due to high amount of analyte; greater than 4 times spike level.
MR	The MS/MSD RPD is greater than method critera. The sample was re-extracted and re-analyzed with similar results indicating a non-homogeneous sample.
MM	The Matrix Spike exceeded control limits; LCS was in control validating the batch.
MI	Outside control limits due to matrix interference.
N	Manual integration performed on sample for quantification.
N/A	Not Applicable.
NC	Not calcuable.
NO	Not Analyzed.
P	A post digestion spike was analyzed, and recoveries were within control limits.
Q	Detection limits elevated due to sample matrix.
Q1	Detection limits elevated due to high levels of non-target compounds. Sample(s) run at a dilution.
R	The duplicate RPD was greater than 20%. The sample was re-extracted and re-analyzed with similar results. This indicates a matrix interference in the sample, likely a non-homogeneity of the sample.
R1	The duplicate RPD was greater than 20%. Visual inspection showed the sample to be non-homogeneous.
RD	RPD not applicable for results less than five times the reporting limit.
RH	The Relative Percent Difference (RPD) between two columns was greater than 40%, the higher result was reported.
RL	The Relative Percent Difference (RPD) between two columns was greater than 40%, the lower result was reported due to obvious interference with the higher result.
RP	MS/MSD RPD is greater than 20%
SR	Surrogate recovery outside control limits. See the surrogate page of the report.
SD	Unable to quantitate surrogate due to sample dilution.
SC	Sample not provided to laboratory in proper sampling container.
V	Volatile analysis was requested, sample container received with headspace.
X1	The duplicate RPD was greater than 20%. Due to insufficient sample, re-analysis was not possible.
X	Sample was analyzed outside recommended holding times.
Y	The result for this parameter was greater than the TCLP regulatory limit.
Z	The pattern seen for the parameter being analyzed is not typical.

Pinnacle Laboratories, Inc. **Interlab Chain of Custody** Date: 12/9 Page: 1 of 1

Network Project Manager: Kimberly D. McNeill

Pinnacle Laboratories, Inc.
2709-D Pan American Freeway, NE
Albuquerque, New Mexico 87107
(505) 344-3777 Fax (505) 344-4413

Please grind up the yellow rocks into fine powder and mix in with soil when analyzed. Please wear some sort of mask when doing this procedure. There might be high hits for Cr & Pb. Any questions call Francine.

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	Metals (8) RCRA	RCRA TCLP METALS	Metals Ca, K, Mg, Na, Bromide	Metals- Al, Sb, As, Ba, Be, B, Cd	Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo	Ni, K, Se, Si, Ag, Na, Tl, V, Zn, Hg	NO_2 & NO_3 + Conductivity	Gen Chemistry: Cl, F, SO4, TDS	Alkalinity (Bcarb/Carb)	Oil and Grease	Volatile Organics GC/MS (8260)	BOD	COD	PESTICIDES/PCB (608/8080)	8270 BY GC/MS	PNA (8310)	8240 (TCLP 1311) ZHE	Herbicides (615/8150)	Base/Neutral Acid Compounds GC/MS (625/8270)	URANIUM	RADIUM 226+228	Gross Alpha/Beta	TO-14	NUMBER OF CONTAINERS
812044-01	12/8	1151	AQ	107983			X	X	X	X	X	X	X														4
-02	↓	1209	NAQ	107984			X	X	X	X	X	X	X														2

PROJECT INFORMATION		SAMPLE RECEIPT		SAMPLES SENT TO:		RELINQUISHED BY: 1.	RELINQUISHED BY: 2.
PROJECT #: 812044		Total Number of Containers		PENSACOLA - STL-FL		Signature: Time:	Signature: Time:
PROJ. NAME: NMOCD		Chain of Custody Seals		PORTLAND - ESL-OR	X	Francine Tonno 1705	
QC LEVEL: (STD.) IV		Received Intact?		STL - CT		Printed Name: Date:	Printed Name: Date:
QC REQUIRED: (MS MSD BLANK)		Received Good Cond./Cold		STL- NEW JERSEY		Francine Tonno 12/9/98	
TAT: (STANDARD) RUSH!!		LAB NUMBER: 98.02385		N. CREEK		Pinnacle Laboratories, Inc.	Company
				BARRINGER		RECEIVED BY: 1.	RECEIVED BY: 2
DUE DATE: 12/17	COMMENTS: Please see original COC under comments section. for metals instruction for soil sample			SEQUOIA		Signature: Time: 945	Signature: Time:
RUSH SURCHARGE: —						Printed Name: Date: 12/10/98	Printed Name: Date:
CLIENT DISCOUNT: —						Company	Company
SPECIAL CERTIFICATION REQUIRED: YES (NO)							

American Environmental Network (NM), Inc.

CHAIN OF CUSTODY

DATE: 12/08/98 PAGE: 1 OF 1

AEN(NM) Accession #: 812044

PLEASE FILL THIS FORM IN COMPLETELY.

SHADED AREAS ARE FOR LAB USE ONLY.

PROJECT MANAGER:

COMPANY: NMOCD
ADDRESS: 2040 South Pacheco
Santa Fe NM 87505
PHONE: 505-827-7155
FAX:

BILL TO: S.A.B
COMPANY:
ADDRESS:

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB I.D	Petroleum Hydrocarbons (418.1) TRPH	(MOD.8015) Diesel/Direct Inject	(M8015) Gas/Purge & Trap	8021 (BTEX)/8015 (Gasoline)	8021 (BTEX) ☐ MTBE ☐ TMB ☐ PCE	8021 (TCL)	8021 (EDX)	8021 (HALO)	8021 (CUST)	504.1 EDB ☐ / DBCP ☐	8260 (TCL) Volatile Organics	8260 (Full) Volatile Organics	8260 (CUST) Volatile Organics	8260 (Landfill) Volatile Organics	Pesticides /PCB (608/8081)	Herbicides (615/8151)	Base/Neutral/Acid Compounds GC/MS (625/8270)	Polynuclear Aromatics (610/8310)	General Chemistry: OCD + BR	pH	Priority Pollutant Metals (13)	Target Analyte List Metals (23)	RCRA Metals (8)	RCRA Metals by TCLP (Method 1311)	Metals: OCD + CAT'd AU'S	* MIX + GRIND SOIL SAMPLE	NUMBER OF CONTAINERS
9812081151	12/08/98	11:51 AM	WATER	01													X				X	X	X	X					X		13
9812081209	12/08/98	12:09 PM	SOIL	02													X				X	X	X						X	*	5
Trip Blank	12/4	1245	AQ	03													X														1

PROJECT INFORMATION

PROJ. NO.: GW-199
PROJ. NAME: CHAMPION-HOBBS
P.O. NO.:
SHIPPED VIA:

SAMPLE RECEIPT

NO. CONTAINERS	18
CUSTODY SEALS	(Y) N / NA
RECEIVED INTACT	YES
BLUE ICE/ICE	ICE

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS

(RUSH) ☐ 24hr ☐ 48hr ☐ 72hr ☐ 1 WEEK (NORMAL) X

CERTIFICATION REQUIRED: ☐ NM ☐ SDWA ☐ OTHER

METHANOL PRESERVATION ☐ ICE +

COMMENTS: FIXED FEE ☐

* MIX + GRIND SOIL SAMPLE (METALS) BEFORE SAMPLING! SMALL YELLOW ROCKS TO BE GROUND-UP!
RETAIN SAMPLE UNTIL OCD NOTIFIES!
1 soil sample rec'd wet, alternate soil sample used.

RELINQUISHED BY: 1.

Signature: Time: 3:00 PM
Printed Name: WAYNE PRICE Date: 12/08/98
Company: NMOCD

RECEIVED BY: 1.

Signature: Time:
Printed Name: Date:
Company:

RELINQUISHED BY: 2.

Signature: Time:
Printed Name: Date:
Company:

RECEIVED BY: (LAB) 2.

Signature: Time: 0955
Printed Name: Date: 12/9/98
American Environmental Network (NM), Inc.

American Environmental Network (NM), Inc.

CHAIN OF CUSTODY

DATE: 12/08/98 PAGE: 1 OF 1

AEN(NM) Accession #: 812044

SHADED AREAS ARE FOR LAB USE ONLY.

PLEASE FILL THIS FORM IN COMPLETELY.

PROJECT MANAGER:

COMPANY: NMOCD
ADDRESS: 2040 South Pacheco
Santa Fe NM 87505
PHONE: 505-827-7155
FAX:
BILL TO: S.A.B
COMPANY:
ADDRESS:

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB I.D.	NUMBER OF CONTAINERS
9812081151	12/08/98	11:51 AM	WATER	01	13/12
9812081209	12/08/98	12:09 PM	SOIL	02	5
Trip Blank	12/4	1245	AQ	03	1

Petroleum Hydrocarbons (418.1) TRPH
(MOD.8015) Diesel/Direct Inject
(M8015) Gas/Purge & Trap
8021 (BTEX)/8015 (Gasoline)
8021 (BTEX) ☐ MTBE ☐ TMB ☐ PCE
8021 (TCL)
8021 (EDX)
8021 (HALO)
8021 (CUST)
504.1 EDB ☐ / DBCP ☐
8260 (TCL) Volatile Organics
8260 (Full) Volatile Organics
8260 (CUST) Volatile Organics
8260 (Landfill) Volatile Organics
Pesticides /PCB (608/8081)
Herbicides (615/8151)
Base/Neutral/Acid Compounds GC/MS (625/8270)
Polynuclear Aromatics (610/8310)
General Chemistry: OCD + BR
PH
Priority Pollutant Metals (13)
Target Analyte List Metals (23)
RCRA Metals (8)
RCRA Metals by TCLP (Method 1311)
Metals: OCD + CAT + AWS
* MIX + GRIND SOIL SAMPLE

PROJECT INFORMATION	
PROJ. NO.:	G2-199
PROJ. NAME:	CHAMPION-HOBBS
P.O. NO.:	
SHIPPED VIA:	

SAMPLE RECEIPT	
NO. CONTAINERS	18
CUSTODY SEALS	(Y) N / NA
RECEIVED INTACT	Yes
BLUE ICE/ICE	4°C

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS

(RUSH) ☐ 24hr ☐ 48hr ☐ 72hr ☐ 1 WEEK (NORMAL) X

CERTIFICATION REQUIRED: ☐ NM ☐ SDWA ☐ OTHER

METHANOL PRESERVATION ☐ ICE +

COMMENTS: FIXED FEE ☐

* MIX + GRIND SOIL SAMPLE (METALS) BEFORE SAMPLING! SMALL YELLOW ROCKS TO BE GROUND-UP!

RETAIN SAMPLE UNTIL OCD NOTIFIES!

1 soil sample rec'd wet, alternate soil sample used.

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.
Signature: Time: 3:00 PM	Signature: Time:
Printed Name: Wayne Price Date: 12/08/98	Printed Name: Date:
Company: NMOCD	Company:
RECEIVED BY: 1.	**RECEIVED BY: (LAB) 2.**
Signature: Time:	Signature: Time: 0955
Printed Name: Date:	Printed Name: Date: 12/9/98
Company:	American Enviromental Network (NM), Inc.

2709-D Pan American Freeway, NE
Albuquerque, New Mexico 87107
Phone (505) 344-3777
Fax (505) 344-4413

PINNACLE
LABORATORIES

FEB 10 1999

PL I.D. **902026**

February 9, 1999

NMOCD
2040 S. Pacheco
Santa Fe, NM 87505

Project Name/Number: CHAMPION-HOBBS GW-199

Attention: Wayne Price

On **12/09/98**, Pinnacle Laborataories Inc., (ADHS License No. AZ0592), received a request to analyze **aqueous and non-aqueous** samples. The samples were analyzed with EPA methodology or equivalent methods. The results of these analyses and the quality control data, which follow each set of analyses, are enclosed.

This report is being reaccessioned under 902026 it was previously reported under accession number 812044.

All analyses were performed by Environmental Services Laboratory, Inc., Portland, OR.

If you have any questions or comments, please do not hesitate to contact us at (505) 344-3777.

Kimberly D. McNeill
Project Manager

H. Mitchell Rubenstein, Ph.D.
General Manager

MR:jt

Enclosure

2709-D Pan American Freeway NE
Albuquerque, New Mexico 87107
Phone (505) 344-3777
Fax (505) 344-4413

PINNACLE LABORATORIES

CLIENT	: NMOCD	DATE RECEIVED	: 12/09/98
PROJECT #	: GW-199		
PROJECT NAME	: CHAMPION-HOBBS	REPORT DATE	: 02/09/99

PL ID: 902026

	PINNACLE ID #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
01	902026-01	9812081151	AQUEOUS	12/08/98
02	902026-02	9812081209	NON-AQ	12/08/98
03	902026-03	TRIP BLANK	AQUEOUS	12/04/98

---TOTALS---

MATRIX	#SAMPLES
AQUEOUS	2
NON-AQ	1

Environmental Services Laboratory, Inc. E S L

17400 SW Upper Boones Ferry Road • Suite 270 • Portland, OR 97224 • (503) 670-8520

February 04, 1999

Kim McNeill
Pinnacle Laboratories
2709-D Pan American Fwy NE
Albuquerque, NM 87107
TEL: 505-344-3777
FAX (505) 344-4413

RE: 812044 / NMOCD Order No.: 9901097

Dear Kim McNeill,

Environmental Services Laboratory received 1 sample on 1/19/99 for the analyses presented in the following report.

The Samples were analyzed for the following tests:
ICP Metals (ICPMET)
MERCURY, Total (Mercury)

There were no problems with the analyses and all data for associated QC met EPA or laboratory specifications except where noted in the Case Narrative. Results apply only to the samples analyzed. Reproduction of this report is permitted only in its entirety, without the written approval from the Laboratory.

If you have any questions regarding these tests results, please feel free to call.

Sincerely,

Andi Hoevet
Project Manager

Technical Review

Environmental Services Laboratory

Date: *05-Feb-99*

CLIENT:	Pinnacle Laboratories	**Client Sample ID:**	812044-02
Lab Order:	9901097	**Tag Number:**	
Project:	812044 / NMOCD	***Collection Date:***	*12/8/99*
Lab ID:	9901097-01A	**Matrix:**	SOIL

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
MERCURY, TOTAL		**MERCURY**				Analyst: jph
Mercury, TCLP	ND	0.0002		mg/L	1	1/27/99
ICP METALS		**ICPMET**				Analyst: jph
Arsenic, TCLP	ND	0.05		mg/L	1	1/28/99
Barium, TCLP	0.36	0.05		mg/L	1	1/28/99
Cadmium, TCLP	ND	0.05		mg/L	1	1/28/99
Chromium, TCLP	33	0.05		mg/L	1	1/28/99
Lead, TCLP	ND	0.05		mg/L	1	1/28/99
Selenium, TCLP	ND	0.05		mg/L	1	1/28/99
Silver, TCLP	ND	0.05		mg/L	1	1/28/99

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

CLIENT: Pinnacle Laboratories
Work Order: 9901097
Project: 812044 / NMOCD

QC SUMMARY REPORT
Sample Duplicate

Sample ID: **9901133-09A DUP** Batch ID: **67** Test Code: **ICPMET** Units: **mg/L** Analysis Date **1/28/99** Prep Date: **1/27/99**
Client ID: **9901097** Run ID: **ICP_990128A** SeqNo: **2208**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Cadmium	ND	0.002	0	0	0.0%	0	0	0	0.0%	20	
Lead	ND	0.005	0	0	0.0%	0	0	0	0.0%	20	

Sample ID: **9901115-01A DUP** Batch ID: **70** Test Code: **Mercury** Units: **mg/L** Analysis Date **1/27/99** Prep Date: **1/27/99**
Client ID: **9901097** Run ID: **MERC_990127A** SeqNo: **1982**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	ND	0.0002	0	0	0.0%	0	0	0	0.0%	20	
Mercury, TCLP	ND	0.0002	0	0	0.0%	0	0	0	0.0%	20	

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

Environmental Services Laboratory

Date: *04-Feb-99*

CLIENT: Pinnacle Laboratories
Work Order: 9901097
Project: 812044 / NMOCD

QC SUMMARY REPORT
Sample Matrix Spike

Sample ID: **9901133-09A MS** Batch ID: **67** Test Code: **ICPMET** Units: **mg/L** Analysis Date **1/28/99** Prep Date: **1/27/99**
Client ID: **9901097** Run ID: **ICP_990128A** SeqNo: **2204**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	.5144	0.005	0.5	0	102.9%	80	120	0			
Barium	.5142	0.005	0.5	0.02716	97.4%	80	120	0			
Cadmium	.508	0.002	0.5	0	101.6%	80	120	0			
Chromium	.5165	0.005	0.5	0	103.3%	80	120	0			
Copper, 200.7	.5281	0.005	0.5	0	105.6%	90	110	0			
Lead, 200.7	.5087	0.005	0.5	0	101.7%	90	110	0			
Selenium	.5077	0.005	0.5	0	101.5%	80	120	0			
Silver	.5139	0.005	0.5	0	102.8%	80	120	0			
Zinc, 200.7	.6245	0.005	0.5	0.0815	108.6%	90	110	0			

Sample ID: **9901133-09A MSD** Batch ID: **67** Test Code: **ICPMET** Units: **mg/L** Analysis Date **1/28/99** Prep Date: **1/27/99**
Client ID: **9901097** Run ID: **ICP_990128A** SeqNo: **2205**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	.5138	0.005	0.5	0	102.8%	80	120	0.5144	0.1%	20	
Barium	.5141	0.005	0.5	0.02716	97.4%	80	120	0.5142	0.0%	20	
Cadmium	.5103	0.002	0.5	0	102.1%	80	120	0.508	0.5%	20	
Chromium	.5194	0.005	0.5	0	103.9%	80	120	0.5165	0.6%	20	
Copper, 200.7	.5283	0.005	0.5	0	105.7%	90	110	0.5281	0.0%	20	
Lead, 200.7	.51	0.005	0.5	0	102.0%	90	110	0.5087	0.3%	20	
Selenium	.51	0.005	0.5	0	102.0%	80	120	0.5077	0.4%	20	
Silver	.5104	0.005	0.5	0	102.1%	80	120	0.5139	0.7%	20	
Zinc, 200.7	.5932	0.005	0.5	0.0815	102.3%	90	110	0.6245	5.1%	20	

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Pinnacle Laboratories
Work Order: 9901097
Project: 812044 / NMOCD

QC SUMMARY REPORT
Sample Matrix Spike

Sample ID: **9901115-01A MS** Batch ID: **70** Test Code: **Mercury** Units: **mg/L** Analysis Date **1/27/99** Prep Date: **1/27/99**
Client ID: **9901097** Run ID: **MERC_990127A** SeqNo: **1979**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	.00217	0.0002	0.002	0	108.5%	75	125	0			
Mercury, TCLP	.00217	0.0002	0.002	0	108.5%	75	125	0			

Sample ID: **9901115-01A MSD** Batch ID: **70** Test Code: **Mercury** Units: **mg/L** Analysis Date **1/27/99** Prep Date: **1/27/99**
Client ID: **9901097** Run ID: **MERC_990127A** SeqNo: **1980**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	.00217	0.0002	0.002	0	108.5%	75	125	0.00217	0.0%	20	
Mercury, TCLP	.00217	0.0002	0.002	0	108.5%	75	125	0.00217	0.0%	20	

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

Environmental Services Laboratory

Date: *04-Feb-99*

CLIENT: Pinnacle Laboratories
Work Order: 9901097
Project: 812044 / NMOCD

QC SUMMARY REPORT

Laboratory Control Spike - generic

Sample ID: **LCS-67** Batch ID: **67** Test Code: **ICPMET** Units: **mg/L** Analysis Date **1/28/99** Prep Date: **1/27/99**
Client ID: **9901097** Run ID: **ICP_990128A** SeqNo: **2202**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	.5119	0.005	0.5	0	102.4%	90	110	0			
Barium	.4859	0.005	0.5	0	97.2%	90	110	0			
Cadmium	.5102	0.002	0.5	0	102.0%	90	110	0			
Chromium	.5133	0.005	0.5	0	102.7%	90	110	0			
Copper, 200.7	.5195	0.005	0.5	0	103.9%	90	110	0			
Hardness	34.52	0.33	33.1	0	104.3%	90	110	0			
Lead, 200.7	.5111	0.005	0.5	0	102.2%	90	110	0			
Selenium	.5083	0.005	0.5	0	101.7%	90	110	0			
Silver	.5095	0.005	0.5	0	101.9%	90	110	0			
Zinc, 200.7	.5214	0.005	0.5	0	104.3%	90	110	0			

Sample ID: **LCS-70** Batch ID: **70** Test Code: **Mercury** Units: **mg/L** Analysis Date **1/27/99** Prep Date: **1/27/99**
Client ID: **9901097** Run ID: **MERC_990127A** SeqNo: **1977**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	.00102	0.0002	0.001	0	102.0%	80	120	0			
Mercury, TCLP	.00102	0.0002	0.001	0	102.0%	80	120	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

Environmental Services Laboratory

Date: *04-Feb-99*

CLIENT: Pinnacle Laboratories
Work Order: 9901097
Project: 812044 / NMOCD

QC SUMMARY REPORT

Initial Calibration Verification Standard

Sample ID: **ICVLOW** Batch ID: **67** Test Code: **ICPMET** Units: **mg/L** Analysis Date **1/28/99** Prep Date:

Client ID: **9901097** Run ID: **ICP_990128A** SeqNo: **2201**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	.5345	0.005									
Barium	.4921	0.005									
Cadmium	.5192	0.002									
Chromium	.5026	0.005									
Copper	.5231	0.005									
Lead, 200.7	.5222	0.005									
Selenium	.5368	0.005									
Silver	.5121	0.005									
Zinc, 200.7	.5229	0.005									

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

Pinnacle Laboratories, Inc. **Interlab Chain of Custody** Date: 12/9 Page: 1 of 1

Network Project Manager: Kimberly D. McNeill

innacle Laboratories, Inc.
709-D Pan American Freeway, NE
lbuquerque, New Mexico 87107
5) 344-3777 Fax (505) 344-4413

lease grind up the yellow rocks into fine owder and mix in with soil when analyzed. lease wear some sort of mask when doing his procedure. There might be high hits r Cr & Pb. Any questions call Francine.

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	Metals (8) RCRA	RCRA TCLP METALS	Metals Ca, K, Mg, Na, Bromide	Metals Al, Sb, As, Ba, Be, B, Cd	Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo	Ni, K, Se, Si, Ag, Na, Tl, V, Zn, Hg	NO_2 & NO_3, Conductivity	Gen Chemistry: Cl, F, SO_4, TDS	Alkalinity (Bicarb/Carb)	Oil and Grease	Volatile Organics GC/MS (8260)	BOD	COD	PESTICIDES/PCB (608/8080)	8270 BY GC/MS	PNA (8310)	8240 (TCLP 1311) ZHE	Herbicides (615/8150)	Base/Neutral Acid Compounds GC/MS (625/8270)	URANIUM	RADIUM 226+228	Gross Alpha/Beta	TO-14	NUMBER OF CONTAINERS
812044-01	12/8	1151	AQ	10A83			X	X	X	X	X	X	X														4
-02	↓	1209	NAQ	10~~B54~~		X	X	X	X	X	X	X	X														2

98 01099

PROJECT INFORMATION				SAMPLE RECEIPT		SAMPLES SENT TO:		RELINQUISHED BY: 1.	RELINQUISHED BY: 2.
OJECT #: 812044				Total Number of Containers		PENSACOLA - STL-FL		Signature: Time: Francine Tonno 1705	Signature: Time:
OJ. NAME: NMOCD				Chain of Custody Seals		PORTLAND - ESL-OR	X	Printed Name: Date: Francine Tonno 12/9/98	Printed Name: Date:
LEVEL: (STD.) IV				Received Intact?		STL - CT		Pinnacle Laboratories, Inc.	Company
REQUIRED:	MS	MSD	BLANK	Received Good Cond./Cold		STL- NEW JERSEY		RECEIVED BY: 1.	RECEIVED BY: 2
T: (STANDARD)	RUSH!!			LAB NUMBER: 98.02385		N. CREEK		Signature: Time: 945	Signature: Time:
						BARRINGER		Printed Name: Date: 12/10/98	Printed Name: Date:
E DATE: 12/17						SEQUOIA		Company	Company
SH SURCHARGE: —									
ENT DISCOUNT: —									
ECIAL CERTIFICATION QUIRED: YES (NO)									

COMMENTS: please see original COC under comments section. for metals instruction for soil sample

American Environmental Network (NM), Inc.

CHAIN OF CUSTODY

DATE: 12/08/98 PAGE: 1 OF 1

AEN(NM) Accession #: 8120AA

SHADED AREAS ARE FOR LAB USE ONLY.

PLEASE FILL THIS FORM IN COMPLETELY.

PROJECT MANAGER:

COMPANY: NMOCD
ADDRESS: 2040 South PACHECO
SANTA Fe NM 87505
PHONE: 505-827-7155
FAX:
BILL TO: S.A.B
COMPANY:
ADDRESS:

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB I.D.	NUMBER OF CONTAINERS
981208 1151	12/08/98	11:51 AM	WATER	01	12
981208 1209	12/08/98	12:09 PM	SOIL	02	5
Trip Blank	12/4	1245	AQ	03	1

Petroleum Hydrocarbons (418.1) TRPH
(MOD.8015) Diesel/Direct Inject
(M8015) Gas/Purge & Trap
8021 (BTEX)/8015 (Gasoline)
8021 (BTEX) ☐ MTBE ☐ TMB ☐ PCE
8021 (TCL)
8021 (EDX)
8021 (HALO)
8021 (CUST)
504.1 EDB ☐ / DBCP ☐
8260 (TCL) Volatile Organics
8260 (Full) Volatile Organics
8260 (CUST) Volatile Organics
8260 (Landfill) Volatile Organics
Pesticides /PCB (608/8081)
Herbicides (615/8151)
Base/Neutral/Acid Compounds GC/MS (625/8270)
Polynuclear Aromatics (610/8310)
General Chemistry: OCD + BR
PH
Priority Pollutant Metals (13)
Target Analyte List Metals (23)
RCRA Metals (8)
RCRA Metals by TCLP (Method 1311)
Metals: OCD + CAM AWS
* MIX + GRIND SOIL SAMPLE

PROJECT INFORMATION	
PROJ. NO.:	GW-199
PROJ. NAME:	CHAMPION-HOBBS
P.O. NO.:	
SHIPPED VIA:	

SAMPLE RECEIPT	
NO. CONTAINERS	18
CUSTODY SEALS	(Y) N/NA
RECEIVED INTACT	Yes
BLUE ICE/ICE	Y.C

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS!

(RUSH) ☐ 24hr ☐ 48hr ☐ 72hr ☐ 1 WEEK (NORMAL) X

CERTIFICATION REQUIRED: ☐ NM ☐ SDWA ☐ OTHER

METHANOL PRESERVATION ☐ ICE +

COMMENTS: FIXED FEE ☐

* MIX + GRIND SOIL SAMPLE (METALS) BEFORE SAMPLING! SMALL YELLOW ROCKS TO BE GROUND-UP!
RETAIN SAMPLE UNTIL OCD NOTIFIES!
1 soil sample rec'd wet, alternate soil sample used.

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.
Signature:	Signature: Time: 3:00 PM
Printed Name:	Printed Name: WAYNE PRICE Date: 12/08/98
Company:	Company: NMOCD
RECEIVED BY: 1.	RECEIVED BY: (LAB) 2.
Signature: Time:	Signature: Time: 0955
Printed Name: Date:	Printed Name: Date: 12/9/98
Company:	American Environmental Network (NM), Inc.