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**GENERAL
CORRESPONDENCE**

YEAR(S):

1991

**DISCHARGE PLAN
FOR
EL PASO NATURAL
GAS COMPANY'S
CHACO PLANT
SAN JUAN COUNTY,
NEW MEXICO**



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SANTA FE

NOVEMBER 1991

VOLUME 1

**DISCHARGE PLAN APPLICATION
FOR EL PASO NATURAL GAS COMPANY'S
CHACO PLANT**

NOVEMBER 15, 1991

Submitted to:

**NEW MEXICO OIL CONSERVATION DIVISION
P.O. Box 2088
Santa Fe, New Mexico 87501**

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AFFIRMATION:

"I hereby certify that I am familiar with the information contained in and submitted with this application and that such information is true, accurate and complete to the best of my knowledge and belief."

Signature

Larry R. Tarver

Larry R. Tarver, North Region
Vice President

Date

11/15/91

1.0 EXECUTIVE SUMMARY

1.0 EXECUTIVE SUMMARY

El Paso Natural Gas Company's Chaco Plant discharges approximately 65,700,000 gallons of wastewater annually. The Chaco Plant is located in Section 16, T. 26 N., R. 12 W., San Juan County, near Farmington, New Mexico. More than 75 percent of the wastewater is blowdown from the plant's cooling towers, boilers and water treatment facility (non-contact wastewater). Non-contact wastewater has a TDS of approximately 1100 mg/l and during periods of normal plant operation contains no toxic hydrocarbon compounds. Wastewater which comes into contact with hydrocarbons during natural gas processing (contact wastewater) passes through an oil-water separator and then is comingled with non-contact wastewater and discharged to evaporation lagoons located north of the facility. Separated oil hydrocarbons are sold. EPNG intends to close the existing evaporation ponds and replace them with engineered, lined, evaporative lagoons. Also it will retire the existing flare pit and two "french drains".

Groundwater at the Chaco Plant is estimated to lie at a depth of approximately 220 feet below the surface (Stone et al, 1983) and is assumed to be a potable water supply.

EPNG is wholly committed to using out sound disposal practices and to this end submits this plan outlining the proposed procedures. Likewise, EPNG is committed to cooperating fully with the New Mexico Oil Conservation Division (NMOCD) in honoring requests for additional information or providing clarification of existing information related to the discharge plan.

2.0 GENERAL INFORMATION

2.0 GENERAL INFORMATION

2.1 NAME OF DISCHARGER/LEGALLY RESPONSIBLE PARTY

All correspondence regarding this discharge plan should be sent to EPNG North Region headquarters at the address below:

Larry R. Tarver
Vice President
North Region
El Paso Natural Gas Company
P.O. Box 1492
El Paso, Texas 79978
(915) 541-5050

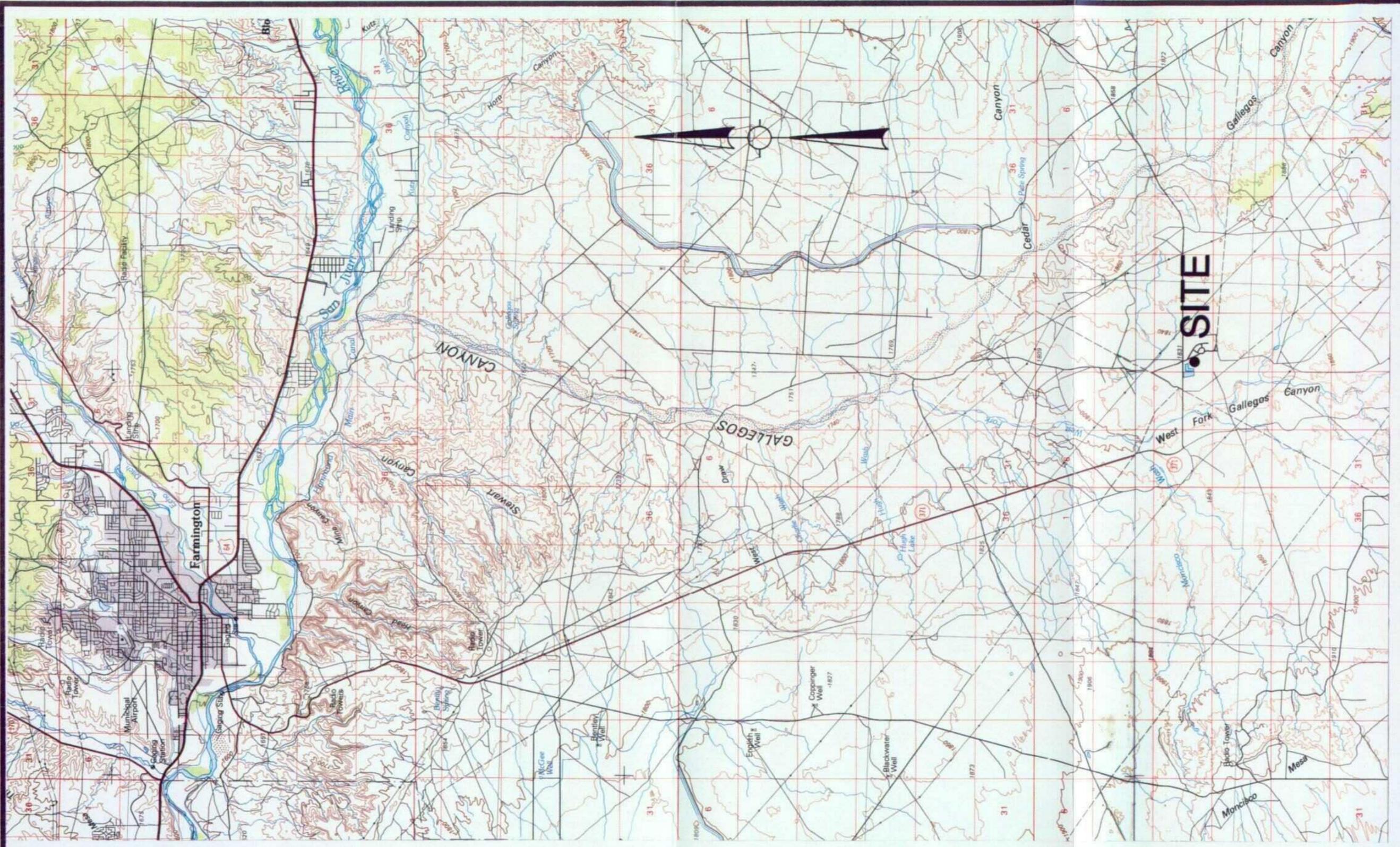
2.2 LOCAL REPRESENTATIVE OR CONTACT

A copy of all correspondence and all questions should be directed to the North Region Manager of Compliance Engineering:

Thomas Hutchins
Manager
Compliance Engineering
North Region
El Paso Natural Gas Company
P.O. Box 1492
El Paso, Texas 79978
(915) 541-3531

2.3 LOCATION OF DISCHARGE

The Chaco Plant is located in Section 16, T. 26 N., R. 12 W., San Juan County, New Mexico, approximately 20 miles south of Farmington, New Mexico (Figure 2-1). An unpaved access road from old State Road No. 371 provides access to the plant. In addition, access is provided from a paved road which leads from New Mexico State Highway 44. An aerial photographic base map of the facility is included as Plate 2-1.



MILES 1 0 1 2 3 4

VICINITY MAP

CDM
 environmental engineers, scientists,
 planners, & management consultants

**EL PASO
 NATURAL GAS
 CHACO PLANT**

Figure
 No.
2-1

2.4 TYPE OF NATURAL GAS OPERATION

The EPNG Chaco Plant is engaged in the compression and processing of natural gas. Presently the Chaco Plant receives approximately 250 MMCF/day of gas for compression from the Bisti, Ballard, Ojito and Lindreth Fields. This natural gas is obtained from Picture Cliff Formation, Dakota Formation, Gallup Formation, Mesa Verde Formation and the Fruitland Formation. Following compression and processing by EPNG, the gas then enters EPNG's pipelines for transmission to market. A listing of the plant facilities are provided below:

A. Gas Compression Facilities

1. Main engine (11-"A" Plant; 3-"B" Plant)

	<u>Sea Level</u>	<u>Altitude</u>
a. Nine Cooper-Bessemer GMVC-10 Turbo	1,800	1,800
b. Two Cooper-Bessemer GMWC-10 Turbo	3,500	3,500
c. Three Clark TLA-10 Turbo	3,400	3,400
d. Two G.E. Turbines - "C" Plant (ISO)	22,280	16,117 &
e. Total Installed	<u> </u>	<u>15,955</u>
HP (15 Units)	77,960	65,472

2. Compressors - Single Stage

- a. Cylinders - Chaco "A" Plant
4-11-1/2" X 14" for each of nine (9) GMVC-10
3-15" X 20" for each of two (2) GMWC-10
- b. Cylinders - Chaco "B" Plant
3-10-1/2" X 19" and 1-12-1/2" for each of
three (3) TLA-10
- c. Compressor Unit De Lava Model 1 B 30/30
for G.E. Turbines

3. HP placed in service as follows:

"A" Plant

One 1800 HP Unit	Sept. 9, 1957
Two 1800 Hp Units	Sept. 10, 1957
One 1800 HP Unit	Sept. 13, 1957
One 1800 HP Unit	Sept. 16, 1957
One 1800 HP Unit	Sept. 17, 1957

One 1800 HP Unit	Sept. 1, 1958
Two 3500 HP Units	Sept. 1, 1958
One 1800 HP Unit	Oct. 1, 1958
One 1800 HP Unit	Feb. 25, 1963
"B" Plant	
Three 3400 HP Units	Dec. 25, 1966
"C" Plant	
One 12,00 G.E. Turbine	May, 1970
3,000 HP Addition To Turbine	Nov. 1970
2,000 HP Addition To Turbines	July, 1971
One 17,000 HP G.E. Turbine	Nov. 1971

B. Recompressor Engines For Gasoline Plant Fuel

1. Main Engines

	<u>Sea Level</u>	<u>Altitude</u>
a. Two Ingersoll-Rand 8 SVGS-1-"A" Plant	440	440
b. One Ingersoll-Rand SVGA-10-"B" Plant	550	550
c. One Ingersoll-Rand KVGA-83-"B" Plant	<u>880</u>	<u>880</u>
d. Total Installed HP (4 Units)	2,310	2,310

2. Compressors

- a. Single - Stage
4 - 5 1/2" X 12"
2 - 10" X 14"
- b. Two - Stage
4 - 5 1/2" X 12"
2 - 10" X 14"

3. Horsepower placed in service as follows:

- a. Two (2) 440 HP Units Jan. 1958
- b. One (1) 550 HP Unit May 1967
- c. One (1) 880 HP Unit May 1967

C. Power Generation Facilities

1. Primary power furnished through transmission facilities connecting San Juan River and Blanco Plant.
2. Standby power furnished by City of Farmington.

D. Water Supply System

1. Number of wells (5) - located 6 1/2 miles N/E of Plant.
2. Pump Capacity:
 - a. Well No. 6 - 60 GPM
 - b. Well No. 7 - 120 GPM
 - c. Well No. 8 - 230 GPM
 - d. Well No. 9 - 90 GPM
 - e. Well No. 10 - 90 GPM
3. Two (2) 500 GPM pumps located at Blanco Reservoir No. 2
4. Thirteen point six (13.6) miles of 10-3/4" water-line tied to Chaco's 12-3/4" water line (12-15-71)

E. Gas Processing Facilities

1. Dehydration
 - a. Design
 1. "A" Plant - Stearns-Roger
 2. "B" Plant - Fish Engineering
 - b. Contractors
 1. "A" Plant - Two (2) 96" I.D. X 60'
 2. "B" Plant - Three (3) 78" I.D. X 20'
 - c. Type
 1. "A" Plant - Dry Bed (Silica Gel)
 2. "B" Plant - Triethylene Glycol
 - d. Capacity
 1. "A" Plant - 265 M² CFD at 14.73 psis
 2. "B" Plant - 370 M² CFD at 14.73 psis

- e. In Service
 - 1. "A" Plant - March 1, 1958
 - 2. "B" Plant - May 15, 1967
- f. Regeneration Gas Compressor - One 100 HP I-R (ES-1) w/Elec. Motor

2. Gasoline Absorption

- a. Design
 - 1. "A" Plant - Stearns-Roger
 - 2. "B" Plant - Fish Engineering
- b. Absorbers
 - 1. "A" Plant - Three (3) 96" I.D. X 55'
 - 2. "B" Plant - Three (3) 96" I.D. X 55'
- c. Type
 - 1. "A" Plant - Oil Absorption
 - 2. "B" Plant - Oil Absorption
- d. Capacity
 - 1. "A" Plant - 269 M² CFD at 14.73 psis
 - 2. "B" Plant - 325 M² CFD at 14.73 psis
- e. Liquid Products Production
 - 1. "A" Plant - 313,978 gpd
 - 2. "B" Plant - 379,147 gpd
- f. In Service
 - 1. "A" Plant - March 1, 1958
 - 2. "B" Plant - May 15, 1967
 - 3. Revised by Fish Engr. Feb. 1972 for 45% propane recovery

F. Steam Generation Facilities

1. Boiler Plant

- a. Two Vogt, Class VS Bentube Boiler Units
 - 1. Boiler output - 65,000 lbs. steam/hr.
 - 2. Design Pressure - 675 psis
- b. One Vogt, class MWH waste heat boiler
 - 1. Boiler Output - 140,000 lbs. steam/hr.
 - 2. Design Pressure - 700 psis
- c. Plant Capacity - 270,000 lbs. steam/hr.

G. Bisti No. 8 - (For Bisti G.S. Service)

1. One 1250 HP I-R Electric Motor
4RDS-2 Reciprocating Compressor
2. HP Placed In Service
 - a. One 1250 HP Electric Unit - November 21, 1978

NOTE: Product Treater retired on W.O. X49877
Bisti No. 7 retired in 1990 on W.O. X50636

2.5 REGULATORY INDEX

Table 2-1 presents the regulatory index. This table provides a cross reference between the requirements established by the New Mexico Water Quality Control Commission (NMWQCC) Regulations and this discharge plan.

**TABLE 2-1
REGULATORY INDEX**

NMWQCC Regulation Required in Discharge Plan	Section in Discharge Plan
1-201	1.0, 2.0
1-203	3.3.4
3-106 C.1	3.2
3-106 C.2	2.3, 5.0, 5.5, Figure 5-2
3-106 C.3	5.4.2
3-106 C.4	5.5
3-106 C.5	4.2
3-106 C.6	5.1, 5.3
3-106 C.7	5.0
3-107	6.0
3-108.B	1.0

3.0 EFFLUENT SOURCES, CHARACTERISTICS AND DISPOSAL

3.0 EFFLUENT SOURCES, CHARACTERISTICS AND DISPOSAL

3.1 PROCESS DESCRIPTION

The Chaco Plant receives raw natural gas from the Picture Cliff, Dakota, Mesa Verde, Gallup, and Fruitland Formations. Gas inlet streams are processed to:

- Remove water
- Add odorant into the natural gas
- Compress the gas for introduction into transmission pipelines
- Separate propane and other products
- Product sweetening

Data from 1991 indicates that total gas inlet flow averages 250 MMCF/day into the Chaco Plant. Typically, 15 to 20 percent of the inlet gas is consumed on-site as fuel or product removal via shrinkage, or due to miscellaneous losses. Approximately 90 percent of consumption is associated with product removal, averaging about 250,000 gallons of liquid per day. A block process diagram appears as Figure 3-1.

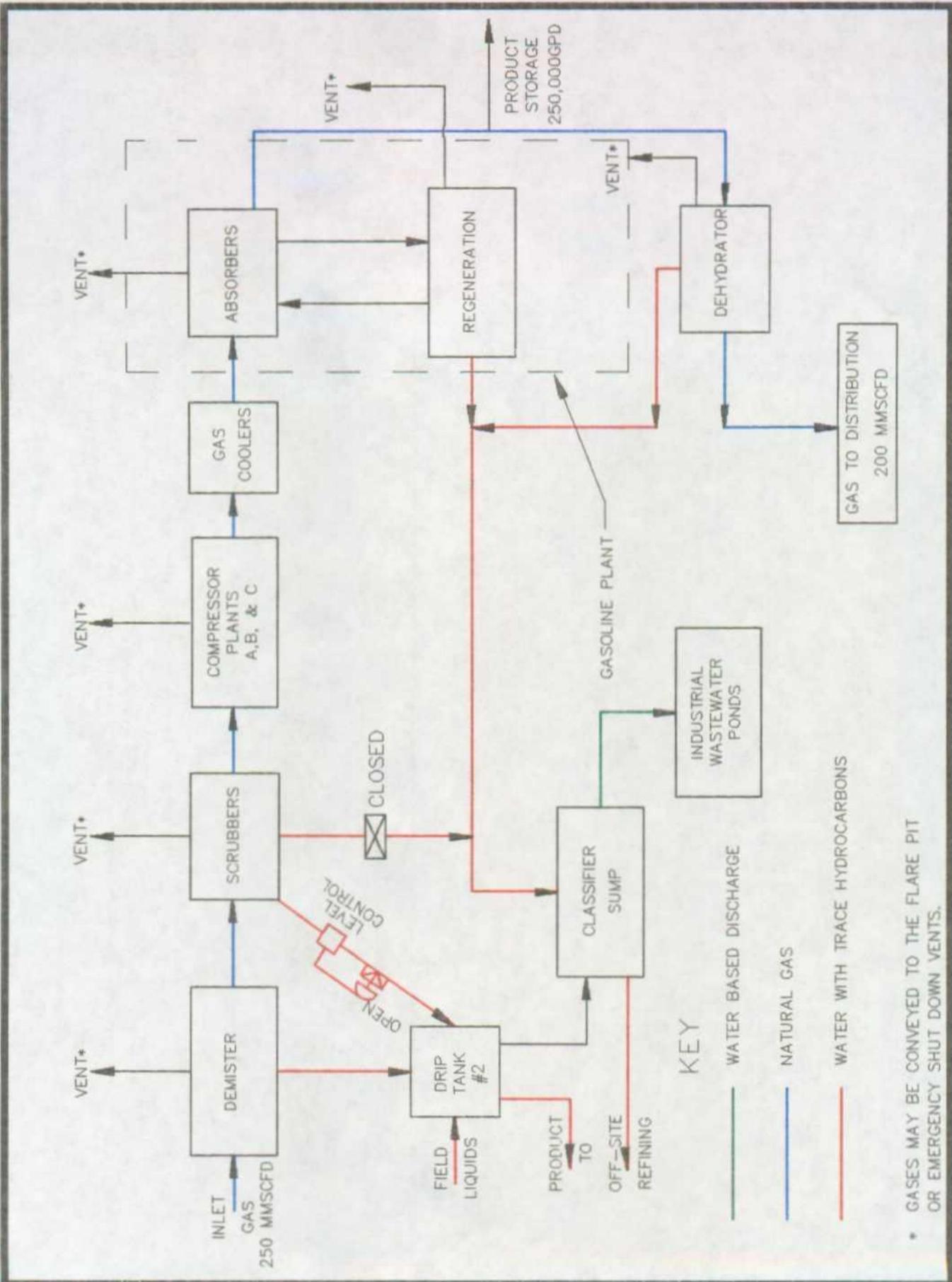
Figures 3-2(a) and 3-2(b) show the process block flow diagram and water balances for both average and worst cases. Plate 3-1 identifies the location of process and waste-management units. Plate 3-2 shows the piping layout at the Chaco Plant.

In the following subsections, unit processes are classified according to wastewater productions. Processes which produce no wastewater are considered "dry" (D).

A plant process which produces wastewater due to contact with hydrocarbons is a "contact" process (C), and those processes which do not contact hydrocarbons are "non-contact" (NC) processes.

Dry processes include:

PROCESS	SUBSECTION
Compressors (D)	3.1.1

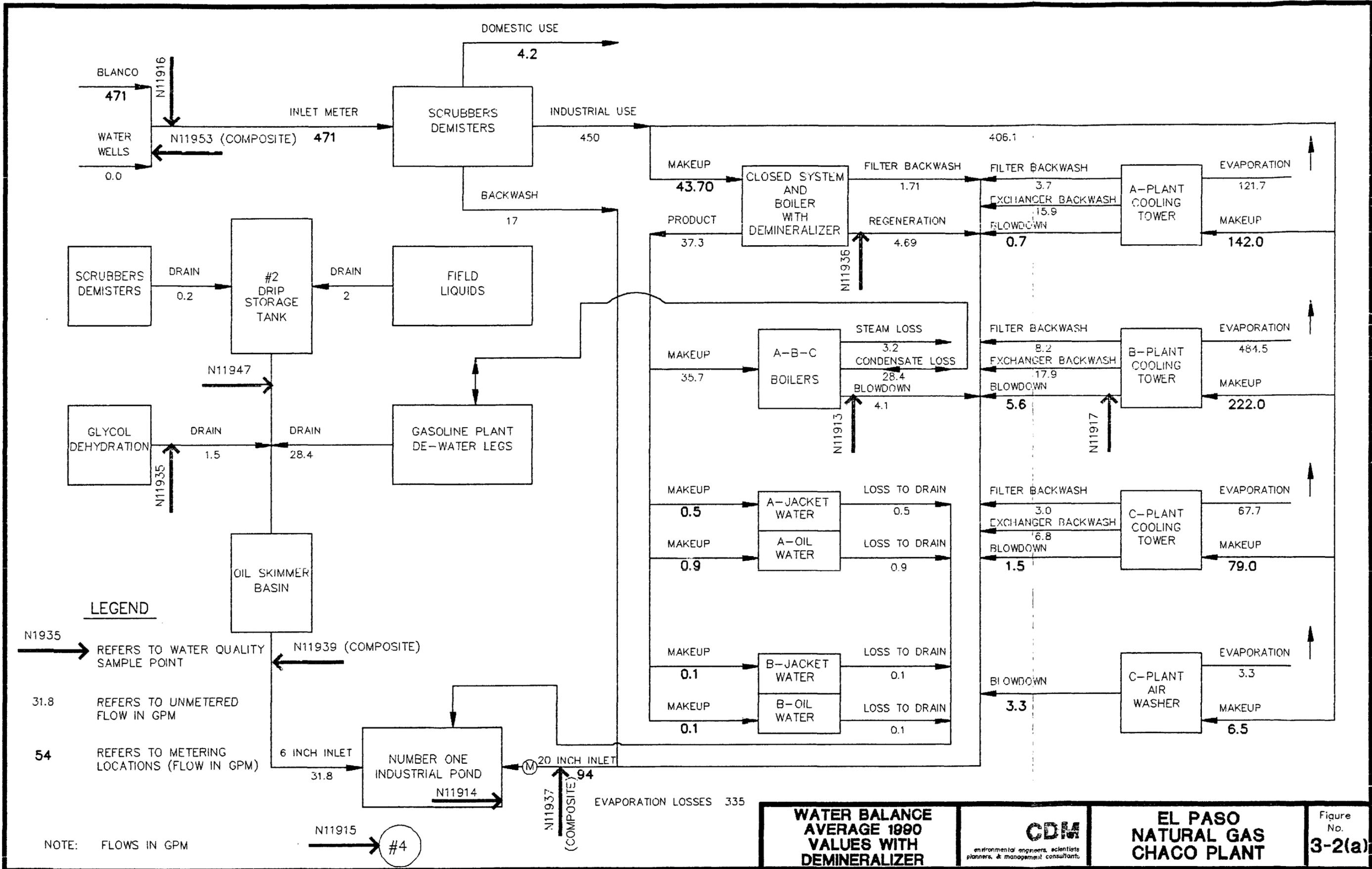


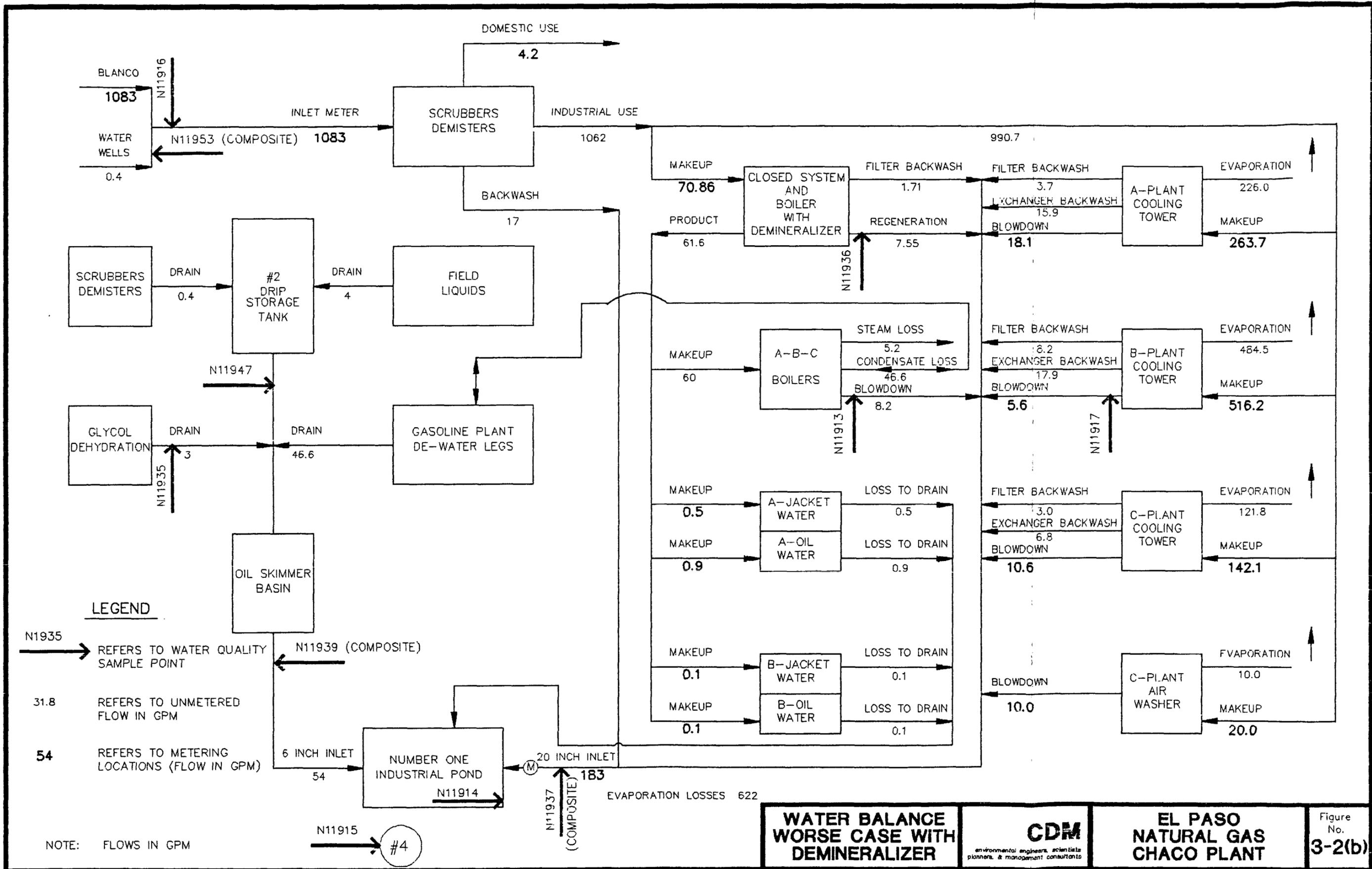
BLOCK FLOW DIAGRAM PROCESS PLANT



EL PASO NATURAL GAS CHACO PLANT

Figure No. **3-1**





Contact processes are:

PROCESS	SUBSECTION
Demisters/Scrubbers/Separators (C)	3.1.2
Gasoline Plant Water Legs (C)	3.1.10
Glycol Dehydration (C)	3.1.11
Classifier Sump (C)	3.1.12
Drip Tank #2 (C)	3.1.13
Industrial Wastewater Ponds (C)	3.1.14

Non-contact wastewater is generated by:

PROCESS	SUBSECTION
Water Treatment (NC)	3.1.3
Boilers (NC)	3.1.4
Cooling Towers (NC)	3.1.5
Air Washer (NC)	3.1.6
Domestic Sewage (NC)	3.1.7
Storm Water (NC)	3.1.8
Jacket and Oil Cooling Water	3.1.9

3.1.1 Compressors (D)

Gas is compressed by reciprocating and centrifugal compressors. These compressors do not generate wastewater, however, compression produces wastewater from cooling towers, oil and jacket water systems, and air washers.

3.1.2 Demisters/Scrubbers/Separators (C)

All inlet gas is passed through one or more scrubber/separator units to remove entrained water produced with the gas. Wastewater generated may contain some free and dissolved hydrocarbons. Separate phase hydrocarbons are removed from storage in Drip Tank #2. Once enough product has been removed, the hydrocarbon is transferred from Drip Tank #2 to Drip Tank #1. Any accumulated contact water is drained to the oil classifier from where the contact water is discharged to the industrial wastewater pond. The separate phase hydrocarbons are transferred from Drip Tank #2 to Drip Tank #1.

3.1.3 Water Treatment (NC)

Makeup water extracted from the San Juan River near Bloomfield is brought on-site and treated using filtration, softeners and demineralizers. This water is used to produce boiler feedwater, cooling water makeup, fire fighting water, domestic supply, and air washer makeup.

Wastewater is produced by boiler blowdown, filter backwash, water softeners, cooling water blowdown and exchanger backwash, demineralizer regeneration, and air washer blowdown. These various non-contact wastewater streams are collected in a 20-inch pipe and conveyed to the number one industrial wastewater pond with the possible exception of the closed cooling systems.

3.1.4 Boilers (NC)

These boilers produce on average about 150,000 pounds of steam per hour. The main boilers produce steam for on-site power generation and general process heating. To maintain proper boiler operation, a certain quantity of boiler water is "blown down" and replaced with purified makeup water. This prevents an increase in total dissolved solids (TDS) in the boiler water, which could potentially lead to scale formation and/or corrosion in the boiler core. Approximately 11,800 gpd of high TDS blowdown water is discharged to the industrial wastewater pond. The unaccounted for water (39,600 gpd), is lost from the system through evaporation, stripping process or other plant losses. An evaporator is available at the plant to evaporate boiler water condensate from untreated inlet water if needed. This unit was previously used to evaporate condensate from softened water, but the plant is currently in the process of converting to a demineralizer for the production of boiler quality feedwater.

3.1.5 Cooling Towers (NC)

Each compressor plant has a dedicated cooling tower that is used to cool compressed gases, as well as perform other general cooling requirements of the process units. Most of the cooling tower water is recycled during operation, thereby causing a high volume of evaporative losses to occur over time. The evaporative losses, in turn, cause salts to

accumulate in the cooling tower waters such that some "blow down" is required to prevent TDS buildup. Treated water from the San Juan River is used as makeup water replacing waters that are discharged via the 20-inch pipe to industrial wastewater pond number one.

3.1.6 Air Washer (NC)

An air washer is available for use on the combustion air inlet of the "C" Plant turbine compressors to provide for inlet air cooling during periods of high ambient air temperature. Evaporation of the water from the air washer also causes a buildup of dissolved solids, increasing the TDS of water in the air washer sump, and requiring the blow down of water proportional to the amount of time the air washers are in service.

3.1.7 Domestic Sewage (NC)

Domestic sewage is generated by the plant work force of approximately 50 people. Sewage created by use of 1320 gallons of water per day (as estimated by the New Mexico Environment Department in the 1989 Wastewater Inventory Report) is discharged to six septic tanks. This discharge is then further directed to either leaching fields (4-inch open vitrified clay pipe) or a holding tank.

3.1.8 Storm Water (NC)

Located on a Tertiary alluvial deposit in the highlands above Gallegos Canyon, the facility is underlain by well draining sandy soils. These soils allow for seepage and rainfall loss due to infiltration. Additionally, the facility is sited in the upper reaches of the West Gallegos Creek watershed, with little basin area draining across its boundaries. That area above the facility typically generates sheet flow migrating down slope from east to west. EPNG has constructed earthen berms east of the facility to manage sheet flow by directing it to swales flanking the property both to the south and north.

Finally, the total rainfall in this area averages less than 10 inches per year. Therefore, very little stormwater is managed at this facility. That stormwater that does run-off is collected by a series of swales and concrete lined channels which direct

discharge to two basins located west of Compressor Plant "B", and west of the boiler building. The accumulated stormwater either evaporates or infiltrates.

3.1.9 Jacket and Oil Cooling Water (NC)

Jacket and oil cooling waters are used in both the "A" and "B" Compressor Plants. This water is maintained at a fairly consistent temperature using radiant cooling from the finfan units and heating from compressor engine heat exchangers. As with any recirculation system, this water tends to accumulate dissolved solids; therefore, small amounts of make-up water (approximately 2,300 gpd) from a softener or the demineralizer are used to offset minor losses related to evaporation or steam discharges. Wastewater is generated from this system at various locations along the jacket and oil cooling water piping systems. This water is collected and conveyed to the industrial wastewater pond.

3.1.10 Gasoline Plant Water Legs (C)

As part of the liquid absorption process, steam is introduced into the hydrocarbon liquid products in the absorption unit and accumulates in the dewatering legs (which are associated with the rich oil stabilizer, still, and product and reflux accumulators). This steam injection forms a condensate that constitutes, on average, nearly 39,600 gallons of water per day. This condensate, which has comeingled with the hydrocarbon liquid products, is conveyed to the classifier and ultimately discharged to the industrial wastewater ponds.

3.1.11 Glycol Dehydration (C)

Before the gas stream exits the plant for transmission, absorbed water is removed in the glycol dehydration unit. These removed waters, averaging 2160 gpd, are conveyed to the classifier via the 6-inch inlet pipe.

3.1.12 Classifier Sump (C)

Contact waters from Drip Tank #2, assorted scrubbers, gasoline plant dewatering legs and the glycol dehydration unit are conveyed to the classifier via the 6-inch inlet pipe reach. The classifier consists of two multi-baffled concrete structures

serving to remove floating hydrocarbons from the waste stream. The floating products are skimmed off of the water phase. The lean oils are put back into the plant lean oil system. The heavier oils are collected in the above ground storage tank and sold to an oil reclaimer. The water phase is ultimately conveyed via a 6-inch pipe from the classifier to the industrial wastewater ponds for discharge. Flow through the classifiers may vary, depending on plant upsets and shutdowns. However, on average about 46,000 gallons of water per day are treated.

3.1.13 Drip Tank #2 (C)

Product and contacted/produced waters that are separated from the gas by demisters and scrubbers, various field liquids produced by pigging, and surge tank liquids are recovered and stored in Drip Tank #2. Product that accumulates is conveyed off-site for processing. Waters that accumulate within Drip Tank #2 are drained to the classifier sump for further separation and treatment. Water flow through Drip Tank #2 averages about 3,200 gallons per day.

3.1.14 Industrial Wastewater Ponds (C)

All wastewater from the classifier sump, 6-inch, 8-inch, and 20-inch drains is discharged into the industrial wastewater ponds that occupy nearly 14 acres northwest of the production area. These ponds, as presented in Plate 3-1, are used primarily for evaporation and waste stream aeration; however, since the ponds are unlined, some infiltration does occur. This infiltration is discussed in more detail in section 4.1.3.

3.1.15 Flare Pit (C)

The flare pit receives emergency releases of gas, which contain small amounts of liquids, for flaring. In addition, the flare pit is used for safety reasons to prevent over-pressuring of process piping and facilities. There is no discharge from these pits.

3.2 WASTE QUALITY CHARACTERISTICS

The Chaco Plant produces on average 180,000 gallons per day of process wastewater. Process wastewater is discharged to the industrial

wastewater ponds to evaporate/infiltrate and aerate. A material balance of the plant intake water and estimated plant water losses is shown in Figures 3-2(a) and 3-2(b). EPNG is currently conducting a flow monitoring program to accurately determine wastewater production at the Chaco Plant. However, the above estimate of discharge is reasonable.

Table 3-1 correlates the sample collection points with the individual sample numbers.

Table 3-2 summarizes plant raw water inlet and wastewater characteristics at various locations in the Chaco Plant. Analytical laboratory reports are included in Appendix A.

The sample locations, identified in Figures 3-2(a) and 3-2(b), include pre- and post- plant contact and non-contact waters. Grab samples of the boiler blowdown, industrial wastewater ponds No. 1 and No. 4, B-cooling tower blowdown, demineralizer regeneration water, Drip Tank #2, glycol dehydrator drainline and the raw water plant inlet were collected during the week of September 4, 1991. In addition, a 48-hour composite sample of the 20-inch line influent to the industrial wastewater pond No. 1 and the 6-inch pipe conveying effluent from the classifier sump was collected during the same week. Finally, a composite sample of the water from wells, used for raw water supply in the case of emergency, was collected September 5, 1991.

Included in Table 3-1 is a listing of the New Mexico Water Quality Control Commission (NMWQCC) groundwater quality standards. These standards, which appear in Section 3-103 of the NMWQCC Regulations, pertain to groundwater quality standards in New Mexico where TDS concentrations are less than 10,000 milligrams per liter (mg/l, or parts per million).

Based on the data collected characterizing waters throughout the site, the following observations can be made:

- Raw water (N11916) for make-up and domestic distribution collected from the San Juan River contains detectable concentrations of barium, fluoride, nitrate, uranium, radium, chloride, iron, and sulfate.
- Raw water which can be obtained from the groundwater supply wells (located 8 to 10 miles from the plant) contains similar constituents as the San Juan River water plus the following

constituents: lead, copper, and manganese. The observed iron concentration exceeds the NMWQCC standards; however, CDM interprets this as characteristic of the naturally occurring groundwater in this area. Additionally, the total dissolved solids in the groundwater supply, 740 mg/l, are nearly 5 times greater than those measured in the San Juan River. These water supply wells are only used to supply backup water to the Chaco Plant. They are operated very infrequently. They are presently only operated to assure mechanical integrity in the event that a backup water supply is needed.

- Total dissolved solids are above the NMWQCC groundwater quality standard for domestic water supplies in the boiler blowdowns, cooling tower blowdown, demineralizer regeneration waters, 20-inch influent line to the industrial wastewater pond #1, Drip Tank #2, and industrial wastewater pond #4. Waters from the glycol dehydration and gasoline plant dewatering legs appear to dilute the Drip Tank #2 TDS contribution enough that effluent from the classifier is below 110 mg/l TDS.
- Although the waters within the plant exhibit elevated levels of some constituents at various locations (i.e., observed concentrations are greater than the NMWQCC groundwater quality standard), waters discharging to industrial wastewater pond #1 (sample N11914) only exceed the NMWQCC for the reported benzene concentration (13 micrograms per liter (mg/l) reported versus 10 mg/l NMWQCC standard). Downstream of this location, in industrial wastewater pond #4, exceedances are reported for chloride and TDS (which are standards for domestic water supplies). This condition is indicative of the evaporation process which occurs in the ponds.

TABLE 3-1
WATER SAMPLE COLLECTION KEY

SAMPLE #	STREAM	SAMPLE POINT	SAMPLE TYPE	DATE - TIME
N11913	Boiler Blowdown	Boiler #1 Sample Cooling Pot	Grab	09-04-91-1130
N11914	Industrial Pond #1	Composite along north shore line	Grab	09-09-91-1215
N11915	Industrial Pond #4	south west corner of pond	Grab	09-04-91-1245
N11916	Plant Inlet	Six inch line D/S of regulator 1/2" valve	Grab	09-04-91-0930
N11917	B - Cooling Tower	1" plastic valve at sample sink	Grab	09-04-91-1015
N11935	Dehydration	Glycol dehydrator 1/2" drain line	Grab	09-05-91-1100
N11936	Demineralization Regeneration	Siphoned from opening in top of tank	Grab	09-06-91-1100
N11937	20 Inch Discharge	U/S discharge meter dam	48 hr. composite	09-06-91-0900
N11939	Contact Water	Oil skimmer 6" outlet	48 hr. composite	09-08-91-1000
N11947	Scrubbers	Drip Storage Tank #2 -2" drain valve	Grab (VOA, metals, radio, 09/10)	09-04-91-1030
N11953	Water Wells	Composite of Wells #6, #8, #9 and #10	Composite of wells	09-05-91-0830

3.2.1 Chemicals, Additives and Preservatives

The type and known quantities of chemicals and additives used in both contact and non-contact processes at the Chaco Plant are summarized in Table 3-2. Appendix B contains Material Safety Data Sheets for all products and chemicals used.

3.2.2 Possible Variation in Wastewater Chemistry and Quantity

Variations in production rates impact water treatment and contact wastewater streams, as well as boiler steam generation. Additionally, seasonal variations impact cooling water, and oil cooling and jacket waters and wastewater production. Given that production rates can vary from 80 to 600 MMSCFD, or by as much as 7.5 times, wastewater flow can be expected to vary similarly. This variation in flow does not, however, correlate directly with a variation in wastewater quality.

Wastewater quality is dependant more upon the liquids contained in the produced gases coming into the plant than on production rate. Field liquids contained in the inlet gas can contain slugs of produced water high in TDS or hydrocarbons, or both. These waters can and do impact Drip Tank #2 effluent rates, and can impact other processes down the line.

Occasional plant process upsets can also impact wastewater quality in the classifier and industrial wastewater ponds for short periods of time.

3.3 SPILL/LEAK PREVENTION AND HOUSEKEEPING PRACTICES

3.3.1 Operation and Maintenance Procedures

The Chaco Plant is operated in a manner to prevent and mitigate any unplanned releases to the environment. Plant process and storage units are regularly observed by a number of personnel during normal operations, and any evidence or sign of spills/leaks is routinely reported to supervisory personnel so that repairs or cleanup can be promptly effected. Routine maintenance procedures conducted at the Chaco Plant also help to assure that equipment remains functional and that the possibility of spills/leaks is minimized.

TABLE 3-2

SAMPLE LOCATION ITEM #	PARAMETER	NHWGCC LIMITS (MG/L)	BOILER BLOWDOWN SAMPLE NUMBER N11913	INDUSTRIAL POND NO. 1 SAMPLE NUMBER N11914	INDUSTRIAL POND NO. 4 SAMPLE NUMBER N11915	PLANT INLET SAMPLE NUMBER N11916	B-COOLING TOWER SAMPLE NUMBER N11917	DEHYDRATION SAMPLE NUMBER N11935	REGENERATION SAMPLE NUMBER N11936	20-INCH DISCHARGE SAMPLE NUMBER N11937	CONTACT WATER SAMPLE NUMBER N11939	SCRUBBERS SAMPLE NUMBER N11947	WELLS SAMPLE NUMBER N11953
1	ARSENIC (MG/L)	0.1	<0.005	<0.005	<0.005	<0.005	0.006	<0.005	0.009	<0.005	<0.005	0.082	<0.005
2	BARIUM (MG/L)	1.0	<0.010	0.202	0.298	0.069	0.355	<0.010	0.6	0.158	0.077	0.737	0.019
3	CADMIUM (MG/L)	0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
4	CHROMIUM (MG/L)	0.05	<0.010	<0.011	<0.010	<0.010	0.016	<0.010	0.014	<0.010	<0.017	<0.5	<0.010
5	CYANIDE, TOTAL (MG/L)	0.2	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
6	FLUORIDE (MG/L)	1.6	0.06	0.64	0.11	0.18	1.44	<0.05	1.83	0.46	<0.05	0.08	1.3
7	LEAD (MG/L)	0.05	0.005	0.003	<0.002	<0.002	<0.002	<0.002	0.003	0.004	<0.002	0.008	0.004
8	TOTAL MERCURY (MG/L)	0.002	<0.0002	0.0007	<0.0002	<0.0002	0.0003	<0.0002	<0.0002	<0.0002	0.0003	1.4	<0.0002
9	NITRATE AS NITROGEN (MG/L)	10	17	0.06	<0.06	0.09	<0.06	<0.06	0.79	0.33	<0.06	<1	0.59
10	SELENIUM (MG/L)	0.05	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
11	SILVER (MG/L)	0.05	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.01	<0.01	<0.01
12	URANIUM (MG/L)	5.0	0.001	0.0041	0.0281	0.0031	0.0069	0.0034	0.005	0.0105	0.0044	0.0034	0.0035
13	RADIUM-226 AND RADIUM-228 (pCi/L)	30.0	1.2	1.5	1.1	1.8	2.5	0.3	0.6	0.6	0.2	2.1	1.2
14	BENZENE (MG/L)	0.01	<0.0005	0.013	<0.0005	<0.000	<0.0005	4.2	<0.0005	<0.0005	0.71	19.2	<0.0005
15	POLYCHLORINATED BIPHENYLS (PCBs)(MG/L)	0.001	<0.0005	<0.005	<0.005	<0.000	<0.0005	<0.0005	<0.0005	<0.0005	<0.005	<0.005	<0.0005
16	TOLUENE (MG/L)	0.75	<0.0005	<0.005	<0.0005	<0.000	<0.0005	3.4	<0.0005	<0.0005	0.6	14.1	<0.0005
17	CARBON TETRACHLORIDE (MG/L)	0.01	<0.0002	<0.002	<0.0002	<0.000	<0.0002	<0.1	<0.0002	<0.0002	<0.005	<0.05	<0.0002
18	1,2-DICHLOROETHANE(EDC)(MG/L)	0.01	<0.0002	<0.002	<0.0002	<0.000	<0.0002	<0.1	<0.0002	<0.0002	<0.005	<0.05	<0.0002

TABLE 3-2

SAMPLE LOCATION		BOILER BLOWDOWN	INDUSTRIAL POND NO. 1	INDUSTRIAL POND NO. 4	PLANT INLET	B-COOLING TOWER	DEHYDRATION	REGENERATION	20-INCH DISCHARGE	CONTACT WATER	SCRUBBERS	WELLS
19	1,1-DICHLOROETHYLENE(1,1-DCE)(MG/L)	0.005	<0.002	<0.0002	<0.000 2	<0.0002	<0.1	<0.0002	<0.0002	<0.005	<0.05	<0.0002
20	1,1,2-TETRACHLOROETHYLENE(PCE)(MG/L)	0.02	<0.002	<0.0002	<0.000 2	<0.0002	<0.1	<0.0002	<0.0002	<0.005	<0.05	<0.0002
21	1,1,2-TRICHLOROETHYLENE(TCE)(MG/L)	0.1	<0.002	<0.0002	<0.000 2	<0.0002	<0.1	<0.0002	<0.0002	<0.005	<0.05	<0.0002
22	ETHYLBENZENE (MG/L)	0.75	<0.005	<0.0005	<0.000 5	<0.0005	0.6	<0.0005	<0.0005	<0.125	0.2	<0.0005
23	TOTAL XYLENES (MG/L)	0.62	<0.005	<0.0005	<0.000 5	<0.0005	3.7	<0.0005	<0.0005	0.12	1.8	<0.0005
24	METHYLENE CHLORIDE (MG/L)	0.1	<0.02	<0.002	<0.002	<0.002	<1.0	<0.002	<0.002	<0.05	<0.5	<0.002
25	CHLOROFORM (MG/L)	0.1	<0.002	<0.0002	<0.000 2	<0.0002	<0.1	<0.0002	0.0215	<0.005	<0.05	<0.0002
26	1,1-DICHLOROETHANE (MG/L)	0.025	<0.002	<0.0002	<0.000 2	<0.0002	<0.1	<0.0002	<0.0002	<0.005	<0.05	<0.0002
27	ETHYLENE DIBROMIDE(EDB)(MG/L7778)	0.0001	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
28	1,1,1-TRICHLOROMETHANE (MG/L)	0.06	<0.002	<0.0002	<0.000 2	<0.0002	<0.1	<0.0002	<0.0002	<0.005	<0.05	<0.0002
29	1,1,2-TRICHLOROMETHANE (MG/L)	0.01	<0.002	<0.0002	<0.000 2	<0.0002	<0.1	<0.0002	<0.0002	<0.005	<0.05	<0.0002
30	1,1,2,2-TETRACHLOROETHANE (MG/L)	0.01	<0.002	<0.0002	<0.000 2	<0.0002	<0.1	<0.0002	<0.0002	<0.005	<0.05	<0.0002
31	VINYL CHLORIDE (MG/L)	0.001	<0.002	<0.0002	<0.000 2	<0.0002	<0.1	<0.0002	<0.0002	<0.005	<0.05	<0.0002
32	PAHS: TOTAL NAPHTHALENE (MG/L)	0.03	0.00095	<0.0003	<0.000 3	<0.0003	4.7	<0.0003	<0.0003	0.1	0.007	<0.0003
33	BENZO-A-PYRENE (MG/L)	0.0007	<0.0005	<0.00001	<0.000 01	<0.00001	<0.005	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
34	CHLORIDE (MG/L)	250	160	580	2.4	50	<0.5	2200	440	<0.5	6400	16
35	COPPER (MG/L)	1.0	0.021	<0.010	<0.010	0.067	<0.010	<0.010	0.174	<0.001	<0.010	0.141

TABLE 3-2

SAMPLE LOCATION	IRON (MG/L)	MANGANESE (MG/L)	PHENOLICS, TOTAL (MG/L)	SULFATE (MG/L)	TOTAL DISSOLVED SOLIDS (MG/L)	ZINC (MG/L)	pH (UNITS)	BORON (MG/L)	BOILER BLOWDOWN	INDUSTRIAL POND NO. 1	INDUSTRIAL POND NO. 4	PLANT INLET	B-COOLING TOWER	DEHYDRATION	REGENERATION	20-INCH DISCHARGE	CONTACT WATER	SCRUBBERS	WELLS
36	• 1.0								0.07	0.878	0.12	0.03	1.22	25.7	0.198	0.974	0.653	1830	3.2
37	• 0.2								<0.010	0.119	0.18	<0.010	0.043	0.108	0.012	0.219	0.02	17.3	0.106
38	• 0.005								0.03	<0.04	<0.04	<0.02	<0.02	0.47	<0.02	<0.02	0.17	4.6	<0.02
39	• 600								130	32	270	46	760	<0.3	490	190	1.6	410	340
40	• 1000								1200	890	1800	160	1500	<10	5100	1100	10	18000	740
41	• 10.0								0.155	0.032	<0.010	<0.010	0.093	<0.010	<0.010	0.183	0.022	0.137	<0.010
42	• 6-9								12.1	6.5	8.8	8.3	8.4	5.3	7.4	7.4	5.8	5.5	8.8
43	** 0.75								<0.10	0.16	0.22	<0.10	0.17	<0.10	0.22	<0.10	<0.10	<0.10	0.26

* standard for domestic water supply

** standard for irrigation use

The majority of process and storage units at the Chaco Plant are bermed or curbed and have underdrains or natural diversions which will direct any unplanned spills or releases to existing waste management areas. Each shift is required to report and clean up any identified release before shift change.

Some of the tankage on the plant, however, is contained within either an earthen berm or concrete berm with an earthen basin. In the case of a spill or overflow, earth or soils may contact produced waters or hydrocarbons. In fact, in some locations, past overfills or spills have visibly contaminated soils, as is evident adjacent to the classifier sump and Drip Tank #2. Maintenance and clean-up of these materials plus other minor "one-time" discharges are addressed in the proposed modifications portion of Section 4.0.

3.3.2 Chemical and Environmental Hazards

A number of process and non-process chemicals or additives (Table 3-3) used at the Chaco Plant could present a threat to the environment only in the event of a major spill or release. The majority of the chemicals are used in small quantities (55 gallons to 2,500 gallons per year) and any spills or leaks would be very small in volume and easily contained in the immediate area.

Major spills could result from the release of lubricating oils. A spill of wastewater could also result from cooling pond dike failure.

3.3.3 Cleanup Procedures

Cleanup procedures would obviously vary with the nature and extent of any unplanned release. Spills of bases are relatively easy to control and general procedures would include neutralization of the material in-place before a final evaluation is made on its ultimate disposal. Once neutralization is confirmed by sampling, it is quite probable that no further actions would be required to ensure protection of human health and the environment.

**TABLE 3-3
CHEMICALS USED AT THE CHACO PLANT**

Chemical Name	Manufacturer	Maximum Amount Kept on Hand	General Location Where Stored
ABSORPTION OIL		80,000 gallons	TANK - GAS PIT AREA
SULFURIC ACID		750 gallons	TANK - COOLING TOWERS A, B, C
AMBITROL F-L		1500 gallons	TANK-TURBINE AREA
CAUSTIC SODA FLAKE		3 - 100# BARRELS	CHEMICAL BUILDING
GLYCOL TRIETHYLENE		2500 gallons	TANK - GAS PLANT AREA
MONOTHALIMINE		1500 gallons	TANK- ANETH TREATER AREA
VAR SOL		500 gallons	TANK-A-COMPRESSOR & BOILER AREA
CAT-FLOC T		1 - 450# BARREL	CHEMICAL BUILDING
HYDROCHLORIC ACID		2000 gallons	TANK - WATER TREATER BUILDING AREA
HYDROXIDE CAUSTIC		3000 gallons	TANK - WATER TREATER BUILDING AREA
ALPHA 512		110 gallons (2 barrels)	CHEMICAL BUILDING
ALPHA 570		110 gallons (2 barrels)	CHEMICAL BUILDING
UI 3030		110 gallons (2 barrels)	CHEMICAL BUILDING
UI 1705		2 @ 200 gallons (2 barrels)	TANKS - COOLING TOWER A, B, C
UI 3140		110 gallons (2 barrels)	CHEMICAL BUILDING
UI 3270		110 gallons (2 barrels)	CHEMICAL BUILDING
UI 2310		110 gallons (2 barrels)	CHEMICAL BUILDING
CHLORINE GAS		5 - 150 # cylinder	WATER TREATING BUILDING AREA
CALCIUM HYPOCHLORITE 65%		1 - 100# drum	CHEMICAL BUILDING
490 MOBIL OIL		15,000 gallons	TANKS - 3 @ A-COMP. 1 @ B-COMP. AREA
797 MOBIL OIL		5,000 gallons	TANK - TURBINE AREA
797 MOBIL OIL		55 gallon barrel	STORAGE DECK, SOUTH OF BOILER PLT.
600W MOBIL OIL		55 gallon barrel	STORAGE DECK, SOUTH OF BOILER PLT.
DTE HEAVY MEDIUM OIL		110 gallon barrel	STORAGE DECK, SOUTH OF BOILER PLT.
MOBIL GEAR 629		55 gallon barrel	STORAGE DECK, SOUTH OF BOILER PLT.
890 HEAVY TRIHOL OIL		55 gallon barrel	CHEMICAL BUILDING
UNLEADED GASOLINE		750 gallons	TANK - N. SIDE OF WAREHOUSE BLDG.
DIESEL		150 gallons	TANK - A COMPRESSOR AREA
PROPANE		3500 gallons	GASOLINE PLANT AREA
METHANOL		200 gallons	TANK - A COMPRESSOR AREA
AUTO/TRANS FLUID	SHELL	6 gallons, 1 qt. can	WAREHOUSE
RIMULA 30 WT. OIL	SHELL	3 gallons, 1 qt. can	WAREHOUSE
ROTELLA T 15-40 WT. OIL	SHELL	3 gallons, 1 qt. can	WAREHOUSE

TABLE 3-3

CHEMICALS USED AT THE CHACO PLANT

Chemical Name	Manufacturer	Maximum Amount Kept on Hand	General Location Where Stored
ROTELLA T 30 WT. OIL	SHELL	3 gallons, 1 qt. can	WAREHOUSE
ANTIFREEZE		6 gallons, 1 qt. can	WAREHOUSE
1170 PRIMER	PROTECTO WRAP	4 gallons, 1 qt. can	WAREHOUSE
SHIELD CONCENTRATE CLEANER	SHIELD	100 gallon barrel	CHEMICAL BUILDING
PAINT		50, 1-gallon can	WAREHOUSE
SPRAY PAINT		30, 12 oz	WAREHOUSE
PAINT THINNER		4, 1-gal can	WAREHOUSE
WD-40		24, 12 oz. cans	WAREHOUSE
KNOCKER LOOSE		24, 9 oz. can	WAREHOUSE
CLEANER/REMOVER PENETRANT	MAGNAFLUX	12, 12 oz. can	WAREHOUSE
DEVELOPER D-701	MET-L-CHEK	6, 10 oz. can	WAREHOUSE
SPOTCHEK	MAGNAFLUX	6, 10 oz. can	WAREHOUSE
ANTISEIZE, AEROSOL	FEL-PRO, INC.	6, 16 oz. can	WAREHOUSE
ANTISEIZE	KOPR-KOTE	12, 8 oz. can	WAREHOUSE
ELECTRIC CONTACT CLEANER	OSBORN	6, 16 oz. can	WAREHOUSE
PAINT REMOVER SPRAY	KLEAN-STRIP	6, 16 oz. can	WAREHOUSE
SILICONE SEALANT	DEVCON	24, 10 oz. tube	WAREHOUSE
CUTTING FLUID	RELTON	12, 16 oz. can	WAREHOUSE
730 SPRAGRIP	A.W. CHESTERTON	6, 12 oz. can	WAREHOUSE
BLASTER-PENETRATING	BLASTER	12, 13 oz. can	WAREHOUSE
AJAX		24, 21 oz. can	WAREHOUSE
BOWL CLEANER	PHILLIPS	24, 1 qt. bottle	WAREHOUSE
DRAIN AWAY		12, 32 oz. bottle	WAREHOUSE
GLASS CLEANER		12, 19 oz. can	WAREHOUSE
ACTIVATED CARBON		70 CUBIC FEET	WATER TREATER BLDG.
ALPHA 512		615 GALLONS	TANKS C.T. AREA
ALPHA 570		615 GALLONS	TANKS C.T. AREA
ANION RESIN		28 CUBIC FEET	WATER TREATER BLDG.
CALCIUM HYPOCHLORITE		2-100 # DRUMS	WATER TREATER BLDG./CHEMICAL BLDG.
CAT - FLOC T			WATER TREATER BLDG./CHEMICAL BLDG.
CAUSTIC SODA FLAKE		3-100 # DRUMS	CHEMICAL BLDG.
CATION RESIN		28 CUBIC FEET	WATER TREATER BLDG.

TABLE 3-3

CHEMICALS USED AT THE CHACO PLANT

Chemical Name	Manufacturer	Maximum Amount Kept on Hand	General Location Where Stored
CHLORINE GAS		5-150# CYLINDERS	WATER TREATER BLDG.
FERREX MEDIA		800 CUBIC FEET	WATER TREATER BLDG./C.T. AREA
GARNET		16 CUBIC FEET	WATER TREATER BLDG.
GRADED ROCK		1200 CUBIC FEET	WATER TREATER BLDG.
GRADED SAND		220 CUBIC FEET	WATER TREATER BLDG./C.T. AREA
HYDROCHLORIC ACID		2000 GALLONS	WATER TREATER BLDG. AREA
SODA ASH (NaCO3)		4-80 # SACKS	CHEMICAL BLDG.
SODIUM HYDROXIDE		3000 GALLONS	WATER TREATER BLDG. AREA
SODIUM HYPOCHLORITE		2-55 GALLON DRUMS	WATER TREATER BLDG./CHEMICAL BLDG.
SULFURIC ACID			TANKS C.T. AREA
UI-1000		240 GALLONS	CHEMICAL BLDG./C.T. AREA
UI-1705		785 GALLONS	TANKS C.T. AREA
UI-2310		4-55 GALLON DRUMS	CHEMICAL BLDG./C.S. PUMP HOUSES
UI-3030		260 GALLONS	CHEMICAL BLDG./TANKS BOILER AREA
UI-3140		260 GALLONS	CHEMICAL BLDG./TANKS BOILER AREA
UI-3270		260 GALLONS	CHEMICAL BLDG./TANKS BOILER AREA
UI-4000		2-55 GALLON DRUMS	WATER TREATER BLDG./C.T. AREA
UI-7227		2-55 GALLON DRUMS	CHEMICAL BLDG. OIL SEPARATOR AREA
UI-9035		2-55 GALLON DRUMS	WATER TREATER BLDG./CHEMICAL BLDG.

Spills or leaks of hydrocarbons could potentially occur from the lube oil storage tanks, used oil storage tank, drip tanks, and product storage tanks. Lube oils are stored in above ground storage tanks located throughout the plant near each point of use. These tanks are contained within concrete floored berms to prevent infiltration of the oils to the ground.

If an oil spill occurs, general cleanup procedures would involve minor earthwork to prevent migration, and recovery of as much free liquid as possible. Recovered oil would then be transported to the waste oil tank for storage prior to off-site reclamation. Any material which may have soaked into the soil will be excavated and transported to the SRS. This proposed procedure is discussed in Section 4.0.

Spills of other organic materials which might occur at the drum storage area will be small in nature and easily contained. If a spill occurs, any free liquids will be contained by earthwork, recovered if possible, and held in storage pending a decision on final disposal. Based on existing literature, analysis, and regulatory guidelines, any affected soil will either be left in place, transferred to other existing waste-management areas (if no incompatibilities exist), or transported off-site for proper disposal.

Potential releases could result from failure of the boiler blowdown cooling pond dike. Should a release occur, several types of earth moving equipment are available to promptly repair damage to any dikes. Any liquids which have been released will be collected, where practical, and reintroduced into the wastewater treatment system.

3.3.4 Reporting

Should a significant release of materials occur, EPNG will provide oral notification to NMOCD as soon as possible after discovery, as required by NMOCD Rule No. 116.

3.3.5 General Housekeeping Procedures

EPNG strives to reduce the potential for spills and leaks in all non-process areas. Records from 1957 to present indicate that no liquid spills are documented at the Chaco Plant.

Non-process chemicals are used in relatively small quantities at the plant and are managed in a manner to prevent discharges to the environment. Any chemical spills which might occur would be immediately contained and disposed of according to proper guidelines.

EPNG currently uses a non-halogenated solvent, Varsol, for degreasing operations. The spent solvent, which contains various aromatic compounds, is combined with other hydrocarbon fractions and discharged to the industrial ponds.

3.3.6 French Drains

"French drain" discharges of lubricant oils and compressor engine exhaust oils constitute an environmental discharge separate from the wastewater streams discussed in the previous section. These discharges are also separate from spills and housekeeping issues because the french drains are continuous discharges integral to the operation of the gas compressors and air compressors in the plant. Some of the gas compressor engines are equipped with recirculating mufflers which collect engine exhaust oils and pass them back into the engine coolant system. The other gas compressor engines discharge exhaust oils directly to the ground through "french drains" or stand pipes fitted into gravel packs in the shallow unsaturated zone. Air compressors used for make-up air to prime pumps, for instrument air to drive instruments, and for utility air for shop use also have engine oil discharges directed to french drains. These air compressors are located throughout the facility.

Reclamation of the unsaturated zone soils is discussed in Section 4.0.

4.0 EFFLUENT DISPOSAL

4.0 EFFLUENT DISPOSAL

4.1 EXISTING OPERATIONS

Since 1967, EPNG's Chaco Plant has discharged most (greater than 99 percent) of its domestic, processed, contact, and all non-contact wastewater to a series of evaporative lagoons. These ponds are located west of the plant as depicted graphically in Plate 3-1. In 1989, use of the domestic ponds was discontinued. At present, only industrial ponds No. 1 through No. 4 and flare pit, are being used.

4.1.1 Domestic Effluent

These ponds are presently empty and dry. In 1989, this waste stream was re-directed to six septic tanks and three associated leach field systems. These septic tanks are located northeast of compressor building B, northeast of the A cooling tower, and west of the water treatment building. Sewage effluent from the office, warehouse and the change room discharges into septic tanks, which feed into a retention tank, which in turn are pumped out by a septage hauler. Sewage effluent from compressor building B enters into a septic tank and is then discharged to a leach field.

No surfacing of sewage was noted at any septic tank and leach field location. The most recent inspection of this domestic sewage system was performed by New Mexico Environment Department official Mr. David Tomko on September 12, 1989. At that time, some domestic effluent was still being directed to an evaporative lagoon. A copy of this most recent report appears as Table 4-1.

4.1.2 Contact and Non-Contact Water

All contact and non-contact water is introduced into the evaporative lagoons labelled industrial ponds No. 1 through No. 4 (Plate 3-1). Effluent flows first into pond No. 1 and then pond No. 2, where the flow is split to ponds Nos. 3 and

ENVIRONMENTAL IMPROVEMENT DIVISION

WASTEWATER INVENTORY REPORT

Report Completed By: David Tomko ^{O/Y} Date 09-12-89 County San Juan

Name and Location of Facility: El Paso Natural Gas Company - Chaco Plant

Address: P.O. Box 4990, Farmington, NH 87499

Type of Wastewater: Sanitary or Domestic X Industrial X Other _____

Plant Products or processes (if Industrial): Natural Gas Compression and Liquid Petroleum Products Removal

Loading Data: Number of Dwellings 13 plant buildings Population Estimate 66

Gallons per Day 1320 est. (20 gallons per person per day)

Type of System: Septic Tank 6 Lagoon or Oxidation Pond X

Package Plant _____ Trickling Filter _____

Activated Sludge _____ Other _____

Number of Lift Stations: None Emergency Power Source (if applicable): Yes _____ No _____

Size of System or Design Capacity: 3 cell lagoon system - total area 1 acre

Final Method of Disposal: Surface Discharge _____ (Chlorinated: Yes _____ No _____).

Evaporation X Irrigation _____ (Chlorinated: Yes _____ No _____)

Sub-surface Seepage Bed or Field _____ Other _____

Remarks: Only 1 cell in use with less than 6" of water.

4. An inspection of these ponds was performed by CDM staff on October 16, 1991, and the following conditions were observed:

Industrial Pond No. 1: sheen or rainbow on water surface, no vegetative growth on pond sides, black soil on pond walls.

Industrial Pond No. 2: slight sheen or rainbow on water surface, minor vegetative growth on lagoon sides, pond appears anaerobic.

Industrial Pond No. 3: no sheen or rainbow on water surface, moderate vegetative growth.

Industrial Pond No. 4: domestic sewage odor, pond appears aerobic, vigorous vegetative growth, color change in water at the end of the pipe.

None of the ponds at the Chaco Plant appear to be lined. For this reason, the following water balance calculations are provided in order to evaluate the relative importance of evaporation versus infiltration.

4.1.3 Evaporative Lagoon Water Balance

Current site process liquid disposal is to the evaporation ponds located north of the plant. The current effluent process involves discharge to industrial pond No. 1 (may contain some free phase hydrocarbon fuel compounds), discharge thereby controlled by free board elevation to industrial pond No. 2 (anaerobic condition) and final release to industrial pond Nos. 3 and 4 (aerobic conditions). The ponds are unlined and are prone to infiltration, seepage and evaporation processes.

In order to evaluate the component of losses from each process, a system water balance for the evaporative pond system was prepared. Each loss component is addressed separately with assumptions utilized and values calculated listed.

Evaporation Losses

The assumptions used to calculate evaporation losses include:

- a. Since there are a number of evaporation ponds located at the north end of the plant (see Plate 3-1), and four evaporation ponds are currently used at this time, an average area was computed for these ponds;
- b. The evaporation ponds contain at least six feet of water all year round;
- c. Any sediments and/or the oily liquids have reduced the permeability of the underlying pond soils and, therefore, evaporation is assumed to be the largest component of water loss from the ponds, with reduced infiltration of water into the ground taking place.

To calculate the amount of evaporation of water from the discharge lagoons, the areas of the ponds was calculated from aerial photographs (the scale of the photograph is one 1 inch equals 200 feet).

The amount of evaporation from each pond was calculated using the following formulas:

a. $E_p = E/C_p$

Where: E is the gross annual lake evaporation;

C_p is the pan coefficient (.7); and

E_p is the amount of evaporation from the evaporation pond;

b. $E_n = E_p \times E_s - R$

Where: E_n is the net evaporation of the pond;
 E_s is the coefficient of evaporation for small shallow ponds; and
 R is the average yearly rainfall of the area.

The average gross annual lake evaporation (E) is 62 inches/year for the Farmington area (Gabin and Lesperance, 1977). The coefficient of evaporation (E_s) for small shallow ponds is 0.85, and the average rainfall for the Farmington area is 8.1 inches per year (Gabin and Lesperance, 1977). The areas and calculations for each of the ponds are listed below.

<u>Pond No. 1:</u>	Surface area 24,800 ft ² Annual evaporation 3.19 acre ft/yr.
<u>Pond No. 2:</u>	Surface area 16,000 ft ² Annual evaporation 2.06 acre ft/yr.
<u>Pond No. 3:</u>	Surface area 82,400 ft ² Annual evaporation 10.60 acre ft/yr.
<u>Pond No. 4:</u>	Surface area 268,400 ft ² Annual evaporation 34.5 acre ft/yr.

Total evaporative lagoon evaporation rate is 50.35 acre ft/yr = 16,405,408 gal/yr.

Seepage Losses

The soils which underlie and surround the evaporative ponds are classified by the Soil Conservation Services (SCS) as the Doak (Du) and Sheppard Series. These soils formed in eolian and alluvium environments and include loamy fine sand. Further discussion of these soils is provided in Section 5.1.

The SCS map for the site area is included as Figure 4-1. The listed range of physical properties for these soils series, as taken from this SCS publication (Keetch, 1980) includes:

hydrologic group	:	B (m o d e r a t e infiltration rate)
flooding frequency	:	None
bedrock depth	:	> 60.0 inches
high water table	:	> 6.0 feet*
permeability	:	0.2 - 20.0 inches/hour
available water capacity	:	0.05 - 0.12 inches/inch

Using an average permeability of 9.0 inches/hour (1.25×10^{-2} ft/min) at the calculated pond surface area (equals seepage area) of 391,600 ft², a seepage loss of 59,081 acre feet per year was calculated.

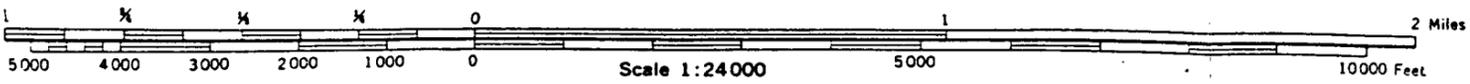
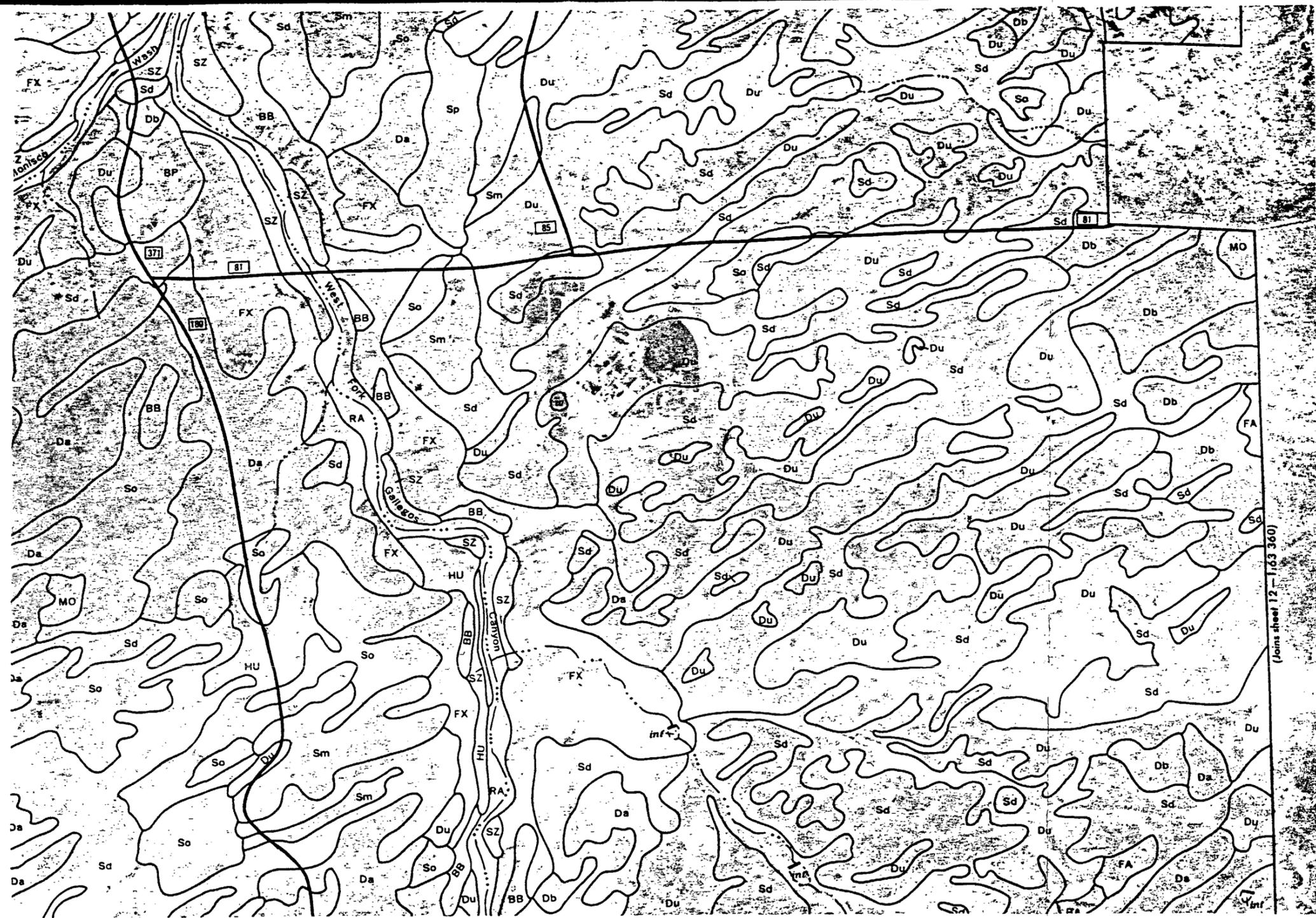
This volume is the maximum potential seepage rate that could occur from the ponds. As this number exceeds the total discharged volume, a much lower seepage volume actually occurs. The reduction in the infiltration rate is believed to be due to reduced permeability of the underlying pond soils by fine sediment and the oil globules causing skin affects.

For this reason, a "worst case infiltration" volume can be calculated by subtracting the calculated evaporitic volume from the discharge volume as performed below.

65,700,000	-	16,405,480	=	49,294,520
annual discharge		annual evaporitic		worst case
volume in gallons		volume in gallons		seepage estimate
per year		per year		in gallons per
				year

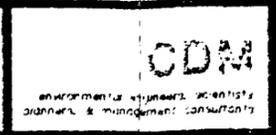
This indicates that as much as 75 percent of effluent discharged to the lagoon may reasonably be lost to infiltration.

* this value represents a high water table level for this soil series, but does not reflect Chaco Plant site conditions



Map taken from Soil Survey of San Juan County New Mexico Eastern Part sheet number 64
 United States Department of Agriculture Soil Conservation Service
 in cooperation with
 United States Department of the Interior
 Bureau of Indian Affairs and Bureau of Reclamation
 and the
 New Mexico Agricultural Experiment Station

**SOILS MAP
 FOR THE
 CHACO PLANT**



**EL PASO
 NATURAL GAS
 CHACO PLANT**

Figure No.
4-1A

SOIL LEGEND

The publication symbol does not designate slopes. The first letter, a capital, is the initial letter of the map unit name. The second letter is a capital if the map unit is broadly defined, otherwise, it is a lower case letter.

SYMBOL	NAME	SYMBOL	NAME
Ap	Apishapa clay loam	Ma	Mayqueen loamy fine sand
As	Apishapa clay	MO	Monierco fine sandy loam, gently sloping
AT	Atrac Fiorita-Travessilla association, hilly	PO	Penistaja loam, gently sloping
Av	Avalon sandy loam, 2 to 5 percent slopes	PP	Penistaja-Buckle association, gently sloping
Ax	Avalon sandy loam, 5 to 8 percent slopes	PT	Penistaja-Travessilla association, moderately sloping
Ay	Avalon loam, 0 to 3 percent slopes	PX	Pits
AZ	Avalon-Sheppard-Shiprock association, gently sloping	RA	Riverwash
BA	Badland	RO	Rock outcrop
BB	Badland-Monierco-Rock outcrop complex, moderately steep	RT	Rock outcrop-Travessilla-Weska complex, extremely steep
BC	Badland-Rock outcrop-Persayo complex, extremely steep	SB	Sheppard-Badland complex, very steep
Be	Beebe loamy sand	SC	Sheppard-Huerfano-Notal complex, gently sloping
Bf	Beebe Variant loamy sand	Sd	Sheppard-Mayqueen-Shiprock complex, 0 to 8 percent slopes
Bk	Blackston loam, 0 to 3 percent slopes	Sh	Shiprock loamy fine sand, 0 to 2 percent slopes
Bm	Blackston gravelly loam, 3 to 8 percent slopes	Sk	Shiprock loamy fine sand, 2 to 5 percent slopes
BP	Blackston-Farb complex, moderately steep	Sm	Shiprock fine sandy loam, 0 to 2 percent slopes
BR	Blancot-Fruitland association, gently sloping	So	Shiprock fine sandy loam, 2 to 5 percent slopes
BT	Blancot-Notal association, gently sloping	Sp	Shiprock fine sandy loam, 5 to 8 percent slopes
BU	Buckle silt loam, gently sloping	Sr	Shiprock Variant fine sandy loam
Da	Doak loam, 0 to 1 percent slopes	St	Stumble loamy sand, 0 to 3 percent slopes
Db	Doak loam, 1 to 3 percent slopes	Su	Stumble loamy sand, 3 to 8 percent slopes
Dc	Doak loam, 3 to 5 percent slopes	SV	Stumble sandy clay loam, gently sloping
Dd	Doak clay loam, 0 to 2 percent slopes	SW	Stumble-Fruitland association, gently sloping
DN	Doak-Avalon association, gently sloping	SX	Stumble-Notal complex, gently sloping
DS	Doak-Sheppard-Shiprock association, rolling	SZ	Stumble-Slickspots complex, gently sloping
Du	Doak-Uffens complex, 0 to 3 percent slopes	TA	Travessilla-Weska-Rock outcrop complex, moderately steep
Dw	Doak-Uffens complex, 3 to 8 percent slopes	Tp	Turley clay loam, 0 to 1 percent slopes
DZ	Dune land	Tr	Turley clay loam, 1 to 3 percent slopes
FA	Farb-Persayo-Rock outcrop complex, moderately steep	Ts	Turley clay loam, 3 to 5 percent slopes
FP	Fluvacents, ponded	Tt	Turley clay loam, wet, 0 to 2 percent slopes
Fr	Fruitland sandy loam, 0 to 2 percent slopes	Tv	Turley-Slickspots complex, 0 to 3 percent slopes
Fs	Fruitland sandy loam, 2 to 5 percent slopes	TW	Twick-Silver association, moderately sloping
Ft	Fruitland sandy loam, wet, 0 to 2 percent slopes	Wa	Walrees loam
Fu	Fruitland loam, 1 to 3 percent slopes	Wr	Werlog loam
Fw	Fruitland loam, 5 to 8 percent slopes	Ws	Werlog loam, saline
FX	Fruitland-Persayo-Sheppard complex, hilly	Yo	Youngston clay loam
Fy	Fruitland-Slickspots complex, 0 to 3 percent slopes		
Ga	Garland loam		
Gr	Green River fine sandy loam		
GY	Gypsorthids-Badland-Stumble complex, moderately steep		
HA	Haplargids-Blackston-Torriorrhents complex, very steep		
HU	Huerfano-Muff-Uffens complex, gently sloping		

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES	SYMBOL
National, state or province	-----
County or parish	-----
Minor civil division	-----
Reservation (national forest or park, state forest or park, and large airport)	-----
Land grant	-----
Limit of soil survey (label)	-----
Field sheet matchline & neatline	-----
AD HOC BOUNDARY (label)	-----
Small airport, airfield, park, oilfield, cemetery, or flood pool	
STATE COORDINATE TICK	
LAND DIVISION CORNERS (sections and land grants)	
ROADS	
Divided (median shown if scale permits)	=====
Other roads	=====
Trail	-----
ROAD EMBLEMS & DESIGNATIONS	
Interstate	
Federal	
State	
County, farm or ranch	
RAILROAD	
POWER TRANSMISSION LINE (normally not shown)	-----
PIPE LINE (normally not shown)	-----
FENCE (normally not shown)	-----
LEVEES	
Without road	=====
With road	=====
With railroad	=====
DAMS	
Large (to scale)	
Medium or small	

PITS	SYMBOL
Gravel pit	
Mine or quarry	
MISCELLANEOUS CULTURAL FEATURES	
Farmstead, house (omit in urban areas)	
Church	
School	
Indian mound (label)	
Located object (label)	
Tank (label)	
Wells, oil or gas	
Windmill	
Kitchen midden	

WATER FEATURES

DRAINAGE	SYMBOL
Perennial, double line	
Perennial, single line	
Intermittent	
Drainage end	
Canals or ditches	
Double-line (label)	
Drainage and/or irrigation	
LAKES, PONDS AND RESERVOIRS	
Perennial	
Intermittent	
MISCELLANEOUS WATER FEATURES	
Marsh or swamp	
Spring	
Well, artesian	
Well, irrigation	
Wet spot	

SPECIAL SYMBOLS FOR SOIL SURVEY

SOIL DELINEATIONS AND SYMBOLS	SYMBOL
ESCARPMENTS	
Bedrock (points down slope)	
Other than bedrock (points down slope)	
SHORT STEEP SLOPE	
GULLY	
DEPRESSION OR SINK	
SOIL SAMPLE SITE (normally not shown)	
MISCELLANEOUS	
Blowout	
Clay spot	
Gravelly spot	
Gumbo, slick or scabby spot (sodic)	
Dumps and other similar non soil areas	
Prominent hill or peak	
Rock outcrop (includes sandstone and shale)	
Saline spot	
Sandy spot	
Severely eroded spot	
Slide or slip (tips point upslope)	
Stony spot, very stony spot	

Key taken from Soil Survey of San Juan County New Mexico Eastern Part United States Department of Agriculture Soil Conservation Service in cooperation with United States Department of the Interior Bureau of Indian Affairs and Bureau of Reclamation and the New Mexico Agricultural Experiment Station

KEY FOR SOILS MAP FOR THE CHACO PLANT AREA

CDM environmental engineers, scientists, planners, & management consultants

EL PASO NATURAL GAS CHACO PLANT

Figure No 4-1B

4.1.4 Flare Pit

A flare pit is located northeast of Industrial Pond No. 3 and downstream from the oil/water classifier and the scrubber. Vapors originate from the liquid and which cannot be recovered are flared. Major flares only occur during periods of plant upset.

4.2 PROPOSED MODIFICATIONS: CLOSURE OF UNLINED PITS, PONDS AND DRAINS

EPNG proposes to close the following unlined pits and ponds which currently or historically contained contact wastewater. These pits are depicted in Plate 3-1. These pits and ponds include:

- Industrial Ponds No. 1 through No. 10
- Former Domestic Ponds No. 1 through No. 3
- Former Domestic Overflow Pits
- Flare Pit
- French Drains

In keeping with sound environmental practices, EPNG proposes to provide engineered evaporation ponds to replace the above named pits, ponds, and drains. A smokeless flare will replace the existing flare pit. Effluent lines will be metered so that actual discharge volumes can be measured. The existing pits, ponds and drains will be closed in accordance with current state and federal environmental standards and guidelines.

The residues in the pits, ponds and drains will be analyzed for characteristics of hazardous waste in accordance with 40 CFR 261 and will be compared to "listed" wastes as well. If material from the ponds and pits is shown to be hazardous, this material will be disposed of in accordance with EPA guidelines. The excavated material will be replaced with clean soil. It has been EPNG's experience that after analysis by the Toxicity Characteristic Leaching Procedure (TCLP), this material will not be classified as hazardous. EPNG has developed a program for remediation of hydrocarbon contaminated soil using a designated Soil Remediation Site (SRS). Once permitted by NMOCD,

pond residue would be placed at the SRS for remediation utilizing the Operational Procedures which appear in draft form in Appendix C.

The principle of operation of the SRS is to thin spread affected soils in 6-inch layers in order to enhance volatilization and natural biodegradation. Proposed soil cleanup target levels would be those which appear in the New Mexico Environmental Improvement Board's Underground Storage Tank Regulations (Section 1209.D.3.a and b). These levels are listed below:

- total BTEX < 50 ppm
- benzene < 10 ppm
- TPH < 100 ppm

Once these levels have been reached (as determined by laboratory analysis), an additional lift can be placed on the remediated soil.

5.0 SITE CHARACTERISTICS

5.0 SITE CHARACTERISTICS

The plant is located in the San Juan River drainage basin (Figure 5-1), and within the west central portion of the San Juan structural basin. Topographic relief within one mile of EPNG's plant is about 80 feet, with elevations ranging from 6000 to 6080 feet above sea level.

The area is characterized by mesas and dry arroyos. The plant is on a gently sloping terrace on the west side of the mesa which separates Gallegos Canyon and West Gallegos Canyon. Both canyons contain salt encrusted dry washes. Tertiary sandstones are exposed in the walls of West Gallegos Canyon and Tertiary sandstones and mudstones crop out in Gallegos Canyon (Figure 5-2). Average annual precipitation in the area is 8.1 inches. Vegetation is characterized by desert brush that covers approximately 80 percent of the surface.

5.1 GEOMORPHOLOGY AND SOILS

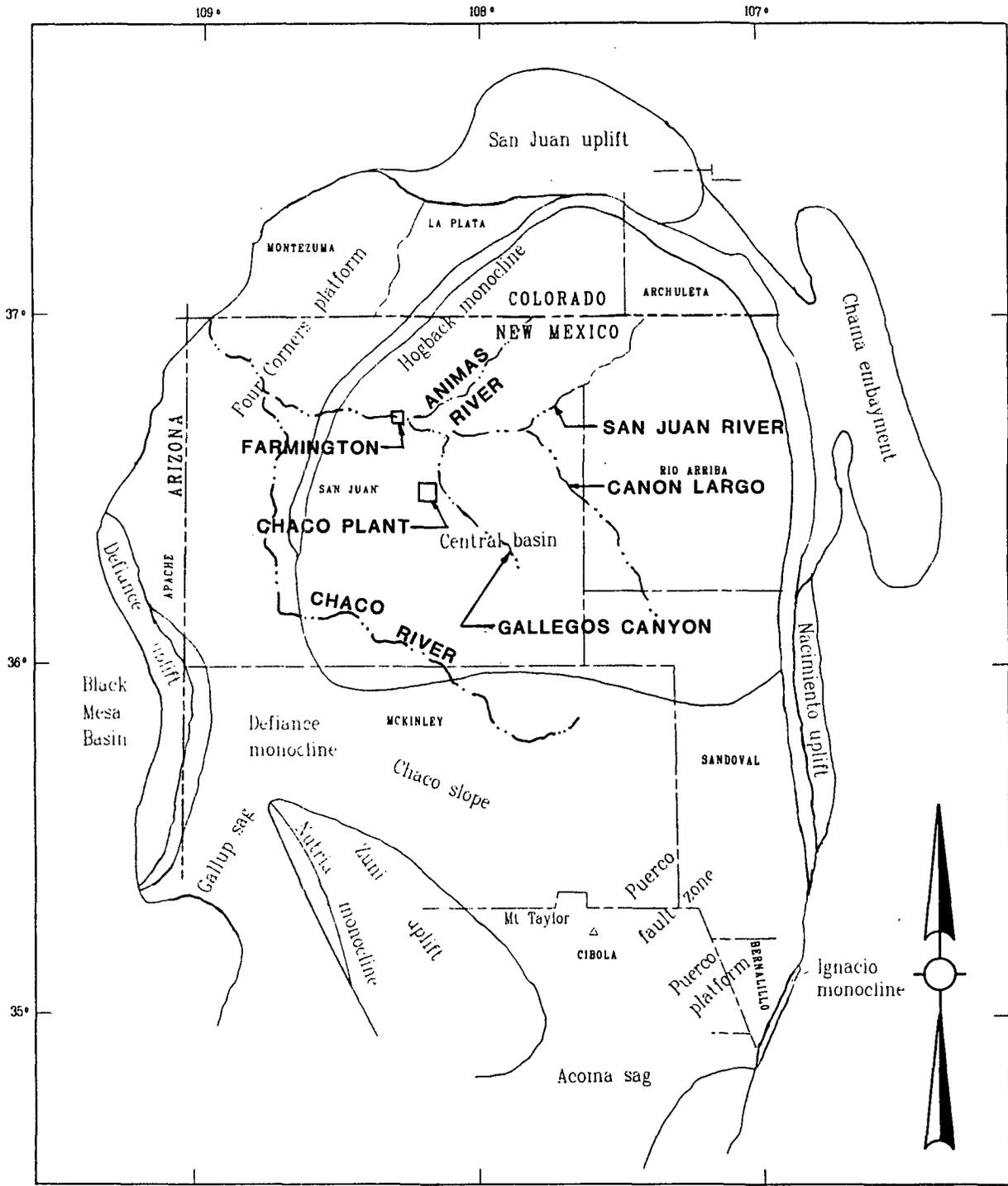
The plant is situated on a terrace between the crest of the mesa and West Gallegos Canyon. The surface slopes about three percent from the highest point, 6037 feet at the southeast corner to 6000 feet at the northwest corner. Three major soil associations are identified on the plant site: the Doak-Uffens complex, the Sheppard-Mayqueen-Shiprock complex, and the Shiprock fine sandy loam (Keetch, 1980). All of these soil associations are well drained soils which formed in alluvium or eolian deposits derived from sandstone and shale. Most of the plant facilities, including the evaporation ponds, are on Doak-Uffens soils. Permeability of these soils is low, ranging from 0.6 to 6.0 inches per hour. For this association runoff is very slow to slow and water erosion potential is low, but wind erosion potential is high.

The facility landfill is constructed on Sheppard-Mayqueen-Shiprock soil. No other plant facilities are constructed on these or the Shiprock soils. Permeability of this soil association is moderately high, ranging from 2 to 20 inches per hour. Water runoff potential is low, but wind erosion potential is high.

5.2 REGIONAL GEOLOGY

The plant is located within the west-central part of the San Juan Basin (Figure 5-1). The deepest portion of the basin contains up to 15,000 feet of Paleozoic and Mesozoic sediments (Fassett and Hinds, 1971). Tertiary and Late Cretaceous age rocks crop out in the immediate vicinity of the plant (Figure 5-2).

Beneath the plant the Paleocene Ojo Alamo Sandstone lies unconformable above the Cretaceous Kirtland Shale (Figure 5-2). The Ojo Alamo Sandstone is composed of interbedded sandstone, conglomeratic sandstone, and shale. The



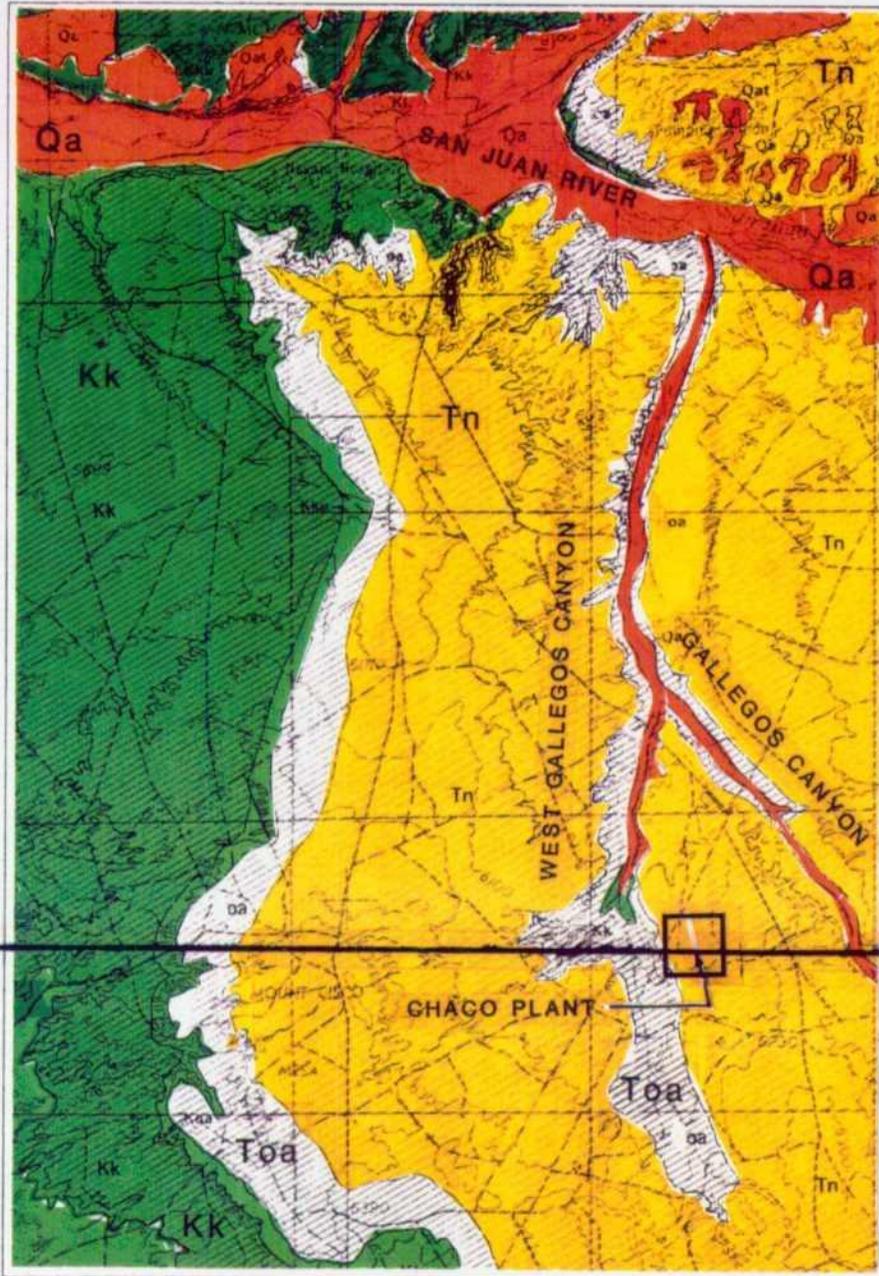
LOCATION MAP

CDM

environmental engineers, scientists
planners, & management consultants

**EL PASO
NATURAL GAS
CHACO PLANT**

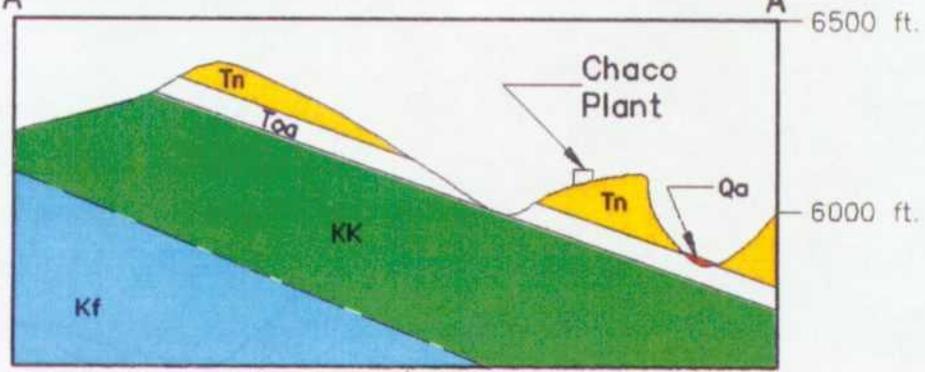
Figure
No.
5-1



- Quaternary
 - Qa Alluvium
- Tertiary
 - Tn Nacimiento Formation
 - Toa Ojo Alamo Formation
- Cretaceous
 - Kk Kirtland Shale

After O'Sullivan and Beikman 1963 and Thorn et al 1990

R14W R13W R12W



GEOLOGIC MAP AND GEOLOGIC CROSS-SECTION

CDM
 environmental engineers, scientists
 planners, & management consultants

EL PASO NATURAL GAS CHACO PLANT

Figure No. **5-2**

massive sandstone beds are sheetlike and discontinuous; they merge with other sandstone sheets, or wedge out into shale beds. The shale beds maintain relatively constant thickness. The unit varies from less than 20 feet to more than 400 feet thick throughout the basin. Channel depths of 50 or more feet have cut into the base of the underlying Fruitland Formation. The sandstone accumulated in stream channels and the shales in overbank deposits of rivers in a broad, wet alluvial apron.

The Paleocene Nacimiento Formation is conformable with the Ojo Alamo. It is comprised of gray to yellowish and reddish claystone and mudstone beds, interbedded with buff, gray or white lenticular sandstone beds. The clay component is described as "swelling" or "soapy." The formation contains significant amounts of carbonaceous material, leaf impressions and coal indicating that it was deposited by streams under more humid conditions than was the Ojo Alamo.

The Nacimiento varies from 400 to 800 feet in thickness and crops out in striking scarp or badlands exposures from the Colorado-New Mexico border southward across the San Juan River, then southeastward to the point of Cuba Mesa and northward to the upper Rio Puerco valley north of Cuba.

Thick Quaternary deposits are restricted to the San Juan, Animas and La Plata Valleys. Thin alluvial deposits are found in some arroyos and thin eolian deposits cap some mesas.

5.3 LOCAL GEOLOGY

The plant is located on a mesa where Quaternary eolian alluvium overlies the Tertiary Nacimiento and Ojo Alamo Sandstone. Fine- to medium-grained, light brown to moderate yellowish brown sand with varying amounts of silt and clay are exposed at the surface at the plant.

The Tertiary Nacimiento Formation caps the mesa according to O'Sullivan and Beikman (1963). In exposures in the badlands of West Gallegos Canyon six miles southeast (T25N, R12W, Sections 11, 14 and 15) the Nacimiento Formation is comprised of a lower mudstone, middle sandstone and upper mudstone and sandstone complex (Lucas, 1984). The thickness and composition of these units are highly variable, however, and individual beds are not laterally continuous.

A light brown sandstone unit of the Nacimiento Formation is present in roadcuts on the paved road to State Highway 44 adjacent to the plant, and in Gallegos Canyon three miles east of the plant and West Gallegos Canyon, one mile west of the plant. A gray and black mudstone unit is well exposed below the sandstone in Gallegos Canyon, but is either covered or not present in West

Gallegos Canyon. Portions of the Nacimiento Formation have been removed by erosion in the area of the plant. Based on information reported by Petroleum Information (PI) for oil and gas wells in the area, the total thickness of the Nacimiento here is approximately 100 feet.

The Ojo Alamo Sandstone crops out below the Nacimiento Formation in West Gallegos Canyon and is approximately 150 feet thick under the plant according to PI data.

5.4 LOCAL HYDROLOGY AND GROUNDWATER QUALITY

5.4.1 Regional Groundwater Hydrology and Water Quality

Three major groundwater systems are present in the Cretaceous and younger-age sedimentary deposits of this area of the San Juan Basin (Stone et al, 1983):

- Confined aquifers within Cretaceous and Tertiary sandstone units;
- Water-table aquifers in Cretaceous and Tertiary sandstone units near their outcrop areas;
- Water-table aquifers in Quaternary alluvium in river valleys; and tributaries.

Cretaceous units. Occurrence of groundwater resources associated with the Cretaceous units is a function of the distribution of sandstone beds within these units. Recharge is dependent upon outcrop distribution, elevation, climate of the outcrop area, lithologic characteristics of the unit and leakage from other units. Hydraulic conductivity is usually low due to the fine-grained textures characteristic of these sediments.

Groundwater quality in Cretaceous sandstone aquifers is controlled by several factors. Total dissolved solids (TDS) concentrations increase as a function of increasing groundwater residence time and reduced transmissivity of aquifer materials. Fresh water is associated with high transmissivity zones, while saline water is associated with low transmissivity zones. Groundwater moving along the sandstone-shale interfaces common to these rocks tends to exhibit increased TDS concentrations (Stone, et al., 1983). Water from these confined aquifers is suitable for livestock and domestic use in some areas, although in most cases it is not considered a major source.

Tertiary units. Groundwater occurrence in the Tertiary units is associated with the distribution of sandstone beds within these units. Recharge to groundwater is by infiltration through formation exposures along the flanks of the Nacimiento Uplift and on the broad plateaus that occur in the central part of the basin. The amount of recharge to Tertiary aquifers is higher than that to Cretaceous aquifers due to broader exposures in areas of high precipitation. Groundwater in these aquifers flows from upland recharge areas to discharge areas along canyon floors. Springs and seeps result due to regional topographic and geomorphic controls. The hydraulic conductivity of the Tertiary sandstones varies significantly, as a function of grain size, sorting and cementation. The hydraulic gradient is controlled by topography, but the structural attitude of the formations can alter the flow direction.

Tertiary sandstone aquifers have generally lower TDS concentrations than the Cretaceous aquifers (Stone et al, 1983), and commonly provide major sources of water for domestic and agricultural usage. The complex intertonguing of sandstone and shale units is the primary influence on specific conductance, which can be as high as 10,500 um/cm.

Quaternary units. Quaternary age aquifers occur primarily as valley fill in the major river valleys and consist of gravel, sand, silt and clay. In arroyos the groundwater quality and quantity is highly variable. Where available, water from this source is used for livestock, irrigation and domestic purposes.

A summary of the Mesozoic and Cenozoic Stratigraphy of the South Central San Juan Basin (after Thorn et al, 1990) appears as Table 5-3.

5.4.2 Local Groundwater Hydrology and Quality

No alluvial aquifer exists at the plant site or in either Gallegos Canyon or West Gallegos Canyon.

The Nacimiento Formation is comprised of 100 feet of low permeability fine grained sandstone, siltstone and shale. No wells are reported in the Nacimiento near the plant. The low permeability material prevents downward percolation from the surface under the plant.

The State Engineer's Office reports one well and Stone et al (1983) reports two other wells in the Ojo Alamo Formation on the mesa which includes the plant site. Stone et al (1983) estimate groundwater to lie at a depth of approximately 220 feet below the plant site.

TABLE 5-3

**MESOZOIC AND CENOZOIC STRATIGRAPHY
SOUTH CENTRAL SAN JUAN BASIN**

(After Thorn et al, 1990)

C E N O Z O I C	QUATERNARY	Alluvium
	TERTIARY	San Jose Formation
		Nacimiento Formation
Ojo Alamo Sandstone		
M E S O Z O I C	CRETACEOUS	Kirtland Shale
		Fruitland Formation
		Pictured Cliffs Sandstone
		Lewis Shale
		Mesa Verde Group
		Mancos Shale
		Dakota Sandstone
	JURASSIC	Morrison Formation
		Wanakah Formation
		Entrada Sandstone
TRIASSIC	Chinle Formation	

The total dissolved solids reported from this aquifer in wells in this area range from 560 to 1,000 ppm (Thorn et al, 1990). The potentiometric surface dips gently northwest toward the San Juan River.

5.5 Water Hydrology and Flooding Potential

The major local drainage feature is West Gallegos Canyon, located approximately one mile west of the site. West Gallegos Canyon enters Gallegos Canyon about six miles north of the site (Figure 5-1). Gallegos Canyon drains approximately 300 square miles and discharges into the San Juan River east of Farmington. Flooding potential from the San Juan River to the site is negligible because the plant is about 20 miles south of, and well outside the floodplain of the San Juan River.

The U.S. Geological Survey maintained a gauging station at the mouth of Gallegos Canyon four miles upstream of the San Juan River near Farmington from October 1977 through September 1981. Reported maximum discharge for this station was 900 cfs on January 17, 1979. The report states that no flow was reported "most of the time." No 100 year flood calculations are possible because of the limited data. The elevation difference between the waste impoundment and the arroyo (approximately 50 feet) presents a potential for flooding from this source along State Highway 44 into West Gallegos Canyon, but it is not expected to produce flooding of concern in Gallegos Canyon or the San Juan River.

Two ephemeral east to west drainages occur, one north of the plant boundaries, the other along the southern plant boundary. Both discharge to west of the plant where a berm prevents surface flow to West Gallegos Canyon. Surface flow to the west is also controlled by drainage-ways on property containing facilities operated by other pipeline companies.

6.0 MONITORING AND REPORTING

6.0 MONITORING AND REPORTING

Samples of wastewater discharged to the evaporative lagoons will be obtained annually and analyzed for the parameters listed in Section 3-103 of the NMWQCC Regulations (with the exception of radioactive species). This data will be presented to NMOCD each year in an annual report. Any changes or modifications to this plan (anticipated or otherwise), or to the effluent disposal system, will be reported to the NMOCD. The NMOCD is hereby notified of EPNG's intent to close the various domestic and industrial ponds as outlined in Section 4.

- A. Proposed implementation schedule for construction of a lined evaporative pond and subsequent closure of existing ponds appears below.

TASK	COMPLETION DATE
Berm Areas Around Chemical Tanks	Spring 1992
Install New Smokeless Flare	Summer 1992
Retire Existing Flare Pit	Summer 1992
Begin Water Conservation Study	Fall 1992
Complete Water Conservation Study	Spring 1993
Begin Evaporative Ponds Construction	Fall 1993
Complete Evaporative Ponds Construction	Spring 1994
Close Existing Industrial Ponds/French Drains	Spring 1994

7.0 BASIS FOR APPROVAL

7.0 BASIS FOR APPROVAL

The existing site conditions at the Chaco Plant indicate that there should be no present or foreseeable future danger to groundwater as the result of proposed discharge practices. No present or foreseeable future users of groundwater in the Chaco Plant area are anticipated to be negatively affected by the proposed effluent disposal practices for the following reasons:

- 100 percent of contact wastewaters undergo hydrocarbon separation prior to discharge to the evaporative ponds.
- 75 percent of all wastewaters are derived from non-contact processes and are of relatively good quality (Section 3.2).
- EPNG proposes to close all unlined pits and ponds to further improve environmental quality (Sections 4.2 and 6.0).
- There is no significant potential for wastewater release due to flooding by a 100-year storm (Section 5.5).
- EPNG is committed to using sound disposal practices and to this end submits this plan outlining the proposed procedures. Likewise, EPNG is committed to cooperating fully with NMOCD in honoring requests for additional information or clarification of existing information related to the discharge plan.

8.0 SUMMARY OF DISCHARGE PLAN REQUIREMENTS

8.0 SUMMARY OF DISCHARGE PLAN REQUIREMENTS

- 1) Annual analysis of effluent taken from the discharge to the evaporative lagoons.
- 2) Remediation of any soils containing elevated levels of petroleum hydrocarbon compounds (see Section 4.0) at an NMOCD-approved Soil Remediation Site.
- 3) NMOCD will be notified of any fire, break, leak, or spill pursuant to the terms and conditions set forth in NMOCD Rule 116.

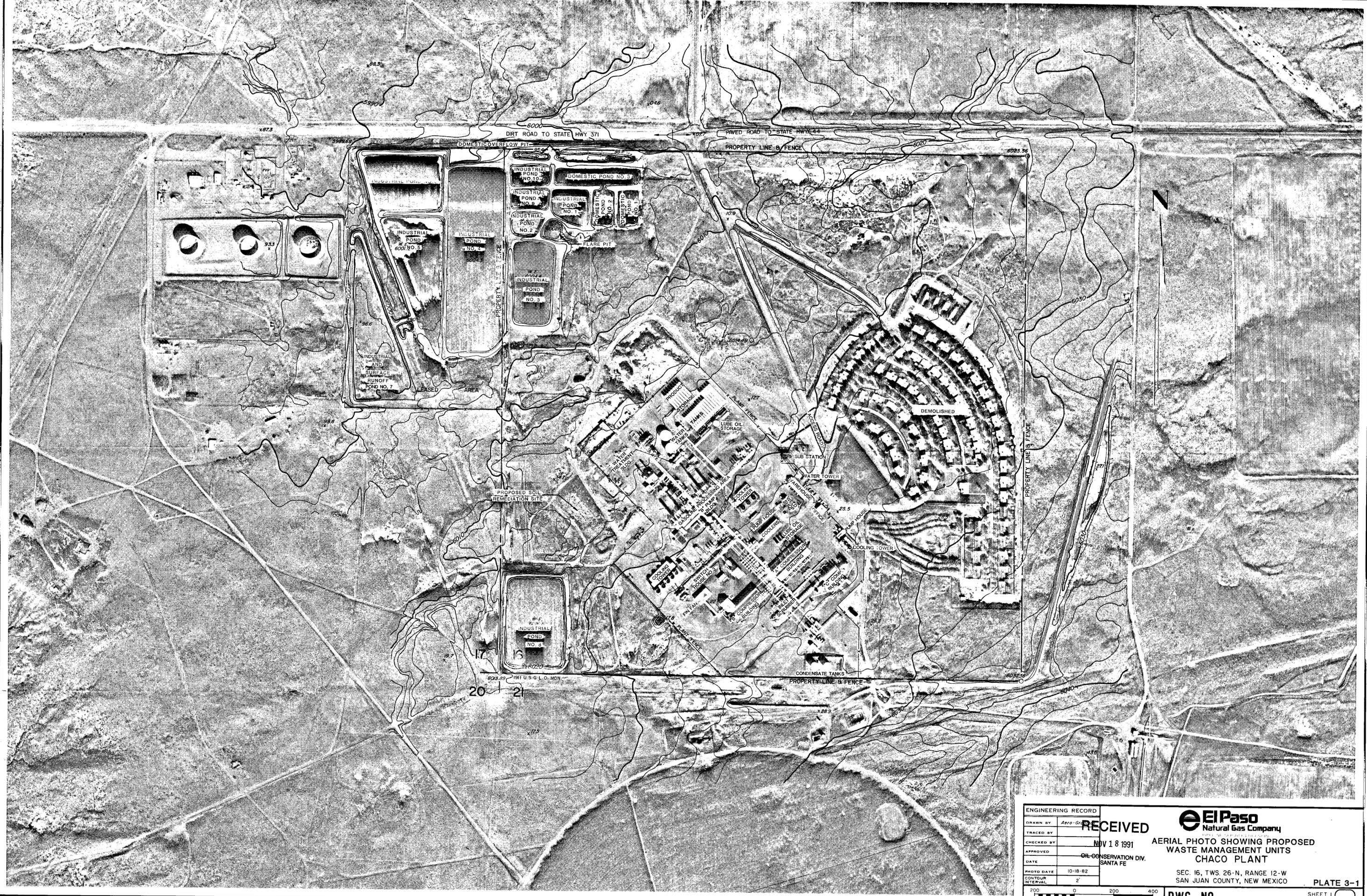
Immediate Notification (pursuant to Rule 116.C(7)) will be provided to NMOCD for all "major" breaks, spills, or leaks as defined by NMOCD Rule 116.C(2), as well as for Leaks and Gas Line Breaks as defined by NMOCD Rule 116.C(4). Subsequent notification, including a complete written report, will be provided to NMOCD within 10 days of the incident, as set forth in NMOCD Rule 116.C(8).

- 4) Maintain records of wastewater characterization for at least five years.

9.0 REFERENCES

9.0 REFERENCES CITED

- Gabin, V. L., and Lesperance, L. L., 1977, New Mexico Climatological Data: Precipitation, Temperature, Evaporation, and Wind-Monthly and Annual Means, 1850-1975: W. K. Summers and Assoc., p. 436.
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- O'Sullivan, R. B. and Beikman, H. M., 1963, Geology, Structure, and Uranium Deposits of the Shiprock Quadrangle, New Mexico and Arizona; U. S. Geological Survey Misc. Geological Investigations Map I-345.
- Stone, W. J., Lyford, F. P., Frenzel, P. F., Mizell, N. H., and Padgett, E. T., 1983, Hydrogeology and Water Resources of San Juan Basin, New Mexico; New Mexico Bureau of Mines and Mineral Resources, Hydrologic Report 6.
- Thorn, C. R., Levings, G. W., Craigg, S. D., Dam, W. L., and Kernodle, J. M., 1990, Hydrogeology of the Ojo Alamo Sandstone in the San Juan Structural Basin, New Mexico, Colorado, Arizona and Utah; U.S. Geological Survey Hydrologic Investigations Atlas 720-B.



Contour Lines Have Been Adjusted To Match Rectified Photo Base

ENGINEERING RECORD		RECEIVED NOV 18 1991 OIL CONSERVATION DIV. SANTA FE		AERIAL PHOTO SHOWING PROPOSED WASTE MANAGEMENT UNITS CHACO PLANT	
DRAWN BY	Aero-Graphic			SEC. 16, TWS. 26-N, RANGE 12-W SAN JUAN COUNTY, NEW MEXICO	
TRACED BY				PLATE 3-1	
CHECKED BY				SHEET 1 OF 1 REV.	
APPROVED BY				DWG. NO.	
DATE					
PHOTO DATE	10-18-82				
CONTOUR INTERVAL	2'				

**DISCHARGE PLAN
FOR
EL PASO NATURAL
GAS COMPANY'S
CHACO PLANT
SAN JUAN COUNTY,
NEW MEXICO**



RECEIVED

NOV 18 1991

OIL CONSERVATION DIV.
SANTA FE

NOVEMBER 1991

VOLUME 2

APPENDIX A
ANALYTICAL LABORATORY REPORTS



ATI I.D. 109594

September 26, 1991

El Paso Natural Gas Company
P.O. Box 4990
Farmington, NM 87499

Project Name/Number: Chaco Plant

Attention: John Lambdin

On 09/06/91, Analytical Technologies, Inc. received a request to analyze aqueous sample(s). The sample(s) 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.

Method 610 analyses were performed by ATI, Fort Collins. Uranium, Radium 226 and Radium 228 analyses were performed by Barringer Laboratories.

If you have any questions or comments, please do not hesitate to contact us at (602) 496-4400.

Mary A. Tyer

Mary Tyer
Project Manager

Robert V. Woods

Robert V. Woods
Laboratory Manager

RVW:clf
Enclosure



CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO PLANT
ATI I.D. : 109594

DATE RECEIVED : 09/06/91
REPORT DATE : 09/25/91

ATI #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
01	N11935	AQUEOUS	09/05/91
02	TRIP BLANK	AQUEOUS	09/05/91

----- TOTALS -----

MATRIX	# SAMPLES
AQUEOUS	2

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from the date of this report. If an extended storage period is required, please contact our sample control department before the scheduled disposal date.



GENERAL CHEMISTRY RESULTS

ATI I.D. : 109594

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO PLANT

DATE RECEIVED : 09/06/91

REPORT DATE : 09/25/91

PARAMETER	UNITS	01
CHLORIDE	MG/L	<0.5
CYANIDE, TOTAL	MG/L	<0.01
FLUORIDE	MG/L	<0.05
NITRATE AS NITROGEN	MG/L	<0.06
PH	UNITS	5.30
PHENOLICS, TOTAL	MG/L	0.47
SULFATE	MG/L	<0.3
TOTAL DISSOLVED SOLIDS	MG/L	<10



Analytical Technologies, Inc.

GENERAL CHEMISTRY - QUALITY CONTROL

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO PLANT

ATI I.D. : 109594

PARAMETER	UNITS	ATI I.D.	SAMPLE RESULT	DUP. RESULT	RPD	SPIKED SAMPLE	SPIKE CONC	% REC
CHLORIDE	MG/L	10960101	260	260	0	510	250	100
CYANIDE, TOTAL	MG/L	10956101	<0.01	<0.01	NA	0.21	0.25	84
FLUORIDE	MG/L	10960101	0.22	0.22	0	0.41	0.20	95
NITRATE AS NITROGEN	MG/L	10960101	34	35	3	132	100	98
PH	UNITS	10958601	7.3	7.3	0	NA	NA	NA
PHENOLICS, TOTAL	MG/L	10964001	0.17	0.17	0	0.42	0.25	100
SULFATE	MG/L	10960101	150	140	7	280	150	87
TOTAL DISSOLVED SOLIDS	MG/L	10965801	18000	18000	0	NA	NA	NA

*Acceptable
Off-
9-30-91*

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

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



METALS RESULTS

ATI I.D. : 109594

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO PLANT

DATE RECEIVED : 09/06/91

REPORT DATE : 09/25/91

PARAMETER	UNITS	01
SILVER	MG/L	<0.010
ARSENIC	MG/L	<0.005
BORON	MG/L	<0.10
BARIUM	MG/L	<0.010
CADMIUM	MG/L	<0.005
CHROMIUM	MG/L	<0.010
COPPER	MG/L	<0.010
IRON	MG/L	25.7
MERCURY	MG/L	<0.0002
MANGANESE	MG/L	0.108
LEAD	MG/L	<0.002
SELENIUM	MG/L	<0.005
URANIUM	MG/L	0.0034
ZINC	MG/L	<0.010



METALS - QUALITY CONTROL

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO PLANT

ATI I.D. : 109594

PARAMETER	UNITS	ATI I.D.	SAMPLE RESULT	DUP. RESULT	RPD	SPIKED SAMPLE	SPIKE CONC	% REC
SILVER	MG/L	10959501	<0.010	<0.010	NA	0.435	0.500	87
ARSENIC	MG/L	10964001	<0.005	<0.005	NA	0.048	0.050	96
BORON	MG/L	10959401	<0.10	<0.10	NA	1.00	1.00	100
BARIUM	MG/L	10957201	0.608	0.604	0.7	1.58	1.00	97
CADMIUM	MG/L	10957201	<0.005	<0.005	NA	0.495	0.500	99
CHROMIUM	MG/L	10957201	<0.010	<0.010	NA	0.990	1.00	99
COPPER	MG/L	10957201	<0.010	<0.010	NA	0.488	0.500	98
IRON	MG/L	10960101	<0.020	<0.020	NA	10.3	10.0	103
MERCURY	MG/L	10960001	<0.0002	<0.0002	NA	0.0050	0.0050	100
MANGANESE	MG/L	10957201	4.02	4.00	0.5	5.06	1.00	104
LEAD	MG/L	10957101	<0.002	<0.002	NA	0.040	0.050	80
SELENIUM	MG/L	10964001	<0.005	<0.005	NA	0.045	0.050	90
URANIUM	MG/L	10999910	0.0045	0.0042	4.5	NA	NA	NA
ZINC	MG/L	10959501	<0.010	<0.010	NA	0.522	0.500	1.04

*Accepted
9-30-9
J.P.*

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

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



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10959401

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: EL PASO NATURAL GAS, NEW MEXICO	DATE SAMPLED	: 09/05/91
PROJECT #	: (NONE)	DATE RECEIVED	: 09/06/91
PROJECT NAME	: CHACO PLANT	DATE EXTRACTED	: N/A
CLIENT I.D.	: N11935	DATE ANALYZED	: 09/09/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 500

COMPOUNDS	RESULTS
BENZENE	4200
BROMODICHLOROMETHANE	<100
BROMOFORM	<100
BROMOMETHANE	<100
CARBON TETRACHLORIDE	<100
CHLOROBENZENE	<250
CHLOROETHANE	<100
CHLOROFORM	<100
CHLOROMETHANE	<100
DIBROMOCHLOROMETHANE	<100
2-CHLOROETHYL VINYL ETHER	<250
1,3-DICHLOROBENZENE	<250
1,2 & 1,4-DICHLOROBENZENE	<250
DICHLORODIFLUOROMETHANE	<100
1,1-DICHLOROETHANE	<100
1,2-DICHLOROETHANE	<100
1,1-DICHLOROETHENE	<100
1,2-DICHLOROETHENE (TOTAL)	<100
1,2-DICHLOROPROPANE	<100
CIS-1,3-DICHLOROPROPENE	<100
TRANS-1,3-DICHLOROPROPENE	<100
ETHYLBENZENE	600
METHYLENE CHLORIDE	<1000
1,1,2,2-TETRACHLOROETHANE	<100
TETRACHLOROETHENE	<100
TOLUENE	3400
1,1,1-TRICHLOROETHANE	<100
1,1,2-TRICHLOROETHANE	<100
TRICHLOROETHENE	<100
TRICHLOROFLUOROMETHANE	<250
VINYL CHLORIDE	<100
TOTAL XYLENES	3700
TRICHLOROTRIFLUOROETHANE	<1000

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	82
BROMOFLUOROBENZENE (%)	83



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10959402

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: EL PASO NATURAL GAS, NEW MEXICO	DATE SAMPLED	: 09/05/91
PROJECT #	: (NONE)	DATE RECEIVED	: 09/06/91
PROJECT NAME	: CHACO PLANT	DATE EXTRACTED	: N/A
CLIENT I.D.	: TRIP BLANK	DATE ANALYZED	: 09/10/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

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COMPOUNDS	RESULTS
-----	-----

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	83
BROMOFLUOROBENZENE (%)	119

Acceptable
JA
9-10-91



GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: EL PASO NATURAL GAS, NEW MEXICO	ATI I.D.	: 109594
PROJECT #	: (NONE)	DATE EXTRACTED	: 09/09/91
PROJECT NAME	: CHACO PLANT	DATE ANALYZED	: 09/09/91
CLIENT I.D.	: REAGENT BLANK	UNITS	: UG/L
		DILUTION FACTOR	: N/A

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	98
BROMOFLUOROBENZENE (%)	81

Acceptable
9-30-91
JL



QUALITY CONTROL DATA

ATI I.D. : 109594

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : EL PASO NATURAL GAS, NEW MEXICO

PROJECT # : (NONE)

DATE ANALYZED : 09/09/91

PROJECT NAME : CHACO PLANT

SAMPLE MATRIX : AQUEOUS

REF I.D. : 10999908

UNITS : UG/L

COMPOUNDS	SAMPLE RESULT	CONC. SPIKED	SPIKED SAMPLE	DUP. % SPIKED		RPD	
				REC. SAMPLE	REC.		
1,1-DICHLOROETHENE	<0.2	20	21	105	21	105	0
TRICHLOROETHENE	<0.2	20	23	115	21	105	9
TETRACHLOROETHENE	<0.2	20	23	115	21	105	9
BENZENE	<0.5	20	20	100	19	95	5
BROMODICHLOROMETHANE	<0.2	20	23	115	21	105	9
CHLOROFORM	<0.2	20	23	115	23	115	0
1,1,1-TRICHLOROETHANE	<0.2	20	21	105	21	105	0
TOLUENE	<0.5	20	20	100	19	95	5
CHLOROBENZENE	<0.2	20	21	105	20	100	5
M-XYLENE	<0.5	20	18	90	17	85	6

*Acceptable
9-90-91
JH*

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

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Spiked Sample Result} - \text{Duplicate Spike Sample Result})}{\text{Average of Spiked Sample}} \times 100$$

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10959401

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT	: EL PASO NATURAL GAS, NEW MEXICO	DATE SAMPLED	: 09/05/91
PROJECT #	: (NONE)	DATE RECEIVED	: 09/06/91
PROJECT NAME	: CHACO PLANT	DATE EXTRACTED	: 09/10/91
CLIENT I.D.	: N11935	DATE ANALYZED	: 09/13/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 25

COMPOUNDS RESULTS

NAPHTHALENE	4700
ACENAPHTHYLENE	<150
ACENAPHTHENE	<250
FLUORENE	160
PHENANTHRENE	440
ANTHRACENE	<5
FLUORANTHENE	<15
PYRENE	<20
BENZO(A)ANTHRACENE	<5
CHRYSENE	<10
BENZO(B)FLUORANTHENE	<5
BENZO(K)FLUORANTHENE	<5
BENZO(A)PYRENE	<5
DIBENZ(a,h)ANTHRACENE	<50
BENZO(g,h,i)PERYLENE	<20
INDENO(1,2,3-CD)PYRENE	<15

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE (%)	NA
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GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT	: EL PASO NATURAL GAS, NEW MEXICO	ATI I.D.	: 109594
PROJECT #	: (NONE)	DATE EXTRACTED	: 09/10/91
PROJECT NAME	: CHACO PLANT	DATE ANALYZED	: 09/13/91
CLIENT I.D.	: REAGENT BLANK	UNITS	: UG/L
		DILUTION FACTOR	: N/A

COMPOUNDS	RESULTS
NAPHTHALENE	<0.30
ACENAPHTHYLENE	<0.30
ACENAPHTHENE	<0.50
FLUORENE	<0.04
PHENANTHRENE	<0.03
ANTHRACENE	<0.01
FLUORANTHENE	<0.03
PYRENE	<0.04
BENZO(A)ANTHRACENE	<0.01
CHRYSENE	<0.02
BENZO(B)FLUORANTHENE	<0.01
BENZO(K)FLUORANTHENE	<0.01
BENZO(A)PYRENE	<0.01
DIBENZ(a,h)ANTHRACENE	<0.10
BENZO(g,h,i)PERYLENE	<0.04
INDENO(1,2,3-CD)PYRENE	<0.03

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE (%) NA

*Accepted
4-30-91
JF*



QUALITY CONTROL DATA

ATI I.D. : 109594

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO PLANT
REF I.D. : 10999909

DATE ANALYZED : 09/13/91
SAMPLE MATRIX : AQUEOUS
UNITS : UG/L

Table with 8 columns: COMPOUNDS, SAMPLE CONC. RESULT, SAMPLE CONCENTRATION, SPIKED SAMPLE, SPIKED % REC., DUP. SPIKED SAMPLE, DUP. % REC., RPD. Rows include ACENAPHTHYLENE and PYRENE.

Acceptable
0.9-90-91

% Recovery = (Spike Sample Result - Sample Result) / Spike Concentration X 100

RPD (Relative % Difference) = (Spiked Sample Result - Duplicate Spike Sample Result) / Average of Spiked Sample X 100



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10959401

TEST : POLYCHLORINATED BIPHENYLS (EPA METHOD 608)

CLIENT	: EL PASO NATURAL GAS, NEW MEXICO	DATE SAMPLED	: 09/05/91
PROJECT #	: (NONE)	DATE RECEIVED	: 09/06/91
PROJECT NAME	: CHACO PLANT	DATE EXTRACTED	: 09/10/91
CLIENT I.D.	: N11935	DATE ANALYZED	: 09/14/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS

RESULTS

AROCLOR 1016	<0.5
AROCLOR 1221	<0.5
AROCLOR 1232	<0.5
AROCLOR 1242	<0.5
AROCLOR 1248	<0.5
AROCLOR 1254	<0.5
AROCLOR 1260	<0.5

SURROGATE PERCENT RECOVERIES

ISODRIN (%)	89
-------------	----



REAGENT BLANK

TEST : POLYCHLORINATED BIPHENYLS (EPA METHOD 608)

CLIENT	: EL PASO NATURAL GAS, NEW MEXICO	ATI I.D.	: 109594
PROJECT #	: (NONE)	DATE EXTRACTED	: 09/10/91
PROJECT NAME	: CHACO PLANT	DATE ANALYZED	: 09/13/91
CLIENT I.D.	: REAGENT BLANK	UNITS	: UG/L
		DILUTION FACTOR	: N/A

COMPOUNDS	RESULTS
AROCLOR 1016	<0.5
AROCLOR 1221	<0.5
AROCLOR 1232	<0.5
AROCLOR 1242	<0.5
AROCLOR 1248	<0.5
AROCLOR 1254	<0.5
AROCLOR 1260	<0.5

SURROGATE PERCENT RECOVERIES

ISODRIN (%) 81

Acceptable
9-30-91
J.



QUALITY CONTROL DATA

ATI I.D. : 109594

TEST : POLYCHLORINATED BIPHENYLS (EPA METHOD 608)

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO PLANT
REF I.D. : 10961701

DATE ANALYZED : 09/14/91
SAMPLE MATRIX : AQUEOUS
UNITS : UG/L

Table with 8 columns: COMPOUNDS, SAMPLE CONC. RESULT, SPIKED SPIKED, % REC., DUP. SPIKED SAMPLE, DUP. % REC., RPD. Row 1: AROCLOR 1260, <0.5, 5.0, 4.7, 94, 5.0, 100, 6

Handwritten note: Accepted 9-30-91

% Recovery = (Spike Sample Result - Sample Result) / Spike Concentration X 100

RPD (Relative % Difference) = (Spiked Sample Result - Duplicate Spike Sample Result) / Average of Spiked Sample X 100



BARRINGER LABORATORIES INC.

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

19-Sep-91

ANALYTICAL TECHNOLOGIES, INC. (Phoenix)
9830 S. 51st St., Ste. B13
Phoenix, AZ 85044

Page: 1
Copy: 1 of 2
Set : 1

Attn: Mary Tyer
Project: 109594-95

PO #:

Received: 9-Sep-91 10:29

Job: 911671E

Status: Final

Sample Type: Water

Sample	Ra-226		Ra-228		U	U
	Total	Error	Total	Error	Total	Total
	pCi/l	2σ	pCi/l	2σ	mg/l	pCi/l(1)
109594-1	0.2	±0.3	0.1	±1.1	0.0034	2.3
109595-1	0.6	±0.4	0.6	±1.2	0.0035	2.4



BARRINGER LABORATORIES INC.

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19-Sep-91

ANALYTICAL TECHNOLOGIES, INC. (Phoenix)
9830 S. 51st St., Ste. B13
Phoenix, AZ 85044

Page: 2
Copy: 1 of 2
Set : 2

Attn: Mary Tyer
Project: 109594-95

PO #:

Received: 9-Sep-91 10:29

Job: 911671E

Status: Final

Abbreviations:

Parameters:

Ra-226 : Radium-226
Ra-228 : Radium-228
U : Uranium

Units:

pCi/l : picoCuries per liter
2σ : Counting error at the 95% confidence level, 2σ
mg/l : milligrams per liter
pCi/l(1) : picoCuries per liter based upon equilibrium cond.

Job approved by:

Signed: *Ellen La Riviere*
.....
Ellen La Riviere
Radiochemistry Laboratory Manager



BARRINGER LABORATORIES INC.

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

19-Sep-91

ANALYTICAL TECHNOLOGIES, INC. (Phoenix)
9830 S. 51st St., Ste. B13
Phoenix, AZ 85044

Page: 1
Copy: 1 of 2
Set : 1

Attn: Mary Tyer
Project: 109594-95

PO #:

Received: 9-Sep-91 10:29

Job: 911671E

Status: Final

QUALITY CONTROL REPORT

Sample Type: Water

Sample Id	Ra-226 Total pCi/l	Error 2σ	Ra-228 Total pCi/l	Error 2σ	U Total mg/l	U Total pCi/l(1)
Duplicate	0.5	±0.4	1.0	±1.5	0.0045	---
Duplicate	0.6	±0.4	0.7	±1.2	0.0042	---
Duplicate % diff.	9.1	---	18	---	4.5	---
Std (found value)	108	±2	27	±2	33	---
Std (true value)	101	---	32	---	34	---
Std % diff.	6.9	---	16	---	2.9	---
Blank	0.1	±0.2	0.0	±0.8	<0.0003	---
Spike % rec.	---	---	---	---	97	---



BARRINGER LABORATORIES INC.

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

19-Sep-91

ANALYTICAL TECHNOLOGIES, INC. (Phoenix)
9830 S. 51st St., Ste. B13
Phoenix, AZ 85044

Page: 2
Copy: 1 of 2
Set : 2

Attn: Mary Tyer
Project: 109594-95

PO #:

Received: 9-Sep-91 10:29

Job: 911671E

Status: Final

QUALITY CONTROL REPORT

Abbreviations:

Parameters:

Ra-226 : Radium-226
Ra-228 : Radium-228
U : Uranium

Units:

pCi/l : picoCuries per liter
2σ : Counting error at the 95% confidence level, 2σ
mg/l : milligrams per liter
pCi/l(1) : picoCuries per liter based upon equilibrium cond.

Job approved by:

Signed:

J. R. Blum
.....

Approved
Quality Assurance Department

Facility Number 1-1-1-1-1 Sample Matrix Water Sample Number 1111913151 Time 11/10/12 24 Hr Clk.
 Sample Location EPNG Chaco Plant Charge Chaco Dish Plant
 Sampling Site Description FFB Glycerol Dehydrator 1/2 inch water strain bike
 Date Of Collection (MMDDYY) 11-10-12 Collection Method: Grab Composite 1 Hrs.
 Sample Collected By Lupe Rangel Phone (505) 599-2144
 Laboratory Conducting Analysis IML

ANALYSIS REQUESTED (Check Appropriate Blocks)

GENERAL CHEMISTRY	METALS	RADIOCHEMISTRY	EPA METHOD SCANS
pH	Arsenic (As)	Combined Ra-226/228	EPA - 601
Chloride (Cl)	Barium (Ba)	Uranium (U)	EPA - 602
Fluoride (F)	Cadmium (Cd)		EPA - 608, PCB'S Only
Nitrate (NO3 as N)	Chromium (Cr)		EPA - 610
Sulfate (SO4)	Lead (Pb)		
Total Dissolved Solids	Mercury (Hg), Total		
Cyanide (CN)	Selenium (Se)		
Phenolics (Method 420)	Silver (Ag)		
	Copper (Cu)		
	Iron (Fe)		
	Manganese (Mn)		
	Zinc (Zn)		
	Boron (B)		

COMMENTS/SPECIAL INSTRUCTIONS

15 bottles

All Invoices and Results to: John Lambdin, c/o EPNG, P.O. Box 4990, Farmington, N.M. 87499

CHAIN OF CUSTODY INFORMATION

RELINQUISHED BY	RELINQUISHED BY	RELINQUISHED BY
<u>[Signature]</u> 1529		
(Signature) (time)	(Signature) (time)	(Signature) (time)
<u>Lupe E. Rangel</u> 090591		
(Print Name) (date)	(Print Name) (date)	(Print Name) (date)
El Paso Natural Gas Co.		
(Company)	(Company)	(Company)
RECEIVED BY	RECEIVED BY	RECEIVED BY
(Signature) (time)	(Signature) (time)	(Signature) (time)
(Print Name) (date)	(Print Name) (date)	(Print Name) (date)
(Company)	(Company)	(Company)



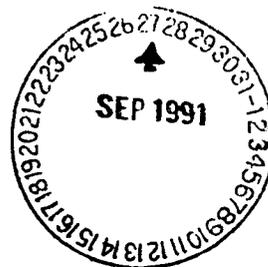
Analytical **Technologies**, Inc.

9830 S. 51st Street Suite B-113 Phoenix, AZ 85044 (602) 496-4400

ATI I.D. 109564

September 26, 1991

El Paso Natural Gas Company
P.O. Box 4990
Farmington, NM 87499



Project Name/Number: Chaco Plant

Attention: John Lambdin

On 09/05/91, Analytical Technologies, Inc. received a request to analyze aqueous sample(s). The sample(s) 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.

Method 610 analyses were performed by ATI, Fort Collins. Uranium, Radium 226 and Radium 228 analyses were performed by Barringer Laboratories.

If you have any questions or comments, please do not hesitate to contact us at (602) 496-4400.

Mary H. Tyer

Mary Tyer
Project Manager

Robert V. Woods

Robert V. Woods
Laboratory Manager

RVW:clf
Enclosure



Analytical Technologies, Inc.

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO PLANT
ATI I.D. : 109564

DATE RECEIVED : 09/05/91
REPORT DATE : 09/23/91

ATI #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
01	N11913	AQUEOUS	09/04/91
02	TRIP BLANK	AQUEOUS	09/04/91

----- TOTALS -----

MATRIX	# SAMPLES
AQUEOUS	2

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from the date of this report. If an extended storage period is required, please contact our sample control department before the scheduled disposal date.



GENERAL CHEMISTRY RESULTS

ATI I.D. : 109564

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO PLANT

DATE RECEIVED : 09/05/91

REPORT DATE : 09/23/91

PARAMETER	UNITS	01
CHLORIDE	MG/L	1.2
CYANIDE, TOTAL	MG/L	<0.01
FLUORIDE	MG/L	0.06
NITRATE AS NITROGEN	MG/L	17
PH	UNITS	12.1
PHENOLICS, TOTAL	MG/L	0.03
SULFATE	MG/L	130
TOTAL DISSOLVED SOLIDS	MG/L	1200



GENERAL CHEMISTRY - QUALITY CONTROL

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO PLANT

ATI I.D. : 109564

Table with 9 columns: PARAMETER, UNITS, ATI I.D., SAMPLE RESULT, DUP. RESULT, RPD, SPIKED SAMPLE, SPIKE CONC, % REC. Rows include Chloride, Cyanide, Fluoride, Nitrate, PH, Phenolics, Sulfate, and Total Dissolved Solids.

Acceptable
JP
9-30-91

% Recovery = (Spike Sample Result - Sample Result) / Spike Concentration X 100

RPD (Relative Percent Difference) = (Sample Result - Duplicate Result) / Average Result X 100



METALS RESULTS

ATI I.D. : 109564

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO PLANT

DATE RECEIVED : 09/05/91

REPORT DATE : 09/23/91

PARAMETER	UNITS	01
SILVER	MG/L	<0.010
ARSENIC	MG/L	<0.005
BORON	MG/L	<0.10
BARIUM	MG/L	<0.010
CADMIUM	MG/L	<0.005
CHROMIUM	MG/L	<0.010
COPPER	MG/L	0.047
IRON	MG/L	0.070
MERCURY	MG/L	<0.0002
MANGANESE	MG/L	<0.010
LEAD	MG/L	0.005
SELENIUM	MG/L	<0.005
URANIUM	MG/L	0.0010
ZINC	MG/L	0.155



METALS - QUALITY CONTROL

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO PLANT

ATI I.D. : 109564

Table with 10 columns: PARAMETER, UNITS, ATI I.D., SAMPLE RESULT, DUP. RESULT, RPD, SPIKED SAMPLE CONC, SPIKE CONC, % REC. Rows include SILVER, ARSENIC, BORON, BARIUM, CADMIUM, CHROMIUM, COPPER, IRON, MERCURY, MANGANESE, LEAD, SELENIUM, URANIUM, ZINC.

Acceptable
9-30-91
D.J.

% Recovery = (Spike Sample Result - Sample Result) / Spike Concentration X 100

RPD (Relative Percent Difference) = (Sample Result - Duplicate Result) / Average Result X 100

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10956401

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: EL PASO NATURAL GAS, NEW MEXICO	DATE SAMPLED	: 09/04/91
PROJECT #	: (NONE)	DATE RECEIVED	: 09/05/91
PROJECT NAME	: CHACO PLANT	DATE EXTRACTED	: N/A
CLIENT I.D.	: N11913	DATE ANALYZED	: 09/09/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
-----------	---------

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	92
BROMOFLUOROBENZENE (%)	85



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10956402

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: EL PASO NATURAL GAS, NEW MEXICO	DATE SAMPLED	: 09/04/91
PROJECT #	: (NONE)	DATE RECEIVED	: 09/05/91
PROJECT NAME	: CHACO PLANT	DATE EXTRACTED	: N/A
CLIENT I.D.	: TRIP BLANK	DATE ANALYZED	: 09/09/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS

RESULTS

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	92
BROMOFLUOROBENZENE (%)	84

*Perfected
9-20-91
JF*



REAGENT BLANK

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: EL PASO NATURAL GAS, NEW MEXICO	ATI I.D.	: 109564
PROJECT #	: (NONE)	DATE EXTRACTED	: 09/06/91
PROJECT NAME	: CHACO PLANT	DATE ANALYZED	: 09/06/91
CLIENT I.D.	: REAGENT BLANK	UNITS	: UG/L
		DILUTION FACTOR	: N/A

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	81
BROMOFLUOROBENZENE (%)	85

*Accepted
6-30-91
J.L.*

QUALITY CONTROL DATA

ATI I.D. : 109564

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : EL PASO NATURAL GAS, NEW MEXICO

PROJECT # : (NONE)

DATE ANALYZED : 09/09/91

PROJECT NAME : CHACO PLANT

SAMPLE MATRIX : AQUEOUS

REF I.D. : 10999906

UNITS : UG/L

COMPOUNDS	SAMPLE RESULT	CONC. SPIKED	SPIKED SAMPLE	DUP. % SPIKED		RPD
				REC. SAMPLE	REC.	
1,1-DICHLOROETHENE	<0.2	20	21	105	23	9
TRICHLOROETHENE	<0.2	20	18	90	19	5
TETRACHLOROETHENE	<0.2	20	24	120	24	0
BENZENE	<0.5	20	18	90	17	6
BROMODICHLOROMETHANE	<0.2	20	19	95	20	5
CHLOROFORM	<0.2	20	23	115	24	4
1,1,1-TRICHLOROETHANE	<0.2	20	20	100	21	5
TOLUENE	<0.5	20	20	100	20	0
CHLOROBENZENE	<0.2	20	21	105	22	5
M-XYLENE	<0.5	20	18	90	18	0

Acceptable
9-30-91

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

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Spiked Sample Result} - \text{Duplicate Spike Sample Result})}{\text{Average of Spiked Sample}} \times 100$$



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10956401

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT	: EL PASO NATURAL GAS, NEW MEXICO	DATE SAMPLED	: 09/04/91
PROJECT #	: (NONE)	DATE RECEIVED	: 09/05/91
PROJECT NAME	: CHACO PLANT	DATE EXTRACTED	: 09/06/91
CLIENT I.D.	: N11913	DATE ANALYZED	: 09/16/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS

RESULTS

NAPHTHALENE	0.95
ACENAPHTHYLENE	<0.30
ACENAPHTHENE	<0.50
FLUORENE	0.44
PHENANTHRENE	0.27
ANTHRACENE	0.01
FLUORANTHENE	<0.03
PYRENE	<0.04
BENZO(A)ANTHRACENE	<0.01
CHRYSENE	<0.02
BENZO(B)FLUORANTHENE	<0.01
BENZO(K)FLUORANTHENE	<0.01
BENZO(A)PYRENE	<0.01
DIBENZ(a,h)ANTHRACENE	<0.10
BENZO(g,h,i)PERYLENE	<0.04
INDENO(1,2,3-CD)PYRENE	<0.03

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE (%)	NA
------------------------	----



GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO PLANT
CLIENT I.D. : REAGENT BLANK

ATI I.D. : 109564
DATE EXTRACTED : 09/06/91
DATE ANALYZED : 09/13/91
UNITS : UG/L
DILUTION FACTOR : N/A

Table with 2 columns: COMPOUNDS and RESULTS. Lists various polynuclear aromatic hydrocarbons and their concentrations, all below 0.30.

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE (%) NA

Acceptable
J.F.
9-30-91



QUALITY CONTROL DATA

ATI I.D. : 109564

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO PLANT
REF I.D. : 10999910

DATE ANALYZED : 09/13/91
SAMPLE MATRIX : AQUEOUS
UNITS : UG/L

Table with 8 columns: COMPOUNDS, SAMPLE CONC. RESULT, SPIKED SPIKED, % SPIKED REC., DUP. SAMPLE, DUP. REC., RPD. Rows include ACENAPHTHYLENE and PYRENE.

Acceptable
J.P.
9-10-91

% Recovery = (Spike Sample Result - Sample Result) / Spike Concentration X 100

RPD (Relative % Difference) = (Spiked Sample Result - Duplicate Spike Sample Result) / Average of Spiked Sample X 100



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10956401

TEST : POLYCHLORINATED BIPHENYLS (EPA METHOD 608)

CLIENT	: EL PASO NATURAL GAS, NEW MEXICO	DATE SAMPLED	: 09/04/91
PROJECT #	: (NONE)	DATE RECEIVED	: 09/05/91
PROJECT NAME	: CHACO PLANT	DATE EXTRACTED	: 09/06/91
CLIENT I.D.	: N11913	DATE ANALYZED	: 09/11/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 5

COMPOUNDS

RESULTS

AROCLOR 1016	<2.5
AROCLOR 1221	<2.5
AROCLOR 1232	<2.5
AROCLOR 1242	<2.5
AROCLOR 1248	<2.5
AROCLOR 1254	<2.5
AROCLOR 1260	<2.5

SURROGATE PERCENT RECOVERIES

ISODRIN (%)	69
-------------	----



GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : POLYCHLORINATED BIPHENYLS (EPA METHOD 608)

CLIENT	: EL PASO NATURAL GAS, NEW MEXICO	ATI I.D.	: 109564
PROJECT #	: (NONE)	DATE EXTRACTED	: 09/06/91
PROJECT NAME	: CHACO PLANT	DATE ANALYZED	: 09/11/91
CLIENT I.D.	: REAGENT BLANK	UNITS	: UG/L
		DILUTION FACTOR	: N/A

COMPOUNDS	RESULTS
AROCLOR 1016	<0.5
AROCLOR 1221	<0.5
AROCLOR 1232	<0.5
AROCLOR 1242	<0.5
AROCLOR 1248	<0.5
AROCLOR 1254	<0.5
AROCLOR 1260	<0.5

SURROGATE PERCENT RECOVERIES

ISODRIN (%) 84

Acceptable
J.F.
9-30-91

QUALITY CONTROL DATA

TEST : POLYCHLORINATED BIPHENYLS (EPA METHOD 608) ATI I.D. : 109564

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
 PROJECT # : (NONE) DATE ANALYZED : 09/11/91
 PROJECT NAME : CHACO PLANT SAMPLE MATRIX : AQUEOUS
 REF I.D. : 10999907 UNITS : UG/L

COMPOUNDS	SAMPLE CONC. RESULT	SAMPLE SPIKED	CONC. SPIKED	SAMPLE REC.	% SPIKED	DUP. SAMPLE REC.	DUP. % REC.	RPD
AROCLOR 1260	<0.5	5.0	4.7	94	4.9	98		4

*Acceptable
9-30-91
JL*

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

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Spiked Sample Result} - \text{Duplicate Spike Sample Result})}{\text{Average of Spiked Sample}} \times 100$$



BARRINGER LABORATORIES INC.

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

19-Sep-91

ANALYTICAL TECHNOLOGIES, INC. (Phoenix)
9830 S. 51st St., Ste. B13
Phoenix, AZ 85044

Page: 1
Copy: 1 of 2
Set : 1

Attn: Mary Tyer
Project: 109560-565

PO #:

Received: 6-Sep-91 17:22

Job: 911651E

Status: Final

Sample Type: Water

Sample	Ra-226		Ra-228		U	U
	Total	Error	Total	Error	Total	Total
	pCi/l	2σ	pCi/l	2σ	mg/l	pCi/l(1)
109560-1	1.1	±0.8	0.4	±1.2	0.0041	2.8
109561-1	0.9	±0.7	0.2	±1.1	0.0281	19
109562-1	1.8	±1.0	0.0	±1.1	0.0031	2.1
109564-1	1.1	±0.7	0.1	±1.2	0.0010	0.7
109565-1	2.0	±1.2	0.5	±1.2	0.0069	4.7



19-Sep-91

ANALYTICAL TECHNOLOGIES, INC. (Phoenix)
9830 S. 51st St., Ste. B13
Phoenix, AZ 85044

Page: 2
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Attn: Mary Tyer
Project: 109560-565

Received: 6-Sep-91 17:22
PO #:

Job: 911651E Status: Final

Abbreviations:

Parameters:

Ra-226 : Radium-226
Ra-228 : Radium-228
U : Uranium

Units:

pCi/l : picoCuries per liter
2σ : Counting error at the 95% confidence level, 2σ
mg/l : milligrams per liter
pCi/l(1) : picoCuries per liter based upon equilibrium cond.

Job approved by:

Signed: *Ellen La Riviere*
.....
Ellen La Riviere
Radiochemistry Laboratory Manager

19-Sep-91

ANALYTICAL TECHNOLOGIES, INC. (Phoenix)
 9830 S. 51st St., Ste. B13
 Phoenix, AZ 85044

Page: 1
 Copy: 1 of 2
 Set: 1

Attn: Mary Tyer
 Project: 109560-565

Received: 6-Sep-91 17:22

PO #:

Job: 911651E

Status: Final

QUALITY CONTROL REPORT

Sample Type: Water

Sample Id	Ra-226		Ra-228		U	U
	Total	Error	Total	Error	Total	Total
	pCi/l	2σ	pCi/l	2σ	mg/l	pCi/l(1)
Duplicate	2.8	±1.4	1.0	±1.5	0.0045	---
Duplicate	1.1	±1.0	0.7	±1.2	0.0042	---
Duplicate % diff.	44	---	18	---	4.5	---
Std (found value)	91	±2	27	±2	33	---
Std (true value)	101	---	32	---	34	---
Std % diff.	9.9	---	16	---	2.9	---
Blank	0.0	±0.1	0.0	±0.8	<0.0003	---
Spike % rec.	---	---	---	---	97	---

Acceptable
PT
9-30-91



BARRINGER LABORATORIES INC.

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

19-Sep-91

ANALYTICAL TECHNOLOGIES, INC. (Phoenix)
9830 S. 51st St., Ste. B13
Phoenix, AZ 85044

Page: 2
Copy: 1 of 2
Set : 2

Attn: Mary Tyer
Project: 109560-565

PO #:

Received: 6-Sep-91 17:22

Job: 911651E

Status: Final

QUALITY CONTROL REPORT

Abbreviations:

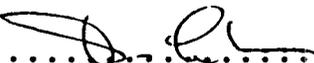
Parameters:

Ra-226 : Radium-226
Ra-228 : Radium-228
U : Uranium

Units:

pCi/l : picoCuries per liter
2σ : Counting error at the 95% confidence level, 2σ
mg/l : milligrams per liter
pCi/l(1) : picoCuries per liter based upon equilibrium cond.

Job approved by:

Signed: 
.....
Approved
Quality Assurance Department



BARRINGER LABORATORIES INC.

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

19-Sep-91

ANALYTICAL TECHNOLOGIES, INC. (Phoenix)
9830 S. 51st St., Ste. B13
Phoenix, AZ 85044

Page: 3
Copy: 2 of 2

Attn: Mary Tyer
Project: 109560-565

Received: 6-Sep-91 17:22
PO #:

Job: 911651E

Status: Final

QUALITY CONTROL REPORT

QUALITY CONTROL DATA SHEET

Received by: gm

Via: Fed.Ex.

Sample Container Type: 1L pl btl
Sample Type: Water
Preservative When Received: HNO3
Additional Lab Preparation: None

Parameter	Method	LLD	Preservative	Analyst	Date(s) of Analysis
Ra-226	SM-705	0.2 pCi/l	HNO3	Seidel	9/13- 9/17
Ra-228	---	0.9 pCi/l	HNO3	Howard	9/13
U	ASTMD2907	0.0003 mg/l	HNO3	Meyer	9/16- 9/17

Signed:


.....
Mark Burkhardt, Ph.D.
Laboratory Director

*Acceptable
J.A.
9-30-91*



Analytical **Technologies**, Inc.

9830 S. 51st Street Suite B-113 Phoenix, AZ 85044 (602) 496-4400

ATI I.D. 109560

September 26, 1991

El Paso Natural Gas Company
P.O. Box 4990
Farmington, NM 87499



Project Name/Number: Chaco Plant

Attention: John Lambdin

On 09/05/91, Analytical Technologies, Inc. received a request to analyze aqueous sample(s). The sample(s) 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.

Method 610 analyses were performed by ATI, Fort Collins. Uranium, Radium 226 and Radium 228 analyses were performed by Barringer Laboratories.

Due to matrix interference, Phenolics analysis was run at a dilution. Detection limits were raised accordingly.

If you have any questions or comments, please do not hesitate to contact us at (602) 496-4400.

Mary S. Tyer
Mary Tyer
Project Manager

Robert V. Woods
Robert V. Woods
Laboratory Manager

Lorraine Davis
Lorraine Davis
QA Coordinator

RVW:clf
Enclosure



Analytical Technologies, Inc.

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO PLANT
ATI I.D. : 109560

DATE RECEIVED : 09/05/91
REPORT DATE : 09/23/91

ATI #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
01	N11914	AQUEOUS	09/04/91
02	TRIP BLANK	AQUEOUS	09/04/91

----- TOTALS -----

MATRIX	# SAMPLES
AQUEOUS	2

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from the date of this report. If an extended storage period is required, please contact our sample control department before the scheduled disposal date.



GENERAL CHEMISTRY RESULTS

ATI I.D. : 109560

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO PLANT

DATE RECEIVED : 09/05/91

REPORT DATE : 09/23/91

PARAMETER	UNITS	01
CHLORIDE	MG/L	160
CYANIDE, TOTAL	MG/L	<0.01
FLUORIDE	MG/L	0.64
NITRATE AS NITROGEN	MG/L	0.06
PH	UNITS	6.5
PHENOLICS, TOTAL	MG/L	<0.04
SULFATE	MG/L	32
TOTAL DISSOLVED SOLIDS	MG/L	890



GENERAL CHEMISTRY - QUALITY CONTROL

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO PLANT

ATI I.D. : 109560

Table with 9 columns: PARAMETER, UNITS, ATI I.D., SAMPLE RESULT, DUP. RESULT, RPD, SPIKED SAMPLE, SPIKE CONC, % REC. Rows include Chloride, Cyanide, Fluoride, Nitrate, PH, Phenolics, Sulfate, and Total Dissolved Solids.

Acceptable
JF
9-30-91

% Recovery = (Spike Sample Result - Sample Result) / Spike Concentration X 100

RPD (Relative Percent Difference) = (Sample Result - Duplicate Result) / Average Result X 100



METALS RESULTS

ATI I.D. : 109560

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO PLANT

DATE RECEIVED : 09/05/91

REPORT DATE : 09/23/91

PARAMETER	UNITS	01
SILVER	MG/L	<0.010
ARSENIC	MG/L	<0.005
BORON	MG/L	0.16
BARIUM	MG/L	0.202
CADMIUM	MG/L	<0.005
CHROMIUM	MG/L	0.011
COPPER	MG/L	0.021
IRON	MG/L	0.878
MERCURY	MG/L	0.0007
MANGANESE	MG/L	0.119
LEAD	MG/L	0.003
SELENIUM	MG/L	<0.005
URANIUM	MG/L	0.0041
ZINC	MG/L	0.032



METALS - QUALITY CONTROL

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO PLANT

ATI I.D. : 109560

PARAMETER	UNITS	ATI I.D.	SAMPLE RESULT	DUP. RESULT	RPD	SPIKED SAMPLE	SPIKE CONC	% REC
SILVER	MG/L	10956201	<0.010	<0.010	NA	0.468	0.500	94
ARSENIC	MG/L	10956401	<0.005	<0.005	NA	0.051	0.050	102
BORON	MG/L	10953101	0.12	0.12	0	1.14	1.00	102
BARIUM	MG/L	10956201	0.069	0.069	0	1.09	1.00	102
CADMIUM	MG/L	10956201	<0.005	<0.005	NA	0.514	0.500	103
CHROMIUM	MG/L	10956201	<0.010	<0.010	NA	1.05	1.00	105
COPPER	MG/L	10956201	<0.010	<0.010	NA	0.504	0.500	101
IRON	MG/L	10956201	0.030	0.030	0	1.04	1.00	101
MERCURY	MG/L	10970302	0.0002	0.0002	0	0.0050	0.0050	96
MANGANESE	MG/L	10956201	<0.010	<0.010	NA	1.04	1.00	104
LEAD	MG/L	10956501	<0.002	<0.002	NA	0.045	0.050	90
SELENIUM	MG/L	10956401	<0.005	<0.005	NA	0.050	0.050	100
URANIUM	MG/L	10999909	0.0045	0.0042	4.5	NA	NA	NA
ZINC	MG/L	10956201	<0.010	<0.010	NA	0.507	0.500	101

*Acceptable
JL
9-30-91*

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

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



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10956001

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: EL PASO NATURAL GAS, NEW MEXICO	DATE SAMPLED	: 09/04/91
PROJECT #	: (NONE)	DATE RECEIVED	: 09/05/91
PROJECT NAME	: CHACO PLANT	DATE EXTRACTED	: N/A
CLIENT I.D.	: N11914	DATE ANALYZED	: 09/09/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 10

COMPOUNDS	RESULTS
BENZENE	13
BROMODICHLOROMETHANE	<2.0
BROMOFORM	<2.0
BROMOMETHANE	<2.0
CARBON TETRACHLORIDE	<2.0
CHLOROBENZENE	<5.0
CHLOROETHANE	<2.0
CHLOROFORM	2
CHLOROMETHANE	<2.0
DIBROMOCHLOROMETHANE	<2.0
2-CHLOROETHYL VINYL ETHER	<5.0
1,3-DICHLOROBENZENE	<5.0
1,2 & 1,4-DICHLOROBENZENE	<5.0
DICHLORODIFLUOROMETHANE	<2.0
1,1-DICHLOROETHANE	<2.0
1,2-DICHLOROETHANE	<2.0
1,1-DICHLOROETHENE	<2.0
1,2-DICHLOROETHENE (TOTAL)	<2.0
1,2-DICHLOROPROPANE	<2.0
CIS-1,3-DICHLOROPROPENE	<2.0
TRANS-1,3-DICHLOROPROPENE	<2.0
ETHYLBENZENE	<5.0
METHYLENE CHLORIDE	<20.0
1,1,2,2-TETRACHLOROETHANE	<2.0
TETRACHLOROETHENE	<2.0
TOLUENE	<5.0
1,1,1-TRICHLOROETHANE	<2.0
1,1,2-TRICHLOROETHANE	<2.0
TRICHLOROETHENE	<2.0
TRICHLOROFLUOROMETHANE	<5.0
VINYL CHLORIDE	<2.0
TOTAL XYLENES	<5.0
TRICHLOROTRIFLUOROETHANE	<20.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	97
BROMOFLUOROBENZENE (%)	107

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10956002

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: EL PASO NATURAL GAS, NEW MEXICO	DATE SAMPLED	: 09/04/91
PROJECT #	: (NONE)	DATE RECEIVED	: 09/05/91
PROJECT NAME	: CHACO PLANT	DATE EXTRACTED	: N/A
CLIENT I.D.	: TRIP BLANK	DATE ANALYZED	: 09/06/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

-----	-----
COMPOUNDS	RESULTS
-----	-----

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	105
BROMOFLUOROBENZENE (%)	95

Accepted
J-9
 9-30-91



GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: EL PASO NATURAL GAS, NEW MEXICO	ATI I.D.	: 109560
PROJECT #	: (NONE)	DATE EXTRACTED	: 09/09/91
PROJECT NAME	: CHACO PLANT	DATE ANALYZED	: 09/09/91
CLIENT I.D.	: REAGENT BLANK	UNITS	: UG/L
		DILUTION FACTOR	: N/A

COMPOUNDS	RESULTS
-----------	---------

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	98
BROMOFLUOROBENZENE (%)	81

Accepted
9-90-91
[Signature]



QUALITY CONTROL DATA

ATI I.D. : 109560

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : EL PASO NATURAL GAS, NEW MEXICO

PROJECT # : (NONE)

DATE ANALYZED : 09/09/91

PROJECT NAME : CHACO PLANT

SAMPLE MATRIX : AQUEOUS

REF I.D. : 10999904

UNITS : UG/L

COMPOUNDS	SAMPLE RESULT	CONC. SPIKED	SPIKED SAMPLE	% REC.	DUP. SPIKED SAMPLE	DUP. % REC.	RPD
1,1-DICHLOROETHENE	<0.2	20	21	105	21	105	0
TRICHLOROETHENE	<0.2	20	23	115	21	105	9
TETRACHLOROETHENE	<0.2	20	23	115	21	105	9
BENZENE	<0.5	20	20	100	19	95	5
BROMODICHLOROMETHANE	<0.2	20	23	115	21	105	9
CHLOROFORM	<0.2	20	23	115	23	115	0
1,1,1-TRICHLOROETHANE	<0.2	20	21	105	21	105	0
TOLUENE	<0.5	20	20	100	19	95	5
CHLOROBENZENE	<0.2	20	21	105	20	100	5
M-XYLENE	<0.5	20	18	90	17	85	6

Acceptable
J.L.
9-30-91

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

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Spiked Sample Result} - \text{Duplicate Spike Sample Result})}{\text{Average of Spiked Sample}} \times 100$$



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10956001

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT	: EL PASO NATURAL GAS, NEW MEXICO	DATE SAMPLED	: 09/04/91
PROJECT #	: (NONE)	DATE RECEIVED	: 09/05/91
PROJECT NAME	: CHACO PLANT	DATE EXTRACTED	: 09/06/91
CLIENT I.D.	: N11914	DATE ANALYZED	: 09/16/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 5

COMPOUNDS	RESULTS
NAPHTHALENE	<15
ACENAPHTHYLENE	<15
ACENAPHTHENE	<25
FLUORENE	14
PHENANTHRENE	18
ANTHRACENE	<0.5
FLUORANTHENE	<1.5
PYRENE	12
BENZO(A)ANTHRACENE	2.0
CHRYSENE	<1
BENZO(B)FLUORANTHENE	<0.5
BENZO(K)FLUORANTHENE	<0.5
BENZO(A)PYRENE	<0.5
DIBENZ(a,h)ANTHRACENE	<5
BENZO(g,h,i)PERYLENE	<2
INDENO(1,2,3-CD)PYRENE	<1.5

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE (%)	NA
------------------------	----



GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT	: EL PASO NATURAL GAS, NEW MEXICO	ATI I.D.	: 109560
PROJECT #	: (NONE)	DATE EXTRACTED	: 09/06/91
PROJECT NAME	: CHACO PLANT	DATE ANALYZED	: 09/13/91
CLIENT I.D.	: REAGENT BLANK	UNITS	: UG/L
		DILUTION FACTOR	: N/A

COMPOUNDS	RESULTS
NAPHTHALENE	<0.30
ACENAPHTHYLENE	<0.30
ACENAPHTHENE	<0.50
FLUORENE	<0.04
PHENANTHRENE	<0.03
ANTHRACENE	<0.01
FLUORANTHENE	<0.03
PYRENE	<0.04
BENZO(A)ANTHRACENE	<0.01
CHRYSENE	<0.02
BENZO(B)FLUORANTHENE	<0.01
BENZO(K)FLUORANTHENE	<0.01
BENZO(A)PYRENE	<0.01
DIBENZ(a,h)ANTHRACENE	<0.10
BENZO(g,h,i)PERYLENE	<0.04
INDENO(1,2,3-CD)PYRENE	<0.03

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE (%) NA

*Accepted
JS
9-30-91*

QUALITY CONTROL DATA

ATI I.D. : 109560

TEST : POLYNUCLEAR AROMATICS (EPA 610)

 CLIENT : EL PASO NATURAL GAS, NEW MEXICO
 PROJECT # : (NONE)
 PROJECT NAME : CHACO PLANT
 REF I.D. : 10999910

 DATE ANALYZED : 09/13/91
 SAMPLE MATRIX : AQUEOUS
 UNITS : UG/L

COMPOUNDS	SAMPLE CONC.		SPIKED SAMPLE	% SPIKED REC.	DUP.	DUP.	RPD
	RESULT	SPIKED			SAMPLE REC.	% SPIKED REC.	
ACENAPHTHYLENE	<0.30	300	180	60	157	52	14
PYRENE	<0.04	40	25.0	62	22.7	57	10

low recovery
*Acceptable
 9-13-91*

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

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Spiked Sample Result} - \text{Duplicate Spike Sample Result})}{\text{Average of Spiked Sample}} \times 100$$



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10956001

TEST : POLYCHLORINATED BIPHENYLS (EPA METHOD 608)

CLIENT	: EL PASO NATURAL GAS, NEW MEXICO	DATE SAMPLED	: 09/04/91
PROJECT #	: (NONE)	DATE RECEIVED	: 09/05/91
PROJECT NAME	: CHACO PLANT	DATE EXTRACTED	: 09/06/91
CLIENT I.D.	: N11914	DATE ANALYZED	: 09/11/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 100

COMPOUNDS	RESULTS
AROCLOR 1016	<50
AROCLOR 1221	<50
AROCLOR 1232	<50
AROCLOR 1242	<50
AROCLOR 1248	<50
AROCLOR 1254	<50
AROCLOR 1260	<50

SURROGATE PERCENT RECOVERIES

ISODRIN (%)	**
-------------	----

** Due to the necessary dilution of the sample, result was not attainable



GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : POLYCHLORINATED BIPHENYLS (EPA METHOD 608)

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO PLANT
CLIENT I.D. : REAGENT BLANK

ATI I.D. : 109560
DATE EXTRACTED : 09/06/91
DATE ANALYZED : 09/11/91
UNITS : UG/L
DILUTION FACTOR : N/A

Table with 2 columns: COMPOUNDS and RESULTS. Lists AROCLOR 1016 through 1260 with results <0.5.

SURROGATE PERCENT RECOVERIES

ISODRIN (%) 84

Handwritten signature and date: Acy... 9-30-91

QUALITY CONTROL DATA

TEST : POLYCHLORINATED BIPHENYLS (EPA METHOD 608) ATI I.D. : 109560
 CLIENT : EL PASO NATURAL GAS, NEW MEXICO
 PROJECT # : (NONE) DATE ANALYZED : 09/11/91
 PROJECT NAME : CHACO PLANT SAMPLE MATRIX : AQUEOUS
 REF I.D. : 10999907 UNITS : UG/L

COMPOUNDS	SAMPLE CONC.		SPIKED %	DUP. SPIKED %		RPD
	RESULT	SPIKED		SAMPLE REC.	SAMPLE REC.	
AROCLOR 1260	<0.5	5.0	4.7	94	4.9	98

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 Aug 11/91
 9-30-91

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

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Spiked Sample Result} - \text{Duplicate Spike Sample Result})}{\text{Average of Spiked Sample}} \times 100$$

19-Sep-91

ANALYTICAL TECHNOLOGIES, INC. (Phoenix)
 9830 S. 51st St., Ste. B13
 Phoenix, AZ 85044

Page: 1
 Copy: 1 of 2
 Set : 1

Attn: Mary Tyer
 Project: 109560-565

PO #:

Received: 6-Sep-91 17:22

Job: 911651E

Status: Final

Sample Type: Water

Sample	Ra-226	Error	Ra-228	Error	U	U
	Total	2 σ	Total	2 σ	Total	Total
	pCi/l		pCi/l		mg/l	pCi/l(1)
109560-1	1.1	± 0.8	0.4	± 1.2	0.0041	2.8
109561-1	0.9	± 0.7	0.2	± 1.1	0.0281	19
109562-1	1.8	± 1.0	0.0	± 1.1	0.0031	2.1
109564-1	1.1	± 0.7	0.1	± 1.2	0.0010	0.7
109565-1	2.0	± 1.2	0.5	± 1.2	0.0069	4.7

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

19-Sep-91

ANALYTICAL TECHNOLOGIES, INC. (Phoenix)
9830 S. 51st St., Ste. B13
Phoenix, AZ 85044

Page: 2
Copy: 1 of 2
Set : 2

Attn: Mary Tyer
Project: 109560-565

PO #:

Received: 6-Sep-91 17:22

Job: 911651E

Status: Final

Abbreviations:

Parameters:

Ra-226 : Radium-226
Ra-228 : Radium-228
U : Uranium

Units:

pCi/l : picoCuries per liter
2 σ : Counting error at the 95% confidence level, 2 σ
mg/l : milligrams per liter
pCi/l(1) : picoCuries per liter based upon equilibrium cond.

Job approved by:

Signed:

Ellen La Riviere
.....
Ellen La Riviere
Radiochemistry Laboratory Manager

19-Sep-91

ANALYTICAL TECHNOLOGIES, INC. (Phoenix)
 9830 S. 51st St., Ste. B13
 Phoenix, AZ 85044

Page: 1
 Copy: 1 of 2
 Set: 1

Attn: Mary Tyer
 Project: 109560-565

PO #:

Received: 6-Sep-91 17:22

Job: 911651E

Status: Final

QUALITY CONTROL REPORT

Sample Type: Water

Sample Id	Ra-226 Error		Ra-228 Error		U	U
	Total	2σ	Total	2σ	Total	Total
	pCi/l		pCi/l		mg/l	pCi/l(1)
Duplicate	2.8	±1.4	1.0	±1.5	0.0045	---
Duplicate	1.1	±1.0	0.7	±1.2	0.0042	---
Duplicate % diff.	44	---	18	---	4.5	---
Std (found value)	91	±2	27	±2	33	---
Std (true value)	101	---	32	---	34	---
Std % diff.	9.9	---	16	---	2.9	---
Blank	0.0	±0.1	0.0	±0.8	<0.0003	---
Spike % rec.	---	---	---	---	97	---

Handwritten:
 Acc. Check
 J.P.
 9-30-91

19-Sep-91

ANALYTICAL TECHNOLOGIES, INC. (Phoenix)
9830 S. 51st St., Ste. B13
Phoenix, AZ 85044

Page: 2
Copy: 1 of 2
Set : 2

Attn: Mary Tyer
Project: 109560-565

PO #:

Received: 6-Sep-91 17:22

Job: 911651E

Status: Final

QUALITY CONTROL REPORT

Abbreviations:

Parameters:

Ra-226 : Radium-226
Ra-228 : Radium-228
U : Uranium

Units:

pCi/l : picoCuries per liter
2 σ : Counting error at the 95% confidence level, 2 σ
mg/l : milligrams per liter
pCi/l(1) : picoCuries per liter based upon equilibrium cond.

Job approved by:

Signed: 
.....
Approved
Quality Assurance Department



BARRINGER LABORATORIES INC.

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

19-Sep-91

ANALYTICAL TECHNOLOGIES, INC. (Phoenix)
9830 S. 51st St., Ste. B13
Phoenix, AZ 85044

Page: 3
Copy: 2 of 2

Attn: Mary Tyer
Project: 109560-565

Received: 6-Sep-91 17:22

PO #:

Job: 911651E

Status: Final

QUALITY CONTROL REPORT

QUALITY CONTROL DATA SHEET

Received by: gm

Via: Fed.Ex.

Sample Container Type: 1L pl btl
Sample Type: Water
Preservative When Received: HNO3
Additional Lab Preparation: None

Parameter	Method	LLD	Preservative	Analyst	Date(s) of Analysis
Ra-226	SM-705	0.2 pCi/l	HNO3	Seidel	9/13- 9/17
Ra-228	---	0.9 pCi/l	HNO3	Howard	9/13
U	ASTMD2907	0.0003 mg/l	HNO3	Meyer	9/16- 9/17

Signed:

.....
Mark Burkhardt, Ph.D.
Laboratory Director

*Acceptable
J.P.
9-30-91*



Analytical **Technologies, Inc.**

9830 S. 51st Street Suite B-113 Phoenix, AZ 85044 (602) 496-4400

ATI I.D. 109561

September 26, 1991

El Paso Natural Gas Company
P.O. Box 4990
Farmington, NM 87499



Project Name/Number: Chaco Plant

Attention: John Lambdin

On 09/05/91, Analytical Technologies, Inc. received a request to analyze aqueous sample(s). The sample(s) 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.

Method 610 analyses were performed by ATI, Fort Collins. Uranium, Radium 226 and Radium 228 analyses were performed by Barringer Laboratories.

Due to matrix interference, Phenolics analysis was run at a dilution. Detection limits were raised accordingly.

If you have any questions or comments, please do not hesitate to contact us at (602) 496-4400.

Mary H. Tyer

Mary Tyer
Project Manager

Robert V. Woods

Robert V. Woods
Laboratory Manager

RVW:clf
Enclosure



CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO PLANT
ATI I.D. : 109561

DATE RECEIVED : 09/05/91
REPORT DATE : 09/25/91

ATI #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
01	N11915	AQUEOUS	09/04/91
02	TRIP BLANK	AQUEOUS	09/04/91

----- TOTALS -----

MATRIX	# SAMPLES
AQUEOUS	2

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from the date of this report. If an extended storage period is required, please contact our sample control department before the scheduled disposal date.



GENERAL CHEMISTRY RESULTS

ATI I.D. : 109561

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO PLANT

DATE RECEIVED : 09/05/91

REPORT DATE : 09/25/91

PARAMETER	UNITS	01
CHLORIDE	MG/L	580
CYANIDE, TOTAL	MG/L	<0.01
FLUORIDE	MG/L	1.10
NITRATE AS NITROGEN	MG/L	<0.06
PH	UNITS	8.8
PHENOLICS, TOTAL	MG/L	<0.04
SULFATE	MG/L	270
TOTAL DISSOLVED SOLIDS	MG/L	1800



GENERAL CHEMISTRY - QUALITY CONTROL

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO PLANT

ATI I.D. : 109561

PARAMETER	UNITS	ATI I.D.	SAMPLE RESULT	DUP. RESULT	RPD	SPIKED SAMPLE	SPIKE CONC	% REC
CHLORIDE	MG/L	10957201	300	300	0	560	250	104
CYANIDE, TOTAL	MG/L	10956101	<0.01	<0.01	NA	0.21	0.25	84
FLUORIDE	MG/L	10956101	1.10	1.10	0	2.03	1.00	93
NITRATE AS NITROGEN	MG/L	10957906	1.40	1.42	1	3.43	2.00	102
PH	UNITS	10887501	8.7	8.7	0	NA	NA	NA
PHENOLICS, TOTAL	MG/L	10956101	<0.04	<0.04	NA	0.45	0.50	90
SULFATE	MG/L	10962204	11	10	10	20	10	90
TOTAL DISSOLVED SOLIDS	MG/L	10954601	630	640	2	NA	NA	NA

*Acceptable
JF
4-20-96*

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

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



METALS RESULTS

ATI I.D. : 109561

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO PLANT

DATE RECEIVED : 09/05/91

REPORT DATE : 09/25/91

PARAMETER	UNITS	01
SILVER	MG/L	<0.010
ARSENIC	MG/L	<0.005
BORON	MG/L	0.22
BARIUM	MG/L	0.298
CADMIUM	MG/L	<0.005
CHROMIUM	MG/L	<0.010
COPPER	MG/L	<0.010
IRON	MG/L	0.120
MERCURY	MG/L	<0.0002
MANGANESE	MG/L	0.180
LEAD	MG/L	<0.002
SELENIUM	MG/L	<0.005
URANIUM	MG/L	0.0281
ZINC	MG/L	<0.010



METALS - QUALITY CONTROL

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO PLANT

ATI I.D. : 109561

Table with 10 columns: PARAMETER, UNITS, ATI I.D., SAMPLE RESULT, DUP. RESULT, RPD, SPIKED SAMPLE, SPIKE CONC, % REC. Rows include SILVER, ARSENIC, BORON, BARIUM, CADMIUM, CHROMIUM, COPPER, IRON, MERCURY, MANGANESE, LEAD, SELENIUM, URANIUM, ZINC.

Accepted
9-30-91
J.F.

% Recovery = (Spike Sample Result - Sample Result) / Spike Concentration X 100

RPD (Relative Percent Difference) = (Sample Result - Duplicate Result) / Average Result X 100



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10956101

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: EL PASO NATURAL GAS, NEW MEXICO	DATE SAMPLED	: 09/04/91
PROJECT #	: (NONE)	DATE RECEIVED	: 09/05/91
PROJECT NAME	: CHACO PLANT	DATE EXTRACTED	: N/A
CLIENT I.D.	: N11915	DATE ANALYZED	: 09/09/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS

RESULTS

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	93
BROMOFLUOROBENZENE (%)	83



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10956102

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: EL PASO NATURAL GAS, NEW MEXICO	DATE SAMPLED	: 09/04/91
PROJECT #	: (NONE)	DATE RECEIVED	: 09/05/91
PROJECT NAME	: CHACO PLANT	DATE EXTRACTED	: N/A
CLIENT I.D.	: TRIP BLANK	DATE ANALYZED	: 09/09/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
-----------	---------

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	91
BROMOFLUOROBENZENE (%)	81

Acetyl
HT
9-31-91



GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: EL PASO NATURAL GAS, NEW MEXICO	ATI I.D.	: 109561
PROJECT #	: (NONE)	DATE EXTRACTED	: 09/06/91
PROJECT NAME	: CHACO PLANT	DATE ANALYZED	: 09/06/91
CLIENT I.D.	: REAGENT BLANK	UNITS	: UG/L
		DILUTION FACTOR	: N/A

COMPOUNDS	RESULTS
-----------	---------

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	81
BROMOFLUOROBENZENE (%)	85

*Acceptable
John Feltner
9-70-91*

QUALITY CONTROL DATA

ATI I.D. : 109561

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
 PROJECT # : (NONE)
 PROJECT NAME : CHACO PLANT
 REF I.D. : 10999906

DATE ANALYZED : 09/09/91
 SAMPLE MATRIX : AQUEOUS
 UNITS : UG/L

COMPOUNDS	SAMPLE RESULT	CONC. SPIKED	SPIKED SAMPLE	DUP. % SPIKED		RPD
				SAMPLE REC.	SAMPLE REC.	
1,1-DICHLOROETHENE	<0.2	20	21	105	23	9
TRICHLOROETHENE	<0.2	20	18	90	19	5
TETRACHLOROETHENE	<0.2	20	24	120	24	0
BENZENE	<0.5	20	18	90	17	6
BROMODICHLOROMETHANE	<0.2	20	19	95	20	5
CHLOROFORM	<0.2	20	23	115	24	4
1,1,1-TRICHLOROETHANE	<0.2	20	20	100	21	5
TOLUENE	<0.5	20	20	100	20	0
CHLOROBENZENE	<0.2	20	21	105	22	5
M-XYLENE	<0.5	20	18	90	18	0

Handwritten:
 Analyzed
 JH
 9-30-91

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

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Spiked Sample Result} - \text{Duplicate Spike Sample Result})}{\text{Average of Spiked Sample}} \times 100$$



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10956101

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT	: EL PASO NATURAL GAS, NEW MEXICO	DATE SAMPLED	: 09/04/91
PROJECT #	: (NONE)	DATE RECEIVED	: 09/05/91
PROJECT NAME	: CHACO PLANT	DATE EXTRACTED	: 09/06/91
CLIENT I.D.	: N11915	DATE ANALYZED	: 09/13/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
NAPHTHALENE	<0.30
ACENAPHTHYLENE	<0.30
ACENAPHTHENE	<0.50
FLUORENE	<0.04
PHENANTHRENE	<0.03
ANTHRACENE	<0.01
FLUORANTHENE	<0.03
PYRENE	<0.04
BENZO(A)ANTHRACENE	<0.01
CHRYSENE	<0.02
BENZO(B)FLUORANTHENE	<0.01
BENZO(K)FLUORANTHENE	<0.01
BENZO(A)PYRENE	<0.01
DIBENZ(a,h)ANTHRACENE	<0.10
BENZO(g,h,i)PERYLENE	<0.04
INDENO(1,2,3-CD)PYRENE	<0.03

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE (%)	NA
------------------------	----



GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO PLANT
CLIENT I.D. : REAGENT BLANK

ATI I.D. : 109561
DATE EXTRACTED : 09/06/91
DATE ANALYZED : 09/13/91
UNITS : UG/L
DILUTION FACTOR : N/A

Table with 2 columns: COMPOUNDS and RESULTS. Lists various polynuclear aromatic hydrocarbons and their concentrations, all below 0.30.

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE (%) NA

Acceptable
9-30-91



QUALITY CONTROL DATA

ATI I.D. : 109561

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO PLANT
REF I.D. : 10999910

DATE ANALYZED : 09/13/91
SAMPLE MATRIX : AQUEOUS
UNITS : UG/L

Table with 8 columns: COMPOUNDS, SAMPLE CONC. RESULT, SAMPLE CONC. SPIKED, SPIKED % SAMPLE REC., DUP. SPIKED % SAMPLE REC., DUP. % SAMPLE REC., RPD. Rows include ACENAPHTHYLENE and PYRENE.

Handwritten signature and date: Haptah, JZ, 9-30-91

% Recovery = (Spike Sample Result - Sample Result) / Spike Concentration X 100

RPD (Relative % Difference) = (Spiked Sample Result - Duplicate Spike Sample Result) / Average of Spiked Sample X 100



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10956101

TEST : POLYCHLORINATED BIPHENYLS (EPA METHOD 608)

CLIENT	: EL PASO NATURAL GAS, NEW MEXICO	DATE SAMPLED	: 09/04/91
PROJECT #	: (NONE)	DATE RECEIVED	: 09/05/91
PROJECT NAME	: CHACO PLANT	DATE EXTRACTED	: 09/06/91
CLIENT I.D.	: N11915	DATE ANALYZED	: 09/11/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 10

COMPOUNDS	RESULTS
AROCLOR 1016	<5.0
AROCLOR 1221	<5.0
AROCLOR 1232	<5.0
AROCLOR 1242	<5.0
AROCLOR 1248	<5.0
AROCLOR 1254	<5.0
AROCLOR 1260	<5.0

SURROGATE PERCENT RECOVERIES

ISODRIN (%)	57
-------------	----



GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : POLYCHLORINATED BIPHENYLS (EPA METHOD 608)

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO PLANT
CLIENT I.D. : REAGENT BLANK

ATI I.D. : 109561
DATE EXTRACTED : 09/06/91
DATE ANALYZED : 09/11/91
UNITS : UG/L
DILUTION FACTOR : N/A

COMPOUNDS

RESULTS

AROCLOR 1016	<0.5
AROCLOR 1221	<0.5
AROCLOR 1232	<0.5
AROCLOR 1242	<0.5
AROCLOR 1248	<0.5
AROCLOR 1254	<0.5
AROCLOR 1260	<0.5

SURROGATE PERCENT RECOVERIES

ISODRIN (%)

84

Handwritten:
Stephens
J.P.
9-30-91



QUALITY CONTROL DATA

ATI I.D. : 109561

TEST : POLYCHLORINATED BIPHENYLS (EPA METHOD 608)

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO PLANT
REF I.D. : 10999907

DATE ANALYZED : 09/11/91
SAMPLE MATRIX : AQUEOUS
UNITS : UG/L

Table with columns: COMPOUNDS, SAMPLE CONC. RESULT, SPIKED SAMPLE, SPIKED % REC., DUP. SAMPLE, DUP. % REC., RPD. Row 1: AROCLOR 1260, <0.5, 5.0, 4.7, 94, 4.9, 98, 4

Handwritten signature and date: 9-10-91

% Recovery = (Spike Sample Result - Sample Result) / Spike Concentration X 100

RPD (Relative % Difference) = (Spiked Sample Result - Duplicate Spike Sample Result) / Average of Spiked Sample X 100



BARRINGER LABORATORIES INC.

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

19-Sep-91

ANALYTICAL TECHNOLOGIES, INC. (Phoenix)
9830 S. 51st St., Ste. B13
Phoenix, AZ 85044

Page: 1
Copy: 1 of 2
Set : 1

Attn: Mary Tyer
Project: 109560-565

PO #:

Received: 6-Sep-91 17:22

Job: 911651E

Status: Final

Sample Type: Water

Sample	Ra-226	Error	Ra-228	Error	U	U
	Total		Total		Total	Total
	pCi/l	2σ	pCi/l	2σ	mg/l	pCi/l(1)
109560-1	1.1	±0.8	0.4	±1.2	0.0041	2.8
109561-1	0.9	±0.7	0.2	±1.1	0.0281	19
109562-1	1.8	±1.0	0.0	±1.1	0.0031	2.1
109564-1	1.1	±0.7	0.1	±1.2	0.0010	0.7
109565-1	2.0	±1.2	0.5	±1.2	0.0069	4.7



19-Sep-91

ANALYTICAL TECHNOLOGIES, INC. (Phoenix)
9830 S. 51st St., Ste. B13
Phoenix, AZ 85044

Page: 2
Copy: 1 of 2
Set : 2

Attn: Mary Tyer
Project: 109560-565

PO #:

Received: 6-Sep-91 17:22

Job: 911651E

Status: Final

Abbreviations:

Parameters:

Ra-226 : Radium-226
Ra-228 : Radium-228
U : Uranium

Units:

pCi/l : picoCuries per liter
2σ : Counting error at the 95% confidence level, 2σ
mg/l : milligrams per liter
pCi/l(1) : picoCuries per liter based upon equilibrium cond.

Job approved by:

Signed:

Ellen La Riviere
.....
Ellen La Riviere
Radiochemistry Laboratory Manager

19-Sep-91

ANALYTICAL TECHNOLOGIES, INC. (Phoenix)
 9830 S. 51st St., Ste. B13
 Phoenix, AZ 85044

Page: 1
 Copy: 1 of 2
 Set: 1

Attn: Mary Tyer
 Project: 109560-565

PO #:

Received: 6-Sep-91 17:22

Job: 911651E

Status: Final

QUALITY CONTROL REPORT

Sample Type: Water

Sample Id	Ra-226 Error		Ra-228 Error		U	U
	Total	2σ	Total	2σ	Total	Total
	pCi/l		pCi/l		mg/l	pCi/l(1)
Duplicate	2.8	±1.4	1.0	±1.5	0.0045	---
Duplicate	1.1	±1.0	0.7	±1.2	0.0042	---
Duplicate % diff.	44	---	18	---	4.5	---
Std (found value)	91	±2	27	±2	33	---
Std (true value)	101	---	32	---	34	---
Std % diff.	9.9	---	16	---	2.9	---
Blank	0.0	±0.1	0.0	±0.8	<0.0003	---
Spike % rec.	---	---	---	---	97	---

*Acceptable
 9-30-91
 J.S.*

19-Sep-91

ANALYTICAL TECHNOLOGIES, INC. (Phoenix)
9830 S. 51st St., Ste. B13
Phoenix, AZ 85044

Page: 2
Copy: 1 of 2
Set : 2

Attn: Mary Tyer
Project: 109560-565

Received: 6-Sep-91 17:22
PO #:

Job: 911651E Status: Final

QUALITY CONTROL REPORT

Abbreviations:

Parameters:

Ra-226 : Radium-226
Ra-228 : Radium-228
U : Uranium

Units:

pCi/l : picoCuries per liter
2σ : Counting error at the 95% confidence level, 2σ
mg/l : milligrams per liter
pCi/l(1) : picoCuries per liter based upon equilibrium cond.

Job approved by:

Signed: 
Approved
Quality Assurance Department



BARRINGER LABORATORIES INC.

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

19-Sep-91

ANALYTICAL TECHNOLOGIES, INC. (Phoenix)
9830 S. 51st St., Ste. B13
Phoenix, AZ 85044

Page: 3
Copy: 2 of 2

Attn: Mary Tyer
Project: 109560-565

Received: 6-Sep-91 17:22

PO #:

Job: 911651E

Status: Final

QUALITY CONTROL REPORT

QUALITY CONTROL DATA SHEET

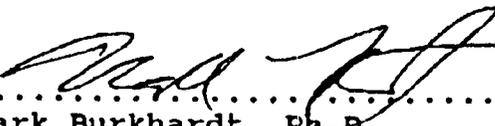
Received by: gm

Via: Fed.Ex.

Sample Container Type: 1L pl btl
Sample Type: Water
Preservative When Received: HNO3
Additional Lab Preparation: None

Parameter	Method	LLD	Preservative	Analyst	Date(s) of Analysis
Ra-226	SM-705	0.2 pCi/l	HNO3	Seidel	9/13- 9/17
Ra-228	---	0.9 pCi/l	HNO3	Howard	9/13
U	ASTMD2907	0.0003 mg/l	HNO3	Meyer	9/16- 9/17

Signed:



 Mark Burkhardt, Ph.D.
 Laboratory Director

*Accepted
 JA
 9-30-91*



Analytical **Technologies**, Inc.

9830 S. 51st Street Suite B-113 Phoenix, AZ 85044 (602) 496-4400

ATI I.D. 109562

September 26, 1991

El Paso Natural Gas Company
P.O. Box 4990
Farmington, NM 87499



Project Name/Number: Chaco Plant

Attention: John Lambdin

On 09/05/91, Analytical Technologies, Inc. received a request to analyze aqueous sample(s). The sample(s) 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.

Method 610 analyses were performed by ATI, Fort Collins. Uranium, Radium 226 and Radium 228 analyses were performed by Barringer Laboratories.

If you have any questions or comments, please do not hesitate to contact us at (602) 496-4400.

Mary S. Tyer

Mary Tyer
Project Manager

Robert V. Woods

Robert V. Woods
Laboratory Manager

RVW:clf
Enclosure



CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO PLANT
ATI I.D. : 109562

DATE RECEIVED : 09/05/91
REPORT DATE : 09/23/91

ATI #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
01	N11916	AQUEOUS	09/04/91
02	TRIP BLANK	AQUEOUS	09/04/91

----- TOTALS -----

MATRIX	# SAMPLES
AQUEOUS	2

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from the date of this report. If an extended storage period is required, please contact our sample control department before the scheduled disposal date.



GENERAL CHEMISTRY RESULTS

ATI I.D. : 109562

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO PLANT

DATE RECEIVED : 09/05/91

REPORT DATE : 09/23/91

PARAMETER	UNITS	01
CHLORIDE	MG/L	2.4
CYANIDE, TOTAL	MG/L	<0.01
FLUORIDE	MG/L	0.18
NITRATE AS NITROGEN	MG/L	0.09
PH	UNITS	8.3
PHENOLICS, TOTAL	MG/L	<0.02
SULFATE	MG/L	46
TOTAL DISSOLVED SOLIDS	MG/L	160



GENERAL CHEMISTRY - QUALITY CONTROL

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO PLANT

ATI I.D. : 109562

PARAMETER	UNITS	ATI I.D.	SAMPLE RESULT	DUP. RESULT	RPD	SPIKED SAMPLE	SPIKE CONC	% REC
CHLORIDE	MG/L	10957201	300	300	0	560	250	104
CYANIDE, TOTAL	MG/L	10951401	<0.01	<0.01	NA	0.27	0.25	108
FLUORIDE	MG/L	10962204	0.42	0.44	5	0.86	0.40	110
NITRATE AS NITROGEN	MG/L	10957906	1.40	1.42	1	3.43	2.00	102
PH	UNITS	10887501	8.7	8.7	0	NA	NA	NA
PHENOLICS, TOTAL	MG/L	10964001	0.17	0.17	0	0.42	0.25	100
SULFATE	MG/L	10962204	11	10	10	20	10	90
TOTAL DISSOLVED SOLIDS	MG/L	10954601	630	640	2	NA	NA	NA

*Accepted
JL-
9-20-01*

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

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



METALS RESULTS

ATI I.D. : 109562

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO PLANT

DATE RECEIVED : 09/05/91

REPORT DATE : 09/23/91

PARAMETER	UNITS	01
SILVER	MG/L	<0.010
ARSENIC	MG/L	<0.005
BORON	MG/L	<0.10
BARIUM	MG/L	0.069
CADMIUM	MG/L	<0.005
CHROMIUM	MG/L	<0.010
COPPER	MG/L	<0.010
IRON	MG/L	0.030
MERCURY	MG/L	<0.0002
MANGANESE	MG/L	<0.010
LEAD	MG/L	<0.002
SELENIUM	MG/L	<0.005
URANIUM	MG/L	0.0031
ZINC	MG/L	<0.010



METALS - QUALITY CONTROL

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO PLANT

ATI I.D. : 109562

Table with 9 columns: PARAMETER, UNITS, ATI I.D., SAMPLE RESULT, DUP. RESULT, RPD, SPIKED SAMPLE, SPIKE CONC, % REC. Rows include SILVER, ARSENIC, BORON, BARIUM, CADMIUM, CHROMIUM, COPPER, IRON, MERCURY, MANGANESE, LEAD, SELENIUM, URANIUM, ZINC.

Acceptable
df-
9-10-90

% Recovery = (Spike Sample Result - Sample Result) / Spike Concentration X 100

RPD (Relative Percent Difference) = (Sample Result - Duplicate Result) / Average Result X 10

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10956201

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: EL PASO NATURAL GAS, NEW MEXICO	DATE SAMPLED	: 09/04/91
PROJECT #	: (NONE)	DATE RECEIVED	: 09/05/91
PROJECT NAME	: CHACO PLANT	DATE EXTRACTED	: N/A
CLIENT I.D.	: N11916	DATE ANALYZED	: 09/06/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

-----	-----
COMPOUNDS	RESULTS
-----	-----

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	97
BROMOFLUOROBENZENE (%)	84



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10956202

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: EL PASO NATURAL GAS, NEW MEXICO	DATE SAMPLED	: 09/04/91
PROJECT #	: (NONE)	DATE RECEIVED	: 09/05/91
PROJECT NAME	: CHACO PLANT	DATE EXTRACTED	: N/A
CLIENT I.D.	: TRIP BLANK	DATE ANALYZED	: 09/06/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

Handwritten notes:
9/2
5-30-91

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	94
BROMOFLUOROBENZENE (%)	81



GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
 PROJECT # : (NONE)
 PROJECT NAME : CHACO PLANT
 CLIENT I.D. : REAGENT BLANK

ATI I.D. : 109562
 DATE EXTRACTED : 09/09/91
 DATE ANALYZED : 09/09/91
 UNITS : UG/L
 DILUTION FACTOR : N/A

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	87
BROMOFLUOROBENZENE (%)	86

Handwritten:
 9-70-91
 Acceptable



QUALITY CONTROL DATA

ATI I.D. : 109562

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO PLANT
REF I.D. : 10999906

DATE ANALYZED : 09/09/91
SAMPLE MATRIX : AQUEOUS
UNITS : UG/L

Table with 8 columns: COMPOUNDS, SAMPLE RESULT, CONC. SPIKED, SPIKED SAMPLE, % REC., DUP. SPIKED SAMPLE, DUP. % REC., RPD. Rows include 1,1-DICHLOROETHENE, TRICHLOROETHENE, TETRACHLOROETHENE, BENZENE, BROMODICHLOROMETHANE, CHLOROFORM, 1,1,1-TRICHLOROETHANE, TOLUENE, CHLOROBENZENE, M-XYLENE.

Acceptable
JL
8-30-91

% Recovery = (Spike Sample Result - Sample Result) / Spike Concentration X 100

RPD (Relative % Difference) = (Spiked Sample Result - Duplicate Spike Sample Result) / Average of Spiked Sample X 100



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10956201

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT	: EL PASO NATURAL GAS, NEW MEXICO	DATE SAMPLED	: 09/04/91
PROJECT #	: (NONE)	DATE RECEIVED	: 09/05/91
PROJECT NAME	: CHACO PLANT	DATE EXTRACTED	: 09/06/91
CLIENT I.D.	: N11916	DATE ANALYZED	: 09/13/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS

RESULTS

NAPHTHALENE	<0.30
ACENAPHTHYLENE	<0.30
ACENAPHTHENE	<0.50
FLUORENE	<0.04
PHENANTHRENE	<0.03
ANTHRACENE	<0.01
FLUORANTHENE	<0.03
PYRENE	<0.04
BENZO(A)ANTHRACENE	<0.01
CHRYSENE	<0.02
BENZO(B)FLUORANTHENE	<0.01
BENZO(K)FLUORANTHENE	<0.01
BENZO(A)PYRENE	<0.01
DIBENZ(a,h)ANTHRACENE	<0.10
BENZO(g,h,i)PERYLENE	<0.04
INDENO(1,2,3-CD)PYRENE	<0.03

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE (%) NA



REAGENT BLANK

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO PLANT
CLIENT I.D. : REAGENT BLANK

ATI I.D. : 109562
DATE EXTRACTED : 09/06/91
DATE ANALYZED : 09/13/91
UNITS : UG/L
DILUTION FACTOR : N/A

Table with 2 columns: COMPOUNDS and RESULTS. Lists various polynuclear aromatic hydrocarbons and their concentrations, all below 0.30.

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE (%) NA

Handwritten signature and date: 9-30-91



QUALITY CONTROL DATA

ATI I.D. : 109562

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO PLANT
REF I.D. : 10999910

DATE ANALYZED : 09/13/91
SAMPLE MATRIX : AQUEOUS
UNITS : UG/L

COMPOUNDS	SAMPLE CONC.		SPIKED %	DUP. %		RPD	
	RESULT	SPIKED		SAMPLE REC.	SAMPLE REC.		
ACENAPHTHYLENE	<0.30	300	180	60	157	52	14
PYRENE	<0.04	40	25.0	62	22.7	57	10

*Acceptable
9-30-91
J.D.*

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

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Spiked Sample Result} - \text{Duplicate Spike Sample Result})}{\text{Average of Spiked Sample}} \times 100$$



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10956201

TEST : POLYCHLORINATED BIPHENYLS (EPA METHOD 608)

CLIENT	: EL PASO NATURAL GAS, NEW MEXICO	DATE SAMPLED	: 09/04/91
PROJECT #	: (NONE)	DATE RECEIVED	: 09/05/91
PROJECT NAME	: CHACO PLANT	DATE EXTRACTED	: 09/06/91
CLIENT I.D.	: N11916	DATE ANALYZED	: 09/11/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
AROCLOR 1016	<0.5
AROCLOR 1221	<0.5
AROCLOR 1232	<0.5
AROCLOR 1242	<0.5
AROCLOR 1248	<0.5
AROCLOR 1254	<0.5
AROCLOR 1260	<0.5

SURROGATE PERCENT RECOVERIES

ISODRIN (%)	80
-------------	----



GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : POLYCHLORINATED BIPHENYLS (EPA METHOD 608)

CLIENT	: EL PASO NATURAL GAS, NEW MEXICO	ATI I.D.	: 109562
PROJECT #	: (NONE)	DATE EXTRACTED	: 09/06/91
PROJECT NAME	: CHACO PLANT	DATE ANALYZED	: 09/11/91
CLIENT I.D.	: REAGENT BLANK	UNITS	: UG/L
		DILUTION FACTOR	: N/A

COMPOUNDS	RESULTS
AROCLOR 1016	<0.5
AROCLOR 1221	<0.5
AROCLOR 1232	<0.5
AROCLOR 1242	<0.5
AROCLOR 1248	<0.5
AROCLOR 1254	<0.5
AROCLOR 1260	<0.5

SURROGATE PERCENT RECOVERIES

ISODRIN (%) 84

*Accepted
JF
09-30-91*



QUALITY CONTROL DATA

TEST : POLYCHLORINATED BIPHENYLS (EPA METHOD 608) ATI I.D. : 109562

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE) DATE ANALYZED : 09/11/91
PROJECT NAME : CHACO PLANT SAMPLE MATRIX : AQUEOUS
REF I.D. : 10999907 UNITS : UG/L

Table with columns: COMPOUNDS, SAMPLE CONC. RESULT, SPIKED SAMPLE, % SPIKED REC., DUP. SPIKED SAMPLE, DUP. % REC., RPD. Row 1: AROCLOR 1260, <0.5, 5.0, 4.7, 94, 4.9, 98, 4

Acceptable
J.S.
9-30-91

% Recovery = (Spike Sample Result - Sample Result) / Spike Concentration X 100

RPD (Relative % Difference) = (Spiked Sample Result - Duplicate Spike Sample Result) / Average of Spiked Sample X 100



BARRINGER LABORATORIES INC.

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

19-Sep-91

ANALYTICAL TECHNOLOGIES, INC. (Phoenix)
9830 S. 51st St., Ste. B13
Phoenix, AZ 85044

Page: 1
Copy: 1 of 2
Set : 1

Attn: Mary Tyer
Project: 109560-565

PO #:

Received: 6-Sep-91 17:22

Job: 911651E

Status: Final

Sample Type: Water

Sample	Ra-226		Ra-228		U	U
	Total	Error	Total	Error	Total	Total
	pCi/l	2σ	pCi/l	2σ	mg/l	pCi/l(1)
109560-1	1.1	±0.8	0.4	±1.2	0.0041	2.8
109561-1	0.9	±0.7	0.2	±1.1	0.0281	19
109562-1	1.8	±1.0	0.0	±1.1	0.0031	2.1
109564-1	1.1	±0.7	0.1	±1.2	0.0010	0.7
109565-1	2.0	±1.2	0.5	±1.2	0.0069	4.7



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19-Sep-91

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9830 S. 51st St., Ste. B13
Phoenix, AZ 85044

Page: 2
Copy: 1 of 2
Set : 2

Attn: Mary Tyer
Project: 109560-565

PO #:

Received: 6-Sep-91 17:22

Job: 911651E

Status: Final

Abbreviations:

Parameters:

Ra-226 : Radium-226
Ra-228 : Radium-228
U : Uranium

Units:

pCi/l : picoCuries per liter
2σ : Counting error at the 95% confidence level, 2σ
mg/l : milligrams per liter
pCi/l(1) : picoCuries per liter based upon equilibrium cond.

Job approved by:

Signed:

Ellen La Riviere
.....
Ellen La Riviere
Radiochemistry Laboratory Manager



BARRINGER LABORATORIES INC.

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

19-Sep-91

ANALYTICAL TECHNOLOGIES, INC. (Phoenix)
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Phoenix, AZ 85044

Page: 1
Copy: 1 of 2
Set: 1

Attn: Mary Tyer
Project: 109560-565

PO #:

Received: 6-Sep-91 17:22

Job: 911651E

Status: Final

QUALITY CONTROL REPORT

Sample Type: Water

Sample Id	Ra-226		Ra-228		U	U
	Total	Error	Total	Error	Total	Total
	pCi/l	2σ	pCi/l	2σ	mg/l	pCi/l(1)
Duplicate	2.8	±1.4	1.0	±1.5	0.0045	---
Duplicate	1.1	±1.0	0.7	±1.2	0.0042	---
Duplicate % diff.	44	---	18	---	4.5	---
Std (found value)	91	±2	27	±2	33	---
Std (true value)	101	---	32	---	34	---
Std % diff.	9.9	---	16	---	2.9	---
Blank	0.0	±0.1	0.0	±0.8	<0.0003	---
Spike % rec.	---	---	---	---	97	---

*Accepted
J.P.
09-20-91*



BARRINGER LABORATORIES INC.

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19-Sep-91

ANALYTICAL TECHNOLOGIES, INC. (Phoenix)
9830 S. 51st St., Ste. B13
Phoenix, AZ 85044

Page: 2
Copy: 1 of 2
Set : 2

Attn: Mary Tyer
Project: 109560-565

PO #:

Received: 6-Sep-91 17:22

Job: 911651E

Status: Final

QUALITY CONTROL REPORT

Abbreviations:

Parameters:

Ra-226 : Radium-226
Ra-228 : Radium-228
U : Uranium

Units:

pCi/l : picoCuries per liter
2σ : Counting error at the 95% confidence level, 2σ
mg/l : milligrams per liter
pCi/l(1) : picoCuries per liter based upon equilibrium cond.

Job approved by:

Signed: 
.....
Approved
Quality Assurance Department

*Accepted
9-30-91
J.P.*

BARRINGER LABORATORIES INC.

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

19-Sep-91

ANALYTICAL TECHNOLOGIES, INC. (Phoenix)
9830 S. 51st St., Ste. B13
Phoenix, AZ 85044

Page: 3
Copy: 2 of 2

Attn: Mary Tyer
Project: 109560-565

Received: 6-Sep-91 17:22
PO #:

Job: 911651E

Status: Final

QUALITY CONTROL REPORT

QUALITY CONTROL DATA SHEET

Received by: gm

Via: Fed.Ex.

Sample Container Type: 1L pl btl
Sample Type: Water
Preservative When Received: HNO3
Additional Lab Preparation: None

Parameter	Method	LLD	Preservative	Analyst	Date(s) of Analysis
Ra-226	SM-705	0.2 pCi/l	HNO3	Seidel	9/13- 9/17
Ra-228	---	0.9 pCi/l	HNO3	Howard	9/13
U	ASTMD2907	0.0003 mg/l	HNO3	Meyer	9/16- 9/17

Signed:

.....
Mark Burkhardt, Ph.D.
Laboratory Director

*Acceptance
9-30-91
JH*



Analytical **Technologies, Inc.**

9830 S. 51st Street Suite B-113 Phoenix, AZ 85044 (602) 496-4400

ATI I.D. 109565

September 26, 1991

El Paso Natural Gas Company
P.O. Box 4990
Farmington, NM 87499



Project Name/Number: Chaco Plant

Attention: John Lambdin

On 09/05/91, Analytical Technologies, Inc. received a request to analyze aqueous sample(s). The sample(s) 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.

Method 610 analyses were performed by ATI, Fort Collins. Uranium, Radium 226 and Radium 228 analyses were performed by Barringer Laboratories.

If you have any questions or comments, please do not hesitate to contact us at (602) 496-4400.

Mary A. Tyer
Mary Tyer
Project Manager

Robert V. Woods
Robert V. Woods
Laboratory Manager

RVW:clf
Enclosure



CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO PLANT
ATI I.D. : 109565

DATE RECEIVED : 09/05/91
REPORT DATE : 09/23/91

ATI #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
01	N11917	AQUEOUS	09/04/91
02	TRIP BLANK	AQUEOUS	09/04/91

----- TOTALS -----

MATRIX	# SAMPLES
AQUEOUS	2

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from the date of this report. If an extended storage period is required, please contact our sample control department before the scheduled disposal date.



GENERAL CHEMISTRY RESULTS

ATI I.D. : 109565

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO PLANT

DATE RECEIVED : 09/05/91
REPORT DATE : 09/23/91

PARAMETER	UNITS	01
CHLORIDE	MG/L	50
CYANIDE, TOTAL	MG/L	<0.01
FLUORIDE	MG/L	1.44
NITRATE AS NITROGEN	MG/L	<0.06
PH	UNITS	8.4
PHENOLICS, TOTAL	MG/L	<0.02
SULFATE	MG/L	760
TOTAL DISSOLVED SOLIDS	MG/L	1500



GENERAL CHEMISTRY - QUALITY CONTROL

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO PLANT

ATI I.D. : 109565

Table with 9 columns: PARAMETER, UNITS, ATI I.D., SAMPLE RESULT, DUP. RESULT, RPD, SPIKED SAMPLE, SPIKE CONC, % REC. Rows include Chloride, Cyanide, Fluoride, Nitrate, PH, Phenolics, Sulfate, and Total Dissolved Solids.

Acceptable
JL
9-30-91

% Recovery = (Spike Sample Result - Sample Result) / Spike Concentration X 100

RPD (Relative Percent Difference) = (Sample Result - Duplicate Result) / Average Result X 10



METALS RESULTS

ATI I.D. : 109565

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO PLANT

DATE RECEIVED : 09/05/91
REPORT DATE : 09/23/91

PARAMETER	UNITS	01
SILVER	MG/L	<0.010
ARSENIC	MG/L	0.006
BORON	MG/L	0.17
BARIUM	MG/L	0.355
CADMIUM	MG/L	<0.005
CHROMIUM	MG/L	0.016
COPPER	MG/L	0.067
IRON	MG/L	1.22
MERCURY	MG/L	0.0003
MANGANESE	MG/L	0.043
LEAD	MG/L	<0.002
SELENIUM	MG/L	<0.005
URANIUM	MG/L	0.0069
ZINC	MG/L	0.093



METALS - QUALITY CONTROL

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
 PROJECT # : (NONE)
 PROJECT NAME : CHACO PLANT

ATI I.D. : 109565

PARAMETER	UNITS	ATI I.D.	SAMPLE RESULT	DUP. RESULT	RPD	SPIKED SAMPLE	SPIKE CONC	% REC
SILVER	MG/L	10957201	<0.010	<0.010	NA	0.441	0.500	88
ARSENIC	MG/L	10956501	0.006	0.006	0	0.053	0.050	94
BORON	MG/L	10956201	<0.10	<0.10	NA	1.00	1.00	100
BARIUM	MG/L	10957201	0.608	0.604	0.7	1.58	1.00	97
CADMIUM	MG/L	10957201	<0.005	<0.005	NA	0.495	0.500	99
CHROMIUM	MG/L	10957201	<0.010	<0.010	NA	0.990	1.00	99
COPPER	MG/L	10957201	<0.010	<0.010	NA	0.488	0.500	98
IRON	MG/L	10960101	<0.020	<0.020	NA	10.3	10.0	103
MERCURY	MG/L	10970302	0.0002	0.0002	0	0.0050	0.0050	96
MANGANESE	MG/L	10957201	4.02	4.00	0.5	5.06	1.00	104
LEAD	MG/L	10956501	<0.002	<0.002	NA	0.045	0.050	90
SELENIUM	MG/L	10956501	<0.005	<0.005	NA	0.036	0.050	72
URANIUM	MG/L	10999909	0.0045	0.0042	4.5	NA	NA	NA
ZINC	MG/L	10957201	0.266	0.268	0.7	0.771	0.500	101

*Acceptable
 J.L.
 9-30-91*

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

$$\text{RPD (Relative Percent Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 10$$



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10956501

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: EL PASO NATURAL GAS, NEW MEXICO	DATE SAMPLED	: 09/04/91
PROJECT #	: (NONE)	DATE RECEIVED	: 09/05/91
PROJECT NAME	: CHACO PLANT	DATE EXTRACTED	: N/A
CLIENT I.D.	: N11917	DATE ANALYZED	: 09/06/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	91
BROMOFLUOROBENZENE (%)	92



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10956502

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: EL PASO NATURAL GAS, NEW MEXICO	DATE SAMPLED	: 09/04/91
PROJECT #	: (NONE)	DATE RECEIVED	: 09/05/91
PROJECT NAME	: CHACO PLANT	DATE EXTRACTED	: N/A
CLIENT I.D.	: TRIP BLANK	DATE ANALYZED	: 09/06/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

Acceptable
JL
9-30-91

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	83
BROMOFLUOROBENZENE (%)	83



GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: EL PASO NATURAL GAS, NEW MEXICO	ATI I.D.	: 109565
PROJECT #	: (NONE)	DATE EXTRACTED	: 09/09/91
PROJECT NAME	: CHACO PLANT	DATE ANALYZED	: 09/09/91
CLIENT I.D.	: REAGENT BLANK	UNITS	: UG/L
		DILUTION FACTOR	: N/A

COMPOUNDS	RESULTS
-----------	---------

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	87
BROMOFLUOROBENZENE (%)	86

Accepted
9-20-91
DT



QUALITY CONTROL DATA

ATI I.D. : 109565

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : EL PASO NATURAL GAS, NEW MEXICO

PROJECT # : (NONE)

DATE ANALYZED : 09/09/91

PROJECT NAME : CHACO PLANT

SAMPLE MATRIX : AQUEOUS

REF I.D. : 10999906

UNITS : UG/L

COMPOUNDS	SAMPLE RESULT	CONC. SPIKED	SPIKED SAMPLE	% REC.	DUP. SPIKED SAMPLE	DUP. % REC.	RPD
1,1-DICHLOROETHENE	<0.2	20	21	105	23	115	9
TRICHLOROETHENE	<0.2	20	18	90	19	95	5
TETRACHLOROETHENE	<0.2	20	24	120	24	120	0
BENZENE	<0.5	20	18	90	17	85	6
BROMODICHLOROMETHANE	<0.2	20	19	95	20	100	5
CHLOROFORM	<0.2	20	23	115	24	120	4
1,1,1-TRICHLOROETHANE	<0.2	20	20	100	21	105	5
TOLUENE	<0.5	20	20	100	20	100	0
CHLOROBENZENE	<0.2	20	21	105	22	110	5
M-XYLENE	<0.5	20	18	90	18	90	0

*Acceptable
JP
9-30-91*

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

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Spiked Sample Result} - \text{Duplicate Spike Sample Result})}{\text{Average of Spiked Sample}} \times 100$$

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10956501

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT	: EL PASO NATURAL GAS, NEW MEXICO	DATE SAMPLED	: 09/04/91
PROJECT #	: (NONE)	DATE RECEIVED	: 09/05/91
PROJECT NAME	: CHACO PLANT	DATE EXTRACTED	: 09/06/91
CLIENT I.D.	: N11917	DATE ANALYZED	: 09/16/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
NAPHTHALENE	<0.30
ACENAPHTHYLENE	<0.30
ACENAPHTHENE	<0.50
FLUORENE	<0.04
PHENANTHRENE	<0.03
ANTHRACENE	<0.01
FLUORANTHENE	<0.03
PYRENE	<0.04
BENZO(A)ANTHRACENE	<0.01
CHRYSENE	<0.02
BENZO(B)FLUORANTHENE	<0.01
BENZO(K)FLUORANTHENE	<0.01
BENZO(A)PYRENE	<0.01
DIBENZ(a,h)ANTHRACENE	<0.10
BENZO(g,h,i)PERYLENE	<0.04
INDENO(1,2,3-CD)PYRENE	<0.03

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE (%)	NA
------------------------	----



GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO PLANT
CLIENT I.D. : REAGENT BLANK

ATI I.D. : 109565
DATE EXTRACTED : 09/06/91
DATE ANALYZED : 09/13/91
UNITS : UG/L
DILUTION FACTOR : N/A

Table with 2 columns: COMPOUNDS and RESULTS. Lists various polynuclear aromatic hydrocarbons and their concentrations, all below 0.30.

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE (%) NA

Acceptable
OK
9-30-91



QUALITY CONTROL DATA

ATI I.D. : 109565

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO PLANT
REF I.D. : 10999910

DATE ANALYZED : 09/13/91
SAMPLE MATRIX : AQUEOUS
UNITS : UG/L

Table with 8 columns: COMPOUNDS, SAMPLE CONC., SPIKED, %, DUP. SPIKED, DUP. %, RPD. Rows include ACENAPHTHYLENE and PYRENE.

Acceptable
SP-
9-70-91

% Recovery = (Spike Sample Result - Sample Result) / Spike Concentration X 100

RPD (Relative % Difference) = (Spiked Sample - Duplicate Spike) / Average of Spiked Sample X 100

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10956501

TEST : POLYCHLORINATED BIPHENYLS (EPA METHOD 608)

CLIENT	: EL PASO NATURAL GAS, NEW MEXICO	DATE SAMPLED	: 09/04/91
PROJECT #	: (NONE)	DATE RECEIVED	: 09/05/91
PROJECT NAME	: CHACO PLANT	DATE EXTRACTED	: 09/06/91
CLIENT I.D.	: N11917	DATE ANALYZED	: 09/11/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
-----------	---------

AROCLOR 1016	<0.5
AROCLOR 1221	<0.5
AROCLOR 1232	<0.5
AROCLOR 1242	<0.5
AROCLOR 1248	<0.5
AROCLOR 1254	<0.5
AROCLOR 1260	<0.5

SURROGATE PERCENT RECOVERIES

ISODRIN (%)	58
-------------	----



GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : POLYCHLORINATED BIPHENYLS (EPA METHOD 608)

CLIENT	: EL PASO NATURAL GAS, NEW MEXICO	ATI I.D.	: 109565
PROJECT #	: (NONE)	DATE EXTRACTED	: 09/06/91
PROJECT NAME	: CHACO PLANT	DATE ANALYZED	: 09/11/91
CLIENT I.D.	: REAGENT BLANK	UNITS	: UG/L
		DILUTION FACTOR	: N/A

COMPOUNDS	RESULTS
AROCLOR 1016	<0.5
AROCLOR 1221	<0.5
AROCLOR 1232	<0.5
AROCLOR 1242	<0.5
AROCLOR 1248	<0.5
AROCLOR 1254	<0.5
AROCLOR 1260	<0.5

SURROGATE PERCENT RECOVERIES

ISODRIN (%) 84

*Accepted
9-30-91*



QUALITY CONTROL DATA

ATI I.D. : 109565

TEST : POLYCHLORINATED BIPHENYLS (EPA METHOD 608)

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO PLANT
REF I.D. : 10999907

DATE ANALYZED : 09/11/91
SAMPLE MATRIX : AQUEOUS
UNITS : UG/L

COMPOUNDS	SAMPLE CONC. RESULT	SPIKED SPIKED	SPIKED SAMPLE	% REC.	DUP.	DUP.	RPD
					SPIKED	%	
AROCLOR 1260	<0.5	5.0	4.7	94	4.9	98	4

*Acceptable
9-30-91
JL*

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

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Spiked Sample Result} - \text{Duplicate Spike Sample Result})}{\text{Average of Spiked Sample}} \times 100$$



BARRINGER LABORATORIES INC.

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

19-Sep-91

ANALYTICAL TECHNOLOGIES, INC. (Phoenix)
9830 S. 51st St., Ste. B13
Phoenix, AZ 85044

Page: 1
Copy: 1 of 2
Set : 1

Attn: Mary Tyer
Project: 109560-565

PO #:

Received: 6-Sep-91 17:22

Job: 911651E Status: Final

Sample Type: Water

Sample	Ra-226	Error	Ra-228	Error	U	U
	Total	2σ	Total	2σ	Total	Total
	pCi/l		pCi/l		mg/l	pCi/l(1)
109560-1	1.1	±0.8	0.4	±1.2	0.0041	2.8
109561-1	0.9	±0.7	0.2	±1.1	0.0281	19
109562-1	1.8	±1.0	0.0	±1.1	0.0031	2.1
109564-1	1.1	±0.7	0.1	±1.2	0.0010	0.7
109565-1	2.0	±1.2	0.5	±1.2	0.0069	4.7



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

19-Sep-91

ANALYTICAL TECHNOLOGIES, INC. (Phoenix)
9830 S. 51st St., Ste. B13
Phoenix, AZ 85044

Page: 2
Copy: 1 of 2
Set : 2

Attn: Mary Tyer
Project: 109560-565

PO #:

Received: 6-Sep-91 17:22

Job: 911651E

Status: Final

Abbreviations:

Parameters:

Ra-226 : Radium-226
Ra-228 : Radium-228
U : Uranium

Units:

pCi/l : picoCuries per liter
2σ : Counting error at the 95% confidence level, 2σ
mg/l : milligrams per liter
pCi/l(1) : picoCuries per liter based upon equilibrium cond.

Job approved by:

Signed:

Ellen La Riviere
.....
Ellen La Riviere
Radiochemistry Laboratory Manager

19-Sep-91

ANALYTICAL TECHNOLOGIES, INC. (Phoenix)
 9830 S. 51st St., Ste. B13
 Phoenix, AZ 85044

Page: 1
 Copy: 1 of 2
 Set : 1

Attn: Mary Tyer
 Project: 109560-565

PO #:

Received: 6-Sep-91 17:22

Job: 911651E

Status: Final

QUALITY CONTROL REPORT

Sample Type: Water

Sample Id	Ra-226 Error		Ra-228 Error		U	U
	Total	2σ	Total	2σ	Total	Total
	pCi/l		pCi/l		mg/l	pCi/l(1)
Duplicate	2.8	±1.4	1.0	±1.5	0.0045	---
Duplicate	1.1	±1.0	0.7	±1.2	0.0042	---
Duplicate % diff.	44	---	18	---	4.5	---
Std (found value)	91	±2	27	±2	33	---
Std (true value)	101	---	32	---	34	---
Std % diff.	9.9	---	16	---	2.9	---
Blank	0.0	±0.1	0.0	±0.8	<0.0003	---
Spike % rec.	---	---	---	---	97	---



BARRINGER LABORATORIES INC.

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19-Sep-91

ANALYTICAL TECHNOLOGIES, INC. (Phoenix)
9830 S. 51st St., Ste. B13
Phoenix, AZ 85044

Page: 2
Copy: 1 of 2
Set : 2

Attn: Mary Tyer
Project: 109560-565

PO #:

Received: 6-Sep-91 17:22

Job: 911651E

Status: Final

QUALITY CONTROL REPORT

Abbreviations:

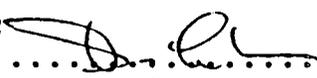
Parameters:

Ra-226 : Radium-226
Ra-228 : Radium-228
U : Uranium

Units:

pCi/l : picoCuries per liter
2σ : Counting error at the 95% confidence level, 2σ
mg/l : milligrams per liter
pCi/l(1) : picoCuries per liter based upon equilibrium cond.

Job approved by:

Signed: 
.....
Approved
Quality Assurance Department



BARRINGER LABORATORIES INC.

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

19-Sep-91

ANALYTICAL TECHNOLOGIES, INC. (Phoenix)
9830 S. 51st St., Ste. B13
Phoenix, AZ 85044

Page: 3
Copy: 2 of 2

Attn: Mary Tyer
Project: 109560-565

Received: 6-Sep-91 17:22

PO #:

Job: 911651E

Status: Final

QUALITY CONTROL REPORT

QUALITY CONTROL DATA SHEET

Received by: gm

Via: Fed.Ex.

Sample Container Type: 1L pl btl
Sample Type: Water
Preservative When Received: HNO3
Additional Lab Preparation: None

Parameter	Method	LLD	Preservative	Analyst	Date(s) of Analysis
Ra-226	SM-705	0.2 pCi/l	HNO3	Seidel	9/13- 9/17
Ra-228	---	0.9 pCi/l	HNO3	Howard	9/13
U	ASTMD2907	0.0003 mg/l	HNO3	Meyer	9/16- 9/17

Signed:


.....
Mark Burkhardt, Ph.D.
Laboratory Director



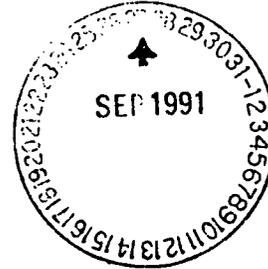
Analytical **Technologies**, Inc.

9830 S. 51st Street Suite B-113 Phoenix, AZ 85044 (602) 496-4400

ATI I.D. 109595

September 26, 1991

El Paso Natural Gas Company
P.O. Box 4990
Farmington, NM 87499



Project Name/Number: Chaco Plant

Attention: John Lambdin

On 09/06/91, Analytical Technologies, Inc. received a request to analyze aqueous sample(s). The sample(s) 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.

Method 610 analyses were performed by ATI, Fort Collins. Uranium, Radium 226 and Radium 228 analyses were performed by Barringer Laboratories.

If you have any questions or comments, please do not hesitate to contact us at (602) 496-4400.

Mary Tyer
Project Manager

Robert V. Woods
Laboratory Manager

RVW:clf
Enclosure



CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO PLANT
ATI I.D. : 109595

DATE RECEIVED : 09/06/91
REPORT DATE : 09/26/91

ATI #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
01	N11953	AQUEOUS	09/05/91
02	TRIP BLANK	AQUEOUS	09/05/91

----- TOTALS -----

MATRIX	# SAMPLES
AQUEOUS	2

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from the date of this report. If an extended storage period is required, please contact our sample control department before the scheduled disposal date.



GENERAL CHEMISTRY RESULTS

ATI I.D. : 109595

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO PLANT

DATE RECEIVED : 09/06/91

REPORT DATE : 09/26/91

PARAMETER	UNITS	01
CHLORIDE	MG/L	16
CYANIDE, TOTAL	MG/L	<0.01
FLUORIDE	MG/L	1.30
NITRATE AS NITROGEN	MG/L	0.59
PH	UNITS	8.8
PHENOLICS, TOTAL	MG/L	<0.02
SULFATE	MG/L	340
TOTAL DISSOLVED SOLIDS	MG/L	740



Analytical Technologies, Inc.

GENERAL CHEMISTRY - QUALITY CONTROL

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO PLANT

ATI I.D. : 109595

Table with 10 columns: PARAMETER, UNITS, ATI I.D., SAMPLE RESULT, DUP. RESULT, RPD, SPIKED SAMPLE, SPIKE CONC, % REC. Rows include Chloride, Cyanide, Fluoride, Nitrate, PH, Phenolics, Sulfate, and Total Dissolved Solids.

Handwritten note: Accepted JF 9-20-91

% Recovery = (Spike Sample Result - Sample Result) / Spike Concentration X 100

RPD (Relative Percent Difference) = (Sample Result - Duplicate Result) / Average Result X 10



METALS RESULTS

ATI I.D. : 109595

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO PLANT

DATE RECEIVED : 09/06/91

REPORT DATE : 09/26/91

PARAMETER	UNITS	01
SILVER	MG/L	<0.010
ARSENIC	MG/L	<0.005
BORON	MG/L	0.26
BARIUM	MG/L	0.019
CADMIUM	MG/L	<0.005
CHROMIUM	MG/L	<0.010
COPPER	MG/L	0.141
IRON	MG/L	3.12
MERCURY	MG/L	<0.0002
MANGANESE	MG/L	0.106
LEAD	MG/L	0.004
SELENIUM	MG/L	<0.005
URANIUM	MG/L	0.0035
ZINC	MG/L	<0.010



METALS - QUALITY CONTROL

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO PLANT

ATI I.D. : 109595

Table with 10 columns: PARAMETER, UNITS, ATI I.D., SAMPLE RESULT, DUP. RESULT, RPD, SPIKED SAMPLE, SPIKE CONC, % REC. Rows include SILVER, ARSENIC, BORON, BARIUM, CADMIUM, CHROMIUM, COPPER, IRON, MERCURY, MANGANESE, LEAD, SELENIUM, URANIUM, ZINC.

Accepted
JP
9-30-91

% Recovery = (Spike Sample Result - Sample Result) / Spike Concentration X 100

RPD (Relative Percent Difference) = (Sample Result - Duplicate Result) / Average Result X 100



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10959501

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: EL PASO NATURAL GAS, NEW MEXICO	DATE SAMPLED	: 09/05/91
PROJECT #	: (NONE)	DATE RECEIVED	: 09/06/91
PROJECT NAME	: CHACO PLANT	DATE EXTRACTED	: N/A
CLIENT I.D.	: N11953	DATE ANALYZED	: 09/09/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	97
BROMOFLUOROBENZENE (%)	82



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10959502

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: EL PASO NATURAL GAS, NEW MEXICO	DATE SAMPLED	: 09/05/91
PROJECT #	: (NONE)	DATE RECEIVED	: 09/06/91
PROJECT NAME	: CHACO PLANT	DATE EXTRACTED	: N/A
CLIENT I.D.	: TRIP BLANK	DATE ANALYZED	: 09/09/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

*Acceptable
9-30-91*

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	93
BROMOFLUOROBENZENE (%)	83



GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
 PROJECT # : (NONE)
 PROJECT NAME : CHACO PLANT
 CLIENT I.D. : REAGENT BLANK

ATI I.D. : 109595
 DATE EXTRACTED : 09/09/91
 DATE ANALYZED : 09/09/91
 UNITS : UG/L
 DILUTION FACTOR : N/A

COMPOUNDS	RESULTS
-----------	---------

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	87
BROMOFLUOROBENZENE (%)	86

*Acceptable
 9-10-91
 JH*



QUALITY CONTROL DATA

ATI I.D. : 109595

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO PLANT
REF I.D. : 10999907

DATE ANALYZED : 09/09/91
SAMPLE MATRIX : AQUEOUS
UNITS : UG/L

Table with 8 columns: COMPOUNDS, SAMPLE RESULT, CONC. SPIKED, SPIKED SAMPLE, %, REC., DUP. SPIKED SAMPLE, DUP. %, RPD. Rows include 1,1-DICHLOROETHENE, TRICHLOROETHENE, TETRACHLOROETHENE, BENZENE, BROMODICHLOROMETHANE, CHLOROFORM, 1,1,1-TRICHLOROETHANE, TOLUENE, CHLOROBENZENE, M-XYLENE.

Acceptable
9-30-91
DL

% Recovery = (Spike Sample Result - Sample Result) / Spike Concentration X 100

RPD (Relative % Difference) = (Spiked Sample Result - Duplicate Spike Sample Result) / Average of Spiked Sample X 100



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10959501

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT	: EL PASO NATURAL GAS, NEW MEXICO	DATE SAMPLED	: 09/05/91
PROJECT #	: (NONE)	DATE RECEIVED	: 09/06/91
PROJECT NAME	: CHACO PLANT	DATE EXTRACTED	: 09/10/91
CLIENT I.D.	: N11953	DATE ANALYZED	: 09/13/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
NAPHTHALENE	<0.30
ACENAPHTHYLENE	<0.30
ACENAPHTHENE	<0.50
FLUORENE	<0.04
PHENANTHRENE	<0.03
ANTHRACENE	0.02
FLUORANTHENE	<0.03
PYRENE	<0.04
BENZO(A)ANTHRACENE	<0.01
CHRYSENE	<0.02
BENZO(B)FLUORANTHENE	<0.01
BENZO(K)FLUORANTHENE	<0.01
BENZO(A)PYRENE	<0.01
DIBENZ(a,h)ANTHRACENE	<0.10
BENZO(g,h,i)PERYLENE	<0.04
INDENO(1,2,3-CD)PYRENE	<0.03

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE (%)	NA
------------------------	----



GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO PLANT
CLIENT I.D. : REAGENT BLANK

ATI I.D. : 109595
DATE EXTRACTED : 09/10/91
DATE ANALYZED : 09/13/91
UNITS : UG/L
DILUTION FACTOR : N/A

COMPOUNDS RESULTS

Table with 2 columns: COMPOUNDS and RESULTS. Lists various polynuclear aromatic hydrocarbons and their concentrations, all below 0.30.

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE (%) NA

Handwritten notes: Hoyle, J.P., 8-30-91



QUALITY CONTROL DATA

ATI I.D. : 109595

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO PLANT
REF I.D. : 10999909

DATE ANALYZED : 09/13/91
SAMPLE MATRIX : AQUEOUS
UNITS : UG/L

COMPOUNDS	SAMPLE CONC.		SPIKED SAMPLE	% REC.	DUP.	DUP.	RPD
	RESULT	SPIKED			SAMPLE	% SPIKED	
ACENAPHTHYLENE	<0.30	300	180	60	157	52	14
PYRENE	<0.04	40	25.0	63	22.7	57	10

*Accepted
JL
4-30-91*

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

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Spiked Sample Result} - \text{Duplicate Spike Sample Result})}{\text{Average of Spiked Sample}} \times 100$$



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10959501

TEST : POLYCHLORINATED BIPHENYLS (EPA METHOD 608)

CLIENT	: EL PASO NATURAL GAS, NEW MEXICO	DATE SAMPLED	: 09/05/91
PROJECT #	: (NONE)	DATE RECEIVED	: 09/06/91
PROJECT NAME	: CHACO PLANT	DATE EXTRACTED	: 09/06/91
CLIENT I.D.	: N11953	DATE ANALYZED	: 09/11/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
AROCLOR 1016	<0.5
AROCLOR 1221	<0.5
AROCLOR 1232	<0.5
AROCLOR 1242	<0.5
AROCLOR 1248	<0.5
AROCLOR 1254	<0.5
AROCLOR 1260	<0.5

SURROGATE PERCENT RECOVERIES

ISODRIN (%)	75
-------------	----

Handwritten:
H. W. Hobb
J.S.
9-30-91



GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : POLYCHLORINATED BIPHENYLS (EPA METHOD 608)

CLIENT	: EL PASO NATURAL GAS, NEW MEXICO	ATI I.D.	: 109595
PROJECT #	: (NONE)	DATE EXTRACTED	: 09/06/91
PROJECT NAME	: CHACO PLANT	DATE ANALYZED	: 09/11/91
CLIENT I.D.	: REAGENT BLANK	UNITS	: UG/L
		DILUTION FACTOR	: N/A

COMPOUNDS	RESULTS
AROCLOR 1016	<0.5
AROCLOR 1221	<0.5
AROCLOR 1232	<0.5
AROCLOR 1242	<0.5
AROCLOR 1248	<0.5
AROCLOR 1254	<0.5
AROCLOR 1260	<0.5

SURROGATE PERCENT RECOVERIES

ISODRIN (%) 84

*Accepted
9-30-91
DJ*



QUALITY CONTROL DATA

ATI I.D. : 109595

TEST : POLYCHLORINATED BIPHENYLS (EPA METHOD 608)

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO PLANT
REF I.D. : 10999907

DATE ANALYZED : 09/11/91
SAMPLE MATRIX : AQUEOUS
UNITS : UG/L

COMPOUNDS	SAMPLE CONC.		SPIKED SAMPLE	% REC.	DUP.	DUP.	RPD
	RESULT	SPIKED			SAMPLE	% REC.	
AROCLOR 1260	<0.5	5.0	4.7	94	4.9	98	4

*Acceptable
9-30-91
J.L.*

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

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Spiked Sample Result} - \text{Duplicate Spike Sample Result})}{\text{Average of Spiked Sample}} \times 100$$



BARRINGER LABORATORIES INC.

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

19-Sep-91

ANALYTICAL TECHNOLOGIES, INC. (Phoenix)
9830 S. 51st St., Ste. B13
Phoenix, AZ 85044

Page: 1
Copy: 1 of 2
Set : 1

Attn: Mary Tyer
Project: 109594-95

PO #:

Received: 9-Sep-91 10:29

Job: 911671E

Status: Final

Sample Type: Water

Sample	Ra-226 Error	Ra-228 Error	U	U
	Total pCi/l 2σ	Total pCi/l 2σ	Total mg/l	Total pCi/l(1)
109594-1	0.2 ±0.3	0.1 ±1.1	0.0034	2.3
109595-1	0.6 ±0.4	0.6 ±1.2	0.0035	2.4



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19-Sep-91

ANALYTICAL TECHNOLOGIES, INC. (Phoenix)
9830 S. 51st St., Ste. B13
Phoenix, AZ 85044

Page: 2
Copy: 1 of 2
Set : 2

Attn: Mary Tyer
Project: 109594-95

PO #:

Received: 9-Sep-91 10:29

Job: 911671E

Status: Final

Abbreviations:

Parameters:

Ra-226 : Radium-226
Ra-228 : Radium-228
U : Uranium

Units:

pCi/l : picoCuries per liter
2σ : Counting error at the 95% confidence level, 2σ
mg/l : milligrams per liter
pCi/l(1) : picoCuries per liter based upon equilibrium cond.

Job approved by:

Signed:

Ellen La Riviere.....

Ellen La Riviere
Radiochemistry Laboratory Manager

19-Sep-91

ANALYTICAL TECHNOLOGIES, INC. (Phoenix)
 9830 S. 51st St., Ste. B13
 Phoenix, AZ 85044

Page: 1
 Copy: 1 of 2
 Set : 1

Attn: Mary Tyer
 Project: 109594-95

PO #:

Received: 9-Sep-91 10:29

Job: 911671E

Status: Final

QUALITY CONTROL REPORT

Sample Type: Water

Sample Id	Ra-226 Error		Ra-228 Error		U	U
	Total	2σ	Total	2σ	Total	Total
	pCi/l		pCi/l		mg/l	pCi/l(1)
Duplicate	0.5	±0.4	1.0	±1.5	0.0045	---
Duplicate	0.6	±0.4	0.7	±1.2	0.0042	---
Duplicate % diff.	9.1	---	18	---	4.5	---
Std (found value)	108	±2	27	±2	33	---
Std (true value)	101	---	32	---	34	---
Std % diff.	6.9	---	16	---	2.9	---
Blank	0.1	±0.2	0.0	±0.8	<0.0003	---
Spike % rec.	---	---	---	---	97	---

19-Sep-91

ANALYTICAL TECHNOLOGIES, INC. (Phoenix)
 9830 S. 51st St., Ste. B13
 Phoenix, AZ 85044

Page: 3
 Copy: 1 of 2

Attn: Mary Tyer
 Project: 109594-95

PO #:

Received: 9-Sep-91 10:29

Job: 911671E

Status: Final

QUALITY CONTROL REPORT

QUALITY CONTROL DATA SHEET

Received by: gr

Via: Federal Express

Sample Container Type: Pl L btl
 Sample Type: Water
 Preservative When Received: HNO3
 Additional Lab Preparation: None

Parameter	Method	LLD	Preservative	Analyst	Date(s) of Analysis
Ra-226	SM-705	0.2 pCi/l	HNO3	Seidel	9/17- 9/19
Ra-228	---	0.9 pCi/l	HNO3	Howard	9/13- 9/19
U	ASTMD2907	0.0003 mg/l	HNO3	Meyer	9/16- 9/17

Signed:

.....
 Mark Burkhardt, Ph.D.
 Laboratory Director

BARRINGER LABORATORIES INC.

15000 W. 6TH AVE., SUITE 300 GOLDEN, CO 80401 (303) 277-1667 FAX (303) 277-1689

19-Sep-91

ANALYTICAL TECHNOLOGIES, INC. (Phoenix)
9830 S. 51st St., Ste. B13
Phoenix, AZ 85044

Page: 3
Copy: 2 of 2

Attn: Mary Tyer
Project: 109594-95

PO #:

Received: 9-Sep-91 10:29

Job: 911671E

Status: Final

QUALITY CONTROL REPORT

QUALITY CONTROL DATA SHEET

Received by: gr

Via: Federal Express

Sample Container Type: Pl L btl
Sample Type: Water
Preservative When Received: HNO3
Additional Lab Preparation: None

Parameter	Method	LLD	Preser- vative	Analyst	Date(s) of Analysis
Ra-226	SM-705	0.2 pCi/l	HNO3	Seidel	9/17- 9/19
Ra-228	---	0.9 pCi/l	HNO3	Howard	9/13- 9/19
U	ASTMD2907	0.0003 mg/l	HNO3	Meyer	9/16- 9/17

Signed:


.....
Mark Burkhardt, Ph.D.
Laboratory Director



ATI I.D. 109658

September 26, 1991

El Paso Natural Gas Company
P.O. Box 4990
Farmington, NM 87499



Project Name/Number: Chaco Plant

Attention: John Lambdin

On 09/11/91 Analytical Technologies, Inc. received a request to analyze aqueous sample(s). The sample(s) 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.

Method 610 analyses were performed by ATI, Fort Collins. Uranium, Radium 226 and Radium 228 analyses were performed by Barringer Laboratories.

Sample N11947 was received on the 7th day after sampling. Total Dissolved Solids analysis was run 5.5 hours after the 7 day holding time had expired.

Due to Iron interference it was not possible to run Nitrate analysis by EPA Method 353.2. Nitrate content was analyzed by EPA Method 300.0. The matrix interference was not discovered until after the 48 hour holding time for Method 300.0 had expired. There will be no charge for Nitrate analysis.

Due to matrix interference Silver and Chromium analyses were run at a dilution. Detection limits were raised accordingly.

If you have any questions or comments, please do not hesitate to contact us at (602) 496-4400.

Mary Tyer
Project Manager

Robert V. Woods
Laboratory Manager

RVW:clf



CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO PLANT
ATI I.D. : 109658

DATE RECEIVED : 09/11/91
REPORT DATE : 09/26/91

ATI #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
01	N11947	AQUEOUS	09/04/91
02	TRIP BLANK	AQUEOUS	09/04/91

----- TOTALS -----

MATRIX	# SAMPLES
AQUEOUS	2

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from the date of this report. If an extended storage period is required, please contact our sample control department before the scheduled disposal date.



GENERAL CHEMISTRY RESULTS

ATI I.D. : 109658

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO PLANT

DATE RECEIVED : 09/11/91

REPORT DATE : 09/26/91

PARAMETER	UNITS	01
CHLORIDE	MG/L	6400
CYANIDE, TOTAL	MG/L	<0.01
FLUORIDE	MG/L	0.08
NITRATE AS NITROGEN	MG/L	<1
PH	UNITS	5.5
PHENOLICS, TOTAL	MG/L	4.6
SULFATE	MG/L	410
TOTAL DISSOLVED SOLIDS	MG/L	18000



GENERAL CHEMISTRY - QUALITY CONTROL

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO PLANT

ATI I.D. : 109658

Table with 9 columns: PARAMETER, UNITS, ATI I.D., SAMPLE RESULT, DUP. RESULT, RPD, SPIKED SAMPLE, SPIKE CONC, % REC. Rows include Chloride, Cyanide, Fluoride, Nitrate, PH, Phenolics, Sulfate, and Total Dissolved Solids.

Fluoride Interference Noted on Acceptable JF 9-30-91

% Recovery = (Spike Sample Result - Sample Result) / Spike Concentration X 100

RPD (Relative Percent Difference) = (Sample Result - Duplicate Result) / Average Result X 100

* Result out of limits due to sample matrix interference



METALS RESULTS

ATI I.D. : 109658

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO PLANT

DATE RECEIVED : 09/11/91

REPORT DATE : 09/26/91

PARAMETER	UNITS	01
SILVER	MG/L	<0.050
ARSENIC	MG/L	0.082
BORON	MG/L	<0.10
BARIUM	MG/L	0.737
CADMIUM	MG/L	<0.005
CHROMIUM	MG/L	<0.5
COPPER	MG/L	<0.010
IRON	MG/L	1830
MERCURY	MG/L	1.4
MANGANESE	MG/L	17.3
LEAD	MG/L	0.008
SELENIUM	MG/L	<0.005
URANIUM	MG/L	0.0034
ZINC	MG/L	0.137



METALS - QUALITY CONTROL

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO PLANT

ATI I.D. : 109658

PARAMETER	UNITS	ATI I.D.	SAMPLE RESULT	DUP. RESULT	RPD	SPIKED SAMPLE	SPIKE CONC	% REC
SILVER	MG/L	10964201	<0.010	<0.010	NA	0.091	0.100	91
ARSENIC	MG/L	10964001	<0.005	<0.005	NA	0.048	0.050	96
BORON	MG/L	10965801	<0.10	<0.10	NA	1.03	1.00	103
BARIUM	MG/L	10966201	0.218	0.219	0.4	1.17	1.00	95
CADMIUM	MG/L	10967301	<0.005	<0.005	NA	0.102	0.100	102
CHROMIUM	MG/L	10966201	<0.010	<0.010	NA	0.965	1.00	96
COPPER	MG/L	10967301	0.013	0.015	14	0.118	0.100	105
IRON	MG/L	10967301	0.024	0.024	0	1.00	1.00	98
MERCURY	MG/L	10962002	0.0174	0.0176	1	0.0419	0.0250	98
MANGANESE	MG/L	10966201	0.026	0.026	0	1.00	1.00	97
LEAD	MG/L	10966104	0.017	0.018	6	0.067	0.050	100
SELENIUM	MG/L	10964001	<0.005	<0.005	NA	0.045	0.050	90
URANIUM	MG/L	10999913	0.0045	0.0042	4.5	NA	NA	NA
ZINC	MG/L	10966201	0.094	0.092	2	0.590	0.500	99

*Acceptable
of
a-30-a1*

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

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



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10965801

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: EL PASO NATURAL GAS, NEW MEXICO	DATE SAMPLED	: 09/04/91
PROJECT #	: (NONE)	DATE RECEIVED	: 09/11/91
PROJECT NAME	: CHACO PLANT	DATE EXTRACTED	: N/A
CLIENT I.D.	: N11947	DATE ANALYZED	: 09/16/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 250

COMPOUNDS	RESULTS
BENZENE	19200 D
BROMODICHLOROMETHANE	<50
BROMOFORM	<50
BROMOMETHANE	<50
CARBON TETRACHLORIDE	<50
CHLOROBENZENE	<125
CHLOROETHANE	<50
CHLOROFORM	<50
CHLOROMETHANE	<50
DIBROMOCHLOROMETHANE	<50
2-CHLOROETHYL VINYL ETHER	<125
1,3-DICHLOROBENZENE	<125
1,2 & 1,4-DICHLOROBENZENE	<125
DICHLORODIFLUOROMETHANE	<50
1,1-DICHLOROETHANE	<50
1,2-DICHLOROETHANE	<50
1,1-DICHLOROETHENE	<50
1,2-DICHLOROETHENE (TOTAL)	<50
1,2-DICHLOROPROPANE	<50
CIS-1,3-DICHLOROPROPENE	<50
TRANS-1,3-DICHLOROPROPENE	<50
ETHYLBENZENE	200
METHYLENE CHLORIDE	<500
1,1,2,2-TETRACHLOROETHANE	<50
TETRACHLOROETHENE	<50
TOLUENE	14100
1,1,1-TRICHLOROETHANE	<50
1,1,2-TRICHLOROETHANE	<50
TRICHLOROETHENE	<50
TRICHLOROFLUOROMETHANE	<125
VINYL CHLORIDE	<50
TOTAL XYLENES	1800
TRICHLOROTRIFLUOROETHANE	<500

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	84
BROMOFLUOROBENZENE (%)	88

D indicates compound analyzed at a greater dilution



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10965802

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: EL PASO NATURAL GAS, NEW MEXICO	DATE SAMPLED	: 09/04/91
PROJECT #	: (NONE)	DATE RECEIVED	: 09/11/91
PROJECT NAME	: CHACO PLANT	DATE EXTRACTED	: N/A
CLIENT I.D.	: TRIP BLANK	DATE ANALYZED	: 09/16/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
?-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

Handwritten signature and date: 9-70-91

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	85
BROMOFLUOROBENZENE (%)	94



GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
 PROJECT # : (NONE)
 PROJECT NAME : CHACO PLANT
 CLIENT I.D. : REAGENT BLANK

ATI I.D. : 109658
 DATE EXTRACTED : 09/16/91
 DATE ANALYZED : 09/16/91
 UNITS : UG/L
 DILUTION FACTOR : N/A

COMPOUNDS	RESULTS
-----------	---------

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	89
BROMOFLUOROBENZENE (%)	95

*Accepted
9-30-91*



QUALITY CONTROL DATA

ATI I.D. : 109658

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO PLANT
REF I.D. : 10999913

DATE ANALYZED : 09/16/91
SAMPLE MATRIX : AQUEOUS
UNITS : UG/L

Table with 8 columns: COMPOUNDS, SAMPLE RESULT, CONC. SPIKED, SPIKED SAMPLE, % REC., DUP. SPIKED SAMPLE, DUP. % REC., RPD. Rows include 1,1-DICHLOROETHENE, TRICHLOROETHENE, TETRACHLOROETHENE, BENZENE, BROMODICHLOROMETHANE, CHLOROFORM, 1,1,1-TRICHLOROETHANE, TOLUENE, CHLOROBENZENE, M-XYLENE.

Handwritten note: Accepted 9-30-91 DP

% Recovery = (Spike Sample Result - Sample Result) / Spike Concentration X 100

RPD (Relative % Difference) = (Spiked Sample Result - Duplicate Spike Sample Result) / Average of Spiked Sample X 100



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10965801

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT	: EL PASO NATURAL GAS, NEW MEXICO	DATE SAMPLED	: 09/04/91
PROJECT #	: (NONE)	DATE RECEIVED	: 09/11/91
PROJECT NAME	: CHACO PLANT	DATE EXTRACTED	: 09/11/91
CLIENT I.D.	: N11947	DATE ANALYZED	: 09/16/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
NAPHTHALENE	7.0
ACENAPHTHYLENE	<0.30
ACENAPHTHENE	<0.50
FLUORENE	0.09
PHENANTHRENE	0.13
ANTHRACENE	<0.01
FLUORANTHENE	0.14
PYRENE	<0.04
BENZO(A)ANTHRACENE	<0.01
CHRYSENE	<0.02
BENZO(B)FLUORANTHENE	<0.01
BENZO(K)FLUORANTHENE	<0.01
BENZO(A)PYRENE	<0.01
DIBENZ(a,h)ANTHRACENE	<0.10
BENZO(g,h,i)PERYLENE	<0.04
INDENO(1,2,3-CD)PYRENE	<0.03

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE (%)	NA
------------------------	----



GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO PLANT
CLIENT I.D. : REAGENT BLANK

ATI I.D. : 109658
DATE EXTRACTED : 09/11/91
DATE ANALYZED : 09/16/91
UNITS : UG/L
DILUTION FACTOR : N/A

Table with 2 columns: COMPOUNDS and RESULTS. Lists various polynuclear aromatic hydrocarbons and their corresponding results, all showing values less than 0.30.

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE (%) NA

Handwritten signature and date: 9-70-91



QUALITY CONTROL DATA

ATI I.D. : 109658

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO PLANT
REF I.D. : 10999912

DATE ANALYZED : 09/16/91
SAMPLE MATRIX : AQUEOUS
UNITS : UG/L

Table with 8 columns: COMPOUNDS, SAMPLE RESULT, CONC. SPIKED, SPIKED SAMPLE, % REC., DUP. SPIKED SAMPLE, DUP. % REC., RPD. Rows include ACENAPHTHYLENE and PYRENE.

Handwritten note: 100

Handwritten note: Acceptable 7-30-91

% Recovery = (Spike Sample Result - Sample Result) / Spike Concentration X 100

RPD (Relative % Difference) = (Spiked Sample Result - Duplicate Spike Sample Result) / Average of Spiked Sample X 100



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10965801

TEST : POLYCHLORINATED BIPHENYLS (EPA METHOD 608)

CLIENT	: EL PASO NATURAL GAS, NEW MEXICO	DATE SAMPLED	: 09/04/91
PROJECT #	: (NONE)	DATE RECEIVED	: 09/11/91
PROJECT NAME	: CHACO PLANT	DATE EXTRACTED	: 09/11/91
CLIENT I.D.	: N11947	DATE ANALYZED	: 09/24/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 10

COMPOUNDS	RESULTS
AROCLOR 1016	<5.0
AROCLOR 1221	<5.0
AROCLOR 1232	<5.0
AROCLOR 1242	<5.0
AROCLOR 1248	<5.0
AROCLOR 1254	<5.0
AROCLOR 1260	<5.0

SURROGATE PERCENT RECOVERIES

ISODRIN (%)	60
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GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : POLYCHLORINATED BIPHENYLS (EPA METHOD 608)

CLIENT	: EL PASO NATURAL GAS, NEW MEXICO	ATI I.D.	: 109658
PROJECT #	: (NONE)	DATE EXTRACTED	: 09/11/91
PROJECT NAME	: CHACO PLANT	DATE ANALYZED	: 09/13/91
CLIENT I.D.	: REAGENT BLANK	UNITS	: UG/L
		DILUTION FACTOR	: N/A

COMPOUNDS	RESULTS
AROCLOR 1016	<0.5
AROCLOR 1221	<0.5
AROCLOR 1232	<0.5
AROCLOR 1242	<0.5
AROCLOR 1248	<0.5
AROCLOR 1254	<0.5
AROCLOR 1260	<0.5

SURROGATE PERCENT RECOVERIES

ISODRIN (%) 92

*at 10/13/91
of
a-30-a1*



QUALITY CONTROL DATA

ATI I.D. : 109658

TEST : POLYCHLORINATED BIPHENYLS (EPA METHOD 608)

CLIENT : EL PASO NATURAL GAS, NEW MEXICO

PROJECT # : (NONE)

DATE ANALYZED : 09/14/91

PROJECT NAME : CHACO PLANT

SAMPLE MATRIX : AQUEOUS

REF I.D. : 10961701

UNITS : UG/L

COMPOUNDS	SAMPLE CONC. RESULT	CONC. SPIKED	SPIKED SAMPLE	% REC.	DUP.	DUP.	RPD
					SPIKED	% REC.	
AROCLOR 1260	<0.5	5.0	4.7	94	5.0	100	6

*Acceptable
9-30-91
D*

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

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Spiked Sample Result} - \text{Duplicate Spike Sample Result})}{\text{Average of Spiked Sample}} \times 100$$



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

24-Sep-91

ANALYTICAL TECHNOLOGIES, INC. (Phoenix)
9830 S. 51st St., Ste. B13
Phoenix, AZ 85044

Page: 1
Copy: 1 of 2
Set : 1

Attn:
Project: 109658

PO #:

Received: 12-Sep-91 17:41

Job: 911705E

Status: Final

Sample Type: Water

Sample	Ra-226 Total pCi/l	Error 2σ	Ra-228 Total pCi/l	Error 2σ	U Total mg/l	U Total pCi/l(1)
109658-1	0.7	±0.5	1.4	±1.8	0.0034	2.3



BARRINGER LABORATORIES INC.

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

24-Sep-91

ANALYTICAL TECHNOLOGIES, INC. (Phoenix)
9830 S. 51st St., Ste. B13
Phoenix, AZ 85044

Page: 2
Copy: 1 of 2
Set : 2

Attn:
Project: 109658

PO #:

Received: 12-Sep-91 17:41

Job: 911705E

Status: Final

Abbreviations:

Parameters:

Ra-226 : Radium-226
Ra-228 : Radium-228
U : Uranium

Units:

pCi/l : picoCuries per liter
2σ : Counting error at the 95% confidence level, 2σ
mg/l : milligrams per liter
pCi/l(1) : picoCuries per liter based upon equilibrium cond.

Job approved by:

Signed: *Ellen La Riviere*
.....
Ellen La Riviere
Radiochemistry Laboratory Manager



BARRINGER LABORATORIES INC.

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

24-Sep-91

ANALYTICAL TECHNOLOGIES, INC. (Phoenix)
9830 S. 51st St., Ste. B13
Phoenix, AZ 85044

Page: 2
Copy: 1 of 2
Set : 2

Attn:
Project: 109658

PO #:

Received: 12-Sep-91 17:41

Job: 911705E

Status: Final

QUALITY CONTROL REPORT

Abbreviations:

Parameters:

Ra-226 : Radium-226
Ra-228 : Radium-228
U : Uranium

Units:

pCi/l : picoCuries per liter
2σ : Counting error at the 95% confidence level, 2σ
mg/l : milligrams per liter

Job approved by:

Signed:


.....

Approved
Quality Assurance Department

24-Sep-91

ANALYTICAL TECHNOLOGIES, INC. (Phoenix)
 9830 S. 51st St., Ste. B13
 Phoenix, AZ 85044

Page: 3
 Copy: 1 of 2

Attn:
 Project: 109658

PO #:

Received: 12-Sep-91 17:41

Job: 911705E

Status: Final

QUALITY CONTROL REPORT

QUALITY CONTROL DATA SHEET

Received by: gr

Via: Federal Express

Sample Container Type: 3 Pl L btl
 Sample Type: Water
 Preservative When Received: HNO3
 Additional Lab Preparation: None

Parameter	Method	LLD	Preservative	Analyst	Date(s) of Analysis
Ra-226	SM-705	0.2 pCi/l	HNO3	Seidel	9/19- 9/24
Ra-228	904.0	0.9 pCi/l	HNO3	Howard	9/16- 9/20
U	ASTMD2907	0.0003 mg/l	HNO3	Meyer	9/18- 9/19

Signed:



.....
 Mark Burkhardt, Ph.D.
 Laboratory Director



Analytical **Technologies**, Inc.

9830 S. 51st Street Suite B-113 Phoenix, AZ 85044 (602) 496-4400

ATI I.D. 109640

September 26, 1991

El Paso Natural Gas Company
P.O. Box 4990
Farmington, NM 87499



Project Name/Number: Chaco Plant

Attention: John Lambdin

On 09/10/91, Analytical Technologies, Inc. received a request to analyze aqueous sample(s). The sample(s) 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.

Method 610 analyses were performed by ATI, Fort Collins. Uranium, Radium 226 and Radium 228 analyses were performed by Barringer Laboratories.

If you have any questions or comments, please do not hesitate to contact us at (602) 496-4400.

E. Proffitt for:

Mary Tyer
Project Manager

Robert V. Woods

Robert V. Woods
Laboratory Manager

Lorraine Davis

Lorraine Davis
QA Coordinator

RVW:clf
Enclosure



CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO PLANT
ATI I.D. : 109640

DATE RECEIVED : 09/10/91
REPORT DATE : 09/26/91

ATI #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
01	N11939	AQUEOUS	09/08/91
02	TRIP BLANK	AQUEOUS	09/08/91

----- TOTALS -----

MATRIX	# SAMPLES
AQUEOUS	2

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from the date of this report. If an extended storage period is required, please contact our sample control department before the scheduled disposal date.







GENERAL CHEMISTRY RESULTS

ATI I.D. : 109640

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO PLANT

DATE RECEIVED : 09/10/91

REPORT DATE : 09/26/91

PARAMETER	UNITS	01
CHLORIDE	MG/L	<0.5
CYANIDE, TOTAL	MG/L	<0.01
FLUORIDE	MG/L	<0.05
NITRATE AS NITROGEN	MG/L	<0.06
PH	UNITS	5.8
PHENOLICS, TOTAL	MG/L	0.17
SULFATE	MG/L	1.6
TOTAL DISSOLVED SOLIDS	MG/L	10

Accepted
DL
9-30-91



GENERAL CHEMISTRY - QUALITY CONTROL

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO PLANT

ATI I.D. : 109640

Table with 9 columns: PARAMETER, UNITS, ATI I.D., SAMPLE RESULT, DUP. RESULT, RPD, SPIKED SAMPLE, SPIKE CONC, % REC. Rows include Chloride, Cyanide, Fluoride, Nitrate, PH, Phenolics, Sulfate, and Total Dissolved Solids.

Acceptable
JL
8-30-91

% Recovery = (Spike Sample Result - Sample Result) / Spike Concentration X 100

RPD (Relative Percent Difference) = (Sample Result - Duplicate Result) / Average Result X 100



METALS RESULTS

ATI I.D. : 109640

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO PLANT

DATE RECEIVED : 09/10/91

REPORT DATE : 09/26/91

PARAMETER	UNITS	01
SILVER	MG/L	<0.010
ARSENIC	MG/L	<0.005
BORON	MG/L	<0.10
BARIUM	MG/L	0.077
CADMIUM	MG/L	<0.005
CHROMIUM	MG/L	0.017
COPPER	MG/L	<0.010
IRON	MG/L	0.653
MERCURY	MG/L	0.0003
MANGANESE	MG/L	0.020
LEAD	MG/L	<0.002
SELENIUM	MG/L	<0.005
URANIUM	MG/L	0.0044
ZINC	MG/L	0.022



METALS - QUALITY CONTROL

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
 PROJECT # : (NONE)
 PROJECT NAME : CHACO PLANT

ATI I.D. : 109640

PARAMETER	UNITS	ATI I.D.	SAMPLE RESULT	DUP. RESULT	RPD	SPIKED SAMPLE	SPIKE CONC	% REC
SILVER	MG/L	10961701	<0.010	<0.010	NA	0.543	0.500	109
ARSENIC	MG/L	10964001	<0.005	<0.005	NA	0.048	0.050	96
BORON	MG/L	10999910	<0.10	<0.10	NA	1.02	1.00	102
BARIUM	MG/L	10964201	0.014	0.014	0	0.109	0.100	95
CADMIUM	MG/L	10964201	<0.005	<0.005	NA	0.100	0.100	100
CHROMIUM	MG/L	10964201	0.026	0.027	4	0.134	0.100	108
COPPER	MG/L	10964201	<0.010	<0.010	NA	0.098	0.100	98
IRON	MG/L	10961701	0.198	0.200	1	1.12	1.00	92
MERCURY	MG/L	10970302	0.0002	0.0002	0	0.0050	0.0050	96
MANGANESE	MG/L	10964201	<0.010	<0.010	NA	0.099	0.100	99
LEAD	MG/L	10964001	<0.002	<0.002	NA	0.051	0.050	102
SELENIUM	MG/L	10964001	<0.005	<0.005	NA	0.045	0.050	90
URANIUM	MG/L	10999913	0.0045	0.0042	4.5	NA	NA	NA
ZINC	MG/L	10964201	<0.010	<0.010	NA	0.108	0.100	108

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

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

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10964001

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: EL PASO NATURAL GAS, NEW MEXICO	DATE SAMPLED	: 09/08/91
PROJECT #	: (NONE)	DATE RECEIVED	: 09/10/91
PROJECT NAME	: CHACO PLANT	DATE EXTRACTED	: N/A
CLIENT I.D.	: N11939	DATE ANALYZED	: 09/16/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 25

COMPOUNDS	RESULTS
BENZENE	710
BROMODICHLOROMETHANE	<5.0
BROMOFORM	<5.0
BROMOMETHANE	<5.0
CARBON TETRACHLORIDE	<5.0
CHLOROBENZENE	<12.5
CHLOROETHANE	<5.0
CHLOROFORM	<5.0
CHLOROMETHANE	<5.0
DIBROMOCHLOROMETHANE	<5.0
?-CHLOROETHYL VINYL ETHER	<12.5
., 3-DICHLOROBENZENE	<12.5
1, 2 & 1, 4-DICHLOROBENZENE	<12.5
DICHLORODIFLUOROMETHANE	<5.0
1, 1-DICHLOROETHANE	<5.0
1, 2-DICHLOROETHANE	<5.0
1, 1-DICHLOROETHENE	<5.0
1, 2-DICHLOROETHENE (TOTAL)	<5.0
1, 2-DICHLOROPROPANE	<5.0
CIS-1, 3-DICHLOROPROPENE	<5.0
TRANS-1, 3-DICHLOROPROPENE	<5.0
ETHYLBENZENE	<12.5
METHYLENE CHLORIDE	<50.0
1, 1, 2, 2-TETRACHLOROETHANE	<5.0
TETRACHLOROETHENE	<5.0
TOLUENE	600
1, 1, 1-TRICHLOROETHANE	<5.0
1, 1, 2-TRICHLOROETHANE	<5.0
TRICHLOROETHENE	<5.0
TRICHLOROFLUOROMETHANE	<12.5
VINYL CHLORIDE	<5.0
TOTAL XYLENES	120
TRICHLOROTRIFLUOROETHANE	<50.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	95
BROMOFLUOROBENZENE (%)	104



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10964002

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: EL PASO NATURAL GAS, NEW MEXICO	DATE SAMPLED	: 09/08/91
PROJECT #	: (NONE)	DATE RECEIVED	: 09/10/91
PROJECT NAME	: CHACO PLANT	DATE EXTRACTED	: N/A
CLIENT I.D.	: TRIP BLANK	DATE ANALYZED	: 09/16/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

*Hayes/bh
9-70-91*

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	92
BROMOFLUOROBENZENE (%)	106



GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
 PROJECT # : (NONE)
 PROJECT NAME : CHACO PLANT
 CLIENT I.D. : REAGENT BLANK

ATI I.D. : 109640
 DATE EXTRACTED : 09/16/91
 DATE ANALYZED : 09/16/91
 UNITS : UG/L
 DILUTION FACTOR : N/A

COMPOUNDS	RESULTS
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BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	89
BROMOFLUOROBENZENE (%)	95

Acceptable
 9-30-91
 Q.P.



QUALITY CONTROL DATA

ATI I.D. : 109640

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO PLANT
REF I.D. : 10999912

DATE ANALYZED : 09/16/91
SAMPLE MATRIX : AQUEOUS
UNITS : UG/L

Table with 8 columns: COMPOUNDS, SAMPLE RESULT, CONC. SPIKED, SPIKED SAMPLE, % REC., DUP. SPIKED SAMPLE, DUP. % REC., RPD. Rows include 1,1-DICHLOROETHENE, TRICHLOROETHENE, TETRACHLOROETHENE, BENZENE, BROMODICHLOROMETHANE, CHLOROFORM, 1,1,1-TRICHLOROETHANE, TOLUENE, CHLOROBENZENE, M-XYLENE.

Handwritten note: H. Campbell 9-20-91 D.P.

% Recovery = (Spike Sample Result - Sample Result) / Spike Concentration X 100

RPD (Relative % Difference) = (Spiked Sample Result - Duplicate Spike Sample Result) / Average of Spiked Sample X 100



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10964001

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT	: EL PASO NATURAL GAS, NEW MEXICO	DATE SAMPLED	: 09/08/91
PROJECT #	: (NONE)	DATE RECEIVED	: 09/10/91
PROJECT NAME	: CHACO PLANT	DATE EXTRACTED	: 09/13/91
CLIENT I.D.	: N11939	DATE ANALYZED	: 09/16/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 10

COMPOUNDS	RESULTS
NAPHTHALENE	100
ACENAPHTHYLENE	<3
ACENAPHTHENE	<5
FLUORENE	28
PHENANTHRENE	27
ANTHRACENE	<0.10
FLUORANTHENE	23
PYRENE	<0.40
BENZO(A)ANTHRACENE	<0.10
CHRYSENE	<0.20
BENZO(B)FLUORANTHENE	<0.10
BENZO(K)FLUORANTHENE	<0.10
BENZO(A)PYRENE	<0.10
DIBENZ(a,h)ANTHRACENE	<1
BENZO(g,h,i)PERYLENE	<0.40
INDENO(1,2,3-CD)PYRENE	<0.30

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE (%)	NA
------------------------	----



GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO PLANT
CLIENT I.D. : REAGENT BLANK

ATI I.D. : 109640
DATE EXTRACTED : 09/13/91
DATE ANALYZED : 09/16/91
UNITS : UG/L
DILUTION FACTOR : N/A

Table with 2 columns: COMPOUNDS and RESULTS. Lists various polynuclear aromatic hydrocarbons and their concentrations, all below 0.30.

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE (%) NA

Handwritten notes: H. Campbell, 4-70-a1



QUALITY CONTROL DATA

ATI I.D. : 109640

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO PLANT
REF I.D. : 10964001

DATE ANALYZED : 09/16/91
SAMPLE MATRIX : AQUEOUS
UNITS : UG/L

Table with 8 columns: COMPOUNDS, SAMPLE CONC. RESULT, SAMPLE CONC. SPIKED, SPIKED SAMPLE REC., % SPIKED REC., DUP. SPIKED SAMPLE REC., DUP. % SPIKED REC., RPD. Rows include ACENAPHTHYLENE and PYRENE.

Acceptable
9-31-91

% Recovery = (Spike Sample Result - Sample Result) / Spike Concentration X 100

RPD (Relative % Difference) = (Spiked Sample Result - Duplicate Spike Sample Result) / Average of Spiked Sample X 100



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10964001

TEST : POLYCHLORINATED BIPHENYLS (EPA METHOD 608)

CLIENT	: EL PASO NATURAL GAS, NEW MEXICO	DATE SAMPLED	: 09/08/91
PROJECT #	: (NONE)	DATE RECEIVED	: 09/10/91
PROJECT NAME	: CHACO PLANT	DATE EXTRACTED	: 09/11/91
CLIENT I.D.	: N11939	DATE ANALYZED	: 09/24/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 10

COMPOUNDS	RESULTS
AROCLOR 1016	<5.0
AROCLOR 1221	<5.0
AROCLOR 1232	<5.0
AROCLOR 1242	<5.0
AROCLOR 1248	<5.0
AROCLOR 1254	<5.0
AROCLOR 1260	<5.0

SURROGATE PERCENT RECOVERIES

ISODRIN (%)	102
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GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : POLYCHLORINATED BIPHENYLS (EPA METHOD 608)

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO PLANT
CLIENT I.D. : REAGENT BLANK

ATI I.D. : 109640
DATE EXTRACTED : 09/11/91
DATE ANALYZED : 09/13/91
UNITS : UG/L
DILUTION FACTOR : N/A

COMPOUNDS

RESULTS

AROCLOR 1016	<0.5
AROCLOR 1221	<0.5
AROCLOR 1232	<0.5
AROCLOR 1242	<0.5
AROCLOR 1248	<0.5
AROCLOR 1254	<0.5
AROCLOR 1260	<0.5

SURROGATE PERCENT RECOVERIES

ISODRIN (%) 92

Acceptable
JF
9-30-91



QUALITY CONTROL DATA

ATI I.D. : 109640

TEST : POLYCHLORINATED BIPHENYLS (EPA METHOD 608)

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO PLANT
REF I.D. : 10961701

DATE ANALYZED : 09/14/91
SAMPLE MATRIX : AQUEOUS
UNITS : UG/L

Table with columns: COMPOUNDS, SAMPLE CONC. RESULT, SPIKED SAMPLE, % SPIKED REC., DUP. SPIKED SAMPLE, DUP. % REC., RPD. Row 1: AROCLOR 1260, <0.5, 5.0, 4.7, 94, 5.0, 100, 6

Acceptable
9-30-91
JL

% Recovery = (Spike Sample Result - Sample Result) / Spike Concentration X 100

RPD (Relative % Difference) = (Spiked Sample Result - Duplicate Spike Sample Result) / Average of Spiked Sample X 100



BARRINGER LABORATORIES INC.

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

24-Sep-91

ANALYTICAL TECHNOLOGIES, INC. (Phoenix)
9830 S. 51st St., Ste. B13
Phoenix, AZ 85044

Page: 1
Copy: 1 of 2
Set : 1

Attn:
Project: 109640

PO #:

Received: 11-Sep-91 16:00

Job: 911684E

Status: Final

Sample Type: Water

Sample	Ra-226 Error	Ra-228 Error	U	U
	Total pCi/l 2σ	Total pCi/l 2σ	Total mg/l	Total pCi/l(1)
109640-1	0.2 ±0.3	0.0 ±1.1	0.0044	3.0



BARRINGER LABORATORIES INC.

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24-Sep-91

ANALYTICAL TECHNOLOGIES, INC. (Phoenix)
9830 S. 51st St., Ste. B13
Phoenix, AZ 85044

Page: 2
Copy: 1 of 2
Set : 2

Attn:
Project: 109640

PO #:

Received: 11-Sep-91 16:00

Job: 911684E

Status: Final

Abbreviations:

Parameters:

Ra-226 : Radium-226
Ra-228 : Radium-228
U : Uranium

Units:

pCi/l : picoCuries per liter
2σ : Counting error at the 95% confidence level, 2σ
mg/l : milligrams per liter
pCi/l(1) : picoCuries per liter based upon equilibrium cond.

Job approved by:

Signed: *Ellen La Riviere*
.....
Ellen La Riviere
Radiochemistry Laboratory Manager



BARRINGER LABORATORIES INC.

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

24-Sep-91

ANALYTICAL TECHNOLOGIES, INC. (Phoenix)
9830 S. 51st St., Ste. B13
Phoenix, AZ 85044

Page: 1
Copy: 1 of 2
Set: 1

Attn:
Project: 109640

PO #:

Received: 11-Sep-91 16:00

Job: 911684E

Status: Final

QUALITY CONTROL REPORT

Sample Type: Water

Sample Id	Ra-226		Ra-228		U
	Total	Error	Total	Error	Total
	pCi/l	2σ	pCi/l	2σ	mg/l
Duplicate	3.1	±1.8	0.7	±1.1	0.0045
Duplicate	1.1	±1.3	0.0	±1.1	0.0042
Duplicate % diff.	48	---	100	---	4.5
Std (found value)	109	±4	29	±2	34
Std (true value)	101	---	32	---	34
Std % diff.	7.9	---	9.4	---	0.0
Blank	0.1	±0.2	0.0	±0.8	<0.0003
Spike % rec.	---	---	---	---	97



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

24-Sep-91

ANALYTICAL TECHNOLOGIES, INC. (Phoenix)
9830 S. 51st St., Ste. B13
Phoenix, AZ 85044

Page: 2
Copy: 1 of 2
Set : 2

Attn:
Project: 109640

PO #:

Received: 11-Sep-91 16:00

Job: 911684E

Status: Final

QUALITY CONTROL REPORT

Abbreviations:

Parameters:

Ra-226 : Radium-226
Ra-228 : Radium-228
U : Uranium

Units:

pCi/l : picoCuries per liter
2σ : Counting error at the 95% confidence level, 2σ
mg/l : milligrams per liter

Job approved by:

Signed: 
.....
Approved
Quality Assurance Department



BARRINGER LABORATORIES INC.

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

24-Sep-91

ANALYTICAL TECHNOLOGIES, INC. (Phoenix)
9830 S. 51st St., Ste. B13
Phoenix, AZ 85044

Page: 3
Copy: 1 of 2

Attn:
Project: 109640

PO #:

Received: 11-Sep-91 16:00

Job: 911684E

Status: Final

QUALITY CONTROL REPORT

QUALITY CONTROL DATA SHEET

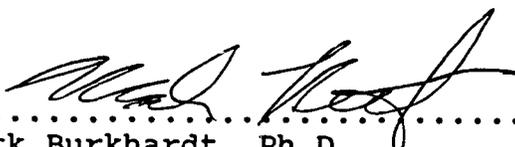
Received by: gr

Via: Fed Express

Sample Container Type: L pl bottles
Sample Type: Water
Preservative When Received: HNO3
Additional Lab Preparation: none

Parameter	Method	LLD	Preservative	Analyst	Date(s) of Analysis
Ra-226	SM-705	0.2 pCi/l	HNO3	Seidel	9/19- 9/24
Ra-228	904.0	0.9 pCi/l	HNO3	Howard	9/13- 9/18
U	ASTMD2907	0.0003 mg/l	HNO3	Meyer	9/16- 9/17

Signed:



 Mark Burkhardt, Ph.D.
 Laboratory Director



Analytical **Technologies, Inc.**

9830 S. 51st Street Suite B-113 Phoenix, AZ 85044 (602) 496-4400

ATI I.D. 109618

September 26, 1991

El Paso Natural Gas Company
P.O. Box 4990
Farmington, NM 87499



Project Name/Number: Chaco Plant

Attention: John Lambdin

On 09/07/91, Analytical Technologies, Inc. received a request to analyze aqueous sample(s). The sample(s) 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.

Method 610 analyses were performed by ATI, Fort Collins. Uranium, Radium 226 and Radium 228 analyses were performed by Barringer Laboratories.

If you have any questions or comments, please do not hesitate to contact us at (602) 496-4400.

Mary Tyer
Project Manager

Robert V. Woods
Laboratory Manager

RVW:clf
Enclosure

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO PLANT
ATI I.D. : 109618

DATE RECEIVED : 09/07/91
REPORT DATE : 09/26/91

ATI #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
01	N11937	AQUEOUS	09/06/91
02	TRIP BLANK	AQUEOUS	09/06/91

----- TOTALS -----

MATRIX	# SAMPLES
-----	-----
AQUEOUS	2

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from the date of this report. If an extended storage period is required, please contact our sample control department before the scheduled disposal date.

GENERAL CHEMISTRY RESULTS

ATI I.D. : 109618

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO PLANT

DATE RECEIVED : 09/07/91

REPORT DATE : 09/26/91

PARAMETER	UNITS	01
CHLORIDE	MG/L	440
CYANIDE, TOTAL	MG/L	<0.01
FLUORIDE	MG/L	0.46
NITRATE AS NITROGEN	MG/L	0.33
PH	UNITS	7.4
PHENOLICS, TOTAL	MG/L	<0.02
SULFATE	MG/L	190
TOTAL DISSOLVED SOLIDS	MG/L	1100

GENERAL CHEMISTRY - QUALITY CONTROL

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
 PROJECT # : (NONE)
 PROJECT NAME : CHACO PLANT

ATI I.D. : 109618

PARAMETER	UNITS	ATI I.D.	SAMPLE RESULT	DUP. RESULT	RPD	SPIKED SAMPLE	SPIKE CONC	% REC
CHLORIDE	MG/L	10964904	470	470	0	970	500	100
CYANIDE, TOTAL	MG/L	10960101	<0.01	<0.01	NA	0.25	0.25	100
FLUORIDE	MG/L	10960101	0.22	0.22	0	0.41	0.20	95
NITRATE AS NITROGEN	MG/L	10964201	3.7	3.7	0	13.8	10.0	101
PH	UNITS	10960204	7.6	7.6	0	NA	NA	NA
PHENOLICS, TOTAL	MG/L	10964201	<0.02	<0.02	NA	0.23	0.25	92
SULFATE	MG/L	10964001	1.6	1.6	0	3.4	2.0	90
TOTAL DISSOLVED SOLIDS	MG/L	10957201	860	860	0	NA	NA	NA

*Acceptable
 JP-
 9-20-21*

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

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

METALS RESULTS

ATI I.D. : 109618

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO PLANT

DATE RECEIVED : 09/07/91

REPORT DATE : 09/26/91

PARAMETER	UNITS	01
SILVER	MG/L	<0.010
ARSENIC	MG/L	<0.005
BORON	MG/L	<0.10
BARIUM	MG/L	0.158
CADMIUM	MG/L	<0.005
CHROMIUM	MG/L	<0.010
COPPER	MG/L	0.174
IRON	MG/L	0.974
MERCURY	MG/L	<0.0002
MANGANESE	MG/L	0.219
LEAD	MG/L	0.004
SELENIUM	MG/L	<0.005
URANIUM	MG/L	0.0105
ZINC	MG/L	0.183



CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO PLANT

ATI I.D. : 109618

Table with 9 columns: PARAMETER, UNITS, ATI I.D., SAMPLE RESULT, DUP. RESULT, RPD, SPIKED SAMPLE CONC, SPIKE CONC, % REC. Rows include SILVER, ARSENIC, BORON, BARIUM, CADMIUM, CHROMIUM, COPPER, IRON, MERCURY, MANGANESE, LEAD, SELENIUM, URANIUM, ZINC.

Acceptable
S-X-90-90

% Recovery = (Spike Sample Result - Sample Result) / Spike Concentration X 100

RPD (Relative Percent Difference) = (Sample Result - Duplicate Result) / Average Result X 100



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10961801

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: EL PASO NATURAL GAS, NEW MEXICO	DATE SAMPLED	: 09/06/91
PROJECT #	: (NONE)	DATE RECEIVED	: 09/07/91
PROJECT NAME	: CHACO PLANT	DATE EXTRACTED	: N/A
CLIENT I.D.	: N11937	DATE ANALYZED	: 09/09/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

-----	-----
COMPOUNDS	RESULTS
-----	-----

BENZENE	<0.5
BROMODICHLOROMETHANE	2.3
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	21.5
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROENZENE	<0.5
1,2 & 1,4-DICHLOROENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	108
BROMOFLUOROBENZENE (%)	82



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10961802

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: EL PASO NATURAL GAS, NEW MEXICO	DATE SAMPLED	: 09/06/91
PROJECT #	: (NONE)	DATE RECEIVED	: 09/07/91
PROJECT NAME	: CHACO PLANT	DATE EXTRACTED	: N/A
CLIENT I.D.	: TRIP BLANK	DATE ANALYZED	: 09/09/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

-----	-----
COMPOUNDS	RESULTS
-----	-----

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	95
BROMOFLUOROBENZENE (%)	86

Acceptable
J.F.
9-30-91



REAGENT BLANK

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: EL PASO NATURAL GAS, NEW MEXICO	ATI I.D.	: 109618
PROJECT #	: (NONE)	DATE EXTRACTED	: 09/09/91
PROJECT NAME	: CHACO PLANT	DATE ANALYZED	: 09/09/91
CLIENT I.D.	: REAGENT BLANK	UNITS	: UG/L
		DILUTION FACTOR	: N/A

COMPOUNDS	RESULTS
-----------	---------

BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	87
BROMOFLUOROBENZENE (%)	86

Acceptable
J.R.
9-31-90



QUALITY CONTROL DATA

ATI I.D. : 109618

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : EL PASO NATURAL GAS, NEW MEXICO

PROJECT # : (NONE)

DATE ANALYZED : 09/09/91

PROJECT NAME : CHACO PLANT

SAMPLE MATRIX : AQUEOUS

REF I.D. : 10999907

UNITS : UG/L

COMPOUNDS	SAMPLE CONC.		SPIKED SAMPLE	DUP. % SPIKED		RPD
	RESULT	SPIKED		REC.	REC.	
1,1-DICHLOROETHENE	<0.2	20	21	105	23	9
TRICHLOROETHENE	<0.2	20	18	90	19	5
TETRACHLOROETHENE	<0.2	20	24	120	24	0
BENZENE	<0.5	20	18	90	17	6
BROMODICHLOROMETHANE	<0.2	20	19	95	20	5
CHLOROFORM	<0.2	20	23	115	24	4
1,1,1-TRICHLOROETHANE	<0.2	20	20	100	21	5
TOLUENE	<0.5	20	20	100	20	0
CHLOROBENZENE	<0.2	20	21	105	22	5
M-XYLENE	<0.5	20	18	90	18	0

*Accepted
J.R.
9-30-91*

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

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Spiked Sample Result} - \text{Duplicate Spike Sample Result})}{\text{Average of Spiked Sample}} \times 100$$



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10961801

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT	: EL PASO NATURAL GAS, NEW MEXICO	DATE SAMPLED	: 09/06/91
PROJECT #	: (NONE)	DATE RECEIVED	: 09/07/91
PROJECT NAME	: CHACO PLANT	DATE EXTRACTED	: 09/10/91
CLIENT I.D.	: N11937	DATE ANALYZED	: 09/13/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
NAPHTHALENE	<0.30
ACENAPHTHYLENE	<0.30
ACENAPHTHENE	<0.50
FLUORENE	<0.04
PHENANTHRENE	0.14
ANTHRACENE	<0.01
FLUORANTHENE	0.13
PYRENE	<0.04
BENZO(A)ANTHRACENE	<0.01
CHRYSENE	<0.02
BENZO(B)FLUORANTHENE	0.09
ENZO(K)FLUORANTHENE	<0.01
BENZO(A)PYRENE	<0.01
DIBENZ(a,h)ANTHRACENE	<0.10
BENZO(g,h,i)PERYLENE	<0.04
INDENO(1,2,3-CD)PYRENE	<0.03

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE (%)	NA
------------------------	----



REAGENT BLANK

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT	: EL PASO NATURAL GAS, NEW MEXICO	ATI I.D.	: 109618
PROJECT #	: (NONE)	DATE EXTRACTED	: 09/10/91
PROJECT NAME	: CHACO PLANT	DATE ANALYZED	: 09/13/91
CLIENT I.D.	: REAGENT BLANK	UNITS	: UG/L
		DILUTION FACTOR	: N/A

COMPOUNDS	RESULTS
NAPHTHALENE	<0.30
ACENAPHTHYLENE	<0.30
ACENAPHTHENE	<0.50
FLUORENE	<0.04
PHENANTHRENE	<0.03
ANTHRACENE	<0.01
FLUORANTHENE	<0.03
PYRENE	<0.04
BENZO(A)ANTHRACENE	<0.01
CHRYSENE	<0.02
BENZO(B)FLUORANTHENE	<0.01
BENZO(K)FLUORANTHENE	<0.01
BENZO(A)PYRENE	<0.01
DIBENZ(a,h)ANTHRACENE	<0.10
BENZO(g,h,i)PERYLENE	<0.04
INDENO(1,2,3-CD)PYRENE	<0.03

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE (%) NA

Handwritten:
 Accepted
 J.L.
 9-30-91



QUALITY CONTROL DATA

ATI I.D. : 109618

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO PLANT
REF I.D. : 10961701

DATE ANALYZED : 09/13/91
SAMPLE MATRIX : AQUEOUS
UNITS : UG/L

COMPOUNDS	SAMPLE CONC.		SPIKED SAMPLE	% REC.	DUP.	DUP.	RPD
	RESULT	SPIKED			SAMPLE	% SPIKED	
ACENAPHTHYLENE	<0.30	300	180	60	157	52	14
PYRENE	<0.04	40	25.0	62	22.7	57	10

*Accepted
J.P.
9-30-91*

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

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Spiked Sample Result} - \text{Duplicate Spike Sample Result})}{\text{Average of Spiked Sample}} \times 100$$



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10961801

TEST : POLYCHLORINATED BIPHENYLS (EPA METHOD 608)

CLIENT	: EL PASO NATURAL GAS, NEW MEXICO	DATE SAMPLED	: 09/06/91
PROJECT #	: (NONE)	DATE RECEIVED	: 09/07/91
PROJECT NAME	: CHACO PLANT	DATE EXTRACTED	: 09/09/91
CLIENT I.D.	: N11937	DATE ANALYZED	: 09/14/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS

RESULTS

AROCLOR 1016	<0.5
AROCLOR 1221	<0.5
AROCLOR 1232	<0.5
AROCLOR 1242	<0.5
AROCLOR 1248	<0.5
AROCLOR 1254	<0.5
AROCLOR 1260	<0.5

SURROGATE PERCENT RECOVERIES

ISODRIN (%)	74
-------------	----



REAGENT BLANK

TEST : POLYCHLORINATED BIPHENYLS (EPA METHOD 608)

CLIENT	: EL PASO NATURAL GAS, NEW MEXICO	ATI I.D.	: 109618
PROJECT #	: (NONE)	DATE EXTRACTED	: 09/09/91
PROJECT NAME	: CHACO PLANT	DATE ANALYZED	: 09/13/91
CLIENT I.D.	: REAGENT BLANK	UNITS	: UG/L
		DILUTION FACTOR	: N/A

COMPOUNDS	RESULTS
AROCLOR 1016	<0.5
AROCLOR 1221	<0.5
AROCLOR 1232	<0.5
AROCLOR 1242	<0.5
AROCLOR 1248	<0.5
AROCLOR 1254	<0.5
AROCLOR 1260	<0.5

SURROGATE PERCENT RECOVERIES

ISODRIN (%) 88

*Acceptable
JL.
9-30-91*



QUALITY CONTROL DATA

ATI I.D. : 109618

TEST : POLYCHLORINATED BIPHENYLS (EPA METHOD 608)

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO PLANT
REF I.D. : 10961701

DATE ANALYZED : 09/14/91
SAMPLE MATRIX : AQUEOUS
UNITS : UG/L

Table with 8 columns: COMPOUNDS, SAMPLE CONC. RESULT, SPIKED SPIKED, % REC., DUP. SAMPLE, DUP. %, RPD. Row 1: AROCLOR 1260, <0.5, 5.0, 4.7, 94, 5.0, 100, 6

Acceptable Q.P. 9-30-91

% Recovery = (Spike Sample Result - Sample Result) / Spike Concentration X 100

RPD (Relative % Difference) = (Spiked Sample Result - Duplicate Spike Sample Result) / Average of Spiked Sample X 100

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24-Sep-91

ANALYTICAL TECHNOLOGIES, INC. (Phoenix)
9830 S. 51st St., Ste. B13
Phoenix, AZ 85044

Page: 1
Copy: 1 of 2
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Attn: Mary Tyer
Project: 109617-18

PO #:

Received: 10-Sep-91 13:53

Job: 911679E

Status: Final

Sample Type: Water

Sample	Ra-226 Total	Error	Ra-228 Total	Error	U Total	U Total
	pCi/l	2 σ	pCi/l	2 σ	mg/l	pCi/l(1)
109617-1	0.5	± 0.4	0.1	± 1.2	0.0050	3.4
109618-1	0.6	± 0.4	0.0	± 1.2	0.0105	7.1



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Attn: Mary Tyer
Project: 109617-18

PO #:

Received: 10-Sep-91 13:53

Job: 911679E

Status: Final

Abbreviations:

Parameters:

Ra-226 : Radium-226
Ra-228 : Radium-228
U : Uranium

Units:

pCi/l : picoCuries per liter
2σ : Counting error at the 95% confidence level, 2σ
mg/l : milligrams per liter
pCi/l(1) : picoCuries per liter based upon equilibrium cond.

Job approved by:

Signed:

Ellen La Riviere
.....
Ellen La Riviere
Radiochemistry Laboratory Manager



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24-Sep-91

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Page: 1
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Attn: Mary Tyer
Project: 109617-18

PO #:

Received: 10-Sep-91 13:53

Job: 911679E

Status: Final

QUALITY CONTROL REPORT

Sample Type: Water

Sample Id	Ra-226		Ra-228		U
	Total	Error	Total	Error	Total
	pCi/l	2 σ	pCi/l	2 σ	mg/l
Duplicate	3.1	± 1.8	0.0	± 1.1	0.0045
Duplicate	1.1	± 1.3	0.7	± 1.1	0.0042
Duplicate % diff.	48	---	100	---	4.5
Std (found value)	109	± 4	29	± 2	33
Std (true value)	101	---	32	---	34
Std % diff.	7.9	---	9.4	---	0.0
Blank	0.1	± 0.2	0.0	± 0.8	<0.0003
Spike % rec.	---	---	---	---	97



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Attn: Mary Tyer
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Received: 10-Sep-91 13:53

Job: 911679E

Status: Final

QUALITY CONTROL REPORT

Abbreviations:

Parameters:

Ra-226 : Radium-226
Ra-228 : Radium-228
U : Uranium

Units:

pCi/l : picoCuries per liter
2σ : Counting error at the 95% confidence level, 2σ
mg/l : milligrams per liter

Job approved by:

Signed: 
.....
Approved
Quality Assurance Department



BARRINGER LABORATORIES INC.

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24-Sep-91

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Page: 3
Copy: 1 of 2

Attn: Mary Tyer
Project: 109617-18

PO #:

Received: 10-Sep-91 13:53

Job: 911679E

Status: Final

QUALITY CONTROL REPORT

QUALITY CONTROL DATA SHEET

Received by: gr

Via: Federal Express

Sample Container Type: 3 Pl L btl

Sample Type: Water

Preservative When Received: HNO3

Additional Lab Preparation: None

Parameter	Method	LLD	Preservative	Analyst	Date(s) of Analysis
Ra-226	SM-705	0.2 pCi/l	HNO3	Seidel	9/19- 9/24
Ra-228	904.0	0.9 pCi/l	HNO3	Howard	9/13- 9/19
U	ASTMD2907	0.0003 mg/l	HNO3	Meyer	9/16- 9/17

Signed:



 Mark Burkhardt, Ph.D.
 Laboratory Director



Analytical **Technologies**, Inc.

9830 S. 51st Street Suite B-113 Phoenix, AZ 85044 (602) 496-4400

ATI I.D. 109617

September 26, 1991

El Paso Natural Gas Company
P.O. Box 4990
Farmington, NM 87499

Project Name/Number: Chaco Plant

Attention: John Lambdin

On 09/07/91, Analytical Technologies, Inc. received a request to analyze aqueous sample(s). The sample(s) 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.

Method 610 analyses were performed by ATI, Fort Collins. Uranium, Radium 226 and Radium 228 analyses were performed by Barringer Laboratories.

If you have any questions or comments, please do not hesitate to contact us at (602) 496-4400.

Mary Tyer
Project Manager

Robert V. Woods
Laboratory Manager

RVW:clf
Enclosure



Analytical Technologies, Inc.

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO TANK

DATE RECEIVED : 09/07/91

REPORT DATE : 09/26/91

ATI I.D. : 109617

ATI #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
01	N11936	AQUEOUS	09/06/91

----- TOTALS -----

MATRIX	# SAMPLES
AQUEOUS	1

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from the date of this report. If an extended storage period is required, please contact our sample control department before the scheduled disposal date.



GENERAL CHEMISTRY RESULTS

ATI I.D. : 109617

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO TANK

DATE RECEIVED : 09/07/91

REPORT DATE : 09/26/91

PARAMETER	UNITS	01
CHLORIDE	MG/L	2200
CYANIDE, TOTAL	MG/L	<0.01
FLUORIDE	MG/L	1.83
NITRATE AS NITROGEN	MG/L	0.79
PH	UNITS	7.4
PHENOLICS, TOTAL	MG/L	<0.02
SULFATE	MG/L	490
TOTAL DISSOLVED SOLIDS	MG/L	5100



CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO TANK

ATI I.D. : 109617

PARAMETER	UNITS	ATI I.D.	SAMPLE RESULT	DUP. RESULT	RPD	SPIKED SAMPLE	SPIKE CONC	% REC
CHLORIDE	MG/L	10964904	470	470	0	970	500	100
CYANIDE, TOTAL	MG/L	10960101	<0.01	<0.01	NA	0.25	0.25	100
FLUORIDE	MG/L	10960201	4.46	4.46	0	8.40	4.00	98
NITRATE AS NITROGEN	MG/L	10964201	3.7	3.7	0	13.8	10.0	101
PH	UNITS	10960204	7.6	7.6	0	NA	NA	NA
PHENOLICS, TOTAL	MG/L	10964201	<0.02	<0.02	NA	0.23	0.25	92
SULFATE	MG/L	10964001	1.6	1.6	0	3.4	2.0	90
TOTAL DISSOLVED SOLIDS	MG/L	10960101	1100	1100	0	NA	NA	NA

Acceptable
JF
9-30-91

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

$$\text{RPD (Relative Percent Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 10$$



METALS RESULTS

ATI I.D. : 109617

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO TANK

DATE RECEIVED : 09/07/91

REPORT DATE : 09/26/91

PARAMETER	UNITS	01
SILVER	MG/L	<0.010
ARSENIC	MG/L	0.009
BORON	MG/L	0.22
BARIUM	MG/L	0.600
CADMIUM	MG/L	<0.005
CHROMIUM	MG/L	0.014
COPPER	MG/L	<0.010
IRON	MG/L	0.198
MERCURY	MG/L	<0.0002
MANGANESE	MG/L	0.012
LEAD	MG/L	0.003
SELENIUM	MG/L	<0.005
URANIUM	MG/L	0.0050
ZINC	MG/L	<0.010



METALS - QUALITY CONTROL

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO TANK

ATI I.D. : 109617

Table with 10 columns: PARAMETER, UNITS, ATI I.D., SAMPLE RESULT, DUP. RESULT, RPD, SPIKED SAMPLE, SPIKE CONC, % REC. Rows include SILVER, ARSENIC, BORON, BARIUM, CADMIUM, CHROMIUM, COPPER, IRON, MERCURY, MANGANESE, LEAD, SELENIUM, URANIUM, ZINC.

Handwritten signature and date: Acosta JF 8-30-91

% Recovery = (Spike Sample Result - Sample Result) / Spike Concentration X 100

RPD (Relative Percent Difference) = (Sample Result - Duplicate Result) / Average Result X 10



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10961701

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT	: EL PASO NATURAL GAS, NEW MEXICO	DATE SAMPLED	: 09/06/91
PROJECT #	: (NONE)	DATE RECEIVED	: 09/07/91
PROJECT NAME	: CHACO TANK	DATE EXTRACTED	: N/A
CLIENT I.D.	: N11936	DATE ANALYZED	: 09/09/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
-----------	---------

BENZENE	<0.5
BROMODICHLOROMETHANE	1.1
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLORO BENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	25.3
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
, 3-DICHLOROBENZENE	<0.5
1, 2 & 1, 4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1, 1-DICHLOROETHANE	<0.2
1, 2-DICHLOROETHANE	<0.2
1, 1-DICHLOROETHENE	<0.2
1, 2-DICHLOROETHENE (TOTAL)	<0.2
1, 2-DICHLOROPROPANE	<0.2
CIS-1, 3-DICHLOROPROPENE	<0.2
TRANS-1, 3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1, 1, 2, 2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1, 1, 1-TRICHLOROETHANE	<0.2
1, 1, 2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	95
BROMOFLUOROBENZENE (%)	85



REAGENT BLANK

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
 PROJECT # : (NONE)
 PROJECT NAME : CHACO TANK
 CLIENT I.D. : REAGENT BLANK

ATI I.D. : 109617
 DATE EXTRACTED : 09/09/91
 DATE ANALYZED : 09/09/91
 UNITS : UG/L
 DILUTION FACTOR : N/A

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.2
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.2
CHLOROFORM	<0.2
CHLOROMETHANE	<0.2
DIBROMOCHLOROMETHANE	<0.2
2-CHLOROETHYL VINYL ETHER	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
DICHLORODIFLUOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
1,2-DICHLOROETHENE (TOTAL)	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.2
TOTAL XYLENES	<0.5
TRICHLOROTRIFLUOROETHANE	<2.0

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE (%)	87
BROMOFLUOROBENZENE (%)	86

Accepted
BT
4-30-91



QUALITY CONTROL DATA

ATI I.D. : 109617

TEST : VOLATILE HALOCARBONS/AROMATICS (EPA 601/602)

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO TANK
REF I.D. : 10999907

DATE ANALYZED : 09/09/91
SAMPLE MATRIX : AQUEOUS
UNITS : UG/L

Table with columns: COMPOUNDS, SAMPLE CONC. RESULT, SPIKED SPIKED, % SPIKED REC., DUP. % SPIKED REC., RPD. Rows include 1,1-DICHLOROETHENE, TRICHLOROETHENE, TETRACHLOROETHENE, BENZENE, BROMODICHLOROMETHANE, CHLOROFORM, 1,1,1-TRICHLOROETHANE, TOLUENE, CHLOROBENZENE, M-XYLENE.

Acceptable 9-30-91 [Signature]

% Recovery = (Spike Sample Result - Sample Result) / Spike Concentration X 100

RPD (Relative % Difference) = (Spiked Sample Result - Duplicate Spike Sample Result) / Average of Spiked Sample X 100



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10961701

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT	: EL PASO NATURAL GAS, NEW MEXICO	DATE SAMPLED	: 09/06/91
PROJECT #	: (NONE)	DATE RECEIVED	: 09/07/91
PROJECT NAME	: CHACO TANK	DATE EXTRACTED	: 09/10/91
CLIENT I.D.	: N11936	DATE ANALYZED	: 09/13/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
NAPHTHALENE	<0.30
ACENAPHTHYLENE	<0.30
ACENAPHTHENE	<0.50
FLUORENE	<0.04
PHENANTHRENE	<0.03
ANTHRACENE	<0.01
FLUORANTHENE	<0.03
PYRENE	<0.04
BENZO(A)ANTHRACENE	<0.01
CHRYSENE	<0.02
BENZO(B)FLUORANTHENE	<0.01
ENZO(K)FLUORANTHENE	<0.01
BENZO(A)PYRENE	<0.01
DIBENZ(a,h)ANTHRACENE	<0.10
BENZO(g,h,i)PERYLENE	<0.04
INDENO(1,2,3-CD)PYRENE	<0.03

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE (%) NA



GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO TANK
CLIENT I.D. : REAGENT BLANK

ATI I.D. : 109617
DATE EXTRACTED : 09/10/91
DATE ANALYZED : 09/13/91
UNITS : UG/L
DILUTION FACTOR : N/A

Table with 2 columns: COMPOUNDS and RESULTS. Lists various polynuclear aromatic hydrocarbons and their concentrations, all below 0.30.

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE (%) NA

Handwritten signature and date: 09-30-91



QUALITY CONTROL DATA

ATI I.D. : 109617

TEST : POLYNUCLEAR AROMATICS (EPA 610)

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO TANK
REF I.D. : 10961701

DATE ANALYZED : 09/13/91
SAMPLE MATRIX : AQUEOUS
UNITS : UG/L

Table with 8 columns: COMPOUNDS, SAMPLE CONC. RESULT, SAMPLE CONC. SPIKED, SPIKED % SAMPLE REC., DUP. SPIKED %, DUP. % SAMPLE REC., RPD. Rows include ACENAPHTHYLENE and PYRENE.

Handwritten note: (Hay) table 9-30-91

% Recovery = (Spike Sample Result - Sample Result) / Spike Concentration X 100

RPD (Relative % Difference) = (Spiked Sample Result - Duplicate Spike Sample Result) / Average of Spiked Sample X 100



GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 10961701

TEST : POLYCHLORINATED BIPHENYLS (EPA METHOD 608)

CLIENT	: EL PASO NATURAL GAS, NEW MEXICO	DATE SAMPLED	: 09/06/91
PROJECT #	: (NONE)	DATE RECEIVED	: 09/07/91
PROJECT NAME	: CHACO TANK	DATE EXTRACTED	: 09/09/91
CLIENT I.D.	: N11936	DATE ANALYZED	: 09/14/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
AROCLOR 1016	<0.5
AROCLOR 1221	<0.5
AROCLOR 1232	<0.5
AROCLOR 1242	<0.5
AROCLOR 1248	<0.5
AROCLOR 1254	<0.5
AROCLOR 1260	<0.5

SURROGATE PERCENT RECOVERIES

ISODRIN (%)	81
-------------	----



GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

TEST : POLYCHLORINATED BIPHENYLS (EPA METHOD 608)

CLIENT	: EL PASO NATURAL GAS, NEW MEXICO	ATI I.D.	: 109617
PROJECT #	: (NONE)	DATE EXTRACTED	: 09/09/91
PROJECT NAME	: CHACO TANK	DATE ANALYZED	: 09/13/91
CLIENT I.D.	: REAGENT BLANK	UNITS	: UG/L
		DILUTION FACTOR	: N/A

COMPOUNDS	RESULTS
AROCLOR 1016	<0.5
AROCLOR 1221	<0.5
AROCLOR 1232	<0.5
AROCLOR 1242	<0.5
AROCLOR 1248	<0.5
AROCLOR 1254	<0.5
AROCLOR 1260	<0.5

SURROGATE PERCENT RECOVERIES

ISODRIN (%) 88

*Asphalt
J.F.
9-90-9*



QUALITY CONTROL DATA

ATI I.D. : 109617

TEST : POLYCHLORINATED BIPHENYLS (EPA METHOD 608)

CLIENT : EL PASO NATURAL GAS, NEW MEXICO
PROJECT # : (NONE)
PROJECT NAME : CHACO TANK
REF I.D. : 10961701

DATE ANALYZED : 09/14/91
SAMPLE MATRIX : AQUEOUS
UNITS : UG/L

COMPOUNDS	SAMPLE CONC. RESULT	CONC. SPIKED	SPIKED SAMPLE	% REC.	DUP.	DUP.	RPD
					SPIKED	%	
AROCLOR 1260	<0.5	5.0	4.7	94	5.0	100	6

*Recy/Abbl
9-30-91
J1*

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

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Spiked Sample Result} - \text{Duplicate Spike Sample Result})}{\text{Average of Spiked Sample}} \times 100$$



BARRINGER LABORATORIES INC.

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24-Sep-91

ANALYTICAL TECHNOLOGIES, INC. (Phoenix)
9830 S. 51st St., Ste. B13
Phoenix, AZ 85044

Page: 1
Copy: 1 of 2
Set : 1

Attn: Mary Tyer
Project: 109617-18

PO #:

Received: 10-Sep-91 13:53

Job: 911679E

Status: Final

Sample Type: Water

Sample	Ra-226 Error		Ra-228 Error		U	U
	Total	2σ	Total	2σ	Total	Total
	pCi/l		pCi/l		mg/l	pCi/l(1)
109617-1	0.5	±0.4	0.1	±1.2	0.0050	3.4
109618-1	0.6	±0.4	0.0	±1.2	0.0105	7.1



BARRINGER LABORATORIES INC.

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Page: 2
Copy: 1 of 2
Set : 2

Attn: Mary Tyer
Project: 109617-18

PO #:

Received: 10-Sep-91 13:53

Job: 911679E

Status: Final

Abbreviations:

Parameters:

Ra-226 : Radium-226
Ra-228 : Radium-228
U : Uranium

Units:

pCi/l : picoCuries per liter
2σ : Counting error at the 95% confidence level, 2σ
mg/l : milligrams per liter
pCi/l(1) : picoCuries per liter based upon equilibrium cond.

Job approved by:

Signed: *Ellen La Riviere*
.....
Ellen La Riviere
Radiochemistry Laboratory Manager



BARRINGER LABORATORIES INC.

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

24-Sep-91

ANALYTICAL TECHNOLOGIES, INC. (Phoenix)
9830 S. 51st St., Ste. B13
Phoenix, AZ 85044

Page: 1
Copy: 1 of 2
Set : 1

Attn: Mary Tyer
Project: 109617-18

PO #:

Received: 10-Sep-91 13:53

Job: 911679E

Status: Final

QUALITY CONTROL REPORT

Sample Type: Water

Sample Id	Ra-226 Error		Ra-228 Error		U
	Total		Total		Total
	pCi/l	2σ	pCi/l	2σ	mg/l
Duplicate	3.1	±1.8	0.0	±1.1	0.0045
Duplicate	1.1	±1.3	0.7	±1.1	0.0042
Duplicate % diff.	48	---	100	---	4.5
Std (found value)	109	±4	29	±2	33
Std (true value)	101	---	32	---	34
Std % diff.	7.9	---	9.4	---	0.0
Blank	0.1	±0.2	0.0	±0.8	<0.0003
Spike % rec.	---	---	---	---	97



BARRINGER LABORATORIES INC.

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

24-Sep-91

ANALYTICAL TECHNOLOGIES, INC. (Phoenix)
9830 S. 51st St., Ste. B13
Phoenix, AZ 85044

Page: 2
Copy: 1 of 2
Set : 2

Attn: Mary Tyer
Project: 109617-18

PO #:

Received: 10-Sep-91 13:53

Job: 911679E

Status: Final

QUALITY CONTROL REPORT

Abbreviations:

Parameters:

Ra-226 : Radium-226
Ra-228 : Radium-228
U : Uranium

Units:

pCi/l : picoCuries per liter
2σ : Counting error at the 95% confidence level, 2σ
mg/l : milligrams per liter

Job approved by:

Signed: D. Q. L.
.....
Approved
Quality Assurance Department



BARRINGER LABORATORIES INC.

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

24-Sep-91

ANALYTICAL TECHNOLOGIES, INC. (Phoenix)
9830 S. 51st St., Ste. B13
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Page: 3
Copy: 1 of 2

Attn: Mary Tyer
Project: 109617-18

PO #:

Received: 10-Sep-91 13:53

Job: 911679E

Status: Final

QUALITY CONTROL REPORT

QUALITY CONTROL DATA SHEET

Received by: gr

Via: Federal Express

Sample Container Type: 3 Pl L btl
Sample Type: Water
Preservative When Received: HNO3
Additional Lab Preparation: None

Parameter	Method	LLD	Preservative	Analyst	Date(s) of Analysis
Ra-226	SM-705	0.2 pCi/l	HNO3	Seidel	9/19- 9/24
Ra-228	904.0	0.9 pCi/l	HNO3	Howard	9/13- 9/19
U	ASTMD2907	0.0003 mg/l	HNO3	Meyer	9/16- 9/17

Signed:



 Mark Burkhardt, Ph.D.
 Laboratory Director

APPENDIX B
MATERIAL DATA SAFETY SHEETS

N/A	Propane/Air 1.1 PCT, Test Gas	Scott Specialty Gases	1105 Liters @ 1000PSIG, Cylinder	Instr./Elect. Shop in Warehouse in Warehouse
11/18/85	Quick-Dry Recorder Ink (Red/Blue)	Taylor Instrument		
11/18/85	Regular Recorder Ink	Taylor Instrument		
05/72	Safestep Sorbent	Andesite of California Inc.		
N/A	Silicone Sealant	Devon	24 - 10 oz. Tubes	Warehouse
11/20/85	Soda Ash	Continental Products of Texas		Chemical Building
N/A	Sodium Chloride	Morton Thiokol, Inc.		
09/77	Sodium Hydroxide	Corporate Research & Development		
N/A	Spotcheck	Magnaflux		Warehouse
N/A	Spray Paint	Crain		Warehouse
N/A	SS-Concentrate	Phillips Petroleum		
12/18/88	Sulfuric Acid	Imperial Oil & Grease Company		Tanks /Cooling Towers (A,B,C)
01/07/86	Tribol 890 (Light, Med., Heavy)	Dow Chemical USA	3-8250 gal.1-#150 gal.	Chemical Building
06/08/90	Triethylene Glycol-Technical	Unichem International	2500 Gallons	Tank (Gas Plant Area)
02/10/91	Unichem 1000	Unichem International		
05/22/86	Unichem 1300	Unichem International	110 Gallons (2 Barrels)	Chemical Building
05/22/86	Unichem 1700	Unichem International	55 Gallon Barrel	Chemical Building
05/22/89	Unichem 1705	Unichem International	2-#410 Gallon/1-#100 Tank	A,B,C Cooling Towers
07/06/87	Unichem 2100	Unichem International	110 Gallons (2 Barrels)	Chemical Building
07/14/89	Unichem 2310	Unichem International		
02/10/91	Unichem 3030	Unichem International		
02/10/91	Unichem 3140	Unichem International		
02/10/91	Unichem 3270	Unichem International		
05/22/86	Unichem 4000	Unichem International		
02/06/91	Unichem 7227	Unichem International		
08/15/88	Unichem 9035	Unichem International		
N/A	Unleaded Gasoline	Corporate Research & Development	750 Gallons	Tank/East of Warehouse Building
05/82	Varsol 1		900 Gallons	Tank (3) A & B Compressors, Boiler
N/A	Vinegar (Bottles)	Formulabs	6 - 16 oz. Bottles	Warehouse
11/15/90	Water Tracing Dye			
N/A	WD-40	Continental Products of Texas	24 - 12 Oz. Cans	Warehouse
06/08/77	Zinc Organic Phosphonate			
N/A	#90 Molub Gear Oil		55 Gallons	Barrel-Chemical Building

INVENTORY CONDUCTED BY: _____ DATE: _____
 TELEPHONE NUMBER: 611-3828

11/11/91

CHCO PLANT INVENTORY SHEET FOR HAZARDOUS CHEMICALS

1. FARMINGTON DIVISION/CHCO AREA 2. LOCATION: CHCO PLANT
3. CHEMICAL TYPE - PLANT/WAREHOUSE CHEMICALS

DATE	CHEMICAL NAME	MANUFACTURER NAME	ICHECK IF IND MSDS IND LABEL	ICHECK IF CHEM KEPT ON HAND	MAX AMOUNT OF CHEM	GENERAL LOCATION WHERE STORED
N/A	60090 011		X		55 Gallons	Barrel-Chemical Building
N/A	690 Heavy Tribol Oil		X		55 Gallons	Barrel-Chemical Building
N/A	Absorption Oil		X		15,000 Gallons	Tank-Plant Area
N/A	Activated Alumina	Discovery Chemicals, Inc.				
11/22/85	Activated Carbon	Continental Products of Texas				
N/A	Ajax		X		12 - 21 oz. Cans	Warehouse
05/15/87	Alpha 512	Unichem International			110 Gallons (2 Barrels)	Chemical Building
05/22/86	Alpha 570	Unichem International			110 Gallons (2 Barrels)	Chemical Building
02/10/86	Ambitrol (R) FL Coolant	Dow Chemical			2000 Gallons	Tank (Turbine Area)
N/A	Anti-Seize	FEL PRO	X		12 - 10 oz. Cans	Warehouse
N/A	Anti-Seize Spray Can	FEL PRO	X		6 - 16 oz. Cans	Warehouse
N/A	Bowl Cleaner	Big John	X		6 - 1 qt. Bottles	Warehouse
07/31/80	Butane	Graves Butane			5 Gallons	Evaporation Ponds
10/85	Carbon Dioxide	Matheson Gas Products				
06/14/90	Caustic Soda Solution 50%	Dow Chemical USA			2100 Gallons	Tank/South Side Water Treater
07/79	Chlorine	Corporate Research & Development			6 - 150# Cylinders	Outside/South Side of Water Treater
N/A	Cleaner/Remover Penetrant	Magnaflux	X		6 - 14 Oz. Cans	Warehouse
11/18/85	Commercial Instrument Ink (Red)	Taylor Instrument				
N/A	Contact Cement	Milhold	X			
N/A	Developer	Magnaflux	X		6 - 32 oz. Cans	Warehouse
05/22/86	De-oiling Surfactant	Unichem International			6 - 14 Oz. Cans	Warehouse
11/19/87	Diesel Fuel #2	Giant Refining Company			55 Gallon Barrel	West Side of B Compressor
N/A	Electric Contact Cleaner	Dherterson	X		150 Gallons	A Compressor Area/North Side
11/85	ERM Pipe	Tex-Tube Division			6 - 16 oz. Cans	Warehouse
10/85	Ethane	Matheson Gas Products				
07/31/80	Ethane-Propane Mix	Matheson Gas Products				
01/15/87	Fonboro 1800 Ink/Aqueous Ink	Cities Service Oil & Gas Corp.				
N/A	Glass Cleaner (Spray)	The Forboro Company				
11/18/85	High Temperature Ink (Red)	Harding Glass Co.	X		12 - 19 oz. Cans	Warehouse
01/01/90	Hydrochloric Acid, Muriatic Acids	Dow Chemical			3500 Gallons	Tank/South Side Water Treater
08/07/86	Hyshen Aerosol Dust Mop	National Sanitary Supply Co.				
N/A	Knocher Loose		X		12 - 9 Oz. Cans	Warehouse
N/A	Liquid Drain Away		X		6 - 32 oz. Bottles	Warehouse
10/85	Methane	Marsh Gas, Natural Gas				
N/A	Methane/Air 2.5% Test Gas	Scott Specialty Gases	X		5 Gallon Bottles	Instr/Electric Shop in Warehouse
05/21/86	Methanol	Arco Chemical Company			150 Gallons	(1) Tank/A Compressor Area
08/01/84	Mineral Spirits, Type I	Corporate Research & Development				
02/15/84	Mobil 600 W Cylinder Oil	Mobil Oil Corporation				
04/17/84	Mobil DIE 797 Oil	Mobil Oil Corporation				
10/26/82	Mobil Pegasus 490	Mobil Oil Corporation				
12/09/83	Mobilgear HD 60090	Mobil Oil Corporation				
N/A	Motor Oil 30 Wt. & 40 Wt.		X		55 Gallons	Barrels - Chemical Building
10/85	Nitrogen	Matheson Gas Products			24 Quart Bottles	Warehouse
10/85	N-Butane	Matheson Gas Products				
N/A	Paint		X		41 - 1 Gallon Cans	Warehouse
N/A	Paint Remover (Spray)	Sherwin Williams	X		6 - 15 oz. Cans	Warehouse
N/A	Paint Thinner		X		12 - 1 Gallon Cans	Warehouse
10/85	Propane	Matheson Gas Products			600 Gallons	Tank - Gas Plant Area

DISCOVERY CHEMICALS, INC.
MATERIAL SAFETY DATA SHEET
Emergency Phone 504 389-9945

PRODUCT IDENTIFICATION:

TRADE NAME: Activated Alumina
CHEMICAL FAMILY: Aluminum Oxide
CHEMICAL FORMULA: Al_2O_3
CAS NO.: 1344-28-1

SUMMARY OF HAZARDS:

Mild irritant to the eyes and respiratory system.

CHEMICAL AND PHYSICAL PROPERTIES:

APPEARANCE/ODOR: White crystalline/no odor.
MELTING POINT: >3000°F
SOLUBILITY IN WATER: Insoluble.

FIRE AND EXPLOSION HAZARDS:

FLASH POINT (METHOD): Nonflammable.
EXTINGUISHING MEDIA: None required.
HAZARDOUS THERMAL DECOMPOSITION PRODUCTS:
None
SPECIAL FIRE FIGHTING PROCEDURES:
None
UNUSUAL FIRE AND EXPLOSION HAZARDS:
None

REACTIVITY DATA:

STABILITY: Stable.
CONDITIONS TO AVOID: None
MATERIALS TO AVOID: None
HAZARDOUS POLYMERIZATION: Will not occur.

Continental Products of Texas

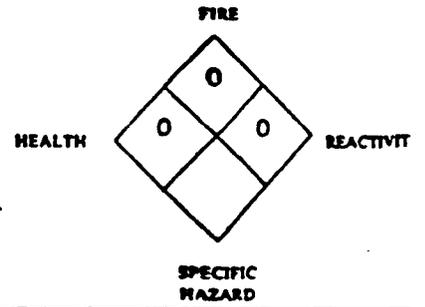
100 Industrial • P.O. Box 3627 • Odessa, Texas 79760
 Telephone No. (915) 337-4681

Activated Carbon

QUICK IDENTIFIER

NFPA Designation 704

HAZARD RATING
 4 - EXTREME
 3 - HIGH
 2 - MODERATE
 1 - SLIGHT
 0 - INSIGNIFICANT



MATERIAL SAFETY DATA SHEET

SECTION 1 - IDENTITY

Common Name: (used on label)
 (Trade Name & Synonyms) **Activated Carbon**

Chemical Name **Activated Carbon** Formula **NA**

Chemical Family **Carbon**

Cas No. **NA**

SECTION 2 - HAZARDOUS INGREDIENTS

Hazardous Component(s)	%	Threshold Limit Value (units)
NA		

SECTION 3 - PHYSICAL & CHEMICAL CHARACTERISTICS (Fire & Explosive Data)

Boiling Point	NA	Specific Gravity (H ₂ O = 1)	NA	Vapor Pressure (mm Hg)	NA
Percent Volatile by Volume (%)	NA	Vapor Density (Air = 1)	NA	Evaporation Rate (H ₂ O = 1)	NA
Solubility in Water	NA	Reactivity in Water	NA		
Appearance and Odor	NA				
Flash Point	NA	Flammable Limits in Air % by Volume	NA	Extinguisher Media	NA
		Lower	Upper		Auto-Ignition Temperature
Special Fire Fighting Procedures	NA				NA
Unusual Fire and Explosion Hazards	NA				

SECTION 4 - PHYSICAL HAZARDS

Stability Table UNSTABLE CONDITIONS TO AVOID NA

COMPATIBILITY (MATERIALS TO AVOID) NA

HAZARDOUS DECOMPOSITION PRODUCTS NA

Stability Table UNSTABLE CONDITIONS TO AVOID NA

Threshold Limit Value NA
Signs and Symptoms of Exposure

1. Acute Overexposure NA
Chronic Overexposure NA

Medical Conditions Generally Aggravated by Exposure NA

Chemical Listed as Carcinogen or Potential Carcinogen UN

National Toxicology Program
Yes No

I.A.R.C. Monographs
Yes No

OSHA
Yes No

OSHA Permissible Exposure Limit NA

ACGIH Threshold Limit Value NA

Other Exposure Limit Used

NA

Emergency and First Aid Procedures

1. Inhalation NA

2. Eyes NA

3. Skin NA

4. Ingestion NA

SECTION 6 - SPECIAL PROTECTION INFORMATION

Respiratory Protection (Specify Type) Nuisance Mask for possible dust

Ventilation Yes Local Exhaust Yes Mechanical (General) Yes Special Other

Protective Gloves Not necessary Eye Protection Safety goggles

Other Protective Clothing or Equipment None

SECTION 7 - SPECIAL PRECAUTIONS AND SPILL/LEAK PROCEDURES

Precautions to be Taken in Handling and Storage UN

Steps to be Taken in Case Material is Released or Spilled UN

Waste Disposal Methods Dispose of according to State and Federal Regulations

NO WARRANTY, EXPRESS OF IMPLIED OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR OTHERWISE IS MADE. BUYER ASSUMES ALL RISK OF USE, STORAGE AND HANDLING, CONTINENTAL PRODUCTS OF TEXAS SHALL NOT BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING DIRECTLY OR INDIRECTLY IN CONNECTION WITH THE PURCHASE, USE, STORAGE OR HANDLING OF THIS PRODUCT.

Date Issued: 11/22/85

Continental Products of Texas

Abbreviations Used
NA Not Applicable
ND Not Determined
UN Unknown

Prepared by

Eric Klim

Eric Klim

MATERIAL SAFETY DATA SHEET



UNICHEM
INTERNATIONAL

Date Prepared 05/15/87

Supersedes Previous Sheet Dated Not Dated

I. PRODUCT IDENTIFICATION

Unichem International 707 N. Leech/P. O. Box 1499/Hobbs, New Mexico 88240
EMERGENCY TELEPHONE NUMBER (505) 393-7751

Trade Name ALPHA 512

Chemical Description Proprietary Microbiocide Blend

II. HAZARDOUS INGREDIENTS

Material	TLV (Units)
Potassium Dimethyldithiocarbamate CAS# 128-03-0	None Established
Methanol CAS# 000-067-561	200 ppm (Skin) 8 Hour TWA or 260 mg/m ³

Neither this product nor its ingredients are listed in any of OSHA Standard, Section 1910.1200 sources as carcinogenic.

III. PHYSICAL DATA

Boiling Point, 760 mm Hg	150°F (Initial)	Freezing Point	-35°F
Specific Gravity (H ₂ O=1)	1.0 g/ml	Solubility in Water	Complete
Appearance and Odor	Brown Clear Liquid; Alcoholic - Sulfur Odor		

IV. FIRE AND EXPLOSION HAZARD DATA

Flash Point (Test Method) 69°F TCC

Extinguishing Media Carbon Dioxide, Dry Chemical, Water Spray, or Fog, Foam. Use a water spray to cool fire-exposed containers.

Special Fire Fighting Procedures Firefighters should wear self-contained breathing apparatus and full protective clothing. Firefighters should be made aware of the corrosive nature of this chemical.

Unusual Fire and Explosion Hazards Methanol is a moderate explosion hazard and a dangerous fire hazard when exposed to heat, sparks, or flames and can react vigorously with oxidizing agents.

Liability is expressly disclaimed for any loss or injury arising out of the use of this information or the use of any materials designated.

V. HEALTH HAZARD DATA

Threshold Limit Value Not Determined

Effects of Overexposure Contact will cause burns to the skin and severe damage to the eyes. Inhalation of vapors or mists will irritate the entire respiratory tract. Ingestion will cause irritation and burning of the digestive tract. Harmful or fatal if swallowed. Symptoms of overexposure to liquid or vapor include dizziness, visual impairment, nausea, and narcosis.

Emergency and First Aid Procedures Eyes: Flush promptly with copious quantities of water for at least fifteen minutes. Seek medical attention. Skin: Flush area with water. Wash with soap and remove contaminated clothing. Inhalation: Remove to fresh air. Apply artificial respiration if necessary. Ingestion: Call a physician. Induce vomiting, if conscious. Give patient water or milk.

VI. REACTIVITY DATA

Stability	Stable	X	Conditions to Avoid	None
	Unstable			

Incompatibility (Materials to Avoid) Strongly Acidic Materials, Oxidizers

Hazardous Decomposition of Products Oxides of Carbon, Nitrogen, and Sulfur
Carbon Disulfide, Dimethylamine

Hazardous Polymerization	May Occur	Conditions to Avoid	None
	Will Not Occur		X

VII. SPILL OR LEAK PROCEDURES

Steps to be Taken if Material is Released or Spilled Provide adequate ventilation. Remove sources of ignition. Contain and absorb spill. This material is toxic to fish.

Waste Disposal Method Dispose via a licensed waste disposal company. Follow local, state, and federal regulations.

VIII. SPECIAL PROTECTION INFORMATION

Respiratory Protection (Specify Type) Use air-supplied or self-contained breathing apparatus if exposure levels exceeds TLV for this product or its ingredients.

Ventilation	Local Exhaust	As needed to prevent accumulation of vapors above TLV	Special	None
	Mechanical (General)		Other	None

Protective Gloves Rubber Eye Protection Safety Glasses, Goggles, and/or Face Shield

Other Protective Equipment Overalls, Rubber Boots, Eyewash Stations, Safety Showers

IX. SPECIAL PRECAUTIONS

Precautions to be Taken in Handling and Storing Store in cool, well-ventilated, low fire-risk area away from ignition sources and incompatible materials. Keep containers closed when not in use.

Other Precautions Avoid prolonged or repeated breathing of vapors or contact with skin. Do not ingest.



UNICHEM
INTERNATIONAL

ALPHA 570

PRODUCT BULLETIN

INGREDIENTS

Active Ingredients:

- Alkyl (C₁₂, 61%; C₁₄, 23%; C₁₆, 11%; C₈ & C₁₀, 2.5%; C₁₈, 2.5%) dimethyl Benzyl Ammonium Chloride 9.0%
- Tributyltin neodecanoate 5.0%
- Alkyl (C₁₄, 58%; C₁₆, 28%; C₁₂, 14%) dimethyl benzyl ammonium chloride ... 4.5%
- Alkyl (C₁₄, 90%; C₁₆, 5%; C₁₂, 5%) dimethyl ethyl ammonium bromide 1.5%

- Inert Ingredients: 80.0%
- Total Ingredients: 100.0%

DESCRIPTION

ALPHA 570 is a product formulated to provide control of the growth of algae in recirculating water cooling towers and evaporative condensers.

USE

If heavy algae slime growths are present, clean the system before initial treatment. If algae growth is absent or just noticeable, proceed with the initial dose. Add all treatments directly to the sump.

INITIAL DOSE: When the system is fouled, apply a dose of four fluid ounces per 100 gallons of water in the system. Repeat daily until control is achieved.

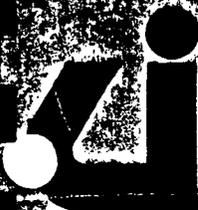
SUBSEQUENT DOSE: When algae control is evident, add two fluid ounces per 100 gallons of water in the system every seven days (weekly), or as needed to maintain control. Badly fouled systems may be manually or chemically cleaned before treatment is begun.

HANDLING

Do not allow water that contains this algicide to come in contact with grass or plants. Do not use in drinking water or in swimming pools. **KEEP OUT OF REACH OF CHILDREN.** Corrosive. Causes eye damage and skin irritation. Do not get in eyes, on skin, or on clothing. Wear goggles or face shield with rubber gloves when handling. Harmful or fatal if swallowed. Avoid contamination of food.

FIRST AID

In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. For eyes, call a physician. Remove and wash contaminated clothing before reuse. If swallowed, drink **PROMPTLY** a large quantity of milk, egg whites, gelatin solution, or if these are not available, drink large quantities of water. Avoid alcohol. Call a physician immediately.



**UNICHEM
INTERNATIONAL**

PHYSICIAN & ENVIRONMENT WARNING:

Probably mucosal damage may contradict the use of gastric lavage. Measures against circulatory shock, respiratory depression and convulsion may be needed. This product is toxic to fish. Keep out of lakes, streams, or ponds. Treated effluent should not be discharged where it will drain into lakes, streams, ponds or public water. Do not contaminate water by cleaning of equipment or disposal of wastes. Apply this product only as specified on this label. Rinse empty container thoroughly with water and discard it.

PACKAGING

ALPHA 570 is available in 55 gallon drum quantities.



MATERIAL SAFETY DATA SHEET

Date Prepared 05/22/86

Supersedes Previous Sheet Dated Not Dated

I. PRODUCT IDENTIFICATION

Unichem International 707 N. Leech/P. O. Box 1499/Hobbs, New Mexico 88240
EMERGENCY TELEPHONE NUMBER (505) 393-7751

Trade Name ALPHA 570

Chemical Description
Proprietary Biocide Blend

II. HAZARDOUS INGREDIENTS

Material

Alkyl Dimethyl Benzylammonium Chloride
Alkyl Dimethyl Ethylammonium Bromide
Tributyltin Neodecanoate

TLV (Units)

Not Established
Not Established
Not Established

Neither this product nor its ingredients are listed in any of OSHA Standard, Section 1910.1200 sources as carcinogenic.

III. PHYSICAL DATA

Boiling Point, 760 mm Hg	208°F	Freezing Point	32°F
Specific Gravity (H ₂ O=1)	0.998 g/ml	Solubility in Water	Complete

Appearance and Odor Light Straw Color, Slight Musty Odor; Liquid

IV. FIRE AND EXPLOSION HAZARD DATA

Flash Point (Test Method) None

Extinguishing Media Carbon Dioxide, Dry Chemical, Water Spray or Fog, Foam. Use a water spray to cool fire-exposed containers.

Special Fire Fighting Procedures Firefighters should wear self-contained breathing apparatus and full protective clothing. Firefighters should be made aware of the corrosive nature of this chemical.

Unusual Fire and Explosion Hazards None

Liability is expressly disclaimed for any loss or injury arising out of the use of this information or the use of any materials designated.

V. HEALTH HAZARD DATA

Threshold Limit Value: Not Determined Acute Oral LD₅₀: 0.88 g/kg (Male rats) 1.08 g/kg (Female Rat)
Acute Dermal LD₅₀: Greater than 2 g/Kg for male and female r:

Effects of Overexposure Contact will cause burns to the skin and severe damage to t eyes. Inhalation of vapors or mists will irritate the entire respiratory tract. Ingestion will cause irritation and burning of the digestive tract.

Emergency and First Aid Procedures Eyes: Flush promptly with copious quantities of water for at least fifteen minutes. Seek medical attention. Skin: Flush area with water. Wash with soap and remove contaminated clothing. Inhalation: Remove to fresh air. Apply artificial respiration if necessary. Ingestion: Call a physician. Do not induce vomiting. Dilute with water or milk. See note to physician below. (Section IX - Other Precautions)

VI. REACTIVITY DATA

Stability	Stable	X	Conditions to Avoid	None
	Unstable			

Incompatibility (Materials to Avoid) Highly Alkaline Materials, Oxidizers

Hazardous Decomposition of Products Oxides of Carbon and Nitrogen

Hazardous Polymerization	May Occur	Conditions to Avoid	None
	Will Not Occur		

VII. SPILL OR LEAK PROCEDURES

Steps to be Taken if Material is Released or Spilled Provide adequate ventilation Remove sources of ignition. Contain and absorb spill. This product is toxic to fish. ep out of lakes, streams, and ponds.

Waste Disposal Method Dispose via a licensed waste disposal company. Follow local, state, and federal regulations.

VIII. SPECIAL PROTECTION INFORMATION

Respiratory Protection (Specify Type) Use air-supplied or self-contained breathing apparatus if exposure levels exceed TLV for this product or its ingredients.

Ventilation	Local Exhaust	As needed to prevent accumulation of	Special	None
	Mechanical (General)	vapors above TLV	Other	None

Protective Gloves Rubber Eye Protection Safety Glasses, Goggles, and/or Face Shield

Other Protective Equipment Overalls, Rubber Boots, Eyewash Stations, Safety Showers

IX. SPECIAL PRECAUTIONS

Precautions to be Taken in Handling and Storing Store in cool, well-ventilated, low fire-risk area away from ignition sources and incompatible materials. Keep containers closed when not in use. Do not transfer or store in improperly marked containers.

Other Precautions Avoid prolonged or repeated breathing of vapors or contact with s .. Do not ingest. TO PHYSICIAN: Probably mucosal damage may contraindicate the use of gastric lavage. Measures against circulation shock, respiratory depression, and convulsion may be needed.

MATERIAL SAFETY DATA SHEET

Dow Chemical U.S.A. Midland, MI 48674 Emergency Phone: 517-636-4400

Product Code: 07666

Page: 1

PRODUCT NAME: AMBITROL (R) FL COOLANT

Effective Date: 02/10/86 Date Printed: 05/20/86

MSDS:000584

1. INGREDIENTS:

Ethylene Glycol	CAS# 000107-21-1	44%
Diethylene Glycol	CAS# 000111-46-6	3.5%
Water	CAS# 007732-18-5	49%
Proprietary ingredients		

Substances listed in the Ingredients Section are those identified as being present at a concentration of 1% or greater, or 0.1% if the substance is on the list of potential carcinogens cited in OSHA Hazard Communication Standard. Where proprietary ingredient shows, the identity of this substance may be made available as provided in 29 CFR 1910.1200(i).

2. PHYSICAL DATA:

BOILING POINT: 229F, 109C
VAP PRESS: Approx. 2.5 mmHg @ 20C
VAP DENSITY: Not applic.
SOL. IN WATER: Completely miscible
SP. GRAVITY: 1.084 @ 60/60F, 16C
APPEARANCE: Red liquid.
ODOR: Information not available.

3. FIRE AND EXPLOSION HAZARD DATA:

FLASH POINT: None
METHOD USED: PMCC

FLAMMABLE LIMITS
LFL: Not applicable.
UFL: Not applicable.

EXTINGUISHING MEDIA: Non-combustible.

(Continued on Page 2)

(R) Indicates a trademark of The Dow Chemical Company

MATERIAL SAFETY DATA SHEET

Dow Chemical U.S.A. Midland, MI 48674 Emergency Phone: 517-636-4400

Product Code: 07666

Page: 2

PRODUCT NAME: AMBITROL (R) FL COOLANT

Effective Date: 02/10/86 Date Printed: 05/20/86

MSDS:000584

3. FIRE AND EXPLOSION HAZARD DATA: (CONTINUED)

FIRE & EXPLOSION HAZARDS: None.

FIRE-FIGHTING EQUIPMENT: Wear positive-pressure, self-contained breathing apparatus.

4. REACTIVITY DATA:

STABILITY: (CONDITIONS TO AVOID) Not considered to be a problem under normal storage conditions.

INCOMPATIBILITY: (SPECIFIC MATERIALS TO AVOID) Oxidizing material

HAZARDOUS DECOMPOSITION PRODUCTS: After water has volatilized, burning will produce carbon monoxide, carbon dioxide, and water.

HAZARDOUS POLYMERIZATION: Will not occur.

5. ENVIRONMENTAL AND DISPOSAL INFORMATION:

ACTION TO TAKE FOR SPILLS/LEAKS: Small spills: Cover with absorbent material, soak up and sweep into drums for disposal. Large spills: Dike around spill and pump into suitable containers for disposal or reprocessing.

DISPOSAL METHOD: Burn in approved incinerator in accordance with local, state, and federal regulations.

6. HEALTH HAZARD DATA:

EYE: May cause slight transient (temporary) eye irritation. Vapors or mists may irritate eyes. Effects likely to heal readily.

SKIN CONTACT: Essentially nonirritating to skin.

SKIN ABSORPTION: Repeated skin exposure may result in absorption

(Continued on Page 3)

(R) Indicates a trademark of The Dow Chemical Company

MATERIAL SAFETY DATA SHEET

Dow Chemical U.S.A. Midland, MI 48674 Emergency Phone: 517-636-4400

Product Code: 07666

Page: 3

PRODUCT NAME: AMBITROL (R) FL COOLANT

Effective Date: 02/10/86 Date Printed: 05/20/86

MSDS:000584

6. HEALTH HAZARD DATA: (CONTINUED)

of harmful amounts. The dermal LD50 has not been determined.

INGESTION: Single dose oral toxicity is believed to be moderate. Amounts ingested incidental to industrial handling are not likely to cause injury; however ingestion of larger amounts could cause serious injury, even death. Single dose oral LD50 has not been determined.

INHALATION: At room temperature, exposures to vapors are unlikely due to physical properties; higher temperatures may generate vapor levels sufficient to cause adverse effects.

SYSTEMIC & OTHER EFFECTS: Excessive exposure may cause CNS, kidney, blood and possibly liver effects. Excessive exposure may cause irritation to upper respiratory tract. Observations in animals include deposition of calcium salts in various tissues after long-term dietary intake of ethylene glycol. Did not cause cancer in long term animal studies. Ethylene glycol has been reported to cause birth defects in rats and mice given high oral doses which were toxic to the mothers. Birth defects were also reported in mice at a high oral dose which was apparently non-toxic to the mother. Exposure of rats and mice to high aerosol concentrations resulted in teratogenic effects in mice but not in rats. Much of the total dose of EG in the aerosol studies probably resulted from ingestion of material deposited on fur. In studies on rats, ethylene glycol has been shown not to interfere with reproduction. In studies on mice, ingestion of ethylene glycol in large amounts caused a small decrease in the number of litters per pair, live pups per litter, and in live pup weight. Results of in vitro ("test tube") mutagenicity tests have been negative. Results of mutagenicity tests in animals have been negative.

(Continued on Page 4)

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MATERIAL SAFETY DATA SHEET

Dow Chemical U.S.A. Midland, MI 48674 Emergency Phone: 517-636-4400

Product Code: 07666

Page: 4

PRODUCT NAME: AMBITROL (R) FL COOLANT

Effective Date: 02/10/86 Date Printed: 05/20/86

MSDS:000584

7. FIRST AID:

EYES: Irrigate immediately with water for at least 5 minutes.

SKIN: Wash off in flowing water or shower. Remove contaminated clothing and wash before reuse.

INGESTION: If swallowed, induce vomiting immediately by giving two glasses of water and sticking finger down throat. Call a physician. (Never give anything by mouth to or attempt to induce vomiting in an unconscious person.)

INHALATION: Remove to fresh air if effects occur. Consult a physician.

NOTE TO PHYSICIAN: Consult standard literature. Supportive care. Treatment based on judgment of the physician in response to reactions of the patient. In the treatment of intoxication by ethylene glycol, the use of ethanol, hemodialysis and intravenous fluids to control acidosis should be considered. N. Eng. J. Med. 304:21 1981.

8. HANDLING PRECAUTIONS:

EXPOSURE GUIDELINE(S): ACGIH TLV is 50 ppm ceiling (125 mg/m³) for ethylene glycol vapor.

VENTILATION: Control airborne concentrations below the exposure guideline. Good general ventilation should be sufficient for most conditions.

RESPIRATORY PROTECTION: Atmospheric levels should be maintained below the exposure guideline. When respiratory protection is required for certain operations, use an approved air-purifying respirator.

SKIN PROTECTION: Use impervious gloves when prolonged or frequently repeated contact could occur.

EYE PROTECTION: Use safety glasses.

(Continued on Page 5)

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MATERIAL SAFETY DATA SHEET

Dow Chemical U.S.A. Midland, MI 48674 Emergency Phone: 517-636-4400

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PRODUCT NAME: AMBITROL (R) FL COOLANT

Effective Date: 02/10/86 Date Printed: 05/20/86

MSDS:000584

9. ADDITIONAL INFORMATION:

SPECIAL PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE: Avoid skin and eye contact. Avoid ingestion. Avoid breathing vapors or mists.

Trace quantities of ethylene oxide (EO) may be present in this product. While these trace quantities could accumulate in headspace areas of storage and transport vessels, they are not expected to create a condition which will result in EO concentrations greater than 0.5 ppm (8 hour TWA) in the breathing zones of the workplace for appropriate applications. OSHA has established a permissible exposure limit of 1.0 ppm 8 hr TWA for EO. (Code of Federal Regulations Part 1910.1047 of Title 29)

MSDS STATUS: Revised 1-9.

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For Further Information.

Revised: 7/31/80

Reviewed: 8/1/85

CITIES SERVICE OIL AND GAS CORPORATION
Safety And Environmental Services
P. O. Box 300
Tulsa, Oklahoma 74102

MATERIAL SAFETY DATA SHEET

NFPA*

Trade Name: Field Grade Butane	Health	1	Slightly Toxic
Synonyms: Butane	Fire	4	Extremely Flammable
CAS Reg. No.: Mixture	Reactivity	0	Stable

Cities Service Index No.:
TSIS-0020, et.al.

*Cities Service Assignment based on
our evaluation.

I. GENERIC COMPOSITION/INGREDIENTS

Material	%	Hazard Data
Butane	>95	Asphyxiant/anesthetic

II. PHYSICAL DATA

Boiling Point, 760 mmHg,
°C(°F): ~0.6 (-31)

Melting Point, °C (°F): NA

Vapor Pressure, mmHg (25°C): ~1823

Specific Gravity
(H₂O=1): ~0.6012

Solubility in H₂O, % By Vol.: ~15

Vapor Density (Air=1): ~2.0

Evaporation Rate (Butyl
Acetate=1): Gas

% Volatiles By Vol.: 100

Appearance and Odor: Colorless gas, natural gas odor.

III. FIRE AND EXPLOSION DATA

Flash Point, °C (°F): Gas Autoignition Temperature, °C (°F): 405 (761)

Flammable Limits in Air, % by Vol: Lower: ~1.9 Upper: ~8.5

Extinguishing Media: Stop flow of gas.

Special Fire Fighting Procedure: Stop flow of gas.

Unusual Fire or Explosion Hazard: Forms explosive mixture w/gas.

IV. HEALTH HAZARD INFORMATION

Toxicity Summary: Slightly toxic - simple asphyxiant/anesthetic.

Exposure Symptoms

Inhalation: Dizziness above 1% in air.
Skin Contact: Liquid will cause freezing burns.
Skin Absorption: No hazard.
Eye Contact: Liquid will cause freezing burns.
Ingestion: Not applicable.

Special Chronic Effects: None

First Aid

Inhalation: Remove to fresh air. Respiratory support if necessary.
 Seek medical aid.
Skin: Treat as burn.
Eyes: Treat as burn.
Ingestion: Not applicable.

Notes to Physician: None

V. REACTIVITY DATA

Conditions Contributing to Instability: Stable

Incompatibility: Strong oxidants.

Hazardous Decomposition Products (thermal, unless otherwise specified): CO₂, CO

Conditions Contributing to Hazardous Polymerization: None

VI. SPILL OR LEAK PROCEDURES

Follow accepted industry practice and/or follow local, state, and federal regulations. Check before handling.

ND = No Data
NA = Not Applicable

VII. SPECIAL PROTECTION INFORMATION

Ventilation Requirements: For confined space entry, follow accepted safe practices. Due regard should be given to explosive limits and oxygen concentrations.

Specific Personal Protective Equipment

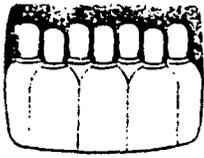
Respiratory: Normally not required.
Eyes: Safety glasses.
Gloves: None
Other Clothing or Equipment: None

VIII. SPECIAL PRECAUTIONS

Precautionary Statements: None

Storage: DOT - flammable compressed gas.

The suggestions and data provided herewith are based upon tests and information which we believe to be reliable. However, we make no guarantee with respect thereto and assume no liability resulting from the use thereof. Users should make their own investigations to determine the suitability of the information or products for their particular purpose. Furthermore, nothing contained therein is intended as permission, inducement or recommendation to violate any laws or to practice any invention covered by existing patents.



MAIH' SON GAS PRODUCTS MATERIAL SAFETY DATA SHEET

017

PRODUCT IDENTIFICATION

MSDS017: ~~CARBON DIOXIDE~~

SYNONYM(S): Carbonic Anhydride

CHEMICAL FORMULA: CO₂

C.A.S. NUMBER: 124-38-9

D.O.T. SHIPPING NAME: Carbon Dioxide

D.O.T. I.D. NUMBER: UN1013

D.O.T. HAZARD CLASS: Nonflammable Gas

D.O.T. LABEL(S): Nonflammable Gas

PHYSICAL DATA

MOLECULAR WEIGHT: 44.011

SUBLIMATION POINT: -78.4°C; -109.2°F

VAPOR PRESSURE @ 21.1°C: 5,727 kPa (gauge); 830 psig

SPECIFIC VOLUME @ 1 ATM, 21.1°C: 0.547 m³/kg; 8.76 ft³/lb

RELATIVE DENSITY, (AIR=1): 1.53 @ 1 atm, 0°C

SOLUBILITY IN WATER @ 1 ATM, 25°C: 7.59 cm³/ kg water

DESCRIPTION: At room temperature and atmospheric pressure carbon dioxide is a colorless, odorless, slightly acid gas. It is shipped as a liquefied gas under its own vapor pressure.

FIRE AND EXPLOSION HAZARD DATA

FLAMMABLE LIMITS IN AIR: Nonflammable.

FIRE FIGHTING PROCEDURES: Carbon dioxide is nonflammable and as such does not create a fire hazard. However, cylinders that are exposed to fire may rupture with violent force. Extinguish surrounding fire and keep cylinders cool using a water spray applied from the maximum possible distance.

HEALTH HAZARD DATA

PERMISSIBLE EXPOSURE LIMITS:

OSHA TWA: 5,000 ppm (9,000 mg/m³)ACGIH TWA: 5,000 ppm (9,000 mg/m³)ACGIH STEL: 15,000 ppm (27,000 mg/m³)

ACUTE EFFECTS OF OVEREXPOSURE: Inhaling carbon dioxide may cause rapid breathing, rapid beating of the heart, headache, sweating, shortness of breath, dizziness, mental depression, visual disturbances, shaking, unconsciousness and death. Contact with the liquid phase or with cold gas escaping from the cylinder may cause frostbite.

CHRONIC EFFECTS OF OVEREXPOSURE: None known

FIRST AID INFORMATION

INHALATION: Move victim to fresh air. If not breathing, give artificial respiration, preferably mouth to mouth. If breathing is difficult, give oxygen. Call a physician.

CONTACT: Treat for frostbite.

REACTIVITY DATA

Carbon dioxide is stable under ordinary conditions of use and storage. It does not polymerize. It does cause violent polymerization of acrylaldehyde or ethyleneimine. It decomposes to carbon monoxide and oxygen when heated above 1700°C. This weakly acidic material will react with alkaline materials to form carbonates and bicarbonates.

An explosion can occur when carbon dioxide contacts mixtures of sodium peroxide with aluminum or magnesium. Reactive metals (such as alkali metals, magnesium, aluminum, titanium, or zirconium), their hydrides, and materials like diethyl magnesium, moist cesium oxide, or lithium acetylide with ammonia can ignite in carbon dioxide atmosphere. Dry ice can form shock sensitive mixtures with sodium, potassium or sodium-potassium alloy.

Product Name: CAUSTIC SODA SOLUTION 50%, PURIFIED GRADE

Effective Date: 06/14/90 Date Printed: 10/07/91

MSDS:000101

4. REACTIVITY DATA:

STABILITY: (CONDITIONS TO AVOID) Product absorbs carbon dioxide from the air. Keep containers closed and sealed.

INCOMPATIBILITY: Water and acid. Product is strong caustic alkali. May react violently with water, acid, and a number of organic compounds. Caustic reacts rapidly with aluminum, tin, and zinc. It will also react with bronze and brass.

HAZARDOUS DECOMPOSITION PRODUCTS: None.

HAZARDOUS POLYMERIZATION: Will not occur.

5. ENVIRONMENTAL AND DISPOSAL INFORMATION:

ACTION TO TAKE FOR SPILLS/LEAKS: Only trained and properly protected personnel should be involved in spill cleanup operations. Acting cautiously, small accidental spills of caustic soda solution should be carefully flushed with water. Dilute acid, preferably acetic acid, may be used to neutralize only the final traces of caustic after flushing.

DISPOSAL METHOD: Disposal of caustic soda must meet all federal, state, and local regulations. Contact The Dow Chemical Company for additional information.

6. HEALTH HAZARD DATA:

EYE: May cause severe irritation with corneal injury and result in permanent impairment of vision, even blindness. Dusts may irritate eyes.

SKIN CONTACT: Short single exposure may cause severe skin burns.

SKIN ABSORPTION: A single prolonged skin exposure is not likely to result in absorption of harmful amounts. The dermal LD50 has not been determined.

INGESTION: May cause gastrointestinal irritation or ulceration and severe burns of the mouth and throat. Single dose oral LD50 has not been determined.

INHALATION: Dusts or mists may cause severe irritation to upper respiratory tract.

SYSTEMIC & OTHER EFFECTS: No relevant information found.

(Continued on page 3)

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Dow U.S.A.

The Dow Chemical Company
Midland, Michigan 48674

Material Safety Data Sheet

Dow Chemical U.S.A.* Midland, MI 48674 Emergency Phone: 517-636-4400

Product code: 15236

Page: 1

Product Name: CAUSTIC SODA SOLUTION 50%, PURIFIED GRADE

Effective Date: 06/14/90 Date Printed: 10/07/91

MSDS:000101

1. INGREDIENTS: (% w/w, unless otherwise noted)

Sodium hydroxide (NaOH)	CAS# 001310-73-2	48.5-50.5%
Sodium carbonate (Na ₂ CO ₃)	CAS# 000497-19-8	<0.2%
Sodium chloride (NaCl)	CAS# 007647-14-5	<1.0%
Water	CAS# 007732-18-5	BAL

This document is prepared pursuant to the OSHA Hazard Communication Standard (29 CFR 1910.1200). In addition, other substances not 'Hazardous' per this OSHA Standard may be listed. Where proprietary ingredient shows, the identity may be made available as provided in this standard.

2. PHYSICAL DATA:

BOILING POINT: Approximately 293F, 145C
FREEZING POINT: Approximately 58F, 14C
VAP. PRESS: 1.5 mmHg, 0.2 kPa @ 20C
VAP. DENSITY: Not applicable
SOL. IN WATER: Water solution
SP. GRAVITY: @ 20C (Dens.) 1.52 g/ml
APPEARANCE: Colorless to slightly colored liquid.
ODOR: No odor.

3. FIRE AND EXPLOSION HAZARD DATA:

FLASH POINT: None
METHOD USED: Not applicable

FLAMMABLE LIMITS
LFL: Not applic.
UFL: Not applic.

EXTINGUISHING MEDIA: Non-combustible.

FIRE & EXPLOSION HAZARDS: In water solution caustic can react with amphoteric metals (such as aluminum) generating hydrogen which is flammable and/or explosive if ignited.

FIRE-FIGHTING EQUIPMENT: Wear self-contained (positive-pressure if available) breathing apparatus and full protective clothing.

(Continued on page 2 , over)

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Product Name: CAUSTIC SODA SOLUTION 50%, PURIFIED GRADE

Effective Date: 06/14/90 Date Printed: 10/07/91

MSDS:000101

7. FIRST AID:

EYES: WATER is the only accepted method of removal of caustic soda (lye) from the eyes or skin. You may have 10 seconds or less to avoid serious permanent injury. Therefore, IMMEDIATE first aid must be given after any injurious exposure. Moving the victim from water access for transport to medical aid should be done only on the advice of qualified medical personnel. While transporting victim to a medical facility, continue washing if possible.

In case of eye contact, wash eyes immediately and continuously for 30 minutes. Call for medical assistance immediately.

SKIN: Immediate continued and thorough washing in flowing water for 30 minutes is imperative while removing contaminated clothing. Prompt medical consultation is essential. Wash contaminated clothing before reuse. Destroy contaminated shoes.

INGESTION: Do not induce vomiting. Give large amounts of water or milk if available and transport to medical facility.

INHALATION: Remove to fresh air if effects occur. Consult medical.

NOTE TO PHYSICIAN: Corrosive. May cause stricture. If lavage is performed, suggest endotracheal and/or esophagosopic control. Material is strong alkali. If burn is present, treat as any thermal burn, after decontamination. For burns of skin only. Eye irrigation may be necessary for an extended period of time to remove as much caustic as possible. Duration of irrigation and treatment is at the discretion of medical personnel. No specific antidote. Supportive care. Treatment based on judgment of the physician in response to reactions of the patient.

8. HANDLING PRECAUTIONS:

EXPOSURE GUIDELINE(S): Sodium hydroxide: OSHA PEL and ACGIH TLV are 2 mg/m³ Ceiling.

VENTILATION: Control airborne concentrations below the exposure guideline. Good general ventilation sufficient for most operations.

RESPIRATORY PROTECTION: In misty atmospheres, use an approved mist respirator. If respiratory irritation is experienced, use an approved air-purifying respirator.

(Continued on page 4 , over)

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Product Name: CAUSTIC SODA SOLUTION 50%, PURIFIED GRADE

Effective Date: 06/14/90 Date Printed: 10/07/91

MSDS:000101

8. HANDLING PRECAUTIONS: (CONTINUED)

SKIN PROTECTION: Use protective clothing impervious to this material. Selection of specific items such as gloves, boots, apron, hard hat with face-shield or full-body suit will depend on operation. Remove contaminated clothing immediately, wash skin area with soap and water, and launder clothing before reuse.

EYE PROTECTION: Use chemical goggles. Full face shield in addition to goggles may be desirable to protect face. Maintain eye wash fountain and safety shower at or near work area.

9. ADDITIONAL INFORMATION:

SPECIAL PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE: Prevent eye and skin contact. Do not breathe dusts or mists.

Avoid storing next to strong acids. Caustic should be stored in clean, dry areas. Do not store in underground tanks. Product absorbs CO₂ from air. Keep containers closed and sealed.

SPECIAL PRECAUTIONS FOR DILUTING CAUSTIC SODA SOLUTION:

1. ALWAYS add caustic soda solution to water with constant agitation. NEVER add water to the caustic soda solution.
2. The water should be lukewarm (80-100F). NEVER start with hot or cold water.

The addition of caustic soda to liquid will cause a rise in temperature. If caustic soda becomes concentrated in one area, or is added too rapidly, or is added to hot or cold liquid, a rapid temperature increase can result in DANGEROUS mists or boiling or spattering which may cause an immediate VIOLENT ERUPTION.

MSDS STATUS: Revised section 9 and regsheets.

For information regarding state/provincial and federal regulations see The Regulatory Information Section.

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Dow Chemical U.S.A.* Midland, MI 48674 Emergency Phone: 517-636-4400

Product code: 15236

Page: R-1

Product Name: CAUSTIC SODA SOLUTION 50%, PURIFIED GRADE

Effective Date: 06/14/90 Date Printed: 10/07/91

MSDS:000101

REGULATORY INFORMATION: (Not meant to be all-inclusive--selected regulations represented.)

NOTICE: The information herein is presented in good faith and believed to be accurate as of the effective date shown above. However, no warranty, express or implied, is given. Regulatory requirements are subject to change and may differ from one location to another; it is the buyer's responsibility to ensure that its activities comply with federal, state or provincial, and local laws. The following specific information is made for the purpose of complying with numerous federal, state or provincial, and local laws and regulations. See MSD Sheet for health and safety information.

U.S. REGULATIONS

SARA HAZARD CATEGORY: This product has been reviewed according to the EPA "Hazard Categories" promulgated under Sections 311 and 312 of the Superfund Amendment and Reauthorization Act of 1986 (SARA Title III) and is considered, under applicable definitions, to meet the following categories:

An immediate health hazard

CANADIAN REGULATIONS

The Workplace Hazardous Materials Information System (W.H.M.I.S.) Classification for this product is:

E

The Transportation of Dangerous Goods Act (T.D.G.A.) classification for this product is:

Sodium Hydroxide, Solution/Class 8, (9.2)/UN1824/11

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* An Operating Unit of The Dow Chemical Company



Dow U.S.A.

The Dow Chemical Company
Midland, Michigan 48674

October 8 1991

EL PASO NATURAL GAS

2206233

CHACO PLANT
15 MILES SOUTH FARMINGTON
FARMINGTON NM 87401

Sir/Madam:

Enclosed are Material Safety Data Sheets(s) which provide information on products you have purchased from us in the recent past. A copy has been sent to both the invoice address and the shipping address as they appeared on the order for these products. Since you may redirect the products to more than one place within your location, please make sure this information is available to all persons handling and/or using the product.

These Material Safety Data Sheet(s) have either been revised since you last received them or are for products which you recently purchased for the first time. Please consider them as the current copy to replace any previous version you may have.

The distribution of these sheets is part of a continuing program for providing information to our customers. The regulations promulgated by OSHA for Hazard Communication, 29 CFR 1910.1200 have been considered in preparing these Material Safety Data Sheet(s).

Thank you for your help.

Nancy B. Tefertiller

N. B. Tefertiller
Health and Environmental Sciences
1803 Building

wkt

Enclosure(s)

MATERIAL SAFETY DATA SHEET

CORPORATE RESEARCH & DEVELOPMENT

SCHENECTADY, N. Y. 12305

Phone: (518) 385-4085 DIAL COM: 8*235-4085



No. 53

~~CHLORINE GAS~~

Date July 1979

SECTION I. MATERIAL IDENTIFICATION

MATERIAL NAME: CHLORINE

OTHER DESIGNATIONS: Cl₂, CAS # 007 782 505

DESCRIPTION: A gas shipped in steel cylinders as a liquid under its own vapor pressure.

MANUFACTURER: Available from many suppliers.

SECTION II. INGREDIENTS AND HAZARDS

	%	HAZARD DATA
Chlorine	> 99	8-hr TWA 1 ppm (C) or 3 mg/m ³ *
<p>*Current OSHA ceiling limit. ACGIH TLV (1978) is 1 ppm with a STEL of 3 ppm for up to 15 minutes exposure. NIOSH (1976) proposed a ceiling limit of 0.5 ppm (15 minute sampling time).</p> <p>(Controversy going on whether OSHA standard should include ceiling limit or not.)</p>		

SECTION III. PHYSICAL DATA

Boiling point at 1 atm, deg C -----	-34	Density at 0°C:	
Vapor pressure at 20°C, mm Hg -----	4800	Gas at 1 atm, g/liter ----	3.214
Vapor density (Air=1) -----	2.49	Liquid at 3.65 atm, g/cc --	1.47
Water solubility at 20°C, 1 atm, g/l --	7.3	Molecular weight -----	70.91

Appearance & Odor: A greenish-yellow gas or clear, amber-colored liquid with a suffocating, pungent, irritating odor. The odor recognition threshold (100% of test panel, unfatigued) is reported at 0.314 ppm. The odor is easily noticed at 1.9-3.5 ppm and has been reported as intolerable at 2.6-41 ppm, depending on the observer.

SECTION IV. FIRE AND EXPLOSION DATA

Flash Point and Method	Autoignition Temp.	Flammability Limits in Air	LOWER	UPPER
Non-flammable				

Use extinguishing media that is appropriate for the surrounding fire. Use water spray to cool intact, fire-exposed containers (one ton tanks and cylinders will release chlorine when a fusible metal safety plug melts at 158-165°F.) If possible, have specially trained personnel remove intact cylinders from fire area.

Chlorine will support the burning of most combustible materials, just as oxygen does.

Flammable gases and vapors can form explosive mixtures with chlorine.

Firefighters must use self-contained breathing equipment, eye protection, and full protective clothing when fighting fires in which chlorine is involved.

SECTION V. REACTIVITY DATA

Chlorine is stable in steel containers at room temperature when dry. [Intense local heat (above 215°C) on steel walls can cause steel to ignite in chlorine.]

It is a powerful oxidizing agent which reacts violently with reducing agents and combustible materials. Materials such as acetylene, turpentine, other hydrocarbons, ammonia, hydrogen, ether, powdered metals, etc. must be kept away from chlorine.

It reacts with H₂S and H₂O forming HCl; it combines with CO and SO₂ to form phosgene and sulfuryl chloride (toxic and corrosive materials).

Wet chlorine (150 ppm water) corrosively attacks most common metals. Handling chlorine requires special materials technology.

SECTION VI. HEALTH HAZARD INFORMATION

TLV 1 ppm or 3 mg/m³ (C)

Chlorine believed to damage the body by local corrosive effects only; no systemic effects. 5-8 ppm in air will be severely irritating to eyes, nose, and respiratory tract of most individuals in a few minutes (10 ppm intolerable for avg. person). Higher level exposures produce coughing, dyspnea, burns of the skin, conjunctivitis, pulmonary edema (may be delayed) and death, depending on concentration and time of exposure (35-51 ppm, lethal in an hour; a few deep breaths fatal at 1000 ppm). Reduced respiratory capacity (especially among smokers) and dental erosion can result from chronic low level exposure. Any contact with liquid chlorine causes burns, blistering and tissue destruction.

FIRST AID: Call physician IMMEDIATELY for any person overexposed to chlorine!

Eve Contact: Flush eyes with water for at least 15 minutes, holding eyelids open. If medical help is not readily available, continue flushing with water.

Skin Contact: (Treat for inhalation exposure first!) Remove contaminated clothing under a safety shower. Wash exposed skin areas thoroughly with water.

Inhalation: Remove to fresh air. Restore breathing when required. Have trained person administer oxygen until victim breathes easily on his own. Keep warm and at rest! In mild cases, give milk to relieve throat irritation.

SECTION VII. SPILL, LEAK, AND DISPOSAL PROCEDURES

Establish written emergency plans and special training of personnel where chlorine is used.

Notify safety personnel. Provide ventilation. Exclude from area all except specially trained, assigned personnel with approved self-contained breathing equipment and appropriate protective clothing. Find and stop leak. (Large uncontrollable leaks require environmental consideration and possible evacuation of surrounding area.) Move leaking container to isolated area. Position to release gas not liquid.

When possible draw off chlorine to process or to disposal system.

DISPOSAL: Bubble through a large volume of 15% aqueous NaOH or other alkali. Suitably dispose of resulting solution. Follow Federal, State and local regulations.

SECTION VIII. SPECIAL PROTECTION INFORMATION

Provide general and local exhaust ventilation to meet TLV requirements. Provide suitable venting for low lying areas. Use enclosed, isolated processing and handling whenever possible. Full face-piece respirators must be available for non-routine and emergency use: canister gas mask below 5000 ppm in air and self-contained breathing equipment for other conditions.

Workers should be provided with chemical safety goggles and impervious gloves. Full protective clothing must be used when needed to prevent exposure to chlorine, liquid or gas. Daily change of work clothes and showering after work shift are recommended. Eyewash stations and chemical safety showers must be available in areas of handling and storage of chlorine.

SECTION IX. SPECIAL PRECAUTIONS AND COMMENTS

Store chlorine containers in well-ventilated areas of low fire potential, away from incompatible materials (see Sec. V) and away from sources of heat and ignition. Protect containers from weather and physical damage; follow standard safety procedures for containers of compressed, corrosive gases. Provide special training to workers handling chlorine. Regularly inspect (and test) piping and containment used for chlorine service. Liquid levels should be less than 85% of tank or cylinder capacity.

Use preplacement and periodic medical exams; preclude from workplace exposure to chlorine those with cardiac, pulmonary or chronic respiratory problems.

Special Ref: "Chlorine and Hydrogen Chloride", Chapter 5, National Academy of Science, Washington, DC (1976).

DATA SOURCE(S) CODE: 2-12, 17, 19, 24, 26

APPROVALS: MIS, *J.M. Nielsen*
CFD

Industrial Hygiene
and Safety *G. White*

MEDICAL REVIEW: 12/79

Judgments as to the suitability of information herein for purchaser's purposes are necessarily purchaser's responsibility. Therefore, although reasonable care has been taken in the preparation of such information, General Electric Company extends no warranties, makes no representations and assumes no responsibility as to the accuracy or suitability of such information for application to purchaser's intended purposes or for consequences of its use.

Material Safety Data Sheet

QUICK IDENTIFIER

Common Name: (used on label and list)

Commercial Instrument Ink (red)

May be used to comply with OSHA's Hazard Communication Standard, 29 CFR 1910.1200. Standard must be consulted for specific requirements.

SECTION 1 -

Manufacturer's Name

Taylor Instrument

Address

95 Ames Street P.O. Box 110

Emergency Telephone No. (716)-235-5000

City, State, and ZIP

Rochester, New York 14692

Other Information Code Same

Signature of Person Responsible for Preparation (Optional)

Date Prepared 11/18/85

SECTION 2 - HAZARDOUS INGREDIENTS/IDENTITY

Hazardous Component(s) (chemical & common name(s))	OSHA PEL	ACGIH TLV	Other Exposure Limits	% (optional)	CAS NO.
Dye	None	None		0.5	-
Gum arabic	None	None		6	-
Denatured alcohol (ethyl alcohol)	1000 ppm	1000 ppm		15	62-175
Glycerine	None	None		47	56817
Water	None	None		32	7732185

SECTION 3 - PHYSICAL & CHEMICAL CHARACTERISTICS

Boiling Point	195° F	Specific Gravity (H ₂ O=1)	1.12	Vapor Pressure (mm Hg)	Unknown
		Vapor Density (Air = 1)	Unknown		
Solubility in Water	Complete	Reactivity in Water	None		
Appearance and Odor	Viscous liquid with alcohol odor	Melting Point	Liquid at room temperature		

SECTION 4 - FIRE & EXPLOSION DATA

Flash Point	75° F. C.	Method Used	Closed cup	Flammable Limits in Air % by Volume	LEL Lower Unknown	UEL Upper Unknown
Auto-Ignition Temperature	Unknown	Extinguisher Media	Dry chemical or alcohol type foam.	Water spray may be ineffective.		
Special Fire Fighting Procedures	None					

Unusual Fire and Explosion Hazards
None



**UNICHEM
INTERNATIONAL**

DE-OILING SURFACTANT

**PRODUCT
BULLETIN**

DESCRIPTION

De-Oiling Surfactant is a homogeneous blend of organic polyols, surface active compounds, and other active ingredients.

USES

De-Oiling Surfactant is used for the emulsification and removal of oil deposits in a closed jacket water system.

APPLICATION

De-Oiling Surfactant should be added to the water system as soon as possible after an oil spill or leak is experienced. Approximately 2 gallons per 1,000 gallons contained water is required. Additional quantities may be utilized in severe or baked-on oil deposits. The system should be thoroughly flushed with fresh water approximately 24 hours after chemical treatment.

PROPERTIES

Color	Brown
Form	Liquid
Density	8.1 lbs/gallon
Pour Point	17 ^o F
Flash Point Open Cup	125 ^o F
Flash Point Closed Cup	94 ^o F
Viscosity @ 100 ^o F	74.6 S.U.
pH	3.8

HANDLING

No special precautions are required for handling De-Oiling Surfactant. However, due care should be exercised in the handling of any water treatment compound.

PACKAGING

De-Oiling Surfactant is available in 55 gallon drums or in bulk quantities.



MATERIAL SAFETY DATA SHEET

Date Prepared 05/22/86

Supersedes Previous Sheet Dated Not Dated

I. PRODUCT IDENTIFICATION

Unichem International 707 N. Leech/P. O. Box 1499/Hobbs, New Mexico 88240
EMERGENCY TELEPHONE NUMBER (505) 393-7751

Trade Name DE-OILING SURFACTANT (DOS)

Chemical Description Proprietary Surfactant in an Aqueous Solution

II. HAZARDOUS INGREDIENTS

Material	TLV (Units)
Isopropanol CAS# 67-63-0	400 ppm
Neither this product nor its ingredients are listed in any of OSHA Standard, Section 1910.1200 sources as carcinogenic.	

III. PHYSICAL DATA

Boiling Point, 760 mm Hg	180°F (Initial)	Freezing Point	17°F
Specific Gravity (H ₂ O=1)	0.97 g/ml	Solubility in Water	Complete

Appearance and Odor Light Yellow Clear Liquid; Slight Alcoholic Odor

IV. FIRE AND EXPLOSION HAZARD DATA

Flash Point (Test Method) 94°F ICC

Extinguishing Media Carbon Dioxide, Dry Chemical, Water Spray or Fog, Foam. Use a water spray to cool fire-exposed containers.

Special Fire Fighting Procedures Firefighters should wear self-contained breathing apparatus and full protective clothing.

Unusual Fire and Explosion Hazards None

Liability is expressly disclaimed for any loss or injury arising out of the use of this information or the use of any materials designated.

V. HEALTH HAZARD DATA

Threshold Limit Value Not Determined

Effects of Overexposure Prolonged skin contact will cause dryness and irritation. Ingestion may cause catharsis. Inhalation of mist may cause respiratory irritation. Eye contact will cause irritation.

Emergency and First Aid Procedures Eyes: Flush promptly with copious quantities of water for at least fifteen minutes. Seek medical attention. Skins: Flush area with water. Wash with soap and remove contaminated clothing. Inhalation: Remove to fresh air. Apply artificial respiration if necessary. Ingestion: Call a physician. Do not induce vomiting. Dilute with water or milk.

VI. REACTIVITY DATA

Stability	Stable <input checked="" type="checkbox"/>	Conditions to Avoid	None
	Unstable		

Incompatibility (Materials to Avoid) Oxidizers, Alkalis

Hazardous Decomposition of Products Oxides of Carbon, Nitrogen, Sulfur, and Ammonia. Contact with strong caustics may liberate amine fumes.

Hazardous Polymerization	May Occur	Conditions to Avoid	None
	Will Not Occur <input checked="" type="checkbox"/>		

VII. SPILL OR LEAK PROCEDURES

Steps to be Taken if Material is Released or Spilled Provide adequate ventilation. Remove sources of ignition. Contain and absorb spill.

Waste Disposal Method Dispose via a licensed waste disposal company. Follow local, state, and federal regulations.

VIII. SPECIAL PROTECTION INFORMATION

Respiratory Protection (Specify Type) Use air-supplied or self-contained breathing apparatus if exposure levels exceed TLV for this product or its ingredients.

Ventilation	Local Exhaust	As needed to prevent accumulation of vapors above TLV	Special	None
	Mechanical (General)		Other	None

Protective Gloves Rubber **Eye Protection** Safety Glasses, Goggles, and/or Face Shield

Other Protective Equipment Overalls, Rubber Boots, Eyewash Stations, Safety Showers

IX. SPECIAL PRECAUTIONS

Precautions to be Taken in Handling and Storing Store in cool, well-ventilated, low fire-risk area away from ignition sources and incompatible materials. Keep containers closed when not in use. Do not transfer or store in improperly marked containers.

Other Precautions Avoid prolonged or repeated breathing of vapors or contact with skin. Do not ingest.

TOXICITY INFORMATION

Lifetime skin painting studies conducted by the American Petroleum Institute, and others have shown that similar products boiling between 170-370 degrees C (350-700 F) usually produce skin tumors and/or skin cancer in laboratory mice. The degree of carcinogenic response was weak to moderate with a relatively long latent period. The implications of these results for humans have not been determined.

Limited studies on oils that are very active carcinogens have shown that washing the animals' skin with soap and water between applications greatly reduces tumor formation.

Potential risks to humans can be minimized by observing good work practices and personal hygiene procedures generally recommended for petroleum products. See Section I for recommended protection and precautions.

Reports of animal studies using both sexes of several species have shown that kidney effects can occur in male rats after prolonged and repeated inhalation exposures to light hydrocarbon vapors of the general type represented by this product. While the effects are of a low order of severity in animals, the implications of these results for humans have not yet been determined.

Product has a low order of acute oral toxicity.

.....

F. PHYSICAL DATA

.....

The following data are approximate or typical values and should not be used for precise design purposes.

BOILING RANGE

160-350 degrees C. (320-650 F)

VAPOR PRESSURE

Less than 1 mm Hg @ 20 C.

SPECIFIC GRAVITY (15.6 C/15.8 C)

0.86

VAPOR DENSITY (AIR = 1)

Greater than 5

MOLECULAR WEIGHT

Approximately 212 average

PERCENT VOLATILE BY VOLUME

100

pH

Essentially neutral

**EVAPORATION RATE @ 1 ATM. AND
25 C (77 F) (n-BUTYL ACETATE=1)**
0.02

POUR, CONGEALING OR MELTING POINT

-10 degrees C. (+14 F.)

Pour Point by ASTM D 97

SOLUBILITY IN WATER @ 1 ATM.

AND 25 C (77 F)

Negligible; less than 0.1%

VISCOSITY

2.7 cSt @ 40 degrees C.

.....
G. REACTIVITY
.....

This product is stable and will not react violently with water. Hazardous polymerization will not occur. Avoid contact with strong oxidants such as liquid chlorine, concentrated oxygen, sodium hypochlorite or calcium hypochlorite.

.....
H. SPILL OR LEAK PROCEDURES
.....

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

Shut off and eliminate all ignition sources. Keep people away. Recover free product. Add sand, earth or other suitable absorbent to spill area. Minimize breathing vapors. Minimize skin contact. Ventilate confined spaces. Open all windows and doors. Keep product out of sewers and watercourses by diking or impounding. Advise authorities if product has entered or may enter sewers, watercourses or extensive land areas. Assure conformity with applicable governmental regulations. Continue to observe precautions for volatile, flammable vapors from absorbed material.

.....
I. PROTECTION AND PRECAUTIONS
.....

VENTILATION

Provide greater than 60 feet per minute hood face velocity. Use only with ventilation sufficient to prevent exceeding recommended exposure limit or buildup of explosive concentrations of vapor in air.

RESPIRATORY PROTECTION

Normally not needed at ambient temperatures. Use supplied-air respiratory protection in confined or enclosed spaces, if needed.

PROTECTIVE GLOVES

Use chemical-resistant gloves, if needed, to avoid prolonged or repeated skin contact.

EYE PROTECTION

Use splash goggles or face shield when eye contact may occur.

OTHER PROTECTIVE EQUIPMENT

Use chemical-resistant apron or other impervious clothing, if needed, to avoid contaminating regular clothing which could result in prolonged or repeated skin contact.

WORK PRACTICES/ENGINEERING CONTROLS

Keep containers closed when not in use. Do not handle or store near heat, sparks, flame, or strong oxidants.

PERSONAL HYGIENE

Minimize breathing vapor, mist or fumes. Avoid prolonged or repeated contact with skin. Remove contaminated clothing; launder or dry-clean before reuse. Remove contaminated shoes and thoroughly clean and dry

DIESEL FUEL

before reuse; discard if oil-soaked. Cleanse skin thoroughly after contact, before breaks and meals, and at end of work period. Product is readily removed from skin by waterless hand cleaners followed by washing thoroughly with soap and water.

J. TRANSPORTATION INFORMATION

TRANSPORTATION INCIDENT INFORMATION

For further information relative to spills resulting from transportation incidents, refer to latest Department of Transportation Emergency Response Guidebook for Hazardous Materials Incidents, DOT P 5800.3.

The information contained herein is provided for informational purposes only. To the best of Giant's knowledge and belief, the information is accurate as of the date of preparation. Giant, however, makes no express or implied representations, warranties, or guarantees with respect to the accuracy, completeness and reliability of the information. Giant disclaims any liability for damage, loss, or injury arising out of, or resulting from, use of the information.

VI. HEALTH HAZARD DATA

NOTE: Steel products under normal conditions do not present an inhalation, ingestion or contact health hazard. However, operations, such as, burning, welding, sawing, brazing, grinding, and possibly machining, etc., which results in elevating the temperature of the product to or above its melting point or results in the generation of airborne particulates, may present health hazards.

EFFECTS OF OVEREXPOSURE:

MAJOR EXPOSURE HAZARD

INHALATION SKIN CONTACT EYE CONTACT INGESTION

Chronic inhalation of high concentrations of iron oxide fumes or dusts may lead to a benign pneumoconiosis (siderosis). Inhalation of high concentrations of ferric oxide may possibly enhance the risk of lung cancer development in workers exposed to pulmonary carcinogens.

The inhalation of high concentrations of freshly formed oxide fumes and dusts of manganese, Copper, Lead and/or Zinc in the respirable particle size range can cause an influenza-like illness termed metal fume fever. Typical symptoms last 12 to 48 hours and are characterized by metallic taste in the mouth, dryness and irritation of the throat, followed by weakness, muscle pain, fever and chills.

EMERGENCY AND FIRST AID PROCEDURES For overexposure to airborne fumes and particulates, remove exposed person to fresh air. If breathing is difficult or has stopped, administer artificial respiration or oxygen as indicated. Seek medical attention promptly.

Treat metal fume fever by bed rest, and administer a pain and fever reducing medication.

VII. SPILL OR LEAK PROCEDURES

NOT APPLICABLE TO STEEL IN THE SOLID STATE.

VIII. SPECIAL PROTECTION INFORMATION

RESPIRATORY: NIOSH/MSHA-approved dust and fume respirators should be used to avoid excessive inhalation of particulates. Appropriate respirator selection depends on the magnitude of exposure.

SKIN: Protective gloves should be worn as required for welding, burning or handling operations.

EYE: Use safety glasses or goggles as required for welding, burning, sawing, brazing, grinding or machining operations.

VENTILATION: Local exhaust ventilation should be provided when welding, burning, sawing, brazing, grinding or machining to prevent excessive dust or fume exposure.

OTHER PROTECTIVE EQUIPMENT:

Depending upon the conditions of use and specific work situations, additional protective equipment and/or clothing may be required to control exposures.

IX. SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE:

Operations with the potential for generating high concentrations of airborne particulates should be evaluated and controlled as necessary. Avoid breathing metal fumes and dusts.

OTHER COMMENTS:

No additional comments are believed to be necessary for these products.

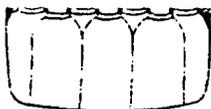
INFORMATION IS TAKEN FROM SOURCES OR BASED UPON DATA BELIEVED TO BE RELIABLE; HOWEVER, Tex-Tube VISION MAKES NO WARRANTY AS TO THE ABSOLUTE CORRECTNESS OR SUFFICIENCY OF ANY OF THE FOREGOING OR THAT ADDITIONAL OR OTHER MEASURES MAY NOT BE REQUIRED UNDER PARTICULAR CONDITIONS.

Original Issue Date:
Revision Date:

ANNEX I

TYPICAL LEVELS OF TRACE OR RESIDUAL ELEMENTS IN STEELS

<u>ELEMENT</u>		<u>% WEIGHT</u>
Aluminum	Al	0.002 - 0.01
Arsenic	As	0.005 - 0.008
Boron	B	0.0002 - 0.0004
Calcium	Ca	0.0002
Chromium	Cr	0.02 - 0.08
Cobalt	Co	<0.005 - 0.009
Copper	Cu	0.009 - 0.18
Lead	Pb	<0.001
Molybdenum	Mo	<0.004 - 0.04
Nickel	Ni	0.011 - 0.04
Niobium	Nb	0.002 - 0.005
Silicon	Si	<0.004 - 0.02
Tin	Sn	<0.004 - 0.02
Titanium	Ti	0.001 - 0.004
Vanadium	V	0.001 - 0.003
Zirconium	Zr	0.002



MATERIAL SAFETY DATA SHEET 031

PRODUCT IDENTIFICATION

MSDS031: ETHANE™

D.O.T. SHIPPING NAME: Ethane

SYNONYM(S): None

D.O.T. I.D. NUMBER: UN1035

CHEMICAL FORMULA: C₂H₆

D.O.T. HAZARD CLASS: Flammable Gas

C.A.S. NUMBER: 74-84-0

D.O.T. LABEL(S): Flammable Gas

PHYSICAL DATA

MOLECULAR WEIGHT: 30.070

BOILING POINT: - 88.6°C; -127.5°F

VAPOR PRESSURE @ 21.1°C: 3,744 kPa (gauge); 543 psig

SPECIFIC VOLUME @ 1 ATM; 21.1°C: 0.799 m³/kg; 12.8 ft³/lb

RELATIVE DENSITY, (AIR=1): 1.048 @ 1 atm, 0°C

SOLUBILITY IN WATER @ 1 ATM, 20°C: 9.82 cm³/Kg water

DESCRIPTION: At room temperature and atmospheric pressure ethane is a colorless, odorless, flammable, nontoxic gas. It is shipped as a liquefied gas under its own vapor pressure.

FIRE AND EXPLOSION HAZARD DATA

FLAMMABLE LIMITS IN AIR: 3.0 - 12.5% by volume.

AUTO-IGNITION TEMPERATURE: 472.2°C; 882°F

FIRE FIGHTING PROCEDURES: The only safe way to extinguish an ethane fire is to stop the flow of gas. If the flow cannot be stopped, let the fire burn itself out while cooling the surroundings using a water spray.

Personnel may have to wear approach type protective suits and positive pressure self-contained breathing apparatus. Firefighters' turnout gear may be inadequate.

UNUSUAL FIRE AND EXPLOSION HAZARDS:

1. Cylinders that are exposed to fire may rupture with violent force. Extinguish surrounding fire and keep cylinders cool using a water spray applied from the maximum possible distance.
2. Flammable gases may spread from a spill after the fire is extinguished and be subject to reignition.

HEALTH HAZARD DATA

PERMISSIBLE EXPOSURE LIMITS:

OSHA TWA: None established

ACGIH TWA: None established *

* ACGIH considers ethane to be a simple asphyxiant.

ACUTE EFFECTS OF OVEREXPOSURE: Ethane is nontoxic but can act as a simple asphyxiant by displacing air. Symptoms of asphyxia include rapid respirations, dizziness and fatigue.

CHRONIC EFFECTS OF OVEREXPOSURE: None known.

FIRST AID INFORMATION

INHALATION: Move victim to fresh air. If not breathing, give artificial respiration, preferably mouth-to-mouth. If breathing is difficult, give oxygen. Call a physician.

REACTIVITY DATA

STABILITY: (X) STABLE () UNSTABLE

INCOMPATIBILITY: Oxidizing materials.

HAZARDOUS DECOMPOSITION/OXIDATION PRODUCTS: Carbon monoxide and carbon dioxide.

POLYMERIZATION: (X) WILL NOT OCCUR () MAY OCCUR

SPILL OR LEAK PROCEDURE

Shut off all ignition sources and ventilate the area. For controlling large flows, personnel may have to wear approach type protective suits and positive pressure self-contained breathing apparatus.

PRECAUTIONARY INFORMATION

STORAGE RECOMMENDATIONS: Cylinders should be stored and used in dry, well ventilated areas away from sources of heat.

PERSONAL PROTECTIVE EQUIPMENT:

EYE PROTECTION - Safety glasses should be worn.

RESPIRATORY PROTECTION - Respiratory equipment is not needed unless the gas displaces the air and causes a deficiency of oxygen and the possibility of asphyxiation.

SKIN PROTECTION - No special equipment is required. Gloves are recommended for cylinder handling.

BEFORE USING THE GAS:

1. Secure the cylinder to prevent it from falling or being knocked over.
2. Leak check the lines and equipment.
3. Have an emergency plan covering steps to be taken in the event of an accidental release.

• • •
*** NOTICE ***

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IN CASE OF EMERGENCY CALL THE NEAREST MATHESON LOCATION

Cucamonga, CA (714) 987-4611, Newark, CA (415) 793-2559, Morrow, GA (404) 961-7891,
Joliet, IL (815) 727-4848, Gloucester, MA (617) 283-7700, East Rutherford, NJ (201) 933-2400, Twinsburg,
OH (216) 425-4406, La Porte, TX (713) 471-2544

Revised: 7/31/80

Reviewed: 8/1/85

CITIES SERVICE OIL AND GAS CORPORATION
Safety And Environmental Services
P. O. Box 300
Tulsa, Oklahoma 74102

MATERIAL SAFETY DATA SHEET

NFPA*

Trade Name: Ethane-Propane Mix	Health	1	Slightly Toxic
Synonyms:	Fire	4	Extremely Flammable
CAS Reg. No.:	Reactivity	0	Stable

Cities Service Index No.:
TSIS-0046,0128

*Cities Service Assignment based on
our evaluation.

Group:

I. GENERIC COMPOSITION/INGREDIENTS

Material	%	Hazard Data
Ethane	variable	Simple asphyxiant
Propane	variable	Simple asphyxiant/anesthetic

II. PHYSICAL DATA

Boiling Point, 760 mmHg,
°C(°F): <-42 (<-44)

Melting Point, °C (°F): NA

Vapor Pressure, mmHg (25°C): Gas at room
temperature & Std. atm.
pressure

Specific Gravity
(H₂O=1): NA

Solubility in H₂O, % By Vol.: >1

Vapor Density (Air=1): ≥1

Evaporation Rate (Butyl
Acetate=1): >1

% Volatiles By Vol.: 100

Appearance and Odor: Clear gas.

ND = No Data

NA = Not Applicable

III. FIRE AND EXPLOSION DATA

Flash Point, °C (°F): Gas Autoignition Temperature, °C (°F): ≥450 (≥842)
Flammable Limits in Air, % by Vol: Lower: 2.0 Upper: 12.5
Extinguishing Media: Stop flow of gas.
Special Fire Fighting Procedure: Stop flow of gas.
Unusual Fire or Explosion Hazard: Forms explosive mixtures with air.

IV. HEALTH HAZARD INFORMATION

Toxicity Summary: Slightly toxic - simple asphyxiant/anesthetic.

Exposure Symptoms

Inhalation: Dizziness above 10% (propane) in air.
Skin Contact: Liquid will cause freezing burns.
Skin Absorption: No hazard.
Eye Contact: Liquid will cause freezing burns.
Ingestion: Not applicable.

Special Chronic Effects: None

First Aid

Inhalation: Remove to fresh air. Respiratory support if necessary.
 Seek medical aid.
Skin: For liquid contact, treat as burn.
Eyes: For liquid contact, treat as burn.
Ingestion: Not applicable.

Notes to Physician: None

V. REACTIVITY DATA

Conditions Contributing to Instability: None
Incompatibility: Strong oxidants.
Hazardous Decomposition Products (thermal, unless otherwise specified): CO, CO₂
Conditions Contributing to Hazardous Polymerization: None

VI. SPILL OR LEAK PROCEDURES

Follow accepted industry practices and/or local, state and federal regulations.
Check before handling.

VII. SPECIAL PROTECTION INFORMATION

Ventilation Requirements: For confined space entry, follow approved safe practices. Due regard should be given to explosive limits and oxygen concentration.

Specific Personal Protective Equipment

Respiratory: None normally required.
Eyes: Safety goggles recommended.
Gloves: None
Other Clothing or Equipment: None

VIII. SPECIAL PRECAUTIONS

Precautionary Statements: None

Storage: DOT - flammable compressed gas.

The suggestions and data provided herewith are based upon tests and information which we believe to be reliable. However, we make no guarantee with respect thereto and assume no liability resulting from the use thereof. Users should make their own investigations to determine the suitability of the information or products for their particular purpose. Furthermore, nothing contained therein is intended as permission, inducement or recommendation to violate any laws or to practice any invention covered by existing patents.

Material Safety Data Sheet

MSDS
010
May 1989

FOXBORO 1800 INK



INDUSTRIAL PRODUCTS DIVISION
GRAPHIC CONTROLS
189 VAN RENSSELAER ST.
BUFFALO, NY 14210

ISSUE DATE 1-15-87

NO. 1 064-MA

EMERGENCY TELEPHONE NO. <u>716-853-7500</u>			
PRODUCT NAME <u>FOXBORO 1800 INK</u>		INK CODE NO. <u>64</u>	
TRADE NAME/SYNONYMS <u>[REDACTED]</u>			
HAZARDOUS INGREDIENTS			
NAME (CAS NO.)	% RANGE	TLV	TOXICOLOGICAL DATA
FORMALDEHYDE (30-00-0)	<1	1 PPM	POSITIVE ANIMAL CARCINOGEN. INDEFINITE HUMAN CARCINOGEN. (IARC)
ETHYLENE GLYCOL (107-21-1)	10-25	5 PPM CEILING VAPOR	LD50: 5.0 G/KG NO OTHER INGREDIENT IS LISTED IN THE MASSACHUSETTS SUBSTANCE LIST CONTAINED IN THE RIGHT-TO-KNOW REGULATIONS 105CMR 670, APPENDIX A.
PHYSICAL DATA			
BOILING PT. (°F) <u>212-250</u>		SPECIFIC GRAVITY <u>1.130-1.145</u>	
VAPOR PRESSURE (MMHG @20°C) <u>DUE TO H2O ONLY</u>		SOLUBILITY IN WATER <u>COMPLETE</u>	
ODOR <u>SLIGHT ODOR OF FORMALDEHYDE</u>		COLORS <u>BLACK, RED, BLUE, GREEN, OR PURPLE LIQUID</u>	
FIRE AND EXPLOSION DATA			
FLASH POINT °F (METHOD USED) <u>NOT FLAMMABLE</u>		FLAMMABLE LIMIT	
EXTINGUISHING MEDIA <u>USE MEDIA PROPER TO PRIMARY CAUSE OF FIRE</u>		LEL <u>N/A</u>	UEL <u>N/A</u>
SPECIAL FIRE FIGHTING PROCEDURES • <u>FIREFIGHTERS SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS AND TURN-OUT GEAR.</u>			
UNUSUAL FIRE AND EXPLOSION HAZARDS <u>NONE</u>			

N/A - NOT APPLICABLE
N/E - NOT ESTABLISHED

The Foxboro Company
Foxboro, MA 02035 U.S.A.
(508) 543-8750

FOXBORO[®]

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HEALTH HAZARD DATA				
THRESHOLD LIMIT VALUE <u>NOT ESTABLISHED</u>				
LD ₅₀ . ORAL <u>> 5G/KG</u>		LD ₅₀ . DERMAL <u>> 2G/KG</u>		
SKIN AND EYE IRRITANT <u>NON-IRRITANT</u>				
EFFECTS OF OVEREXPOSURE <u>CONTACT WITH SKIN AND EYES MAY RESULT IN IRRITATION.</u>				
<u>INGESTION MAY RESULT IN GASTRIC DISTURBANCE. INHALATION OF VAPORS MAY RESULT</u>				
<u>IN RESPIRATORY IRRITATION.</u>				
<p>FIRST AID PROCEDURES - <u>EYES/SKIN</u> - FLUSH AFFECTED AREAS THOROUGHLY WITH WATER. IF IRRITATION DEVELOPS, CONSULT A PHYSICIAN.</p> <p><u>INGESTION</u> - IF SWALLOWED, DILUTE WITH WATER AND INDUCE VOMITING. GET IMMEDIATE MEDICAL ATTENTION.</p> <p><u>INHALATION</u> - IF INHALED, MOVE TO FRESH AIR. AID BREATHING IF NECESSARY AND GET MEDICAL ATTENTION.</p>				
REACTIVITY DATA				
STABILITY	STABLE	X	CONDITIONS TO AVOID	STRONG OXIDIZING AGENTS. DECOMPOSES AT TEMPERATURES >200°C.
	UNSTABLE			
HAZARDOUS DECOMPOSITION PRODUCTS <u>ACROLEIN</u>				
HAZARDOUS POLYMERIZATION <u>WILL NOT OCCUR</u>				
SPILL OR LEAK PROCEDURES				
WIPE UP SPILLS WITH TOWELS AND CLOTHS. REMOVE STAINS WITH SOAPY WATER. WASTE DISPOSAL SHOULD BE IN ACCORDANCE WITH EXISTING FEDERAL, STATE, AND LOCAL ENVIRONMENTAL CONTROL REGULATIONS.				
SPECIAL PROTECTION INFORMATION				
RESPIRATORY PROTECTION <u>ORGANIC VAPOR RESPIRATOR, IF VAPORS OR MISTS ARE GENERATED.</u>				
VENTILATION <u>MECHANICAL (GENERAL) IS SATISFACTORY.</u>				
PROTECTIVE CLOTHING <u>GOGGLES AND GLOVES TO AVOID PROLONGED CONTACT.</u>				
OTHER <u>NONE</u>				

Material Safety Data Sheet

QUICK IDENTIFIER

Common Name: (used on label and list)

May be used to comply with OSHA's Hazard Communication Standard, 29 CFR 1910.1200. Standard must be consulted for specific requirements.

High Temperature Ink (red)
(Part # 96S51)

SECTION 1 -

Manufacturer's Name

Taylor Instrument

Address

95 Ames Street P.O. Box 110

Emergency Telephone No.

(716)-235-5000

City, State, and ZIP

Rochester, New York 14692

Other Information Calls

Same

Signature of Person Responsible for Preparation (Optional)

Date Prepared

11/18/85

SECTION 2 - HAZARDOUS INGREDIENTS/IDENTITY

Hazardous Component(s) (chemical & common name(s))

OSHA PEL

ACGIH TLV

Other Exposure Limits

% (optional)

CAS NO.

Dye

None

None

1

-

Glycerine

None

None

99

56817

SECTION 3 - PHYSICAL & CHEMICAL CHARACTERISTICS

Boiling Point

> 550° F

Specific Gravity (H₂O = 1)

1.2 to 1.3

Vapor Pressure (mm Hg)

Less than 0.1

Vapor Density (Air = 1)

Unknown

Solubility in Water

Complete

Reactivity in Water

None

Appearance and Odor

Viscous liquid with no appreciable odor

Melting Point

Liquid at room temperature

SECTION 4 - FIRE & EXPLOSION DATA

Flash Point

> 390° F

C

Method Used

Pensky-Marten closed cup

Flammable Limits in Air % by Volume

LEL Lower

Unknown

UEL Upper

Unknown

Auto-Ignition Temperature

Unknown

Extinguisher Media

Use water, CO₂, dry chemical

Special Fire Fighting Procedures

None

Unusual Fire and Explosion Hazards

Contact with a strong oxidizing agent such as chromium trioxide, potassium

chloride, or potassium permanganate may cause an explosion.

SECTION 5 - PHYSICAL HAZARDS (REACTIVITY DATA)

Reactivity: Unstable Conditions Stable to Avoid None

Incompatibility (Materials to Avoid): See Section 4 - "Fire and Explosion Data"

Decomposition Products: None

Polymerization: May Occur Conditions Will Not Occur to Avoid None

SECTION 6 - HEALTH HAZARDS

1. Acute: None known 2. Chronic: None known

Routes of Exposure:

Special Conditions Generally Avoided by Exposure:

Special Listed as Carcinogen: National Toxicology Program Yes No I.A.R.C. Monographs Yes No OSHA Yes No

Emergency and First Aid Procedures: Avoid inhalation and ingestion. For eyes and skin, flush with water for 15 minutes. For eyes, call physician.

MINUTES
FIRST
AID

- 1. Inhalation
- 2. Eyes
- 3. Skin
- 4. Ingestion

SECTION 7 - SPECIAL PRECAUTIONS AND SPILL/LEAK PROCEDURES

Precautions to be Taken in Handling and Storage: None

Special Precautions: None

Precautions to be Taken in Case of Spill or Release: Dike large spills. Recover or absorb with absorbent material. Flush residues.

Regulatory (Consult Federal, state, and local regulations): Severe

SECTION 8 - SPECIAL PROTECTION INFORMATION/CONTROL MEASURES

Personal Protection (Type): None needed under normal conditions of use.

Respirator: None Local Exhaust: None Mechanical (General): None Special: None Other: None

Eye Protection: As needed to prevent ink staining of hands. Eye Protection: Chemical splash goggles or face shield suggested during use.

Hand Protection: As determined by conditions of use.

Hygiene Practices: " " " " " "

IMPORTANT

Do not leave any blank spaces. If required information is unavailable, unknown, or does not apply, so indicate.

**CLIMAX CHEMICAL
COMPANY**
MONUMENT, NEW MEXICO

MATERIAL SAFETY DATA SHEET

HCL
PRODUCT

*(Approved by U.S. Department of Labor
and Assembly under Form 158-005-6)*

SECTION I - IDENTIFICATION OF PRODUCT

MANUFACTURER'S NAME CLIMAX CHEMICAL COMPANY, INC.		EMERGENCY TELEPHONE NO. 1-800-545-8858
ADDRESS (Number, Street, City, State and ZIP CODE) P.O. BOX 2548, HOBBS, NEW MEXICO 88240		
TRADE NAME Hydrochloric Acid, Muriatic Acid	CHEMICAL NAME Hydrochloric Acid	
CHEMICAL FAMILY Inorganic Acid	CHEMICAL FORMULA HCl (Aqueous)	

SECTION II - HAZARDOUS COMPONENTS OF MIXTURES

COMPONENT(S) CHEMICAL NAME	CAS REGISTRY NO.	% (Approx)	ACGIH TLV-TWA
* HYDROGEN CHLORIDE (Reporting Quantity = 5000 lbs.) This compound is highly corrosive to most metals with the evolution of Hydrogen gas. * Denotes chemical subject to reporting requirements of Section 313 of Title III of the 1990 Superfund Amendments and Reauthorization Act (SARA) and 40 CFR Part 372.	7647-01-0	35%	5 ppm Ceiling

SECTION III - PHYSICAL DATA

APPEARANCE AND ODOR Clear, colorless liquid with pungent, sharp, irritating odor.	SPECIFIC GRAVITY 20 BE: 1.1800 @ 15.6/15.6 deg C. 22 BE: 1.1789 @ 15.6/15.6 deg C.
BOILING POINT 150 - 230 degrees F. (65.6 - 110.0 degrees C.)	VAPOR DENSITY IN AIR (Air = 1) 1.27
VAPOR PRESSURE 78 mm Hg @ 20 degrees C.	% VOLATILE, BY VOLUME 35
EVAPORATION RATE (n-BUTYL ACETATE = 1.00) < 1.00	SOLUBILITY IN WATER 82.3 gm/100gm H2O @ 0 deg C.
pH INFORMATION < 1	MELTING POINT 20 BE: -53 deg C. (-63.4 deg F.) 22 BE: -68 deg C. (-88.3 deg F.)

SECTION IV - REACTIVITY DATA

STABILITY Stable	CONDITIONS TO AVOID Contact with strong bases can cause violent reaction generating large amounts of heat. Reactions with metals can release flammable hydrogen gas. (Refer to Section VIII)
INCOMPATIBILITY (Materials to Avoid)	Bases, metals, mercuric sulfate, perchloric acid, carbides of calcium, cesium, rubidium, acetylides of cesium and rubidium, phosphides of calcium and uranium and lithium silicide.
HAZARDOUS DECOMPOSITION PRODUCTS None (Refer to "Conditions to Avoid")	
HAZARDOUS POLYMERIZATION Will not occur.	

SECTION V - FIRE AND EXPLOSION HAZARD DATA

FLASHPOINT (Method used) None	FLAMMABLE LIMITS IN AIR None
EXTINGUISHING AGENTS N/A	
UNUSUAL FIRE AND EXPLOSION HAZARDS	Normally non-flammable, but reacts with most metals with evolution of hydrogen gas. When mixed with air may result in fire or explosion if ignited. Firefighters should wear self-contained breathing apparatus (+ pressure type).

SECTION VI - TOXICITY AND FIRST AID

EXPOSURE LIMITS (When exposure to this product and other chemicals is concurrent, the exposure limit must be defined in the workplace.) ACGIH: 5 ppm Ceiling (Effects described in this section are believed not to occur if exposures are maintained at or below appropriate TLVs. Because of the wide variation in individual susceptibility, these exposure limits may not be applicable to all persons and those with medical conditions listed below.) OSHA: 5 ppm Ceiling	
ACUTE TOXICITY: Primary route(s) of exposure: <input checked="" type="checkbox"/> Inhalation; <input checked="" type="checkbox"/> Skin; <input type="checkbox"/> Ingestion*	
Inhalation: Hydrogen chloride gas, mist and vapor can cause irritation of respiratory tract, with burning, choking, coughing, headaches and rapid heartbeat. Levels of 10 to 35 ppm can cause irritation of throat and 50-100 ppm is nearly unbearable for 1 hour. Inflammation, destruction of nasal passages and breathing difficulties can occur with higher concentrations and may be delayed in onset. 1000-2000 ppm can be fatal. Skin: Liquid hydrogen chloride or concentrated vapors can rapidly cause burning of skin. Repeated or prolonged contact with dilute solutions, and concentrated vapors, can cause irritation and dermatitis. Eyes: Liquid or concentrated vapors can cause eye irritation, severe burns and permanent damage including blindness. Ingestion: Can cause severe burns of mouth, esophagus and stomach. Nausea, pain and vomiting frequently occur. Depending upon amount swallowed, holes in the intestinal tract, kidney inflammation, shock and death can occur.	
FIRST AID: Inhalation: Move person to fresh air. If breathing stops, administer artificial respiration. Get medical attention immediately. Skin: Remove contaminated clothing and wash skin thoroughly for a minimum of 15 minutes with large quantities of water (preferably a safety shower). Get medical attention immediately. Eyes: Wash eyes immediately with large amounts of water (preferably eye wash fountain), lifting the upper and lower eyelids and rotating eyeball. Continue washing for a minimum of 15 minutes. Get medical attention immediately. Ingestion: If conscious, give large quantities of water. Do not induce vomiting. Get medical attention immediately.	

SECTION VI - TOXICITY AND FIRST AID (Continued)

CHRONIC TOXICITY

Exposures of 100 ppm for 8 hours a day for 50 days caused only slight unrest and irritation to the eyes and nose of rabbits, guinea pigs and pigeons. The hemoglobin content of the blood was also slightly diminished. Monkeys receiving twenty exposures of 33 ppm for 8 hours did not display any adverse effects. Higher exposures (unspecified) have caused weight loss which paralleled the severity of exposure. Baboons exposed to 500, 5000, or 10,000 ppm for 15 minutes did not have significant alterations in any pulmonary function parameters 3 days or 3 months after exposure. In humans, long term overexposures have been associated with erosion of the teeth.

Carcinogenicity: No standard carcinogenicity studies for hydrogen chloride were identified. Two studies on rats were conducted to determine if hydrogen chloride increased the formation of nasal tumors or increased the carcinogenic potential of formaldehyde. In both studies the rats were exposed to 10 ppm hydrogen chloride, 6 hours per day, 5 days a week. One study lasted 24 weeks while the other lasted the animal's lifetime. Hydrogen chloride did not cause an increase in nasal tumors and did not increase the carcinogenicity of formaldehyde.

Hydrogen chloride is not listed on the IARC, NTP or OSHA carcinogen lists.

Reproductive Toxicity: No studies were identified relative to hydrogen chloride and reproductive toxicity.

SECTION VII - PERSONAL PROTECTION AND CONTROLS

RESPIRATORY PROTECTION For vapor concentrations which exceed or are likely to exceed 5 ppm, an approved full face respirator with acid gas canister is acceptable. Approved self-contained breathing apparatus with full face piece should be worn when air concentrations exceed 100 ppm or during leaks and/or emergencies. Follow any applicable respirator use standards or regulations.

VENTILATION As necessary to maintain air concentration below 5 ppm, at all times.

SKIN PROTECTION Wear neoprene or PVC rain suit, boots, and gloves.

EYE PROTECTION Wear chemical goggles which are splashproof and face shield.

HYGIENE Avoid contact with skin and avoid breathing vapors. Do not eat, drink, or smoke in work area. Wash hands prior to eating, drinking, or using restroom. Any protective clothing, or shoes which become contaminated with hydrochloric acid should be removed immediately, and thoroughly laundered before wearing again.

OTHER CONTROL MEASURES Safety showers and eyewash station must be available in immediate area. To determine the exposure level(s), monitoring should be performed regularly. NOTE: Protective equipment and clothing should be selected, used, and maintained according to applicable standards and regulations. For further information, contact the clothing or equipment manufacturer.

SECTION VIII - STORAGE AND HANDLING PRECAUTIONS

Follow protective controls set forth in Section VII when handling this product. Store in closed, properly labeled, rubber-lined steel, acid-resistant plastic, or glass containers. DO NOT store near strong alkalis or reactive materials. DO NOT remove or deface container label or tag. Hydrogen chloride can react with cyanide, forming lethal concentrations of hydrocyanic acid. DO NOT enter confined spaces such as tanks or pits without following proper entry procedures such as ASIM D-4276.

SECTION IX - SPILL, LEAK AND DISPOSAL PRACTICES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED Evacuate immediate area where concentrated fumes are present. Cleanup personnel must wear proper protective equipment (see Section VII). Completely contain spilled acid with dikes, etc., and prevent run-off into ground and surface waters or into sewers. Neutralize with soda ash or dilute caustic soda. Neutralization products, both liquid and solid, must be recovered for proper disposal.

WASTE DISPOSAL METHOD Recovered solids or liquids may be sent to a licensed reclaimer or disposed of in a permitted waste management facility. Consult federal, state, or local disposal authorities for approved procedures.

SECTION X - TRANSPORTATION

DOT HAZARD CLASSIFICATION

"CORROSIVE"

PLACARD REQUIRED

"CORROSIVE"

LABEL REQUIRED

"CORROSIVE" (Label as required by OSHA Hazard Communication Standard, and any applicable state and local regulations.)

ADDITIONAL INFORMATION

DATE OF ISSUE: 1-01-90

REMARKS:

NEW

REVISED; SUPERSEDES 8-23-88

FOR ADDITIONAL INFORMATION CONTACT:

CLIMAX CHEMICAL COMPANY

P.O. BOX 2548

HOBBS, NEW MEXICO 88240

1-800-545-5959 17823 - Gerald Smith

NOTICE: CLIMAX CHEMICAL COMPANY believes that the information contained on this Material Safety Data Sheet is accurate. The suggested procedures are based on experience as of the date of publication. This information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process. They are not necessarily all-inclusive nor fully adequate in every circumstance. Also, the suggestions should not be confused with nor followed in violation of applicable laws, regulations, rules, or insurance requirements. No warranty or guarantee is made as to its accuracy, reliability or completeness. It is the user's responsibility to safety himself as to the suitability and completeness of such information for his own particular use.

NATIONAL SANITARY SUPPLY CO.
217 S. Figueroa Street
Los Angeles, California 90061
Tel. No. 213/770-1970
Emergency Tel. No. 213.327-6795

MATERIAL SAFETY DATA SHEET

SECTION 1. IDENTIFICATION OF PRODUCT

Product Name: [REDACTED] Date Issued: 8/7/86
Product Code: DMT016/886 Supercedes: 11/85
Type of Product: CLEANER National Item#: 4761XX
Prepared By: IAN R. GECKER

SECTION 2. INGREDIENTS	CAS NUMBER	EXPOSURE LIMITS IN AIR ACGIH-TLV	OSHA-PEL
PETROLEUM DISTILLATES	91203	300 PPM	300 PPM
1,1,1 TRICHLOROETHANE	71556	350 PPM	350 PPM
PERCHLOROETHYLENE	127184	50 PPM	50 PPM
ISOBUTANE/PROPANE	75285/74986	800 PPM	800 PPM

SECTION 3. PHYSICAL DATA:

Vapor Density (air=1): <1.0 Melting Point or Range, F: N/A
Specific Gravity g/cc @ 60 F: N/A Boiling Point or Range, F: N/A
Solubility in Water: INSOLUBLE Evaporation Rate (BuAce=1) <1.0
Vapor Pressure, psig @ 70 F: 27-37 pH @ 25 C: N/A
Appearance and Odor: SPRAY MIST/FLORAL Flash Point F (TCC): >20.F
Flame Extension @ 70 F: <18

SECTION 4. FIRE AND EXPLOSION HAZARD DATA

Flash Point, F (TCC): >20 F
Auto Ignition Temperature, F: N/A
Flammable Limits in Air, Volume %: LOWER (LEL) 1.8 UPPER (UEL) 9.5
Fire Extinguishing Materials: WATER SPRAY, FOAM, CARBON DIOXIDE, DRY
CHEMICAL
Special Firefighting Procedures: FIREFIGHTERS MUST WEAR FULL BUNKER GEAR
(HELMET, FACE SHIELD, COATS, GLOVES, BOOTS). USE A SELF-CONTAINED
NIOSH APPROVED BREATHING APPARATUS. CONTAINERS EXPOSED TO HEAT MUST
BE WATER COOLED TO PREVENT BURSTING AND ROCKETING AND FURTHER
SPEWING OF IGNITED FLAMMABLE CONSTITUENTS.
Unusual Fire and Explosion Hazards: AEROSOL PRESSURIZED CONTAINERS WILL
BURST AND/OR ROCKET WHEN EXPOSED TO TEMPERATURES ABOVE 120 F.

SECTION 5. REACTIVITY DATA

Stability: STABLE
Conditions to Avoid: EXPOSURE TO TEMPERATURES IN EXCESS OF 120 F, HEAT
SPARK, OPEN FLAME, OR OTHER SOURCES OF IGNITION.
Incompatibility (materials to avoid): ALKALIES, STRONG OXIDIZERS, ACIDS
Hazardous Decomposition Products (including combustion products): CARBON
DIOXIDE, CARBON MONOXIDE AND ORGANIC VAPORS OF UNKNOWN COMPOSITION,
HYDROGEN CHLORIDE, CHLORINE OR PHOSGENE.
Hazardous Polymerization: WILL NOT OCCUR

SECTION 6. SPILL, LEAK AND DISPOSAL PROCEDURES

Spill Response: TURN OFF ALL SOURCES OF IGNITION. VENTILATE AREA
COMPLETELY. DIKE AREA. APPLY AN ABSORBENT AND SWEEP UP.
Waste Disposal: PLACE INTO CONTAINERS FOR DISPOSAL. WASTE RESIDUE MAY BE
FLAMMABLE. HANDLE ACCORDINGLY.
Note: DISPOSE OF ALL WASTE IN ACCORDANCE WITH FEDERAL, STATE AND LOCAL
REGULATIONS.

MATERIAL SAFETY DATA SHEET

Product Name: HYSHEEN AEROSOL DJST MOP TREATMENT
Date Issued: 8/7/86

SECTION 7. HEALTH HAZARD DATA

SYMPTOMS OF OVEREXPOSURE

Inhaled: DIZZINESS, NAUSEA, HEADACHE, ANESTHETIC EFFECTS. THROAT IRRITATION ABOVE 1000 PPM.
Contact With Skin or Eyes: IRRITATION, CONTACT DERMATITIS.
Absorbed Through Skin: NOT READILY ABSORBED. MAY CAUSE SYSTEMIC EFFECTS.
Swallowed: NAUSEA, VOMITING. SINGLE DOSE TOXICITY IS LOW TO MODERATE.

HEALTH EFFECTS OR RISKS FROM EXPOSURE

Acute: LIVER DISEASE AND RHYTHM DISORDERS OF THE HEART FROM OVER EXPOSURE
Chronic: LIVER AND TOXIC EFFECTS IN TEST ANIMALS

SECTION 8. EMERGENCY AND FIRST AID PROCEDURES

Eye Contact: FLUSH WITH WATER FOR 15 MINUTES. GET IMMEDIATE MEDICAL ATTENTION.
Skin Contact: FLUSH WITH WATER. WASH WITH SOAP AND WARM WATER. GET MEDICAL ATTENTION.
Inhaled: REMOVE TO FRESH AIR. IF NOT BREATHING GIVE CPR OR OXYGEN. GET IMMEDIATE MEDICAL ATTENTION.
Swallowed: DO NOT INDUCE VOMITING. GET IMMEDIATE MEDICAL ATTENTION. DO NOT ALLOW VOMITOUS TO BE BREATHED INTO LUNGS AS PNEUMONITIS MAY RESULT.

SUSPECTED CANCER AGENT

NOTE: THIS PRODUCT'S INGREDIENTS ARE NOT FOUND IN THE LISTS BELOW.
FEDERAL OSHA, NTP, IARC
CALIFORNIA EMPLOYERS USING CAL/OSHA-REGULATED CARCINOGENS MUST REGISTER WITH CAL/OSHA. THE CAL/OSHA AND FEDERAL OSHA CARCINOGEN LISTS ARE SIMILAR.
MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE
EXISTING SKIN, EYE AND LUNG DISORDERS MAY BE AGGRAVATED BY EXPOSURE TO THIS PRODUCT. LIVER DISEASE AND RHYTHM DISORDERS OF THE HEART DUE TO OVER EXPOSURE.
Recommendation to Physician: ASPIRATION OF MATERIAL INTO LUNGS CAN CAUSE CHEMICAL PNEUMONITIS WHICH CAN BE FATAL. ALSO, POSSIBLE PULMONARY EDEMA/HEMORRAGE.

SECTION 9. SPECIAL PROTECTION INFORMATION

Ventilation and Engineering Controls: MAINTAIN ADEQUATE VENTILATION TO KEEP VAPOR CONCENTRATION BELOW PEL LIMITS.
Respiratory Protection: NONE WHEN USED IN ACCORDANCE WITH LABEL DIRECTIONS.
Eye Protection: NONE WHEN USED IN ACCORDANCE WITH LABEL DIRECTIONS.
Gloves: NONE WHEN USED IN ACCORDANCE WITH LABEL DIRECTIONS.
Other Clothing and Equipment: NONE WHEN USED IN ACCORDANCE WITH LABEL DIRECTIONS.
Work Practices, Hygienic Practices: WASH WITH SOAP AND WATER BEFORE EATING, SMOKING, DRINKING OR USING TOILET FACILITIES.
Other Handling and Storage Requirements: HANDLE AND STORE IN ACCORDANCE WITH LABEL DIRECTIONS. DO NOT PUNCTURE OR INCINERATE CONTAINER.
Protective Measures During Maintenance of Contaminated Equipment: FLUSH OFF WITH WATER AND WIP OFF WITH RAGS ALL CONTAMINATION PRIOR TO WORKING ON EQUIPMENT. ALLOW TO AIR DRY. WORK IN WELL VENTILATED AREA.

THE INFORMATION ON THIS MATERIAL SAFETY DATA SHEET REPRESENTS THE LATEST DATA AND BEST OPINION AS TO THE PROPER USE AND HANDLING OF THIS PRODUCT UNDER NORMAL CONDITIONS. ANY USE OF THIS PRODUCT OR METHOD OF APPLICATION WHICH IS NOT IN CONFORMANCE WITH THIS DATA SHEET AND THE PRODUCT LABEL DIRECTIONS, IS THE RESPONSIBILITY OF THE USER. THIS MATERIAL SAFETY DATA SHEET WAS PREPARED TO COMPLY WITH THE OSHA HAZARD COMMUNICATION REGULATION.

METHANOL

MSDS No.
HCROO1423

Rev. Date
05/21/86



ARCO CHEMICAL COMPANY
DIVISION OF ATLANTIC RICHFIELD COMPANY
1500 MARKET STREET
P.O. BOX 7258
PHILADELPHIA, PENNSYLVANIA 19101

IMPORTANT: Read this MSDS before handling and disposing of this product and pass this information on to employees, customers, and users of this product
This product is covered by the OSHA Hazard Communication Rule and this document has been prepared in accord with the MSDS requirements of the rule.

I. General		
Trade Name METHANOL	Telephone Numbers EMERGENCY 800/424-9300 CHEMTREC 215/353-8300 ARCO CHEM CUSTOMER SERVICE 800/321-7000 INFO ONLY	
Other Names METHYL ALCOHOL, WOOD ALCOHOL		
Chemical Family ALIPHATIC ALCOHOL	DOT Hazardous Materials Proper Shipping Name METHYL ALCOHOL	
Generic Name N/P	DOT Hazard Class FLAMMABLE LIQUID	
CAS No. SEE SECTION IX	Company ID No. E000142300	UN/NA ID No. UN 1230
II. DANGER Summary of Hazards		
SEE SUPPLEMENT BEGINNING ON PAGE 6		
PHYSICAL HAZARDS:	EXTREMELY FLAMMABLE-MAY BURN WITH INVISIBLE FLAME	
ACUTE HEALTH EFFECTS: (SHORT-TERM)	MODERATE INHALATION HAZARD MODERATE EYE IRRITANT MODERATE SKIN ABSORPTION HAZARD MODERATE INGESTION HAZARD. SEE SUPPLEMENT SLIGHT SKIN IRRITANT	
CHRONIC HEALTH EFFECTS: (LONG-TERM)	SWALLOWING AS LITTLE AS ONE TO FOUR OUNCES OF METHANOL HAS BEEN REPORTED TO CAUSE DEATH OR SERIOUS IRREVERSIBLE INJURY SUCH AS BLINDNESS. SEE SUPPLEMENT	
III. Fire and Explosion		
Flash Point (Method) AP 50° F (CC)	Autoignition Temperature (Method) AP 725° F	Flammable Limits (% Vol. in Air) At Normal Atmospheric Temperature and Pressure Lower AP 6 Upper AP 36
Fire and Explosion Hazards	RELEASES FLAMMABLE VAPORS BELOW NORMAL AMBIENT TEMPERATURES. WHEN MIXED WITH AIR AND EXPOSED TO IGNITION SOURCE, CAN BURN IN OPEN OR EXPLODE IF CONFINED. MIXTURES WITH WATER AND AS LITTLE AS 21% (BY VOL) METHANOL ARE STILL FLAMMABLE (FLASH PT. <100 F). UNDER SOME CIRCUMSTANCES, MAY CORRODE CERTAIN METALS, INCLUDING ALUMINUM AND ZINC, AND GENERATE HYDROGEN GAS.	
Extinguishing Media	DRY CHEMICAL WATER FOG CO2 WATERSPRAY FOAM FOR ALCOHOLS	
Special Firefighting Procedures	A METHANOL FIRE MAY NOT BE VISIBLE TO THE NAKED EYE. DO NOT ENTER FIRE AREA W/O PROPER PROTECTION. SEE SECTION X - DECOMPOSITION PRODUCTS POSSIBLE. FIGHT FIRE FROM SAFE DISTANCE/PROTECTED LOCATION. HEAT MAY BUILD PRESSURE/RUPTURE CLOSED CONTAINERS. SPREADING FIRE, INCREASING RISK OF BURNS/INJURIES. APPLY AQUEOUS EXTINGUISHING MEDIA CAREFULLY TO AVOID FROTHING AND LIMIT EXPOSURE OF NEARBY EQUIPMENT. NOTIFY AUTHORITIES IF LIQUID ENTERS SEWER/PUBLIC WATERS.	

IV.

Health Hazards

SEE SUPPLEMENT
BEGINNING ON PAGE 6

Summary of Acute Hazards MODERATE HEALTH HAZARD - SEE BELOW FOR ROUTE-SPECIFIC DETAILS.

ROUTE OF EXPOSURE	SIGNS AND SYMPTOMS	Primary Route(s)
Inhalation	OVEREXPOSURE MAY CAUSE COUGHING, SHORTNESS OF BREATH, DIZZINESS, INTOXICATION AND COLLAPSE.	<input checked="" type="checkbox"/>
Eye Contact	MAY CAUSE MODERATE IRRITATION, INCLUDING BURNING SENSATION, TEARING, REDNESS OR SWELLING.	<input checked="" type="checkbox"/>
Skin Absorption	EXPOSURE TO THIS MATERIAL CAN RESULT IN ABSORPTION THROUGH SKIN CAUSING HEALTH HAZARD.	<input checked="" type="checkbox"/>
Skin Irritation	MAY PRODUCE SKIN IRRITATION.	<input type="checkbox"/>
Ingestion	SEE SUPPLEMENT	<input checked="" type="checkbox"/>
Summary of Chronic Hazards and Special Health Effects	SEE SUPPLEMENT SEE SUPPLEMENT	

V.

Protective Equipment and Other Control Measures

Respiratory	DO NOT USE AIR-PURIFYING RESPIRATOR. ONLY NIOSH/MSHA APPROVED SUPPLIED AIR OR SELF-CONTAINED BREATHING APPARATUS OPERATED IN POSITIVE PRESSURE MODE ARE SATISFACTORY.
Eye	EYE PROTECTION SUCH AS CHEMICAL SPLASH GOGGLES AND/OR FACE SHIELD MUST BE WORN WHEN POSSIBILITY EXISTS FOR EYE CONTACT DUE TO SPLASHING OR SPRAYING LIQUID, AIRBORNE PARTICLES, OR VAPOR. CONTACT LENSES SHOULD NOT BE WORN.
Skin	WHEN SKIN CONTACT IS POSSIBLE, PROTECTIVE CLOTHING INCLUDING GLOVES, APRON, SLEEVES, BOOTS, HEAD AND FACE PROTECTION SHOULD BE WORN. THIS EQUIPMENT MUST BE CLEANED THOROUGHLY AFTER EACH USE.
Engineering Controls	GENERAL ROOM OR LOCAL EXHAUST VENTILATION IS USUALLY REQUIRED TO MEET EXPOSURE STANDARD(S).
Other Hygienic and Work Practices	EMERGENCY EYE WASH FOUNTAINS AND SAFETY SHOWERS SHOULD BE AVAILABLE IN THE IMMEDIATE VICINITY OF ANY POTENTIAL EXPOSURE. USE GOOD PERSONAL HYGIENE PRACTICES. WASH HANDS BEFORE EATING, DRINKING, SMOKING, OR USING TOILET FACILITIES. PROMPTLY REMOVE SOILED CLOTHING/WASH THOROUGHLY BEFORE REUSE. SHOWER AFTER WORK USING PLENTY OF SOAP AND WATER.

VI.

Occupational Exposure Limits

Substance	Source	Date	Type	Value/Units	Time
METHYL ALCOHOL - SKIN	ACGIH	1984	TWA	200 PPM	8 HRS
			STEL	250 PPM	15 MIN
	OSHA	1971	TWA	200 PPM	8 HRS



VII. Emergency and First Aid

Inhalation	IF OVERCOME BY EXPOSURE, REMOVE VICTIM TO FRESH AIR IMMEDIATELY. GIVE OXYGEN OR ARTIFICIAL RESPIRATION AS NEEDED. OBTAIN EMERGENCY MEDICAL ATTENTION. PROMPT ACTION IS ESSENTIAL.
Eye Contact	IN CASE OF EYE CONTACT, IMMEDIATELY RINSE WITH CLEAN WATER FOR 20-30 MINUTES. RETRACT EYELIDS OFTEN. OBTAIN EMERGENCY MEDICAL ATTENTION.
Skin Contact	IMMEDIATELY REMOVE CONTAMINATED CLOTHING. WASH SKIN THOROUGHLY WITH MILD SOAP/WATER. FLUSH W/LUKEWARM WATER FOR 15 MINUTES. IF STICKY, USE WATERLESS CLEANER FIRST. SEEK MEDICAL ATTENTION IF ILL EFFECT OR IRRITATION DEVELOPS.
Ingestion	IF SWALLOWED, GIVE LUKEWARM WATER (PINT) IF VICTIM COMPLETELY CONSCIOUS/ALERT. INDUCE VOMITING. OBTAIN EMERGENCY MEDICAL ATTENTION. PROMPT ACTION IS ESSENTIAL.
Emergency Medical Treatment Procedures	METHANOL INGESTION IS LIFE-THREATENING. INDUCE VOMITING WITH SYRUP OF IPECAC. FOLLOW EMESIS WITH MODERATE AMOUNTS OF WATER ORALLY. SYMPTOM ONSET MAY BE DELAYED. ETHANOL THERAPY MAY BE INDICATED.

VIII. Spill and Disposal

Precautions if Material is Spilled or Released	EXTREMELY FLAMMABLE LIQUID. RELEASE CAUSES IMMEDIATE FIRE/EXPLOSION HAZARD. LIQUIDS/VAPORS MAY IGNITE. EVACUATE/LIMIT ACCESS. EQUIP RESPONDERS WITH PROPER PROTECTION (SEE SEC. V). KILL ALL IGNITION SOURCES. STOP RELEASE. PREVENT FLOW TO SEWERS/PUBLIC WATERS. RESTRICT WATER USE FOR CLEANUP. NOTIFY FIRE/ENVIRONMENTAL AUTHORITIES. IMPOUND/RECOVER LARGE LAND SPILL. BLANKET WITH FIREFIGHTING FOAM (SEE SEC. III). SOAK UP SMALL SPILL WITH INERT SOLIDS. USE SUITABLE DISPOSAL CONTAINERS. ON WATER, MATERIAL SOLUBLE/MAY FLOAT OR SINK. MAY BIODEGRADE. CONTAIN/MINIMIZE DISPERSION/COLLECT. DISPERSE RESIDUE TO REDUCE AQUATIC HARM. REPORT PER REGULATORY REQUIREMENTS.
Waste Disposal Methods	CONTAMINATED PRODUCT/SOIL/WATER MAY BE RCRA/OSHA HAZARDOUS WASTE (SEE 40 CFR 261 AND 29 CFR 1910). IF SPENT SOLVENT INTENDED FOR DISPOSAL, MAY BE DESIGNATED FOOS; IF SPILL CLEANUP RESIDUE, U154 UNDER RCRA LISTINGS. LAND-FILL SOLIDS AT PERMITTED SITES. USE REGISTERED TRANSPORTERS. BURN CONCENTRATED LIQUIDS IN SYSTEMS DESIGNED FOR LOW FLASH POINT MATERIAL. AVOID FLAMEDOUTS. ASSURE EMISSIONS COMPLY WITH APPLICABLE REGULATIONS. DILUTE AQUEOUS WASTE MAY BIODEGRADE. AVOID OVERLOADING/POISONING PLANT BIOMASS. ASSURE EFFLUENT COMPLIES WITH APPLICABLE REGULATIONS.

IX. Components (This may not be a complete list of components)

Component Name	CAS No.	Carcinogen#	Composition amount (Wt.) (See Qualification on Page 4)
METHANOL	67-56-1	N/AP GT	99 PERCENT

#Listed By: 1 = NTP, 2 = IARC, 3 = OSHA, 4 = Other

Compositions given are typical values, not specifications.

X. Physical and Chemical Data

Boiling Point (At 760.0 mm Hg) AP 147° F	Viscosity Units, Temp. (Method) N/AP	Dry Point N/AP
Freezing Point AP -144° F	Vapor Pressure (MM HG AT 68° F) AP 96	Volatile Characteristics MODERATE
Specific Gravity (H ₂ O = 1 at 39.2° F) AP 0.79	Vapor Sp. Gr. (Air = 1.0 at 60° - 90° F) AP 1.1	Solubility in Water COMPLETE
Hazardous Polymerization NOT EXPECTED TO OCCUR	Other Chemical Reactivity N/P	pH N/AP
		Stability STABLE

Other Physical and Chemical Properties N/P

Appearance and Odor CLEAR, COLORLESS LIQUID; FAINT ALCOHOL ODOR; ODOR IS NOT A GOOD INDICATOR OF EXPOSURE LEVEL.

Conditions to Avoid HEAT, SPARKS, OPEN FLAME, OXIDIZING CONDITIONS

Materials to Avoid STRONG OXIDIZING AGENTS; ALUMINUM; ZINC; ANY REACTIVE METAL WHICH WILL DISPLACE HYDROGEN; CERTAIN FORMS OF PLASTICS, RUBBER AND COATINGS

Hazardous Decomposition Products INCOMPLETE COMBUSTION WILL GENERATE HIGHLY POISONOUS CARBON MONOXIDE AND PERHAPS OTHER TOXIC VAPORS SUCH AS FORMALDEHYDE.

XI. Additional Precautions

Handling, Storage and Recontamination Procedures STORE ONLY IN TIGHTLY CLOSED/ PROPERLY VENTED CONTAINERS AWAY FROM HEAT/ SPARKS/OPEN FLAMES/STRONG OXIDIZING AGENTS. USE ONLY NON-SPARKING TOOLS. BLANKET STORAGE WITH DRY INERT GAS. STORE DRUMS WITH BUNG IN UP POSITION. CAREFULLY VENT INTERNAL PRESSURE BEFORE REMOVING CLOSURE. GROUND CONTAINERS BEFORE TRANSFER. WILL ABSORB ATMOSPHERIC MOISTURE. ELECTRICAL EQUIPMENT SHOULD CONFORM TO NATIONAL ELECTRIC CODE. CARBON STEEL IS SATISFACTORY MATERIAL OF CONSTRUCTION. DO NOT STORE IN ALUMINUM OR ZINC (GALVANIZED). HANDLE "EMPTY" DRUMS WITH CARE/VAPOR RESIDUE MAY BE FLAMMABLE/POISONOUS.

ISOLATE, VENT, DRAIN, WASH AND PURGE SYSTEMS OR EQUIPMENT BEFORE MAINTENANCE OR REPAIR. REMOVE ALL IGNITION SOURCES. CHECK ATMOSPHERE FOR EXPLO-SIVENESS AND OXYGEN DEFICIENCIES. USE-ADEQUATE PERSONAL PROTECTIVE EQUIPMENT. OBSERVE PRECAUTIONS PERTAINING TO CONFINED SPACE ENTRY.

SOME OF THE INFORMATION PRESENTED AND CONCLUSIONS DRAWN HEREIN ARE FROM SOURCES OTHER THAN DIRECT TEST DATA ON THE MATERIAL ITSELF

General Comments

Note - - - Qualifications: EQ = Equal AP = Approximately N/P = No Applicable Information Found
 LT = Less Than UK = Unknown N/AP = Not Applicable
 GT = Greater Than TR = Trace N/DA = No Data Available

Disclaimer of Liability

The information in this MSDS was obtained from sources which we believe are reliable. HOWEVER, THE INFORMATION IS PROVIDED WITHOUT ANY WARRANTY, EXPRESS OR IMPLIED, REGARDING ITS CORRECTNESS.

The conditions or methods of handling, storage, use and disposal of the product are beyond our control and may be beyond our knowledge. FOR THIS AND OTHER REASONS, WE DO NOT ASSUME RESPONSIBILITY AND EXPRESSLY DISCLAIM LIABILITY FOR LOSS, DAMAGE OR EXPENSE ARISING OUT OF OR IN ANY WAY CONNECTED WITH THE HANDLING, STORAGE, USE OR DISPOSAL OF THE PRODUCT.

II. Label Information

Manufacturer:	ARCO CHEMICAL COMPANY DIVISION OF ATLANTIC RICHFIELD COMPANY 1500 MARKET STREET. P.O. BOX 7258 PHILADELPHIA, PENNSYLVANIA 19101	Telephone Numbers EMERGENCY 800/424-9300 CHEMTREC 215/353-8300 ARCO CHEM CUSTOMER SERVICE 800/321-7000 INFO ONLY
Use Statement:	FOR INDUSTRIAL USE ONLY KEEP OUT OF REACH OF CHILDREN	
Signal Word:	DANGER	
Physical Hazards:	EXTREMELY FLAMMABLE	
Health Hazards:	INHALATION HAZARD SKIN CONTACT HAZARD INGESTION HAZARD	EYE IRRITANT SKIN IRRITANT MAY CAUSE LONG-TERM ADVERSE HEALTH EFFECTS
Precautionary Measures:	DO NOT HANDLE NEAR HEAT, SPARKS, OR OPEN FLAME. KEEP CONTAINER CLOSED WHEN NOT IN USE. DO NOT STORE NEAR COMBUSTIBLE MATERIALS. AVOID CONTACT WITH EYES. AVOID PROLONGED OR REPEATED BREATHING OF VAPOR. AVOID PROLONGED OR REPEATED CONTACT WITH SKIN. USE ONLY WITH ADEQUATE VENTILATION/PERSONAL PROTECTION. PREVENT CONTACT WITH FOOD, CHEWING, OR SMOKING MATERIALS. WASH THOROUGHLY AFTER HANDLING. DO NOT TASTE/SWALLOW.	
DOT Information:	UN/NA ID Number- UN 1230 Hazard Class- FLAMMABLE LIQUID Proper Shipping- METHYL ALCOHOL	
Instructions:	DRY CHEMICAL	WATER FOG
In case of fire, use-	CO2 WATERSPRAY	
First Aid -Inhalation	IF OVERCOME BY EXPOSURE, REMOVE VICTIM TO FRESH AIR IMMEDIATELY. GIVE OXYGEN OR ARTIFICIAL RESPIRATION AS NEEDED. OBTAIN EMERGENCY MEDICAL ATTENTION. PROMPT ACTION IS ESSENTIAL.	
-Eye Contact	IN CASE OF EYE CONTACT, IMMEDIATELY RINSE WITH CLEAN WATER FOR 20-30 MINUTES. RETRACT EYELIDS OFTEN. OBTAIN EMERGENCY MEDICAL ATTENTION.	
-Skin Contact	IMMEDIATELY REMOVE CONTAMINATED CLOTHING. WASH SKIN THOROUGHLY WITH MILD SOAP/WATER. FLUSH W/LUKEWARM WATER FOR 15 MINUTES. IF STICKY, USE WATERLESS CLEANER FIRST. SEEK MEDICAL ATTENTION IF ILL EFFECT OR IRRITATION DEVELOPS.	
-Ingestion	IF SWALLOWED, GIVE LUKEWARM WATER (PINT) IF VICTIM COMPLETELY CONSCIOUS/ALERT. INDUCE VOMITING. OBTAIN EMERGENCY MEDICAL ATTENTION. PROMPT ACTION IS ESSENTIAL.	
In case of spill,	EXTREMELY FLAMMABLE LIQUID. RELEASE CAUSES IMMEDIATE FIRE/EXPLOSION HAZARD. EXTINGUISH ALL IGNITION SOURCES. IMPOUND/RECOVER LARGE LAND SPILL; SOAK UP SMALL SPILL. ON WATER, MAY BIODEGRADE. CONTAIN/MINIMIZE DISPERSION/COLLECT. REPORT PER REGULATORY REQUIREMENTS.	
Protective Equipment:		
-Respiratory	USE NIOSH/MSHA APPROVED SUPPLIED AIR OR SELF-CONTAINED BREATHING APPARATUS.	
-Eye	CHEMICAL SPLASH GOGGLES AND/OR FACE SHIELD.	
-Skin	PROTECTIVE CLOTHING INCLUDING GLOVES, APRON, SLEEVES, BOOTS, AND FULL HEAD/FACE PROTECTION.	



METHANOL

MSDS No.
HC 001423
Rev. Date
05/21/86

XIII.

Supplement

ACUTE AND CHRONIC HEALTH EFFECTS

SWALLOWING AS LITTLE AS 1 TO 4 OUNCES OF METHANOL HAS BEEN REPORTED TO CAUSE DEATH OR SERIOUS IRREVERSIBLE INJURY SUCH AS BLINDNESS IN HUMANS. STUDIES IN EXPERIMENTAL ANIMALS INDICATE THAT THE METABOLISM OF METHANOL TO FORMIC ACID RESULTS IN METABOLIC ACIDOSIS AND REVERSIBLE OR IRREVERSIBLE DAMAGE TO THE OPTIC NERVE. SEE THE MEDICAL TREATMENT SECTION OF THIS DATA SHEET FOR INFORMATION ON TREATING METHANOL POISONING.

A RECENT ARTICLE HAS REPORTED EFFECTS OF EXPOSURE TO METHANOL VAPORS (AM. IND. HYG. ASSOC. J. 45(1): 57-55, 1984). IN THIS REPORT TEACHERS AIDES EXPOSED TO METHANOL VAPORS (365-3080 PPM) IN DIRECT-PROCESS SPIRIT DUPLICATING OPERATIONS REPORTED SIGNIFICANTLY MORE OF THE FOLLOWING COMPLAINTS THAN A COMPARISON GROUP: BLURRED VISION, HEADACHE, DIZZINESS, AND NAUSEA.

SPECIAL HEALTH EFFECTS

INGESTION OF THIS PRODUCT, EVEN IN SMALL AMOUNTS, CAN CAUSE BLINDNESS AND DEATH. ONSET OF SYMPTOMS MAY BE DELAYED FOR 18-24 HOURS; TREATMENT PRIOR TO ONSET OF OBVIOUS SYMPTOMS MAY BE LIFE-SAVING. METHANOL IS RAPIDLY ABSORBED AND EMESIS SHOULD BE INITIATED EARLY TO BE EFFECTIVE, WITHIN 30 MINUTES OF INGESTION, IF POSSIBLE. ADMINISTER SYRUP OF IPECAC. AFTER THE DOSE IS GIVEN, ENCOURAGE PATIENT TO TAKE 6-8 OUNCES OF CLEAR NON-CARBONATED FLUID. DOSE MAY BE REPEATED ONCE IF EMESIS DOES NOT OCCUR WITHIN 20-30 MINUTES. ADMINISTRATION OF AN AQUEOUS SLURRY OF ACTIVATED CHARCOAL WITH MAGNESIUM CIRTATE OR SORBITOL AS A CATHARTIC HAS BEEN REPORTED HELPFUL.

ETHANOL INHIBITS THE FORMATION OF TOXIC METABOLITES. IF ETHANOL THERAPY IS INDICATED, ADMINISTER A LOADING DOSE OF 7.6-10 ML/KG OF BODY WEIGHT OF 10% ETOH IN DSW OVER 30-60 MINUTES. MAINTENANCE DOSE IS 1.4 ML/KG/HR OF 10% ETOH, TO ACHIEVE A 100-130 MG/DL BLOOD ETOH LEVEL DURING ETHANOL THERAPY. (IF CHARCOAL IS ADMINISTERED, ETHANOL SHOULD BE ADMINISTERED INTRAVENOUSLY AND NOT ORALLY.)

MAINTAIN CONTACT WITH POISON CONTROL CENTER DURING ALL ASPECTS OF DIAGNOSIS AND TREATMENT.

NOTICE TO DEPOSITORS-40 CFR PART 280-UNDERGROUND STORAGE TANK REGULATIONS

A NEW FEDERAL LAW REQUIRES OWNERS OF UNDERGROUND TANKS, USED TO STORE PETROLEUM OR CERCLA HAZARDOUS SUBSTANCES, TO NOTIFY DESIGNATED STATE OR LOCAL AGENCIES BY MAY 8, 1986 OF THE EXISTENCE OF THEIR TANKS. NOTIFICATIONS FOR TANKS BROUGHT INTO USE AFTER MAY 8, 1986 MUST BE MADE WITHIN 30 DAYS. CONSULT EPA'S REGULATIONS, ISSUED ON NOVEMBER 8, 1985, TO DETERMINE WHETHER YOU ARE AFFECTED BY THIS LAW

MATERIAL SAFETY DATA SHEET

CORPORATE RESEARCH & DEVELOPMENT
120 ERIE BOULEVARD
SCHENECTADY, N.Y. 12305



NO. 334
MINERAL SPIRITS
TYPE I
Revision E
DATE July 1984

SECTION I. MATERIAL IDENTIFICATION

MATERIAL NAME: MINERAL SPIRITS, TYPE I
DESCRIPTION: Refined distillate of petroleum. Hydrocarbon mixture (see Sect II) with a controlled distillation range and a flash point >100 F.
OTHER DESIGNATIONS: Stoddard Solvent; Petroleum Distillate, Naphtha or Spirits, (combustible); White Spirits; ASTM D235, Type I; GE Material D538; CAS #008 052 413; C.E.O.
MANUFACTURER: Available from many suppliers.

SECTION II. INGREDIENTS AND HAZARDS

	%	HAZARD DATA
Mineral Spirits, Type I		8-hr TWA 100 ppm* (or 525 mg/m ³)
<u>Typical composition:</u>		
Paraffinic hydrocarbons	30-50	
Naphthenic hydrocarbons (Cycloparaffins)	30-40	
Aromatic and olefinic hydrocarbons	10-20	Eye, Human 470 ppm/15M (Irritation Effect)
*ACGIH (1983) TLV; STEL is 200 ppm. NIOSH has recommended a 10-hr TWA of 60 ppm or 350 mg/m ³ . The "action level" is also recommended to be 350 mg/m ³ . Current OSHA PEL for Stoddard Solvent is 500 ppm.		

SECTION III. PHYSICAL DATA

Boiling point, 1 atm, deg F	----- 300-407	Specific gravity 60/60 F	---- ca 0.79
Vapor pressure @ 25 C, mm Hg	----- ca 5	Volatiles, %	----- ca 100
Vapor density (Air=1) (average)	- ca 4.8	Evaporation rate (BuAc=1)	---- ca 0.08
Solubility in water, 20C	----- Insoluble		

Appearance & Odor: Clear, colorless liquid with a kerosine-like odor that is usually perceptible to humans at about 1 ppm in air.

SECTION IV. FIRE AND EXPLOSION DATA

Flash Point: one Method	Autoignition Temp.	Flammability limits in Air	Lower	Upper
100 F min. (TCC)	450-500 F	% by volume	0.8	~6

Extinguishing media: Foam, dry chemical, carbon dioxide, and water spray or fog. Use of a direct stream of water on burning liquid can scatter flames.
This liquid is near its lower flammability limit at room temperature (saturated air at 25 C contains about 0.5 volume % of Stoddard Solvent). In a fire situation or when heated or misted, it becomes a hazardous, highly flammable material.
Use self-contained breathing apparatus for respiratory protection in fighting fires in enclosures.

SECTION V. REACTIVITY DATA

This material is stable in closed containers under its normal handling and storage conditions. It does not polymerize.
As a combustible hydrocarbon liquid (OSHA Class II), it can react violently with strong oxidizing agents such as chlorine, oxygen, or such strong oxidizing acids as nitric and sulfuric.
Thermal-oxidative degradation can produce carbon monoxide and partially oxidized hydrocarbons.

SECTION VI. HEALTH HAZARD INFORMATION	TLV 100 ppm (See Sect II)
<p>This material is a central nervous system depressant and a mucous membrane irritant. Symptoms of overexposure include dizziness, headache, intoxication with euphoria leading to unconsciousness. Nose and throat irritation may occur from inhalation. Prolonged or repeated skin contact will cause defatting, irritation and dermatitis. Eye contact with liquid can cause conjunctivitis. Eye irritation can also occur after 15 minutes exposure to vapors at 470 ppm. A fatal ingestion dosage for humans is estimated at 3-4 ounces. Aspiration into the lungs after ingestion can cause edema; and one ounce aspirated may be fatal.</p> <p>FIRST AID:</p> <p><u>Eye Contact:</u> Flush thoroughly with running water for 15 min., including under eyelids.</p> <p><u>Skin Contact:</u> Promptly remove solvent wet clothing and wash contact area with soap and water. Get medical help if irritation persists or if large body area contacted.</p> <p><u>Inhalation:</u> Remove to fresh air. Restore and/or support breathing as needed. (If breathing is difficult, give oxygen therapy.) Get medical help.</p> <p><u>Ingestion:</u> Contact physician! Aspiration a hazard! Give 3 oz of USP white mineral oil or edible vegetable oil to drink. Do not induce vomiting unless medical help is not available, the victim is alert, and 1-2 oz has been ingested.</p>	
SECTION VII. SPILL, LEAK, AND DISPOSAL PROCEDURES	
<p>Notify safety personnel of large spills. Eliminate sources of heat or ignition. Provide adequate ventilation. Clean-up personnel need protection against skin contact and inhalation of vapors. Contain spill. Recover liquid when possible. Absorb small spills and residues with vermiculite, dry sand, or similar material. Pick up and place in suitable containers. Avoid discharging Mineral Spirits directly into a sewer or surface waters!</p> <p>DISPOSAL: Absorbed material can be buried in an approved landfill, incinerated, or removed via a licensed solvent disposal company. Follow Federal, State and Local regulations.</p>	
SECTION VIII. SPECIAL PROTECTION INFORMATION	
<p>Provide general ventilation and, especially when heated or misted, local exhaust ventilation (explosion-proof) to meet TLV requirements. A chemical cartridge respirator with organic vapor cartridge and a full facepiece can be used below 1000 ppm. Self-contained breathing apparatus with a full facepiece has been recommended for use up to 5000 ppm. Approved protective gloves should be used to prevent prolonged or repeated skin contact. Chemical safety goggles and/or face shield should be used where splashing is possible. An eyewash station and washing facilities should be accessible. Remove contaminated clothing (fire and health hazard); thoroughly dry or launder before reuse. Preplacement and periodic medical exams should emphasize skin, liver, kidney, central nervous system, and respiratory diseases for those regularly exposed. Individuals with such problems may be at an increased risk from exposure.</p>	
SECTION IX. SPECIAL PRECAUTIONS AND COMMENTS	
<p>Store in a cool, clean, well-ventilated, fire resistant storage area away from oxidizing agents and sources of heat and ignition. Use a solvent storage room or cabinet that meets requirements for an OSHA Class II Combustible liquid. Store in closed metal drums or safety cans with identifying labels. Prevent physical damage to containers. Bond and ground containers for transfers of liquid to prevent static sparks. Use non-sparking tools and follow electrical codes in areas of use and storage. No smoking in areas of use or storage. Use with good ventilation. Avoid inhalation of mist or vapors. Prevent eye contact and repeated or prolonged skin contact.</p> <p>DOT Classification: PETROLEUM NAPHTHA I.D. No. UN1255 Label: (None) PETROLEUM DISTILLATE I.D. No. UN1268 Label: (None)</p> <p>DATA SOURCE(S) CODE: 2-7, 9, 11, 12, 14, 16, 27, 31, 38, 47</p>	
<p><small>Judgments as to the suitability of information herein for purchaser's purposes are necessarily purchaser's responsibility. Therefore, enough reasonable care has been taken in the preparation of such information. General Electric Company extends no warranties, makes no representations and disclaims any responsibility as to the accuracy or suitability of such information for application to purchaser's intended purposes or for consequences of its use.</small></p>	<p>APPROVALS: MIS CRD <i>J. K. Pichler</i></p> <p>INDUST. HYGIENE SAFETY <i>J. K. Pichler</i></p> <p>MEDICAL REVIEW: 1 AUGUST 195-</p>

MOBIL OIL CORPORATION MATERIAL SAFETY DATA BULLETIN

***** I. PRODUCT IDENTIFICATION *****

MOBIL 600 W CYLINDER OIL

SUPPLIER:

MOBIL OIL CORP.

HEALTH EMERGENCY TELEPHONE:

(212) 883-4411

CHEMICAL NAMES AND SYNONYMS:

PET. HYDROCARBONS AND ADDITIVES

TRANSPORT EMERGENCY TELEPHONE:

(800) 424-9300 (CHEMTREC)

USE OR DESCRIPTION:

CYLINDER OIL

***** II. TYPICAL CHEMICAL AND PHYSICAL PROPERTIES *****

APPEARANCE: ASTM 3.0 LIQUID

ODOR: MILD

PH: NA

VISCOSITY AT 100 F, SUS: 2000.0

AT 40 C, CS: 375.0

VISCOSITY AT 210 F, SUS: 140.0

AT 100 C, CS: 29.0

FLASH POINT F(C): 540(282) (ASTM D-92)

MELTING POINT F(C): NA

POUR POINT F(C): 40(4)

BOILING POINT F(C): > 600(316)

RELATIVE DENSITY, 15/4 C: 0.901

SOLUBILITY IN WATER: NEGLIGIBLE

VAPOR PRESSURE-MM HG 20C: < .1

NA=NOT APPLICABLE NE=NOT ESTABLISHED D=DECOMPOSES
FOR FURTHER INFORMATION, CONTACT YOUR LOCAL MARKETING OFFICE.

***** III. INGREDIENTS *****

WT PCT (APPROX)	EXPOSURE LIMITS (MG/M3)	SOURCES (PPM AND NOTES)
-----------------	-------------------------	-------------------------

HAZARDOUS INGREDIENTS:

NONE

OTHER INGREDIENTS:

REFINED MINERAL OILS >95

ADDITIVES AND/OR OTHER INGREDIENTS < 5

KEY TO SOURCES: A=ACGIH-TLV, A*=SUGGESTED-TLV, M=MOBIL, O=OSHA
NOTE: LIMITS SHOWN FOR GUIDANCE ONLY. FOLLOW APPLICABLE REGULATIONS.

***** IV. HEALTH HAZARD DATA *****

EFFECTS OF OVEREXPOSURE: NOT EXPECTED TO BE A PROBLEM.

***** V. EMERGENCY AND FIRST AID PROCEDURES *****

EYE CONTACT: FLUSH WITH WATER.

SKIN CONTACT: WASH CONTACT AREAS WITH SOAP AND WATER.

INHALATION: NOT EXPECTED TO BE A PROBLEM.

INGESTION: NOT EXPECTED TO BE A PROBLEM WHEN INGESTED. IF UNCOMFORTABLE SEEK MEDICAL ASSISTANCE.

***** VI. FIRE AND EXPLOSION HAZARD DATA *****

FLASH POINT F(C): 540(282) (ASTM D-92)

FLAMMABLE LIMITS, LEL: .6 UEL: 7.0

EXTINGUISHING MEDIA: CARBON DIOXIDE, FOAM, DRY CHEMICAL AND WATER FOG.

SPECIAL FIRE FIGHTING PROCEDURES: FIREFIGHTERS MUST USE SELF-CONTAINED BREATHING APPARATUS.

UNUSUAL FIRE AND EXPLOSION HAZARDS: NONE

NFPA HAZARD ID: HEALTH: 0, FLAMMABILITY: 1, REACTIVITY: 0

***** VII. REACTIVITY DATA *****
 STABILITY (THERMAL, LIGHT, ETC.): STABLE
 CONDITIONS TO AVOID: EXTREME HEAT
 INCOMPATIBILITY (MATERIALS TO AVOID): STRONG OXIDIZERS
 HAZARDOUS DECOMPOSITION PRODUCTS: CARBON MONOXIDE.
 HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

***** VIII. SPILL OR LEAK PROCEDURE *****
 ENVIRONMENTAL IMPACT: REPORT SPILLS AS REQUIRED TO APPROPRIATE
 AUTHORITIES. U. S. COAST GUARD REGULATIONS REQUIRE IMMEDIATE
 REPORTING OF SPILLS THAT COULD REACH ANY WATERWAY INCLUDING
 INTERMITTENT DRY CREEKS. REPORT SPILL TO COAST GUARD TOLL FREE
 NUMBER 800-424-8802.

PROCEDURES IF MATERIAL IS RELEASED OR SPILLED: ADSORB ON FIRE RETARDANT
 TREATED SAWDUST, DIATOMACEOUS EARTH, ETC. SHOVEL UP AND DISPOSE OF
 AT AN APPROPRIATE WASTE DISPOSAL FACILITY IN ACCORDANCE WITH
 CURRENT APPLICABLE LAWS AND REGULATIONS, AND PRODUCT
 CHARACTERISTICS AT TIME OF DISPOSAL.

WASTE MANAGEMENT: PRODUCT IS SUITABLE FOR BURNING IN AN ENCLOSED,
 CONTROLLED BURNER FOR FUEL VALUE OR DISPOSAL BY SUPERVISED
 INCINERATION. IN ADDITION, THE PRODUCT IS SUITABLE FOR PROCESSING
 BY AN APPROVED RECYCLING FACILITY OR CAN BE DISPOSED OF AT ANY
 GOVERNMENT APPROVED WASTE DISPOSAL FACILITY. USE OF THESE METHODS
 IS SUBJECT TO USER COMPLIANCE WITH APPLICABLE LAWS AND REGULATIONS
 AND CONSIDERATION OF PRODUCT CHARACTERISTICS AT TIME OF DISPOSAL.

***** IX. SPECIAL PROTECTION INFORMATION *****
 EYE PROTECTION: NO SPECIAL EQUIPMENT REQUIRED.
 SKIN PROTECTION: NO SPECIAL EQUIPMENT REQUIRED. HOWEVER, GOOD PERSONAL
 HYGIENE PRACTICES SHOULD ALWAYS BE FOLLOWED.
 RESPIRATORY PROTECTION: NO SPECIAL REQUIREMENTS UNDER ORDINARY
 CONDITIONS OF USE AND WITH ADEQUATE VENTILATION.
 VENTILATION: NO SPECIAL REQUIREMENTS UNDER ORDINARY CONDITIONS OF USE
 AND WITH ADEQUATE VENTILATION.

***** X. SPECIAL PRECAUTIONS *****
 NO SPECIAL PRECAUTIONS REQUIRED.

***** XI. TOXICOLOGICAL DATA *****
 ---ACUTE---

OPAL TOXICITY (RATS): NONTOXIC(ESTIMATED) ---BASED ON TESTING OF
 SIMILAR PRODUCTS AND/OR THE COMPONENTS.
 DERMAL TOXICITY (RABBITS): NONTOXIC(ESTIMATED) ---BASED ON TESTING OF
 SIMILAR PRODUCTS AND/OR THE COMPONENTS.
 INHALATION TOXICITY (RATS): NOT APPLICABLE ---HARMFUL CONCENTRATIONS OF
 MISTS AND/OR VAPORS ARE UNLIKELY TO BE ENCOUNTERED THROUGH ANY
 CUSTOMARY OR REASONABLY FORESEEABLE HANDLING, USE, OR MISUSE OF
 THIS PRODUCT.
 EYE IRRITATION (RABBITS): EXPECTED TO BE NON-IRRITATING. ---BASED ON
 TESTING OF SIMILAR PRODUCTS AND/OR THE COMPONENTS.
 SKIN IRRITATION (RABBITS): EXPECTED TO BE NON-IRRITATING. ---BASED ON
 TESTING OF SIMILAR PRODUCTS AND/OR THE COMPONENTS.

***** XII. REGULATORY INFORMATION *****

TSCA INVENTORY STATUS: ALL COMPONENTS REGISTERED.

I.O.T. SHIPPING NAME: NOT APPLICABLE

D.O.T. HAZARD CLASS: NOT APPLICABLE

US OSHA HAZARD COMMUNICATION STANDARD: PRODUCT ASSESSED IN ACCORDANCE WITH OSHA CFR 1910.1200 AND DETERMINED NOT TO BE HAZARDOUS.

RCRA INFORMATION: THE UNUSED PRODUCT, IN OUR OPINION, IS NOT SPECIFICALLY LISTED BY THE EPA AS A HAZARDOUS WASTE (40 CFR, PART 261); DOES NOT EXHIBIT THE HAZARDOUS CHARACTERISTICS OF IGNITABILITY, CORROSIVITY, OR REACTIVITY, AND IS NOT FORMULATED WITH THE METALS CITED IN THE EP TOXICITY TEST. HOWEVER, USED PRODUCT MAY BE REGULATED.

THE FOLLOWING PRODUCT INGREDIENTS ARE CITED ON THE LISTS BELOW:

CHEMICAL NAME	CAS NUMBER	LIST CITATIONS
OILS, LAPD	8016-22-2	7,8,17

--- KEY TO LIST CITATIONS ---

- 1 = OSHA Z, 2 = ACGIH, 3 = IARC, 4 = NTP, 5 = NCI,
- 6 = EPA CARC, 7 = NFPA 49, 8 = NFPA 325M, 9 = DOT HMT, 10 = CA RTK,
- 11 = IL RTK, 12 = MA RTK, 13 = MN RTK, 14 = NJ RTK, 15 = MI 293,
- 16 = FL RTK, 17 = PA RTK.

***** INFORMATION GIVEN HEREIN IS OFFERED IN GOOD FAITH AS ACCURATE, BUT WITHOUT GUARANTEE. CONDITIONS OF USE AND SUITABILITY OF THE PRODUCT FOR PARTICULAR USES ARE BEYOND OUR CONTROL; ALL RISKS OF USE OF THE PRODUCT ARE THEREFORE ASSUMED BY THE USER AND WE EXPRESSLY DISCLAIM ALL WARRANTIES OF EVERY KIND AND NATURE, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE IN RESPECT TO THE USE OR SUITABILITY OF THE PRODUCT. NOTHING IS INTENDED AS A RECOMMENDATION FOR USES WHICH INFRINGE VALID PATENTS OR AS EXTENDING LICENSE UNDER VALID PATENTS. APPROPRIATE WARNINGS AND SAFE HANDLING PROCEDURES SHOULD BE PROVIDED TO HANDLERS AND USERS. *****

PREPARED BY: MOBIL OIL CORPORATION
 ENVIRONMENTAL AFFAIRS AND TOXICOLOGY DEPARTMENT, PRINCETON, NJ
 FOR FURTHER INFORMATION, CONTACT:
 MOBIL OIL CORPORATION, PRODUCT FORMULATION AND QUALITY CONTROL
 3225 GALLOWES ROAD, FAIRFAX, VA 22037 (703) 849-3265

***** APPENDIX *****

FOR MOBIL USE ONLY: (FILL NO: TSD019A032) MHC: 0* 0* NA 0* 0* PPEC: US33-224 APPROVE REVISED: 02/15/84

MOBIL MATERIAL SAFETY DATA BULLETIN

MOBIL OIL CORPORATION 150 EAST 42ND STREET
 ENVIRONMENTAL AFFAIRS AND TOXICOLOGY DEPT. NEW YORK, N.Y. 10017 (USA)

***** PRODUCT IDENTIFICATION *****
 MOBIL DTE 797 OIL

SUPPLIER:	MOBIL OIL CORP.	HEALTH EMERGENCY TELEPHONE:	(212)883-4411
CHEMICAL NAMES AND SYNONYMS:	PET. HYDROCARBONS AND ADDITIVES	TRANSPORT EMERGENCY TELEPHONE:	(800)424-9300(CHEMTREC)
USE OR DESCRIPTION:	STEAM TURBINE OIL	OTHER DESIGNATION:	(TRN 600114)

***** TYPICAL CHEMICAL AND PHYSICAL PROPERTIES *****

APPEARANCE:	ASTM D.5 LIQUID	VISCOSITY: AT 100 F, SUS	160.0	AT 40 C, CS	30.0
ODOR:	MILD	VISCOSITY: AT 210 F, SUS	44.0	AT 100 C, CS	5.3
RELATIVE DENSITY: 15/4 C	0.858	SOLUBILITY IN WATER:	NEGLIGIBLE	PH:	NA
MELTING POINT: F(C)	NA	POUR POINT: F(C)	20(-7)		
BOILING POINT: F(C)	>600(315)	FLASH POINT: F(C) (METHOD)	410(210) (ASTM D-92)		
VAPOR PRESSURE:MM HG 20C	< .1				

NA=NOT APPLICABLE NE=NOT ESTABLISHED D=DECOMPOSES

***** INGREDIENTS *****

	WT PCT	TLV(TWA):	MG/M3	PPM
	(APPROX)			
HAZARDOUS INGREDIENTS:				
NONE				
NON-HAZARDOUS INGREDIENTS:				
REFINED MINERAL OILS	> 95			
ADDITIVES AND/OR OTHER INGREDIENTS.	< 5			

NOTE: TLVS SHOWN FOR GUIDANCE ONLY. FOLLOW APPLICABLE REGULATIONS.

INFORMATION GIVEN HEREIN IS OFFERED IN GOOD FAITH AS ACCURATE, BUT WITHOUT GUARANTEE. CONDITIONS OF USE AND SUITABILITY OF THE PRODUCT FOR PARTICULAR USES ARE BEYOND OUR CONTROL; ALL RISKS OF USE OF THE PRODUCT ARE THEREFORE ASSUMED BY THE USER AND WE EXPRESSLY DISCLAIM ALL WARRANTIES OF EVERY KIND AND NATURE, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE IN RESPECT TO THE USE OR SUITABILITY OF THE PRODUCT. NOTHING IS INTENDED AS A RECOMMENDATION FOR USES WHICH INFRINGE VALID PATENTS OR AS EXTENDING LICENSE UNDER VALID PATENTS. APPROPRIATE WARNINGS AND SAFE HANDLING PROCEDURES SHOULD BE PROVIDED TO HANDLERS AND USERS.

***** FIRE AND EXPLOSION HAZARD DATA *****

FLASH POINT: F(C) (METHOD) 410(210) (ASTM D-92) FLAMMABLE LIMITS: LEL .6 UEL 7.0

EXTINGUISHING MEDIA: CARBON DIOXIDE, FOAM, DRY CHEMICAL AND WATER FOG.

SPECIAL FIRE FIGHTING PROCEDURES: FIREFIGHTERS MUST USE SELF-CONTAINED BREATHING APPARATUS.

UNUSUAL FIRE AND EXPLOSION HAZARDS: NONE

***** HEALTH HAZARD DATA *****

THRESHOLD LIMIT VALUE: (IF ESTABLISHED)

EFFECTS OF OVEREXPOSURE: SLIGHT SKIN IRRITATION.

***** EMERGENCY AND FIRST AID PROCEDURES *****

EYE CONTACT: FLUSH WITH WATER.

SKIN CONTACT: WASH CONTACT AREAS WITH SOAP AND WATER.

INHALATION: NOT EXPECTED TO BE A PROBLEM.

INGESTION: NOT EXPECTED TO BE A PROBLEM WHEN INGESTED. IF UNCOMFORTABLE SEEK MEDICAL ASSISTANCE.

***** REACTIVITY DATA *****

STABILITY: (THERMAL, LIGHT, ETC.) CONDITIONS TO AVOID: STABLE EXTREME HEAT

INCOMPATIBILITY: (MATERIALS TO AVOID) STRONG OXIDIZERS

HAZARDOUS DECOMPOSITION PRODUCTS: CARBON MONOXIDE.

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR CONDITIONS TO AVOID:

***** SPILL OR LEAK PROCEDURE *****

ENVIRONMENTAL IMPACT:

REPORT SPILLS AS REQUIRED TO APPROPRIATE AUTHORITIES. U. S. COAST GUARD REGULATIONS REQUIRE IMMEDIATE REPORTING OF SPILLS THAT COULD REACH ANY WATERWAY INCLUDING INTERMITTENT DRY CREEKS. REPORT SPILL TO COAST GUARD TOLL FREE NUMBER 800-424-8802.

PROCEDURES IF MATERIAL IS RELEASED OR SPILLED:

ABSORB ON FIRE RETARDANT TREATED SAWDUST, DIATOMACEOUS EARTH, ETC. SHOVEL UP AND DISPOSE OF AT AN APPROPRIATE WASTE DISPOSAL FACILITY IN ACCORDANCE WITH CURRENT APPLICABLE LAWS AND REGULATIONS, AND PRODUCT CHARACTERISTICS AT TIME OF DISPOSAL.

WASTE MANAGEMENT:

DISPOSE OF WASTE BY SUPERVISED INCINERATION IN COMPLIANCE WITH APPLICABLE LAWS AND REGULATIONS.

***** SPECIAL PROTECTION INFORMATION *****

EYE PROTECTION:

NO SPECIAL EQUIPMENT REQUIRED.

SKIN PROTECTION:

NO SPECIAL EQUIPMENT REQUIRED. HOWEVER, GOOD PERSONAL HYGIENE PRACTICES SHOULD ALWAYS BE FOLLOWED.

RESPIRATORY PROTECTION:

NO SPECIAL REQUIREMENTS UNDER ORDINARY CONDITIONS OF USE AND WITH ADEQUATE VENTILATION.

VENTILATION:

NO SPECIAL REQUIREMENTS UNDER ORDINARY CONDITIONS OF USE AND WITH ADEQUATE VENTILATION.

OTHER:

***** SPECIAL PRECAUTIONS *****

HANDLING: NO SPECIAL PRECAUTIONS REQUIRED.

***** TOXICOLOGICAL DATA *****

ACUTE

ORAL TOXICITY: (RATS)

NONTOXIC (ESTIMATED) ---BASED ON TESTING OF SIMILAR PRODUCTS AND/OR THE COMPONENTS.

DERMAL TOXICITY: (RABBITS)

NONTOXIC (ESTIMATED) ---BASED ON TESTING OF SIMILAR PRODUCTS AND/OR THE COMPONENTS.

INHALATION TOXICITY: (RATS)

NOT APPLICABLE ---HARMFUL CONCENTRATIONS OF MISTS AND/OR VAPORS ARE UNLIKELY TO BE ENCOUNTERED THROUGH ANY CUSTOMARY OR REASONABLY FORESEEABLE HANDLING, USE, OR MISUSE OF THIS PRODUCT.

EYE IRRITATION: (RABBITS)

EXPECTED TO BE NON-IRRITATING. ---BASED ON TESTING OF SIMILAR PRODUCTS AND/OR THE COMPONENTS.

SKIN IRRITATION: (RABBITS)

MAY CAUSE SLIGHT IRRITATION ON PROLONGED OR REPEATED CONTACT. ---BASED ON TESTING OF SIMILAR PRODUCTS AND/OR THE COMPONENTS.

SUBACUTE AND MUTAGENICITY (SUMMARY)

CHRONIC OR SPECIALIZED (SUMMARY)

OTHER DATA

FILE CODES:

(FILL NO: MTL253001) MHC: 0* 0* NA 0* 1* PPEC: US84-071 APPROVE
3374

ENVIRONMENTAL AFFAIRS AND TOXICOLOGY DEPT.

MANAGER OF PRODUCT SAFETY INFORMATION, PHONE: 509-737-5596

REVISED:

4/17/84

MOBIL OIL CORPORATION MATERIAL SAFETY DATA BULLETIN

***** I. PRODUCT IDENTIFICATION *****
 MOBIL PEGASUS 490

SUPPLIER: MOBIL OIL CORP. HEALTH EMERGENCY TELEPHONE: (212) 883-4411
 CHEMICAL NAMES AND SYNONYMS: PET. HYDROCARBONS AND ADDITIVES TRANSPORT EMERGENCY TELEPHONE: (800) 424-9300 (CHEMTREC)
 USE OR DESCRIPTION: GAS ENGINE OIL

***** II. TYPICAL CHEMICAL AND PHYSICAL PROPERTIES *****

APPEARANCE: ASTM 4.0 LIQUID ODOR: MILD PH: NA
 VISCOSITY AT 100 F, SUS: 670.0 AT 40 C, CS: 128.0
 VISCOSITY AT 210 F, SUS: 72.0 AT 100 C, CS: 13.6
 FLASH POINT F(C): >480(249) (ASTM D-92)
 MELTING POINT F(C): NA POUR POINT F(C): 10(-12)
 BOILING POINT F(C): > 600(316)
 RELATIVE DENSITY, 15/4 C: 0.879 SOLUBILITY IN WATER: NEGLIGIBLE
 VAPOR PRESSURE-MM HG 20C: < .1
 NA=NOT APPLICABLE NE=NOT ESTABLISHED D=DECOMPOSES
 FOR FURTHER INFORMATION, CONTACT YOUR LOCAL MARKETING OFFICE.

***** III. INGREDIENTS *****

	WT PCT (APPROX)	EXPOSURE LIMITS MG/M3	SOURCES PPM (AND NOTES)
HAZARDOUS INGREDIENTS:			
NONE			
OTHER INGREDIENTS:			
REFINED MINERAL OILS	>95		
ADDITIVES AND/OR OTHER INGREDIENTS	< 5		

KEY TO SOURCES: A=ACGIH-TLV, A*=SUGGESTED-TLV, M=MOBIL, O=CSHA
 NOTE: LIMITS SHOWN FOR GUIDANCE ONLY. FOLLOW APPLICABLE REGULATIONS.

***** IV. HEALTH HAZARD DATA *****

EFFECTS OF OVEREXPOSURE: NOT EXPECTED TO BE A PROBLEM.

***** V. EMERGENCY AND FIRST AID PROCEDURES *****

EYE CONTACT: FLUSH WITH WATER.
 SKIN CONTACT: WASH CONTACT AREAS WITH SOAP AND WATER.
 INHALATION: NOT EXPECTED TO BE A PROBLEM.
 INGESTION: NOT EXPECTED TO BE A PROBLEM. HOWEVER, IF GREATER THAN 1/2 LITER (PINT) INGESTED, IMMEDIATELY GIVE 1 TO 2 GLASSES OF WATER AND CALL A PHYSICIAN, HOSPITAL EMERGENCY ROOM OR POISON CONTROL CENTER FOR ASSISTANCE. DO NOT INDUCE VOMITING OR GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON.

***** VI. FIRE AND EXPLOSION HAZARD DATA *****

FLASH POINT F(C): > 480(249) (ASTM D-92)

FLAMMABLE LIMITS. LEL: .6 UEL: 7.0

EXTINGUISHING MEDIA: CARBON DIOXIDE, FOAM, DRY CHEMICAL AND WATER FOG.

SPECIAL FIRE FIGHTING PROCEDURES: FIREFIGHTERS MUST USE SELF-CONTAINED BREATHING APPARATUS.

UNUSUAL FIRE AND EXPLOSION HAZARDS: NONE

NFPA HAZARD ID: HEALTH: 0, FLAMMABILITY: 1, REACTIVITY: 0

***** VII. REACTIVITY DATA *****

STABILITY (THERMAL, LIGHT, ETC.): STABLE

CONDITIONS TO AVOID: EXTREME HEAT

INCOMPATIBILITY (MATERIALS TO AVOID): STRONG OXIDIZERS

HAZARDOUS DECOMPOSITION PRODUCTS: CARBON MONOXIDE.

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

***** VIII. SPILL OR LEAK PROCEDURE *****

ENVIRONMENTAL IMPACT: REPORT SPILLS AS REQUIRED TO APPROPRIATE AUTHORITIES. U. S. COAST GUARD REGULATIONS REQUIRE IMMEDIATE REPORTING OF SPILLS THAT COULD REACH ANY WATERWAY INCLUDING INTERMITTENT DRY CREEKS. REPORT SPILL TO COAST GUARD TOLL FREE NUMBER 300-424-8802.

PROCEDURES IF MATERIAL IS RELEASED OR SPILLED: ADSORB ON FIRE RETARDANT TREATED SAWDUST, DIATOMACEOUS EARTH, ETC. SHOVEL UP AND DISPOSE OF AT AN APPROPRIATE WASTE DISPOSAL FACILITY IN ACCORDANCE WITH CURRENT APPLICABLE LAWS AND REGULATIONS, AND PRODUCT CHARACTERISTICS AT TIME OF DISPOSAL.

WASTE MANAGEMENT: PRODUCT IS SUITABLE FOR BURNING IN AN ENCLOSED, CONTROLLED BURNER FOR FUEL VALUE OR DISPOSAL BY SUPERVISED INCINERATION. IN ADDITION, THE PRODUCT IS SUITABLE FOR PROCESSING BY AN APPROVED RECYCLING FACILITY OR CAN BE DISPOSED OF AT ANY GOVERNMENT APPROVED WASTE DISPOSAL FACILITY. USE OF THESE METHODS IS SUBJECT TO USER COMPLIANCE WITH APPLICABLE LAWS AND REGULATIONS AND CONSIDERATION OF PRODUCT CHARACTERISTICS AT TIME OF DISPOSAL.

***** IX. SPECIAL PROTECTION INFORMATION *****

EYE PROTECTION: NO SPECIAL EQUIPMENT REQUIRED.

SKIN PROTECTION: NO SPECIAL EQUIPMENT REQUIRED. HOWEVER, GOOD PERSONAL HYGIENE PRACTICES SHOULD ALWAYS BE FOLLOWED.

RESPIRATORY PROTECTION: NO SPECIAL REQUIREMENTS UNDER ORDINARY CONDITIONS OF USE AND WITH ADEQUATE VENTILATION.

VENTILATION: NO SPECIAL REQUIREMENTS UNDER ORDINARY CONDITIONS OF USE AND WITH ADEQUATE VENTILATION.

***** X. SPECIAL PRECAUTIONS *****

NO SPECIAL PRECAUTIONS REQUIRED.

***** XI. TOXICOLOGICAL DATA *****
---ACUTE---

ORAL TOXICITY (RATS): LD50: > 5 G/KG 0/10 RATS DIED AT THIS DOSAGE LEVEL. SLIGHTLY TOXIC(ESTIMATED) ---BASED ON TESTING OF SIMILAR PRODUCTS AND/OR THE COMPONENTS.
DERMAL TOXICITY (RABBITS): LD50: > 2 G/KG 0/10 RABBITS DIED AT THIS DOSAGE LEVEL. SLIGHTLY TOXIC(ESTIMATED) ---BASED ON TESTING OF SIMILAR PRODUCTS AND/OR THE COMPONENTS.
INHALATION TOXICITY (RATS): NOT APPLICABLE ---HARMFUL CONCENTRATIONS OF MISTS AND/OR VAPORS ARE UNLIKELY TO BE ENCOUNTERED THROUGH ANY CUSTOMARY OR REASONABLY FORESEEABLE HANDLING, USE, OR MISUSE OF THIS PRODUCT.
EYE IRRITATION (RABBITS): EXPECTED TO BE NON-IRRITATING. EYE IRRITATION SCORES: 0 AT 24 HOURS, 0 AT 48 HOURS, 0 AT 72 HOURS--- BASED ON TESTING OF SIMILAR PRODUCTS AND/OR THE COMPONENTS.
SKIN IRRITATION (RABBITS): EXPECTED TO BE NON-IRRITATING. PRIMARY IRRITATION SCORE: 0/3---BASED ON TESTING OF SIMILAR PRODUCTS AND/OR THE COMPONENTS.

***** XII. REGULATORY INFORMATION *****

TSCA INVENTORY STATUS: ALL COMPONENTS REGISTERED.
D.O.T. SHIPPING NAME: NOT APPLICABLE
D.O.T. HAZARD CLASS: NOT APPLICABLE
US OSHA HAZARD COMMUNICATION STANDARD: PRODUCT ASSESSED IN ACCORDANCE WITH OSHA CFR 1910.1200 AND DETERMINED NOT TO BE HAZARDOUS.
RCRA INFORMATION: THE UNUSED PRODUCT, IN OUR OPINION, IS NOT SPECIFICALLY LISTED BY THE EPA AS A HAZARDOUS WASTE (40 CFR, PART 261); DOES NOT EXHIBIT THE HAZARDOUS CHARACTERISTICS OF IGNITABILITY, CORROSIVITY, OR REACTIVITY, AND IS NOT FORMULATED WITH THE METALS CITED IN THE EP TOXICITY TEST. HOWEVER, USED PRODUCT MAY BE REGULATED.

THE FOLLOWING PRODUCT INGREDIENTS ARE CITED ON THE LISTS BELOW:

CHEMICAL NAME	CAS NUMBER	LIST CITATIONS
ZINC (ELEMENTAL ANALYSIS) (0.018 PCT)	7440-66-6	15

--- KEY TO LIST CITATIONS ---

- 1 = OSHA 2, 2 = ACGIH, 3 = IARC, 4 = NTP, 5 = NCI,
- 6 = EPA CARC, 7 = NFPA 49, 8 = NFPA 325H, 9 = DOT HMT, 10 = CA RTK,
- 11 = IL RTK, 12 = MA RTK, 13 = MN RTK, 14 = NJ RTK, 15 = MI 293,
- 16 = FL RTK, 17 = PA RTK.

INFORMATION GIVEN HEREIN IS OFFERED IN GOOD FAITH AS ACCURATE, BUT WITHOUT GUARANTEE. CONDITIONS OF USE AND SUITABILITY OF THE PRODUCT FOR PARTICULAR USES ARE BEYOND OUR CONTROL; ALL RISKS OF USE OF THE PRODUCT ARE THEREFORE ASSUMED BY THE USER AND WE EXPRESSLY DISCLAIM ALL WARRANTIES OF EVERY KIND AND NATURE, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE IN RESPECT TO THE USE OR SUITABILITY OF THE PRODUCT. NOTHING IS INTENDED AS A RECOMMENDATION FOR USES WHICH INFRINGE VALID PATENTS OR AS EXTENDING LICENSE UNDER VALID PATENTS. APPROPRIATE WARNINGS AND SAFE HANDLING PROCEDURES SHOULD BE PROVIDED TO HANDLERS AND USERS.

PREPARED BY: MOBIL OIL CORPORATION
ENVIRONMENTAL AFFAIRS AND TOXICOLOGY DEPARTMENT, PRINCETON, NJ
FOR FURTHER INFORMATION, CONTACT:
MOBIL OIL CORPORATION, PRODUCT FORMULATION AND QUALITY CONTROL
3225 GALLOWS ROAD, FAIRFAX, VA 22037 (703) 849-3265

***** APPENDIX *****

FOR MOBIL USE ONLY: (FILL NO: RN612DA201) MHC: 1* 1* NA C* 0* PPEC:
US82-090 APPROVE REVISED: 10/26/82

MOBIL MATERIAL SAFETY DATA BULLETIN

MOBIL OIL CORPORATION
ENVIRONMENTAL AFFAIRS AND TOXICOLOGY DEPT.

150 EAST 42ND STREET
NEW YORK, N.Y. 10017 (USA)

***** PRODUCT IDENTIFICATION *****
MOBILUBE HD 80W-90

SUPPLIER: MOBIL OIL CORP.
CHEMICAL NAMES AND SYNONYMS: PET. HYDROCARBONS AND ADDITIVES
USE OR DESCRIPTION: AUTOMOTIVE GEAR LUBRICANT

HEALTH EMERGENCY TELEPHONE: (212)883-4411
TRANSPORT EMERGENCY TELEPHONE: (800)424-9300(CHEMTREC)
OTHER DESIGNATION: (TRN 510156)

***** TYPICAL CHEMICAL AND PHYSICAL PROPERTIES *****

APPEARANCE: VISCOSITY: AT 100 F, SUS AT 40 C, CS
ASTM 7.0 VISCOUS LIQUID 72.0 132.0
ODOR: VISCOSITY: AT 210 F, SUS AT 100 C, CS
MILD 76.0 13.9
RELATIVE DENSITY: 15/4 C SOLUBILITY IN WATER: PH:
0.895 NEGLIGIBLE NA
MELTING POINT: F(C) POUR POINT: F(C)
NA -15(-26)
BOILING POINT: F(C) FLASH POINT: F(C) (METHOD)
>600(316) >375(191) (ASTM D-92)
VAPOR PRESSURE:MM HG 20C
< .1

NA=NOT APPLICABLE NE=NOT ESTABLISHED D=DECOMPOSES

***** INGREDIENTS *****

	WT PCT (APPROX)	TLV(TWA):	MG/M3	PPM
HAZARDOUS INGREDIENTS:				
NONE				
NON-HAZARDOUS INGREDIENTS:				
REFINED MINERAL OILS	> 90			
ADDITIVES AND/OR OTHER INGREDIENTS.	< 10			

NOTE: TLVS SHOWN FOR GUIDANCE ONLY. FOLLOW APPLICABLE REGULATIONS.

INFORMATION GIVEN HEREIN IS OFFERED IN GOOD FAITH AS ACCURATE, BUT WITHOUT GUARANTEE. CONDITIONS OF USE AND SUITABILITY OF THE PRODUCT FOR PARTICULAR USES ARE BEYOND OUR CONTROL; ALL RISKS OF USE OF THE PRODUCT ARE THEREFORE ASSUMED BY THE USER AND WE EXPRESSLY DISCLAIM ALL WARRANTIES OF EVERY KIND AND NATURE, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE IN RESPECT TO THE USE OR SUITABILITY OF THE PRODUCT. NOTHING IS INTENDED AS A RECOMMENDATION FOR USES WHICH INFRINGE VALID PATENTS OR AS EXTENDING LICENSE UNDER VALID PATENTS. APPROPRIATE WARNINGS AND SAFE HANDLING PROCEDURES SHOULD BE PROVIDED TO HANDLERS AND USERS.

***** SPILL OR LEAK PROCEDURE *****

ENVIRONMENTAL IMPACT:

REPORT SPILLS AS REQUIRED TO APPROPRIATE AUTHORITIES. U. S. COAST GUARD REGULATIONS REQUIRE IMMEDIATE REPORTING OF SPILLS THAT COULD REACH ANY WATERWAY INCLUDING INTERMITTENT DRY CREEKS. REPORT SPILL TO COAST GUARD TOLL FREE NUMBER 800-424-3502.

PROCEDURES IF MATERIAL IS RELEASED OR SPILLED:

ADSORB ON FIRE RETARDANT TREATED SAWDUST, DIATOMACEOUS EARTH, ETC. SCRAPE UP AND REMOVE. DISPOSE OF AT AN APPROPRIATE WASTE DISPOSAL FACILITY IN ACCORDANCE WITH CURRENT APPLICABLE LAWS AND REGULATIONS, AND PRODUCT CHARACTERISTICS AT TIME OF DISPOSAL.

WASTE MANAGEMENT:

DILUTE WASTE WITH A SOLVENT, TO REDUCE ITS VISCOSITY, AND DISPOSE BY SUPERVISED INCINERATION IN COMPLIANCE WITH APPLICABLE LAWS AND REGULATIONS.

***** SPECIAL PROTECTION INFORMATION *****

EYE PROTECTION:

NORMAL INDUSTRIAL EYE PROTECTION PRACTICES SHOULD BE EMPLOYED.

SKIN PROTECTION:

NO SPECIAL EQUIPMENT REQUIRED. HOWEVER, GOOD PERSONAL HYGIENE PRACTICES SHOULD ALWAYS BE FOLLOWED.

RESPIRATORY PROTECTION:

NO SPECIAL REQUIREMENTS UNDER ORDINARY CONDITIONS OF USE AND WITH ADEQUATE VENTILATION.

VENTILATION:

NO SPECIAL REQUIREMENTS UNDER ORDINARY CONDITIONS OF USE AND WITH ADEQUATE VENTILATION.

OTHER:

***** SPECIAL PRECAUTIONS *****

HANDLING: NO SPECIAL PRECAUTIONS REQUIRED.

***** TOXICOLOGICAL DATA *****

ACUTE

ORAL TOXICITY: (RATS)

SLIGHTLY TOXIC (ESTIMATED) ---BASED ON TESTING OF SIMILAR PRODUCTS AND/OR THE COMPONENTS.

DERMAL TOXICITY: (RABBITS)

SLIGHTLY TOXIC (ESTIMATED) ---BASED ON TESTING OF SIMILAR PRODUCTS AND/OR THE COMPONENTS.

INHALATION TOXICITY: (RATS)

NOT APPLICABLE ---HARMFUL CONCENTRATIONS OF MISTS AND/OR VAPORS ARE UNLIKELY TO BE ENCOUNTERED THROUGH ANY CUSTOMARY OR REASONABLY FORESEEABLE HANDLING, USE, OR MISUSE OF THIS PRODUCT.

EYE IRRITATION: (RABBITS)

MAY CAUSE SLIGHT IRRITATION. ---BASED ON TESTING OF SIMILAR PRODUCTS AND/OR THE COMPONENTS.

SKIN IRRITATION: (RABBITS)

MAY CAUSE SLIGHT IRRITATION ON PROLONGED OR REPEATED CONTACT. ---BASED ON TESTING OF SIMILAR PRODUCTS AND/OR THE COMPONENTS.

SUBACUTE AND MUTAGENICITY (SUMMARY)

CHRONIC OR SPECIALIZED (SUMMARY)

OTHER DATA

FILE CODES:

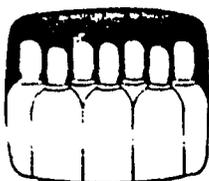
(FILL NO: RP54350201) HHC: 1* 1* NA 1* 1* PPEC: US33-259 APPROVE
1744

ENVIRONMENTAL AFFAIRS AND TOXICOLOGY DEPT.

REVISED:

MANAGER OF PRODUCT SAFETY INFORMATION, PHONE: 602-737-5506

12/ 9/83



MATHESON GAS PRODUCTS

MATERIAL SAFETY DATA SHEET

OF

PRODUCT IDENTIFICATION

MSDS067: NITROGEN

SYNONYM(S): None

CHEMICAL FORMULA: N₂

C.A.S. NUMBER: 7727-37-9

D.O.T. SHIPPING NAME: Nitrogen

D.O.T. I.D. NUMBER: UN1066

D.O.T. HAZARD CLASS: Nonflammable Gas

D.O.T. LABEL(S): Nonflammable Gas

PHYSICAL DATA

MOLECULAR WEIGHT: 28.0134

BOILING POINT: -195.8°C; -320.4°F

SPECIFIC VOLUME @ 1 ATM, 21.1°C: 0.861 m³/kg; 13.8 ft³/lb

RELATIVE DENSITY, (AIR=1): 0.967 @ 1 atm, 25°C

SOLUBILITY IN WATER @ 1 ATM, 25°C: 14.85 cm³/kg water

DESCRIPTION: Nitrogen is a colorless, odorless, nontoxic, nonflammable gas. It is compressed and shipped in high pressure cylinders.

FIRE AND EXPLOSION HAZARD DATA

FLAMMABLE LIMITS IN AIR: Nonflammable

FIRE FIGHTING PROCEDURES: Nitrogen is nonflammable and as such does not create a fire hazard. However, cylinders that are exposed to fire may rupture with violent force. Extinguish surrounding fire and keep cylinders cool using a water spray applied from the maximum possible distance.

HEALTH HAZARD DATA

PERMISSIBLE EXPOSURE LIMITS:

OSHA TWA: None established

ACGIH TWA: None established

ACUTE EFFECTS OF OVEREXPOSURE: Nitrogen is nontoxic but can act as a simple asphyxiant by displacing air. Symptoms of asphyxia include rapid respirations, dizziness and fatigue.

CHRONIC EFFECTS OF OVEREXPOSURE: None known

FIRST AID INFORMATION

INHALATION: Move victim to fresh air. If not breathing, give artificial respiration, preferably mouth to mouth. If breathing is difficult, give oxygen. Call a physician.

REACTIVITY DATA

STABILITY: (X) STABLE () UNSTABLE

INCOMPATIBILITY: Not reactive under normal circumstances.

HAZARDOUS DECOMPOSITION/OXIDATION PRODUCTS: None

POLYMERIZATION: (X) WILL NOT OCCUR () MAY OCCUR

SPILL OR LEAK PROCEDURE

Ventilate the area. Nitrogen can act as a simple asphyxiant by displacing air. Personnel entering the area should wear positive pressure self-contained breathing apparatus.

PRECAUTIONARY INFORMATION

STORAGE RECOMMENDATIONS: Cylinders should be stored and used in dry, well ventilated areas away from sources of heat.

PERSONAL PROTECTIVE EQUIPMENT:

EYE PROTECTION - Safety glasses should be worn.

RESPIRATORY PROTECTION - Respiratory equipment is not needed unless the gas displaces the air and causes a deficiency of oxygen and the possibility of asphyxiation.

SKIN PROTECTION - No special equipment is required. Gloves are recommended for cylinder handling.

BEFORE USING THE GAS:

1. Secure the cylinder to prevent it from falling or being knocked over.
2. Leak check the lines and equipment.
3. Have an emergency plan covering steps to be taken in the event of an accidental release.

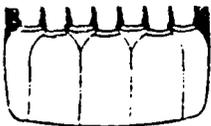
* * * *

*** NOTICE ***

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IN CASE OF EMERGENCY CALL THE NEAREST MATHESON LOCATION

Cucamonga, CA (714) 987-4611, Newark, CA (415) 793-2559, Morrow, GA (404) 961-7891,
Joliet, IL (815) 727-4848, Gloucester, MA (617) 283-7700, East Rutherford, NJ (201) 933-2400, Twinsburg,
OH (216) 425-4406, La Porte, TX (713) 471-2544



MATERIAL SAFETY DATA SHEET 011

PRODUCT IDENTIFICATION

MSDS011: n-BUTANE
SYNONYM(S): Normal Butane, Butane
CHEMICAL FORMULA: $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_3$ or C_4H_{10}
C.A.S. NUMBER: 106-97-8

D.O.T. SHIPPING NAME: Butane
D.O.T. I.D. NUMBER: UN1075
D.O.T. HAZARD CLASS: Flammable Gas
D.O.T. LABEL(S): Flammable Gas

PHYSICAL DATA

MOLECULAR WEIGHT: 58.124
FREEZING POINT: -138.4°C ; -217.0°F
BOILING POINT: -0.6°C ; 31.1°F
VAPOR PRESSURE @ 21.1°C : 110 kPa (gauge); 16.3 psig
SPECIFIC VOLUME @ 1 ATM, 21.1°C : $0.400 \text{ m}^3/\text{kg}$; $6.4 \text{ ft}^3/\text{lb}$
RELATIVE DENSITY, (AIR=1): 2.11 @ 1 atm, 20°C
SOLUBILITY IN WATER @ 1 ATM, 0°C : $3.147 \text{ cm}^3/100 \text{ cm}^3$ water
DESCRIPTION: At room temperature and atmospheric pressure n-butane is a colorless, flammable, relatively nontoxic gas with a characteristic natural gas odor. It is shipped as a liquefied gas under its own vapor pressure.

FIRE AND EXPLOSION HAZARD DATA

FLAMMABLE LIMITS IN AIR: 1.8 - 8.4% by volume.

AUTO-IGNITION TEMPERATURE: 430°C ; 806°F

FIRE FIGHTING PROCEDURES: The only safe way to extinguish an n-butane fire is to stop the flow of gas. If the flow cannot be stopped, let the fire burn itself out while cooling the cylinder and the surroundings using a water spray.

Personnel may have to wear approach type protective suits and positive pressure self-contained breathing apparatus. Firefighters' turnout gear may be inadequate.

Small secondary fires may be brought under control by using carbon dioxide or dry chemical type fire extinguishers while stopping the flow.

UNUSUAL FIRE AND EXPLOSION HAZARDS:

1. Cylinders that are exposed to fire may rupture with violent force. Extinguish surrounding fire and keep cylinders cool using a water spray applied from the maximum possible distance.
2. Flammable gases may spread from a spill after the fire is extinguished and be subject to reignition.

HEALTH HAZARD DATA

PERMISSIBLE EXPOSURE LIMITS:

OSHA TWA: None established
ACGIH TWA: 800 ppm ($1,900 \text{ mg}/\text{m}^3$)

ACUTE EFFECTS OF OVEREXPOSURE: n-Butane is a simple asphyxiant. Inhalation of high concentrations may cause rapid respirations, dizziness, fatigue, and nausea. Massive exposures may cause unconsciousness and death.

Contact with the liquid phase may cause frostbite.

CHRONIC EFFECTS OF OVEREXPOSURE: None known

FIRST AID INFORMATION

INHALATION: Move victim to fresh air. If not breathing, give artificial respiration, preferably mouth to mouth. If breathing is difficult, give oxygen. Call a physician.

CONTACT: Treat for Frostbite.

REACTIVITY DATA

STABILITY: (X) STABLE () UNSTABLE

INCOMPATIBILITY: Oxidizing materials.

HAZARDOUS DECOMPOSITION/OXIDATION PRODUCTS: Carbon monoxide and carbon dioxide

POLYMERIZATION: (X) WILL NOT OCCUR () MAY OCCUR

SPILL OR LEAK PROCEDURE

Shut off all ignition sources and ventilate the area. For controlling large flows, personnel may have to wear approach type protective suits and self-contained breathing apparatus.

PRECAUTIONARY INFORMATION

STORAGE RECOMMENDATIONS: Cylinders should be stored and used in dry, well-ventilated areas away from sources of heat or ignition. Do not store with oxidizers.

PERSONAL PROTECTIVE EQUIPMENT:

EYE PROTECTION: Safety glasses should be worn.

RESPIRATORY PROTECTION - Approved respiratory equipment must be worn when airborne concentrations exceed safe limits. Gas displaces the air and causes a deficiency of oxygen and the possibility of asphyxiation.

SKIN PROTECTION - No special equipment is required. Gloves are recommended for cylinder handling.

BEFORE USING THE GAS:

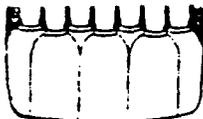
1. Secure the cylinder to prevent it from falling or being knocked over.
2. Install check valves or traps to prevent suckback to the cylinder.
3. Ground all lines and equipment
4. Leak check the lines and equipment.
5. Have an emergency plan covering steps to be taken in the event of an emergency release.

*** NOTICE ***

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IN CASE OF EMERGENCY CALL THE NEAREST MATHESON LOCATION

Cucamonga, CA (714) 987-4611, Newark, CA (415) 793-2559, Morrow, GA (404) 961-7891,
Joliet, IL (815) 727-4848, Gloucester, MA (617) 283-7700, East Rutherford, NJ (201) 933-2400, Twinsburg,
OH (216) 425-4406, La Porte, TX (713) 471-2544



WATKINSON GAS PRODUCTS

MATERIAL SAFETY DATA SHEET

076

PRODUCT IDENTIFICATION

MSDS076: PROPANE

D.O.T. SHIPPING NAME: Propane

SYNONYM(S): Liquefied Petroleum Gas

D.O.T. I.D. NUMBER: UN1075

CHEMICAL FORMULA: C_3H_8 or $CH_3CH_2CH_3$

D.O.T. HAZARD CLASS: Flammable Gas

C.A.S. NUMBER: 74-98-6

D.O.T. LABEL(S): Flammable Gas

PHYSICAL DATA

MOLECULAR WEIGHT: 44.097

FREEZING POINT: $-187.7^{\circ}C$; $-305.9^{\circ}F$

BOILING POINT: $-42.1^{\circ}C$; $-43.7^{\circ}F$

VAPOR PRESSURE: 752 kPa (gauge); 109 psig

SPECIFIC VOLUME @ 1 ATM, $21.1^{\circ}C$: $0.931 m^3/kg$; $8.5 ft^3/lb$

RELATIVE DENSITY, (AIR=1): 1.55 @ 1 atm, $20^{\circ}C$

SOLUBILITY IN WATER @ 1 ATM, $18^{\circ}C$: $6.5 cm^3/0.1 kg$ water

DESCRIPTION: At room temperature and atmospheric pressure propane is a colorless, flammable, nontoxic gas, with a characteristic natural gas odor. It is shipped as a liquefied gas under its own vapor pressure.

FIRE AND EXPLOSION HAZARD DATA

FLAMMABLE LIMITS IN AIR: 2.2 - 9.5% by volume.

AUTO-IGNITION TEMPERATURE: $468^{\circ}C$; $874^{\circ}F$

FIRE FIGHTING PROCEDURES: The only safe way to extinguish a propane fire is to stop the flow of gas. If the flow cannot be stopped, let the fire burn itself out while cooling the cylinder and the surroundings using a water spray.

Personnel may have to wear approach type protective suits and positive pressure self-contained breathing apparatus. Firefighters' turnout gear may be inadequate.

UNUSUAL FIRE AND EXPLOSION HAZARDS:

1. Cylinders that are exposed to fire may rupture with violent force. Extinguish surrounding fire and keep cylinders cool using a water spray applied from the maximum possible distance.
2. Flammable gases may spread from a spill after the fire is extinguished and be subject to reignition.

HEALTH HAZARD DATA

PERMISSIBLE EXPOSURE LIMITS:

OSHA TWA: 1,000 ppm ($1,000 mg/m^3$)

ACGIH TWA: None established *

* ACGIH considers propane to be a simple asphyxiant.

ACUTE EFFECTS OF OVEREXPOSURE: Propane is nontoxic but can act as a simple asphyxiant by displacing air. Symptoms of asphyxia include rapid respirations, dizziness and fatigue.

Contact with the liquid phase or with the cold gas escaping from a cylinder may cause frostbite.

CHRONIC EFFECTS OF OVEREXPOSURE: None known

FIRST AID INFORMATION

INHALATION: Move victim to fresh air. If not breathing, give artificial respiration, preferably mouth-to-mouth. If breathing is difficult, give oxygen. Call a physician.

CONTACT: Treat for frostbite.

REACTIVITY DATA

STABILITY: (X) STABLE () UNSTABLE

INCOMPATIBILITY: Oxidizing materials.

HAZARDOUS DECOMPOSITION/OXIDATION PRODUCTS: Carbon monoxide, carbon dioxide

POLYMERIZATION: (X) WILL NOT OCCUR () MAY OCCUR

SPILL OR LEAK PROCEDURE

Shut off all ignition sources and ventilate the area. For controlling large flows, personnel may have to wear approach-type protective suits and positive pressure self-contained breathing apparatus.

PRECAUTIONARY INFORMATION

STORAGE RECOMMENDATIONS: Cylinders should be stored and used in dry, well-ventilated areas away from sources of heat or ignition. Do not store with oxidizers.

PERSONAL PROTECTIVE EQUIPMENT:

EYE PROTECTION - Safety glasses should be worn.

RESPIRATORY PROTECTION - Approved respiratory equipment must be worn when airborne concentrations exceed safe levels.

SKIN PROTECTION - No special equipment is required. Gloves are recommended for cylinder handling.

BEFORE USING THE GAS:

1. Secure the cylinder to prevent it from falling or being knocked over.
2. Leak check the lines and equipment.
3. Have an emergency plan covering steps to be taken in the event of an accidental release.

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*** NOTICE ***

This data is furnished gratuitously, independent of any sale of the product, and only for your independent investigation and verification. While this data is believed to be correct, Matheson makes no representation as to the accuracy of the data. Matheson makes no warranties, guarantees or representations of any kind or nature with respect to the product or to this data, either express or implied, and whether arising by law or otherwise, including but not limited to any implied warranty of merchantability or fitness for any particular purpose. Matheson shall in no event be liable for any personal injury, property or other damages of any nature whatsoever, whether special, indirect, consequential or compensatory, directly or indirectly resulting from the publication or use of or reliance upon this data.

IN CASE OF EMERGENCY CALL THE NEAREST MATHESON LOCATION

Cucamonga, CA (714) 987-4611 Newark, CA (415) 793-2599 Morrow, GA (404) 961-7891
Joliet, IL (815) 727-4848 Gloucester, MA (617) 283-7700 East Rutherford, NJ (201) 933-2400, Twinsburg, OH (216) 425-4406, La Porte, TX (713) 471-2544

Material Safety Data Sheet

QUICK IDENTIFIER
Common Name: (used on label and list)

May be used to comply with OSHA's Hazard Communication Standard, 29CFR 1910.1200. Standard must be consulted for specific requirements.

Quick-Dry Recorder Ink (red, blue)
(Part #s 96S55, 96S56, 96S62, 96S68,
96S69, 96S77, 96S78)

SECTION 1 -

Manufacturer's Name Taylor Instrument
Address 95 Ames Street P.O. Box 110
City, State, and ZIP Rochester, New York 14692
Emergency Telephone No. (716)-235-5000
Other Information Calls Same
Signature of Person Responsible for Preparation (Optional)
Date Prepared 11/18/85

SECTION 2 - HAZARDOUS INGREDIENTS/IDENTITY

Hazardous Component(s) (chemical & common name(s))	OSHA PEL	ACGIH TLV	Other Exposure Limits	% (optional)	CAS NO.
Dye	None	None		0.5	-
Gum arabic	None	None		1	-
Water	None	None		69	7732185
Glycerine	None	None		29	56817
Salicylic acid	None	None		0.2	59727

SECTION 3 - PHYSICAL & CHEMICAL CHARACTERISTICS

Boiling Point 214° F
Specific Gravity (H₂O=1) 1.07
Vapor Pressure (mm Hg) Unknown
Vapor Density (Air = 1) Unknown
Solubility in Water Complete
Reactivity in Water None
Appearance and Odor Viscous liquid with no appreciable odor
Melting Point Liquid at room temperature

SECTION 4 - FIRE & EXPLOSION DATA

Flash Point None, c. **Method Used**
Flammable Limits in Air % by Volume LEL Lower None UEL Upper None
Auto-Ignition Temperature None **Extinguisher Media** None
Special Fire Fighting Procedures None
Unusual Fire and Explosion Hazards None

PHYSICAL PROPERTIES (REACTIVITY DATA)

Stability: Unstable Conditions Stable to Avoid None
Incompatibility (Materials to Avoid): None
Decomposition Products: None
Hazardous Polymerization: May Occur Conditions Will Not Occur to Avoid None

SECTION 6 - HEALTH HAZARDS

1. Acute: Gum arabic can cause dermatitis.
2. Chronic:
Routes and Systems of Exposure: Inhalation of gum arabic may cause watery nose and eyes, coughing and wheezing. Salicylic acid poisoning can cause nausea, vomiting, ringing in ears, dizziness, headaches, dullness, confusion, sweating, rapid pulse and breathing, and sometimes skin eruptions.
Medical Conditions Generally Aggravated by Exposure:

Chemical Listed as Carcinogen: Potential Carcinogen National Toxicology Program Yes No I.A.R.C. Monographs Yes No OSHA Yes No

Emergency and First Aid Procedures: Avoid inhalation and ingestion. For eyes and skin, flush with water for 15 minutes. For eyes, call physician.

ROUTES OF ENTRY

- 1. Inhalation
2. Eyes
3. Skin
4. Ingestion

SECTION 7 - SPECIAL PRECAUTIONS AND SPILL/LEAK PROCEDURES

Precautions to be Taken in Handling and Storage: None
Special Handling: None

First Aid to be Taken in Case of Material Released or Spilled: Flush with water. An absorbent material can be used.

Disposal: Sewer (Consult federal, state, and local regulations)

SECTION 8 - SPECIAL PROTECTION INFORMATION/CONTROL MEASURES

Personal Protective Equipment: None needed under normal conditions of use.
Respiratory Protection: None
Eye Protection: Chemical splash goggles and face shield suggested during handling.
Skin Protection: As needed to prevent ink staining of hands.
Hygienic Practices: As determined by conditions of use.

Material Safety Data Sheet

QUICK IDENTIFIER

Common Name: (used on label and list)

Regular Recorder Ink (red, blue, black, green, purple)

May be used to comply with OSHA's Hazard Communication Standard, 29CFR 1910.1200. Standard must be consulted for specific requirements.

SECTION 1 - (Part #s 96S8, 96S10, 96S11, 96S12, 96S13, 96S15, 96S16, 96S17, 96S32, 96S36, 96S37, 96S39A, 96S44, 96S44, 96S45, 96S46, 96S57, 96S58, 96S59, 96S61, 96S62, 96S66, 96S67, 96S88, 96S92, 96S93, 96S132, 96S160, 96S161)

Manufacturer's Name Taylor Instrument

Address 95 Ames Street P.O. Box 110

Emergency Telephone No. (716)-235-5000

City, State, and ZIP Rochester, New York 14692

Other Information Calls Same

Signature of Person Responsible for Preparation (Optional)

Date Prepared 11/18/85

SECTION 2 - HAZARDOUS INGREDIENTS/IDENTITY

Hazardous Component(s) (chemical & common name(s))	OSHA PEL	ACGIH TLV	Other Exposure Limits	% (optional)	CAS NO.
Dye	None	None		1	-
Gum arabic	None	None		1	-
Denatured alcohol (ethyl alcohol)	1000 ppm	1000 ppm		15	64175
Glycerine	None	None		47	56817
Water	None	None		36	7732185

SECTION 3 - PHYSICAL & CHEMICAL CHARACTERISTICS

Boiling Point 195° F Specific Gravity (H₂O=1) 1.15 Vapor Pressure (mm Hg) Unknown
 Vapor Density (Air = 1) Unknown

Solubility in Water Complete Reactivity in Water None

Appearance and Odor Viscous liquid with alcohol odor Melting Point Liquid at room temperature

SECTION 4 - FIRE & EXPLOSION DATA

Flash Point 75° F. C. Method Used Closed cup Flammable Limits in Air % by Volume LEL Lower Unknown UEL Upper Unknown

Auto-ignition Temperature Unknown Extinguisher Media Dry chemical or alcohol type foam. Water spray may be ineffective.

Special Fire Fighting Procedures None

Unusual Fire and Explosion Hazards None

SECTION 5 - PHYSICAL HAZARDS (REACTIVITY DATA)

Stability Stable Unstable Conditions to Avoid None

Incompatibility (Materials to Avoid) None

Hazardous Decomposition Products None

Hazardous Polymerization May Occur Conditions Will Not Occur to Avoid None

SECTION 6 - HEALTH HAZARDS

1. Acute Gum arabic can cause dermatitis. 2. Chronic Ingestion of denatured alcohol can cause blindness.

Signs and Symptoms of Exposure Inhalation of gum arabic may cause watery nose and eyes, coughing and wheezing,

Medical Conditions Generally Aggravated by Exposure

Chemical Listed as Carcinogen or Potential Carcinogen National Toxicology Program Yes No I.A.R.C. Monographs Yes No OSHA Yes No

Emergency and First Aid Procedures Avoid inhalation and ingestion. For eyes and skin, flush with water for 15 minutes. For eyes, call physician.

ROUTES OF ENTRY

- 1. Inhalation
- 2. Eyes
- 3. Skin
- 4. Ingestion

SECTION 7 - SPECIAL PRECAUTIONS AND SPILL/LEAK PROCEDURES

Precautions to be Taken in Handling and Storage Do not store above 140° F. Do not expose to flame or fire.

Other Precautions None

Steps to be Taken in Case Material is Released or Spilled Flush with water. An absorbent material can be used.

Waste Disposal Methods (Consult Federal, state, and local regulations) Dispose of waste in accordance with state and federal regulations.

SECTION 8 - SPECIAL PROTECTION INFORMATION/CONTROL MEASURES

Laboratory Protection (Specify Type) None needed under normal conditions of use.

Respirator None Local Exhaust None Mechanical (General) None Special None Other None

Eye Protection As needed to prevent ink staining of hands. Eye Protection - Chemical splash goggles or face shield suggested during use.

Other Protective Equipment As determined by conditions of use.

Hygienic Practices " " " " " "

IMPORTANT

Do not leave any blank spaces. If required information is unavailable, unknown, or does not apply, so indicate.

MATERIAL SAFETY DATA SHEET

Required under USDL Safety and Health Regulations for Ship Repairing,
Shipbuilding, and Shipbreaking (29 CFR 1915, 1916, 1917)

SECTION I

MANUFACTURER'S NAME ANDESITE OF CALIFORNIA, INC.		EMERGENCY TELEPHONE NO. (213) 726-7602
ADDRESS (Number, Street, City, State, and ZIP Code) 1260 South Goodrich Blvd., Los Angeles, CA 90022		
CHEMICAL NAME AND SYNONYMS	TRADE NAME AND SYNONYMS SAFESTEP SORBENT	
CHEMICAL FAMILY OXIDES OF METALS	FORMULA ADSORBENT/ANTI-SLIP	

SECTION II - HAZARDOUS INGREDIENTS

PAINTS, PRESERVATIVES, & SOLVENTS	%	TLV (Units)	ALLOYS AND METALLIC COATINGS	%	TLV (Units)
PIGMENTS			BASE METAL		
CATALYST			ALLOYS		
VEHICLE			METALLIC COATINGS		
SOLVENTS			FILLER METAL PLUS COATING OR CORE FLUX		
ADDITIVES			OTHERS		
OTHERS					
HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES				%	TLV (Units)
CONTAINS NO HAZARDOUS MATERIALS AS DEFINED BY BUREAU OF LABOR STANDARDS. SEE ATTACHED CONSUMER SPECIFICATION SHEET.					

SECTION III - PHYSICAL DATA

BOILING POINT (°F.) See attached	SPECIFIC GRAVITY (H ₂ O=1)
VAPOR PRESSURE (mm Hg.) Data Sheet	PERCENT VOLATILE BY VOLUME (%)
VAPOR DENSITY (AIR=1)	EVAPORATION RATE (_____ =1)
SOLUBILITY IN WATER	
APPEARANCE AND ODOR	

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method used)	NONE	FLAMMABLE LIMITS	LeI	UeI
EXTINGUISHING MEDIA	NONE			
SPECIAL FIRE FIGHTING PROCEDURES	NONE			
UNUSUAL FIRE AND EXPLOSION HAZARDS	NONE			

Andesite of California Inc.

1260 South Goodrich Boulevard
Los Angeles, California 90022

Sorbent Properties

Sorbent Name: SAFESTEP[®]

Generic Name/Description: Sorbent for safe, immediate, and complete pick-up/clean-up/disposal of common and toxic/hazardous waste spills (see attached brochure)

Molecular Formula: Natural silicates of aluminum and other metals

Polarity: Polar

MINERAL ANALYSIS

Silicon Dioxide	71.00 %
Aluminum Oxide	14.23
Ferric Oxide	1.75
Calcium Oxide	.54
Magnesium Oxide	.90
Potassium Oxide	1.61
Alkalies	5.96

Specific Gravity: 2

Bulk Density: 0.5 to 0.7 g/ml

Combustible: No

Ash Content: Majority, inorganic material

BTU/Lb: N/A

Reactivity: No dangerous reaction. Reacts with hydrofluoric acid

Toxicity: Human: None
Environmental: None

Uptake Selectivity: No substances selectively sorbed

Sorbent/Sorbate Properties: See attached proposed Commercial Item Description.

Performance Parameters: None of the following environmental effects impact sorbent use on a particular sorbate - pH, salinity, ambient temperature.

Safety precautions: as appropriate only for the sorbate in question.

SUBSTANCES SORBED BY THE SORBENT

CERCLA LIQUID FUNCTIONAL GROUPS

Acids, inorganic
Acids, organic
Alcohols and glycols
Aldehydes
Aliphatics

Aliphatics, halogenated
Amides
Amines, alkyl
Amines, aryl
Aromatics
Aromatics, halogenated

Caustics
Cyanates
Cyanides and nitriles
Epoxides
Esters
Ethers

Halides, alkyl
Halides, inorganic
Heavy metals
Hydrazines
Ketones
Nitro compounds

Nitroso compounds
Olefins
Organophosphates
Oxides, alkylene
Peroxides
Phenols and cresols

Sulfates
Sulfides and mercaptans
Sulfites

Based upon the chemically inert nature of SAFESTEP, it is believed that SAFESTEP can be used effectively on all of the listed CERCLA functional groups with the few possible exceptions noted below:

- 1) Hydrofluoric acid reacts with the silicious components of the sorbent.
- 2) Concentrated peroxides should not be contracted with SAFESTEP without prior testing for possible catalytic decomposition of the peroxides.
- 3) SAFESTEP's possible effect upon hydrazines also merits testing.

The above recommendations are based upon our best available Knowledge and experience with the product. However, this information is not to be considered a warrantee, expressed or implied. The user must assume complete responsibility for the safe use of the product with any sorbates in question.

Continental Products of Texas

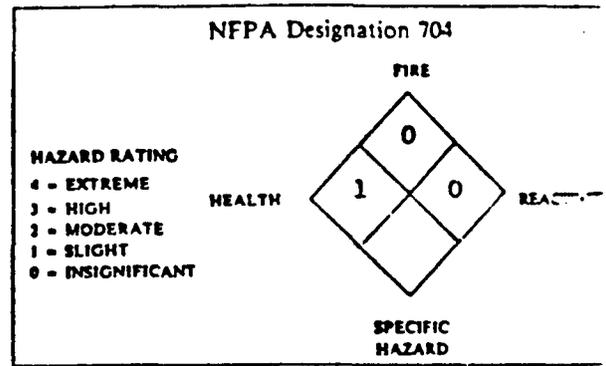
100 Industrial • P.O. Box 3627 • Odessa, Texas 79760

Telephone No. (915) 337-4681

SODA ASH

QUICK IDENTIFIER

MATERIAL SAFETY DATA SHEET



SECTION 1 - IDENTITY

Common Name: (used on label)
(Trade Name & Synonyms)

SODA ASH

Chemical Name Sodium Carbonate

Formula Na_2CO_3

Chemical Family Inorganic Alkali

Cas No.

SECTION 2 - HAZARDOUS INGREDIENTS

Hazardous Component(s)	%	Threshold Limit Value (units)
------------------------	---	-------------------------------

NA

SECTION 3 - PHYSICAL & CHEMICAL CHARACTERISTICS (Fire & Explosive Data)

Boiling Point	NA	Specific Gravity ($\text{H}_2\text{O} = 1$)	2.533	Vapor Pressure (mm Hg)	NA
Percent Volatile by Volume (%)	NA	Vapor Density (Air = 1)	NA	Evaporation Rate (_____ = 1)	NA
Solubility in Water	Appreciable	Reactivity in Water	NA		
Appearance and Odor	White odorless, anhydrous hygroscopic powder or granular material				
Flash Point	NA	Flammable Limits in Air % by Volume	NA	Extinguisher Media	CO_2 , Water, Dry chemical
Special Fire Fighting Procedures	Self contained breathing apparatus	Lower	Upper		
Unusual Fire and Explosion Hazards	Nonexplosive or inflammable				

SECTION 4 - PHYSICAL HAZARDS

Stability
Stable UNSTABLE CONDITIONS TO AVOID

COMPATIBILITY (MATERIALS TO AVOID) Acids - will release carbon dioxide gas

Carbon dioxide gas

HAZARDOUS DECOMPOSITION PRODUCTS

Hazardous Polymerization
MAY OCCUR WILL NOT OCCUR CONDITIONS TO AVOID

Threshold Limit Value NA
Signs and Symptoms of Exposure

1. Acute Overexposure Irritative to mucous membranes, eyes, skin. Ingestion will cause damage to gastrointestinal tract, vomiting and diarrhea.
Chronic Overexposure

Medical Conditions Generally Aggravated by Exposure

Chemical Listed as Carcinogen or Potential Carcinogen NA

National Toxicology Program Yes No

I.A.R.C. Monographs Yes No

OSHA Yes No

OSHA Permissible Exposure Limit NA

ACGIH Threshold Limit Value NA

Other Exposure Limit Used NA

Emergency and First Aid Procedures

1. Inhalation Irritation will result from inhalation. Seek medical assistance.
2. Eyes Promptly wash from eyes with plenty of water @ least 15 minutes and get medical help.
- Skin Flush skin immediately. Get medical attention if irritation persists.
4. Ingestion Get medical attention immediately. Give large amounts of water or milk to dilute.

SECTION 6 - SPECIAL PROTECTION INFORMATION

Respiratory Protection (Specify Type) NIOSH approved respirator for sodium carbonate

Ventilation Local Exhaust yes Mechanical (General) yes Special Other

Protective Gloves Rubber or glastic gloves Eye Protection Safety glasses or chemical safety goggles if dusty.

Other Protective Clothing or Equipment Clothing sufficient to protect skin from dust.

SECTION 7 - SPECIAL PRECAUTIONS AND SPILL/LEAK PROCEDURES

Precautions to be Taken in Handling and Storage Store in cool dry place. Avoid prolonged storage - caking may result. Do not store near acid.

Steps to be Taken in Case Material is Released or Spilled Shovel up and remove excess. Flush residue with water. Sweep up powder. Wash area with water.

Waste Disposal Methods According to State and Federal Regulations

NO WARRANTY, EXPRESS OF IMPLIED OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR OTHERWISE IS MADE. BUYER ASSUMES ALL RISK OF USE, STORAGE AND HANDLING, CONTINENTAL PRODUCTS OF TEXAS SHALL NOT BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING DIRECTLY OR INDIRECTLY IN CONNECTION WITH THE PURCHASE, USE, STORAGE OR HANDLING OF THIS PRODUCT.

Date Issued: 11/20/85

Abbreviations Used
NA Not Applicable
ND Not Determined
UN Unknown

Continental Products of Texas

Prepared by

Eric Klim
Eric Klim

Data Sheet

MORTON THIOKOL, INC.

Morton Salt Division

110 North Wacker Drive, Chicago, Illinois 60606-1555



Emergency Phone No. (312) 807-2000

PRODUCT IDENTIFICATION

Chemical Name: Sodium Chloride
Common Name: Salt Product Name: _____
CAS Number: 7647-14-5 Chemical Formula: NaCl
Product Use: _____

HAZARDOUS INGREDIENTS

<u>Chemical Name</u>	<u>Common Name</u>	<u>CAS NO.</u>	<u>%</u>	<u>OSHA PEL</u>	<u>ACGIH TLV-TWA</u>
None					

PHYSICAL DATA

Boiling Point, (760mm Hg.) 1413°C Specific Gravity (Water = 1) 2.165
Vapor Pressure (mm Hg) 1mm @ 865°C % Non-Volatile 100
Vapor Density (AIR = 1) N/A Evaporation Rate (Ether = 1) N/A
Solubility in Water 1g in 2.8ml H₂O at 25°C pH 6.7 - 7.3
Appearance White Crystalline Powder Odor Odorless

FIRE AND EXPLOSION HAZARD DATA

Flash Point N/A °F Flammable Limits Lel N/A Uel N/A

Method Used:
Non-Combustible

Extinguishing Media:
Not applicable

Special Fire Fighting Procedures:
Not applicable

Unusual Fire and Explosion Hazards:
Not applicable

Hazardous Decomposition Products:
When heated to decomposition it emits toxic fumes of Cl₂ and Na₂O

HEALTH HAZARD DATA

Oral Toxicity:

Does not meet toxicity criteria under OSHA 1910.1200 Hazard Communication, Appendix A parts 3. & 6.

Dermal Toxicity:

Not toxic to the skin

Eye:

Not toxic to the eye

Inhalation:

Not toxic through inhalation

Chronic Toxicity: No applicable information found

Mutagenesis: No applicable information found

Effects of Overexposure:

- Ingestion:**
1. Disagreeable taste
 2. Nausea and vomiting
- Skin Contact:**
1. Irritation
 2. Inflammation
 3. Small ulcerations
- Eye Contact:**
1. Mechanical irritation
 2. Watering of eyes
 3. Inflammation of conjunctivas
- Inhalation:**
1. Slight irritation of nose
 2. Sneezing
-

Acute Systemic Effects:

Ingestion of large amounts can cause irritation of the stomach.

Chronic Systemic Effects:

No applicable information found.

EMERGENCY AND FIRST AID PROCEDURES

- Eye Contact:**
1. Wash the affected eye or eyes under slowly running water for 15 minutes or longer making sure that the victim's eyelids are held wide apart and he moves his eyes slowly in every direction.
 2. Make sure that no solid particles remain the the creases of the eye; if they do, continue to wash the eye.
 3. If the pain persists, the medical service will refer the victim to an ophthalmologist.
- Skin Contact:**
1. Remove the victim from the source of contamination.
 2. Remove clothing from the affected area.
 3. Wash affected area under the shower.
 4. Rinse carefully.

Skin Contact
(continued)

5. Dry gently with a clean soft towel.
6. If the skin is inflamed or painful, contact the medical service who will treat it in the same way as a heat or thermal burn.

Inhalation:

1. Make the victim blow his nose to remove the dust but discourage him from sniffing.
2. If there is any doubt about the victim's condition send or escort him to the infirmary, first-aid room or hospital.

Ingestion:

1. Make the victim vomit by having him stick his finger down his throat or tickling his uvula with the handle of a spoon.
2. Afterwards give him as much milk or water as he wants.

REACTIVITY DATA

Stability Stable Unstable Conditions to Avoid:

Incompatibility: (Materials to Avoid)

Bromine Trifluoride, Lithium (BrF₃, Li)

Can Hazardous Polymerization Occur: No

Hazardous Decomposition Products and Conditions:

When heated to decomposition it emits toxic fumes of Cl₂ and Na₂O

SPILL OR LEAK PROCEDURES

Response to Small Spills:

No special requirements

Response to Large Spills:

No special requirements

Hazards to be Avoided:

None known

Reportable Quantity:

Check your State for requirements

Waste Classification:

Some States have set maximum limits on Chlorides in waste effluent.

Disposal Methods:

Dilution with water is the only practical method to meet requirements.

SPECIAL PROTECTION INFORMATION

Respiratory Protection:

No special equipment

For Hands, Body:

No special equipment

For Eyes:

No special equipment

Ventilation:

None required

SPECIAL PRECAUTIONS

Other Precautions:

Transport in dry equipment. Storage should be in a dry location.

LABELING INFORMATION

DOT Shipping Name: Salt (common) sodium chloride

DOT Label: Not applicable

UN No.: Not applicable

Other Contents of Product Label:

Not applicable

WARNING:

None

USERS RESPONSIBILITY

The responsibility to provide a safe workplace remains with the user. The user should consider the health hazards and safety information contained herein as a guide and should take those precautions required in an individual operation to instruct employees and develop work practice procedures for a safe work environment.

Disclaimer of Liability

The information contained herein is, to the best of our knowledge and belief, accurate. However, since the conditions of handling and use are beyond our control, we make no guarantee of results, and assume no liability for damages incurred by use of this material. It is the responsibility of the user to comply with all applicable federal, state, and local laws and regulations.

Nothing contained herein is to be construed as a recommendation for use in violation of any patents or of applicable laws or regulations.

MORTON THIOKOL INC.

Morton Salt Division



110 North Wacker Drive, Chicago, Illinois 60606-1555 (312) 807-2000

MATERIAL SAFETY DATA SHEET

CORPORATE RESEARCH & DEVELOPMENT

SCHENECTADY, N. Y.

MATERIALS SERVICES
 INFORMATION

NO. _____

SODIUM HYDROXIDE

Revision A

Date September 1977

SECTION I. MATERIAL IDENTIFICATION

MATERIAL NAME: SODIUM HYDROXIDE
OTHER DESIGNATIONS: Caustic Soda, Soda Lye, NaOH, GE Material D4B4, ASTM D456,
DESCRIPTION: This material is an anhydrous solid (flake, pellet, etc.) CAS# 001 310 732
MANUFACTURER: Available from many suppliers.

SECTION II. INGREDIENTS AND HAZARDS

	%	HAZARD DATA
Typical content: Sodium Hydroxide (NaOH)	96	<u>Ceiling Limit</u> 2 mg/m ³
Impurities:		
Sodium Carbonate (Na ₂ CO ₃)	0.5-2.5	
Sodium Chloride (NaCl)	0.01-2.1	
Sodium Sulfate (Na ₂ SO ₄)	0.02-0.1	
Potassium, Calcium and Magnesium	0.1	
Silicon Dioxide (SiO ₂)	0.03	
Other metals (total)	0.01	

SECTION III. PHYSICAL DATA

Boiling point, 1 atm, deg C	----- 1388	Vapor pressure, mm Hg @ 1000 C	----- 42
Specific gravity (20/4 C)	----- 2.13		@ 1200 C ----- 232
Volatiles	----- non-volatile	Viscosity at 350 C, cps	----- 4.0
	at room temperature	Water solubility, %, @ 0 C	----- 29.6
		@ 100 C	----- 77.5
Melting point, deg C	----- 318		

Appearance & odor: White or off-white, hygroscopic solid; no odor.

SECTION IV. FIRE AND EXPLOSION DATA

			LOWER	UPPER
Flash Point and Method	Autoignition Temp.	Flammability Limits In Air		
None - not combustible	N/A	N/A	N/A	N/A

Although it is not combustible, it can be hazardous if present in a fire area. The following should be known for fire fighting: (1) It can melt and flow when heated (m.p. 318 C). (2) Hot or molten material can react violently with water (splattering). (3) Can react with certain metals, such as aluminum, to generate flammable hydrogen gas. (See also Reactivity Data, Section V)

SECTION V. REACTIVITY DATA

It is a stable material under normal conditions of storage. No self-polymerization. No hazardous decomposition products. Slowly it can pick up moisture from the air and react with carbon dioxide from the air to form sodium carbonate.

Sodium hydroxide can react violently with strong acids and with many organic chemicals, especially with nitrocarbons and chlorocarbons. (Will react with trichloroethylene to form spontaneously flammable dichloroacetylene.) It generates much heat when it dissolves in water.

Avoid contact with leather and wool and with aluminum, tin, zinc, and alloys which contain these metals.

SECTION VI. HEALTH HAZARD INFORMATION

TLV (Ceiling Value) 2 mg/m³

Sodium hydroxide is a strong alkali and is dangerous when improperly handled. It can be destructive to all human tissue it contacts, producing severe burns. Eye contact can produce severe or permanent injury. Dust or mist inhalation can injure the entire respiratory tract.

FIRST AID

Eye contact - Wash eyes immediately with plenty of running water for no less than 15 minutes, including under the eyelids and all surfaces. Speed in rinsing out the eyes with water after contact is extremely important if permanent injury is to be avoided. Contact physician as soon as possible.

Ingestion - Immediately dilute chemical by drinking large amounts of water or milk, then neutralize with dilute vinegar or fruit juice. Vomiting may occur spontaneously, but do not induce it. Contact a physician promptly.

Inhalation - Remove from exposure to mist or dust and get prompt medical help.

Skin contact - Wash contact area promptly with large quantities of water. (Dilute acetic acid, vinegar, can be used to neutralize.) Remove contaminated clothing under the shower. Prolong washing in serious cases until medical help arrives - even for an hour or longer. Physician should see all cases other than minor exposures to small areas of skin.

SECTION VII. SPILL, LEAK, AND DISPOSAL PROCEDURES

When solid sodium hydroxide is spilled in a dry condition, it can be promptly shoveled up for recovery or disposal. (CAUTION! Avoid dusting. Avoid contact with the skin.) Control the disposal of the waste solid. (Delay in clean up may allow absorption of moisture from the atmosphere and may increase the difficulties of clean up.) Flush contaminated surfaces with water and neutralize with dilute acid, preferably acetic acid, to remove final traces. (Sodium bicarbonate may also be used to partially neutralize.) Finally, rinse with water.

Disposal of waste is greatly dependent on local conditions and requirements. Pre-emergency plans should be made to meet legal and technical requirements. Waste caustic should never be deliberately discharged directly into sewers or surface waters. (First, convert to neutral salts and dilute well with water.)

SECTION VIII. SPECIAL PROTECTION INFORMATION

Provide adequate ventilation to meet TLV requirements, especially where dusting or misting conditions can exist. Use filter-type respirator for mist and dust protection where needed.

Use chemical safety goggles! A plastic face shield can also be used.

Use rubber gloves, rubber apron or protective clothing, rubber boots where needed to prevent contact with sodium hydroxide, especially when solutions are prepared.

Eye wash fountains and safety showers must be immediately available!

SECTION IX. SPECIAL PRECAUTIONS AND COMMENTS

Workers should not be permitted to handle this material without proper training or to work with it without protective equipment.

Store in well-sealed containers. Avoid handling conditions that may lead to spills and leaks, or to formation of mist or dust.

Wherever this material is stored, unloaded, handled or used abundant water (preferably running water) should be available for emergency use.

Drains for storage or use areas for this material should have retention basins for pH adjustment and dilution of spills and flushings before discharge.

This material is classified as a CORROSIVE by the Department of Transportation.

The pellet form is probably the safest solid form for handling and dispensing.

APPROVALS: MIS, CRD *J. M. V. Kellen*

Industrial Hygiene and Safety *Decker*

MEDICAL REVIEW:

Judgments as to the suitability of information herein for purchaser's purposes are necessarily purchaser's responsibility. Therefore, although reasonable care has been taken in the preparation of such information, General Electric Company extends no warranties, makes no representations and assumes no responsibility as to the accuracy or suitability of such information for application to purchaser's intended purposes or for consequences of its use.



SATISFACTION
ASSURED

SS - CONCENTRATE

Product

CDB

Dallas, Texas 75220

Labor-Saving Chemical Tools for Institution & Industrial Use

DESCRIPTION: SS-CONCENTRATE is a 100% organic formulation representing a completely new approach in one step degreasing and deodorizing. It is noncorrosive and contains no petroleum distillates, organic halides or alkalies. This multipurpose formulation will strip grease and heavy oil deposits from virtually any surface. It will emulsify instantly in water at ambient temperature to penetrate and liquefy many different types of resins and greases.

USE: This is the perfect product for removal of oily films from metal surfaces. Its lingering, fresh, natural citrus scent provides a multiplicity of additional applications, such as unclogging drains and grease traps. It will remove tar, asphalt and bitumen from most hard surfaces.

TECHNICAL DATA

Color	Orange	Activity	100%
Odor	Fresh Citrus	pH (10% aqueous solution)	4-6
Flash Point (c.c.)	140°F	Specific Gravity	0.840
Free Acid	None	Pounds per Gallon	7.00
Free Alkali	None	Diluent	Water

DIRECTIONS: To declog drains, pour 8 ounces of SS-CONCENTRATE directly into drain. Let stand for 1 hour or more. Flush with hot water. For disposals, use the same procedure.

To clean and degrease surfaces, dilute 4 ounces of SS-CONCENTRATE into 1 gallon of warm water. Apply solution generously to surface to be cleaned. Let stand for 5 minutes. Rinse thoroughly.

For odor control, dilute 2 ounces of SS-CONCENTRATE into 1 gallon of cold water. Apply through a sprayer to odor source. SS-CONCENTRATE will immediately leave a fresh citrus scent.

USED IN:

- Sewage Plants
- Service Stations
- Garbage Trucks
- Automotive Plants
- Theatres
- Locker Rooms
- Rest Rooms

USED TO:

- Schools
- Restaurants
- Office Buildings
- Apartments
- Nursing Homes
- Hospitals
- Commissaries
- Degrease Trucks
- Declog Grease Traps
- Remove Printer's Ink
- Remove Tire Marks
- Remove Soap Scum
- De-Tar Vehicles and Loosen Chewing Gum from Carpets and Hard Surfaces (other than plastic)
- Clean Fuel Oil Deposits from Metal Surfaces
- Remove Decals
- Clear Drains
- Remove Adhesive
- Clean Motors
- Clean Equipment

CAUTION: Combustible. Keep away from heat and open flame. Do not take internally. Avoid contact with eyes. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. If irritation persists, seek medical attention. If swallowed, consult a physician immediately. CONTAINS NO PETROLEUM DISTILLATES.

(Continued...OVER)

Save Time and Labor With Crain Chemical Products.
You Can Expect the Best From Crain Chemical Company.
Since 1945

(Patent Applied For)

Tar & Asphalt Removal: To emulsify tar, asphalt, bitumen and asphalt-based plastic cement, apply undiluted to the soiled surface by spraying, mopping or pouring. Allow to stand 2-4 minutes for deep penetration, agitate if necessary. Rinse with water preferably under pressure.

Tire Mark Removal: Apply with mop, sprayer or brush. Allow to stand 1-2 minutes. For best results agitate the area while SS-CONCENTRATE is penetrating. Hose off with water and squeegee or vacuum dry.

Engine & Motor Degreasing: Brush or spray concentrate on surface to be cleaned. Allow 3-5 minutes to soak in. Rinse with hot water or steam off.

Rug & Upholstery Spot Removal: To remove oil and grease, pour SS-CONCENTRATE on sponge or cloth and apply to soiled area. Blot soiled area with sponge or cloth. If spot remains, repeat process. To remove chewing gum, blot SS-CONCENTRATE on gum and let stand for 2 minutes. Use a tongue depressor or the dull edge of a knife to scrape off. It is always best to test SS-CONCENTRATE on an inconspicuous area before applying.

All-Purpose Degreasing: (Concrete floors, grills and hoods, kitchen floors, machinery, etc.) Spray or sponge on, allow to stand 2-4 minutes before rinsing with clear water. SS-CONCENTRATE may be diluted up to 50:1 with water, depending on desired task and applied in the same manner.

Citrus-Scented Odor Control: SPACE SPRAY — Spray mist into air to help control malodors. SURFACE SPRAY — Spray to lightly wet source of malodor.

Tile & Tub Cleaning: Sponge, mop or brush on surface. Let stand 2-3 minutes, agitate and rinse with clear water.

Drain Line Maintainer: SS-CONCENTRATE deodorizes and liquefies grease and scum which cause clogging. Add 3-4 ounces to each drain and let stand 5-10 minutes, then flush with hot water for 2 minutes.

Grease Traps: For traps under 20 feet capacity, pour or pump 5 ounces daily into grease trap. For larger traps add 8-10 ounces daily.

Garbage Trucks & Dumpster Cleaning/Degreasing: Mix 1 gallon of SS-CONCENTRATE to 20 gallons of warm water. Spray the solution on surface to be cleaned or degreased. Let stand for 2-3 minutes. If necessary, agitate with a brush, then hose off with water.

Bumper Sticker & Decal Remover: Pour SS-CONCENTRATE on cloth and apply to area being cleaned. Rub until adhesive is removed.

Drain Declogging: For drains stopped up due to grease accumulations, pour 4 ounces of concentrate directly into drain. Allow to stand 10 minutes, wash down with hot water. If not completely cleared, repeat. Same procedure is used for bathroom sinks and tubs.

Shower & Tub Soap Scum Removal: Ideal for removing soap film incrustation on walls of shower and tub. Apply with sponge, allow to stand 1-2 minutes. Agitate, if necessary, and rinse off.

Remove Stains from Concrete: Remove oil stains from concrete driveways. Pour or spray SS-CONCENTRATE directly on stain. Allow 3-5 minutes to dissolve stain, rinse off.

Pet Odor Control: For indoor use, dilute 1 ounce of SS-CONCENTRATE with 1 gallon of cold water. Apply through a sprayer to odor source. For outdoor use, dilute 2 ounces of SS-CONCENTRATE with 1 gallon of cold water and follow same procedure. Do not use directly on pets.

Removes Stains from Natural Fiber Clothing: To remove oil, grease and food stains from clothing, pour SS-CONCENTRATE on cloth and apply to soiled area. Wash with detergent as usual. If spot remains, repeat process. Always test an inconspicuous area of clothing before applying.

Try SS-CONCENTRATE on these items too...

Scuff Marks	Putty
Kitchen Grease	Duplicator Ink
Rubber Cement	Asphalt
Crayon Marks	Fresh Paint
Spray Adhesive	Waxes, Creosote

December 18, 1988



WORLDWIDE



USA and Canada Other Countries

Material Safety Data Sheet

SULFURIC ACID

PHILLIPS 66 COMPANY
A Subsidiary of Phillips Petroleum Company
Bartlesville, Oklahoma 74004

PHONE NUMBERS
Emergency: (918) 661-3865
Business Hours: (918) 661-3865
After Hours: (918) 661-8118
General MSDS Information: (918) 661-8327

A. Product Identification

Synonyms: Oil of Vitreol
Chemical Name: Sulfuric Acid
Chemical Family: Acid
Chemical Formula: H₂SO₄
CAS Reg. No.: 7664-93-9
Product No.: CC5570

Product and/or Components Entered on EPA's TSCA Inventory: YES

B. Hazardous Components

Ingredients	CAS Number	% By Wt.	OSHA PEL	ACGIH TLV
Sulfuric Acid	7664-93-9	93 (Min)	1 mg/m ³	1 mg/m ³

C. Personal Protection Information

Ventilation: Use adequate ventilation to control exposure below recommended exposure limits. See Recommended Exposure Limits in Health Hazard Data (Section F).

Respiratory Protection: Use NIOSH/MSHA approved full-face, air supplied respiratory protective equipment. Use NIOSH/MSHA approved self-contained breathing apparatus (SCBA) for entry to or escape from unknown atmospheres.

Eye Protection: Full-face shield and chemical goggles for splash protection.

Skin Protection: Rubber gloves. Protective clothing, boots and rubber apron.

NOTE: Personal protection information shown in Section C is based upon general information as to normal uses and conditions. Where special or unusual uses or conditions exist, it is suggested that the expert assistance of an industrial hygienist or other qualified professional be sought.

D. Handling and Storage Precautions

Avoid inhalation and skin and eye contact. Wear protective equipment and/or garments described above if exposure conditions warrant.

Store in cool, dry, well-ventilated area. Provide means of controlling leaks and spills. Avoid contact with materials listed below in Reactivity Data. When diluting acid, add acid to water - never add water to acid.

E. Reactivity Data

Stability: Stable

Conditions to Avoid: Not Applicable

Incompatibility (Materials to Avoid): Oxidizing or reducing materials, metals, combustible materials, and moisture.
Avoid adding water to product.

Hazardous Polymerization: Will Not Occur

Conditions to Avoid: Not Applicable

Hazardous Decomposition Products: Sulfuric acid mist and sulfur oxides.
Hydrogen gas can be generated as a decomposition product and care must be taken not to ignite.

F. Health Hazard Data

Recommended Exposure Limits:

OSHA PEL is 1 mg/m³; ACGIH TLV is 1 mg/m³.

First Aid and Emergency Procedures:

Eye: Hold eyelids apart and irrigate eyes with running water for at least 15 minutes and continue to irrigate until otherwise directed by a physician. Treat for shock as necessary.

Skin: Flood affected area with running water for at least 15 minutes while removing contaminated clothing. Treat for shock as necessary. Seek immediate medical attention.

Inhalation: Immediately remove from exposure. Initiate artificial respiration, cardiopulmonary resuscitation, or treatment for shock as necessary. Administer oxygen as needed. Obtain prompt medical assistance.

Ingestion: If vomitus is bloody, do not attempt to give anything by mouth. Otherwise, immediately rinse the mouth and lips and assist victim in swallowing large amounts of water. Do not induce vomiting or attempt chemical neutralization. Treat for shock as necessary. Obtain prompt medical assistance. May present an aspiration hazard.

G. Physical Data

Appearance: Colorless, Oily Liquid
Odor: Pungent
Boiling Point: 626F (330C)
Vapor Pressure: 0.02 psia (1 mm Hg) at 295F
Vapor Density (Air = 1): >1
Solubility in Water: Complete, generates large amounts of heat
Specific Gravity (H2O = 1): 1.834 at 60/60F
Percent Volatile by Volume: Negligible
Evaporation Rate (Butyl Acetate = 1): <1
Viscosity: Not Established

H. Fire and Explosion Data

Flash Point (Method Used): Not Applicable
Flammable Limits (% by Volume in Air): LEL - Not Applicable
UEL - Not Applicable

Fire Extinguishing Media: Dry chemical, foam or carbon dioxide (CO2)

Special Fire Fighting Procedures: Product is not flammable, but may cause ignition on contact with combustible liquids and solids. Self-contained breathing apparatus and full protective clothing recommended. Water may be used to extinguish burning combustibles, but do not apply directly to acid.

Fire and Explosion Hazards: Can cause ignition on contact with combustibles. Exothermic with water. Sulfur oxides and hydrogen gas may be released as decomposition products.

Acute Effects of Overexposure:

- Eye:** Corrosive, devastating injury resulting in glaucoma, cataracts, extensive damage to cornea and conjunctiva leading to blindness.
- Skin:** Corrosive; can burn and char the skin which can lead to scarring.
- Inhalation:** Irritation of the eyes, nose and respiratory system, coughing; severe overexposure can result in laryngeal, tracheobronchial and even pulmonary edema, bronchoconstriction, laryngeal spasm leading to asphyxiation.
- Ingestion:** Corrosive to tissues; immediate pain when taken into the mouth as well as spasm of the larynx, trachea, and bronchi. Epigastric pain, nausea, vomiting, intense thirst, circulatory collapse, perforation of the trachea or stomach, and death. May be aspirated into the lungs if swallowed resulting in pulmonary edema and chemical pneumonitis.

Subchronic and Chronic Effects of Overexposure:

Chronic conjunctivitis, frequent respiratory infections, emphysema, and digestive disturbances, erosion and/or discoloration of teeth have been reported in persons exposed to sulfuric acid over the course of many years.

Other Health Effects:

No known applicable information.

Health Hazard Categories:

	Animal	Human		Animal	Human
Known Carcinogen	---	---	Toxic		
Suspect Carcinogen	---	---	Corrosive	<u> X </u>	<u> X </u>
Mutagen	---	---	Irritant	---	---
Teratogen	---	---	Target Organ Toxin	<u> X </u>	<u> X </u>
Allergic Sensitizer	---	---	Specify - Lung-Aspiration Hazard		
Highly Toxic	---	---			

N. Additional Comments

This product contains the following chemical or chemicals subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372. (See Section B).

Sulfuric Acid

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NA - Not Applicable NE - Not Established

SECTION V-HEALTH HAZARD DATA

EFFECTS OF OVEREXPOSURE - Conditions to Avoid		THRESHOLD LIMIT VALUE PERMISSIBLE EXPOSURE LIMIT
Mild skin irritation		OTHER LIMIT <input type="checkbox"/> It is recommended that the generalized ACGIH limit be followed TWA 5 mg/m ³ , if sprayed in air.
PRIMARY ROUTES OF ENTRY Ingestion <input checked="" type="checkbox"/> Skin Contact <input type="checkbox"/> Other (Specify)		
EMERGENCY AND FIRST AID PROCEDURES		
Rinse material from eye with warm water; if ingested, do not induce vomiting, call a physician.		

SECTION VI-REACTIVITY DATA

STABILITY	UNSTABLE	CONDITIONS TO AVOID
	STABLE X	Sources of Ignition
INCOMPATIBILITY (Materials to Avoid) Strong oxidizing agents		
HAZARDOUS DECOMPOSITION PRODUCTS: None in normal use		
HAZARDOUS POLYMERIZATION	MAY OCCUR	CONDITIONS TO AVOID
	WILL NOT OCCUR X	None

SECTION VII-SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED	Dike spill - clean up promptly with Oil absorbent - place in impervious container
WASTE DISPOSAL METHOD	Reclaim, incinerate or transport to licensed disposal facility per applicable regulations.

SECTION VIII-SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (Specify type)		Use with adequate ventilation:
VENTILATION	LOCAL EXHAUST (Specify Rate)	SPECIAL
	MECHANICAL (General) (Specify Rate)	OTHER
PROTECTIVE GLOVES (Specify type)	Not required	EYE PROTECTION (Specify type)
OTHER PROTECTIVE EQUIPMENT		Protective eyewear always recommended

SECTION IX-SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE
Store neatly to detect leaks.
SPECIAL PRECAUTIONS
Maintain cleanliness

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Name (Print)	MICHAEL ROUSSEAU DE N
Signature	<i>Michael Rousseau</i>
Title	Environmental Chemist
Date	JANUARY 7, 1986

MATERIAL SAFETY DATA SHEET

Dow Chemical U.S.A.* Midland, MI 48674 Emergency Phone: 517-636-4400

Product Code: 87792

Page: 1

Product Name: TRIETHYLENE GLYCOL - TECHNICAL

Effective Date: 06/08/90 Date Printed: 06/27/90

MSDS:000271

1. INGREDIENTS: (% w/w, unless otherwise noted)

Triethylene glycol CAS# 000112-27-6 99%

This document is prepared pursuant to the OSHA Hazard Communication Standard (29 CFR 1910.1200). In addition, other substances not 'Hazardous' per this OSHA Standard may be listed. Where proprietary ingredient shows, the identity may be made available as provided in this standard.

2. PHYSICAL DATA:

BOILING POINT: 545.9F; 286C
VAP PRESS: < 1.0 mmHg @ 20C
VAP DENSITY: 5.18
SOL. IN WATER: Completely miscible
SP. GRAVITY: 1.1 @ 25/25C
APPEARANCE: Colorless liquid.
ODOR: Mild odor.

3. FIRE AND EXPLOSION HAZARD DATA:

FLASH POINT: 350F; 177C
METHOD USED: PMCC

FLAMMABLE LIMITS

LFL: 0.9%
UFL: 9.2%

EXTINGUISHING MEDIA: Water fog, alcohol resistant foam, CO2, dry chemical.

FIRE & EXPLOSION HAZARDS: Not available.

FIRE-FIGHTING EQUIPMENT: Wear positive pressure self-contained

(Continued on Page 2)

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MATERIAL SAFETY DATA SHEET

Dow Chemical U.S.A.* Midland, MI 48674 Emergency Phone: 517-636-4400

Product Code: 87792

Page: 2

Product Name: TRIETHYLENE GLYCOL - TECHNICAL

Effective Date: 06/08/90 Date Printed: 06/27/90

MSDS:000271

3. FIRE AND EXPLOSION HAZARD DATA: (CONTINUED)

breathing apparatus.

4. REACTIVITY DATA:

STABILITY: (CONDITIONS TO AVOID) Will ignite in air at 700F.

INCOMPATIBILITY: (SPECIFIC MATERIALS TO AVOID) Oxidizing material.

HAZARDOUS DECOMPOSITION PRODUCTS: Burning produces normal products of combustion, including carbon monoxide, carbon dioxide, and water.

HAZARDOUS POLYMERIZATION: Will not occur.

5. ENVIRONMENTAL AND DISPOSAL INFORMATION:

ACTION TO TAKE FOR SPILLS/LEAKS: Small spills: Soak up with absorbent material and collect for disposal. Large spills: dike to prevent contamination of waterways, then pump into suitable containers for disposal.

DISPOSAL METHOD: Burn in an approved incinerator in accordance with all local, state, and federal laws and regulations.

6. HEALTH HAZARD DATA:

EYE: Essentially nonirritating to eyes.

SKIN CONTACT: Prolonged or repeated exposure may cause skin irritation. May cause more severe response if skin is abraded (scratched or cut).

SKIN ABSORPTION: A single prolonged exposure is not likely to result in the material being absorbed through skin in harmful

(Continued on Page 3)

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MATERIAL SAFETY DATA SHEET

Dow Chemical U.S.A.* Midland, MI 48674 Emergency Phone: 517-636-4400

Product Code: 87792

Page: 3

Product Name: TRIETHYLENE GLYCOL - TECHNICAL

Effective Date: 06/08/90 Date Printed: 06/27/90

MSDS:000271

6. HEALTH HAZARD DATA: (CONTINUED)

amounts. The dermal LD50 has not been determined.

INGESTION: Single dose oral toxicity is low. The oral LD50 for rats is 16,800-22,060 mg/kg.

INHALATION: No adverse effects are anticipated from inhalation.

SYSTEMIC & OTHER EFFECTS: Based on available data, repeated exposures are not anticipated to cause any significant adverse effects. Did not cause cancer in long-term animal studies. Birth defects are unlikely. Exposures having no adverse effects on the mother should have no effect on the fetus. In animal studies, has been shown not to interfere with reproduction.

7. FIRST AID:

EYES: Irrigate immediately with water for at least five minutes.

SKIN: Wash off in flowing water or shower.

INGESTION: Induce vomiting if large amounts are ingested. Consult medical personnel.

INHALATION: Remove to fresh air if effects occur. Call a physician.

NOTE TO PHYSICIAN: No specific antidote. Supportive care. Treatment based on judgment of the physician in response to the patient.

8. HANDLING PRECAUTIONS:

EXPOSURE GUIDELINE: AIHA WEEL is 10 mg/m³ for polyethylene glycols.

VENTILATION: Provide general and/or local exhaust ventilation to

(Continued on Page 4)

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MATERIAL SAFETY DATA SHEET

Dow Chemical U.S.A.* Midland, MI 48674 Emergency Phone: 517-636-4400

Product Code: 87792

Page: 4

Product Name: TRIETHYLENE GLYCOL - TECHNICAL

Effective Date: 06/08/90 Date Printed: 06/27/90

MSDS:000271

8. HANDLING PRECAUTIONS: (CONTINUED)

control airborne levels below the exposure guidelines.

RESPIRATORY PROTECTION: Atmospheric levels should be maintained below the exposure guideline. When respiratory protection is required for certain operations, use an approved air-purifying respirator. In misty atmospheres, use an approved mist respirator.

SKIN PROTECTION: For brief contact, no precautions other than clean body-covering clothing should be needed. When prolonged or frequently repeated contact could occur, use protective clothing impervious to this material. Selection of specific items such as gloves, boots, apron or full-body suit will depend on operation. If hands are cut or scratched, use impervious gloves even for brief exposures.

EYE PROTECTION: Use safety glasses.

9. ADDITIONAL INFORMATION:

SPECIAL PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE:
Practice reasonable care to avoid exposure.

Trace quantities of ethylene oxide (EO) may be present in this product. While these trace quantities could accumulate in headspace areas of storage and transport vessels, they are not expected to create a condition which will result in EO concentrations greater than 0.5 ppm (8 hour TWA) in the breathing zone of the workplace for appropriate applications. OSHA has established a permissible exposure limit of 1.0 ppm 8 hr TWA for EO. (Code of Federal Regulations Part 1910.1047 of Title 29).

MSDS STATUS: Revised section 9 and regsheet.

(Continued on Page 5)

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MATERIAL SAFETY DATA SHEET

Dow Chemical U.S.A.* Midland, MI 48674 Emergency Phone: 517-636-4400

Product Code: 87792

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Product Name: TRIETHYLENE GLYCOL - TECHNICAL

Effective Date: 06/08/90 Date Printed: 06/27/90

MSDS:000271

REGULATION INFORMATION: (Not meant to be all-inclusive--selected regulations represented.)

NOTICE: The information herein is presented in good faith and believed to be accurate as of the effective date shown above. However, no warranty, express or implied, is given. Regulatory requirements are subject to change and may differ from one location to another; it is the buyer's responsibility to ensure that its activities comply with federal, state or provincial, and local laws. The following specific information is made for the purpose of complying with numerous federal, state or provincial, and local laws and regulations. See MSD Sheet for health and safety information.

SARA HAZARD CATEGORY: This product has been reviewed according to the EPA "Hazard Categories" promulgated under Sections 311 and 312 of the Superfund Amendment and Reauthorization Act of 1986 (SARA Title III) and

is considered, under applicable definitions, to meet the following categories:

Not to have met any hazard category

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For Further Information.

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**UNICHEM
INTERNATIONAL****DESCRIPTION**

UNICHEM 1000 is an organic dispersant designed to be utilized with a biocide treatment program.

UNICHEM 1000 will loosen and disperse dead slime and/or algae deposits for easy removal of blowdown in a cooling water recirculating system. This dispersant action will allow better contact between the biocide and the bacteria or algae.

APPLICATION

UNICHEM 1000 is normally used between 20-100 ppm depending on the severity of foulant present in the system. UNICHEM 1000 normally should be added to the system after biocide treatment or between biocide additions in heavily fouled systems.

TYPICAL PROPERTIES

Appearance	Brown liquid
Density	7.10 lbs/gal
Freeze Point	-20°F
Flash Point (TCC)	60°F

HANDLING

Do not expose this product to open flame or extreme heat. Avoid contact with eyes, skin, or clothing. In case of eye contact, flush with water for at least fifteen minutes. Seek medical help if irritation persists. For skin contact, flush with water and wash thoroughly with soap and water. Remove contaminated clothing and wash before reuse. Avoid breathing fumes or vapors.

Refer to the material safety data sheet for more information regarding the safe use and handling of this product.

PACKAGING

UNICHEM 1000 is normally sold in 55 gallon drums or in bulk quantities.

Product Name: UNICHEM 1000

Section: 01 PRODUCT IDENTIFICATION

UNICHEM INTERNATIONAL INC.	Emergency Telephone	505-393-7751
P.O. BOX 1499	Previous Version Date	5/22/86
707 N. LEECH	Date Prepared	2/10/91
HOBBS	Version: 0000001	
NM	88241-1499	

Product Name: UNICHEM 1000

Chemical Description:
Proprietary dispersant

Section: 02 HAZARDOUS INGREDIENTS

<u>Component Name</u>	<u>CAS#</u>	<u>% Range</u>
isopropyl alcohol	00067-63-0	< 55%

Section: 03 PHYSICAL DATA

Freezing Point: - 20 Deg.F. Boiling Point, 760 mm Hg: init 180 Deg.F
Specific Gravity(H2O=1) : .852 Solubility in water: Soluble
Appearance and Odor: Tan to brown liquid; slight ammonia odor.

Section: 04 FIRE AND EXPLOSION HAZARD DATA

Flash Point (Test Method): 60 Deg.F TCC

Extinguishing Media

CO2, dry chemical, water spray or fog, or foam. Use water to keep containers cool. Isolate "fuel" supply from fire. Contain fire fighting liquids for proper disposal.

Special Fire Fighting Procedures

Do not enter confined fire space without proper personal protective equipment including NIOSH approved self-contained breathing apparatus with full facepiece operated in the positive pressure demand mode. Do not inject a solid stream of water or foam into hot, burning pools; this may cause splattering and increase fire intensity.

Unusual Fire and Explosion Hazards

Treat as an extremely flammable liquid. This material is highly volatile and readily gives off vapors which may travel along the ground or be moved by ventilation and ignited by pilot lights, other flames, sparks, heaters, smoking, electrical motors, static discharge, or other ignition sources at locations distant from material handling point. Never use welding or cutting torch on or near drum (even empty) because product (even just residue) can ignite

Product Name: UNICHEM 1000

Section: 04 FIRE AND EXPLOSION HAZARD DATA CONTINUED

explosively. Containers may explode from internal pressure if confined to fire. Keep containers cool. Keep unnecessary people away.

Section: 05 HEALTH HAZARD DATA

Effects of Overexposure

Eye Contact: the liquid is irritating to the eyes and produces intense stinging and burning. May cause eye damage.

Skin Contact: repeated or prolonged contact with the skin may cause irritation and dermatitis.

Inhalation: vapors may cause mild irritation of the eyes, nose, and throat. Prolonged exposures may cause nausea, headache, and mild narcosis.

Ingestion: will cause burning of the gastrointestinal tract, nausea, vomiting, bleeding, CNS depression, hemolysis, and pulmonary damage. May cause serious injury and can be fatal.

Emergency and First Aid Procedures

SKIN

Wash with soap and water. Remove contaminated clothing and launder contaminated clothing before reuse. Get medical attention if redness or irritation develops.

EYES

Flush eyes immediately with large amounts of water for at least 15 minutes. Lift lower and upper lids occasionally. Get medical attention.

INHALATION

Remove victim to fresh air. Give artificial respiration if not breathing. If breathing is difficult, administer oxygen. Keep person warm, quiet and get medical attention.

INGESTION

Call a physician immediately. Give victim a glass of water. Do NOT induce vomiting unless instructed by a physician or poison control center. Never give anything by mouth to an unconscious person.

Section: 06 REACTIVITY DATA

Stable (Y=Yes/N=No): Y

Stability -- Conditions to Avoid

None known.

Product Name: UNICHEM 1000

Section: 06 REACTIVITY DATA

CONTINUED

Incompatibility (Materials to Avoid)

Avoid contact with strong oxidizing agents, strong alkalies, and strong mineral acids.

Hazardous Decomposition Products

Thermal decomposition or combustion may produce smoke, carbon monoxide and carbon dioxide.

Hazardous Polymerization May Occur (Y=Yes/N=No): N

Hazardous Polymerization -- Conditions to Avoid

None

Section: 07 SPILL OR LEAK PROCEDURES

Steps to be Taken if Material is Released or Spilled

Eliminate sources of ignition. Persons not wearing suitable personal protective equipment should be excluded from area of spill until clean-up has been completed. Shut off source of spill if possible to do so without hazard. Prevent liquid from entering sewers or watercourses. Provide adequate ventilation. Contain spilled liquid with sand or earth. Recover undamaged and minimally contaminated material for reuse or reclamation. Place all collected material and spill absorbents into DOT approved containers.

Advise authorities. If this product is an EPA hazardous substance (see Section 10), notify the U.S. EPA or the National Response Center. Additional notification pursuant to SARA Section 302/304 (40 CFR 355) may also be required.

Waste Disposal Method

Treatment, storage, transportation and disposal must be in accordance with EPA or State regulations under authority of the Resource Conservation and Recovery Act (40 CFR 260-271).

Section: 08 SPECIAL PROTECTIVE INFORMATION

Respiratory Protection

If workplace exposure limit(s) of product or any component is exceeded, an NIOSH/MSHA approved air supplied respirator is advised in absence of proper environmental control. OSHA regulations also permit other NIOSH/MSHA respirators (negative pressure organic vapor type) under specified conditions. Engineering or administrative controls should be implemented to reduce exposure.

Ventilation

The use of mechanical dilution ventilation is recommended whenever this product is used in confined spaces, is heated above ambient temperatures or is agitated. When applicable,

Product Name: UNICHEM 1000

Section: 08 SPECIAL PROTECTIVE INFORMATION CONTINUED

sufficient local ventilation should be provided to maintain employee exposures below safe working limits (TWA's).

Protective Gloves

Neoprene, nitrile, polyvinyl alcohol (PVA), polyvinyl chloride (PVC)

Eye Protection

Chemical splash goggles or face shield in compliance with OSHA regulations is advised; however OSHA regulations also permits safety glasses under certain conditions. The use of contact lenses is not recommended.

Other Protective Equipment

Eye wash and safety shower

Section: 09 SPECIAL PRECAUTIONS

Precautions to be Taken in Handling and Storing

Avoid contact with eyes, skin or clothing. Avoid breathing vapors or mist. Keep away from heat, sparks, and open flames and never use a cutting torch on or near container (even empty) or explosion may result.

Other Precautions

Containers of this material may be hazardous when emptied. Since emptied containers retain product residues (vapor, liquid, and/or solid), all hazard precautions given in the data sheet must be observed. Do not transfer to improperly marked container. Do not use pressure to empty container. Do not cut, heat, weld, or expose containers to flame or other sources of ignition. Keep container closed. Use with adequate ventilation. Wash thoroughly after handling.

Section: 10 REGULATORY INFORMATION

Superfund Amendments and Reauthorization Act Of 1986(SARA) Title III

Section 302/304-Extremely Hazardous Substances (40 CFR 355)

SARA requires emergency planning based on Threshold Planning Quantities (TPQs) and release reporting based on Reportable Quantities (RQs) in 40 CFR 355 (used for SARA 302, 304, 311 and 312). These values are subject to change and the regulations should be consulted to verify current statutory requirements.

Components present in this product at a level which could require reporting under the statute are:

<u>Component Name</u>	<u>RQ</u>	<u>TPQ</u>	<u>% Range</u>
NONE			

Product Name: UNICHEM 1000

Section: 10 REGULATORY INFORMATION

CONTINUED

Section 311/312 Chemical Inventory Reporting Requirements (40 CFR 370)

The Superfund Amendments and Reauthorization Act (SARA) may require submission of reports (chemical list, MSDS, Tier I & Tier II) to the State Emergency Response Commission, Local Emergency Response Committee and the local fire department. The SARA physical and health hazards related to this product are:

Acute Health Hazard Sudden Release of Pressure Fire
 Chronic Health Hazard Reactive

Section 313-List of Toxic Chemicals (40 CFR 372)

This product contains the following toxic chemicals subject to the reporting requirements of Section 313 of the Emergency Planning and Community Right-to-Know Act of 1986 (40 CFR 372). This information should be included in all MSDSs that are copied and distributed for this material.

<u>Component Name</u>	<u>CAS #</u>	<u>% Range</u>
NONE		

CERCLA, 40 CFR 261 AND 302

The Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) requires notification of the National Response Center 1-800-424-8802 of any release of a Hazardous Substances equal to or greater than the reportable quantities (RQs) listed in 40CFR 302.4. Values are given in pounds for the component and not the mixture, if applicable. (These values are subject to change and the regulations should be consulted to verify current statutory levels.)

<u>Component Name</u>	<u>CAS #</u>	<u>CERCLA RQ</u>
NONE		

OSHA Exposure Limits

Component Name

isopropyl alcohol

TWA ppm: 400.0 TWA MG/M3: 980.0 STEL ppm: 500.0 STEL MG/M3: 1225.0

National Fire Protection Agency

2 Health 3 Fire
0 Reactive _____ Other

Department of Transportation Shipping Information

Proper Shipping Name: Flammable liquid, n.o.s.

Hazard Class: Flammable liquid Identification: UN 1993

This product contains: isopropyl alcohol

Hazardous Substance RQ: *NONE* Emergency Response Guide Number: 27
Labels: Flammable liquid

Toxic Substances Control Act (TSCA), 40 CFR 261

This product (or components if product is a mixture) is in

Product Name: UNICHEM 1000

Section: 10 REGULATORY INFORMATION

CONTINUED

compliance with TSCA.
--

Section 10 information is to remain attached to the material safety data sheet for this product.
--

While UNICHEM INTERNATIONAL believes that the above data is correct, UNICHEM INTERNATIONAL expressly disclaims liability for any loss or injury arising out of the use of this information or the use of any materials designated.



**UNICHEM
INTERNATIONAL**

UNICHEM 1300

PRODUCT BULLETIN

DESCRIPTION:

UNICHEM 1300 is an organic scale and corrosion inhibitor and dispersant for use in cooling tower recirculating water systems. UNICHEM 1300 contains specific compounds proportioned for scale and corrosion inhibition. UNICHEM 1300 is a highly effective anti-precipitant for calcium phosphate, calcium carbonate, and calcium sulfate. In addition, it contains tolyltriazole for copper and copper alloy corrosion inhibitions. UNICHEM 1300 additionally inhibits iron deposition at inhibition percentages approaching 100%. It is an excellent dispersant for particulate matter such as mud, silt and dead bacteria (slime) commonly found in cooling water systems.

APPLICATION:

UNICHEM 1300 should be fed to the system continuously. The amount of UNICHEM 1300 normally used should be 80 to 140 ppm. The amount of UNICHEM 1300 fed to the system is normally controlled by an orthophosphate residual of 8 to 16 ppm. The total phosphate residual should be maintained at 10 to 18 ppm.

PROPERTIES:

Appearance:	Clear Amber
Form:	Liquid
Density:	11.2 pounds/gallon
Freeze Point:	0°F
Flash Point:	None

HANDLING:

UNICHEM 1300 is low in toxicity; however, due care should be exercised in the handling of any water treatment compound in its concentrated form. If spilled, wash thoroughly with copious quantities of water. If irritation persists, contact a physician.

PACKAGING:

UNICHEM 1300 is available in 55 gallon drums or bulk quantities.



**UNICHEM
INTERNATIONAL**

MATERIAL SAFETY DATA SHEET

Date Prepared 05/22/86

Supersedes Previous Sheet Dated 10/31/85

I. PRODUCT IDENTIFICATION

Unichem International 707 N. Leech/P. O. Box 1499/Hobbs, New Mexico 88240
EMERGENCY TELEPHONE NUMBER (505) 393-7751

Trade Name UNICHEM 1300

Chemical Description

Proprietary Scale and Corrosion Inhibitor Blend

II. HAZARDOUS INGREDIENTS

Material

Potassium Hydroxide CAS# 1310-58-3
Proprietary Corrosion Inhibitor
Proprietary Corrosion/Scale Inhibitors

TLV (Units)

2 mg/m³
10 mg/m³
Not Established

Neither this product nor its ingredients are listed in any of OSHA Standard, Section 1910.1200 sources as carcinogenic.

III. PHYSICAL DATA

Boiling Point, 760 mm Hg	212°F	Freezing Point	0°F
Specific Gravity (H ₂ O=1)	1.3 g/ml	Solubility in Water	Complete

Appearance and Odor Amber, Clear Liquid; Slight Sweet Odor

IV. FIRE AND EXPLOSION HAZARD DATA

Flash Point (Test Method) None

Extinguishing Media Carbon Dioxide, Dry Chemical, Water Spray or Fog, Foam. Use a water spray to cool fire-exposed containers.

Special Fire Fighting Procedures Firefighters should wear self-contained breathing apparatus and full protective clothing. Firefighters should be made aware of the corrosive nature of this chemical.

Unusual Fire and Explosion Hazards None

Liability is expressly disclaimed for any loss or injury arising out of the use of this information or the use of any materials designated.

V. HEALTH HAZARD DATA

Threshold Limit Value Not Determined

Effects of Overexposure Contact will cause burns to the skin and severe damage to the eyes. Inhalation of vapors or mists will irritate the entire respiratory tract. Ingestion will cause irritation and burning of the digestive tract.

Emergency and First Aid Procedures Eyes: Flush promptly with copious quantities of water for at least fifteen minutes. Seek medical attention. Skin: Flush area with water. Wash with soap and remove contaminated clothing. Inhalation: Remove to fresh air. Apply artificial respiration if necessary. Ingestion: Call a physician. Do not induce vomiting. Dilute with water or milk.

VI. REACTIVITY DATA

Stability	Stable <input checked="" type="checkbox"/>	Conditions to Avoid	None
	Unstable		

Incompatibility (Materials to Avoid) Strongly acidic materials, oxidizers.

Hazardous Decomposition of Products Oxides of Carbon and Nitrogen

Hazardous Polymerization	May Occur	Conditions to Avoid	None
	Will Not Occur <input checked="" type="checkbox"/>		

VII. SPILL OR LEAK PROCEDURES

Steps to be Taken if Material is Released or Spilled Provide adequate ventilation. Remove sources of ignition. Contain and absorb spill.

Waste Disposal Method Dispose via a licensed waste disposal company. Follow local, state, and federal regulations.

VIII. SPECIAL PROTECTION INFORMATION

Respiratory Protection (Specify Type) Use air-supplied or self-contained breathing apparatus if exposure levels exceed TLV for this product or its ingredients.

Ventilation	Local Exhaust	As needed to prevent accumulation of vapors above TLV	Special	None
	Mechanical (General)		Other	None

Protective Gloves Rubber **Eye Protection** Safety Glasses, Goggles, and/or Face Shield

Other Protective Equipment Overalls, Rubber Boots, Eyewash Stations, Safety Showers

IX. SPECIAL PRECAUTIONS

Precautions to be Taken in Handling and Storing Store in cool, well-ventilated, low fire-risk area away from ignition sources and incompatible materials. Keep containers closed when not in use. Do not transfer or store in improperly marked containers.

Other Precautions Avoid prolonged or repeated breathing of vapors or contact with skin. Do not ingest.

UNICHEM 1700 is an organic scale and corrosion inhibitor for use in recirculating cooling tower systems. UNICHEM 1700 is a highly effective anti-precipitant for calcium phosphate, calcium carbonate and calcium sulfate. In addition, UNICHEM 1700 is an excellent dispersant for particulate matter such as mud, silt, and dead bacteria (slime) commonly found in cooling water systems.

UNICHEM 1700 additionally inhibits iron deposition (transports iron) at inhibition percentages approaching 100%.

UNICHEM 1700 is extremely stable even under conditions of high temperature and pH. After heating for four hours at a pH of 12 and 400° F, the antiprecipitant activity of UNICHEM 1700 is still excellent. Other comparative polymers and copolymers are relatively ineffective after exposure to the same conditions as a result of hydrolysis.

UNICHEM 1700 should be fed continuously to the cooling tower recirculating water. The amount of UNICHEM 1700 required normally is approximately 50 ppm.

Appearance:	Water white clear
Form:	Liquid
Density:	9.1 lbs/gal
pH:	1.6
Pour Point:	Below - 10°F
Flash Point:	None

UNICHEM 1700 is low in toxicity; however, due care should be exercised in the handling of any water treatment compound in its concentrated form. If spilled, wash thoroughly with copious quantities of water. If irritation persists, contact a physician.

UNICHEM 1700 is available in 55 gallon drums or in bulk quantities.



MATERIAL SAFETY DATA SHEET

Date Prepared 05/22/86

Supersedes Previous Sheet Dated 02/26/85

I. PRODUCT IDENTIFICATION

Unichem International 707 N. Leech/P. O. Box 1499/Hobbs, New Mexico 88240
EMERGENCY TELEPHONE NUMBER (505) 393-7751

Trade Name UNICHEM 1700+

Chemical Description Proprietary Scale Inhibitor and Dispersant

II. HAZARDOUS INGREDIENTS

Material

TLV (Units)

Proprietary Scale/Corrosion Inhibitor (Acid, Corrosive)

None Established

Neither this product nor its ingredients are listed in any of OSHA Standard, Section 1910.1200 sources as carcinogenic.

III. PHYSICAL DATA

Boiling Point, 760 mm Hg	212°F	Freezing Point	-10°F
Specific Gravity (H ₂ O=1)	1.1 g/ml	Solubility in Water	Complete

Appearance and Odor Water White Clear; Slight Odor

IV. FIRE AND EXPLOSION HAZARD DATA

Flash Point (Test Method) None

Extinguishing Media Carbon Dioxide, Dry Chemical, Water Spray or Fog, Foam. Use a water spray to cool fire-exposed containers.

Special Fire Fighting Procedures Firefighters should wear self-contained breathing apparatus and full protective clothing. Firefighters should be made aware of the corrosive nature of this chemical.

Unusual Fire and Explosion Hazards None

Liability is expressly disclaimed for any loss or injury arising out of the use of this information or the use of any materials designated.



V. HEALTH HAZARD DATA

Threshold Limit Value Not Determined

Effects of Overexposure Contact will cause burns to the skin and severe damage to the eyes. Inhalation of vapors or mists will irritate the entire respiratory tract. Ingestion will cause irritation and burning of the digestive tract.

Emergency and First Aid Procedures Eyes: Flush promptly with copious quantities of water for at least fifteen minutes. Seek medical attention. Skin: Flush area with water. Wash with soap and remove contaminated clothing. Inhalation: Remove to fresh air. Apply artificial respiration if necessary. Ingestion: Call a physician. Do not induce vomiting. Dilute with water or milk.

VI. REACTIVITY DATA

Stability	Stable	X	Conditions to Avoid	None
	Unstable			

Incompatibility (Materials to Avoid) Highly Alkaline Materials, Oxidizers

Hazardous Decomposition of Products Oxides of Carbon and Nitrogen

Hazardous Polymerization	May Occur		Conditions to Avoid	None
	Will Not Occur	X		

VII. SPILL OR LEAK PROCEDURES

Steps to be Taken if Material is Released or Spilled Provide adequate ventilation. Remove sources of ignition. Contain and absorb spill.

Waste Disposal Method Dispose via a licensed waste disposal company. Follow local, state, and federal regulations.

VIII. SPECIAL PROTECTION INFORMATION

Respiratory Protection (Specify Type) Use air-supplied or self-contained breathing apparatus if exposure levels exceed TLV for this product or its ingredients.

Ventilation	Local Exhaust	As needed to prevent accumulation of	Special	None
	Mechanical (General)	vapors above TLV	Other	None

Protective Gloves Rubber **Eye Protection** Safety Glasses, Goggles, and/or Face Shield

Other Protective Equipment Overalls, Rubber Boots, Eyewash Stations, Safety Showers

IX. SPECIAL PRECAUTIONS

Precautions to be Taken in Handling and Storing Store in cool, well-ventilated, low fire-risk area away from ignition sources and incompatible materials. Keep containers closed when not in use. Do not transfer or store in improperly marked containers.

Other Precautions Avoid prolonged or repeated breathing of vapors or contact with skin. Do not ingest.


**UNICHEM
INTERNATIONAL**
DESCRIPTION

UNICHEM 1705 is a scale and corrosion inhibitor for use in open recirculating cooling water systems. UNICHEM 1705 is a highly effective antiprecipitant for calcium phosphate, calcium and magnesium carbonate and calcium sulfate. In addition, UNICHEM 1705 is an excellent dispersant for particulates, such as mud, silt and biomass. UNICHEM 1705 is stable even under conditions of high temperature and pH. UNICHEM 1705 contains specific corrosion inhibitors for copper alloys.

UNICHEM 1705 is designed to be used in alkaline cooling water systems. UNICHEM 1705 contains a small amount of ortho phosphate. This primarily provides a convenient way to monitor the level of UNICHEM 1705 in the recirculating water.

APPLICATION

UNICHEM 1705 should be injected continuously into the cooling water system at a rate sufficient to maintain 80 to 120 ppm in the recirculating water. The rate of addition can be controlled by maintaining an ortho phosphate residual of 3 to 4 ppm in the recirculating water.

TYPICAL PROPERTIES

Appearance	Amber Clear Liquid
Density	10.5 lbs/gal
Freeze Point	25°F
Flash Point (TCC).....	None

HANDLING

UNICHEM 1705 is an alkaline compound. Avoid contact with eyes, skin, and clothing by wearing the proper safety equipment including eye protection, rubber gloves, and protective clothing. In case of eye contact, flush thoroughly with water for at least fifteen minutes. Consult a physician. For skin contact, rinse with copious quantities of water and wash with soap. Remove contaminated clothing and wash thoroughly. Seek medical attention if irritation persists. Avoid breathing vapors or fumes.

Refer to the material safety data sheet for more information regarding the safe use and handling of this product.

PACKAGING

UNICHEM 1705 is available in 55 gallon drums or in bulk quantities.



MATERIAL SAFETY DATA SHEET

Date Prepared 09/22/89

Supersedes Previous Sheet Dated None

I. PRODUCT IDENTIFICATION

Unichem International 707 N. Leech/P. O. Box 1499/Hobbs, New Mexico 88240
EMERGENCY TELEPHONE NUMBER (505) 393-7751

Trade Name UNICHEM 1705

Chemical Description

Proprietary Scale and Corrosion Inhibitor Blend

II. HAZARDOUS INGREDIENTS

Material

Potassium Hydroxide CAS# 1310-58-3 (11.25%)
Proprietary Corrosion Inhibitor
Proprietary Corrosion/Scale Inhibitors

TLV (Units)

2 mg/m³
10 mg/m³
Not Established

Neither this product nor its ingredients are listed in any of OSHA Standard, Section 1910.1200 sources as carcinogenic.

SARA Hazard Category Acute Health Hazard

III. PHYSICAL DATA

Boiling Point, 760 mm Hg	212°F	Freezing Point	25°F
Specific Gravity (H ₂ O=1)	1.3 g/ml	Solubility in Water	Complete

Appearance and Odor Amber, Clear Liquid; Slight Sweet Odor

IV. FIRE AND EXPLOSION HAZARD DATA

Flash Point (Test Method) None

Extinguishing Media Carbon Dioxide, Dry Chemical, Water Spray or Fog, Foam. Use a water spray to cool fire-exposed containers.

Special Fire Fighting Procedures Firefighters should wear self-contained breathing apparatus and full protective clothing. Firefighters should be made aware of the corrosive nature of this chemical.

Unusual Fire and Explosion Hazards None

Liability is expressly disclaimed for any loss or injury arising out of the use of this information or the use of any materials designated.

V. HEALTH HAZARD DATA

Threshold Limit Value Not Determined

Effects of Overexposure Contact will cause burns to the skin and severe damage to the eyes. Inhalation of vapors or mists will irritate the entire respiratory tract. Ingestion will cause irritation and burning of the digestive tract.

Emergency and First Aid Procedures Eyes: Flush promptly with copious quantities of water for at least fifteen minutes. Seek medical attention. Skins: Flush area with water. Wash with soap and remove contaminated clothing. Inhalation: Remove to fresh air. Apply artificial respiration if necessary. Ingestion: Call a physician. Do not induce vomiting. Dilute with water or milk.

VI. REACTIVITY DATA

Stability	Stable <input checked="" type="checkbox"/>	Conditions to Avoid	None
	Unstable		

Incompatibility (Materials to Avoid) Strongly acidic materials, oxidizers.

Hazardous Decomposition of Products Oxides of Carbon and Nitrogen

Hazardous Polymerization	May Occur	Conditions to Avoid	None
	Will Not Occur <input checked="" type="checkbox"/>		

VII. SPILL OR LEAK PROCEDURES

Steps to be Taken if Material is Released or Spilled Provide adequate ventilation. Remove sources of ignition. Contain and absorb spill.

CERCLA RQ: 8889 lbs of product (due to potassium hydroxide content)

Waste Disposal Method Dispose via a licensed waste disposal company. Follow local, state, and federal regulations.

VIII. SPECIAL PROTECTION INFORMATION

Respiratory Protection (Specify Type) Use air-supplied or self-contained breathing apparatus if exposure levels exceed TLV for this product or its ingredients.

Ventilation	Local Exhaust	As needed to prevent accumulation of vapors above TLV	Special	None
	Mechanical (General)		Other	None

Protective Gloves Rubber **Eye Protection** Safety Glasses, Goggles, and/or Face Shield

Other Protective Equipment Overalls, Rubber Boots, Eyewash Stations, Safety Showers

IX. SPECIAL PRECAUTIONS

Precautions to be Taken in Handling and Storing Store in cool, well-ventilated, low fire-risk area away from ignition sources and incompatible materials. Keep containers closed when not in use. Do not transfer or store in improperly marked containers.

Other Precautions Avoid prolonged or repeated breathing of vapors or contact with skin. Do not ingest.



MATERIAL SAFETY DATA SHEET

Date Prepared 07/06/87

Supersedes Previous Sheet Dated None

I. PRODUCT IDENTIFICATION

Unichem International 707 N. Leech/P. O. Box 1499/Hobbs, New Mexico 88240
EMERGENCY TELEPHONE NUMBER (505) 393-7751

Trade Name UNICHEM 2100

Chemical Description Proprietary Cooling Water Corrosion and Scale Inhibitor

II. HAZARDOUS INGREDIENTS

Material

TLV (Units)

Potassium Hydroxide CAS# 1310-58-3

2 mg/m³

Neither this product nor its ingredients are listed in any of OSHA Standard, Section 1910.1200 sources as carcinogenic.

III. PHYSICAL DATA

Boiling Point, 760 mm Hg	212°F (Initial)	Freezing Point	5°F
Specific Gravity (H ₂ O=1)	1.06 g/ml	Solubility in Water	Complete

Appearance and Odor Straw Yellow Clear Liquid; Slightly Sweet Odor

IV. FIRE AND EXPLOSION HAZARD DATA

Flash Point (Test Method) None

Extinguishing Media Carbon Dioxide, Dry Chemical, Water Spray or Fog, Foam. Use a water spray to cool fire-exposed containers.

Special Fire Fighting Procedures Firefighters should wear self-contained breathing apparatus and full protective clothing. Firefighters should be made aware of the corrosive nature of this chemical.

Unusual Fire and Explosion Hazards None

Liability is expressly disclaimed for any loss or injury arising out of the use of this information or the use of any materials designated:



V. HEALTH HAZARD DATA

Threshold Limit Value Not Determined

Effects of Overexposure Contact will cause burns to the skin and severe damage to the eyes. Inhalation of vapors or mists will irritate the entire respiratory tract. Ingestion will cause irritation and burning of the digestive tract.

Emergency and First Aid Procedures EYES: Flush promptly with copious quantities of water for at least fifteen minutes. Seek medical attention. SKIN: Flush area with water. Wash with soap and remove contaminated clothing. INHALATION: Remove to fresh air. Apply artificial respiration if necessary. INGESTION: Call a physician. Do not induce vomiting. Dilute with water or milk.

VI. REACTIVITY DATA

Stability	Stable <input checked="" type="checkbox"/>	Conditions to Avoid None
	Unstable	

Incompatibility (Materials to Avoid) Strongly Acidic Materials; Oxidizers

Hazardous Decomposition of Products Oxides of Carbon and Nitrogen

Hazardous Polymerization	May Occur	Conditions to Avoid None
	Will Not Occur <input checked="" type="checkbox"/>	

VII. SPILL OR LEAK PROCEDURES

Steps to be Taken if Material is Released or Spilled Provide adequate ventilation. Remove sources of ignition. Contain and absorb spill.

Waste Disposal Method Dispose via a licensed waste disposal company. Follow local, state, and federal regulations.

VIII. SPECIAL PROTECTION INFORMATION

Respiratory Protection (Specify Type) Use air-supplied or self-contained breathing apparatus if exposure levels exceeds TLV for this product or its ingredients if applicable.

Ventilation	Local Exhaust. As Needed to Prevent Accumulation of Vapors	Special None
	Mechanical (General)	Other None

Protective Gloves Rubber **Eye Protection** Safety Glasses, Goggles and/or Face Shield

Other Protective Equipment Overalls, Rubber Boots, Eyewash Stations, Safety Showers

IX. SPECIAL PRECAUTIONS

Precautions to be Taken in Handling and Storing Store in cool, well-ventilated, low fire-risk area away from ignition sources and incompatible materials. Keep containers closed when not in use. Do not transfer to improperly marked containers.

Other Precautions Avoid prolonged or repeated breathing of vapors or contact with skin. Do not ingest.



**UNICHEM
INTERNATIONAL**

UNICHEM 2310

PRODUCT BULLETIN

DESCRIPTION

UNICHEM 2310 is a nitrite based corrosion inhibitor. UNICHEM 2310 contains buffering agents and other inorganic compounds which act together with the nitrite to form a highly effective corrosion inhibitor. UNICHEM 2310 also contains specific inhibitors for the protection of copper, copper alloys, and other metals in mixed metal systems.

USES

UNICHEM 2310 is recommended for use in closed water systems. UNICHEM 2310 may be used in systems utilizing glycol or alcohol as antifreeze without adversely affecting the inhibitor or the antifreeze. UNICHEM 2310 should be used in systems with low to moderate hardness levels.

APPLICATION

UNICHEM 2310 should be applied to the system at the rate of two to three gallons per one thousand gallons of contained water or makeup. The system pH should be maintained above a pH of 7.5 to prevent degradation of the nitrite. A sodium nitrite residual should be maintained at 400-600 ppm as sodium nitrite.

TYPICAL PROPERTIES

Appearance	Light Yellow Clear Liquid
Density	9.70 lbs/gallon
Pour Point	22°F
Flash Point (TCC).....	None

HANDLING

Due care should be taken when handling any industrial compound. Avoid contact with eyes, skin, and clothing. If contact occurs, flush thoroughly with water. If irritation persists, seek medical aid. Use with adequate ventilation.

Refer to the material safety data sheet for more information regarding the safe use and handling of this product.

PACKAGING

UNICHEM 2310 is available in 55 gallon drums or in bulk quantities.



UNICHEM
INTERNATIONAL

MATERIAL SAFETY DATA SHEET

Date Prepared 07/14/89

Supersedes Previous Sheet Dated Not Dated

I. PRODUCT IDENTIFICATION

Unichem International 707 N. Leech/P. O. Box 1499/Hobbs, New Mexico 88240
EMERGENCY TELEPHONE NUMBER (505) 393-7751

Trade Name UNICHEM 2310

Chemical Description
Proprietary Corrosion Inhibitor Blend

II. HAZARDOUS INGREDIENTS

Material	TLV (Units)
Sodium Nitrite (Oxidizer) CAS#7632-00-0 CERCLA Reportable Quantity: 500 lbs of product	None Established
Neither this product nor its ingredients are listed in any of OSHA Standard, Section 1910.1200 sources as carcinogenic.	

III. PHYSICAL DATA

Boiling Point, 760 mm Hg	212°F	Freezing Point	22°F
Specific Gravity (H ₂ O=1)	1.16 g/ml	Solubility in Water	Complete
Appearance and Odor Light Yellow to Water White Clear Liquid; Slight Odor			

IV. FIRE AND EXPLOSION HAZARD DATA

Flash Point (Test Method) None

Extinguishing Media Carbon Dioxide, Dry Chemical, Water Spray or Fog, Foam. Use a water spray to cool fire-exposed containers.

Special Fire Fighting Procedures Firefighters should wear self-contained breathing apparatus and full protective clothing.

Unusual Fire and Explosion Hazards None

Liability is expressly disclaimed for any loss or injury arising out of the use of this information or the use of any materials designated.

V. HEALTH HAZARD DATA

Threshold Limit Value Not Determined

Effects of Overexposure Prolonged skin contact will cause dryness and irritation. Ingestion may cause catharsis. Inhalation of mist may cause respiratory irritation. Eye contact will cause irritation.

Emergency and First Aid Procedures Eyes: Flush promptly with copious quantities of water for at least fifteen minutes. Seek medical attention. Skin: Flush area with water. Wash with soap and remove contaminated clothing. Inhalation: Remove to fresh air. Apply artificial respiration if necessary. Ingestion: Call a physician. Do not induce vomiting. Dilute with water or milk.

VI. REACTIVITY DATA

Stability	Stable	X	Conditions to Avoid	None
	Unstable			

Incompatibility (Materials to Avoid) Acids, Reducing Agents

Hazardous Decomposition of Products Oxides of Carbon and Nitrogen

Hazardous Polymerization	May Occur		Conditions to Avoid	None
	Will Not Occur	X		

VII. SPILL OR LEAK PROCEDURES

Steps to be Taken if Material is Released or Spilled Provide adequate ventilation. Remove sources of ignition. Contain and absorb spill.

Waste Disposal Method Dispose via a licensed waste disposal company. Follow local, state, and federal regulations.

VIII. SPECIAL PROTECTION INFORMATION

Respiratory Protection (Specify Type) Use air-supplied or self-contained breathing apparatus if exposure levels exceed TLV for this product or its ingredients.

Ventilation	Local Exhaust	As needed to prevent accumulation of	Special	None
	Mechanical (General)	vapors above TLV	Other	None

Protective Gloves Rubber Eye Protection Safety Glasses, Goggles, and/or Face Shield

Other Protective Equipment Overalls, Rubber Boots, Eyewash Stations, Safety Showers

IX. SPECIAL PRECAUTIONS

Precautions to be Taken in Handling and Storing Store in cool, well-ventilated, low fire-risk area away from ignition sources and incompatible materials. Keep containers closed when not in use. Do not transfer or store in improperly marked containers.

Other Precautions Avoid prolonged or repeated breathing of vapors or contact with skin. Do not ingest.

Product Name: UNICHEM 3030

Section: 01 PRODUCT IDENTIFICATION

UNICHEM INTERNATIONAL INC.	Emergency Telephone	505-393-7751
P.O. BOX 1499	Previous Version Date	5/22/86
707 N. LEECH	Date Prepared	2/10/91
HOBBS	Version: 0000001	
NM	88241-1499	

Product Name: UNICHEM 3030

Chemical Description:
Proprietary boiler water scale and corrosion inhibitor

Section: 02 HAZARDOUS INGREDIENTS

<u>Component Name</u>	<u>CAS#</u>	<u>% Range</u>
sodium nitrate	07631-99-4	< 15%
ethylenediaminetetraacetic acid, tetrasodium salt	00064-02-8	< 10%
potassium hydroxide	01310-58-3	< 5%
trisodium nitrilotriacetate	05064-31-3	< 1%

Section: 03 PHYSICAL DATA

Freezing Point: 10 Deg.F. Boiling Point, 760 mm Hg: 212 Deg.F
Specific Gravity(H2O=1) : 1.300 Solubility in water: Complete
Appearance and Odor: Light brown liquid; no significant odor.

Section: 04 FIRE AND EXPLOSION HAZARD DATA

Flash Point (Test Method): None

Extinguishing Media

Material is not combustible. Keep containers cool. Contain fire fighting liquids for proper disposal.

Special Fire Fighting Procedures

Do not enter confined fire space without proper personal protective equipment including NIOSH approved self-contained breathing apparatus with full facepiece operated in the positive pressure demand mode. Do not inject a solid stream of water or foam into hot, burning pools; this may cause splattering and increase fire intensity.

Unusual Fire and Explosion Hazards

None

Section: 05 HEALTH HAZARD DATA

Effects of Overexposure

Product Name: UNICHEM 3030

Section: 05 HEALTH HAZARD DATA

CONTINUED

Eye contact: vapors, liquid, and mists are extremely corrosive to the eyes. Brief contact of the vapors will be severely irritating. Brief contact of the liquid or mists will severely damage the eyes and prolonged contact may cause permanent eye injury which may be followed by blindness.

Skin contact: vapors, mists, and liquid are extremely corrosive to the skin. Vapors will severely irritate the skin and liquid and mists will severely burn the skin. Prolonged liquid contact will burn or destroy surrounding tissue and death may accompany burns which extend over large portions of the body.

Inhalation: vapors and mists are extremely corrosive to the nose, throat, and mucous membranes. Bronchitis, pulmonary edema, and chemical pneumonitis may occur. Irritation, coughing, chest pain, and difficulty in breathing may occur with brief exposure while prolonged exposure may result in more severe irritation and tissue damage. Breathing high concentrations may result in death.

Ingestion: vapors, mists, and liquid are extremely corrosive to the mouth and throat. Swallowing the liquid burns the tissues, causes severe abdominal pain, nausea, vomiting, and collapse. Swallowing large quantities can cause death.

Chronic effects of exposure: may result in area of destruction of skin tissue or primary irritant dermatitis. Similarly, inhalation of vapors or mists may cause varying degrees of damage to the affected tissues and also increasing susceptibility to respiratory illness.

Systemic & Other Effects: very small amounts of nitrilotriacetic acid (NTA) are present in this product. NTA is a component listed by the IARC as a possible human carcinogen (Group 2B). While current data regarding human exposures to NTA is inadequate, large dietary doses of NTA have caused urinary tumors in laboratory animals.

Emergency and First Aid Procedures

SKIN

Wash with soap and water. Remove contaminated clothing and launder contaminated clothing before reuse. Get medical attention if redness or irritation develops.

EYES

Flush eyes immediately with large amounts of water for at least 15 minutes. Lift lower and upper lids occasionally. Get medical attention.

INHALATION

Remove victim to fresh air. Give artificial respiration if

Product Name: UNICHEM 3030

Section: 05 HEALTH HAZARD DATA

CONTINUED

not breathing. If breathing is difficult, administer oxygen.
Keep person warm, quiet and get medical attention.

INGESTION

Call a physician immediately. Give victim a glass of water.
Do NOT induce vomiting unless instructed by a physician or
poison control center. Never give anything by mouth to an
unconscious person.

Section: 06 REACTIVITY DATA

Stable (Y=Yes/N=No): Y

Stability -- Conditions to Avoid

None known.

Incompatibility (Materials to Avoid)

Avoid contact with strong oxidizers or acidic materials.

Hazardous Decomposition Products

Smoke, carbon dioxide, carbon monoxide, oxides of nitrogen.

Hazardous Polymerization May Occur (Y=Yes/N=No): N

Hazardous Polymerization -- Conditions to Avoid

None

Section: 07 SPILL OR LEAK PROCEDURES

Steps to be Taken if Material is Released or Spilled

Persons not wearing suitable personal protective equipment
should be excluded from area of spill until clean-up has
been completed. Shut off source of spill if possible to do
so without hazard. Prevent liquid from entering sewers or
watercourses. Provide adequate ventilation. Contain spilled
liquid with sand or earth. Recovered undamaged or minimally
contaminated material for reuse or reclamation. Place all
collected material and spill absorbents into DOT approved
containers.

Advise authorities. If this product is an EPA hazardous
substance (see Section 10), notify the U.S.EPA or the
National Response Center. Additional notification pursuant
to SARA Section 302/304 (40 CFR 355) may also be required.

Waste Disposal Method

Treatment, storage, transportation and disposal must be in
accordance with EPA or State regulations under authority of
the Resource Conservation and Recovery Act (40 CFR 260-271).

Section: 08 SPECIAL PROTECTIVE INFORMATION

Respiratory Protection

A respirator is normally not required if this product is

Product Name: UNICHEM 3030

Section: 08 SPECIAL PROTECTIVE INFORMATION CONTINUED

used with adequate ventilation.

Ventilation

The use of mechanical dilution ventilation is recommended whenever this product is used in confined spaces, is heated above ambient temperatures or is agitated. When applicable, sufficient local ventilation should be provided to maintain employee exposures below safe working limits (TWA's).

Protective Gloves

Neoprene, nitrile, polyvinyl alcohol (PVA), polyvinyl chloride (PVC)

Eye Protection

Chemical splash goggles or face shield in compliance with OSHA regulations is advised; however OSHA regulations also permits safety glasses under certain conditions. The use of contact lenses is not recommended.

Other Protective Equipment

Eye wash and safety shower

Section: 09 SPECIAL PRECAUTIONS

Precautions to be Taken in Handling and Storing

Avoid contact with eyes, skin or clothing. Avoid breathing vapors or mist.

Other Precautions

Containers of this material may be hazardous when emptied. Since emptied containers retain product residues (vapor, liquid, and/or solid), all hazard precautions given in the data sheet must be observed. Do not transfer to improperly marked container. Do not use pressure to empty container. Do not cut, heat, weld, or expose containers to flame or other sources of ignition. Keep container closed. Use with adequate ventilation. Wash thoroughly after handling.

Section: 10 REGULATORY INFORMATION

Superfund Amendments and Reauthorization Act Of 1986(SARA) Title III

Section 302/304-Extremely Hazardous Substances (40 CFR 355)

SARA requires emergency planning based on Threshold Planning Quantities (TPQs) and release reporting based on Reportable Quantities (RQs) in 40 CFR 355 (used for SARA 302, 304, 311 and 312). These values are subject to change and the regulations should be consulted to verify current statutory requirements.

Components present in this product at a level which

Section: 10 REGULATORY INFORMATION

CONTINUED

could require reporting under the statute are:

<u>Component Name</u>	<u>RQ</u>	<u>TPO</u>	<u>% Range</u>
NONE			

Section 311/312 Chemical Inventory Reporting Requirements (40 CFR 370)

The Superfund Amendments and Reauthorization Act (SARA) may require submission of reports (chemical list, MSDS, Tier I & Tier II) to the State Emergency Response Commission, Local Emergency Response Committee and the local fire department. The SARA physical and health hazards related to this product are:

<input checked="" type="checkbox"/> Acute Health Hazard	<input type="checkbox"/> Sudden Release of Pressure	<input type="checkbox"/> Fire
<input checked="" type="checkbox"/> Chronic Health Hazard	<input type="checkbox"/> Reactive	

Section 313-List of Toxic Chemicals (40 CFR 372)

This product contains the following toxic chemicals subject to the reporting requirements of Section 313 of the Emergency Planning and Community Right-to-Know Act of 1986 (40 CFR 372). This information should be included in all MSDSs that are copied and distributed for this material.

<u>Component Name</u>	<u>CAS #</u>	<u>% Range</u>
NONE		

CERCLA, 40 CFR 261 AND 302

The Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) requires notification of the National Response Center 1-800-424-8802 of any release of a Hazardous Substances equal to or greater than the reportable quantities (RQs) listed in 40CFR 302.4. Values are given in pounds for the component and not the mixture, if applicable. (These values are subject to change and the regulations should be consulted to verify current statutory levels.)

<u>Component Name</u>	<u>CAS #</u>	<u>CERCLA RQ</u>
ethylenediaminetetraacetic acid, tetrasodium salt	00064-02-8	5000
potassium hydroxide	01310-58-3	1000

OSHA Exposure Limits

<u>Component Name</u>
NONE

National Fire Protection Agency

<u>2</u> Health	<u>0</u> Fire
<u>0</u> Reactive	<u>CORR</u> Other

Department of Transportation Shipping Information

Proper Shipping Name: Alkaline liquid, n.o.s.
 Hazard Class: Corrosive material Identification: NA 1719
 This product contains: ethylenediaminetetraacetic acid, potassium hydroxide

Product Name: UNICHEM 3030

Section: 10 REGULATORY INFORMATION

CONTINUED

Hazardous Substance RQ: 20000# Emergency Response Guide Number: 60
Labels: Corrosive

Toxic Substances Control Act (TSCA), 40 CFR 261

This product (or components if product is a mixture) is in compliance with TSCA.

--

Section 10 information is to remain attached to the material safety data sheet for this product.

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While UNICHEM INTERNATIONAL believes that the above data is correct, UNICHEM INTERNATIONAL expressly disclaims liability for any loss or injury arising out of the use of this information or the use of any materials designated.

**UNICHEM
INTERNATIONAL****DESCRIPTION**

UNICHEM 3140 is a water soluble stabilized solution of sulfite.

USES

UNICHEM 3140 is used for the removal of dissolved oxygen in boilers and other closed system water heating installations.

APPLICATION

Add UNICHEM 3140 continuously to the boiler feedwater at a rate sufficient to maintain a sulfite residual of 20-40 ppm.

TYPICAL PROPERTIES

Appearance	White Water Clear Liquid
Solubility	Completely Soluble in Water
Density	10.0 lbs/gal
Freeze Point	13°F
pH	4.3

HANDLING

Do not spill UNICHEM 3140 on the skin or in the eyes. If spilled, wash with copious quantities of water and consult a physician if irritation of redness persists.

Wear chemical worker's goggles, gloves, and apron when handling UNICHEM 3140.

PACKAGING

UNICHEM 3140 is normally packaged in 55 gallon steel drums or in bulk quantities.

Product Name: UNICHEM 3140

Section: 01 PRODUCT IDENTIFICATION

UNICHEM INTERNATIONAL INC.	Emergency Telephone	505-393-7751
P.O. BOX 1499	Previous Version Date	5/22/86
707 N. LEECH	Date Prepared	2/10/91
HOBBS	Version: 0000001	
NM	88241-1499	

Product Name: UNICHEM 3140

Chemical Description:
Proprietary boiler water oxygen scavenger

Section: 02 HAZARDOUS INGREDIENTS

<u>Component Name</u>	<u>CAS#</u>	<u>% Range</u>
sodium bisulfite	07631-90-5	< 30%

Section: 03 PHYSICAL DATA

Freezing Point: 13 Deg.F.	Boiling Point, 760 mm Hg: 212 Deg.F
Specific Gravity(H ₂ O=1) : 1.200	Solubility in water: Complete
Appearance and Odor: Water white, clear liquid; slight musty odor.	

Section: 04 FIRE AND EXPLOSION HAZARD DATA

Flash Point (Test Method): NoneExtinguishing Media

Material is not combustible. Keep containers cool. Contain fire fighting liquids for proper disposal.

Special Fire Fighting Procedures

Do not enter confined fire space without proper personal protective equipment including NIOSH approved self-contained breathing apparatus with full facepiece operated in the positive pressure demand mode. Do not inject a solid stream of water or foam into hot, burning pools; this may cause splattering and increase fire intensity.

Unusual Fire and Explosion Hazards

None

Section: 05 HEALTH HAZARD DATA

Effects of Overexposure

Eye Contact: may cause irritation or burns if not promptly removed.

Skin Contact may cause irritation.

Product Name: UNICHEM 3140

Section: 07 SPILL OR LEAK PROCEDURES CONTINUED

should be excluded from area of spill until clean-up has been completed. Shut off source of spill if possible to do so without hazard. Prevent liquid from entering sewers or watercourses. Provide adequate ventilation. Contain spilled liquid with sand or earth. Recovered undamaged or minimally contaminated material for reuse or reclamation. Place all collected material and spill absorbents into DOT approved containers.

Advise authorities. If this product is an EPA hazardous substance (see Section 10), notify the U.S.EPA or the National Response Center. Additional notification pursuant to SARA Section.302/304 (40 CFR 355) may also be required.

Waste Disposal Method

Treatment, storage, transportation and disposal must be in accordance with EPA or State regulations under authority of the Resource Conservation and Recovery Act (40 CFR 260-271).

Section: 08 SPECIAL PROTECTIVE INFORMATION

Respiratory Protection

A respirator is normally not required if this product is used with adequate ventilation.

Ventilation

The use of mechanical dilution ventilation is recommended whenever this product is used in confined spaces, is heated above ambient temperatures or is agitated. When applicable, sufficient local ventilation should be provided to maintain employee exposures below safe working limits (TWA's).

Protective Gloves

Neoprene, nitrile, polyvinyl alcohol (PVA), polyvinyl chloride (PVC)

Eye Protection

Chemical splash goggles or face shield in compliance with OSHA regulations is advised; however OSHA regulations also permits safety glasses under certain conditions. The use of contact lenses is not recommended.

Other Protective Equipment

Eye wash and safety shower

Section: 09 SPECIAL PRECAUTIONS

Precautions to be Taken in Handling and Storing

Avoid contact with eyes, skin or clothing. Avoid breathing vapors or mist.

Product Name: UNICHEM 3140

Section: 09 SPECIAL PRECAUTIONS

CONTINUEDOther Precautions

Containers of this material may be hazardous when emptied. Since emptied containers retain product residues (vapor, liquid, and/or solid), all hazard precautions given in the data sheet must be observed. Do not transfer to improperly marked container. Do not use pressure to empty container. Do not cut, heat, weld, or expose containers to flame or other sources of ignition. Keep container closed. Use with adequate ventilation. Wash thoroughly after handling.

Section: 10 REGULATORY INFORMATION

Superfund Amendments and Reauthorization Act Of 1986(SARA) Title IIISection 302/304-Extremely Hazardous Substances (40 CFR 355)

SARA requires emergency planning based on Threshold Planning Quantities (TPQs) and release reporting based on Reportable Quantities (RQs) in 40 CFR 355 (used for SARA 302, 304, 311 and 312). These values are subject to change and the regulations should be consulted to verify current statutory requirements.

Components present in this product at a level which could require reporting under the statute are:

Component Name

RQ TPQ % Range

NONE

Section 311/312 Chemical Inventory Reporting Requirements (40 CFR 370)

The Superfund Amendments and Reauthorization Act (SARA) may require submission of reports (chemical list, MSDS, Tier I & Tier II) to the State Emergency Response Commission, Local Emergency Response Committee and the local fire department. The SARA physical and health hazards related to this product are:

Acute Health Hazard _ Sudden Release of Pressure _ Fire
 Chronic Health Hazard _ Reactive

Section 313-List of Toxic Chemicals (40 CFR 372)

This product contains the following toxic chemicals subject to the reporting requirements of Section 313 of the Emergency Planning and Community Right-to-Know Act of 1986 (40 CFR 372). This information should be included in all MSDSs that are copied and distributed for this material.

Component Name

CAS #

% Range

NONE

CERCLA, 40 CFR 261 AND 302

The Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) requires notification of the



**UNICHEM
INTERNATIONAL**

UNICHEM 3270

PRODUCT BULLETIN

DESCRIPTION

UNICHEM 3270 is a volatile neutralizing amine corrosion inhibitor.

USES

UNICHEM 3270 is used for corrosion protection in steam and condensate lines and in auxiliary equipment of boiler plants. This compound volatilizes and quickly neutralizes carbon dioxide and other acidic components in steam at the point of condensation. In addition to corrosion prevention in the return condensate system, this compound effectively reduces the iron content of the condensate return and thus minimizes boiler deposits due to iron.

APPLICATION

UNICHEM 3270 should be fed continuously to the boiler feed water in proportion to the quantity of make-up water. A pH of 6.8 to 8.5 should be maintained in the condensate return.

TYPICAL PROPERTIES

Appearance	Clear Brown Liquid
Pour Point	15°F
Flash Point, Closed Cup	120°F
pH	12.70
Density	8.1 lbs/gal

HANDLING

UNICHEM 3270 is an alkaline compound. Avoid contact with eyes, skin, and clothing by wearing the proper safety equipment including eye protection, rubber gloves, and protective clothing. In case of eye contact, flush thoroughly with water for at least fifteen minutes. Consult a physician. For skin contact, rinse with copious quantities of water and wash with soap. Remove contaminated clothing and wash thoroughly. Seek medical attention if irritation persists. Avoid breathing vapors or fumes.

Refer to the Material Safety Data Sheet for more information regarding the safe use of this product.

PACKAGING

UNICHEM 3270 is normally sold in 55 gallon drums or in bulk quantities.

Product Name: UNICHEM 3270

Section: 01 PRODUCT IDENTIFICATION

UNICHEM INTERNATIONAL INC.	Emergency Telephone	505-393-7751
P.O. BOX 1499	Previous Version Date	5/22/86
707 N. LEECH	Date Prepared	2/10/91
HOBBS	Version: 0000001	
NM	88241-1499	

Product Name: UNICHEM 3270

Chemical Description:
Proprietary neutralizing amine blend

Section: 02 HAZARDOUS INGREDIENTS

<u>Component Name</u>	<u>CAS#</u>	<u>% Range</u>
cyclohexylamine	00108-91-8	< 25%

Section: 03 PHYSICAL DATA

Freezing Point: 15 Deg.F.	Boiling Point, 760 mm Hg: init 212 Deg.F
Specific Gravity(H2O=1) : .970	Solubility in water: Complete
Appearance and Odor: Water white to light yellow, clear liquid; amine odor.	

Section: 04 FIRE AND EXPLOSION HAZARD DATA

Flash Point (Test Method): 120 Deg.F TCCExtinguishing Media

CO2, dry chemical, water spray or fog, or foam. Use water to keep containers cool. Isolate "fuel" supply from fire. Contain fire fighting liquids for proper disposal.

Special Fire Fighting Procedures

Do not enter confined fire space without proper personal protective equipment including NIOSH approved self-contained breathing apparatus with full facepiece operated in the positive pressure demand mode. Do not inject a solid stream of water or foam into hot, burning pools; this may cause splattering and increase fire intensity.

Unusual Fire and Explosion Hazards

This material is volatile and readily gives off vapors that may travel along the ground or be moved by ventilation and ignited by pilot lights, other flames, sparks, heaters, smoking, electrical motors, static discharge, or other ignition sources at locations distant from material handling point. Never use welding or cutting torch on or near drum (even empty) because product (even just residue) can ignite explosively. Containers may explode from internal pressure

Product Name: UNICHEM 3270

Section: 04 FIRE AND EXPLOSION HAZARD DATA CONTINUED

if confined to fire. Keep containers cool. Keep unnecessary people away.

Section: 05 HEALTH HAZARD DATA

Effects of Overexposure

Eye Contact: contact with the eyes causes severe irritation and burns.

Skin Contact: severely irritating and corrosive upon skin contact. Can cause dermatitis. Material is well absorbed through skin.

Inhalation: excessive inhalation of vapors can cause nasal and respiratory irritation.

Ingestion: toxic; can cause severe gastrointestinal irritation, vomiting, diarrhea, sweating, weakness, headache.

The primary routes of exposure are by inhalation of vapors and skin contact.

Emergency and First Aid Procedures

SKIN

Wash with soap and water. Remove contaminated clothing and launder contaminated clothing before reuse. Get medical attention if redness or irritation develops.

EYES

Flush eyes immediately with large amounts of water for at least 15 minutes. Lift lower and upper lids occasionally. Get medical attention.

INHALATION

Remove victim to fresh air. Give artificial respiration if not breathing. If breathing is difficult, administer oxygen. Keep person warm, quiet and get medical attention.

INGESTION

Call a physician immediately. Give victim a glass of water. Do NOT induce vomiting unless instructed by a physician or poison control center. Never give anything by mouth to an unconscious person.

Section: 06 REACTIVITY DATA

Stable (Y=Yes/N=No): Y

Stability -- Conditions to Avoid

None known.

Incompatibility (Materials to Avoid)

Avoid contact with strong oxidizers or acidic materials.

Product Name: UNICHEM 3270

Section: 06 REACTIVITY DATA

CONTINUED

Hazardous Decomposition Products

Smoke, carbon dioxide, carbon monoxide, oxides of nitrogen.

Hazardous Polymerization May Occur (Y=Yes/N=No): N

Hazardous Polymerization -- Conditions to Avoid

None

Section: 07 SPILL OR LEAK PROCEDURES

Steps to be Taken if Material is Released or Spilled

Eliminate sources of ignition. Persons not wearing suitable personal protective equipment should be excluded from area of spill until clean-up has been completed. Shut off source of spill if possible to do so without hazard. Prevent liquid from entering sewers or watercourses. Provide adequate ventilation. Contain spilled liquid with sand or earth. Recover undamaged and minimally contaminated material for reuse or reclamation. Place all collected material and spill absorbents into DOT approved containers.

Advise authorities. If this product is an EPA hazardous substance (see Section 10), notify the U.S.EPA or the National Response Center. Additional notification pursuant to SARA Section 302/304 (40 CFR 355) may also be required.

Waste Disposal Method

Treatment, storage, transportation and disposal must be in accordance with EPA or State regulations under authority of the Resource Conservation and Recovery Act (40 CFR 260-271).

Section: 08 SPECIAL PROTECTIVE INFORMATION

Respiratory Protection

If workplace exposure limit(s) of product or any component is exceeded, an NIOSH/MSHA approved air supplied respirator is advised in absence of proper environmental control. OSHA regulations also permit other NIOSH/MSHA respirators (negative pressure organic vapor type) under specified conditions. Engineering or administrative controls should be implemented to reduce exposure.

Ventilation

The use of mechanical dilution ventilation is recommended whenever this product is used in confined spaces, is heated above ambient temperatures or is agitated. When applicable, sufficient local ventilation should be provided to maintain employee exposures below safe working limits (TWA's).

Protective Gloves

Neoprene, nitrile, polyvinyl alcohol (PVA), polyvinyl

Product Name: UNICHEM 3270

Section: 08 SPECIAL PROTECTIVE INFORMATION CONTINUED

chloride (PVC)

Eye Protection

Chemical splash goggles or face shield in compliance with OSHA regulations is advised; however OSHA regulations also permits safety glasses under certain conditions. The use of contact lenses is not recommended.

Other Protective Equipment

Eye wash and safety shower

Section: 09 SPECIAL PRECAUTIONS

Precautions to be Taken in Handling and Storing

Avoid contact with eyes, skin or clothing. Avoid breathing vapors or mist. Keep away from heat, sparks, and open flames and never use a cutting torch on or near container (even empty) or explosion may result.

Other Precautions

Containers of this material may be hazardous when emptied. Since emptied containers retain product residues (vapor, liquid, and/or solid), all hazard precautions given in the data sheet must be observed. Do not transfer to improperly marked container. Do not use pressure to empty container. Do not cut, heat, weld, or expose containers to flame or other sources of ignition. Keep container closed. Use with adequate ventilation. Wash thoroughly after handling.

Section: 10 REGULATORY INFORMATION

Superfund Amendments and Reauthorization Act Of 1986(SARA) Title III

Section 302/304-Extremely Hazardous Substances (40 CFR 355)

SARA requires emergency planning based on Threshold Planning Quantities (TPQs) and release reporting based on Reportable Quantities (RQs) in 40 CFR 355 (used for SARA 302, 304, 311 and 312). These values are subject to change and the regulations should be consulted to verify current statutory requirements.

Components present in this product at a level which could require reporting under the statute are:

Component Name
cyclohexylamine

<u>RQ</u>	<u>TPQ</u>	<u>% Range</u>
1	10000	< 25%

Section 311/312 Chemical Inventory Reporting Requirements (40 CFR 370)

The Superfund Amendments and Reauthorization Act (SARA) may require submission of reports (chemical list, MSDS, Tier I & Tier II) to the State Emergency Response Commission, Local

Product Name: UNICHEM 3270

Section: 99 REGULATORY INFORMATION

CONTINUED

safety data sheet for this product.

- -
While UNICHEM INTERNATIONAL believes that the above data is correct, UNICHEM INTERNATIONAL expressly disclaims liability for any loss or injury arising out of the use of this information or the use of any materials designated.



**UNICHEM
INTERNATIONAL**

UNICHEM 4000

PRODUCT BULLETIN

DESCRIPTION

UNICHEM 4000 is a homogeneous blend of organic polyols, surface active compounds, and other active ingredients. UNICHEM 4000 is used for the emulsification and removal of oil deposits in cooling water systems.

APPLICATION

UNICHEM 4000 should be added to the cooling water system as soon as possible after an oil spill or leak is experienced. The use rate of UNICHEM 4000 will vary dependent upon the severity of the hydrocarbon leak. In open recirculating systems a slug dose of 25-100 ppm is typically required. In closed systems, a dosage of 1-3 gallons per 1,000 gallons may be required in some cases. UNICHEM 4000 can also be applied before cleaning and flushing in severely fouled systems to loosen oily deposits.

TYPICAL PROPERTIES

Appearance	Brown Liquid
Density	8.1 lbs/gallon
Pour Point	17°F
Flash Point (TCC)	94°F
pH3.8

HANDLING

Do not expose this product to open flame or extreme heat. Avoid contact with skin, eyes or clothing. In case of eye contact, flush with water for at least fifteen minutes. Seek medical help if irritation persists. For skin contact, flush with water and wash thoroughly with soap and water. Remove contaminated clothing and wash before reuse. Avoid breathing fumes or vapors.

Refer to the Material Safety Data Sheet for more information regarding the safe use of this product.

PACKAGING

UNICHEM 4000 is available in 55 gallon drums or in bulk quantities.



UNICHEM
INTERNATIONAL

MATERIAL SAFETY DATA SHEET

Date Prepared 05/22/86

Supersedes Previous Sheet Dated Not Dated

I. PRODUCT IDENTIFICATION

Unichem International 707 N. Leech/P. O. Box 1499/Hobbs, New Mexico 88240
EMERGENCY TELEPHONE NUMBER (505) 393-7751

Trade Name UNICHEM 4000

Chemical Description Proprietary Surfactant in an Aqueous Solution

II. HAZARDOUS INGREDIENTS

Material

TLV (Units)

Isopropanol CAS# 67-63-0

400 ppm

Neither this product nor its ingredients are listed in any of OSHA Standard, Section 1910.1200 sources as carcinogenic.

III. PHYSICAL DATA

Boiling Point, 760 mm Hg	180°F (Initial)	Freezing Point	17°F
Specific Gravity (H ₂ O=1)	0.97 g/ml	Solubility in Water	Complete

Appearance and Odor Light Yellow Clear Liquid; Slight Alcoholic Odor

IV. FIRE AND EXPLOSION HAZARD DATA

Flash Point (Test Method) 94°F TCC

Extinguishing Media Carbon Dioxide, Dry Chemical, Water Spray or Fog, Foam. Use a water spray to cool fire-exposed containers.

Special Fire Fighting Procedures Firefighters should wear self-contained breathing apparatus and full protective clothing.

Unusual Fire and Explosion Hazards None

Liability is expressly disclaimed for any loss or injury arising out of the use of this information or the use of any materials designated.

V. HEALTH HAZARD DATA

Threshold Limit Value Not Determined

Effects of Overexposure Prolonged skin contact will cause dryness and irritation. Ingestion may cause catharsis. Inhalation of mist may cause respiratory irritation. Eye contact will cause irritation.

Emergency and First Aid Procedures Eyes: Flush promptly with copious quantities of water for at least fifteen minutes. Seek medical attention. Skin: Flush area with water. Wash with soap and remove contaminated clothing. Inhalation: Remove to fresh air. Apply artificial respiration if necessary. Ingestion: Call a physician. Do not induce vomiting. Dilute with water or milk.

VI. REACTIVITY DATA

Stability	Stable	X	Conditions to Avoid	None
	Unstable			

Incompatibility (Materials to Avoid) Oxidizers, Alkalis

Hazardous Decomposition of Products Oxides of Carbon, Nitrogen, Sulfur, and Ammonia. Contact with strong caustics may liberate amine fumes.

Hazardous Polymerization	May Occur	Conditions to Avoid	None
	Will Not Occur		

VII. SPILL OR LEAK PROCEDURES

Steps to be Taken if Material is Released or Spilled Provide adequate vent. ti.
Remove sources of ignition. Contain and absorb spill.

Waste Disposal Method Dispose via a licensed waste disposal company. Follow local state, and federal regulations.

VIII. SPECIAL PROTECTION INFORMATION

Respiratory Protection (Specify Type) Use air-supplied or self-contained breathing apparatus if exposure levels exceed TLV for this product or its ingredients.

Ventilation	Local Exhaust	As needed to prevent accumulation of	Special	None
	Mechanical (General)	vapors above TLV	Other	None

Protective Gloves Rubber **Eye Protection** Safety Glasses, Goggles, and/or Face Shield

Other Protective Equipment Overalls, Rubber Boots, Eyewash Stations, Safety Showers

IX. SPECIAL PRECAUTIONS

Precautions to be Taken in Handling and Storing Store in cool, well-ventilated, low fire-risk area away from ignition sources and incompatible materials. Keep containers closed when not in use. Do not transfer or store in improperly marked containers.

Other Precautions Avoid prolonged or repeated breathing of vapors or contact with skin. Do not ingest.



**UNICHEM
INTERNATIONAL**

UNICHEM 7227

PRODUCT BULLETIN

DESCRIPTION

UNICHEM 7227 is a blend of demulsifiers, wetting agents, and other surface active agents.

USES

UNICHEM 7227 improves the efficiency of the desalting process by promoting fast and complete water separation. It also assists in the removal of salts and solids which are dispersed in the crude oil.

APPLICATION

UNICHEM 7227 is injected ahead of the crude oil charge pump to ensure proper distribution of the chemical. Normal dosages will range between 3-12 ppm depending upon the severity of the emulsion formed in the desalting process.

TYPICAL PROPERTIES

Appearance	Amber liquid
Density	8.04 lbs/gal
Pour Point	-40°F
Flash Point (TCC).....	78°F

HANDLING

Do not expose this product to open flame or extreme heat. Avoid contact with skin, eyes, or clothing. In case of eye contact, flush with water for at least fifteen minutes. Seek medical help if irritation persists. For skin contact, flush with water and wash thoroughly with soap and water. Remove contaminated clothing and wash before reuse. Avoid breathing fumes or vapors.

Refer to the material safety data sheet for more information regarding the safe use and handling of this product.

PACKAGING

UNICHEM 7227 is normally sold in 55 gallon drums or in bulk quantities.

Product Name: UNICHEM 7227

Section: 01 PRODUCT IDENTIFICATION

UNICHEM INTERNATIONAL INC.	Emergency Telephone	505-393-7751
P.O. BOX 1499	Previous Version Date	10/02/87
707 N. LEECH	Date Prepared	2/06/91
HOBBS	Version: 0000001	
NH	88241-1499	

Product Name: UNICHEM 7227

Chemical Description:
Proprietary blend of anionic and nonionic surfactants.

Section: 02 HAZARDOUS INGREDIENTS

<u>Component Name</u>	<u>CAS#</u>	<u>% Range</u>
aromatic hydrocarbon solvent	64742-94-5	< 60%
petroleum distillate	64742-06-9	< 30%
isopropyl alcohol	00067-63-0	< 10%
naphthalene	00091-20-3	< 5%

Section: 03 PHYSICAL DATA

Freezing Point: - 40 Deg.F. Boiling Point, 760 mm Hg: init. 325 Deg.F
Specific Gravity(H2O=1) : .890 Solubility in water: Dispersible
Appearance and Odor: Amber to brown, clear liquid; aromatic odor.

Section: 04 FIRE AND EXPLOSION HAZARD DATA

Flash Point (Test Method): 78 Deg.F TCC

Extinguishing Media

CO2, dry chemical, water spray or fog, or foam. Use water to keep containers cool. Isolate "fuel" supply from fire. Contain fire fighting liquids for proper disposal.

Special Fire Fighting Procedures

Do not enter confined fire space without proper personal protective equipment including NIOSH approved self-contained breathing apparatus with full facepiece operated in the positive pressure demand mode. Do not inject a solid stream of water or foam into hot, burning pools; this may cause splattering and increase fire intensity.

Unusual Fire and Explosion Hazards

Treat as an extremely flammable liquid. This material is highly volatile and readily gives off vapors which may travel along the ground or be moved by ventilation and ignited by pilot lights, other flames, sparks, heaters, smoking, electrical motors, static discharge, or other

Product Name: UNICHEM 7227

Section: 04 FIRE AND EXPLOSION HAZARD DATA CONTINUED

ignition sources at locations distant from material handling point. Never use welding or cutting torch on or near drum (even empty) because product (even just residue) can ignite explosively. Containers may explode from internal pressure if confined to fire. Keep containers cool. Keep unnecessary people away.

Section: 05 HEALTH HAZARD DATA

Effects of Overexposure

Eye Contact: the liquid is irritating to the eyes and produces intense stinging and burning. If not promptly removed, may cause eye damage.

Skin Contact: repeated or prolonged contact with the skin may cause irritation and dermatitis.

Inhalation: prolonged vapor concentrations are irritating to the eyes and the respiratory tract, may cause nausea, headaches, mild narcosis, dizziness, and are anesthetic. May also cause convulsions, loss of consciousness and may have other central nervous system effects.

Inhalation or aspiration into the lungs may result in lipid pneumonitis.

Ingestion: may result in gastric disturbances, nausea, vomiting, bleeding, CNS depression, hemolysis, and pulmonary damage. Can be fatal.

Emergency and First Aid Procedures

SKIN

Wash with soap and water. Remove contaminated clothing and launder contaminated clothing before reuse. Get medical attention if redness or irritation develops.

EYES

Flush eyes immediately with large amounts of water for at least 15 minutes. Lift lower and upper lids occasionally. Get medical attention.

INHALATION

Remove victim to fresh air. Give artificial respiration if not breathing. If breathing is difficult, administer oxygen. Keep person warm, quiet and get medical attention.

INGESTION

Call a physician immediately. Give victim a glass of water. Do NOT induce vomiting unless instructed by a physician or poison control center. Never give anything by mouth to an unconscious person.

Section: 06 REACTIVITY DATA

Stable (Y=Yes/N=No): Y

Product Name: UNICHEM 7227

Section: 06 REACTIVITY DATACONTINUED
-----Stability -- Conditions to Avoid

None known.

Incompatibility (Materials to Avoid)

Avoid contact with strong oxidizing agents, strong alkalis, and strong mineral acids.

Hazardous Decomposition Products

Thermal decomposition or combustion may produce smoke, carbon monoxide and carbon dioxide.

Hazardous Polymerization May Occur (Y=Yes/N=No): NHazardous Polymerization -- Conditions to Avoid

None

Section: 07 SPILL OR LEAK PROCEDURESSteps to be Taken if Material is Released or Spilled

Eliminate sources of ignition. Persons not wearing suitable personal protective equipment should be excluded from area of spill until clean-up has been completed. Shut off source of spill if possible to do so without hazard. Prevent liquid from entering sewers or watercourses. Provide adequate ventilation. Contain spilled liquid with sand or earth. Recover undamaged and minimally contaminated material for reuse or reclamation. Place all collected material and spill absorbents into DOT approved containers.

Advise authorities. If this product is an EPA hazardous substance (see Section 10), notify the U.S.EPA or the National Response Center. Additional notification pursuant to SARA Section 302/304 (40 CFR 355) may also be required.

Waste Disposal Method

Treatment, storage, transportation and disposal must be in accordance with EPA or State regulations under authority of the Resource Conservation and Recovery Act (40 CFR 260-271).

Section: 08 SPECIAL PROTECTIVE INFORMATIONRespiratory Protection

If workplace exposure limit(s) of product or any component is exceeded, an NIOSH/MSHA approved air supplied respirator is advised in absence of proper environmental control. OSHA regulations also permit other NIOSH/MSHA respirators (negative pressure organic vapor type) under specified conditions. Engineering or administrative controls should be implemented to reduce exposure.

Ventilation

The use of mechanical dilution ventilation is recommended

Product Name: UNICHEM 7227

Section: 08 SPECIAL PROTECTIVE INFORMATION CONTINUED

whenever this product is used in confined spaces, is heated above ambient temperatures or is agitated. When applicable, sufficient local ventilation should be provided to maintain employee exposures below safe working limits (TWA's).

Protective Gloves

Neoprene, nitrile, polyvinyl alcohol (PVA), polyvinyl chloride (PVC)

Eye Protection

Chemical splash goggles or face shield in compliance with OSHA regulations is advised; however OSHA regulations also permits safety glasses under certain conditions. The use of contact lenses is not recommended.

Other Protective Equipment

Eye wash and safety shower

Section: 09 SPECIAL PRECAUTIONS

Precautions to be Taken in Handling and Storing

Avoid contact with eyes, skin or clothing. Avoid breathing vapors or mist. Keep away from heat, sparks, and open flames and never use a cutting torch on or near container (even empty) or explosion may result.

Other Precautions

Containers of this material may be hazardous when emptied. Since emptied containers retain product residues (vapor, liquid, and/or solid), all hazard precautions given in the data sheet must be observed. Do not transfer to improperly marked container. Do not use pressure to empty container. Do not cut, heat, weld, or expose containers to flame or other sources of ignition. Keep container closed. Use with adequate ventilation. Wash thoroughly after handling.

Section: 10 REGULATORY INFORMATION

Superfund Amendments and Reauthorization Act Of 1986(SARA) Title III

Section 302/304-Extremely Hazardous Substances (40 CFR 355)

SARA requires emergency planning based on Threshold Planning Quantities (TPQs) and release reporting based on Reportable Quantities (RQs) in 40 CFR 355 (used for SARA 302, 304, 311 and 312). These values are subject to change and the regulations should be consulted to verify current statutory requirements.

Components present in this product at a level which could require reporting under the statute are:

Product Name: UNICHEM 7227

Section: 10 REGULATORY INFORMATION

CONTINUED

Component Name

RO TPO % Range

NONE

Section 311/312 Chemical Inventory Reporting Requirements (40 CFR 370)

The Superfund Amendments and Reauthorization Act (SARA) may require submission of reports (chemical list, MSDS, Tier I & Tier II) to the State Emergency Response Commission, Local Emergency Response Committee and the local fire department. The SARA physical and health hazards related to this product are:

- | | | |
|---|---|--|
| <input checked="" type="checkbox"/> Acute Health Hazard | <input type="checkbox"/> Sudden Release of Pressure | <input checked="" type="checkbox"/> Fire |
| <input checked="" type="checkbox"/> Chronic Health Hazard | <input type="checkbox"/> Reactive | |

Section 313-List of Toxic Chemicals (40 CFR 372)

This product contains the following toxic chemicals subject to the reporting requirements of Section 313 of the Emergency Planning and Community Right-to-Know Act of 1986 (40 CFR 372). This information should be included in all MSDSs that are copied and distributed for this material.

Component Name

CAS # % Range

naphthalene

00091-20-3 < 5%

CERCLA, 40 CFR 261 AND 302

The Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) requires notification of the National Response Center 1-800-424-8802 of any release of a Hazardous Substances equal to or greater than the reportable quantities (RQs) listed in 40CFR 302.4. Values are given in pounds for the component and not the mixture, if applicable. (These values are subject to change and the regulations should be consulted to verify current statutory levels.)

Component Name

CAS # CERCLA RQ

naphthalene

00091-20-3 100

OSHA Exposure Limits

Component Name

isopropyl alcohol

TWA ppm: 400.0 TWA MG/M3: 980.0 STEL ppm: 500.0 STEL MG/M3: 1225.0

naphthalene

TWA ppm: 10.0 TWA MG/M3: 50.0 STEL ppm: 15.0 STEL MG/M3: 75.0

National Fire Protection Agency

2 Health

3 Fire

0 Reactive

_____ Other

Department of Transportation Shipping Information

Proper Shipping Name: Flammable liquid, n.o.s.

Hazard Class: Flammable liquid

Identification: UN 1993

This product contains: naphthalene, isopropyl alcohol

Product Name: UNICHEM 7227

Section: 10 REGULATORY INFORMATION

CONTINUED

Hazardous Substance RQ: 2000# Emergency Response Guide Number: 27
Labels: Flammable liquid

Toxic Substances Control Act (TSCA), 40 CFR 261

This product (or components if product is a mixture) is in compliance with TSCA.

--

Section 10 information is to remain attached to the material safety data sheet for this product.

While UNICHEM INTERNATIONAL believes that the above data is correct, UNICHEM INTERNATIONAL expressly disclaims liability for any loss or injury arising out of the use of this information or the use of any materials designated.



UNICHEM 9035

PRODUCT BULLETIN

DESCRIPTION

UNICHEM 9035 is a liquid cationic polyelectrolyte.

USES

UNICHEM 9035 is used as a primary coagulant in water clarification. It is effective over a wide pH range and is unaffected by chlorine. UNICHEM 9035 is very effective on low turbidity waters. Dosage range (based on the volume of water to be treated) is generally 1 to 20 ppm.

TYPICAL PROPERTIES

Appearance	Light Blue Viscous Liquid
Density	8.60
Freeze Point	30°F
Flash Point	> 200°F TCC

HANDLING

UNICHEM 9035 must be kept above the freeze point. Approved protective clothing is recommended to prevent direct contact of the polymer with skin and/or eyes. If contact is made, wash immediately with copious quantities of water. Keep out of reach of children. Keep container closed when not in use. Do not transfer to improperly marked containers.

Refer to the Material Safety Data Sheet for more information regarding the safe use of this product.

PACKAGING

UNICHEM 9035 is available in 55 gallon drums or in bulk quantities.



MATERIAL SAFETY DATA SHEET

Date Prepared 8-15-88

Supersedes Previous Sheet Dated None

I. PRODUCT IDENTIFICATION

Unichem International 707 N. Leech/P. O. Box 1499/Hobbs, New Mexico 88240
EMERGENCY TELEPHONE NUMBER (505) 393-7751

Trade Name UNICHEM 9035

Chemical Description Proprietary blend of Polymers in an aqueous solution.

II. HAZARDOUS INGREDIENTS

Material

Formaldehyde CAS#50-00-0 (contains less than 1%)

This product contains less than 1% of formaldehyde. Formaldehyde has been found by the IARC to be an animal carcinogen. Long-term high dosage inhalation of formaldehyde has caused nasal cancer in rats.

TLV (Units)

OSHA Limits: 3 ppm PEL (8 hours)
5 ppm ceiling
10 ppm peak (30 min.)
ACGIH Limits: 2 ppm ceiling

III. PHYSICAL DATA

Boiling Point, 760 mm Hg	212°F (initial)	Freezing Point	30°F
Specific Gravity (H ₂ O=1)	1.03 g/ml	Solubility in Water	Complete (slowly)

Appearance and Odor Light blue viscous liquid; slight ammonia odor

IV. FIRE AND EXPLOSION HAZARD DATA

Flash Point (Test Method) >200°F (TCC)

Extinguishing Media Carbon Dioxide, Dry Chemical, Water Spray or Fog, Foam. Use a water spray to cool fire-exposed containers.

Special Fire Fighting Procedures Firefighters should wear self-contained breathing apparatus and full protective clothing. Firefighters should be made aware of the corrosive nature of this chemical.

Unusual Fire and Explosion Hazards
None

Liability is expressly disclaimed for any loss or injury arising out of the use of this information or the use of any materials designated.

V. HEALTH HAZARD DATA

Threshold Limit Value Not Determined

Effects of Overexposure Contact will cause burns to the skin and severe damage to the eyes. Inhalation of vapors or mists will irritate the entire respiratory tract. Ingestion will cause irritation and burning of the digestive tract.

Emergency and First Aid Procedures EYES: Flush promptly with copious quantities of water for at least fifteen minutes. Seek medical attention. SKIN: Flush area with water. Wash with soap and remove contaminated clothing. INHALATION: Remove to fresh air. Apply artificial respiration if necessary. INGESTION: Call a physician. Do not induce vomiting. Dilute with water or milk.

VI. REACTIVITY DATA

Stability	Stable	Conditions to Avoid	None
	Unstable		

Incompatibility (Materials to Avoid) Strongly alkaline materials; Oxidizers

Hazardous Decomposition of Products Oxides of Carbon and Nitrogen

Hazardous Polymerization	May Occur	Conditions to Avoid	None
	Will Not Occur		

VII. SPILL OR LEAK PROCEDURES

Steps to be Taken if Material is Released or Spilled Provide adequate ventilation
Remove sources of ignition. Contain and absorb spill.

Waste Disposal Method Dispose via a licensed waste disposal company. Follow local, state, and federal regulations.

VIII. SPECIAL PROTECTION INFORMATION

Respiratory Protection (Specify Type) Use air-supplied or self-contained breathing apparatus if exposure levels exceeds TLV for this product or its ingredients if applicable.

Ventilation	Local Exhaust	As needed to prevent accumulation of vapors	Special	none
	Mechanical (General)		Other	none

Protective Gloves Rubber **Eye Protection** Safety glasses, goggles and/or face shield

Other Protective Equipment Overalls, rubber boots, eyewash stations, safety showers

IX. SPECIAL PRECAUTIONS

Precautions to be Taken in Handling and Storing Store in cool, well-ventilated, low fire-risk area away from ignition sources and incompatible materials. Keep containers closed when not in use. Do not transfer to improperly marked containers.

Other Precautions Avoid prolonged or repeated breathing of vapors or contact with skin. Do not ingest.

MATERIAL SAFETY DATA SHEET

CORPORATE RESEARCH & DEVELOPMENT

SCHENECTADY, N. Y. 12305



No. 1257

VAR SOL 1

Date May 1982

SECTION I. MATERIAL IDENTIFICATION

MATERIAL NAME: VAR SOL 1
 DESCRIPTION: Petroleum solvent or mineral spirits.
 OTHER DESIGNATIONS: GE Material D5B8, ASTM D235, ASTM D484, Type 1
 MANUFACTURER: Exxon Co.
 P.O. Box 2180
 Houston, Texas Tel: (713) 656-3424

SECTION II. INGREDIENTS AND HAZARDS

	%	HAZARD DATA
Mixture of petroleum hydrocarbons	100	8-hr TWA 100 ppm*
<u>Typical Composition:</u>		
	Vol %	
Aromatics (C ₈ and higher)	18	
Olefins	1	Rat, Oral
Saturates	81	LD ₅₀ >5 g/kg
Sulfur content	1 ppm	
*ACGIH(1982) TLV for Stoddard Solvent. Animal studies by Exxon Corp. medical research has shown that male rats exposed to similar vapors at 100 ppm had kidney damage. Additional studies are being conducted to validate these findings and to determine if a revised TLV should be recommended.		
		Rabbit, Dermal
		LD ₅₀ >2 g/kg

SECTION III. PHYSICAL DATA

Boiling range, 1 atm, deg C	155-205	Specific gravity, 15.6/15.6C	ca 0.79
Vapor pressure, 25C, mmHg	<10	Evaporation rate (nBuAc=1)	<0.1
Vapor density (Air=1)	ca 4.8	Volatiles, %	100
Solubility in water	Negligible	Molecular weight (avg)	ca 140

Appearance & odor: Water-white liquid; mineral spirits odor (no long-lasting odor after evaporation).

SECTION IV. FIRE AND EXPLOSION DATA

			LOWER	UPPER
Flash Point and Method	Autoignition Temp.	Flammability Limits In Air		
ca 42C (108F) TCC	254C (ASTM D2155)	% by Volume @ 25C	0.9	6.0

Extinguishing Media: Dry chemical, carbon dioxide, foam, water spray or fog.
 Water spray can be used to keep fire-exposed containers cool to avoid pressure rupture.
 This material is an OSHA Class II Combustible Liquid. It is a dangerous fire hazard if heated or sprayed in air.
 Firefighters should wear self-contained breathing apparatus for fighting fires in enclosed areas.

SECTION V. REACTIVITY DATA

This is a stable material in closed containers at room temperature under normal storage and handling conditions. It does not polymerize.
 Incompatible with strong oxidizing agents such as chlorine, conc. oxygen, calcium hypochlorite, nitric acid, etc.
 Thermal-oxidative degradation may produce carbon monoxide and partially oxidized hydrocarbons.

TECHNICAL DATA BULLETIN

Formulabs Yellow/Green Products are especially formulated versions of the dye fluorescein. This dye is the traditional fluorescent water tracing and leak detection material and has been used for water labeling studies from the beginning of this century. It may be detected visually, by ultra-violet light and by appropriate fluoremetric equipment. Today it is most often used visually. Fluorescein is the dye used by the military to mark downed pilots for search-and-rescue operations over large water bodies. Visually the dye appears as yellow-to-green, depending on its concentration, and, under ultra-violet light, as a bright lime green.

The dye is resistant to adsorption on most suspended matter in fresh and salt water. However, compared to Formulabs FWT Red products it is significantly less resistant to degradation by sunlight; and when used in fluoremetry, stands out much less clearly against background fluorescence. Based on biochemical oxygen demand (BOD) studies, the dye is biodegradable with 65% of the available oxygen consumed in 7 days. Fluorescein is not recommended for use in drinking water systems or near their intakes. The suitability of these products for any specific application should be evaluated by a qualified hydrologist or other industry professional.

GENERAL PROPERTIES

Detectability of active ingredient

In delonized water in 100 ml flask:

- Visual < 100 ppb

- U.V. (long wave) 10 ppb

- Fluoremeter < 0.1 ppb

Actual detectability and coverage
(below) in the field will vary with
specific water conditions.

Maximum absorbance/emission
wavelengths

490/520 nm.

- No significant change in fluorescence
between 6.5 and 11 pH.**TABLET PROPERTIES**

Appearance

Orange approximately 1.6 cm in
diameter.

Tablet weight

1.35 gms \pm 0.05.

Active Ingredient

13.5% by weight.

Dissolution time

One tablet in flowing, delonized water
in a 10 gallon tank

50% < 3 minutes

95% < 6 minutes.

LIQUID PROPERTIES

Appearance	Reddish brown aqueous solution substantially free of insoluble matter.
Active Ingredient	7.5% by weight.
Specific gravity	1.05 ± 0.05 @ 25°C.
Viscosity	1.8 cps. measured on a Brookfield visometer, Model LV, UL adaptor, 60 rpm @ 25°C.
pH	8.5 ± 0.5 @ 25°C.

POWDER PROPERTIES

Appearance	Orange fine powder.
Active Ingredient	75% by weight.
Dissolution time	One gram in flowing delonized water in a 10 gallon tank 50% < 5 minutes 95% < 10 minutes.

COVERAGE OF PRODUCTS

Product	Quantities in Gallons of Water (K = 000)		
	Visual	U.V.	Fluoremeter
One tablet	605	6050	605K
One pint liquid	125K	1250K	125,000K
One lb. powder	1,200K	12,000K	12,000,000K

Formulabs also makes water soluble wax forms of this dye - cakes, cones and doughnuts - in 2 to 6 oz. sizes. These provide a slower, metered-like input to water bodies. Contact us for further information.

CAUTION: These products may cause irritation and/or staining if allowed to come in contact with the skin. The use of gloves and goggles is recommended when handling this product, as with any other dye or chemical.

 **Formulabs**

Dye Tracing Division, P.O. Box 1116, Piqua, Ohio 45356
Phone: (513) 773-8933 FAX: (513) 773-7831

To our best knowledge, the information and recommendations contained herein are accurate and reliable. However, this information and our recommendations are furnished without warranty, representation, inducement, or license of any kind, including, but not limited to the implied warranties and fitness for a particular use or purpose. Customers are encouraged to conduct their own tests and to read the material safety data sheet carefully before using.

YGPROD-5/91

TECHNICAL DATA BULLETIN

Dye tracing products are used in many analytical applications. The unique needs of our customers seem almost unlimited. Some of the most common uses are:

- Plumbing tracing
- Pollution studies
- Retention time studies
- Septic system analysis
- Flow mapping and rate of flow studies
- Storm and sewer drain analyses
- Condenser coil and tube studies
- Source and output detection
- Power plant piping tracing
- Lake, river, and pond analyses
- Leak detection in many fluid-carrying systems

How Fluorescent Dye Tracing Products work:

The "visual" aspect of Formulabs' dye products refers to normal reflection of light as color. The "fluorescent" aspect refers to special properties of some chemicals to absorb certain wavelengths and then emit, rather than reflect, light in response. The emission can be seen by using a "black" ultra-violet light or precisely measured with a fluorometer. The reflected and emitted light have different wavelengths and are, therefore, not the same color.

Fluorescent properties are of greatest value when:

- Tracing must be done when there is no sun or sufficient artificial light (in a sewer or a cave, for instance)
- Precise quantified data is required
- Very small amounts of tracing material is allowed

The maximum absorbance/emission wavelengths of our products are:

<u>Product</u>	<u>Absorption</u>	<u>Emission</u>
FWT Red	550 nm.	588 nm.
Industrial Red	550	588
Yellow/Green	490	520
Clear	349	430
Blue	630	n a

Normally, the blue products are for visual tracing only. However, some of our blue products have been enhanced with a fluorescent dye component.

What PPB means:

Most of our products contain fluorescent dyes which can be detected visually, or with the use of ultra-violet light or fluorometer.

As used in Formulabs' literature, "ppb" refers to one part of active dye per billion parts of water. Using a fluorometer, the active dye can often be detected at levels less than one ppb. All data is presented as reference points only and should not be regarded as a recommendation.

Users should make their own determination of appropriate dilution levels in any specific situation, which will vary with the nature, condition, and use of the water or liquid and the specific evaluation to be performed.

How to calculate the size of a body of water:

One gallon of water occupies .1337 cubic feet. For a rectangular tank, multiply depth in feet times width times length times the factor .1337 to establish the number of gallons. For more complicated bodies of water, formulas can be found in scientific texts on water utility management, hydrology, or related sciences.

Examples of Specific Projects

Test sewer lines for Infiltration.
Locate sewer lines.
Check for illegal connections.
Prove septic bypasses.
Identify indirect cross-connections.
Check drain pipes, downspouts, and gutters to assure drainage into proper channels.
Use in inspection service for certification and reinspection documentation.
Analyze travel times.
Detect toilet leaks; Drip Kits are frequently used by plumbers and salespeople; municipalities and utilities use them as part of public relations and user conservation programs.
Detect leaks in closed systems and cooling systems of steel manufacturers.
Study infiltration of industrial water and piping systems.
Trace acid coming through cooling systems.
Check pump systems flow in fleet trucks, and for preventative maintenance programs.
Detect sewer leaks into ponds, lagoons, and reservoir liners.
Check circulation through sludge beds and measure discharge flow from water tanks.
Illustrate the hydraulic characteristics of streams and other water bodies.
Identify and differentiate batches of slurry before the brick firing process.
Measure the speed and longevity of material passing through a system (i.e. retention time studies).

Other User Information

For *stream tracing and pollution detection*, introduce tracers into the water at the source or suspected source of pollution. Allow sufficient time, as calculated, to permit the dye tracer to reach the effluent or recipient location. Take samples of water for analysis.

Dye tablets may be dropped or flushed directly into drains, sewers or other points in the system. However, it may be desirable to dissolve them in a small amount of water to form a calculated concentration prior to use.

Special larger shapes (cakes, cones, and donuts) have been designed to provide optimum dissolution rates in large systems. Donuts are frequently suspended from a line or string into the body of water. Cakes and donuts are sealed in a hardy water soluble film for ease of use.

Blue has the highest degree of light stability and Red is recommended for yellow or green backgrounds such as algae rich water. FWT Red, Blue, or Yellow/green should be used in water bearing heavy sediment loads or when passing through soil with high clay content. Industrial Red will adsorb onto either.

Photo degradation takes place in sunlight at different rates for different dyes. Red takes from approximately five to seven days and yellow/green fades within two to three days. Blue, on the other hand, breaks down in three or four weeks.

The color of all dyes will disappear if the solution is mixed with chlorine. Add approximately 4 grams of 12 percent bleach for every gram of product in solution.

The logo for Formulabs, featuring a stylized 'F' symbol followed by the word 'Formulabs' in a bold, sans-serif font.

Dye Tracing Division, P.O. Box 1116, Plqua, Ohio 45356

Phone: (513) 773-8933 FAX: (513) 773-7831

To our best knowledge, the information and recommendations contained herein are accurate and reliable. However, this information and our recommendations are furnished without warranty, representation, inducement, or license of any kind, including, but not limited to the implied warranties and fitness for a particular use or purpose. Customers are encouraged to conduct their own tests and read the material safety data sheets carefully before using these products.

DTGUI-10/91

MATERIAL SAFETY DATA SHEET
YELLOW/GREEN DYE TABLET
PAGE 1 OF 4

MSDS PREPARATION INFORMATION

PREPARED BY: M. L. MOORMAN
(513) 773-8933
DATE PREPARED: 11/15/90

PRODUCT INFORMATION

MANUFACTURED BY: FORMULABS, INC.
1710 COMMERCE DRIVE
PIQUA, OHIO 45356
(513) 773-8933 BUSINESS
(800) 424-9300 CHEMTREC 24-HR EMERGENCY CONTACT

CHEMICAL NAME NOT APPLICABLE
CHEMICAL FORMULA NOT APPLICABLE
CHEMICAL FAMILY WATER SOLUBLE DYE TABLET

HAZARDOUS INGREDIENTS

HAZARDOUS INGREDIENT	T.L.V.	C.A.S. #
NONE PER 29 CFR 1910.1200		

PHYSICAL DATA

PHYSICAL STATE DRY TABLET
ODOR AND APPEARANCE YELLOW-GREEN COLOR WITH NO APPARENT ODOR
SPECIFIC GRAVITY NOT APPLICABLE
VAPOR PRESSURE (mm Hg @ 25 deg. C) NOT APPLICABLE
VAPOR DENSITY (AIR = 1) NOT APPLICABLE
EVAPORATION RATE (Butyl Acetate = 1) NOT APPLICABLE
BOILING POINT NOT APPLICABLE
FREEZING POINT NOT APPLICABLE
pH NOT APPLICABLE
SOLUBILITY IN WATER INFINITE SOLUBILITY

FIRE OR EXPLOSION HAZARD

CONDITION OF FLAMMABILITY NON-FLAMMABLE
MEANS OF EXTINCTION WATERFOG, CARBON DIOXIDE, FOAM, OR DRY CHEMICAL
FLASH POINT AND METHOD NOT APPLICABLE

MATERIAL SAFETY DATA SHEET
YELLOW/GREEN DYE TABLET
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UPPER FLAMMABLE LIMIT NOT APPLICABLE
LOWER FLAMMABLE LIMIT NOT APPLICABLE
AUTO-IGNITION TEMPERATURE NOT APPLICABLE
HAZARDOUS COMBUSTION PRODUCTS NOT APPLICABLE
UNUSUAL FIRE HAZARD BURNING MAY PRODUCE CARBON MONOXIDE,
CARBON DIOXIDE, OXIDES OF NITROGEN OR
AMMONIA, AND/OR HYDROGEN CHLORIDE
GAS.

EXPLOSION DATA

SENSITIVITY TO STATIC
DISCHARGE NOT APPLICABLE
SENSITIVITY TO MECHANICAL
IMPACT NOT APPLICABLE

REACTIVITY DATA

PRODUCT STABILITY STABLE
PRODUCT INCOMPATIBILITY NONE KNOWN
CONDITIONS OF REACTIVITY NONE KNOWN
HAZARDOUS DECOMPOSITION PRODUCTS BURNING MAY PRODUCE CARBON
MONOXIDE, CARBON DIOXIDE,
OXIDES OF NITROGEN OR
AMMONIA, AND/OR HYDROGEN
CHLORIDE GAS.

TOXICOLOGICAL PROPERTIES

SYMPTOMS OF OVEREXPOSURE FOR EACH POTENTIAL ROUTE OF ENTRY:
INHALATION, ACUTE NO HARMFUL EFFECTS EXPECTED.
INHALATION, CHRONIC NO HARMFUL EFFECTS EXPECTED.
SKIN CONTACT WILL TEMPORARILY GIVE THE SKIN A
YELLOW/GREEN COLOR.
SKIN ABSORPTION NO HARMFUL EFFECTS EXPECTED.
EYE CONTACT NO HARMFUL EFFECTS EXPECTED.
INGESTION NO HARMFUL EFFECTS EXPECTED. URINE MAY
HAVE A SLIGHT YELLOW/GREEN TINT UNTIL
ALL DYE IS FLUSHED FROM THE SYSTEM.
EFFECTS OF ACUTE EXPOSURE NO HARMFUL EFFECTS EXPECTED.
EFFECTS OF CHRONIC EXPOSURE NO HARMFUL EFFECTS EXPECTED.
THRESHOLD LIMIT VALUE NOT APPLICABLE
CARCINOGENICITY NONE KNOWN
TERATOGENICITY NONE KNOWN
MUTAGENICITY NONE KNOWN
TOXICOLOGICALLY SYNERGISTIC
PRODUCTS NONE KNOWN

PREVENTIVE MEASURES

PERSONAL PROTECTIVE EQUIPMENT:

GLOVES	RUBBER
RESPIRATORY	USE DUST MASK IF NECESSARY TO PREVENT INHALATION OF DUSTS.
CLOTHING	PROTECTIVE CLOTHING WHERE SKIN CONTACT IS UNAVOIDABLE.
OTHER	HAVE ACCESS TO AN EMERGENCY EYEWASH.
ENGINEERING CONTROLS	SUFFICIENT TO PREVENT INHALATION OF DUSTS.
SPILL OR LEAK RESPONSE	SWEEP UP SPILLED MATERIAL AND DISCARD INTO PROPER WASTE CONTAINER. PROVIDE ADEQUATE VENTILATION DURING CLEAN UP. WEAR PROPER RESPIRATORY PROTECTION.
WASTE DISPOSAL	DISPOSE OF WASTE IN ACCORDANCE WITH FEDERAL, STATE, AND LOCAL REGULATIONS.
HANDLING PROCEDURES AND EQUIPMENT	NO SPECIAL REQUIREMENTS.
STORAGE REQUIREMENTS	NOT APPLICABLE
SHIPPING INFORMATION	NOT APPLICABLE

FIRST AID MEASURES

FIRST AID EMERGENCY PROCEDURES:

EYE CONTACT	FLUSH EYES THOROUGHLY WITH LOW PRESSURE WATER. GET MEDICAL ATTENTION IF IRRITATION RESULTS.
SKIN CONTACT	WASH SKIN THOROUGHLY WITH SOAP AND WATER.
INHALATION	NO HARMFUL EFFECTS EXPECTED.
INGESTION	DRINK PLENTY OF WATER. SEEK MEDICAL ATTENTION IF LARGE AMOUNTS WERE INGESTED OR IF NAUSEA OCCURS.

SPECIAL NOTICE

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END OF MATERIAL SAFETY DATA SHEET

MATERIAL SAFETY DATA SHEET

U. S. DEPARTMENT OF LABOR "ESSENTIALLY SIMILAR" TO FORM 158-005-4

SECTION I			
MANUFACTURER'S NAME	Continental Products of Texas	EMERGENCY TELEPHONE NO. (915) 337-4681	
ADDRESS	Box 3627 - Odessa, Texas 79760		
CHEMICAL NAME AND SYNONYMS	Zinc Organic Phosphonate	TRADE NAME AND SYNONYMS	Antipol 662
CHEMICAL FAMILY	Metal Organic	FORMULA	Zn _x C _x H _x (PO ₄) _x

SECTIONS II HAZARDOUS INGREDIENTS							
INGREDIENT	%	SPECIES	LD ₅₀		LC ₅₀		
			ORAL	DERMAL	CONCENTRATION	HOURS	
POTENTIALLY TOXIC INGREDIENTS						%	TLV (UNITS)

SECTION III PHYSICAL DATA			
BOILING POINT (°F.)	None	SPECIFIC GRAVITY (H ₂ O=1)	No.
VAPOR PRESSURE (MM HG.)	None	PERCENT VOLATILE BY VOLUME (%)	No.
VAPOR DENSITY (AIR = 1)	None	EVAPORATION RATE (AIR = 1)	No.
SOLUBILITY IN WATER	100		
APPEARANCE AND ODOR	White Powder		

SECTION IV FIRE AND EXPLOSION HAZARD DATA			
FLASH POINT (METHOD USED)	None	FLAMMABLE LIMITS	LEL UEL
EXTINGUISHING MEDIA	None		
SPECIAL FIRE FIGHTING PROCEDURES	None		
UNUSUAL FIRE AND EXPLOSION HAZARDS	None		

SECTION V HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE

EFFECTS OF OVEREXPOSURE **None**

EMERGENCY AND FIRST AID PROCEDURES **None**

SECTION VI REACTIVITY DATA

STABILITY

UNSTABLE

CONDITIONS TO AVOID

STABLE

X

INCOMPATIBILITY (MATERIALS TO AVOID)

HAZARDOUS DECOMPOSITION PRODUCTS

HAZARDOUS
POLYMERIZATION

MAY OCCUR

CONDITIONS TO AVOID

WILL NOT OCCUR

X

SECTION VII SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

None

WASTE DISPOSAL METHOD

Regular Waste

SECTION VIII SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (SPECIFY TYPE)

VENTILATION

LOCAL EXHAUST

SPECIAL

MECHANICAL (GENERAL)

OTHER

PROTECTIVE GLOVES **Np**

EYE PROTECTION **Safety Glasses**

OTHER PROTECTIVE EQUIPMENT **Dust Respirator**

SECTION IX SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING **None**

OTHER PRECAUTIONS **None**

ISSUED: **6-8-77**

Continental Products of Texas

J. D. Crawford
J. D. CRAWFORD, VICE PRESIDENT

**APPENDIX C
PROPOSED SOIL REMEDIATION
SITE PROCEDURES**

Procedures for Operation of the SRS

- 1.) Soil containing hydrocarbons is generated and transported to the SRS. All sources of soils to be disposed of at the SRS must be approved by Compliance Engineering.
- 2.) Identify the cell and area within the cell where the activity will take place.
- 3.) Begin the site documentation, using the Soil Remediation Site Form.
- 4.) Perform the desired activity as follows:

Dumping--Soil is to be deposited on fresh ground. As the cell is filled, the occupied area shall be roped off or marked by some other approved means.

Spreading--Spread soil in a 6-inch layer on fresh ground.

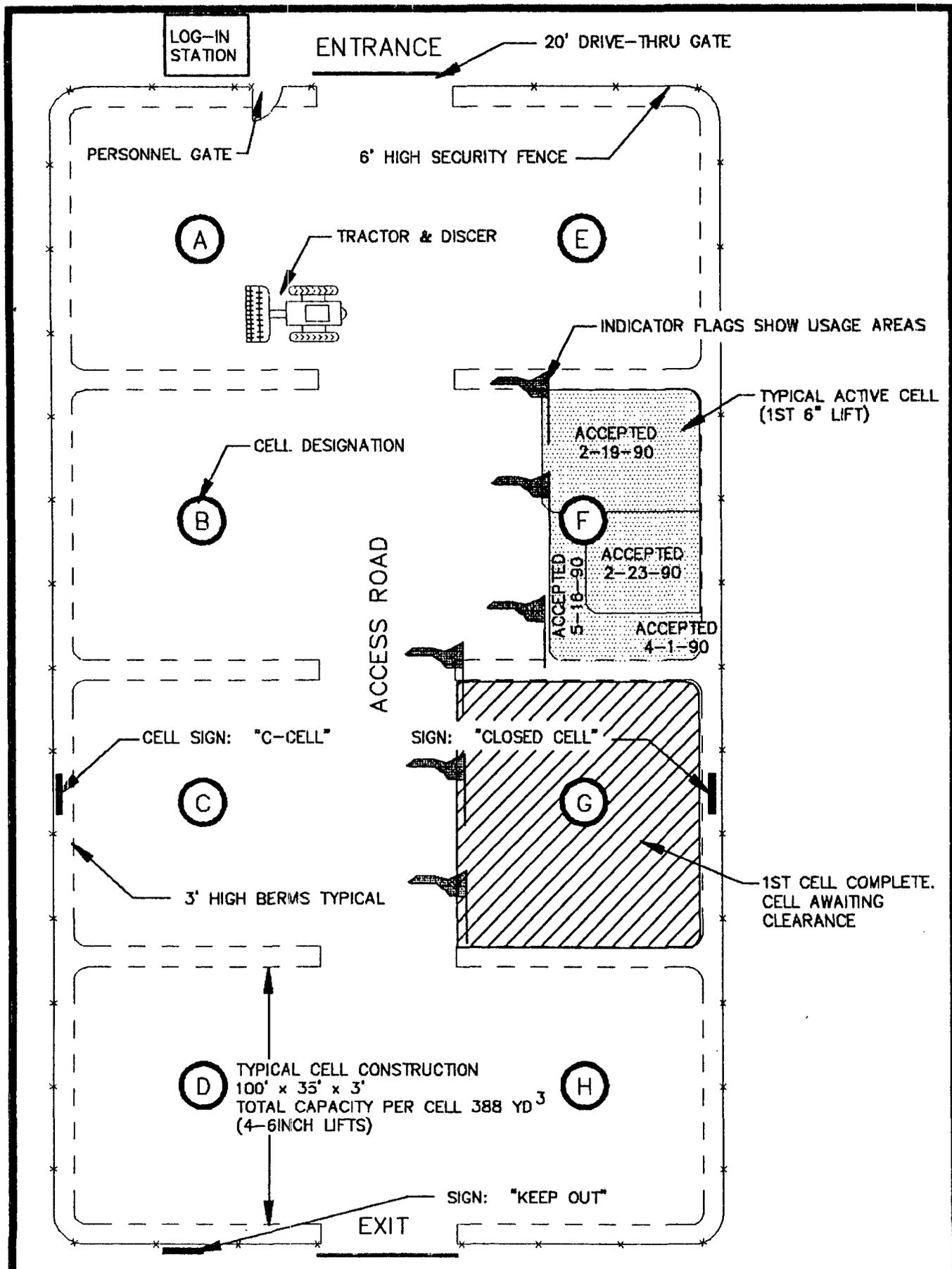
Discing--Soil is to be disced a minimum of twice a month, not to exceed 20 days from the previous discing.

Close--When the Administrator deems that a cell is full, it will be closed to further dumping. Compliance Engineering will be notified and will coordinate the sampling.

Sampling--Sampling is to occur after a cell has been deemed full and therefore closed. Sampling protocol will be according to the attached sampling plan.

Open--A cell will be reopened only after sample results have been received, evaluated, and approved by Compliance Engineering.

- 5.) Each cell will have a sign indicating its status (i.e. open, closed, etc.). In addition, the area within the cell will be marked to identify areas already occupied by contaminated soil.
- 6.) The SRS forms for each cell will be maintained on site. The forms will be forwarded to Compliance Engineering at the time of cell closure or the end of every month, whichever is sooner.
- 7.) The facility shall be audited by EPNG's Environmental Affairs department or an authorized representative.
- 8.) The SRS will have an administrator assigned to the facility. The administrator will be responsible for monitoring all of the activities listed in Item 4 and will be the main contact with Compliance Engineering.



**BLOCK FLOW
DIAGRAM
PROCESS PLANT**



**EL PASO
NATURAL GAS
CHACO PLANT**

Figure
No.
1

SOIL REMEDIATION SITE FORM

GENERAL INFORMATION

DATE OF ACTIVITY _____

TIME OF ACTIVITY _____

PLACE OF ACTIVITY - CELL #: _____

(circle) ACTIVITY: DUMP - SPREAD - DISC - SAMPLE - CLOSE - OPEN

ACTIVITY PERFORMED BY:

_____ NAME

_____ DEPT

_____ COMPANY

DUMPING INFORMATION

DESCRIPTION OF THE SOURCE OF THE SOIL: _____

LOCATION OF THE SOURCE OF THE SOIL: _____

AREA: _____

PIPELINE DISTRICT/PLANT: _____

WELL SITE/AREA WITHIN PLANT: _____

GEOGRAPHIC LOCATION: _____ SEC. _____ T. _____ R.

APPROXIMATE AMOUNT OF SOIL DISPOSED: _____ yd³

WHERE WITHIN THE CELL THE SOIL WAS DUMPED: NW SW NE SE

WORK ORDER NUMBER: _____

SAMPLING INFORMATION

SAMPLE NUMBER _____

DESCRIPTION OF SAMPLING EFFORT: _____

SITE MAP: IDENTIFY THE AREA WITHIN THE CELL WHERE THE ACTIVITY TOOK PLACE BY SHADING IN A DEFINED SPACE.

CELL #: _____

Drawn to Scale: 1" = 10' (example)