GW - 31

GENERAL CORRESPONDENCE

YEAR(S):

1996 - 1980

SANTA FE / REGION

INSIDE:
El DIARIO
WEATHER
DEATHS

A powering inferno: For scientists, the heat is on

By KEITH EASTHOUSE
The New Mexican

Fenton Hill, a remote 8,700-foot peak in the Jemez Mountains, is snowy and raked with bitter winds this time of year. But 12,000 feet below its frigid exterior lies a layer of hot bedrock that could be one of the keys to the nation's energy future.

A team of Los Alamos National Laboratory scientists studying at a Fenton Hill station sees in that bedrock one of science's most compelling dreams: a clean and virtually inexhaustible energy supply. The bedrock is widespread in the West.

They already have demonstrated that it's possible to drill holes in the ground and harvest the heat energy contained in the rock with a minimum of pollution.

They also have documented that the amount of energy theoretically available through what is called "hot dry rock" technology dwarfs the amount of energy contained in known deposits of fossil fuels like oil and natural gas.

Now they're about to take on a new challenge: They want to prove that the energy, which comes to the surface in the form of heated water, can be produced over a period of months, or even years — a crucial hurdle that must be overcome if the technology is to become economically feasible for private industry. The record at Fenton Hill is 30 days.

Called the "long-term flow test," this critical phase of the lab's hot dry rock project is scheduled to begin this week and could literally make or break the technology.

"The long-term flow test is one of the key elements in getting hot dry rock technology in shape," said Alan Jelacic of the U.S. Department of Energy's geothermal division in Washington, D.C. "If they (Los Alamos scientists) can demonstrate that energy in the form of heated water can be produced over the long haul, then private industry may have an incentive to get involved and the technology will probably have a bright future."

And if the test fails?

"Then it would paint a bad picture for the future of hot dry rock in Los Alamos and elsewhere," Jelacic said.

The technology is called hot dry rock to distinguish it from conventional geothermal energy, which taps into existing hot underground water reservoirs.

Hot dry rock technology creates its own underground reservoir by sending pressurized water down an injection well directly into the bedrock, which is heated to temperatures of 450 degrees Fahrenheit and higher by the Earth's molten core and by natural radioactive decay.

After the water has heated up through contact with the rock, a process that typically takes 12 hours, it is then pumped back through another well to the surface. There it can be converted into steam and ultimately into electricity.

Los Alamos' hot dry rock project, which has received about $160 million from the Energy Department over its 17-year lifetime, will be the focus of a conference next weekend in Los Alamos and Santa Fe.

The participants will include the leading scientists in the field, members of the energy industry, and federal and state energy officials.

The purpose of the conference, according to its organizer, former U.S. Interior Secretary Stewart Udall, is to raise awareness about the Los Alamos project and geothermal heat technology in general. In a telephone interview from his Santa Fe home, Udall said the technology is so promising that "at first blush, it might seem to be science fiction."

He said the technology is the sort of project LANL, still primarily a nuclear weapons research facility, needs to become more involved with in the post-Cold War era. "If (the lab) has a future, this is it," Udall said.

Udall also said the Energy Department should devote more resources to promising alternative energy technologies such as hot dry rock. DOE funding for Los Alamos' hot dry rock project has fallen from $5 million in 1988 to $3.2 million in the current fiscal year.

That's only enough to keep the long-term flow test going three months, according to David Duchane, the program manager for the Los Alamos geothermal energy program. For the test to have any real value, Duchane said it needs to last for a minimum of one to two years. He said that the lab hopes the Department of Energy will provide additional funds once it sees the flow test is succeeding.

According to Duchane, hot dry rock has a couple of important advantages over conventional geothermal energy, which has been put to commercial use on the West Coast.

One is that it produces heated water that contains only small amounts of mineral deposits. The water brought to the surface by conventional geothermal energy has been underground for thousands of years and contains large amounts of solids that must be separated from the water before the water can be made into steam.

"There is essentially no waste products with hot dry rock," aside from small amounts of carbon dioxide and hydrogen sulfide gas, Duchane said.

Another advantage hot dry rock has is that the same water is circulated over and over again, while conventional geothermal plants must shut once the underground reservoir has been tapped out.

Additionally, the hot bedrock is found almost anywhere, while natural underground water reservoirs are limited in number.

There is so much hot bedrock in the world that the amount of energy that theoretically could be tapped in the United States alone is 10 million quads. In comparison, the amount of energy available worldwide in all known forms of fossil fuels is 360,000 quads. Three hundred quads is the amount of energy consumed worldwide in a year. A quad is a measurement of energy.

Duchane said in a 1990 paper that hot dry rock "represents an untapped resource which could contribute to energy security for literally thousands of years."

An important factor in hot dry rock technology is how deep the hot bedrock is. If the temperature gradient between the surface and the rock below is large enough —. say 125 degrees Fahrenheit per mile — then the needed hot rock is easily within reach of available drilling technology.

Such a temperature gradient exists in about 2 percent of the land mass of the United States. Much of that land — approximately 38,000 square miles — is located in the West.

With current technology, hot dry rock could be economically competitive with other forms of energy, Duchane said. For example, at a gradient of 240 degrees Fahrenheit per mile, the temperature gradient at Fenton Hill, electricity produced by hot dry rock could be sold wholesale at 5 to 6 cents per kilowatt-hour.

That's roughly equivalent to the price of energy produced by coal-fired electric plants, and it is cheaper than electrical energy from nuclear power plants. However, it is more expensive than natural gas, which is going for as little as 3 to 4 cents per kilowatt-hour.

The price of electricity from hot dry rock could be even cheaper if credit were to be given for the fact that the energy-generation system produces minimal amounts of carbon dioxide and other pollutants. Federal and state governments have talked about applying such pollution credits on electric utilities but have not yet done so.

Even in areas where the temperature gradients are small and the hot rock located at a great depth, hot water still could be brought to the surface simply by drilling deeper, Duchane said. He also said that in areas where the rock is not hot enough to make steam for electricity, it could be used to heat homes.

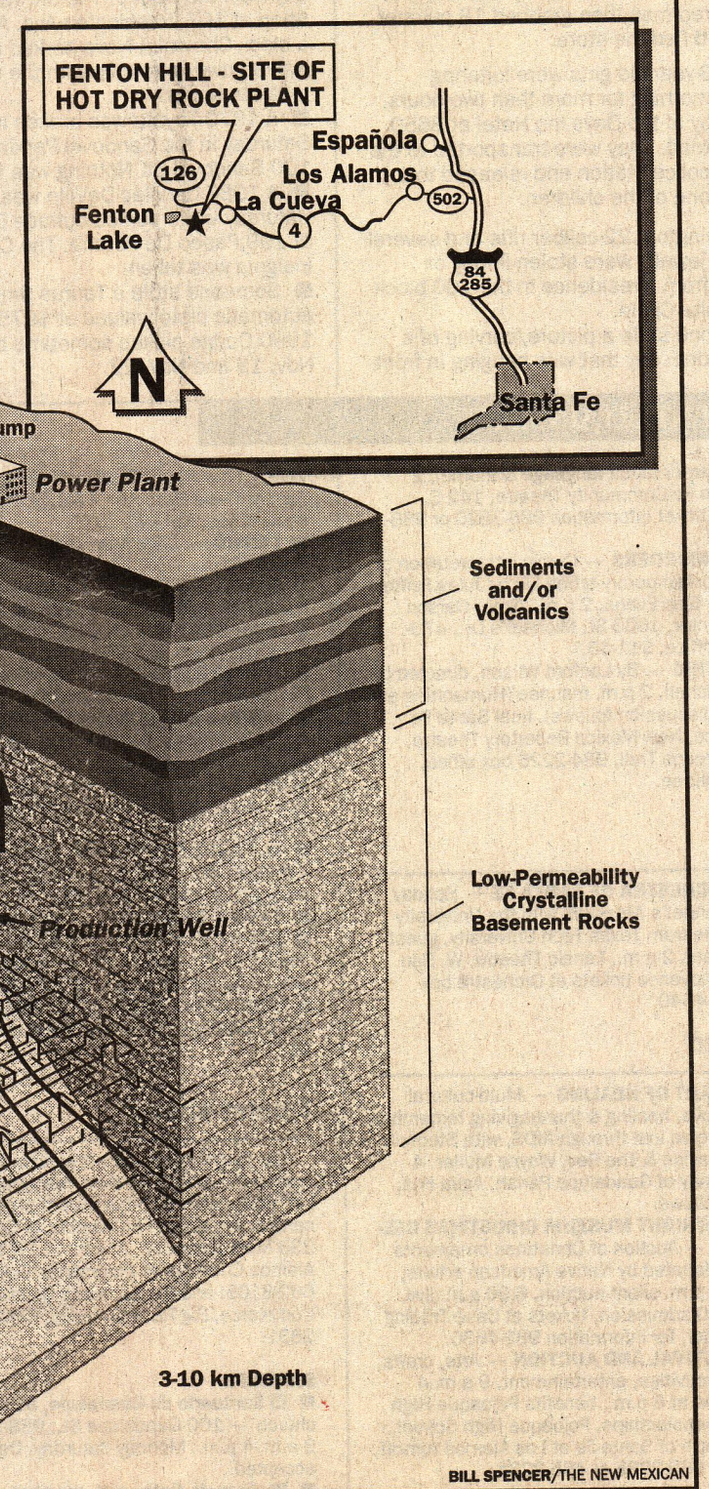
Hot dry rock is not without it's problems, however.

For one thing, while a hot dry rock plant would be a closed system, circulating the same water over and over again, it requires an initial source of water. That means that a hot dry rock plant must be able to find and pay for a water source, not always an easy thing in the arid West.

Additionally, drilling and equipment failure costs can be high because the rock being drilled is hot and hard. Hard rock is preferable to sedimentary rock because it usually retains the water injected into it. Water retention in

Please see **HOT**, Page B-4

The Los Alamos Hot Dry Rock Geothermal Energy Project



BILL SPENCER/THE NEW MEXICAN

'If (LANL) has a future, this is it.'

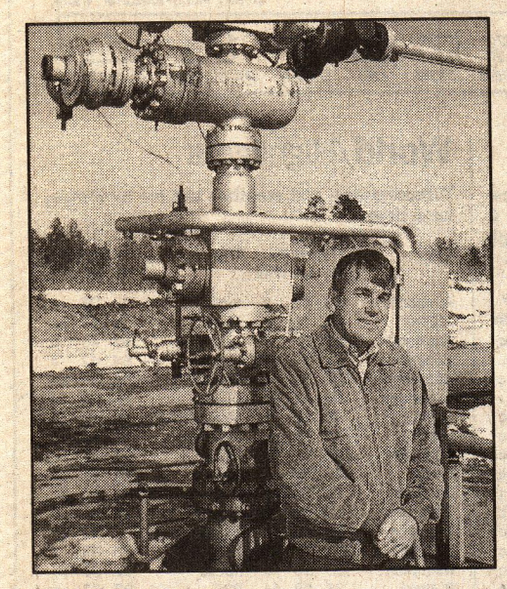
Stewart Udall
former U.S. Interior Secretary

'Unless hot dry rock can be proven to be a predictable source of energy over the long haul, over a period of several years, it won't get off the ground.'

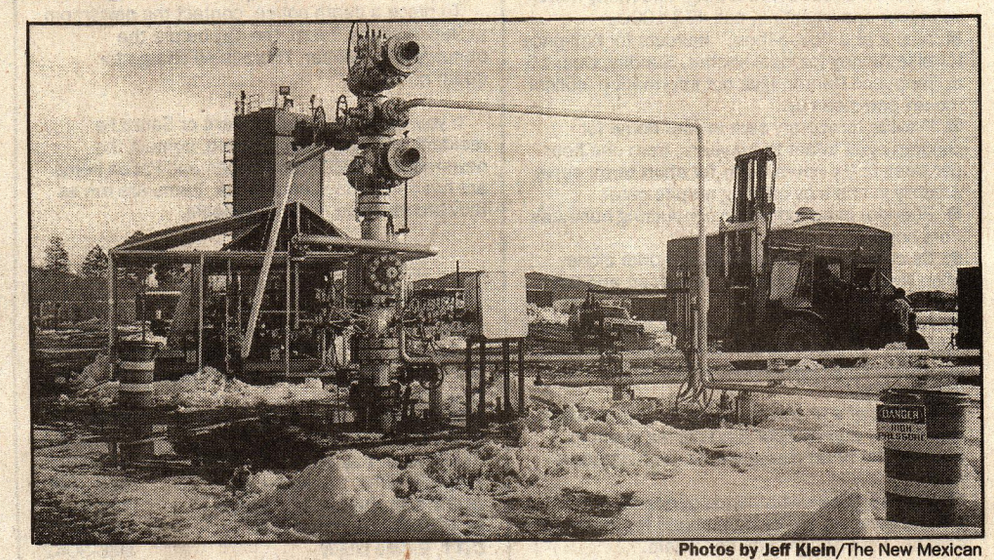
Alan Jelacic
U.S. Department of Energy

'This is not pie-in-the-sky stuff. It will happen, and it will take less than decades.'

Gerald Huttrer
geologist



DAVID DUCHANE
'Essentially no waste products.'



Photos by Jeff Klein/The New Mexican

Foreground, the 12,000-foot-deep well at Fenton Hill in the Jemez Mountains used by scientists from Los Alamos National Laboratories.

HOT

Continued from Page B-1

sedimentary rock is poor because the rock, even at great depths, tends to be porous.

"If you pump into sedimentary rock, it'll just drain away," Duchane said.

That can sometimes happen with hard rock, as scientists at Fenton Hill discovered in the early 1980s when large quantities of the injected water flowed out of reach of the retrieving well.

The reason was that the rock, which fractures when exposed to the highly pressurized water, didn't fracture in the way that lab scientists had predicted. The water also may have flowed along natural stress lines that the scientists weren't aware of, Duchane said.

Drillers were forced to move the bottom of the retrieval well to find the water. But Duchane said the difficulty helped develop a new technology: the use of seismic detectors on the wells, which can pinpoint the micro-earthquakes that injecting water into the bedrock creates.

With the aid of state-of-the-art computers, these seismic detectors can map the micro-earthquakes and give researchers a map of the underground reservoir.

The micro-earthquakes caused by water injection have led some to wonder whether a major earthquake could occur. Duchane said that while "that cannot be ruled out theoretically," scientists have found no evidence that such an event might occur.

The technology also has had problems with water flowing too fast into the retrieving well and not getting enough of a chance to heat up to a high temperature.

The long-term flow test that begins this week does not have to create an underground reservoir. Such a reservoir, equivalent in size to 750 million cubic feet of rock, already exists thanks to the work in the early and mid-1980s.

What the test must demonstrate is that it can bring to the surface very hot water — in the neighborhood of 400 degrees Fahrenheit — over a sustained period of time before the rock cools to the point that it can't heat the water adequately anymore.

Without such a demonstration, private sector investment — critical to any new technology — will not be forthcoming.

"Unless hot dry rock can be proven to be a predictable source of energy over the long haul, over a period of several years, it won't get off the ground," Jelacic said. "It's got to be predictable so that a guy who wants to build a plant can confidently take out a bank loan, knowing that he won't lose his shirt."

Gerald Huttrer, a geologist who runs his own geothermal firm in Denver, agrees that hot dry rock has many hurdles to overcome. But he is convinced that the technology ultimately will be seen as feasible by private industry.

"This is not pie-in-the-sky stuff," Huttrer said. "It will happen, and it will take less than decades."

Los Alamos
NATIONAL LABORATORY

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

Date: December 18, 1996
In Reply Refer To: ESH-18/WQ&H:96-0639
Mail Stop: K497
Telephone: (505) 667-7969

Mark Ashley
Oil Conservation Division
2040 South Pacheco Street
Santa Fe, New Mexico 87505

SUBJECT: ANALYTICAL RESULTS FROM THE SPILL AT FENTON HILL ON NOVEMBER 22, 1996

Dear Mr. Ashley:

Enclosed are the analytical results and a summary table for samples collected from the water course at Fenton Hill following the November 22, 1996, spill of a cement/mud slurry from Los Alamos National Laboratory's Hot Dry Rock (HDR) Geothermal Facility (facility).

A solids sample was collected from the water course approximately 1000 feet below the facility's perimeter fence and analyzed for TCLP metals. The analytical results show that the solids deposited in the water course as a result of the spill do not fit the RCRA definition of a hazardous waste (See Table 1.).

Two water samples were collected from the water course following the spill: One sample, collected approximately 750 feet below the facility's perimeter fence, was very turbid from suspended solids; The second sample, collected 50 feet below the fence, was clear with most of the solids having settled out. Analysis of these samples was conducted for total metals without any sample filtering. The results show, as expected, that the sample with the high suspended solids content contained elevated concentrations of total metals while the total metals concentrations in the clear sample were near or below laboratory detection limits (See Table 1.).

Please feel free to contact me at 667-7969 if you have questions or concerns regarding these analytical results.

Sincerely,

Bob Beers
Water Quality and Hydrology Group

BB/em

Enclosures: a/s

Cy: S. Boyce, Acting District Ranger , Jemez Ranger District, Santa Fe National Forest, w/enc.
G. Saums, NMED SWQB, w/enc., Santa Fe, New Mexico
B. Hoditschek, NMED SWQB, w/enc., Santa Fe, New Mexico
D. Krier, EES-1, w/enc., MS D462
J. Albright, EES-4, w/enc., MS D443
J. Thomson, EES-4, w/enc., MS D443
D. Thomas, EES-DO, w/enc., MS D446
B. Koch, DOE/LAAO, w/enc., MS A316
S. Rae, ESH-18, w/o enc., MS K497
N. Williams, ESH-18, w/enc, MS K497
M. Saladen, ESH-18, w/enc., MS K497
M. Alexander, ESH-18, w/ enc., MS K497
WQ&H File, w/enc., MS K497
CRM-4, w/enc., MS A150

Los Alamos National Laboratory

Fenton Hill Hot Dry Rock Geothermal Facility
November 22, 1996, Spill Data

Table 1.

Sample Type	Sample Location	pH	TCLP Metals (mg/L) Pb	As	Ba	Cd	Cr	Hg	Se	Ag
Solids(a)	1000' below fence	12.1	<0.1	0.7	<0.5	0.011	0.05	<0.002	<0.05	<0.04
RCRA TCLP Limits		*12.5*	*5*	*5*	*100*	*1*	*6*	*0.2*	*0.7*	*0.5*

(a) Sample ID: Fenton Hill Stream Channel

Sample Type	Sample Location	pH	Total Metals (mg/L) AL	As	Ba	Be	Hg	Cd	Cr	Co	Pb	Cu	Sb	Se	V	Zn
Clear Water(a)	50' below fence	8.7	<0.5	0.06	0.31	<0.001	<0.0002	<0.004	0.006	<0.01	<0.002	<0.01	<0.03	<0.005	0.009	<0.1
Turbid Water(b)	750' below fence	**11.9**	**13.8**	**0.51**	0.94	0.011	0.0018	0.017	0.22	0.07	**0.87**	0.18	0.16	**0.08**	0.085	0.2
NM WQCC Livestock Watering Standards		*6 to 9*	*5*	*0.2*	*NA*	*NA*	*0.01*	*0.05*	*1.0*	*1.0*	*0.1*	*0.5*	*NA*	*0.05*	*0.1*	*25*
		6.9		.1	1		.002	.01	.05			1				10

Note: NM WQCC Stream Standards are for dissolved concentrations, with the exception of Hg.

(a) Sample ID: Fenton Hill @ HDR Fence
(b) Sample ID: Fenton Hill Below HDR Fence

ASSAIGAI ANALYTICAL LABORATORIES, INC.
7300 Jefferson, N.E. • Albuquerque, New Mexico 87109 • (505) 345-8964 • FAX (505) 345-7259
3332 Wedgewood, E-5 • El Paso, Texas 79925 • (915) 593-6000 • FAX (915) 593-7820

LOS ALAMOS NATIONAL LABS
PO BOX 1663-MSK497
LOS ALAMOS, NM 87545

Attn: BOB BEERS

Purchase Order: 032BDSML6-8H
Invoice Number:

Order #: 96-11-221
Date: 12/06/96 14:34
Work ID: FENTON HILL SPILL
Date Received: 11/26/96
Date Completed: 12/06/96

Client Code: LOS10

SAMPLE IDENTIFICATION

Sample Number	Sample Description	Sample Number	Sample Description
01	FENTON HILL STREAM CHANNEL	03	FENTON HILL BELOW HDR FENC
02	FENTON HILL POND WATER	04	FENTON HILL @ HDR FENCE

ND = None Detected D_F = Dilution Factor NT = Not Tested
B = Analyte was present in the blank
E = Estimated Value or Result exceeds calibration range
MULTIPLY THE LIMIT(= AAL'S DETECTION LIMIT) BY DILUTION FACTOR

Certified By
FRED L. SHORE, Ph.D.

Received: 11/26/96 Results By Test

TEST CODE default units	Sample 01 (entered units)	Sample 02 (entered units)	Sample 03 (entered units)	Sample 04 (entered units)
PRCTSX % (Percent)	100.00			
TCLPXX N/A	11/26/96			
TCVHGX N/A	11/27/96			
TICPX N/A	11/27/96			
W6010X N/A		11/27/96	11/27/96	11/27/96
WCVHGX N/A		11/27/96	11/27/96	11/27/96
WGFAAX N/A		11/27/96	11/27/96	11/27/96

Received: 11/26/96 Results by Sample

SAMPLE ID **FENTON HILL STREAM CHANNEL** FRACTION 01A TEST CODE SPH NAME pH/SW846 9045B

Date & Time Collected 11/21/96 14:00:00 Category SOLID

PARAMETER	RESULT	LIMIT	D_F	DATE_ANAL
pH	12.1	0.10	1.0	11/27/96

Notes and Definitions for this Report:

EXTRACTED

ANALYST CJ

UNITS pH Units

BATCH_ID SPH246

COMMENTS

Received: 11/26/96 Results by Sample

SAMPLE ID **FENTON HILL STREAM CHANNEL** FRACTION 01A TEST CODE TCLPPB NAME TCLP LEAD(FAA)/1311/7420
Date & Time Collected 11/21/96 14:00:00 Category SOLID

PARAMETER	RESULT	LIMIT	D_F	DATE_EXT	DATE_ANAL
Lead, Pb	ND	0.10	1.0	11/27/96	12/02/96

Notes and Definitions for this Report:

ANALYST CD
UNITS mg/L
BATCH_ID M96169
COMMENTS

Received: 11/26/96 Results by Sample

SAMPLE ID **FENTON HILL STREAM CHANNEL** FRACTION 01A TEST CODE TICP NAME TCLP METALS/1311/SW8466010

Date & Time Collected 11/21/96 14:00:00 Category SOLID

PARAMETER	RESULT	LIMIT	D_F	DATE_EXT	DATE_ANAL
Arsenic, As	0.7	0.40	1.0	11/27/96	11/29/96
Barium, Ba	ND	0.50	1.0	11/27/96	11/28/96
Cadmium, Cd	0.011	0.0050	1.0	11/27/96	11/27/96
Chromium, Cr	0.05	0.020	1.0	11/27/96	11/27/96
Lead, Pb	NT	0.050			
Mercury, Hg	ND	0.0020	1.0	11/27/96	11/29/96
Selenium, Se	ND	0.050	1.0	11/27/96	11/27/96
Silver, Ag	ND	0.040	1.0	11/27/96	11/27/96

Notes and Definitions for this Report:

ANALYST KH

UNITS mg/L

BATCH_ID M96171,M96169

TCLP_XT_DATE

Received: 11/26/96 Results by Sample

SAMPLE ID **FENTON HILL BELOW HDR FENC** FRACTION 03A TEST CODE W6010 NAME METALS-ICP/SW846 6010
Date & Time Collected 11/21/96 14:20:00 Category WATER

PARAMETER	RESULT	LIMIT	D_F	DATE_EXT	DATE_ANAL
Silver, Ag	ND	0.020	1.0	11/27/96	11/27/96
Aluminum, Al	13.8	0.50	1.0	11/27/96	11/27/96
Arsenic, As	0.51	0.060	1.0	11/27/96	11/28/96
Barium, Ba	0.94	0.010	1.0	11/27/96	11/28/96
Beryllium, Be	0.011	0.0010	1.0	11/27/96	11/27/96
Calcium, Ca	NT	0.30			
Cadmium, Cd	0.017	0.0040	1.0	11/27/96	11/27/96
Cobalt, Co	0.07	0.010	1.0	11/27/96	11/27/96
Chromium, Cr	0.22	0.020	1.0	11/27/96	11/27/96
Copper, Cu	0.18	0.010	1.0	11/27/96	11/27/96
Iron, Fe	21.0	0.30	1.0	11/27/96	11/27/96
Potassium, K	122	0.20	1.0	11/27/96	11/27/96
Magnesium, Mg	4.3	0.20	1.0	11/27/96	11/27/96
Manganese, Mn	NT	0.0050			
Sodium, Na	NT	0.30			
Nickel, Ni	0.07	0.040	1.0	11/27/96	11/27/96
Lead, Pb	NT	0.040			
Antimony, Sb	0.16	0.030	1.0	11/27/96	11/27/96
Selenium, Se	0.08	0.050	1.0	11/27/96	11/27/96
Vanadium, V	0.085	0.0030	1.0	11/27/96	11/27/96
Zinc, Zn	0.2	0.10	1.0	11/27/96	11/27/96

Notes and Definitions for this Report:

ANALYST KH
UNITS mg/L
BATCH_ID M96168

Received: 11/26/96 Results by Sample

SAMPLE ID **FENTON HILL BELOW HDR FENC** FRACTION **03A** TEST CODE **WCVHG** NAME **MERCURY (CVAA)/EPA 245.1**

Date & Time Collected **11/21/96 14:20:00** Category **WATER**

PARAMETER	RESULT	LIMIT	D_F	DATE_EXT	DATE_ANAL
Mercury	0.0018	0.00020	1.0	11/27/96	11/29/96

Notes and Definitions for this Report:

ANALYST CD

UNITS mg/L

BATCH_ID M96171

COMMENTS

Received: 11/26/96 Results by Sample

SAMPLE ID **FENTON HILL BELOW HDR FENC** FRACTION 03A TEST CODE **WFAAAG** NAME SILVER (FAA)/EPA 272.1
Date & Time Collected 11/21/96 14:20:00 Category **WATER**

PARAMETER	RESULT	LIMIT	D_F	DATE_EXT	DATE_ANAL
Silver, Ag	ND	0.010	1.0	11/27/96	12/05/96

Notes and Definitions for this Report:

ANALYST CD
UNITS mg/L
BATCH_ID M96168
COMMENTS

Received: 11/26/96 Results by Sample

SAMPLE ID **FENTON HILL BELOW HDR FENC** FRACTION **03A** TEST CODE **WFAACA** NAME **CALCIUM (FAA)/EPA 215.1**
Date & Time Collected **11/21/96 14:20:00** Category **WATER**

PARAMETER	RESULT	LIMIT	D_F	DATE_EXT	DATE_ANAL
Calcium, Ca	978	1.0	200	11/27/96	12/02/96

Notes and Definitions for this Report:

ANALYST CD
UNITS mg/L
BATCH_ID M96168
COMMENTS

Received: 11/26/96 Results by Sample

SAMPLE ID **FENTON HILL BELOW HDR FENC** FRACTION **03A** TEST CODE **WFAANA** NAME **SODIUM (FAA)/EPA 273.1**

Date & Time Collected **11/21/96 14:20:00** Category **WATER**

PARAMETER	RESULT	LIMIT	D_F	DATE_EXT	DATE_ANAL
Sodium, Na	2260	1.0	200	11/27/96	12/02/96

Notes and Definitions for this Report:

ANALYST CD

UNITS mg/L

BATCH_ID M96168

COMMENTS

Received: 11/26/96 Results by Sample

SAMPLE ID **FENTON HILL BELOW HDR FENC** FRACTION **03A** TEST CODE **WGFPB** NAME **LEAD (GFAA)/EPA 239.2**
Date & Time Collected **11/21/96 14:20:00** Category **WATER**

PARAMETER	RESULT	LIMIT	D_F	DATE_EXT	DATE_ANAL
Lead, Pb	0.87	0.0020	10	11/27/96	12/04/96

Notes and Definitions for this Report:

ANALYST CD
UNITS mg/L
BATCH_ID M96167
COMMENTS

Received: 11/26/96 Results by Sample

SAMPLE ID **FENTON HILL BELOW HDR FENC** FRACTION **03A** TEST CODE **WGFTL** NAME **THALLIUM (GFAA) EPA 279.2**

Date & Time Collected **11/21/96 14:20:00** Category **WATER**

PARAMETER	RESULT	LIMIT	D_F	DATE_EXT	DATE_ANAL
Thallium, Tl	ND	0.0020	1.0	11/27/96	12/03/96

Notes and Definitions for this Report:

ANALYST CD
UNITS mg/L
BATCH_ID M96167
COMMENTS

SAMPLE ID FENTON HILL @ HDR FENCE FRACTION 04A TEST CODE W6010 NAME METALS-ICP/SW846 6010
Date & Time Collected 11/21/96 14:20:00 Category WATER

PARAMETER	RESULT	LIMIT	D_F	DATE_EXT	DATE_ANAL
Silver, Ag	ND	0.020	1.0	11/27/96	11/27/96
Aluminum, Al	ND	0.50	1.0	11/27/96	11/27/96
Arsenic, As	0.06	0.060	1.0	11/27/96	11/28/96
Barium, Ba	0.31	0.010	1.0	11/27/96	11/28/96
Beryllium, Be	ND	0.0010	1.0	11/27/96	11/27/96
Calcium, Ca	87.3	0.30	1.0	11/27/96	11/27/96
Cadmium, Cd	ND	0.0040	1.0	11/27/96	11/27/96
Cobalt, Co	ND	0.010	1.0	11/27/96	11/27/96
Chromium, Cr	ND	0.020	1.0	11/27/96	11/27/96
Copper, Cu	ND	0.010	1.0	11/27/96	11/27/96
Iron, Fe	ND	0.30	1.0	11/27/96	11/27/96
Potassium, K	19.2	0.20	1.0	11/27/96	11/27/96
Magnesium, Mg	10.7	0.20	1.0	11/27/96	11/27/96
Manganese, Mn	0.017	0.0050	1.0	11/27/96	11/27/96
Sodium, Na	217	0.30	1.0	11/27/96	11/27/96
Nickel, Ni	ND	0.040	1.0	11/27/96	11/27/96
Lead, Pb	ND	0.040	1.0	11/27/96	11/27/96
Antimony, Sb	ND	0.030	1.0	11/27/96	11/27/96
Selenium, Se	ND	0.050	1.0	11/27/96	11/27/96
Vanadium, V	0.009	0.0030	1.0	11/27/96	11/27/96
Zinc, Zn	ND	0.10	1.0	11/27/96	11/27/96

Notes and Definitions for this Report:

ANALYST KH
UNITS mg/L
BATCH_ID M96168

Received: 11/26/96 Results by Sample

SAMPLE ID **FENTON HILL @ HDR FENCE** FRACTION **04A** TEST CODE **WCVHG** NAME **MERCURY (CVAA)/EPA 245.1**

Date & Time Collected **11/21/96 14:20:00** Category **WATER**

PARAMETER	RESULT	LIMIT	D_F	DATE_EXT	DATE_ANAL
Mercury	ND	0.00020	1.0	11/27/96	11/29/96

Notes and Definitions for this Report:

ANALYST CD

UNITS mg/L

BATCH_ID M96171

COMMENTS

Received: 11/26/96 Results by Sample

SAMPLE ID FENTON HILL @ HDR FENCE FRACTION 04A TEST CODE WFAAAG NAME SILVER (FAA)/EPA 272.1

Date & Time Collected 11/21/96 14:20:00 Category WATER

PARAMETER	RESULT	LIMIT	D_F	DATE_EXT	DATE_ANAL
Silver, Ag	ND	0.010	1.0	11/27/96	12/05/96

Notes and Definitions for this Report:

ANALYST CD

UNITS mg/L

BATCH_ID M96168

COMMENTS

Received: 11/26/96 Results by Sample

SAMPLE ID **FENTON HILL @ HDR FENCE** FRACTION 1A TEST CODE **WGFPB** NAME LEAD (GFAA)/EPA 239.2

Date & Time Collected **11/21/96 14:20:00** Category **WATER**

PARAMETER	RESULT	LIMIT	D_F	DATE_EXT	DATE_ANAL
Lead, Pb	ND	0.0020	1.0	11/27/96	12/04/96

Notes and Definitions for this Report:

ANALYST ND

UNITS mg/L

BATCH_ID M96167

COMMENTS

Received: 11/26/96 Results by Sample

SAMPLE ID FENTON HILL @ HDR FENCE FRACTION 04A TEST CODE WGFSE NAME SELENIUM (GFAA)/EPA 270.2
Date & Time Collected 11/21/96 14:20:00 Category WATER

PARAMETER	RESULT	LIMIT	D_F	DATE_EXT	DATE_ANAL
Selenium, Se	ND	0.0050	1.0	11/27/96	12/05/96

Notes and Definitions for this Report:

ANALYST CD
UNITS mg/L
BATCH_ID M96168
COMMENTS

Received: 11/26/96 Results by Sample

SAMPLE ID **FENTON HILL @ HDR FENCE** FRACTION **04A** TEST CODE **WGFTL** NAME **THALLIUM (GFAA) EPA 279.2**

Date & Time Collected **11/21/96 14:20:00** Category **WATER**

PARAMETER	RESULT	LIMIT	D_F	DATE_EXT	DATE_ANAL
Thallium, Tl	ND	0.0020	1.0	11/27/96	12/03/96

Notes and Definitions for this Report:

ANALYST CD

UNITS mg/L

BATCH_ID M96167

COMMENTS

Received: 11/26/96 Results by Sample

SAMPLE ID **FENTON HILL @ HDR FENCE** FRACTION **04A** TEST CODE **WMSCMT** NAME **MISC TEST WATER-METALS**

Date & Time Collected **11/21/96 14:20:00** Category **WATER**

ANALYTES	RESULT	LIM
Cr	0.006	0.005

Notes and Definitions for this Report:

DATE_EXT 11/27/96
DATE_ANAL 12/05/96
ANALYST CD
D_F 1.0
UNITS mg/L
BATCH_ID M96167
COMMENTS

Los Alamos
NATIONAL LABORATORY

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

Date: November 26, 1996
In Reply Refer To: ESH-18/WQ&H:96-0602
Mail Stop: K497
Telephone: (505) 667-3040

Mark Ashley
Oil Conservation Division
2040 South Pacheco Street
Santa Fe, New Mexico 87505

Dear Mr. Ashley:

Enclosed is a *Notification of a Spill* report which Los Alamos National Laboratory (Laboratory) is submitting, in accordance with Section 1203. of the New Mexico Water Quality Control Commission (WQCC) Regulations, for a spill of which occurred at the Laboratory's Fenton Hill Hot Dry Rock Geothermal Facility (facility) on November 22, 1996. Please note that this is a revised version of the original spill report which you received by fax on November 22, 1996, at 4:51pm. Revision of the original report (See the section of the form titled "Describe Cause of Problem and Remedial Action") was made to correct an error: The terminal end of the spill is not 150 feet from the confluence with Lake Fork Canyon, as originally indicated, but 150 feet from a *tributary* of Lake Fork Canyon. The distance from the terminal point of the spill to Lake Fork Canyon is approximately 2000 feet. A map has been enclosed to illustrate these distances.

Also enclosed is an e-mail from Jim Thomson (LANL) which defines the quantities and fractions of the materials spilled and Material Safety Data Sheets (MSDS) for each of the materials spilled.

As indicated in the spill report, silt fences along the path of the spill and at its terminal point were installed on Friday, 11/22/96, and Saturday, 11/23/96, in order to control further migration of the spill. Water and solids samples collected on 11/22/96 were submitted for analysis on 11/26/96. The analytical results from these samples will be submitted to your office as soon as they become available.

Please feel free to contact me at 667-7969 if I can provide further information of this spill.

Sincerely,

Bob Beers
Water Quality and Hydrology Group

BB/em

Enclosures: a/s

Cy: S. Boyce, Acting District Ranger , Jemez Ranger District, Santa Fe National Forest, w/enc.
B. Hoditschek, NMED SWQB, Santa Fe, New Mexico, w/enc.
J. Albright, EES-4, w/enc., MS D443
J. Thomson, Lithos & Associates, w/enc.
D. Thomas, EES-DO, w/enc., MS D446
B. Koch, DOE/LAAO, w/enc., MS A316
S. Rae, ESH-18, w/o enc., MS K497
N. Williams, ESH-18, w/enc, MS K497
M. Saladen, ESH-18, w/enc., MS K497
M. Alexander, ESH-18, w/o enc., MS K497
WQ&H File, w/enc., MS K497
CRM-4, w/enc., MS A150

DISTRICT I
P.O.Box 1980, Hobbs, NM 88241-1980
DISTRICT II
P.O. Drawer DD, Artesia, NM 88211-0719
DISTRICT III
1000 Rio Brazos Rd, Aztec, NM 87410

State of New Mexico
Energy, Minerals and Natural Resources Department

OIL CONSERVATION DIVISION
2040 Pacheco St.
Santa Fe, NM 87505

SUBMIT 2 COPIES TO APPROPRIATE DISTRICT OFFICE IN ACCORDANCE WITH RULE 116 PRINTED ON BACK SIDE OF FORM

NOTIFICATION OF FIRE, BREAKS, SPILLS, LEAKS, AND BLOWOUTS

667-7969

OPERATOR	Los Alamos National Lab			ADDRESS	MS K497, Los Alamos 87545	TELEPHONE #	
REPORT OF	FIRE	BREAK	SPILL X	LEAK	BLOWOUT	OTHER*	
TYPE OF FACILITY	DRLG WELL	PROD WELL	TANK BTRY	PIPE LINE	GASO PLNT	OIL RFY	OTHER* Geothermal Plug & Ab.
FACILITY NAME:	Fenton Hill Hot Dry Rock						
LOCATION OF FACILITY Qtr/Qtr Sec. or Footage	NE 1/4 Sec 13, T19N, R2E			SEC. 13	TWP. 19N	RGE. 2E	COUNTY Sandoval
DISTANCE AND DIRECTION FROM NEAREST TOWN OR PROMINENT LANDMARK	approximately 5 mi from La Cueva by road						
DATE AND HOUR OF OCCURRENCE	11.22.96 12:00 Am			DATE AND HOUR OF DISCOVERY	11.22.96 1:00 Am		
WAS IMMEDIATE NOTICE GIVEN?	YES ✓	NO	NOT REQUIRED	IF YES, TO WHOM	Mark Ashley, OCD		
BY WHOM	Neil Williams			DATE AND HOUR	11.22.96 ~3:00 PM		
TYPE OF FLUID LOST	Cement/mud slurry			QUANTITY OF LOSS	< 5,000 gal	VOLUME RECOVERED	unknown
DID ANY FLUIDS REACH A WATERCOURSE?	YES ✓	NO		QUANTITY	less than 5,000 gal		

IF YES, DESCRIBE FULLY**
Retainer down hole failed, releasing fluid to metal mud pit (well pit). Operator opened gate in pit to avoid overflow. Slurry flowed on ground & bypassed inlet to service pond and flowed off site into an ephemeral tributary of Lake Fork

DESCRIBE CAUSE OF PROBLEM AND REMEDIAL ACTION TAKEN**
Slurry flowed approx. 1500 ft down the tributary to a point approx. 150 ft above the confluence with Lake Fork. ESH-18 took water and slurry samples from the water course. Locations were marked in the field for installation of

DESCRIBE AREA AFFECTED AND CLEANUP ACTION TAKEN**
silt fences to contain the slurry and prevent further migration. No decisions have been made yet regarding additional control measures or cleanup, pending review of sample data. Silt fence installation will begin tomorrow.

DESCRIPTION OF AREA	FARMING	GRAZING X	URBAN	OTHER* Forest Service land			
SURFACE CONDITIONS	SANDY	SANDY LOAM	CLAY	ROCKY X	WET X	DRY	SNOW X

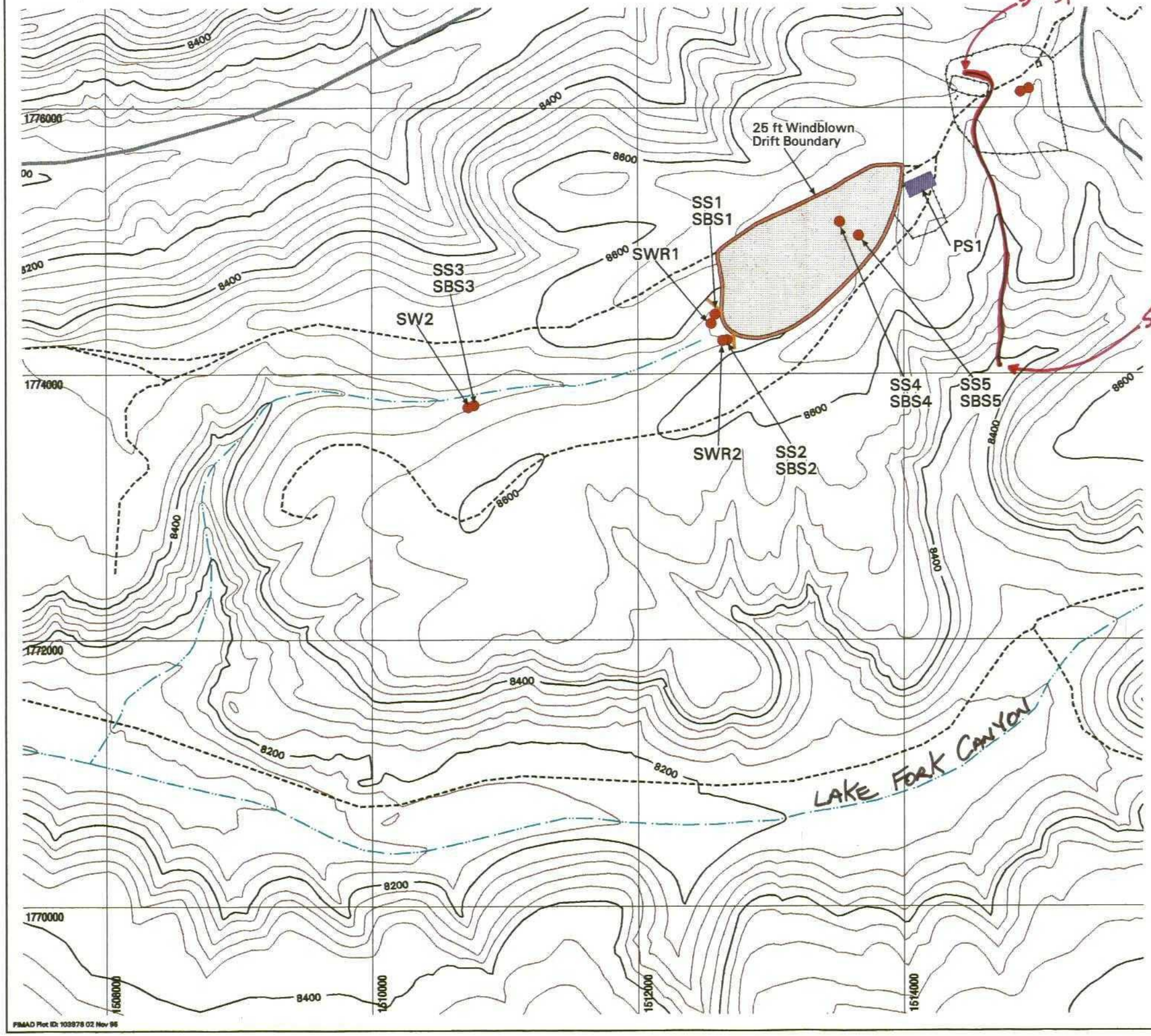
DESCRIBE GENERAL CONDITIONS PREVAILING (TEMPERATURE, PRECIPITATION, ETC.)**
After midnight spill there was a rain storm beginning at about 2:30 AM. Ground is saturated with snow melt and rainfall.

I HEREBY CERTIFY THAT THE INFORMATION ABOVE IS TRUE AND COMPLETE TO THE BEST OF MY KNOWLEDGE AND BELIEF

SIGNED Neil Williams PRINTED NAME AND TITLE Neil Williams Envir. Engr. DATE 11.22.96 5:00 PM

*SPECIFY **ATTACH ADDITIONAL SHEETS IF NECESSARY

Fenton Hill (TA-57) Milagro Project Sampling Plan



FIMAD Plot ID: 103978 02 Nov 95

Fenton Hill (TA-57) Milagro Project Sampling Plan

- Drainage
- Fence, Industrial
- Road, Dirt
- Road, Paved
- Silt Fence
- Application Area (22.327 acres)
- Application Area Buffer (25 ft)
- Sample Location

MILAGRO PROJECT SAMPLING PLAN

ANALYTES: Metals

OBJECTIVE	TYPE	LOCATION
Background Sampling		
pond sludge quality	sludge	PS1
soil-application area	soil: surface	SS4, SS5
soil-application area	soil: sub-surface	SBS4, SBS5
soil-adjacent down gradient	soil: surface	SS2, SS1
soil-adjacent down gradient	soil: sub-surface	SBS2, SBS1
soil-distant down gradient	soil: surface	SS3
soil-distant down gradient	soil: sub-surface	SBS3
surface water-distant down gradient	surface water	SW2
surface water-Lake Fork Canyon and Rio Cebolla (not on map)	surface water	SW3
Sampling During Application		
stormwater runoff-down gradient	stormwater runoff	SWR1, SWR2
Post-Application Sampling		
soil-application area	soil: surface	SS4, SS5
soil-application area	soil: sub-surface	SBS4, SBS5
soil-adjacent down gradient	soil: surface	SS2, SS1
soil-adjacent down gradient	soil: sub-surface	SBS2, SBS1
soil-distant down gradient	soil: surface	SS3
soil-distant down gradient	soil: sub-surface	SBS3
surface water-distant down gradient	surface water	SW2

N

State Plane Coordinate System, New Mexico Central Zone, 1983 North American Datum

Grid provides NM State Plane coordinates in feet.
Grid interval, in feet: 2000

Contour Interval: 40 ft

0 400 800 1200 1600
METERS
0 500 1000 1500 2000
FEET

NOTICE: The information on this map is provisional. Feature locations are dependent on scale and cartography, and their accuracy may not have been confirmed. Los Alamos National Laboratory boundary is based on legal description established in 1985. Other boundary, structure, and utility data are from Los Alamos National Laboratory Engineering Division and Los Alamos County Utility and Engineering Departments. Contour data are from Los Alamos National Laboratory Environmental Restoration Project aerial survey, September 1991.

University of California
Los Alamos National Laboratory
Earth and Environmental Sciences Division
FIMAD Facility for Information Management, Analysis, and Display
FIMAD is the electronic data repository for the Environmental Restoration Project at Los Alamos National Laboratory.
Produced by: Marcia Jones

Date: November 02, 1995 FIMAD Plot ID: 103978

Date: Mon, 25 Nov 96 08:25:31 MST
X-Sender: fhmail@seismo5.lanl.gov
Mime-Version: 1.0
To: dkthomas@lanl.gov
From: Jim Thomson <thomson_jim@lanl.gov>
Subject: Spill info
Cc: albright@seismo5.lanl.gov, bbeers@lanl.gov, nwilliams@lanl.gov

On 11/22 and 11/23, a series of silt fences were installed down the path of Friday's spill. Sufficient materials were on hand to build all fencing recommended by ESH-18 plus a few.

Following are estimates of the quantities and fractions of the materials spilled at Fenton Hill on 11/22/96:

	Volume-Cubic Ft	Percentage
Water	576.19	88.94%
Bentonite	27.31	4.22%
Barite	23.85	3.68%
Caustic soda	0.19	0.03%
Cement class H	14.42	2.23%
Silica flour (S-8)	5.77	0.89%
Retarder (R-8)	0.10	0.02%
Dispersant (CD-32)	0.04	0.01%
Total volume	647.86	

Jim Thomson
Lithos Associates/Los Alamos National Laboratory
Fenton Hill HDR Project
Mail Stop D443
Phone: (505)667-7900
FAX: (505)665-4151
e-mail: thomson_jim@lanl.gov

NL Baroid

Environmental, Safety and Transportation Data Sheet

AQUAGEL

I PRODUCT IDENTIFICATION

SUPPLIER: NL BAROID	TELEPHONE NO.: 713/987-5900
ADDRESS: P.O. BOX 1675 HOUSTON, TEXAS 77251	
TRADE NAME: AQUAGEL®	
GENERIC DESCRIPTION: WYOMING BENTONITE, SODIUM MONTMORILLONITE	

II HAZARDOUS INGREDIENTS

MATERIAL OR COMPONENT	%	HAZARD DATA
SILICA		LOW CONCENTRATIONS OF
		CRYSTALLINE SILICA (SiO_2)
		IN THE FORM OF QUARTZ,
		CRISTOBALITE, AND TRIDYMITE
		MAY BE PRESENT
		(SEE SECTION V)

III PHYSICAL DATA

BOILING POINT (°F): NA	MELTING POINT: ND	FREEZING POINT: ND
SPECIFIC GRAVITY (H_2O = 1): 2.5	VAPOR PRESSURE (mm Hg): NA	
VAPOR DENSITY (AIR = 1): NA	SOLUBILITY IN H_2O, % BY WT.: NA	
% VOLATILES BY VOL.: NA	EVAPORATION RATE (BUTYL ACETATE = 1): NA	
APPEARANCE AND ODOR: LIGHT TAN TO GRAY POWDER, NO ODOR	Density @ 20°C (Uncompacted): 49.4 lbs/cubic foot	
pH: NA		

NA = Not Applicable ND = Not Determined

AQUAGEL®

HEALTH HAZARD	0
FLAMMABILITY	0
REACTIVITY	0

Ratings based on NIOSH "Identification System for Occupationally Hazardous Materials" (1974)

BEST Sheet

IV FIRE AND EXPLOSION DATA

AQUAGEL IS NOT FLAMMABLE AND NOT EXPLOSIVE. DOES NOT SUPPORT COMBUSTION.

EXTINGUISHING MEDIA: WATER

V HEALTH HAZARD INFORMATION

CARCINOGENICITY — NOT ON NTP, IARC OR OSHA LISTS

ACUTE ORAL LD_{50}	ACUTE DERMAL LD_{50}	AQUATIC TOXICITY (LC_{50})
ND	ND	ND

ROUTES OF EXPOSURE AND EFFECTS

TLV FOR RESPIRABLE DUST

$$\frac{10\ MG/M^3}{\%\ RESPIRABLE\ QUARTZ + 2}$$

TLV FOR "TOTAL DUST"

$$\frac{30\ MG/M^3}{\%\ QUARTZ + 3}$$

IF CRISTOBALITE OR TRIDYMITE IS DETECTED, USE ONE-HALF THE VALUE CALCULATED FROM *FORMULAE FOR QUARTZ*

SKIN: POTENTIAL IRRITANT
EYES: IRRITANT
INHALATION: IRRITATION TO LUNGS, NOSE, AND THROAT; PROLONGED INHALATION MAY CAUSE LUNG INJURY, OR DISEASE

EMERGENCY AND FIRST AID PROCEDURES

WASH AREAS OF CONTACT WITH SOAP AND WATER.

BEST Sheet

VI REACTIVITY DATA

CONDITIONS CONTRIBUTING TO INSTABILITY

THIS PRODUCT IS STABLE UNDER NORMAL DRILLING CONDITIONS.

INCOMPATIBILITY

NONE

HAZARDOUS DECOMPOSITION PRODUCTS

NONE

CONDITIONS CONTRIBUTING TO HAZARDOUS POLYMERIZATION

NONE

VII SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED

NORMAL HOUSEKEEPING, CAUSES SLIPPERY SURFACES WHEN WET.

NEUTRALIZING CHEMICALS

NA

WASTE DISPOSAL METHOD

MUD WASTES SHOULD BE DISPOSED OF IN DESIGNATED DISPOSAL AREAS. (i.e. GENERAL LANDFILLS OR DESIGNATED OCEAN DISPOSAL SITES).

VIII INDUSTRIAL HYGIENE CONTROL MEASURES

VENTILATION REQUIREMENTS

MECHANICAL, GENERAL ROOM VENTILATION
USE LOCAL VENTILATION TO MAINTAIN TLV (SEE SECTION V)

SPECIFIC PERSONAL PROTECTIVE EQUIPMENT

RESPIRATORY

USE A NIOSH APPROVED MECHANICAL FILTER RESPIRATOR FOR NON TOXIC DUSTS.

EYE

NONE REQUIRED

GLOVES

NONE REQUIRED

OTHER CLOTHING AND EQUIPMENT

APRON, EYEWASH STATION

BEST Sheet

IX SPECIAL PRECAUTIONS

PRECAUTIONARY STATEMENTS

AVOID PROLONGED INHALATION.

RECOMMENDED LABEL:

FRONT PANEL: CAUTION
SEE BACK PANEL FOR CAUTION BEFORE USE.

BACK PANEL: CAUTION
THIS PRODUCT CONTAINS FREE SILICA. PROLONGED INHALATION OF THE POWDER MAY RESULT IN LUNG DISEASE. AVOID CREATING DUSTY CONDITIONS AND USE A NIOSH APPROVED DUST RESPIRATOR.

OTHER HANDLING AND STORAGE REQUIREMENTS

AQUAGEL IS NON HAZARDOUS. NO HAZARDS ARE INVOLVED WITH NORMAL HANDLING.

DEPARTMENT OF TRANSPORTATION INFORMATION

PROPER SHIPPING NAME: NOT REGULATED

HAZARD CLASS: NOT HAZARDOUS

HAZARDOUS SUBSTANCE: NONE

PREPARED BY **NL Baroid**
ENVIRONMENTAL SERVICES

DATE
JULY, 1987

NL Baroid

Environmental, Safety and Transportation Data Sheet

BAROID

I PRODUCT IDENTIFICATION

SUPPLIER	TELEPHONE NO
NL BAROID	713/987-5900

ADDRESS
P.O. BOX 1675 HOUSTON, TEXAS 77251

TRADE NAME
BAROID®

GENERIC DESCRIPTION
BARITE, BARIUM SULPHATE, BARYTES

II HAZARDOUS INGREDIENTS

MATERIAL OR COMPONENT	%	HAZARD DATA
SILICA		LOW CONCENTRATIONS OF
		CRYSTALLINE SILICA (SiO_2)
		IN THE FORM OF QUARTZ,
		CRISTOBALITE, AND TRIDYMITE
		MAY BE PRESENT
		(SEE SECTION V)

III PHYSICAL DATA

BOILING POINT (°F)	MELTING POINT	FREEZING POINT
NA	2901°F	NA

SPECIFIC GRAVITY (H_2O = 1)	VAPOR PRESSURE (mm Hg)
4.2	NA

VAPOR DENSITY (AIR = 1)	SOLUBILITY IN H_2O, % BY WT
NA	LOW

% VOLATILES BY VOL.	EVAPORATION RATE (BUTYL ACETATE = 1)
NA	NA

APPEARANCE AND ODOR	Density @ 20°C
WHITE TO GRAY TO TAN POWDER, ODORLESS	4.5 @ 15°C

pH ND

N/A = Not Applicable N/D = Not Determined

BAROID®

HEALTH HAZARD	1
FLAMMABILITY	0
REACTIVITY	0

Ratings based on NIOSH "Identification System for Occupationally Hazardous Materials" (1974)

BEST Sheet

IV FIRE AND EXPLOSION DATA

THIS PRODUCT IS NOT FLAMMABLE OR EXPLOSIVE.

EXTINGUISHING MEDIA: WATER, FOAM, CARBON DIOXIDE

V HEALTH HAZARD INFORMATION

CARCINOGENICITY — NOT ON NTP, IARC OR OSHA LISTS

ACUTE ORAL LD_{50}	ACUTE DERMAL LD_{50}	AQUATIC TOXICITY (LC_{50})	7500 ppm

ROUTES OF EXPOSURE AND EFFECTS

TLV FOR RESPIRABLE DUST

$$\frac{10\ MG/M^3}{\%\ RESPIRABLE\ QUARTZ\ +\ 2}$$

TLV FOR "TOTAL DUST"

$$\frac{30\ MG/M^3}{\%\ QUARTZ\ +\ 3}$$

IF CRISTOBALITE OR TRIDYMITE IS DETECTED, USE ONE-HALF THE VALUE CALCULATED FROM FORMULAE FOR QUARTZ

SKIN: POTENTIAL IRRITANT: PROLONGED CONTACT MAY CAUSE DERMATITIS
EYES: IRRITANT
INHALATION: IRRITATION TO LUNGS, NOSE, AND THROAT; PROLONGED INHALATION MAY CAUSE LUNG INJURY OR DISEASE

EMERGENCY AND FIRST AID PROCEDURES

EYE: IRRIGATE IMMEDIATELY WITH WATER. IF IRRIGATION PERSISTS, CONTACT PHYSICIAN. FLUSH SKIN WITH WATER.

SWALLOW: GIVE WATER AND INDUCE VOMITING.

IF INHALED IN LARGE AMOUNTS MOVE TO FRESH AIR.

BEST Sheet

VI REACTIVITY DATA

CONDITIONS CONTRIBUTING TO INSTABILITY

STABLE

INCOMPATIBILITY

NONE

HAZARDOUS DECOMPOSITION PRODUCTS

NONE

CONDITIONS CONTRIBUTING TO HAZARDOUS POLYMERIZATION

WILL NOT OCCUR.

VII SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED

NORMAL HOUSEKEEPING, SWEEP UP AND SALVAGE.

NEUTRALIZING CHEMICALS

NA

WASTE DISPOSAL METHOD

DESIGNATED LANDFILL

VIII INDUSTRIAL HYGIENE CONTROL MEASURES

VENTILATION REQUIREMENTS

MECHANICAL, GENERAL ROOM VENTILATION
USE LOCAL VENTILATION TO MAINTAIN TLV (SEE SECTION V)

SPECIFIC PERSONAL PROTECTIVE EQUIPMENT

RESPIRATORY

USE A NIOSH APPROVED MECHANICAL FILTER RESPIRATOR FOR NONTOXIC DUSTS, IF DUST CONCENTRATION EXCEEDS 10mg/m^3

EYE

GOGGLES

GLOVES

WORKING GLOVES

OTHER CLOTHING AND EQUIPMENT

BEST Sheet

IX SPECIAL PRECAUTIONS

PRECAUTIONARY STATEMENTS

DO NOT INGEST
AVOID INHALATION AND PROLONGED SKIN CONTACT

RECOMMENDED LABEL
FRONT PANEL: CAUTION
SEE BACK PANEL FOR CAUTION BEFORE USE

BACK PANEL: CAUTION
THIS PRODUCT CONTAINS FREE SILICA. PROLONGED INHALATION OF THE POWDER MAY RESULT IN LUNG DISEASE. AVOID CREATING DUSTY CONDITIONS AND USE A NIOSH APPROVED DUST RESPIRATOR.

OTHER HANDLING AND STORAGE REQUIREMENTS

STORE IN SHELTERED AREA OR COVER FOR MOISTURE PROTECTION

DEPARTMENT OF TRANSPORTATION INFORMATION

PROPER SHIPPING NAME: NOT REGULATED

HAZARD CLASS: NOT HAZARDOUS

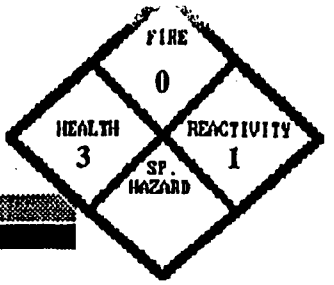
HAZARDOUS SUBSTANCE: NONE

LABEL: NONE REQUIRED

PREPARED BY **NL Baroid**
ENVIRONMENTAL SERVICES

DATE
JULY, 1987

Baroid Environmental, Safety and Transportation Data Sheet



CAUSTIC SODA

I. PRODUCT IDENTIFICATION

SUPPLIER BAROID DRILLING FLUIDS, INC.	**REGULAR TELEPHONE NUMBER** 713/987-5900 **EMERGENCY TELEPHONE NO.** 713/987-4000
ADDRESS P.O. BOX 1675 HOUSTON, TEXAS 77251	
TRADE NAME CAUSTIC SODA	
GENERIC DESCRIPTION SODIUM HYDROXIDE, SODIUM HYDRATE, LYE, WHITE CAUSTIC	

II. HAZARDOUS INGREDIENTS

MATERIAL OR COMPONENT	%	HAZARD DATA
SODIUM HYDROXIDE 1310-73-2	100	TLV CEILING: 2mg/m3 - OSHA

III. PHYSICAL DATA

BOILING POINT (Deg F) 2500	**MELTING POINT** 590	**FREEZING POINT** NA
SPECIFIC GRAVITY (H2O = 1) 2.1	**VAPOR PRESSURE (mm Hg)** NONE	
VAPOR DENSITY (AIR = 1) NA	**SOLUBILITY IN WATER, % BY WT.** 50	
% VOLATILES BY VOLUME NA	**EVAPORATION RATE(BUTYL ACETATE = 1)** NA	
APPEARANCE AND ODOR WHITE POWDER,FLAKES OR LUMPS,NO ODOR	**DENSITY @ 20 Deg C (Uncompacted)** ND	
pH ND		

NA = Not Applicable ND = Not Determined

Baroid Drilling Fluids, Inc.
P.O. Box 1675, Houston, Texas 77251

IV. FIRE AND EXPLOSION DATA

CAUSTIC SODA IS NOT FLAMMABLE OR COMBUSTIBLE.
EXTINGUISHING MEDIA: USE MEDIA WHICH IS APPLICABLE TO SURROUNDING MATERIAL.
SPECIAL FIRE FIGHTING PROCEDURES: USE CARE NOT TO SPLATTER OR SPLASH THIS MATERIAL WHEN FLOODING WITH WATER, SINCE IT IS HARMFUL UPON CONTACT WITH SKIN.
UNUSUAL FIRE AND EXPLOSION HAZARDS: WATER SOLUTION CAUSTIC CAN REACT WITH METALS GENERATING HYDROGEN WHICH IS FLAMMABLE OR EXPLOSIVE.

V. HEALTH HAZARD INFORMATION

CARCINOGENICITY - NOT ON NTP, IARC OR OSHA LISTS

ACUTE ORAL LD50	ACUTE DERMAL LD50	AQUATIC TOXICITY LC50
>500MG/KG PPM	500 MG/KG	700

ROUTES OF EXPOSURE AND EFFECTS

INGESTION: TOXIC. BURNING IN MOUTH AND ESOPHAGUS, NAUSEA, VOMITING, STOMACH PAIN, DIARREA.
SKIN CONTACT: DEEP SKIN BURNS.
EYE CONTACT: DAMAGE TO TISSUE ON CONTACT. SEVERE EYE HAZARD.
INHALATION: IRRITATION OF RESPIRATORY TRACTS, INFLAMMATION OF THE LUNGS.
SODIUM HYDROXIDE TLV - CEILING 2 MG/M3 - OSHA

EMERGENCY AND FIRST AID PROCEDURES

IMMEDIATELY FLUSH SKIN WITH LARGE AMOUNTS OF WATER FOR AT LEAST 15 MINUTES TO AVOID INJURY. REMOVE ALL CONTAMINATED CLOTHING AND SHOWER. IRRIGATE EYES AT ONCE WITH LARGE QUANTITIES OF WATER FOR AT LEAST 15 MINUTES. CONTACT PHYSICIAN.
IF SWALLOWED, GIVE PERSON LARGE AMOUNTS OF WATER. DO NOT INDUCE VOMITING. CONTACT PHYSICIAN. IF INHALED, REMOVE PERSON TO FRESH AIR. IF BREATHING HAS STOPPED GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, SUPPLY OXYGEN.

VI. REACTIVITY DATA

CONDITIONS CONTRIBUTING TO INSTABILITY

REACTS WITH WATER TO PRODUCE HEAT

INCOMPATIBILITY

ACIDS, METALS, EXPLOSIVES, ORGANIC PEROXIDES,WATER, EASILY IGNITABLE MATTER

HAZARDOUS DECOMPOSITION PRODUCTS

ND

CONDITIONS CONTRIBUTING TO HAZARDOUS POLYMERIZATION

NONE

VII. SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED

FOR SOLID:SHOVEL INTO DRY CONTAINERS AND COVER. FLUSH SPILL AREA WITH WATER. DILUTE WITH WATER AND NEUTRALIZE WITH 6M-HCL OR OTHER SUITABLE ACID. FOR SOLUTION:TAKE UP WITH SAND.FLUSH AREA WITH WATER. RQ(EPA&DOT)1000LB/454KG

NEUTRALIZING CHEMICALS

DILUTE HCL, H2SO4 SOLUTION

WASTE DISPOSAL METHOD

DISPOSE OF IN ACCORDANCE WITH ALL LOCAL, STATE, AND FEDERAL REGULATIONS

VIII. INDUSTRIAL HYGIENE CONTROL MEASURES

VENTILATION REQUIREMENTS

GENERAL ROOM VENTILATION
USE LOCAL EXHAUST VENTILATION WHEN NECESSSARY (SEE SECTION V) TO MAINTAIN BREATHING ATMOSPHERE IN ACCORDANCE WITH TLV.

SPECIFIC PERSONAL PROTECTIVE EQUIPMENT

RESPIRATORY

USE A NIOSH APPROVED MECHANICAL FILTER; FULL FACE PIECE

EYE

GOGGLES, FULL FACE SHIELD

GLOVES

RUBBER

OTHER CLOTHING AND EQUIPMENT

APRON, COVERALLS, BOOTS, EYEWASH AND SHOWER

IX. SPECIAL PRECAUTIONS

PRECAUTIONARY STATEMENTS

AVOID BREATHING VAPOR.
EYE HAZARD.
AVOID CONTACT WITH SKIN AND CLOTHING.
WASH THOROUGHLY AFTER HANDLING.
ALWAYS USE PROPER PERSONAL PROTECTIVE EQUIPMENT WHEN HANDLING CAUSTIC
SODA.

OTHER HANDLING AND STORAGE REQUIREMENTS

PROTECT CONTAINER AGAINST PHYSICAL DAMAGE.
STORE IN A DRY PLACE, SINCE CAUSTIC SODA IS VERY HYDROSCOPIC.
KEEP SEPARATE FROM ACIDS, METALS, EXPLOSIVES, ORGANIC PEROXIDES, AND EASIY IGNITABLE MATERIALS.

X. DEPARTMENT OF TRANSPORTATION INFORMATION

PROPER SHIPPING NAME :
SODIUM HYDROXIDE, DRY, SOLID

PLACARDS :
CORROSIVE

HAZARD CLASS :
CORROSIVE MATERIAL

REPORTABLE QUANTITY :
1000 LBS

HAZARDOUS SUBSTANCE :
SODIUM HYDROXIDE

ID NUMBER :
UN1823

LABEL :
CORROSIVE

XI. REGULATORY INFORMATION

STATUS ON SUBSTANCE LISTS

Comprehensive Environmental Response, Compensation and Liability Act of 1980, (CERCLA) requires notification of the National Response Center of release of quantities of Hazardous Substances equal to or greater than the reportable quantities (RQs) in 40 CFR 302.4.

Components present in this product which may require notification are:

Chemical	CAS Number
SODIUM HYDROXIDE	1310-73-2

Superfund Amendments and Reauthorization Act of 1986 (SARA) Title III requires emergency planning based on Threshold Planning Quantities (TPQs) and release reporting based on RQs.
Components present in this product at a level which could require reporting under the statute are:

NOT ON EXTREMELY HAZARDOUS LIST

SARA requires the submission of annual reports of toxic chemicals that appear in 40 CFR 372 (for SARA 313). This information must be included in all MSDS that are copied and distributed for this material.
Components present in this product at a level which could require reporting under the statute are:

SODIUM HYDROXIDE REPORTABLE QUANTITY 1000 LBS.

Toxic Substances Control Act (TSCA)
The ingredients of this product are on the TSCA inventory.

XII. STATE RIGHT TO KNOW

LISTED ON MASSACHUSETTS SUBSTANCE LIST, NEW JERSEY RIGHT TO KNOW HAZARDOUS SUBSTANCE LIST AND PENNSYLVANIA HAZARDOUS SUBSTANCE LIST.

BJ SERVICES
MATERIAL SAFETY DATA SHEET

CEMENT (All Classes)

HMIS HAZARD INDEX

HEALTH:	1
FLAMMABILITY:	0
REACTIVITY:	0
PERSONAL PROTECTION:	e

SECTION I - GENERAL INFORMATION

PRODUCT NAME	CEMENT (All Classes)
ITEM NUMBER	100019, 100297, 100160, 100020, 100021, 410507, 410505,100093,100022
CHEMICAL DESCRIPTION	Portland cement
PRODUCT USE	Cementing
SUPPLIER	BJ SERVICES COMPANY
ADDRESS	5500 NORTHWEST CENTRAL DR HOUSTON TX 77092
EMERGENCY TELEPHONE NUMBER	(800)424-9300 for CHEMTREC (202)483-7616 Alaska and International
PREPARED BY	BJ SERVICES ENVIRONMENTAL GROUP (713)351-0773
DATE PREPARED	December 1992 Supersedes: March 1992

SECTION II - HAZARDOUS COMPONENTS

HAZARDOUS COMPONENTS	CAS#	PERCENT	HAZARD
No hazardous ingredients	N.A.	N.A.	N.A.

SECTION III - FIRE AND EXPLOSION HAZARD DATA

FLASHPOINT AND METHOD OF DETERMINATION	N.A.
UPPER EXPLOSION LIMIT(% BY VOL)	N.A.
LOWER EXPLOSION LIMIT(% BY VOL)	N.A.
AUTO-IGNITION TEMPERATURE	N.A.
EXTINGUISHING MEDIA	Use appropriate media for surrounding fi
SPECIAL FIRE FIGHTING PROCEDURES	None
EXPLOSION DATA	N.A.
HAZARDOUS COMBUSTION PRODUCTS	None

SECTION IV - HEALTH HAZARD DATA

BJ SERVICES
MATERIAL SAFETY DATA SHEET

CEMENT (All Classes)

HMIS HAZARD INDEX

HEALTH:	1
FLAMMABILITY:	0
REACTIVITY:	0
PERSONAL PROTECTION:	e

PRIMARY ROUTES OF ENTRY..... SKIN CONTACT
EYE CONTACT
INHALATION

ACUTE OVEREXPOSURE EFFECTS:

SKIN CONTACT..... Wet cement can dry the skin and cause alkali burns.

SKIN ABSORPTION..... Not absorbed by skin.

EYE CONTACT..... Dust may irritate the eyes.

INHALATION..... Inhalation of dust or particulates may be irritating to upper respiratory tract.

INGESTION..... Not an expected route of exposure

CHRONIC OVEREXPOSURE EFFECTS.... Dust can cause inflammation of the lining tissue of the interior of the nose and inflammation of the cornea. Individuals who are allergic to chromium may develop an allergic dermatitis, (Portland cement may contain traces of chromium).

EXPOSURE LIMITS:

HAZARDOUS COMPONENT	ACGIH TLV	OSHA PEL
No hazardous ingredients	10 mg/m^3 (total dust)	Same

CARCINOGENICITY, REPRODUCTIVE EFFECTS..... Not listed as carcinogen - IARC, NTP OR OSHA

TERATOGENICITY, MUTAGENICITY.... No effects listed.

TOXICITY STUDIES
LD(50)..... N.E.

BJ SERVICES
MATERIAL SAFETY DATA SHEET

CEMENT (All Classes)

HMIS HAZARD INDEX

HEALTH:	1
FLAMMABILITY:	0
REACTIVITY:	0
PERSONAL PROTECTION:	e

LC(50)..... N.E.

SECTION V - FIRST AID PROCEDURES

FOR EYES..... Immediately flush with plenty of water fo at least 15 minutes. If irritation persists, contact a physician.

FOR SKIN..... Flush skin with water or wash with mild soap and water if available. If irritation persists, contact a physician.

FOR INHALATION..... Remove to fresh air. If breathing is labored, give oxygen. If breathing has stopped, give artificial respiration. Keep person warm, quiet and get medical attention.

FOR INGESTION..... If swallowed, contact a physician immediately.

SECTION VI - PHYSICAL DATA

APPEARANCE AND ODOR..... Grey powder, no odor
SPECIFIC GRAVITY..... 3.15
VAPOUR PRESSURE..... N.A.
VAPOUR DENSITY (air=1)..... N.A.
EVAPORATION RATE..... N.A.
BOILING POINT..... N.A.
FREEZING POINT..... N.A.
SOLUBILITY IN H20..... Slight,<1%
pH..... N.A.

SECTION VII - REACTIVITY DATA

CHEMICAL STABILITY..... Stable
INCOMPATIBLE MATERIALS..... None
HAZARDOUS POLYMERIZATION..... DOES NOT POLYMERIZE
HAZARDOUS DECOMPOSITION PRODUCTS None

BJ SERVICES
MATERIAL SAFETY DATA SHEET

CEMENT (All Classes)

HMIS HAZARD INDEX

HEALTH:	1
FLAMMABILITY:	0
REACTIVITY:	0
PERSONAL PROTECTION:	e

SHIPPING INFORMATION

PROPER SHIPPING NAME.....	Not DOT Regulated
HAZARD CLASS.....	N.A.
UN/NA NUMBER.....	N.A.
PACKING GROUP W/ "PG".....	N.A.
SUBSIDIARY RISK.....	N.A.
REPORTABLE QUANTITY (RQ).....	N.A.
EMERGENGY GUIDE RESPONSE #...	N.A.

ENVIRONMENTAL INFORMATION

SARA TITLE III

SECTION 302/304.....	This product does not contain ingredient listed as an Extremely Hazardous Substance.
SECTION 311/312.....	IMMEDIATE
SECTION 313.....	This product does not contain ingredient (at a level of 1% or greater) on the Li of Toxic Chemicals

OTHER REGULATORY INFORMATION

TSCA INVENTORY.....	All of the components in this product appear on the TSCA inventory.
CALIFORNIA PROP 65.....	None of the chemicals on the current Proposition 65 list are known to be present in this product.

SECTION XI - REVISIONS

SECTION #	REVISION
II	Added OSHA Hazard
X	Shipping Information Updated

BJ SERVICES
MATERIAL SAFETY DATA SHEET

CEMENT (All Classes)

HMIS HAZARD INDEX

HEALTH:	1
FLAMMABILITY:	0
REACTIVITY:	0
PERSONAL PROTECTION:	e

The information contained herein is based on data considered accurate. However, no warranty is expressed or implied regarding the accuracy of these data or the results to be obtained from the use thereof. Vendor assumes no responsibility for injury to vendee or third persons proximately caused by the material if reasonable safety procedures are not adhered to as stipulated in the data sheet. Additionally, vendor assumes no responsibility for injury to vendee or third persons proximately caused by abnormal use of the material even if reasonable safety procedures are followed. Furthermore, vendee assumes the risk in his use of the material.

==========

BJ SERVICES
MATERIAL SAFETY DATA SHEET

S - 8

HMIS HAZARD INDEX

HEALTH:	2
FLAMMABILITY:	0
REACTIVITY:	0
PERSONAL PROTECTION:	e

SECTION I - GENERAL INFORMATION

PRODUCT NAME	S - 8
ITEM NUMBER	499648, 415033, 415034, 100121
CHEMICAL DESCRIPTION	Silica flour
PRODUCT USE	Strength retrogression control
SUPPLIER	BJ SERVICES COMPANY
ADDRESS	5500 NORTHWEST CENTRAL DR HOUSTON TX 77092
EMERGENCY TELEPHONE NUMBER	(800)424-9300 for CHEMTREC (202)483-7616 Alaska and International
PREPARED BY	BJ SERVICES ENVIRONMENTAL GROUP (713)351-0773
DATE PREPARED	December 1992 Supersedes: February 1990

SECTION II - HAZARDOUS COMPONENTS

HAZARDOUS COMPONENTS	CAS#	PERCENT	HAZARD
Silica	14808-60-7	100	Respiratory irritant

SECTION III - FIRE AND EXPLOSION HAZARD DATA

FLASHPOINT AND METHOD OF DETERMINATION	N.A.
UPPER EXPLOSION LIMIT(% BY VOL)	N.A.
LOWER EXPLOSION LIMIT(% BY VOL)	N.A
AUTO-IGNITION TEMPERATURE	N.A.
EXTINGUISHING MEDIA	N.A. Material does not burn
SPECIAL FIRE FIGHTING PROCEDURES	None
EXPLOSION DATA	N.A.
HAZARDOUS COMBUSTION PRODUCTS	None

SECTION IV - HEALTH HAZARD DATA

PRIMARY ROUTES OF ENTRY..... INHALATION

ACUTE OVEREXPOSURE EFFECTS:

BJ SERVICES
MATERIAL SAFETY DATA SHEET

S - 8

HMIS HAZARD INDEX

HEALTH:	2
FLAMMABILITY:	0
REACTIVITY:	0
PERSONAL PROTECTION:	e

SKIN CONTACT..... No effects
SKIN ABSORPTION..... Not absorbed by skin.

EYE CONTACT..... Eye contact may cause irritation and redness.

INHALATION..... Shortness of breath and reduced pulmonary function.

INGESTION..... None

CHRONIC OVEREXPOSURE EFFECTS.... Excessive inhalation of dust may result in respiratory disease, including silicosis, pneumoconiosis and pulmonary fibrosis.

EXPOSURE LIMITS:

HAZARDOUS COMPONENT	ACGIH TLV	OSHA PEL
Silica	0.1 mg/m^3 (respirable dust)	10 mg/m

CARCINOGENICITY, REPRODUCTIVE EFFECTS..... The International Agency for Research on Cancer (IARC) has evaluated that there is "sufficient evidence for the carcinogenicity of crystalline silica to experimental animals" and "limited evidence" with respect to humans.

TERATOGENICITY, MUTAGENICITY.... No effects listed.

TOXICITY STUDIES
LD(50)..... N.E.
LC(50)..... N.E.

SECTION V - FIRST AID PROCEDURES

BJ SERVICES
MATERIAL SAFETY DATA SHEET

R - 8

HMIS HAZARD INDEX

HEALTH:	1
FLAMMABILITY:	0
REACTIVITY:	0
PERSONAL PROTECTION:	e

SECTION I - GENERAL INFORMATION

PRODUCT NAME	R - 8
ITEM NUMBER	423562, 100284, 488053
CHEMICAL DESCRIPTION	Sodium Lignosulfonate CAS# 68513-75-7
PRODUCT USE	Retarder for cement
SUPPLIER	BJ SERVICES COMPANY
ADDRESS	5500 NORTHWEST CENTRAL DR HOUSTON TX 77092
EMERGENCY TELEPHONE NUMBER	(800)424-9300 for CHEMTREC (202)483-7616 Alaska and International
PREPARED BY	BJ SERVICES ENVIRONMENTAL GROUP (713)351-0773
DATE PREPARED	December 1992 Supersedes: February 1990

SECTION II - HAZARDOUS COMPONENTS

HAZARDOUS COMPONENTS	CAS#	PERCENT	HAZARD
No hazardous ingredients	N.A.	N.A.	N.A.

SECTION III - FIRE AND EXPLOSION HAZARD DATA

FLASHPOINT AND METHOD OF DETERMINATION	N.A.
UPPER EXPLOSION LIMIT(% BY VOL)	3.5 oz/cu ft (dust)
LOWER EXPLOSION LIMIT(% BY VOL)	0.2 oz/cu ft (dust)
AUTO-IGNITION TEMPERATURE	400 ^{o}C for dust
EXTINGUISHING MEDIA	Dry chemical, CO_2, foam or water spray.
SPECIAL FIRE FIGHTING PROCEDURES	Use supplied breathing air and protectiv clothing.
EXPLOSION DATA	Heavy concentrations of suspended dusts may form an explosive condition in air.
HAZARDOUS COMBUSTION PRODUCTS	Sulfur dioxide, carbon monoxide and carb dioxide.

BJ SERVICES
MATERIAL SAFETY DATA SHEET

R - 8

HMIS HAZARD INDEX

HEALTH:	1
FLAMMABILITY:	0
REACTIVITY:	0
PERSONAL PROTECTION:	e

SECTION IV - HEALTH HAZARD DATA

PRIMARY ROUTES OF ENTRY..... SKIN CONTACT
EYE CONTACT
INHALATION

ACUTE OVEREXPOSURE EFFECTS:

SKIN CONTACT..... No effects known
SKIN ABSORPTION..... Not absorbed by skin.

EYE CONTACT..... Eye contact may cause irritation and redness.

INHALATION..... Inhalation of dust or particulates may be irritating to upper respiratory tract.

INGESTION..... None known

CHRONIC OVEREXPOSURE EFFECTS.... None known

EXPOSURE LIMITS:

HAZARDOUS COMPONENT	ACGIH TLV	OSHA PEL
No hazardous ingredients		

CARCINOGENICITY, REPRODUCTIVE EFFECTS..... Not listed as carcinogen - IARC, NTP OR OSHA

TERATOGENICITY, MUTAGENICITY.... No effects listed.

TOXICITY STUDIES
LD(50)..... N.E.
LC(50)..... N.E.

SECTION V - FIRST AID PROCEDURES

BJ SERVICES
MATERIAL SAFETY DATA SHEET

R - 8

HMIS HAZARD INDEX

HEALTH:	1
FLAMMABILITY:	0
REACTIVITY:	0
PERSONAL PROTECTION:	e

FOR EYES.....	Immediately flush with plenty of water f at least 15 minutes. If irritation persists, contact a physician.
FOR SKIN.....	Flush skin with water or wash with mild soap and water if available. If irritation persists, contact a physician.
FOR INHALATION.....	Remove to fresh air. If breathing is labored, give oxygen. If breathing has stopped, give artificia respiration. Keep person warm, quiet and get medical attention.
FOR INGESTION.....	Give water to dilute and get medical attention.

SECTION VI - PHYSICAL DATA

APPEARANCE AND ODOR.....	Brown powder with slight odor
SPECIFIC GRAVITY.....	N.A. Bulk Density: 35 lbs/cu ft
VAPOUR PRESSURE.....	N.A.
VAPOUR DENSITY (air=1).....	N.A.
EVAPORATION RATE.....	N.A.
BOILING POINT.....	N.A.
FREEZING POINT.....	N.A.
SOLUBILITY IN H20.....	Complete
pH.....	8.5 (3% solution)

SECTION VII - REACTIVITY DATA

CHEMICAL STABILITY.....	Stable
INCOMPATIBLE MATERIALS.....	Strong oxidizing agents
HAZARDOUS POLYMERIZATION.....	DOES NOT POLYMERIZE
HAZARDOUS DECOMPOSITION PRODUCTS	Sulfur dioxide, carbon monoxide and carb dioxide.

SECTION VIII - SPECIAL/PERSONAL PROTECTION

BJ SERVICES
MATERIAL SAFETY DATA SHEET

R - 8

HMIS HAZARD INDEX

HEALTH:	1
FLAMMABILITY:	0
REACTIVITY:	0
PERSONAL PROTECTION:	e

VENTILATION.....	The use of mechanical ventilation is recommended whenever this product is used in a confined space. Where engineering controls are not feasible, assure use is in an area where there is natural air movement.
RESPIRATORY PROTECTION.....	As Needed Dust Mask
PROTECTIVE GLOVES.....	Rubber or Neoprene
EYE PROTECTION.....	Goggles
OTHER PROTECTIVE EQUIPMENT.....	Eyewash bottles or other rinsing equipment should be easily accessible.

SECTION IX - HANDLING PRECAUTIONS

LEAK AND SPILL PROCEDURES.....	Sweep up and place in suitable containers for reuse or disposal. Area may be washed down with water into sewer in accordance with local regulations
WASTE DISPOSAL.....	If this product becomes a waste it does not meet the requirements of a RCRA hazardous waste. Always dispose of according to local/state/federal regulations.
HANDLING PROCEDURES & SPECIAL EQUIPMENT.....	Avoid high concentrations of dust. Minimize contact with eyes, skin and clothing.
STORAGE REQUIREMENTS.....	Store in a cool, well ventilated area.

SECTION X - REGULATORY INFORMATION

SHIPPING INFORMATION

PROPER SHIPPING NAME.....	Not DOT Regulated
HAZARD CLASS.....	N.A.

BJ SERVICES
MATERIAL SAFETY DATA SHEET

R - 8

HMIS HAZARD INDEX

HEALTH:	1
FLAMMABILITY:	0
REACTIVITY:	0
PERSONAL PROTECTION:	e

UN/NA NUMBER..... N.A.
PACKING GROUP W/ "PG"..... N.A.
SUBSIDIARY RISK..... N.A.
REPORTABLE QUANTITY (RQ)..... N.A.
EMERGENGY GUIDE RESPONSE #... N.A.

ENVIRONMENTAL INFORMATION

SARA TITLE III

SECTION 302/304..... This product does not contain ingredient listed as an Extremely Hazardous Substance.
SECTION 311/312..... IMMEDIATE
SECTION 313..... This product does not contain ingredient (at a level of 1% or greater) on the Lis of Toxic Chemicals

OTHER REGULATORY INFORMATION

TSCA INVENTORY..... All of the components in this product appear on the TSCA inventory.

CALIFORNIA PROP 65..... None of the chemicals on the current Proposition 65 list are known to be present in this product.

SECTION XI - REVISIONS

SECTION #	REVISION
X	Shipping and regulatory information updated

BJ SERVICES
MATERIAL SAFETY DATA SHEET

R - 8

HMIS HAZARD INDEX

HEALTH:	1
FLAMMABILITY:	0
REACTIVITY:	0
PERSONAL PROTECTION:	e

The information contained herein is based on data considered accurate. However, no warranty is expressed or implied regarding the accuracy of these data or the results to be obtained from the use thereof. Vendor assumes no responsibility for injury to vendee or third persons proximately caused by the material if reasonable safety procedures are not adhered to as stipulated in the data sheet. Additionally, vendor assumes no responsibility for injury to vendee or third persons proximately caused by abnormal use of the material even if reasonable safety procedures are followed. Furthermore, vendee assumes the risk in his use of the material.

BJ SERVICES
MATERIAL SAFETY DATA SHEET

CD - 32

HMIS HAZARD INDEX

HEALTH:	2
FLAMMABILITY:	1
REACTIVITY:	0
PERSONAL PROTECTION:	h

SECTION I - GENERAL INFORMATION

PRODUCT NAME	CD - 32
ITEM NUMBER	488013, 424007
CHEMICAL DESCRIPTION	Blend
PRODUCT USE	Dispersant for cement
SUPPLIER	BJ SERVICES COMPANY
ADDRESS	5500 NORTHWEST CENTRAL DR HOUSTON TX 77092
EMERGENCY TELEPHONE NUMBER	(800)424-9300 for CHEMTREC (202)483-7616 Alaska and International
PREPARED BY	BJ SERVICES ENVIRONMENTAL GROUP (713)351-0773
DATE PREPARED	March 1994 Supersedes: December 1991

SECTION II - HAZARDOUS COMPONENTS

HAZARDOUS COMPONENTS	CAS#	PERCENT	HAZARD
Trade secret	Proprietary	100	Irritant

SECTION III - FIRE AND EXPLOSION HAZARD DATA

FLASHPOINT AND METHOD OF DETERMINATION	>200 F (PMCC)
UPPER EXPLOSION LIMIT(% BY VOL)	N.E.
LOWER EXPLOSION LIMIT(% BY VOL)	N.E.
AUTO-IGNITION TEMPERATURE	N.E.
EXTINGUISHING MEDIA	Dry chemical, CO_2, or water spray
SPECIAL FIRE FIGHTING PROCEDURES	Cool exposed containers with water spray. Self-contained breathing apparatus in confined areas.
EXPLOSION DATA	None
HAZARDOUS COMBUSTION PRODUCTS	Carbon dioxide, carbon monoxide and oxid of nitrogen and sulfur.

BJ SERVICES
MATERIAL SAFETY DATA SHEET

CD - 32

HMIS HAZARD INDEX

HEALTH:	2
FLAMMABILITY:	1
REACTIVITY:	0
PERSONAL PROTECTION:	h

SECTION IV - HEALTH HAZARD DATA

PRIMARY ROUTES OF ENTRY..... SKIN CONTACT
EYE CONTACT
INHALATION
INGESTION

ACUTE OVEREXPOSURE EFFECTS:

SKIN CONTACT..... May cause irritation, especially on prolonged contact.

SKIN ABSORPTION..... Not known to be absorbed through the skin.

EYE CONTACT..... Causes irritation, possibly severe.

INHALATION..... Dust may cause respiratory tract irritation.

INGESTION..... May cause gastrointestinal irritation, nausea, vomiting and diarrhea.

CHRONIC OVEREXPOSURE EFFECTS.... May aggravate existing skin, eye and lung conditions.

EXPOSURE LIMITS:

HAZARDOUS COMPONENT	ACGIH TLV	OSHA PEL
Trade secret	15 mg/m3 (dust)	15 mg/m3 (dust)

CARCINOGENICITY, REPRODUCTIVE EFFECTS..... Not listed as carcinogen - IARC, NTP OR OSHA

TERATOGENICITY, MUTAGENICITY.... No effects listed.

TOXICITY STUDIES
LD(50)..... No toxicity testing has been done on this product

BJ SERVICES
MATERIAL SAFETY DATA SHEET

CD - 32

HMIS HAZARD INDEX

HEALTH:	2
FLAMMABILITY:	1
REACTIVITY:	0
PERSONAL PROTECTION:	h

LC(50)..... No toxicity testing has been done on this product

SECTION V - FIRST AID PROCEDURES

FOR EYES..... Immediately flush with plenty of water f at least 15 minutes, holding eyelids apart to ensure flushing of the entire surface. Washing within one minute is essential to achieve maximum effectiveness.
Seek medical attention.

FOR SKIN..... Flush skin with water or wash with mild soap and water if available.
If irritation persists, contact a physician.

FOR INHALATION..... Remove to fresh air.
If breathing is labored, give oxygen.
If breathing has stopped, give artificia respiration. Keep person warm, quiet and get medical attention.

FOR INGESTION..... Do NOT induce vomiting. If vomiting occu spontaneously, keep airway clear.
Get medical attention.
Never give anything by mouth to an unconscious person.

SECTION VI - PHYSICAL DATA

APPEARANCE AND ODOR	Light tan powder, bland odor
SPECIFIC GRAVITY	0.6
VAPOUR PRESSURE	N.A.
VAPOUR DENSITY (air=1)	N.A.
EVAPORATION RATE	N.A.
BOILING POINT	N.A.
FREEZING POINT	N.A.
SOLUBILITY IN H20	Complete
pH	9.5 (5% solution)

BJ SERVICES
MATERIAL SAFETY DATA SHEET

CD - 32

HMIS HAZARD INDEX

HEALTH:	**2**
FLAMMABILITY:	**1**
REACTIVITY:	**0**
PERSONAL PROTECTION:	**h**

SECTION VII - REACTIVITY DATA

CHEMICAL STABILITY.....	Stable
INCOMPATIBLE MATERIALS.....	Strong oxidizing agents
HAZARDOUS POLYMERIZATION.....	DOES NOT POLYMERIZE
HAZARDOUS DECOMPOSITION PRODUCTS	See combustion products

SECTION VIII - SPECIAL/PERSONAL PROTECTION

VENTILATION.....	The use of mechanical ventilation is recommended whenever this product is used in a confined space. Where engineering controls are not feasible, assure use is in an area where there is natural air movement.
RESPIRATORY PROTECTION.....	Dust Respirator if necessary
PROTECTIVE GLOVES.....	Rubber or Neoprene
EYE PROTECTION.....	Goggles
OTHER PROTECTIVE EQUIPMENT.....	Eyewash bottles or other rinsing equipment should be easily accessible.

SECTION IX - HANDLING PRECAUTIONS

LEAK AND SPILL PROCEDURES.....	Sweep up and place in suitable containers for reuse or disposal.
WASTE DISPOSAL.....	If this product becomes waste it does not meet the requirements of a RCRA hazardous waste. Always dispose of according to all local, state, and federal laws and regulations.
HANDLING PROCEDURES & SPECIAL EQUIPMENT.....	Avoid contact with eyes, skin, and clothing. Avoid breathing dust. Wash thoroughly after handling.

BJ SERVICES
MATERIAL SAFETY DATA SHEET

CD - 32

HMIS HAZARD INDEX

HEALTH:	2
FLAMMABILITY:	1
REACTIVITY:	0
PERSONAL PROTECTION:	h

STORAGE REQUIREMENTS..... Store in a cool, dry place.
Store in a well-ventilated area

SECTION X - REGULATORY INFORMATION

SHIPPING INFORMATION

PROPER SHIPPING NAME..... Not DOT Regulated
HAZARD CLASS..... N.A.
UN/NA NUMBER..... N.A.
PACKING GROUP W/ "PG"..... N.A.
SUBSIDIARY RISK..... N.A.
REPORTABLE QUANTITY (RQ)..... N.A.
EMERGENGY GUIDE RESPONSE #... N.A.

ENVIRONMENTAL INFORMATION

SARA TITLE III

SECTION 302/304..... This product does not contain ingredient: listed as an Extremely Hazardous Substance.
SECTION 311/312..... IMMEDIATE
SECTION 313..... This product does not contain ingredient: (at a level of 1% or greater) on the Lis of Toxic Chemicals

OTHER REGULATORY INFORMATION

TSCA INVENTORY..... All of the components in this product appear on the TSCA inventory.

CALIFORNIA PROP 65..... None of the chemicals on the current Proposition 65 list are known to be present in this product.

SECTION XI - REVISIONS

SECTION # REVISION

BJ SERVICES
MATERIAL SAFETY DATA SHEET

CD - 32

HMIS HAZARD INDEX

HEALTH:	**2**
FLAMMABILITY:	**1**
REACTIVITY:	**0**
PERSONAL PROTECTION:	**h**

II	Revised CAS information
III	Updated flashpoint and hazardous combustion products
V	Updated first aid for ingestion
VI	Updated pH
IX	Updated handling procedures

The information contained herein is based on data considered accurate. However, no warranty is expressed or implied regarding the accuracy of these data or the results to be obtained from the use thereof. Vendor assumes no responsibility for injury to vendee or third persons proximately caused by the material if reasonable safety procedures are not adhered to as stipulated in the data sheet. Additionally, vendor assumes no responsibility for injury to vendee or third persons proximately caused by abnormal use of the material even if reasonable safety procedures are followed. Furthermore, vendee assumes the risk in his use of the material.

Los Alamos
NATIONAL LABORATORY

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

Date: January 16, 1997
In Reply Refer To: ESH-18/WQ&H:97-0636
Mail Stop: K497
Telephone: (505) 667-7969

Mark Ashley
Oil Conservation Division
State of New Mexico Energy, Minerals, and
Natural Resources Department
2040 South Pacheco Street
Santa Fe, New Mexico 87505

SUBJECT: MILAGRO PROJECT LAND APPLICATION NOI: POST-APPLICATION SOIL MONITORING FOR 1996

Dear Mr. Ashley:

In accordance with the conditions of your Division's approval of Los Alamos National Laboratory's (LANL) Notice of Intent to Discharge (NOI) for the Milagro Project at Fenton Hill, I have enclosed the annual sampling results for 1996. Also enclosed, for your information, is a map of the application site and sampling locations.

The enclosed Table 1 summarizes the analytical results for total arsenic (As) for all three rounds of sampling conducted for the Milagro Project NOI: pre-application; post-application, 1995; and post-application, 1996. The 1996 sampling results show that the elevated arsenic concentrations evident within the application site in 1995 (SS-4 and SS-5: 24 ppm and 18 ppm, respectively) have naturally attenuated to concentrations equivalent to pre-application conditions.

Additionally, all of the down-gradient sampling locations, SS-1, SS-2, and SS-3, continued to show stable arsenic concentrations equal to pre-application conditions. These stable arsenic concentrations strongly indicate that the arsenic is remaining within the application site and is not migrating down-gradient into the water course.

As required by your Division, LANL will continue to collect annual soil samples from the application site and down-gradient locations during 1997. If the analytical results for 1997 show similar arsenic levels to 1996 then LANL will request a waiver from the remaining 3 years of annual sampling. The silt fences which were installed prior to land application will be maintained throughout 1997.

I appreciate the time and effort which you have provided LANL on Milagro Project activities. If you have any questions regarding the enclosed analytical results or LANL's waiver request please feel free to contact me at 667-7969.

Sincerely,

Bob Beers
Water Quality and Hydrology Group

BB/tp

Enclosures: Map and Data Table
Analytical Report

Cy: S. Boyce, Forest Service, Jemez Springs, w/enc.
S. Rae, ESH-18, w/o enc., MS K497
N. Williams, ESH-18, w/enc., MS K497
M. Saladen, ESH-18, w/o enc., MS K497
B. Koch, DOE/LAAAO, w/enc., MS A316
G. Sinnis, P-23, w/enc., MS H803
D. Krier, EES-1, w/enc., MS D462
J. Thomson, EES-4, w/o enc., MS D443
P. Shanley, ESH-19, w/enc., MS K498
T. Glatzmaier, EES-5, w/enc., MS M992
P. Longmire, CST-7, w/enc., MS J534
J. Nyhan, EES-15, w/enc., MS J495
WQ&H File, w/o enc., MS K497
CRM-4, w/o enc., MS A150

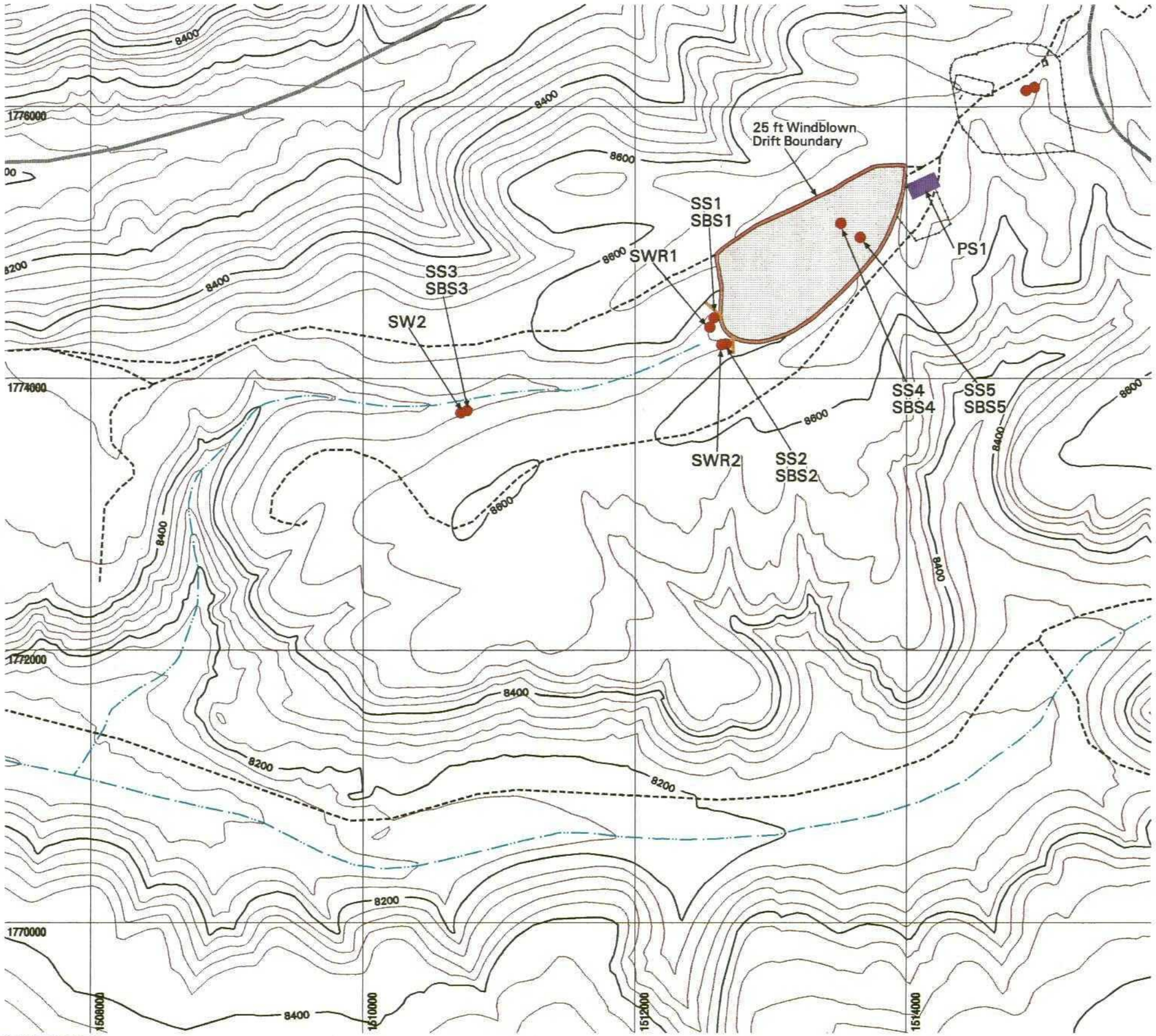
Los Alamos National Laboratory
Milagro Project

Pre- and Post-Land Application Monitoring
Arsenic Concentrations in Soil (ppm)

TABLE 1.

Sample Location	Pre-Application-5/17/95	Post-Application-10/24/95	Post-Application-10/18/96
SS-1: soil, surface	3.	3.	<3.
SBS-1: soil, sub-surface	1.	2.	<3.
SS-2: soil, surface	3.	3.	<3.
SBS-2: soil, sub-surface	2.	3.	<3.
SS-3: soil, surface	2.	3.	<3.
SBS-3: soil, sub-surface	2.	4.	<3.
SS-4: soil, surface	3.	24.	3.9
SBS-4: soil, sub-surface	4.	4.	<3.
SS-5: soil, surface	2.	18.	<3.
SBS-5: soil, sub-surface	2.	3.	<3.

Fenton Hill (TA-57) Milagro Project Sampling Plan



FIMAD Plot ID: 103978 02 Nov 95

Fenton Hill (TA-57) Milagro Project Sampling Plan

- Drainage
- Fence, Industrial
- Road, Dirt
- Road, Paved
- Silt Fence
- Application Area (22.327 acres)
- Application Area Buffer (25 ft)
- Sample Location

MILAGRO PROJECT SAMPLING PLAN

ANALYTES: Metals

OBJECTIVE	TYPE	LOCATION
Background Sampling		
pond sludge quality	sludge	PS1
soil-application area	soil: surface	SS4, SS5
soil-application area	soil: sub-surface	SBS4, SBS5
soil-adjacent down gradient	soil: surface	SS2, SS1
soil-adjacent down gradient	soil: sub-surface	SBS2, SBS1
soil-distant down gradient	soil: surface	SS3
soil-distant down gradient	soil: sub-surface	SBS3
surface water-distant down gradient	surface water	SW2
surface water-Lake Fork Canyon and Rio Cebolla (not on map)	surface water	SW3
Sampling During Application		
stormwater runoff-down gradient	stormwater runoff	SWR1, SWR2
Post-Application Sampling		
soil-application area	soil: surface	SS4, SS5
soil-application area	soil: sub-surface	SBS4, SBS5
soil-adjacent down gradient	soil: surface	SS2, SS1
soil-adjacent down gradient	soil: sub-surface	SBS2, SBS1
soil-distant down gradient	soil: surface	SS3
soil-distant down gradient	soil: sub-surface	SBS3
surface water-distant down gradient	surface water	SW2

N

State Plane Coordinate System, New Mexico Central Zone.
1983 North American Datum

Grid provides NM State Plane coordinates in feet.
Grid interval, in feet: 2000

Contour interval: 40 ft

0 500 1000 1500 2000
METERS
0 500 1000 1500 2000
FEET

NOTICE: The information on this map is provisional. Feature locations are dependent on scale and symbology and their accuracy may not have been confirmed. Los Alamos National Laboratory boundary is based on legal description established in 1946. Other boundary, structure, and utility data are from Los Alamos National Laboratory Engineering Division and/or Los Alamos County Utility and Engineering Departments. Contour data are from Los Alamos National Laboratory Environmental Restoration Project aerial survey, September 1991.

University of California
Los Alamos National Laboratory
Earth and Environmental Sciences Division
FIMAD Facility for Information Management, Analysis, and Display
FIMAD is the electronic data repository for the Environmental Restoration Project at Los Alamos National Laboratory.
Produced by: Marcia Jones

Date: November 02, 1995 FIMAD Plot ID: 103978

ASSAIGAI ANALYTICAL LABORATORIES, INC.
7300 Jefferson, N.E. • Albuquerque, New Mexico 87109 • (505) 345-8964 • FAX (505) 345-7259
3332 Wedgewood, E-5 • El Paso, Texas 79925 • (915) 593-6000 • FAX (915) 593-7820

LOS ALAMOS NATIONAL LABS
MAIL STOP K498/ESH-19
LOS ALAMOS, NM 87545

Attn: GUS SINNIS
Invoice Number:

Order #: 96-10-174
Date: 11/04/96 16:04
Work ID: MILAGRO PROJECT BASELINE
Date Received: 10/18/96
Date Completed: 11/04/96
Client Code: LOS14

SAMPLE IDENTIFICATION

Sample Number	Sample Description
01	TA57-SS5
02	TA57-SBS5
03	TA57-SS4
04	TA57-SS4-DUP
05	TA57-SBS4
06	TA57-SS1
07	TA57-SBS1
08	TA57-SS2
09	TA57-SBS2
10	TA57-SS3
11	TA57-SBS3

ND = None Detected D_F = Dilution Factor NT = Not Tested
B = Analyte was present in the blank
E = Estimated Value or Result exceeds calibration range
MULTIPLY THE LIMIT(= AAL'S DETECTION LIMIT) BY DILUTION FACTOR

Certified By
FRED L. SHORE, Ph.D.

Received: 10/18/96 Results By Test

TEST CODE default units	Sample 01 (entered units)	Sample 02 (entered units)	Sample 03 (entered units)	Sample 04 (entered units)	Sample 05 (entered units)
S6010X N/A	10/28/96	10/28/96	10/28/96	10/28/96	10/28/96
SCVHGX N/A	10/23/96	10/23/96	10/23/96	10/23/96	10/23/96

TEST CODE default units	Sample 06 (entered units)	Sample 07 (entered units)	Sample 08 (entered units)	Sample 09 (entered units)	Sample 10 (entered units)
S6010X N/A	10/28/96	10/28/96	10/28/96	10/28/96	10/28/96
SCVHGX N/A	10/23/96	10/23/96	10/23/96	10/23/96	10/23/96

TEST CODE default units	Sample 11 (entered units)
S6010X N/A	10/28/96
SCVHGX N/A	10/23/96

SAMPLE ID TA57-SS5 FRACTION 01A TEST CODE S6010 NAME METALS-ICP/SW846 6010
Date & Time Collected 10/18/96 09:05:00 Category SOIL

PARAMETER	RESULT	LIMIT	D_F	DATE_EXT	DATE_ANAL
Silver, Ag	ND	1.0	1.0	10/28/96	10/31/96
Aluminum, Al	NT	25			
Arsenic, As	ND	3.0	1.0	10/28/96	10/31/96
Barium, Ba	84.8	0.50	1.0	10/28/96	10/31/96
Beryllium, Be	ND	0.50	1.0	10/28/96	10/31/96
Calcium, Ca	NT	15			
Cadmium, Cd	ND	0.20	1.0	10/28/96	10/31/96
Cobalt, Co	NT	0.50			
Chromium, Cr	3.3	1.0	1.0	10/28/96	10/31/96
Copper, Cu	NT	0.50			
Iron, Fe	NT	15			
Potassium, K	NT	10			
Magnesium, Mg	NT	10			
Manganese, Mn	NT	0.25			
Sodium, Na	NT	15			
Nickel, Ni	3.7	2.0	1.0	10/28/96	10/31/96
Lead, Pb	10.6	2.0	1.0	10/28/96	10/31/96
Antimony, Sb	ND	1.5	1.0	10/28/96	10/31/96
Selenium, Se	ND	2.5	1.0	10/28/96	10/31/96
Vanadium, V	NT	0.15			
Zinc, Zn	NT	5.0			

Notes and Definitions for this Report:

ANALYST KH
UNITS mg/Kg
BATCH_ID M9678

Received: 10/18/96 Results by Sample

SAMPLE ID TA57-SS5 FRACTION 01A TEST CODE SCNT NAME CYANIDE, TOTAL/SW846 9010A

Date & Time Collected 10/18/96 09:05:00 Category SOIL

PARAMETER	RESULT	LIMIT	D_F	DATE_ANAL
Cyanide, Total	ND	0.50	1.0	10/31/96

Notes and Definitions for this Report:

EXTRACTED

ANALYST DG

UNITS mg/Kg

BATCH_ID W9650

COMMENTS

REPORT

Work Order # 96-10-174

Received: 10/18/96

Results by Sample

SAMPLE ID TA57-SS5 FRACTION 01A TEST CODE SCVHG NAME MERCURY (CVAA)/SW846 7471

Date & Time Collected 10/18/96 09:05:00 Category SOIL

PARAMETER	RESULT	LIMIT	D_F	DATE_EXT	DATE_ANAL
Mercury	ND	0.15	1.0	10/23/96	10/24/96

Notes and Definitions for this Report:

ANALYST CD

UNITS mg/Kg

BATCH_ID M9664

PRCNT_MOIST

Received: 10/18/96

Results by Sample

SAMPLE ID TA57-SS5 FRACTION 01A TEST CODE SMSCMT NAME MISC TEST SOIL-METALS

Date & Time Collected 10/18/96 09:05:00 Category SOIL

ANALYTES	RESULT	LIM
THALLIUM	ND	20.0

Notes and Definitions for this Report:

DATE_EXT 10/28/96

DATE_ANAL 10/31/96

ANALYST KH

D_F 1.0

UNITS mg/L

BATCH_ID M9678-004

COMMENTS

SAMPLE ID TA57-SBS5 FRACTION 02A TEST CODE S6010 NAME METALS-ICP/SW846 6010
Date & Time Collected 10/18/96 09:11:00 Category SOIL

PARAMETER	RESULT	LIMIT	D_F	DATE_EXT	DATE_ANAL
Silver, Ag	ND	1.0	1.0	10/28/96	10/31/96
Aluminum, Al	NT	25			
Arsenic, As	ND	3.0	1.0	10/28/96	10/31/96
Barium, Ba	24.7	0.50	1.0	10/28/96	10/31/96
Beryllium, Be	ND	0.50	1.0	10/28/96	10/31/96
Calcium, Ca	NT	15			
Cadmium, Cd	ND	0.20	1.0	10/28/96	10/31/96
Cobalt, Co	NT	0.50			
Chromium, Cr	4.6	1.0	1.0	10/28/96	10/31/96
Copper, Cu	NT	0.50			
Iron, Fe	NT	15			
Potassium, K	NT	10			
Magnesium, Mg	NT	10			
Manganese, Mn	NT	0.25			
Sodium, Na	NT	15			
Nickel, Ni	3.3	2.0	1.0	10/28/96	10/31/96
Lead, Pb	7.4	2.0	1.0	10/28/96	10/31/96
Antimony, Sb	ND	1.5	1.0	10/28/96	10/31/96
Selenium, Se	ND	2.5	1.0	10/28/96	10/31/96
Vanadium, V	NT	0.15			
Zinc, Zn	NT	5.0			

Notes and Definitions for this Report:

ANALYST KH
UNITS mg/Kg
BATCH_ID M9678

Received: 10/18/96 Results by Sample

SAMPLE ID TA57-SBS5 FRACTION 02A TEST CODE SCNT NAME CYANIDE, TOTAL/SW846 9010A

Date & Time Collected 10/18/96 09:11:00 Category SOIL

PARAMETER	RESULT	LIMIT	D_F	DATE_ANAL
Cyanide, Total	ND	0.50	1.0	10/31/96

Notes and Definitions for this Report:

EXTRACTED

ANALYST DG

UNITS mg/Kg

BATCH_ID W9650

COMMENTS

SAMPLE ID TA57-SBS5 FRACTION 02A TEST CODE SCVHG NAME MERCURY (CVAA)/SW846 7471
Date & Time Collected 10/18/96 09:11:00 Category SOIL

PARAMETER	RESULT	LIMIT	D_F	DATE_EXT	DATE_ANAL
Mercury	ND	0.15	1.0	10/23/96	10/24/96

Notes and Definitions for this Report:

ANALYST CD
UNITS mg/Kg
BATCH_ID M9664
PRCNT_MOIST

Received: 10/18/96 Results by Sample

SAMPLE ID TA57-SBS5 FRACTION 02A TEST CODE SMSCMT NAME MISC TEST SOIL-METALS

Date & Time Collected 10/18/96 09:11:00 Category SOIL

ANALYTES	RESULT	LIM
THALLIUM	ND	20.0

Notes and Definitions for this Report:

DATE_EXT 10/28/96
DATE_ANAL 10/31/96
ANALYST KH
D_F 1.0
UNITS mg/L
BATCH_ID M9678-009
COMMENTS

Received: 10/18/96 Results by Sample

SAMPLE ID TA57-SS4 FRACTION 03A TEST CODE S6010 NAME METALS-ICP/SW846 6010

Date & Time Collected 10/18/96 09:20:00 Category SOIL

PARAMETER	RESULT	LIMIT	D_F	DATE_EXT	DATE_ANAL
Silver, Ag	ND	1.0	1.0	10/28/96	10/31/96
Aluminum, Al	NT	25			
Arsenic, As	ND	3.0	1.0	10/28/96	10/31/96
Barium, Ba	121	0.50	1.0	10/28/96	10/31/96
Beryllium, Be	0.65	0.50	1.0	10/28/96	10/31/96
Calcium, Ca	NT	15			
Cadmium, Cd	ND	0.20	1.0	10/28/96	10/31/96
Cobalt, Co	NT	0.50			
Chromium, Cr	5.2	1.0	1.0	10/28/96	10/31/96
Copper, Cu	NT	0.50			
Iron, Fe	NT	15			
Potassium, K	NT	10			
Magnesium, Mg	NT	10			
Manganese, Mn	NT	0.25			
Sodium, Na	NT	15			
Nickel, Ni	5.8	2.0	1.0	10/28/96	10/31/96
Lead, Pb	11.0	2.0	1.0	10/28/96	10/31/96
Antimony, Sb	ND	1.5	1.0	10/28/96	10/31/96
Selenium, Se	ND	2.5	1.0	10/28/96	10/31/96
Vanadium, V	NT	0.15			
Zinc, Zn	NT	5.0			

Notes and Definitions for this Report:

ANALYST KH

UNITS mg/Kg

BATCH_ID M9678

SAMPLE ID TA57-SS4 FRACTION 03A TEST CODE SCNT NAME CYANIDE, TOTAL/SW846 9010A
Date & Time Collected 10/18/96 09:20:00 Category SOIL

PARAMETER	RESULT	LIMIT	D_F	DATE_ANAL
Cyanide, Total	ND	0.50	1.0	10/31/96

Notes and Definitions for this Report:

EXTRACTED
ANALYST DG
UNITS mg/Kg
BATCH_ID W9650
COMMENTS

SAMPLE ID TA57-SS4 FRACTION 03A TEST CODE SCVHG NAME MERCURY (CVAA)/SW846 7471
Date & Time Collected 10/18/96 09:20:00 Category SOIL

PARAMETER	RESULT	LIMIT	D_F	DATE_EXT	DATE_ANAL
Mercury	ND	0.15	1.0	10/23/96	10/24/96

Notes and Definitions for this Report:

ANALYST CD
UNITS mg/Kg
BATCH_ID M9664
PRCNT_MOIST

Received: 10/18/96 **Results by Sample**

SAMPLE ID **TA57-SS4** FRACTION **03A** TEST CODE **SMSCMT** NAME **MISC TEST SOIL-METALS**

Date & Time Collected **10/18/96 09:20:00** Category **SOIL**

ANALYTES	RESULT	LIM
THALLIUM	ND	20.0

Notes and Definitions for this Report:

DATE_EXT 10/28/96
DATE_ANAL 10/31/96
ANALYST KH
D_F 1.0
UNITS mg/L
BATCH_ID M9678-010
COMMENTS

Received: 10/18/96 Results by Sample

SAMPLE ID TA57-SS4-DUP FRACTION 04A TEST CODE S6010 NAME METALS-ICP/SW846 6010

Date & Time Collected 10/18/96 09:25:00 Category SOIL

PARAMETER	RESULT	LIMIT	D_F	DATE_EXT	DATE_ANAL
Silver, Ag	ND	1.0	1.0	10/28/96	10/31/96
Aluminum, Al	NT	25			
Arsenic, As	3.9	3.0	1.0	10/28/96	10/31/96
Barium, Ba	127	0.50	1.0	10/28/96	10/31/96
Beryllium, Be	0.63	0.50	1.0	10/28/96	10/31/96
Calcium, Ca	NT	15			
Cadmium, Cd	ND	0.20	1.0	10/28/96	10/31/96
Cobalt, Co	NT	0.50			
Chromium, Cr	5.6	1.0	1.0	10/28/96	10/31/96
Copper, Cu	NT	0.50			
Iron, Fe	NT	15			
Potassium, K	NT	10			
Magnesium, Mg	NT	10			
Manganese, Mn	NT	0.25			
Sodium, Na	NT	15			
Nickel, Ni	5.9	2.0	1.0	10/28/96	10/31/96
Lead, Pb	12.8	2.0	1.0	10/28/96	10/31/96
Antimony, Sb	ND	1.5	1.0	10/28/96	10/31/96
Selenium, Se	ND	2.5	1.0	10/28/96	10/31/96
Vanadium, V	NT	0.15			
Zinc, Zn	NT	5.0			

Notes and Definitions for this Report:

ANALYST KH

UNITS mg/Kg

BATCH_ID M9678

Received: 10/18/96 Results by Sample

SAMPLE ID TA57-SS4-DUP FRACTION 04A TEST CODE SCNT NAME CYANIDE, TOTAL/SW846 9010A

Date & Time Collected 10/18/96 09:25:00 Category SOIL

PARAMETER	RESULT	LIMIT	D_F	DATE_ANAL
Cyanide, Total	ND	0.50	1.0	10/31/96

Notes and Definitions for this Report:

EXTRACTED

ANALYST DG

UNITS mg/Kg

BATCH_ID W9650

COMMENTS

Received: 10/18/96 Results by Sample

SAMPLE ID TA57-SS4-DUP FRACTION 04A TEST CODE SCVHG NAME MERCURY (CVAA)/SW846 7471
Date & Time Collected 10/18/96 09:25:00 Category SOIL

PARAMETER	RESULT	LIMIT	D_F	DATE_EXT	DATE_ANAL
Mercury	ND	0.15	1.0	10/23/96	10/24/96

Notes and Definitions for this Report:

ANALYST CD
UNITS mg/Kg
BATCH_ID M9664
PRCNT_MOIST

Received: 10/18/96 Results by Sample

SAMPLE ID TA57-SS4-DUP FRACTION 04A TEST CODE SMSCMT NAME MISC TEST SOIL-METALS

Date & Time Collected 10/18/96 09:25:00 Category SOIL

ANALYTES	RESULT	LIM
THALLIM	ND	20.0

Notes and Definitions for this Report:

DATE_EXT 10/28/96
DATE_ANAL 10/31/96
ANALYST KH
D_F 1.0
UNITS mg/L
BATCH_ID M9678-011
COMMENTS

SAMPLE ID **TA57-SBS4** FRACTION **05A** TEST CODE **S6010** NAME **METALS-ICP/SW846 6010**
Date & Time Collected **10/18/96 09:30:00** Category **SOIL**

PARAMETER	RESULT	LIMIT	D_F	DATE_EXT	DATE_ANAL
Silver, Ag	ND	1.0	1.0	10/28/96	10/31/96
Aluminum, Al	NT	25			
Arsenic, As	ND	3.0	1.0	10/28/96	10/31/96
Barium, Ba	47.0	0.50	1.0	10/28/96	10/31/96
Beryllium, Be	0.54	0.50	1.0	10/28/96	10/31/96
Calcium, Ca	NT	15			
Cadmium, Cd	ND	0.20	1.0	10/28/96	10/31/96
Cobalt, Co	NT	0.50			
Chromium, Cr	4.2	1.0	1.0	10/28/96	10/31/96
Copper, Cu	NT	0.50			
Iron, Fe	NT	15			
Potassium, K	NT	10			
Magnesium, Mg	NT	10			
Manganese, Mn	NT	0.25			
Sodium, Na	NT	15			
Nickel, Ni	3.3	2.0	1.0	10/28/96	10/31/96
Lead, Pb	9.6	2.0	1.0	10/28/96	10/31/96
Antimony, Sb	ND	1.5	1.0	10/28/96	10/31/96
Selenium, Se	ND	2.5	1.0	10/28/96	10/31/96
Vanadium, V	NT	0.15			
Zinc, Zn	NT	5.0			

Notes and Definitions for this Report:

ANALYST KH
UNITS mg/Kg
BATCH_ID M9678

Received: 10/18/96 Results by Sample

SAMPLE ID TA57-SBS4 FRACTION 05A TEST CODE SCNT NAME CYANIDE, TOTAL/SW846 9010A

Date & Time Collected 10/18/96 09:30:00 Category SOIL

PARAMETER	RESULT	LIMIT	D_F	DATE_ANAL
Cyanide, Total	ND	0.50	1.0	10/31/96

Notes and Definitions for this Report:

EXTRACTED

ANALYST DG

UNITS mg/Kg

BATCH_ID W9650

COMMENTS

SAMPLE ID TA57-SBS4 FRACTION 05A TEST CODE SCVHG NAME MERCURY (CVAA)/SW846 7471
Date & Time Collected 10/18/96 09:30:00 Category SOIL

PARAMETER	RESULT	LIMIT	D_F	DATE_EXT	DATE_ANAL
Mercury	ND	0.15	1.0	10/23/96	10/24/96

Notes and Definitions for this Report:

ANALYST CD
UNITS mg/Kg
BATCH_ID M9664
PRCNT_MOIST

Received: 10/18/96 Results by Sample

SAMPLE ID TA57-SBS4 FRACTION 05A TEST CODE SMSCMT NAME MISC TEST SOIL-METALS
Date & Time Collected 10/18/96 09:30:00 Category SOIL

ANALYTES	RESULT	LIM
THALLIUM	ND	20.0

Notes and Definitions for this Report:

DATE_EXT 10/28/96
DATE_ANAL 10/31/96
ANALYST KH
D_F 1.0
UNITS mg/L
BATCH_ID M9678-012
COMMENTS

Received: 10/18/96 Results by Sample

SAMPLE ID TA57-SS1 FRACTION 06A TEST CODE S6010 NAME METALS-ICP/SW846 6010

Date & Time Collected 10/18/96 09:50:00 Category SOIL

PARAMETER	RESULT	LIMIT	D_F	DATE_EXT	DATE_ANAL
Silver, Ag	ND	1.0	1.0	10/28/96	10/31/96
Aluminum, Al	NT	25			
Arsenic, As	ND	3.0	1.0	10/28/96	10/31/96
Barium, Ba	191	0.50	1.0	10/28/96	10/31/96
Beryllium, Be	ND	0.50	1.0	10/28/96	10/31/96
Calcium, Ca	NT	15			
Cadmium, Cd	ND	0.20	1.0	10/28/96	10/31/96
Cobalt, Co	NT	0.50			
Chromium, Cr	3.9	1.0	1.0	10/28/96	10/31/96
Copper, Cu	NT	0.50			
Iron, Fe	NT	15			
Potassium, K	NT	10			
Magnesium, Mg	NT	10			
Manganese, Mn	NT	0.25			
Sodium, Na	NT	15			
Nickel, Ni	4.5	2.0	1.0	10/28/96	10/31/96
Lead, Pb	18.3	2.0	1.0	10/28/96	10/31/96
Antimony, Sb	ND	1.5	1.0	10/28/96	10/31/96
Selenium, Se	ND	2.5	1.0	10/28/96	10/31/96
Vanadium, V	NT	0.15			
Zinc, Zn	NT	5.0			

Notes and Definitions for this Report:

ANALYST KH

UNITS mg/Kg

BATCH_ID M9678

SAMPLE ID TA57-SS1 FRACTION 06A TEST CODE SCNT NAME CYANIDE, TOTAL/SW846 9010A
Date & Time Collected 10/18/96 09:50:00 Category SOIL

PARAMETER	RESULT	LIMIT	D_F	DATE_ANAL
Cyanide, Total	0.6	0.50	1.0	10/31/96

Notes and Definitions for this Report:

EXTRACTED
ANALYST DG
UNITS mg/Kg
BATCH_ID W9650
COMMENTS

SAMPLE ID TA57-SS1 FRACTION 06A TEST CODE SCVHG NAME MERCURY (CVAA)/SW846 7471
Date & Time Collected 10/18/96 09:50:00 Category SOIL

PARAMETER	RESULT	LIMIT	D_F	DATE_EXT	DATE_ANAL
Mercury	ND	0.15	1.0	10/23/96	10/24/96

Notes and Definitions for this Report:

ANALYST CD
UNITS mg/Kg
BATCH_ID M9664
PRCNT_MOIST

SAMPLE ID TA57-SS1 FRACTION 06A TEST CODE SMSCMT NAME MISC TEST SOIL-METALS
Date & Time Collected 10/18/96 09:50:00 Category SOIL

ANALYTES	RESULT	LIM
THALLIUM	ND	20.0

Notes and Definitions for this Report:

DATE_EXT 10/28/96
DATE_ANAL 10/31/96
ANALYST KH
D_F 1.0
UNITS mg/L
BATCH_ID M9678-013
COMMENTS

Received: 10/18/96 Results by Sample

SAMPLE ID TA57-SBS1 FRACTION 07A TEST CODE S6010 NAME METALS-ICP/SW846 6010

Date & Time Collected 10/18/96 10:15:00 Category SOIL

PARAMETER	RESULT	LIMIT	D_F	DATE_EXT	DATE_ANAL
Silver, Ag	ND	1.0	1.0	10/28/96	10/31/96
Aluminum, Al	NT	25			
Arsenic, As	ND	3.0	1.0	10/28/96	10/31/96
Barium, Ba	43.2	0.50	1.0	10/28/96	10/31/96
Beryllium, Be	0.65	0.50	1.0	10/28/96	10/31/96
Calcium, Ca	NT	15			
Cadmium, Cd	ND	0.20	1.0	10/28/96	10/31/96
Cobalt, Co	NT	0.50			
Chromium, Cr	4.2	1.0	1.0	10/28/96	10/31/96
Copper, Cu	NT	0.50			
Iron, Fe	NT	15			
Potassium, K	NT	10			
Magnesium, Mg	NT	10			
Manganese, Mn	NT	0.25			
Sodium, Na	NT	15			
Nickel, Ni	3.5	2.0	1.0	10/28/96	10/31/96
Lead, Pb	9.4	2.0	1.0	10/28/96	10/31/96
Antimony, Sb	ND	1.5	1.0	10/28/96	10/31/96
Selenium, Se	ND	2.5	1.0	10/28/96	10/31/96
Vanadium, V	NT	0.15			
Zinc, Zn	NT	5.0			

Notes and Definitions for this Report:

ANALYST KH

UNITS mg/Kg

BATCH_ID M9678

SAMPLE ID TA57-SBS1 FRACTION 07A TEST CODE SCNT NAME CYANIDE, TOTAL/SW846 9010A
Date & Time Collected 10/18/96 10:15:00 Category SOIL

PARAMETER	RESULT	LIMIT	D_F	DATE_ANAL
Cyanide, Total	ND	0.50	1.0	10/31/96

Notes and Definitions for this Report:

EXTRACTED
ANALYST DG
UNITS mg/Kg
BATCH_ID M9650
COMMENTS

SAMPLE ID TA57-SBS1 FRACTION 07A TEST CODE SCVHG NAME MERCURY (CVAA)/SW846 7471
Date & Time Collected 10/18/96 10:15:00 Category SOIL

PARAMETER	RESULT	LIMIT	D_F	DATE_EXT	DATE_ANAL
Mercury	ND	0.15	1.0	10/23/96	10/24/96

Notes and Definitions for this Report:

ANALYST CD
UNITS mg/Kg
BATCH_ID M9664
PRCNT_MOIST

REPORT

Work Order # 96-10-174

Results by Sample

SAMPLE ID TA57-SBS1 FRACTION 07A TEST CODE SMSCMT NAME MISC TEST SOIL-METALS
Date & Time Collected 10/18/96 10:15:00 Category SOIL

ANALYTES	RESULT	LIM
THALLIUM	ND	20.0

Notes and Definitions for this Report:

DATE_EXT 10/28/96
DATE_ANAL 10/31/96
ANALYST KH
D_F 1.0
UNITS mg/L
BATCH_ID M9678-014
COMMENTS

REPORT
Results by Sample

Work Order # 96-10-174

SAMPLE ID TA57-SS2 FRACTION 08A TEST CODE S6010 NAME METALS-ICP/SW846 6010
Date & Time Collected 10/18/96 10:32:00 Category SOIL

PARAMETER	RESULT	LIMIT	D_F	DATE_EXT	DATE_ANAL
Silver, Ag	ND	1.0	1.0	10/28/96	10/31/96
Aluminum, Al	NT	25			
Arsenic, As	ND	3.0	1.0	10/28/96	10/31/96
Barium, Ba	157	0.50	1.0	10/28/96	10/31/96
Beryllium, Be	0.54	0.50	1.0	10/28/96	10/31/96
Calcium, Ca	NT	15			
Cadmium, Cd	ND	0.20	1.0	10/28/96	10/31/96
Cobalt, Co	NT	0.50			
Chromium, Cr	4.0	1.0	1.0	10/28/96	10/31/96
Copper, Cu	NT	0.50			
Iron, Fe	NT	15			
Potassium, K	NT	10			
Magnesium, Mg	NT	10			
Manganese, Mn	NT	0.25			
Sodium, Na	NT	15			
Nickel, Ni	4.7	2.0	1.0	10/28/96	10/31/96
Lead, Pb	11.2	2.0	1.0	10/28/96	10/31/96
Antimony, Sb	ND	1.5	1.0	10/28/96	10/31/96
Selenium, Se	ND	2.5	1.0	10/28/96	10/31/96
Vanadium, V	NT	0.15			
Zinc, Zn	NT	5.0			

Notes and Definitions for this Report:

ANALYST KH
UNITS mg/Kg
BATCH_ID M9678

Received: 10/18/96 Results by Sample

SAMPLE ID TA57-SS2 FRACTION 08A TEST CODE SCNT NAME CYANIDE, TOTAL/SW846 9010A

Date & Time Collected 10/18/96 10:32:00 Category SOIL

PARAMETER	RESULT	LIMIT	D_F	DATE_ANAL
Cyanide, Total	ND	0.50	1.0	10/31/96

Notes and Definitions for this Report:

EXTRACTED

ANALYST DG

UNITS mg/Kg

BATCH_ID W9650

COMMENTS

Received: 10/18/96 Results by Sample

SAMPLE ID TA57-SS2 FRACTION 08A TEST CODE SCVHG NAME MERCURY (CVAA)/SW846 7471

Date & Time Collected 10/18/96 10:32:00 Category SOIL

PARAMETER	RESULT	LIMIT	D_F	DATE_EXT	DATE_ANAL
Mercury	ND	0.15	1.0	10/23/96	10/24/96

Notes and Definitions for this Report:

ANALYST CD

UNITS mg/Kg

BATCH_ID M9664

PRCNT_MOIST

Received: 10/18/96

REPORT

Work Order # 96-10-174

Results by Sample

SAMPLE ID TA57-SS2 FRACTION 08A TEST CODE SMSCMT NAME MISC TEST SOIL-METALS

Date & Time Collected 10/18/96 10:32:00 Category SOIL

ANALYTES	RESULT	LIM
THALLIUM	ND	20.0

Notes and Definitions for this Report:

DATE_EXT 10/28/96

DATE_ANAL 10/31/96

ANALYST KH

D_F 1.0

UNITS mg/L

BATCH_ID M9678-015

COMMENTS

SAMPLE ID TA57-SBS2 FRACTION 09A TEST CODE S6010 NAME METALS-ICP/SW846 6010
Date & Time Collected 10/18/96 10:51:00 Category SOIL

PARAMETER	RESULT	LIMIT	D_F	DATE_EXT	DATE_ANAL
Silver, Ag	ND	1.0	1.0	10/28/96	10/31/96
Aluminum, Al	NT	25			
Arsenic, As	ND	3.0	1.0	10/28/96	10/31/96
Barium, Ba	39.1	0.50	1.0	10/28/96	10/31/96
Beryllium, Be	0.82	0.50	1.0	10/28/96	10/31/96
Calcium, Ca	NT	15			
Cadmium, Cd	ND	0.20	1.0	10/28/96	10/31/96
Cobalt, Co	NT	0.50			
Chromium, Cr	2.9	1.0	1.0	10/28/96	10/31/96
Copper, Cu	NT	0.50			
Iron, Fe	NT	15			
Potassium, K	NT	10			
Magnesium, Mg	NT	10			
Manganese, Mn	NT	0.25			
Sodium, Na	NT	15			
Nickel, Ni	2.9	2.0	1.0	10/28/96	10/31/96
Lead, Pb	9.8	2.0	1.0	10/28/96	10/31/96
Antimony, Sb	ND	1.5	1.0	10/28/96	10/31/96
Selenium, Se	ND	2.5	1.0	10/28/96	10/31/96
Vanadium, V	NT	0.15			
Zinc, Zn	NT	5.0			

Notes and Definitions for this Report:

ANALYST KH
UNITS mg/Kg
BATCH_ID M9678

Received: 10/18/96 **Results by Sample**

SAMPLE ID **TA57-SBS2** FRACTION **09A** TEST CODE **SCNT** NAME **CYANIDE, TOTAL/SW846 9010A**

Date & Time Collected **10/18/96 10:51:00** Category **SOIL**

PARAMETER	RESULT	LIMIT	D_F	DATE_ANAL
Cyanide, Total	ND	0.50	1.0	10/31/96

Notes and Definitions for this Report:

EXTRACTED

ANALYST DG

UNITS mg/Kg

BATCH_ID W9650

COMMENTS

Received: 10/18/96 Results by Sample

SAMPLE ID TA57-SBS2 FRACTION 09A TEST CODE SCVHG NAME MERCURY (CVAA)/SW846 7471

Date & Time Collected 10/18/96 10:51:00 Category SOIL

PARAMETER	RESULT	LIMIT	D_F	DATE_EXT	DATE_ANAL
Mercury	ND	0.15	1.0	10/23/96	10/24/96

Notes and Definitions for this Report:

ANALYST CD

UNITS mg/Kg

BATCH_ID M9664

PRCNT_MOIST

Received: 10/18/96 Results by Sample

SAMPLE ID TA57-SBS2 FRACTION 09A TEST CODE SMSCMT NAME MISC TEST SOIL-METALS

Date & Time Collected 10/18/96 10:51:00 Category SOIL

ANALYTES	RESULT	LIM
THALLIUM	ND	20.0

Notes and Definitions for this Report:

DATE_EXT 10/28/96
DATE_ANAL 10/31/96
ANALYST KH
D_F 1.0
UNITS mg/L
BATCH_ID M9678-016
COMMENTS

SAMPLE ID **TA57-SS3** FRACTION **10A** TEST CODE **S6010** NAME **METALS-ICP/SW846 6010**
Date & Time Collected **10/18/96 11:27:00** Category **SOIL**

PARAMETER	RESULT	LIMIT	D_F	DATE_EXT	DATE_ANAL
Silver, Ag	ND	1.0	1.0	10/28/96	10/31/96
Aluminum, Al	NT	25			
Arsenic, As	ND	3.0	1.0	10/28/96	10/31/96
Barium, Ba	111	0.50	1.0	10/28/96	10/31/96
Beryllium, Be	ND	0.50	1.0	10/28/96	10/31/96
Calcium, Ca	NT	15			
Cadmium, Cd	ND	0.20	1.0	10/28/96	10/31/96
Cobalt, Co	NT	0.50			
Chromium, Cr	3.1	1.0	1.0	10/28/96	10/31/96
Copper, Cu	NT	0.50			
Iron, Fe	NT	15			
Potassium, K	NT	10			
Magnesium, Mg	NT	10			
Manganese, Mn	NT	0.25			
Sodium, Na	NT	15			
Nickel, Ni	3.4	2.0	1.0	10/28/96	10/31/96
Lead, Pb	11.1	2.0	1.0	10/28/96	10/31/96
Antimony, Sb	ND	1.5	1.0	10/28/96	10/31/96
Selenium, Se	NT	2.5			
Vanadium, V	NT	0.15			
Zinc, Zn	NT	5.0			

Notes and Definitions for this Report:

ANALYST KH
UNITS mg/Kg
BATCH_ID M9678

Received: 10/18/96 **Results by Sample**

SAMPLE ID TA57-SS3 FRACTION 10A TEST CODE SCNT NAME CYANIDE, TOTAL/SW846 9010A

Date & Time Collected 10/18/96 11:27:00 Category SOIL

PARAMETER	RESULT	LIMIT	D_F	DATE_ANAL
Cyanide, Total	ND	0.50	1.0	10/31/96

Notes and Definitions for this Report:

EXTRACTED

ANALYST DG

UNITS mg/Kg

BATCH_ID W9650

COMMENTS

SAMPLE ID TA57-SS3 FRACTION 10A TEST CODE SCVHG NAME MERCURY (CVAA)/SW846 7471
Date & Time Collected 10/18/96 11:27:00 Category SOIL

PARAMETER	RESULT	LIMIT	D_F	DATE_EXT	DATE_ANAL
Mercury	ND	0.15	1.0	10/23/96	10/24/96

Notes and Definitions for this Report:

ANALYST CD
UNITS mg/Kg
BATCH_ID M9664
PRCNT_MOIST

Received: 10/18/96 Results by Sample

SAMPLE ID TA57-SS3 FRACTION 10A TEST CODE SMSCMT NAME MISC TEST SOIL-METALS

Date & Time Collected 10/18/96 11:27:00 Category SOIL

ANALYTES	RESULT	LIM
THALLIUM	ND	20.0

Notes and Definitions for this Report:

DATE_EXT 10/28/96
DATE_ANAL 10/31/96
ANALYST KH
D_F 1.0
UNITS mg/L
BATCH_ID M9678-017
COMMENTS

Received: 10/18/96 Results by Sample

SAMPLE ID **TA57-SBS3** FRACTION **11A** TEST CODE **S6010** NAME **METALS-ICP/SW846 6010**

Date & Time Collected **10/18/96 11:33:00** Category **SOIL**

PARAMETER	RESULT	LIMIT	D_F	DATE_EXT	DATE_ANAL
Silver, Ag	ND	1.0	1.0	10/28/96	10/31/96
Aluminum, Al	NT	25			
Arsenic, As	ND	3.0	1.0	10/28/96	10/31/96
Barium, Ba	78.5	0.50	1.0	10/28/96	10/31/96
Beryllium, Be	0.68	0.50	1.0	10/28/96	10/31/96
Calcium, Ca	NT	15			
Cadmium, Cd	ND	0.20	1.0	10/28/96	10/31/96
Cobalt, Co	NT	0.50			
Chromium, Cr	4.2	1.0	1.0	10/28/96	10/31/96
Copper, Cu	NT	0.50			
Iron, Fe	NT	15			
Potassium, K	NT	10			
Magnesium, Mg	NT	10			
Manganese, Mn	NT	0.25			
Sodium, Na	NT	15			
Nickel, Ni	3.7	2.0	1.0	10/28/96	10/31/96
Lead, Pb	8.9	2.0	1.0	10/28/96	10/31/96
Antimony, Sb	ND	1.5	1.0	10/28/96	10/31/96
Selenium, Se	ND	2.5	1.0	10/28/96	10/31/96
Vanadium, V	NT	0.15			
Zinc, Zn	NT	5.0			

Notes and Definitions for this Report:

ANALYST KH

UNITS mg/Kg

BATCH_ID M9678

Received: 10/18/96 Results by Sample

SAMPLE ID TA57-SBS3 FRACTION 11A TEST CODE SCNT NAME CYANIDE, TOTAL/SW846 9010A

Date & Time Collected 10/18/96 11:33:00 Category SOIL

PARAMETER	RESULT	LIMIT	D_F	DATE_ANAL
Cyanide, Total	ND	0.50	1.0	10/31/96

Notes and Definitions for this Report:

EXTRACTED

ANALYST DG

UNITS mg/Kg

BATCH_ID W9650

COMMENTS

SAMPLE ID TA57-SBS3 FRACTION 11A TEST CODE SCVHG NAME MERCURY (CVAA)/SW846 7471
Date & Time Collected 10/18/96 11:33:00 Category SOIL

PARAMETER	RESULT	LIMIT	D_F	DATE_EXT	DATE_ANAL
Mercury	ND	0.15	1.0	10/23/96	10/24/96

Notes and Definitions for this Report:

ANALYST CD
UNITS mg/Kg
BATCH_ID M9664
PRCNT_MOIST

REPORT

Work Order # 96-10-174

Results by Sample

SAMPLE ID TA57-SBS3 FRACTION 11A TEST CODE SMSCMT NAME MISC TEST SOIL-METALS

Date & Time Collected 10/18/96 11:33:00 Category SOIL

ANALYTES	RESULT	LIM
THALLIUM	ND	20.0

Notes and Definitions for this Report:

DATE_EXT 10/28/96
DATE_ANAL 10/31/96
ANALYST KH
D_F 1.0
UNITS mg/L
BATCH_ID M9678-018
COMMENTS

Received: 10/18/96 Results by Sample

SAMPLE ID TA57-SBS2 FRACTION 09A TEST CODE S6010 NAME METALS-ICP/SW846 6010

Date & Time Collected 10/18/96 10:51:00 Category SOIL

PARAMETER	RESULT	LIMIT	D_F	DATE_EXT	DATE_ANAL
Silver, Ag	ND	1.0	1.0	10/28/96	10/31/96
Aluminum, Al	NT	25			
Arsenic, As	ND	3.0	1.0	10/28/96	10/31/96
Barium, Ba	39.1	0.50	1.0	10/28/96	10/31/96
Beryllium, Be	0.82	0.50	1.0	10/28/96	10/31/96
Calcium, Ca	NT	15			
Cadmium, Cd	ND	0.20	1.0	10/28/96	10/31/96
Cobalt, Co	NT	0.50			
Chromium, Cr	.9	1.0	1.0	10/28/96	10/31/96
Copper, Cu	NT	0.50			
Iron, Fe	NT	15			
Potassium, K	NT	10			
Magnesium, Mg	NT	10			
Manganese, Mn	NT	0.25			
Sodium, Na	NT	15			
Nickel, Ni	2.9	2.0	1.0	10/28/96	10/31/96
Lead, Pb	9.8	2.0	1.0	10/28/96	10/31/96
Antimony, Sb	ND	1.5	1.0	10/28/96	10/31/96
Selenium, Se	ND	2.5	1.0	10/28/96	10/31/96
Vanadium, V	NT	0.15			
Zinc, Zn	NT	5.0			

Notes and Definitions for this Report:

ANALYST KH

UNITS mg/Kg

BATCH_ID M9678

DISTRICT I
P.O.Box 1980, Hobbs, NM 88241-1980
DISTRICT II
P.O. Drawer DD, Artesia, NM 88211-0719
DISTRICT III
1000 Rio Brazos Rd, Aztec, NM 87410

State of New Mexico
Energy, Minerals and Natural Resources Department

OIL CONSERVATION DIVISION
2040 Pacheco St.
Santa Fe, NM 87505

SUBMIT 2 COPIES TO APPROPRIATE DISTRICT OFFICE IN ACCORDANCE WITH RULE 116 PRINTED ON BACK SIDE OF FORM

NOTIFICATION OF FIRE, BREAKS, SPILLS, LEAKS, AND BLOWOUTS

OPERATOR	Los Alamos National Lab				ADDRESS	Ms K497, Los Alamos 87545	TELEPHONE #	667-7969
REPORT OF	FIRE	BREAK	SPILL X	LEAK	BLOWOUT	OTHER*		
TYPE OF FACILITY	DRLG WELL	PROD WELL	TANK BTRY	PIPE LINE	GASO PLNT	OIL RFY	OTHER* Geothermal Plug & Ab.	
FACILITY NAME:	Fenton Hill Hot Dry Rock							
LOCATION OF FACILITY Qu/Qu Sec. or Footage	NE 1/4 Sec 13, T19N, R2E				SEC. 13	TWP. 19N	RGE. 2E	COUNTY Sandoval
DISTANCE AND DIRECTION FROM NEAREST TOWN OR PROMINENT LANDMARK	approximately 5 mi from La Cueva by road							
DATE AND HOUR OF OCCURRENCE	11.22.96 12:00 Am				DATE AND HOUR OF DISCOVERY	11.22.96 1:00 Am		
WAS IMMEDIATE NOTICE GIVEN?	YES ✓	NO	NOT REQUIRED		IF YES, TO WHOM	Mark Ashley, OCD		
BY WHOM	Neil Williams				DATE AND HOUR	11.22.96		
TYPE OF FLUID LOST	Cement/mud slurry				QUANTITY OF LOSS	< 5,000 gal	VOLUME RECOVERED	unknown
DID ANY FLUIDS REACH A WATERCOURSE?	YES ✓	NO			QUANTITY	less than 5000 gal		

IF YES, DESCRIBE FULLY**
Retainer down hole failed, releasing fluid to metal mud pit (well pit). Operator opened gate in pit to avoid overflow. Slurry flowed on ground & bypassed inlet to service pond and flowed off site into an ephemeral tributary of Lake Fork.

DESCRIBE CAUSE OF PROBLEM AND REMEDIAL ACTION TAKEN**
Slurry flowed approx. 1500 ft down the tributary to a point approx. 150 ft above the confluence with Lake Fork. ESH-18 took water and slurry samples from the water course. Locations were marked in the field for installation of

DESCRIBE AREA AFFECTED AND CLEANUP ACTION TAKEN**
silt fences to contain the slurry and prevent further migration. No decisions have been made yet regarding additional control measures or cleanup, pending review of sample data. Silt fence installation will begin tomarrow.

DESCRIPTION OF AREA	FARMING	GRAZING X	URBAN	OTHER* Forest Service land				
SURFACE CONDITIONS	SANDY	SANDY LOAM	CLAY	ROCKY X	WET X	DRY	SNOW X	

DESCRIBE GENERAL CONDITIONS PREVAILING (TEMPERATURE, PRECIPITATION, ETC.)**
After midnight spill there was a rain storm beginning at about 2:30 AM. Ground is saturated with snow melt and rainfall.

I HEREBY CERTIFY THAT THE INFORMATION ABOVE IS TRUE AND COMPLETE TO THE BEST OF MY KNOWLEDGE AND BELIEF

SIGNED Neil Williams PRINTED NAME AND TITLE Neil Williams Envir. Engr. DATE 11.22.96 5:00 PM

*SPECIFY **ATTACH ADDITIONAL SHEETS IF NECESSARY

TABLE I

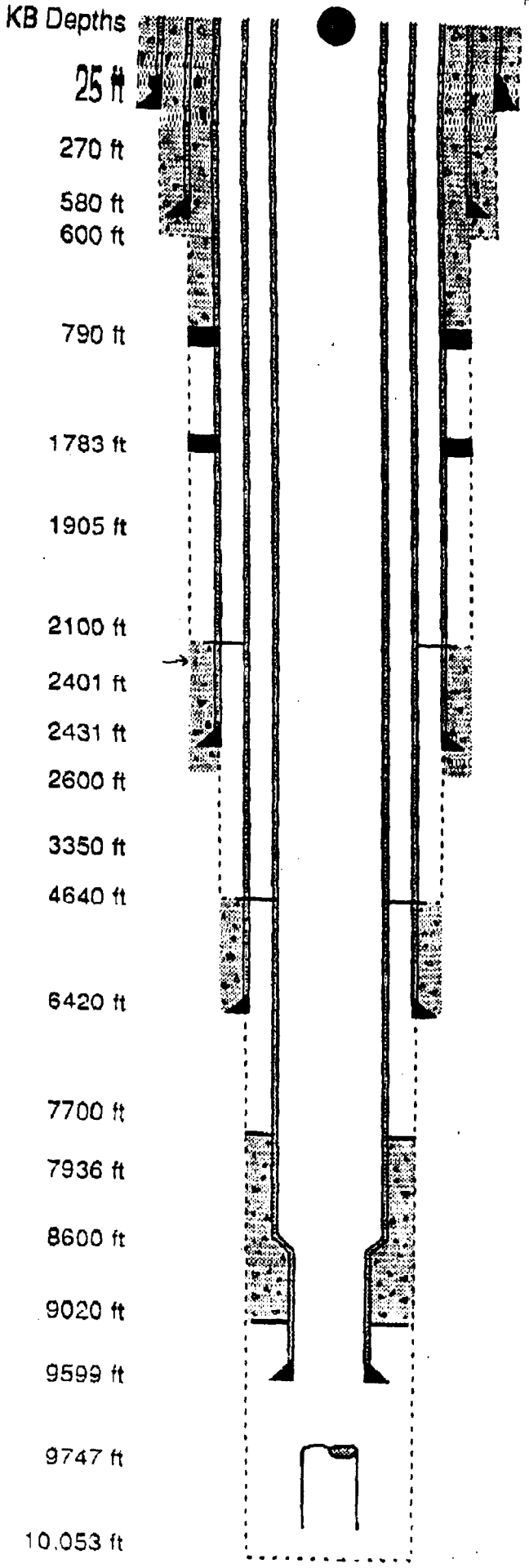
FIELD GEOLOGIC LOG OF TEST HOLE GT-2

ELEVATION OF LAND SURFACE 8690 FT (2648.7 m)

	Thickness (ft)	Depth (ft)
Bandelier Tuff		
Tuff, dark gray, moderately welded to welded, rhyolitic crystal and crystal fragments of quartz and sanidine, lithic fragments of pumice, rhyolite, and latite in ash matrix. Pumice, light gray with lithic fragments of light to dark gray rhyolite. Moderately welded tuff 0 to 110 ft; pumice 110 to 250 ft; welded tuff 250 to 295 ft; moderately welded tuff 295 to 325 ft; welded tuff 325 to 350 ft.	350 (106.7 m)	350 (106.7 m)
Paliza Canyon Formation		
Andesites and basaltic andesite breccia, dark gray, with interbedded sands and gravels.	50 (15.2 m)	400 (121.9 m)
Abiquiu Tuff		
Sandstone, light gray tuffaceous, friable, with angular basalt in upper part of section, crystal fragments of quartz, sanidine, and chalcedony; lithic fragments of rhyolite and quartzite in tuffaceous sand matrix.	50 (15.2 m)	450 (137.1 m)
Abo Formation		
Shale, siltstone, and fine-grained sandstone, brownish-red to dark red, with lenses of white to gray shale; clay lenses, dark red, with thin limestone lenses, gray, near base. Shale, dark red with thin lenses of white to gray shale and clay, 450 to 495 ft; siltstone and fine-grained sandstone, brownish-red, arkosic, 495 to 600 ft; shale, dark red, alternating with lenses of silty sandstone and siltstone and thin lenses of white to gray shale, 600 to 775 ft; sandstone, dark red, fine-grained, 775 to 800 ft; shale, dark red, alternating with lenses of silty sandstone and siltstone, 800 to 965 ft; sandstone, dark red, fine-grained, 965 to 1005 ft; shale, brownish-red, alternating with fine-grained silty sandstone, and thin lenses of limestone, gray, 1005 to 1095 ft; sandstone, red, fine-grained with lenses of thin limestone, gray, 1095 to 1130 ft; shale, red with lenses of fine-grained sandstone, thin lenses of white to gray shale and limestone, gray, 1130 to 1230 ft.	780 (237.7 m)	1230 (374.9 m)
Magdalena Group		
Upper limestone member consists of limestone, alternating with shale, fine-grained sandstone, and clay. Limestone, gray, alternating with thin lenses of sandstone, reddish-brown, fine-grained, and shale, red, 1230 to 1360 ft; clay, gray with thin lenses of limestone, gray, dense, 1360 to 1390 ft; limestone, gray, dense, arkosic, and shale, reddish-brown, with thin lenses of sandstone, reddish-brown, fine-grained, 1390 to 1580 ft; limestone, gray, dense, arkosic, 1580 to 1625 ft; clay, gray, with thin lenses of limestone, gray, dense, 1625 to 1650 ft; limestone, gray, dense with thin lenses of sandstone, reddish-brown, fine-grained, 1650 to 1700 ft;		

TABLE I (Continued)

	Thickness (ft)	Depth (ft)
Magdalena Group (continued)		
limestone, gray, dense, alternating with shale, dark red, sandstone, fine-grained, brown-red, and clay, dark gray, 1700 to 1840 ft.	610 (185.9 m)	1840 (560.8 m)
Lower limestone member consists of limestone, dark gray, dense, with thin lenses of shale, dark gray, and sandstone, white to gray, fine-grained.	115 (35.1 m)	1955 (595.9 m)
Shale member, (not previously described in area) shale, dark gray with thin lenses of limestone, gray, dense, siliceous, and siltstone, reddish-brown and clay, dark gray.	180 (54.9 m)	2135 (650.8 m)
Sandia Formation		
Upper clastic member consists of limestone, gray with sandstone, reddish-brown, fine- to coarse-grained, with shales, brown, and clays brown to greenish gray.	205 (62.5 m)	2340 (713.2 m)
Lower limestone member consists of limestone, light gray, siliceous, dense, with a few thin lenses of sandstone, fine- to coarse-grained, and siltstone, light gray.	55 (16.8 m)	2395 (730.0 m)
Precambrian Rocks		
Granites, granodiorites, monzonites, quartz monzonites, gneiss, schist and amphibolites with dikes of biotite-hornblende-pagioclase. Granite, light pinkish-red, 2395 to 2540 ft; granodiorite, light gray, 2540 to 2600 ft; granite, light pink coarse-grained, 2600 to 2615 ft; granodiorite, light pink, 2715 to 2730 ft; granodiorite, light gray, 2730 to 2745 ft; granite, pink, coarsed-grained, 2745 to 2765 ft; granodiorite, gray, 2765 to 2805 ft; granite, pink, coarse-grained, 2805 to 2930 ft; granodiorite, gray, 2930 to 2990 ft; monzonite, light gray, 2990 to 3030 ft; granodiorite, gray (dike ~3120 to 3123 ft), 3030 to 3175 ft; granite, pink, coarse-grained, 3175 to 3195 ft; granodiorite, gray, 3195 to 3260 ft; granite, pink, coarse-grained (dike ~3260 to 3265 ft), 3260 to 3340 ft; granodiorite, light gray, 3340 to 3375 ft; granite, pink (dike ~3495 to 3500 ft), 3375 to 3520 ft; granite, light pink, coarse-grained, alternating with granite, gray, fine-grained, 3520 to 3695 ft; granite, light gray, fine-grained, 3695 to 3755 ft; granite, light pink to light gray, 3755 to 3855 ft; granite, light gray with intervals of granite, pink, coarse-grained, 3855 to 3915 ft; granite, light pinkish-gray, 3915 to 3980 ft; granite, gray, 3980 to 4010 ft; granite, pink, coarse-grained, 4010 to 4030 ft; granite, light pinkish-gray, 4030 to 4210 ft; granite, light pink to light gray, coarse-grained [altered (weathered?) 4285 to 4290 ft]; 4210 to 4290 ft; granite, dark gray (thin dikes in interval), 4290 to 4350 ft; granite, gray, 4350 to 4480 ft; granite, light pinkish-gray, 4480 to 4610 ft; granite, light gray, 4610 to 4685 ft; granite, light pink, 4685 to 4750 ft; granite,		



KB 8711 ft - GL 86[illegible] ft
48" hole drilled to 10' GL
30" culvert SA 10' GL with 10 yards concrete

10 3/4" casing parted at 270' - cemented four times with a total of 500 sacks
20" 94# H-40 BT&C casing SA 580' with 830 ft^3 cement
26 1/2" hole drilled to 600'

13 3/8" stage collar

Wellbore Diagram for EE-1 9-22-81

13 3/8" stage collar cemented without returns
Cement lost to LC zone

Lost circulation zone in 17 1/2" hole

Calculated top of cement on first stage recementing of 13 3/8" casing
Top of Precambrian

13 3/8" 54.5# k-55 ST&C casing SA 2432" with 225 sacks of cement on recementing
17 1/2" hole drilled to 2600'

Lost circulation zone in 12 1/4" hole

Top of cement per CBL on cementing of 10 3/4" casing

10 3/4" 45.5# K-55 BT&C casing SA 6420 with 300 ft^3 cement

Top of cement per CBL at 7700' on cementing of of 8 5/8x7 5/8"casing
Lost circulation zone in 9 7/8" hole

Bottom of 8 5/8" 32# k-55 LT&C casing
Top of 7 5/8" 26.4# N-80 Hydril casing

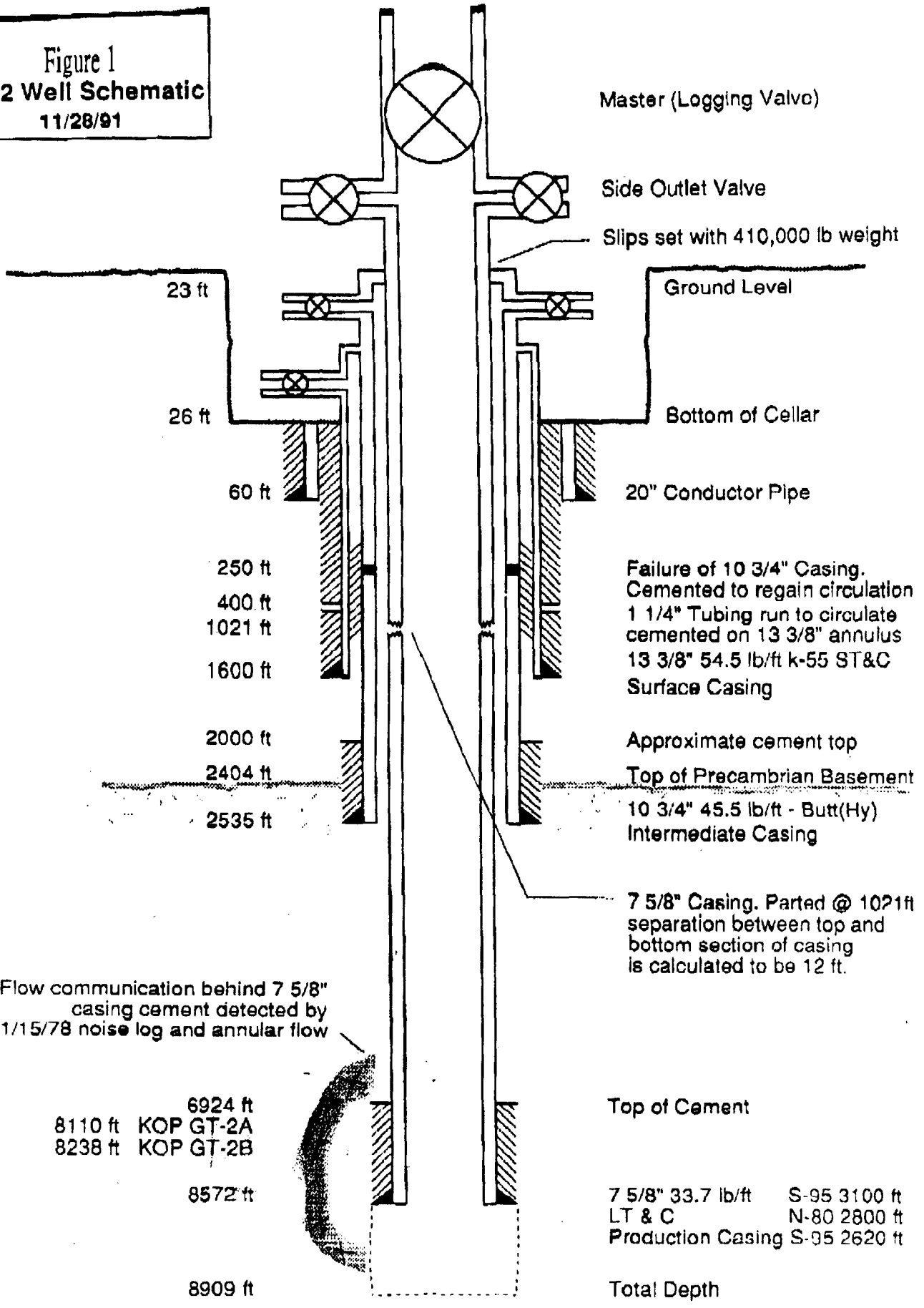
Bottom of cement per CBL at 9020'

7 5/8" 26.4# N-80 Hydril casing SA 9599' with 240 ft^3 and recemented with 180 ft^3

Top of fish (5 1/2" casing and inflatable packers)

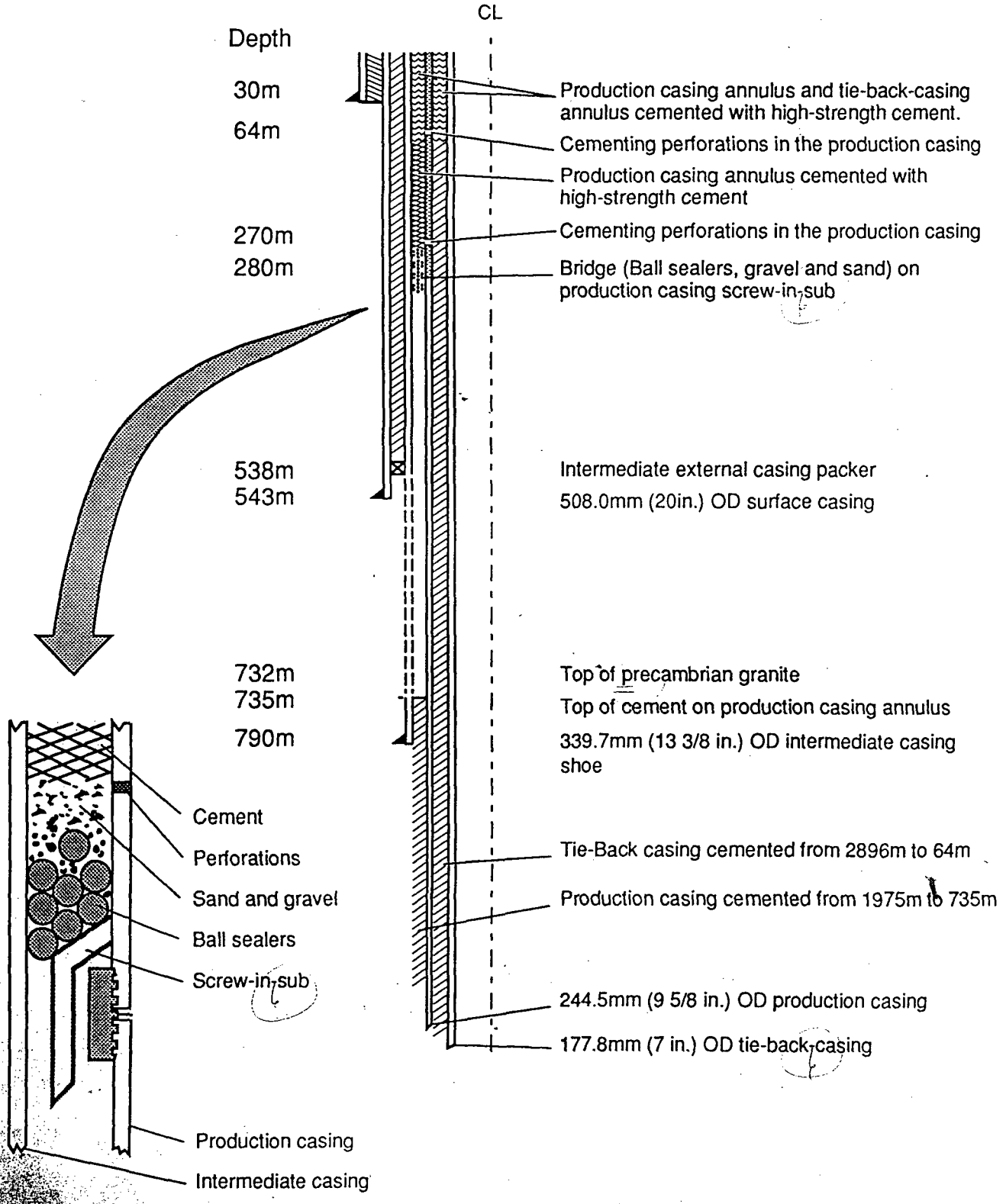
TD of 9 5/8" hole (cleaned out with 6 3/4' bit)

Figure 1
GT-2 Well Schematic
11/28/91



NAME	ORG	PHONE
Stephen McLin	LANL - ESH-18	665-1721
MARK ASHLEY	NMOCD	827-7155
ROGER ANDERSON	NMOCD	827-7152
Dan Thomas	DOE EES	667-9008
Neil Williams	ESH-18	665-0954
Jim Thomson	EES-4	7-7900
Roy Johnson	OCD Santa Fe	827-8198
Tom TURNER	LANL - CONSULTANT	801 942 4566
Bob Beers	ESH-18	667-7969

Figure 12. Final EE-2A Upper Wellbore Configuration



FINAL EE-2A SCHEMATIC LOWER WELLBORE CONFIGURATION

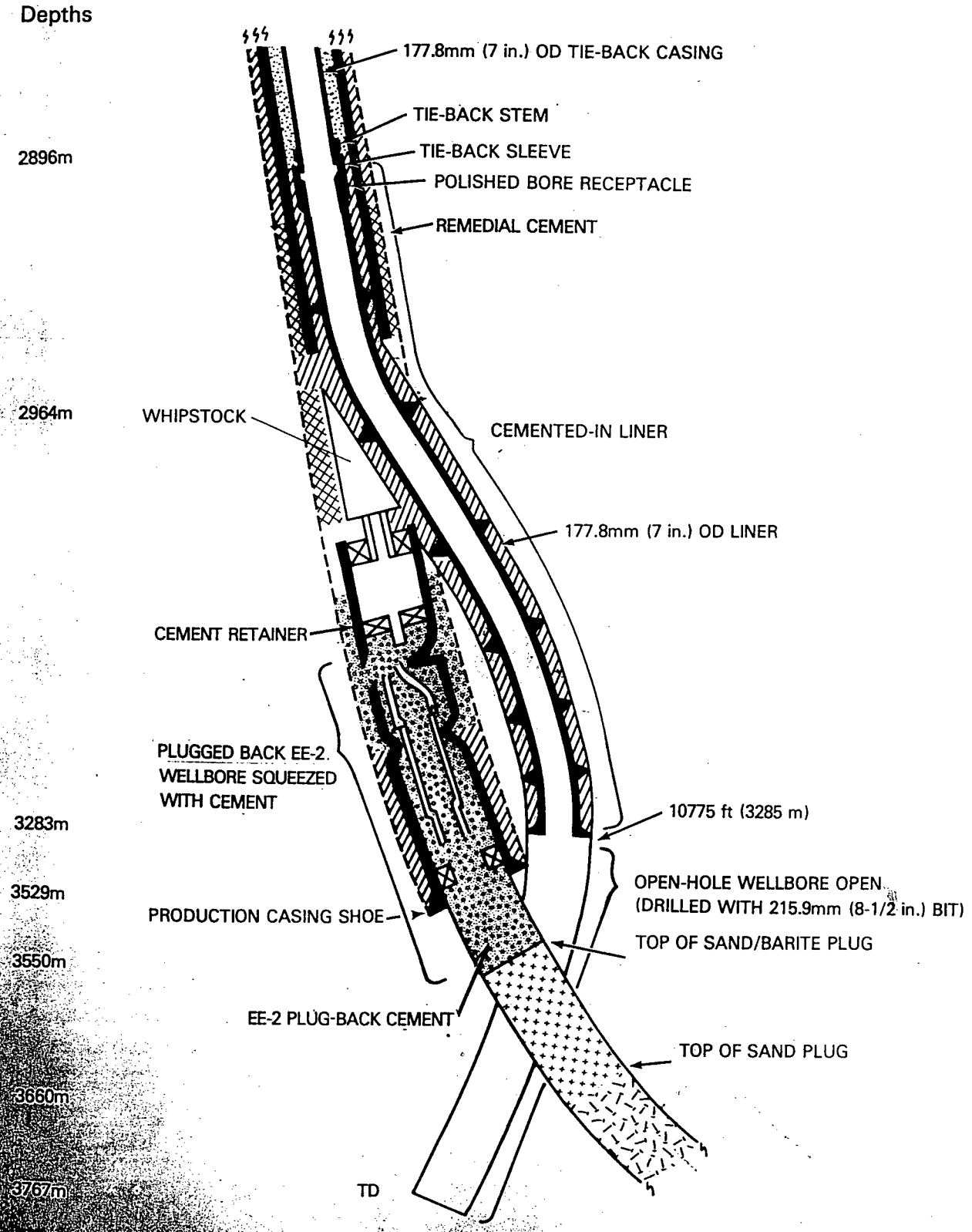


TABLE I

FIELD GEOLOGIC LOG OF TEST HOLE GT-2

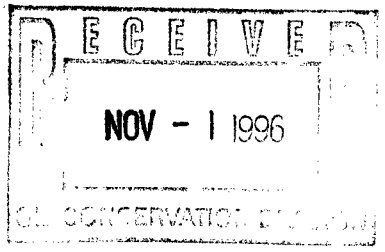
ELEVATION OF LAND SURFACE 8690 FT (2648.7 m)

	Thickness (ft)	Depth (ft)
Bandelier Tuff		
Tuff, dark gray, moderately welded to welded, rhyolitic crystal and crystal fragments of quartz and sanidine, lithic fragments of pumice, rhyolite, and latite in ash matrix. Pumice, light gray with lithic fragments of light to dark gray rhyolite. Moderately welded tuff 0 to 110 ft; pumice 110 to 250 ft; welded tuff 250 to 295 ft; moderately welded tuff 295 to 325 ft; welded tuff 325 to 350 ft.	350 (106.7 m)	350 (106.7 m)
Paliza Canyon Formation		
Andesites and basaltic andesite breccia, dark gray, with interbedded sands and gravels.	50 (15.2 m)	400 (121.9 m)
Abiquiu Tuff		
Sandstone, light gray tuffaceous, friable, with angular basalt in upper part of section, crystal fragments of quartz, sanidine, and chalcedony; lithic fragments of rhyolite and quartzite in tuffaceous sand matrix.	50 (15.2 m)	450 (137.1 m)
Abo Formation		
Shale, siltstone, and fine-grained sandstone, brownish-red to dark red, with lenses of white to gray shale; clay lenses, dark red, with thin limestone lenses, gray, near base. Shale, dark red with thin lenses of white to gray shale and clay, 450 to 495 ft; siltstone and fine-grained sandstone, brownish-red, arkosic, 495 to 600 ft; shale, dark red, alternating with lenses of silty sandstone and siltstone and thin lenses of white to gray shale, 600 to 775 ft; sandstone, dark red, fine-grained, 775 to 800 ft; shale, dark red, alternating with lenses of silty sandstone and siltstone, 800 to 965 ft; sandstone, dark red, fine-grained, 965 to 1005 ft; shale, brownish-red, alternating with fine-grained silty sandstone, and thin lenses of limestone, gray, 1005 to 1095 ft; sandstone, red, fine-grained with lenses of thin limestone, gray, 1095 to 1130 ft; shale, red with lenses of fine-grained sandstone, thin lenses of white to gray shale and limestone, gray, 1130 to 1230 ft.	780 (237.7 m)	1230 (374.9 m)
Magdalena Group		
Upper limestone member consists of limestone, alternating with shale, fine-grained sandstone, and clay. Limestone, gray, alternating with thin lenses of sandstone, reddish-brown, fine-grained, and shale, red, 1230 to 1360 ft; clay, gray with thin lenses of limestone, gray, dense, 1360 to 1390 ft; limestone, gray, dense, arkosic, and shale, reddish-brown, with thin lenses of sandstone, reddish-brown, fine-grained, 1390 to 1580 ft; limestone, gray, dense, arkosic, 1580 to 1625 ft; clay, gray, with thin lenses of limestone, gray, dense, 1625 to 1650 ft; limestone, gray, dense with thin lenses of sandstone, reddish-brown, fine-grained, 1650 to 1700 ft;		

Los Alamos
NATIONAL LABORATORY

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

Date: October 28, 1996
In Reply Refer To: ESH-18/WQ&H-96-0550
Mail Stop: K497
Telephone: (505) (667-7969)



Mr. Mark Ashley
Oil Conservation Division
Energy, Minerals, and Natural Resources Department
2040 South Pacheco Street
Santa Fe, New Mexico 87505

SUBJECT: GROUND WATER DISCHARGE PLAN GW-31 DECOMMISSIONING OF LOS ALAMOS NATIONAL LABORATORY'S FENTON HILL HOT DRY ROCK GEOTHERMAL FACILITY

Dear Mr. Ashley:

I would like to take this opportunity to notify you of the changes that are in progress at Los Alamos National Laboratory's (Laboratory) Fenton Hill Hot Dry Rock Geothermal Facility (hereafter, facility). The Department of Energy has directed the Laboratory to decommission the facility by the end of CY 1996. Please find, for your information, the enclosed copy of the Laboratory's Plugging and Abandonment (P&A) Procedures for the facility. These P&A Procedures have been reviewed and approved by the following regulatory agencies: OCD, Mr. Roy Johnson; US Bureau of Land Management, Mr. Steve Salzman; US Forest Service, Mr. Dennis Trujillo; and NM State Engineer, Mr. Charles Wohlenberg for Mr. Calvin Chavez.

Work is currently under way to P&A sixteen of the facility's nineteen wells. Two wells, EE-2 and TH-3, are to be kept open for logging tool development, and shall remain the responsibility of the Laboratory's Earth and Environmental Sciences Group (EES-4) to be plugged at a later date. The third well to remain open, WW-1, the facility's primary water supply well, will be transferred to the Milagro Project. P&A of nine of the shallow and intermediate depth wells has been completed and a drilling rig has started work on the first of the deep wells, GT-2.

After P&A of GT-2 is completed, on approximately October 22, the rig will be moved to EE-1 where approximately 500k gallons of geothermal fluid in the 1 million gallon service pond will be disposed of through injection into the Phase I reservoir through the EE-1 wellbore. The actual volume to be injected is uncertain due to varying estimates on the volume of geothermal fluids that will be vented from the Phase II reservoir during plugging and abandonment. An Injection Permit for EE-1 is on file in your office and will be re-activated by Mr. Roy Johnson, OCD District IV Supervisor, when he is satisfied that the condition of the casing is adequate for injection service. Once injection is completed, wells EE-1 and EE-3 will be plugged and abandoned.

The actual volume of geothermal fluids injected through the EE-1 wellbore will be recorded and reported to your office upon completion of all closure activities. As was discussed during our April 4, 1996, meeting at the facility, it is the Laboratory's understanding that the geothermal fluids in the 1 million gallon service are not subject to RCRA due to a specific exclusion for waters produced during the exploration, development, or production of geothermal energy [40CFR261.4(b)(5)]. Water quality samples of the geothermal fluid will be collected and analyzed prior to injection and will be made available to your agency upon your request. The sludge in the bottom of the service pond will then be removed and disposed of off-site.

The majority of the equipment currently on-site will remain there for the time being. The DOE has directed that all hardware that could be used for future Hot Dry Rock Geothermal field experiments be placed into storage for the present. The Fenton Hill facility is the preferred short-term storage site. The remaining equipment, structures, and facilities that are not are not placed into storage will be transferred either to the Milagro Project or the U.S.Forest Service. The 1 million gallon storage pond will be transferred to the Milagro Project. Perimeter fencing of the facility is scheduled to remain in place.

Under the current schedule, decommissioning of the facility will be completed by December 31, 1996. Once all decommissioning activities are complete the Laboratory will submit a closure letter to your agency which outlines the status of operations and activities at the facility. Please feel free to contact me at 667-7969 if you have any questions or concerns regarding decommissioning of the Fenton Hill Hot Dry Rock Facility or if you would like to visit the facility during decommissioning activities.

Sincerely,

Bob Beers
Water Quality and Hydrology

BB/tp

Enclosures: a/s

Cy: J. Albright, EES-4, w/o enc., MS D437
J. Thomson, EES-4, w/o enc., MS D437
S. Rae, ESH-18, w/enc., MS K497
N. Williams, ESH-18, w/o enc., MS K497
M. Saladen, ESH-18, w/o enc., MS K497
K. Zamora, DOE/LAAO, w/o enc., MS A316
G. Sinnis, P-23, w/o enc., MS H803
P. Shanley, ESH-19, w/o enc., MS K498
WQ&H File, w/enc., MS K497
CRM-4, w/enc., MS A150

Department of Energy
Albuquerque Operations Office
Los Alamos Area Office
Los Alamos, New Mexico 87544

JUL 1 2 1996

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. Roy Johnson
Senior Petroleum Geologist
District IV Supervisor
New Mexico Oil Conservation Division
2040 Pacheco Street
Santa Fe, NM 87507

Dear Mr. Johnson:

Subject: Plugging and Abandonment (P&A) Procedures

Enclosed please find the P&A procedures for wells associated with the Los Alamos National Laboratory's (LANL) Fenton Hill Hot Dry Rock Geothermal Project. The U. S. Department of Energy has directed LANL to plug and abandon sixteen wells in Sandoval County as part of the planned decommissioning of the Fenton Hill facility. These P&A procedures are being submitted to your agency for review, comment, and approval.

Questions regarding the enclosed P&A procedures should be addressed to Jim Albright of LANL's GeoEngineering Group at 667-4318. Please submit written comments and approvals to me at your earliest convenience.

Sincerely,

Joseph C. Vozella
Assistant Area Manager
Office of Environment and Projects

LAAMEP:7JV-210

Enclosure

cc w/enclosure:
K. Zamora, AAMEP, LAAO
S. Rae, ESH-18, LANL, MS-K497
N. Williams, ESH-18, LANL, MS-K497
J. Albright, EES-4, LANL, MS-D443

Department of Energy
Albuquerque Operations Office
Los Alamos Area Office
Los Alamos, New Mexico 87544

SEP - 6 1996

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. Roy Johnson
Senior Petroleum Geologist
Supervisor District IV
New Mexico Oil Conservation Division
2040 S. Pacheco Street
Santa Fe, New Mexico 87507

Dear Mr. Johnson:

Subject: Plugging and Abandonment (P&A) Procedures for Wells Associated with Fenton Hill Hot Dry Rock Geothermal Project: May 30, 1996

Following are some additions and modifications which the Los Alamos National Laboratory (LANL) wishes to append to the above-referenced document. These come as a result of your recommendations and comments and those of Mr. Steve Salzman, U. S. Bureau of Land Management.

1. Mud used for filler plugs on all wells will include an appropriate corrosion inhibitor.

2. Cement used in all wells will contain 40% silica flour.

3. The 7-5/8" casing in GT-2 will be cut at the lowest free point and removed.

4. Attempt to pull 8-5/8" casing in well PC-1.

5. Cut 7" casing at the lowest free point in well PC-2 and remove.

6. All casing cuts will be made below the shoe of the next outer casing. In some cases, the procedures specify making casing cuts slightly above the shoe.

Questions regarding these additions and modifications to the existing P&A Procedures should be addressed to Jim Albright of LANL's Earth and Environmental Sciences Group at (505) 667-4318.

Sincerely,

for Joseph C. Vozella
Assistant Area Manager
Office of Environment and Projects

LAAMEP:9KZ-023

cc:
See page 2

cc:
K. Zamora, AAMEP, LAAO
S. Rae, (ESH-18/WQ&H-96-0401), ESH-18, LANL, MS-K497
B. Beers, ESH-18, LANL, MS-K497
N. Williams, ESH-18, LANL, MS-K497
J. Albright, EES-4, LANL, MS-D443
K. McAda, EPD, AL

PLUGGING AND ABANDONMENT PROCEDURES

FOR WELLS ASSOCIATED WITH THE

FENTON HILL HOT DRY ROCK GEOTHERMAL PROJECT

May 30, 1996

Los Alamos National Laboratory
GeoEngineering Group - EES-4
Earth and Environmental Sciences Division
and
Water Quality and Hydrology Group - ESH-18
Environment, Safety, and Health Division

REGULATORY APPROVALS:

N.M. Oil Conservation Division - Roy Johnson

U.S. Bureau of Land Management - Steve Salzman

U.S. Forest Service - Dennis Trujillo

N.M. State Engineer's Office - Calvin Chavez

Overview:

Los Alamos National Laboratory (LANL) has been directed by the U.S. Department of Energy to plug and abandon (P&A) the wells associated with the Fenton Hill Hot Dry Rock (HDR) Geothermal Project. The wells are located in Sandoval County, New Mexico approximately 35 miles west of Los Alamos and range in depth from 450' to 12,235'. LANL intends to maintain two of the wells associated with the project, EE-2A and TH-3, for geoscientific studies and instrumentation development. These two wells will be abandoned at a later date.

Following is a list of the wells scheduled for abandonment during 1996. This document contains detailed P&A procedures of each of these wells arranged in the order in which they appear below. Casing schematics are provided for the deeper wells. Sundry Notices are attached for wells with depths in excess of 1,000'.

Name	Depth	Casing	Previous Service
GT-2	8,909'	See schematic	Phase I production
EE-1	10,053'	See schematic	Phase I injection
EE-3A	12,107'	See schematic	Phase II injection
GT-1	2,575'	See schematic	Heat/seismic measurement
PC-1	2,178'	See schematic	Heat/seismic measurement
PC-2	1,825'	See schematic	Heat/seismic measurement
TH-A	590'	4-1/2"/7" cemented @ 97'	Heat measurement
TH-B	650'	4-1/2"/7" cemented @ 97'	Heat measurement
TH-C	750'	4/1/2"/7" cemented @ 97'	Heat measurement
TH-D	500'	4-1/2"/7" cemented @ 97'	Heat measurement
TH-1	450'	1-1/2" steel pipe	Heat measurement
TH-2	450'	1-1/2" steel pipe	Heat measurement
TH-4	450'	1-1/2" steel pipe	Heat measurement
TH-5	450'	1-1/2" steel pipe	Heat measurement
WW-2	450'	16" casing (slotted)	Fresh water prod.
WW-3	460'	16" casing (slotted)	Fresh water prod.

Water Disposal in the Phase I reservoir

Approximately 700,000 gallons of produced geothermal fluid will be injected into the Phase I Hot Dry Rock reservoir through the EE-1 wellbore. GT-2 and EE-1 are the only two wells connected to the Phase I reservoir which is located approximately 8,000-9,600' below the surface and isolated from the aquifers by app. 5,500' of impermeable granite. GT-2 will be plugged and abandoned prior to injection operations. The 8-5/8" casing in EE-1 will be perforated at approximately 7,600' and cement squeezed outside the casing up to 6,500' to assure that the Phase I reservoir is isolated from the 8-5/8" x 10-3/4" casing annulus prior to injection. A mechanical integrity test of the 8-5/8" casing will then be performed. If there is evidence of a leak in the 8-5/8" casing, fluid injection will be performed through drill pipe and a packer set just above the 7-5/8" casing shoe at 9,599'. Complete P&A of EE-1 will be performed immediately after the injection operations are complete.

Well Locations

The physical locations of the deep wells (those over 1,000' in depth) can be found on the attached Sundry Notices. The remaining well locations are provided in Attachment 7.

Schedule

The P&A operations will be performed using three different rigs: a drilling rig rated to 500,000 lb hook load for the the deep wells (GT-2, EE-1, and EE-3A), a workover rig rated to 150,000 for the all other wells with casing sizes over 1-1/2", and a LANL owned pulling unit for well TH-1,2,4, and 5. Two rigs may be active simultaneously. Operations may start as soon as mid-July and it's expected that all P&A work will be completed before October 1, 1996.

Attachments

1.A. Sundry Notice for EE-1
1.B. P&A procedures for EE-1
1.C. Casing schematic for EE-1
2.A. Sundry notice for EE-3
2.B. P&A procedures for EE-3
2.C. Casing schematic for EE-3
3.A. Sundry Notice for GT-1
3.B. P&A procedures for GT-1
3.C. Casing schematic for GT-1
4.A. Sundry Notice for GT-2
4.B. P&A procedures for GT-2
4.C. Casing schematic for GT-2
5.A. Sundry Notice for PC-1
5.B. P&A procedures for PC-1
5.C. Casing schematic for PC-1
6.A. Sundry Notice for PC-2
6.B. P&A procedures for PC-2
6.C. Casing schematic for PC-2
7. Casing Descriptions, P&A Procedures, and Physical Locations for Shallow Wells Associated with the Fenton Hill Project

ATTACHMENT 1.A

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT

OIL CONSERVATION DIV[illegible]ON
2040 S. Pacheco
SANTA FE, NEW MEXICO 87501

Form G-103
Adopted 10-1-74
Revised 10-1-78

NO. OF COPIES RECEIVED		
DISTRIBUTION		
File		
N. M. B. M.		
U. S. G. S		
Operator		
Land Office		

SUNDRY NOTICES AND REPORTS ON GEOTHERMAL RESOURCES WELLS

Federal Land Use Agreement

5. Indicate Type of Lease: State ☐ Fee ☐

5.a State Lease No.

Do Not Use This Form for Proposals to Drill or to Deepen or Plug Back to a Different Reservoir. Use "Application For Permit –" (Form G-101) for Such Proposals.)

1. Type of well: Geothermal Producer ☐ Temp. Observation ☐ Low-Temp Thermal ☐ Injection/Disposal ☒

7. Unit Agreement Name: Fenton Hill

2. Name of Operator: Los Alamos National Laboratory

8. Farm or Lease Name:

3. Address of Operator: P.O.Box 1663 Los Alamos, NM 87545

9. Well No.: EE-1

4. Location of Well: Unit Letter ____ 1,463 Feet From The East Line and 1,501 Feet From The North Line, Section 13 Township 19N Range 2E NMPM.

10. Field and Pool, or Wildcat:

15. Elevation (Show whether DF, RT, GR, etc.): 8,695'

12. County: Sandoval

16. Check Appropriate Box To Indicate Nature of Notice, Report or Other Data

NOTICE OF INTENTION TO:

- PERFORM REMEDIAL WORK ☐
- PLUG AND ABANDON ☒
- TEMPORARILY ABANDON ☐
- PULL OR ALTER CASING ☐
- CHANGE PLANS ☐
- OTHER ____ ☐

SUBSEQUENT REPORT OF:

- REMEDIAL WORK ☐
- ALTERING CASING
- COMMENCE DRILLING OPNS. ☐
- PLUG & ABANDONMENT
- CASING TEST AND CEMENT JOB ☐
- OTHER ____

17. Describe Proposed or completed Operations *(Clearly state all pertinent details, and give pertinenet dates, including estimated date of starting any proposed work)* SEE RULE 203.

Set cement retainer at 8,800', set cement plug from 8,800' to casing shoe at 9,599', set 200 linear foot plug on top of retainer. Fill hole with 40 vis mud. Tag cement top. Cut 8-5/8" casing at 6,500' and remove. Set 200 linear foot cement plug from 6,300-6,500'. Set cement retainer just above cement plug in 10-3/4" casing and set 200 linear foot above retainer. Fill hole with 30-40 vis mud. Tag cement top. Run CBL to verify cement in 10-3/4" x 13-3/8" annulus - perf and squeeze if needed. Set 100 linear foot cement plugs at 2,000' intervals up to 1,000'. Set cement plug from 800-1,000'. Set 50 linear foot plug at surface. Cut off casings 6' below ground level and weld plate with well name on top. Cover wellhead.
See attached detailed procedures and casing schematic.

It is estimated that this proposed work may start in mid-July, 1996.

18. I hereby certify that the information above is true and complete to the best of my knowledge and belief.

SIGNED [signature] TITLE EES-4 Group Leader DATE [illegible]

APPROVED BY ____ TITLE ____ DATE ____

ATTACHMENT 1.B.

Los Alamos National Laboratory

Fenton Hill Hot Dry Rock Test Site

Preliminary Well Abandonment Procedure
Well: EE-1

ThermaSource, Inc.

4-2-96 Revision 2

Pertinent Well Data

1. Well Completed 9-22-81

2. Total Depth 9-5/8" hole to 10,053'.

3. Combination string of 7-5/8" and 8-5/8" casing run from 9599' to surface. 7-5/8" 26.4 ppf, N-80 hydril casing from 8600' to 9599'. 8-5/8" 32 ppf, K-55, LT&C casing run from 8600' back to surface. Cemented annulus from 7700' to 9020'.

4. 10-3/4" 45.5 ppf, K-55 Buttress casing run from 6420' back to surface. Cemented annulus from 4640' to 6420'. Hole in 10-3/4" casing due to parted casing at 270' and cemented four times with 500 sacks of cement.

5. 13-3/8" 54.5 ppf, K-55, ST&C casing run from 2432' back to surface. Cemented annulus from 2100' to 2432' and 790' up to surface.

6. 20" 94 ppf, H-40, Buttress casing run from 580' back to surface and cemented form 580' to surface.

7. 30" conductor cemented in a 48" hole to 25'.

8. Fish left in 9-5/8" open hole form 9747' to total depth consisting of 5-1/2" casing and inflatable packer.

Time	Sequence of Operations
24 hours	1. Rig up on well and nipple up appropriate blow out preventer stack. Test stack and complete rig up operations.
18 hours	2. Pick up 6-3/4" bit and run in hole picking up drill pipe. Check for bridges and obstructions. Run in to bottom of 7-5/8" casing at 9599'.

8 hours 3. Pull out of hole with bit and pick up cement retainer on drill pipe and run in hole with same to 9500'.

4 hours 4. Set cement retainer in 7-5/8" at approximately 8800' a depth based on the results of CBL and pull off of same. Stab back into retainer and pump below retainer with water. Then mix and pump enough cement to fill the 7-5/8" casing from the retianer to the shoe of the 7-5/8" casing below the retainer. Displace all cement below retainer, pull out of retainer and prepare to set cement plugs on top of retainer.

10 hours 5. Mix and pump enough cement to fill 7-5/8" casing from 8800' up to 8600'. Pull up and wait on cement for 8 hours. Mix and pump 30 to 40 vis. gel mud to fill hole. Run in hole and tag top of cement to verify proper location of cement plug.

12 hours 6. Pull out hole and pick up 8-5/8" casing cutter and run in hole with same. Cut 8-5/8" casing at 6500'. Pull out of hole with cutter.

24 hours 7. Pull and lay down 8-5/8" casing from 6500', approximately 80' below the shoe of the 10-3/4" casing, if casing pulls free if casing does not pull free then rig up to run cement bond log and free point indicator. If casing is not free in open hole then verify from logs that formations do not contain usable water the cut 8-5/8" at the top free point and proceed ahead with cut and pull 8-5/8" casing.

10 hours 8. Pick up 9-7/8" bit and 10-3/4" casing scrapper. Run in hole and check casing for bridges or obstructions in the 10-3/4" casing. Run into casing to 8-5/8" casing stub with open ended drill pipe and set cement plug in open hole from top of 8-5/8" casing stub up inside 10-3/4" casing..

8 hours 9. Pull out of hole with bit and pick up 10-3/4" 45.5 ppf casing cement retainer and run in hole with same. Set retainer slightly above cement plug. Disengage from retainer and pull up

above retainer.

10 hours 10. Mix and pump cement to fill 10-3/4" casing from retainer up 200'. Pull out of cement and wait on cement for 8 hours. While waiting on cement circulate and mix mud filling 10-3/4 casing with 30 to 40 vis gel mud. Run in hole and tag top of cement to verify proper location of cement.

6 hours 11. Run cement bond log on 10-3/4" casing to verify cement in annulus of 10-3/4" and 13-3/8".

4 hours 12. If cement in located in annulus the proceed ahead with abandonment. Set 200 linear feet cement plugs in the mud left in the wellbore every 2000' from the bottom cement plug set on top of the cement retainer to the surface.

2 hours 13. Set final cement plug from 50' up to surface.

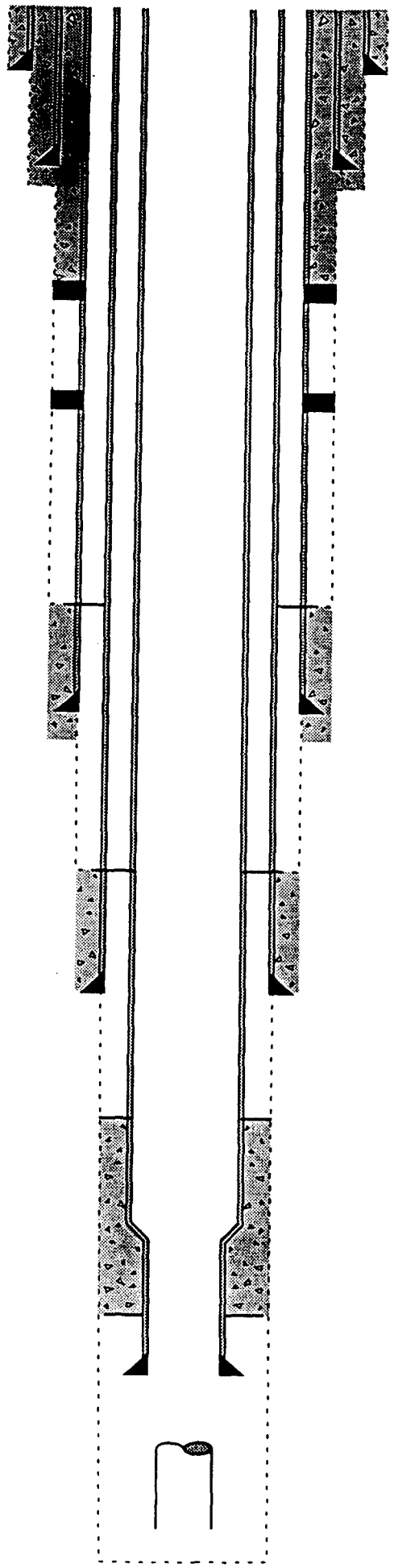
18 hours 14. Nipple down blow out preventer stack. Cut and remove all casing strings to below ground level. Weld metal plate on top of all casing strings with well name welded into plate.

18 hours 15. Nipple down and rig up to move to next well.

---

172 hours (7.17 days) Total Time on Location

ATTACHMENT 1.C.



KB 8711 ft - GL 8696 ft
48" hole drilled to 10' GL
30" culvert SA 10' GL with 10 yards concrete

10 3/4" casing parted at 270' - cemented four times with a total of 500 sacks
20" 94# H-40 BT&C casing SA 580' with 830 ft^3 cement
26 1/2" hole drilled to 600'

Wellbore Diagram for EE-1 9-22-81

13 3/8" stage collar

13 3/8" stage collar cemented without returns
Cement lost to LC zone

Lost circulation zone in 17 1/2" hole

Calculated top of cement on first stage recementing of 13 3/8" casing
Top of Precambrian

13 3/8" 54.5# k-55 ST&C casing SA 2432" with 225 sacks of cement on recementing
17 1/2" hole drilled to 2600'

Lost circulation zone in 12 1/4" hole

Top of cement per CBL on cementing of 10 3/4" casing

10 3/4" 45.5# K-55 BT&C casing SA 6420 with 300 ft^3 cement

Top of cement per CBL at 7700' on cementing of of 8 5/8x7 5/8"casing
Lost circulation zone in 9 7/8" hole

Bottom of 8 5/8" 32# k-55 LT&C casing
Top of 7 5/8" 26.4# N-80 Hydril casing

Bottom of cement per CBL at 9020'

7 5/8" 26.4# N-80 Hydril casing SA 9599' with 240 ft^3 and recemented with 180 ft^3

Top of fish (5 1/2" casing and inflatable packers)

TD of 9 5/8" hole (cleaned out with 6 3/4' bit)

ATTACHMENT 2.A.

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT

OIL CONSERVATION DIVISION
2040 S. Pacheco
SANTA FE, NEW MEXICO 87501

Form G-103
Adopted 10-1-
Revised 10-1-

NO. OF COPIES RECEIVED		
DISTRIBUTION		
File		
N. M. B. M.		
U. S. G. S		
Operator		
Land Office		

SUNDRY NOTICES AND REPORTS ON GEOTHERMAL RESOURCES WELLS

Federal Land Use Agreement

5. Indicate Type of Lease State ☐ Fee ☐

5.a State Lease No.

Do Not Use This Form for Proposals to Drill or to Deepen or Plug Back to a Different Reservoir. Use "Application For Permit —" (Form G-101) for Such Proposals.)

1. Type of well: Geothermal Producer ☐ Temp. Observation ☐ Low-Temp Thermal ☐ Injection/Disposal ☒

7. Unit Agreement Name: Fenton Hill

2. Name of Operator: Los Alamos National Laboratory

8. Farm or Lease Name:

3. Address of Operator: P.O.Box 1663 Los Alamos, NM 87545

9. Well No.: EE-3

4. Location of Well
Unit Letter 1,754 Feet From The East Line and 1,420 Feet From The North Line, Section 13 Township 19N Range 2E NMPM.

10. Field and Pool, or Wildcat

15. Elevation (Show whether DF, RT, GR, etc.): 8,695'

12. County: Sandoval

16. Check Appropriate Box To Indicate Nature of Notice, Report or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
PERFORM REMEDIAL WORK	☐	PLUG AND ABANDON	☒	REMEDIAL WORK	☐	ALTERING CASING	
TEMPORARILY ABANDON	☐			COMMENCE DRILLING OPNS.	☐	PLUG & ABANDONMENT	
PULL OR ALTER CASING	☐	CHANGE PLANS	☐	CASING TEST AND CEMENT JOB	☐		
OTHER	☐			OTHER			

17. Describe Proposed or completed Operations *(Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work)* SEE RULE 203.

Pull 4-1/2" tubing from PBR at 9,191'. Set cement retainer (9-5/8") at 9,100'.
Set cement plug from 9,100' to 8,900'. Fill hole with 30-40 vis. mud. Tag cement top.
Cut 9-5/8" casing at 4,200' and remove (see step 6 of attached prodedure for contingency).
Set cement plug at 4,100-4,200'. Fill hole with 30-40 vis. mud. Tag cement top.
Set 13-3/8" cement retainer at 2,452'. Set 100 linear foot cement plug on top of reatiner.
Set cement plug at 1,371-1,471'. Set 50 linear foot plug at surface. Cut off casing
6' below ground level and weld plate with well name on top. Cover wellhead.
See attached detailed procedures and casing schematic.

It is estimated that this proposed work may start in late July 1996.

18. I hereby certify that the information above is true and complete to the best of my knowledge and belief.

SIGNED James A. Albright TITLE EES-4 Group Leader DATE 6-7-96

APPROVED BY _____ TITLE _____

Los Alamos National Laboratory

Fenton Hill Hot Dry Rock Test Site

Preliminary Well Abandonment Procedure
Well: EE-3A

ThermaSource, Inc.

4-2-96 Revision 3

Pertinent Well Data

1. EE-3A was originally completed on May 14, 1986.

2. 9-5/8" casing was originally set in the original EE-3 at a total depth of 10,374'. EE-3 was originally drilled to 13,933' on 8-7-81. EE-3 was adequately abandoned and EE-3A was sidetracked through a section cut in the 9-5/8" between 9285' to 9372'. The section was then underreamed to 16" from 9293' to 9330'. Present bottom of 9-5/8" casing at 9285'. 9-5/8" casing is cemented from 9285' up to 5200' using stage collar at 7281'. Top of cement in 9-5/8" casing X 12-1/4" hole is at approximately 5200' based on CBL.

3. Casing leak or hole in the 9-5/8" casing located at approximately 4150'. Pressure up on 9-5/8" casing result with pressure appearing on the 9-5/8" X 13-3/8" annulus.

4. 13-3/8" casing set to total depth of 2552' and cemented from 2552' up to 2275' and from 1421' back to surface using an external casing packer set at 1421' in 20" casing.

5. 20" casing set to total depth of 1580' and cemented from total depth back to surface.

6. 30" conductor pipe set and cemented to a total depth of 87'.

7. 5-1/2" liner from 9191' to 11,436' and cemented from 11,436' up to 10,950'. Combination 4-1/2" (3.75" Minimum I.D.) and 5" tubing tied-back to top of liner at 9191' using polish bore receptacle back to surface.

8. EE-3A was drilled with a 8-1/2" bit to total depth of 13,182 on 6-17-85. Hole was plugged back with barite, packer and sand to 12,107'.

Time	Sequence of Operations
18 hours	1. Rig up on well and nipple up appropriate blow preventer stack. Test stack and complete rig up operations.
12 hours	2. Rig up and pull 4-1/2" tubing and pull same out of hole and lay down same from tie-back sleeve at 9191' .
6 hours	3. Pick up 8-1/2" bit and 9-5/8" casing scrapper. Run in hole with same and check 9-5/8" casing to 9100'.
8 hours	4. Pull out of hole with 8-1/2" bit and pick up 9-5/8" casing cement retainer. Run in hole with retainer and set same at 9100'. Disengage from retainer and pull above retainer and prepare to set cement plug.
10 hours	5. Mix and pump cement to fill 200 linear feet of 9-5/8" casing from 9100' up to 8900'. Pull out of cement and wait on cement form 8 hours. While waiting on cement mix and fill hole with 30 to 40 vis. gel mud. Tag top of cement to verify proper location of cement.
26 hours	6. Pull out of hole and pick up 9-5/8" casing cutter and cut 9-5/8" casing at approximately 4200'. Pull out of hole and attempt to pull 9-5/8" casing. Pull and lay down 9-5/8" casing. If unable to pull 9-5/8" then run in hole with cement retainer and set same at 4100' approximately 50' above casing leak. Pump below retainer and attempt to establish circulation through the leak and up the annulus of 9-5/8" X 13-3/8" to the surface. If circulation can be established then mix and pump cement to fill 9-5/8" X 13-3/8" annulus up to a free point so that the upper portion of the 9-5/8" can be recovered. Then proceed on with the remainder of the procedures.
12 hours	7. Run in hole with 12-1/4" bit and 13-3/8" casing scrapper. Clean out 13-3/8" casing to 2552' and 12-1/4" open hole to top of 9-5/8" stub at 4200'. Trip out of hole with bit and run in

hole open ended to top of 9-5/8" stub and set 100 linear open hole cement plug from top of 9-5/8" stub up to 4100' +/-.

12 hours 8. Wait on cement to set and tag top to verify cement plug is in proper location. Fill hole with good 30 to 40 vis. gel mud.

5 hours 9. Trip to pick up 13-3/8" casing cement retainer and run in hole with same. Set retainer at 2452'. Disengage from retainer and pull above same and prepare to set cement plug.

3 hours 10. Mix and pump cement to fill 100 linear feet of 13-3/8" casing from 2452' up to 2352'. Mix and fill hole with 30 to 40 vis gel mud.

2 hours 11. Set another cement plug from 1471' up to 1371' and another from 50' to surface.

18 hours 12. Nipple down blow out preventer stack and cut all casing string at ground level. Weld top plate on all casings with well name welded on top.

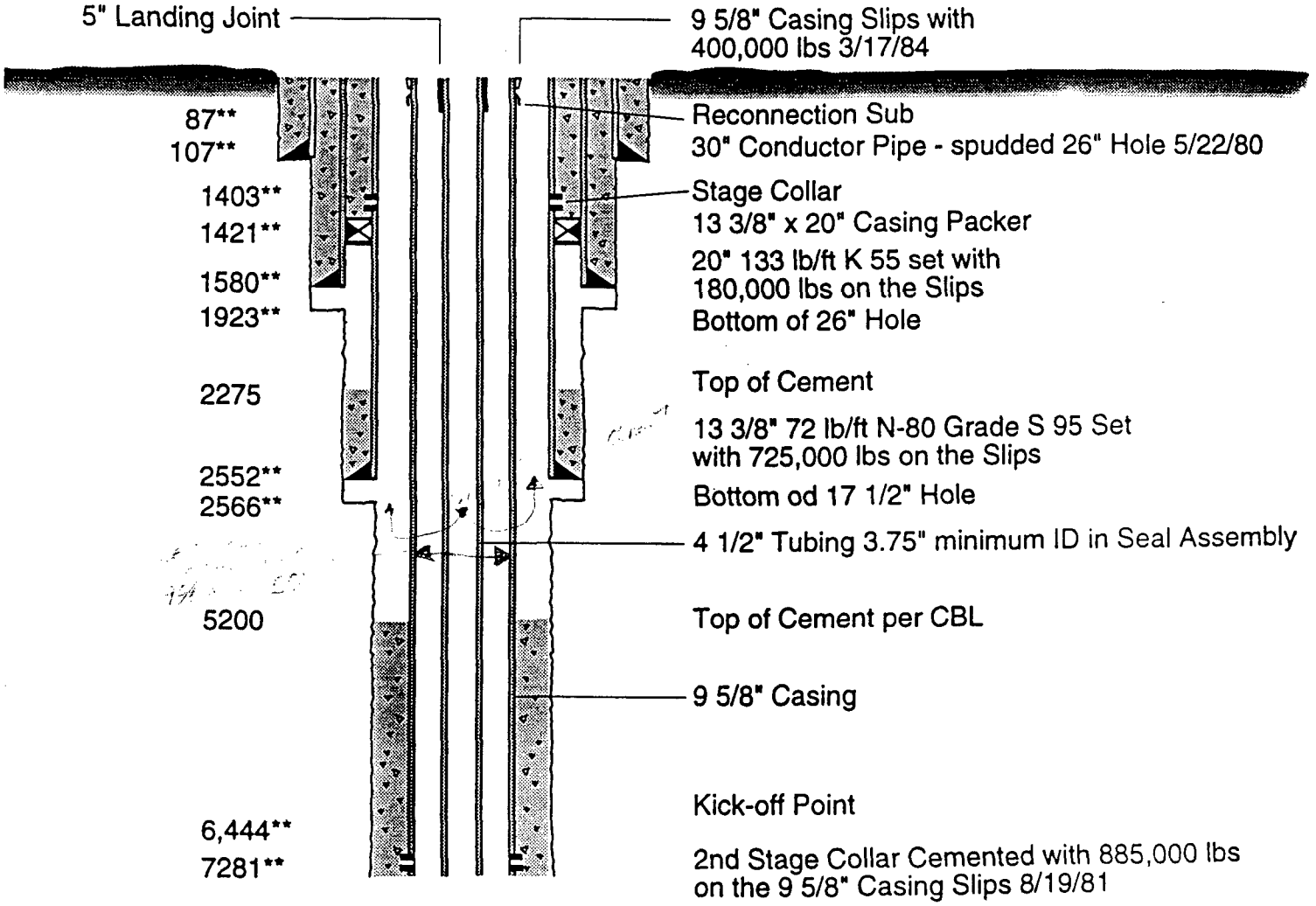
18 hours 13. Rig down and release rig.

---

150 hours (6.25 days) Total Time on Location

Present Configuration of EE 3-A

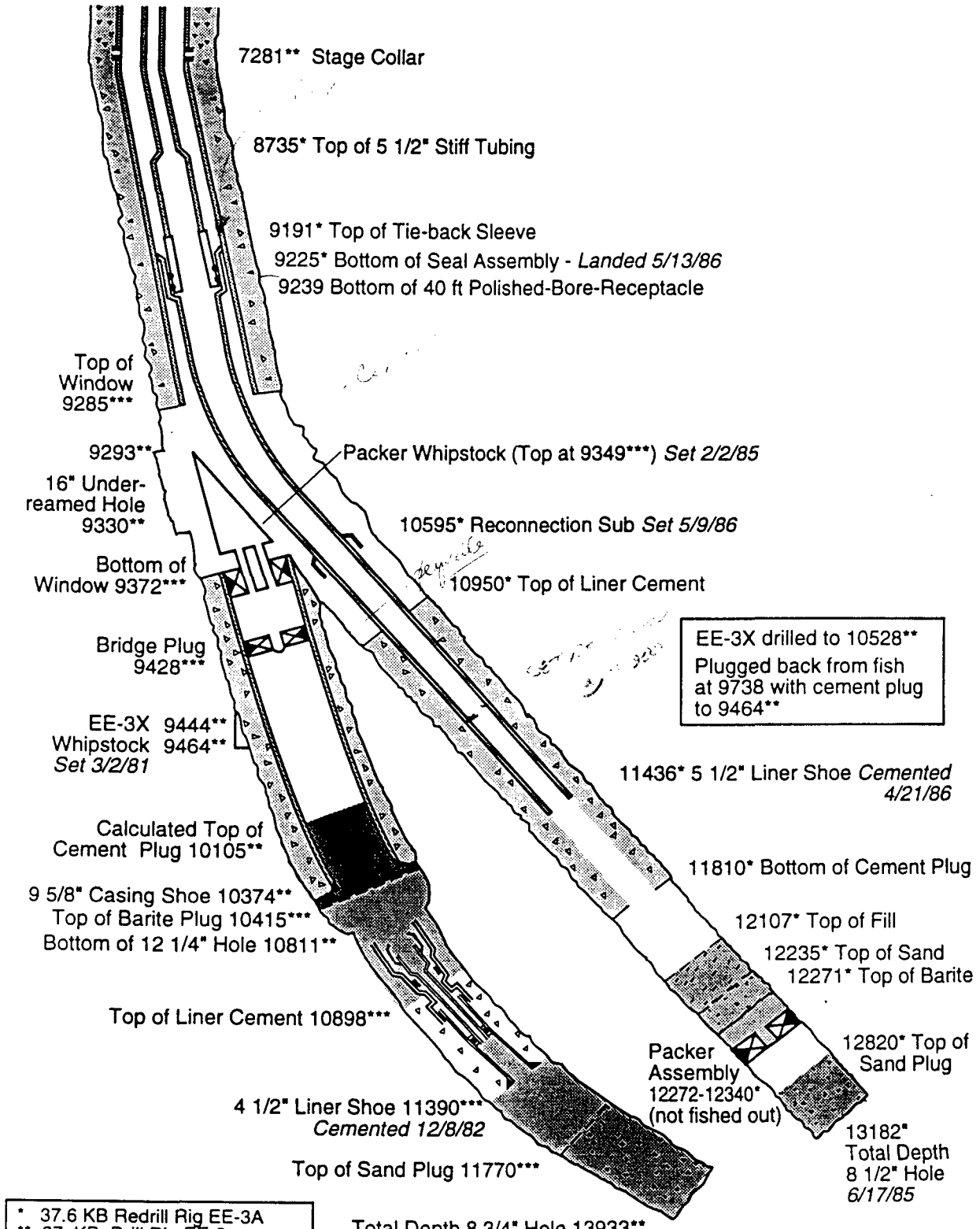
As Completed June 17, 1988
(Drawing revised 4 /15/91, all depths in ft)



* 37.6 KB Plugback EE-3A
** 27 KB Drill Rig EE-3
*** 22 KB Workover/Completion Rig EE3-Side track EE-3A

Present Configuration of EE-3A. Completed by May 14, 1986

(Drawing revised 4/15/91, all depths in ft)



Effective 4/30/92

ATTACHMENT 3.A.

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT

OIL CONSERVATION DIVISION
2040 S. Pacheco
SANTA FE, NEW MEXICO 87501

Form G-103
Adopted 10-1-
Revised 10-1-

NO. OF COPIES RECEIVED		
DISTRIBUTION		
File		
N. M. B. M.		
U. S. G. S		
Operator		
Land Office		

SUNDRY NOTICES AND REPORTS ON GEOTHERMAL RESOURCES WELLS

Federal Land Use Agreement

5. Indicate Type of Lease: State ☐ Fee ☐

5.a State Lease No.

Do Not Use This Form for Proposals to Drill or to Deepen or Plug Back to a Different Reservoir. Use "Application For Permit —" (Form G-101) for Such Proposals.)

1. Type of well: Geothermal Producer ☐ Temp. Observation ☒ Low-Temp Thermal ☐ Injection/Disposal ☐

7. Unit Agreement Name: Fenton Hill

2. Name of Operator: Los Alamos National Laboratory

8. Farm or Lease Name:

3. Address of Operator: P.O.Box 1663 Los Alamos, NM 87545

9. Well No.: GT-1

4. Location of Well
Unit Letter 403 Feet From The East Line and 1,253 Feet From The South Line, Section 1 Township 19N Range 2E NMPM.

10. Field and Pool, or Wildcat

15. Elevation (Show whether DF, RT, GR, etc.): 8,475'

12. County: Sandoval

16. Check Appropriate Box To Indicate Nature of Notice, Report or Other Data

NOTICE OF INTENTION TO:		SUBSEQUENT REPORT OF:	
PERFORM REMEDIAL WORK ☐	PLUG AND ABANDON ☒	REMEDIAL WORK ☐	ALTERING CASING
TEMPORARILY ABANDON ☐		COMMENCE DRILLING OPNS. ☐	PLUG & ABANDONMEN
PULL OR ALTER CASING ☐	CHANGE PLANS ☐	CASING TEST AND CEMENT JOB ☐	
OTHER ☐		OTHER	

17. Describe Proposed or completed Operations (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work) SEE RULE 203.

Attempt to pull 5" casing. If unsuccessful, set 5" bridge plug at 2,300' and set 100 linear foot cement plugs above and below bridge plug. Fill hole with 9.5 ppg mud. Cut 5" casing at 1,300' and remove. Set 7-5/8" bridge plug at 1,250' and set 100 linear foot cement plugs above and below bridge plug. Fill hole with 9.5 ppg mud. Set 100 linear foot plug at surface. Cut off casing 6' below ground level and weld plate with well name on top. Cover wellhead and restore location to original condition. See attached detailed procedures and casing schematic.

It is estimated that this proposed work may start in late July, 1996.

18. I hereby certify that the information above is true and complete to the best of my knowledge and belief.

SIGNED James A. Gallegos TITLE EES-4 GROUP LEADER DATE 6/21/96

APPROVED BY _____ TITLE _____

ATTACHMENT 3.B.

Los Alamos National Laboratory

Fenton Hill Hot Dry Rock Test Site

Well Abandonment Procedure
Well: GT-1

ThermaSource, Inc.

5-21-96

Pertinent Well Data

1. Well Completed 6-30-72.

2. Total Depth is 2575' in Precambrian amphibolite.

3. 10-3/4" casing set at 258' in a 13-3/4" hole. Cement information was not available.

4. 7-5/8" casing set at 1357' in a 9-7/8" hole which was drilled to 1600'. Cement information was not available.

5. 5" casing set at 2400' in a 6-3/4" hole. Cement information was not available.

6. 4" open hole drilled from 2400' to 2430' and 4-1/4" hole then opened to 2430' and drilled to 2575'.

7. Approximate water levels in hole at 320' in 1972 and 480' in 1973.

Time	Sequence of Operations
	1. Move in rig and center same over well.
6 hours	2. Nipple up necessary blow out preventer stack.
10 hours	3. Since no cement information is available, rig up and attempt to pull 5" casing. If success then pull same out of hole and lay down same.
10 hours	If unsuccessful then pick up 4-1/4" bit and run in hole with bit on 2-3/8" tubing to check for fill or obstructions. Then pick up 5" bridge plug and run in hole with same and set plug at 2300' Mix and pump cement below bridge plug and dump enough cement to fill 100 linear feet of 5" casing. Mix and fill hole with heavy non-corrosive gel mud. Trip out of hole and pick up 5" casing cutter. Run in hole and cut 5" casing at 1300'. Pull out of

		hole and lay down casing cutter. Pull and lay down 5" casing from cut upward.
6 hours	4.	Pick up 6-7/8" bit and run into 7-5/8" casing to check for fill or obstructions.
6 hours	5.	Pick up 7-5/8" bridge plug and run in hole with same. Set bridge plug at 1250' (50' above casing stub.
4 hours	6.	Mix and pump cement below bridge plug and dump enough cement to fill 100 linear feet of 7-5/8". Pull above cement, mix and pump heavy non-corrosive gel mud to fill hole.
2 hours	7.	Set final surface cement plug from surface to 100'.
4 hours	8.	Cut and remove all casings 6' below ground level. weld steel plate on top of casings with well number welded on top of same.
2 hours	9.	Cover wellhead and restore location to natural condition.
	10.	Release rid to next well.

---

40 hours Total Time on Location

ATTACHMENT 3.C.

GT-1 WELLBORE SCHEMATIC

5/29/96

FORMATION TOPS

Abiquiu tuff - 60'
Abo - 160'

258'

10-3/4 CASING SHOE (no wt. available) CEMENTED

13-3/4" HOLE TO 280'

Magdelena - 1,070'

1,357'

7-5/8" CASING SHOE (no wt. available) CEMENTED

9-7/8" HOLE TO 1,600'

Sandia - 1,815'

Precambrian 2,105'

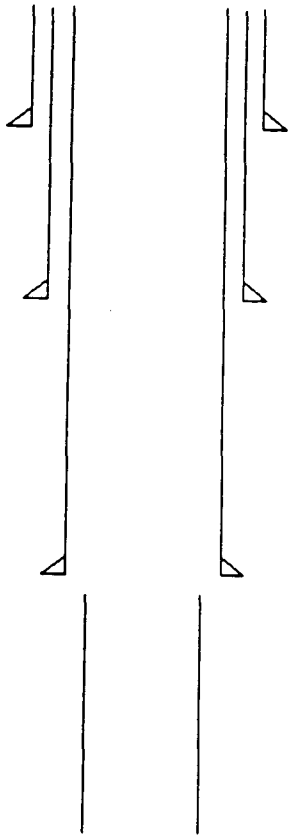
2,400'

5" CASING SHOE (no wt. available) NOT CEMENTED

6-3/4" HOLE TO 2,410'

2,575'

4-1/4" OPEN HOLE TO TD



Notes: Although not documented, the 10-3/4" and 7-5/8" casing strings were probably only cemented a few feet at the bottom, but there may have been cement poured behind the casing.

WELL COMPLETED 6/30/72
LOCATED IN BARLEY CNYN

ATTACHMENT 4.A.

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT

OIL CONSERVATION DIVISION
2040 S. Pacheco
SANTA FE, NEW MEXICO 87501

Form G-103
Adopted 10-1-7
Revised 10-1-7

NO. OF COPIES RECEIVED		
DISTRIBUTION		
File		
N. M. B. M.		
U. S. G. S		
Operator		
Land Office		

SUNDRY NOTICES AND REPORTS ON GEOTHERMAL RESOURCES WELLS

Federal Land Use Agreement

5. Indicate Type of Lease State ☐ Fee ☐

5.a State Lease No.

Do Not Use This Form for Proposals to Drill or to Deepen or Plug Back to a Different Reservoir. Use "Application For Permit –" (Form G-101) for Such Proposals.)

1. Type of well: Geothermal Producer ☒ Temp. Observation ☐ Low-Temp Thermal ☐ Injection/Disposal ☐

7. Unit Agreement Name: Fenton Hill

2. Name of Operator: Los Alamos National Laboratory

8. Farm or Lease Name:

3. Address of Operator: P.O.Box 1663 Los Alamos, NM 87545

9. Well No.: GT-2

4. Location of Well
Unit Letter 1,525 Feet From The East Line and 1,747 Feet From The North Line, Section 13 Township 19N Range 2E NMPM.

10. Field and Pool, or Wildcat

15. Elevation (Show whether DF, RT, GR, etc.)

12. County: Sandoval

16. Check Appropriate Box To Indicate Nature of Notice, Report or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
PERFORM REMEDIAL WORK	☐	PLUG AND ABANDON	☒	REMEDIAL WORK	☐	ALTERING CASING	
TEMPORARILY ABANDON	☐			COMMENCE DRILLING OPNS.	☐	PLUG & ABANDONMENT	
PULL OR ALTER CASING	☐	CHANGE PLANS	☐	CASING TEST AND CEMENT JOB	☐		
OTHER	☐			OTHER			

17. Describe Proposed or completed Operations (Clearly state all pertinent details, and give pertinenet dates, including estimated date of starting any proposed work) SEE RULE 203.

Set cement retainer at 8,472', set cement plug from retainer to TD, set 200 linear foot cement plug on top of retainer. Fill hole with 30-40 vis mud. Tag cement top.
Set 100 linear foot cement plugs at 2,000' intervals to 2,500'. Tag top of top plug.
Cut 7-5/8" casing below 10-3/4" shoe and remove. Set 10-3/4" cement retainer at 2,450' and set 200 linear foot plug above retainer. Set cement plug at 1,550-1,650'.
Set 50 linear foot plug at surface. Cut casings 6' below ground level and weld plate with well name on top. Cover wellhead.
See attached detailed procedures and casing schematic.

It is estimated that this proposed work may start in mid-July, 1996.

18. I hereby certify that the information above is true and complete to the best of my knowledge and belief.

SIGNED [signature] TITLE GT-4 GROUP LEADER DATE 7-2-96

APPROVED BY

ATTACHMENT 4.B.

Los Alamos National Laboratory
Fenton Hill Hot Dry Rock Test Site

Preliminary Well Abandonment Procedure
Well: GT-2

ThermaSource, Inc.

4-2-96 Revision 2

Pertinent Well Data

1. Total depth of the well is 8909'.

2. 7-5/8" 33.7 ppf, S-95 and N-80 casing set to a total depth of 8572'. 7-5/8" cemented from 8572' up to 6924'.

3. 7-5/8" is appeared to be parted at 1021' and casing stubs are separated approximately 12 feet.

4. 10-3/4" 45.5 ppf casing set to total depth of 2535'. 10-3/4" casing is cemented from 2535' up to 2000' and from approximately 1100' up to 250'.

5. 13-3/8" 54.4 ppf, K-55, ST&C casing set to total depth of 1600' and cemented from total depth to surface.

6. 20" conductor set and cemented from 60' to surface.

7. Top of Precambrian Granite basement is 2404' up inside and behind the 10-3/4" casing.

8. Apparent flow around 7-5/8" shoe cement from below casing at 8572' up to above cement top in annulus indicated by noise log run on 11-15-78.

Time	Sequence of Operations
18 hours	1. Rig up on well and nipple up appropriate blow out preventer stack. Test stack and complete rig up operations.
18 hours	2. Pick up 6-5/8" bit and run in hole and attempt to work through parted area in 7-5/8" at 1021'. If successful then proceed to bottom of the 7-5/8" casing at 8572' checking for obstructions or bridges. If unsuccessful the pull out of hole and pull top portion of 7-5/8" from 1021' and lay down recovered section. Proceed ahead with abandonment.

8 hours 3. Pull out of hole with bit and pick 7-5/8" casing cement retainer. Run in hole with same and set at approximately 8472'. Disengage from retainer and pull up above it. Circulate through drill pipe and stab back into retainer. Attempt to inject fluid below retainer.

22 hours 4. Mix and pump cement below retainer if possible to inject below retainer. Pump enough cement to fill 450' of 7-5/8" casing and open hole to 8909'. Pull out of retainer and mix and pump enough cement to fill 200 linear feet of 7-5/8" casing from 8472' up to 8272'. Pull up out of cement and wait 8 hours. While waiting on cement mix and fill hole with 30 to 40 vis. gel mud. Tag top of cement to verify proper cement plug location. Pull up and set 100 linear feet cement plug every 2000' from 8272' upward to 2500' before proceeding on to next step. Wait on cement and tag top of top plug to verify proper location.

12 hours 5. Pull out of hole with drill pipe. Attempt to retrieve top portion of 7-5/8" if not already removed.

10 hours 6. Run in hole with 7-5/8" internal casing cutter and cut 7-5/8" casing below shoe of 10-3/4" casing.

12 hours 7. Trip out of hole and lay down casing cutter and pick up 7-5/8" casing spear and run in hole. Engage 7-5/8" casing stub at 1021' and pull 7-5/8" from cut point and lay down same.

6 hours 8. Pick up 9-7/8" bit and casing scrapper and run in hole to 2500', approximate top of cement plug, checking for bridges and obstructions. Pull out of hole and lay down bit.

4 hours 9. Pick up 10-3/4" casing cement retainer and run in hole with same. Set retainer at approximately 2450' just above top of cement. Disengage from retainer and pull above.

3 hours 10. Mix and pump cement to fill 200 linear feet of 10-3/4" casing from 2435' up to 2235'. Pull up

to 1650'.

3 hours 11. Mix and pump cement to fill 100 linear feet of 10-3/4" casing from 1650' up to 1550'. Pull up out of cement to 50'.

2 hours 12. Mix and pump cement to fill 50 linear feet of 10-3/4" casing from 50' to surface. Pull out of hole.

18 hours 13. Remove blow out preventer stack and cut off all casing strings at ground level. Weld on metal plate on all casings with well name welded in top of plate.

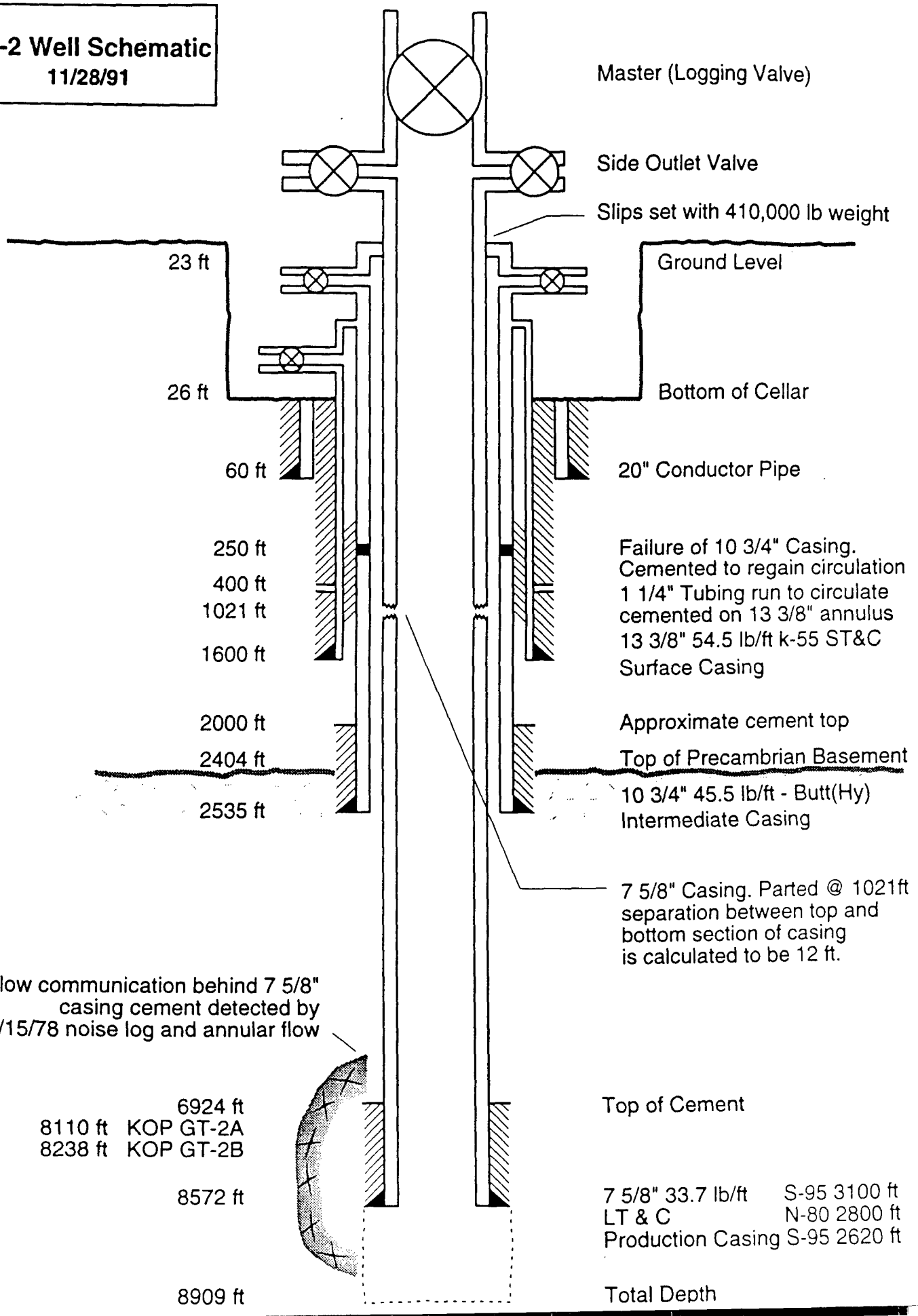
18 hours 14. Rig down and remove rig.

---

154 hours (6.42 days) Total Time on Location

ATTACHMENT 4.C.

GT-2 Well Schematic
11/28/91



ATTACHMENT 5.A.

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT

OIL CONSERVATION DIVISION
2040 S. Pacheco
SANTA FE, NEW MEXICO 87501

Form G-103
Adopted 10-1-7
Revised 10-1-7

NO. OF COPIES RECEIVED		
DISTRIBUTION		
File		
N. M. B. M.		
U. S. G. S		
Operator		
Land Office		

SUNDRY NOTICES AND REPORTS ON GEOTHERMAL RESOURCES WELLS

Federal Land Use Agreement

5. Indicate Type of Lease: State ☐ Fee ☐

5.a State Lease No.

Do Not Use This Form for Proposals to Drill or to Deepen or Plug Back to a Different Reservoir. Use "Application For Permit —" (Form G-101) for Such Proposals.)

1. Type of well: Geothermal Producer ☐ Temp. Observation ☒ Low-Temp Thermal ☐ Injection/Disposal ☐

7. Unit Agreement Name: Fenton Hill

2. Name of Operator: Los Alamos National Laboratory

8. Farm or Lease Name:

3. Address of Operator: P.O.Box 1663 Los Alamos, NM 87545

9. Well No.: PC-1

4. Location of Well
Unit Letter 1,966 Feet From The West Line and 3,084 Feet From
The North Line, Section 18 Township 19N Range 3E NMPM.

10. Field and Pool, or Wildcat

15. Elevation (Show whether DF, RT, GR, etc.): 8,400'

12. County: Sandoval

16. Check Appropriate Box To Indicate Nature of Notice, Report or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
PERFORM REMEDIAL WORK	☐	PLUG AND ABANDON	☒	REMEDIAL WORK	☐	ALTERING CASING	
TEMPORARILY ABANDON	☐			COMMENCE DRILLING OPNS.	☐	PLUG & ABANDONMENT	
PULL OR ALTER CASING	☐	CHANGE PLANS	☐	CASING TEST AND CEMENT JOB	☐		
OTHER	☐			OTHER			

17. Describe Proposed or completed Operations *(Clearly state all pertinent details, and give pertinenet dates, including estimated date of starting any proposed work)* SEE RULE 203.

Cut 4-1/2" casing at 1,300' and remove. Set 7" bridge plug at 1,250' and set 100 linear foot cement plugs above and below bridge plug. Fill hole with 9.5 ppg mud. Cut 7" casing at 1,000' and remove. Set 8-5/8" bridge plug at 950', set 100 linear foot plugs above and below bridge plug. Fill hole with 9.5 ppg mud. Set 50 linear plug at surface. Cut off casings 6' below ground level and weld plate with well name on top. Cover wellhead and restore location to original condition.
See attached detailed procedures and casing schematic.

It is estimated that this proposed work may start in late July, 1996.

18. I hereby certify that the information above is true and complete to the best of my knowledge and belief.

SIGNED [signature] TITLE EES-4 GROUP LEADER DATE 6/24/96

APPROVED BY

ATTACHMENT 5.B.

Los Alamos National Laboratory

Fenton Hill Hot Dry Rock Test Site

Well Abandonment Procedure
Well: PC-1

ThermaSource, Inc.

5-21-96

Pertinent Well Data

1. Well Completed 6-22-84.

2. Total Depth is 2178' in Precambrian.

3. 16" Conductor set at 15', no cement information available.

4. 10-3/4", 28 ppf casing set at 608', no cement information available.

5. 8-5/8", 28.5 ppf casing set at 1038', casing was mudded in with no cement information available.

6. 7" casing set at 1372' in approximately 40 linear feet of cement.

7. 5-1/2", 15.5 ppf liner set from 1335' to 1886'. Liner was set into cement. Cemented intervals not available.

8. 4-1/2" casing set in cement from surface to 2150'. No cement information available on cemented annulus.

9. Aquifers encountered at 225', 386', 690' (with static fluid level at 605'), 1100' (with static fluid level at 960').

10. Drilling assembly was left in hole on bottom.

Time	Sequence of Operations
	1. Move in rig and center same over well.
6 hours	2. Nipple up necessary blow out preventer stack on 7" casinghead.
6 hours	3. Pick up 2-3/8" tubing work string and 3-3/4" bit. Run in hole with bit to check for fill and bridges.

Los Alamos National Lab.
Fenton Hill HDR
PC-1 Well Abandonment
5-21-96

6 hours	4.	Trip out of hole and pick up internal 4-1/2" casing cutter. Run in hole to approximately 1300' and cut 4-1/2" casing.
8 hours	5.	Pull out of hole with casing cutter and pick up casing spear. Run in hole and engage 4-1/2" casing. Pull, retrieve and lay down 4-1/2" casing.
4 hours	6.	Pick up 6-1/8" bit and run in hole of 7" casing and check for fill and obstructions.
3 hours	7.	Trip out of hole and pick up 7" bridge plug and run in hole with same to 1250', approximately 50' above casing stub. Set plug at 1250'.
2 hours	8.	Mix and pump cement below bridge plug and dump enough cement on top of plug to fill 100 linear feet of 7" casing. Pull of cement and fill hole with heavy mud.
6 hours	9.	Trip out of hole and pick up 7" internal casing cutter. Cut 7" casing at approximately 1000'. Pull out of hole with cutter and attempt to pull top portion of 7" casing.
8 hours	10.	If successful in pulling 7" casing then run in hole with 7-7/8" bit and check for fill or obstruction. Trip out of hole and pick up 8-5/8" bridge plug and run in hole with same.
or		Set bridge plug at 950' (50' above casing stub). Mix and pump cement below plug and dump enough cement on top of plug to fill 100 linear feet of 8-5/8" casing.
4 hours		If unsuccessful in pulling 7" casing then run into hole with 7" bridge plug and set same in 7" casing above cut area. Mix and pump cement below 7" bridge plug until obtain pressure build up. Pull out of bridge plug and dump enough cement on top of plug to fill 100 linear feet of 7" casing.
4 hours	11.	Fill hole with heavy non-corrosive gel mud.

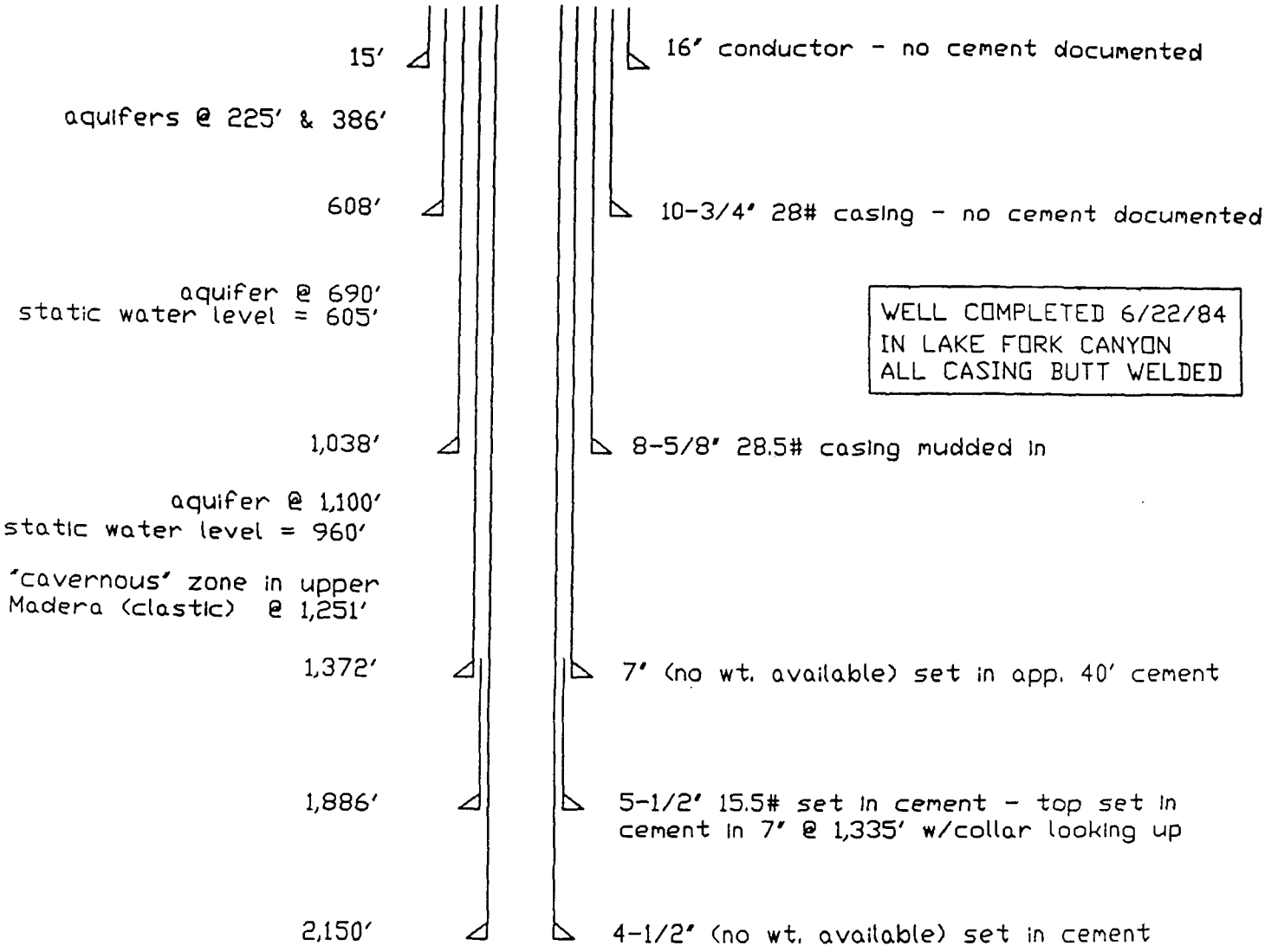
2 hours	12.	Set addition cement plug in casing hole from surface to 50'.
4 hours	13.	Cut and remove all casings 6' below ground level. Weld steel plate on top of casings with well number welded on top of same.
2 hours	14.	Cover wellhead and restore location to natural condition.
4 hours	15.	Rig down rig and move same off location.
	16.	Release rig to next well.

61 or 65 hours Total Time on Location

ATTACHMENT 5.C.

PC-1 WELLBORE SCHEMATIC
DATA DERIVED FROM D.MILES DAILY REPORTS

5/17/96



TOTAL DEPTH = 2,178' IN PRECAMBRIAN
DRILLING ASSY WAS LEFT ON BOTTOM

ATTACHMENT 6.A.

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT

OIL CONSERVATION DIVISION
2040 S. Pacheco
SANTA FE, NEW MEXICO 87501

Form G-103
Adopted 10-1-7
Revised 10-1-7

NO. OF COPIES RECEIVED		
DISTRIBUTION		
File		
N. M. B. M.		
U. S. G. S		
Operator		
Land Office		

SUNDRY NOTICES AND REPORTS ON GEOTHERMAL RESOURCES WELLS

Federal Land Use Agreement

5. Indicate Type of Lease State ☐ Fee ☐

5.a State Lease No.

Do Not Use This Form for Proposals to Drill or to Deepen or Plug Back to a Different Reservoir. Use "Application For Permit —" (Form G-101) for Such Proposals.)

1. Type of well: Geothermal Producer ☐ Temp. Observation ☒ Low-Temp Thermal ☐ Injection/Disposal ☐

7. Unit Agreement Name: Fenton Hill

2. Name of Operator: Los Alamos National Laboratory

8. Farm or Lease Name:

3. Address of Operator: P.O.Box 1663 Los Alamos, NM 87545

9. Well No.: PC-2

4. Location of Well
Unit Letter 4,458 Feet From The East Line and 3,038 Feet From The North Line, Section 13 Township 19N Range 2E NMPM.

10. Field and Pool, or Wildcat

15. Elevation (Show whether DF, RT, GR, etc.): 8,635'

12. County: Sandoval

16. Check Appropriate Box To Indicate Nature of Notice, Report or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
PERFORM REMEDIAL WORK	☐	PLUG AND ABANDON	☒	REMEDIAL WORK	☐	ALTERING CASING	
TEMPORARILY ABANDON	☐			COMMENCE DRILLING OPNS.	☐	PLUG & ABANDONMENT	
PULL OR ALTER CASING	☐	CHANGE PLANS	☐	CASING TEST AND CEMENT JOB	☐		
OTHER	☐			OTHER			

17. Describe Proposed or completed Operations *(Clearly state all pertinent details, and give pertinenet dates, including estimated date of starting any proposed work)* SEE RULE 203.

Set 7" bridge plug at 1,750' and set 100 linear foot cement plugs above and below bridge plug. Cut 7" casing at 1,400' and remove. Set 8-5/8" bridge plug at 1,350' and set 100 linear foot cement plugs above and below bridge plug. Cut 8-5/8" casing at 1,050' and remove. Set 10-3/4" bridge plug at 1,000' and set 100 linear foot cement plugs above and below bridge plug. Fill hole with 9.5 ppg mud. Set 50 linear foot cement plug at surface. Cut off casings at 6' below ground level and weld plate with well name on top. Cover wellhead and restore location to original condition. See detailed prodedures and casing schematic attached.

It is estimated that this proposed work may start in late July, 1996.

18. I hereby certify that the information above is true and complete to the best of my knowledge and belief.

SIGNED James A. Albright TITLE EES-4 GROUP LEADER DATE 6/24/96

APPROVED BY _____ TITLE _____

CONDITIONS

ATTACHMENT 6.B.

Los Alamos National Laboratory

Fenton Hill Hot Dry Rock Test Site

Well Abandonment Procedure
Well: PC-2

ThermaSource, Inc.

5-21-96

Pertinent Well Data

1. Well Completed 12-21-84.

2. Total Depth is 1827'.

3. 16" Conductor set at 2', no cement information available.

4. 10-3/4", 28 ppf casing set at 1136', no cement information available except that 300 lbs of wheat was poured down annulus.

5. 8-5/8", 28.5 ppf casing set at 1453', casing was mudded in with no cement information available except that 400 lbs of wheat was poured down annulus.

6. 7", P-110 casing set at 1820' cement to undetermined levels in the annulus.

7. Aquifers encountered at 589' to 600', 630' to 645', 830' and 930' located behind 10-3/4" casing. Additional aquifers encountered at 1317-32' with static fluid level at 1317'.

8. Well blew out with H_2S and CO_2 from 1825'.

Time	Sequence of Operations
	1. Move in rig and center same over well.
6 hours	2. Nipple up necessary blow out preventer stack on 8-5/8" casinghead.
6 hours	3. Pick up 2-3/8" tubing work string and 6-1/8" bit. Run in hole with bit to check for fill and bridges.

4 hours	4.	Pick up 7" casing bridge plug and set same at 1750'. Mix and pump cement below plug and dump enough cement on top of bridge plug to fill 100 linear feet in 7" casing.
6 hours	5.	Trip out of hole and pick up internal 7" casing cutter. Run in hole to approximately 1400' and cut 7" casing.
8 hours	6.	Pull out of hole with casing cutter and pick up casing spear. Run in hole and engage 7" casing. Pull, retrieve and lay down 7" casing.
4 hours	7.	Pick up 7-7/8" bit and run in hole of 8-5/8" casing and check for fill and obstructions.
3 hours	8.	Trip out of hole and pick up 8-5/8" bridge plug and run in hole with same to 1350', approximately 50' above casing stub. Set plug at 1350'.
4 hours	9.	Mix and pump cement below bridge plug and dump enough cement on top of plug to fill 100 linear feet of 8-5/8" casing. Pull of cement and fill hole with heavy mud.
6 hours	10.	Trip out of hole and pick up 8-5/8" internal casing cutter. Cut 8-5/8" casing at approximately 1050'. Pull out of hole with cutter and attempt to pull top portion of 8-5/8" casing.
8 hours	11.	If successful in pulling 8-5/8" casing then run in hole with 9-7/8" bit and check for fill or obstruction. Trip out of hole and pick up 10-3/4" bridge plug and run in hole with same.
or		Set bridge plug at 1000' (50' above casing stub). Mix and pump cement below plug and dump enough cement on top of plug to fill 100 linear feet of 10-3/4" casing.
4 hours		If unsuccessful in pulling 8-5/8" casing then run into hole with 8-5/8" bridge plug and set same in 8-5/8" casing above cut area. Mix and pump cement below 8-5/8" bridge plug until obtain pressure build up. Pull out of bridge

		plug and dump enough cement on top of plug to fill 100 linear feet of 8-5/8" casing.
4 hours	12.	Fill hole with heavy non-corrosive gel mud.
2 hours	13.	Set addition cement plug in casing hole from surface to 50'.
4 hours	14.	Cut and remove all casings 6' below ground level. Weld steel plate on top of casings with well number welded on top of same.
2 hours	15.	Cover wellhead and restore location to natural condition.
4 hours	16.	Rig down rig and move same off location.
	17.	Release rig to next well.

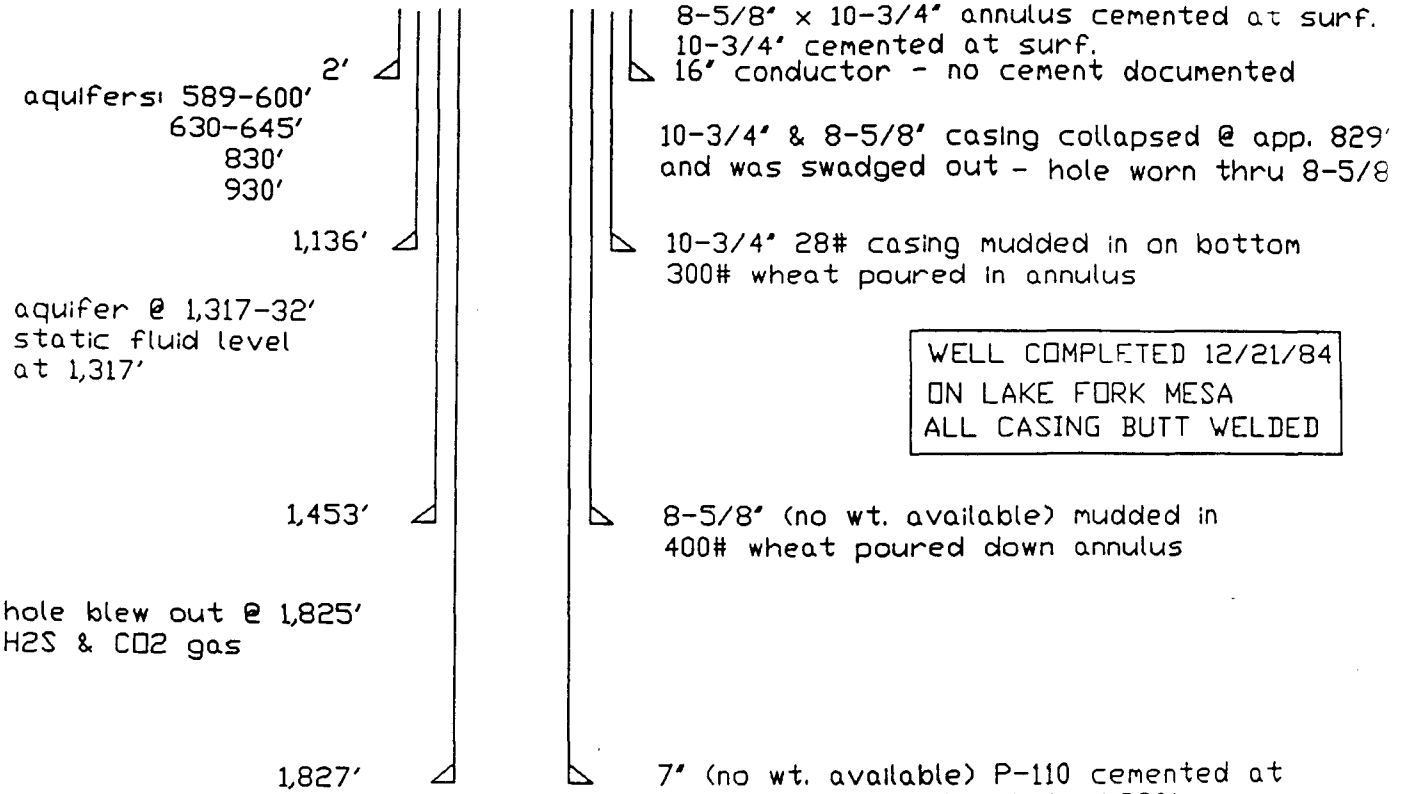
67 or 71 hours Total Time on Location

ATTACHMENT 6.C.

PC-2 WELLBORE SCHEMATIC

DATA DERIVED FROM D.MILES DAILY REPORTS

5/17/96



ATTACHMENT 7

CASING DESCRIPTIONS, P&A PROCEDURES, AND PHYSICAL LOCATIONS FOR SHALLOW WELLS ASSOCIATED WITH THE FENTON HILL PROJECT

Plugging objective

The primary objective of the procedures described below is to eliminate the possibility of contamination of the aquifers from surface. The Bandelier Tuff provides an impermeable barrier between the surface and the fresh water aquifer. A cement plug consisting of at least 50 linear feet will be placed in the Bandelier Tuff to protect the fresh water aquifer from surface contamination. The procedures described below assume that the casing can be removed from the wells. In the event that a casing string can't be pulled, the freepoint of the string will be determined and the string will be cut as deep as possible before cement is placed.

Well descriptions and procedures

Name	Depth	Casing	P&A Procedure
TH-A	590'	4-1/2"/7" cemented @ 97'	Procedure A (below)
TH-B	650'	4-1/2"/7" cemented @ 97'	Procedure B
TH-C	750'	4/1/2"/7" cemented @ 97'	Procedure C
TH-D	500'	4-1/2"/7" cemented @ 97'	Procedure D
TH-1	450'	1-1/2" steel pipe	Procedure 1
TH-2	450'	1-1/2" steel pipe	Procedure 1
TH-4	450'	1-1/2" steel pipe	Procedure 1
TH-5	450'	1-1/2" steel pipe	Procedure 1
WW-2	450'	16" casing (slotted)	Procedure W
WW-3	460'	16" casing (slotted)	Procedure W

Prodedure A: Pull 4-1/2" casing, set 200 linear foot cement plug at bottom and tag, fill w/9.5 ppg mud, set 50 linear foot plug at surface

Procedure B: Pull 4-1/2" casing, set 320 linear foot cement plug at bottom and tag, fill w/9.5 ppg mud, set 50 linear foot plug at surface

Procedure C: Pull 4-1/2" casing, set 560 linear foot cement plug at bottom and tag, fill w/9.5 ppg mud, set 50 linear foot plug at surface

Procedure D: Pull 4-1/2" casing, set 310 linear foot cement plug at bottom and tag, fill w/9.5 ppg mud, set 50 linear foot plug at surface

Procedure 1: Pull 1-1/2" pipe, cement to surface

Procedure W: Sand back to 350', set 100 linear foot cement plug, fill w/9.5 ppg mud, set 50 linear foot plug at surface

Note: 10% will be added to all calculated cement volumes

ATTACHMENT 7 (CONT'D)

Well Locations

Physical well locations are described below in Universal Transverse Mercator (UTM) coordinates. All wells are located in Sandoval County, NM in the NW quadrant of the Jemez Springs 15' Quadrangle.

Well Name	UTM East Coordinate	UTM North Coordinate
TH-A	3-49-793	13 39-71-429
TH-B	3-49-941	13 39-76-669
TH-C	3-53-433	13 39-81-646
TH-D	3-45-506	13 39-72-926
TH-1	3-48-913	13 39-71-699
TH-2	3-49-042	13 39-71-824
TH-4	3-48-846	13 39-71-955
TH-5	3-48-866	13 39-71-464
WW-2	3-48-846	13 39-71-749
WW-3	3-48-954	13 39-71-771
REF*	3-49-322	13 39-72-275

* REF is a reference location to the NE corner of Section 13 Township 19N Range 2E.

Los Alamos
NATIONAL LABORATORY

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

Date: February 12, 1996
In Reply Refer To: ESH-18/WQ&H:96-0033
Mail Stop: K497
Telephone: (505) 667-7969

Mr. Mark Ashley
Oil Conservation Division
State of New Mexico Energy, Minerals, and
Natural Resources Department
2040 South Pacheco Street
Santa Fe, New Mexico 87505

SUBJECT: WATER AND SOIL SAMPLES FROM MILAGRO PROJECT LAND APPLICATION SITE

Dear Mr. Ashley:

Pursuant to your Division's conditional approval of the Laboratory's Notice of Intent to Discharge (NOI) for the Milagro Project, I am submitting the analytical results for soil and surface water samples collected in accordance with the Milagro Project Sampling Plan previously submitted to your office (current version enclosed). Samples were collected pre-application (5/17/95) and 90-days post-application (10/24/95) as required by your Division's conditional approval.

Enclosed is a table summarizing the analytical data for total arsenic (As), the analyte of prime concern due to its elevated concentrations in the pond water. As expected, post-application arsenic concentrations in the surface soils within the application site (sampling locations: SS4 and SS5) increased over their pre-application, background, values. However, as the post-application data indicates, there does not appear to be any migration of arsenic off of the application site (SS1,SS2,SS3) or down-gradient to lower soil horizons(SBS4,SBS5). Laboratory soil scientist Phillip Fresquez (ESH-20) has visited the application site and reported that the site's calcareous and highly alkaline soils have enhanced the adsorption of arsenic to the surface soils thereby retarding migration (personnel communication, 1/12/96).

Another round of comprehensive soil and surface water monitoring at the land application site will be conducted in the late spring of 1996. As in the past, all analytical results will be forwarded to your Division. Should the monitoring results in 1996 continue to demonstrate that there is no migration of potential contaminants, the Laboratory may request from your Division a waiver from future monitoring.

I appreciate the time and effort which you have provided the Laboratory on Milagro Project activities. If you have any questions regarding the enclosed analytical results please feel free to contact me at 667-7969 or Alex Puglisi at 667-4882. Thank you.

Sincerely,

Bob Beers

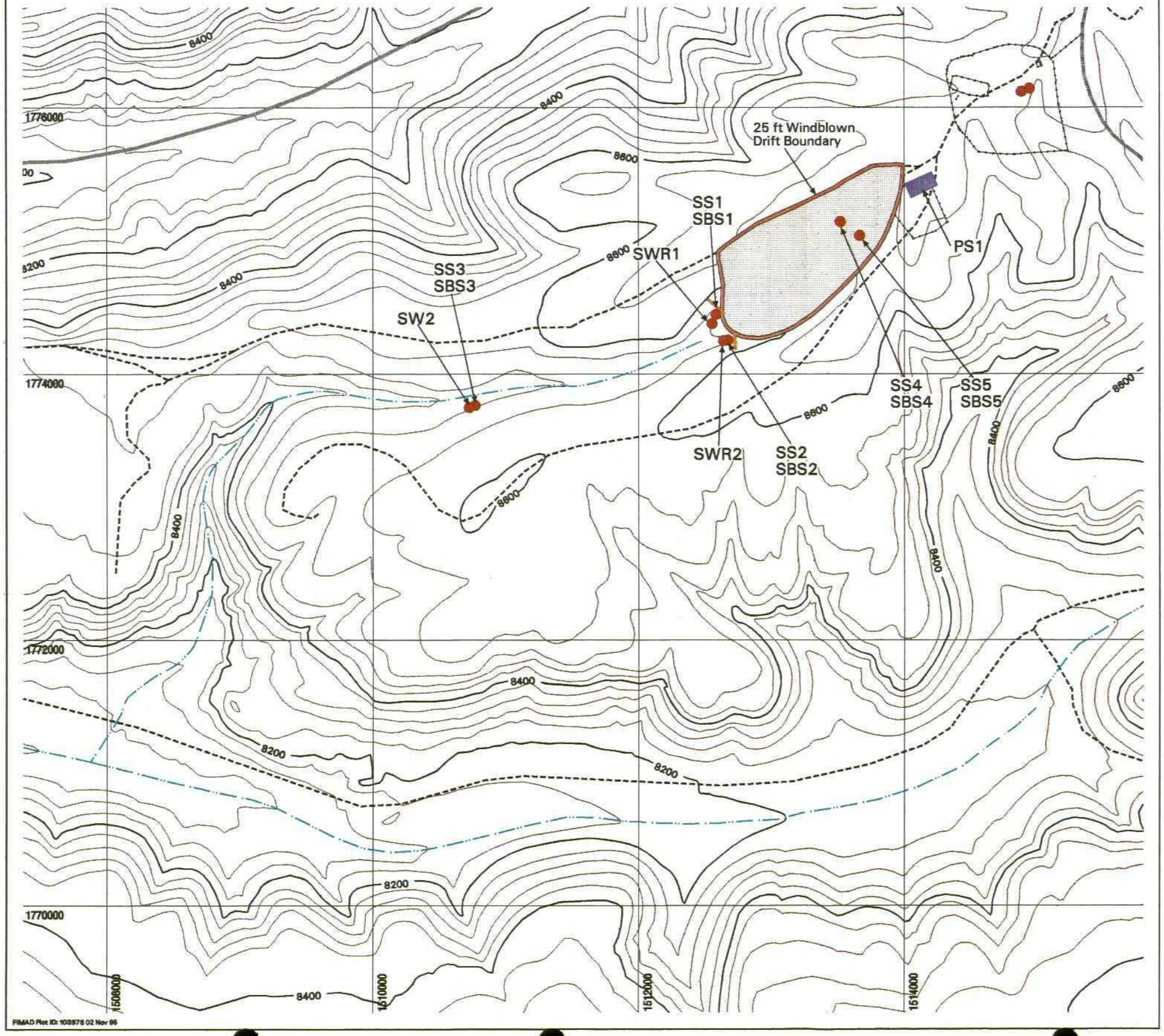
Bob Beers
Water Quality and Hydrology Group

RB/vc

Enclosures: a/s

Cy: A. Puglisi, ESH-18, w/o enc., MS K497
M. Saladen, ESH-18, w/o enc., MS K497
N. Williams, ESH-18, w/o enc., MS K497
K. Zamora, DOE/LAAAO, w/enc., MS A316
G. Sinnis, P-23, w/o enc., MS H803
J. Thompson, EES-4, w/o enc., MS D443
WQ&H File, w/enc., MS K497
CRM-4, w/enc., MS A150

Fenton Hill (TA-57) Milagro Project Sampling Plan



FIMAD Plot ID: 103978 02 Nov 95

Fenton Hill (TA-57) Milagro Project Sampling Plan

- Drainage
- Fence, Industrial
- Road, Dirt
- Road, Paved
- Silt Fence
- Application Area (22.327 acres)
- Application Area Buffer (25 ft)
- Sample Location

MILAGRO PROJECT SAMPLING PLAN

ANALYTES: Metals

OBJECTIVE	TYPE	LOCATION
Background Sampling		
pond sludge quality	sludge	PS1
soil-application area	soil: surface	SS4, SS5
soil-application area	soil: sub-surface	SBS4, SBS5
soil-adjacent down gradient	soil: surface	SS2, SS1
soil-adjacent down gradient	soil: sub-surface	SBS2, SBS1
soil-distant down gradient	soil: surface	SS3
soil-distant down gradient	soil: sub-surface	SBS3
surface water-distant down gradient	surface water	SW2
surface water-Lake Fork Canyon and Rio Cebolla (not on map)	surface water	SW3
Sampling During Application		
stormwater runoff-down gradient	stormwater runoff	SWR1, SWR2
Post-Application Sampling		
soil-application area	soil: surface	SS4, SS5
soil-application area	soil: sub-surface	SBS4, SBS5
soil-adjacent down gradient	soil: surface	SS2, SS1
soil-adjacent down gradient	soil: sub-surface	SBS2, SBS1
soil-distant down gradient	soil: surface	SS3
soil-distant down gradient	soil: sub-surface	SBS3
surface water-distant down gradient	surface water	SW2

N

State Plane Coordinate System, New Mexico Central Zone.
1983 North American Datum

Grid provides NM State Plane coordinates in feet.
Grid interval, in feet: 2000

Contour Interval: 40 ft

0 152 304 456 608
METERS
0 500 1000 1500 2000
FEET

NOTICE: The information on this map is provisional. Feature locations are dependent on scale and symbology and their accuracy may not have been confirmed. Los Alamos National Laboratory boundary is based on legal description established in 1986. Other boundary, structure, and utility data are from Los Alamos National Laboratory Engineering Division and Los Alamos County Utility and Engineering Departments. Contour data are from the Los Alamos National Laboratory Environmental Restoration Project aerial survey, September 1991.

University of California
Los Alamos National Laboratory
Earth and Environmental Sciences Division
FIMAD Facility for Information Management, Analysis, and Display
FIMAD is the electronic data repository for the Environmental Restoration Project at Los Alamos National Laboratory.
Produced by: Marcia Jones

Date: November 02, 1995 FIMAD Plot ID: 103978

MILARGO PROJECT LAND APPLICATION SITE
WATER and SOIL MONITORING DATA

Total Arsenic (As) Concentrations: Pre and Post Land Application

Project Name: Milagro Project
Project Location: Fenton Hill Geothermal Facility

			Pre-Application Sampling		Post-Application Sampling	
Location	**Sample Type**	**Collected by**	**Date**	**Arsenic Values**	**Date**	**Arsenic Values**
SW2	surface water	ESH-18	5/17/95	<0.003 ppm	None available	
SW3	surface water	ESH-18	5/17/95	<0.003 ppm	None available	
SS-1	soil, surface	ESH-19	5/17/95	3. µg/g	10/24/95	3. µg/g
SBS-1	soil, sub-surface	ESH-19	5/17/95	1. µg/g	10/24/95	2. µg/g
SS-2	soil, surface	ESH-19	5/17/95	3. µg/g	10/24/95	3. µg/g
SBS-2	soil, sub-surface	ESH-19	5/17/95	2. µg/g	10/24/95	3. µg/g
SS-3	soil, surface	ESH-19	5/17/95	2. µg/g	10/24/95	3. µg/g
SBS-3	soil, sub-surface	ESH-19	5/17/95	2. µg/g	10/24/95	4. µg/g
SS-4	soil, surface	ESH-19	5/17/95	3. µg/g	10/24/95	24. µg/g
SBS-4	soil, sub-surface	ESH-19	5/17/95	4. µg/g	10/24/95	4. µg/g
SS-5	soil, surface	ESH-19	5/17/95	2. µg/g	10/24/95	18. µg/g
SBS-5	soil, sub-surface	ESH-19	5/17/95	2. µg/g	10/24/95	3. µg/g
SWR-1	stormwater	ESH-18	8/21/95	0.0006 ppm		

Los Alamos National Laboratory
Water Quality and Hydrology Group (ESH-18)
Contact: Bob Beers, 667-7969

1/18/96

LOS ALAMOS NATIONAL LABORATORY

MILAGRO PROJECT @ FENTON HILL

LAND APPLICATION SITE MONITORING

WATER & SOIL ANALYTICAL RESULTS

PRE-APPLICATION MONITORING RESULTS

SAMPLE COLLECTION DATE: 5/17/95

REPORT NUMBER: 35532

********** CST ANALYTICAL REPORT **********

Prepared by: PEC on 12-Jun-1995

REQUEST NUMBER: 21968 MATRIX: SS ANALYST: AAS PROGRAM CODE: E303

OWNER: Ron C. Conrad GROUP: ESH-19 MAIL-STOP: K490 PHONE: 7-0950

NOTEBOOK: CST9002 PAGE: 58

CUSTOMER SAMPLES:

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	ANALYTICAL TECHNIQUE	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT
57-SS1	95.09076	AS	ETVAA	3.	0.6	UG/G	6/01/95	
57-SS1	95.09076	HG	CVAA	0.02	0.01	UG/G	6/01/95	
57-SS1	95.09076	SE	ETVAA	0.5	0.1	UG/G	6/01/95	
57-SBS1	95.09077	AS	ETVAA	1.	0.2	UG/G	6/01/95	
57-SBS1	95.09077	HG	CVAA	< 0.01		UG/G	6/01/95	
57-SBS1	95.09077	SE	ETVAA	0.3	0.1	UG/G	6/01/95	
57-SS2	95.09078	AS	ETVAA	3.	0.6	UG/G	6/01/95	
57-SS2	95.09078	HG	CVAA	< 0.01		UG/G	6/01/95	
57-SS2	95.09078	SE	ETVAA	0.6	0.1	UG/G	6/01/95	
57-SBS2	95.09079	AS	ETVAA	2.	0.4	UG/G	6/01/95	
57-SBS2	95.09079	HG	CVAA	< 0.01		UG/G	6/01/95	
57-SBS2	95.09079	SE	ETVAA	0.5	0.1	UG/G	6/01/95	
57-SS3	95.09080	AS	ETVAA	2.	0.4	UG/G	6/01/95	
57-SS3	95.09080	HG	CVAA	0.01	0.01	UG/G	6/01/95	
57-SS3	95.09080	SE	ETVAA	0.6	0.1	UG/G	6/01/95	
57-SBS3	95.09081	AS	ETVAA	2.	0.4	UG/G	6/01/95	
57-SBS3	95.09081	HG	CVAA	0.03	0.01	UG/G	6/01/95	
57-SBS3	95.09081	SE	ETVAA	0.4	0.1	UG/G	6/01/95	
57-SS4	95.09082	AS	ETVAA	3.	0.6	UG/G	6/01/95	
57-SS4	95.09082	HG	CVAA	< 0.01		UG/G	6/01/95	
57-SS4	95.09082	SE	ETVAA	0.6	0.1	UG/G	6/01/95	
57-SBS4	95.09083	AS	ETVAA	4.	0.8	UG/G	6/01/95	
57-SBS4	95.09083	HG	CVAA	0.05	0.01	UG/G	6/01/95	
57-SBS4	95.09083	SE	ETVAA	0.6	0.1	UG/G	6/01/95	
57-SS5	95.09084	AS	ETVAA	2.	0.4	UG/G	6/01/95	
57-SS5	95.09084	HG	CVAA	0.04	0.01	UG/G	6/01/95	
57-SS5	95.09084	SE	ETVAA	0.5	0.1	UG/G	6/01/95	
57-SBS5	95.09085	AS	ETVAA	2.	0.4	UG/G	6/01/95	
57-SBS5	95.09085	HG	CVAA	0.02	0.01	UG/G	6/01/95	
57-SBS5	95.09085	SE	ETVAA	0.3	0.1	UG/G	6/01/95	
SS2DUPLICATE	95.09095	AS	ETVAA	2.	0.4	UG/G	6/01/95	
SS2DUPLICATE	95.09095	HG	CVAA	0.01	0.01	UG/G	6/01/95	
SS2DUPLICATE	95.09095	SE	ETVAA	0.5	0.1	UG/G	6/01/95	

CUSTOMER SAMPLE DUPLICATES:

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	ANALYTICAL TECHNIQUE	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT
57-SS1	95.09076	AS	ETVAA	10.	9.	UG/G	6/01/95	
57-SS1	95.09076	AS	ETVAA	3.	0.6	UG/G	6/01/95	
57-SS1	95.09076	HG	CVAA	0.02	0.01	UG/G	6/01/95	
57-SS1	95.09076	HG	CVAA	0.04	0.01	UG/G	6/01/95	
57-SS1	95.09076	SE	ETVAA	0.5	0.1	UG/G	6/01/95	
57-SBS1	95.09077	HG	CVAA	< 0.01		UG/G	6/01/95	
57-SBS1	95.09077	HG	CVAA	< 0.01		UG/G	6/01/95	
57-SS2	95.09078	HG	CVAA	< 0.01		UG/G	6/01/95	
57-SS2	95.09078	HG	CVAA	< 0.01		UG/G	6/01/95	
57-SBS2	95.09079	HG	CVAA	0.04	0.01	UG/G	6/01/95	
57-SBS2	95.09079	HG	CVAA	0.04	0.01	UG/G	6/01/95	
57-SS3	95.09080	HG	CVAA	< 0.01		UG/G	6/01/95	
57-SS3	95.09080	HG	CVAA	< 0.01		UG/G	6/01/95	
57-SBS3	95.09081	HG	CVAA	0.06	0.01	UG/G	6/01/95	
57-SBS3	95.09081	HG	CVAA	0.03	0.01	UG/G	6/01/95	
57-SS4	95.09082	HG	CVAA	0.02	0.01	UG/G	6/01/95	
57-SS4	95.09082	HG	CVAA	< 0.01		UG/G	6/01/95	
57-SBS4	95.09083	HG	CVAA	0.07	0.01	UG/G	6/01/95	
57-SBS4	95.09083	HG	CVAA	0.02	0.01	UG/G	6/01/95	
57-SS5	95.09084	HG	CVAA	0.02	0.01	UG/G	6/01/95	
57-SS5	95.09084	HG	CVAA	0.04	0.01	UG/G	6/01/95	
57-SBS5	95.09085	HG	CVAA	0.03	0.01	UG/G	6/01/95	
57-SBS5	95.09085	HG	CVAA	0.01	0.01	UG/G	6/01/95	
SS2DUPLICATE	95.09095	HG	CVAA	0.02	0.01	UG/G	6/01/95	
SS2DUPLICATE	95.09095	HG	CVAA	0.02	0.01	UG/G	6/01/95	

MATRIX SPIKES:

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	ANALYTICAL TECHNIQUE	AMOUNT SPIKED	AMOUNT RECOVERED	UNITS	COMPLETION DATE	COMMENT
57-SS1	95.09076	HG	CVAA	2.	2.	UG/G	6/01/95	
57-SS1	95.09076	SE	ETVAA	10.	9.	UG/G	6/01/95	

****

REPORT NUMBER: 35532 (continued)

********** CST QUALITY ASSURANCE REPORT *********

Prepared by: PEC on 12-Jun-1995

REQUEST NUMBER: 21968 MATRIX: SS ANALYST: AAS PROGRAM CODE: E303

OWNER: Ron C. Conrad GROUP: ESH-19 MAIL-STOP: K490 PHONE: 7-0950

NOTEBOOK: CST9002 PAGE: 58

SUMMARY OF CONTROL STATUS OF OPEN (NON-BLIND) QC SAMPLES RUN WITH THIS BATCH

SAMPLE NUM	ANALYSIS	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	QC VALUE	QC UNCERTAINTY	COMPLETION DATE	COMMENT
00.30469	AS	112.	22.	MG/KG	128.	71.	6/01/95	UNDER CONTROL
00.30469	HG	4.	0.4	MG/KG	4.85	2.4	6/01/95	UNDER CONTROL
00.30469	SE	75.	15.	MG/KG	101.	55.	6/01/95	UNDER CONTROL

SUMMARY OF CONTROL STATUS OF BLIND QC SAMPLES RUN WITH THIS BATCH

SAMPLE NUM	ANALYSIS	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	QC VALUE	QC UNCERTAINTY	COMPLETION DATE	COMMENT
95.09086	AS	596.	119.	UG/G	575.	25.	6/06/95	UNDER CONTROL
95.09086	SE	13.	3.	UG/G	2.4	2.2	6/01/95	WARNING 2-3 SIG
95.09087	HG	80.	10.	NG/G	140.	40.	6/01/95	UNDER CONTROL

REPORT NUMBER: 35532

Analyst	Reviewer	Team Leader	QA Officer
PEC	PEC	[signature]	mag
6/12/95	6/12/95	6/12/95	6/12/95
Date	Date	Date	Date

No Sample Discrepancies Noted by Sample Management Section

The control status of the preceeding data was evaluated using the standard statistical criteria set forth in 'Quality Assurance for Health and Environmental Chemistry: 1992,' LA-12790-MS, Vol. I, pp. 19-20.

REPORT NUMBER: 35280

********** CST ANALYTICAL REPORT **********

Prepared by: MKOBY on 5-Jun-1995

REQUEST NUMBER: 21968 MATRIX: SS ANALYST: IMS PROGRAM CODE: E303

OWNER: Ron C. Conrad GROUP: ESH-19 MAIL-STOP: K490 PHONE: 7-0950

NOTEBOOK: PAGE:

CUSTOMER SAMPLES:

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	ANALYTICAL TECHNIQUE	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT
57-SS1	95.09076	SB	ICPMS	0.25	0.25	UG/G	6/05/95	
57-SS1	95.09076	TL	ICPMS	0.37	0.25	UG/G	6/05/95	
57-SBS1	95.09077	SB	ICPMS	< 0.25		UG/G	6/05/95	
57-SBS1	95.09077	TL	ICPMS	0.25	0.25	UG/G	6/05/95	
57-SS2	95.09078	SB	ICPMS	< 0.25		UG/G	6/05/95	
57-SS2	95.09078	TL	ICPMS	0.25	0.25	UG/G	6/05/95	
57-SBS2	95.09079	SB	ICPMS	< 0.25		UG/G	6/05/95	
57-SBS2	95.09079	TL	ICPMS	0.37	0.25	UG/G	6/05/95	
57-SS3	95.09080	SB	ICPMS	< 0.25		UG/G	6/05/95	
57-SS3	95.09080	TL	ICPMS	0.37	0.25	UG/G	6/05/95	
57-SBS3	95.09081	SB	ICPMS	< 0.25		UG/G	6/05/95	
57-SBS3	95.09081	TL	ICPMS	0.37	0.25	UG/G	6/05/95	
57-SS4	95.09082	SB	ICPMS	< 0.25		UG/G	6/05/95	
57-SS4	95.09082	TL	ICPMS	0.37	0.25	UG/G	6/05/95	
57-SBS4	95.09083	SB	ICPMS	< 0.25		UG/G	6/05/95	
57-SBS4	95.09083	TL	ICPMS	0.37	0.25	UG/G	6/05/95	
57-SS5	95.09084	SB	ICPMS	< 0.25		UG/G	6/05/95	
57-SS5	95.09084	TL	ICPMS	0.25	0.25	UG/G	6/05/95	
57-SBS5	95.09085	SB	ICPMS	< 0.25		UG/G	6/05/95	
57-SBS5	95.09085	TL	ICPMS	< 0.25		UG/G	6/05/95	
SS2DUPLICATE	95.09095	SB	ICPMS	< 0.25		UG/G	6/05/95	
SS2DUPLICATE	95.09095	TL	ICPMS	0.25	0.25	UG/G	6/05/95	

CUSTOMER SAMPLE DUPLICATES:

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	ANALYTICAL TECHNIQUE	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT
57-SS1	95.09076	SB	ICPMS	< 0.25		UG/G	6/05/95	
57-SS1	95.09076	TL	ICPMS	0.25	0.25	UG/G	6/05/95	

MATRIX SPIKES:

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	ANALYTICAL TECHNIQUE	AMOUNT SPIKED	AMOUNT RECOVERED	UNITS	COMPLETION DATE	COMMENT

57-SS1	95.09076 SB	ICPMS	6.25	0.25	UG/G	6/05/95
57-SS1	95.09076 TL	ICPMS	6.25	4.75	UG/G	6/05/95

****

REPORT NUMBER: 35280 (continued)

********** CST QUALITY ASSURANCE REPORT *********

Prepared by: MKOBY on 5-Jun-1995

REQUEST NUMBER: 21968 MATRIX: SS ANALYST: IMS PROGRAM CODE: E303

OWNER: Ron C. Conrad GROUP: ESH-19 MAIL-STOP: K490 PHONE: 7-0950

NOTEBOOK: PAGE:

SUMMARY OF CONTROL STATUS OF OPEN (NON-BLIND) QC SAMPLES RUN WITH THIS BATCH

SAMPLE NUM	ANALYSIS	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	QC VALUE	QC UNCERTAINTY	COMPLETION DATE	COMMENT
00.30469	SB	3.13	0.63	MG/KG	43.9	93.5	6/05/95	UNDER CONTROL
00.30469	TL	77.	5.	MG/KG	102.	50.5	6/05/95	UNDER CONTROL

SUMMARY OF CONTROL STATUS OF BLIND QC SAMPLES RUN WITH THIS BATCH

SAMPLE NUM	ANALYSIS	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	QC VALUE	QC UNCERTAINTY	COMPLETION DATE	COMMENT
95.09086	SB	0.25	0.25	UG/G	6.4	2.6	6/05/95	WARNING 2-3 SIG
95.09086	TL	0.5	0.3	UG/G	1.	1.	6/05/95	UNDER CONTROL

REPORT NUMBER: 35280

Analyst	Reviewer	Team Leader	QA Officer
6/6/95	6/6/95	6/12/95	6/12/95
Date	Date	Date	Date

No Sample Discrepancies Noted by Sample Management Section

The control status of the preceeding data was evaluated using the standard statistical criteria set forth in 'Quality Assurance for Health and Environmental Chemistry: 1992,' LA-12790-MS, Vol. I, pp. 19-20.

****

REPORT NUMBER: 35215

********** CST ANALYTICAL REPORT **********

Prepared by: M. KOZUBAL on 2-Jun-1995

REQUEST NUMBER: 21968 MATRIX: SS ANALYST: OES PROGRAM CODE: E303

OWNER: Ron C. Conrad GROUP: ESH-19 MAIL-STOP: K490 PHONE: 7-0950

NOTEBOOK: EMP0126 PAGE: 28

CUSTOMER SAMPLES:

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	ANALYTICAL TECHNIQUE	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT
57-SS1	95.09076	AG	ICPES	< 1.		UG/G	6/01/95	
57-SS1	95.09076	AL	ICPES	7500.	750.	UG/G	6/01/95	
57-SS1	95.09076	BA	ICPES	180.	18.	UG/G	6/01/95	
57-SS1	95.09076	BE	ICPES	0.45	0.05	UG/G	6/01/95	
57-SS1	95.09076	CA	ICPES	3300.	330.	UG/G	6/01/95	
57-SS1	95.09076	CD	ICPES	< 0.4		UG/G	6/01/95	
57-SS1	95.09076	CO	ICPES	3.1	1.5	UG/G	6/01/95	
57-SS1	95.09076	CR	ICPES	5.9	1.	UG/G	6/01/95	
57-SS1	95.09076	CU	ICPES	7.	0.7	UG/G	6/01/95	
57-SS1	95.09076	FE	ICPES	8500.	850.	UG/G	6/01/95	
57-SS1	95.09076	K	ICPES	1300.	130.	UG/G	6/01/95	
57-SS1	95.09076	MG	ICPES	1200.	120.	UG/G	6/01/95	
57-SS1	95.09076	MN	ICPES	1100.	110.	UG/G	6/01/95	
57-SS1	95.09076	NA	ICPES	110.	11.	UG/G	6/01/95	
57-SS1	95.09076	NI	ICPES	3.9	2.5	UG/G	6/01/95	
57-SS1	95.09076	PB	ICPES	18.	8.	UG/G	6/01/95	
57-SS1	95.09076	V	ICPES	11.	1.	UG/G	6/01/95	
57-SS1	95.09076	ZN	ICPES	67.	7.	UG/G	6/01/95	
57-SBS1	95.09077	AG	ICPES	< 1.		UG/G	6/01/95	
57-SBS1	95.09077	AL	ICPES	3700.	370.	UG/G	6/02/95	
57-SBS1	95.09077	BA	ICPES	38.	4.	UG/G	6/02/95	
57-SBS1	95.09077	BE	ICPES	0.42	0.08	UG/G	6/02/95	
57-SBS1	95.09077	CA	ICPES	790.	79.	UG/G	6/02/95	
57-SBS1	95.09077	CD	ICPES	< 0.4		UG/G	6/02/95	
57-SBS1	95.09077	CO	ICPES	1.7	0.5	UG/G	6/02/95	
57-SBS1	95.09077	CR	ICPES	3.2	0.5	UG/G	6/02/95	
57-SBS1	95.09077	CU	ICPES	2.5	0.5	UG/G	6/02/95	
57-SBS1	95.09077	FE	ICPES	6800.	680.	UG/G	6/02/95	
57-SBS1	95.09077	K	ICPES	440.	200.	UG/G	6/02/95	
57-SBS1	95.09077	MG	ICPES	570.	57.	UG/G	6/02/95	
57-SBS1	95.09077	MN	ICPES	300.	30.	UG/G	6/02/95	
57-SBS1	95.09077	NA	ICPES	91.	9.	UG/G	6/02/95	
57-SBS1	95.09077	NI	ICPES	4.8	3.	UG/G	6/02/95	
57-SBS1	95.09077	PB	ICPES	9.1	4.6	UG/G	6/02/95	
57-SBS1	95.09077	V	ICPES	6.9	0.7	UG/G	6/02/95	
57-SBS1	95.09077	ZN	ICPES	32.	3.	UG/G	6/02/95	
57-SS2	95.09078	AG	ICPES	< 1.		UG/G	6/02/95	

57-SS2	95.09078 AL	ICPES	8100.	810.	UG/G	6/02/95
57-SS2	95.09078 BA	ICPES	180.	18.	UG/G	6/02/95
57-SS2	95.09078 BE	ICPES	0.51	0.05	UG/G	6/02/95
57-SS2	95.09078 CA	ICPES	3300.	330.	UG/G	6/02/95
57-SS2	95.09078 CD	ICPES	< 0.4		UG/G	6/02/95
57-SS2	95.09078 CO	ICPES	3.6	0.7	UG/G	6/02/95
57-SS2	95.09078 CR	ICPES	7.2	1.6	UG/G	6/02/95
57-SS2	95.09078 CU	ICPES	7.2	1.6	UG/G	6/02/95
57-SS2	95.09078 FE	ICPES	8500.	850.	UG/G	6/02/95
57-SS2	95.09078 K	ICPES	1600.	160.	UG/G	6/02/95
57-SS2	95.09078 MG	ICPES	1300.	130.	UG/G	6/02/95
57-SS2	95.09078 MN	ICPES	980.	98.	UG/G	6/02/95
57-SS2	95.09078 NA	ICPES	100.	10.	UG/G	6/02/95
57-SS2	95.09078 NI	ICPES	6.2	1.4	UG/G	6/02/95
57-SS2	95.09078 PB	ICPES	18.	4.	UG/G	6/02/95
57-SS2	95.09078 V	ICPES	12.	2.	UG/G	6/02/95
57-SS2	95.09078 ZN	ICPES	60.	6.	UG/G	6/02/95
57-SBS2	95.09079 AG	ICPES	< 1.		UG/G	6/02/95
57-SBS2	95.09079 AL	ICPES	10000.	1000.	UG/G	6/02/95
57-SBS2	95.09079 BA	ICPES	110.	11.	UG/G	6/02/95
57-SBS2	95.09079 BE	ICPES	0.74	0.08	UG/G	6/02/95
57-SBS2	95.09079 CA	ICPES	1400.	140.	UG/G	6/02/95
57-SBS2	95.09079 CD	ICPES	< 0.4		UG/G	6/02/95
57-SBS2	95.09079 CO	ICPES	3.9	0.8	UG/G	6/02/95
57-SBS2	95.09079 CR	ICPES	8.3	0.8	UG/G	6/02/95
57-SBS2	95.09079 CU	ICPES	5.4	0.7	UG/G	6/02/95
57-SBS2	95.09079 FE	ICPES	10000.	1000.	UG/G	6/02/95
57-SBS2	95.09079 K	ICPES	1200.	120.	UG/G	6/02/95
57-SBS2	95.09079 MG	ICPES	1200.	120.	UG/G	6/02/95
57-SBS2	95.09079 MN	ICPES	810.	81.	UG/G	6/02/95
57-SBS2	95.09079 NA	ICPES	150.	18.	UG/G	6/02/95
57-SBS2	95.09079 NI	ICPES	8.	4.	UG/G	6/02/95
57-SBS2	95.09079 PB	ICPES	11.	4.	UG/G	6/02/95
57-SBS2	95.09079 V	ICPES	13.	1.	UG/G	6/02/95
57-SBS2	95.09079 ZN	ICPES	54.	5.	UG/G	6/02/95
57-SS3	95.09080 AG	ICPES	< 1.		UG/G	6/02/95
57-SS3	95.09080 AL	ICPES	7300.	730.	UG/G	6/02/95
57-SS3	95.09080 BA	ICPES	130.	13.	UG/G	6/02/95
57-SS3	95.09080 BE	ICPES	0.59	0.08	UG/G	6/02/95
57-SS3	95.09080 CA	ICPES	2700.	270.	UG/G	6/02/95
57-SS3	95.09080 CD	ICPES	< 0.4		UG/G	6/02/95
57-SS3	95.09080 CO	ICPES	2.7	0.7	UG/G	6/02/95
57-SS3	95.09080 CR	ICPES	6.4	0.7	UG/G	6/02/95
57-SS3	95.09080 CU	ICPES	6.4	0.7	UG/G	6/02/95
57-SS3	95.09080 FE	ICPES	7700.	770.	UG/G	6/02/95
57-SS3	95.09080 K	ICPES	1100.	200.	UG/G	6/02/95
57-SS3	95.09080 MG	ICPES	1100.	110.	UG/G	6/02/95
57-SS3	95.09080 MN	ICPES	650.	65.	UG/G	6/02/95
57-SS3	95.09080 NA	ICPES	120.	12.	UG/G	6/02/95
57-SS3	95.09080 NI	ICPES	4.8	1.6	UG/G	6/02/95
57-SS3	95.09080 PB	ICPES	< 20.		UG/G	6/02/95
57-SS3	95.09080 V	ICPES	10.	2.	UG/G	6/02/95
57-SS3	95.09080 ZN	ICPES	51.	5.	UG/G	6/02/95
57-SBS3	95.09081 AG	ICPES	< 1.		UG/G	6/02/95
57-SBS3	95.09081 AL	ICPES	7600.	760.	UG/G	6/02/95
57-SBS3	95.09081 BA	ICPES	82.	8.	UG/G	6/02/95
57-SBS3	95.09081 BE	ICPES	0.79	0.08	UG/G	6/02/95
57-SBS3	95.09081 CA	ICPES	1400.	140.	UG/G	6/02/95
57-SBS3	95.09081 CD	ICPES	< 0.4		UG/G	6/02/95
57-SBS3	95.09081 CO	ICPES	3.3	0.6	UG/G	6/02/95

57-SBS3	95.09081	CR	ICPES	7.6	0.9	UG/G	6/02/95
57-SBS3	95.09081	CU	ICPES	3.6	0.7	UG/G	6/02/95
57-SBS3	95.09081	FE	ICPES	9700.	970.	UG/G	6/02/95
57-SBS3	95.09081	K	ICPES	820.	130.	UG/G	6/02/95
57-SBS3	95.09081	MG	ICPES	930.	93.	UG/G	6/02/95
57-SBS3	95.09081	MN	ICPES	600.	60.	UG/G	6/02/95
57-SBS3	95.09081	NA	ICPES	130.	13.	UG/G	6/02/95
57-SBS3	95.09081	NI	ICPES	4.8	3.6	UG/G	6/02/95
57-SBS3	95.09081	PB	ICPES	< 17.		UG/G	6/02/95
57-SBS3	95.09081	V	ICPES	11.	1.	UG/G	6/02/95
57-SBS3	95.09081	ZN	ICPES	43.	4.	UG/G	6/02/95
57-SS4	95.09082	AG	ICPES	< 1.		UG/G	6/02/95
57-SS4	95.09082	AL	ICPES	9900.	990.	UG/G	6/02/95
57-SS4	95.09082	BA	ICPES	190.	19.	UG/G	6/02/95
57-SS4	95.09082	BE	ICPES	0.84	0.08	UG/G	6/02/95
57-SS4	95.09082	CA	ICPES	2700.	270.	UG/G	6/02/95
57-SS4	95.09082	CD	ICPES	< 0.4		UG/G	6/02/95
57-SS4	95.09082	CO	ICPES	6.2	1.	UG/G	6/02/95
57-SS4	95.09082	CR	ICPES	9.3	1.1	UG/G	6/02/95
57-SS4	95.09082	CU	ICPES	6.4	0.6	UG/G	6/02/95
57-SS4	95.09082	FE	ICPES	11000.	1100.	UG/G	6/02/95
57-SS4	95.09082	K	ICPES	1300.	130.	UG/G	6/02/95
57-SS4	95.09082	MG	ICPES	1400.	140.	UG/G	6/02/95
57-SS4	95.09082	MN	ICPES	1300.	130.	UG/G	6/02/95
57-SS4	95.09082	NA	ICPES	140.	14.	UG/G	6/02/95
57-SS4	95.09082	NI	ICPES	9.1	2.	UG/G	6/02/95
57-SS4	95.09082	PB	ICPES	15.	12.	UG/G	6/02/95
57-SS4	95.09082	V	ICPES	18.	2.	UG/G	6/02/95
57-SS4	95.09082	ZN	ICPES	45.	5.	UG/G	6/02/95
57-SBS4	95.09083	AG	ICPES	< 1.		UG/G	6/02/95
57-SBS4	95.09083	AL	ICPES	15000.	1500.	UG/G	6/02/95
57-SBS4	95.09083	BA	ICPES	78.	8.	UG/G	6/02/95
57-SBS4	95.09083	BE	ICPES	1.2	0.1	UG/G	6/02/95
57-SBS4	95.09083	CA	ICPES	1800.	180.	UG/G	6/02/95
57-SBS4	95.09083	CD	ICPES	< 0.4		UG/G	6/02/95
57-SBS4	95.09083	CO	ICPES	4.5	2.	UG/G	6/02/95
57-SBS4	95.09083	CR	ICPES	9.4	0.9	UG/G	6/02/95
57-SBS4	95.09083	CU	ICPES	4.9	1.3	UG/G	6/02/95
57-SBS4	95.09083	FE	ICPES	14000.	1400.	UG/G	6/02/95
57-SBS4	95.09083	K	ICPES	1100.	110.	UG/G	6/02/95
57-SBS4	95.09083	MG	ICPES	1600.	160.	UG/G	6/02/95
57-SBS4	95.09083	MN	ICPES	380.	38.	UG/G	6/02/95
57-SBS4	95.09083	NA	ICPES	260.	26.	UG/G	6/02/95
57-SBS4	95.09083	NI	ICPES	7.	3.	UG/G	6/02/95
57-SBS4	95.09083	PB	ICPES	18.	10.	UG/G	6/02/95
57-SBS4	95.09083	V	ICPES	15.	2.	UG/G	6/02/95
57-SBS4	95.09083	ZN	ICPES	52.	5.	UG/G	6/02/95
57-SS5	95.09084	AG	ICPES	< 1.		UG/G	6/02/95
57-SS5	95.09084	AL	ICPES	7100.	710.	UG/G	6/02/95
57-SS5	95.09084	BA	ICPES	120.	12.	UG/G	6/02/95
57-SS5	95.09084	BE	ICPES	0.33	0.1	UG/G	6/02/95
57-SS5	95.09084	CA	ICPES	2000.	200.	UG/G	6/02/95
57-SS5	95.09084	CD	ICPES	< 0.4		UG/G	6/02/95
57-SS5	95.09084	CO	ICPES	2.6	1.4	UG/G	6/02/95
57-SS5	95.09084	CR	ICPES	6.5	1.2	UG/G	6/02/95
57-SS5	95.09084	CU	ICPES	7.4	0.8	UG/G	6/02/95
57-SS5	95.09084	FE	ICPES	8100.	810.	UG/G	6/02/95
57-SS5	95.09084	K	ICPES	1100.	150.	UG/G	6/02/95
57-SS5	95.09084	MG	ICPES	1100.	110.	UG/G	6/02/95
57-SS5	95.09084	MN	ICPES	510.	51.	UG/G	6/02/95

57-SS5	95.09084	NA	ICPES	140.	14.	UG/G	6/02/95
57-SS5	95.09084	NI	ICPES	6.8	4.3	UG/G	6/02/95
57-SS5	95.09084	PB	ICPES	14.	12.	UG/G	6/02/95
57-SS5	95.09084	V	ICPES	12.	1.	UG/G	6/02/95
57-SS5	95.09084	ZN	ICPES	45.	5.	UG/G	6/02/95
57-SBS5	95.09085	AG	ICPES	< 1.		UG/G	6/02/95
57-SBS5	95.09085	AL	ICPES	4100.	410.	UG/G	6/02/95
57-SBS5	95.09085	BA	ICPES	51.	5.	UG/G	6/02/95
57-SBS5	95.09085	BE	ICPES	0.18	0.08	UG/G	6/02/95
57-SBS5	95.09085	CA	ICPES	940.	94.	UG/G	6/02/95
57-SBS5	95.09085	CD	ICPES	< 0.4		UG/G	6/02/95
57-SBS5	95.09085	CO	ICPES	1.6	0.7	UG/G	6/02/95
57-SBS5	95.09085	CR	ICPES	3.7	0.4	UG/G	6/02/95
57-SBS5	95.09085	CU	ICPES	2.8	0.5	UG/G	6/02/95
57-SBS5	95.09085	FE	ICPES	5700.	570.	UG/G	6/02/95
57-SBS5	95.09085	K	ICPES	470.	47.	UG/G	6/02/95
57-SBS5	95.09085	MG	ICPES	550.	55.	UG/G	6/02/95
57-SBS5	95.09085	MN	ICPES	190.	19.	UG/G	6/02/95
57-SBS5	95.09085	NA	ICPES	120.	12.	UG/G	6/02/95
57-SBS5	95.09085	NI	ICPES	< 4.		UG/G	6/02/95
57-SBS5	95.09085	PB	ICPES	< 13.		UG/G	6/02/95
57-SBS5	95.09085	V	ICPES	7.2	0.7	UG/G	6/02/95
57-SBS5	95.09085	ZN	ICPES	24.	2.	UG/G	6/02/95
SS2DUPLICATE	95.09095	AG	ICPES	< 1.		UG/G	6/02/95
SS2DUPLICATE	95.09095	AL	ICPES	6400.	640.	UG/G	6/02/95
SS2DUPLICATE	95.09095	BA	ICPES	130.	13.	UG/G	6/02/95
SS2DUPLICATE	95.09095	BE	ICPES	0.39	0.08	UG/G	6/02/95
SS2DUPLICATE	95.09095	CA	ICPES	2200.	220.	UG/G	6/02/95
SS2DUPLICATE	95.09095	CD	ICPES	< 0.4		UG/G	6/02/95
SS2DUPLICATE	95.09095	CO	ICPES	2.6	1.2	UG/G	6/02/95
SS2DUPLICATE	95.09095	CR	ICPES	5.5	1.6	UG/G	6/02/95
SS2DUPLICATE	95.09095	CU	ICPES	5.2	0.9	UG/G	6/02/95
SS2DUPLICATE	95.09095	FE	ICPES	7100.	710.	UG/G	6/02/95
SS2DUPLICATE	95.09095	K	ICPES	1300.	130.	UG/G	6/02/95
SS2DUPLICATE	95.09095	MG	ICPES	1000.	100.	UG/G	6/02/95
SS2DUPLICATE	95.09095	MN	ICPES	710.	71.	UG/G	6/02/95
SS2DUPLICATE	95.09095	NA	ICPES	88.	9.	UG/G	6/02/95
SS2DUPLICATE	95.09095	NI	ICPES	5.4	2.2	UG/G	6/02/95
SS2DUPLICATE	95.09095	PB	ICPES	4.3	4.	UG/G	6/02/95
SS2DUPLICATE	95.09095	V	ICPES	9.2	0.9	UG/G	6/02/95
SS2DUPLICATE	95.09095	ZN	ICPES	47.	5.	UG/G	6/02/95

CUSTOMER SAMPLE DUPLICATES:

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	ANALYTICAL TECHNIQUE	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT
57-SS1	95.09076	AG	ICPES	< 1.		UG/G	6/01/95	
57-SS1	95.09076	AL	ICPES	5600.	560.	UG/G	6/01/95	
57-SS1	95.09076	BA	ICPES	170.	17.	UG/G	6/01/95	
57-SS1	95.09076	BE	ICPES	0.37	0.04	UG/G	6/01/95	
57-SS1	95.09076	CA	ICPES	3000.	300.	UG/G	6/01/95	
57-SS1	95.09076	CD	ICPES	< 0.4		UG/G	6/01/95	
57-SS1	95.09076	CO	ICPES	2.7	0.7	UG/G	6/01/95	
57-SS1	95.09076	CR	ICPES	4.7	1.1	UG/G	6/01/95	
57-SS1	95.09076	CU	ICPES	6.4	0.6	UG/G	6/01/95	
57-SS1	95.09076	FE	ICPES	6800.	680.	UG/G	6/01/95	
57-SS1	95.09076	K	ICPES	960.	96.	UG/G	6/01/95	
57-SS1	95.09076	MG	ICPES	1000.	100.	UG/G	6/01/95	

57-SS1	95.09076 MN	ICPES	1100.	110.	UG/G	6/01/95
57-SS1	95.09076 NA	ICPES	100.	10.	UG/G	6/01/95
57-SS1	95.09076 NI	ICPES	4.9	4.4	UG/G	6/01/95
57-SS1	95.09076 PB	ICPES	< 25.		UG/G	6/01/95
57-SS1	95.09076 V	ICPES	8.8	0.9	UG/G	6/01/95
57-SS1	95.09076 ZN	ICPES	65.	7.	UG/G	6/01/95

****

REPORT NUMBER: 35215 (continued)

********** CST QUALITY ASSURANCE REPORT **********

Prepared by: M. KOZUBAL on 2-Jun-1995

REQUEST NUMBER: 21968 MATRIX: SS ANALYST: OES PROGRAM CODE: E303

OWNER: Ron C. Conrad GROUP: ESH-19 MAIL-STOP: K490 PHONE: 7-0950

NOTEBOOK: EMP0126 PAGE: 28

SUMMARY OF CONTROL STATUS OF OPEN (NON-BLIND) QC SAMPLES RUN WITH THIS BATCH

SAMPLE NUM	ANALYSIS	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	QC VALUE	QC UNCERTAINTY	COMPLETION DATE	COMMENT
00.30469	AG	19.	2.	MG/KG	92.5	49.5	6/02/95	UNDER CONTROL
00.30469	AL	5300.	530.	MG/KG	4800.	2400.	6/02/95	UNDER CONTROL
00.30469	BA	250.	25.	MG/KG	276.	82.5	6/02/95	UNDER CONTROL
00.30469	BE	85.	9.	MG/KG	95.1	43.	6/02/95	UNDER CONTROL
00.30469	CA	3400.	340.	MG/KG	3680.	1285.	6/02/95	UNDER CONTROL
00.30469	CD	91.	9.	MG/KG	102.	56.5	6/02/95	UNDER CONTROL
00.30469	CO	88.	9.	MG/KG	95.8	45.5	6/02/95	UNDER CONTROL
00.30469	CR	150.	15.	MG/KG	154.	73.	6/02/95	UNDER CONTROL
00.30469	CU	100.	10.	MG/KG	119.	59.5	6/02/95	UNDER CONTROL
00.30469	FE	8300.	830.	MG/KG	8640.	3460.	6/02/95	UNDER CONTROL
00.30469	K	2100.	210.	MG/KG	2200.	805.	6/02/95	UNDER CONTROL
00.30469	MG	1700.	170.	MG/KG	1830.	870.	6/02/95	UNDER CONTROL
00.30469	MN	180.	18.	MG/KG	191.	66.5	6/02/95	UNDER CONTROL
00.30469	NA	500.	50.	MG/KG	594.	282.	6/02/95	UNDER CONTROL
00.30469	NI	140.	14.	MG/KG	163.	85.5	6/02/95	UNDER CONTROL
00.30469	PB	140.	14.	MG/KG	147.	73.5	6/02/95	UNDER CONTROL
00.30469	V	74.	8.	MG/KG	81.8	29.	6/02/95	UNDER CONTROL
00.30469	ZN	100.	10.	MG/KG	120.	63.	6/02/95	UNDER CONTROL

SUMMARY OF CONTROL STATUS OF BLIND QC SAMPLES RUN WITH THIS BATCH

SAMPLE NUM	ANALYSIS	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	QC VALUE	QC UNCERTAINTY	COMPLETION DATE	COMMENT
95.09086	AG	24.	2.	UG/G	28.9	7.3	6/02/95	UNDER CONTROL
95.09086	AL	18.	1.8	MG/G	19.	4.	6/02/95	UNDER CONTROL
95.09086	BA	300.	30.	UG/G	340.	60.	6/02/95	UNDER CONTROL
95.09086	BE	1.2	0.1	UG/G	1.13	0.12	6/02/95	UNDER CONTROL
95.09086	CA	4.4	0.44	MG/G	4.05	0.45	6/02/95	UNDER CONTROL
95.09086	CD	17.	2.	UG/G	17.9	3.9	6/02/95	UNDER CONTROL

95.09086 CO	8.3	1.4	UG/G	8.	2.	6/02/95	UNDER CONTROL
95.09086 CR	18.	2.	UG/G	18.	2.	6/02/95	UNDER CONTROL
95.09086 CU	2600.	260.	UG/G	2900.	500.	6/02/95	UNDER CONTROL
95.09086 FE	26.	2.6	MG/G	27.5	3.5	6/02/95	UNDER CONTROL
95.09086 K	4.3	0.43	MG/G	4.5	0.5	6/02/95	UNDER CONTROL
95.09086 MG	4.9	0.49	MG/G	5.5	0.6	6/02/95	UNDER CONTROL
95.09086 MN	8100.	810.	UG/G	7750.	1150.	6/02/95	UNDER CONTROL
95.09086 NA	0.58	0.058	MG/G	0.53	0.03	6/02/95	UNDER CONTROL
95.09086 NI	12.	2.	UG/G	11.	2.	6/02/95	UNDER CONTROL
95.09086 PB	5500.	550.	UG/G	5150.	350.	6/02/95	UNDER CONTROL
95.09086 V	40.	4.	UG/G	45.	5.	6/02/95	UNDER CONTROL
95.09086 ZN	6000.	600.	UG/G	6100.	500.	6/02/95	UNDER CONTROL

REPORT NUMBER: 35215

Analyst	Reviewer	Team Leader	QA Officer
6-5-95	6-5-95	6/12/95	6/12/95
Date	Date	Date	Date

No Sample Discrepancies Noted by Sample Management Section

The control status of the preceeding data was evaluated using the standard statistical criteria set forth in 'Quality Assurance for Health and Environmental Chemistry: 1992,' LA-12790-MS, Vol. I, pp. 19-20.

****

REPORT NUMBER: 35217

********** CST ANALYTICAL REPORT **********

Prepared by: MBG on 2-Jun-1995

REQUEST NUMBER: 21972 MATRIX: W ANALYST: OES PROGRAM CODE: WE3E

OWNER: Alex Puglisi GROUP: ESH-18 MAIL-STOP: K497 PHONE: 7-4882

NOTEBOOK: Y3725 PAGE: 142

CUSTOMER SAMPLES:

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	ANALYTICAL TECHNIQUE	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT
57-SW2	95.09140	AG	ICPES	< 0.01		MG/L	6/02/95	
57-SW2	95.09140	AL	ICPES	0.2	0.1	MG/L	6/02/95	
57-SW2	95.09140	BA	ICPES	0.06	0.006	MG/L	6/02/95	
57-SW2	95.09140	BE	ICPES	< 0.001		MG/L	6/02/95	
57-SW2	95.09140	CA	ICPES	16.	1.6	MG/L	6/02/95	
57-SW2	95.09140	CD	ICPES	< 0.003		MG/L	6/02/95	
57-SW2	95.09140	CO	ICPES	< 0.004		MG/L	6/02/95	
57-SW2	95.09140	CR	ICPES	< 0.004		MG/L	6/02/95	
57-SW2	95.09140	CU	ICPES	< 0.004		MG/L	6/02/95	
57-SW2	95.09140	FE	ICPES	0.1	0.1	MG/L	6/02/95	
57-SW2	95.09140	K	ICPES	2.4	0.6	MG/L	6/02/95	
57-SW2	95.09140	MG	ICPES	3.2	0.32	MG/L	6/02/95	
57-SW2	95.09140	MN	ICPES	0.11	0.011	MG/L	6/02/95	
57-SW2	95.09140	NA	ICPES	2.8	0.3	MG/L	6/02/95	
57-SW2	95.09140	NI	ICPES	< 0.01		MG/L	6/02/95	
57-SW2	95.09140	PB	ICPES	< 0.03		MG/L	6/02/95	
57-SW2	95.09140	V	ICPES	< 0.004		MG/L	6/02/95	
57-SW2	95.09140	ZN	ICPES	< 0.02		MG/L	6/02/95	
57-SW3	95.09141	AG	ICPES	< 0.01		MG/L	6/02/95	
57-SW3	95.09141	AL	ICPES	0.4	0.1	MG/L	6/02/95	
57-SW3	95.09141	BA	ICPES	0.038	0.004	MG/L	6/02/95	
57-SW3	95.09141	BE	ICPES	0.001	0.001	MG/L	6/02/95	
57-SW3	95.09141	CA	ICPES	12.	1.2	MG/L	6/02/95	
57-SW3	95.09141	CD	ICPES	< 0.003		MG/L	6/02/95	
57-SW3	95.09141	CO	ICPES	< 0.004		MG/L	6/02/95	
57-SW3	95.09141	CR	ICPES	0.004	0.004	MG/L	6/02/95	
57-SW3	95.09141	CU	ICPES	< 0.004		MG/L	6/02/95	
57-SW3	95.09141	FE	ICPES	0.6	0.1	MG/L	6/02/95	
57-SW3	95.09141	K	ICPES	2.5	0.6	MG/L	6/02/95	
57-SW3	95.09141	MG	ICPES	1.7	0.2	MG/L	6/02/95	
57-SW3	95.09141	MN	ICPES	0.15	0.015	MG/L	6/02/95	
57-SW3	95.09141	NA	ICPES	6.9	0.7	MG/L	6/02/95	
57-SW3	95.09141	NI	ICPES	< 0.01		MG/L	6/02/95	
57-SW3	95.09141	PB	ICPES	< 0.03		MG/L	6/02/95	
57-SW3	95.09141	V	ICPES	< 0.004		MG/L	6/02/95	
57-SW3	95.09141	ZN	ICPES	0.02	0.02	MG/L	6/02/95	

CUSTOMER SAMPLE DUPLICATES:

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	ANALYTICAL TECHNIQUE	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT
57-SW2	95.09140	AG	ICPES	< 0.01		MG/L	6/02/95	
57-SW2	95.09140	AL	ICPES	0.2	0.1	MG/L	6/02/95	
57-SW2	95.09140	BA	ICPES	0.06	0.006	MG/L	6/02/95	
57-SW2	95.09140	BE	ICPES	< 0.001		MG/L	6/02/95	
57-SW2	95.09140	CA	ICPES	16.	1.6	MG/L	6/02/95	
57-SW2	95.09140	CD	ICPES	< 0.003		MG/L	6/02/95	
57-SW2	95.09140	CO	ICPES	< 0.004		MG/L	6/02/95	
57-SW2	95.09140	CR	ICPES	0.005	0.004	MG/L	6/02/95	
57-SW2	95.09140	CU	ICPES	0.005	0.004	MG/L	6/02/95	
57-SW2	95.09140	FE	ICPES	0.1	0.1	MG/L	6/02/95	
57-SW2	95.09140	K	ICPES	2.4	0.6	MG/L	6/02/95	
57-SW2	95.09140	MG	ICPES	3.2	0.32	MG/L	6/02/95	
57-SW2	95.09140	MN	ICPES	0.11	0.011	MG/L	6/02/95	
57-SW2	95.09140	NA	ICPES	2.8	0.3	MG/L	6/02/95	
57-SW2	95.09140	NI	ICPES	< 0.01		MG/L	6/02/95	
57-SW2	95.09140	PB	ICPES	< 0.03		MG/L	6/02/95	
57-SW2	95.09140	V	ICPES	< 0.004		MG/L	6/02/95	
57-SW2	95.09140	ZN	ICPES	< 0.02		MG/L	6/02/95	

MATRIX SPIKES:

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	ANALYTICAL TECHNIQUE	AMOUNT SPIKED	AMOUNT RECOVERED	UNITS	COMPLETION DATE	COMMENT
57-SW2	95.09140	AG	ICPES	1.	0.9	MG/L	6/02/95	
57-SW2	95.09140	AL	ICPES	2.	2.3	MG/L	6/02/95	
57-SW2	95.09140	BA	ICPES	1.	1.1	MG/L	6/02/95	
57-SW2	95.09140	BE	ICPES	1.	1.2	MG/L	6/02/95	
57-SW2	95.09140	CA	ICPES	2.	3.	MG/L	6/02/95	
57-SW2	95.09140	CD	ICPES	1.	1.	MG/L	6/02/95	
57-SW2	95.09140	CO	ICPES	1.	1.	MG/L	6/02/95	
57-SW2	95.09140	CR	ICPES	1.	1.2	MG/L	6/02/95	
57-SW2	95.09140	CU	ICPES	1.	1.1	MG/L	6/02/95	
57-SW2	95.09140	FE	ICPES	2.	2.2	MG/L	6/02/95	
57-SW2	95.09140	K	ICPES	2.	2.3	MG/L	6/02/95	
57-SW2	95.09140	MG	ICPES	2.	2.3	MG/L	6/02/95	
57-SW2	95.09140	MN	ICPES	1.	1.	MG/L	6/02/95	
57-SW2	95.09140	NA	ICPES	2.	2.4	MG/L	6/02/95	
57-SW2	95.09140	NI	ICPES	1.	1.1	MG/L	6/02/95	
57-SW2	95.09140	PB	ICPES	1.	1.	MG/L	6/02/95	
57-SW2	95.09140	V	ICPES	1.	1.2	MG/L	6/02/95	
57-SW2	95.09140	ZN	ICPES	1.	1.1	MG/L	6/02/95	

****

REPORT NUMBER: 35217 (continued)

********** CST QUALITY ASSURANCE REPORT *********

Prepared by: MBG on 2-Jun-1995

REQUEST NUMBER: 21972 MATRIX: W ANALYST: OES PROGRAM CODE: WE3E

OWNER: Alex Puglisi GROUP: ESH-18 MAIL-STOP: K497 PHONE: 7-4882

NOTEBOOK: Y3725 PAGE: 142

SUMMARY OF CONTROL STATUS OF OPEN (NON-BLIND) QC SAMPLES RUN WITH THIS BATCH

SAMPLE NUM	ANALYSIS	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	QC VALUE	QC UNCERTAINTY	COMPLETION DATE	COMMENT
00.29417	AL	8.5	0.9	MG/L	10.	0.4	6/02/95	UNDER CONTROL
00.29417	BA	460.	46.	UG/L	500.	22.	6/02/95	UNDER CONTROL
00.29417	BE	430.	43.	UG/L	500.	22.	6/02/95	UNDER CONTROL
00.29417	CA	8.1	10.	MG/L	10.	0.4	6/02/95	UNDER CONTROL
00.29417	CD	380.	42.	UG/L	498.	21.	6/02/95	WARNING 2-3 SIG
00.29417	CO	420.	42.	UG/L	500.	22.	6/02/95	UNDER CONTROL
00.29417	CR	430.	43.	UG/L	499.	21.	6/02/95	UNDER CONTROL
00.29417	CU	430.	43.	UG/L	500.	22.	6/02/95	UNDER CONTROL
00.29417	FE	940.	94.	UG/L	999.	43.	6/02/95	UNDER CONTROL
00.29417	K	8.7	0.9	MG/L	10.	0.4	6/02/95	UNDER CONTROL
00.29417	MG	8.7	0.9	MG/L	10.	0.4	6/02/95	UNDER CONTROL
00.29417	MN	430.	43.	UG/L	500.	22.	6/02/95	UNDER CONTROL
00.29417	NA	9.3	0.9	MG/L	10.	0.4	6/02/95	UNDER CONTROL
00.29417	NI	400.	40.	UG/L	500.	22.	6/02/95	WARNING 2-3 SIG
00.29417	PB	25.	2.5	UG/L	25.	1.	6/02/95	UNDER CONTROL
00.29417	V	430.	43.	UG/L	500.	22.	6/02/95	UNDER CONTROL
00.29417	ZN	410.	41.	UG/L	500.	22.	6/02/95	UNDER CONTROL

SUMMARY OF CONTROL STATUS OF BLIND QC SAMPLES RUN WITH THIS BATCH

There were no blind Quality Control materials run with the samples reported above for one of the following reasons:

___ Only qualitative data requested

✓ Only Open (non-blind) QC samples run with this sample batch.

___ No QC samples run with this sample batch.

___ No QC samples for this constituent and matrix type available within CST

REPORT NUMBER: 35217

Analyst	Reviewer	Team Leader	QA Officer
Michele B. Jones	MBG		mag
6-8-95	6-8-95	6/8/95	6/9/95
Date	Date	Date	Date

No Sample Discrepancies Noted by Sample Management Section

The control status of the preceeding data was evaluated using the standard statistical criteria set forth in 'Quality Assurance for Health and Environmental Chemistry: 1992,' LA-12790-MS, Vol. I, pp. 19-20.

****

REPORT NUMBER: 35416

********** CST ANALYTICAL REPORT **********

Prepared by: PEC on 8-Jun-1995

REQUEST NUMBER: 21972 MATRIX: W ANALYST: AAS PROGRAM CODE: WE3E

OWNER: Alex Puglisi GROUP: ESH-18 MAIL-STOP: K497 PHONE: 7-4882

NOTEBOOK: PAGE:

CUSTOMER SAMPLES:

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	ANALYTICAL TECHNIQUE	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT
57-SW2	95.09140	AS	ETVAA	< 3.		UG/L	6/02/95	
57-SW2	95.09140	HG	CVAA	< 0.2		UG/L	6/01/95	
57-SW2	95.09140	SE	ETVAA	< 2.		UG/L	6/02/95	
57-SW3	95.09141	AS	ETVAA	< 3.		UG/L	6/02/95	
57-SW3	95.09141	HG	CVAA	< 0.2		UG/L	6/01/95	
57-SW3	95.09141	SE	ETVAA	< 2.		UG/L	6/02/95	

CUSTOMER SAMPLE DUPLICATES:

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	ANALYTICAL TECHNIQUE	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT
57-SW2	95.09140	AS	ETVAA	< 3.		UG/L	6/02/95	
57-SW2	95.09140	SE	ETVAA	< 2.		UG/L	6/02/95	

MATRIX SPIKES:

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	ANALYTICAL TECHNIQUE	AMOUNT SPIKED	AMOUNT RECOVERED	UNITS	COMPLETION DATE	COMMENT
57-SW2	95.09140	AS	ETVAA	10.	9.9	UG/L	6/02/95	
57-SW2	95.09140	SE	ETVAA	10.	9.3	UG/L	6/02/95	

****

REPORT NUMBER: 35416 (continued)

********** CST QUALITY ASSURANCE REPORT *********

Prepared by: PEC on 8-Jun-1995

REQUEST NUMBER: 21972 MATRIX: W ANALYST: AAS PROGRAM CODE: WE3E

OWNER: Alex Puglisi GROUP: ESH-18 MAIL-STOP: K497 PHONE: 7-4882

NOTEBOOK: PAGE:

SUMMARY OF CONTROL STATUS OF OPEN (NON-BLIND) QC SAMPLES RUN WITH THIS BATCH

SAMPLE NUM	ANALYSIS	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	QC VALUE	QC UNCERTAINTY	COMPLETION DATE	COMMENT
00.29417	AS	26.	5.	UG/L	25.	1.	6/07/95	UNDER CONTROL
00.29417	SE	26.	5.	UG/L	25.	1.	6/07/95	UNDER CONTROL
00.30468	HG	4.	0.4	UG/L	5.04	1.05	6/01/95	UNDER CONTROL

SUMMARY OF CONTROL STATUS OF BLIND QC SAMPLES RUN WITH THIS BATCH

There were no blind Quality Control materials run with the samples reported above for one of the following reasons:

___ Only qualitative data requested

✓ Only Open (non-blind) QC samples run with this sample batch.

___ No QC samples run with this sample batch.

___ No QC samples for this constituent and matrix type available within CST

REPORT NUMBER: 35416

PEC	PEC		mag
Analyst	Reviewer	Team Leader	QA Officer
6/8/95	6/8/95	6/8/95	6/9/95
Date	Date	Date	Date

No Sample Discrepancies Noted by Sample Management Section

REPORT NUMBER: 35281

********** CST ANALYTICAL REPORT **********

Prepared by: MKOBY on 5-Jun-1995

REQUEST NUMBER: 21972 MATRIX: W ANALYST: IMS PROGRAM CODE: WE3E

OWNER: Alex Puglisi GROUP: ESH-18 MAIL-STOP: K497 PHONE: 7-4882

NOTEBOOK: PAGE:

CUSTOMER SAMPLES:

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	ANALYTICAL TECHNIQUE	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT
57-SW2	95.09140	SB	ICPMS	< 2.		UG/L	6/05/95	
57-SW2	95.09140	TL	ICPMS	< 2.		UG/L	6/05/95	
57-SW3	95.09141	SB	ICPMS	< 2.		UG/L	6/05/95	
57-SW3	95.09141	TL	ICPMS	< 2.		UG/L	6/05/95	

CUSTOMER SAMPLE DUPLICATES:

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	ANALYTICAL TECHNIQUE	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT
57-SW2	95.09140	SB	ICPMS	< 2.		UG/L	6/05/95	
57-SW2	95.09140	TL	ICPMS	< 2.		UG/L	6/05/95	

MATRIX SPIKES:

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	ANALYTICAL TECHNIQUE	AMOUNT SPIKED	AMOUNT RECOVERED	UNITS	COMPLETION DATE	COMMENT
57-SW2	95.09140	SB	ICPMS	11.	10.	UG/L	6/05/95	
57-SW2	95.09140	TL	ICPMS	11.	11.	UG/L	6/05/95	

****

REPORT NUMBER: 35281 (continued)

********** CST QUALITY ASSURANCE REPORT *********

Prepared by: MKOBY on 5-Jun-1995

REQUEST NUMBER: 21972 MATRIX: W ANALYST: IMS PROGRAM CODE: WE3E

OWNER: Alex Puglisi GROUP: ESH-18 MAIL-STOP: K497 PHONE: 7-4882

NOTEBOOK: PAGE:

SUMMARY OF CONTROL STATUS OF OPEN (NON-BLIND) QC SAMPLES RUN WITH THIS BATCH

SAMPLE NUM	ANALYSIS	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	QC VALUE	QC UNCERTAINTY	COMPLETION DATE	COMMENT
00.29417	SB	27.	2.	UG/L	25.	1.	6/05/95	UNDER CONTROL
00.29417	TL	28.	2.	UG/L	25.	1.	6/05/95	UNDER CONTROL

SUMMARY OF CONTROL STATUS OF BLIND QC SAMPLES RUN WITH THIS BATCH

There were no blind Quality Control materials run with the samples reported above for one of the following reasons:

___ Only qualitative data requested

__✓__ Only Open (non-blind) QC samples run with this sample batch.

___ No QC samples run with this sample batch.

___ No QC samples for this constituent and matrix type available within CST

REPORT NUMBER: 35281

Analyst	Reviewer	Team Leader	QA Officer
6/6/95	6/6/95	6/6/95	6/9/95
Date	Date	Date	Date

No Sample Discrepancies Noted by Sample Management Section

The control status of the preceeding data was evaluated using the standard statistical criteria set forth in

Department of Energy
Albuquerque Operations Office
Los Alamos Area Office
Los Alamos, New Mexico 87544

FEB 9 1996

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. William J. LeMay
Oil Conservation Division
New Mexico Energy, Minerals, and
Natural Resources Department
2040 S. Pacheco
Santa Fe, NM 87501

Dear Mr. LeMay:

The enclosed information for Calendar Year (CY) 1995 is being submitted to you as a supplement to the Ground Water Discharge Plan (GW-31) for the Fenton Hill Geothermal Site. The Discharge Plan was renewed by the Oil Conservation Division (OCD) on June 5, 1995, until June 5, 2000.

Following is a summary of relevant data for CY 1995:

1. There were no National Pollutant Discharge Elimination System (NPDES) wastewater discharges to surface waters as shown in Enclosure 1.

2. Enclosure II contains a summary of water injected into geothermal wells for 1995.

If you have any questions concerning this information, please call Ken Zamora of my staff at (505) 665-5047; or Neil Williams, of the Los Alamos National Laboratory's Water Quality and Hydrology Group at (505) 665-0454.

Sincerely,

Joseph C. Vozella
Assistant Area Manager
Office of Environment and Projects

LAAMEP:7KZ-007

Enclosures

cc:
See page 2

FEB 9 1996

cc w/enclosures:
K. Zamora, AAMEP, LAAO
D. Erickson, ESH-DO, LANL, MS-K491
S. Rae (ESH-18\WQ&H:96-0016-1), ESH-18,
LANL, MS-K497
J. Albright, EES-4, LANL, MS-D443
WQ&H File, LANL, MS-K497
CRM-4, LANL, MS-A150
K. McAda, EPD, AL

Enclosure I

NPDES Permitted Discharges from the Service Pond
for 1995

Fenton Hill Geothermal Site
Sandoval County, N.M.

Date of Discharge	Gallons Discharged From Service Pond
1995	NONE

There were no accidental spills or leaks from the Service Pond during 1995.

Enclosure II

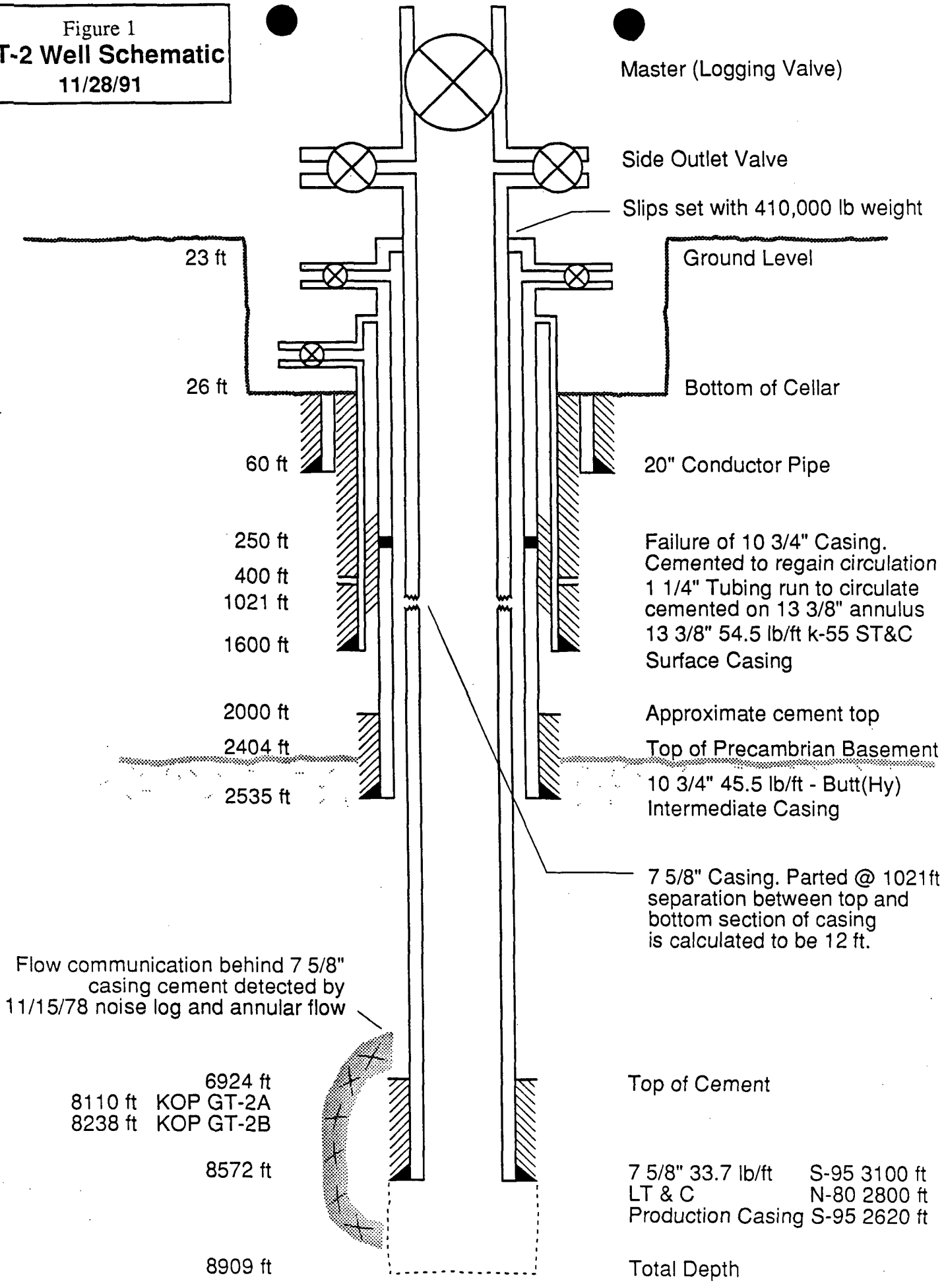
Water Injected into Well EE-3A during 1995

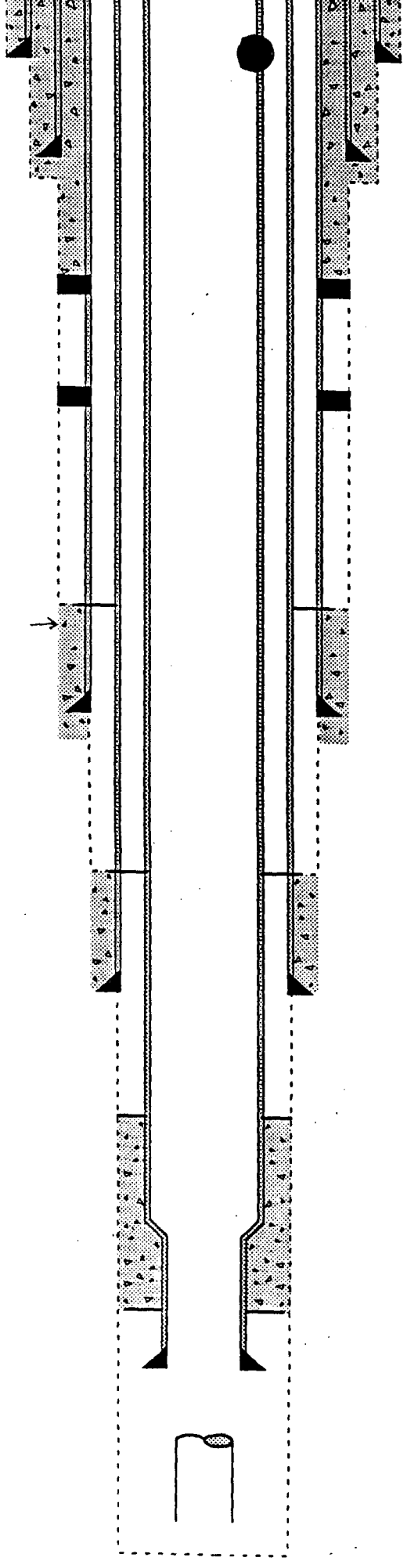
Fenton Hill Geothermal Site
Sandoval County, N.M.

Month	Injected Volume (Gallons)
January	193,555
February	132,460
March	484,204
April	163,028
May	4,408,736
June	5,369,337
July	2,796,493
August	268,619
September	0
October	0
November	0
December	0
Total Water Injected in 1995	**13,816,432**

There were no accidental spills during the injection of water into the geothermal wells or during the venting of water from the wells. August 15 was the last date of injection in 1995 due to a casing leak in EE-3A.

Figure 1
GT-2 Well Schematic
11/28/91





KB 8711 ft - GL 8696 ft

25 ft — 48" hole drilled to 10' GL

30" culvert SA 10' GL with 10 yards concrete

270 ft — 10 3/4" casing parted at 270' - cemented four times with a total of 500 sacks

580 ft — 20" 94# H-40 BT&C casing SA 580' with 830 ft^3 cement

600 ft — 26 1/2" hole drilled to 600'

790 ft — 13 3/8" stage collar

Wellbore Diagram for EE-1 9-22-81

1783 ft — 13 3/8" stage collar cemented without returns
Cement lost to LC zone

1905 ft — Lost circulation zone in 17 1/2" hole

2100 ft — Calculated top of cement on first stage recementing of 13 3/8" casing

2401 ft — Top of Precambrian

2431 ft — 13 3/8" 54.5# k-55 ST&C casing SA 2432" with 225 sacks of cement on recementing
17 1/2" hole drilled to 2600'

2600 ft

3350 ft — Lost circulation zone in 12 1/4" hole

4640 ft — Top of cement per CBL on cementing of 10 3/4" casing

6420 ft — 10 3/4" 45.5# K-55 BT&C casing SA 6420 with 300 ft^3 cement

7700 ft — Top of cement per CBL at 7700' on cementing of of 8 5/8x7 5/8"casing

7936 ft — Lost circulation zone in 9 7/8" hole

8600 ft — Bottom of 8 5/8" 32# k-55 LT&C casing
Top of 7 5/8" 26.4# N-80 Hydril casing

9020 ft — Bottom of cement per CBL at 9020'

9599 ft — 7 5/8" 26.4# N-80 Hydril casing SA 9599' with 240 ft^3 and recemented with 180 ft^3

9747 ft — Top of fish (5 1/2" casing and inflatable packers)

10,053 ft — TD of 9 5/8" hole (cleaned out with 6 3/4" bit)

Los Alamos
NATIONAL LABORATORY

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

Date: September 19, 1995
In Reply Refer To: ESH-18/WQ&H:95-0415
Mail Stop: K497
Telephone: (505) 667-4882

Mark Ashley
Oil Conservation Division
2040 South Pachecho Street
Santa Fe, New Mexico 87505

SUBJECT: STORMWATER SAMPLES FROM MILAGRO PROJECT LAND APPLICATION SITE

Dear Mr. Ashley

Pursuant to your Division's conditional approval of the Laboratory's Notice of Intent to Discharge (NOI) for the Milagro Project, I am submitting analytical results for recent stormwater runoff samples taken at the site. These samples were obtained on August 18, 1995, from the northernmost stormwater sampling station at Fenton Hill. This station is designated as SWR-1 on the Milagro Project Sampling Plan previously submitted to your office and is approximately 100-150 feet downgradient from the application site.

As the analytical data indicates, there does not seem to be any migration of potential contaminants from the Milagro site. Concentrations of heavy metals in the stormwater are significantly lower than those found in the pond water being applied at the site.

I appreciate the time and effort which you have provided in assisting us to address the activities which have been implemented as a result of the Milagro Project. I would like to invite you to tour the site again at your convenience in order to observe the changes which have occurred since your last visit.

If you have any questions regarding the enclosed analytical results, or the status of operations at Milagro, please feel free to contact me at 667-4882 or Bob Beers at 667-7969.

Thank you.

Sincerely,

Alex A. Puglisi

Alex A. Puglisi

AP/rj

Enclosures: a/s

Cy: R. Beers, ESH-18, MS K497
M. Saladen, ESH-18, MS K497
K. Zamora, DOE/LAAO, w/enc., MS A316
G. Sinnis, P-23, MS H803
J. Thompson, EES-4, MS D443

J. Albright, EES-4, MS D443
R. Anderson, Oil Conservation Division, w/enc., Santa Fe
WQ&H File, w/enc., MS K497
CRM-4, w/enc., MS A150

MILAGRO 1995

SAMPLE #	DESCRIPTION	DATE MM/DD/YY	Ag ppm	Al	Std.D. +/-	As ppm	B ppm	Std.D. +/-	Ba ppm	Std.D. +/-	Be ppm
M95-1	Milagro, Rain/Runoff	08/21/95	(0.001	0.24	0.01	0.0006	0.014	0.002	0.02	0.01	(0.002

SAMPLE #	Br ppm	Ca ppm	Std.D. +/-	Cd ppm	Cl ppm	Co ppm	CO3 ppm	Cond. (L) umho/cm	Cr ppm	Cu ppm	F ppm	Fe ppm	Std.D. +/-	HCO3 ppm
M95-1	(0.02	3.07	0.04	(0.001	0.60	(0.002	0	30.6	(0.002	(0.002	0.02	0.12	0.01	11.6

SAMPLE #	Hg ppm	K ppm	Std.D. +/-	Li ppm	Mg ppm	Std.D. +/-	Mn ppm	Std.D. +/-	Mo ppm	Na ppm	Std.D. +/-	Ni ppm	NO2 ppm	NO3 ppm	Pb ppm
M95-1	0.0005	3.31	0.01	(0.01	0.83	0.02	0.13	0.01	(0.002	0.20	0.01	0.008	0.01	0.70	(0.002

SAMPLE #	pH (L)	PO4 ppm	Sb ppm	Se ppm	Si ppm	Std.D. +/-	SiO2 calculated	SO4 ppm	Sr ppm	Std.D. +/-	Ti ppm	Std.D. +/-	Tl ppm	V ppm
M95-1	6.60	0.09	(0.0002	0.0003	2.28	0.01	4.88	0.80	0.05	0.01	0.007	0.002	(0.002	(0.002

SAMPLE #	Zn ppm	Std.D. +/-	TDS ppm	Cation Sum	Anion Sum	Balance	B/CL by wt	LI/CL by wt	F/CL by wt	NA/CL by wt	K/CL by wt	SO4/CL by wt
M95-1	0.05	0.01	26.7	0.349	0.240	0.3728	0.0233	0.0000	0.0333	0.3333	5.5167	1.3333

SAMPLE #	HCO3/CL by wt
M95-1	19.3333

Los Alamos
NATIONAL LABORATORY

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

Date: August 31, 1995
In Reply Refer To: ESH-18/WQ&H:95-388
Mail Stop: K497
Telephone: (505) 667-7969

Mr. Mark Ashley
Oil Conservation Division
2040 South Pacheco Street
Santa Fe, NM 87505

SUBJECT: LANL DISCHARGE FROM FENTON HILL FACILITY

Dear Mr. Ashley:

As we discussed during our phone conversation on August 28, 1995, Los Alamos National Laboratory (LANL) will discharge approximately 500,000 gallons of water from the 1 million gallon (MG) service pond at the Fenton Hill Facility. Recently, a small leak in the 9 5/8" casing became enlarged creating a pathway from the pressurized hot dry rock reservoir to the outer annulus of the injection well. As a result, Roy Johnson at OCD was notified of the leak, injection activities at the facility were shut down, and water from the hot dry rock reservoir is currently venting into the 1 MG service pond at a rate which will soon exceed the pond's capacity.

This discharge will be land applied utilizing the sprinkler system and application area specified in the Notice of Intent (NOI) submitted to your office on March 20, 1995, for the Milagro Project. The attached table presents a summary of the discharges that have been made under the Milagro Project NOI.

The origins of the water in the 1 MG service pond are identical to the ones listed for the 5 MG pond utilized by the Milagro Project. Samples collected on August 28, 1995, from the 1 MG service pond indicate that contaminant levels in the discharge will be similar to those found in the Milagro discharges. Analytical data for these samples have been attached for your information.

LANL will conduct all planned discharges from the 1 MG service pond in conformance with the conditions specified in our original NOI for the Milagro Project and in subsequent correspondence from your office. All runoff from the site will be controlled and storm water events will be sampled.

Thank you for your cooperation in this manner. If you have any questions, please feel free to contact me at 667-7969.

Sincerely,

Bob Beers

Bob Beers
Water Quality and Hydrology Group

RB/vc

Attach: a/s

Cy: J. Albright, EES-4, w/att., MS D443
J. Thompson, EES-4, w/att., MS D443
R. Anderson, Oil Conservation Division, Santa Fe, New Mexico, w/att.
R. Johnson, Oil Conservation Division, Santa Fe, New Mexico, w/att.
G. Sinnis, P-23, w/att., MS H803
A. Puglisi, ESH-18, w/att., MS K497
K. Zamora, DOE/LAAO, w/att., MS A316
WQ&H File, w/att., MS K497
CRM-4, w/att., MS A150

LANL
ESH-18

DISCHARGE SUMMARY
for the
MILAGRO PROJECT NOI

8/31/95

Source of Discharge Water	Application Dates	Quantity Applied (gallons)
Completed Discharges		
5 MG Pond	5/22/95-6/7/95	2,900,000
1 MG Service Pond	8/16/95-8/30/95	310,000
		Total = 3,120,000
Future Discharges		
1 MG Service Pond	9/5/95-9/15/95	500,000 (estimated)

LOS ALAMOS NATIONAL LABORATORY ANALYTICAL RESULTS REPORT

Project: Fenton Hill Geothermal Facility

Sample Location: 1 MG Service Pond

Sample Collection Date: August 28, 1995

Sample Type: Water, unfiltered

Analyst: Dale Counce, EES-1

HDR 1995

SAMPLE #	DESCRIPTION	DATE MM/DD/YY	Time	Al	Std.D. +/-	As ppm	Std.D. +/-	B ppm	Std.D. +/-	Ba ppm	Std.D. +/-
HDR95-76	1 MSP near EE3A Discharge	08/28/95	09:00	0.15	0.01	5.08	0.02	52.5	0.1	0.19	0.01
HDR95-77	1 MSP East End	08/28/95	09:00	0.19	0.01	5.08	0.09	51.8	0.1	0.20	0.01

SAMPLE #	Br ppm	Ca ppm	Std.D. +/-	Cl ppm	CO3 ppm	Cond. (L) umho/cm	F ppm	Fe ppm	Std.D. +/-	HCO3 ppm	K ppm	Std.D. +/-	Li ppm	Std.D. +/-	Mg ppm
HDR95-76	9.57	75.2	0.3	1723	62.2	7090	9.34	0.39	0.01	623	112	2	20.0	0.1	3.67
HDR95-77	9.70	74.1	0.9	1705	63.0	7050	9.52	4.12	0.03	617	111	1	21.2	0.1	3.63

SAMPLE #	Std.D. +/-	Mn ppm	Std.D. +/-	Na ppm	Std.D. +/-	NO3 ppm	pH (L)	PO4 ppm	Si ppm	Std.D. +/-	SiO2 calculated	SO4 ppm	Sr ppm	Std.D. +/-	Zn ppm
HDR95-76	0.02	0.34	0.01	1390	13	<0.1	7.91	<0.2	91.3	0.7	195	384	1.74	0.01	<0.01
HDR95-77	0.09	0.41	0.01	1350	10	<0.1	7.93	<0.2	148	1	317	382	1.79	0.01	<0.01

SAMPLE #	TDS ppm	Cation Sum	Anion Sum	Balance
HDR95-76	4668	70.521	71.472	-0.0134
HDR95-77	4726	68.373	70.831	-0.0353

LOS ALAMOS NATIONAL LABORATORY

MILAGRO PROJECT @ FENTON HILL

LAND APPLICATION SITE MONITORING

WATER & SOIL ANALYTICAL RESULTS

POST-APPLICATION MONITORING RESULTS

SAMPLE COLLECTION DATE: 10/24/95

REPORT NUMBER: 39168

********** CST ANALYTICAL REPORT **********

Prepared by: BRL on 5-Dec-1995

REQUEST NUMBER: 22763 MATRIX: SS ANALYST: AAS PROGRAM CODE: E303

OWNER: Ron C. Conrad GROUP: ESH-19 MAIL-STOP: K490 PHONE: 7-0950

NOTEBOOK: CST9002 PAGE: 83

CUSTOMER SAMPLES:

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	ANALYTICAL TECHNIQUE	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT
95-SS1	95.16636	AS	ETVAA	3.	0.6	UG/G	11/29/95	
95-SS1	95.16636	HG	CVAA	0.03	0.01	UG/G	11/08/95	
95-SS1	95.16636	SE	ETVAA	0.6	0.3	UG/G	11/29/95	
95-SBS1	95.16637	AS	ETVAA	2.	0.5	UG/G	11/29/95	
95-SBS1	95.16637	HG	CVAA	0.01	0.01	UG/G	11/08/95	
95-SBS1	95.16637	SE	ETVAA	0.3	0.3	UG/G	11/29/95	
95-SS2	95.16638	AS	ETVAA	3.	0.6	UG/G	11/29/95	
95-SS2	95.16638	HG	CVAA	0.03	0.01	UG/G	11/08/95	
95-SS2	95.16638	SE	ETVAA	0.4	0.3	UG/G	11/29/95	
95-SBS2	95.16639	AS	ETVAA	3.	0.6	UG/G	11/29/95	
95-SBS2	95.16639	HG	CVAA	0.03	0.01	UG/G	11/08/95	
95-SBS2	95.16639	SE	ETVAA	< 0.3		UG/G	11/29/95	
95-SS3	95.16640	AS	ETVAA	3.	0.6	UG/G	11/29/95	
95-SS3	95.16640	HG	CVAA	0.03	0.01	UG/G	11/08/95	
95-SS3	95.16640	SE	ETVAA	0.5	0.3	UG/G	11/29/95	
95-SBS3	95.16641	AS	ETVAA	4.	0.8	UG/G	11/29/95	
95-SBS3	95.16641	HG	CVAA	0.03	0.01	UG/G	11/08/95	
95-SBS3	95.16641	SE	ETVAA	0.4	0.3	UG/G	11/29/95	
95-SS4	95.16642	AS	ETVAA	24.	5.	UG/G	11/30/95	
95-SS4	95.16642	HG	CVAA	0.03	0.01	UG/G	11/08/95	
95-SS4	95.16642	SE	ETVAA	0.5	0.3	UG/G	11/29/95	
95-SBS4	95.16643	AS	ETVAA	4.	0.8	UG/G	11/29/95	
95-SBS4	95.16643	HG	CVAA	0.03	0.01	UG/G	11/08/95	
95-SBS4	95.16643	SE	ETVAA	0.3	0.3	UG/G	11/29/95	
95-SS5	95.16644	AS	ETVAA	18.	4.	UG/G	11/30/95	
95-SS5	95.16644	HG	CVAA	0.03	0.01	UG/G	11/08/95	
95-SS5	95.16644	SE	ETVAA	0.3	0.3	UG/G	11/29/95	
95-SBS5	95.16645	AS	ETVAA	3.	0.6	UG/G	11/29/95	
95-SBS5	95.16645	HG	CVAA	0.03	0.01	UG/G	11/08/95	
95-SBS5	95.16645	SE	ETVAA	< 0.3		UG/G	11/29/95	

CUSTOMER SAMPLE DUPLICATES:

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	ANALYTICAL TECHNIQUE	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT

95-SS1	95.16636	AS	ETVAA	3.	0.6	UG/G	11/29/95
95-SS1	95.16636	HG	CVAA	0.04	0.01	UG/G	11/08/95
95-SS1	95.16636	HG	CVAA	0.04	0.01	UG/G	11/08/95
95-SS1	95.16636	SE	ETVAA	0.6	0.3	UG/G	11/29/95
95-SBS1	95.16637	HG	CVAA	0.03	0.01	UG/G	11/08/95
95-SBS1	95.16637	HG	CVAA	0.03	0.01	UG/G	11/08/95
95-SS2	95.16638	HG	CVAA	0.03	0.01	UG/G	11/08/95
95-SS2	95.16638	HG	CVAA	0.03	0.01	UG/G	11/08/95
95-SBS2	95.16639	HG	CVAA	0.03	0.01	UG/G	11/08/95
95-SBS2	95.16639	HG	CVAA	0.03	0.01	UG/G	11/08/95
95-SS3	95.16640	HG	CVAA	0.03	0.01	UG/G	11/08/95
95-SS3	95.16640	HG	CVAA	0.05	0.01	UG/G	11/08/95
95-SBS3	95.16641	HG	CVAA	0.04	0.01	UG/G	11/08/95
95-SBS3	95.16641	HG	CVAA	0.04	0.01	UG/G	11/08/95
95-SS4	95.16642	HG	CVAA	0.04	0.01	UG/G	11/08/95
95-SS4	95.16642	HG	CVAA	0.04	0.01	UG/G	11/08/95
95-SBS4	95.16643	HG	CVAA	0.05	0.01	UG/G	11/08/95
95-SBS4	95.16643	HG	CVAA	0.03	0.01	UG/G	11/08/95
95-SS5	95.16644	HG	CVAA	0.03	0.01	UG/G	11/08/95
95-SS5	95.16644	HG	CVAA	0.03	0.01	UG/G	11/08/95
95-SBS5	95.16645	HG	CVAA	0.02	0.01	UG/G	11/08/95

MATRIX SPIKES:

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	ANALYTICAL TECHNIQUE	AMOUNT SPIKED	AMOUNT RECOVERED	UNITS	COMPLETION DATE	COMMENT
95-SS1	95.16636	AS	ETVAA	10.	8.	UG/G	11/29/95	
95-SS1	95.16636	HG	CVAA	2.	1.9	UG/G	11/08/95	
95-SS1	95.16636	SE	ETVAA	10.	10.	UG/G	11/29/95	

****

REPORT NUMBER: 39168 (continued)

********** CST QUALITY ASSURANCE REPORT **********

Prepared by: BRL on 5-Dec-1995

REQUEST NUMBER: 22763 MATRIX: SS ANALYST: AAS PROGRAM CODE: E303

OWNER: Ron C. Conrad GROUP: ESH-19 MAIL-STOP: K490 PHONE: 7-0950

NOTEBOOK: CST9002 PAGE: 83

SUMMARY OF CONTROL STATUS OF OPEN (NON-BLIND) QC SAMPLES RUN WITH THIS BATCH

SAMPLE NUM	ANALYSIS	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	QC VALUE	QC UNCERTAINTY	COMPLETION DATE	COMMENT
00.30469	AS	155.	31.	MG/KG	128.	71.	11/30/95	UNDER CONTROL
00.30469	SE	111.	22.	MG/KG	101.	55.	11/29/95	UNDER CONTROL

SUMMARY OF CONTROL STATUS OF BLIND QC SAMPLES RUN WITH THIS BATCH

SAMPLE NUM	ANALYSIS	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	QC VALUE	QC UNCERTAINTY	COMPLETION DATE	COMMENT
95.16646	AS	640.	128.	UG/G	575.	25.	11/30/95	UNDER CONTROL
95.16646	SE	0.9	0.3	UG/G	2.4	2.2	11/29/95	UNDER CONTROL
95.16647	HG	100.	10.	NG/G	165.		11/08/95	OUT OF CONTROL

REPORT NUMBER: 39168

Analyst	Reviewer	Team Leader	QA Officer
Brl		SK Doan	mag
12/5/95	12/5/95	12/13/95	12/15/95
Date	Date	Date	Date

No Sample Discrepancies Noted by Sample Management Section

The control status of the preceeding data was evaluated using the standard statistical criteria set forth in 'Quality Assurance for Health and Environmental Chemistry: 1992,' LA-12790-MS, Vol. I, pp. 19-20.

****

REPORT NUMBER: 39257

********** CST ANALYTICAL REPORT **********

Prepared by: MKOBY on 12-Dec-1995

REQUEST NUMBER: 22763 MATRIX: SS ANALYST: IMS PROGRAM CODE: E303

OWNER: Ron C. Conrad GROUP: ESH-19 MAIL-STOP: K490 PHONE: 7-0950

NOTEBOOK: PAGE:

CUSTOMER SAMPLES:

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	ANALYTICAL TECHNIQUE	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT
95-SS1	95.16636	SB	ICPMS	< 0.25		UG/G	12/12/95	
95-SS1	95.16636	TL	ICPMS	0.37	0.25	UG/G	12/12/95	
95-SBS1	95.16637	SB	ICPMS	< 0.25		UG/G	12/12/95	
95-SBS1	95.16637	TL	ICPMS	< 0.25		UG/G	12/12/95	
95-SS2	95.16638	SB	ICPMS	< 0.25		UG/G	12/12/95	
95-SS2	95.16638	TL	ICPMS	< 0.25		UG/G	12/12/95	
95-SBS2	95.16639	SB	ICPMS	< 0.25		UG/G	12/12/95	
95-SBS2	95.16639	TL	ICPMS	< 0.25		UG/G	12/12/95	
95-SS3	95.16640	SB	ICPMS	< 0.25		UG/G	12/12/95	
95-SS3	95.16640	TL	ICPMS	< 0.25		UG/G	12/12/95	
95-SBS3	95.16641	SB	ICPMS	< 0.25		UG/G	12/12/95	
95-SBS3	95.16641	TL	ICPMS	< 0.25		UG/G	12/12/95	
95-SS4	95.16642	SB	ICPMS	< 0.25		UG/G	12/12/95	
95-SS4	95.16642	TL	ICPMS	< 0.25		UG/G	12/12/95	
95-SBS4	95.16643	SB	ICPMS	< 0.25		UG/G	12/12/95	
95-SBS4	95.16643	TL	ICPMS	< 0.25		UG/G	12/12/95	
95-SS5	95.16644	SB	ICPMS	< 0.25		UG/G	12/12/95	
95-SS5	95.16644	TL	ICPMS	< 0.25		UG/G	12/12/95	
95-SBS5	95.16645	SB	ICPMS	< 0.25		UG/G	12/12/95	
95-SBS5	95.16645	TL	ICPMS	< 0.25		UG/G	12/12/95	

CUSTOMER SAMPLE DUPLICATES:

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	ANALYTICAL TECHNIQUE	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT
95-SS1	95.16636	SB	ICPMS	< 0.25		UG/G	12/12/95	
95-SS1	95.16636	TL	ICPMS	< 0.25		UG/G	12/12/95	

MATRIX SPIKES:

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	ANALYTICAL TECHNIQUE	AMOUNT SPIKED	AMOUNT RECOVERED	UNITS	COMPLETION DATE	COMMENT
95-SS1	95.16636	SB	ICPMS	6.25		UG/G	12/12/95	

95-SS1	95.16636 TL	ICPMS	6.25	6.38	UG/G	12/12/95

****

REPORT NUMBER: 39257 (continued)

********** CST QUALITY ASSURANCE REPORT *********

Prepared by: MKOBY on 12-Dec-1995

REQUEST NUMBER: 22763 MATRIX: SS ANALYST: IMS PROGRAM CODE: E303

OWNER: Ron C. Conrad GROUP: ESH-19 MAIL-STOP: K490 PHONE: 7-0950

NOTEBOOK: PAGE:

SUMMARY OF CONTROL STATUS OF OPEN (NON-BLIND) QC SAMPLES RUN WITH THIS BATCH

SAMPLE NUM	ANALYSIS	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	QC VALUE	QC UNCERTAINTY	COMPLETION DATE	COMMENT
00.30469	SB	9.5	0.5	MG/KG	43.9	93.5	12/12/95	UNDER CONTROL
00.30469	TL	107.	6.	MG/KG	102.	50.5	12/12/95	UNDER CONTROL

SUMMARY OF CONTROL STATUS OF BLIND QC SAMPLES RUN WITH THIS BATCH

SAMPLE NUM	ANALYSIS	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	QC VALUE	QC UNCERTAINTY	COMPLETION DATE	COMMENT
95.16646	SB	< 0.25		UG/G	6.5	2.2	12/12/95	WARNING 2-3 SIG
95.16646	TL	1.	0.25	UG/G	1.	1.	12/12/95	UNDER CONTROL

REPORT NUMBER: 39257

Analyst	Reviewer	Team Leader	QA Officer
12/13/95	12/13/95	12/13/95	12/15/95
Date	Date	Date	Date

No Sample Discrepancies Noted by Sample Management Section

The control status of the preceeding data was evaluated using the standard statistical criteria set forth in 'Quality Assurance for Health and Environmental Chemistry: 1992,' LA-12790-MS, Vol. I, pp. 19-20.

****

REPORT NUMBER: 39042

********** CST ANALYTICAL REPORT **********

Prepared by: C FEDERICI on 17-Nov-1995

REQUEST NUMBER: 22763 MATRIX: SS ANALYST: OES PROGRAM CODE: E303

OWNER: Ron C. Conrad GROUP: ESH-19 MAIL-STOP: K490 PHONE: 7-0950

NOTEBOOK: EM90126 PAGE: 81

CUSTOMER SAMPLES:

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	ANALYTICAL TECHNIQUE	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT
95-SS1	95.16636	AG	ICPES	< 2.5		UG/G	11/17/95	
95-SS1	95.16636	BA	ICPES	170.	17.	UG/G	11/17/95	
95-SS1	95.16636	BE	ICPES	0.78	0.75	UG/G	11/17/95	
95-SS1	95.16636	CD	ICPES	3.6	2.3	UG/G	11/17/95	
95-SS1	95.16636	CR	ICPES	8.5	1.	UG/G	11/17/95	
95-SS1	95.16636	NI	ICPES	12.	4.9	UG/G	11/17/95	
95-SS1	95.16636	PB	ICPES	8.7	7.5	UG/G	11/17/95	
95-SBS1	95.16637	AG	ICPES	< 2.5		UG/G	11/17/95	
95-SBS1	95.16637	BA	ICPES	44.	4.4	UG/G	11/17/95	
95-SBS1	95.16637	BE	ICPES	< 0.75		UG/G	11/17/95	
95-SBS1	95.16637	CD	ICPES	4.7	2.3	UG/G	11/17/95	
95-SBS1	95.16637	CR	ICPES	4.9	1.	UG/G	11/17/95	
95-SBS1	95.16637	NI	ICPES	8.6	4.9	UG/G	11/17/95	
95-SBS1	95.16637	PB	ICPES	9.9	7.5	UG/G	11/17/95	
95-SS2	95.16638	AG	ICPES	< 2.5		UG/G	11/17/95	
95-SS2	95.16638	BA	ICPES	150.	15.	UG/G	11/17/95	
95-SS2	95.16638	BE	ICPES	0.81	0.74	UG/G	11/17/95	
95-SS2	95.16638	CD	ICPES	4.3	2.3	UG/G	11/17/95	
95-SS2	95.16638	CR	ICPES	7.2	1.	UG/G	11/17/95	
95-SS2	95.16638	NI	ICPES	9.6	4.9	UG/G	11/17/95	
95-SS2	95.16638	PB	ICPES	9.8	7.4	UG/G	11/17/95	
95-SBS2	95.16639	AG	ICPES	< 2.5		UG/G	11/17/95	
95-SBS2	95.16639	BA	ICPES	57.	5.7	UG/G	11/17/95	
95-SBS2	95.16639	BE	ICPES	1.3	0.74	UG/G	11/17/95	
95-SBS2	95.16639	CD	ICPES	4.9	2.3	UG/G	11/17/95	
95-SBS2	95.16639	CR	ICPES	7.7	0.99	UG/G	11/17/95	
95-SBS2	95.16639	NI	ICPES	< 12.	4.9	UG/G	11/17/95	
95-SBS2	95.16639	PB	ICPES	< 7.4		UG/G	11/17/95	
95-SS3	95.16640	AG	ICPES	< 2.5		UG/G	11/17/95	
95-SS3	95.16640	BA	ICPES	170.	17.	UG/G	11/17/95	
95-SS3	95.16640	BE	ICPES	0.93	0.75	UG/G	11/17/95	
95-SS3	95.16640	CD	ICPES	4.	2.3	UG/G	11/17/95	
95-SS3	95.16640	CR	ICPES	5.2	1.	UG/G	11/17/95	
95-SS3	95.16640	NI	ICPES	13.	4.9	UG/G	11/17/95	
95-SS3	95.16640	PB	ICPES	13.	7.5	UG/G	11/17/95	
95-SBS3	95.16641	AG	ICPES	< 2.5		UG/G	11/17/95	
95-SBS3	95.16641	BA	ICPES	83.	8.3	UG/G	11/17/95	

95-SBS3	95.16641	BE	ICPES	1.1	0.74	UG/G	11/17/95
95-SBS3	95.16641	CD	ICPES	3.6	2.3	UG/G	11/17/95
95-SBS3	95.16641	CR	ICPES	8.8	0.99	UG/G	11/17/95
95-SBS3	95.16641	NI	ICPES	13.	4.9	UG/G	11/17/95
95-SBS3	95.16641	PB	ICPES	< 7.4		UG/G	11/17/95
95-SS4	95.16642	AG	ICPES	< 2.5		UG/G	11/17/95
95-SS4	95.16642	BA	ICPES	160.	16.	UG/G	11/17/95
95-SS4	95.16642	BE	ICPES	1.1	0.74	UG/G	11/17/95
95-SS4	95.16642	CD	ICPES	4.	2.3	UG/G	11/17/95
95-SS4	95.16642	CR	ICPES	10.	1.	UG/G	11/17/95
95-SS4	95.16642	NI	ICPES	14.	4.9	UG/G	11/17/95
95-SS4	95.16642	PB	ICPES	< 7.4		UG/G	11/17/95
95-SBS4	95.16643	AG	ICPES	< 2.5		UG/G	11/17/95
95-SBS4	95.16643	BA	ICPES	56.	5.6	UG/G	11/17/95
95-SBS4	95.16643	BE	ICPES	0.98	0.74	UG/G	11/17/95
95-SBS4	95.16643	CD	ICPES	4.1	2.3	UG/G	11/17/95
95-SBS4	95.16643	CR	ICPES	6.3	0.98	UG/G	11/17/95
95-SBS4	95.16643	NI	ICPES	8.4	4.9	UG/G	11/17/95
95-SBS4	95.16643	PB	ICPES	8.7	7.4	UG/G	11/17/95
95-SS5	95.16644	AG	ICPES	< 2.5		UG/G	11/17/95
95-SS5	95.16644	BA	ICPES	100.	10.	UG/G	11/17/95
95-SS5	95.16644	BE	ICPES	< 0.75		UG/G	11/17/95
95-SS5	95.16644	CD	ICPES	3.8	2.3	UG/G	11/17/95
95-SS5	95.16644	CR	ICPES	4.9	1.	UG/G	11/17/95
95-SS5	95.16644	NI	ICPES	11.	4.9	UG/G	11/17/95
95-SS5	95.16644	PB	ICPES	9.6	7.5	UG/G	11/17/95
95-SBS5	95.16645	AG	ICPES	< 2.5		UG/G	11/17/95
95-SBS5	95.16645	BA	ICPES	32.	3.2	UG/G	11/17/95
95-SBS5	95.16645	BE	ICPES	< 0.74		UG/G	11/17/95
95-SBS5	95.16645	CD	ICPES	3.8	2.3	UG/G	11/17/95
95-SBS5	95.16645	CR	ICPES	4.9	0.99	UG/G	11/17/95
95-SBS5	95.16645	NI	ICPES	11.	4.9	UG/G	11/17/95
95-SBS5	95.16645	PB	ICPES	< 7.4		UG/G	11/17/95

CUSTOMER SAMPLE DUPLICATES:

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	ANALYTICAL TECHNIQUE	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT
95-SS1	95.16636	AG	ICPES	< 2.5		UG/G	11/17/95	
95-SS1	95.16636	BA	ICPES	160.	16.	UG/G	11/17/95	
95-SS1	95.16636	BE	ICPES	< 0.75		UG/G	11/17/95	
95-SS1	95.16636	CD	ICPES	4.	2.3	UG/G	11/17/95	
95-SS1	95.16636	CR	ICPES	5.9	1.	UG/G	11/17/95	
95-SS1	95.16636	NI	ICPES	9.7	4.9	UG/G	11/17/95	
95-SS1	95.16636	PB	ICPES	< 7.5		UG/G	11/17/95	

MATRIX SPIKES:

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	ANALYTICAL TECHNIQUE	AMOUNT SPIKED	AMOUNT RECOVERED	UNITS	COMPLETION DATE	COMMENT
95-SS1	95.16636	AG	ICPES	1.	0.32	MG/L	11/17/95	
95-SS1	95.16636	BA	ICPES	8.	3.4	MG/L	11/17/95	
95-SS1	95.16636	BE	ICPES	8.	3.6	MG/L	11/17/95	
95-SS1	95.16636	CD	ICPES	8.	3.5	MG/L	11/17/95	
95-SS1	95.16636	CR	ICPES	8.	3.6	MG/L	11/17/95	
95-SS1	95.16636	NI	ICPES	8.	3.5	MG/L	11/17/95	

95-SS1	95.16636 PB	ICPES	8.	0.66	MG/L	11/17/95

****

REPORT NUMBER: 39042 (continued)

********** CST QUALITY ASSURANCE REPORT *********

Prepared by: C FEDERICI on 17-Nov-1995

REQUEST NUMBER: 22763 MATRIX: SS ANALYST: OES PROGRAM CODE: E303

OWNER: Ron C. Conrad GROUP: ESH-19 MAIL-STOP: K490 PHONE: 7-0950

NOTEBOOK: EM90126 PAGE: 81

SUMMARY OF CONTROL STATUS OF OPEN (NON-BLIND) QC SAMPLES RUN WITH THIS BATCH

SAMPLE NUM	ANALYSIS	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	QC VALUE	QC UNCERTAINTY	COMPLETION DATE	COMMENT
00.30469	AG	74.	22.	MG/KG	92.5	49.5	11/17/95	UNDER CONTROL
00.30469	BA	270.	27.	MG/KG	276.	82.5	11/17/95	UNDER CONTROL
00.30469	BE	88.	8.8	MG/KG	95.1	43.	11/17/95	UNDER CONTROL
00.30469	CD	96.	9.6	MG/KG	102.	56.5	11/17/95	UNDER CONTROL
00.30469	CR	150.	15.	MG/KG	154.	73.	11/17/95	UNDER CONTROL
00.30469	NI	150.	15.	MG/KG	163.	85.5	11/17/95	UNDER CONTROL
00.30469	PB	130.	13.	MG/KG	147.	73.5	11/17/95	UNDER CONTROL

SUMMARY OF CONTROL STATUS OF BLIND QC SAMPLES RUN WITH THIS BATCH

SAMPLE NUM	ANALYSIS	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	QC VALUE	QC UNCERTAINTY	COMPLETION DATE	COMMENT
95.16646	AG	3.9	2.5	UG/G	28.9	7.3	11/17/95	OUT OF CONTROL
95.16646	BA	280.	28.	UG/G	340.	60.	11/17/95	UNDER CONTROL
95.16646	BE	1.2	0.74	UG/G	1.13	0.12	11/17/95	UNDER CONTROL
95.16646	CD	12.	2.3	UG/G	17.9	3.9	11/17/95	UNDER CONTROL
95.16646	CR	16.	1.6	UG/G	18.	2.	11/17/95	UNDER CONTROL
95.16646	NI	16.	4.9	UG/G	11.	2.	11/17/95	UNDER CONTROL
95.16646	PB	4500.	450.	UG/G	5150.	350.	11/17/95	UNDER CONTROL

REPORT NUMBER: 39042

Analyst	Reviewer	Team Leader	QA Officer
11-17-95	11/20/95	12/13/95	12/15/95
Date	Date	Date	Date

Los Alamos
NATIONAL LABORATORY

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

Date: September 13, 1995
In Reply Refer To: ESH-18/WQ&H:95-0322
Mail Stop: K497
Telephone: (505) 667-7969

Mr. Mark Ashley
Oil Conversation Division
New Mexico Energy, Minerals and Natural Resources Department
2040 South Pacheco St.
Santa Fe, New Mexico 87501

SUBJECT: INSPECTION OF THE FENTON HILL HOT DRY ROCK FACILITY

Dear Mr. Ashley:

At the conclusion of your inspection of the Fenton Hill Hot Dry Rock Facility on May 15, 1995, you identified four concerns which required further clarification. These four concerns are addressed below:

1. **Concern:** Where are the contaminated rags generated at the Fenton Hill facility disposed of?

   Response: Once the drum of rags is full, a Waste Profile Form will be completed to characterize the waste. LANL's Waste Transportation Team (CST-5) will transport the drum from the Fenton Hill Facility to LANL's Waste Treatment, Storage, and Disposal Facility at TA-54. From there, a private contractor or common carrier will transport the rags to a private facility in either Texas or Louisiana for incineration.

2. **Concern:** Where are the used oil filters generated at the Fenton Hill facility disposed of?

   Response: In the past, used oil filters were collected by the same private contractor who collected the facility's sanitary solid waste. In order to be assured that its oil filters are being disposed of correctly, in the future the Fenton Hill facility will follow the disposal procedures outlined in the enclosed letter from Michael Bailey at Johnson Controls.

3. **Concern:** Does the Fenton Hill facility have a Spill Control and Countermeasure (SPCC) Plan?

   Response: Enclosed is a copy of the facility's current SPCC Plan.

4. **Concern:** Does the potable water at the Fenton Hill facility comply with drinking water standards?

   Response: Enclosed is a memo from the Johnson Controls Environmental Laboratory which presents the water quality data which has been collected at Fenton Hill since 1985. As the memo states, all samples collected comply with the Safe Drinking Water Act for coliform bacteria.

Please contact me if I can be of further assistance.

Sincerely,

Bob Beers
Water Quality and Hydrology Group

BB/rj

Attach: a/s

Cy: S. Rae, ESH-18, w/o att., MS K497
N. Williams, ESH-18, w/o att., MS K497
J. Throne, EES-4, w/o att., MS D443
J. Albright, EES-4, w/o att., MS D443
WQ&H File, w/o att., MS K497
CRM-4, w/o att., MS A150

Johnson Controls World Services Inc.
Laboratory Support Division
Post Office Box 50
Los Alamos, NM 87544-0050

JOHNSON CONTROLS

May 24, 1995
JENV.95-326

Los Alamos National Laboratory
Los Alamos, NM 87545

ATTN: Jay Thorn, Fenton Hill Geothermal Testsite Manager, D443

THRU: Richard Perkins, Environmental Compliance Supervisor, JENV

SUBJECT: USED MOTOR OIL FILTER DISPOSAL RECOMMENDATION

As per your request, JENV is submitting a recommendation on the proper disposal of your used motor oil filters. You indicated that the quantity of filters generated by your operation is approximately two per month. JENV recommends that the filters be drained into the used motor oil drum at your site so that no free liquid exits in the filters. The filters will be placed into a plastic bag and transported by you to the JCI Motor Pool, TA-60 Building 1, where you can place them into a dumpster. The filters will be transported to the Los Alamos County Landfill by routine dumpster pickup. Ed Montoya, SFMO, requests that only used oil filters be placed into the dumpster and not gas or diesel fuel filters. If you have other kinds of filters besides motor oil filters for disposal, or if you have any questions about this recommendation, please contact Michael Bailey or Richard Perkins at JENV, 7-0104.

Very truly yours,

Michael Bailey

Michael Bailey,
cy:
T. Christopherson, BUS-5, MS P274
S. J. Calanni, VP/Gen Manager, JMGR
M. Brown, JENV
G. Vavra, Manager, Operations, OMDO
J. J. Lopez, Manager, JHSE
Claude Lee, SSDO
Ed Montoya, SFMO
file
Reading file

Johnson Controls World Services Inc.
Laboratory Support Division
Post Office Box 50
Los Alamos, NM 87544-0050

JOHNSON CONTROLS

May 26, 1995
JENV. 95-332

Los Alamos National Laboratory
Los Alamos, New Mexico 87544

ATTN: Robert Beers, ESH-18, K497

THRU: Michael F. Brown, Deputy Manager, JENV MFB.
Marke Talley, Environmental Supervisor, JENV Marke Talley

SUBJECT: FENTON HILL WATER QUALITY

As you requested, the attached table concerning Fenton Hill, (TA-57) Water Quality from 1993-1995 indicates that all samples comply with the Safe Drinking Water Act, defined as containing no coliform bacteria and less than 200 noncoliform bacteria per sample.
The plate counts from the past two years suggest stagnation in the trailer, but not in the rest of the buildings, operations, and lab buildings. There is no chlorine data because the TA-57 system is not chlorinated.

Please call me at 667-0105 if you need further information.

Kelly Chrissinger

Kelly Chrissinger,
Summer Student, JENV

Attachment: Fenton Hill Water Quality (1 page)
Copy: Ralph Yetter, FSS-DO, M718

Copy Without Attachment: Joe J. Lopez, JHSE
Tom Christopherson, BUS-5, P274
Robert Patterson, FSS-DO, P913
Ralph Yetter, FSS-DO, M718
S. J. Calanni, PMGR
file, reading file

Location	Date	Time	Coliforms	[redacted]oliforms	R2A
Fenton Hill	5/30/85	11:00 AM	A	(A)	
Fenton Hill	5/20/87	4:45 PM	A	A	
Men's Room Sink	6/18/87	2:11 PM	A	A	157/mL
Chem. Trailer	6/18/87	2:01 PM	A	A	177/mL
Drinking Fountain	6/18/87	2:08 PM	A	A	236/mL
Trailer Immediate	6/18/87	2:17 PM	A	A	>8000/mL
Drinking Fountain Immediate	6/18/87	2:04 PM	A	A	301/mL
Trailer Immediate	6/18/87	2:24 PM	A	A	2750/mL
FHS-17	6/21/88	3:15 PM	A	A	
FHS-37	6/21/88	3:15 PM	A	A	
TA-57	1/18/89	3:00 PM	A	A	
Water Fountain	4/19/89	9:00 AM	A	A	
Men's Restroom	7/11/90	1:00 PM	A	A	
Drinking Fountain	1/24/91	9:15 AM	A	A	
TA-57	9/30/92	1:56 PM	A	A	
Opps. Building	1/28/93	2:56PM	A	A	
Opps. Building	1/28/93	2:56 PM	A	A	
Opps. Building	2/28/93	12:16 PM	A	A	
Opps. Building	2/28/93	12:16 PM	A	A	
Opps. Building	3/30/93	3:00 PM			4
Opps. Building	3/30/93	3:00 PM			2
TA-57	5/5/93	3:38 PM	A	A	
TA-57	5/5/93	3:38 PM	A	1	
Opps. Building	6/3/93	4:30 PM	A	1	
Opps. Building	6/3/93	4:30 PM	A	A	
Opps. Building	7/6/93	2:30 PM	A	A	
Opps. Building	7/6/93	2:30 PM	A	A	
Opps. Building	8/3/93	2:30 PM	A	A	
Opps. Building	8/3/93	2:30 PM	A	A	
TA-57	9/7/93	4:30 PM	A	A	
TA-57	9/7/93	4:30 PM	A	A	
TA-57	10/4/93	6:00 PM	A	A	4 colonies
TA-57	10/4/93	6:00 PM	A or NA	A or TMTC	no growth
Men's Room Sink	11/3/93	4:41 PM	A	A	1800
Men's Room Sink	11/3/93	4:41 PM	A	A	1800
TA-57	12/2/93	3:00 PM	A	A	not run
TA-57	12/2/93	3:00 PM	A	A	not run
Opps. Building	3/17/94	2:30 PM			5700
Opps. Building	3/17/94	2:30 PM			<5700
TA-57	4/13/94	4:09 PM	A	A	
TA-57	4/13/94	4:09 PM	A	A	
TA-57	5/4/94	3:30 PM	A	A	
TA-57	5/4/94	3:30 PM	A	A	
TA-57	6/2/94	4:33 PM	A	A	
TA-57	6/2/94	4:33 PM	A	A	
TA-57	6/2/94	4:33 PM	A	A	660
TA-57	7/26/94	4:10 PM	A	A	
TA-57	7/26/94	4:10 PM	A	A	
TA-57	8/9/94	4:00 PM	A	A	
TA-57	8/9/94	4:00 PM	A	A	
TA-57	9/1/94	3:30 PM	A	1	
TA-57	9/1/94	3:30 PM	A	2	
TA-57	10/6/94	4:00 PM	A	A	
TA-57	10/6/94	4:00 PM	A	A	
TA-57	10/31/94	4:00 PM	A	A	
TA-57	10/31/94	4:00 PM	A	A	
TA-57	11/30/94	4:15 PM	A	A	
TA-57	11/30/94	4:15 PM	A	A	
Bldg. 17 Bathroom Sink	1/03/95		A	A	
TA-57	1/31/95		A	A	
TA-57	3/17/95		A	A	
TA-57	3/30/95		A	A	
TA-57	5/5/95	2:30 PM	A	A	

Los Alamos
NATIONAL LABORATORY

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

Date: August 28, 1995
In Reply Refer To: ESH-18/WQ&H:95-376
Mail Stop: K497
Telephone: (505) 667-7969

Mr. Mark Ashley
Oil Conservation Division
2040 South Pacheco Street
Santa Fe, NM 87505

SUBJECT: IRRIGATION LINE BREAK AT FENTON HILL

Dear Mr. Ashley:

Pursuant to our phone conversation of August 22, 1995, I would like to inform you that on Monday, August 21, 1995, a break occurred in an irrigation line at the Fenton Hill Geothermal Site resulting in a discharge, to the surface of the ground, of approximately 5,000 to 10,000 gallons of water. The line break and discharge occurred while water from the facility's 1 million gallon service pond was being pumped to the sprinkler system located on the application site which OCD approved under the Milagro Project Notice of Intent (Approval transmitted in an April 10, 1995, letter from Mr. William J. LeMay, OCD, to Mr. Steven Rae, Los Alamos National Laboratory).

An examination of the area around the line break on Tuesday morning, August 22, 1995, by Fenton Hill personnel, revealed that none of the discharged water left the application site; storm water sampling stations down gradient from the line break were dry and there was no evidence that water flowed through the silt fences erected at the application site's boundary. In addition, no ponding or pooling was found on the application site down gradient from the line break.

On Tuesday morning, August 22, 1995, Fenton Hill personnel repaired the broken irrigation line and resumed their sprinkler application of service pond water. Fenton Hill personnel estimated that as of Tuesday morning, August 22, 1995, approximately 165,000 gallons of water from the 1 million gallon service pond had been applied to the site and that approximately 185,000 gallons of water remain to be applied.

Please contact me if you desire more information regarding this incident.

Sincerely,

Bob Beers
Water Quality and Hydrology Group

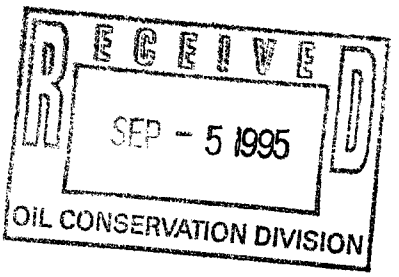
RB/vc

Cy: Jim Albright, EES-4, MS D443
Jay Thorn, EES-4, MS D443
Jim Thompson, EES-4, MS D443
Steve Rae, ESH-18, MS K497
Alex Puglisi, ESH-18, MS K497
Mike Alexander, ESH-18, MS K497
WQ&H File, MS K497
CRM-4, MS A150

Los Alamos
NATIONAL LABORATORY

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

Date: August 24, 1995
In Reply Refer To: ESH-18/WQ&H:95-0374
Mail Stop: K497
Telephone: (505) 667-4882



Mr. Marke Ashley
New Mexico Oil Conservation Division
2040 S. Pacheco
Santa Fe, New Mexico 87505

Dear Mr. Ashley:

RE: DISCHARGE OF WATER FROM SERVICE POND AT THE FENTON HILL GEOTHERMAL PROJECT

As we discussed during our telephone conversation on August 16, 1995, Los Alamos National Laboratory (LANL) will discharge approximately 350,000 gallons of water from the 1 million gallon (MG) service pond at the Fenton Hill Geothermal Facility. This discharge will be land applied utilizing the sprinkler systems and application areas specified in the Notice of Intent (NOI) submitted to your office on March 20, 1995, for the Milagro Project.

The origins of the water contained in the service pond are identical to the ones listed for the 5 MG pond utilized by the Milagro Project. In fact, 350,000 gallons of water were transferred from the 5 MG pond to the service pond during the preliminary stages of the Milagro Project. A sample taken from the service pond indicates that contaminant levels in this discharge will be similar to those found in the Milagro discharge. Analytical data for this sample has been attached for your information.

The Laboratory will conduct all planned discharges from the service pond in conformance with the conditions specified in our original NOI for the Milagro Project and in subsequent correspondence from your office. All runoff at the site will be controlled and storm water events will be sampled.

Thank you for your cooperation in this matter. I appreciate your time and effort throughout the initial stages of the Milagro Project and in addressing this discharge. If you have any questions, please feel free to contact me at 667-4882.

Sincerely,

Alex A. Puglisi

Alex Puglisi
Water Quality and Hydrology Group

AP/em

Attach: a/s

Cy: R. Beers, ESH-18, w/att., MS K497
G. Sinnis, P-23, w/att., MS H803
R. Anderson, Oil Conservation Division, Santa Fe, New Mexico, w/att.
K. Zamora, DOE/LAAO, w/att., MS A316
WQ&H File, w/att., MS K497
CRM-4, w/att., MS A150

HDR 1995

SAMPLE #	DESCRIPTION	DATE MM/DD/YY	Time	NaFluorescein ppb	As ppm	Std.D. +/-	B ppm	Std.D. +/-	Ca ppm	Std.D. +/-	CO3 ppm
HDR95-60	EE3A 9 5/8 X 13 3/8 Annulus	08/08/95	9:20	—	1.10	0.03	40.9	0.1	16.5	0.2	0
* HDR95-61	1 MGP after Fresh Water Flush	08/10/95	—	—	4.60	0.04	40.5	0.1	58.0	0.3	0
HDR95-62	EE3A CSG Annulus	08/15/95	12:16	2.3	2.93	0.01	47.1	0.1	128	1	—
HDR95-63	EE3A CSG Annulus	08/15/95	12:34	1.8	3.72	0.09	47.4	0.9	121	1	—
HDR95-64	EE3A CSG Annulus	08/15/95	12:45	1.6	3.99	0.01	47.4	0.3	111	1	—
HDR95-65	EE3A CSG Annulus	08/15/95	12:50	1.6	3.74	0.07	47.2	0.1	106	1	—
HDR95-66	EE3A CSG Annulus	08/15/95	12:55	1.8	3.51	0.01	47.1	0.1	100	1	—
HDR95-67	EE3A CSG Annulus	08/15/95	12:58	1.6	3.59	0.05	45.8	0.3	100	1	—
HDR95-68	EE3A CSG Annulus	08/15/95	13:00	1.7	3.39	0.03	47.2	0.7	99.5	0.5	—
HDR95-69	EE3A CSG Annulus	08/15/95	13:05	1.6	3.21	0.06	47.3	0.1	95.3	0.3	—
HDR95-70	EE3A CSG Annulus	08/15/95	13:10	1.6	3.16	0.01	46.4	0.2	90.7	0.6	—
HDR95-71	EE3A CSG Annulus	08/15/95	13:20	1.3	3.74	0.09	44.6	0.8	83.3	0.7	—
HDR95-72	EE3A CSG Annulus	08/15/95	13:25	1.3	3.65	0.03	44.8	0.2	83.3	0.1	—
HDR95-73	EE3A CSG Annulus	08/15/95	13:35	1.3	3.85	0.01	43.8	0.9	81.0	0.4	—
HDR95-74	EE3A CSG Annulus	08/15/95	13:45	1.6	3.46	0.02	45.0	0.1	75.6	0.1	—
HDR95-75	EE3A CSG Annulus	08/15/95	14:00	1.4	3.96	0.02	42.8	0.7	74.4	0.4	—

SAMPLE #	Fe ppm	Std.D. +/-	HCO3 ppm	K ppm	Std.D. +/-	Li ppm	Std.D. +/-	Mg ppm	Std.D. +/-	Na ppm	Std.D. +/-	pH (L)	Si ppm	Std.D. +/-	SiO2 calculated
HDR95-60	—		921	88.8	0.9	18.6	0.1	1.95	0.01	1046	25	7.93	58.7	0.1	126
* HDR95-61	—		673	92.4	0.1	92.4	0.1	3.37	0.01	1009	8	8.03	116	1	248
HDR95-62	3.52	0.01	—	106	2	19.9	0.1	5.46	0.02	1260	7	—	142	2	304
HDR95-63	12.3	0.1	—	100	3	20.2	0.2	5.01	0.04	1230	30	—	137	1	293
HDR95-64	14.7	0.3	—	99	1	19.0	0.1	4.52	0.09	1170	13	—	139	1	297
HDR95-65	13.1	0.1	—	94.7	0.1	19.5	0.1	4.22	0.01	1180	31	—	143	1	306
HDR95-66	10.3	0.1	—	96.2	0.9	18.4	0.3	4.08	0.03	1190	32	—	143	5	306
HDR95-67	11.5	0.1	—	98.8	0.5	19.3	0.2	4.24	0.01	1160	3	—	134	1	287
HDR95-68	9.99	0.01	—	100	1	18.8	0.1	4.12	0.07	1160	48	—	141	1	302
HDR95-69	8.39	0.04	—	101	1	18.8	0.2	3.97	0.07	1190	2	—	140	1	300
HDR95-70	8.47	0.04	—	95.3	0.2	18.5	0.2	3.82	0.03	1190	31	—	142	1	304
HDR95-71	11.2	0.2	—	94.9	0.1	18.3	0.2	3.52	0.06	1160	23	—	147	1	314
HDR95-72	10.0	0.2	—	98.8	0.1	18.2	0.2	3.55	0.03	1150	7	—	145	1	310
HDR95-73	8.14	0.08	—	97.8	0.1	17.9	0.1	3.71	0.01	1130	40	—	140	1	300
HDR95-74	5.15	0.03	—	96.3	0.6	17.2	0.1	3.44	0.01	1110	15	—	144	1	308
HDR95-75	7.01	0.09	—	103	1	17.3	0.1	3.40	0.01	1110	19	—	145	1	310

Los Alamos
NATIONAL LABORATORY

memorandum

Earth and Environmental Sciences

EES-4 GeoEngineering
Los Alamos, New Mexico 87545

To/MS: R.S. Beers, ESH-18, K497
From/MS: Jay Thorne, EES-4, D443
Phone/FAX: 7-7900 / 5-4151
Symbol: EES-4-95-79
Date: June 27, 1995

N DIVISION
RECEIVED
'95 JUL 7 AM 8 52

SUBJECT: RESPONSE TO INSPECTION FINDINGS FROM THE DISCHARGE PLAN INSPECTION OF FENTON HILL HDR FACILITY BY MARK ASHLEY, OCD ON MAY 17, 1995

Response to OCD Finding/Concerns:

(1) Bob Beers is talking to Michelle Cash, ESH-19, about the collection and disposal of drums containing contaminated rags.

(2) As per my request, Mr. Michael Bailey, JENV-Johnson Controls, has established for us an avenue by which we can dispose of our used oil filters in accordance with appropriate state and federal regulations. Please see attached memo.

(3) Our facility SPCC plan should be ready any day now, as it is in its final review. We would be glad to provide you with a copy as soon as it is ready.

(4) Bob Beers is working on this finding at this time.

Response to ESH-18 Concerns:

(2) In response to this concern, and after talking to Bob Beers, I am sending copies of our daily log sheets for our back-side leak detection for the past month. Also included is our "Water Log Book" copies for approximately one month. Bob Beers and I thought this would be representative of our monitoring system.

JT:jb

Attach: a/s

Cy: EES-4 file
Dan Thomas, EES-DO, D446
Michael Bailey, JCI-JENV, MS A199
Jim Albright, EES-4, D443
Mark Ashley, Oil Conservation Div., NMEMNR Dept.

RECEIVED
JUL 14 1995
Environmental Bureau
Oil Conservation Division

Johnson Controls World Services Inc.
Laboratory Support Division
Post Office Box 50
Los Alamos, NM 87544-0050

JOHNSON CONTROLS

May 24, 1995
JENV.95-326

Los Alamos National Laboratory
Los Alamos, NM 87545

ATTN: Jay Thorn, Fenton Hill Geothermal Testsite Manager, D443

THRU: Richard Perkins, Environmental Compliance Supervisor, JENV

SUBJECT: USED MOTOR OIL FILTER DISPOSAL RECOMMENDATION

As per your request, JENV is submitting a recommendation on the proper disposal of your used motor oil filters. You indicated that the quantity of filters generated by your operation is approximately two per month. JENV recommends that the filters be drained into the used motor oil drum at your site so that no free liquid exits in the filters. The filters will be placed into a plastic bag and transported by you to the JCI Motor Pool, TA-60 Building 1, where you can place them into a dumpster. The filters will be transported to the Los Alamos County Landfill by routine dumpster pickup. Ed Montoya, SFMO, requests that only used oil filters be placed into the dumpster and not gas or diesel fuel filters. If you have other kinds of filters besides motor oil filters for disposal, or if you have any questions about this recommendation, please contact Michael Bailey or Richard Perkins at JENV, 7-0104.

Very truly yours,

Michael Bailey

Michael Bailey,
cy:
T. Christopherson, BUS-5, MS P274
S. J. Calanni, VP/Gen Manager, JMGR
M. Brown, JENV
G. Vavra, Manager, Operations, OMDO
J. J. Lopez, Manager, JHSE
Claude Lee, SSDO
Ed Montoya, SFMO
file
Reading file

3/2/95

Measured fluid level of leak detection system at 1 Mgal pond.

Level in leak detection well was — 180 1/2"
from the top of PVC pipe

Level in 1 Mgal pond was — 130 1/2"
from the top of the steel can

The difference in elevation between PVC top + steel can top is — 7 1/2"
(PVC is higher)

So leak detection level is +2 1/2"
below the pond level.

Pumped out water in leak detection well - took less than 10 minutes after measurement

Checked recovery system at 5 Mgal pond - all is fine - leak rate into recovery tank = 0
Checks performed by Jim Thomson

3/7/95

1 Mgal leak detection system water level = 203 1/2"
to top of PVC pipe
120"

Pond fluid level = 120"
to top of can
~~Including~~ 7 1/2" height difference ΔL = 76"

5 Mgal pond checked & OK - leak to recovery pump is a slow drip
" " level is 8.20 psi (4.13 Mgal)

Checks performed by Jim Thomson

3/13/95

Leak detection well level = 212 1/2"
Pond level (green can) = 110 1/2"
Difference in elevation of well tops — 7 1/2"
ΔL = 94.5

5 Mgal pond level = 8.05 psi = 4.018 Mgal
Leak rate into recovery tank = appx. 1 pint/min.
checked by - DT

20 3/16/95

Installed pond level indication at 1 Mgal pond. Guards were instructed to begin recording pond level using new indicator. Measurement is from the bottom of the can to the level (opposite of previous measurement. 10 ft is the level of the overflow.

3/19/95

Leak detection well level - 2 0 2"
Pond level green tank - 7'3"
5 mgal pond level - 3.88 mgal
Leak rate into Recovery tank - Approx 1 pt. per min

3/26/95

Leak detection well level - 1 9 1/2
Pond level green tank - 5'4"
5 mil gal pond level - 3.98 mgal
Leak rate into Recovery tank - 0

FENTON HILL SURFACE WATER SYSTEM WEEKLY CHECK SHEET

DATE	1 MGAL WATER LEVEL	1 MGAL LEAK DETECT WELL LEVEL	NET DIFF. BETWEEN WATER LEVELS	5 MGAL RECOVERY SYSTEM OK? (Y/N)	5 MGAL LEAK RATE	5 MGAL CONTENTS MGAL)	OPERATOR INITIALS
3/27/95	6'4"	191½"	120"	✓	0	3.98	TP
4/3/95	7'[illegible]	190½"	106½"	✓	0	3.76	TP
4/10/95	7'4"	190½"	102"	✓	0	3.40	TP
4/17/95	7'6"	198¼"	108¼"	✓	0	3.74	TP
4/24/95	8'6½"	190½	88"	✓	0	3.80	TP
5/1/95	9'4"	186½	74½"	✓	⅓ Pint Per min.	3.74	TP
5/8/95	9'4"	184	72	✓	0	3.90	TP
5/15/95	8'7"	182½	79½	✓	0	3.14	TP
5/22/95	7'3½"	182½"	95"	✓	½ Pint Per min	2.97	TP
5/29/95	8'5"	183"	82"	✓	0	1.50	TP
6/5/95	7'10"	180½	86½	✓	0	1.20	TP
6/12/95	9'	178½	70½	✓	0	.20	TP
6/19/95	6'9"	185"	104"	✓	0	.13	[illegible]

[redacted] HILL EE-3A BACKSIDE CHECK S[redacted]ET

FOR WEEK BEGINNING MAY 1 19 95

			METER "A"	METER "B"	REMARKS
1	MONDAY	06:00 HRS	75490		F.S.
		18:00 HRS	77430		SF
2	TUESDAY	06:00 HRS	79620		BM
		18:00 HRS	81730		BM
3	WEDNESDAY	06:00 HRS	83870		BM
		18:00 HRS	86180		BM
4	THURSDAY	06:00 HRS	0088233		Toby
		18:00 HRS	0090410		LBI
5	FRIDAY	06:00 HRS	0092549		LBI
		18:00 HRS	0094687		LNT
6	SATURDAY	06:00 HRS	0096764		LBI
		18:00 HRS	0099110		[illegible]
7	SUNDAY	06:00 HRS	0101300		[illegible]
		18:00 HRS	0103500		[illegible]

[illegible] 10 5430

FENTON HILL EE-3A BACKSIDE CHECK SHEET

FOR WEEK BEGINNING MAY 8 1995

109550

		METER "A"	METER "B"	REMARKS
8 MONDAY	06:00 HRS	105430		BM
	18:00 HRS	106360		SJ
9 TUESDAY	06:00 HRS	106360		BM
	18:00 HRS	106360		BM
10 WEDNESDAY	06:00 HRS	106360		
	18:00 HRS	0106360		
11 THURSDAY	06:00 HRS	0106365		
	18:00 HRS	0106365		
12 FRIDAY	06:00 HRS	0106365		
	18:00 HRS	0106480		RKT
13 SATURDAY	06:00 HRS	0106974		
	18:00 HRS	0107489		
14 SUNDAY	06:00 HRS	108170		F.S.
	18:00 HRS	108870		F.S.

4190

FENTON HILL EE-3A BACKSIDE CHECK SHEET

FOR WEEK BEGINNING MAY 15 1995

			METER "A"	METER "B"	REMARKS
15	MONDAY	06:00 HRS	109550		F.S.
		18:00 HRS	110260		Sg
16	TUESDAY	06:00 HRS	111210		BM
		18:00 HRS	112050		BM
17	WEDNESDAY	06:00 HRS	113130		BM
		18:00 HRS	114350		BM
18	THURSDAY	06:00 HRS	0115379		[illegible]
		18:00 HRS	0116556		[illegible]
19	FRIDAY	06:00 HRS	0117710		[illegible]
		18:00 HRS	0118948		[illegible]
20	SATURDAY	06:00 HRS	0120299		[illegible]
		18:00 HRS	0121828		[illegible] TANK overflowing
21	SUNDAY	06:00 HRS	123510		F.S. " "
		18:00 HRS (0830)	(123770) 000000 7770		F.S.

FENTON HILL EE-3A BACKSIDE CHECK SHEET

3660

FOR WEEK BEGINNING MAY 22 1995

		METER "A"	METER "B"	REMARKS
22 MONDAY	06:00 HRS	4190		ES
	18:00 HRS	6110		ES
23 TUESDAY	06:00 HRS	8470		BM
	18:00 HRS	10550		BM
24 WEDNESDAY	06:00 HRS	12880		BM
	18:00 HRS	15230		
25 THURSDAY	06:00 HRS	0017297		~~LEL~~
	18:00 HRS	0019643		~~LEL~~
26 FRIDAY	06:00 HRS	0021951		~~LEL~~
	18:00 HRS	0024345		RKT
27 SATURDAY	06:00 HRS	0026733		LEL
	18:00 HRS	0029250		LEL
28 SUNDAY	06:00 HRS	31650		FS
	18:00 HRS	34140		FS

NOTICE OF PUBLICATION
STATE OF NEW MEXICO
ENERGY, MINERALS & NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION

Notice is hereby given that pursuant to the New Mexico Water Quality Control Commission Regulations, the following discharge plan renewal applications have been submitted to the Director of the Oil Conservation Division, 2040 South Pacheco, Santa Fe, New Mexico, 87505, Telephone (505) 827-7131:

(GW-018) - Warren Petroleum Company, Ken Stinson, P.O. Box 67, Monument, New Mexico 88265, has submitted a discharge plan renewal application for their Bluitt Gas Processing Plant located in the NE/4, Section 15, Township 8 South, Range 36 East, NMPM, Lea County, New Mexico. Approximately 19,500 gallons per day of process waste is disposed of in an OCD approved Class II injection well. The waste water has a total dissolved solids concentration of approximately 5200 mg/l. Ground water most likely to be affected in the event of an accidental discharge is at a depth of approximately 100 feet with a total dissolved solids concentration of approximately 1400 mg/l. The discharge plan addresses how spills, leaks, and other accidental discharge.

(GW-026) - Warren Petroleum Company, Ken Stinson, P.O. Box 67, Monument, New Mexico 88265, has submitted a discharge plan renewal application for their Saunders Gas Processing Plant located Section 34, Township 14 South, Range 33 East, NMPM, Lea County, New Mexico. Approximately 18,900 gallons per day of process waste water is disposed of in an OCD approved Class II injection well. The waste water has a total dissolved solids concentration of approximately 3881 mg/l. Ground water most likely to be affected in the event of an accidental discharge is at a depth of approximately 100 feet with a total dissolved solids concentration of approximately 600 mg/l. The discharge plan addresses how spills, leaks, and other accidental discharges to the surface will be managed.

(GW-027) - Warren Petroleum Company, Ken Stinson, P.O. Box 67, Monument, New Mexico 88265, has submitted a discharge plan renewal application for their Vada Gas Processing Plant located Section 23, Township 10 South, Range 33 East, NMPM, Lea County, New Mexico. Approximately 1,380 gallons per day of process waste water is disposed of in an OCD approved Class II injection well. The waste water has a total dissolved solids concentration of approximately 11,200 mg/l. Ground water most likely to be affected in the event of an accidental discharge is at a depth of approximately 35 feet with a total dissolved solids concentration of approximately 1000 mg/l. The discharge plan addresses how spills, leaks, and other accidental discharges to the surface will be managed.

(GW-031) - U.S. Department of Energy, Fenton Hill Geothermal Facility, Larry Kirkman, Acting Area Manager, Albuquerque Operations, Los Alamos Area Office, Los Alamos, New Mexico 87544, has submitted a discharge plan renewal application for their Fenton Hill Geothermal Facility located in the NE/4 Section 13, Township 19 North, Range 2 East, NMPM, Sandoval County, New Mexico. Water from a geothermal loop is discharged to a double-lined service pond equipped with leak detection during periods of emergency venting or during periods when maintenance operations on the geothermal loop require a discharge of water from the loop. The discharge to the pond will be temporary as the water will be reinjected to the geothermal loop when normal operating conditions are established. The water from the geothermal loop has a total dissolved solids concentration of approximately 3,200 mg/l. Ground water most likely to be affected in the event of an accidental discharge is at a depth of approximately 370 feet with a total dis-

STATE OF NEW MEXICO
County of Bernalillo SS

Bill Tafoya being duly sworn declares and says that he is Classified Advertising manager of **The Albuquerque Journal**, and that this newspaper is duly qualified to publish legal notices or advertisements within the meaning of Section 3, Chapter 167, Session Laws of 1937, and that payment therefore has been made of assessed as court cost; that the notice, copy of which is hereto attached, was published in said paper in the regular daily edition, for 1 times, the first publication being of the 12 day of May, 1995, and the subsequent consecutive publications on _____, 1995

Bill Tafoya

OFFICIAL SEAL
Megan Garcia
NOTARY PUBLIC
STATE OF NEW MEXICO
My Commission Expires: 5-20-98

Sworn and subscribed to before me, a notary Public in and for the County of Bernalillo and State of New Mexico, this 12 day of, May 1995

Megan Garcia

PRICE 102.47

Statement to come at end of month.

CLA-22-A (R-1/93) ACCOUNT NUMBER 590938

OK MM

Department of Energy
Field Office, Albuquerque
Los Alamos Area Office
Los Alamos, New Mexico 87544

APR 2 1 1995

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. William J. LeMay, Director
Oil Conservation Division
New Mexico Energy, Minerals and
Natural Resources Department
2040 South Pacheco St.
Santa Fe, NM 87501

Dear Mr. LeMay:

Enclosed please find the Department of Energy's application for renewal of the Discharge Plan for Geothermal Operations at Fenton Hill, Sandoval County, New Mexico. We are requesting an extension of the existing plan for an additional five-year period in order to complete the experimental work at the Fenton Hill Geothermal site. As is indicated in the application for renewal, no major changes in the operation of the facility are anticipated.

If you have any questions concerning the submittal, please feel free to call Ken Zamora, Office of Environment and Projects, at (505) 665-5047.

Sincerely,

Larry Kirkman, P.E.
Acting Area Manager

LAAMEP:5KZ-003

Enclosure

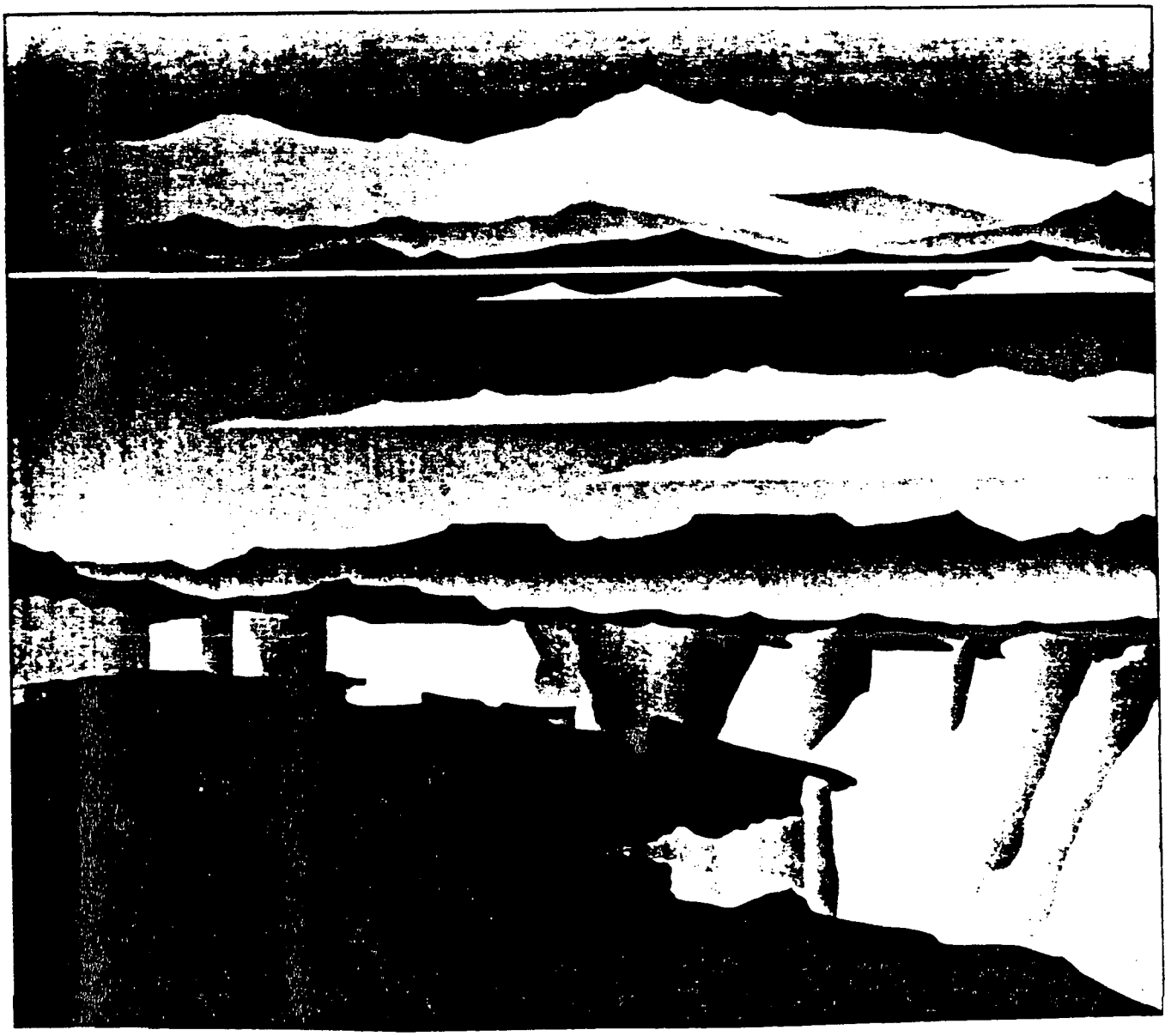
cc w/enclosure:
E. Kelley
New Mexico Environment
Department
P. O. Box 26110
Santa Fe, NM 87501
K. Zamora, AAMEP, LAAO
J. Albright, EES-4, LANL, MS-D443
WQ&H File, LANL, MS-K497
K. McAda, EPD, AL

March 20, 1995

Hot Dry Rock Geothermal Energy Development Program

APPLICATION FOR RENEWAL

DISCHARGE PLAN FOR GEOTHERMAL OPERATIONS AT FENTON HILL SANDOVAL COUNTY, N.M.



PREPARED BY
LOS ALAMOS NATIONAL LABORATORY

SUBMITTED BY
U.S. DEPARTMENT OF ENERGY
LOS ALAMOS AREA OFFICE

Application For Renewal
Discharge Plan for Geothermal Facilities

I. General Information

A. Name, Address, and Telephone Number for Discharger or Legally Responsible Party:

Mr. Larry D. Kirkman, Acting Area Manager
U.S. Department of Energy
Los Alamos Area Office
528 35th Street
Los Alamos, New Mexico 87544

(505) 667-5105

Dennis J. Erickson, Director
Environment, Safety and Health Division
Los Alamos National Laboratory
P.O. Box 1663 MS K491
Los Alamos, New Mexico 8 7545

(505) 667-4218

B. Location of Discharge: 1/4 NE Section 13, Township 19 North, Range 2 East, NMPM.

The Fenton Hill geothermal site is located in the Jemez Mountains in Sandoval County of north central New Mexico. It is about 35 miles west of Los Alamos and 10 miles north of Jemez Springs.

C. Type of Operation: Geothermal.

The Los Alamos Hot Dry Rock (HDR) Geothermal Energy Development Program, sponsored by the U.S. Department of Energy (DOE), Division of Geothermal and Hydropower Technologies, is a research program to develop the technology necessary to economically extract the energy contained at accessible depths within the earth's crust. The Fenton Hill Project is the field site for the application and testing of this research. The site is operated in cooperation with the U.S. Department of Agriculture, National Forest Service.

A complete description of the Project is presented in the original Discharge Plan approved June 5, 1985. A modification to the original plan was approved September 8, 1987, to allow for the use of chemically reactive tracers to obtain measurements of the temperature patterns in the geothermal zone.

During the next renewal period (June 1995, to June 2000), only one minor change in the operation of the facility is anticipated; the 5.7 million gallon reservoir will no longer be available to receive discharges from the geothermal loop (vented fluids). All fluids vented from the geothermal loop will be discharged to the 1.0 million gallon service pond. As a result, use of the 1.0 million gallon service pond will become active and routine . The 5.7 million gallon reservoir will be used only as a source of fresh water for geothermal system charging and make-up.

D. Affirmation:

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

(Signature)

Larry D. Kirkman, Acting Area Manager
U.S. Department of Energy
Los Alamos Area Office

3/24/95
(Signature)

Dennis J. Erickson, Director
Environment, Safety and Health Division
Los Alamos National Laboratory

II. PLANT PROCESS

A. Describe storage and uses of geothermal waters and any surface disposal impoundments.

As reported in the original Discharge Plan, geothermal waters are not used in this Project. Water from the upper aquifer is pumped into the injection well to geothermal depths to be heated by hot dry rocks. Improvements to the surface impoundments are complete. The 1.0 million gallon pond has been lined in accordance with the plan and specifications approved by the Oil Conservation Division April 4, 1990. The proposed experimental facilities will be a closed loop system with no routine liquid discharges to the surface.

B. Estimated quantities used in gallons per day (gpd).

It is estimated that approximately 8.7 acre-feet of water will be used each year that the experiment is active.

C. Any additives or commingling.

Sodium sulfates and other water treatment chemicals will be added to the recirculating water to remove dissolved oxygen and prevent corrosion. Chemically reactive tracers are also added to the recirculating water as described in the Discharge Plan Modification approved on September 8, 1987. The experimental work to be completed at the Fenton Hill Site does not include commingling of water supplies.

III. SITE CHARACTERISTICS

A. Provide the name, description, and location of any ground water discharge sites (water wells, seeps, springs, watercourses) within one mile of the outside perimeter of the facility. For water wells, specify use of water (e.g., irrigation, domestic, etc.)

This information was provided in the original Discharge Plan and has not changed. Additional information can be found in NPDES Permit No. 0028576. Water is used for domestic and experimental research purposes only.

B. If known, provide the flow direction of the groundwater most likely to be affected by the discharge. Include the source of the information and how it was determined.

This information was included in Appendix C of the original Discharge Plan and has not changed.

C. Provide depth to water of geothermal water, and if possible, any fresh water wells that could be affected by any discharge.

Geothermal waters are not used in the Project; the geothermal well is dry until injected with water from the upper aquifer which is subsequently pumped from the geothermal well. Water in the domestic/experimental water well is tapped at approximately 377 feet.

D. Depth to and lithologic description of rock at base of alluvium. Provide drillers logs and geologic information and maps as available.

This information is provided in the original Discharge Plan.

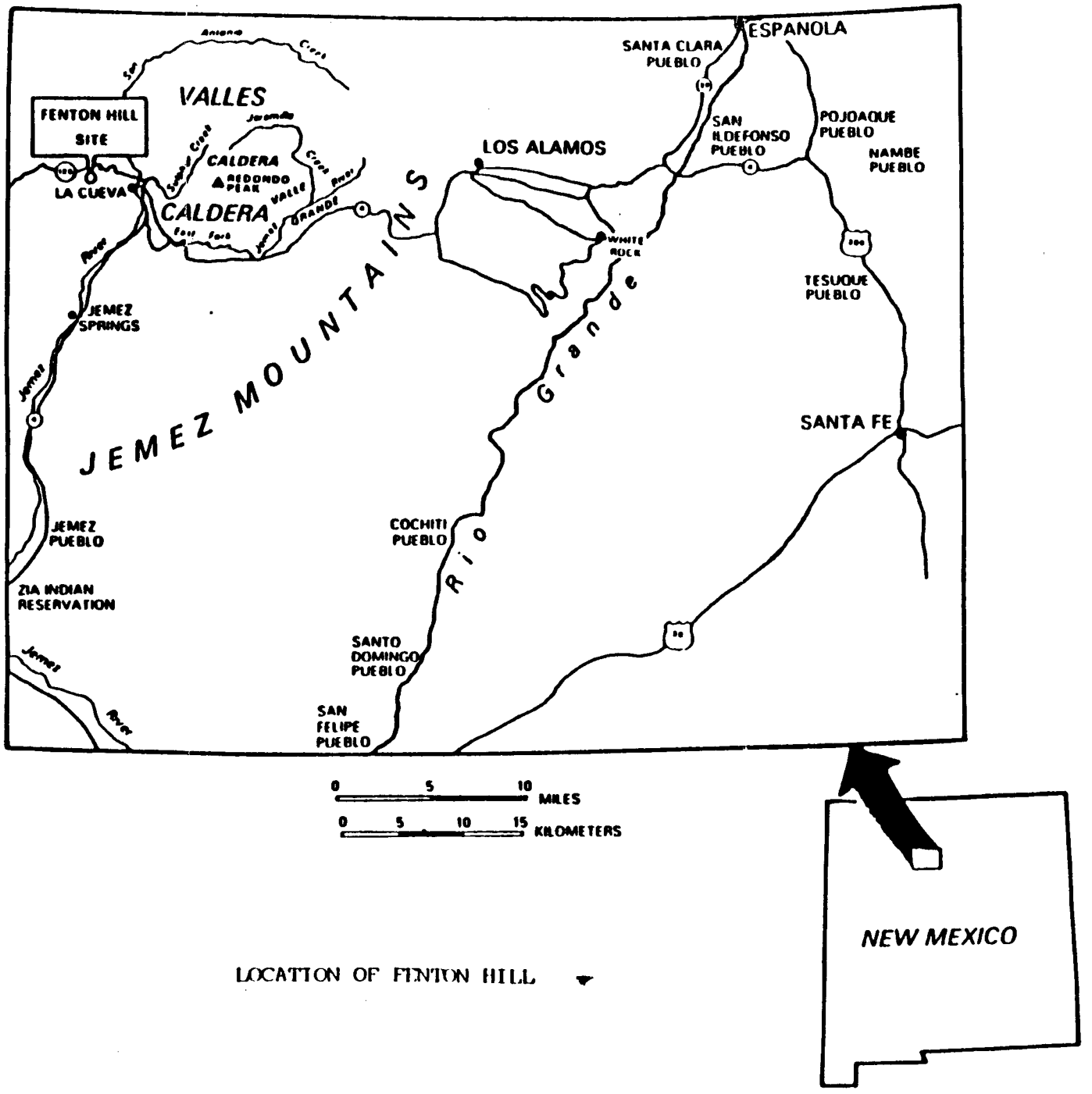
E. Describe flooding potential of the discharge site.

No flooding danger exists because the Project site is located above nearby streams on top of a narrow (1/2 mile wide) ridge; local runoff is diverted from the developed site.

F. Any additional information that may be necessary to demonstrate that approval of the renewal of the Discharge Plan will not result in concentrations in excess of the standards of WQCC Regulations, Section 3-103, or the presence of any toxic pollutant at any place of withdrawal of water for present or reasonably foreseeable future use. Detailed information on site geologic and hydrologic conditions may be required for a technical evaluation of the applicant's proposed Discharge Plan.

The Department of Energy requests that the original Discharge Plan for the Fenton Hill geothermal site, as modified June 5, 1990, be renewed. No water was discharged to the surface during the past five years; there are plans to discharge water from the 5.7 million gallon reservoir in the near-term future in order to allow replacement of its cover and to repair its liner. This repair activity and proposed discharge is to support non-geothermal astrophysical research involving the 5.7 million gallon reservoir. A description of the non-geothermal activity is being sent under separate cover.

Detailed information on the site's geologic and hydrologic conditions are provided in the original Discharge Plan; the main concept behind the LTFT is that of being a closed circuit experiment which continuously reuses the same water.



LOCATION OF FENTON HILL

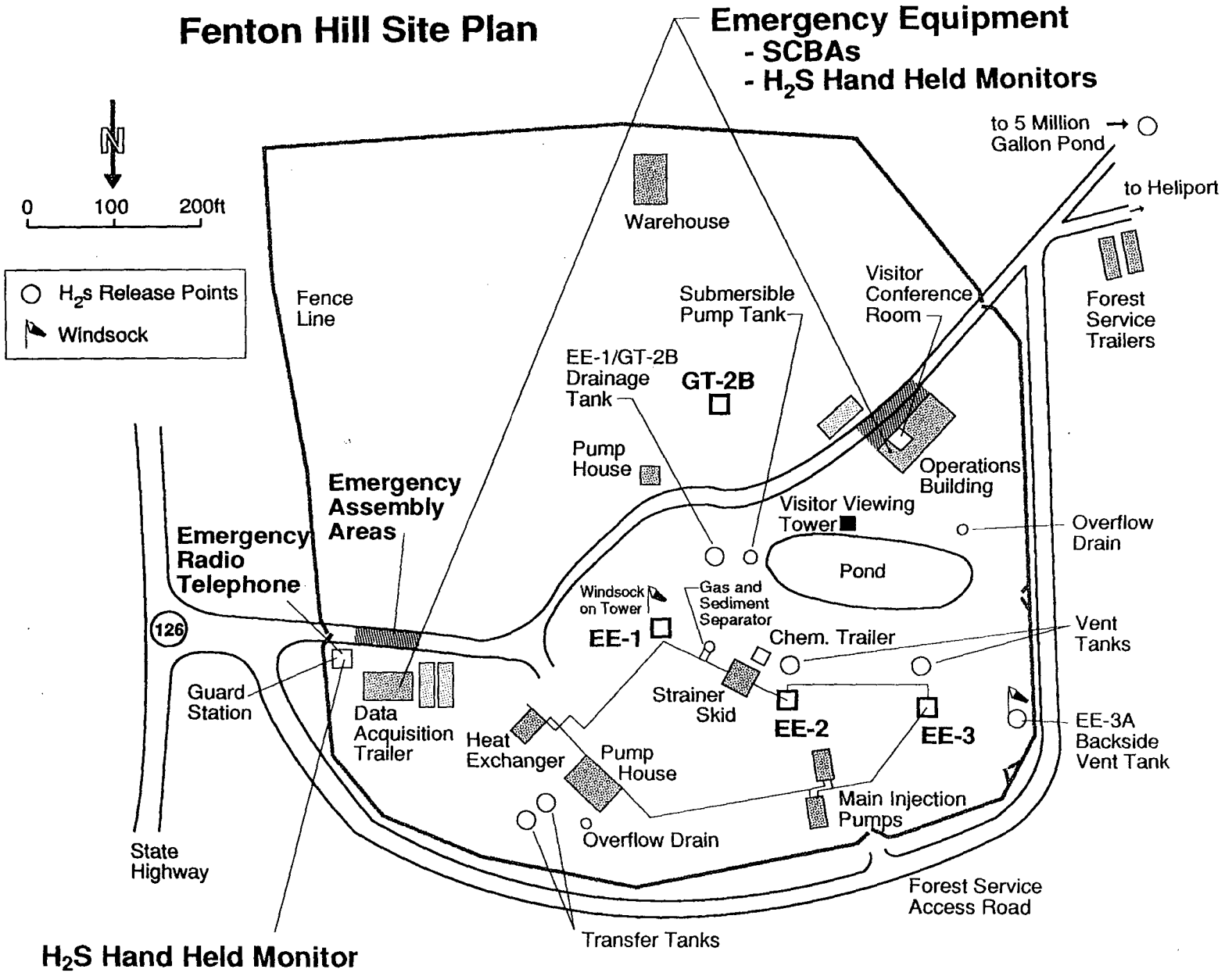


Figure 3. **Location of Emergency Equipment and Mustering Area**

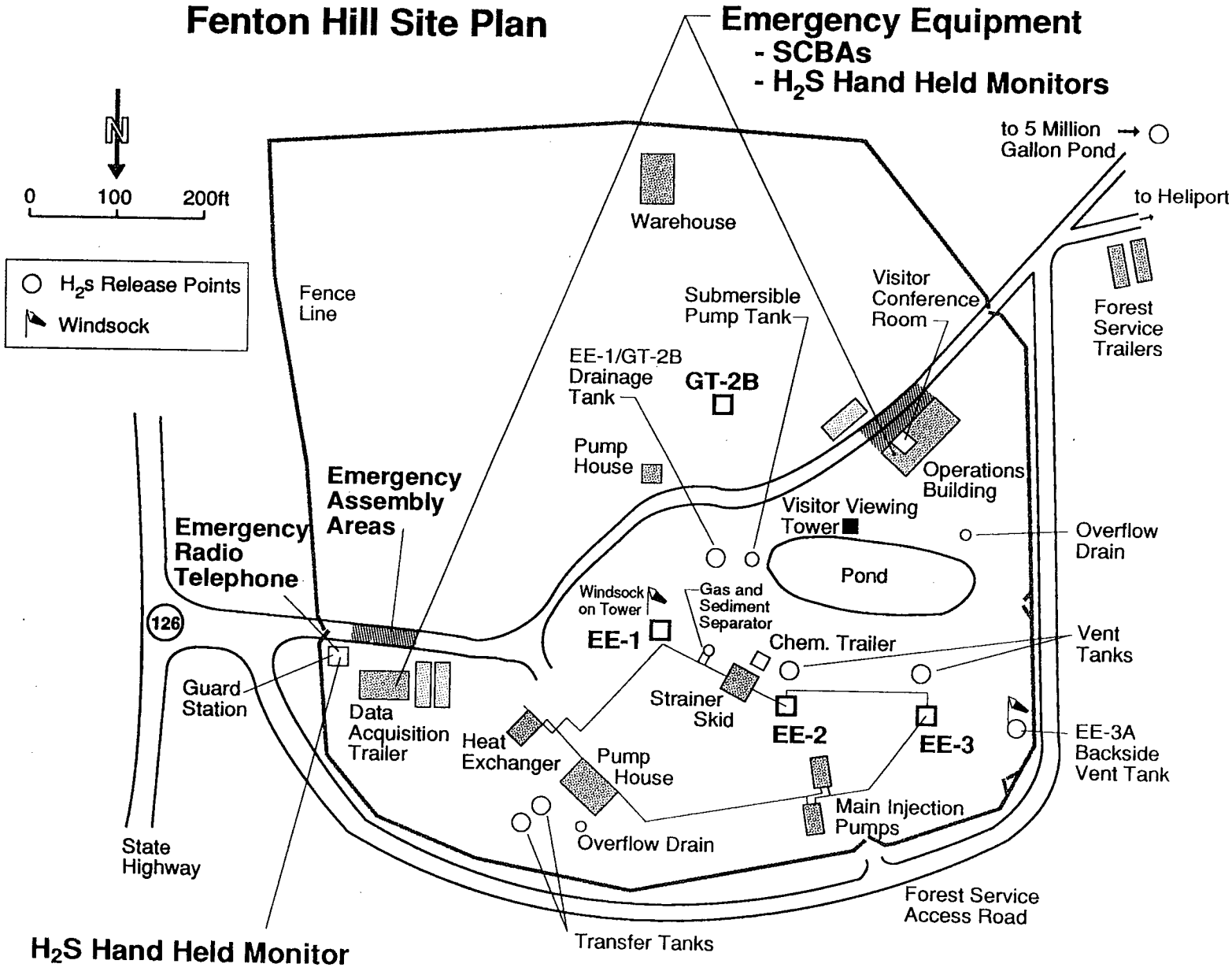


Figure 3. **Location of Emergency Equipment and Mustering Area**

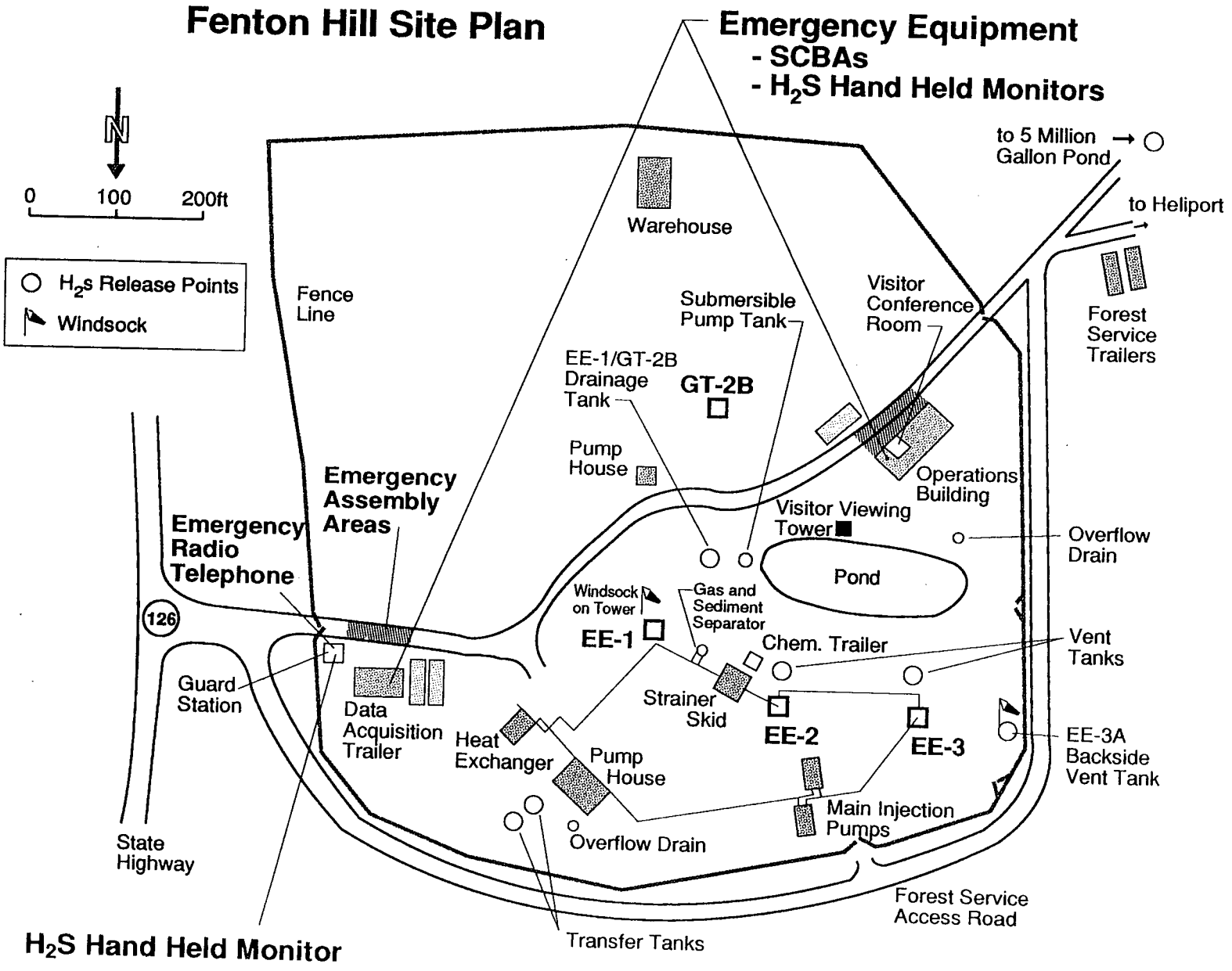


Figure 3. **Location of Emergency Equipment and Mustering Area**

Los Alamos
NATIONAL LABORATORY
memorandum

Physics Division, P-23, MS H846
Los Alamos, NM 87545
Email: GUS@lanl.gov
(505)667-9217, FAX 665-7920

To/MS: Mark Ashley, OCD
From/MS: Gus Sinnis/MS H846
Phone/FAX: 7-9217/5-7920
Symbol: P-23
Date: June 9, 1995

Dear Mark,

Here is the logsheet from the last 3 weeks. As you can see we did not run last week because of the heavy rains over Memorial Day weekend. At present the pond level is down to about 150,000 gallons. This is all that we can pump out with the current system. We are in the process of switching over to a different system with a much lower flow rate.

The new system will use the cyclone separator to remove any sediment present in the water. The sediment will go into a frac tank for temporary storage and the clean water will go out the center PVC line, we have removed the two aluminum lines. I have sent 2 sediment samples to a lab for analysis. I will send the results of the analysis to you when we receive them and ask for your advice on a disposal site.

Sincerely,

Gus Sinnis

MILAGRO Pond ⊛ Pump Started/Stopped Remotely -No Level reading

DATE	BEGIN LEVEL	END LEVEL	
5-22-95	10:30 2.9 MGal	2046 (5.6) 2.4 Mgal	
5/23/95 0615	(5.3) 2.3 Mgal	(5.1) @ 21:15, = 2.15	
5/24 0:645	(5.2) 2.2 Mgal At	9:00 am we shut off	
the center and south lines. (There has been no rain		in over 24 hrs)	
5/24 5	[illegible]	2.12 gal @ 3:00	HDR pumped overnight
5/25 7:30	(4.6) = [illegible] Mgal 1.9 Mgal		
North & center off (Run only South line			
5/25/95 1730 (4.4)	5:30PM ⊛	9PM ⊛ → 4.1 = 1.6 Mgal	
5/26/95	05:30 AM ⊛	1:30 PM ~~(3.0) = 0.7 Mgal~~	Vented gage
5/26/95	1:40PM 4.1 = 1.6 Mgal	9:15 PM 3.8 = 1.42 Mgal	
5/27/95	Heavy Rain last night	No discharge	
5/28/95	Ground still saturated	No discharge	
5/29/95	Heavy Rain all day	No discharge	
5/30/95	Ground saturated	No discharge	
5/30/95 13:20	Removed storm water bottles <100ml/bottle		
	no signs of flow in weir (grab, just rainwater in		
	bottles) Emptied bottles & replaced.		
6/1/95	9:50 am. 3.8 = 1.4 Mgal		
	South line only on.		
6/1/95 Shuting it all	off at 4:15 (3.4 psi)	= 1.33 x 10^6 gal	
6/3/95	0915	1630 center line off	
6/5/95	0700 1.2 Mgal	2130 Plus Wtr → 1 Mgal pond	
6/6/95	0600 @ 1000 Level = 0.6 Mgal	1700 = 0.45 Mgal, 2130 shutdown	≈100k gal
6/7/95	0530 @ 0745 Level 350k	18:00 .6 est = 0.15 Mgal	

Milagro Discharge

Affidavit of Publication

STATE OF NEW MEXICO)
) ss.
COUNTY OF LEA)

Joyce Clemens being first duly sworn on oath deposes and says that he is Adv. Director of THE LOVINGTON DAILY LEADER, a daily newspaper of general paid circulation published in the English language at Lovington, Lea County, New Mexico; that said newspaper has been so published in such county continuously and uninterruptedly for a period in excess of Twenty-six (26) consecutive weeks next prior to the first publication of the notice hereto attached as hereinafter shown; and that said newspaper is in all things duly qualified to publish legal notices within the meaning of Chapter 167 of the 1937 Session Laws of the State of New Mexico.

RECEIVED
MAY 31 1995
Oil Conservation Division

That the notice which is hereto attached, entitled Notice Of Publication

was published in a regular and entire issue of THE LOVINGTON DAILY LEADER and not in any supplement thereof, one consecutive time, the same day of the week, for one (1) day beginning with the issue of May 9, 19 95 and ending with the issue of May 9, 19 95.

And that the cost of publishing said notice is the sum of $ 75.60 which sum has been (Paid) (Assessed) as Court Costs

Joyce Clemens

Subscribed and sworn to before me this 22nd day of May, 19 95

Jean Jenner
Notary Public, Lea County, New Mexico

My Commission Expires Sept. 28, 19 98

NOTICE OF PUBLICATION
STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION

Notice is hereby given that pursuant to the New Mexico Water Quality Control Commission Regulations, the following discharge plan renewal applications have been submitted to the Director of the Oil Conservation Division, 2040 South Pacheco, Santa Fe, New Mexico 87505, Telephone (505)827-7131:

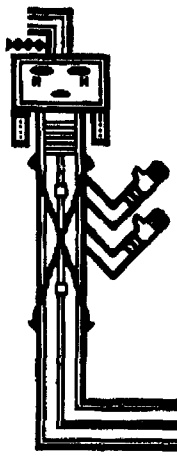
(GW-018)-Warren Petroleum Company, Ken Stinson, P.O. Box 67, Monument, New Mexico 88265, has submitted a discharge plan renewal application for their Bluitt Gas Processing Plant located in the NE/4, Section 15, Township 8 South, Range 36 East, NMPM, Lea County, New Mexico. Approximately 19,500 gallons per day of process waste water is disposed of in an OCD approved Class II injection well. The waste water has a total dissolved solids concentration of approximately 5200 mg/l. Ground water most likely to be affected in the event of an accidental discharge is at a depth of approximately 100 feet with a total dissolved solids concentration of approximately 1400 mg/l. The discharge plan addresses how spills, leaks, and other accidental discharge

(GW-026)-Warren Petroleum Company, Ken Stinson, P.O. Box 67, Monument, New Mexico 88265, has submitted a discharge plan renewal application for their Saunders Gas Processing Plant located Section 34, Township 14 South, Range 33 East, NMPM, Lea County, New Mexico. Approximately 18,900 gallons per day of process waste water is disposed of in an OCD approved Class II injection well. The waste water has a total dissolved solids concentration of approximately 3881 mg/l. Ground water most likely to be affected in the event of an accidental discharge is at a depth of approximately 100 feet with a total dissolved solids concentration of approximately 600 mg/l. The discharge plan addresses how spills, leaks, and other accidental discharges to the surface will be managed.

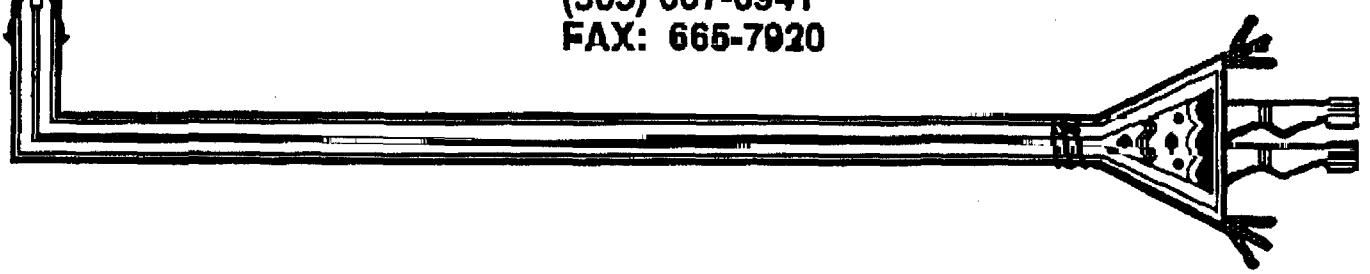
(GW-027)-Warren Petroleum Company, Ken Stinson, P.O. Box 67, Monument, New Mexico 88265, has submitted a discharge plan renewal application for their Vada Gas Processing Plant located Section 23, Township 10 South, Range 33 East, NMPM, Lea County, New Mexico. Approximately 1,380 gallons per day of process waste water is disposed of in an OCD approved Class II injection well. The waste water has a total dissolved solids concentration of approximately 14,890 mg/l. Ground water most likely to be affected in the event of an accidental discharge is at a depth of approximately 35 feet with a total dissolved solids concentration of approximately 1000 mg/l. The discharge plan addresses how spills, leaks, and other accidental discharges to the surface will be managed.

(GW-031) - U.S. Department of Energy, Fenton Hill Geothermal Facility, Larry Kirkman, Acting Area Manager, Albuquerque Operations, Los Alamos Area Office, Los Alamos, New Mexico 87544, has submitted a discharge plan renewal application for their Fenton Hill Geothermal Facility located in the NE/4, Section 13, Township 19 North, Range 2 East, NMPM, Sandoval county, New Mexico. Water from a geothermal loop is discharged to a double-lined service pond equipped with leak detection during periods of emergency venting or during periods when maintenance operations on the geothermal loop require a discharge of water from the loop. The discharge to the pond will be temporary as the water will be reinjected to the geothermal loop when normal operating conditions are attained. The water from the geothermal loop has a total dissolved solids concentration of approximately 3,200 mg/l. Ground water most likely to be affected in the event of an accidental discharge is at a depth of approximately 370 feet with a total dissolved solids concentration of approximately 240 mg/l. The discharge plan addresses how spills, leaks, and other accidental discharges to the surface will be managed.

Any interested person may obtain further information from



LOS ALAMOS NATIONAL LABORATORY
Nuclear and Particle Physics
GROUP P-25, MS H846
Los Alamos, NM 87545, USA
(505) 667-6941
FAX: 665-7920



Date: 5/26/95 **Time:** 2:55 AM/PM

From: Gus Simms **Fax Number:** (505) 665-7920

To: Mark Ashley

Organization: OCD

Fax Number: 827-8177

Confirmation Number:

Number of Pages (excluding cover): 1

Comments: Mark, here is the first week's logsheet for the Milagro land application. The gauge is not very accurate, I think this accounts for the variation in the remaining water level. If you have any questions please call me (667-9217)

Cy: CRM-4, MS-A150

Foreign Mail (check one): ☐ Correspondence ☐ GTDA (for Reports)

UNCLASSIFIED

MILAGRO Pond

⊛ Pump Started/Stopped Remotely – No Level reading

DATE	BEGIN LEVEL	END LEVEL	
~~5~~-22-95 ~~[illegible]~~	10:30 2.9 MGal	2046 (5.6) 2.4 Mgal	
5/23/95 0615	(5.3) 2.3 Mgal	(5.1) @ 21:15, = 2.15	
5/24 0:649	(5.2) 2.2 Mgal At	9:00 am we shut off	
the center and south lines.	(There has been no rain	in over 24 hrs.)	
5/24 5 ~~[illegible]~~	~~[illegible]~~ /	2.12 gal / ⊛ 3:00	HDR pumped overnight
5/25 7:30	(4.6) = ~~[illegible]~~ 1.9 Mgal	2	
North & center off (Run only South line			
5/25/95 1730 (4.4)	5:30 PM ⊛	9 PM ⊛ → 4.1 = 1.6 Mgal	
5/26/95	05:30 AM ⊛	1:30 PM ~~(2.0) = 0.7 Mgal~~	Vented gage
5/26/95	1:40 PM 4.1 = 1.6 Mgal		

c

Milagro Discharge

— 1 —

STATE OF NEW MEXICO COUNTY OF LOS ALAMOS

IN THE _____ COURT

AFFIDAVIT OF PUBLICATION

STATE OF NEW MEXICO)

) ss.

COUNTY OF LOS ALAMOS)

NOTICE OF PUBLICATION

STATE OF NEW MEXICO ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT OIL CONSERVATION DIVISION

Notice is hereby given that pursuant to the New Mexico Water Quality Control Commission Regulations, the following discharge plan renewal applications have been submitted to the Director of the Oil Conservation Division, 2040 South Pacheco, Santa Fe, New Mexico 87505, Telephone (505) 827-7131:

(GW-018) - Warren Petroleum Company, Ken Stinson, P.O. Box 67, Monument, New Mexico 88265, has submitted a discharge plan renewal application for their Bluitt Gas Processing Plant located in the NE/4, Section 15, Township 8 South, Range 36 East, NMPM, Lea County, New Mexico. Approximately 19,500 gallons per day of process waste water is disposed of in an OCD approved Class II injection well. The waste water has a total dissolved solids concentration of approximately 5200 mg/l. Ground water most likely to be affected in the event of an accidental discharge is at a depth of approximately 100 feet with a total dissolved solids concentration of approximately 1400 mg/l. The discharge plan addresses how spills, leaks, and other accidental discharge

(GW-026) - Warren Petroleum Company, Ken Stinson, P.O. Box 67, Monument, New Mexico 88265, has submitted a discharge plan renewal application for their Saunders Gas Processing Plant located Section 34, Township 14 South, Range

(GW-031) - U.S. Department of Energy, Fenton Hill Geothermal Facility, Larry Kirkman, Acting Area Manger, Albuquerque Operations, Los Alamos Area Office, Los Alamos, New Mexico 87544, has submitted a discharge plan renewal application for their Fenton Hill Geothermal Facility located in the NE/4, Section 13, Township 19 North, Range 2 East, NMPM, Sandoval County, New Mexico. Water from a geothermal loop is discharged to a double-lined service pond equipped with leak detection during periods of emergency venting or during periods when maintenance operations on the geothermal loop require a discharge of water from the loop. The discharge to the pond will be temporary as the water will be reinjected to the geothermal loop when normal operating conditions are attained. The water from the geothermal loop has a total dissolved solids concentration of approximately 3,200 mg/l. Ground water most likely to be affected in the event of an accidental discharge is at a depth of approximately 370 feet with a total dissolved solids concentration of approximately 240 mg/l. The discharge plan addresses how spills, leaks, and other accidental discharges to the surface will be managed.

Any interested person may obtain further information from the Oil Conservation Division and may submit written comments to the Director of the Oil Conservation Division at the address given above. The discharge plan applications may be viewed at the above address between 8:00 a.m. and 4:00 p.m., Monday thru Friday. Prior to ruling on any proposed discharge plan or its

OFFICIAL SEAL
MARGARET FULLMAN
NOTARY PUBLIC
STATE OF NEW MEXICO
My Commission Expires 1-13-96

THE LOS ALAMOS MONITOR
LOS ALAMOS, NEW MEXICO

Evelyn Vigil, being duly sworn, declares and says that she is the Editor of the Los Alamos Monitor, a newspaper published and having a general fully paid circulation and second-class postal privilege in the County of Los Alamos, State of New Mexico.

Affiant further states that this newspaper is duly qualified to publish legal notices or advertisements within the meaning of Section 14-11 N.M.S.A, 1978 Compilation and was so qualified at the time of all publications in reference hereto.

Affiant further states that the publication, a copy of which hereto affixed, was published in said paper, in the regular and entire issue of each number of the paper, during the period and time of publication and that the notice was published in the newspaper proper and not in a supplement, for one (1) consecutive weeks, the first publication being on the 9th day of May, 1995, and the subsequent consecutive publications on _____ and _____, 19___.

_____

Subscribed and sworn before me this 15th day of May, 1995.

Mary Margaret Fullman
Notary Public

My Commission Expires: November 13, 1996

an accidental discharge is at a depth of approximately 100 feet with a total dissolved solids concentration of approximately 1400 mg/l. The discharge plan addresses how spills, leaks, and other accidental discharge

(GW-026) - Warren Petroleum Company, Ken Stinson, P.O. Box 67, Monument, New Mexico 88265, has submitted a discharge plan renewal application for their Saunders Gas Processing Plant located Section 34, Township 14 South, Range 33 East, NMPM, Lea County, New Mexico. Approximately 18,9000 gallons per day of process waste water is disposed of in an OCD approved Class II injection well. The waste water has a total dissolved solids concentration of approximately 3881 mg/l. Ground water most likely to be affected in the event of an accidental discharge is at a depth of approximately 100 feet with a total dissolved solids concentration of approximately 600 mg/l. The discharge plan addresses how spills, leaks, and other accidental discharges to the surface will be managed.

(GW-027) - Warren Petroleum Company, Ken Stinson, P.O. Box 67, Monument, New Mexico 88265, has submitted a discharge plan renewal application for their Vada Gas Processing Plant located Section 23, Township 10 South, Range 33 East, NMPM, Lea County, New Mexico. Approximately 1,380 gallons per day of process waste water is disposed of in an OCD approved Class II injection well. The waste water has a total dissolved solids concentration of approximately 14,890 mg/l. Ground water most likely to be affected in the event of an accidental discharge is at a depth of approximately 35 feet with a total dissolved solids concentration of approximately 1000 mg/l. The discharge plan addresses how spills, leaks, and other accidental discharges to the surface will be managed.

370 feet with a total dissolved solids concentration of approximately 240 mg/l. The discharge plan addresses how spills, leaks, and other accidental discharges to the surface will be managed.

Any interested person may obtain further information from the Oil Conservation Division and may submit written comments to the Director of the Oil Conservation Division at the address given above. The discharge plan applications may be viewed at the above address between 8:00 a.m. and 4:00 p.m., Monday thru Friday. Prior to ruling on any proposed discharge plan or its modification, the Director of the Oil Conservation Division shall allow at least thirty (30) days after the date of publication of this notice during which comments may be submitted to him and public hearing may be requested by any interested person. Request for public hearing shall set forth the reasons why a hearing shall be held. A hearing will be held if the director determines that there is significant public interest.

If no hearing is held, the Director will approve or disapprove the plan based on the information available. If a public hearing is held, the Director will approve the plan based on the information in the plan and information presented at the hearing.

GIVEN under the Seal of New Mexico Oil Conservation Commission at Santa Fe, New Mexico, on this 2nd day of May, 1995.

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

/s/William J. Lemay, Director
WILLIAM J. LEMAY, Director

SEAL

Publication Date: May 9, 1995.

---

subsequent consecutive publications on

_____ and _____, 19____.

Subscribed and sworn before me this 15th day of May, 1995.

Mary Margaret Fullman
Notary Public

My Commission Expires: November 13, 1996

Los Alamos Monitor
256 D.P. Rd
Los Alamos, NM 87544
(505) 662-4185

Energy, Min.&Nat. Resources
Sally E. Martinez
2040 S. Pacheco
Santa Fe, NM 87505

505-827-7131

CLASSIFIED ADVERTISING INVOICE

START DATE: 05/09/95
END DATE: 05/09/95
NUMBER OF INSERTIONS: 1
NUMBER OF WORDS: 273
AD CHARGE: 104.24
REMARK:

CLASSIFICATION: 101 LEGALS

FIRST LINE OF AD TEXT: NOTICE OF PUBLICATIO

TOTAL DUE: $ 104.24

TO PLACE A CLASSIFIED AD OR IF YOU HAVE A PROBLEM WITH THIS INVOICE PLEASE CONTACT MARY MARGARET FULLMAN (505) 662-5933. OFFICE HOURS ARE FROM 8:00 TO 5:30.

STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION
2040 S. PACHECO
SANTA FE, NEW MEXICO 87505
(505) 827-7131

May 5, 1995

LOS ALAMOS MONITOR
256 DP Road
Los Alamos, New Mexico 87544

RE: _____

ATTN: ADVERTISING MANAGER

Dear Sir/Madam:

Please publish the attached notice one time immediately on receipt of this request. Please proofread carefully, as any error in a land description or in a key word or phrase can invalidate the entire notice.

Immediately upon completion of publication, please send the following to this office:

1. **Publisher's affidavit in duplicate.**
2. **Statement of cost (also in duplicate.)**
3. **CERTIFIED invoices for prompt payment.**

We should have these immediately after publication in order that the legal notice will be available for the hearing which it advertises, and also so that there will be no delay in your receiving payment.

Please publish the notice no later than May 12, 1995.

Sincerely,

Sally Martinez
Sally E. Martinez
Administrative Secretary

Attachment

Z 765 962 343

Receipt for Certified Mail
No Insurance Coverage Provided
Do not use for International Mail
(See Reverse)

Sent to	Los Alamos Monitor
Street and No.	
P.O., State and ZIP Code	
Postage	$
Certified Fee	
Special Delivery Fee	
Restricted Delivery Fee	
Return Receipt Showing to Whom & Date Delivered	
Return Receipt Showing to Whom, Date, and Addressee's Address	
TOTAL Postage & Fees	$
Postmark or Date	

PS Form **3800**, March 1993

NOTICE OF PUBLICATION

STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION

Notice is hereby given that pursuant to the New Mexico Water Quality Control Commission Regulations, the following discharge plan renewal applications have been submitted to the Director of the Oil Conservation Division, 2040 South Pacheco, Santa Fe, New Mexico 87505, Telephone (505) 827-7131:

(GW-018) - Warren Petroleum Company, Ken Stinson, P.O. Box 67, Monument, New Mexico 88265, has submitted a discharge plan renewal application for their Bluitt Gas Processing Plant located in the NE/4, Section 15, Township 8 South, Range 36 East, NMPM, Lea County, New Mexico. Approximately 19,500 gallons per day of process waste water is disposed of in an OCD approved Class II injection well. The waste water has a total dissolved solids concentration of approximately 5200 mg/l. Ground water most likely to be affected in the event of an accidental discharge is at a depth of approximately 100 feet with a total dissolved solids concentration of approximately 1400 mg/l. The discharge plan addresses how spills, leaks, and other accidental discharge

(GW-026) - Warren Petroleum Company, Ken Stinson, P.O. Box 67, Monument, New Mexico 88265, has submitted a discharge plan renewal application for their Saunders Gas Processing Plant located Section 34, Township 14 South, Range 33 East, NMPM, Lea County, New Mexico. Approximately 18,9000 gallons per day of process waste water is disposed of in an OCD approved Class II injection well. The waste water has a total dissolved solids concentration of approximately 3881 mg/l. Ground water most likely to be affected in the event of an accidental discharge is at a depth of approximately 100 feet with a total dissolved solids concentration of approximately 600 mg/l. The discharge plan addresses how spills, leaks, and other accidental discharges to the surface will be managed.

(GW-027) - Warren Petroleum Company, Ken Stinson, P.O. Box 67, Monument, New Mexico 88265, has submitted a discharge plan renewal application for their Vada Gas Processing Plant located Section 23, Township 10 South, Range 33 East, NMPM, Lea County, New Mexico. Approximately 1,380 gallons per day of process waste water is disposed of in an OCD approved Class II injection well. The waste water has a total dissolved solids concentration of approximately 14,890 mg/l. Ground water most likely to be affected in the event of an accidental discharge is at a depth of approximately 35 feet with a total dissolved solids concentration of approximately 1000 mg/l. The discharge plan addresses how spills, leaks, and other accidental

discharges to the surface will be managed.

(GW-031) - U.S. Department of Energy, Fenton Hill Geothermal Facility, Larry Kirkman, Acting Area Manger, Albuquerque Operations, Los Alamos Area Office, Los Alamos, New Mexico 87544, has submitted a discharge plan renewal application for their Fenton Hill Geothermal Facility located in the NE/4, Section 13, Township 19 North, Range 2 East, NMPM, Sandoval County, New Mexico. Water from a geothermal loop is discharged to a double-lined service pond equipped with leak detection during periods of emergency venting or during periods when maintenance operations on the geothermal loop require a discharge of water from the loop. The discharge to the pond will be temporary as the water will be reinjected to the geothermal loop when normal operating conditions are attained. The water from the geothermal loop has a total dissolved solids concentration of approximately 3,200 mg/l. Ground water most likely to be affected in the event of an accidental discharge is at a depth of approximately 370 feet with a total dissolved solids concentration of approximately 240 mg/l. The discharge plan addresses how spills, leaks, and other accidental discharges to the surface will be managed.

Any interested person may obtain further information from the Oil Conservation Division and may submit written comments to the Director of the Oil Conservation Division at the address given above. The discharge plan applications may be viewed at the above address between 8:00 a.m. and 4:00 p.m., Monday thru Friday. Prior to ruling on any proposed discharge plan or its modification, the Director of the Oil Conservation Division shall allow at least thirty (30) days after the date of publication of this notice during which comments may be submitted to him and public hearing may be requested by any interested person. Request for public hearing shall set forth the reasons why a hearing shall be held. A hearing will be held if the director determines that there is significant public interest.

If no hearing is held, the Director will approve or disapprove the plan based on the information available. If a public hearing is held, the Director will approve the plan based on the information in the plan and information presented at the hearing.

GIVEN under the Seal of New Mexico Oil Conservation Commission at Santa Fe, New Mexico, on this 2nd day of May, 1995.

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

William J. LeMay

SEAL

WILLIAM J. LEMAY, Director

STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION
2040 S. PACHECO
SANTA FE, NEW MEXICO 87505
(505) 827-7131

April 10, 1995

Certified Mail
Return Receipt No. Z-765-962-832

Mr. Steven Rae
Los Alamos National Laboratory
Los Alamos, NM 87545

RE: Notice of Intent to Discharge
Milagro Project at Fenton Hill
Los Alamos, NM

Dear Mr. Rae:

The New Mexico Oil Conservation Division (OCD) has completed a review of the Los Alamos National Laboratory Notice of Intent to Discharge (NOI), Milagro Project at Fenton Hill dated March 20, 1995. Based on the information provided, your request is approved with the following conditions: 4-19-95

1. The area of application will be bermed to prevent runoff from a 100 year flood. they will address this one.

2. The sprinkler irrigation system will be designed in such a way as to prevent pooling, ponding, and/or wind blown drift.

3. In addition to the water analysis provided, the sludge in the bottom of the storage pond will also be analyzed for the same constituents with the results submitted to the OCD. Disposal of the sludge must be approved by the OCD prior to disposal.

4. Soil background samples will be taken from the surface down gradient from the area of application and 3 feet below the area of application before the discharge is to commence and 90 days after the discharge is completed. The down gradient location will also be sampled annually for the next 5 years. The analysis will cover the same constituents analyzed for the water. Results will be submitted to the OCD upon receipt of the results. 4-19-95 can be less than 3' if required.

5. In the event of stormwater runoff, samples will be collected with the results being submitted to the OCD.

6. The OCD will be notified at least 72 hours in advance of all activities such that the OCD may have the opportunity to witness and/or split samples.

Please be advised that OCD approval does not relieve Los Alamos National Laboratory of liability should remaining contaminants pose a future threat to surface water, ground water, human health or the environment. In addition, OCD approval does not relieve Los Alamos National Laboratory of liability for compliance with other federal, state or local laws and/or regulations.

If you have any questions regarding this matter, please feel free to contact Mark Ashley at (505) 827-7155.

Sincerely,

William J. LeMay
Director

WJL/mwa

xc: Jim Piatt, Chief, Surface Water Quality Bureau, NMED

Z 765 962 832

Receipt for Certified Mail
No Insurance Coverage Provided
Do not use for International Mail
(See Reverse)

Sent to	
Street and No.	
P.O., State and ZIP Code	
Postage	$
Certified Fee	
Special Delivery Fee	
Restricted Delivery Fee	
Return Receipt Showing to Whom & Date Delivered	
Return Receipt Showing to Whom, Date, and Addressee's Address	
TOTAL Postage & Fees	$
Postmark or Date	

PS Form 3800, March 1993

Los Alamos
NATIONAL LABORATORY

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

Date: March 20, 1995
In Reply Refer To: ESH-18/WQ&H:95-0144
Mail Stop: K497
Telephone: (505) 665-1859

RECEIVED
MAR 21 1995
Environmental Bureau
Oil Conservation Division

GLEN SAUMS (NMED) 827-2827 827-0160 (FAX)
PETER MONAHAN (NMED) 827-2794

Roger Anderson
Oil Conservation Division
2040 South Pacheco Street
Santa Fe, New Mexico 87505

John Piatt, Chief
Surface Water Quality Bureau
New Mexico Environment Department
1190 St. Francis Drive
Santa Fe, New Mexico 87502

Dear Messrs. Anderson and Piatt:

SUBJECT: LOS ALAMOS NATIONAL LABORATORY, NOTICE OF INTENT TO DISCHARGE, MILAGRO PROJECT AT FENTON HILL

Enclosed is a Notice of Intent to Discharge (NOI) for the Milagro Project at Fenton Hill. This NOI is being submitted to both the New Mexico Environment Department (NMED) and the Oil Conservation Division pursuant to Section 1-201 of the New Mexico Water Quality Control Commission (WQCC) Regulations. The NOI covers the discharge of 3.5 million gallons of water from a storage pond located at the Fenton Hill Geothermal Site. This water will be applied to the surface of the ground through the use of a temporary sprinkler irrigation system. This will be a one time discharge. Please see the attached NOI, site map, and analytical results for more details.

Please call Alex Puglisi at 667-4882 or Bob Beers at 667-7969 if you need any additional information regarding the attached NOI and the Milagro Project.

Thank you for your attention in this matter.

Sincerely,

Steven Rae
Acting Group Leader
Water Quality and Hydrology Group

AP:SR/em

Attach: a/s

Cy: A. Puglisi, ESH-18, w/att., MS K497
B. Beers, ESH-18, w/o att., MS K497
N. Williams, ESH-18, w/o att., MS K497
M. Saladen, ESH-18, w/o att., MS K497
H. Decker, NMED, w/att., MS J993
G. Sinnis, P-23, w/att., MS H846
J. Albright, EES-4, w/att., MS D443
M. Murray, P-11, w/att., MS H846
M. Leavitt, NMED, w/att., Santa Fe, New Mexico
K. Zamora, DOE/LAAO, w/o att., MS A316
WQ&H File, w/att., MS K497
CRM-4, w/o att., MS A150

NOTICE OF INTENT TO DISCHARGE

1. Name and address of the facility making the discharge.

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

2. Location of the discharge (in Township, Range and Section, if available).

Fenton Hill Geothermal Site
Sandoval County, New Mexico
NE 1/4 Sec. 13, T19N, R2E (New Mexico Principal Meridian)
1,776,000 N, 374,000 E (New Mexico State Plane grid)

3. Project description

The Milagro collaboration will include installation of a gamma-ray telescope at the 5 million gallon clean water storage reservoir at the Fenton Hill Geothermal Site. Before construction can begin the reservoir must be drained. The Laboratory proposes to drain the pond by applying the water to the surrounding forest. A USGS map with an outline of the area (roughly 40 acres) set aside by the Forest Service for the Milagro project is included. Following is the method we propose to apply this water to the surrounding forest. The Laboratory has chosen this approach to maximize this amount of evaporation, and minimize the effect on the environment. The Forest Service is aware of these plans and has approved it. In addition, the Forest Service has indicated that the Laboratory could use additional area to spray the water if necessary. The reservoir presently contains 4 million gallons of water. The Hot/Dry Rock Program at Fenton Hill will take .75 million gallons of this water to meet its need. Thus, the Milagro Project will apply the remaining 3.25 million gallons of water to the surrounding forest.

4. The means of discharge (To Lagoon, Flowing Stream, Water Course, Arroyo, Septic Tank, Other).

The discharge will be applied to the surface of approximately 40 acres of land within the boundaries of the Santa Fe National Forest. The method of land application is described below.

1. 4x2" PVC pipes acting as headers to deliver water from reservoir to spray system.
2. Along each header, at 50' intervals, attach standard backyard garden hoses (25 hoses per header).
3. At the end of each garden hose attach 1 "rain-bird or fogger" type spray nozzle. The nozzles will be set to maximum fog (to maximize the evaporation rate) and spray at 2 gallons per minute (gpm).
4. To maximize evaporation the nozzles will be placed on posts 6' off of the ground.
5. The total rate of application will be 200 gpm.
6. The total area of application will be 40 acres.
7. To maximize evaporation and aid monitoring the spraying operation will only take place during the day. No spraying will occur at night and application will be postponed during storm events to prevent runoff.
8. The application site will be monitored throughout periods of application. If pooling, ponding, or runoff does occur, the offending sprayers will be turned off.
9. Application sites and application rates will be chosen so as to prevent any runoff into adjacent watercourses.

The 3.25 million gallons of water is roughly equal to 10 acre-feet of water. Since water is being applied to 40 acres of land, the Laboratory will be applying approximately 3.0" of water to the land over a 30 day period (minus any evaporation). If we assume that 1/3 of the water evaporates, this application process is equivalent to 2" of rain fall over a 1 month time period. This application rate should be sufficiently low enough to prevent pooling or ponding.

5. **The estimated concentration of contaminants in the discharge.**

See attached Analytical Results for Metals, Volatile Organic Compounds, Semi-Volatile Organic Compounds, Anions/Catrons, and Nutrients.

6. **The type of operation from which the discharge is derived.**

Geothermal Research and Development. Water from recovery well at the site mixed with fresh water from production well.

7. **The estimated flow to be discharged per day.**

Approximately 100,000 gallons per day. Total volume of water discharged is expected to be approximately 3.25 million gallons.

8. **The estimated depth to ground water (if available).**

The depth to the top of the aquifer at the site is about 370 ft (113m). Water level measurements in observation wells in the immediate area of the site indicate that the water table is near flat.

Signed Steven Rae **Date** 3-20-95

Steven Rae, Acting Group Leader (ESH-18)

FENTON HILL SAMPLES
2/8/95

1.) Taken at pump house on North side of pond.

FENTON 1	total metals: TAL + Lithium
FENTON 2	dissolved metals (filtered)
FENTON 3	SVOA
FENTON 4	boron
FENTON 5	868 - anions/cations
FENTON 6	869 - nutrients
FENTON 7	VOA

2.) Taken at sump on West side of pond.

FENTON 2A	SVOA
FENTON 2B	boron
FENTON 2C	total metals: TAL + Lithium
FENTON 2D	dissolved metals (filtered)
FENTON 2E	868 - anions/cations
FENTON 2F	869 - nutrients

Amended Arsenic
Fenton Hill
Milagro

Los Alamos

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

memorandum

To: Alex Puglisi, CST-3

Date: March 17, 1995

From: Toney Begay, CST-9

Mail Stop/Phone: E518/7-6011

Thru: Steve Doom, Team Leader, CST-9

Subject: Arsenic analysis summary - RN21289

Due to inconsistencies of the previous arsenic data for request number, 21289, these samples were re-analyzed. The results obtained from the re-analysis were more consistent. Attached is the final report (number 32962) for these arsenic values.

Per our telephone conversation yesterday, the other inorganic results were fine and therefore no re-analysis was necessary.

This closes this request. I am sorry for this delay and the inconvenience it caused. Please feel free to call me again at any time.

Regards,

Toney Begay

Toney Begay, CST-9

REPORT NUMBER: 32962

********** CST ANALYTICAL REPORT **********

Prepared by: TONEY on 17-Mar-1995

REQUEST NUMBER: 21289 MATRIX: W ANALYST: AAS PROGRAM CODE: E250

OWNER: AP GROUP: MAIL-STOP: PHONE:

NOTEBOOK: PAGE:

CUSTOMER SAMPLES:

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	ANALYTICAL TECHNIQUE	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT
FENTON.1	95.03089	AS	ETVAA	4.4	0.9	MG/L	3/17/95	REANALYSIS
FENTON.2C	95.03090	AS	ETVAA	4.2	0.8	MG/L	3/17/95	REANALYSIS
FENTON.2	95.03091	AS	ETVAA	4.	0.8	MG/L	3/17/95	REANALYSIS
FENTON.2D	95.03092	AS	ETVAA	4.	0.8	MG/L	3/17/95	REANALYSIS

****

Arsenic, Mercury, Selenium Analyses

REPORT NUMBER: 32399

********** CST ANALYTICAL REPORT **********

Prepared by: MAB on 28-Feb-1995

REQUEST NUMBER: 21289 MATRIX: W ANALYST: AAS PROGRAM CODE: E250

OWNER: AP GROUP: MAIL-STOP: PHONE:

NOTEBOOK: PAGE:

CUSTOMER SAMPLES:

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	ANALYTICAL TECHNIQUE	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT
~~FENTON.1~~	~~95.03089~~	~~AS~~	~~ETVAA~~	~~3200.~~	~~640.~~	~~UG/L~~	~~2/23/95~~	see amended results
FENTON.1	95.03089	HG	CVAA	< 0.2		UG/L	2/22/95	
FENTON.1	95.03089	SE	ETVAA	< 1.		UG/L	2/14/95	
~~FENTON.2C~~	~~95.03090~~	~~AS~~	~~ETVAA~~	~~3500.~~	~~700.~~	~~UG/L~~	~~2/23/95~~	See amended results
FENTON.2C	95.03090	HG	CVAA	< 0.2		UG/L	2/22/95	
FENTON.2C	95.03090	SE	ETVAA	< 1.		UG/L	2/14/95	
~~FENTON.2~~	~~95.03091~~	~~AS~~	~~ETVAA~~	~~3200.~~	~~640.~~	~~UG/L~~	~~2/23/95~~	See amended results
FENTON.2	95.03091	HG	CVAA	< 0.2		UG/L	2/22/95	
FENTON.2	95.03091	SE	ETVAA	< 1.		UG/L	2/14/95	
~~FENTON.2D~~	~~95.03092~~	~~AS~~	~~ETVAA~~	~~4500.~~	~~900.~~	~~UG/L~~	~~2/28/95~~	see amended results
FENTON.2D	95.03092	HG	CVAA	< 0.2		UG/L	2/22/95	
FENTON.2D	95.03092	SE	ETVAA	< 1.		UG/L	2/14/95	

CUSTOMER SAMPLE DUPLICATES:

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	ANALYTICAL TECHNIQUE	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT
FENTON.1	95.03089	AS	ETVAA	3200.	640.	UG/L	2/23/95	
FENTON.1	95.03089	HG	CVAA	0.2	0.2	UG/L	2/22/95	

MATRIX SPIKES:

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	ANALYTICAL TECHNIQUE	AMOUNT SPIKED	AMOUNT RECOVERED	UNITS	COMPLETION DATE	COMMENT
FENTON.1	95.03089	HG	CVAA	2.	1.7	UG/L	2/22/95	

****

Uranium, Lithium
Fenton Hill
Milagro

REPORT NUMBER: 32359

********** CST ANALYTICAL REPORT **********

Prepared by: MKOBY on 27-Feb-1995

REQUEST NUMBER: 21289 MATRIX: W ANALYST: IMS PROGRAM CODE: E250

OWNER: AP GROUP: MAIL-STOP: PHONE:

NOTEBOOK: PAGE:

CUSTOMER SAMPLES:

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	ANALYTICAL TECHNIQUE	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT
FENTON.1	95.03089	LI	ICPMS	19.5	3.6	MG/L	2/27/95	
FENTON.1	95.03089	U	ICPMS	< 2.		UG/L	2/27/95	
FENTON.2C	95.03090	LI	ICPMS	19.6	2.6	MG/L	2/27/95	
FENTON.2C	95.03090	U	ICPMS	< 2.		UG/L	2/27/95	
FENTON.2	95.03091	U	ICPMS	< 2.		UG/L	2/27/95	
FENTON.2D	95.03092	U	ICPMS	< 2.		UG/L	2/27/95	

CUSTOMER SAMPLE DUPLICATES:

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	ANALYTICAL TECHNIQUE	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT
FENTON.5	95.03102	LI	ICPMS	25.6	4.4	MG/L	2/27/95	
FENTON.5	95.03102	LI	ICPMS	23.3	4.4	MG/L	2/27/95	
FENTON.5	95.03102	U	ICPMS	< 2.		UG/L	2/27/95	
FENTON.5	95.03102	U	ICPMS	< 2.		UG/L	2/27/95	

MATRIX SPIKES:

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	ANALYTICAL TECHNIQUE	AMOUNT SPIKED	AMOUNT RECOVERED	UNITS	COMPLETION DATE	COMMENT
FENTON.5	95.03102	U	ICPMS	11.	12.	UG/L	2/27/95	

****

Anions/Cations
Nutrients
Fenton Hill

REPORT NUMBER: 32346

********** CST ANALYTICAL REPORT **********

Prepared by: KATHY STRAW on 27-Feb-1995

REQUEST NUMBER: 21289 MATRIX: W ANALYST: WET PROGRAM CODE: E250

OWNER: AP GROUP: MAIL-STOP: PHONE:

NOTEBOOK: A001307 PAGE: 128

CUSTOMER SAMPLES:

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	ANALYTICAL TECHNIQUE	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT
FENTON.5	95.03102	CL	IC	1.3	0.1	G/L	2/15/95	
FENTON.5	95.03102	COD	COLOR	55.	11.	MG/L	2/24/95	
FENTON.5	95.03102	COND	CB	4500.	225.	UMHOS/CM	2/23/95	
FENTON.5	95.03102	F	ISE	7.51	0.75	MG/L	2/27/95	
FENTON.5	95.03102	PALK	TITR	45.	5.	MG/L	2/27/95	
FENTON.5	95.03102	PH	GE	8.08	0.1	UNITS	2/23/95	
FENTON.5	95.03102	SO4	IC	239.	24.	MG/L	2/15/95	
FENTON.5	95.03102	TALK	TITR	472.	47.	MG/L	2/27/95	
FENTON.5	95.03102	TDS	GRAV	3.3	0.3	G/L	2/23/95	
FENTON.5	95.03102	TSS	GRAV	15.	1.	MG/L	2/23/95	
FENTON.2E	95.03104	CL	IC	1.3	0.1	G/L	2/15/95	
FENTON.2E	95.03104	COD	COLOR	39.	10.	MG/L	2/24/95	
FENTON.2E	95.03104	COND	CB	4480.	224.	UMHOS/CM	2/23/95	
FENTON.2E	95.03104	F	ISE	7.54	0.75	MG/L	2/27/95	
FENTON.2E	95.03104	PALK	TITR	18.	5.	MG/L	2/27/95	
FENTON.2E	95.03104	PH	GE	8.11	0.1	UNITS	2/23/95	
FENTON.2E	95.03104	SO4	IC	238.	24.	MG/L	2/15/95	
FENTON.2E	95.03104	TALK	TITR	466.	47.	MG/L	2/27/95	
FENTON.2E	95.03104	TDS	GRAV	3.2	0.3	G/L	2/23/95	
FENTON.2E	95.03104	TSS	GRAV	< 1.		MG/L	2/23/95	
FENTON.6	95.03105	NH3-N	FIA	< 0.01		MG/L	2/22/95	
FENTON.6	95.03105	NO2-N	FIA	< 0.02		MG/L	2/23/95	
FENTON.6	95.03105	NO3-N	FIA	0.06	0.04	MG/L	2/23/95	
FENTON.6	95.03105	PO4-P	ACOLR	1.4	0.3	MG/L	2/23/95	
FENTON.6	95.03105	TKN	ACOLR	0.36	0.04	MG/L	2/23/95	
FENTON.2F	95.03106	NH3-N	FIA	< 0.01		MG/L	2/22/95	
FENTON.2F	95.03106	NO2-N	FIA	< 0.02		MG/L	2/23/95	
FENTON.2F	95.03106	NO3-N	FIA	0.1	0.04	MG/L	2/23/95	
FENTON.2F	95.03106	PO4-P	ACOLR	1.3	0.3	MG/L	2/23/95	
FENTON.2F	95.03106	TKN	ACOLR	0.28	0.03	MG/L	2/23/95	

CUSTOMER SAMPLE DUPLICATES:

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	ANALYTICAL TECHNIQUE	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT

FENTON.5	95.03102 F	ISE	7.31	0.73	MG/L	2/27/95
FENTON.2E	95.03104 F	ISE	6.58	0.66	MG/L	2/27/95

****

Metals
Fenton Hill
Milagro Project

REPORT NUMBER: 32457

********** CST ANALYTICAL REPORT **********

Prepared by: MBG on 1-Mar-1995

REQUEST NUMBER: 21289 MATRIX: W ANALYST: OES PROGRAM CODE: E250

OWNER: AP GROUP: MAIL-STOP: PHONE:

NOTEBOOK: Y04156 PAGE: 280

CUSTOMER SAMPLES:

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	ANALYTICAL TECHNIQUE	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT
FENTON.1	95.03089	AG	ICPES	< 0.012		MG/L	2/13/95	
FENTON.1	95.03089	AL	ICPES	< 0.1		MG/L	2/13/95	
FENTON.1	95.03089	BA	ICPES	0.18	0.004	MG/L	2/13/95	
FENTON.1	95.03089	CD	ICPES	< 0.003		MG/L	2/13/95	
FENTON.1	95.03089	CO	ICPES	< 0.004		MG/L	2/13/95	
FENTON.1	95.03089	CR	ICPES	< 0.004		MG/L	2/13/95	
FENTON.1	95.03089	CU	ICPES	1.8	0.2	MG/L	2/13/95	? DISSOLVED
FENTON.1	95.03089	FE	ICPES	1.6	0.2	MG/L	2/13/95	
FENTON.1	95.03089	MN	ICPES	0.069	0.007	MG/L	2/13/95	
FENTON.1	95.03089	MO	ICPES	0.02	0.01	MG/L	2/13/95	
FENTON.1	95.03089	NI	ICPES	< 0.01		MG/L	2/13/95	
FENTON.1	95.03089	PB	ICPES	0.17	0.13	MG/L	2/13/95	
FENTON.1	95.03089	V	ICPES	0.007	0.006	MG/L	2/13/95	
FENTON.1	95.03089	ZN	ICPES	0.26	0.03	MG/L	2/13/95	
FENTON.2C	95.03090	AG	ICPES	0.027	0.012	MG/L	2/13/95	
FENTON.2C	95.03090	AL	ICPES	< 0.1		MG/L	2/14/95	
FENTON.2C	95.03090	BA	ICPES	0.17	0.02	MG/L	2/13/95	
FENTON.2C	95.03090	CD	ICPES	< 0.003		MG/L	2/13/95	
FENTON.2C	95.03090	CO	ICPES	< 0.004		MG/L	2/13/95	
FENTON.2C	95.03090	CR	ICPES	< 0.004		MG/L	2/13/95	
FENTON.2C	95.03090	CU	ICPES	< 0.009		MG/L	2/13/95	
FENTON.2C	95.03090	FE	ICPES	1.	0.1	MG/L	2/13/95	
FENTON.2C	95.03090	MN	ICPES	0.065	0.007	MG/L	2/13/95	
FENTON.2C	95.03090	MO	ICPES	0.026	0.015	MG/L	2/13/95	
FENTON.2C	95.03090	NI	ICPES	< 0.01		MG/L	2/13/95	
FENTON.2C	95.03090	PB	ICPES	< 0.03		MG/L	2/13/95	
FENTON.2C	95.03090	V	ICPES	< 0.008		MG/L	2/13/95	
FENTON.2C	95.03090	ZN	ICPES	0.15	0.02	MG/L	2/13/95	
FENTON.2	95.03091	AG	ICPES	0.043	0.012	MG/L	2/14/95	
FENTON.2	95.03091	AL	ICPES	< 0.1		MG/L	2/14/95	
FENTON.2	95.03091	BA	ICPES	0.16	0.02	MG/L	2/14/95	
FENTON.2	95.03091	CD	ICPES	< 0.003		MG/L	2/14/95	
FENTON.2	95.03091	CO	ICPES	< 0.004		MG/L	2/14/95	
FENTON.2	95.03091	CR	ICPES	< 0.004		MG/L	2/14/95	
FENTON.2	95.03091	CU	ICPES	0.12	0.03	MG/L	2/14/95	
FENTON.2	95.03091	FE	ICPES	1.	0.1	MG/L	2/14/95	
FENTON.2	95.03091	MN	ICPES	0.059	0.006	MG/L	2/14/95	

FENTON.2	95.03091	MO	ICPES	0.025	0.015	MG/L	2/14/95
FENTON.2	95.03091	NI	ICPES	< 0.01		MG/L	2/14/95
FENTON.2	95.03091	PB	ICPES	< 0.03		MG/L	2/14/95
FENTON.2	95.03091	V	ICPES	< 0.01		MG/L	2/14/95
FENTON.2	95.03091	ZN	ICPES	< 0.02		MG/L	2/14/95
FENTON.2D	95.03092	AG	ICPES	0.041	0.012	MG/L	2/14/95
FENTON.2D	95.03092	AL	ICPES	< 0.1		MG/L	2/14/95
FENTON.2D	95.03092	BA	ICPES	0.16	0.02	MG/L	2/14/95
FENTON.2D	95.03092	CD	ICPES	< 0.003		MG/L	2/14/95
FENTON.2D	95.03092	CO	ICPES	< 0.004		MG/L	2/14/95
FENTON.2D	95.03092	CR	ICPES	< 0.004		MG/L	2/14/95
FENTON.2D	95.03092	CU	ICPES	< 0.017		MG/L	2/14/95
FENTON.2D	95.03092	FE	ICPES	0.99	0.1	MG/L	2/14/95
FENTON.2D	95.03092	MN	ICPES	0.064	0.006	MG/L	2/14/95
FENTON.2D	95.03092	MO	ICPES	0.024	0.015	MG/L	2/14/95
FENTON.2D	95.03092	NI	ICPES	< 0.01		MG/L	2/14/95
FENTON.2D	95.03092	PB	ICPES	< 0.03		MG/L	2/14/95
FENTON.2D	95.03092	V	ICPES	< 0.01		MG/L	2/14/95
FENTON.2D	95.03092	ZN	ICPES	0.045	0.02	MG/L	2/14/95
FENTON.4	95.03093	B	ICPES	36.	6.	MG/L	2/14/95
FENTON.2B	95.03099	B	ICPES	38.	6.	MG/L	2/14/95
FENTON.5	95.03102	CA	ICPES	32.	3.	MG/L	2/14/95
FENTON.5	95.03102	HARD	CALC	96.	10.	MG/L	2/14/95
FENTON.5	95.03102	K	ICPES	97.	15.	MG/L	2/14/95
FENTON.5	95.03102	MG	ICPES	4.2	0.4	MG/L	2/14/95
FENTON.5	95.03102	NA	ICPES	1000.	100.	MG/L	2/14/95
FENTON.2E	95.03104	CA	ICPES	31.	5.	MG/L	2/14/95
FENTON.2E	95.03104	HARD	CALC	93.	10.	MG/L	2/14/95
FENTON.2E	95.03104	K	ICPES	87.	13.	MG/L	2/14/95
FENTON.2E	95.03104	MG	ICPES	4.	0.5	MG/L	2/14/95
FENTON.2E	95.03104	NA	ICPES	950.	95.	MG/L	2/14/95

CUSTOMER SAMPLE DUPLICATES:

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	ANALYTICAL TECHNIQUE	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT
FENTON.5	95.03102	CA	CALC	32.	3.	MG/L	2/14/95	
FENTON.5	95.03102	HARD	CALC	96.	10.	MG/L	2/14/95	
FENTON.5	95.03102	K	CALC	95.	15.	MG/L	2/14/95	
FENTON.5	95.03102	MG	CALC	4.2	0.4	MG/L	2/14/95	
FENTON.5	95.03102	NA	CALC	1000.	100.	MG/L	2/14/95	

****

Fenton Hill (Milagro Project) 2/21/95 Volatiles

CST-12 VOLATILE ORGANIC ANALYSIS SUMMARY OF ANALYTICAL RESULTS

TO: Alex A. Puglisi **DATE:** 14-Feb-95
THRU: Anthony Lombardo, CST-12 Organic Analysis Team Leader 2/15/95
FROM: Michael Guttman, CST-12 Organic Analysis Section 2/14/95

MATRIX: WATER **REQUEST NUMBER:** 21286

Results Summary
Attached is a tabulation of samples submitted for volatiles analysis and their analytical results (Table 1). The samples were collected on 8-Feb-95 and were analyzed on 10-Feb-95.

Method Summary
Samples were analyzed using EPA Method 8260. In summary, a measured volume of sample, usually 5 mL, is analyzed using the purge and trap method combined with capillary column GC/MS. A Delta Perspective PTA-30 Autosampler and a Tekmar 3000 Purge and Trap Concentrator are interfaced to a Hewlett-Packard 5890 Gas Chromatograph / 5971 Mass Selective Detector to perform the analyses. The analytical column used is a J&W Scientific DB624, 75 m by 0.53 mm ID, 3 micron film or equivalent.

Anomalies And Analysis Notes
Below is a summary of QA/QC criteria as outlined in EPA SW-846 and LANL SOPs and a summary of any anomalies which occured during the analyses.

Calibration QC were within criteria for all analyses.
Surrogate recoveries were within criteria for all analyses.
Internal standard responses were within criteria for all analyses.

Matrix spike and matrix spike duplicate were analyzed as part of the analytical batch which included the samples from this work request. All spike recoveries and relative percent differences were within criteria. A copy of the MS/MSD recovery form is included with this report.

Holding times were met for all sample analyses.

If you have any questions regarding this data, please call Anthony Lombardo at 667-5889.

2/15/95

CST-12 VOLATILE ORGANIC ANALYSIS
SUMMARY OF ANALYTICAL RESULTS

Table 1. Summary of results of sample analyses for volatiles.

REQUEST NUMBER: 21286

SAMPLE ID	TARGET COMPOUNDS FOUND	AMOUNT (ug/L)	LOQ (ug/L)	TICs
B95.03081	None			N
S95.03080	Acetone	55	20	Y
	2-Butanone	20	20	
	Bromoform	6.8	5	

Sample IDs beginning with the letter S are samples; those beginning with the letter B are blanks.

LOQ: Limit of quantitation. LOQs normally range between 5 and 20ug/L depending on the compound, unless otherwise noted.

TICs: Tentatively identified compounds.

NA: Not applicable.

MB
2/14/95

3A

WATER VOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

Lab Name: LANL CST-12 Contract: _____

Project No.: _____ Site: _____ Location: _____ Group: _____

Matrix Spike - Sample No.: S9501987

m/z
2/14/95

COMPOUND	SPIKE ADDED (ug/L)	SAMPLE CONCENTRATION (ug/L)	MS CONCENTRATION (ug/L)	MS % REC #	QC. LIMITS REC.
1,1-Dichloroethene	50	0	49	98	(61-145)
Benzene	50	0	50	100	(76-127)
Trichloroethene	50	0	48	96	(71-120)
Toluene	50	0	49	98	(76-125)
Chlorobenzene	50	0	48	96	(75-130)

COMPOUND	SPIKE ADDED (ug/L)	MSD CONCENTRATION (ug/L)	MS % REC #	% RPD #	QC LIMITS RPD	QC LIMITS REC.
1,1-Dichloroethene	50	49	98	0	14	(61-145)
Benzene	50	52	104	4	11	(76-127)
Trichloroethene	50	49	98	2	14	(71-120)
Toluene	50	50	100	2	13	(76-125)
Chlorobenzene	50	51	102	6	13	(75-130)

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

RPD: 0 out of 5 outside limits
Spike Recovery: 0 out of 10 outside limits

Comments: _____

2/15/95

********** CST ANALYTICAL REPORT **********

EPA VOLATILES Prepared by: LCO on 15-Feb-1995

REQUEST NUMBER: 21286 MATRIX: W ANALYST: MICHAEL GUTTMAN PROGRAM CODE: E250 NOTEBOOK: PAGE:

OWNER: AP GROUP: MAIL-STOP: PHONE: TECHNIQUE: GCMS ANALYTICAL PROCEDURE: EPA SW-846 3RD

Customer Sample Results, Sample # 95.03080 Date Collected: 2/08/95 Date Received: 2/09/95 Date Extracted: 2/10/95 Date Analyzed: 2/10/95

CUSTOMER NUMBER	SAMPLE NUMBER	ANALYSIS	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT	COMPOUND NAME
FENTON.7	95.03080	67641	55.	16.5	UG/L	2/15/95	N	Acetone
FENTON.7	95.03080	71432	< 5.		UG/L	2/15/95	N	Benzene
FENTON.7	95.03080	108861	< 5.		UG/L	2/15/95	N	Bromobenzene
FENTON.7	95.03080	74975	< 5.		UG/L	2/15/95	N	Bromochloromethane
FENTON.7	95.03080	75274	< 5.		UG/L	2/15/95	N	Bromodichloromethane
FENTON.7	95.03080	75252	6.8	2.04	UG/L	2/15/95	N	Bromoform
FENTON.7	95.03080	74839	< 10.		UG/L	2/15/95	N	Bromomethane
FENTON.7	95.03080	78933	20.	6.	UG/L	2/15/95	N	2-Butanone
FENTON.7	95.03080	104518	< 5.		UG/L	2/15/95	N	n-Butylbenzene
FENTON.7	95.03080	135988	< 5.		UG/L	2/15/95	N	sec-Butylbenzene
FENTON.7	95.03080	98066	< 5.		UG/L	2/15/95	N	tert-Butylbenzene
FENTON.7	95.03080	75150	< 5.		UG/L	2/15/95	N	Carbon disulfide
FENTON.7	95.03080	56235	< 5.		UG/L	2/15/95	N	Carbon tetrachloride
FENTON.7	95.03080	108907	< 5.		UG/L	2/15/95	N	Chlorobenzene
FENTON.7	95.03080	124481	< 5.		UG/L	2/15/95	N	Chlorodibromomethane
FENTON.7	95.03080	75003	< 10.		UG/L	2/15/95	N	Chloroethane
FENTON.7	95.03080	67663	< 5.		UG/L	2/15/95	N	Chloroform
FENTON.7	95.03080	74873	< 10.		UG/L	2/15/95	N	Chloromethane
FENTON.7	95.03080	95498	< 5.		UG/L	2/15/95	N	o-Chlorotoluene
FENTON.7	95.03080	106434	< 5.		UG/L	2/15/95	N	p-Chlorotoluene
FENTON.7	95.03080	96128	< 10.		UG/L	2/15/95	N	1,2-Dibromo-3-chloropropane
FENTON.7	95.03080	74953	< 5.		UG/L	2/15/95	N	Dibromomethane
FENTON.7	95.03080	95501	< 5.		UG/L	2/15/95	N	o-Dichlorobenzene (1,2)
FENTON.7	95.03080	541731	< 5.		UG/L	2/15/95	N	m-Dichlorobenzene (1,3)
FENTON.7	95.03080	106467	< 5.		UG/L	2/15/95	N	p-Dichlorobenzene (1,4)
FENTON.7	95.03080	75718	< 10.		UG/L	2/15/95	N	Dichlorodifluoromethane

********** CST ANALYTICAL REPORT **********

CUSTOMER NUMBER	SAMPLE NUMBER	ANALYSIS	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT	COMPOUND NAME
FENTON.7	95.03080	75343	< 5.		UG/L	2/15/95	N	1,1-Dichloroethane
FENTON.7	95.03080	107062	< 5.		UG/L	2/15/95	N	1,2-Dichloroethane
FENTON.7	95.03080	75354	< 5.		UG/L	2/15/95	N	1,1-Dichloroethene
FENTON.7	95.03080	156605	< 5.		UG/L	2/15/95	N	trans-1,2-Dichloroethene
FENTON.7	95.03080	156592	< 5.		UG/L	2/15/95	N	cis-1,2-Dichloroethylene
FENTON.7	95.03080	78875	< 5.		UG/L	2/15/95	N	1,2-Dichloropropane
FENTON.7	95.03080	142289	< 5.		UG/L	2/15/95	N	1,3-Dichloropropane
FENTON.7	95.03080	594207	< 5.		UG/L	2/15/95	N	2,2-Dichloropropane
FENTON.7	95.03080	563586	< 5.		UG/L	2/15/95	N	1,1-Dichloropropene
FENTON.7	95.03080	10061015	< 5.		UG/L	2/15/95	N	cis-1,3-Dichloropropene
FENTON.7	95.03080	10061026	< 5.		UG/L	2/15/95	N	trans-1,3-Dichloropropene
FENTON.7	95.03080	100414	< 5.		UG/L	2/15/95	N	Ethylbenzene
FENTON.7	95.03080	106934	< 5.		UG/L	2/15/95	N	Ethylene dibromide
FENTON.7	95.03080	591786	< 20.		UG/L	2/15/95	N	2-Hexanone
FENTON.7	95.03080	98828	< 5.		UG/L	2/15/95	N	Isopropylbenzene
FENTON.7	95.03080	99876	< 5.		UG/L	2/15/95	N	4-Isopropyltoluene
FENTON.7	95.03080	74884	< 5.		UG/L	2/15/95	N	Methyl iodide
FENTON.7	95.03080	108101	< 20.		UG/L	2/15/95	N	4-Methyl-2-pentanone
FENTON.7	95.03080	75092	< 5.		UG/L	2/15/95	N	Methylene chloride
FENTON.7	95.03080	103651	< 5.		UG/L	2/15/95	N	Propylbenzene
FENTON.7	95.03080	100425	< 5.		UG/L	2/15/95	N	Styrene
FENTON.7	95.03080	630206	< 5.		UG/L	2/15/95	N	1,1,1,2-Tetrachloroethane
FENTON.7	95.03080	79345	< 5.		UG/L	2/15/95	N	1,1,2,2-Tetrachloroethane
FENTON.7	95.03080	127184	< 5.		UG/L	2/15/95	N	Tetrachloroethylene
FENTON.7	95.03080	108883	< 5.		UG/L	2/15/95	N	Toluene
FENTON.7	95.03080	76131	< 5.		UG/L	2/15/95	N	1,1,2-Trichloro-1,2,2-trifluoroethane
FENTON.7	95.03080	71556	< 5.		UG/L	2/15/95	N	1,1,1-Trichloroethane
FENTON.7	95.03080	79005	< 5.		UG/L	2/15/95	N	1,1,2-Trichloroethane
FENTON.7	95.03080	79016	< 5.		UG/L	2/15/95	N	Trichloroethene
FENTON.7	95.03080	75694	< 5.		UG/L	2/15/95	N	Trichlorofluoromethane
FENTON.7	95.03080	96184	< 5.		UG/L	2/15/95	N	1,2,3-Trichloropropane
FENTON.7	95.03080	95636	< 5.		UG/L	2/15/95	N	1,2,4-Trimethylbenzene
FENTON.7	95.03080	108678	< 5.		UG/L	2/15/95	N	1,3,5-Trimethylbenzene
FENTON.7	95.03080	75014	< 10.		UG/L	2/15/95	N	Vinyl chloride
FENTON.7	95.03080	1330207	< 5.		UG/L	2/15/95	N	Mixed-Xylenes (o ± m ± p)

Tentatively Identified Compounds in Customer Sample # 95.03080

none

Semi-Volatiles

CST-12 SEMIVOLATILE ORGANIC ANALYSIS
SUMMARY OF ANALYTICAL RESULTS

TO: Alex A. Puglisi
FROM: Anthony Lombardo, CST-12 Organic section AL 3/2/95

REQUEST NUMBER: 21286
MATRIX: Water
SUMMARY DATE: March 1, 1995

1. Results Summary

Two samples were received for semivolatile analysis. Samples were collected on February 8, 1995. Sample extraction was started on February 13, 1995. Samples were analyzed on February 24, 1995. All hold times were met. Below is a tabulation of the analytical results:

SAMPLE ID	TARGET COMPOUNDS FOUND	AMOUNT (ug/L)	LOQ (ug/L)	TICs
95.03085 (Blank)	Di-n-butyl-phthalate	11	10	N
95.03083	Di-n-butyl-phthalate	11(1)	10	N
95.03084	Di-n-butyl-phthalate	13(1)	10	N

LOQ: Limit Of Quantitation. LOQ for most compounds is 10 ug/L, but is 20 ug/L or 50 ug/L for some compounds. See final report for specific compound detection limits.
TICs: Tentatively identified compounds
(1): Amount was not significantly higher than amount found in the blank.

Non-target peaks were not identified or quantitated for this request. Further TIC information can be provided at customer request.

2. Method Summary

Samples were extracted by continuous liquid-liquid extraction method. A measured volume of sample, usually 1 liter, is placed in a continuous liquid-liquid extractor. pH is adjusted to >11 (base-neutral extraction) and the sample is extracted for 18 to 24 hours. The sample pH is then adjusted to <2 (acid extraction) and methylene chloride extraction is repeated for an additional 18 to 24 hours. Sample extracts were then combined, dried and concentrated to 1.0 ml final volume. Appropriate surrogate standards were added prior to extraction. Analysis was performed by capillary column GC/MS methods. Extraction and analysis methods are consistent with EPA SW-846 methods 3520 and 8270. Analytical column used was a J&W Scientific DB5-MS 30M by 0.25 mm ID, 0.25 micron film or equivalent.

3. Anomalies and analysis notes.

GQ
3/2/95

Sample analyses met all QA/QC criteria as outlined in EPA-SW846 methods and LANL SOPs, except where noted below.

Di-n-butylphthalate was seen in the blank at 11 ug/L. This compound is considered a common contaminant and is allowed in blanks at up to five times the LOQ. Amount of Di-n-butylphthalate found in the samples was not significantly higher than the amount found in the blank and can be attributed to laboratory contamination.

Surrogate recoveries were within EPA criteria for all analyses. Internal standard responses were within criteria for all analyses. All hold times were met.

If you have any question regarding this data, please call Anthony Lombardo at 667-5889.

SD
3/2/95

********** CST ANALYTICAL REPORT **********

EPA SEMIVOLATILES Prepared by: JDT on 2-Mar-1995

REQUEST NUMBER: 21286 MATRIX: W ANALYST: ANTHONY LOMBARDO PROGRAM CODE: E250 NOTEBOOK: CST9004 PAGE: 85

OWNER: AP GROUP: MAIL-STOP: PHONE: TECHNIQUE: GCMS ANALYTICAL PROCEDURE: EPA SW-846 3RD

Customer Sample Results, Sample # 95.03083 Date Collected: 2/08/95 Date Received: 2/09/95 Date Extracted: 2/13/95 Date Analyzed: 2/24/95

CUSTOMER NUMBER	SAMPLE NUMBER	ANALYSIS	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT	COMPOUND NAME
FENTON.3	95.03083	83329	< 10.		UG/L	3/02/95		Acenaphthene
FENTON.3	95.03083	208968	< 10.		UG/L	3/02/95		Acenaphthylene
FENTON.3	95.03083	62533	< 10.		UG/L	3/02/95		Aniline
FENTON.3	95.03083	120127	< 10.		UG/L	3/02/95		Anthracene
FENTON.3	95.03083	103333	< 10.		UG/L	3/02/95		Azobenzene
FENTON.3	95.03083	92875	< 50.		UG/L	3/02/95		m-Benzidine
FENTON.3	95.03083	56553	< 10.		UG/L	3/02/95		Benzo[a]anthracene
FENTON.3	95.03083	50328	< 10.		UG/L	3/02/95		Benzo[a]pyrene
FENTON.3	95.03083	205992	< 10.		UG/L	3/02/95		Benzo[b]fluoranthene
FENTON.3	95.03083	191242	< 10.		UG/L	3/02/95		Benzo[g,h,i]perylene
FENTON.3	95.03083	207089	< 10.		UG/L	3/02/95		Benzo[k]fluoranthene
FENTON.3	95.03083	65850	< 50.		UG/L	3/02/95		Benzoic acid
FENTON.3	95.03083	100516	< 10.		UG/L	3/02/95		Benzyl alcohol
FENTON.3	95.03083	111911	< 10.		UG/L	3/02/95		Bis(2-chloroethoxy)methane
FENTON.3	95.03083	111444	< 10.		UG/L	3/02/95		Bis(2-chloroethyl)ether
FENTON.3	95.03083	108601	< 10.		UG/L	3/02/95		Bis(2-chloroisopropyl)ether
FENTON.3	95.03083	117817	< 10.		UG/L	3/02/95		Bis(2-ethylhexyl)phthalate
FENTON.3	95.03083	101553	< 10.		UG/L	3/02/95		4-Bromophenylphenyl ether
FENTON.3	95.03083	85687	< 10.		UG/L	3/02/95		Butyl benzyl phthalate
FENTON.3	95.03083	59507	< 10.		UG/L	3/02/95		4-Chloro-3-methylphenol
FENTON.3	95.03083	106478	< 10.		UG/L	3/02/95		4-Chloroaniline
FENTON.3	95.03083	91587	< 10.		UG/L	3/02/95		2-Chloronaphthalene
FENTON.3	95.03083	95578	< 10.		UG/L	3/02/95		o-Chlorophenol
FENTON.3	95.03083	7005723	< 10.		UG/L	3/02/95		4-Chlorophenylphenyl ether
FENTON.3	95.03083	218019	< 10.		UG/L	3/02/95		Chrysene
FENTON.3	95.03083	84742	11.	3.3	UG/L	3/02/95		Di-n-butyl phthalate

********** CST ANALYTICAL REPORT **********

CUSTOMER NUMBER	SAMPLE NUMBER	ANALYSIS	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT	COMPOUND NAME
FENTON.3	95.03083	117840	< 10.		UG/L	3/02/95		Di-n-octyl phthalate
FENTON.3	95.03083	53703	< 10.		UG/L	3/02/95		Dibenzo[a,h]anthracene
FENTON.3	95.03083	132649	< 10.		UG/L	3/02/95		Dibenzofuran
FENTON.3	95.03083	95501	< 10.		UG/L	3/02/95		o-Dichlorobenzene (1,2)
FENTON.3	95.03083	541731	< 10.		UG/L	3/02/95		m-Dichlorobenzene (1,3)
FENTON.3	95.03083	106467	< 10.		UG/L	3/02/95		p-Dichlorobenzene (1,4)
FENTON.3	95.03083	91941	< 20.		UG/L	3/02/95		3,3'-Dichlorobenzidine
FENTON.3	95.03083	120832	< 10.		UG/L	3/02/95		2,4-Dichlorophenol
FENTON.3	95.03083	84662	< 10.		UG/L	3/02/95		Diethyl phthalate
FENTON.3	95.03083	131113	< 10.		UG/L	3/02/95		Dimethyl phthalate
FENTON.3	95.03083	105679	< 10.		UG/L	3/02/95		2,4-Dimethylphenol
FENTON.3	95.03083	51285	< 50.		UG/L	3/02/95		2,4-Dinitrophenol
FENTON.3	95.03083	121142	< 10.		UG/L	3/02/95		2,4-Dinitrotoluene
FENTON.3	95.03083	606202	< 10.		UG/L	3/02/95		2,6-Dinitrotoluene
FENTON.3	95.03083	206440	< 10.		UG/L	3/02/95		Fluoranthene
FENTON.3	95.03083	86737	< 10.		UG/L	3/02/95		Fluorene
FENTON.3	95.03083	118741	< 10.		UG/L	3/02/95		Hexachlorobenzene
FENTON.3	95.03083	87683	< 50.		UG/L	3/02/95		Hexachlorobutadiene
FENTON.3	95.03083	77474	< 10.		UG/L	3/02/95		Hexachlorocyclopentadiene
FENTON.3	95.03083	67721	< 10.		UG/L	3/02/95		Hexachloroethane
FENTON.3	95.03083	193395	< 10.		UG/L	3/02/95		Indeno[1,2,3-cd]pyrene
FENTON.3	95.03083	78591	< 10.		UG/L	3/02/95		Isophorone
FENTON.3	95.03083	534521	< 50.		UG/L	3/02/95		2-Methyl-4,6-dinitrophenol
FENTON.3	95.03083	91576	< 10.		UG/L	3/02/95		2-Methylnaphthalene
FENTON.3	95.03083	95487	< 10.		UG/L	3/02/95		2-Methylphenol
FENTON.3	95.03083	106445	< 10.		UG/L	3/02/95		4-Methylphenol
FENTON.3	95.03083	91203	< 10.		UG/L	3/02/95		Naphthalene
FENTON.3	95.03083	88744	< 20.		UG/L	3/02/95		2-Nitroaniline
FENTON.3	95.03083	99092	< 20.		UG/L	3/02/95		3-Nitroaniline
FENTON.3	95.03083	100016	< 20.		UG/L	3/02/95		4-Nitroaniline
FENTON.3	95.03083	98953	< 10.		UG/L	3/02/95		Nitrobenzene
FENTON.3	95.03083	88755	< 10.		UG/L	3/02/95		2-Nitrophenol
FENTON.3	95.03083	100027	< 50.		UG/L	3/02/95		4-Nitrophenol
FENTON.3	95.03083	621647	< 10.		UG/L	3/02/95		N-Nitrosodi-n-propylamine
FENTON.3	95.03083	62759	< 10.		UG/L	3/02/95		N-Nitrosodimethylamine
FENTON.3	95.03083	86306	< 10.		UG/L	3/02/95		N-Nitrosodiphenylamine

********** CST ANALYTICAL REPORT **********

CUSTOMER NUMBER	SAMPLE NUMBER	ANALYSIS	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT	COMPOUND NAME
FENTON.3	95.03083	87865	< 50.		UG/L	3/02/95		Pentachlorophenol
FENTON.3	95.03083	85018	< 10.		UG/L	3/02/95		Phenanthrene
FENTON.3	95.03083	108952	< 10.		UG/L	3/02/95		Phenol
FENTON.3	95.03083	129000	< 10.		UG/L	3/02/95		Pyrene
FENTON.3	95.03083	120821	< 10.		UG/L	3/02/95		1,2,4-Trichlorobenzene
FENTON.3	95.03083	95954	< 10.		UG/L	3/02/95		2,4,5-Trichlorophenol
FENTON.3	95.03083	88062	< 10.		UG/L	3/02/95		2,4,6-Trichlorophenol

Tentatively Identified Compounds in Customer Sample # 95.03083

none

********** CST ANALYTICAL REPORT **********

EPA SEMIVOLATILES Prepared by: JDT on 2-Mar-1995

REQUEST NUMBER: 21286 MATRIX: W ANALYST: ANTHONY LOMBARDO PROGRAM CODE: E250 NOTEBOOK: CST9004 PAGE: 85

OWNER: AP GROUP: MAIL-STOP: PHONE: TECHNIQUE: GCMS ANALYTICAL PROCEDURE: EPA SW-846 3RD

Customer Sample Results, Sample # 95.03084 Date Collected: 2/08/95 Date Received: 2/09/95 Date Extracted: 2/13/95 Date Analyzed: 2/24/95

CUSTOMER NUMBER	SAMPLE NUMBER	ANALYSIS	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT	COMPOUND NAME
FENTON.2A	95.03084	83329	< 10.		UG/L	3/02/95		Acenaphthene
FENTON.2A	95.03084	208968	< 10.		UG/L	3/02/95		Acenaphthylene
FENTON.2A	95.03084	62533	< 10.		UG/L	3/02/95		Aniline
FENTON.2A	95.03084	120127	< 10.		UG/L	3/02/95		Anthracene
FENTON.2A	95.03084	103333	< 10.		UG/L	3/02/95		Azobenzene
FENTON.2A	95.03084	92875	< 50.		UG/L	3/02/95		m-Benzidine
FENTON.2A	95.03084	56553	< 10.		UG/L	3/02/95		Benzo[a]anthracene
FENTON.2A	95.03084	50328	< 10.		UG/L	3/02/95		Benzo[a]pyrene
FENTON.2A	95.03084	205992	< 10.		UG/L	3/02/95		Benzo[b]fluoranthene
FENTON.2A	95.03084	191242	< 10.		UG/L	3/02/95		Benzo[g,h,i]perylene
FENTON.2A	95.03084	207089	< 10.		UG/L	3/02/95		Benzo[k]fluoranthene
FENTON.2A	95.03084	65850	< 50.		UG/L	3/02/95		Benzoic acid
FENTON.2A	95.03084	100516	< 10.		UG/L	3/02/95		Benzyl alcohol
FENTON.2A	95.03084	111911	< 10.		UG/L	3/02/95		Bis(2-chloroethoxy)methane
FENTON.2A	95.03084	111444	< 10.		UG/L	3/02/95		Bis(2-chloroethyl)ether
FENTON.2A	95.03084	108601	< 10.		UG/L	3/02/95		Bis(2-chloroisopropyl)ether
FENTON.2A	95.03084	117817	< 10.		UG/L	3/02/95		Bis(2-ethylhexyl)phthalate
FENTON.2A	95.03084	101553	< 10.		UG/L	3/02/95		4-Bromophenylphenyl ether
FENTON.2A	95.03084	85687	< 10.		UG/L	3/02/95		Butyl benzyl phthalate
FENTON.2A	95.03084	59507	< 10.		UG/L	3/02/95		4-Chloro-3-methylphenol
FENTON.2A	95.03084	106478	< 10.		UG/L	3/02/95		4-Chloroaniline
FENTON.2A	95.03084	91587	< 10.		UG/L	3/02/95		2-Chloronaphthalene
FENTON.2A	95.03084	95578	< 10.		UG/L	3/02/95		o-Chlorophenol
FENTON.2A	95.03084	7005723	< 10.		UG/L	3/02/95		4-Chlorophenylphenyl ether
FENTON.2A	95.03084	218019	< 10.		UG/L	3/02/95		Chrysene
FENTON.2A	95.03084	84742	13.	3.9	UG/L	3/02/95		Di-n-butyl phthalate

********** CST ANALYTICAL REPORT **********

CUSTOMER NUMBER	SAMPLE NUMBER	ANALYSIS	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT	COMPOUND NAME
FENTON.2A	95.03084	117840	< 10.		UG/L	3/02/95		Di-n-octyl phthalate
FENTON.2A	95.03084	53703	< 10.		UG/L	3/02/95		Dibenzo[a,h]anthracene
FENTON.2A	95.03084	132649	< 10.		UG/L	3/02/95		Dibenzofuran
FENTON.2A	95.03084	95501	< 10.		UG/L	3/02/95		o-Dichlorobenzene (1,2)
FENTON.2A	95.03084	541731	< 10.		UG/L	3/02/95		m-Dichlorobenzene (1,3)
FENTON.2A	95.03084	106467	< 10.		UG/L	3/02/95		p-Dichlorobenzene (1,4)
FENTON.2A	95.03084	91941	< 20.		UG/L	3/02/95		3,3'-Dichlorobenzidine
FENTON.2A	95.03084	120832	< 10.		UG/L	3/02/95		2,4-Dichlorophenol
FENTON.2A	95.03084	84662	< 10.		UG/L	3/02/95		Diethyl phthalate
FENTON.2A	95.03084	131113	< 10.		UG/L	3/02/95		Dimethyl phthalate
FENTON.2A	95.03084	105679	< 10.		UG/L	3/02/95		2,4-Dimethylphenol
FENTON.2A	95.03084	51285	< 50.		UG/L	3/02/95		2,4-Dinitrophenol
FENTON.2A	95.03084	121142	< 10.		UG/L	3/02/95		2,4-Dinitrotoluene
FENTON.2A	95.03084	606202	< 10.		UG/L	3/02/95		2,6-Dinitrotoluene
FENTON.2A	95.03084	206440	< 10.		UG/L	3/02/95		Fluoranthene
FENTON.2A	95.03084	86737	< 10.		UG/L	3/02/95		Fluorene
FENTON.2A	95.03084	118741	< 10.		UG/L	3/02/95		Hexachlorobenzene
FENTON.2A	95.03084	87683	< 50.		UG/L	3/02/95		Hexachlorobutadiene
FENTON.2A	95.03084	77474	< 10.		UG/L	3/02/95		Hexachlorocyclopentadiene
FENTON.2A	95.03084	67721	< 10.		UG/L	3/02/95		Hexachloroethane
FENTON.2A	95.03084	193395	< 10.		UG/L	3/02/95		Indeno[1,2,3-cd]pyrene
FENTON.2A	95.03084	78591	< 10.		UG/L	3/02/95		Isophorone
FENTON.2A	95.03084	534521	< 50.		UG/L	3/02/95		2-Methyl-4,6-dinitrophenol
FENTON.2A	95.03084	91576	< 10.		UG/L	3/02/95		2-Methylnaphthalene
FENTON.2A	95.03084	95487	< 10.		UG/L	3/02/95		2-Methylphenol
FENTON.2A	95.03084	106445	< 10.		UG/L	3/02/95		4-Methylphenol
FENTON.2A	95.03084	91203	< 10.		UG/L	3/02/95		Naphthalene
FENTON.2A	95.03084	88744	< 20.		UG/L	3/02/95		2-Nitroaniline
FENTON.2A	95.03084	99092	< 20.		UG/L	3/02/95		3-Nitroaniline
FENTON.2A	95.03084	100016	< 20.		UG/L	3/02/95		4-Nitroaniline
FENTON.2A	95.03084	98953	< 10.		UG/L	3/02/95		Nitrobenzene
FENTON.2A	95.03084	88755	< 10.		UG/L	3/02/95		2-Nitrophenol
FENTON.2A	95.03084	100027	< 50.		UG/L	3/02/95		4-Nitrophenol
FENTON.2A	95.03084	621647	< 10.		UG/L	3/02/95		N-Nitrosodi-n-propylamine
FENTON.2A	95.03084	62759	< 10.		UG/L	3/02/95		N-Nitrosodimethylamine
FENTON.2A	95.03084	86306	< 10.		UG/L	3/02/95		N-Nitrosodiphenylamine

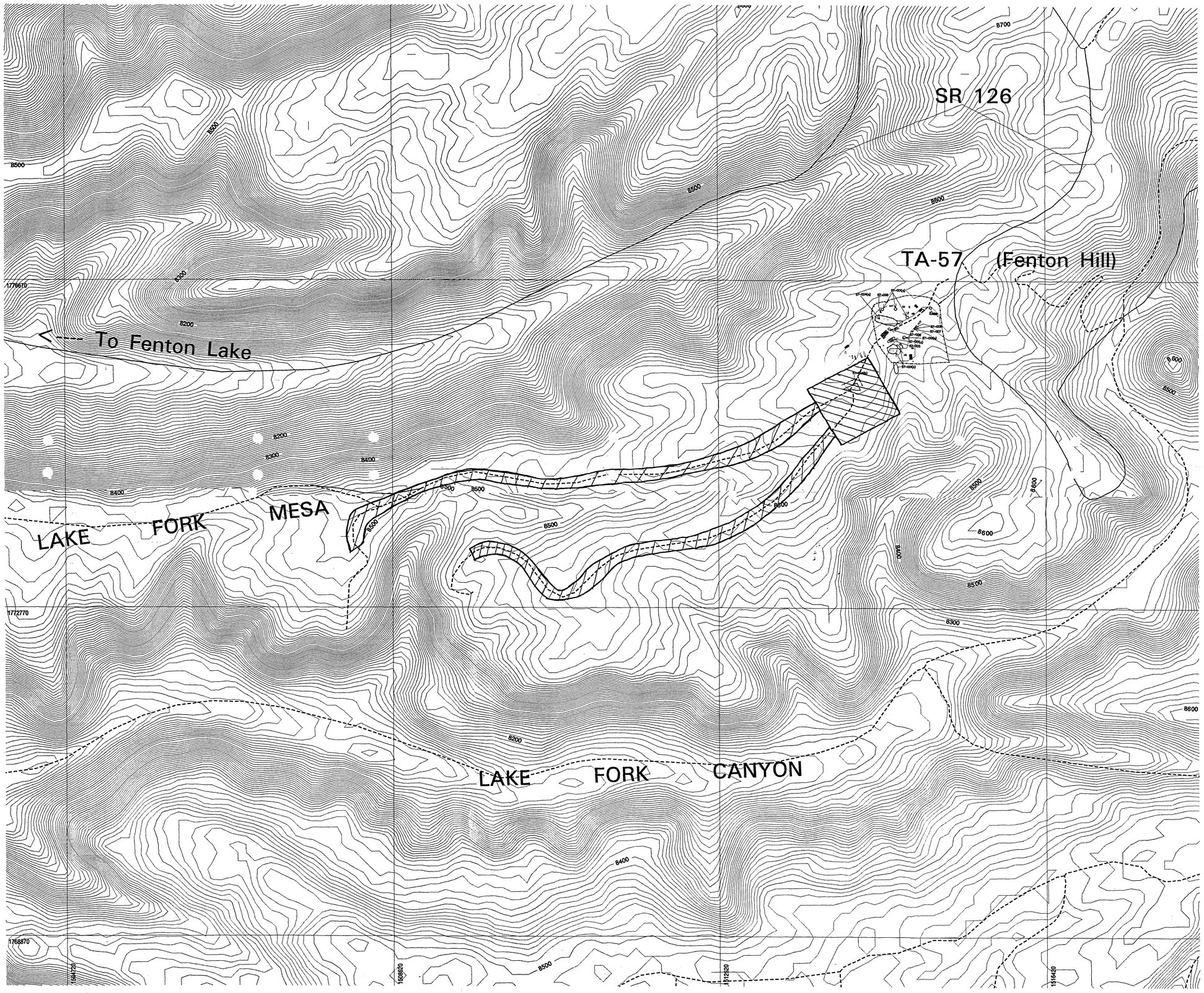
********** CST ANALYTICAL REPORT **********

CUSTOMER NUMBER	SAMPLE NUMBER	ANALYSIS	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT	COMPOUND NAME
FENTON.2A	95.03084	87865	< 50.		UG/L	3/02/95		Pentachlorophenol
FENTON.2A	95.03084	85018	< 10.		UG/L	3/02/95		Phenanthrene
FENTON.2A	95.03084	108952	< 10.		UG/L	3/02/95		Phenol
FENTON.2A	95.03084	129000	< 10.		UG/L	3/02/95		Pyrene
FENTON.2A	95.03084	120821	< 10.		UG/L	3/02/95		1,2,4-Trichlorobenzene
FENTON.2A	95.03084	95954	< 10.		UG/L	3/02/95		2,4,5-Trichlorophenol
FENTON.2A	95.03084	88062	< 10.		UG/L	3/02/95		2,4,6-Trichlorophenol

Tentatively Identified Compounds in Customer Sample # 95.03084

none

LOS ALAMOS NATIONAL LABORATORY



MAP-21
Potential Release Sites

- Contours, 100 ft
- Contours, 10 ft
- Road, Paved
- Road/Trail
- Potential Release Site
- Permanent Structure
- Temporary Structure
- PRS, point location
- Proposed Land Application Area (10 Acres)
- Additional USFS Land (30 Acres)

N

State Plane Coordinate System, New Mexico Central Zone.
1983 North American Datum

Grid provides NM State Plane coordinates in feet.
Grid interval, in feet: 3900

0 152 304 456 608
METERS
0 500 1000 1500 2000
FEET

NOTICE: The information on this map is provisional and the accuracy has not been confirmed. Feature locations are dependent on scale and symbology and should not be relied upon to establish legal claims. Basemap Sources: Boundary, structure and utility data are from Los Alamos National Laboratory Engineering Division and Los Alamos County Utility and Engineering Departments. Contour data is from Los Alamos National Laboratory Environmental Restoration Program aerial survey, September, 1991.

University of California
Los Alamos National Laboratory
Earth & Environmental Sciences Division
FIMAD Facility for Information Management, Analysis and Display
FIMAD is the electronic data repository for the Environmental Restoration Program at Los Alamos National Laboratory.
Produced by: Marcia Jones

Date: February 25, 1995 FIMAD Plot ID: 103113

Department of Energy
Field Office, Albuquerque
Los Alamos Area Office
Los Alamos, New Mexico 87544

FEB - 2 1995

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. William J. LeMay
Oil Conservation Division
New Mexico Energy, Minerals and Natural
Resources Department
2040 South Pacheco
Santa Fe, NM 87501

Dear Mr. LeMay:

This information for calendar year 1994, is being submitted to you as a supplement to the Ground Water Discharge Plan (GW-31) for the Fenton Hill Geothermal Site. The Discharge Plan was renewed by the Oil Conservation Division (OCD) on July 19, 1990, until June 5, 1995.

There were no changes or modifications to the geothermal research program that would result in changes to this plan. There was also no spill or breach of the service pond or any other part of the geothermal system. Following is a summary of relevant data for calendar year 1994.

1. There were no National Pollutant Discharge Elimination System (NPDES) wastewater discharges to surface waters as shown in Enclosure I.

2. Enclosure II contains a summary of Water Injected into Geothermal Wells for 1994.

Please call Joseph C. Vozella of my staff at (505) 665-5027, or Neil Williams of Los Alamos National Laboratory's Water Quality and Hydrology Group at (505) 665-0454 if you have any questions concerning this information.

Sincerely,

Larry Kirkman, P.E.
Acting Area Manager

LAAMEP:5JV-007

Enclosures

cc:
See Page 2

FEB - 2 1995

cc w/enclosures:
J. Vozella, AAMEP, LAAO
K. Zamora, Scientech, LAAO
D. Erickson, ESH-DO, LANL,
MS-K491
S. Rae, (ESH-18/WQ&H:95-006-1),
ESH-18, LANL, MS-K497
N. Williams, ESH-18, LANL,
MS-K497
J. Albright, EES-4, LANL,
MS-D443
WQ&H File, LANL, MS-K497
CRM-4, LANL, MS-A150
K. McAda, EPD, AL

Enclosure I

NPDES Permitted Discharges from the Service Pond
for 1994

Fenton Hill Geothermal Site
Sandoval County, N.M.

Date of Discharge	**Gallons Discharged From Service Pond**
1994	NONE

There were no accidental spills or leaks from the Service Pond during 1994.

Enclosure II

Water Injected into Well EE-3A during 1994

Fenton Hill Geothermal Site
Sandoval County, N.M.

Month	Injected Volume (Gallons)
January	0
February	0
March	0
April	59,908
May	332,207
June	396,536
July	96,164
August	72,522
September	236,453
October	395,203
November	200,394
December	173,089
Total Water Injected in 1994	**1,962,476**

There were no accidental spills or leaks during the injection of water into the geothermal wells or during the venting of water from the wells.

Department of Energy
Los Alamos Area Office
Albuquerque Operations Office
Los Alamos, New Mexico 87544

MAY 23 1994

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. William J. LeMay
Oil Conservation Division
New Mexico Energy, Minerals, and
Natural Resources Department
P. O. Box 2088
Santa Fe, New Mexico 87504-2088

Dear Mr. LeMay:

This information for calendar years 1992 and 1993 is being submitted to you as a supplement to the Ground Water Discharge Plan (Plan) (GW-31) for the Fenton Hill Geothermal Site. The Plan was renewed until June 5, 1995 by the Oil Conservation Division on July 19, 1990.

There were no changes or modifications to the geothermal research program that would result in changes to this Plan. There was also no spill or breach of the service pond or any other part of the geothermal system. Following is a summary of relevant data for calendar years 1992 and 1993:

1. There were no National Pollutant Discharge Elimination System wastewater discharges to surface waters as shown in Enclosure I.

2. Enclosure II contains a summary of water injected into geothermal wells for 1992 and 1993.

Please call me at (505) 665-5027, or Neil Williams of Los Alamos National Laboratory's Environmental Protection Group at (505) 665-0454, if you have any questions concerning this information.

Sincerely,

for Joseph C. Vozella, Chief
Environment, Safety and Health
Branch

LESH:9JV-088

Enclosures

cc:
See page 2

cc w/enclosures:
K. Zamora, Scientech, LAAO
S. Rae, ESH-8, LANL, MS-K490
N. Williams, ESH-8, LANL, MS-K490
J. Albright, EES-4, LANL, MS-D443
ESH-8 Reading File, LANL, MS-K490
WQ&H File, LANL, MS-K490
CRM-4, LANL, MS-A150
K. McAda, EPD, AL

cc w/o enclosures:
K. Hargis (ESH-8-WQ&H:94-192-1), ESH-8, LANL, MS-K490

Los Alamos
NATIONAL LABORATORY

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

Date: May 5, 1994
In Reply Refer To: ESH-8/WQ&H:94-192
Mail Stop: K490
Telephone: (505) 667-5021

Mr. Jerry L. Bellows
Area Manager
U.S. Department of Energy
Los Alamos Area Office
Los Alamos, New Mexico 8754

Dear Mr. Bellows:

SUBJECT: GROUND WATER DISCHARGE PLAN REPORT FOR THE FENTON HILL GEOTHERMAL FACILITY, 1992 AND 1993

Enclosed for your review is a draft letter transmitting routine data on the Fenton Hill Geothermal Facility to the Oil Conservation Division (OCD). The Laboratory was in compliance with the requirements of the Ground Water Discharge Plan (GW-31) during this reporting period.

Should you have any questions regarding the enclosed letter and enclosures, please contact Neil Williams, of the Laboratory's Environmental Protection Group (ESH-8), at 665-0454.

Sincerely,

Kenneth M. Hargis

Kenneth M. Hargis
Leader,
Environmental Protection Group

KMH:RB/em

Enclosures: a/s

Cy: ESH-8 Reading File, w/enc., MS K490
WQ&H File, w/enc., MS K490
CRM-4, w/enc., MS A150

Enclosure I

NPDES Permitted Discharges from the Service Pond
for 1992 and 1993

Fenton Hill Geothermal Site
Sandoval County, N.M.

Date of Discharge	Gallons Discharged From Service Pond
1992	NONE
1993	NONE

There were no accidental spills or leaks from the Service Pond during 1992 and 1993.

Enclosure II

Water Injected into Geothermal Wells
for 1992 and 1993

Fenton Hill Geothermal Site
Sandoval County, N.M.

Calendar Year	Gallons Injected Into The Wells
1992	33,265,000
1993	12,989,000

There were no accidental spills or leaks during injection of water into the geothermal wells or during venting of water from the wells.

Enclosure I

NPDES Permitted Discharges from the Service Pond
for 1992 and 1993

Fenton Hill Geothermal Site
Sandoval County, N.M.

Date of Discharge	Gallons Discharged From Service Pond
1992	NONE
1993	NONE

There were no accidental spills or leaks from the Service Pond during 1992 and 1993.

Enclosure II

Water Injected into Geothermal Wells
for 1992 and 1993

Fenton Hill Geothermal Site
Sandoval County, N.M.

Calendar Year	Gallons Injected Into The Wells
1992	33,265,000
1993	12,989,000

There were no accidental spills or leaks during injection of water into the geothermal wells or during venting of water from the wells.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OCT 5 1993

OFFICE OF WATER

MEMORANDUM

SUBJECT: Transmittal of the Inspection Report for the UIC Inspection of Los Alamos National Laboratory

FROM: Dan Chadwick, Geologist (WH550E) Dan Chadwick
Compliance and Enforcement Section

TO: Ray Leissner, Engineer (6W-SU)
UIC State Programs Section

Attached is the inspection report with my observations from the UIC inspection of Los Alamos National Laboratory (LANL). I apologize for the delay and I hope you can still use the information. If you have any questions feel free to call me at (202) 260-5548.

Attachment

cc
Margo Dusenbury
Richard Orbahm
Roger Anderson

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1445 ROSS AVENUE
DALLAS, TEXAS 75202-2733

August 26, 1993

MEMORANDUM

SUBJECT: Preliminary Findings of the Underground Injection Control (UIC) Portion of the Multi-Media Inspection of the Los Alamos National Laboratory (LANL), Los Alamos, New Mexico

FROM: Ray Leissner (6W-SU) Ray Leissner
UIC State Programs Section (6W-SU)

TO: Mac Weaver, P. E.
Chief, UIC State Programs Section (6W-SU)

BACKGROUND

The LANL is made up of 73 technical areas (TAs); each of which perform a specific function in support of the goals of the laboratory. Some of the TAs are remotely located throughout a 43 square mile area containing LANL and require separate site security. Each TA contains several buildings/structures (depending on the TA's function), and operates as a separate and integral unit of the Laboratory. Each TA is directed by a on-site management staff which in turn is directed by a central administration headed by the LANL Director and staff. The Department of Energy (DOE) owns LANL and has approximately 60 employees on-site for DOE concerns which include environmental compliance. The LANL is operated by the University of California with approximately 8000 employees.

At the request of EPA Region 6, the multi-media inspections conducted at LANL were directed by the National Enforcement Investigation Center (NEIC), Denver, Colorado.

INSPECTION, AUGUST 3-5, 1993

The UIC inspection began with a briefing in building 100 of TA 3. The UIC inspection team was assembled and consisted of Dan Chadwick: EPA Headquarters, Richard Ohrbom: New Mexico Environment Department, Steven Rae and Michael Alexander of DOE's Environmental Protection Group, EM-8 and myself. Security/safety requirements were addressed; the inspection team goals were discussed; a list of active septic systems was provided

(attachment 1) and; inspection sites were prioritized. Our DOE hosts arranged for transportation, escort, and the opportunity of photographs at our inspection sites as well as accomindating numerous requests for records. The photographs have not yet arrived.

Following, in chronological order, are the TAs the team inspected and a brief summary of our findings.

TA 60, GSA Motorpool, Building 60

This facility handles the maintenance for all government vehicles at LANL. The facility was examined for possible 5X28 well(s). The motorpool has a active plan for the recycling of all used motor oil and antifreeze. All washdown and bay areas allowed for containment and collection of all waste materials. The floor drains were connected to a fluid trap and central sewer treatment system.

TA 57, Fenton Hill Geothermal Site

Roger Anderson and Kathy Brown of the Oil Conservation Division, New Mexico joined the team for this inspection. A site description is provide for in the Fenton Hill site plan (attachment 2). The injection well (diagramed in attachment 3) is currently inactive. It is unknown if the facility will be reactivated. A constant flowrate of approximately 5-7 gpm from the 4 1/2"-9 5/8" annulus indicates communication between the longstring (9 5/8") casing and the surrounding formation below the 13 5/8" casing set at 2556 feet. However, this is well below any usable groundwater (est. 800-1000').

OCD's permit requires proof of mechanical integrity of the 9 5/8"-13 3/8" annulus only. When the 4 1/2"-9 5/8" annulus flow rate is shut in, the annulus will reach approximately 300 psi. Zero pressure readings on the wellhead gauges for the 9 5/8"-13 3/8" annulus indicate no communication.

It should be noted: When active, the well injected only potable water chlorinated for algae control. The annulus flow is directed into two large holding tanks and appeared non-saline (algae growth evident). And, LANL has in place a plan for plugging and abandonment of the well should the project be concluded.

TA 22, Group M-7 Detonator Facility

Three dry wells (Class 5W20) were found at this site. Two were abandoned and one active. The wellbore diagrams are described in attachment 4. Fluids accepted by the active

well consists of washwater from washateria activities at the facility (est. at 300 gal./week). Prior to disposal the water is routed through two settling tanks for solids removal. Recent testing of the water at the well revealed no high explosives (HE) contamination (see attachment 5).

The two inactive wells were abandoned shortly after start-up due to inadequate drainage capacity. Only two vent pipes were visible (see diagram-attachment 4). One of these vent pipes was not capped. This was noted by our DOE escort and addressed at the exit interview.

There has been previous correspondence (1986-1989) between LANL, DOE and NMED regarding these wells. NMED and DOE/LANL have agreed to complete the process to document proper plugging and/or permitting of these wells where applicable.

TA 39, Building 2, Shockwave Testing Facility

This remote facility is serviced by a septic system with a leachfield. In addition numerous floor drains and wash basins were/are connected to the septic system and could collect machinery and/or photo lab fluids. However, the estimated volumes disposed do not warrant the classification of the system as a class V well as defined by the State of New Mexico.

LANL was in the process of plugging all floor drains at TA 39 utilizing rubber stoppers. One drain remained open at the time of inspection. The inspection team recommended all floor drains be permanently plugged.

It should be noted; to prevent disposal of undesirable fluids into the wash basins, signs have been posted (attachment 6) over every wash basin in LANL and personnel trained in proper disposal of waste chemicals.

TA 33, Building 86

This was an tritium processing facility with a septic system and leachfield. The facility is now being decommissioned and the septic system is only used by the security guardhouse. Floor drains originally connected to the septic system have been sealed. The team did not enter the building due to time constraints.

Sampling conducted as part of an ongoing site assessment program by Santa Fe Engineering, Ltd., for LANL has determined a tritium plume exists just north of the leachfield. LANL currently suspects a National Pollutant Discharge Elimination System (NPDES) outfall within the same area as the source. Further study and remediation are planned.

TA 16, Building 540, Steamplant

This facility consists of a steam generation plant that in the early 1970s used two wells to dispose of cooling tower blowdown. Few records were available. Each well consisted of a corrugated pipes buried 12'-14' vertically into the ground, connected in series and filled with gravel. There was no surface evidence of their existence. A veteran employee was recruited to point out their probable location. Records indicate they were replaced by a NPDES outfall shortly after start-up due to lack of capacity.

TA 16, 300 Line

This facility is a line of buildings (now partially abandoned) that processes HE. Fluids from these buildings passed through a settling tank prior to injection. The well was similar in construction to those described above and was found filled to the surface with local soil/rocks. Only the upper most edge of the corrugated pipe was partially exposed. An aluminum cover plate was found nearby. Records indicate the well lacked capacity and was replaced by a NPDES outfall. NMED has requested LANL to submit for approval, plans to cap the well with cement.

SUMMARY

From a UIC standpoint the inspection revealed no significant problems. Concerns discovered during the inspection were discussed in the exit interview with LANL, DOE and NEIC personnel. These concerns included the need to verify adequate closure of those wells already plugged and abandoned, follow-up on LANL's on-going program to plug floor drains leading to septic system drain fields and documenting the existing well that qualifies as a Class V well under State regulations (see TA 22). Follow-up to these issues will be carried out by the State UIC program and EPA will be copied on all correspondence.

The final determination regarding UIC issues has not yet been made. This will be made in the NEIC's final report covering all programs involved in the multi-media inspection. Observations from other programs' inspection teams have not been assimilated by the NEIC team leader. Any additional discoveries made by other program inspection teams may effect the final determination regarding UIC issues.

Attachments

CC: David Abshire, (6W-SU)
Dan Chadwick, (WH-550E)
Walt Helmick, (6E-SH)
Margo Dusenbury, NEIC, Denver
Richard Ohrbom, New Mexico Environment Department
Roger Anderson, New Mexico Oil Conservation Division
Kathy Brown, New Mexico Oil Conservation Division

Attachment 1

Floors Drains that go Septic Tank
→ inspected

ACTIVE SEPTIC TANK SYSTEMS

Los Alamos National Laboratory — Environmental Surveillance Section (HSE-8)
January 1991

Septic Tank	Location Section, Town, Range	Year Installed	Buildings Served	Persons Served	Volume (gal.)	Discharge Point	To Be Eliminated	Comments
							9/17/92	
TA-3-1484	NE 1/4, Sec. 20, T19N, R6E	1981	Bldg. 130	2	1000	Seepage pit	SWSC	
TA-3-2035	SE 1/4, Sec. 17, T19N, R6E	?	Cafeteria	N.A.	1500	Sanitary sewer		Holding tank used as grease
TA-6-40	SW 1/4, Sec. 20, T19N, R6E	1946	Bldgs. 1 & 3	0–2	840	Holding tank	SWSC	Drain line plugged, 1988
TA-6-43	SW 1/4, Sec. 20, T19N, R6E	1946	Bldg. 6	3–5	960	Holding tank	SWSC	Drain line plugged, 19[illegible]
TA-9-107	NE 1/4, Sec. 30, T19N, R6E	1952	Bldgs. 41–43, 45 & 46	0–2	540	Holding tank	SWSC	Drain line plugged, 19[illegible]
TA-9-108	NE 1/4, Sec. 30, T19N, R6E	1952	Bldg. 48	2	1360	Leach field	SWSC (12/1/92)	New leach field installed, 19[illegible]
TA-9-109	NE 1/4, Sec. 30, T19N, R6E	1952	Bldg. 50	0–2	600	Leach field	SWSC (11/13/92)	New leach field installed, 19[illegible]
TA-9-110	NE 1/4, Sec. 30, T19N, R6E	1952	Bldg. 51	0–2	425	Holding tank	SWSC	Drain line plugged, 19[illegible]
TA-11-20	NE 1/4, Sec. 32, T19N, R6E	?	Bldg. 4	6	500	Holding tank		Drain line plugged, 19[illegible]
TA-11-43	NE 1/4, Sec. 32, T19N, R6E	1963	Bldg. 3	0–2	300	Leach field		New leach field installed, 19[illegible]
TA-14-19	SW 1/4, Sec. 28, T19N, R6E	?	Bldg. 6	0–2	640	Leach field	SWSC	New leach field installed, 19[illegible]
TA-15-00	NE 1/4, Sec. 33, T19N, R6E		Hydrotest site	10	1000	Leach field		
TA-15-00	NE 1/4, Sec. 33, T19N, R6E		Radiographic lab	18	1000	Leach field	SWSC	
TA-15-51	SE 1/4, Sec. 28, T19N, R6E	?	Bldg. 20	2	505	Seepage pit	SWSC (8/31/92)	
TA-15-61	SW 1/4, Sec. 27, T19N, R6E	?	Bldg. 45	1	540	Seepage pit		
TA-15-62	SE 1/4, Sec. 27, T19N, R6E	?	Bldg. 44	0–2	540	Holding tank		Drain line plugged, 1988
TA-15-63	SE 1/4, Sec. 28, T19N, R6E	?	Bldg. 40	35	2060	Seepage pit	SWSC (6/29/92)	
TA-15-195	NE 1/4, Sec. 33, T19N, R6E	1988	Bldg. 183	34	4000	Seepage pit	SWSC	New septic tank installed, 19[illegible]
TA-15-205	NW 1/4, Sec. 34, T19N, R6E	?	Bldgs. 185 & 186	8	605	Leach field	(SWSC) (11/23/92)	
TA-15-282	SW 1/4, Sec. 27, T19N, R6E	?	Bldg. 280	1	1000	Leach field	SWSC (11/17/92)	

Active Septic Tank Systems (Continued)

Septic Tank	Location Section, Town, Range	Year Installed	Buildings Served	Persons Served	Volume (gal.)	Discharge Point	To Be Eliminated	Comments
TA-15-284	NE 1/4, Sec. 33, T19N, R6E	?	Bldg. 233	0–2	750	Seepage pit		
TA-15-286	NE 1/4, Sec. 33, T19N, R6E	?	Bldg. 285	3	1500	Seepage pit	SWSC	
TA-16-000	NE 1/4, Sec. 31, T19N, R6E	?	Bldg. 370	0–2	1000	Seepage bed		
TA-16-175	SW 1/4, Sec. 30, T19N, R6E	?	Bldg. 54	0–2	1500	Leach field		New system installed, 1988
TA-16-178	NW 1/4, Sec. 30, T19N, R6E	?	Bldg. 210	0–2	380	Leach field		
TA-16-371	NE 1/4, Sec. 31, T19N, R6E	1951	Bldg. 370	0–2	1216	Holding tank		Drain line plugged, 1989
TA-16-381	NW 1/4, Sec. 32, T19N, R6E	1954	Bldg. 380	0–2	540	Leach field		
TA-16-385	SW 1/4, Sec. 29, T19N, R6E	?	Bldg. 389	2	300	Holding tank		Drain line plugged, 1988
TA-18-39	NE 1/4, Sec. 35, T19N, R6E	1950	Bldg. 23	0–2	524	Leach field		
TA-18-42	NE 1/4, Sec. 35, T19N, R6E	1950	Bldg. 32	0–2	587	Leach field		
TA-18-120	NE 1/4, Sec. 35, T19N, R6E	1959	Bldg. 116	0–2	500	Leach field	SWSC (10/9/92)	
TA-22-50	SW 1/4, Sec. 20, T19N, R6E	?	Bldg. 34	3	1365	Leach field	SWSC →	
TA-22-51	SW 1/4, Sec. 20, T19N, R6E	1952	Bldgs. 1, 32, & 52	73	8775	Sand filter	SWSC →	
TA-33-31	SE 1/4, Sec. 13, T18N, R6E	?	Bldgs. 19, 39, 113, 114, & 168	56	1360	Seepage pits (2)		
TA-33-33	SE 1/4, Sec. 24, T18N, R6E	?	Bldg. 24	0–2	730	Holding tank		Drain line plugged, 1989
TA-33-93	NE 1/4, Sec. 24, T18N, R6E	1955	Bldg. 86	6	1660	Sand filter		
TA-33-96	SE 1/4, Sec. 19, T18N, R7E	?	Bldg. 87	0–2	768	Sand filter		
TA-33-121	SE 1/4, Sec. 13, T18N, R6E	1957	Bldg. 1	0–2	500	Leach field		Drain line covered
TA-33-179	SE 1/4, Sec. 19, T18N, R7E	1987	NRAO	0–2	1000	Leach field		
TA-33-206	NE 1/4, Sec. 24, T18N, R6E	1987	Trailer	0–2	1000	Holding tank		Previousl, TA-[illegible]-23
TA-36-17	NE 1/4, Sec. 35, T19N, R6E	1950	Bldgs. 1 & 22	21	1360	Seepage pit	SWSC (11/17/92)	
TA-36-61	NW 1/4, Sec. 34, T19N, R6E	?	Bldg. 31	0–2	420	Holding tank		Drain line plugged, 1989; previously TA-[illegible]

Active Septic Tank Systems (Continued)

Septic Tank	Location Section, Town, Range	Year Installed	Buildings Served	Persons Served	Volume (gal.)	Discharge Point	To Be Eliminated	Comments
TA-36-70	NW 1/4, Sec. 36, T19N, R6E	?	Guard station	1	500	Seepage pit	SWSC (12/14/92)	
TA-36-100	NE 1/4, Sec. 35, T19N, R6E	1988	Bldg. M-8	20	1000	Leach field	SWSC (11/12/92)	Next to TA-36-17; previously TA-36-80
TA-37-28	NE 1/4, Sec. 32, T19N, R6E	?	Bldg. 1	0–2	540	Leach field		
TA-39-104	SE 1/4, Sec. 13, T18N, R6E	1985	Bldgs. 2 & 100	80	2500	Sand filter		New sand filter, 1985; previously TA-39-2
TA-39-132	NE 1/4, Sec. 13, T18N, R6E	1989	Pulsed power bldg.	10	1000	Leach field		Previously TA-39-80
TA-40-24	SW 1/4, Sec. 21, T19N, R6E	1949	Bldgs. 1, 19, & 23	37	1215	Seepage pit		
TA-40-25	NW 1/4, Sec. 28, T19N, R6E	1949	Bldg. 11	0–2	540	Leach field		Leach field installed, 1988
TA-46-230	NW 1/4, Sec. 26, T19N, R6E	?	Bldg. 158	25–30	1000	Seepage pit	SWSC	Drain line plugged, 1989
TA-48-32	NE 1/4, Sec. 21, T19N, R6E	1983	Bldg. 29	70	2000	Seepage pit	SWSC (11/17/92)	Two 1000-gal. tanks
TA-49-118	NW 1/4, Sec. 3, T18N, R6E	1985	Office	0–4	1000	Evapotrans. bed		Bed installed, 1990
TA-49-119	NW 1/4, Sec. 3, T18N, R6E	1985	Bldg. 113	8–10	1500	Evapotrans. bed		Bed installed, 1992
TA-51-4	SE 1/4, Sec. 26, T19N, R6E	1962	Bldg. 7	0–2	972	Leach field	SWSC (11/20/92)	
TA-51-9	SW 1/4, Sec. 25, T19N, R6E	1960	Bldg. 15	3	1500	Leach field	SWSC (11/23/92)	
TA-51-30	NW 1/4, Sec. 26, T19N, R6E	1983	Bldgs. 11 & 12	35	1000	Seepage pit	SWSC (7/25/92)	
TA-52-3	SE 1/4, Sec. 22, T19N, R6E	1968	Utrex bldg.	12	2580	Leach field	SWSC →	
TA-52-34A	SE 1/4, Sec. 22, T19N, R6E	1983	Bldg. 44	18	2000	Seepage pit	SWSC →	Common seepage pit
TA-52-34B	SE 1/4, Sec. 22, T19N, R6E	1983	Bldg. 45	18	2000	Seepage pit	SWSC →	Common seepage pit
TA-52-95	SE 1/4, Sec. 22, T19N, R6E		Trailers	35	3000	Holding tank	SWSC	
TA-52-97	SE 1/4, Sec. 22, T19N, R6E	1983	Bldgs. 41 & 42	65	2500	Seepage pit	SWSC →	Common seepage pit; overflow to TA-52-34A

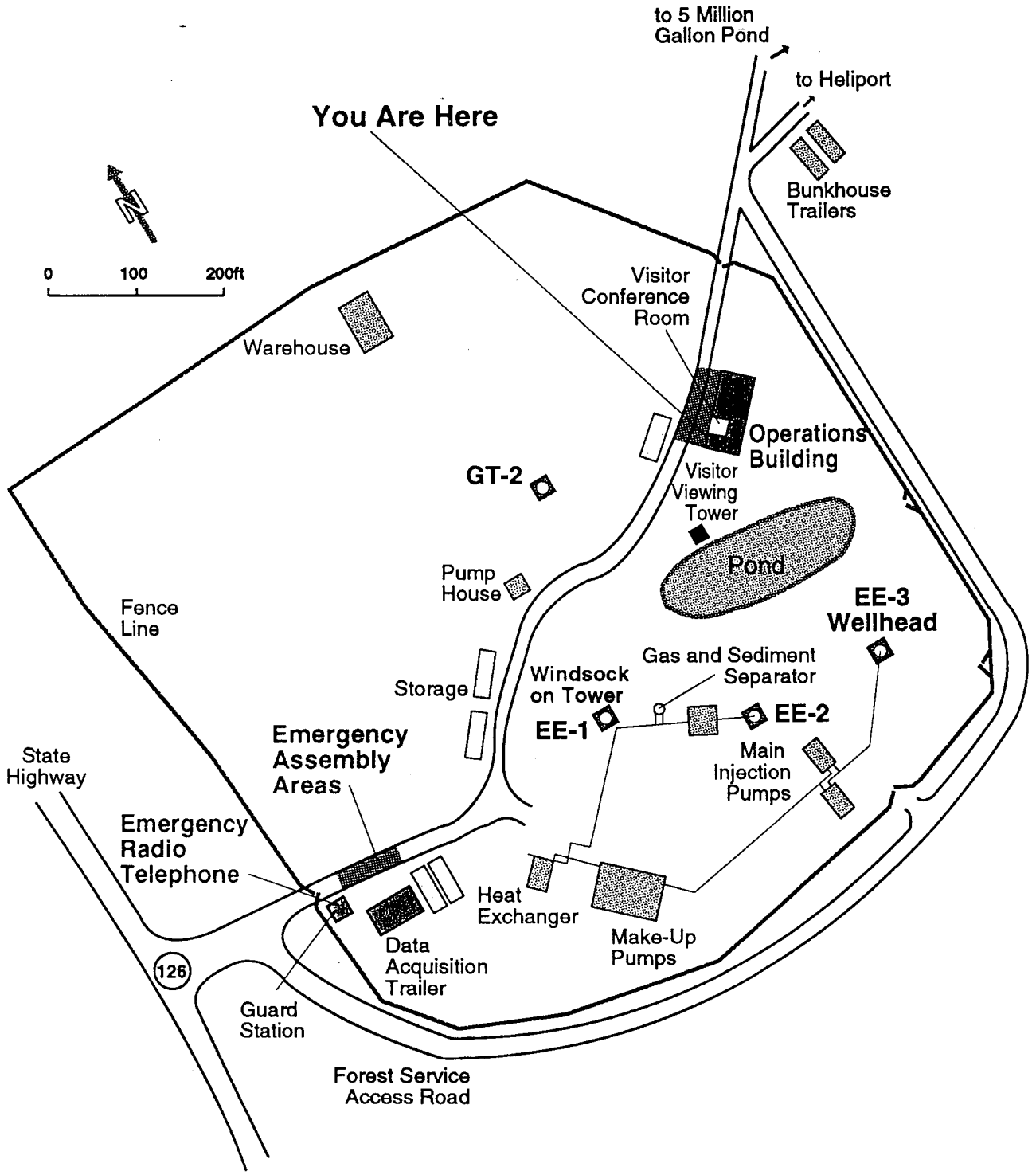
Active Septic Tank Systems (Continued)

Septic Tank	Location Section, Town, Range	Year Installed	Buildings Served	Persons Served	Volume (gal.)	Discharge Point	To Be Eliminated	Comments
TA-52-98	SE 1/4, Sec. 22, T19N, R6E	1983	Bldg. 33	10	1000	Seepage pit	SWSC→	Common seepage pit; overflow to TA-52-34D
TA-52-99	SE 1/4, Sec. 22, T19N, R6E	1983	Bldgs. 35 & 36	32	1500	Seepage pit	SWSC	Previously TA-52-00
TA-53-1016	NE 1/4, Sec. 23, T19N, R6E	?	Trailer	4	500	Holding tank	~~SWSC (in 1992)~~	Previously TA-53-00
TA-54-16	SE 1/4, Sec. 31, T19N, R7E	1977	Bldg. 11	1	1000	Leach field		
TA-54-28	SW 1/4, Sec. 31, T19N, R7E	1983	Bldg. 22	13	1000	Seepage pit		
TA-54-43	NE 1/4, Sec. 36, T19N, R6E	1988	PCB facility	8	1700	Holding tank		
TA-54-80	NE 1/4, Sec. 36, T19N, R6E	1989	Trailers	8	1500	Holding tank		
TA-54-89	SW 1/4, Sec. 25, T19N, R6E	1988	MD-34	12	1500	Evapotrans. bed	SWSC	
TA-54-150	NE 1/4, Sec. 36, T19N, R6E	1990	Bldg. 117	6	500	Holding tank		
TA-58-00	SE 1/4, Sec. 17, T19N, R6E	1989	EEO trailer	12–24	3000	Holding tank	SWSC	
TA-63-12	SW 1/4, Sec. 22, T19N, R6E	?	Bldg. 48	20–30	1000	Seepage pit	SWSC →	Pending; previously TA-63-12
TA-63-14	SW 1/4, Sec. 22, T19N, R6E	?	Bldgs. 101 & 155	30–40	920	Seepage pit	SWSC→	Previously TA-63-14 & TA-63-15
TA-66-03	NE 1/4, Sec. 21, T19N, R6E	1988	ATAC bldg.	16	2000	Seepage pit		Previously TA-66-00
TA-69-09	NW 1/4, Sec. 19, T19N, R6E	1953	Guard station	1	600	Holding tank		Drain line plugged, 1988; previously TA-0-59
TA-69-10	SW 1/4, Sec. 20, T19N, R6E	1986	Trailer		1000	Seepage pit		Previously TA-1-10
TA-72-18	SE 1/4, Sec. 24, T19N, R6E	1989	Pistol range	0–40	2000	Leach field		Replaced TA-0-276; previously TA-0-00

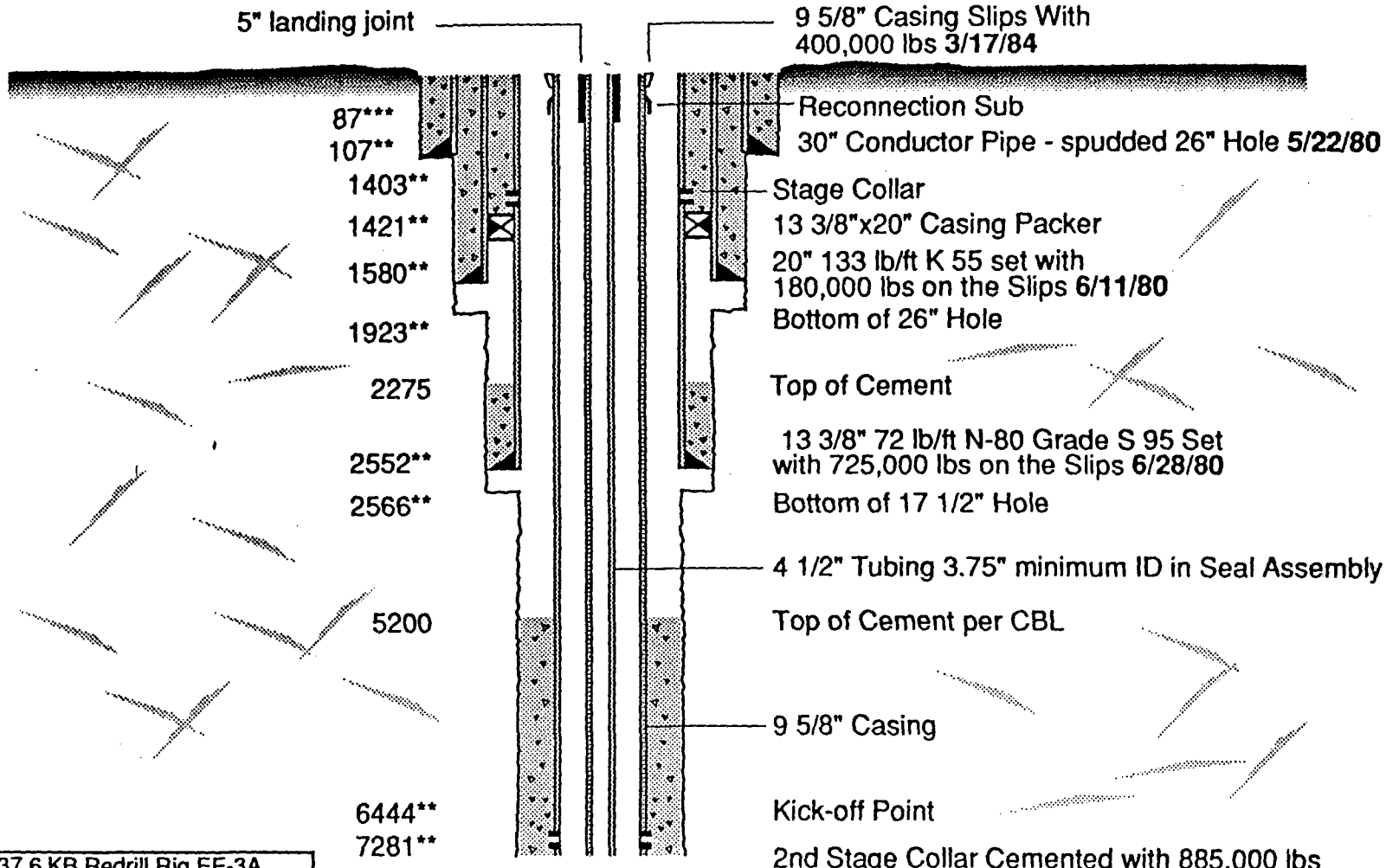
Note: SWSC means the Sanitary Wastewater Systems Consolidation Project.

Attachment II

Fenton Hill Site Plan

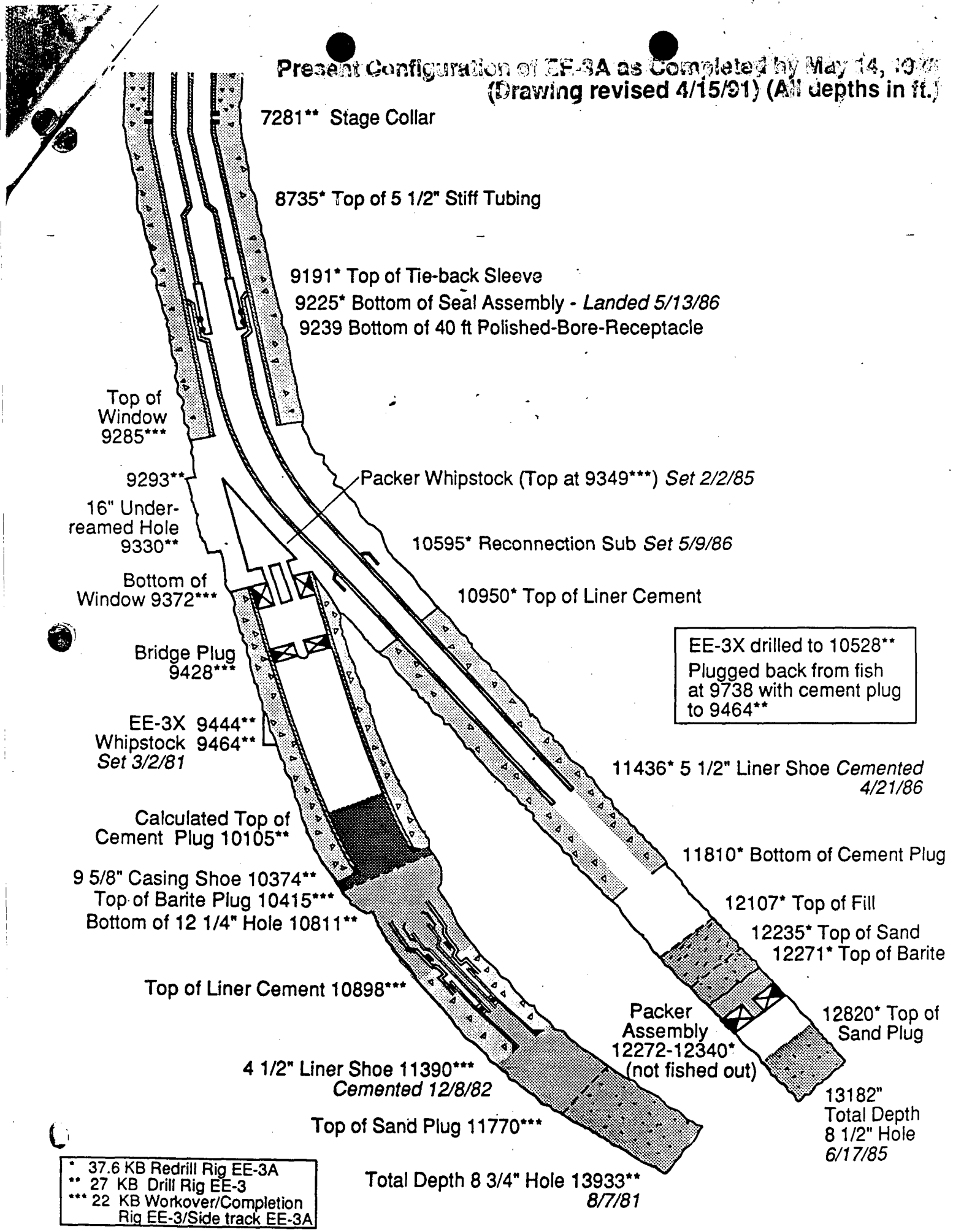


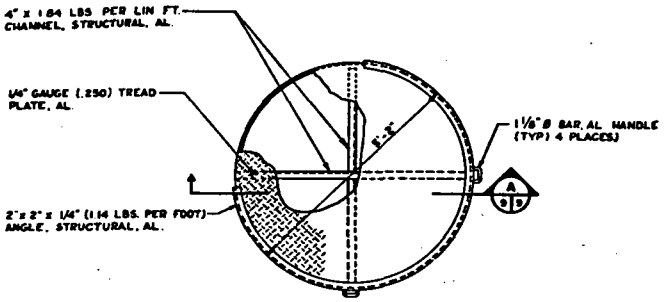
Present Configuration of EE 3-A as Completed by May 14, 1986
(Drawing revised 4/15/91) (All depths in ft)



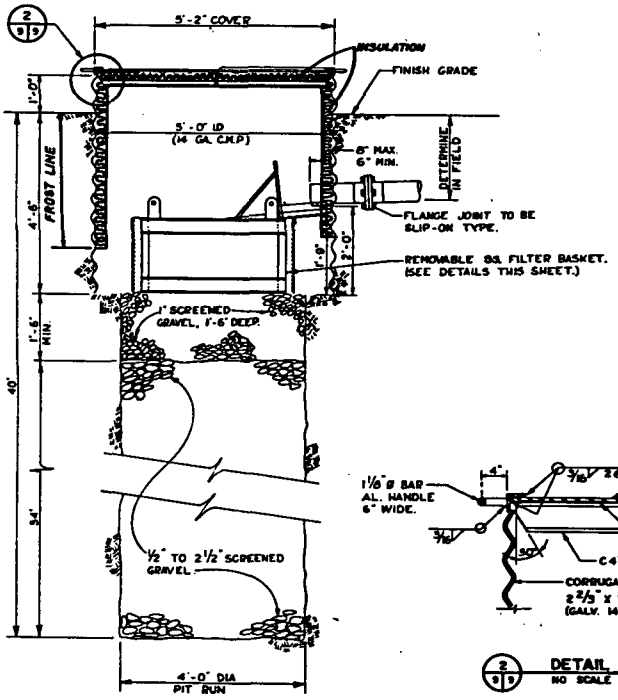
* 37.6 KB Redrill Rig EE-3A
** 27 KB Drill Rig EE-3
*** 22 KB Workover/Completion Rig EE-3/Side track EE-3A

Attachment #3

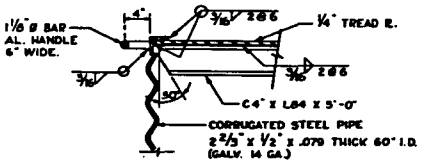

Present Configuration of EE-3A as Completed by May 14, 19
(Drawing revised 4/15/91) (All depths in ft.)
7281** Stage Collar
8735* Top of 5 1/2" Stiff Tubing
9191* Top of Tie-back Sleeve
9225* Bottom of Seal Assembly - Landed 5/13/86
9239 Bottom of 40 ft Polished-Bore-Receptacle
Top of Window 9285***
9293**
16" Under-reamed Hole 9330**
Bottom of Window 9372***
Bridge Plug 9428***
EE-3X 9444**
Whipstock 9464**
Set 3/2/81
Calculated Top of Cement Plug 10105**
9 5/8" Casing Shoe 10374**
Top of Barite Plug 10415***
Bottom of 12 1/4" Hole 10811**
Top of Liner Cement 10898***
4 1/2" Liner Shoe 11390***
Cemented 12/8/82
Top of Sand Plug 11770***
Total Depth 8 3/4" Hole 13933**
8/7/81
Packer Whipstock (Top at 9349***) Set 2/2/85
10595* Reconnection Sub Set 5/9/86
10950* Top of Liner Cement
EE-3X drilled to 10528**
Plugged back from fish at 9738 with cement plug to 9464**
11436* 5 1/2" Liner Shoe Cemented 4/21/86
11810* Bottom of Cement Plug
12107* Top of Fill
12235* Top of Sand
12271* Top of Barite
Packer Assembly 12272-12340* (not fished out)
12820* Top of Sand Plug
13182" Total Depth 8 1/2" Hole 6/17/85
* 37.6 KB Redrill Rig EE-3A
** 27 KB Drill Rig EE-3
*** 22 KB Workover/Completion Rig EE-3/Side track EE-3A



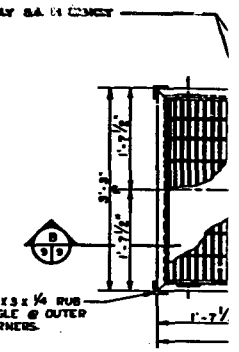
1 DRYWELL MANHOLE COVER PLAN



A SECTION NO SCALE

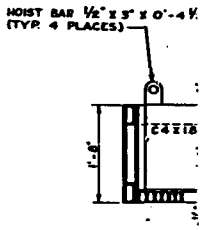


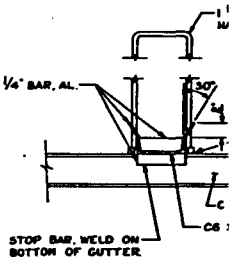
2 DETAIL NO SCALE



FILTER
NO SCALE

1 1/8" Ø BA
WELD TO
GUTTER.

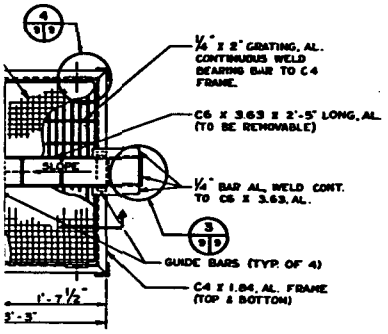




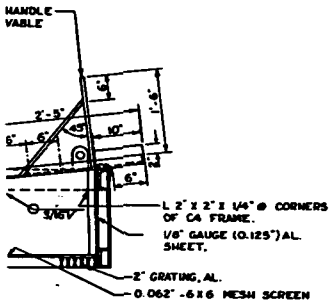
3 DETAIL NO SCALE

NOTES:
1. TOTAL WEIGHT OF MANHOLE COVER IS 111 LBS.
2. TOTAL WEIGHT OF FILTER BASKET WITH SAND IS 1273 LBS.
3. FILTER BASKET SHALL BE ALL ALUMINUM ALLOY (6061-T61) CONFORMING TO ASTM B221, AND SHALL BE ALL WELDED CONSTRUCTION.
4. FILTER BASKET SHALL HAVE 1'-0" OF SAND, LEVEL IN BOX. USING GROUP WILL SPECIFY GRADE.
5. ALL WELDS MUST BE CONTINUOUS WITH NO CRACKS OR CREVICES THAT CONTAMINATED WATER CAN ENTER.

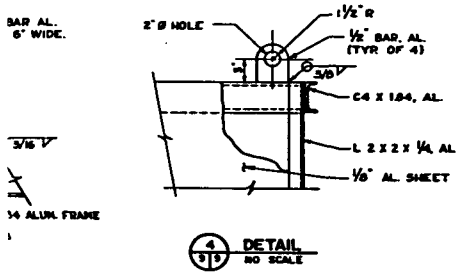
PHASE II



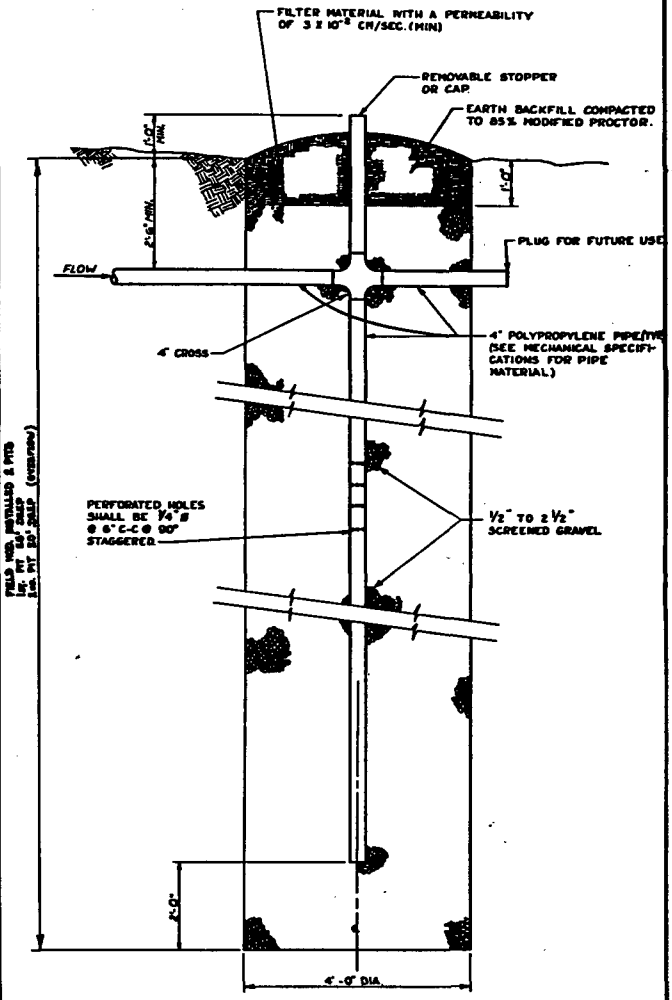
KET PLAN



ION
ALE



4/S DETAIL
NO SCALE



2/S SEEPAGE PIT SECTION
NO SCALE

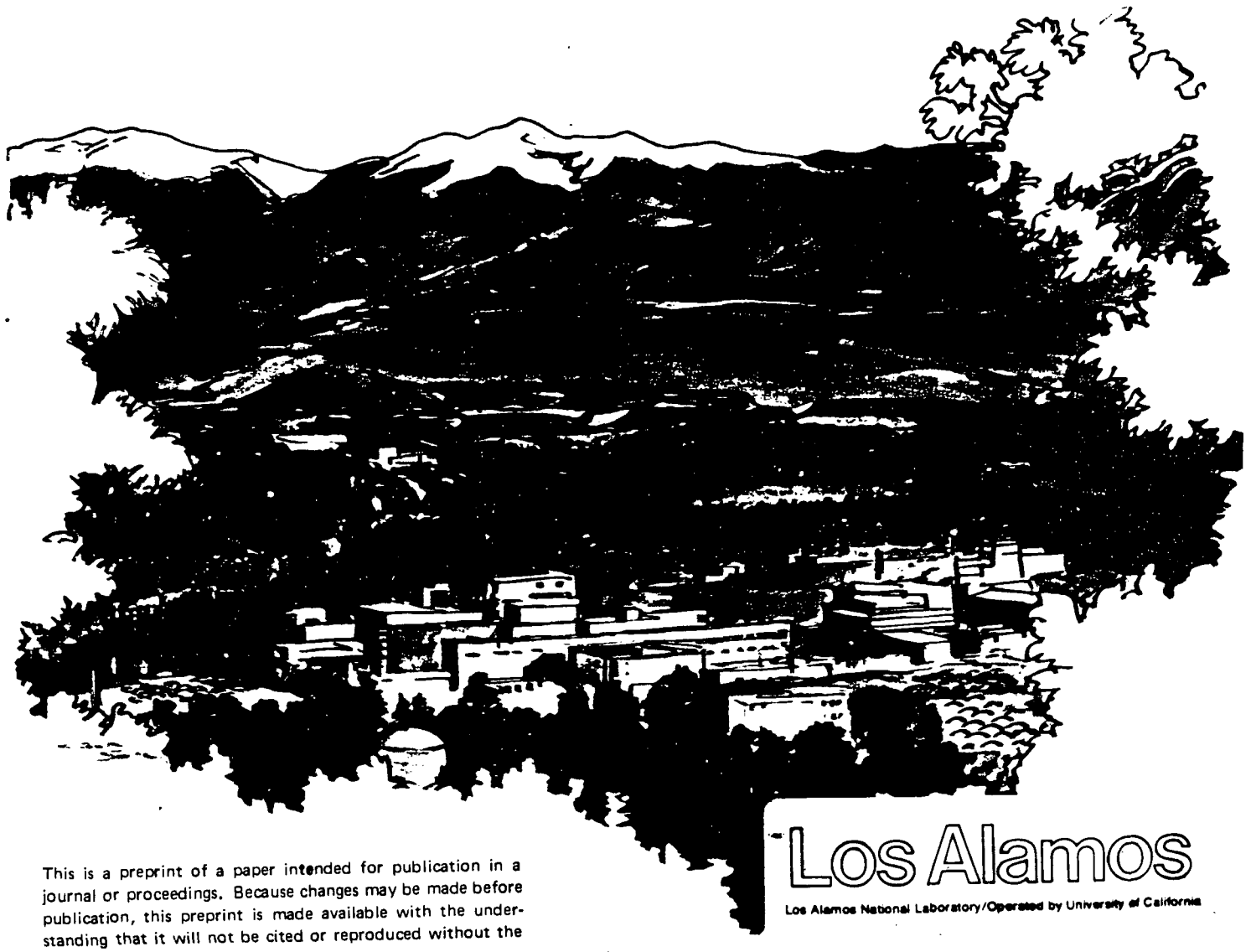
PHASE I

UNITED STATES DEPARTMENT OF ENERGY			
NEW DETONATOR FACILITY, TA-22			
CIVIL			
SEEPAGE PIT DETAIL			
PHASE I & II			
BERNARD JOHNSON INC. ARCHITECTS ENGINEERS PLANNERS	LA-XA-C9-	15	120

ENG C-44942 LAB JOB 6709-22

Attachment 5

FIELD SPOT TESTS FOR CAST & PLASTIC BONDED EXPLOSIVES



Los Alamos
Los Alamos National Laboratory/Operated by University of California

Attachment 5

M-7 EXPLOSIVE SWIPE TEST FORM

Attachment, Group M-7 SOP TD-194

Under the reagent headings please indicate the test results: Y or P for tests positive and N or X for tests negative. Revision 2/5/93

Tester: TOM TURNER
Date: 8/4/93
Location (TA-?-?-?):

Page: of

Reference M-7 Memorandum:

Test No.	Item	Reagent A	B	C	Comments
1.	Reference (IRMA Exhaust)	[P]	[P]	[N]	
2.	Reference (IRMA Exhaust)	[P]	[P]	[P]	
3.	End of Trough	[N]	[N]	[N]	
4.	Water	[N]	[ ]	[ ]	B+C NOT Tested
5.	Water	[ ]	[N]	[ ]	A+C NOT Tested
6.	Water	[ ]	[ ]	[N]	A+B NOT Tested
7.	Pipe	[N]	[N]	[N]	
8.	Repeat Test 3	[N]	[N]	[N]	
9.	Repeat Test 4	[N]	[ ]	[ ]	B+C NOT Tested
10.	Repeat Test 5	[ ]	[N]	[ ]	A+C NOT Tested
11.	Repeat Test 6	[ ]	[ ]	[N]	A+B NOT Tested
12.	Repeat Test 7	[N]	[N]	[N]	
13.		[ ]	[ ]	[ ]	
14.		[ ]	[ ]	[ ]	
15.		[ ]	[ ]	[ ]	
16.		[ ]	[ ]	[ ]	
17.		[ ]	[ ]	[ ]	
18.		[ ]	[ ]	[ ]	
19.		[ ]	[ ]	[ ]	
20.		[ ]	[ ]	[ ]	

Attachment 6

NOTICE!

NO CHEMICAL WASTE IN THIS DRAIN

SEE H&S MANUAL, AR 10-3

OR CONTACT THE WASTE MANAGEMENT GROUP (HSE-7) AT 7-6095

ATTACHMENT B

REPORT ON THE UNDERGROUND INJECTION CONTROL PORTION OF THE MULTIMEDIA INSPECTION OF THE LOS ALAMOS NATIONAL LABORATORY AUGUST 3 TO AUGUST 5, 1993

Inspection of the Los Alamos National Laboratory

Introduction

A multimedia inspection of the Los Alamos National Laboratory (LANL) was conducted at the request of the State of New Mexico and USEPA Region 6. The National Enforcement Investigation Center had the lead for the inspection. The Multimedia Inspection started on the morning of August 2, 1993 and continued for two weeks. The Underground Injection Control (UIC) portion of this inspection started at about noon on August 3, 1993 and lasted until the exit briefing which ended at 4:00PM on August 5, 1993. A time-table of the UIC portion of the inspection is included as Table 1. This report summarizes the UIC inspection of LANL.

Inspection Activities

Day One (8-3-93)

The following UIC inspection of LANL was conducted by Richard Orhbam of the New Mexico Health and Environment Department (NMHED), Ray Leissner of the UIC Section Region VI and Dan Chadwick of the Compliance And Enforcement Section, Headquarters. The inspection team was assisted by Mike Alexander of the Water Quality and Toxics Section, Environmental Protection Group, LANL and his supervisor Steve Rae.

GSA Motor Pool inspection

TA60 Bld1
Background of the Motor Pool at TA60

The GSA motor pool building is a large building that looked well kept inside and out. The motorpool conducts automobile repair and some spot painting for the vehicles used by LANL only. The building where this motor pool is located was built in 1977 and all drains were connected to the sanitary sewer system from the start.

Inspection of the Motor Pool at TA60
(Inside Repair Bays)

The motor pool consists of two machine shops. A trench in the concrete floor that appeared to drain the bay at one time was now sealed off. There were two "safety cleans" in the repair bay that use recycled rinse-water for mechanics to wash their hands.

All drains at the facility that have not been sealed are connected to the sanitary sewer system. We were told that no

TABLE 1

TIME TABLE FOR THE UIC INSPECTION OF LOS ALAMOS NATIONAL LABORATORY

DATE	TIME*	LOCATION	PARTICIPANTS	OBSERVATIONS /ACTIONS
8-3-93	11:30AM	TA3 Bldg100	Ray Leissner, Dan Chadwick, Richard Orbahm	Check in at Bldg 100 (the command ctr). Get LANL issued ID badge & have lunch.
	2:00PM	TA3	Ray, Dan, Richard, ~~Steve Rae & Mike~~ Alexander	Meet with Steve Rae & Mike Alexander of EM8 to discuss what we want to look at.
	3:00PM	TA60 Bldg1	Ray, Dan, Richard, Mike & Motor Pool Manager	Inspect GSA Motor Pool.
	4:30PM	TA3		End of day 1 inspection.
8-4-93	9:00AM	TA3 Bldg100	Ray, Dan, Richard, Mike, Roger Anderson & Cathy Brown	Meet with Roger Anderson & Cathy Brown of NMOCD & drive in two vehicles to Fenton Hill Site.
	10;30AM	TA57	Ray, Dan, Richard, Mike, Roger, Cathy, (Fenton Hill Staff) Jim Alexander, Jay Thorne & Jim Thompson	Inspect Fenton Hill Geothermal Site.
	1:30PM	TA57	(Same as above)	End Fenton Hill inspection & break for lunch.

* Times are approximate

TABLE 1

TIME TABLE FOR THE UIC INSPECTION OF LOS ALAMOS NATIONAL LABORATORY

DATE	TIME*	LOCATION	PARTICIPANTS	OBSERVATIONS /ACTIONS
8-4-93	2:30PM	TA3	Ray, Dan, Richard, Mike & Steve	Return to Steve Rae's office. Ray, Richard & Mike go to inspect sites at TA22 & TA33. I go to Mike's office & review LANL SWPPPs.
	2:45PM	TA3	Dan & Steve	Review LANL SWPPPs looking for potential 5D4 injection wells.
	4:30PM	TA3		End of day 2 inspection.
8-5-93	8:00AM	TA3 Bldg100	Ray, Dan, Richard & Mike	Meet Mike & proceed with him to TA39.
	9:00 AM	TA39 Bldg2	Ray, Dan, Richard, (DOE Staff) Mike Christian & (TA39 Staff) Cathy Jones	Inspect building with floor drains.
	10:00AM	TA33 Bldg86	Ray, Dan, Richard & Mike	Ray & Rich inspect area in front of bldg86. Mike & Dan inspect area behind bldg86.
	10:45AM	TA16 Steam Plant area	Ray, Dan, Richard, Mike, (DOE Engineers) Dave Sneesby & Don Losoro	Inspect potential injection wells in the area around the steam plant.
	12:30	TA16		Lunch

TABLE 1

TIME TABLE FOR THE UIC INSPECTION OF LOS ALAMOS NATIONAL LABORATORY

DATE	TIME*	LOCATION	PARTICIPANTS	OBSERVATIONS /ACTIONS
8-5-93	1:00PM	TA16	Ray, Dan, Richard Mike, (TA16 Staff) Tommy gonzales, Royce Taylor, Don Palmer, Rick Coteris, Renita Cook & Pete Valarte	Inspect HE area.
	3:00PM	TA3	Dan & (DOE staff) Charles & Dorothy	Discuss septic system sampling.
	3:15PM	TA3	Ray, Dan, Richard Mike, Steve & several LANL staff including Director of EM8	Exit Briefing.
	4:00PM	TA3		End UIC inspection of LANL.

drains are connected to leach fields. The drains for the repair bays have an oil-water separator and this is pumped out. Used oil is picked up from the site monthly by a company called "Mesa."

(Area Adjacent to and Outside of the Repair Bays)

This facility uses a brake washing method called the "wet-down" method that is approved by the Occupational Safety and Health Administration. In this method the brake drum is washed down with water (instead of compressed air) to protect workers from breathing asbestos dust.

The water is collected by berms, syphoned into barrels and stored for recycling. Used antifreeze and asbestos water are recycled. The storage area for the barrels of this waste water has a berm all the way around it that is approximately 10-inches high. Also used batteries were stored in a separate, labeled area on pallets and similarly bermed. Empty 55-gallon drums were stored in a labeled area also. They were stored upside down to keep rain out and the area had secondary containment for residual oil from the drums.

Waste oil at this facility is routed via sub-floor piping to three tanks which are located on a lot adjacent to and topographically lower than the facility. The three tanks have a combined capacity of one thousand gallons, which I was told is generated by the facility in one month. The piping have clean-out points that can be opened from the top.

The facility has a steam-cleaning area that is bordered by a trench, which is covered by a steel plate. The trench flows to an oil/water separator which is periodically pumped out. Effluent passing the oil/water separator goes to the sanitary sewer system.

This facility also does spot painting in an area outside the repair bays. Paints were stored nearby and the area was labeled. I was told that large paint jobs are sent to commercial facilities. We saw a "Suburban" that had some primer on it and it was prepared for painting. It was located inside the repair bay area adjacent to the paint area we were just showed. To me it appeared to be a considerable paint/body-work job. About three-fourths of the truck was primed and prepared for painting.

Observations/Conclusions

All drains at the motorpool are connected to the sanitary sewer system. The inspection team found no injection wells at this site.

Day Two (8-4-93)

Background of TA57
(Fenton Hill Geothermal Area)

Roger Anderson, an engineer for New Mexico Oil Conservation Division (NMOCD), and Cathy Brown a geologist for NMOCD accompanied the UIC inspection team on an inspection of the Fenton Hill geothermal area at TA57 (about 30 miles from TA3). At TA57 we will be inspecting the geothermal injection well, look for and inspect other injection wells and inspect storage areas for potential satellite RCRA disposal sites.

Inspection of TA57
(Fenton Hill Geothermal Area)

Machine Shop Adjacent to Visitors Trailer

The first place inspected was the machine shop that was adjacent to ~~the~~ visitors trailer at TA57. I was accompanied on this inspection by Jay Thorne of the TA57 staff. He told me that all equipment for this TA, and much of the equipment for the other TAs at LANL, are made on-site at this machine shop.

The shop had a "Safety Clean" device for washing parts. This consisted of a closed loop cleaning system that uses trichloroethane. This device is serviced by a contractor monthly. Oily rags and cloths from cleanup of this shop and other activities at TA57 are collected and taken to Los Alamos weekly.

There was a metal cabinet marked "flammable" that was used for storing paints and solvents. Only a few one-gallon containers were in the cabinet.

There were no drains evident in the machine shop. There were some holes in the floor that clearly did not penetrate all the way through the floor. Mr Thorne said they were for the placement of portable work-stands.

All biological waste from the visitors trailer/machine shop complex ~~went to~~ a septic tank located adjacent to the building. But the machine shop itself did not appear to be connected to the septic system.

Inspection of TA57 Grounds

Next I joined the main inspection group (See Table 1 for participants) and we took a circular tour of the grounds, moving along the same route the water would take after production from the reservoir. The first place the water goes to after it is produced from the ground is the heat exchanger. The heat

exchanger consists of several miles of piping with fans blowing up over the piping.

The inspection team went next to the electric generation room. Large nitrogen bottles were located near the generators. They were used for emergency back-pressure.

As we walked from the generator to the injection well-head we went past a small building with no wall on the front (Identified as the Storage Drum Shed on the TA57 map). We could not approach the building because of a fence but I could see that it contained a barrel marked "Flammable Liquids"; six 55-gallon drums, and five smaller drums. There were visible stains on one of the drums. I was told that lubrication oils and antifreezes were stored there and that (although not visible) the storage area had a drip-pan berm below the platform.

Next we stopped at the injection well-head. There we could see three casing strings plus the conductor casing. A discussion was held at the injection wellhead regarding the MIT of this well conducted in July 1993. As previously discussed in the opening lecture about Fenton Hill, a constant flow rate of about 5 to 7 gallons per minute is coming from the annulus between the 4 1/2 inch casing and the 9 5/8 inch casing. This indicates communication between the 9 5/8 inch casing (long string casing) and the surrounding formation below the 13 5/8 inch casing which is set at 2,55~~0~~ feet. This is well below the USDW estimated to be at a depth between 800 and 1000 feet. The permit for this well from NMOCD only requires proof of mechanical integrity of the annulus between the 9 5/8 inch casing and the 13 3/8 inch casing. Therefore this injection well is in compliance with its state-issued permit. It should also be noted that when active this well only injected potable water that was chlorinated for algae control.

Near the well-head there is a large grate or drain in the middle of the compound. It is located in a low area of the compound and it drains to the reservoir. This area is also a hydrogen sulfide caution area.

Inspection of Storage Warehouse and Adjacent Smaller Building

At this point I left the main inspection team and went with Jim Albright to inspect a storage warehouse and an adjacent smaller building that was also used for storage. In the main warehouse I saw three cabinets that held what Jim believed were solvents. The containers in this cabinet were unmarked and Jim was not very knowledgeable about the use of the warehouse. This area was marked flammable. The shelves in the warehouse held mostly spare parts and I could see no 55-gallon drums.

The adjacent smaller building housed large, tall, bottled gas cylinders marked nitrogen, carbon dioxide and oxygen. On the map this building is listed as the "Oxygen Shed."

Inspection of Building Near Geothermal Production Well

Another small building that was located near the production well, adjacent to the geophysical logging truck was inspected. It appeared to store only spare parts. No barrels or cans were in sight.

Observations/Conclusions

The geothermal injection well (Class V designation number 5A5) was in compliance with its permit. No other injection wells were found at this site. Observations regarding storage of potentially RCRA-regulated materials will be forwarded to officials in the RCRA program.

Day Three (8-5-93)

Background of TA39
(Ancho Canyon Site)

The activities of the TA include mostly photographic development and shock wave studies. This TA has a sanitary sewer system that includes buildings 98, 100, 107 and the shop. Buildings 2 and 89 at this TA are connected to a leach field. The floor drains have been plugged. However, areas where work is not taking place have not been plugged.

Inspection of TA39, Building 2
(Ancho Canyon Site)

We inspected a room that had boilers and other equipment. A tube was attached to the boilers to absorb blow-down of water and oil. It was designed and manufactured at LANL and consisted of shredded absorbent sheets (the kind used for industrial spills), that are inserted in a plastic tube. Three floor drains located in the room are connected to a sump. Stains of water and oil were on the floor under some motors of the pumps.

The floor drains within this TA that go to the septic system/leach field are located in assembly rooms, former machine shops and photographic development laboratories. All of these were plugged. Cathy oversaw the plugging of floor drains located in TA39. Plugging procedure for some of the floor drains is as follows. A sheet of plastic was cut larger than the hole. This was then put in the hole and sealed by pouring a silica-based plaster in it called "silastic." Other floor drains that we saw in the former machine shop were sealed by placing a rubber-stopper type seal into the hole where the drain was. Turning the

metal screw in the middle of the stopper makes the stopper expand and this seals the hole. A steel grate is placed over this. We saw indication of another hole in the floor of the machine shop that was the same diameter as the floor drains and was covered by a steel plate. We were told this was for electrical wiring.

Observations/Recommendation For TA39

All the floor drains we saw at this TA have been sealed and we saw signs that BMPs were being implemented. Some of the plugs in the floor drains we saw at this TA are temporary and should all be permanent.

Background of TA33, Building 86
(HP Site)

Tritium experiments were conducted in this building. Now it is in the process of being "decommissioned." A plugging and abandonment plan is being designed. There were floor drains in the machine shop of this building. The floor drains have been plugged with concrete. The inspection team was not able to verify the existence (and/or plugging) of the floor drains.

There is a smaller building adjacent to building 86. This is building 19 and it is where the facility guard and the contractors closing the building stay. This building is using the same septic system to dispose of its biological waste that building 86 was using.

Inspection of TA33, Building 86
(Area in Front of Bldg86)

We observed stacks of injection pipe and coreing pipe beside the road across from building 86. Other trash was lying around this pipe. Ray and Rich went over to investigate this while I went with Mike to look behind building 86.

(Area Behind Bldg86)

Mike and I walked to the area behind building 86 where the septic tank and leach field were. It was staked out and two covered man-holes were observed. These were not locked and were accessible. One of the stakes located at the midpoint of where the leach field was suppose to be had a tag on it that said "sand filter". The area where the septic tank and leach field were located was relatively flat, sloping slightly away from the building in the direction of the long axis of the leach field. Beyond the leach field in the direction of the slope was a broad valley. In the area directly over the septic tank/Leach field system Sage Brush was thriving. Sage Brush was only sparsely growing beyond this area (the plants may be thriving on nutrients derived from the leach field).

Observations/Conclusions

Because Tritium was used at this site all closures should be thorough. LANL should work closely with New Mexico while developing their closure plans. Some tritium has been found in the canyon behind building 86. Although it is believed that the tritium is from the NPDES permitted outfall that existed here it should be investigated whether the leach field may be the source of some of this tritium. The septic tank and leach field have been sampled but the results are not yet available. New Mexico and USEPA officials should be very interested in the results of that sampling especially because the septic system is still active and could be flushing contaminants into the environment.

Background of TA16, Building 540 Area (the Steam Plant Area) (S-Site)

The steam plant supplies steam-heat to the buildings of TA16. It has floor drains. An NPDES permitted outfall adjacent to the steam plant has a continuous discharge that looks clear. I was told that this outfall is boiler blow-down water and the NPDES discharge replaces two dry well type injection wells at this sight that were in series with each other. The soil permeability would not accept the volume of boiler blow-down water that the plant generated.

Inspection of TA16, Building 540 Area)

In the area outside the steam-plant and near the NPDES outfall the inspection team observed the following.

1. Seven corrugated steel pipes 3 to 4 feet in diameter. Five of these were located 20 to 50 feet from the NPDES outfall. These large conduits had what appeared to be steam pipes in them. The corrugated steel conduits were open to the ground at the bottom and were secured with steel mesh over their tops. Not all steel mesh covers were locked.

2. Also observed in the area were two square grates near the front of the steam plant which housed steam condensate pipes.

3. A cement mound was observed in the area with a manhole cover on it that said "Structure No.; TA-16-790; Designation; Manhole 16790".

4. A steel pipe (about 4 to 5 inches in diameter) was also seen sticking out of the ground just outside the fence from the steam plant, just down-hill from some steam plant piping near the abandoned dry wells. It was unmarked.

5. At the NPDES outfall two gauges were monitoring the pH of the outfall. One read a pH of 7.11 and the other read 7.54. Also at

this area were two concrete bunkers located over the outfall than were designed for taking grab samples of the outfall effluent.

At this point in our inspection of the area adjacent to Building 540 of TA16 we met Don Losoro and Dave Sneesby (LANL engineers) who told us about the wells that were abandoned at this location. The two dry-wells were French Drains (they also called them seepage pits). They were lined with boulders and open at the bottom. For closure both wells were filled with soil and three capped steel pipes stick out of the ground where the wells once were. According to Don and Dave the steam plant has always been hooked up to the sanitary sewer system (for biological waste disposal).

Observations/Conclusions

The seven large conduits in this area could be potential conduits for pollution to ground water. Also the one unmarked pipe was unusual, especially because all other conduits were well marked. Unmarked pipe that is sticking out of the ground is a bad management practice for a place with the pollution potential of LANL. The two dry-wells in the area appeared to be properly closed if the effluent was only from boiler blow-down although it was not mentioned if the soil below the boulder lining was sampled.

Background of TA16 (High Explosives Area)

Dry wells are located at buildings 58, 208 and one across the road from building 306. The dry-well at building 58 did not percolate, so the effluent was routed to the adjacent canyon. The well across from building 306 was abandoned because it did not percolate and it was never used for waste disposal. Closure of the injection well across from building 306 involved filling it with soil. Royce Taylor, an engineer at TA16, was not sure if there was ever a closure plan for it.

Inspection of TA16 (High Explosives Area)
(Area Across From Building 306)

At the dry well across from building 306 we met Renita Cook of the Materials Section, who helped with discussion of the well. This dry well was filled with soil, and the metal culvert that was the surface casing of the well was left in place. A large, circular metal cover for the well was lying on the ground next to the closed well. The NPDES outfall is 15 feet away from the abandoned well (NPDES number EPA05A058, identified as being located at TA16 300 line). Our records showed that the out-put at this outfall was 2,200 gallons per day. The TA technician said that output is now 10 gallons per minute. This is 14,400 gallons per day as verified by the TA technician (knowing daily duration of discharge).

(Inspection of Sumps Adjacent to the HE Manufacturing Buildings)

We went from the dry well to look at the sumps that are part of the drainage system of the HE manufacturing buildings. The sump we looked at had been plugged but we were told it was typical. It had baffles in it to let HE waste accumulate. An alarm had recently been installed at active sumps that let the building engineer know when the baffles had to be emptied. Some of the effluent from this building had plastics in it that binds to the HE during the manufacturing process. I observed that the effluent in one of the sumps we looked at was brown with a white discontinuous film on top of it.

(Burning Area)

Next our inspection took us to the observation building adjacent to the burn pads where we met Pete Valarte, the manager of the 300 line. Pete showed us the burn pads and a near-by NPDES outfall that discharged burn pad effluent into the canyon.

Observation/Conclusions

The only SDWA issue that we observed at this TA was whether or not the well across from building 306 had been properly closed.

Overall Observations and Conclusions

The findings from the UIC inspection of LANL are summarized as follows.

TA60, Bldg1 (Motor pool) - All drains are connected to the sanitary sewer system and regulated fluids are recycled.

TA57 (Fenton Hill Site) - The geothermal injection well is in compliance with its state permit. No other injection wells were found at the TA. The RCRA observations have been forwarded to the RCRA program.

TA22, Group M1-7 Detonator Facility - Three dry wells were found at this site. They were determined to be 5W20 injection wells. Two were abandoned and one was active. The active well accepts wash water from the clothing of HE manufacturing workers. The well accepts 300 gallons per week. Sampling showed no HE contaminants in the wash water. LANL personnel have agreed to ensure that the inactive wells will be properly plugged and abandoned, and the active well will require a permit. Documentation on the plugging activities will be provided. **I was not present at this inspection because I was reviewing files at this time.**

TA39, Bldg2 - There is a potential for fluids from machinery and photographic development to enter the septic system at this TA. Some of the plugs used at this TA are temporary and we recommended that these drains be permanently closed. There were signs of BMPs in place to prevent misuse of the TAs septic system.

TA33, Bldg86 - A tritium plume was found behind this building. The septic system is still being used by the small staff that is overseeing the closing of the building. Floor drains have been sealed but if tritium was introduced into the septic system before the drains were closed then some of this tritium could still be flushed into the subsurface by continued use. LANL officials have sampled the septic system and are evaluating the situation.

TA16, Bldg540 (Steam Plant) - French drains or seepage pits that were formerly used for boiler blow-down disposal have been closed and the boiler blow-down is now routed to an NPDES outfall.

TA16 (HE Manufacturing Area) - NMED has requested that DOE should submit closure plans for the injection well located across from building 306 for state approval.

Department of Energy
Field Office, Albuquerque
Los Alamos Area Office
Los Alamos, New Mexico 87544

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. William J. LeMay, Director
Oil Conservation Division
New Mexico Energy, Minerals and Natural
Resources Department
P. O. Box 2088
Santa Fe, NM 87504-2088

Dear Mr. LeMay:

This information, for calendar years 1990 and 1991, is being submitted to you as a supplement to the Ground Water Discharge Plan (GW-31) for the Fenton Hill Geothermal Site. The Discharge Plan was renewed by the Oil Conservation Division (OCD) on July 19, 1990, until June 5, 1995.

There were no changes or modifications to the geothermal research program that would result in changes to this plan. There was also no spill or breach of the service pond or any other part of the geothermal system. Following is a summary of relevant data for calendar 1990 and 1991:

1. There were no National Pollutant Discharge Elimination System wastewater discharges to surface waters as shown in Enclosure I.

2. Enclosure II contains a summary of Water Injected into Geothermal Wells for 1990 and 1992.

3. The Service Pond liner installation was completed in June, 1990. Installation was in accordance with plans and specifications approved by OCD as a requirement of the Discharge Plan.

Please call Joseph C. Vozella of my staff at 667-5288, or Neil Williams of Los Alamos National Laboratory's Environmental Protection Group at 665-0454 if you have any questions concerning this information.

Sincerely,

Jerry L. Bellows
Area Manager

LESH:6JV-011

Enclosures:
See page 2

cc w/enclosures:
J. Vozella, ES&H, LAAO
A. Tiedman, ADO, LANL, MS A120
T. Gunderson, EM-DO, LANL, MS K491
K. Hargis (EM-8:92-3166-1),
EM-8, LANL, MS K490
S. Rae, EM-8, LANL, MS K490
N. Williams, EM-8, LANL, MS K490
J. Albright, EES-4, LANL, MS D443
Circ. File

Enclosure I

NPDES Permitted Discharges from the Service Pond
for 1990 and 1991

Fenton Hill Geothermal Site
Sandoval County, N. M.

Date of Discharge	Gallons Discharged From Service Pond
1990	NONE
1991	NONE

There were no accidental spills or leaks from the Service Pond during 1990 and 1991.

Enclosure II

Water Injected into Geothermal Wells
for 1990 and 1991

Fenton Hill Geothermal Site
Sandoval County, N. M.

Calendar Year	Gallons Injected Into Well
1990	3,174,274
1991	2,587,212

There were no accidental spills or leaks during injection of water into the geothermal wells or during venting of water from the wells.

STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

GARREY CARRUTHERS
GOVERNOR

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87504
(505) 827-5800

April 4, 1990

CERTIFIED MAIL
RETURN RECEIPT NO. P-918-402-152

Mr. Jock B. Tillman, Area Manager
Department of Energy
Los Alamos Area Office
Los Alamos, New Mexico 87544

RE: Proposed Service pond liner
Discharge Plan GW-31
Fenton Hill Geothermal Site

Dear Mr. Tillman:

The Oil Conservation Division (OCD) has received the Plans and Specifications, dated February 20, 1990, for the lining of the service pond at the above referenced facility.

The proposed double lined pond with leak detection is in compliance with the OCD Guidelines for Design and Construction of Waste Storage/Disposal Pits and will provide protection of ground water and the environment from contamination. The liner is hereby approved for installation.

Please notify this office when installation of the leak detection system is scheduled to afford an OCD staff member the opportunity to witness the installation.

The lined service pond plans and specification will become part of your previously approved discharge plan.

If you have any questions, please feel free to call met at (505) 827-5884.

Sincerely,

Roger C. Anderson
Environmental Engineer

RCA/sl

cc: Aztec District Office

STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

GARREY CARRUTHERS
GOVERNOR

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87504
(505) 827-5800

July 19, 1990

CERTIFIED MAIL
RETURN RECEIPT NO. P-918-402-290

Area Manager
Department of Energy
Los Alamos Area Office
Los Alamos, New Mexico 87544

RE: Discharge Plan GW-31 Renewal
Fenton Hill Geothermal Facility
Sandoval County, New Mexico

Dear Sir:

The ground water discharge plan renewal (GW-31) for the Fenton Hill Geothermal Facility located in Section 31, Township 19 North, Range 2 East, NMPM, Sandoval County, New Mexico is hereby approved. The renewal application consists of the original discharge plan as approved June 5, 1985, materials dated February 26, 1990 and the renewal application dated May 17, 1990.

The discharge plan was submitted pursuant to Section 3-106 of the New Mexico Water Quality Control Commission Regulations. It is renewed pursuant to Section 3-109.A., which provides for the possible future amendments of the plan. Please be advised that the approval of this plan does not relieve you of liability should your operation result in actual pollution of surface or ground waters or the environment which may be actionable under other laws and/or regulations.

Please note that Section 3-104 of the regulations requires that "when a plan has been approved, discharges must be consistent with the terms and conditions of the plan." Pursuant to Section 3-107.C., you are required to notify the Director of any facility expansion, production increase, or process modification that would result in any change in the discharge of water quality or volume.

Pursuant to Section 3-109.G.4., this plan approval is for a period of five (5) years. This approval will expire June 5, 1995 and you should submit an application for renewal in ample time before that date.

On behalf of the staff of the Oil Conservation Division, I wish to thank you and your staff for your cooperation during this discharge plan review.

Sincerely,

William J. LeMay
Director

WJL/RCA/sl

cc: OCD Aztec District Office

AUGHENBAUGH & ASSOCIATES
ENGINEERS AND SURVEYORS
POST OFFICE BOX 44354
RIO RANCHO, NEW MEXICO 87174
(505) 891-3097

September 28, 1990

Los Alamos National Laboratory
Att'n: Mr. Jim Thomson, MS-D443
Post Office Box 990
Los Alamos, New Mexico 87545

RE: LANL CONTRACT #5-5580R-1 TOD-6
EE-1 POND, FENTON HILL
HOT DRY ROCK GEOTHERMAL PROJECT

Dear Mr. Thomson:

As requested, two sets of As Built Drawings for the referenced project have been made and certified. By a copy of this letter, the drawings will be delivered to the New Mexico Oil Conservation Division and New Mexico State Engineer's Office for their information and use.

Please let us know if we can be of any further assistance.

Sincerely yours,
Aughenbaugh & Associates

Dustin M. Aughenbaugh, P.E.

cc: NM Oil Conservation Div. w/1 set Dwg.
Att'n: Mr. Robert Anderson
NM State Engineer w/1 set Dwg.

DMA/mra

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
Ecological Services
Suite D, 3530 Pan American Highway, NE
Albuquerque, New Mexico 87107
June 18, 1990

Mr. William J. Lemay, Director
Oil Conservation Division
P. O. Box 2088
Santa Fe, New Mexico 87504-2088

Dear Mr. Lemay:

This letter responds to the public notice for proposed discharge plans submitted to your division. We have reviewed the following plans and have not identified any resource issues of concern to our agency. Renewal of these plans should not have a significant impact upon plants, fish, shellfish or wildlife resources of New Mexico.

GW-18, OXY USA, Inc., Midland, Texas.
GW-31, U.S. Department of Energy, Los Alamos Area Office, Los Alamos, NM.

These comments represent the views of the Fish and Wildlife Service. Thank you for the opportunity to review and comment on the proposed plans. If you have any questions concerning our comments please contact Tom O'Brien at (505) 883-7877 or FTS 474-7877.

Sincerely yours,

John C. Peterson
Field Supervisor

cc:
Director, New Mexico Department of Game and Fish, Santa Fe, New Mexico
Director, New Mexico Health and Environment Department, Environmental Improvement Division, Santa Fe, New Mexico
Regional Administrator, Environmental Protection Agency, Dallas, Texas
Regional Director, U.S. Fish and Wildlife Service, Fish and Wildlife Enhancement, Albuquerque, New Mexico

THE OBSERVER
New Mexico's Fastest Growing Newspaper

Panorama Plaza Suite D & E
1594 Sara Rd, Rio Rancho, NM 87124
P.O. Box 15878, Rio Rancho, NM 87174
(505)892-8080 FAX (505)892-5719

SD_____

AFFIDAVIT OF PUBLICATION

STATE OF NEW MEXICO)
)
COUNTY OF SANDOVAL)

MICHAEL J. RYAN, being duly sworn, upon oath stated:

That affiant is the Publisher of THE OBSERVER, a weekly newpape published in the County of Sandoval and having a gerneral circulation i the City of Rio Rancho and the County of Sandoval and duly qualified fc the publication of legal advertisements within the meaning of the Publica tion of Notice Act, being Sections 14-11-1 seq., NMSA 1978, as amendec that the publication, a copy of which is hereto attached, was published i said newpaper in the regular edition and entire issue of every number c the paper during the period and time of publication, and that said Notic was published in the Newspaper proper, and not in a supplemen for 1 consecutive weeks, the first publication being on the 30th day of May 1990 and the subsequent publication(s on _____ 1990 and that payment therefore has bee made or assessed as court costs in the case and cause number shown i the attached publication.

Michael J. Ryan
Affiant

Subscribed and sworn to before me this 30th day of May, 1990.

Notary Seal expires 3-9-93

Sharon R Ely
Notary Public

Seal

Any interested person may obtain further information from the Oil Conservation Division and may submit written comments to the Director of the Oil Conservation Division at the address given above. Prior to ruling on any proposed discharge plan or its modification, the Director of the Oil Conservation Division shall allow at least thirty (30) days after the date of publication of this notice during which comments may be submitted to him and public hearing may be requested by any interested person. Requests for public hearing shall set forth the reasons why a hearing should be held. A hearing will be held if the Director determines there is significant public interst.

If no pubic hearing is held, the Director will approve or disapprove the proposed plan based on information avialable. If a public hearing is held, the Director will approve or disapprove the proposed plan based on information in the plan and information submitted at the hearing.

GIVEN under the Seal of New Mexico Oil Conservation Commission at Santa Fe, New Mexico, on this 22nd day of May, 1990. To be published on or before June, 1, 1990.

SEAL
STATE OF NEW MEXICO
OIL CONSERVATION DIVISION
/s/WILLIAM J. LEMAN,
Director

Date of publication: May 30, 1990.

NOTICE OF PUBLICATION
STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESORCES DEPARTMENT
OIL CONSERVATION DIVISION

Notice is hereby given that pursuant to New Mexico Water Quality Control Commission Regulations, the following discharge plan renewal application has been submitted to the Director of the Oil Conservation Division, State Land Office Building, P.O. Box 2088, Santa Fe, New Mexico 87504-2088, Telephone (505) 827-5800:

(GW-31) U.S. Depratment of Energy, Fenton Hill Geothermal Facility, Jack B. Tillman, Area Manager, Albuquerque Operations, Los Alamos Area Office, Los Alamos, New Mexico 87544, has submitted an application for renewal of its previously approved discharge plan for its Fenton Hill Geothermal Facility located in the NE/4, Section 13, Township 19 North, Range 2 East, NMPM, Sandoval County, New Mexico. Water from a geothermal loop is discharged to a double-lined service pond equipped with leak detection during periods of emergency venting or during periods when maintenance operations on the geothermal loop require a discharge of water from the loop. The discharge to the pond will be temporary as the water will be reinjected to the geothermal loop when normal operating conditions are attained. The water from the geothermal loop has a total dissolved solids concentration of approximately 3200 mg/l. The ground water most likely to be affected is at a depth of approximately 370 feet with a total dissolved solids concentration of approximately 240 mg/l. The discharge plan addresses how spills, leaks or other discharges to the ground will be handled.

NOTICE OF PUBLICATION
STATE OF NEW MEXICO
ENERGY, MINERALS & NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION

Notice is hereby given that pursuant to New Mexico Water Quality Control Commission Regulations, the following discharge plan renewal application has been submitted to the Director of the Oil Conservation Division, State Land Office Building, P. O. Box 2088, Santa Fe, New Mexico 87504-2088, Telephone (505) 827-5800:

(GW-31) U.S. Department of Energy, Fenton Hill Geothermal Facility, Jack B. Tillman, Area Manager, Albuquerque Operations, Los Alamos Area Office, Los Alamos, New Mexico 87544, has submitted an application for renewal of its previously approved discharge plan for its Fenton Hill Geothermal Facility located in the NE/4, Section 13, Township 19 North, Range 2 East, NMPM, Sandoval County, New Mexico. Water from a geothermal loop is discharged to a double-lined service pond equipped with leak detection during periods of emergency venting or during periods when maintenance operations on the geothermal loop require a discharge of water from the loop. The discharge to the pond will be temporary as the water will be reinjected to the geothermal loop when normal operating conditions are attained. The water from the geothermal loop has a total dissolved solids concentration of approximately 3200 mg/l. The ground water most likely to be affected is at a depth of approximately 370 feet with a total dissolved solids concentration of approximately 240 mg/l. The discharge plan addresses how spills, leaks or other discharges to the ground will be handled.

Any interested person may obtain further information from the Oil Conservation Division and may submit written comments to the Director of the Oil Conservation Division at the address given above. Prior to ruling on any proposed discharge plan or its modification, the Director of the Oil Conservation Division shall allow at least thirty (30) days after the date of publication of this notice during which comments may be submitted to him and public hearing may be requested by any interested person. Requests for public hearing shall set forth the reasons why a hearing should be held. A hearing will be held if the Director determines there is significant public interest.

If no public hearing is held, the Director will approve or disapprove the proposed plan based on information available. If a public hearing is held, the Director will approve or disapprove the proposed plan based on information in the plan and information submitted at the hearing.

GIVEN under the Seal of New Mexico Oil Conservation Commission at Santa Fe, New Mexico, on this 22nd day of May, 1990.

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION
s/ *WILLIAM J. LEMAY, Director*

Journal June 1, 1990

STATE OF NEW MEXICO }
County of Bernalillo } ss

Thomas J. Smithson, being duly sworn declares and says that he is National Advertising manager of the **Albuquerque Journal**, and that this newspaper is duly qualified to publish legal notices or advertisements within the meaning of Section 3, Chaper 167, Session Laws of 1937, and that payment therefore has been made or assessed as court costs; that the notice, a copy of which is hereto attached, was published in said paper in the regular daily edition,

for 1 times, the first publication being on the 1 day of June, 1990, and the subsequent consecutive publications on ....., 1990.

Thomas J. Smithson

Sworn and subscribed to before me, a Notary Public in and for the County of Bernalillo and State of New Mexico, this 1 day of June, 1990.

Bernadette Quintana
NOTARY PUBLIC

PRICE $23.64

Statement to come at end of month.

ACCOUNT NUMBER C 21184

OFFICIAL SEAL
Bernadette Quintana
NOTARY PUBLIC - NEW MEXICO
MY COMMISSION EXPIRES 12-18-93

EDJ-15 (R-12/89)

NOTICE OF PUBLICATION

STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

Notice is hereby given that pursuant to New Mexico Water Quality Control Commission Regulations, the following discharge plan renewal application has been submitted to the Director of the Oil Conservation Division, State Land Office Building, P. O. Box 2088, Santa Fe, New Mexico 87504-2088, Telephone (505) 827-5800:

(GW-31) U.S. Department of Energy, Fenton Hill Geothermal Facility, Jack B. Tillman, Area Manager, Albuquerque Operations, Los Alamos Area Office, Los Alamos, New Mexico 87544, has submitted an application for renewal of its previously approved discharge plan for its Fenton Hill Geothermal Facility located in the NE/4, Section 13, Township 19 North, Range 2 East, NMPM, Sandoval County, New Mexico. Water from a geothermal loop is discharged to a double-lined service pond equipped with leak detection during periods of emergency venting or during periods when maintenance operations on the geothermal loop require a discharge of water from the loop. The discharge to the pond will be temporary as the water will be reinjected to the geothermal loop when normal operating conditions are attained. The water from the geothermal loop has a total dissolved solids concentration of approximately 3200 mg/l. The ground water most likely to be affected is at a depth of approximately 370 feet with a total dissolved solids concentration of approximately 240 mg/l. The discharge plan addresses how spills, leaks or other discharges to the ground will be handled.

Any interested person may obtain further information from the Oil Conservation Division and may submit written comments to the Director of the Oil Conservation Division at the address given above. Prior to ruling on any proposed discharge plan or its modification, the Director of the Oil Conservation Division shall allow at least thirty (30) days after the date of publication of this notice during which comments may be submitted to him and public hearing may be requested by any interested person. Requests for public hearing shall set forth the reasons why a hearing should be held. A hearing will be held if the Director determines there is significant pubic interest.

If no public hearing is held, the Director will approve or disapprove the proposed plan based on information available. If a public hearing is held, the Director will approve or disapprove the proposed plan based on information in the plan and information submitted at the hearing.

GIVEN under the Seal of New Mexico Oil Conservation Commission at Santa Fe, New Mexico, on this 22nd day of May, 1990. To be published on or before June 1, 1990.

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

WILLIAM J. LEMAY, Director

S E A L

Department of Energy
Albuquerque Operations
Los Alamos Area Office
Los Alamos, New Mexico 87544

MAY 17 1990

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. William J. LeMay, Director
Oil Conservation Division
NM Energy, Minerals and
Natural Resources Department
P. O. Box 2088
Santa Fe, NM 87504-2088

Dear Mr. LeMay:

Enclosed please find the Department of Energy's application for renewal of the Discharge Plan for Geothermal Operations at Fenton Hill, Sandoval County, New Mexico. We are requesting an extension of the existing plan for an additional five year period in order to complete the experimental work at the Fenton Hill Geothermal site. As is indicated in the application for renewal, no major changes in the operation of the facility are anticipated.

If you have any questions concerning the submittal, please feel free to call Jim Phoenix of my staff at 667-5280.

Sincerely,

for Jack B. Tillman
Area Manager

LESH:2PS-263-5

Enclosures

cc:
Kathleen Sisneros, NM Environmental Improvement Division, Santa Fe, NM
A. Tiedman, LANL, MS-A120
J. Albright, LANL, MS-D443

Application for Renewal

Discharge Plan for Geothermal Facilities

I. GENERAL INFORMATION

A. Name, Address and Telephone Number for Discharger or Legally Responsible Party:

Jack B. Tillman, Area Manager
U.S. Department of Energy
Los Alamos Area Office
528 35th Street
Los Alamos, New Mexico 87544

(505) 667-5105

B. Location of Discharge: 1/4 NE Section 13, Township 19 North, Range 2 East, NMPM.

The Fenton Hill geothermal site is located in the Jemez Mountains in Sandoval County of north central New Mexico. It is about 35 miles west of Los Alamos and 10 miles north of Jemez Springs.

C. Type of Operation: Geothermal.

The Los Alamos Hot Dry Rock (HDR) Geothermal Energy Development Program, sponsored by the U.S. Department of Energy (DOE), Division of Geothermal and Hydropower Technologies, is a research program to develop the technology necessary to economically extract the energy contained at accessible depths within the earth's crust. The Fenton Hill Project is the field site for the application and testing of this research. The site is operated in cooperation with the U.S. Department of Agriculture, National Forest Service.

A complete description of the Project is presented in the original Discharge Plan approved June 5, 1985. A modification to the original plan was approved September 8, 1987, to allow for the use of chemically reactive tracers to obtain measurements of the temperature patterns in the geothermal zone. The focus of the project has not changed substantially since its inception; however, the time schedule for completion of the various experiments has continued to be pushed back. For example, the workover operations on the geothermal wells originally scheduled for 1985 have only recently been completed.

In FY90 and through the first half of FY91, the Project will continue to focus exclusively on the preparations for the Long Term Flow Test (LTFT), an experiment designed to develop a comprehensive understanding of the structure, flow characteristics, geochemistry, and thermal-power potential of the HDR reservoir. By the summer quarter of FY91, barring unforeseen developments, the entire LTFT surface system will have been assembled, tested, and certified for safe, reliable operation. The LTFT experiment is currently scheduled to begin in late 1991 or early 1992 and will continue for a minimum of one year. All scheduled drilling and workover operations of the Project have been completed.

D. Affirmation:

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

Joyce Hester Larson for ______ 5/16/90

(Signature) (Date)

Jack B. Tillman, Area Manager
U.S. Department of Energy

II. PLANT PROCESS

A. Describe storage and uses of geothermal waters and any surface disposal impoundments.

As reported in the original Discharge Plan, geothermal waters are not used in this Project. Water from the upper aquifer is pumped into the injection well to geothermal depths to be heated by hot dry rocks. Improvements to the surface impoundments are scheduled. The water treatment system from the 1.0 million gallon pond to the 5.7 million gallon pond has been improved by the addition of a sand/carbon filter, and the 1.0 million gallon pond will be lined in accordance with the plans and specifications approved by the Oil Conservation Division April 4, 1990. The proposed experimental facilities will be a closed loop system with no anticipated discharges to the environment.

B. Estimated quantities used in gallons per day (gpd).

It is estimated that approximately 8.7 acre-feet of water will be used each year that the experiment is active.

C. Any additives or commingling.

Sodium sulfates and other non-toxic water treatment chemicals will be added to the recirculating water to remove dissolved oxygen and prevent corrosion. Chemically reactive tracers are also added to the recirculating water as described in the Discharge Plan Modification approved on September 8, 1987. The experimental work to be completed at the Fenton Hill Site does not include commingling of water supplies.

III. SITE CHARACTERISTICS

A. Provide the name, description, and location of any ground water discharge sites (water wells, seeps, springs, watercourses) within one mile of the outside perimeter of the facility. For water wells, specify use of water (e.g., irrigation, domestic, etc.)

This information was provided in the original Discharge Plan and has not changed. Additional information can be found in NPDES Permit No. 0028576. Water is used for domestic and experimental research purposes only.

B. If known, provide the flow direction of the groundwater most likely to be affected by the discharge. Include the source of the information and how it was determined.

This information was included in Appendix C of the original Discharge Plan and has not changed.

C. Provide depth to water of geothermal water, and if possible, any fresh water wells that could be affected by any discharge.

Geothermal waters are not used in the Project; the geothermal well is dry until injected with water from the upper aquifer which is subsequently pumped from the geothermal well. Water in the domestic/experimental water well is tapped at approximately 377 feet.

D. Depth to and lithologic description of rock at base of alluvium. Provide drillers logs and geologic information and maps as available.

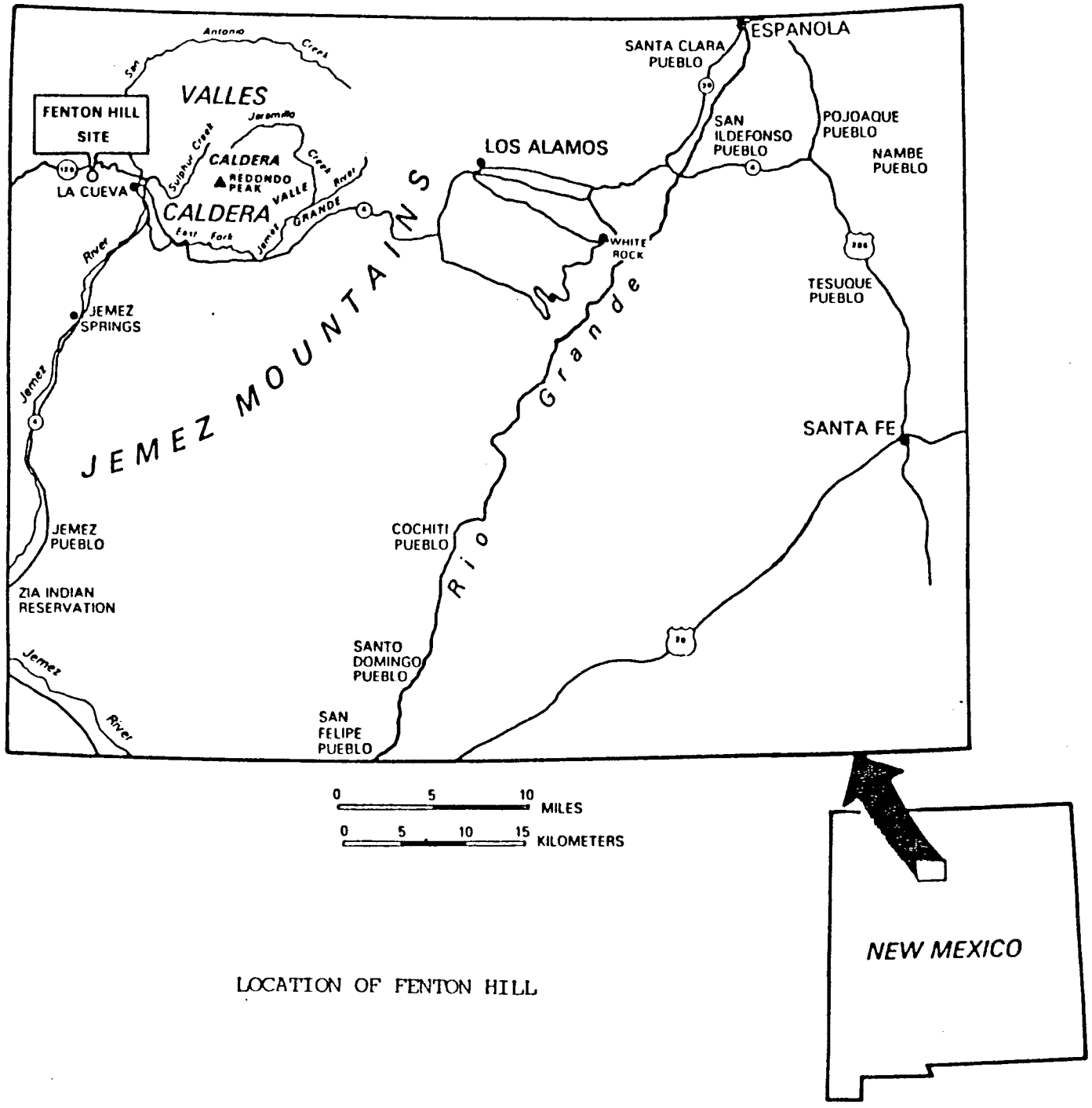
This information is provided in the original Discharge Plan.

E. Describe flooding potential of the discharge site.

No flooding danger exists because the Project site is located above nearby streams on top of a narrow (1/2 mile wide) ridge; local runoff is diverted from the developed site.

F. Any additional information that may be necessary to demonstrate that approval of the renewal of the Discharge Plan will not result in concentrations in excess of the standards of WQCC Regulations, Section 3-103, or the presence of any toxic pollutant at any place of withdrawal of water for present or reasonably foreseeable future use. Detailed information on site geologic and hydrologic conditions may be required for a technical evaluation of the applicant's proposed Discharge Plan

The Department of Energy requests that the original Discharge Plan for the Fenton Hill geothermal site, as modified September 8, 1987, be renewed. No water was discharged in the past year; there are no plans to discharge in the near-term future because of the status of the Project. Details are provided in the original Discharge Plan; the main concept behind the LTFT is that of being a closed circuit experiment which continuously reuses the same water.



LOCATION OF FENTON HILL

Department of Energy
Albuquerque Operations
Los Alamos Area Office
Los Alamos, New Mexico 87544

FEB. 26 1990

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. William J. LeMay
Director, Oil Conservation Division
NM Energy, Minerals & Natural Resources Dept.
P. O. Box 2088
Santa Fe, NM 87504-2088

Dear Mr. LeMay:

The following information is being submitted in accordance with the Ground Water Discharge (DP-31) Plan for the Fenton Hill Geothermal Site, which was originally approved by the Oil Conservation Division (OCD), on June 5, 1985.

1. Summary of NPDES Permitted Discharges from the Service Pond for 1987, 1988, and 1989. (Enclosure I)

2. Summary of Water Injected into Geothermal Wells and Water Vented into the Service Pond from the Wells for 1987, 1988, and 1989. (Enclosure II)

3. Average Chemical Concentration of Water Vented from Geothermal Wells. (Enclosure III)

4. Report on Installation of the Proposed Liner for the Service Pond in accordance with Discharge Plan Requirements. (Enclosure IV)

5. Plans and Specifications for the Proposed Liner for the Service Pond. (Enclosure V)

I understand that the original five-year approval period for the Fenton Hill Ground Water Discharge Plan will expire on June 5, 1990. Please be advised that the U. S. Department of Energy, Los Alamos Area Office, will be requesting an extension of the existing plan for an additional five-year period in order to complete the experimental work at Fenton Hill. No major changes in the operation of these facilities or in the discharges from the site are anticipated.

I am very appreciative of the technical assistance provided by Mr. Boyer and Mr. Anderson of your staff regarding the implementation of the Fenton Hill Ground Water Discharge Plan.

Please call Jim Phoenix of my staff at 667-5288 if you have any questions concerning the enclosed information.

Sincerely,

Jack B. Tillman
Area Manager

Enclosures

cc:
K. Hargis (HSE-8:90-086-1), LANL, MS K490

ALL-CS

Attachment I

NPDES Permitted Discharges From the Service Pond
for 1987, 1988, and 1989

Fenton Hill Geothermal Site
Sandoval County, N.M.

Date of Discharge		Gallons Discharged From Service Pond
March 9, 1987		7,200
April 22-23, 1987		16,500
April 27-29, 1987		39,600
May 4, 1987		3,300
Nov. 7-8, 1987		18,914
	Total 1987	85,514
May 27-28, 1988		48,535
June 3, 1988		45,539
June 6-10, 1988		129,599
June 15, 1988		23,711
	Total 1988	247,384
	Total 1989	0

There were no accidental spills or leaks from the Service Pond during 1987, 1988, and 1989

Attachment II

Water Injected into Geothermal Wells and
Water Vented into the Service Pond from Wells
for 1987, 1988, and 1989

Fenton Hill Geothermal Site
Sandoval County, N.M.

Date of Activity	Gallons Injected Into Well	Gallons Vented Into Service Pond
Feb. 23 - Mar. 3, 1987	0	245,000
Oct. 18 - Nov. 2, 1987	562,835	562,835
Dec. 1 - Dec. 20, 1987	1,212,100	934,500
Total 1987	1,774,935	1,742,335
June 15 - June 16, 1988	48,500	616,824
June 30,1988 - June 30, 1989	1,546,116	0
July 1, 1989 - Dec. 31, 1989	2,853,697	0
Total 1988 & 1989	4,448,313	616,824

There were no accidental spills or leaks during injection of water into the geothermal wells or during venting of water from the wells.

Attachment III

Average Chemical Concentration of Water
Vented from Geothermal Wells

Fenton Hill Geothermal Site
Sandoval County, N.M.

(Average Chemical Concentration of 14 Samples Collected During Experiment 2074, Dec. 1 - Dec. 20, 1987)

Parameter	Conc. (ppm)	Parameter	Conc. (ppm)
Ag	<0.002	Mg	0.98
Al	1.00	Mn	0.13
As	3.96	Mo	0.066
B	52.3	Na	1445.0
Ba	0.24	NH_4	3.39
Br	9.8	Ni	0.010
Ca	24.6	NO_3	<0.4
Cd	<0.002	Pb	<0.005
Cl	1918.0	pH	5.72
Co	<0.005	PO_4	<0.4
CO_3	0	Rb	2.11
Cond.	766 $\mu\Omega$/cm	S^{--}	2.68
Cr	<0.005	Se	<0.2
Cs	2.26	Si	195.0
Cu	<0.005	SiO_2	418.0
F	11.1	SO_4	320.0
Fe	6.23	Sr	1.18
HCO_3	650.0	TSS	20.0
Hg	<0.02	U	<0.2
K	139.0	Zn	0.39
Li	26.2	TDS	5037.0

Attachment IV

Report on Installation of the Proposed Liner
for the Service Pond

Fenton Hill Geothermal Site
Sandoval County, N.M.

I. Introduction

The Ground Water Discharge Plan for the Fenton Hill Geothermal Site was originally approved by the Oil Conservation Division (OCD) on June 5, 1985. A request to modify the Discharge Plan was submitted on April 27, 1987, to the OCD in order to allow the use of chemical tracers during geothermal experiments. This modification to the plan was approved by the OCD in September 8, 1987.

II. Water Storage Ponds

As described in the original Ground Water Discharge Plan, a 5.7 million gallon hypalon-lined reservoir was constructed at the site to hold water used for charging and make up of the geothermal system. A 1.0 million gallon clay-lined service pond was also constructed at the site to hold cuttings and mud from the wells during workover operations and to hold water vented from the geothermal system. Under the approved discharge plan, a new liner is to be installed in the service pond to replace the existing clay liner upon completion of workover operations on the wells.

III. Proposed Liner

Workover operations on the geothermal wells have been completed and plans and specifications for the proposed line system have been prepared. The top liner will be constructed of a 30 mil chemical-resistant (Seaman Corp. XR-5) membrane. The secondary liner will be constructed of a 30 mil polyvinyl chloride (PVC) membrane. A leak detection system consisting of a four inch PVC perforated pipe discharging to a monitoring tank will be installed between the two liners in order to guarantee the integrity of the system. Plans and specifications for the proposed liner are included with this report. (See Attachment V)

IV. Schedule for Completion

In preparation for the new liner, sediment from the storage pond was removed during the summer of 1989 and has been stored in a borrow pit on U. S. Forest Service property as directed by the Forest Service. The sediment which originated from geothermal development was found to be exempt from the hazardous waste provisions under 40 CFR Part 261.4 (b)(5) of the Resource, Conservation, and Recovery Act (RCRA). As a precautionary measure, EP Toxicity testing was conducted on sediment samples. Concentrations were found to be below the limits for EP Toxicity Metals. Some trace amounts of semi-volatiles were found related to the hydrocarbon background from drilling operations. (See Table I)

A tour of the Fenton Hill Geothermal Site and storage pond area was conducted with OCD representatives on August 16, 1989, in order to review the site and discuss the proposed liner installation. Plans and specifications for the new liner have been prepared based on discussions with the OCD.

Upon approval of the plans and specifications for the new liner by the OCD, the service pond will be fine graded and select material will be added where required to support the liner. The liner preparation work and installation will be conducted in accordance with industry standards and the manufacturer's recommendations.

The liner preparation and installation is scheduled to take approximately 60 days. All work is expected to be completed by June 1, 1990.

TABLE I

EP Toxicity Test Results
From Storage Pond Sediments

Fenton Hill Geothermal Site
Sandoval County, N.M.

EP Tox. Metal	Detected Conc. (mg/l)	Regulatory Max. Conc. EP Tox. (mg/l
As	0.28	5.0
Ba	2.7	100.0
Cd	0.02	1.0
Cr	0.047	5.0
Pb	0.64	5.0
Hg	0.002	0.2
Se	<0.001	1.0
Ag	0.02	5.0

Quantifiable Semi-Vol. Organics	Detected Conc. (mg/Kg)
2-Methylnaphthalene	0.513
Bis (2-Ethylhexyl) Phthalate	0.481

(Composite sample of sediment collected from Fenton Hill Storage Pond on July 1, 1988)

Attachment V

SPECIFICATION FOR POND LINER

SECTION 1 GENERAL REQUIREMENTS

1.1 SCOPE

This specification defines the requirements for a dual membrane liner system which shall consist of a primary liner of 30 mil XR-5, a secondary liner of 30 mil oil resistant PVC, a geofiber intermediate and bottom pads, and all hardware and fittings required to seal the piping outlet and inlet. The liner system shall be installed by the supplier at the Fenton Hill site which is located approximately 30 miles west of Los Alamos on State Road 126 in Sandoval County, New Mexico at an altitude of 8,700 feet.

1.2 DRAWINGS

The liners shall be manufactured to fit the nominal dimensions of the pond area and the contouring shown on the attached drawings.

1.3 LINERS AND ASSOCIATED HARDWARE

1.3.1 The primary membrane liner shall be constructed of 30 mil type 8130 XR-5. The secondary membrane liner shall be fabricated of 30 mil oil resistant PVC. Primary and secondary liners shall be sized to fit the configuration of the reshaped EE-1 pond as shown on drawings. The liners shall be fabricated of first quality new material with no visible defects. Additional liner material shall be provided to adequately seal the liner to the piping inlets and outlets, valve envelopes and other liner penetrations or attachments.

1.3.2 The geofiber polyfelt fabric, installed between the primary and secondary liners and under the secondary liner, shall be a polyfelt TS-1000 as manufactured by Staff Industries, Inc. or an approved equal. When approved the geofiber fabric shall be installed, where directed by the Engineer, on the prepared subgrade and under the secondary PVC liner.

1.3.3 The fabricator shall have a minimum 500,000 sq. ft. liner fabrication experience.

1.3.4 All personnel and special equipment required for installation of the liner, including field seaming and field sealing to the piping inlet and outlet, shall be furnished by the vendor. The supervisor of the installation crew shall have a minimum of 100,000 sq. ft. installation experience and shall be on site at all times during the liner installation.

1.4 DESCRIPTIVE SUBMITTALS

1.4.1 One (1) set of materials list, catalog data and samples shall be submitted for the primary and secondary liners, and geofiber fabric.

1.4.2 Six (6) sets of shop drawings, catalog data, equipment and materials lists shall be submitted for the items of equipment and materials forming a part of this order within two (2) weeks after receipt of the purchase order, unless otherwise specified by the University. The University shall review the submittals to determine general conformance of the specific equipment with the design concept of the project and it's compliance, so far as it may be determined, with the specifications. Shop drawings shall be approved at the factory.

Approval of shop drawings by the owner does not relieve the vendor from responsibility for deviations from the specifications or drawings, nor shall it relieve the vendor from responsibility for errors of any kind in the shop drawings or data sheets. Approval also does not relieve the vendor of it's responsibility for the dimensions, performance, fabrication processes and techniques of construction of the equipment referred to.

1.4.3 Following review by the Engineer, two (2) copies of the shop drawings shall be returned to the vendor approved or marked with comments for action. Where drawings are approved without exception, resubmittal is not necessary and the vendor may proceed with construction. Where drawings are approved as noted, vendor shall make the necessary corrections or revisions, and submit one (1) print of the corrected drawing. Construction shall proceed in accordance with the corrected drawing. Drawings requiring resubmittal shall be properly resubmitted as in paragraph 2.2.

SPECIFICATION FOR SITE, EXCAVATION AND RELATED WORK

SECTION II GENERAL REQUIREMENTS

2.1 SCOPE

This specification defines the requirements for all earthwork, piping, structures and associated work, not included in Section I, Specifications for Pond Liner, to shape and construct the pond, dikes and containment area. The work consists of Clearing and Grubbing; Grading, Blading and Reshaping, and Subgrade Preparation; Hauling and Disposal; Excavation, Borrow and Embankment; Removal of Structures and Obstructions; Excavation and Backfill for Piping and (Minor) Structures; Erosion and Sediment Control; and Piping, Culverts and Underdrains at the Fenton Hill site which is located approximately 30 miles west of Los Alamos on State Route 126 in Sandoval County.

All work detailed on the drawings, to be performed under contract or purchase order shall, except as modified herein, be constructed in accordance with the New Mexico State Highway Department Standard Specifications For Road and Bridge Construction, 1984 Edition.

2.2 DRAWINGS

The work shall be constructed to comply with the dimensions and details shown on the attached drawing.

2.3 CLEARING AND GRUBBING

This work shall consist of clearing, grubbing, removing and disposing of vegetation and debris in accordance with these specifications, except those items that are designated to remain. This work shall also include the preservation from damage or defacement of all vegetation and items designated to remain. This work will be considered incidental to the work under the contract items and no direct payment will be made for clearing and grubbing.

2.4 EXCAVATION, BORROW AND EMBANKMENT

This work shall consist of excavation and satisfactory disposal of all material not being removed under some other item which is encountered within the limits of the work in substantial compliance with the specifications and the lines, grades, thicknesses and typical cross sections shown on the plans or established by the Engineer. All excavation will be classified as "unclassified excavation" or "borrow" as hereinafter described.

(a) **Unclassified Excavation:** Unclassified excavation shall consist of the excavation and disposal of all materials of whatever character encountered in the work.

(b) **Borrow:** Borrow shall consist of approved material required for the construction of embankments or for other portions of the work and shall be obtained from approved sources.

(c) **Embankment:** Embankment shall consist of constructing embankments and miscellaneous fill with suitable materials from unclassified excavation, structure excavation, and borrow.

2.5 SUBGRADE PREPARATION

This work shall consist of compacting and finishing the subgrade in substantial compliance with the specifications and the lines, grades, and typical cross-sections shown on the plans or established by the Engineer.

The top 6 inches of the pond shall be compacted to not less than 100 percent of maximum density, except high volume change soils shall be compacted to 95 percent of maximum density. For the purpose of these specifications, a high volume change soil is defined as any soil containing 35 percent or more of material passing No. 200 sieve. The moisture content of the top 6 inches shall be in accordance with the provisions of the second paragraph of Subsection 203.037 Moisture and Density Control. No payment will be made for rehandling or manipulating material.

Densities will be determined in compliance with AASHTO T 99. Field density tests will be taken at locations designated by the Engineer and the densities will be determined in compliance with AASHTO T 205, use of nuclear methods in conformity with AASHTO T 238 and T 239, or other approved methods.

The top surface of the finished subgrade shall not vary more than 0.1 foot above or below established grade and 0.05 foot above or below the typical cross-section measured on the finished surface at right angles to the centerline. All deviations from these tolernaces shall be corrected.

2.6 GRADING

The site grading shall consist of constructing and shaping the site and ditches to grade and typical sections as shown on the plans.

STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

GARREY CARRUTHERS
GOVERNOR

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87504
(505) 827-5800

December 8, 1989

CERTIFIED MAIL
RETURN RECEIPT NO. P-106-675-200

Area Manager
Department of Energy
Los Alamos Area Office
Los Alamos, New Mexico 87544

RE: Discharge Plan GW-31
Fenton Hill Geothermal Facility
Sandoval County, New Mexico

Dear Sir:

On June 5, 1985, the ground water discharge plan, GW-31 for the Fenton Hill Geothermal Facility located in Section 13, Township 19 North, Range 2 East, NMPM, Sandoval County, New Mexico, was approved by the Director of the Oil Conservation Division (OCD). This discharge plan was required and submitted pursuant to Water Quality Control Commission (WQCC) regulations and was approved for a period of five years. The approval will expire on June 5, 1990.

If your facility continues to have effluent or leachate discharges and you wish to continue discharging, please submit your application for renewal of plan approval as quickly as possible. The OCD is reviewing discharge plan submittals and renewals carefully and the review time can often extend for several months. Please indicate whether you have made, or intent to make, any changes in your discharge system, and if so, include an application for plan amendment with your application for renewal. To assist you in preparation of your renewal application, I have enclosed a copy of the OCD's guidelines for preparation of ground water discharge plans at natural gas processing plants. These guidelines will be used in review of your renewal application. The guidelines are presently being revised to include berming of tanks, curbing and paving of process areas susceptible to leaks or spills and the disposition of any solid wastes. Please include these items in your renewal application.

If you no longer have such discharges and discharge plan renewal is not needed, please notify this office.

Please note that all gas plants, refineries and compressor stations in excess of 25 years of age will be required to submit plans for, or the results of, an underground drainline testing program as a requirement for discharge plan renewal.

If you have any questions, please do not hesitate to contact Roger Anderson at (505) 827-5884.

Sincerely,

David G. Boyer, Hydrogeologist
Environmental Bureau Chief

DGB/sl

cc: OCD Aztec Office

STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION

GARREY CARRUTHERS
GOVERNOR

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87504
(505) 827-5800

September 8, 1987

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. Harold E. Valencia
U.S. Department of Energy
Albuquerque Operations
Los Alamos Area Office
Los Alamos, NM 87544

RE: Discharge Plan GW-31 Modification
U.S. Department of Energy
Fenton Hill Geothermal Facility

Dear Mr. Valencia:

The modification to previously approved groundwater discharge plan (GW-31) for the above-referenced facility located in Section 13, Township 19 North, Range 2 East, NMPM, Sandoval County, New Mexico is hereby approved. The modification consists of the application dated April 27, 1987 for use of special fluid tracers. The discharge plan (GW-31) was approved June 5, 1985.

The application for modification was submitted pursuant to WQCC Regulation 3-107.C and is approved pursuant to WQCC Regulation 3-109. Please be advised that the approval of this modification does not relieve you of liability should your operation result in actual pollution of surface or ground waters which may be actionable under other laws and/or regulations.

There will be no routine monitoring or reporting requirements other than those mentioned in the plan and modification.

Please note that Section 3-104 of the regulations requires that "When a plan has been approved, discharges must be consistent with the terms and conditions of the plan." Pursuant to Section 3-107.C. you are required to notify the Director of any facility expansion or process modification that would result in any significant modification in the discharge of water contaminants.

Sincerely,

William J. LeMay
Director

WJL/RCA/ag

xc: OCD-Aztec
Kathy Sisneros, EID - Surface Water

P 612 458 650

RECEIPT FOR CERTIFIED MAIL

NO INSURANCE COVERAGE PROVIDED
NOT FOR INTERNATIONAL MAIL

(See Reverse)

Sent to Harold Valencia		
Street and No. US DOE		
P.O., State and ZIP Code Los Alamos, NM 87544		
Postage	$	
Certified Fee		
Special Delivery Fee		
Restricted Delivery Fee		
Return Receipt Showing to whom and Date Delivered		
Return receipt showing to whom, Date, and Address of Delivery		
TOTAL Postage and Fees	$	
Postmark or Date		

PS Form 3800, Feb. 1982 ★ U.S.G.P.O. 1983-403-517

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE

Ecological Services
Suite D, 3530 Pan American Highway NE
Albuquerque, New Mexico 87107

August 12, 1987

Mr. William J. Lemay
Oil Conservation Division
State of New Mexico
State Land Office Building
P. O. Box 2088
Santa Fe, New Mexico 87504-2088

Dear Mr. Lemay:

We have reviewed the proposed discharge plan GW-31 for the Department of Energy, Los Alamos Area Office, Fenton Hill Geothermal Facility located at T.19N., R.2E., Section 13, Sandoval County, New Mexico. The discharge plan is for a modification of the exisitng plan to allow the use of brominated aromatic tracers for research. The tracers will react to form phenol compounds which will be released to a lined retention pond.

Additional information obtained during an August 11, 1987, telephone conversation with Roger Anderson of the Oil Conservation Division, indicates that the discharge will be to an enclosed, double-lined retention pond. The residue level of phenol compounds will remain below the ground water standard of five parts per billion and will begin to decrease after 300 days. The research will conclude within one year. Based upon this information, we have determined that exposure to fish and wildlife resources of concern to our agency will not occur.

We have no objection to the discharge plan modification.

These comments represent the views of the Fish and Wildlife Service. Thank you for the opportunity to comment on the proposed plan. If you have any questions concerning our comments please contact Tom O'Brien at (505) 883-7877 or FTS 474-7877.

Sincerely yours,

Thomas J. O'Brien

for John C. Peterson
Field Supervisor

cc:
Director, New Mexico Department of Game and Fish, Santa Fe, New Mexico
Director, New Mexico Health and Environment Department, Environmental Improvement Division, Santa Fe, New Mexico
Regional Administrator, Environmental Protection Agency, Dallas, Texas
Regional Director, U.S. Fish and Wildlife Service, Fish and Wildlife Enhancement, Albuquerque, New Mexico

NOTICE OF PUBLICATION
STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

Notice is hereby given that pursuant to New Mexico Water Quality Control Commission Regulations, the following proposed discharge plan modification has been submitted for approval to the Director of the Oil Conservation Division, State Land Office Building, P.O. Box 2088, Santa Fe, New Mexico 87504-2088, Telephone (505)827-5800:

(GW-31) U.S. Department of Energy, H.E. Valencia, Area Manager, Albuquerque Operations, Los Alamos Area Office, Los Alamos, New Mexico 87544, has submitted an application for modification of its previously approved discharge plan for the Fenton Hill Geothermal Facility. The modification proposes the use of chemical tracers for research purposes. The tracers are brominated aromatics which, through hydrolysis, will react to form a phenol compound. The concentrations of phenols in the water discharged to the lined retention pond will not exceed the ground water standard of five (5) parts per billion. The upper-most ground water likely to be affected by the geothermal operations is at a depth of approximately 370 feet with a total dissolved solids concentration of approximately 240 mg/1.

Any interested person may obtain further information from the Oil Conservation Division and may submit written comments to the Director of the Oil Conservation Division at the address given above. Prior to ruling on any proposed discharge plan or its modification, the Director of the Oil Conservation Division shall allow at least thirty (30) days after the date of publication of this notice during which comments may be submitted to him and a public hearing may be requested by an interested person. Requests for public hearing shall set forth the reasons why a hearing should be held. A hearing will be held if the Director determines there is significant public interest.

If no public hearing is held, the Director will approve or disapprove the proposed plan based on information available. If a public hearing is held, the Director will approve or disapprove the proposed plan based on information in the plan and information submitted at the hearing.

GIVEN Under the Seal of the New Mexico Oil Conservation Commission at Santa Fe, New Mexico on this 20th day of July, 1987. To be published on or before July 31, 1987.

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION
s/William J. Lemay
Director

Journal August 2, 1987

STATE OF NEW MEXICO } ss
County of Bernalillo

RECEIVED
AUG - 5 1987
OIL CONSERVATION DIVISION
SANTA FE

THOMAS J. SMITHSON being duly sworn declares and says that he is ..... of the **Albuquerque Journal**, and that this newspaper is duly qualified to publish legal notices or advertisements within the meaning of Section 3, Chapter 167, Session Laws of 1937, and that payment therefore has been made or assessed as court costs; that the notice, a copy of which is hereto attached, was published in said paper in the regular daily edition,

for 1 times, the first publication being on the 2 day of August, 198 7, and the subsequent consecutive publications on ..... ,198.....

.....

Sworn and subscribed to before me, a Notary Public in and for the County of Bernalillo and State of New Mexico, this 3 day of August, 198 7

SEAL
NOTARY PUBLIC - STATE OF NEW MEXICO
Filed with Secretary of State
Commission Expires 4-12-90

PRICE 21.24

Statement to come at end of month.

ACCOUNT NUMBER C80932

EDJ-15 (R-2/86)

NOTICE OF PUBLICATION
STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

Notice is hereby given that pursuant to New Mexico Water Quality Control Commission Regulations, the following proposed discharge plan modification has been submitted for approval to the Director of the Oil Conservation Division, State Land Office Building, P.O. Box 2088, Santa Fe, New Mexico 87504-2088, Telephone (505) 827-5800:

(GW-31) U.S. Department of Energy, H.E. Valencia, Area Manager, Albuquerque Operations, Los Alamos Area Office, Los Alamos, New Mexico 87544, has submitted an application for modification of its previously approved discharge plan for the Fenton Hill Geothermal Facility. The modification proposes the use of chemical tracers for research purposes. The tracers are brominated aromatics which, through hydrolysis, will react to form a phenol compound. The concentrations of phenols in the water discharged to the lined retention pond will not exceed the ground water standard of five (5) parts per billion. The upper-most ground water likely to be affected by the geothermal operations is at a depth of approximately 370 feet with a total dissolved solids concentration of approximately 240 mg/l.

Any interested person may obtain further information from the Oil Conservation Division and may submit written comments to the Director of the Oil Conservation Division at the address given above. Prior to ruling on any proposed discharge plan or its modification, the Director of the Oil Conservation Division shall allow at least thirty (30) days after the date of publication of this notice during which comments may be submitted to him and a public hearing may be requested by an interested person. Requests for public hearing shall set forth the reasons why a hearing should be held. A hearing will be held if the Director determines there is significant public interest.

If no public hering is held, the Director will approve or disapprove the proposed plan based on information available. If a public hearing is held, the Director will approve or disapprove the proposed plan based on information in the plan and information submitted at the hearing.

GIVEN Under the Seal of the New Mexico Oil Conservation Commission at Santa Fe, New Mexico on this 20th day of July, 1987. To be published on or before July 31, 1987.

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

WILLIAM J. LEMAY
Director

S E A L

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

GARREY CARRUTHERS
GOVERNOR

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87501
(505) 827-5800

June 29, 1987

Mr. Charles Nylander
Section Leader, Regulatory Compliance Section
Mail Stop K490
Los Alamos National Laboratory
Los Alamos, NM 87545

RE: HSE 8-87-625, Brine Disposal

Dear Mr. Nylander:

Upon receipt of your letter on June 9, I contacted our district supervisors and provided a copy of your letter. They have no problems with the transportation or disposal as outlined in your letter, and you are free to proceed with the operation. Please notify this office when the transfer has been completed.

If we can be of further assistance, please contact me at 827-5812.

Sincerely,

David G. Boyer
Hydrogeologist, Environmental Bureau Chief

DGB/ag

cc: OCD Artesia
OCD Hobbs

Los Alamos
Los Alamos National Laboratory
Los Alamos, New Mexico 87545

DATE: June 9, 1987
IN REPLY REFER TO: HSE8-87-625
MAIL STOP: K490
TELEPHONE: (505) 665-0453
(FTS) 855-0453

Mr. David Boyer, Geohydrologist
N. M. Oil Conservation Division
P. O. Box 2088
Santa Fe, New Mexico 87504-2088

Dear Mr. Boyer:

On June 5, 1987 I telephoned you regarding several questions concerning the disposal of salt water. I am writing this letter to request a written confirmation of our conversation.

Yesterday, I informed you that Los Alamos National Laboratory (Laboratory) had approximately 2,000 barrels of salt water remaining from completed solar energy experiments, and that we desired to dispose of this salt water by shipping it via tank truck to a brine water disposal site near Jal, New Mexico. The brine disposal site is called T K Lake Disposal, and is located on Highway 128 between Jal and Carlsbad. The disposal site is permitted by Oil Conservation Division (OCD), pursuant to New Mexico Water Quality Control Commission (WQCC) Regulations for brine disposal and can accept the salt water from the Laboratory.

The company that will contract with us to do the trucking is:

B & E Incorporated
P. O. Box 2292
Hobbs, NM
Contact: Phil Withrow

The salt water transportation will be performed under Jim's Water Service permit issued by OCD. We anticipate transporting 3 truck loads per week, but possibly might transport as many as 6 truck loads per week. The average volume per truck load would be approximately 105 barrels of salt water.

Per your suggestion, the transportation contract will be written with documentation requirements that will assure that the salt water is delivered in toto at T K Lake Disposal.

It is my understanding that our proposed methodology for salt water disposal is permissible under OCD and WQCC regulations, and that the transportation company and disposal company are

appropriately permitted by OCD. I would appreciate receipt of correspondance confirming my understandings as stated above.

Thank you for your assistance.

Sincerely,

Charles Nylander

Charles Nylander,
Section Leader, Regulatory
Compliance Section

CN:tms

Cy: J. Aragon, HSE-DO, MS K491
W. Hansen, HSE-DO, MS K491
R. Koenig, HSE-7, MS E518
T. Gunderson, HSE-8, MS K490
A. Drypolcher, HSE-8, MS K490
S. Zygmunt, HSE-7, MS E518
CRM-4 (2), MS A150

Department of Energy
Albuquerque Operations
Los Alamos Area Office
Los Alamos, New Mexico 87544

APR 27 1987

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. William J. LeMay, Director
N. M. Oil Conservation Division
P. O. Box 2088
Santa Fe, NM 87504-2088

Dear Mr. LeMay:

GROUND WATER DISCHARGE PLAN (GW-31) FENTON HILL GEOTHERMAL FACILITY

Section VII.D of the "Discharge Plan for Geothermal Operations at Fenton Hill" (GW-31) requires Los Alamos National Laboratory (LANL) to report through the Department of Energy's (DOE) Los Alamos Area Office (LAAO) changes or modifications to the geothermal research program that would result in changes to the discharge plan. Furthermore, Sub-section 3-109.F of the New Mexico Water Quality Control Commission (NMWQCC) regulations allows modification of an approved discharge plan at the request of a discharger. Therefore, the following information describes planned modifications to the geothermal research program and details a request for modification of approved discharge plan GW-31.

The DOE hereby requests modification of the approved discharge plan GW-31 and provides the following information, as required by Section 1-201 of the NMWQCC regulations.

1. Name and address of the person making the discharge:

   U. S. Department of Energy
   Los Alamos Area Office
   Los Alamos, New Mexico 87544

2. Location of the discharge:

   Fenton Hill, Sandoval County, New Mexico.

3. Estimate of concentration of water contaminants in the discharge:

   Less than 5 micrograms per liter phenol.

4. Estimated quantity of discharge:

   Up to 4 million gallons.

Enclosed with this letter is a report that describes the proposed modification of discharge plan GW-31. As noted in the report, the modification involves use of chemical tracers for research purposes.

The Oil Conservation Division (OCD) discharge plan (GW-31) approval letter, dated June 5, 1985 contains several reporting provisions with regard to the on-going operations at Fenton Hill. The following information addresses those provisions and provides additional data regarding water quality.

The discharge plan states on page 34 that - "At present the plan is build the pond (i.e. service pond) as soon as workover operations are completed in 1985." Unfortunately, workover operations are not yet complete because of various difficulties encountered. At present the operating group is planning for workover operations extending into FY 1988. However, should schedules be accelerated, cleaning and repair of the service pond could occur during the summer of 1987.

On a number of occasions water has been vented into the service pond from geothermal walls EE-2 and EE-3. The dates of the vents, the amounts of each vent in gallons, and the amount of water in gallons injected into the geothermal well prior to the vents are shown in Table I.

TABLE I

DATE OF VENT	VOL. OF VENT	VOL. INJECTED
28-29 May 1985	503000	423000
29 June to 2 July 1985	586000	136800
18 July to 23 July 1985	437000	1525000
2 Feb. to 4 Feb. 1986	368000	113100
22 Apr. to 25 Apr. 1986	123000	---
19 May to 19 June 1986	---	6148271 (produced)
19 June to 15 July 1986	250000	---
24 Sept. to 11 Oct. 1986	1700000	3613729
4 Dec. to 23 Dec. 1986	485000	182000
23 Feb. to 3 March 1987	245000	---
Totals	4697000	12141900

The water vented from the geothermal wells has remained in the service pond and the 5 million gallon reservoir since starting venting in May 1985. In general, the service pond has been full or partially full from May 1985 to the present. During this time period, discharges pursuant to National Pollutant Discharge Elimination System (NPDES) permit NM0028576 from the service pond totalling 2,163,000 gallons occurred during August through December 1986. On September 5, 1985 approximately 1,000,000 gallons of water were transfered from the service pond to the 5 million gallon reservoir.

There have been no accidental spills or leaks during the period of this reporting period.

The enclosed Table II contains average concentrations of various chemical constituents in the water vented from the geothermal wells into the service pond. These averages result from chemical analyses performed from July 1985 through December 1986. Enclosed Table III is similar to Table II, except that the averages result from chemical analyses performed from November 1985 through March 1987.

Should you have any questions concerning the enclosed Notice of Intent to Modify Discharge Plan GW-31 or this letter, please feel free to contact James Phoenix (667-5288) of my staff.

Sincerely,

Harold E. Valencia
Area Manager

6728A

Enclosures:
As Stated

TABLE II

Averages of analyses made on fluids vented from the geothermal wells EE-2 and EE-3 into the service pond (EE-1 pond)

Ag	Al	As	Au	B	Ba	Br	Ca	Cd	Cl	Co
ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
<0.001	0.5	6.9	<0.001	92.5	0.69	22.4	108.3	<0.00	3719	0.002

CO3	cond.(L)	Cr	Cs	Cu	EH(L)	F	Fe	HCO3	Hg
ppm	umho/cm	ppm	ppm	ppm	mvppm	ppm	ppm	ppm	
0	13151	0.012	5.7	0.001	242	7.4	9.0	681	<0.1

K	Li	Mg	Mn	Mo	Na	NH4	Ni	No3	O2(dis)	Pb
ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
285	46	6.0	0.76	<0.1	2152	3.3	0.025	0.2	1.20	0.013

pH(L)	PO4	Rb	S	Sb	Se	Si	SiO2	SO4	Sr	TSS
	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
6.88	<0.5	3.0	0.07	<0.1	<0.1	185	424	172	2.51	17.8

U	Zn	TDS
ppm	ppm	ppmn
<0.1	0.05	7941

TABLE III

Averages of analyses made onsamples collected from the sevice pond (EE-1 pond).

Sample #	Date	Ag	Au	Al	As	B
	MM/DD/YY	ppm	ppm	ppm	ppm	ppm
EE-1 Pond Average	11-85 thru 3-87	<0.001	<0.001	0.1	5.3	83.7

Ba	Br	Ca	Cd	Cl	Co	Co3	Cond.(L)	Cr	Cs
pm	ppm	ppm	ppm	ppm	ppm	ppm	umho/cm	ppm	ppm
0.40	18.1	54.3	<0.001	3067	<0.001	21	11361	0.002	2.37

Cu	EH (1)	F	Fe	HCO3	Hg	K	Li	Mg	Mn	Mo
ppm	mv	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
0.002	239	6.12	4.68	589	<0.2	210	42.2	4.4	0.38	<0.2

Na	NH4	Ni	NO3	O2(dis)	Pb	pH (L)	PO4	Rb	S
ppm	ppm	ppm	ppm	ppm	ppm		ppm	ppm	ppm
2101	2.17	0.001	<0.5	4.6	0.020	7.80	<0.5	2.41	0.10

Sb	Se	Si	Sio2	So4	Sr	Tss	U	Zn	TDS
ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
<0.2	<0.2	81.1	156	151	1.89	212	<0.2	0.31	6628

NOTICE OF INTENT TO MODIFY DISCHARGE PLAN

for

GEOTHERMAL OPERATIONS AT FENTON HILL

SANDOVAL COUNTY, N.M.

1. INTRODUCTION

On June 5, 1985, the New Mexico Oil Conservation Division approved the discharge plan (GW-31) for geothermal operations at Fenton Hill in Sandoval County, N. M. [1]. As a condition of this plan and as required by Section 1-201 of the New Mexico Water Quality Control Commission (NMWQCC) Regulations as amended through June 18, 1986, the Los Alamos National Laboratory is required to report through DOE - Los Alamos Area Office, any changes or modifications to the geothermal research program that would result in changes to this plan.

In an effort to obtain a measurement of the temperature patterns in the geothermal zone, the use of chemically reactive tracers is being considered. Since these tracers or their decomposition products are not indicated in the approved discharge plan, this notice of intent to discharge is submitted.

2. SITE DESCRIPTION

2.1 Site Operations

Geothermal operations at Fenton Hill result in the retention of injected water in the fractured Precambrian formation at a depth of approximately 10,000 feet. Because of the extent of hydraulic fracturing, and due to previous injections, retention of approximately 8 - 10 percent of the injected fluid in the formation is most likely. The remaining water is returned to the surface to be held in either a clay-lined or Hypalon-lined retention pond. The discharge plan describes the monitoring system for each of these ponds.

2.2 Site Hydrology

A perched aquifer occurs at a depth of 450 feet below the surface at supply well FH-1. The aquifer is in the Abiquiu Tuff and is perched on clays and siltstones of the Abo formation. The aquifer is evidentally of limited extent, being terminated to the east along the canyon cut by San Antonio Creek. The movement of water in the aquifer is to the southwest, where a part is discharged through seeps and springs along the lower part of Lake Fork Canyon and the Rio Cebolla [2]. Figure 1 shows the site, designated as Technical Area 57 (TA-57) and the location of the monitoring wells.

There are other aquifers in the vicinity. However each contains greater then 10,000 parts per million total dissolved solids and is thus unfit for domestic or agricultural use and not subject to the NMWQCC regulations.

The aquifer is separated from the geothermal injection zone by over 7,000 feet of strata consisting of the impermeable Abo formation, the Magdalena Group of limestone and clays, the Sandia formation, and Precambrian rock [3]. Communication of injected fluids from the geothermal region is unlikely. All geothermal wellbores are constructed using casing as shown in the original permit application. The possibility of communication of geothermal fluids migrating through a wellbore is extremely remote. Monitoring systems built into the retention ponds will detect surface seepage. The most likely route of communication of geothermal fluid to the aquifer is through a major failure of the liner or berm of the Hypalon-lined retention pond. As stated in the Discharge Plan, movement of released water would be topographically controlled with little water reaching Lake Fork Canyon.

Cumulative ground water production from the Fenton Hill geothermal project since 1976 has been 41.5×10^6 gallon. Drawdown at the Fenton Hill well has been 14 feet since that time [4]. The saturated zone is currently over 70 ft at the well.

3 TRACER CHEMISTRY

Table 1 provides a list of chemicals which would be used in the experiments. Table 2 provides a list of the reaction products of these tracers. The extent of tracer reaction is a function of time and temperature. The fracture zone temperature may be calculated as a function of the residence time in the zone by obtaining an analysis of residual tracer and reaction product concentrations.

Each tracer is a brominated aromatic. At elevated temperature in the presence of water, a hydrolysis reaction occurs. In this reaction, the bromide is substituted with a hydroxyl group, resulting in the formation of a phenol compound. This is not an equilibrium reaction, thus the concentrations of the bromoaromatic and the phenol compounds reporting to the retention pond at the surface are a direct indication of conditions existing in the reaction zone 10,000 feet or more below the surface.

4 USE OF TRACERS

There are up to five tracer injection tests planned. For each test, from 15 to 87 grams of tracer will be injected in a slugwise fashion. It is expected that the tracer will react to completion and approximately 10 percent of the injected water containing tracer will be retained in the geothermal formation. Hot water containing unreacted and tracer reaction product will be withdrawn and placed in one of the lined retention ponds. This process will repeat for up to five tests. Based upon current operating plans, the phenol concentration in the retention pond is not expected to exceed 5 parts per billion (ppb), the standard for domestic water supply.

Table 3 shows the concentration of phenol reaction product in the retention pond. As shown, a terminal concentration in the retention pond of approximately 4.3 ppb is expected following the year-long test program.

5 REGULATORY ASSESSMENT

None of the tracers or their reaction products are classified as toxic pollutants under Section 1-101 of the NMQCC regulations. A check with the Ground Water Section of the New Mexico Environmental Improvement Division was made to determine whether or not the list of toxic pollutants was specific to the compounds listed or was general to cover a homologous family of compounds. It was determined that the list was specific and therefore did not include the mononitrophenols which are the reaction products of three of the tracers under consideration.

Section 3-106, paragraph B of the NMQCC regulations requires that notification be given of the intent to discharge any of the water contaminants lists in Section 3-103 or any toxic pollutants. The phenol reaction products are an element of Section 3-103 B.

6. MONITORING AND REPORTING

As previously stated, phenol concentration in the retention pond is not expected to exceed 5 parts per billion, the standard for domestic water supply given in Section 3-103 B. To assure this, the retention pond will be sampled at 4 equidistant points on its perimeter and the composite sample analyzed for phenol quarterly. A report of this analysis will be made to NMOCD within 30 days after receiving the analytical results. This monitoring and reporting will continue until the phenol concentration has leveled out or dropped for three consecutive reporting perods.

In the event that the phenol level in the pond exceeds 5 ppb, the Project Manager will, within 180 days, provide NMOCD with a plan which will assure that the ground water is not impacted such that the phenol level is above standard.

BIBLIOGRAPHY

---

1. Discharge Plan for Geothermal Operations at Fenton Hill, Sandoval County, NM., Los Alamos National Laboratory, HDR-84-DP01, June 1984.

2. Purtymun, W. D. et. al., Water Quality in the Vicinity of Fenton Hill, 1979, Los Alamos National Laboratory, LA-8424-PR, June 1980.

3. Purtymun, W. D. , West, F. G., and Pettit, R. A., Geology of Geothermal Test Hole GT-2, Fenton Hill Site, July 1974, Los Alamos National Laboratory, LA-5780-MS, November 1974.

4. Purtymun, W. D., et. al., Water Quality in the Vicinity of Fenton Hill, 1983 and 1984, Los Alamos National Laboratory, LA-10892-PR, January 1987.

TABLE 1

LIST OF TRACERS

meta-bromobenzoic acid

para- bromobenzaldehyde

4' bromoacetophenone

1-bromo, 2-nitrobenzene

1-bromo, 3-nitrobenzene

1-bromo, 4-nitrobenzene

TABLE 2

LIST OF TRACER DECOMPOSITION PRODUCT

meta-phenolbenzoic acid

para-phenolbenzaldehyde

4' phenolacetophenone

meta-nitrophenol

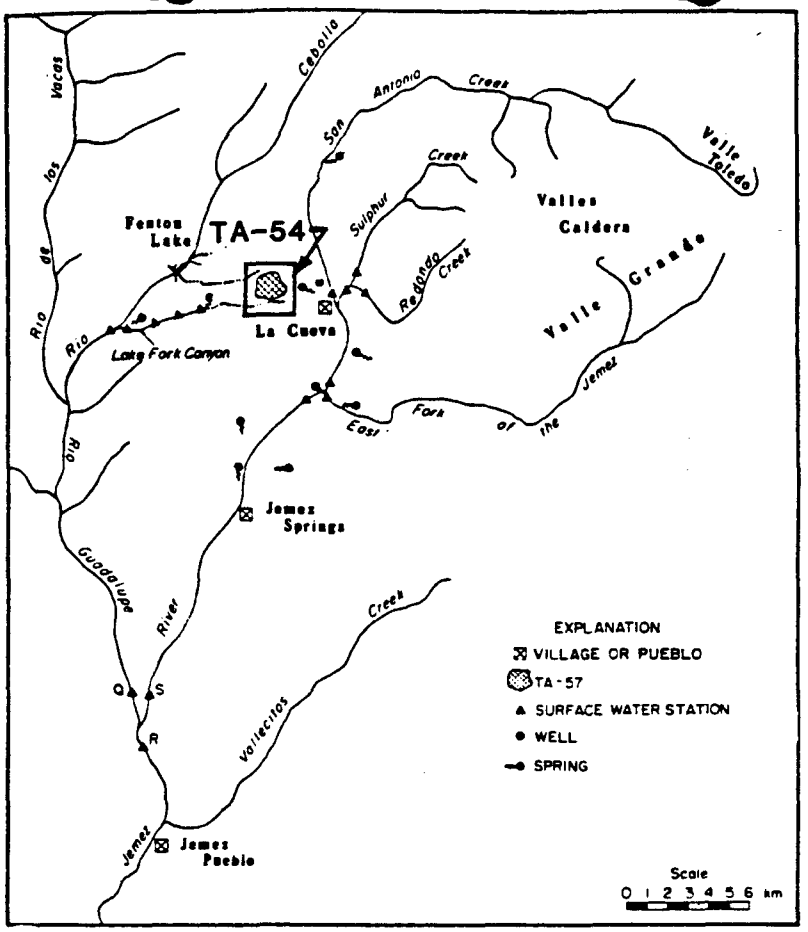
para-nitrophenol

ortho-nitrophenol

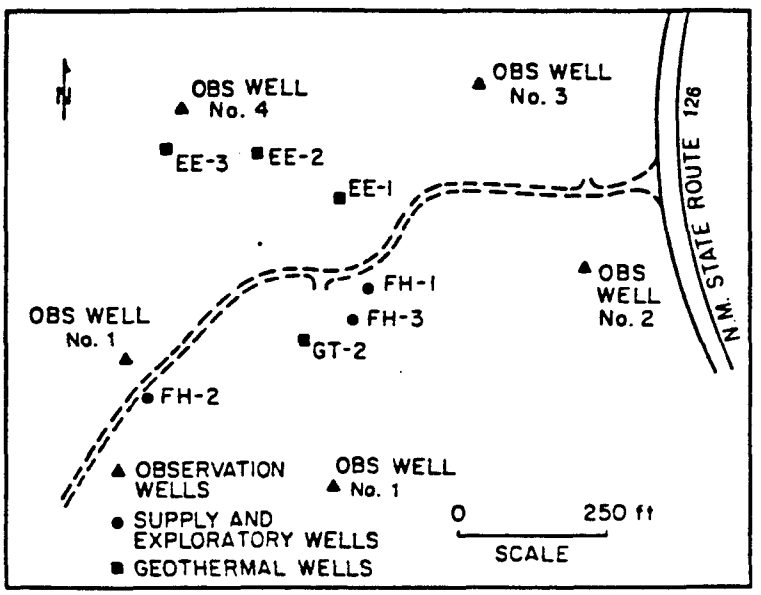
TABLE 3

TRACER CONCENTRATIONS

TEST	DAY	GRAMS TRACER INJECTED	POND PHENOL CONCENTRATION (PPB)
1	1	15	1.4
2	75	33	2.3
3	150	51	3.2
4	225	70	4.1
5	300	87	4.9
_	360	_	4.3



OVERALL AREA PLAN



TA-54 WELL LOCATION

FIGURE 1

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

50 YEARS
1935 - 1985

TONEY ANAYA
GOVERNOR

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87501
(505) 827-5800

June 5, 1985

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. Harold E. Valencia
U. S. Department of Energy
Albuquerque Operations
Los Alamos Area Office
Los Alamos, NM 87544

Re: Discharge Plan for U. S. Dept. of Energy's Fenton Hill Geothermal Facility (GW-31).

Dear Mr. Valencia:

The ground water discharge plan (GW-31) for the U. S. Department of Energy's Fenton Hill Geothermal Facility located in Section 13, Township 19 North, Range 2 East, Sandoval County, New Mexico, is hereby approved with the following provisions:

1) Since the bentonite clay and drilling mud liner for the one-million gallon service pond has been damaged, it is understood as per your discharge plan, that the service pond will be relined and modified to contain a leak detection system. Prior to modification of the service pond, plans and specifications for the modification shall be submitted to the OCD for approval as part of the discharge plan.

2) As stated in your discharge plan, the service pond will usually be empty except during maintenance operations and periods of emergency venting of the geothermal loop. Since the effluent from the geothermal loop could potentially affect ground water in the area, all discharge events to the service pond shall be reported in writing to the OCD. The report shall include the approximate discharge volume and estimated time the discharge will remain in the pond. During any time period that effluent is held in the service pond, the leak detection system shall be monitored via the system's catchment basin at least weekly and a log book shall be kept on site documenting the inspection with the date, the findings of each inspection, and the name of the individual inspecting the pond.

3) Reporting of spills or leaks will be as specified in the discharge plan.

4) As stated in your discharge plan, if storage requirements for emergency venting exceed the capacity of the one-million gallon service pond, the larger (water) reservoir will be used for the excess. Any such events shall be reported in writing to the OCD in a manner similar to discharge reports for the service pond.

The approved discharge plan consists of the plan dated June, 1984, and the materials dated April 19, 1985, submitted as supplements to the discharge plan.

The discharge plan was submitted pursuant to Section 3-106 of the NM Water Quality Control Commission Regulations. It is approved pursuant to Section 3-109.F., which provides for possible future amendment of the plan. Please be advised that the approval of this plan does not relieve you of liability should your operation result in actual pollution of surface or ground waters which may be actionable under other laws and/or regulations.

There will be no routine monitoring or reporting requirements other than those previously mentioned.

Please note that Section 3-104 of the regulations requires that "When a plan has been approved, discharges must be consistent with the terms and conditions of the plan." Pursuant to Section 3-107.C. you are required to notify the director of the facility expansion, production increase, or process modification that would result in any significant modification in the discharge of water contaminants.

Pursuant to subsection 3-109.G.4., this plan approval is for a period of five years. This approval will expire June 5, 1990, and you should submit an application for new approval in ample time before that date.

On behalf of the staff of the Oil Conservation Division, I wish to thank you (and your staff and/or consultants) for your cooperation during this dicharge plan review.

Sincerely,

R. L. STAMETS
Director

RLS/PB/dp

cc: Roy Johnson - OCD Santa Fe

P 505 906 069

RECEIPT FOR CERTIFIED MAIL

NO INSURANCE COVERAGE PROVIDED—
NOT FOR INTERNATIONAL MAIL

(See Reverse)

Sent to Harold E. Valencia	
Street and No. U.S.DEPT. OF ENERGY	
P.O., State and ZIP Code Los Alamos, NM 87544	
Postage	$
Certified Fee	
Special Delivery Fee	
Restricted Delivery Fee	
Return Receipt Showing to whom and Date Delivered	
Return Receipt Showing to whom, Date, and Address of Delivery	
TOTAL Postage and Fees	$
Postmark or Date	

PS Form 3800, Feb. 1982

NOTICE OF PUBLICATION
STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION
SANTA FE, NEW MEXICO

Notice is hereby given that pursuant to New Mexico Water Quality Control Commission regulations, the following discharge plan has been submitted for approval to the Director of the Oil Conservation Division, P. O. Box 2088, State Land Office Building, Santa Fe, New Mexico 87501 (505) 827-5800.

The U. S. Department of Energy, Fenton Hill Geothermal Facility (NE/4 Section 13, Township 19 North, Range 2 East, NMPM, Sandoval County, New Mexico), H. E. Valencia, Authorized Agent, Albuquerque Operations, Los Alamos Area Office, Los Alamos, New Mexico 87544, proposes to discharge water from the geothermal loop to a service pond during periods of emergency venting or during periods when maintenance operations on the geothermal loop require a discharge of water from the loop. The discharge to the pond will be temporary as the water will be reinjected to the geothermal loop when normal operating conditions are attained. The pond is scheduled to be relined, a drainage and leak monitoring system provided, and the pond made ready to serve the geothermal loop operations for final tests scheduled in 1986 and 1987. The water from the geothermal loop has a total dissolved solids concentration of approximately 3200 mg/l. The ground water most likely to be affected is at a depth of approximately 370 feet with a total dissolved solids concentration of approximately 240 mg/l.

Any interested person may obtain further information from the Oil Conservation Division and may submit written comments to the Director of the Oil Conservation Division at the address given above. Prior to ruling on any proposed discharge plan or its modification, the Director of the Oil Conservation Division shall allow at least thirty (30) days after the date of publication of this notice during which comments may be submitted to him and a public hearing may be requested by an interested person. Requests for public hearing shall set forth the reasons why a hearing should be held. A hearing will be held if the Director determines there is significant public interest.

If no public hearing is held, the Director will approve or disapprove the proposed plan based on information available. If a public hearing is held, the Director will approve or disapprove the proposed plan based on information in the plan and information submitted at the hearing.

GIVEN Under the Seal of the New Mexico Oil Conservation Commission at Santa Fe, New Mexico, on this 6th day of May, 1985.

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

R. L. STAMETS
Director

S E A L

Department of Energy
Albuquerque Operations
Los Alamos Area Office
Los Alamos, New Mexico 87544

APR 19 1985

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. Dick Stamets, Director
Oil Conservation Division
P.O. Box 2088
Santa Fe, NM 87501-2088

RE: Oil Conservation Division letter dated September 18, 1984
Oil Conservation Division letter dated February 26, 1985

Dear Mr. Stamets:

We have attached a modified map and a supplement to the June, 1984 Groundwater Discharge Plan for our Fenton Hill Geothermal Operations. This map and supplement are intended to respond to the questions and requests in Mr. Boyer's September 18, 1984, letter.

The supplement is stamped "Draft" but we will consider it as part of the Discharge Plan upon your approval.

Please call Avedon Gallegos at 667-5288, of my office, if any questions arise.

Harold E. Valencia
Area Manager

ns:04-16/2670A

Attachment:
As Stated

cc:
Jesse Aragon, HSE-DO, LANL, MS-P228
P. Franke, ESS-DOT, LANL, MS-J981
M. McCorkle, HSE-8, LANL, MS-E518

DISCHARGE PLAN FOR GEOTHERMAL OPERATIONS AT FENTON HILL

SANDOVAL COUNTY, NEW MEXICO

SUPPLEMENT TO THE PLAN BASED ON OCD REVIEW OF SEPTEMBER 18, 1984

1. The 1" = 20' Rossander Surveying Co. Map of the Fenton Hill Site

The next update of the map will include the following in its' new corrections. These are shown in red markup on the attached copy of the current map.

(a) Location of water supply wells FH-1, 2, and 3;

(b) Name of the ponding area immediately south of EE-2;

(c) The location of the proposed 1 million gallon EE-2/EE-3 service pond; and

(d) The "mud pits" referred to on page 34.

2. Analyses of Service Pond Sediment, Pages 24 - 25.

The pond referred to on pages 24 and 25 is the pond designated EE-1 Ponding Area (1 million Gallon retaining pond).

Some possible reasons for the large deviation in the results of the mud analyses obtained by the two independent laboratories have been considered again. We have checked the calculations involved in converting % to ppm (parts per million) and they seem correct. We have also checked the basis for the analyses and they were both based on dried mud.

The samples were collected at the same time from the same pond but no attempt was made to mingle and homogenize the samples submitted to the two laboratories. Thus local variations in composition of the mud could

explain the variation in results. For example, an aliquot analyzed may have contained a chip of Al metal while the next aliquot did not.

The original percentage calculations are provided for comparative purposes.

Element	H-7 Lab Conc. %	Error %	ESS-1 Lab Conc. %	Error Std. dev.
Ag	0.000369	±0.000064	0.00004	0.00004
Al	0.68	± 0.0764	1.45	0.01
As	0.0000346	±0.0000086	0.021	0.002
B			0.0416	0.005
Ba	0.20	± 0.0108	1.67	0.02
Ca	1.36	± 0.036	1.69	0.07
Cd	0.00394	± 0.0004	0.00008	0.00004
Co			0.00032	0.00004
Cr	0.0174	± 0.0081	0.0029	0.00004
Cu	0.0272	± 0.00096	0.0372	0.0001
Fe	0.2357	± 0.0448	1.36	0.04
H_2O			28.48	Dried at 90°C
Hg	0.0460	± 0.038		
K	0.2737	± 0.0026	1.41	0.08
Li	0.0105	± 0.00022	0.0169	0.0008
Mg	0.9906	± 0.0091	0.27	0.040
Mn	0.0434	± 0.0012	0.060	0.004
Na	0.5175	± 0.0078	1.92	0.04
Ni			0.0018	0.0001
Pb	0.016327	± 0.002633	0.034	0.002
Se	0.000074	± 0.000004	N.D.	0.004
Sr			0.0112	0.0004
Zn	0.0270	± 0.0019	0.0304	0.0012

3. Status of EE-1 and GT-2 Ponding Areas

The GT-2 Ponding Area is referred to on page 34 as the Mud Pit. This ponding area has been abandoned after the drilling of GT-2. It presently contains storm run off and snow melt. It will be backfilled and graded to fit the local topography at the time the upper service pond is cleaned and reworked.

The EE-1 Ponding Area served for the drilling of EE-1, was cleaned and modified for the drilling of EE-2 and EE-3. It is now the service pond for pumping experiments in EE-2/EE-3 and for the redrilling of EE-3. This pond is to be cleaned and lined to serve as storage for venting and makeup during future reservoir flow experiments.

4. The 5.7 M Gallon Reservoir

The "Hyperlon" Liner is bedded on a thin layer of sand on a six inch thick layer of granular material. This layer is bedded in volcanic tuff. A 6 inch Ø perforated CMP drainage field is set in 12" trenches cut in this rock, below the granular material layer. This drainage field terminates in the collection system described on page 31, which is now installed and operating.

The reservoir has been and will be filled with fresh water from the supply wells at the site and hauled in from approved and tested fresh water supply away from the site. If storage requirements for emergency venting exceed the capacity of the one million gallon service pond, the larger reservoir will be used for the excess.

5. Service Pond - EE-2/EE-3 Drilling

As stated in the response to question 3, the EE-1 ponding area shown on the map has been used as the "service pond" for the EE-2/EE-3 drilling. Upon completion of the present workover/redrilling operations this pond will be modified to serve as the retaining pond for pumping operations.

The present lining of this "service pond" is composed of Betonite clays and drilling muds bedded on the tuff and fill as pond sediments. This material has been damaged by cleaning (dragline type) operation and examination of integrity of the pond is limited.

6. Retaining Pond - Modified 1 M Gallon Pond

The "service pond" is presently about 70% full and wells EE-2 and EE-3 are vented. After the current workover/redrilling when the wells are shut in the pond will be empty and modifications discussed on page 33 and 34 can be undertaken. This is scheduled for the Spring of 1986.

Construction drawings will be prepared for modification of this pond. These drawings will provide details on erosion control measures to protect the ponds clay lined sides. Copies of these drawings will be submitted to OCD for review prior to construction.

7. Change In Reporting Procedures

On page 36, Item D Reporting is to be changed in its entirety to the following:

D. Reporting

(a) The Los Alamos National Laboratory through the DOE will, as required by WQCC Section 3-107.C, notify the OCD Director of proposed facility changes or process modifications that would result in any significant modification in the discharge. Such notification will be made prior to the change to allow OCD review and comment on the proposed modificaiton prior to its implementation.

(b) Notification of fire, breaks, leaks, spills, and blowouts will be made to the OCD and to DOE by the Los Alamos National Laboratory. As required by OCD Geothermal Rule G-117, the Hot Dry Rock Program Manager at the Los Alamos National Laboratory will inform the Santa Fe Office of the OCD, the Health Safety and Environment (HSE) Division of the Laboratory and the DOE/LAAO of any incident resulting in an increase to the discharge as defined by Rule G-117. If immediate notification is required it will be in person or by telephone from the Program Manager. Subsequent notification will be provided as a written report from the HSE Division of the Laboratory through the DOE/LAAO to the Director of the OCD submitted within ten days after discovery of the incident.

(c) Notification of detection of leakage in the 1 M Gallon service pond. Leak detection of the 1 M Gallon service pond is now dependent on visual observation on a daily basis. When this pond

is modified after completion of workover/redrilling operations a monitoring and alarm system as described on page 45 will be established. Reporting of leaks will be in conformance with OCD Geothermal Rule G-117 and paragraph (b) above. Sampling and analyses of the contents of the service pond is done routinely by site staff and by the HSE Division of the Laboratory. This will be coordinated with any leak detection and results furnished as part of subsequent notification as required by OCD Rule G-117.

(d) Notification of use of the 5.7 M Gallon Reservoir for storing liquids from emergency venting. The 5.7 M Gallon Reservoir now has a leak collection system which returns the liquids to the reservoir. Emergency venting of the geothermal reservoir system that would increase the leak volume, as defined in OCD Rule G-117, would be reported as required by OCD Rule G-117. A major venting of the geothermal system will be treated as an unplanned operation and notification will be made as required based on extension and effect of the venting.

Santa Fe, N.M., Friday, March 22, 1985 THE NEW MEXICAN

World's largest hot, dry rock geothermal project nears end

LOS ALAMOS — The world's largest hot, dry rock geothermal energy system will be completed in the next three months, culminating 15 years and $150 million worth of research.

A $1 million drilling contract has been awarded to Big Chief Drilling Co. of Oklahoma to compete the Los Alamos National Laboratory project in the Jemez Mountains.

The drillers will try to connect a huge underground geothermal reservoir with two deep, 8-inch-diameter wells that will draw heat from hot rock. The heat will be used to produce electricity.

"What Los Alamos has accomplished has simply never been done before," Dick Benson, LANL program manager, said. "The technology developed here has already had tremendous spinoffs for industry, for although the basic drilling concept is that used in oil and gas fields, the complications of extreme depth, directional drilling, impermeable granite, and an intensely hot corrosive atmosphere has forced us to fabricate and design the tools and technology we needed as the project advanced."

The underground reservoir was created in December 1983. Researchers say it has enough heat to supply electricity for about 10 years to a city of at least 5,000.

The geothermal system comprises two wells and an underground reservoir of about 4 billion cubic feet of hot, fractured rock. One well is about 14,000 feet deep. The second is about 9,300 feet deep, and the drilling company will drill that well to about 12,800 feet to connect the two and draw heat from the 500-degree Fahrenheit reservoir.

Benson said the drilling, testing, and initial experiments should take about 90 days, depending on weather. "Once we make the connection we will begin long-term testing to essentially complete the solid technological base for private industry to develop," Benson said.

"The enormous potential of this hot dry rock energy source — reachable in many places on earth — coupled with the tremendous technological risks necessary to develop the resource, were too great to be assumed independently by industry," Benson said.

Benson said the perceived risks would be reduced if a second successful system were brought in at a different site.

"This should bring hot dry rock development to the point at which industry could proceed on its own," he said.

The hot, dry rock geothermal technology has been under development by lab researchers since 1970.

The process involves fracturing large areas of hot, deep rock by forcing cold water under pressure down a well into the hot rock. After the fractures are made, cold water is circulated through the rock and brought, heated, to the surface through a second well. The heat is removed from the water and could be used to produce electricity, space or industrial heat.

An earlier, smaller system with a 10,000-foot-deep reservoir produced about 5 megawatts of heat. Electricity produced by this system was used to power equipment at the Fenton Hill geothermal research site.

Since 1980, the project has received funding from West German and Japanese governments, as well as the U.S. Department of Energy.

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

TONEY ANAYA
GOVERNOR

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87501
(505) 827-5800

February 26, 1985

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. Harold E. Valencia, Area Manager
U. S. Department of Energy
Albuquerque Operations
Los Alamos Area Office
Los Alamos, NM 87544

Re: Letter dated February 20, 1985, requesting an extension to operate without an approved discharge plan for the Fenton Hill Geothermal Operation

Dear Mr. Valencia:

We have received your letter dated February 20, 1985, requesting an extension to operate without an approved discharge plan. It is our understanding that a response to a letter from OCD dated September 18, 1984, concerning your discharge plan for the Fenton Hill Geothermal Operation will be submitted by April 15, 1985.

Pursuant to Section 3-106.A. of the New Mexico Water Quality Control Commission Regulations and for good cause shown, the U. S. Department of Energy is hereby granted its request to operate its Fenton Hill Geothermal Operation without an approved discharge plan until June 30, 1985 provided all information requested by OCD in a letter dated September 18, 1984, is submitted no later than April 15, 1985.

If you have any questions on this extension, or on the discharge plan process, please feel free to contact Dave Boyer or Phil Baca at (505) 827-5812.

Sincerely,

R. L. STAMETS
Director

RLS/PB

cc: Roy Johnson - OCD

Department of Energy
Albuquerque Operations
Los Alamos Area Office
Los Alamos, New Mexico 87544

FEB 20 1985

Mr. Dick Staments, Director
Oil Conservation Division
P. O. Box 2088
Santa Fe, New Mexico 87501-2088

RE: Letter dated September 18, 1984, Discharge Plan for Geothermal Operations at Fenton Hill, Sandoval County, New Mexico

Dear Mr. Staments:

On November 19, 1984, my letter to you was to confirm an understanding between your staff, this office, and the Los Alamos National Laboratory. It was agreed that requests specified in the referenced letter did not need to be addressed until after an onsite visit (attachment). The visit was scheduled for December 14, 1984, but, was cancelled due to adverse weather conditions.

We are in the process of preparing a response and have scheduled to submit it by April 15, 1985. We proposed to provide the requested information in a letter format and when agreement is reached, the discharge plan will be modified and submitted to your office.

If an extension is necessary to accommodate the requested schedule, we request that the extension be granted under Section 3-106 A. of the WQCC regulations which state, "...or such longer time as the director shall for good cause allow."

I again want to extend an invitation for you and your staff to tour the Fenton Hill facilities. Any dates that are convenient for you are acceptable. I believe a tour will add to your and your staff's understanding of the Fenton Hill operations. Please contact Avedon Gallegos, of my staff, at 667-5288 to arrange for a visit.

Sincerely,

Harold E. Valencia
Area Manager

Attachment

cc: W. Hansen, HSE-DO, MS P228
P. Franke, ESS-DOT, MS J981
M. McCorkle, HSE-8, MS E518

NOV 19 1984

Dick Stamets, Director
Oil Conservation Division
P. O. Box 2088
Santa Fe, New Mexico 87501

RE: Request for Additional Information on the "Discharge Plan for Geothermal Operations at Fenton Hill, Sandoval County, NM"

Dear Mr. Stamets:

Mr. Melvin McCorkle with the University of California has been in contact with your office regarding a September 18, 1984 letter from Mr. David Boyer. Since Mr. Boyer was out of the office until October 24, and could not be reached, Mr. Phil Baca agreed that requests specified in the above referenced letter do not need to be addressed until after an on-site visit. Such a visit will add to your staff's understanding of our operations.

I would like to extend an invitation to you, Mr. Baca and Mr. Boyer, to tour the Fenton Hill Facilities at your convenience. Please contact Don Gallegos with my staff at 667-5288 to arrange for a visit.

Sincerely,

Original signed by
Harold E. Valencia

Harold E. Valencia
Area Manager

cc:
Jesse Aragon, HSE-DO, LANL, M.S. P228
P. Franke, ESS-DOT, LANL, M.S. J981
M. McCorkle, HEE-8, LANL, M.S. E518

Department of Energy
Albuquerque Operations
Los Alamos Area Office
Los Alamos, New Mexico 87544

NOV 19 1984

Dick Stamets, Director
Oil Conservation Division
P. O. Box 2088
Santa Fe, New Mexico 87501

RE: Request for Additional Information on the "Discharge Plan for Geothermal Operations at Fenton Hill, Sandoval County, NM"

Dear Mr. Stamets:

Mr. Melvin McCorkle with the University of California has been in contact with your office regarding a September 18, 1984 letter from Mr. David Boyer. Since Mr. Boyer was out of the office until October 24, and could not be reached, Mr. Phil Baca agreed that requests specified in the above referenced letter do not need to be addressed until after an on-site visit. Such a visit will add to your staff's understanding of our operations.

I would like to extend an invitation to you, Mr. Baca and Mr. Boyer, to tour the Fenton Hill Facilities at your convenience. Please contact Don Gallegos with my staff at 667-5288 to arrange for a visit.

Sincerely,

Harold E. Valencia
Area Manager

cc:
Jesse Aragon, HSE-DO, LANL, M.S. P228
P. Franke, ESS-DOT, LANL, M.S. J981
M. McCorkle, HSE-8, LANL, M.S. E518

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

September 18, 1984

TONEY ANAYA
GOVERNOR

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87501
(505) 827-5800

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. Harold E. Valencia, Area Manager
U. S. Department of Energy
Albuquerque Operations
Los Alamos Area office
Los Alamos, New Mexico 87544

Re: "Discharge Plan for Geothermal Operations at Fenton Hill, Sandoval County, New Mexico"

Dear Mr. Valencia:

The OCD received the above-referenced document August 10, 1984, and has reviewed it for compliance with the ground water protection requirements of Part 3 of the New Mexico Water Quality Control Commission (WQCC) Regulations. When complete and approved, this discharge plan will also satisfy OCD Geothermal Rule G-116 "Disposal of Produced Waters."

Since discharges from the ponds to canyon alluvium off-site have been discontinued and are not proposed as part of this discharge plan, this greatly simplifies plan review. However, I do have several questions, comments and requests for clarifying information.

1. Update the 1" = 20' Rossander Surveying Co. Map to include the following:

   (a) Location of water supply wells FH-1, 2, and 3;

   (b) Name of the ponding area immediately south of EE-2;

   (c) The location of the proposed 1 million gallon EE-2/EE-3 service pond; and

   (d) The "mud pits" referred to on page 34.

2. Which service pond was sampled for the bottom sediment analyses presented on pages 24-25? Why is there such a large deviation between the results of the two analyses?

3. What is the current and proposed status for the EE-1 and GT-2 ponding areas? Are these the two service ponds referred to at the top of page 29?

4. What is the composition of the subliner under the 5.7 M gallon reservoir (p. 31)? Is the water currently and proposed to be in this pond fresh water from the supply wells (except for emergency venting of the geothermal reservoir)?

5. Referring to the map referenced in question 1, which pond has served as the "service pond" for the EE-2/EE-3 drilling p.31)? Provide details on thickness and installation of the clay liner. Was this liner removed during the last cleaning for this pond?

6. Since the retaining pond would ordinarily be empty (p.32), provide information on erosion control measures proposed to protect the pond's clay-lined sides with the pool plans and specifications to be submitted to OCD for review.

7. The proposed reporting section (p.36) is inadequate:

   (a) The discharger is required by WQCC Section 3-107.C. to notify the OCD director of proposed facility changes or process modifications that would result in any significant modification in the discharge. Such a notification must be made prior to the change to allow OCD review and comment on the proposed modification prior to its implementation.

   (b) The DOE should propose monitoring, inspection and reporting procedures that cover the following items:

      (1) OCD notification of major or minor breaks, spills or leaks pursuant to OCD Geothermal Rule G-117;

(2) OCD notification of detection of leakage in the 1 M gal. service pond including results of DOE sample analyses, and proposed DOE action; and

(3) OCD notification of use of the 5.7 million gal. water pond to store liquids resulting from emergency venting of the geothermal reservoir system.

If you have any questions regarding the information requested, please contact me at the above address or by telephone at 827-5812. Since I will be out of the office until October 24, I will be unable to answer inquiries prior to that date.

Sincerely,

DAVID G. BOYER
Hydrogeologist

cc: OCD District IV

Enclosure: (Geothermal Rules G-116, 117)

Department of Energy
Albuquerque Operations
Los Alamos Area Office
Los Alamos, New Mexico 87544

AUG 8 1984

Joe Ramey, Director
Oil Conservation Division
State Land Office Bldg., Room 206
310 Old Santa Fe Trail
Santa Fe, New Mexico 87501

Dear Mr. Ramey:

Enclosed are three copies of the "Discharge Plan for Geothermal Operations at Fenton Hill, Sandoval County, N.M.", which was prepared by the Los Alamos National Laboratory.

The comments contained in your February 22, 1984 letter have been incorporated.

If you have questions, please call Bill Crismon at 667-5288.

Sincerely,

Harold E. Valencia
Area Manager

Enclosure

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

TONEY ANAYA
GOVERNOR

February 22, 1984

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87501
(505) 827-5800

Department of Energy
Albuquerque Operations
Los Alamos Area Office
Los Alamos, New Mexico 87544

Attention: Mr. William Crisman, Jr.

Gentlemen:

The draft of the Groundwater Discharge Plan for the Fenton Hill Geothermal Operations has been reviewed with the following comments which should be addressed in the final plans:

1. No analysis of material in bottom of service pond (after page 25).

2. That in closing any ponds they should be slightly mounded so as to ensure that rain water will be diverted.

With these incorporated, the final plan should be approvable.

Yours very truly,

JOE D. RAMEY
Director

JDR/fd

Department of Energy
Albuquerque Operations
Los Alamos Area Office
Los Alamos, New Mexico 87544

JUN 28 1983

Mr. Joe Ramey, Director
Oil Conservation Division (OCD)
P. O. Box 228
Santa Fe, New Mexico 87501

RE: Groundwater Discharge Plan for Fenton Hill

Dear Mr. Ramey:

Enclosed is a draft of the Groundwater Discharge Plan for the Geothermal Operations at Fenton Hill. As discussed in my May 26, 1983 letter, three complete final copies of the plan will be forwarded to you after completion of the OCD review and approval process.

If additional information or clarification is necessary, please call William Crismon at 667-5288 or Wally McCorkle at 667-7957. We are looking forward to working with your staff on this matter.

Sincerely,

William Crismon Jr.

William Crismon, Jr.
Chief, Technical Programs Branch

Enclosure

cc:
A. Drypolcher, NMEID, Santa Fe, NM
F. Humke, USEPA, Dallas, Texas

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

TONEY ANAYA
GOVERNOR

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87501
(505) 827-5800

June 6, 1983

Harold E. Valencia
Area Manager
Department of Energy
Albuquerque Operations
Los Alamos Area Office
Los Alamos, New Mexico 87544

Dear Mr. Valencia:

The due date for the submission of your groundwater discharge plan for the Fenton Hill activities is hereby extended from May 25, 1983 to June 30, 1983.

Yours very truly,

JOE D. RAMEY
Director

JDR/fd

cc: Oscar Simpson

Department of Energy
Albuquerque Operations
Los Alamos Area Office
Los Alamos, New Mexico 87544

MAY 25 1983

Mr. Joe Ramey, Director
Oil Conservation Division
P. O. Box 228
Santa Fe, New Mexico 87501

RE: Groundwater Discharge Plan for Fenton Hill

Dear Mr. Ramey:

Recently you and members of your staff met with Laboratory staff members to discuss your request for a groundwater discharge plan for the Fenton Hill activities.

Substantial progress has been made toward completion of the plan; however, an extension from May 25, 1983 until June 30, 1983 as the due date for submission of the plan is requested.

As reviewed with you at the May 6, 1983 meeting, the Laboratory needs additional time to further investigate double lining techniques for retention ponds. The Fenton Hill project requires the cleanout and reuse of ponds used to store drilling fluids. This requires us to formulate a lining technique that will allow us to "muck out" the drilling fluid ponds without breaching the lining. Secondly, the drilling muds on the bottom of the existing drilling fluid pond must be characterized to permit development of an acceptable disposal method. Finally, we will upgrade the current draft of the contingency section of the plan.

As you suggested, the June 30, 1983 submission will consist of single draft plan and after appropriate review, necessary clarification and/or submission of additional information and approval by your office, three complete final copies of the submission will be forwarded to your office.

The courtesy extended to the Laboratory staff is appreciated. You, or members of you staff, are invited to tour the Fenton Hill Facility. To arrange a tour, please call Mr. William Crismon at 667-5288 or Mr. Wally McCorkle at 667-7957. We are looking forward to continued interaction with your staff.

Sincerely,

Harold E. Valencia
Area Manager

cc: A. Drypolcher, NMEID, Santa Fe, NM
Fred Humke, USEPA, Dallas, Texas

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

BRUCE KING
GOVERNOR

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87501
(505) 827-2434

January 10, 1983

Department of Energy
Albuquerque Operations
Los Alamos Area Office
Los Alamos, NM 87544

RE: Mr. Harold Valencia
Area Manager

RE: Request for Discharge Plan
for Geothermal Operations at
Fenton Hill
Sandoval County, NM

Dear Mr. Valencia:

Under provisions of the regulations of the Water Quality Control Commission you are hereby notified that the filing of a discharge plan for your Geothermal Fenton Hill Facility located in Sandoval County, New Mexico, is required. Discharge plans are defined in Section 1-101.P of the regulations and a copy of the regulations is enclosed for your convenience.

This plan should cover all discharges of effluent at the plant sites or adjacent to plant sites. Section 3-106 A of the regulations requires submittal of the discharge plans within 120 days of receipt of this notice unless an extension of this period is sought and approved.

The discharge plans should be prepared in accordance with Part 3 of the Regulations.

If there are any questions on this matter, please do not hesitate to call Oscar Simpson at 827-5822. Mr. Simpson has been assigned responsibility for review of all discharge plans.

Yours very truly,

JOE D. RAMEY
Director

JDR/OS/dp

cc: Mr. Melvin McCorkle
P.O. Box 1663
Mail Stop E518
Los Alamos, NM 87545

Department of Energy
Albuquerque Operations
Los Alamos Area Office
Los Alamos, New Mexico 87544

FEB 1 1982

Mr. Oscar Simpson
Hydrogeologist
Energy and Minerals Department
P. O. Box 2088
Santa Fe, NM 87501

Re: Los Alamos National Laboratory Hot Dry Rock (HDR) Geothermal Project at Fenton Hill

Dear Mr. Simpson:

As the result of your tour of the HDR project at Fenton Hill, you requested additional information before determining if submission of a groundwater discharge plan is necessary as a requirement under New Mexico Groundwater Standards.

The items enumerated below are my understanding of the requested additional information.

1. All of the flow data since October 1979.
   See five data sheets attached.

2. Water quality information of the Abiquiu Tuff.
   See attached report number LA-8964-MS entitled
   "Aquifer Evaluation at Fenton Hill
   October and November, 1980".

3. USGS Topo Map numbers for the Fenton Hill Area.
   The following 7.5 minute quadrangle maps are
   available from the USGS, Federal Center, Denver,
   Colorado 80225.

   a. Redondo Peak.
   b. Valle San Antonio.
   c. Seven Springs.
   d. Jemez Springs.

4. An aerial photo or site plan of Fenton Hill project.
   See attached drawing entitled "Topographic Map of the
   Geothermal Site".

5. The plans and specifications for the 5 million gallon storage pond.

   a. See attached 14 drawings entitled "Water Storage Pond, TA-57".

   b. See attached booklet entitled "Title II, Water Storage Pond - TA-57".

6. Schematic of the well casing for each well. See attached drawing for EE-1 pipe string, GT-28 string, EE-2 as completed on May 12, 1980 and EE-3.

7. An inventory, including name, manufacturer, and quantity of additives used for drilling and/or testing.

   See two data sheets attached.

On behalf of the Department of Energy (DOE) and the Laboratory, I want to express my appreciation for the cooperation you have extended to us. If additional information is needed, please feel free to contact the DOE or the Laboratory staff with your request.

Sincerely yours,

Harold E. Valencia
Area Manager

Attachments
As stated

August 13, 1981

ADDENDUM TO THE SOP FOR "THE USE OF ^{82}Br TO STUDY WATER CIRCULATION PATTERNS AT TA-57 (FENTON HILL)".

The changed condition needed to be covered by this addendum is that the irradiated NH_4Br will be injected as a solution instead of a crystalline solid. It will be transported from our Hot Cells at TA-48 to Fenton Hill in this same solution form. The lead shield for transporting this solution is described in the review of it by Carl Buckland dated March 20, 1980.

Br-82 in this form is in group 4 for transport considerations and as such we can transport 20 Ci. There is no problem with producing this amount at the reactor and processing in our hot cells. This would also be satisfactory as far as dilution underground is concerned to an amount up to about 4 Ci. If there is a need to go higher than this, it would probably have resulted from a larger dilution factor so the final predicted surface concentration instead of a set number of curies at start time should be the most important consideration.

Insertion of the ^{82}Br at Fenton Hill. The shield containing the radioactive solution will be placed near the piping system. It will be connected to that piping by a system of tubing, fittings, and valves rated to withstand the pressure needed to force the Br-82 solution into the recirculating water that is going back downhole. It must be checked for crimps or obvious damage before being connected. With the valves at the pig still closed, the valves from the main recirculating line to the well are opened to bring pressurized water up to the valves at the pig. Check carefully for leaks, then if there are none, open the pig valve on the low pressure side (toward the well) first, then the high pressure side from the water tank. These can be done simultaneously but there may be a small chance of Br-82 solution diffusing back into the water supply if the high pressure line were left open to the pig and the outlet kept closed. The ball valves presently in use will flush down to a lower contamination level if they are operated several times during the rinse period of 5-10 minutes. On shutdown the high pressure supply line to the pig is closed, then the valve between the well and the pig, then the drain line for the tubing connections is opened, then disconnect the tubing from the pig and drain it into a plastic bottle. The tubing should be

placed in a plastic bag for return to CNC-3. It and the drain water in the bottle should be monitored before transport or disposal. The only variation in the above sequence that can cause trouble is to open the drain line while there is still pressure on the system. Extension handles have been used to operate the ball valves but there is no evidence at present that says this is necessary, it is just good practice.

It is appropriate to point out that at some point between the present level of 400 mCi and the upper limit of 20 Ci described in this SOP, a new pig with more shielding might be needed. It should not be necessary to revise the document to cover this situation. The requirement is already laid on that H-1 approve the shipment for departure. This document does apply the requirement that a responsible person in H-1 be consulted about plans when a new pig is to be constructed and be asked to inspect it at any stage in construction he deems necessary.

This operation appears to be safer than the previous one of transporting and injecting the solid ammonium bromide, but some experiments may require the first method. It is retained as an alternate accepted procedure.

Attachment to the Addendum to S.O.P. for "The Use of [redacted] to Study Water Circulation Patterns at TA-57 (Fenton Hill)"

TUBING PRESSURE RATINGS

This is a difficult subject to cover in simple terms, tables and graphs because of the many variables in tubing materials, wall thicknesses, hardness and surface finishes.

Although SWAGELOK Tube Fittings greatly simplify and lower the cost of a tubing installation, certain good practices are necessary. The tubing material must be softer than the fitting material. Typical recommended ordering instructions are shown for each type of tubing.

When tubing is properly selected and handled and when SWAGELOK Tube Fittings are assembled according to instructions, assemblies will remain leak-free far beyond the allowable working pressures shown. SWAGELOK Tube Fittings have been repeatedly tested to the *burst* of the tubing in both the *minimum* and *maximum* wall thickness shown for each size.

SWAGELOK Tube Fittings are not normally recommended for tube wall thicknesses beyond the ranges shown for each size. If you have tubing thinner or thicker than shown on the tables, request information from your local distributor.

Shown in the TABLES 1, 2, 3 & 4 are maximum allowable working pressures for ALUMINUM, COPPER, STEEL and STAINLESS STEEL tubing in various wall thicknesses.

All allowable working pressure loads are calculated from S values as specified by Table 302.3.1 and Paragraph 304.1.2 of Code for Pressure Piping ANSI B31.3.

TABLE 5 shows factors for calculation of working pressures at elevated temperatures. For a given material, multiply the factor shown times allowable working pressure.

TABLE 6 is a Chart of Factors. It can be used to calculate allowable pressures with other tubing materials not shown in tables 1, 2, 3 & 4. Multiply the factor x allowable stress value in psi to determine allowable pressure.

ALLOWABLE PRESSURE CHARTS

TABLE 1 • ALUMINUM TUBING*

Minimum ultimate tensile strength 38,000 p.s.i. • For metal temperatures not to exceed –20° to 100°F. • Allowable working pressure loads calculated from S values as specified by Table 302.3.1 and Paragraph 304.1.2 of Code for Pressure Piping ANSI B31.3.

TUBE O.D. (IN.)	TUBE WALL THICKNESS (INCHES)								SWAGELOK FITTING SERIES
	.035	.049	.058	.065	.083	.095	.109	.120	
	WORKING PRESSURE* (PSIG)								
1/8"									200
3/16"	4,142	5,966							300
1/4"	2,992	4,408	5,405						400
5/16"	2,327	3,401	4,132						500
3/8"	1,909	2,764	3,353						600
1/2"	1,406	2,014	2,422	2,755					810
5/8"	1,111	1,586	1,900	2,147					1010
3/4"		1,301	1,558	1,767	2,299				1210
7/8"		1,111	1,320	1,491					1410
1"		959	1,149	1,301	1,681	1,947			1610

SUGGESTED ORDERING INFORMATION

High quality aluminum-alloy drawn seamless tubing ASTM B-210 or equivalent. (Values shown are for alloy 6061-T6.)

TABLE 2 • COPPER TUBING*

Minimum ultimate tensile strength 30,000 p.s.i. • For metal temperatures not to exceed –20° to 100°F. • Allowable working pressure loads calculated from S values as specified by Table 302.3.1 and Paragraph 304.1.2 of Code for Pressure Piping ANSI B31.3.

TUBE O.D. (IN.)	TUBE WALL THICKNESS (INCHES)								SWAGELOK FITTING SERIES
	.028	.035	.049	.065	.083	.095	.109	.120	
	WORKING PRESSURE (PSIG)								
1/8"	3,198	4,056							200
3/16"	2,034	2,616	3,768						300
1/4"	1,464	1,890	2,784	3,750					400
5/16"		1,470	2,148	2,952					500
3/8"		1,206	1,746	2,412					600
1/2"		888	1,272	1,740	2,292				810
5/8"			1,002	1,356	1,776	2,076			1010
3/4"			822	1,116	1,452	1,686	1,968		1210
7/8"			702	942	1,230	1,422	1,656		1410
1"			606	822	1,062	1,230	1,428	1,590	1610

SUGGESTED ORDERING INFORMATION

Soft annealed seamless copper tubing ASTM B-75 or equivalent.

*See note on reverse side

Standard Operating Procedure
for the Use of Radioactive Br at TA-57 (Fenton Hill)

This is a short form of the operating procedure. ^{82}Br is used to study a water circulation problem at the drill site. It is injected at several thousand feet below the surface and its circulation path studied by nuclear counting techniques. The quantities of radioactivity involved are about 100 mCi to inject downhole, about 200 mCi to leave CNC-3 for transport to Fenton Hill, and 500 mCi at CNC-3. This amount does not apply to the procedure described in the addendum.

The hazards involve exposure of operating personnel to the radiation from the source during its preparation, analysis, transportation, and emplacement; or contamination of the vehicle, the public roads, the drilling rig, or the surrounding site.

The source will be prepared by irradiation of high-purity ammonium bromide with neutrons at Omega site. Its transportation to CNC-3 is covered by an existing SOP. Analysis, repackaging and testing of the primary container will be done at the Hot Cells remotely so there is no radiation exposure hazard at this stage. The transportation shield will be covered with plastic while it is in the cell so it will be kept clean. The shield is equipped with a bolt-on lid that is equipped with an O-ring gasket to prevent leakage of the sample. The shield will be bolted to the bed of the truck so that an accident will not separate it from the vehicle. H-1 monitors will check the outside of the shield with rough swipes over the whole surface. They must read no more than background for release of the shipment to proceed to Fenton Hill. Surface and 1 meter readings will be taken and recorded on a tag on the shield by H-1. It is the responsibility of CNC-3 personnel to be absolutely certain that H-1 has completed their monitoring, labeling of the pig and the vehicle, and any other of their assigned tasks before departure. H-1 group office will be notified when a shipment is to leave. All personnel escorting the sample or working near it will wear film badges and those who might come in close enough contact to receive more than a few mr will be equipped with pocket dosimeters and finger ring badges as needed. There will be an H-1 monitor on site at Fenton Hill before the shield is removed from the truck and until H-1 is satisfied there is no longer a hazard from that source. The closest contact of personnel to the unshielded source will occur when it is removed from the

lead transportation shield. The separation distance will be about 0.6 m and the exposure time about 1 minute. The source while in this position is not actually unshielded except in a very narrow cone straight down because it is packaged in a nose cone of tungsten metal that screws onto the drill stem while the source still inside the W is inside the lead transportation shield. The NH_4Br is flame sealed in a small quartz tube and tested at 200°C and 6000 psi before irradiation since this is the environment it must survive up to the time of down hole injection. If it is used in deeper holes that lead to more severe conditions preceeding the crushing of the source, it will be tested appropriately. H-1 will monitor the areas of the Fenton Hill site that might be exposed to the Br isotope until they are convinced there is no hazard. The ^{82}Br is ideal for this type of experiment because its half life of 35.4 hours is short enough that very little of the injected isotope can diffuse to the surface before decay. Its gamma rays are well known and make its assay and detection very simple. Its biological hazard is very low compared to the previously used radioiodine.

The CNC-3 personnel who will do the work on this experiment are:

John W. Barnes, staff member, working with radioactive materials since 1942 and in charge of radiochemistry hot cells at TA-48 since 1963.

Glenn E. Bentley, staff member, working in isotope production in the TA-48 hot cells since 1976, specialist on Pu in soil, and had been in charge of an environmental analytical laboratory in Boulder, Co.

Two senior technicians, Thomas P. DeBusk and Martin A. Ott, have been working with radioactive materials in the TA-48 hot cells since 1963 and 1965 respectively.

There may be additional people involved in this operation in the future, it is the responsibility of the CNC-3 staff members named above to assure that those making the trip and inserting the source are qualified by having sufficient experience with the equipment, radioactive material, and have read this SOP.

The longer form of operating procedures for handling the Br source is included as an attachment.

The integrity of the ^{82}Br sealed in a quartz tube can be monitored by the down-hole G-M tube. The reliability of the tube is verified by its response to the known natural radioactive background. At insertion depth the quartz tube is broken by a motor driven ram and again the G-M tube is used to verify completion of the insertion. Starting with 100 mCi of ^{82}Br and mixing it with 300000 gal of water will lead to a concentration of 2×10^{-5} μCi/cc at 3 days after insertion. This is well below the allowable value of 8×10^{-4} μCi/cc listed in Allan Stokers memo. Any ^{82}Br getting to the surface at completion of the experiment will be collected in either the EE-1 or GT-2 ponds.

G-3 and G-4 personnel will be the same people who normally take part in experiments at the Fenton Hill site.

The above SOP is a short form condensation of operating directions that are included as attachments. It is understood that the operating directions do not conflict with operating philosophy or boundary conditions expressed in the SOP. The operating directions covering appropriate parts of the work have been originated by G-3, G-4, H-8 and CNC-3 with considerable input from H-1 during the writing.

Operating Directions for Production, Analysis and Emplacement of ^{82}Br at Fenton Hill

SUMMARY

^{82}Br is produced at the Omega West reactor by neutron capture on Br present in Analytical Reagent grade NH_4Br. ^{82}Br has a half life of 35.4 hours and principal gamma energies from 554 to 1475 keV. Ammonium bromide as a solid is sealed in a quartz ampoule for irradiation, analysis and transportation to the site. The solubility of ammonium bromide is 97g/100 cc of water at 25°C. The salt for irradiation is flame sealed in quartz under mild vacuum. The sealed ampoule is tested at 6000 psi (external) before irradiation. It is tested for possible breakage during irradiation by putting it in boiling water and looking for bubbles. Integrity of the ampoules is verified at Fenton Hill after the tungsten nose cone containing it in the transport shield is fastened to the rig and removed from the shield by swiping the bottom of the nose cone with a tissue held by long tongs and checking for gamma activity. A hot swipe 10 mr in excess of what is showed on leaving the CNC-3 Hot Cell is reason for a very thorough examination of the nose cone before proceeding with the experiment.

The closest contact between personnel and the source will occur when it is attached to the drill rig and raised above the shield for removal of the shield. The minimum separation should be at least 0.6 m and the time less than a minute.

Production and Analysis

The irradiation at Omega West Reactor, Group CNC-5 is a routine operation covered by their Standard Operatng Procedures. Shipment of the samples from Omega to CNC-3 at TA-48 is covered by an existing SOP. The radiation level of the sample as received in our cells will be less than 0.1% of many of our medical isotope targets.

There are some special considerations involved in the production of this isotope so those along with the routine Hot Cell procedures will be described here. The ^{82}Br source will be delivered for down hole insertion at Fenton Hill in the sealed quartz ampoule in which it is irradiated. The

ampoule must survive an underground environment of 200°C and 6000 psi (4.1×10^4 kPa) before it is smashed to release the ^{82}Br into the surrounding water. Therefore, the NH_4Br sealed in a quartz tube that is 9.0 to 9.3 mm o.d. and 34-42 mm long is tested at this temperature and pressure before irradiation. A tiny hole could be caused by impact-breaking of the seal-off tip in the Omega rabbit. For this reason the irradiated ampoule will be immersed in boiling water in a Hot Cell to check for this sort of leak. A steam of bubbles from the ampoule here would keep it from being sent to Fenton Hill. All reasonable precautions will be taken to keep the quartz ampoule, the tungsten nose cone, and the transport shield from surface contamination. Specifically, the work will be done in as clean a cell as we have available. Fresh plastic will be placed on the working surface and the manipulator pads cleaned just before a run. The quartz ampoule will be contained in a clean plastic vessel for counting it and moving it on the train. A swipe sample will be taken just before loading it in the nose cone. A swipe sample of the nose cone will be taken just before loading it in the transport shield. These swipes should be lower than 5 mr $\beta+\gamma$. The outside surface of the transport shield should be covered with plastic to decrease contamination while in the cell. The loaded transport shield is to be swiped over the surface after it is removed from the cell. These swipes are to be checked with a sensitive β, γ survey instrument with the γ shield open. H-1 personnel will be taking and counting the swipes since they must label the shield for transport.

The above paragraph states the boundary conditions for handling the source in our cells. The operational details will have to be developed by Hot Cell personnel. The requirements for keeping the surface clean, swiping it for verification, testing it for leaks are adequate parameters to insure a safe sample.

The number of millicuries of ^{82}Br is determined by the use of a Ge-Li crystal and pulse analyzer in the operating gallery of the hot cell. There is a small opening in the front wall of the cell so that gamma rays from the sealed quartz containiner inside the hot cell can be counted with known geometry without exposure to personnel. Gross gamma readings will always be recorded for the sample as a check on the answer from the pulse analyzer.

The Shipping and Emplacement Shield

The Br source will be shielded laterally by 33 mm of W and 30 mm of Pb and about 45 mm of Pb straight down. The top of the shield is 25 mm of Pb but it is 127 mm above the source. The shield will receive the source inside the CNC-3 Hot Cells and will have the lid put on remotely. The shield is to be protected from contamination with a covering of plastic sheet which is removed after it is brought out of the cell. The lid to the shield is bolted in place and the seal is completed with an elastomeric O-ring. The shield will be bolted to the truck which conveys it to TA-57. H-1 monitors at TA-48 will swipe the shield all over with rough swipes. These are to be checked with a sensitive β, γ survey instrument with the β shield open.

These same swipes can be checked for α. The shield will not be released for travel until the swipes are no greater than background. H-1 will tag the cask before it leaves for TA-57. It is the plan that the shipment will not have to be tagged with a RADIOACTIVE placard. This means a surface reading of less than 50 mr/hr and less than 1 mr/hr at 1 m. The H-1 group office is to be notified when the shipment leaves TA-48.

The driver and anyone accompanying the shipment are required to wear film badges and dosimeters. They should have finger ring badages in their possession. They should also have emergency equipment including: survey meter, 2 pairs of tongs one of which could pick up the ampoule and the other be capable of handling the W noe cone; wrenches to fit bolts on the shield, flashlight, mirror on a handle, box of kemwipes, and a plastic bag. The crew accompanying the source must be equipped with safety glasses and hard hats for use at TA-57. An H-1 monitor will be on site at TA-57 from the time of emplacement of the radioactive contamination is over. H-1 personnel shall be certain that anyone who might get any exposure to radiation is wearing a film badge while on site and that personnel working closely with the source have their exposure documented with finger ring badges and pocket dosimeters.

The Br containing shield weighs about 55 kg and will be positioned under the downhole tool by two people. The W nose cone will be screwed onto the downhole tool by using the shield as a wrenched while the tool is lowered into it to make contact. The shield is manually slid to one side when the source is removed but this is the point at which a swipe

sample is taken with a tissue held by a long tong. This is to verify the continuing integrity of the quartz ampoule. The Br source after emplacement on the rig and swiping of the W nose cone can be lowered back into the shield if it is not yet ready to go downhold. After the source is sent downhold the shield is to be kept nearby. The W nose cone will be monitored on its return to the surface and if still radioactive it can be returned to the CNC-3 Hot Cell in the shield.

HEALTH•SAFETY•ENVIRONMENT FORM

SOP SUBMITTAL

DATE Nov. 18, 1980

LOS ALAMOS SCIENTIFIC LABORATORY

TO H-DIVISION SOP OFFICE MAIL STOP 401

SOP TITLE "The Use of ^{82}Br to Study Water Circulation Patterns at TA-57 (Fenton Hill)"

ORIGINATING ORGANIZATION CNC-11 LOCATION TA-48 & TA-57 (AS SPECIFIED IN THE SOP)

SOP STATUS: ☐ NEW ☐ REVISED ☑ RENEWAL ☒ OTHER Revised Addendum (SPECIFY)

DISCIPLINES INVOLVED:

- ☒ HEALTH PHYSICS (H–1)
- ☐ OCCUPATIONAL MEDICINE (H–2)
- ☐ FIRE PROTECTION (H–3)
- ☐ SAFETY (H–3)
- ☐ INDUSTRIAL HYGIENE (H–5)
- ☐ WASTE MANAGEMENT (H–7)
- ☐ ENVIRONMENTAL SURVEILLANCE (H–8)
- ☐ OTHER _____ (SPECIFY)

EXPLANATION/COMMENTS:

SUBMITTED BY J. E. Sattizahn ORGANIZATION CNC-11

APPROVED BY:

(NAME)	(TITLE)	(ORGANIZATION)	(DATE)
J. Sattizahn	Group Leader	CNC-11	11/19/80
(NAME)	(TITLE)	(ORGANIZATION)	(DATE)

NOTE: THIS SOP MUST BE APPROVED IN ACCORDANCE WITH ESTABLISHED DIVISION PROCEDURES BEFORE IT IS SUBMITTED TO H-DIVISION.

HEALTH•SAFETY•ENVIRONMENT FORM

LOS ALAMOS SCIENTIFIC LABORATORY

SOP SUBMITTAL

DATE

TO H-DIVISION SOP OFFICE MAIL STOP 401

SOP TITLE THE USE OF ^{82}BR TO STUDY WATER CIRCULATION PATTERNS AT TA-57 (FENTON HILL)

ORIGINATING ORGANIZATION G-3 LOCATION TA-57
(AS SPECIFIED IN THE SOP)

SOP STATUS: ☐ NEW ☐ REVISED ☒ RENEWAL ☐ OTHER _____
(SPECIFY)

DISCIPLINES INVOLVED:

- ☒ HEALTH PHYSICS (H–1)
- ☐ OCCUPATIONAL MEDICINE (H–2)
- ☐ FIRE PROTECTION (H–3)
- ☐ SAFETY (H–3)
- ☐ INDUSTRIAL HYGIENE (H–5)
- ☐ WASTE MANAGEMENT (H–7)
- ☒ ENVIRONMENTAL SURVEILLANCE (H–8)
- ☐ OTHER _____ (SPECIFY)

EXPLANATION/COMMENTS:

SUBMITTED BY Bert R. Dennis ORGANIZATION G-3

APPROVED BY:

(NAME)	(TITLE)	(ORGANIZATION)	(DATE)
Bert R Dennis	G.L.	G-3	11/25/80

NOTE: THIS SOP MUST BE APPROVED IN ACCORDANCE WITH ESTABLISHED DIVISION PROCEDURES BEFORE IT IS SUBMITTED TO H-DIVISION.

HEALTH•SAFETY•ENVIRONMENT FORM

LOS ALAMOS SCIENTIFIC LABORATORY

SOP SUBMITTAL

DATE Sept. 1, 1981

TO H-DIVISION SOP OFFICE MAIL STOP 401

SOP TITLE "The Use of ^{82}Br to Study Water Circulation Patterns at TA-57 (Fenton Hill)

ORIGINATING ORGANIZATION CNC-3 LOCATION TA-48 & TA-57
(AS SPECIFIED IN THE SOP)

SOP STATUS: ☐ NEW ☒ REVISED ☐ RENEWAL ☐ OTHER _____
(SPECIFY)

DISCIPLINES INVOLVED:

- ☒ HEALTH PHYSICS (H-1)
- ☐ OCCUPATIONAL MEDICINE (H-2)
- ☐ FIRE PROTECTION (H-3)
- ☐ SAFETY (H-3)
- ☐ INDUSTRIAL HYGIENE (H-5)
- ☐ WASTE MANAGEMENT (H-7)
- ☒ ENVIRONMENTAL SURVEILLANCE (H-8)
- ☐ OTHER _____ (SPECIFY)

EXPLANATION/COMMENTS:

SUBMITTED BY John W. Barnes ORGANIZATION CNC-3

APPROVED BY:

(NAME)	(TITLE)	(ORGANIZATION)	(DATE)
[signature]	Group Leader	CNC-11	9/2/81

NOTE: THIS SOP MUST BE APPROVED IN ACCORDANCE WITH ESTABLISHED DIVISION PROCEDURES BEFORE IT IS SUBMITTED TO H-DIVISION.

University of California
LOS ALAMOS SCIENTIFIC LABORATORY
Post Office Box 1663 Los Alamos, New Mexico 87545

In reply refer to: G-1
Mail stop: 570

February 26, 1980

Mr. Don Nutter
Oil Conservation Division
PO Box 2088
Santa Fe, NM 87501

Dear Don:

Below is a list of geothermal holes that have been drilled in the State of New Mexico on Federal lands under the authority of a Department of Energy/Los Alamos Scientific Laboratory agreement with the US Forest Service:

DESCRIPTION	LOCATION	TOTAL DEPTH	BOTTOM HOLE TEMPERATURE
GT-1	SE 1/4, Sect. 1, TI9N, R 2E, NMPM	2757'	100.4°C
GT-2	NE 1/4, Sect. 13, TI9N, R 2E, NMPM	9610'	197°C
EE-1	NE 1/4, Sect. 13, TI9N, R 2E, NMPM	10,053'	207°C
EE-2	NE 1/4, Sect. 13, TI9N, R 2E, NMPM	13,629'=Slant Depth 13,044'-Vertical	Estimated 275°C
EE-3	NE 1/4, Sect. 13, TI9N, R 2E, NMPM	15,000'=Slant Depth 14,500'=Vertical	Estimated: 275°C

All of these geothermal holes are part of the DOE/LASL drilling activities at the LASL Fenton Hill test site. GT-1 was a test hole and has been subsequently plugged. GT-2 and EE-1 are presently in operation on a test basis.

Mr. Don Nutter

February 27, 1980

EE-2 drilling is almost completed and will be used in conjunction with EE-3 for a larger geothermal reservoir assessment. Drilling of EE-3 will commence in late 1980.

Enclosed for your information are several publications pursuant to these activities.

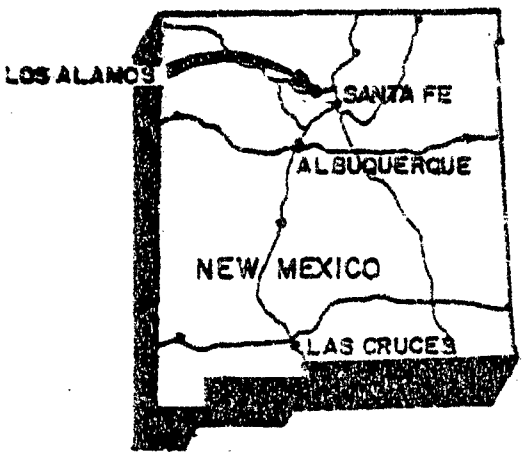
If I can be of additional assistance to you or your office, I can be contacted at 667-2631.

Sincerely,

John C. Kedge

JCK:bb
Encl: a/s
Cys: G-DO, MS 570
G-1, MS 587
ISD-5, MS 150

UNITED STATES
DEPARTMENT OF ENERGY
LOS ALAMOS AREA OFFICE
LOS ALAMOS, NEW MEXICO



WATER STORAGE POND, TA-57

LOS ALAMOS SCIENTIFIC LABORATORIES

LOS ALAMOS, NEW MEXICO

TITLE II

Boyle Engineering Corporation

3939 D SAN PEDRO NE
ALBUQUERQUE, NEW MEXICO

CONTRACT DOCUMENTS

FENTON HILL
WATER STORAGE POND TA-57

Prepared by

BOYLE ENGINEERING CORPORATION
FEBRUARY, 1980

TABLE OF CONTENTS

STANDARD FORM 20
JANUARY 1961 EDITION
GENERAL SERVICES ADMINISTRATION
FED. PROC. REG. (41 CFR) 1-16.401

REFERENCE

DATE

INVITATION FOR BIDS
(CONSTRUCTION CONTRACT)

NAME AND LOCATION OF PROJECT
Water Storage Pond, TA-57
Approximately 40 miles west of
Los Alamos, New Mexico

DEPARTMENT OR AGENCY
U. S. Department of Energy

BY (Issuing office)
U.S. Department of Energy
Los Alamos Area Office
Los Alamos, New Mexico

Sealed bids in original only **for the work described herein will be received until**

at U.S. Department of Energy
Los Alamos Area Office Headquarters Building, Room 100
Los Alamos, New Mexico 87544

and at that time publicly opened. (See directions for submitting bids, SF-22, Page ID 7)

Information regarding bidding material, bid guarantee, and bonds

A bid guarantee in a form specified in the Instructions to Bidders, SF-22 in a penal sum of not less than 20% of the total bid price, will be required with each bid if the bid price is in excess of $2,000.00. If a surety bond is submitted, it shall be on a U.S. Standard Form 24.

Wage Determination

The wage rates set forth are the minimum rates which may be paid to the classification of laborers and mechanics designated therein pursuant to the Davis-Bacon Act (Act of March 3, 1931 amended; 40 U.S.C. 276a and following). The DOE does not represent that said minimum rates do now, nor that they will at any time in the future, prevail in the locality of the work for such laborers or mechanics; nor that such mechanics or laborers are or will be obtainable at said rates of work under this contract; nor that said rates represent the most recent wage determination by the Secretary of Labor with respect to such classifications of laborers or mechnaics in the locality of the work.

Description of work

U.S. GOVERNMENT PRINTING OFFICE 1980—O-572728

Notice of Requirement for Certification of Nonsegregated Facilities

Bidders and offerors are cautioned as follows: By signing this bid or offer, the bidder or offeror will be deemed to have signed and agreed to the provisions of the "Certification of Nonsegregated Facilities" in this solicitation. The certification provides that the bidder or offeror does not maintain or provide for his employees facilities which are segregated on a basis of race, creed, color, or national origin, whether such facilities are segregated by directive or on a de facto basis. The certification also provides that he will not maintain such segregated facilities. Failure of a bidder or offeror to agree to the Certification of Nonsegregated Facilities will render his bid or offer nonresponsive to the terms of solicitation involving awards of contracts exceeding $10,000 which are not exempt from the provisions of the Equal Opportunity clause.

NATIONAL ALLIANCE OF BUSINESSMEN'S PROGRAM FOR HARD-CORE UNEMPLOYED

Business leaders have formed a partnership with government to seek to solve the problem of hard-core unemployment in the 50 largest U. S. cities. A new organization, the National Alliance of Businessmen, has been established with headquarters in Washington, D. C., and branches in each of the 50 cities. Alliance goals are to have 500,000 hard-core unemployed on the job by 1971 (100,000 by June 1969), and to find 200,000 jobs for needy youth of the inner cities this summer. Government funds are available to reimburse employers for the excess costs of training the hard-core unemployed.

We encourage your participation in this program, and to pledge JOBS for and hire qualified "hard-core" personnel who might otherwise be unemployed. Pledges may be made through your local NAB Metropolitan Office. For additional information, including information about the local availability of qualified employees, contact the Director of the local Office of the State Employment Service.

8. Late Bids, Modifications of Bids, or Withdrawal of Bids.—(*a*) Any bid received at the office designated in the soliciation after the exact time specified for receipt will not be considered unless it is received before award is made and either:

(1) It was sent by registered or certified mail not later than the fifth calendar day prior to the date specified for the receipt of bids (e.g., a bid submitted in response to a solicitation requiring receipt of bids by the 20th of the month must have been mailed by the 15th or earlier); or

(2) It was sent by mail (or telegram if authorized) and it is determined by the Government that the late receipt was due solely to mishandling by the Government after receipt at the Government installation.

(*b*) Any modification or withdrawal of a bid is subject to the same conditions as in (a), above. A bid may also be withdrawn in person by a bidder or his authorized representative, provided his identify is made known and he signs a receipt for the bid, but only if the withdrawal is made prior to the exact time set for receipt of bids.

(*c*) The only acceptable evidence to establish:

(1) The date of mailing of a late bid, modification, or withdrawal sent either by registered or certified mail is the U.S. Postal Service postmark on both the envelope or wrapper and on the original receipt from the U.S. Postal Service. If neither postmark shows a legible date, the bid, modification, or withdrawal shall be deemed to have been mailed late. (The term "postmark" means a printed, stamped, or otherwise placed impression (exclusive of a postage meter machine impression) that is readily identifiable without further action as having been supplied and affixed on the date of mailing by employees of the U.S. Postal Service. Therefore, offerors should request the postal clerk to place a hand cancellation bull's-eye "postmark" on both the receipt and the envelope or wrapper.)

(2) The time of receipt at the Government installation is the time-date stamp of such installation on the bid wrapper or other documentary evidence of receipt maintained by the installation.

(*d*) Notwithstanding (a) and (b) of this provision, a late modification of an otherwise successful bid which makes its terms more favorable to the Government will be considered at any time it is received and may be accepted.

NOTE: The term "telegram" includes mailgrams.

9. Public Opening of Bids.—Bids will be publicly opened at the time set for opening in the invitation for bids. Their content will be made public for the information of bidders and others interested, who may be present either in person or by representative.

10. Award of Contract.—(*a*) Award of contract will be made to that responsible bidder whose bid, conforming to the invitation for bids is most advantageous to the Government, price and other factors considered.

(*b*) The Government may, when in its interest, reject any or all bids or waive any informality in bids received.

(*c*) The Government may accept any item or combination of items of a bid, unless precluded by the invitation for bids or the bidder includes in his bid a restrictive limitation.

11. Contract and Bonds.—The bidder whose bid is accepted will, within the time established in the bid, enter into a written contract with the Government and, if required, furnish performance and payment bonds on Government standard forms in the amounts indicated in the invitation for bids or the specifications.

☆ U.S. GOVERNMENT PRINTING OFFICE: 1978-261-647/3634

SUPPLEMENT TO STANDARD FORM 22, INSTRUCTIONS TO BIDDERS
(February 1978 Edition)

12. INFORMATION REGARDING BUY AMERICAN ACT

The Buy American Act (41 U.S.C. 10a-10d) generally requires that only domestic construction material be used in the performance of this contract. (See the clause entitled "Buy American" in Standard Form 23A, General Provisions, Construction Contract.) This requirement does not apply to the following construction materials or components:

Antimony
Asbestos
Bauxite
Chrome ore or chromite
Cobalt
Cork
Graphite
Jute and jute burlaps
Logs, veneer and lumber from balsa, greenheart, lignum vitae, mahogany, and teak.
Mica
Nickel
Rubber, crude and latex
Shellac
Tin

a. Furthermore, bids or proposals offering use of additional nondomestic construction material may be acceptable for award if the Government determines that use of comparable domestic construction material is impracticable or would unreasonably increase the cost or that domestic construction material (in sufficient and reasonably available commercial quantities and of a satisfactory quality) is unavailable. Reliable evidence shall be furnished justifying such use of additional nondomestic construction material.

b. Where it is alleged that the use of domestic construction material would unreasonably increase the cost:

(1) data shall be included, based on a reasonable canvass of suppliers, demonstrating that the cost of each such domestic construction material would exceed by more than six percent the cost of comparable nondomestic construction material. (All costs of delivery to the construction site shall be included, as well as any applicable duty.)

(2) for evaluation purposes, six percent of the cost of all additional nondomestic construction material, which qualifies under paragraph (1), above, will be added to the bid or proposal.

c. When offering additional nondomestic construction material, bids or proposals may also offer, at stated prices, any available comparable domestic construction materials, so as to avoid the possibility that failure of a nondomestic construction material to be acceptable, under a., above, will cause rejection of the entire bid.

13. INFORMATION REGARDING BIDDERS

Each bidder shall have the following information (completed in all respects) on file with the Contracting Officer prior to award of this contract:

a. Standard Government Form No. 129 - Bidders Mailing List Application.

b. Data on Plant to be used on construction jobs.

c. Experience Data.

Forms for submission of above information are available from the United States Department of Energy, Los Alamos Area Office, Financial Management and Contracts Branch, Los Alamos, New Mexico 87544.

Any substantial change in status of, or information concerning the bidder shall be submitted to the Contracting Officer promptly. The data submitted by the bidder will be considered by the Contracting Officer in determining whether the low bidder is sufficiently responsible and experienced in work of the nature provided for in this project and able to successfully complete the work in a timely fashion.

14. BONDS

a. Payment Bond

The Contractor shall furnish either (i) good and sufficient surety or sureties acceptable to the Government for the protection of persons furnishing material or labor in connection with the performance of the work under this contract on U. S. Standard Form No. 25A, or (ii) in lieu thereof, to deposit for this purpose one of the types of security listed in Federal Procurement Regulation (41 CFR 1-10.204). The penal sum of such security shall be 50% of the contract price or estimated contract price. If this contract is in excess of $1 million dollars, but not more than $5 million dollars the penal sum shall be 40% of the contract price or estimated contract price. When the contract price is more than $5 million dollars, the penal sum shall be $2,500,000.

b. Performance Bond

The Contractor shall furnish either (i) a performance bond with good and sufficient surety or sureties acceptable to the Government in connection with the performance of the work under this contract on U. S. Standard Form No. 25, or (ii) in lieu thereof, to deposit for this purpose one of the types of security listed in Federal Procurement Regulation (41 CFR 1-10.204). Unless otherwise specified in Division 1, the penal sum of such performance bond shall be 100% of the contract price (or estimated contract price).

c. Applicability

Performance and payment bonds shall be furnished when (1) the contract award resulting from this bid exceeds $25,000, or (2) bonds are specifically required by the Invitation for Bids (Standard Form 20).

d. Date of Bond

Any bonds or other securities required hereunder will be dated as of the same or later date than the date of the contract and will be furnished by the Contractor to the Government at the time the contract is executed.

e. Bid Form

Pending publication of a new edition of Construction Contract Standard Form 21, the provision below is contained in the Instructions to Bidders and is binding to the same extent as if included in the Construction Contract.

The undersigned further agrees that, when reinsurance agreements are contemplated, all necessary reinsurance agreements will be on Government forms and will be executed and submitted with the bonds. However, when an additional period (not to exceed 45 calendar days) is authorized by the procuring activity, reinsurance agreements may be submitted within such period after the execution of the bond.

15. PREPARATION OF BIDS

The sealed envelope submitted by each bidder shall contain only one each of the following documents.

Complete all documents.

a. Bid Form (Standard Form 21). Acknowledge all addendum on the Bid Form.

b. Representations and Certifications (Standard Form 19B), including Supplement to SF-19B.

c. Bid Guarantee in accordance with paragraph 4 of Instructions to Bidders.

If not provided separately, the Standard Form 19B and 21 shall be removed from a bound set of these specifications. The bidder may submit, with the bid, the information requested by paragraph 14., above.

16. NOTICE OF COMPLEXITY

(This clause should be added where appropriate)

DELETE

This project is vital to the defense and security of the United States and is of a critical and complex nature. Accordingly, certain clauses of the Technical Provisions and these Instructions to Bidders are more stringent than

those contained in normal construction contracts. Bidders are cautioned to examine carefully these portions of the documents and specifications, and the requirements set forth in them.

17. SPECIAL EXPERIENCE REQUIREMENT AND CERTIFICATION

(This clause should be added where appropriate)

It is required that the Contractor receiving this award shall be recognized in the fire sprinkler design and installation industry as regularly engaged in that industry, and that he has, during the last five years designed and installed loop and grid systems, such as specified in the Technical Provisions, in existing, occupied, multi-story buildings, consisting of both wet pipe and antifreeze systems, which were designed for, and installed in, buildings, of a size similar to those described in the specifications in compliance with NFPA Codes 13 and 24.

The bidder shall submit, with the bid and in the sealed envelope, the following additional information, in order to certify to the special experience requirements set forth above:

> Data on past experience of the bidder, submitted for the purpose of meeting the criteria set forth above in this paragraph, includng the location, procuring entity, time for performance, amount of contract and nature of work accomplished on such projects. This data shall include name, experience and history of the bidder's supervisory personnel to be assigned to the project.

The foregoing information shall be submitted in addition to the data required to be on file with the Contracting Officer pursuant to clause 14., "Information Regarding Bidders," above.

18. SITE INSPECTION AND TECHNICAL INQUIRIES

The site of the proposed work may be inspected when proper appointment is made with the following or as required below:

Name Mr. Mike McFadden
United States Department of Energy
Address Los Alamos, New Mexico 87544

Telephone (505) 667-4661

Technical inquiries may be directed to:

Name Boyle Engineering Corporation

Address 3939 D San Pedro NE, Albuquerque, New Mexico 87110

Telephone (505) 883-7700

19. BASIS OF AWARD

Award will be made to one bidder for the base bid.

20. NOTICE OF TOTAL SMALL BUSINESS SET-ASIDE

a. Restriction

Bids or proposals under this procurement are solicited from small business concerns only and this procurement is to be awarded only to one or more small business concerns. This action is based on a determination by the Contracting Officer, alone or in conjunction with a representative of the Small Business Administration, that it is in the interest of maintaining or mobilizing the Nation's full productive capacity, in the interest of war or national defense programs, or in the interest of assuring that a fair proportion of Government procurement is placed with small business concerns. Bids or proposals received from firms which are not small business concerns shall be considered nonresponsive.

b. Definition

A "small business concern" is a concern, including its affiliates, which is independently owned and operated, is not dominant in the field of operation in which it is bidding on Government contracts, and can further qualify under the criteria set forth in regulations of the Small Business Administration.

(For additional information, see governing regulations of the Small Business Administration (13 CFR Part 121)).

21. PRE-BIDDING CONFERENCE

A conference will be held at _____ on _____ for the purpose of enabling bidders to secure clarification and explanation of the technical and nontechnical provisions of the contract and to enable the Contracting Officer to inform bidders of the priniciples and practices which he will follow in the administration of the Contract.

Although bidders are not required to attend the pre-bidding conference, attendance is strongly recommended so that bidders may gain an accurate appreciation for the complexity of this project. This on-site inspection may be essential in order to prepare an accurate bid.

22. NOTICE OF REQUIREMENT FOR AFFIRMATIVE ACTION TO ENSURE EQUAL EMPLOYMENT OPPORTUNITY (EXECUTIVE ORDER 11246)

(The following clause is applicable to all contracts in excess of $10,000.)

a. The Offeror's or Bidder's attention is called to the "Equal Opportunity Clause" and the "Standard Federal Equal Employment Opportunity Construction Contract Specifications" set forth herein.

b. The goals and timetables for minority and female participation, expressed in percentage terms for the Contractor's aggregate workforce in each trade on all construction work in the covered area, are as follows:

Timetables	Goals for Minority Participation for each trade	Goals for Female Participation for each trade
From 4/1/78 until 3/31/79	33.0%	3.1%
From 4/1/79 until 3/31/80	33.0%	5.0%
From 4/1/80 until 3/31/81	33.0%	6.9%

These goals are applicable to all the Contractor's construction work (whether or not it is Federal or federally assisted) performed in the covered area.

The Contractor's compliance with the Executive Order and the regulations in 41 CFR Part 60-4 shall be based on its implementation of the Equal Opportunity Clause, specific affirmative action obligations required by the specifications set forth in 41 CFR 60-4.3(a), and its efforts to meet the goals established for the geographical area where the contract resulting from this solicitation is to be performed. The hours of minority and female employment and training must be substantially uniform throughout the length of the contract, and in each trade, and the Contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from Contractor to Contractor or from project to project for the sole purpose of meeting the Contractor's goals shall be violation of the contract, the Executive Order and the regulations in 41 CFR Part 60-4. Compliance with the goals will be measured against the total work hours performed.

c. The Contractor shall provide written notification to the Director of the Office of Federal Contract Compliance Programs within 10 working days of award of any construction subcontract in excess of $10,000 at any tier for construction work under the contract resulting from this solicitation. The notification shall list the name, address, and telephone number of the subcontractor; employer identification number; estimated dollar amount of the subcontract; estimated starting and completion dates of the subcontract; and the geographical area in which the contract is to be performed.

d. As used in this Notice, and in the contract resulting from this soliciation, the "covered area" is the State of New Mexico.

23. LIQUIDATED DAMAGES

Note: See Section 01100, Special Project Requirements, Subsection 01106, regarding liquidated damages, if any.

24. DELETIONS

a. The following clauses of the documents comprising this Invitation for Bids have been modified:

1. Clauses 1 and 2 of Standard Form 19-B are deleted and substituted by Clauses 14 and 15 of the Supplement to Standard Form 19-B.

2. Clauses 6, 7(c), 18, 20, and 21 of Standard Form 23-A are deleted and substituted by Clauses 32.6, 32.7(c), 32.18, 32.20, and 32.21 of the Supplement to Standard Form 23-A.

3. Clauses 1, 7, 9, 10, 23 and 28 of Standard Form 23-A have been modified by the inclusion of additional requirements in Clauses 32.1, 32.7, 32.9, 32.10, 32.23 and 32.28 of the Supplement to Standard Form 23-A.

4. Clauses 3 and 4 of Standard Form 19-A are deleted and substituted by Clause 10 of the Supplement to Standard Form 19-A.

b. The following clauses are deleted from the document comprising this Invitation for Bids: SF 23-A; Clauses 19, 29 and 30.

(Instructions: List any other contract clauses which have been deleted from this Invitation.)

Clauses 16, 17, and 21 have been deleted from this Invitation.

STANDARD FORM 21
DECEMBER 1965 EDITION
GENERAL SERVICES ADMINISTRATION
FED. PROC. REG. (41 CFR) 1-16.401

BID FORM
(CONSTRUCTION CONTRACT)

REFERENCE

Read the Instructions to Bidders (Standard Form 22)
This form to be submitted in

DATE OF INVITATION

NAME AND LOCATION OF PROJECT

5 Million Gallon Water Storage Pond
TA-57
Approximately 40 miles west of
Los Alamos, New Mexico

NAME OF BIDDER *(Type or print)*

(Date)

TO: United States Department of Energy
Los Alamos Area Office
Los Alamos, New Mexico 87544

In compliance with the above-dated invitation for bids, the undersigned hereby proposes to perform all work for

5 Million Gallon Water Storage Pond
TA-57
Los Alamos, New Mexico

in strict accordance with the General Provisions (Standard Form 23-A), Labor Standards Provisions Applicable to Contracts in Excess of $2,000 (Standard Form 19-A), specifications, schedules, drawings, and conditions, for the following amount(s) (See Supplement to SF-22, Instructions to Bidders, Paragraph 20, BASIS OF AWARD, PAGE ID15).

"SEE ATTACHED BID SCHEDULE"

(Continue on other side)

The undersigned agrees that, upon written acceptance of this bid, mailed or otherwise furnished within calendar days (calendar days unless a different period be inserted by the bidder) after the date of opening of bids, he will within calendar days (unless a longer period is allowed) after receipt of the prescribed forms, execute Standard Form 23, Construction Contract, and give performance and payment bonds on Government standard forms with good and sufficient surety.

The undersigned agrees, if awarded the contract, to commence the work within calendar days after the date of receipt of notice to proceed, and to complete the work within calendar days after the date of receipt of notice to proceed.

Notice to Proceed may be issued concurrently with written acceptance of bid.

RECEIPT OF AMENDMENTS: *The undersigned acknowledges receipt of the following amendments of the invitation for bids, drawings, and/or specifications, etc. (Give number and date of each):*

ADDENDUM NO. _____ DATE _____

ADDENDUM NO. _____ DATE _____

ADDENDUM NO. _____ DATE _____

ADDENDUM NO. _____ DATE _____

ADDENDUM NO. _____ DATE _____

The representations and certifications on the accompanying STANDARD FORM 19-B are made a part of this bid.

ENCLOSED IS BID GUARANTEE, CONSISTING OF | IN THE AMOUNT OF

NAME OF BIDDER (*Type or print*)	FULL NAME OF ALL PARTNERS (*Type or print*)
BUSINESS ADDRESS (*Type or print*) (*Include "ZIP Code"*)	
BY (*Signature in ink. Type or print name under signature*)	
TITLE (*Type or print*)	

DIRECTIONS FOR SUBMITTING BIDS: *Envelopes containing bids, guarantee, etc., must be sealed, marked, and addressed as follows:*

Shall be either delivered of mailed to:

U.S. Department of Energy
Financial Management & Contracts Branch
Los Alamos Area Office
Los Alamos, New Mexico 87544

MARKED in lower left hand corner of envelope:
BID UNDER INVITATION NO.

To be opened at :00 local time

CAUTION—Bids should not be qualified by exceptions to the bidding conditions.

* U.S. GOVERNMENT PRINTING OFFICE : 1966 O—225-830

REPRESENTATIONS AND CERTIFICATIONS

(Construction and Architect-Engineer Contract)

(For use with Standard Forms 19, 21 and 252)

REFERENCE *(Enter same No.(s) as on SF 19, 21 and 252)*

NAME AND ADDRESS OF BIDDER *(No., Street, City, State, and ZIP Code)*

DATE OF E

In negotiated procurements, "bid" and "bidder" shall be construed to mean "offer" and "offeror."

The bidder makes the following representations and certifications as a part of the bid identified above. *(Check appropriate boxes.)*

1. SMALL BUSINESS

He ☐ is, ☐ is not, a small business concern. (A small business concern for the purpose of Government procurement is a concern, including its affiliates, which is independently owned and operated, is not dominant in the field of operations in which it is bidding on Government contracts, and can further qualify under the criteria concerning number of employees, average annual receipts, or other criteria as prescribed by the Small Business Administration. For additional information see governing regulations of the Small Business Administration (13 CFR Part 121)).

2. MINORITY BUSINESS ENTERPRISE

He ☐ is, ☐ is not a minority business enterprise. A minority business enterprise is defined as a "business, at least 50 percent of which is owned by minority group members or, in case of publicly owned businesses, at least 51 percent of the stock of which is owned by minority group members." For the purpose of this definition, minority group members are Negroes, Spanish-speaking American persons, American-Orientals, American-Indians, American-Eskimos, and American-Aleuts."

DELETE

3. CONTINGENT FEE

(a) He ☐ has, ☐ has not, employed or retained any company or person (other than a full-time bona fide employee working solely for the bidder) to solicit or secure this contract, and *(b)* he ☐ has, ☐ has not, paid or agreed to pay any company or person (other than a full-time bona fide employee working solely for the bidder) any fee, commission, percentage or brokerage fee, contingent upon or resulting from the award of this contract; and agrees to furnish information relating to *(a)* and *(b)* above as requested by the Contracting Officer. *(For interpretation of the representation, including the term "bona fide employee," see Code of Federal Regulations, Title 41, Subpart 1-1.5.)*

4. TYPE OF ORGANIZATION

He operates as an ☐ individual, ☐ partnership, ☐ joint venture, ☐ corporation, incorporated in State of . . . . . .

5. INDEPENDENT PRICE DETERMINATION

(a) By submission of this bid, each bidder certifies, and in the case of a joint bid each party thereto certifies as to his own organization, that in connection with this procurement:

(1) The prices in this bid have been arrived at independently, without consultation, communication, or agreement, for the purpose of restricting competition, as to any matter relating to such prices with any other bidder or with any competitor;

(2) Unless otherwise required by law, the prices which have been quoted in this bid have not been knowingly disclosed by the bidder and will not knowingly be disclosed by the bidder prior to opening, in the case of a bid, or prior to award, in the case of a proposal, directly or indirectly to any other bidder or to any competitor; and

(3) No attempt has been made or will be made by the bidder to induce any other person or firm to submit or not to submit a bid for the purpose of restricting competition.

(b) Each person signing this bid certifies that:

(1) He is the person in the bidder's organization responsible within that organization for the decision as to the prices being bid herein and that he has not participated, and will not participate, in any action contrary to (*a*)(1) through (*a*)(3) above; or

(2) (i) He is not the person in the bidder's organization responsible within that organization for the decision as to the prices being bid herein but that he has been authorized in writing to act as agent for the persons responsible for such decision in certifying that such persons have not participated, and will not participate, in any action contrary to (*a*)(1) through (*a*)(3) above, and as their agent does hereby so certify; and (ii) he has not participated, and will not participate, in any action contrary to (*a*)(1) through (*a*)(3) above.

(c) This certification is not applicable to a foreign bidder submitting a bid for a contract which requires performance or delivery outside the United States, its possessions, and Puerto Rico.

(d) A bid will not be considered for award where (*a*)(1), (*a*)(3), or (*b*) above, has been deleted or modified. Where (*a*)(2) above, has been deleted or modified, the bid will not be considered for award unless the bidder furnishes with the bid a signed statement which sets forth in detail the circumstances of the disclosure and the head of the agency, or his designee, determines that such disclosure was not made for the purpose of restricting competition.

NOTE.—Bids must set forth full, accurate, and complete information as required by this invitation for bids (including attachments). The penalty for making false statements in bids is prescribed in 18 U.S.C. 1001.

STANDARD FORM 19-B, JUNE 1976 EDITION
GENERAL SERVICES ADMINISTRATION
FED. PROC. REG. (41 CFR) 1-16.401 AND 1-16.701

THE FOLLOWING NEED BE CHECKED ONLY IF BID EXCEEDS $10,000 IN AMOUNT.

6. EQUAL OPPORTUNITY

He ☐ has, ☐ has not, participated in a previous contract or subcontract subject to the Equal Opportunity Clause herein, the clause originally contained in Section 301 of Executive Order No. 10925, or the clause contained in Section 201 of Executive Order No. 11114; he ☐ has, ☐ has not, filed all required compliance reports; and representations indicating submission of required compliance reports, signed by proposed subcontractors, will be obtained prior to subcontract awards.

(The above representations need not be submitted in connection with contracts or subcontracts which are exempt from the equal opportunity clause.)

7. PARENT COMPANY AND EMPLOYER IDENTIFICATION NUMBER

Each bidder shall furnish the following information by filling in the appropriate blocks:

(a) Is the bidder owned or controlled by a parent company as described below? ☐ Yes ☐ No. *(For the purpose of this bid, a parent company is defined as one which either owns or controls the activities and basic business policies of the bidder. To own another company means the parent company must own at least a majority (more than 50 percent) of the voting rights in that company. To control another company, such ownership is not required; if another company is able to formulate, determine, or veto basic business policy decisions of the bidder, such other company is considered the parent company of the bidder. This control may be exercised through the use of dominant minority voting rights, use of proxy voting, contractual arrangements, or otherwise.)*

(b) If the answer to *(a)* above is "Yes," bidder shall insert in the space below the name and main office address of the parent company.

NAME OF PARENT COMPANY	MAIN OFFICE ADDRESS *(No., Street, City, State, and ZIP Code)*

(c) Bidder shall insert in the applicable space below, if he has no parent company, his own Employer's Identification Number (E.I. No.) *(Federal Social Security Number used on Employer's Quarterly Federal Tax Return, U.S. Treasury Department Form 941)*, or, if he has a parent company, the E.I. No. of his parent company.

EMPLOYER IDENTIFICATION NUMBER OF	PARENT COMPANY	BIDDER
➤		

8. CERTIFICATION OF NONSEGREGATED FACILITIES

(Applicable to (1) contracts, (2) subcontracts, and (3) agreements with applicants who are themselves performing federally assisted construction contracts, exceeding $10,000 which are not exempt from the provisions of the Equal Opportunity clause.)

By the submission of this bid, the bidder, offeror, applicant, or subcontractor certifies that he does not maintain or provide for his employees any segregated facilities at any of his establishments, and that he does not permit his employees to perform their services at any location, under his control, where segregated facilities are maintained. He certifies further that he will not maintain or provide for his employees any segregated facilities at any of his establishments, and that he will not permit his employees to perform their services at any location, under his control, where segregated facilities are maintained. The bidder, offeror, applicant, or subcontractor agrees that a breach of this certification is a violation of the Equal Opportunity clause in this contract. As used in this certification, the term "segregated facilities" means any waiting rooms, work areas, rest rooms and wash rooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees which are segregated by explicit directive or are in fact segregated on the basis of race, color, religion, or national origin, because of habit, local custom, or otherwise. He further agrees that (except where he has obtained identical certifications from proposed subcontractors for specific time periods) he will obtain identical certificatons from proposed subcontractors prior to the award of subcontractors exceeding $10,000 which are not exempt from the provisions of the Equal Opportunity clause; that he will retain such certifications in his files; and that he will forward the following notice to such proposed subcontractors (except where the proposed subcontractors have submitted identical certifications for specific time periods):

NOTICE TO PROSPECTIVE SUBCONTRACTORS OF REQUIREMENT FOR CERTIFICATIONS OF NONSEGREGATED FACILITIES

A Certification of Nonsegregated Facilities must be submitted prior to the award of a subcontract exceeding $10,000 which is not exempt from the provisions of the Equal Opportunity clause. The certification may be submitted either for each subcontract or for all subcontracts during a period (i.e., quarterly, semiannually, or annually).

NOTE: The penalty for making false statements in offers is prescribed in 18 U.S.C. 1001.

9. CLEAN AIR AND WATER

(Applicable if the bid or offer exceeds $100,000, or the contracting officer has determined that orders under an indefinite quantity contract in any year will exceed $100,000, or a facility to be used has been the subject of a conviction under the Clean Air Act (42 U.S.C. 1857c-8(c)(1)) or the Federal Water Pollution Control Act (33 U.S.C. 1319(c)) and is listed by EPA, or is not otherwise exempt.)

The bidder or offeror certifies as follows:

(a) Any facility to be utilized in the performance of this proposed contract has ☐, has not ☐, been listed on the Environmental Protection Agency List of Violating Facilities.

(b) He will promptly notify the contracting officer, prior to award, of the receipt of any communication from the Director, Office of Federal Activities, Environmental Protection Agency, indicating that any facility which he proposes to use for the performance of the contract is under consideration to be listed on the EPA List of Violating Facilities.

(c) He will include substantially this certification, including this paragraph (c), in every nonexempt subcontract.

☆U. S. GPO:1977-0-241-530/3364

BID FORM

FENTON HILL RESERVOIR

5 MILLION GALLON WATER STORAGE POND, TA-57

BID ITEM	DESCRIPTION OF WORK	BID AMOUNT (LUMP SUM)
1.	All work required to complete the project as shown on the plans and in the specifications, including site work, structural and piping, reservoir cover and all appurtenances for the lump sum price of _____ _____ _____ _____	$_____
	TOTAL AMOUNT OF BID:	$_____

COST BREAKDOWN

(Break down the total cost into unit costs for the following categories. Minor modifications to the work classifications may be made subject to prior approval of the CONTRACTING OFFICER.)

Site Grading

Excavation

Embankment

Liner

Roof

6" DI Yard Piping

8" DI Yard Piping

6" Steel Piping

Fencing

Roadway

Seeding

SUPPLEMENT TO STANDARD FOR 19B,
REPRESENTATIONS AND CERTIFICATIONS, JUNE 1976

10. AFFIRMATIVE ACTION PROGRAM

The bidder (or offeror) represents that (1) it (_____) has developed and has on file (_____) has not developed and does not have on file at each establishment affirmative action programs as required by the rules and regulations of the Secretary of Labor (41 CFR 60-1 and 60-2), or (2) it (_____) has not previously had contracts subject to the written affirmative action program requirement of the rules and regulations of the Secretary of Labor.

The bidder (or offeror) agrees that it will make good faith efforts to adhere to the affirmative action plan, if any, set forth in this invitation for bids. Prior to the award of a construction contract resulting from this Invitation for Bids, the Contracting Officer shall determine in accordance with FPR 1-1.1203 and 1-12.803 that the prospective Contractor appears to be able to conform to the requirements of the Equal Opportunity clause and the applicable Affirmative Action Program.

11. WOMAN-OWNED BUSINESS

(The following representation is required in all bids in excess of $10,000.)

Concern is (_____) is not (_____) a woman-owned business.

A woman-owned business is a business which is, at least, 51 percent owned, controlled, and operated by a woman or women. Controlled is defined as exercising the power to make policy decisions. Operated is defined as actively involved in the day-to-day management.

For the purpose of this definition, businesses which are publicly owned, joint-stock associations, and business trusts are excepted. Exempted businesses may voluntarily represent that they are, or are not, woman-owned if this information is available.

12. PERCENT OF FOREIGN CONTENT

(The following representation will be required in contracts in excess of $10,000.)

The offeror/contractor will represent (as an estimate), immediately after the award of a contract, the percent of the foreign content of the item or service being procured expressed as a percent of the contract award price (accuracy within plus or minus 5 percent is acceptable).

13. ALTERATION TO STANDARD FORM 19-B

Paragraph 7 of SF-19B is amended to include a new subsection (d).

(d) The bidder does ( ) does not ( ) have a DUNS Contractor Establishment Number. If the bidder does have a DUNS No., please insert it in the space below:

DUNS No. _____

14. SMALL AND SMALL DISADVANTAGED BUSINESS CERTIFICATION

(A) The offeror ( ) contractor ( ) certifies that he is ( ) is not ( ) a small business concern as defined in accordance with Section 3 of the Small Business Act (15 U.S.C. 632).

(B) The offeror ( ) contractor ( ) certifies that he is a small business (as set forth in (A) above) and is ( ) is not ( ) owned and controlled by socially and economically disadvantaged individuals. Such a firm is defined as one -

(i) which is at least 51 per centum owned by one or more such individuals or, in the case of publicly owned business, at least 51 per centum of the stock is owned by such individuals.

(ii) whose management and daily business operations are controlled by one or more such individuals, and

(iii) which certifies concerning said ownership and control in accordance with section (C) below.

(C) The offeror ( ) contractor ( ) certifies that he is ( ) is not ( ) a minority individual(s) in accordance with (C)(i) below or that he is ( ) is not ( ) socially and economically disadvantaged in accordance with section (C)(ii) or (C)(iii). Socially and economically disadvantaged individuals are defined as:

(i) United States citizens who are Black Americans, Hispanic Americans, Native Americans, or other specified minorities:

(ii) any other individual found to be disadvantaged pursuant to section 8(a) of the Small Business Act (15 U.S.C. 637); or

(iii) any other individual defined as socially and economically disadvantaged, for purposes relating to other sections of the Small Business Act.

NOTE: NO SOLICITATION MAY BE PROPERLY CONSIDERED WITHOUT THIS CERTIFICATION AND NO AWARD MAY BE MADE WITHOUT IT BEING EXECUTED.

15. CERTIFICATION REGARDING SUBCONTRACTING AND PLANS: SUBCONTRACTING REPRESENTATION

(A) The offeror ( ) contractor ( ) represents that the following conditions prevail which determine whether the firm shall be required to submit a subcontracting plan for small business concerns and small business concerns owned and controlled by socially and economically disadvantaged individuals:

(i) he is ( ) a small business as defined in accordance with Section 3 of the Small Business Act (15 U.S.C. 632);

(ii) subcontracting possibilities are not ( ) offered with respect to this contract;

(iii) the contract, including all subcontracts thereunder, will be performed entirely outside of the United States, its territories and possessions, the District of Columbia and the Commonwealth of Puerto Rico and is therefore not covered ( );

(iv) the contract, including all prior modifications and/or extensions of which this award is a part and all projected future actions, shall not ( ) exceed $1,000,000 (if solely for construction of a public facility) or $500,000 otherwise; and

(v) the contract is for services which are personal in nature and is therefore not covered ( ).

(B) The offeror ( ) contractor ( ) represents that he is ( ) is not ( ) required to submit plans for subcontracting with small and small disadvantaged businesses because he has properly executed one or more of the above representations.

(C) The offeror ( ) contractor ( ) certifies that he will submit ( ) a Subcontracting Plan in accordance with the terms and conditions specified unless exepted by (A) above, and that he will ( ) will not ( ) require it of all appropriate subcontractors unless they certify that they are exempt.

Failure to execute this representation will be deemed a minor informality and the offeror will be permitted to correct the omission prior to award.

16. SMALL BUSINESS AND SMALL DISADVANTAGED BUSINESS SUBCONTRACTING PROGRAM (Advertised)

(The following representation is applicable if the bid amount is $1,000,000.00 or more):

(a) The offeror represents that it is aware:

(1) Of the subcontracting plan requirement in this provision and, if selected for award, it will submit within the time specified by the contracting officer, a subcontracting plan that will afford the maximum practicable opportunity to participate in the performance of the contract to small and small disadvantaged business concerns and will include:

(i) Percentage goals (expressed in terms of percentage of total planned subcontracting dollars) for the utilization as subcontractors of small business concerns and small business concerns owned and controlled by socially and economically disadvantaged individuals. (For the purposes of the subcontracting plan, the contractor shall include all purchases which contribute to the performance of the contract, including a proportionate share of products, services, etc. whose costs are normally allocated as indirect or overhead costs.)

(ii) The name of an individual within the employ of the offeror who will administer the subcontracting program of the offeror and a description of the duties of such individual;

(iii) A description of the efforts the offeror or bidder will take to assure tht small business concerns and small business concerns owned and controlled by socially and economically disadvantaged individuals will have an equitable opportunity to compete for subcontracts;

(iv) Assurances that the bidder will include the clause entitled Utilization of Small business Concerns and Small Business Concerns Owned and Controlled by Socially and Economically Disadvantaged Individuals in all contracts which offer further subcontracting opportunities, and that the bidder will require all subcontractors (except small business concerns) who receive subcontracts in excess of $1,000,000 in the case of a contract for the construction of any public facility, or in excess of $500,000 in the case of all other contracts, to adopt a plan similar to the plan agreed to by the bidder;

(v) Assurances that the bidder will submit such periodic reports and cooperate in any studies or surveys as may be required by the contracting agency or the Small Business Administration in order to determine the extent of compliance by the bidder with the subcontracting plan; and

(vi) A recitation of the types of records the successful bidder will maintain to demonstrate procedures which have been adopted to comply with the requirements and goals set forth in the plan, including the establishment of source lists of small business concerns and small business concerns owned and controlled by socially and economically disadvantaged individuals; and efforts to identify and award subcontracts to such small business concerns.

(2) Of the clause entitled Utilization of Small Business Concerns and Small Business Concerns Owned and controlled by Socially and economically disadvantaged Individuals in the contract.

(b) If the contracting officer believes that the subcontracting plan submitted pursuant to this Section does not reflect the best effort by the bidder to award subcontracts to small and small disadvantage firms to the fullest extent consistent with the efficient performance of the contract, he shall notify the agency's director of the Office of Small and Disadvantaged Business Utilization who shall in turn notify the Small Business Administration and request a review of the plan pursuant to Section 8(d)(10) and 11) of the Small Business Act. Such request for an SMA review shall not delay award of the contract. Prior compliance of the offeror with other such subcontracting plans under previous contracts will be considered by the contracting officer in determining the responsibility of the bidder for award of the contract.

(c) The bidder understands that:

(1) It agrees to carry out the government's policy to provide the maximum practicable opportunity for small business concerns and small business concerns owned and controlled by socially and economically disadvantaged individuals to particiate in the performance of the contract, consistent with its efficient performance.

(2) If it does not submit a subcontracting plan within the time limits prescribed by the contracting agency, it will be ineligible to be awarded the contract.

(3) Prior compliance of the bidder with other such subcontracting plans under previous contracts will be considered by the contracting officer in determining the responsibility of the offeror for award of the contract.

(4) It is the contractor's responsibility to develop a subcontracting plan with respect to both small business concerns and small business concerns owned and controlled by socially and economically disadvantaged individuals.

(d) Subcontracting plans are not required of small business concerns.

(e) The failure of any contractor or subcontractor to comply in good faith with (i) the clause entitled Utilization of Small Business Concerns and Small Business Concerns Owned and Controlled by Socially and Economically Disadvantaged Individuals, or (ii) the terms of any subcontracting plan required by this Small Business and Small Disadvantaged Business Subcontracting Plan (Advertised) provision, will be a material breach of the contract or subcontract.

(f) Nothing contained in this provision supersedes the requirements of Defense Manpower Policy 4A or any successor policy.

JANUARY 1961 EDITION
GENERAL SERVICES ADMINISTRATION
FED. PROC. REG. (41 CFR) 1-16.401

CONSTRUCTION CONTRACT

(See instructions on reverse)

DATE OF CONTRACT

NAME AND ADDRESS OF CONTRACTOR

CHECK APPROPRIATE BOX

- ☐ Individual
- ☐ Partnership
- ☐ Joint Venture
- ☐ Corporation, incorporated in the State of _____

DEPARTMENT OR AGENCY

CONTRACT FOR (*Work to be performed*)

PLACE

CONTRACT PRICE (*Express in words and figures*)

ADMINISTRATIVE DATA (*Optional*)

The United States of America (hereinafter called the Government), represented by the Contracting Officer executing this contract, and the individual, partnership, joint venture, or corporation named above (hereinafter called the Contractor), mutually agree to perform this contract in strict accordance with the General Provisions (Standard Form 23-A), Labor Standards Provisions Applicable to Contracts in Excess of $2,000 (Standard Form 19-A), and the following designated specifications, schedules, drawings, and conditions:

WORK SHALL BE STARTED	WORK SHALL BE COMPLETED

parties hereto:

In witness whereof, the parties hereto have executed this contract as of the date entered on the first page hereof.

THE UNITED STATES OF AMERICA	CONTRACTOR
By _____	_____ *(Name of Contractor)*
_____ *(Official title)*	By _____ *(Signature)*
	_____ *(Title)*

INSTRUCTIONS

1. The full name and business address of the Contractor must be inserted in the space provided on the face of the form. The Contractor shall sign in the space provided above with his usual signature and typewrite or print his name under the signature.

2. An officer of a corporation, a member of a partnership, or an agent signing for the Contractor shall place his signature and title after the word "By" under the name of the Contractor. A contract executed by an attorney or agent on behalf of the Contractor shall be accompanied by two authenticated copies of his power of attorney or other evidence of his authority to act on behalf of the Contractor.

* U.S. GOVERNMENT PRINTING OFFICE : 1960 O—572723—46

GENERAL PROVISIONS (SF 23A) AND SUPPLEMENT

INDEX

PAGE

GENERAL PROVISIONS

(Construction Contract)

1. DEFINITIONS

(a) The term "head of the agency" or "Secretary" as used herein means the Secretary, the Under Secretary, any Assistant Secretary, or any other head or assistant head of the executive or military department or other Federal agency; and the term "his duly authorized representative" means any person or persons or board (other than the Contracting Officer) authorized to act for the head of the agency or the Secretary.

(b) The term "Contracting Officer" as used herein means the person executing this contract on behalf of the Government and includes a duly appointed successor or authorized representative.

2. SPECIFICATIONS AND DRAWINGS

The Contractor shall keep on the work a copy of the drawings and specifications and shall at all times give the Contracting Officer access thereto. Anything mentioned in the specifications and not shown on the drawings, or shown on the drawings and not mentioned in the specifications, shall be of like effect as if shown or mentioned in both. In case of difference between drawings and specifications, the specifications shall govern. In case of discrepancy either in the figures, in the drawings, or in the specifications, the matter shall be promptly submitted to the Contracting Officer, who shall promptly make a determination in writing. Any adjustment by the Contractor without such a determination shall be at his own risk and expense. The Contracting Officer shall furnish from time to time such detail drawings and other information as he may consider necessary, unless otherwise provided.

3. CHANGES

(a) The Contracting Officer may, at any time, without notice to the sureties, by written order designated or indicated to be a change order, make any change in the work within the general scope of the contract, including but not limited to changes:

(1) In the specifications (including drawings and designs);

(2) In the method or manner of performance of the work;

(3) In the Government-furnished facilities, equipment, materials, services, or site; or

(4) Directing acceleration in the performance of the work.

(b) Any other written order or an oral order (which terms as used in this paragraph (b) shall include direction, instruction, interpretation, or determination) from the Contracting Officer, which causes any such change, shall be treated as a change order under this clause, provided that the Contractor gives the Contracting Officer written notice stating the date, circumstances, and source of the order and that the Contractor regards the order as a change order.

(c) Except as herein provided, no order, statement, or conduct of the Contracting Officer shall be treated as a change under this clause or entitle the Contractor to an equitable adjustment hereunder.

(d) If any change under this clause causes an increase or decrease in the Contractor's cost of, or the time required for, the performance of any part of the work under this contract, whether or not changed by any order, an equitable adjustment shall be made and the contract modified in writing accordingly: *Provided, however,* That except for claims based on defective specifications, no claim for any change under (b) above shall be allowed for any costs incurred more than 20 days before the Contractor gives written notice as therein required: *And provided further,* That in the case of defective specifications for which the Government is responsible, the equitable adjustment shall include any increased cost reasonably incurred by the Contractor in attempting to comply with such defective specifications.

(e) If the Contractor intends to assert a claim for an equitable adjustment under this clause, he must, within 30 days after receipt of a written change order under (a) above or the furnishing of a written notice under (b) above, submit to the Contracting Officer a written statement setting forth the general nature and monetary extent of such claim, unless this period is extended by the Government. The statement of claim hereunder may be included in the notice under (b) above.

(f) No claim by the Contractor for an equitable adjustment hereunder shall be allowed if asserted after final payment under this contract.

4. DIFFERING SITE CONDITIONS

(a) The Contractor shall promptly, and before such conditions are disturbed, notify the Contracting Officer in writing of: (1) Subsurface or latent physical conditions at the site differing materially from those indicated in this contract, or (2) unknown physical conditions at the site, of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inhering in work of the character provided for in this contract. The Contracting Officer shall promptly investigate the conditions, and if he finds that such conditions do materially so differ and cause an increase or decrease in the Contractor's cost of, or the time required for, performance of any part of the work under this contract, whether or not changed as a result of such conditions, an equitable adjustment shall be made and the contract modified in writing accordingly.

(b) No claim of the Contractor under this clause shall be allowed unless the Contractor has given the notice required in (a) above; provided, however, the time prescribed therefor may be extended by the Government.

(c) No claim by the Contractor for an equitable adjustment hereunder shall be allowed if asserted after final payment under this contract.

5. TERMINATION FOR DEFAULT—DAMAGES FOR DELAY—TIME EXTENSIONS

(a) If the Contractor refuses or fails to prosecute the work, or any separable part thereof, with such diligence as will insure its completion within the time specified in this contract, or any extension thereof, or fails to complete said work within such time, the Government may, by written notice to the Contractor, terminate his right to proceed with the work or such part of the work as to which there has been delay. In such event the Government may take over the work and prosecute the same to completion, by contract or otherwise, and may take possession of and utilize in completing the work such materials, appliances, and plant as may be on the site of the work and necessary therefor. Whether or not the Contractor's right to proceed with the work is terminated, he and his sureties shall be liable for any damage to the Government resulting from his refusal or failure to complete the work within the specified time.

(b) If fixed and agreed liquidated damages are provided in the contract and if the Government so terminates the Contractor's right to proceed, the resulting damage will consist of such liquidated damages until such reasonable time as may be required for final completion of the work together with any increased costs occasioned the Government in completing the work.

(c) If fixed and agreed liquidated damages are provided in the contract and if the Government does not so terminate the Contractor's right to proceed, the resulting damage will consist of such liquidated damages until the work is completed or accepted.

(d) The Contractor's right to proceed shall not be so terminated nor the Contractor charged with resulting damage if:

(1) The delay in the completion of the work arises from unforeseeable causes beyond the control and without the fault or negligence of the Contractor, including but not restricted to, acts of God, acts of the public enemy, acts of the Government in either its sovereign or contractual capacity, acts of another contractor in the performance of a contract with the Government, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes, unusually severe weather, or delays of subcontractors or suppliers arising from unforeseeable causes beyond the control and without the fault or negligence of both the Contractor and such subcontractors or suppliers; and

(2) The Contractor, within 10 days from the beginning of any such delay (unless the Contracting Officer grants a further period of time before the date of final payment

under the contract), notifies the Contracting Officer in writing of the causes of delay.

The Contracting Officer shall ascertain the facts and the extent of the delay and extend the time for completing the work when, in his judgment, the findings of fact justify such an extension, and his findings of fact shall be final and conclusive on the parties, subject only to appeal as provided in Clause 6 of these General Provisions.

(e) If, after notice of termination of the Contractor's right to proceed under the provisions of this clause, it is determined for any reason that the Contractor was not in default under the provisions of this clause, or that the delay was excusable under the provisions of this clause, the rights and obligations of the parties shall, if the contract contains a clause providing for termination for convenience of the Government, be the same as if the notice of termination had been issued pursuant to such clause. If, in the foregoing circumstances, this contract does not contain a clause providing for termination for convenience of the Government, the contract shall be equitably adjusted to compensate for such termination and the contract modified accordingly; failure to agree to any such adjustment shall be a dispute concerning a question of fact within the meaning of the clause of this contract entitled "Disputes."

(f) The rights and remedies of the Government provided in this clause are in addition to any other rights and remedies provided by law or under this contract.

(g) As used in Paragraph (d)(1) of this clause, the term "subcontractors or suppliers" means subcontractors or suppliers at any tier.

6. DISPUTES

(a) Except as otherwise provided in this contract, any dispute concerning a question of fact arising under this contract which is not disposed of by agreement shall be decided by the Contracting Officer, who shall reduce his decision to writing and mail or otherwise furnish a copy thereof to the Contractor. The decision of the Contracting Officer shall be final and conclusive unless, within 30 days from the date of receipt of such copy, the Contractor mails or otherwise furnishes to the Contracting Officer a written appeal addressed to the head of the agency involved. The decision of the head of the agency or his duly authorized representative for the determination of such appeals shall be final and conclusive. This provision shall not be pleaded in any suit involving a question of fact arising under this contract as limiting judicial review of any such decision to cases where fraud by such official or his representative or board is alleged: *Provided, however*, That any such decision shall be final and conclusive unless the same is fraudulent or capricious or arbitrary or so grossly erroneous as necessarily to imply bad faith or is not supported by substantial evidence. In connection with any appeal proceeding under this clause, the Contractor shall be afforded an opportunity to be heard and to offer evidence in support of his appeal. Pending final decision of a dispute hereunder, the Contractor shall proceed diligently with the performance of the contract and in accordance with the Contracting Officer's decision.

(b) This Disputes clause does not preclude consideration of questions of law in connection with decisions provided for in paragraph (a) above. Nothing in this contract, however, shall be construed as making final the decision of any administrative official, representative, or board on a question of law.

7. PAYMENTS TO CONTRACTOR

(a) The Government will pay the contract price as hereinafter provided.

(b) The Government will make progress payments monthly as the work proceeds, or at more frequent intervals as determined by the Contracting Officer, on estimates approved by the Contracting Officer. If requested by the Contracting Officer, the Contractor shall furnish a breakdown of the total contract price showing the amount included therein for each principal category of the work, in such detail as requested, to provide a basis for determining progress payments. In the preparation of estimates the Contracting Officer, at his discretion, may authorize material delivered on the site and preparatory work done to be taken into consideration. Material delivered to the Contractor at locations other than the site may also be taken into consideration (1) if such consideration is specifically authorized by the contract and (2) if the Contractor furnishes satisfactory evidence that he has acquired title to such material and that it will be utilized on the work covered by this contract.

(c) In making such progress payments, there shall be retained 10 percent of the estimated amount until final completion and acceptance of the contract work. However, if the Contracting Officer, at any time after 50 percent of the work has been completed, finds that satisfactory progress is being made, he may authorize payment in full of each progress payment for work performed beyond the 50 percent stage of completion. Also, whenever the work is substantially complete, the Contracting Officer may consider the amount retained to be in excess of the amount adequate for the protection of the Government, at his discretion, may release to the Contractor all or a portion of such excess amount. Furthermore, on completion and acceptance of each separate building, public work, or other division of the contract, on which the price is stated separately in the contract, payment may be made therefor without retention of a percentage.

(d) All material and work covered by progress payments made shall thereupon become the sole property of the Government, but this provision shall not be construed as relieving the Contractor from the sole responsibility for all material and work upon which payments have been made or the restoration of any damaged work, or as waiving the right of the Government to require the fulfillment of all of the terms of the contract.

(e) Upon completion and acceptance of all work, the amount due the Contractor under this contract shall be paid upon the presentation of a properly executed voucher and after the Contractor shall have furnished the Government with a release of all claims against the Government arising by virtue of this contract, other than claims in stated amounts as may be specifically excepted by the Contractor from the operation of the release. If the Contractor's claim to amounts payable under the contract has been assigned under the Assignment of Claims Act of 1940, as amended (31 U.S.C. 203, 41 U.S.C. 15), a release may also be required of the assignee.

8. ASSIGNMENT OF CLAIMS

(a) Pursuant to the provisions of the Assignment of Claims Act of 1940, as amended (31 U.S.C. 203, 41 U.S.C. 15), if this contract provides for payments aggregating $1,000 or more, claims for moneys due or to become due the Contractor from the Government under this contract may be assigned to a bank, trust company, or other financing institution, including any Federal lending agency, and may thereafter be further assigned and reassigned to any such institution. Any such assignment or reassignment shall cover all amounts payable under this contract and not already paid, and shall not be made to more than one party, except that any such assignment or reassignment may be made to one party as agent or trustee for two or more parties participating in such financing. Unless otherwise provided in this contract, payments to an assignee of any moneys due or to become due under this contract shall not, to the extent provided in said Act, as amended, be subject to reduction or setoff. (The preceding sentence applies only if this contract is made in time of war or national emergency as defined in said Act; and is with the Department of Defense, the General Services Administration, the Energy Research and Development Administration, the National Aeronautics and Space Administration, the Federal Aviation Administration, or any other department or agency of the United States designated by the President pursuant to Clause 4 of the proviso of section 1 of the Assignment of Claims Act of 1940, as amended by the Act of May 15, 1951, 65 Stat. 41.)

(b) In no event shall copies of this contract or of any plans, specifications, or other similar documents relating to work under this contract, if marked "Top Secret," "Secret," or "Confidential," be furnished to any assignee of any claim arising under this contract or to any other person not entitled to receive the same. However, a copy of any part or all of this contract so marked may be furnished, or any information contained therein may be disclosed, to such assignee upon the prior written authorization of the Contracting Officer.

9. MATERIAL AND WORKMANSHIP

(a) Unless otherwise specifically provided in this contract, all equipment, material, and articles incorporated in the work covered by this contract are to be new and of the most suitable grade for the purpose intended. Unless otherwise specifically provided in this contract, reference to any equipment, material, article, or patented process, by trade name, make, or catalog number, shall be regarded as establishing a standard of quality and shall not be construed as limiting competition, and the Contractor may, at his option, use any equipment, material, article, or process, which, in the judgment of the Contracting Officer, is equal to that named. The Contractor shall furnish to the Contracting Officer for his approval the name of the manufacturer, the model number,

and other identifying data and information respecting the performance, capacity, nature, and rating of the machinery and mechanical and other equipment which the Contractor contemplates incorporating in the work. When required by this contract or when called for by the Contracting Officer, the Contractor shall furnish the Contracting Officer for approval full information concerning the material or articles which he contemplates incorporating in the work. When so directed, samples shall be submitted for approval at the Contractor's expense, with all shipping charges prepaid. Machinery, equipment, material, and articles installed or used without required approval shall be at the risk of subsequent rejection.

(b) All work under this contract shall be performed in a skillful and workmanlike manner. The Contracting Officer may, in writing, require the Contractor to remove from the work any employee the Contracting Officer deems incompetent, careless or otherwise objectionable.

10. INSPECTION AND ACCEPTANCE

(a) All work (which term includes but is not restricted to materials, workmanship, and manufacture and fabrication of components) shall be subject to inspection and test by the Government at all reasonable times and at all places prior to acceptance. Any such inspection and test is for the sole benefit of the Government and shall not relieve the Contractor of the responsibility of providing quality control measures to assure that the work strictly complies with the contract requirements. No inspection or test by the Government shall be construed as constituting or implying acceptance. Inspection or test shall not relieve the Contractor of responsibility for damage to or loss of the material prior to acceptance, nor in any way affect the continuing rights of the Government after acceptance of the completed work under the terms of paragraph (f) of this clause, except as hereinabove provided.

(b) The Contractor shall, without charge, replace any material or correct any workmanship found by the Government not to conform to the contract requirements, unless in the public interest the Government consents to accept such material or workmanship with an appropriate adjustment in contract price. The Contractor shall promptly segregate and remove rejected material from the premises.

(c) If the Contractor does not promptly replace rejected material or correct rejected workmanship, the Government (1) may, by contract or otherwise, replace such material or correct such workmanship and charge the cost thereof to the Contractor, or (2) may terminate the Contractor's right to proceed in accordance with the clause of this contract entitled "Termination for Default—Damages for Delay—Time Extensions."

(d) The Contractor shall furnish promptly, without additional charge, all facilities, labor, and material reasonably needed for performing such safe and convenient inspection and test as may be required by the Contracting Officer. All inspection and test by the Government shall be performed in such manner as not unnecessarily to delay the work. Special, full size, and performance tests shall be performed as described in this contract. The Government reserves the right to charge to the Contractor any additional cost of inspection or test when material or workmanship is not ready at the time specified by the Contractor for inspection or test or when reinspection or retest is necessitated by prior rejection.

(e) Should it be considered necessary or advisable by the Government at any time before acceptance of the entire work to make an examination of work already completed, by removing or tearing out same, the Contractor shall, on request, promptly furnish all necessary facilities, labor, and material. If such work is found to be defective or nonconforming in any material respect, due to the fault of the Contractor or his subcontractors, he shall defray all the expenses of such examination and of satisfactory reconstruction. If, however, such work if found to meet the requirements of the contract, an equitable adjustment shall be made in the contract price to compensate the Contractor for the additional services involved in such examination and reconstruction and, if completion of the work has been delayed thereby, he shall, in addition, be granted a suitable extension of time.

(f) Unless otherwise provided in this contract, acceptance by the Government shall be made as promptly as practicable after completion and inspection of all work required by this contract, or that portion of the work that the Contracting Officer determines can be accepted separately. Acceptance shall be final and conclusive except as regards latent defects, fraud, or such gross mistakes as may amount to fraud, or as regards the Government's rights under any warranty or guarantee.

11. SUPERINTENDENCE BY CONTRACTOR

The Contractor, at all times during performance and until the work is completed and accepted, shall give his personal superintendence to the work or have on the work a competent superintendent, satisfactory to the Contracting Officer and with authority to act for the Contractor.

12. PERMITS AND RESPONSIBILITIES

The Contractor shall, without additional expense to the Government, be responsible for obtaining any necessary licenses and permits, and for complying with any applicable Federal, State, and municipal laws, codes, and regulations, in connection with the prosecution of the work. He shall be similarly responsible for all damages to persons or property that occur as a result of his fault or negligence. He shall take proper safety and health precautions to protect the work, the workers, the public, and the property of others. He shall also be responsible for all materials delivered and work performed until completion and acceptance of the entire construction work, except for any completed unit of construction thereof which theretofore may have been accepted.

13. CONDITIONS AFFECTING THE WORK

The Contractor shall be responsible for having taken steps reasonably necessary to ascertain the nature and location of the work, and the general and local conditions which can affect the work or the cost thereof. Any failure by the Contractor to do so will not relieve him from responsibility for successfully performing the work without additional expense to the Government. The Government assumes no responsibility for any understanding or representations concerning conditions made by any of its officers or agents prior to the execution of this contract, unless such understanding or representations by the Government are expressly stated in the contract.

14. OTHER CONTRACTS

The Government may undertake or award other contracts for additional work, and the Contractor shall fully cooperate with such other contractors and Government employees and carefully fit his own work to such additional work as may be directed by the Contracting Officer. The Contractor shall not commit or permit any act which will interfere with the performance of work by any other contractor or by Government employees.

15. SHOP DRAWINGS

(a) The term "shop drawings" includes drawings, diagrams, layouts, schematics, descriptive literature, illustrations, schedules, performance and test data, and similar materials furnished by the Contractor to explain in detail specific portions of the work required by the contract.

(b) If this contract requires shop drawings, the Contractor shall coordinate all such drawings, and review them for accuracy, completeness, and compliance with contract requirements and shall indicate his approval thereon as evidence of such coordination and review. Shop drawings submitted to the Contracting Officer without evidence of the Contractor's approval may be returned for resubmission. The Contracting Officer will indicate his approval or disapproval of the shop drawings and if not approved as submitted shall indicate his reasons therefor. Any work done prior to such approval shall be at the Contractor's risk. Approval by the Contracting Officer shall not relieve the Contractor from responsibility for any errors or omissions in such drawings, nor from responsibility for complying with the requirements of this contract, except with respect to variations described and approved in accordance with (c) below.

(c) If shop drawings show variations from the contract requirements, the Contractor shall describe such variations in writing, separate from the drawings, at the time of submission. If the Contracting Officer approves any such variation(s), he shall issue an appropriate contract modification, except that, if the variation is minor and does not involve a change in price or in time of performance, a modification need not be issued.

16. USE AND POSSESSION PRIOR TO COMPLETION

The Government shall have the right to take possession of or use any completed or partially completed part of the work. Prior to such possession or use, the Contracting Officer shall furnish the Contractor an itemized list of work remaining to be performed or corrected on such portions of the project as are to be possessed or used by the Government, provided that failure to list any item of work shall not relieve the Contractor of responsibility for compliance with the terms of the

contract. Such possession or use shall not be deemed an acceptance of any work under the contract. While the Government has such possession or use, the Contractor, notwithstanding the provisions of the clause of this contract entitled "Permits and Responsibilities," shall be relieved of the responsibility for the loss or damage to the work resulting from the Government's possession or use. If such prior possession or use by the Government delays the progress of the work or causes additional expense to the Contractor, an equitable adjustment in the contract price or the time of completion will be made and the contract shall be modified in writing accordingly.

17. SUSPENSION OF WORK

(a) The Contracting Officer may order the Contractor in writing to suspend, delay, or interrupt all or any part of the work for such period of time as he may determine to be appropriate for the convenience of the Government.

(b) If the performance of all or any part of the work is, for an unreasonable period of time, suspended, delayed, or interrupted by an act of the Contracting Officer in the administration of this contract, or by his failure to act within the time specified in this contract (or if no time is specified, within a reasonable time), an adjustment shall be made for any increase in the cost of performance of this contract (excluding profit) necessarily caused by such unreasonable suspension, delay, or interruption and the contract modified in writing accordingly. However, no adjustment shall be made under this clause for any suspension, delay, or interruption to the extent (1) that performance would have been so suspended, delayed, or interrupted by any other cause, including the fault or negligence of the Contractor or (2) for which an equitable adjustment is provided for or excluded under any other provision of this contract.

(c) No claim under this clause shall be allowed (1) for any costs incurred more than 20 days before the Contractor shall have notified the Contracting Officer in writing of the act or failure to act involved (but this requirement shall not apply as to a claim resulting from a suspension order), and (2) unless the claim, in an amount stated, is asserted in writing as soon as practicable after the termination of such suspension, delay, or interruption, but not later than the date of final payment under the contract.

18. TERMINATION FOR CONVENIENCE OF THE GOVERNMENT

If not physically incorporated elsewhere, the clause in Section 1–8.703 of the Federal Procurement Regulations, or paragraph 7–602.29(a) of the Armed Services Procurement Regulation, as applicable, in effect on the date of this contract is hereby incorporated by reference as fully as if set forth at length herein.

DELETED

19. PAYMENT OF INTEREST ON CONTRACTORS' CLAIMS

(a) If an appeal is filed by the Contractor from a final decision of the Contracting Officer under the Disputes clause of this contract, denying a claim arising under the contract, simple interest on the amount of the claim finally determined owed by the Government shall be payable to the Contractor. Such interest shall be at the rate determined by the Secretary of the Treasury pursuant to Public Law 92–41, 85 Stat. 97, from the date the Contractor furnishes to the Contracting Officer his written appeal under the Disputes clause of this contract, to the date of (1) a final judgment by a court of competent jurisdiction, or (2) mailing to the Contractor of a supplemental agreement for execution either confirming completed negotiations between the parties or carrying out a decision of a board of contract appeals.

(b) Notwithstanding (a) above, (1) interest shall be applied only from the date payment was due, if such date is later than the filing of appeal, and (2) interest shall not be paid for any period of time that the Contracting Officer determines the Contractor has unduly delayed in pursuing his remedies before a board of contract appeals or a court of competent jurisdiction.

DELETED

20. PRICING OF ADJUSTMENTS

When costs are a factor in any determination of a contract price adjustment pursuant to the Changes clause or any other provision of this contract, such costs shall be in accordance with the contract cost principles and procedures in Part 1–15 of the Federal Procurement Regulations, (41 CFR 1–15) or Section XV of the Armed Services Procurement Regulation, as applicable, which are in effect on the date of this contract.

DELETED

21. PATENT INDEMNITY

Except as otherwise provided, the Contractor agrees to indemnify the Government and its officers, agents, and employees against liability, including costs and expenses, for infringement upon any Letters Patent of the United States (except Letters Patent issued upon an application which is now or may hereafter be, for reasons of national security, ordered by the Government to be kept secret or otherwise withheld from issue) arising out of the performance of this contract or out of the use or disposal by or for the account of the Government of supplies furnished or construction work performed hereunder.

DELETED

22. ADDITIONAL BOND SECURITY

If any surety upon any bond furnished in connection with this contract becomes unacceptable to the Government, or if any such surety fails to furnish reports as to his financial condition from time to time as requested by the Government, or if the contract price is increased to such an extent that the penal sum of any bond becomes inadequate in the opinion of the Contracting Officer, the Contractor shall promptly furnish such additional security as may be required from time to time to protect the interests of the Government and of persons supplying labor or materials in the prosecution of the work contemplated by this contract.

23. EXAMINATION OF RECORDS BY COMPTROLLER GENERAL

(a) This clause is applicable if the amount of this contract exceeds $10,000 and was entered into by means of negotiation, including small business restricted advertising, but is not applicable if this contract was entered into by means of formal advertising.

(b) The contractor agrees that the Comptroller General of the United States or any of his duly authorized representatives shall, until the expiration of 3 years after final payment under this contract or such lesser time specified in either Appendix M of the Armed Services Procurement Regulation or the Federal Procurement Regulations Part 1–20, as appropriate, have access to and the right to examine any directly pertinent books, documents, papers, and records of the contractor involving transactions related to this contract.

(c) The Contractor further agrees to include in all his subcontracts hereunder a provision to the effect that the subcontractor agrees that the Comptroller General of the United States or any of his duly authorized representatives shall, until the expiration of 3 years after final payment under the subcontract or such lesser time specified in either Appendix M of the Armed Services Procurement Regulation or the Federal Procurement Regulations Part 1–20, as appropriate, have access to and the right to examine any directly pertinent books, documents, papers, and records of such subcontractor, involving transactions related to the subcontract. The term "subcontract" as used in this clause excludes (1) purchase orders not exceeding $10,000 and (2) subcontracts or purchase orders for public utility services at rates established for uniform applicability to the general public.

(d) The periods of access and examination described in (b) and (c), above, for records which relate to (1) appeals under the "Disputes" clause of this contract, (2) litigation or the settlement of claims arising out of the performance of this contract, or (3) costs and expenses of this contract as to which exception has been taken by the Comptroller General or any of his duly authorized representatives, shall continue until such appeals, litigation, claims, or exceptions have been disposed of.

24. BUY AMERICAN

(a) *Agreement.* In accordance with the Buy American Act (41 U.S.C. 10a–10d), and Executive Order 10582, December 17, 1954 (3 CFR, 1954–58 Comp., p. 230), as amended by Executive Order 11051, September 27, 1962 (3 CFR, 1959–63 Comp., p. 635), the Contractor agrees that only domestic construction material will be used (by the Contractor, subcontractors, materialmen, and suppliers) in the performance of this contract, except for nondomestic material listed in the contract.

(b) *Domestic construction material.* "Construction material" means any article, material, or supply brought to the construction site for incorporation in the building or work. An unmanufactured construction material is a "domestic construction material" if it has been mined or produced in the United States. A manufactured construction material is a "domestic construction material" if it has been manufactured in the United States and if the cost of its components which have been mined, produced, or manufactured in the United States exceeds 50 percent of the cost of all its components. "Component" means any article, material, or supply directly incorporated in a construction material.

(c) *Domestic component.* A component shall be considered to have been "mined, produced, or manufactured in the

United States" (regardless of its source in fact) if the article, material, or supply in which it is incorporated was manufactured in the United States and the component is of a class or kind determined by the Government to be not mined, produced, or manufactured in the United States in sufficient and reasonably available commercial quantities and of a satisfactory quality.

25. EQUAL OPPORTUNITY

(The following clause is applicable unless this contract is exempt under the rules, regulations, and relevant orders of the Secretary of Labor (41 CFR, ch. 60).)

During the performance of this contract, the Contractor agrees as follows:

(a) The Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. The Contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, sex, or national origin. Such action shall include, but not be limited to, the following: Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the Contracting Officer setting forth the provisions of this Equal Opportunity clause.

(b) The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, or national origin.

(c) The Contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice, to be provided by the agency Contracting Officer, advising the labor union or workers' representative of the contractor's commitments under this Equal Opportunity clause, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

(d) The Contractor will comply with all provisions of Executive Order No. 11246 of September 24, 1965, as amended by Executive Order No. 11375 of October 13, 1967, and of the rules, regulations, and relevant orders of the Secretary of Labor.

(e) The Contractor will furnish all information and reports required by Executive Order No. 11246 of September 24, 1965, as amended by Executive Order No. 11375 of October 13, 1967, and by the rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the contracting agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

(f) In the event of the Contractor's noncompliance with the Equal Opportunity clause of this contract or with any of the said rules, regulations, or orders, this contract may be canceled, terminated, or suspended, in whole or in part, and the Contractor may be declared ineligible for further Government contracts in accordance with procedures authorized in Executive Order No. 11246 of September 24, 1965, as amended by Executive Order No. 11375 of October 13, 1967, and such other sanctions may be imposed and remedies invoked as provided in Executive Order No. 11246 of September 24, 1965, as amended by Executive Order No. 11375 of October 13, 1967, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.

(g) The Contractor will include the provisions of paragraphs (a) through (g) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to Section 204 of Executive Order No. 11246 of September 24, 1965, as amended by Executive Order No. 11375 of October 13, 1967, so that such provisions will be binding upon each subcontractor or vendor. The Contractor will take such action will respect to any subcontract or purchase order as the contracting agency may direct as a means of enforcing such provisions, including sanctions for noncompliance: *Provided, however*, that in the event the Contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the contracting agency, the Contractor may request the United States to enter into such litigation to protect the interests of the United States.

26. COVENANT AGAINST CONTINGENT FEES

The Contractor warrants that no person or selling agency has been employed or retained to solicit or secure this contract upon an agreement or understanding for a commission, percentage, brokerage, or contingent fee, excepting bona fide employees or bona fide established commercial or selling agencies maintained by the Contractor for the purpose of securing business. For breach or violation of this warranty the Government shall have the right to annul this contract without liability or in its discretion to deduct from the contract price or consideration, or otherwise recover, the full amount of such commission, percentage, brokerage, or contingent fee.

27. OFFICIALS NOT TO BENEFIT

No member of or delegate to Congress or resident Commissioner shall be admitted to any share or part of this contract, or to any benefit that may arise therefrom; but this provision shall not be construed to extend to this contract if made with a corporation for its general benefit.

28. CONVICT LABOR

In connection with the performance of work under this contract, the Contractor agrees not to employ any person undergoing sentence of imprisonment at hard labor except as provided by Public Law 89-176, September 10, 1965 (18 U.S.C. 4082(c)(2)) and Executive Order 11755, December 29, 1973.

29. UTILIZATION OF SMALL BUSINESS CONCERNS

(a) It is the policy of the Government as declared by the Congress that a fair proportion of the purchases and contracts for supplies and services for the Government be placed with small business concerns.

(b) The Contractor agrees to accomplish the maximum amount of subcontracting to small business concerns that the Contractor finds to be consistent with the efficient performance of this contract.

DELETE

30. UTILIZATION OF MINORITY BUSINESS ENTERPRISES

(a) It is the policy of the Government that minority business enterprises shall have the maximum practicable opportunity to participate in the performance of Government contracts.

(b) The Contractor agrees to use his best efforts to carry out this policy in the award of his subcontracts to the fullest extent consistent with the efficient performance of this contract. As used in this contract, the term "minority business enterprise" means a business, at least 50 percent of which is owned by minority group members or, in case of publicly-owned businesses, at least 51 percent of the stock of which is owned by minority group members. For the purposes of this definition, minority group members are Negroes, Spanish-speaking American persons, American-Orientals, American-Indians, American-Eskimos, and American-Aleuts. Contractors may rely on written representations by subcontractors regarding their status as minority business enterprises in lieu of an independent investigation.

DELETE

31. FEDERAL, STATE, AND LOCAL TAXES

(a) Except as may be otherwise provided in this contract, the contract price includes all applicable Federal, State and local taxes and duties.

(b) Nevertheless, with respect to any Federal excise tax or duty on the transactions or property covered by this contract, if a statute, court decision, written ruling, or regulation takes effect after the contract date, and—

(1) Results in the Contractor being required to pay or bear the burden of any such Federal excise tax or duty or increase in the rate thereof which would not otherwise have been payable on such transactions or property, the contract price shall be increased by the amount of such tax or duty or rate increase: *Provided*, That the Contractor if requested by the Contracting Officer, warrants in writing that no amount for such newly imposed Federal excise tax or duty or rate increase was included in the contract price as a contingency reserve or otherwise; or

(2) Results in the Contractor not being required to pay or bear the burden of, or in his obtaining a refund or drawback of, any such Federal excise tax or duty which would otherwise have been payable on such transactions or property or which was the basis of an increase in the contract price, the contract price shall be decreased by the amount of the relief, refund, or drawback, or that amount shall be paid to the Government, as directed by the Contracting Officer. The contract price shall be similarly decreased if the Contractor, through his fault or negligence or his failure to follow instructions of the Contract-

ing Officer, is required to pay or bear the burden of, or does not obtain a refund or drawback of, any such Federal excise tax or duty.

(c) No adjustment pursuant to paragraph b above will be made under this contract unless the aggregate amount thereof is or may reasonably be expected to be over $100.00.

(d) As used in paragraph b above, the term "contract date" means the date set for the bid opening, or if this is a negotiated contract, the date of this contract. As to additional supplies or services procured by modification to this contract, the term "contract date" means the date of such modification.

(e) Unless there does not exist any reasonable basis to sustain an exemption, the Government, upon request of the Contractor, without further liability, agrees, except as otherwise provided in this contract, to furnish evidence appropriate to establish exemption from any tax which the Contractor warrants in writing was excluded from the contract price. In addition, the Contracting Officer may furnish evidence to establish exemption from any tax that may, pursuant to this Clause, give rise to either an increase or decrease in the contract price. Except as otherwise provided in this contract, evidence appropriate to establish exemption from duties will be furnished only at the discretion of the Contracting Officer.

(f) The Contractor shall promptly notify the Contracting Officer of matters which will result in either an increase or decrease in the contract price, and shall take action with respect thereto as directed by the Contracting Officer.

U. S. GOVERNMENT PRINTING OFFICE : 1976 O - 201-981

SUPPLEMENT TO GENERAL PROVISIONS

PAGE

59. Value Engineering Incentive
60. Utilization of Small Business Concerns and Small Business Concerns Owned and Controlled by Socially and Economically Disadvantaged Individuals
61. Notice and Assistance Regarding Patent and Copyright Infringement

SUPPLEMENT TO SF 23-A GENERAL PROVISIONS (CONSTRUCTION CONTRACTS)

The following additional articles and provisions are added to Standard Form 23-A:

32. ALTERATIONS AND ADDITIONS

The following alterations in or additions to the provisions of SF 23-A, General Provisions, of this contract were made prior to execution of the contract by the parties.

1. Definitions (DOE PR 9-7.602-1, June 79). The following paragraphs are added to this clause:

(c) The term "DOE" means U. S. Department of Energy.

(d) Wherever in the specifications or upon the drawings the words "directed," "required," "approved," "accepted," or words of like import are used, it means the direction, requirement, approval, acceptability of or to the Contracting Officer.

6. Disputes (FPR 1-7.102-12, 1-7.602-8, March 1979.) Delete the clause and substitute the following:

(a) This contract is subject to the Contract Disputes Act of 1978 (41 U.S.C. 601, et. seq.). If a dispute arises relating to the contract, the contractor may submit a claim to the Contracting Officer who shall issue a written decision on the dispute in the manner specified in FPR 1-1.318.

(b) "Claim" means:

(1) a written request submitted to the Contracting Officer;

(2) for payment of money, adjustment of contract terms, or other relief;

(3) which is in dispute or remains unresolved after a reasonable time for its review and disposition by the Government; and

(4) for which a Contracting Officer's decision is demanded.

(c) In the case of disputed requests or amendments to such requests for payment exceeding $50,000, or with any amendment causing the total request in dispute to exceed $50,000, the Contractor shall certify, at the time of submission as a claim, as follows:

I certify that the claim is made in good faith, that the supporting data are accurate and complete to the best of my knowledge and belief; and that the amount requested accurately reflects the contract adjustment for which the contractor believes the Government is liable.

(Contractor's Name) _____

(Title) _____

(d) The Government shall pay the contractor interest:

(1) on the amount found due on claims submitted under this clause;

(2) at the rates fixed by the Secretary of the Treasury, under the Renegotiation Act, Public Law 92-41;

(3) from the date the Contracting Officer receives the claim, until the Government makes payment.

(e) The decision of the Contracting Officer shall be final and conclusive and not subject to review by any forum, tribunal, or Government agency unless an appeal or action is timely commenced within the times specified by the Contract Disputes Act of 1978.

(f) The Contractor shall proceed diligently with performance of this contract, pending final resolution of any request for relief, claim, appeal or action related to the contract, and comply with any decision of the Contracting Officer.

7. Payments to Contractor (FPR 1-7.602-7, May 1976). Delete paragraph (c) and substitute the following:

(c) In making such progress payments there shall be retained 10 percent of the estimated amount until final completion and acceptance of the contract work. However, if the Contracting Officer finds that satisfactory progress was achieved during any period for which a progress payment is to be made, he or she may authorize such payment to be made in full without retention of a percentage. Also, whenever the work is substantially complete, the Contracting Officer shall retain an amount he or she considers adequate for protection of the Government and, at his or her discretion, may release to the Contractor all or a portion of any excess amount. Furthermore, on completion and acceptance of each separate building, public work, or other division of the contract, on which the price is stated separately in the contract, payment may be made therefor without retention of a percentage.

(FPR Amendment 200, July 16, 1979) Change paragraph (e) to paragraph (f) and add a new paragraph (e) as follows:

(e) If Miller Act (40 U.S.C. 270a-270e) performance or payment bonds are required under this contract, the Government shall pay to the Contractor the total premiums paid by the contractor to obtain the bonds. This payment

shall be paid at one time to the contractor together with the first progress payment otherwise due after the contractor has (1) furnished the bonds (including coinsurance and reinsurance agreements, when applicable), (2) furnished evidence of full payment to the surety company, and (3) submitted a request for such payment. The payment by the Government of the bond premiums to the contractor shall not be made as increments of the individual progress payments and shall not be in addition to the contract price.

9. Materials and Workmanship. Insert the following sentence after the second sentence of paragraph (a):

A Contractor is not prohibited from furnishing such an "equal" item merely because in the technical specifications a trade name or make or catalog number is used without the words "or equal." These words will be implied unless the technical specification expressly provides "no substitutes."

Add a new paragraph (c) as follows:

(c) Nothing in this clause shall preclude the use of items manufactured from recovered materials as provided in FPR Subpart 1-1.25.

10. Inspection and Acceptance (ALPI 9-16, Oct 76). Add the following paragraph (g):

(g) The work will be conducted under the general direction of the Contracting Officer and is subject to inspection by his or her duly appointed inspectors to insure strict compliance with the terms of the contract. No inspector is authorized to change any provision of the plans and specifications, nor shall the presence or absence of any inspector relieve the Contractor from any requirements of the contract. The "Architect-Engineer" has the authority to inspect the work for quality and compliance with the plans and specifications; establish lines, grades and controls for the work; and to recommend changes to the Contracting Officer pursuant to the clause of

the General Provisions entitled "Changes." The facility operating contractor may perform architect-engineer inspection services. No interpretation of this contract or direction shall be binding upon the Government unless it is in writing and signed by the Contracting Officer.

18. Termination for Convenience of the Government (DOE PR 9-7.602-30, June 1979). Delete the clause and substitute the following:

(a) The performance of work under this contract may be terminated by the Government in accordance with this clause in whole, or from time to time in part, whenever the Contracting Officer shall determine that such termination is in the best interest of the Government. Any such termination shall be effected by delivery to the Contractor of a Notice of Termination specifying that the termination is made under this General Provision and the extent to which performance of work under the contract is terminated, and the date upon which such termination becomes effective.

(b) After receipt of a Notice of Termination and except as otherwise directed by the Contracting Officer, the Contractor shall:

(1) Stop work under the contract on the date and to the extent specified in the Notice of Termination;

(2) Place no further orders or subcontracts for materials, services, or facilities, except as may be necessary for completion of such portion of the work under the contract as is not terminated;

(3) Terminate all orders and subcontracts to the extent that they relate to the performance of work terminated by the Notice of Termination;

(4) Assign to the Government, in the manner, at the times, and to the extent directed by the Contracting Officer, all of the

right, title, and interest of the Contractor under the orders and subcontracts so terminated, in which case the Government shall have the right, in its discretion, to settle or pay any or all claims arising out of the termination of such orders and subcontracts;

(5) Settle all outstanding liabilities and all claims arising out of such termination of orders and subcontracts, with the approval or ratification of the Contracting Officer to the extent he or she may require, which approval or ratification shall be final for all the purposes of this clause;

(6) Transfer title to the Government and deliver in the manner, at the time, and to the extent, if any, directed by the Contracting Officer, (i) the fabricated or unfabricated parts, work in process, completed work, supplies, and other material produced as a part of, or acquired in connection with the performance of, the work terminated by the Notice of Termination, and (ii) the completed or partially completed plans, drawings, information, and other property which, if the contract had been completed, would have been required to be furnished to the Government;

(7) Use its best efforts to sell, in the manner, at the times, to the extent, and at the price or prices directed or authorized by the Contracting Officer, any property of the types referred to in (6) above; provided, however, that the Contractor (i) shall not be required to extend credit to any purchaser, and (ii) may acquire any such property under the conditions prescribed and at a price or prices approved by the Contracting Officer; and provided further, that the proceeds of any such transfer or disposition shall be applied in reduction of any payments to be made by the

Government to the Contractor under this contract or shall otherwise be credited to the price or cost of the work covered by this contract or paid in such other manner as the Contracting Officer may direct;

(8) Complete performance of such part of the work as shall not have been terminated by the Notice of Termination; and

(9) Take such action as may be necessary, or as the Contracting Officer may direct, for the protection and preservation of the property related to this contract which is in the possession of the Contractor and in which the Government has or may acquire an interest.

At any time after expiration of the plant clearance period, as defined in Subpart 1-8.1 of the Federal Procurement Regulations (41 CFR 1-8.1), as the definition may be amended from time to time, the Contractor may submit to the Contracting Officer a list, certified as to quantity and quality, of any or all items of termination inventory not previously disposed of, exclusive of items the disposition of which has been directed or authorized by the Contracting Officer, and may request the Government to remove such items or enter into a storage agreement covering them. Not later than fifteen (15) days thereafter, the Government will accept title to such items and remove them or enter into a storage agreement covering the same; provided, that the list submitted shall be subject to verification by the Contracting Officer upon removal of the items or, if the items are stored, within forty-five (45) days from the date of submission of the list, and any necessary adjustment to correct the list as submitted shall be made prior to final settlement.

(c) After receipt of a Notice of Termination, the Contractor shall submit to the Contracting Officer its termination claim in the form and with the certification prescribed by the Contracting Officer. Such claims shall be

submitted promptly but in no event later than one year from the effective date of termination, unless one or more extensions in writing are granted by the Contracting Officer upon request of the Contractor made in writing within such one-year period or authorized extension thereof. However, if the Contracting Officer determines that the facts justify such action, he or she may receive and act upon any such termination claim at any time after such one-year period or extension thereof. Upon failure of the Contractor to submit its termination claim within the time allowed, the Contracting Officer may, subject to any review required by DOE's procedures in effect as of the date of execution of this contract, determine, on the basis of information available to him or her, the amount, if any, due the Contractor by reason of the termination and shall thereupon pay to the Contractor the amount so determined.

(d) Subject to the provisions of paragraph (c) and subject to any review required by DOE's procedures in effect as of the date of execution of this contract, the Contractor and the Contracting Officer may agree upon the whole or any part of the amount or amounts to be paid to the Contractor by reason of the total or partial termination of work pursuant to this clause, which amount or amounts may include a reasonable allowance for profit on work done; provided, that such agreed amount or amounts, exclusive of settlement costs, shall not exceed the total contract price as reduced by the amount of payments otherwise made and as further reduced by the contract price of the work not terminated. The contract shall be amended accordingly, and the Contractor shall be paid the agreed amount. Nothing in paragraph (e) of this clause, prescribing the amount to be paid to the Contractor in the event of failure of the Contractor and the Contracting Officer to agree upon the whole amount to be paid to the Contractor by reason of the termination of work pursuant to this clause, shall be deemed to limit, restrict, or

otherwise determine or affect the amount or amounts which may be agreed upon to be paid to the Contractor pursuant to this paragraph (d).

(e) In the event of the failure of the Contractor and the Contracting Officer to agree, as provided in paragraph (d), upon the whole amount to be paid to the Contractor by reason of the termination of work pursuant to this clause, the Contracting Officer shall, subject to any review required by DOE's procedures in effect as of the date of execution of this contract, determine, on the basis of information available to him or her, the amount, if any, due to the Contractor by reason of the termination and shall pay to the Contractor the amounts determined as follows:

(1) With respect to all contract work performed prior to the effective date of the Notice of Termination, the total (without duplication of any items) of

(i) The cost of such work;

(ii) The cost of settling and paying claims arising out of the termination of work under subcontracts or orders as provided in paragraph (b)(5) above, exclusive of the amounts paid or payable on account of supplies or materials delivered or services furnished by the subcontractor prior to the effective date of the Notice of Termination of work under this contract, which amounts shall be included in the cost on account of which payment is made under (i) above; and

(iii) A sum, as profit on (i), above, determined by the Contracting Officer pursuant to Federal Procurement Regulation 1-8.303 (41 CFR 1-8.303), in effect as of the date of execution of this contract,

to be fair and reasonable; provided, however, that if it appears that the Contractor would have sustained a loss on the entire contract had it been completed, no profit shall be included or allowed under this subdivision (iii) and an appropriate adjustment shall be made reducing the amount of the settlement to reflect the indicated rate of loss; and

(2) The reasonable cost of the preservation and protection of property incurred pursuant to paragraph (b)(9); and any other reasonable cost incidental to termination of work under this contract, including expense incidental to the determination of the amount due to the Contractor as the result of the termination of work under this contract.

The total sum to be paid to the Contractor under (1) above shall not exceed the total contract price as reduced by the amount of payments otherwise made and as further reduced by the contract price of work not terminated. Except for normal spoilage, and except to the extent that the Government shall have otherwise expressly assumed the risk of loss, there shall be excluded from the amounts payable to the Contractor under (1) above, the fair value as determined by the Contracting Officer, of property which is destroyed, lost, stolen, or damaged so as to become undeliverable to the Government, or to a buyer pursuant to paragraph (b)(7).

(f) Costs claimed, agreed to, or determined pursuant to paragraphs (c), (d), and (e) of this clause shall be in accordance with the contract cost principles and procedures in Part 1-15 of the Federal Procurement Regulations (41 CFR 1-15) as supplemented or modified by DOE-PR Part 9-15.2 (41 CFR Section 9-15.2), in effect on the date of this contract.

(g) The Contractor shall have the right of appeal, under the clause of this contract entitled "Disputes," from any determination made by the Contracting Officer under paragraph (c) or (e) above, except that, if the Contractor has failed to submit his claim within the time provided in paragraph (c) above, and has failed to request extension of such time, it shall have no such right of appeal. In any case where the Contracting Officer has made a determination of the amount due under paragraph (c) or (e) above, the Government shall pay to the Contractor the following: (1) if there is no right of appeal hereunder or if no timely appeal has been taken, the amount so determined by the Contracting Officer, or (2) if an appeal has been taken, the amount finally determined on such appeal.

(h) In arriving at the amount due the Contractor under this clause there shall be deducted (1) all unliquidated advance or other payments on account theretofore made to the Contractor, applicable to the terminated portion of this contract, (2) any claim which the Government may have against the Contractor in connection with this contract, and (3) the agreed price for, or the proceeds of sale of, any materials, supplies, or other things kept by the Contractor or sold, pursuant to the provisions of this clause, and not otherwise recovered by or credited to the Government.

(i) If the termination hereunder be partial, prior to the settlement of the terminated portion of this contract, the Contractor may file with the Contracting Officer a request in writing for an equitable adjustment of the price or prices specified in the contract relating to the continued portion of the contract (the portion not terminated by the Notice of Termination), and such equitable adjustment as may be agreed upon shall be made in such price or prices; however, nothing contained herein shall limit the right of the Government and the Contractor to agree upon the amount or amounts to be paid to the Contractor for the completion of the

continued portion of the contract when said contract does not contain an established contract price for such continued portion.

(j) The Government may from time to time, under such terms and conditions as it may prescribe, make partial payments and payments on account against costs incurred by the Contractor in connection with the terminated portion of this contract whenever in the opinion of the Contracting Officer the aggregate of such payments shall be within the amount to which the Contractor will be entitled hereunder. If the total of such payments is in excess of the amount finally agreed or determined to be due under this clause, such excess shall be payable by the Contractor to the Government upon demand, together with interest computed at the rate established by the Secretary of the Treasury pursuant to Pub. L. 92-41 (50 U.S.C. App. 1215 (b)(2)) for the Renegotiation Board, for the period from the date such excess payment is received by the Contractor to the date on which such excess is repaid to the Government: provided, however, that no interest shall be charged with respect to any such excess payment attributable to a reduction in the Contractor's claim by reason of retention or other disposition, of termination inventory until ten days after the date of such retention or disposition, or such later date as determined by the Contracting Officer by reason of the circumstances.

(k) Unless otherwise provided for in this contract, or by applicable statute, the Contractor, from the effective date of termination and for a period of three years after final settlement under this contract, shall preserve and make available to the Government at all reasonable times at the office of the Contractor, but without direct charge to the Government, all its books, records, documents, and other evidence bearing on the costs and expenses of the Contractor under this contract and relating to the work terminated hereunder, or, to the extent approved by the Contracting Officer, photographs, microphotographs, or other authentic reproductions thereof.

20. Pricing of Adjustments (DOE-PR 9-7.602-30, June 1979). Delete the clause and substitute the following:

When costs are a factor in any determination of a contract price adjustment pursuant to the Changes clause or any other provision of this contract, such costs shall be in accordance with the contract cost principles and procedures in Part 1-15 of the Federal Procurement Regulations (41 CFR 1-15) as supplemented or modified by DOE-PR 9-15.2 (41 CFR 9-15.2) in effect on the date of this contract.

21. Patent Indemnity (DOE-PR 9-7.602-16, June 1979). Delete the clause and substitute the following:

If the amount of this contract is in excess of $10,000 the contractor shall indemnify the Government and its officers, agents, and employees against liability, including costs, for infringement of any United States letters patent (except U.S. letters patent issued upon an application which is now or may hereafter be kept secret or otherwise withheld from issue by order of the Government) arising out of the manufacture or delivery of supplies or out of construction, alteration, modification, or repair of real property (hereinafter referred by as "construction work") under this contract, or out of the use or disposal by or for the account of the Government of such supplies or construction work. The foregoing indemnity shall not apply unless the contractor shall have been informed as soon as practicable by the Government of the suit or action alleging such infringement, and shall have been given such opportunity as is afforded by applicable laws, rules, or regulations to participate in the defense thereof; and further, such indemnity shall not apply to: (a) an infringement resulting from compliance with specific written instructions of the Contracting Officer directing a change in the supplies to be delivered or in the materials or equipment to be used, or directing a manner of performance of the contract not normally used by the contractor; (b) an infringement resulting from addition to or change in, such supplies or components furnished or construction work performed

which addition or change was made subsequent to delivery or performance by the contractor; or (c) a claimed infringement which is settled without the consent of the contractor, unless required by final decree of a court of competent jurisdiction.

23. Examination of Records by Comptroller General (DOE-PR (ERDA) 9-7.5004-10, Oct 75). The following change is made to this clause:

Substitute the words "unless the DOE authorizes their prior disposition" for the words "or such lesser time specified in either Appendix M of the Armed Services Procurement Regulation or the Federal Procurement Regulations Part 1-20, as appropriate" in paragraphs (b) and (c).

The following paragraph is added to this clause:

(e) Nothing in this contract shall be deemed to preclude an audit by the General Accounting Office of any transaction under this contract.

28. Convict Labor (FPR 1-12.204, June 1974). Delete the words "at hard labor."

33. CONFLICT PROVISIONS (ALPI 9-16, Oct 76)

(a) Except as otherwise provided in the event of conflict between the provisions of Division I and these General Provisions the provisions in Division I shall govern. In case of conflict between the provisions of Division I and of the specifications or the drawings, the provisions of Division I shall govern.

(b) Unless otherwise specifically provided, the latest revisions (current at the time of the invitation date which is specified in the Invitation for Bids, SF 20) of specifications, publications or standards of the Federal Government, technical societies, or testing organizations included in these specifications by reference shall govern. In case of conflict between any document incorporated in this contract by reference and any express provisions of this contract the latter shall govern.

34. AUDIT (FPR 1-3.814-2, May 76)

(a) General. The Contracting Officer or his representatives shall have the audit and inspection rights described in the applicable paragraphs (b), (c), and (d) below.

(b) Examination of Costs. If this is a cost-reimbursement type, incentive, time and materials, labor hour, or price redeterminable contract, or any combination thereof, the Contractor shall maintain, and the Contracting Officer or his or her representatives shall have the right to examine books, records, documents, and other evidence and accounting procedures and practices, sufficient to reflect properly all direct and indirect costs of whatever nature claimed to have been incurred and costs of whatever nature claimed to have been incurred and anticipated to be incurred for the performance of this contract. Such right of examination shall include inspection at all reasonable times of the Contractor's plants, or such parts thereof, as may be engaged in the performance of this contract.

(c) Cost or Pricing Data. If the Contractor submitted cost or pricing data in connection with the pricing of this contract or any change or modification thereto, unless such pricing was based on adequate price competion, established catalog or market prices of commercial items sold in substantial quantities to the general public, or prices set by law or regulation, the Contracting Officer or his or her representatives who are employees of the United States Government shall have the right to examine all books, records, documents and other data of the Contractor related to the negotiation, pricing or performance of such contract, change or modification, for the purpose of evaluating the accuracy, completeness and currency of the cost or pricing data submitted. Additionally, in the case of pricing any change or modification exceeding $100,000 to formally advertised contracts, the Comptroller General of the United States or his or her representatives who are employees of the United States Government shall have such rights. The right of examination shall extend to all documents necessary to permit adequate evaluation of the cost or pricing data submitted, along with the computations and projects used therein.

(d) Availability. The materials described in (b) and (c) above, shall be made available at the office of the Contractor, at all reasonable times, for inspection, audit or reproduction, until the expiration of 3 years from the date of final payment under this contract or such lesser time specified in Part 1-20 of the Federal Procurement Regulations (41 CFR Part 1-20) and for such longer period, if any, as is required by applicable statute, or by other clauses of this contract, or by (1) and (2) below:

(1) If this contract is completely or partially terminated, the records relating to the work terminated shall be made available for a period of 3 years from the date of any resulting final settlement.

(2) Records which relate to appeals under the "Disputes" clause of this contract, or litigation or the settlement of claims arising out of the performance of this contract, shall be made available until such appeals, litigation, or claims have been disposed of.

(e) The Contractor shall insert a clause containing all the provisions of this clause, including this paragraph (e), in all subcontracts hereunder except altered as necessary for proper identification of the contracting parties and the Contracting Officer under the Government prime contract.

35. RENEGOTIATION (DOE-PR 9-7.602-52, June 1979)

If this contract is subject to the Renegotiation Act of 1951, as amended, the following provisions shall apply:

(a) This contract is subject to the Renegotiation Act of 1951 (50 U.S.C. App. 1211, et seq.), as amended, and to any subsequent act of Congress providing for the renegotiation of contracts. Nothing contained in this clause shall impose any renegotiation obligation with respect to this contract or any subcontract hereunder which is not imposed by an act of Congress heretofore or hereafter enacted. Subject to the foregoing, this contract shall be

deemed to contain all the provisions required by section 104 of the Renegotiation Act of 1951, and by any such other act, without subsequent contract amendment specifically incorporating such provisions.

(b) The Contractor agrees to insert the provisions of this clause, including this paragraph (b), in all subcontracts, as that term is defined in section 103 g. of the Renegotiation Act of 1951, as amended.

36. PRICE REDUCTION FOR DEFECTIVE COST OR PRICING DATA - PRICING ADJUSTMENTS (FPR 1-3.814-1(b), Jan 74)

(a) This clause shall become operative only with respect to any modification of this contract which involves aggregate increases and/or decreases in costs plus applicable profits in excess of $100,000 unless the modification is priced on the basis of adequate price competition, established catalog or market prices of commercial items sold in substantial quantities to the general public, or prices set by law or regulation. The right to price reduction under this clause is limited to defects in data relating to such modification.

(b) If any price, including profit or fee, negotiated in connection with any price adjustment under this contract was increased by any significant sums because:

(1) The Contractor furnished cost or pricing data which was not accurate, complete and current as certified in the Contractor's Certificate of Current Cost or Pricing Data;

(2) A subcontractor, pursuant to the clause of this contract entitled "Subcontractor Cost or Pricing Data" or "Subcontractor Cost or Pricing Data - Price Adjustments" or any subcontract clause therein required, furnished cost or pricing data which was not accurate, complete and current as certified in the subcontractor's Certificate of Current Cost or Pricing Data;

(3) A subcontractor or prospective subcontractor furnished cost or pricing data which was required to be accurate, complete and current and to be submitted to support a subcontract cost estimate furnished by the Contractor but which was not accurate, complete and current as of the date certified in the Contractor's Certificate of Current Cost of Pricing Data; or

(4) The Contractor or a subcontractor or prospective subcontractor furnished any data, not within (1), (2) or (3) above, which was not accurate, as submitted: the price shall be reduced accordingly and the contract shall be modified in writing as may be necessary to reflect such reduction. However, any reduction in the contract price due to defective subcontract data of a prospective subcontractor, when the subcontract was not subsequently awarded to such subcontractor, will be limited to the amount (plus applicable overhead and profit markup) by which the actual subcontract, or actual cost to the Contractor if there was no subcontract, was less than the prospective subcontract cost estimate submitted by the Contractor: Provided the actual subcontract price was not affected by defective cost or pricing data.

(c) Failure to agree on a reduction shall be a dispute concerning a question of fact within the meaning of the "Disputes" Clause of this contract.

NOTE: Since the contract is subject to reduction under this clause by reason of defective cost or pricing data submitted in connection with certain subcontracts, it is expected that the Contractor may wish to include a clause in each such subcontract requiring the subcontractor to appropriately indemnify the Contractor. It is also expected that any subcontractor subject to such indemnification will generally require substantially similar indemnification for defective cost or pricing data required to be submitted by its lower tier subcontractors.

37. SUBCONTRACTOR COST OR PRICING DATA - PRICE ADJUSTMENTS (FPR 1-3.814-3(b), May 76)

(a) Paragraphs (b) and (c) of this clause shall become operative only with respect to any modification made pursuant to one or more provisions of this contract which involves aggregate increases and/or decreases in costs plus applicable profits expected to exceed $100,000. The requirements of this clause shall be limited to such modifications.

(b) The Contractor shall require subcontractors hereunder to submit cost or pricing data under the following circumstances:

(1) Prior to the award of any subcontract the amount of which is expected to exceed $100,000 when entered into;

(2) Prior to the pricing of any subcontract modification which involves aggregate increases and/or decreases in costs plus applicable profits expected to exceed $100,000; except where the price is based on adequate price competition, established catalog or market prices of commercial items sold in substantial quantities to the general public, or prices set by law or regulation.

(c) The Contractor shall require subcontractors to certify that to the best of their knowledge and belief the cost or pricing data submitted under (b) above is accurate, complete, and current as of the date of agreement on the negotiated price of the subcontract or subcontract change or modification.

(d) The Contractor shall insert the substance of this clause including this paragraph (d) in each subcontract which exceeds $100,000.

38. INDEMNIFICATION BY CONTRACTOR (ALPI 9-16, Oct 76)

The Contractor shall indemnify and hold harmless the Government and its agents and employees from and against all liability, claims and suits for injury or death to

persons and damage to property (other than Government property) based upon or arising from the operations of the Contractor and its subcontractors in the performance of this contract.

39. NOTICE TO THE GOVERNMENT OF LABOR DISPUTES (FPR 1-7.203-3)

(a) Whenever the Contractor has knowledge that any actual or potential labor dispute is delaying or threatens to delay the timely performance of this contract, the Contractor shall immediately give notice thereof, including all relevant information with respect thereto, to the Contracting Officer.

(b) The Contractor agrees to insert the substance of this clause, including this paragraph (b), in any subcontract hereunder as to which a labor dispute may delay the timely performance of this contract; except that each such subcontract shall provide that in the event its timely performance is delayed or threatened by delay by any actual or potential labor dispute, the subcontractor shall immediately notify his next higher tier subcontractor, or the Prime Contractor, as the case may be, of all relevant information with respect to such disputes.

40. EMPLOYMENT OF THE HANDICAPPED (FPR Temporary Regulation No. 38, May 1976)

(The following clause is applicable if this contract is for $2,500 or more.)

(a) The Contractor will not discriminate against any employee or applicant for employment because of physical or mental handicap in regard to any position for which the employee or applicant for employment is qualified. The Contractor agrees to take affirmative action to employ, advance in employment and otherwise treat qualified handicapped individuals without discrimination based upon their physical or mental handicap in all employment practices such as the following: employment, upgrading, demotion or transfer, recruitment, advertising, layoff or termination, rates of pay or other forms of compensation, and selection for training including apprenticeship.

(b) The Contractor agrees to comply with the rules, regulations, and relevant orders of the Secretary of Labor issued pursuant to the Rehabilitation Act of 1973, as amended.

(c) In the event of the Contractor's noncompliance with the requirements of this clause, actions for noncompliance may be taken in accordance with the rules, regulations and relevant orders of the Secretary of Labor issued pursuant to the Act.

(d) The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices in a form to be prescribed by the Director, Office of Federal Contract Compliance Programs, Department of Labor, provided by or through the Contracting Officer. Such notices shall state the Contractor's obligation under the law to take affirmative action to employ and advance in employment qualified handicapped employees and applicants for employment, and the rights of applicants and employees.

(e) The Contractor will notify each labor union or representative of workers with which it has a collective bargaining agreement or other contract understanding, that the Contractor is bound by the terms of section 503 of the Act and is committed to take affirmative action to employ and advance in employment physically and mentally handicapped individuals.

(f) The Contractor will include the provisions of this clause in every subcontract or purchase order of $2,500 or more unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to section 503 of the Act, so that such provisions will be binding upon each subcontractor or vendor. The Contractor will take such action with respect to any subcontract or purchase order as the Director, Office of Federal Contract Compliance Programs, may direct to enforce such provisions, including action for noncompliance.

41. DISABLED VETERANS AND VETERANS OF THE VIETNAM ERA (FPR Temporary Regulation No. 39, July 1976)

(This clause is applicable pursuant to 41 CFR 60-250 if this contract is for $10,000 or more.)

(a) The Contractor will not discriminate against any employee or applicant for employment because he or she is a disabled veteran or veteran of the Vietnam

era in regard to any position for which the employee or applicant for employment is qualified. The Contractor agrees to take affirmative action to employ, advance in employment, and otherwise treat qualified disabled veterans and veterans of the Vietnam era without discrimination based upon their disability or veterans status in all employment practices such as the following: employment, up-grading, demotion or transfer, recruitment, advertising, layoff or termination, rates of pay or other forms of compensation, and selection for training, including apprenticeship.

(b) The Contractor agrees that all suitable employment openings of the Contractor which exist at the time of the execution of this contract and those which occur during the performance of this contract, including those not generated by this contract and including those occurring at an establishment of the Contractor other than the one wherein the contract is being performed but excluding those of independently operated corporate affiliates, shall be listed at an appropriate local office of the State employment service system wherein the opening occurs. The Contractor further agrees to provide such reports to such local office regarding employment openings and hires as may be required.

State and local government agencies holding Federal contracts of $10,000 or more shall also list all their suitable openings with the appropriate office of the State employment service, but are not required to provide those reports set forth in Paragraphs (d) and (e).

(c) Listing of employment openings with the employment service system pursuant to this clause shall be made at least concurrently with the use of any other recruitment source or effort and shall involve the normal obligations which attach to the placing of a bona fide job order, including the acceptance of referrals of veterans and nonveterans. The listing of employment openings does not require the hiring of any particular job applicant or from any particular group of job applicants, and nothing herein is intended to relieve the Contractor from any requirements in Executive orders or regulations regarding nondiscrimination in employment.

(d) The reports required by Paragraph (b) of this clause shall include, but not be limited to, periodic reports which shall be filed at least quarterly with the appropriate local office or, where the Contractor has more than one hiring location in a State, with the central office of that State employment service. Such reports shall indicate for each hiring location (1) the number of individuals hired during the reporting period, (2) the number of nondisabled veterans of the Vietnam era hired, (3) the number of disabled veterans of the Vietnam era hired, and (4) the total number of disabled veterans hired. The reports should include covered veterans hired for on-the-job training under 38 U.S.C. 1787. The Contractor shall submit a report within 30 days after the end of each reporting period wherein any performance is made on this Contract identifying data for each hiring location. The Contractor shall maintain at each hiring location copies of the reports submitted until the expiration of one year after final payment under the Contract, during which time these reports and related documentation shall be made available, upon request, for examination by any authorized representatives of the Contracting Officer or of the Secretary of Labor. Documentation would include personnel records respecting job openings, recruitment, and placement.

(e) Whenever the Contractor becomes contractually bound to the listing provisions of this clause, it shall advise the employment service system in each State where it has establishments of the name and location of each hiring location in the State. As long as the Contractor is contractually bound to these provisions and has so advised the State system, there is no need to advise the State system of subsequent contracts. The Contractor may advise the State system when it is no longer bound by this Contract clause.

(f) This clause does not apply to the listing of employment openings which occur and are filled outside the 50 States, the District of Columbia, Puerto Rico, Guam, and the Virgin Islands.

(g) The provisions of Paragraphs (b), (c), (d), and (e) of this clause do not apply to openings which the Contractor proposes to fill from within its own organization or to fill pursuant to a customary and

traditional employer-union hiring arrangement. This exclusion does not apply to a particular opening once an employer decides to consider applicants outside of its own organization or employer-union arrangement for that opening.

(h) As used in this clause:

(1) "All suitable employment openings" includes, but is not limited to, openings which occur in the following job categories: production and non-production; plant and office; laborers and mechanics; supervisory and nonsupervisory; technical; and executive, administrative, and professional openings that are compensated on a salary basis of less than $25,000 per year. This term includes full-time employment, temporary employment of more than 3 days' duration, and part-time employment. It does not include openings which the Contractor proposes to fill from within his own organization or to fill pursuant to a customary and traditional employer-union hiring arrangement nor openings in an educational institution which are restricted to students of that institution. Under the most compelling circumstances an employment opening may not be suitable for listing, including such situations where the needs of the Government cannot reasonably be otherwise supplied, where listing would be contrary to national security, or where the requirement of listing would otherwise not be for the best interest of the Government.

(2) "Appropriate office of the State employment service system" means the local office of the Federal/State national system of public employment offices with assigned responsibility for serving the area where the employment opening is to be filled, including the District of Columbia, Guam, Puerto Rico, and the Virgin Islands.

(3) "Openings which the Contractor proposes to fill from within its own organization" means employment openings for which no consideration will be given to persons outside the Contractor's organization (including any affiliates, subsidiaries, and the parent companies) and includes any openings which the Contractor proposes to fill from regularly established "recall" lists.

(4) "Openings which the Contractor proposes to fill pursuant to a customary and traditional employer-union hiring arrangement" means employment openings which the Contractor proposes to fill from union halls, which is part of the customary and traditional hiring relationship which exists between the Contractor and representatives of its employees.

(5) "Disabled veteran" means a person entitled to disability compensation under laws administered by the Veterans Administration for disability rated at 30 per centum or more, or a person whose discharge or release from active duty was for a disability incurred or aggravated in the line of duty.

(6) "Veteran of the Vietnam era" means a person (1) who (i) served on active duty for a period of more than 180 days, any part of which occurred between August 5, 1964 and May 7, 1975, and was discharged or released therefrom with other than a dishonorable discharge, or (ii) was discharged or released from active duty for a service-connected disability if any part of such active duty was performed between August 5, 1964 and May 7, 1975, and (2) who was so discharged or released within 48 months preceding the alleged violations of the Vietnam Era Veteran's Readjustment Assistance Act, the affirmative action clause, and/or the regulations issued pursuant to the Act.

(i) The Contractor agrees to comply with the rules, regulations, and relevant orders of the Secretary of Labor issued pursuant to the Act.

(j) In the event of the Contractor's noncompliance with the requirements of this clause, actions for noncompliance may be taken in accordance with the rules, regulations, and relevant orders of the Secretary of Labor issued pursuant to the Act.

(k) The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices in a form to be prescribed by the Director of the Office of Federal Contract Compliance Programs, provided by or through the Contracting Officer. Such notice shall state the Contractor's obligation under the law to take affirmative action to employ and advance in employment qualified disabled veterans and veterans of the Vietnam era for employment, and the rights of applicants and employees.

(l) The Contractor will notify each labor union or representative of workers with which it has a collective bargaining agreement or other contract understanding that the Contractor is bound by terms of the Vietnam Era Veteran's Readjustment Assistance Act and is committed to take affirmative action to employ and advance in employment qualified disabled veterans and veterans of the Vietnam era.

(m) The Contractor will include the provisions of this clause in every subcontract or purchase order of $10,000 or more unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to the Act, so that such provisions will be binding upon each subcontractor or vendor. The Contractor will take such action with respect to any subcontract or purchase order as the Director of the Office of Federal Contract Compliance Programs may direct to enforce such provisions, including action for noncompliance.

42. USE OF U.S. FLAG COMMERCIAL VESSELS (FPR 1-19.108-2, Nov. 1976

(a) The Cargo Preference Act of 1954 (Public Law 664, August 26, 1954, 68 Stat. 832, 46 U.S.C. 1241(b)), requires that Federal departments or agencies shall transport at least 50 percent of the gross tonnage (computed separately for dry bulk carriers, dry cargo liners, and tankers) of equipment, materials, or commodities which may be transported on ocean vessels on privately owned United States flag commercial vessels. Such transportation shall be accomplished whenever:

DELETE

(1) Any equipment, materials, or commodities, within or outside the United States, which may be transported by ocean vessel, are:

DELETE

(A) Procured, contracted for, or otherwise obtained for the agency's account; or

DELETE

(B) Furnished to or for the account of any foreign nation without provision for reimbursement.

(2) Funds or credits are advanced or the convertibility of foreign currencies is guaranteed in connection with furnishing such equipment, materials, or commodities which may be transported by ocean vessel.

NOTE. This requirement does not apply to small purchases as defined in 41 CFR 1-3.6 or to cargoes carried in the vessels of the Panama Canal Company.

(b) The contractor agrees as follows:

(1) To utilize privately owned United States flag commercial vessels to ship at least 50 percent of the gross tonnage (computed separately for dry bulk carriers, dry cargo liners, and tankers) involved, whenever shipping any equipment, materials, or commodities under the conditions set forth in (a) above pursuant to this contract to the extent such vessels are available at fair and reasonable rates for United States flag commercial vessels.

NOTE. Guidance regarding fair and reasonable rates for United States flag vessels may be obtained from the Division of National Cargo, Office of Market Development, Maritime Administration, Washington, D.C. 20230; Area Code 202, phone 377-3449.

(2) To furnish, within 15 working days following the date of loading for shipments originating within the United States or within 25 working days following the date of loading for shipments originating outside the United States, a legible copy of a rated, "on-board" commercial ocean bill of lading in English for each shipment of cargo covered by the provisions in (a) above to both the Contracting Officer (through the prime contractor in the case of subcontractor bills of lading) and to the Division of National Cargo, Office of Market Development, Maritime Administration, Washington, D.C. 20230.

(3) To insert the substance of the provisions of this clause in all subcontracts issued pursuant to this contract except for small purchases as defined in 41 CFR 1-3.6. DELETE

43. CLEAN AIR AND WATER (FPR 1-1.2302-2, Aug 75)

(Applicable if the contract exceeds $100,000, or the Contracting Officer has determined that orders under an indefinite quantity contract in any one year will exceed $100,000, or a facility to be used has been the subject of a conviction under the Clean Air Act (42 U.S.C. 1857c-8(c)(1)) or the Federal Water Pollution Control Act (33 U.S.C. 1319(c)) and is listed by EPA, or the contract is not otherwise exempt.)

(a) The Contractor agrees as follows:

(1) To comply with all the requirements of Section 114 of the Clean Air Act, as amended (42 U.S.C. 1857, et seq. as amended by Public Law 91-604) and section 308 of the Federal Water Pollution Control Act (33 U.S.C. 1251, et seq., as amended by Public Law 92-500), respectively, relating to inspection, monitoring, entry, reports, and information, as well as other requirements specified in section 114 and section 308 of the Air Act and the Water Act, respectively, and all regulations and guidelines issued thereunder before the award of this contract.

(2) That no portion of the work required by this prime contract will be performed in a facility listed on the Environmental Protection Agency List of Violating Facilities on the date when this contract was awarded unless and until the EPA eliminates the name of such facility or facilities from such listing.

(3) To use its best efforts to comply with clean air standards and clean water standards at the facility in which the contract is being performed.

(4) To insert the substance of the provisions of this clause into any nonexempt subcontract, including this paragraph (a)(4).

(b) The terms used in this clause have the following meanings:

(1) The term "Air Act" means the Clean Air Act, as amended (42 U.S.C. 1857, et seq., as amended by Public Law 91-604).

(2) The term "Clean Water Act" means Federal Water Pollution Control Act, as amended (33 U.S.C. 1251, et seq. as amended by Public Law 92-500).

(3) The term "clean air standards" means any enforceable rules, regulations, guidelines, standards, limitations, orders, controls, prohibitions, or other requirements which are contained in, issued under, or otherwise adopted pursuant to the Air Act or Executive Order 11738, an applicable implementation plan as described in section 110(d) of the Clean Air Act (42 U.S.C. 1857c-5(d)), an approved implementation procedure or plan under section 111(c) or section 111(d), respectively, of the Air Act (42 U.S.C. 1857c-6(c) or (d)), or an approved implementation procedure under section 112(d) of the Air Act (42 U.S.C. 1857c-7(d)).

(4) The term "clean water standards" means any enforceable limitation, control, condition, prohibition, standard, or other requirement which is promulgated pursuant to the Water Act or contained in a permit issued to a discharger by the Environmental Protection Agency or by a State under an approved program, as authorized by section 402 of the Water Act (33 U.S.C. 1342), or by local government to ensure compliance with pretreatment regulations as required by section 307 of the Water Act (33 U.S.C. 1317).

(5) The term "compliance" means compliance with clean air or water standards. Compliance shall also mean compliance with a schedule or plan ordered or approved by a court of competent jurisdiction, the Environmental Protection Agency or an air or water pollution control agency in accordance with the requirements of the Air Act or Water Act and regulations issued pursuant thereto.

(6) The term "facility" means any building, plant, installation, structure, mine, vessel or other floating craft, location, or site of operations, owned, leased, or supervised by a contractor or subcontractor, to be utilized in the performance of a contract or subcontract. Where a location or site of operations contains or includes more than one building, plant, installation, or structure, the entire location or site shall be deemed to be a facility except where the Director, Office of Federal Activities, Environmental Protection Agency, determines that independent facilities are collocated in one geographical area.

44. SAFETY AND HEALTH (DOE-PR 9-7.603-58, June 1979)

(a) The Contractor shall take all reasonable precautions in the performance of the work under this contract to protect the safety and health of employees and of members of the public and shall comply with all applicable safety and health regulations and requirements (including reporting requirements) of DOE. The Contracting Officer shall notify in writing the Contractor of any noncompliance with the provisions of this clause and the corrective action to be taken. After receipt of such notice, the Contractor shall immediately take such corrective action. The Contractor shall submit a management program and implementation plan to the Contracting Officer for review and approval within 30 days after the date of award of this contract. In the event that the Contractor fails to comply with said regulations or requirements of DOE, the Contracting Officer may, without prejudice to any other legal or contractual rights of DOE, issue an order stopping all or any part of the work; thereafter a start order for resumption of the work may be issued at the discretion of the Contracting Officer. The Contractor shall make no claim for an extension of time or for compensation or damages by reason of or in connection with such work stoppage.

(b) For the purposes of this Contract, the "health and safety regulations and requirements of "DOE" are:

(1) the Secretary of Labor's "Safety and Health Regulations for Construction," 29 CFR 1926, and the Secretary of Labor's "Occupational Safety and Health Standards," 29 CFR 1910, in effect on the effective date of this Contract. (It is recognized that 29 CFR 1910 and 29 CFR 1926 sometimes both treat the same specific health or safety concern. In such cases the requirements of 29 CFR 1926 shall govern.); and

(2) such other provisions as may be contained in this Contract relating to health, safety and fire protection.

(c) The Contractor shall include the provisions of this article in all of its subcontracts involving performance of work at the site. However, such provision in the subcontracts shall not relieve the Contractor of its obligation to assure compliance with the provisions of this article for all aspects of the work.

(d) The management program and implementation plan referred to in paragraph (a) above shall consist of a descriptive outline of the Contractor's safety program (including the operations of subcontractors) encompassing aspects of safety, accident prevention and fire protection. The outline should contain the following information:

(1) Safety Program

(i) A statement of the Contractor's safety policy, including an analysis of the personnel safety, health, environmental, and fire hazards expected on the project, and the types of safety equipment and/or procedures to be used in controlling those hazards.

(ii) The name and qualifications of the Contractor's representative administering the safety program at the construction site.

(iii) A schedule of weekly safety inspections to be conducted by a designated Contractor official.

(iv) A schedule of weekly safety meetings with employees and supervisors in order to emphasize project safety, health and fire prevention.

(v) A description of the Contractor's program for certifying the safe operating condition and proper maintenance of earthmoving equipment, cranes, vehicles, pressure vessels, protective devices for portable electrical tools and other portable equipment.

(vi) The Contractor's program for ensuring adequate illumination, noise control and housekeeping in work areas.

(vii) The mechanism by which the Contractor will have available at all times information concerning the names and characteristics of all toxic materials, gases or liquids that he may introduce onto the site or that may be produced in the course of the job. A plan to identify these materials and their effects on the employees and a program to protect employees from these potential hazards shall be included.

(viii) The mechanism for ensuring that all personnel have eye and head protection at all times while at the construction site.

(2) First Aid Program

(i) A list of employees available at the site who are trained in adminstering first aid.

(ii) Provisions for adequate emergency services.

(iii) The method for prompt investigation and reporting of injuries to DOE.

(3) Fire Prevention Program

(i) A method by which employees and the local fire department will be alerted to emergencies.

(ii) The Contractor's fire prevention program should ensure that the following precautions are taken:

1. Instructions for notifying the fire department shall be posted at all telephones.

2. All hazardous activities and materials shall be identified and proper means taken to prevent fires from developing from them.

3. Clear access shall be provided to all areas for fire fighting vehicles and hose lines.

4. Combustible debris shall be removed promptly and a responsible employee shall make a tour of the construction area at the end of the day to assure that no incipient fires remain.

(iii) Automatic sprinkler protection may be required before the structure is complete if, in the judgment of the Contracting Officer, the potential loss of DOE property exceeds the limits allowed by DOE requirements.

(4) Safety Meetings

The Contractor's safety representative at the construction site shall be available to meet from time-to-time with DOE or operating Contractor personnel regarding safety matters.

(e) The Contractor shall immediately notify the Contracting Officer of any personal injury resulting in lost work days and any loss or damage to Government property.

(f) In addition to the reporting requirements of 29 CFR Part 1926, the Contractor shall submit DOE Form No. 101 (Supervisor's Report of Occupational Injury or Illness), DOE Form No. 102-A (Quarterly Tabulation of Contractor Occupational Injuries and Illnesses), and DOE Form 102-B (Quarterly Tabulation of Fire, Motor Vehicle Accident, and Other Property Damage Experience) for the duration of the contract. The DOE Form 102-A and DOE Form 102-B shall be submitted to the Contracting Officer by the 25th day of the last month, of each quarter (i.e., March 25, June 25, September 25, and December 25).

45. USE OF EXPLOSIVES (ALPI 9-16, Oct 76)

The use of explosives is not permitted, unless conditions for their use and the Contractor's liability therefor are expressly stated in the Technical Provisions, or unless such use is authorized in writing by the Contracting Officer with express conditions concerning use and liability.

46. SECURITY (DOE-PR 9-7.603-53, June 1979)

(a) Contractor's Duty to Safeguard Restricted Data, Formerly Restricted Data, and Other Classified Information. The Contractor shall, in accordance with DOE's security regulations and requirements, be responsible for safeguarding Restricted Data, Formerly Restricted Data, and other classified information and protecting against sabotage, espionage, loss, and theft, the classified documents and material in the Contractor's possession in connection with the performance of work under this contract. Except as otherwise expressly provided in this contract, the Contractor shall, upon completion or termination of this contract, transmit to DOE any classified matter in the possession of the Contractor or any person under the Contractor's control in connection with performance of this contract. If retention by the Contractor of any classified matter is required after the completion or termination of the contract and such retention is approved by the Contracting Officer, the Contractor will complete a certificate of possession to be furnished to DOE specifying the classified matter to be retained. The certification shall identify the

DELETE

items and types or categories of matter retained, the conditions governing the retention of the matter and the period of retention, if known. If the retention is approved by the Contracting Officer, the security provisions of the contract will continue to be applicable to the matter retained.

(b) Regulations. The Contractor agrees to conform to all security regulation and requirements of DOE.

(c) Definition of Restricted Data. The term "Restricted Data," as used in this clause, means all data concerning (1) design, manufacture, or utilization of atomic weapons; (2) the production of special nuclear material; or (3) the use of special nuclear material in the production of energy, but shall not include data declassified or removed from the Restricted Data category pursuant to section 142 of the Atomic Energy Act of 1954, as amended.

(d) Definition of Formerly Restricted Data. The term "Formerly Restricted Data," as used in this clause, means all data removed from the Restricted Data category under section 142 d. of the Atomic Energy Act of 1954, as amended.

(e) Security Clearance of Personnel. The Contractor shall not permit any individual to have access to Restricted Data, Formerly Restricted Data, or other classified information, except in accordance with the Atomic Energy Act of 1954, as amended, and DOE's regulations or requirements applicable to the particular type or category of classified information to which access is required.

(f) Criminal Liability. It is understood that disclosure of Restricted Data, Formerly Restricted Data, or other classified information relating to the work or services ordered hereunder to any person not entitled to receive it, or failure to safeguard any Restricted Data, Formerly Restricted Data, or any other classified matter that may come to the Contractor or any person under the Contractor's control in connection with work under this contract, may subject the Contractor, its agents, employees, or subcontractors to criminal liability under the laws of the United States. (See the Atomic Energy Act of 1954, as amended, 42 U.S.C. 2011 et seq.; 18 U.S.C. 793 and 794; and Executive Order 11652, as amended.)

(g) Subcontracts and Purchase Orders. Except as otherwise authorized in writing by the Contracting Officer, the Contractor shall insert provisions similar to the foregoing in all subcontracts and purchase orders under this contract.

DELETE

47. GOVERNMENT PROPERTY (DOE-PR 9-7.603-60, Jan 80)

(This clause applies when the Government is to furnish, or the Contractor is to acquire, Government property.)

a. The Government shall deliver to the Contractor, for use in connection with and under the terms of this contract, the property described as Government-furnished property in the Technical Provisions of this contract, together with such related data and information as the Contractor may request and as may reasonably be required for the intended use of such property (hereinafter referred to as "Government-furnished property"). The delivery or performance dates for the supplies or services to be furnished by the Contractor under this contract are based upon the expectation that Government-furnished property suitable for use (except for such property furnished "as is") will be delivered to the Contractor at the times stated in the Technical Provisions or, if not so stated, in sufficient time to enable the Contractor to meet such delivery or performance dates. In the event that Government-furnished property is not delivered to the Contractor by such time or times, the Contracting Officer shall, upon timely written request made by the Contractor, make a determination of the delay, if any, occasioned the Contractor thereby, and shall equitably adjust the delivery or performance dates or the contract price, or both, and any other contractual provision affected by any such delay, in accordance with the procedures provided for in the clause of this contract entitled "Changes." Except for Government-furnished property furnished "as is," in the event the Government-furnished property is received by the Contractor in a condition not suitable for the intended use the Contractor shall, upon receipt thereof, notify the Contracting Officer of such fact and, as directed by the Contracting Officer, either (1) return such property at the Government's expense or otherwise dispose of the property, or (2) effect

repair or modification, in accordance with the procedures provided for in the clause of this contract entitled "Changes." The foregoing provisions for adjustment are exclusive and the Government shall not be liable to suit for breach of contract by reason of any delay in delivery of Government-furnished property or delivery of such property in a condition not suitable for its intended use.

(b) (1) By notice in writing, the Contracting Officer may (i) decrease the property provided or to be provided by the Government under this contract, or (ii) substitute other Government-owned property for property to be provided by the Government, or to be acquired by the Contractor for the Government, under this contract. The Contractor shall promptly take such action as the Contracting Officer may direct with respect to the removal and shipping of property covered by such notice.

(2) In the event of any decrease in or substitution of property pursuant to subparagraph (i), above, or any withdrawal of authority to use property provided under any other contract or lease, which property the Government had agreed in the Technical Provisions to make available for the performance of this contract, the Contracting Officer, upon the written request of the Contractor (or, if the substitution of property causes a decrease in the cost of performance, on his own initiative), shall equitably adjust such contractual provisions as may be affected by the decrease, substitution, or withdrawal, in accordance with the procedures provided for in the "Changes" clause of this contract.

(c) Title to all property furnished by the Government shall remain in the Government. In order to define the obligations of the parties under this clause, title to each item of facilities, special test equipment, and special tooling (other than that subject to a "Special Tooling" clause) acquired by the Contractor for the Government pursuant to this contract shall pass to and vest in the Government

when its use in the performance of this contract commences, or upon payment therefor by the Government, whichever is earlier, whether or not title previously vested. All Government-furnished property, together with all property acquired by the Contractor title to which vests in the Government under this paragraph, is subject to the provisions of this clause and is hereinafter collectively referred to as "Government property." Title to Government property shall not be affected by the incorporation or attachment thereof to any property not owned by the Government, nor shall such Government property, or any part thereof, be or become a fixture or lose its identity as personalty by reason of affixation to any realty.

(d) The Contractor shall be responsible for and accountable for all Government property provided under this contract. The Contractor shall establish and maintain a system to control, protect, preserve, and maintain all Government property in accordance with applicable provisions of the DOE Property Management Regulations (DOE-PMR) 41 CFR 109-60 as in effect on the date of the contract. This system shall, upon request by the Contracting Officer, be submitted for review and, if satisfactory, approved in writing by the Contracting Officer. The Contracting Officer shall maintain and make available such records as are required by the approved system and must account for all property until relieved of responsibility therefor in accordance with written instructions of the Contracting Officer.

(e) The Government property shall, unless otherwise provided herein or approved by the Contracting Officer, be used only for the performance of this contract.

(f) The Contractor shall maintain and administer, in accordance with sound industrial practice, and with applicable provisions of DOE-PMR 109-60, a program for the utilization, maintenance, repair, protection, and preservation of Government property so as to assure its full availability and usefulness for the performance of this contract. In the event that any damage occurs to Government property the

risk of which has been assumed by the Government under this contract, the Government shall replace such items or the Contractor shall make such repair of the property as the Government directs: Provided, however, That if the Contractor cannot effect such repair within the time required, the Contractor shall dispose of such property in the manner directed by the Contracting Officer. The contract price includes no compensation to the Contractor for the performance of any repair or replacement for which the Government is responsible, and an equitable adjustment will be made in any contractual provisions affected by such repair or replacement of Government property made at the direction of the Government, in accordance with the procedures provided for in the "Changes" clause of this contract. Any repair or replacement for which the Contractor is responsible under the provisions of this contract shall be accomplished by the Contractor at his own expense.

(g) Unless otherwise provided in this contract, the Contractor assumes the risk of, and shall be responsible for, any loss of or damage to Government property provided under this contract upon its delivery to him or upon passage of title thereto to the Government as provided in paragraph (c) hereof, except for reasonable wear and tear and except to the extent that such property is consumed in the performance of this contract.

(h) The Government, and any persons designated by it, shall at all reasonable times have access to the premises wherein any Government property is located, for the purpose of inspecting the Government property.

(i) Upon the completion of this contract, or at such earlier dates as may be fixed by the Contracting Officer, the Contractor shall submit, in a form acceptable to the Contracting Officer, inventory schedules covering all items of Government property not consumed in the performance of this contract (including any resulting scrap) or not theretofore delivered to the Government, and shall prepare for shipment, delivery f.o.b. origin, or dispose of the Government property, as may be directed or

authorized by the Contracting Officer. The net proceeds of any such disposal shall be credited to the contract price or shall be paid in such other manner as the Contracting Officer may direct.

(j) Unless otherwise provided herein, the Government:

(1) May abandon any Government property in place, and thereupon all obligations of the Government regarding such abandoned property shall cease; and

(2) Has no obligation to the Contractor with regard to restoration or rehabilitation of the Contractor's premises, neither in case of abandonment (paragraph (j)(1), above), disposition on completion of need or of the contract (paragraph (i), above), nor otherwise, except for restoration or rehabilitation costs which are properly included in an equitable adjustment under paragraph (b), above.

(k) All communications issued pursuant to this clause shall be in writing.

48. WORK FORCES - WORK PERIODS (ALPI 9-16, Oct 76)

(a) The Contractor shall furnish sufficient forces, construction plant, and equipment, and shall work such hours, including night shifts, overtime

operations and Sunday and holiday work as may be necessary, to insure the prosecution of the work in accordance with the approved progress schedule. Before commencing work, the Contractor shall furnish a program of shifts, hours, and days per week to be worked and the approximate number of persons per shift. The Contractor shall notify the Contracting Officer 48 hours in advance of any change to the program.

(b) If, in the opinion of the Contracting Officer, the Contractor falls behind the progress schedule, the Contractor shall take such steps as may be necessary to improve its progress, and the Contracting Officer may require the Contractor to increase the number of shifts, or overtime operations, days of work, or the amount of construction plant, or all of them, and to submit for approval such supplementary schedules or schedules in chart form as may be deemed necessary to demonstrate the manner in which the agreed rate of progress will be regained, all without additional cost to the Government.

(c) Failure of the Contractor to comply with the requirements of this provision shall be grounds for determination by the Contracting Officer that the Contractor is not prosecuting the work with such diligence as will insure completion of the contract within the time specified (see the clause of the General Provisions entitled "Termination for Default - Damages for Delay - Time Extensions").

49. SCHEDULES, BREAKDOWNS, SUBCONTRACTS, PAYMENT (ALPI 9-16, Oct 76)

(Refer to the clause of the General Provisions entitled "Payments to Contractor.")

(a) Progress Schedule. Within fifteen (15) days after receipt of Notice to Proceed, the Contractor shall submit a progress schedule to the Contracting Officer for his or her approval.

(1) The schedule will be in the form, detail and number prescribed by the Contracting Officer. It will be revised by the Contractor from time to time to reflect all changes in contract work and adjustments in time, money, or both that are approved by the Contracting Officer.

(2) A "Critical Path" type of schedule will be acceptable if accompanied by sufficient information and back-up data to satisfy the Contracting Officer.

(3) The schedule will show the date of the commencement of work on each pertinent phase or item of construction (including interruptions in existing utility service), the percentage of scheduled completion at the end of each week, and the date of completion of each such phase or item of the work. If a Critical Path type schedule is used, the percentage of completion for each phase or item on the schedule will be shown at the end of each week.

(4) The progress schedule will indicate labor, materials and equipment actually incorporated into the work (construction in place). No progress will be indicated for materials and equipment on the site but not incorporated in the work.

(b) Breakdown of Bid. Within fifteen (15) days after receipt of Notice to Proceed, the Contractor shall submit a bid breakdown (in the form, detail and number prescribed by the Contracting Officer), totaling the contract price, to the Contracting Officer for his or her approval.

(1) The breakdown will correspond to the phases or items indicated in the progress schedule showing separate amounts for labor, materials and equipment necessary to complete the work, including quantities and unit prices as requested by the Contracting Officer.

(2) Mobilization, preparatory work, cost of bonds, overhead and profit will be included in each of the several items to which they are applicable and will not be stated as separate items.

(3) The Contracting Officer shall have the right to revise the breakdown submitted, prior to his or her approval, if, in his or her opinion the items indicated do not conform to their true value. The breakdown will be revised at the same time revisions become necessary in the progress schedule.

(c) Subcontracts

(1) Unless otherwise instructed by the Contracting Officer, the Contractor shall submit in writing within fifteen (15) days after receipt of the Notice to Proceed the names of all subcontractors, and lower tier subcontractors involving on-site labor, together with a summary of the extent, character, and dollar amount of the work to be done by each subcontractor. The Contractor shall, upon the request of the Contracting Officer, furnish the Contracting Officer with a copy or copies of all subcontracts for performance of the work under this contract.

(2) Immediately after issuance of the Notice to Proceed, and any time thereafter, the Contracting Officer may request submittal of purchase orders or subcontracts for materials or equipment (including those issued by subcontractors) with priority ratings extended when applicable. The submittal to the Contracting Officer shall be made immediately after the Contractor receives confirmation of the various items. The promised date(s) of shipment, point(s) of delivery, quantity and name of items to be furnished and unit prices will be clearly indicated. The date each purchase order or subcontract is placed will be furnished to the Contracting Officer.

(d) Changes Affecting Delivery

The Contracting Officer will be notified immediately of any changes or circumstances which would affect timely delivery of any item.

(e) Basis for Payment

(1) Progress payments will be computed on a basis of the percentage of completion of the work in place, multiplied by the lump-sum contract price, the percentage of completion representing the ratio of the value of that portion of the work completed to the total price, as determined by the application of prices shown in the approved breakdown of bid.

(2) No payment(s) will be made to the Contractor until the breakdown of bid and the progress schedule have been submitted to and approved by the Contracting Officer.

(f) Fire Protection During Construction-Payment Withholding. Whenever the Technical Provisions require fire protection during construction, the Contracting Officer may withhold payment until the fire protection system is in operation.

50. STORAGE AND WORK AREAS (ALPI 9-16, October 1976)

(a) Warehouse, shop, and office facilities and stockpile areas will be provided by the Contractor at its own expense. If the Contracting Officer designates locations on the site for this purpose, the Contractor may erect structures, install utilities, and establish storage areas as may be necessary to prosecute the work under the contract. All the above structures and facilities shall remain the property of the Contractor and, unless otherwise authorized by the Contracting Officer, shall be removed from the property of the Government at the Contractor's expense upon completion of the work or when directed by the Contracting Officer. Government premises shall be made available for use by the Contractor without cost except as otherwise stated in the Technical Provisions, whenever such use will not interfere with other uses of the Government or its contractors.

(b) Only materials, appliances, and plans to be used for the performance of the contract work may be stored in stockpile areas or in warehouses and shop facilities (whether erected by the Contractor or not) located on Government-controlled land. If the Contractor abandons the performance of the contract work or if the Contractor's right to proceed is terminated pursuant to the clause of General Provisions entitled "Termination for Default - Damages for Delay - Time Extensions," the Contractor shall hold and save the Government and its officers and agents free and harmless from any liability of any nature or kind, arising from the Government's entry into such stockpile areas, warehouses, or shop facilities and from the Government's taking

possession of and utilizing such materials, appliances, and plant in completing the contract work.

(c) All operations of the Contractor, including storage of construction materials and equipment, upon Government premises shall be confined to areas authorized or approved by the Contracting Officer. No unauthorized or unwarranted entry upon or passage through, or storage or disposal of materials shall be made upon Government premises. The Contractor shall hold and save the Government, its officers and agents free and harmless from liability of any nature or kind arising from any use, trespass, or damage occasioned by its operations on premises of third persons.

(d) The Contractor shall, under regulations prescribed by the Contracting Officer, use only established roadways or construct and use such temporary roadways as may be authorized. Where materials are transported in the prosecution of the work, vehicles shall not be loaded beyond the loading capacity recommended by the manufacturer of the vehicles or prescribed by any applicable Federal, state, or local law or regulation. When it is necessary to cross curbings or sidewalks or to operate heavily loaded vehicles on surfaced streets, sidewalks or developed areas, protection against damage shall be provided by the Contractor, and any damaged roads, curbings, sidewalks or developed areas shall be repaired by, or at the expense of the Contractor.

(e) The Contractor shall provide and maintain during the entire period covered by this contract a weather-tight bulletin board approximately 3 feet high by 5 feet long. It shall be mounted in a conspicuous place, as approved by the Contracting Officer, accessible to all employees of the Contractor and subcontractors. The bulletin board will remain the property of the Contractor. All Government posters or notices, the contract Davis-Bacon wage rate decision, contractor safety programs, and any publications in the interest of workmen shall be displayed.

51. UTILITIES

(a) For utilities to be used by the Contractor in performance of the construction work:

(1) Supplying of Water, Gas and Electricity: If available, water, gas and electricity shall be furnished by the Government to the Contractor without charge. The Government, in its sole discretion, shall determine availability. If the Government determines that these utilities, or any of them, are not available, or, if the Government initially furnishes these utilities, then discontinues furnishing these utilities, the Contractor will furnish its own utilities as it requires without cost to the Government or liability of the Government for discontinuation of service.

(2) Temporary Connections: All temporary connections between Contractor's facilities and existing utilities systems will be made at the Contractor's expense by the Government Maintenance Contractor (The Zia Company). Such connections shall be made only at locations approved by the Government and only when Contractor's facilities have the approval of the Government. Application for connection services shall be made sufficiently in advance to permit performance by the time the utilities are required. Applications will be made at The Zia Company, Fiscal Division, during regular working hours. The Zia Company will perform disconnect services upon completion of the work or upon earlier notice from the Contractor that it no longer has need for the connections. Disconnect shall be made at no cost to the Contractor.

(3) The current "Utility & Services Rules & Regulations" of the Government Maintenance Contractor (The Zia Company) shall govern. These rules and regulations are on file at The Zia Company, Fiscal Division, Los Alamos, New Mexico.

(4) Temporary Lighting, Heating and Ventilation: The Contractor shall be responsible for furnishing and maintaining adequate facilities, approved by the Contracting Officer, for temporary lighting, heating and ventilation, as required in all areas during all processes of work. Minimum temperatures as specified in various technical sections shall be maintained, and lighting and ventilation shall be maintained at levels high enough to afford safety to personnel and to provide suitable environment in which requirements of specifications can be accomplished.

DELETE

(5) Telephone: All telephones required by the Contractor shall be furnished at the Contractor's own expense.

(b) For utilities to be installed by the Contractor as a part of the facility being constructed, all permanent connections into existing utility systems will be made by The Zia Company at no expense to the Contractor; provided, however, that all incidental work, including but not limited to the excavation and backfilling, will be provided by the Contractor in accordance with the applicable provisions of the specifications.

DELETE

(c) The Contractor, upon completion of its work or when directed by the Contracting Officer, shall immediately replace or relocate and install as directed all presently existing safety, security, utility and similar markers and signs affected by construction. All damaged signs shall be replaced by the Government at the Contractor's expense.

(d) Certain portions of the work may require interruptions to utility services. No outage will be permitted without prior consent of the Contracting Officer. All outages shall be held to a minimum in number and duration. Specific requirements shall be set forth in Section 01507 of the Technical Provisions. All utility tie-in costs and premium time shall be included in the total contract price.

(e) The Contractor will provide at its own expense a cross connection control filling device for water loading stations similar to that shown in the LASL Sketch No. 6737 (see next page). Failure of the Contractor to provide such a device or to supervise its use properly will constitute grounds for discontinuance of water service.

52. CLEANUP, SALVAGE AND DISPOSAL OF WASTE MATERIALS (ALPI 9-16, October 76)

(a) The Contractor shall at all times keep the work site, including storage areas used by the Contractor, free from accumulations of waste material, slush, trash or rubbish, and prior to completion of work remove any such accumulation from and about the premises, and from and about all tools, scaffolding, equipment, and construction. Upon completion of contract work the Contractor shall leave the work and premises in a condition satisfactory to the Contracting Officer.

(b) Salvaged materials shall be handled as provided in the Technical Provisions.

(c) The Contractor shall be responsible for the removal and disposal of all scrap and waste materials at no additional cost to the Government. The Government, subject to availability thereof, may provide a dumping ground for scrap and waste materials.

Burning of waste material is not permitted.

53. EXISTING INSTALLATION PROTECTION AND REPAIR (ALPI 9-16, Oct 76)

(a) Existing Installation Protection. The Contractor shall be responsible for any damage to existing installations (such as structures and underground utilities) which are indicated in the specifications or drawings (or the existence of which the Contractor knew or should have known) that occurs as a result of the fault or negligence of the Contractor or its subcontractors in the performance of this contract. If the Contracting Officer determines that installations, materials, equipment, supplies, and work performed are not adequately

protected by the Contractor, necessary protective action may be taken by the Contracting Officer, and the cost thereof will be charged to the Contractor.

(b) Existing Installation Repair.

(1) Existing installations which are damaged as a result of the fault or negligence of the Contractor or its subcontractors shall be repaired by the Contractor as directed by the Contracting Officer without cost to the Government.

(2) Existing installations which are damaged by the Contractor or its subcontractors without fault or negligence on the part of either shall be repaired by the Contractor if and as directed by the Contracting Officer, and such directions by the Contracting Officer shall be deemed a change order within the meaning of the clause of the General Provisions entitled "Changes."

54. WARRANTIES (ALPI 9-16, Oct 76)

(a) The Contractor warrants all work covered by this contract (including all machinery and equipment, parts and assemblies thereof) against failure caused by omissions of materials, defective materials or poor workmanship, or improper workmanship for a period of one year from the date of acceptance of the completed work. All roofing and flashing work specified herein shall be warranted for a period of two years. The Contractor's warranty with respect to work repaired or replaced hereunder shall run for one year from the date of such repair or replacement. The Contractor shall obtain for the benefit of the Government any warranties and guarantees obtainable from manufacturers, sellers or subcontractors.

(b) Upon completion of the construction, the Contractor shall deliver to the Contracting Officer, in duplicate, copies of manufacturers' catalog information data covering all fixtures and equipment installed. This information shall be supplied in a bound file for each building or structure, with the location of each item noted. The manufacturers'

catalog data shall include full identification of the equipment or fixture, capacities, current characteristics, dimensions and identification of replacement parts. Operating instructions for installed equipment shall be furnished and conspicuously mounted by the Contractor at places designated.

55. TESTING (ALPI 9-16, Oct 76)

(a) Unless specifically stated to the contrary, all testing performed under this contract will be paid for by the contractor and performed by the Contractor or, where testing by a testing organization is called for or required, by an organization approved by the Contracting Officer. Unless waived in writing by the Contracting Officer, all such tests shall be made in the presence of the Contracting Officer. When such presence is so waived, sworn statements, in triplicate, of the tests made and the results thereof shall be furnished to the Contracting Officer as soon as possible after the tests are made.

(b) TESTS OF PRESSURE VESSELS

(1) Prior to installation and acceptance by the Government, any power-boiler, low-pressure heating boiler, or unfired pressure vessel operated at a pressure of 15 pounds per square inch or greater, furnished under this contract, shall be stamped with an ASME Boiler and Pressure Vessel Code Symbol and a National Board of Boiler and Pressure Vessel Inspector's number, thus certifying that all necessary tests have been performed. Manufacturer's data reports (unless exempted by the ASME Code) shall be filed with the National Board in Columbus, Ohio. Three copies of these data reports and National Board certificate shall be submitted to the Contracting Officer.

(2) Any boilers or pressure vessels operated at pressures stated above, utilized by the Contractor in its performance of the work, shall be similarly tested and certified before

being brought on the project and annually thereafter so long as they are used on the project site.

(c) If it is provided in the Technical Provisions that a test is to be performed at Government expense, the same shall be performed by the Government or by an organization selected by the Government. If it is provided in the Technical Provisions that a test is to be performed by an organization selected by the Government, the cost of such test will be borne by the Government unless a contrary intent is stated. Costs of any test which reveal that contract requirements have not been met will be paid by the Contractor and not the Government.

(d) The Contractor shall cooperate with the Government and any testing organization selected by the Government in the preparation for any performance of any test to be conducted by the Government or any testing organization selected by the Government.

(e) In addition to the foregoing, the Contractor shall perform such additional type and number of tests as may be necessary at the Contractor's own expense to insure control of the work and workmanship.

56. BASE LINES AND GRADES

The Contractor shall lay out his work from base lines and grades established by the Government and shall be responsible for all measurements in connection therewith. The Contractor will be held responsible for the proper execution of the work to such lines and grades and all stakes or other marks thus established shall be preserved by the Contractor until their removal is authorized by the Contracting Officer.

57. PRESERVATION OF EXISTING VEGETATION

(a) The Contractor shall preserve and protect all existing vegetation such as trees, shrubs, and grass on or adjacent to the site which do not reasonably interfere with construction as may be determined by the Contracting Officer. The Contractor shall be responsible for all unauthorized cutting or damaging of trees and shrubs including damage due to careless or negligent operation of equipment, stockpiling of materials, or tracking of grass areas by equipment.

(b) Care shall be taken by the Contractor in felling trees authorized for removal to avoid any unnecessary damage to vegetation that is to remain in place. Any limbs or branches of trees broken during such operation shall be trimmed with a clean cut and painted with an approved tree pruning compound. The Contractor shall be liable for or may be required to replace or restore at his own expense all vegetation that may be destroyed or damaged, which has not been protected or preserved as required herein.

(c) Prior to initiation of construction operations, trees to be preserved shall be protected by banding with 1" x 3" staves set vertically and fastened together around the trees' trunks with #12 AWG soft annealed galvanized wire. Banding shall be braided and stapled to staves in such a manner that staves are spaced approximately 1" apart. Banding shall occur at approximately 2'-0" intervals. Staves shall extend to a height not less than 6'-0" from the base of the trees. The protectors shall remain on all trees until construction is completed and then removed by the Contractor. Any staves damaged by the Contractor during construction shall be promptly replaced in a manner satisfactory to the Contracting Officer.

(d) In no case shall trees to be preserved be used as anchors for hoists, bracing or shoring during construction.

58. FIRE PROTECTION SYSTEM

(Paragraph (a) of this clause shall be deleted when clause 18 of the Supplement to SF-22 is included in the contract.)

(a) The fire protection system shall be furnished and installed by a fire sprinkler company which (1) is recognized in the fire sprinkler design and installation industry as regularly engaged in that industry; (2) has during the last five years designed and installed loop and grid systems, such as specified in the Technical Provisions, and which were designed for, and installed in, buildings, of a size similar to those described in the Technical Provisions in compliance with NFPA Codes 13 and 24;

and (3) has the capability to identify additional system requirements or changes if required because of unforeseen field conditions or design deficiencies. No subcontract for any of the work described in the specifications or drawings shall be awarded without the prior written approval of the Contracting Officer.

DELETE

(b) The Contractor must insure that the installation of all sprinkler piping and sprinkler heads are coordinated with the installation of ceiling or roof materials, overhead lighting, ductwork, piping and suspended equipment to provide an installation in complete compliance with the appropriate NFPA Codes, particularly NFPA 13.

DELETE

(c) The Contractor shall complete and submit to the Contracting Officer immediately after completion of all tests on underground waterlines and automatic sprinkler systems one original copy of Form ALL-27, entitled "Contractor's Certificate Covering Materials and Tests." Form ALL-27 is included as Appendix A of the Technical Provisions of these specifications.

DELETE

59. VALUE ENGINEERING INCENTIVE

(This clause is applicable to all contracts in excess of $10,000 unless deleted in the Technical Provisions.)

(a) Intent and Objectives. This clause applies to any cost reduction proposal (hereinafter referred to as a Value Engineering Change Proposal or VECP) initiated and developed by the Contractor for the purpose of changing any requirement of this contract. This clause does not, however, apply to any such proposal unless it is identified by the Contractor, at the time of its submission to the Government, as a proposal submitted pursuant to this clause.

(1) VECP's contemplated are those that would result in net savings to the Government by providing either: (i) a decrease in the cost of performance of this contract, or (ii) a reduction in the cost of ownership (hereinafter referred to as collateral costs)

of the work provided by this contract, regardless of acquisition costs. VECP's must result in savings without imparing any required functions and characteristics such as service life, reliability, economy of operation, ease of maintenance, standardized features, esthetics, fire protection features and safety features presently required by this contract. However, nothing herein precludes the submittal of VECP's where the Contractor considers that the required functions and characteristics could be combined, reduced or eliminated as being nonessential or excessive for the function served by the work involved.

(2) A VECP identical to one submitted under any other contract with the Contractor or another Contractor may also be submitted under this contract.

(3) A proposal to decrease the cost of performing the contract solely or principally by substituting another subcontractor for one listed by the Contractor in its bid is not a VECP. In considering a VECP which, as an incident thereof, would entail substitution for a listed subcontractor, maintaining the objective of the subcontractor listing will be taken into account along with factors cited in paragraph (a)(1) of this clause.

(b) Subcontractor Inclusion. The Contractor shall include the provisions of this clause, with a provision for sharing arrangements that meet or exceed the minimum percentage contained herein, in all first-tier subcontracts in excess of $25,000, and in any other subcontract which, in the judgment of the Contractor, is of such nature as to offer reasonable likelihood of value engineering cost reductions. At the option of the first-tier subcontractor, this clause may be included in lower-tier subcontracts. The Contractor shall encourage submission of VECP's from subcontractors; however, it is not mandatory that VECP's be submitted nor is it mandatory that the Contractor accept and/or transmit to the Government VECP's proposed by its subcontractors.

(c) Data Requirements. As a minimum, the following information shall be submitted by the Contractor with each VECP:

(1) A description of the difference between the existing contract requirement and the proposed change, and the comparative advantages and disadvantages of each; including justification where function or characteristic of a work item is being reduced.

(2) Separate detailed cost estimates for both the existing contract requirement and the proposed change, and an estimate of the change in contract price including consideration of the costs of development and implementation of the VECP and the sharing arrangement set forth in this clause.

(3) An estimate of the effects the VECP would have on collateral costs to the Government, including an estimate of the sharing that the Contractor requests be paid by the Government upon approval of the VECP.

(4) Architectural, engineeering or other analysis in sufficient detail to identify and describe each requirement of the contract which must be changed if the VECP is accepted, with the recommendation as to how to accomplish each such change and its effect on unchanged work.

(5) A statement of the time by which approval of the VECP must be issued by the Government to obtain the maximum cost reduction during the remainder of this contract, noting any effect on the contract completion time or delivery schedule.

(6) Identification of any previous submission of the VECP including the dates submitted, the agencies involved, the numbers of the Government contracts involved, and the previous actions by the Government, if known.

(d) Processing Procedures. Six copies (or such other number of copies as may be specified by the Contracting Officer) of each VECP shall be submitted to the Contracting Officer, or his duly authorized representative. VECP's will be processed expeditiously; however, the Government will not be liable for any delay in acting upon a VECP submitted pursuant to this clause. The Contractor may withdraw, in whole or in part, any VECP at any time prior to acceptance by the Government. The Government shall not be liable for VECP development cost in the case where a VECP is rejected or withdrawn. The decision of the Contracting Officer as to the acceptance of a VECP under this contract shall be final and shall not be subject to the "Disputes" clause of this contract.

(1) The Contracting Officer may modify a VECP, with the concurrence of the Contractor, to make it acceptable. If any modification increases or decreases the savings resulting from the VECP, the Contractor's fair share will be determined on the basis of the VECP as modified.

(2) The Contracting Officer may accept, in whole or in part, a VECP submitted pursuant to this clause by giving the Contractor written notice thereof reciting acceptance under this clause. However, pending issuance of a formal change order or unless otherwise directed, the Contractor shall remain obligated to perform in accordance with the terms of the existing contract. Where the Contracting Officer has determined that a proposed change meets the submission requirmenets of this clause, he may accept the VECP and instruct the Contractor to proceed with the change even though an agreement has not been reached respecting costs savings and other results of the change.

(3) An approved VECP shall be finalized through an equitable adjustment in the contract price and time of performance by the issuance of a change order pursuant to the provisions of this clause bearing a notation so stating. Where an approved VECP also involves any other

applicable clause of this contract such as "Termination for Convenience of the Government," "Suspension of Work," "Changes," or "Differing Site Conditions" then that clause shall be cited in addition to this clause.

(e) Computations for Change in Contract Cost of Performance. Separate estimates shall be prepared for both the existing contract requirement and the proposed change. Each estimate shall consist of the Contractor and all subcontractors' work in sufficient detail to show unit quantities and costs of labor, material, and equipment.

(1) Contractor development and implementation costs for the VECP shall be included in the estimate for the proposed change. However, these costs will not be allowable if they are otherwise reimbursable as a direct charge under this contract.

(2) Government costs of processing or implementation of a VECP shall not be included in the estimate; however such cost will be considered in the determination as to whether a net savings accures to the Government (reference paragraph (a)(1) of this clause).

(3) If the difference in the estimates indicates a net reduction in contract price, no allowance will be made for overhead, profit and bond. The resultant net reduction in contract cost of performance shall be shared in accordance with the provisions of paragraphs (g)(1) or (g)(2) of this clause; and the contract price shall be reduced by the Government's share of the savings.

(4) If the difference in the estimates indicates a net increase in contract price, the contract price shall be adjusted pursuant to the "Changes" clause of this contract, and the resulting contract modification shall also cite this clause, as provided by paragraph (d)(3) of this clause.

(f) Computations for Collateral Costs. Separate estimates shall be prepared for collateral costs of both the existing contract requirement and the proposed change. Each estimate shall consist of an itemized breakdown of all costs and the basis for the data used in the estimate. Cost benefits to the Government include, but are not limited to: reduced costs of operation, maintenance or repair, extended useful service life, increases in usable floor space, and reduction in the requirements for Government furnished property. Increased collateral costs include the converse of such factors. Computation shall be as follows:

(1) Costs shall be calculated over a 20-year period on a uniform basis for each estimate and shall include Government costs of processing or implementing the VECP.

(2) If the difference in the estimates as approved by the Government indicate a savings, the Contractor shall divide the resultant amount by 20 to arrive at the average annual net collateral savings. The resultant savings shall be shared in accordance with the provisions of paragraph (g)(3) of the clause; and the contract price shall be increased by the Contractor's share of the savings.

(3) In the event that agreement cannot be reached on the amount of estimated collateral costs, the Contracting Officer shall determine the amount. The Contracting Officer's decision is final and is not subject to the provisions of the "Disputes" clause of this contract.

(g) Sharing Arrangements. If a VECP is accepted by the Government, the Contractor is entitled to share in instant contract savings and collateral savings not as alternatives, but rather to the full extent provided for in this clause. For the purpose of sharing under this clause, the term "instant contract" shall not include any changes to or other modifications of this contract, executed subsequent to acceptance of the particular VECP, by which the Government increases the quantity of any item of work or adds any item of work. It shall, however,

include any extension of the instant contract through exercise of an option (if any) provided under this contract after acceptance of the VECP.

(1) When only the prime Contractor is involved, it shall receive 50 percent and the Government 50 percent of the net reduction in the cost of performance of this contract.

(2) When a first-tier subcontractor is involved, it shall receive a minimum of 30 percent, the prime Contractor a maximum of 30 percent, and the Government a fixed 40 percent of the net reduction in the cost of performance of this contract. Other subcontractors shall receive a portion of the first-tier subcontractor savings in accordance with the terms of their contracts with the first-tier subcontractor.

(3) When collateral savings occur, the Contractor shall receive 20 percent of the average one year's net collateral savings. Subsequent participation (to any tier) in such savings with the Contractor shall be as provided in the terms of the agreements of the contracting parties.

(4) The Contractor shall not receive instant savings or collateral savings shares on optional work listed in this contract until the Government exercises its option to obtain that work.

(h) Data Restriction Rights. The Contractor may restrict the Government's right to use any sheet of a VECP, or of the supporting data, submitted pursuant to this clause, in accordance with the terms of the following legend if it is marked on each such sheet:

(1) The data furnished pursuant to the Value Engineering Incentive clause of this contract shall not be disclosed outside the Government, or duplicated, used, or disclosed in whole or in part, for any purpose other than to evaluate a VECP submitted under said clause. This restriction does not limit the

Government's right to use information contained in this data if it is or has been obtained, or is otherwise available, from the Contractor or from another source, without limitations. If such a proposal is accepted by the Government under said contract after the use of this data in such an evaluation, the Government shall have the right to duplicate, use, and disclose any data reasonably necessary to the full utilization of such proposal as accepted, in any manner and for any purpose whatsoever, and have others so do.

(2) In the event of acceptance of a VECP, the Contractor hereby grants to the Government all rights to use, duplicate or disclose, in whole or in part, in any manner and for any purpose whatsoever, and to have or to permit others to do so, data reasonably necessary to fully utilize such proposal on this and any other Government contract.

60. UTILIZATION OF SMALL BUSINESS CONCERNS AND SMALL BUSINESS CONCERNS OWNED AND CONTROLLED BY SOCIALLY AND ECONOMICALLY DISADVANTAGED INDIVIDUALS (FPR Temporary Regulation No. 50, July 1979)

(a) It is the policy of the United States that small business concerns and small business concerns owned and controlled by socially and economically disadvantaged individuals shall have the maximum practicable opportunity to participate in the performance of contracts let by any Federal Agency.

(b) The contractor hereby agrees to carry out this policy in the awarding of subcontracts to the fullest extent consistent with the efficient performance of this contract. The contractor further agrees to cooperate in any studies or surveys that may be conducted by the Small Business Administration or the contracting agency which may be necessary to determine the extent of the contractor's compliance with this clause.

(c) (1) The term "small business concern" shall mean a small business as defined pursuant to Section 3 of the Small Business Act and in relevant regulations promulgated pursuant thereto (See 13 CFR Part 121).

(2) The term "small business concern owned and controlled by socially and economically disadvantaged individuals" shall mean a small business concern --

(i) which is at least 51 per centum owned by one or more socially and economically disadvantaged individuals; or in the case of any publicly owned business, at least 51 per centum of the stock of which is owned by one or more socially and economically disadvantaged individuals; and

(ii) whose management and daily business operations are controlled by one or more of such individuals.

The contractor shall presume that socially and economically disadvantaged individuals include Black Americans, Hispanic Americans, Native Americans, and other minorities, or any other individual found to be disadvantaged by the Small Business Administration pursuant to Section 8(a) of the Small Business Act.

(d) Contractors acting in good faith may rely on written representations by their subcontractors as either a small business concern or a small business concern owned and controlled by socially and economically disadvantaged individuals.

61. NOTICE AND ASSISTANCE REGARDING PATENT AND COPYRIGHT INFRINGEMENT (DOE PR 9-7.602-51, JUNE 1979)

The provisions of this clause shall be applicable only if the amount of this contract exceeds $10,000.

(a) The Contractor shall report to the Contracting Officer, promptly and in reasonable written detail, each notice or claim of patent or copyright infringement based on the performance of this contract of which the Contractor has knowledge.

(b) In the event of any claim or suit against the Government on account of any alleged patent or copyright infringement arising out of the performance of this

contract or out of the use of any supplies furnished or work or services performed hereunder, the Contractor shall furnish to the Government when requested by the Contracting Officer, all evidence and information in possession of the Contractor pertaining to such suit or claim. Such evidence and information shall be furnished at the expense of the Government except where the Contractor has agreed to indemnify the Government.

(c) This clause shall be included in all subcontracts.

LABOR STANDARDS PROVISIONS

APPLICABLE TO CONTRACTS IN EXCESS OF $2,000

1. DAVIS-BACON ACT (40 U.S.C. 276a–276a–7)

(a) All mechanics and laborers, including apprentices and trainees, employed or working directly upon the site of the work shall be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by the Copeland Regulations, 29 CFR Part 3), the full amounts due at time of payment computed at wage rates not less than the aggregate of the basic hourly rates and the rates of payments, contributions, or costs for any fringe benefits contained in the wage determination decision of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the Contractor or subcontractor and such laborers and mechanics. A copy of such wage determination decision shall be kept posted by the Contractor at the site of the work in a prominent place where it can be easily seen by the workers.

(b) The Contractor may discharge his obligation under this clause to workers in any classification for which the wage determination decision contains:

(1) Only a basic hourly rate of pay, by making payment at not less than such basic hourly rate, except as otherwise provided in the Copeland Regulations (29 CFR Part 3); or

(2) Both a basic hourly rate of pay and fringe benefits payments, by making payment in cash, by irrevocably making contributions pursuant to a fund, plan, or program for, and/or by assuming an enforceable commitment to bear the cost of, bona fide fringe benefits contemplated by the Davis-Bacon Act, or by any combination thereof. Contributions made, or costs assumed, on other than a weekly basis shall be considered as having been constructively made or assumed during a weekly period to the extent that they apply to such period. Where a fringe benefit is expressed in a wage determination in any manner other than as an hourly rate and the Contractor pays a cash equivalent or provides an alternative fringe benefit, he shall furnish information with his payrolls showing how he determined that the cost incurred to make the cash payment or to provide the alternative fringe benefit is equal to the cost of the wage determination fringe benefit. In any case where the Contractor provides a fringe benefit different from any contained in the wage determination, he shall similarly show how he arrived at the hourly rate shown therefor. In the event of disagreement between or among the interested parties as to an equivalent of any fringe benefit, the Contracting Officer shall submit the question, together with his recommendation, to the Secretary of Labor for final determination.

(c) The assumption of an enforceable commitment to bear the cost of fringe benefits, or the provision of any fringe benefits not expressly listed in section 1(b)(2) of the Davis-Bacon Act or in the wage determination decision forming a part of the contract, may be considered as payment of wages only with the approval of the Secretary of Labor pursuant to a written request by the Contractor. The Secretary of Labor may require the Contractor to set aside assets, in a separate account, to meet his obligations under any unfunded plan or program.

(d) The Contracting Officer shall require that any class of laborers or mechanics, including apprentices and trainees, which is not listed in the wage determination decision and which is to be employed under the contract shall be classified or reclassified conformably to the wage determination decision, and shall report the action taken to the Secretary of Labor. If the interested parties cannot agree on the proper classification or reclassification of a particular class of laborers or mechanics to be used, the Contracting Officer shall submit the question, together with his recommendation, to the Secretary of Labor for final determination. Apprentices and trainees may be added under this clause only where they are employed pursuant to an apprenticeship or trainee program meeting the requirements of the Apprentices and Trainees clause below.

(e) In the event it is found by the Contracting Officer that any laborer or mechanic, including apprentices and trainees, employed by the Contractor or any subcontractor directly on the site of the work covered by this contract has been or is being paid at a rate of wages less than the rate of wages required by paragraph (a) of this clause, the Contracting Officer may (1) by written notice to the Government Prime Contractor terminate his right to proceed with the work, or such part of the work as to which there has been a failure to pay said required wages, and (2) prosecute the work to completion by contract or otherwise, whereupon such Contractor and Subcontractor and his sureties shall be liable to the Government for any excess costs occasioned the Government thereby.

(f) Paragraphs (a) through (e) of the clause shall apply to this contract to the extent that it is (1) a prime contract with the Government subject to the Davis-Bacon Act, or (2) a subcontract also subject to the Davis-Bacon Act under such prime contract.

2. CONTRACT WORK HOURS AND SAFETY STANDARDS ACT—OVERTIME COMPENSATION (40 U.S.C. 327–333).

This contract is subject to the Contract Work Hours and Safety Standards Act and to the applicable rules, regulations, and interpretations of the Secretary of Labor.

(a) The Contractor shall not require or permit any laborer or mechanic, including apprentices, trainees, watchmen, and guards, in any workweek in which he is employed on any work under this contract to work in excess of 8 hours in any calendar day or in excess of 40 hours in such workweek on work subject to the provisions of the Contract Work Hours and Safety Standards Act unless such laborer or mechanic, including apprentices, trainees, watchmen, and guards, receives compensation at a rate not less than 1½ times his basic rate of pay for all such hours worked in excess of 8 hours in any calendar day or in excess of 40 hours in such workweek, whichever is the greater number of overtime hours. The "basic rate of pay," as used in this clause, shall be the amount paid per hour exclusive of the Contractor's contribution or cost for fringe benefits, and any cash payment made in lieu of providing fringe benefits, or the basic hourly rate contained in the wage determination, whichever is greater.

(b) In the event of any violation of the provisions of paragraph (a), the Contractor shall be liable to any affected employee for any amounts due, and to the United States for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including an apprentice, trainee, watchman, or guard, employed in violation of the provisions of paragraph (a) in the sum of $10 for each calendar day on which such employee was required or permitted to be employed on such work in excess of 8 hours or in excess of the standard workweek of 40 hours without payment of the overtime wages required by paragraph (a).

3. APPRENTICES AND TRAINEES

DELETED

(a) Apprentices shall be permitted to work as such only when they are registered individually under a bona fide apprenticeship program registered with a State apprenticeship agency which is recognized by the Bureau of Apprenticeship and Training, U.S. Department of Labor; or if no such recognized agency exists in a State, under a program registered with the aforesaid Bureau of Apprenticeship and Training. The allowable ratio of apprentices to journeymen in any craft classification shall not be greater than the ratio permitted to the Contractor as to his entire work force under the registered program. Any employee listed on a payroll at an apprentice wage rate who is not a trainee as defined in paragraph (b) of this clause, and who is not registered as above, shall be paid the wage rate determined by the Secretary of Labor for the classification of work he actually performed. The Contractor shall furnish to the Contracting Officer written evidence of the registration of his program and apprentices, as well as of the appropriate ratios allowed and the wage rates required to be paid thereunder for the area of construction, prior to using any apprentices in the contract work. The term "apprentice" means (1) a person employed and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Bureau of Apprenticeship and Training, or with a State apprenticeship agency recognized by the Bureau, or (2) a person in his first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Bureau of Apprenticeship and Training, or a State Apprenticeship Council (where appropriate) to be eligible for probationary employment as an apprentice.

DELETED

(b) Trainees shall be permitted to work as such when they are bona fide trainees employed pursuant to a program approved by the U.S. Department of Labor, Manpower Administration, Bureau of Apprenticeship and Training. The term "trainee" means a person receiving on-the-job training in a construction occupation under a program which is approved (but not necessarily sponsored) by the U.S. Department of Labor, Manpower Administration, Bureau of Apprenticeship and Training, and which is reviewed from time to time by the Manpower Administration to insure that the training meets adequate standards.

DELETED

(c) In connection with contracts in excess of $10,000, the Contractor agrees as follows:

(1) The Contractor shall make a diligent effort to hire for performance of work under this contract a number of apprentices or trainees, or both, in each craft classification which bears to the average number of the journeymen in that occupation to be employed in the performance of the contract the applicable ratio as set forth in paragraph (c)(7) of this clause.

DELETED

(2) The Contractor shall insure that 25 percent of such apprentices or trainees in each occupation shall be in their first year of training, where feasible. Each bid shall be based on consideration of (i) the availability of training opportunities for first year apprentices, (ii) the hazardous nature of the work for beginning workers, and (iii) excessive unemployment of apprentices in their second and subsequent years of training.

DELETED

(3) The Contractor shall, during the performance of the contract, to the greatest extent possible, employ the number of apprentices or trainees necessary to meet currently the requirements of paragraph (c)(1) and (c)(2) of this clause.

DELETED

(4) The Contractor shall maintain records of employment on this contract by trade of the number of apprentices and trainees, apprentices and trainees in first year of training, and of journeymen, and wages paid and hours worked of such apprentices, trainees, and journeymen. In addition, the Contractor who claims compliance based on the criterion set forth in [illegible] paragraph (c)(6)(iii) of this clause shall maintain such records of employment on all his construction work in the same labor market area, both public and private, during the performance of this contract. In each of the above cases the Contractor shall make such records available for inspection upon request of the Department of Labor or the Contracting Officer.

DELETED

(5) The Contractor shall supply one copy of each of the written notices required by paragraph (c)(6)(iii) of this clause at the request of the Contracting Officer. The Contractor also agrees to supply at [illegible] intervals during the performance of the contract and after completion of the contract performance a statement describing steps taken toward making a diligent effort and containing a breakdown by craft, of hours worked and wages paid for first year apprentices and trainees, other apprentices and trainees, and journeymen. One copy of the statement will be sent to the Contracting Officer and one copy to the Secretary of Labor.

DELETED

(6) The Contractor will be deemed to have made a "diligent effort" as required by paragraph (c)(2) if during the performance of this contract, he achieves one of the following three objectives: (i) The Contractor employs under this contract a number of apprentices and trainees by craft or craft classification at least equal to the ratios established in accordance with paragraph (c)(7) of this clause, or (ii) the Contractor employs, on all his construction work, both public and private, in the same labor

STANDARD FORM 19–A
NOVEMBER 1972 EDITION
GENERAL SERVICES ADMINISTRATION
FPR (41 CFR) 1–16.401

market area, an average number of apprentices and trainees by craft at least equal to the ratios established in accordance with paragraph (c)(7) of this clause, or (iii) the Contractor (A) if covered by a collective bargaining agreement, before commencement of any work on the project, has given written notice to all joint apprenticeship committees, the local U.S. Employment Security Office, local chapter of the Urban League, Workers Defense League, or other local organizations concerned with minority employment, and the Bureau of Apprenticeship and Training Representative, U.S. Department of Labor, for the locality of the work; (B) if not covered by a collective bargaining agreement, has given written notice to all of the groups stated in (A) except joint apprenticeship committees, and will in addition notify all apprenticeship sponsors in the labor market area; (C) has employed all qualified applicants referred to him through normal channels (such as the Employment Service, the Joint Apprenticeship Committees and where applicable, minority organizations and apprentice outreach programs who have been delegated this function) at least up to the number of such apprentices and trainees required by paragraph (c)(7) of this clause. The notice, as referred to herein, will include at least the Contractor's name and address, the agency designation, the contract number, job site address, value of the contract, expected starting and completion dates, the estimated average number of employees in each occupation to be employed over the duration of the contract work, and a statement of his willingness to employ a number of apprentices and trainees at least equal to the ratios established in accordance with paragraph (c)(7) of this clause.

(7) The Contractor recognizes that the Secretary of Labor has determined that the applicable ratios of apprentices and trainees to journeymen in any occupation for the purpose of this clause shall be as follows: (i) In any occupation the applicable ratio of apprentices and trainees to journeymen shall be as high as the predominant ratio for the occupation in the area where the construction is being undertaken, set forth in collective bargaining agreements, and available through the Bureau of Apprenticeship and Training Representative, U.S. Department of Labor, for the applicable area; (ii) for any occupation for which no ratio is found, the ratio of apprentices and trainees to journeymen shall be determined by the Contractor in accordance with the recommendations set forth in the Standards of the National Joint Apprentice Committee for the occupation, which are on file at offices of the U.S. Department of Labor's Bureau of Apprenticeship and Training; and (iii) for any occupation for which no such recommendations are found, the ratio of apprentices and trainees to journeymen shall be at least one apprentice or trainee for every five journeymen.

4. PAYROLLS AND BASIC RECORDS

(a) The Contractor shall maintain payrolls and basic records relating thereto during the course of the work and shall preserve them for a period of 3 years thereafter for all laborers and mechanics, including apprentices, trainees, watchmen, and guards working at the site of the work. Such records shall contain the name and address of each such employee, his correct classification, rate of pay (including rates of contributions for, or costs assumed to provide, fringe benefits), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Contractor has obtained approval from the Secretary of Labor as provided in paragraph (c) the clause entitled "Davis-Bacon Act," he shall maintain records which show the commitment, its approval, written communication of the plan or program to the laborers or mechanics affected, and the costs anticipated or incurred under the plan or program.

(b) The Contractor shall furnish weekly a copy of all payrolls to the Contracting Officer. The Government Prime Contractor shall be responsible for the submission of copies of payrolls of all subcontractors. The copy shall be accompanied by a statement signed by the Contractor indicating that the payrolls are correct and complete, that the wage rates contained therein are not less than those determined by the Secretary of Labor, and that the classifications set forth for each laborer or mechanic, including apprentices and trainees, conform with the work he performed. Submission of the "Weekly Statement of Compliance" required under this contract and the Copeland Regulations of the Secretary of Labor (29 CFR Part 3) shall satisfy the requirement for submission of the above statement. The Contractor shall submit also a copy of any approval by the Secretary of Labor with respect to fringe benefits which is required by paragraph (c) of the clause entitled "Davis-Bacon Act."

(c) The Contractor shall make the records required under this clause available for inspection by authorized representatives of the Contracting Officer and the Department of Labor, and shall permit such representatives to interview employees during working hours on the job.

5. COMPLIANCE WITH COPELAND REGULATIONS

The Contractor shall comply with the Copeland Regulations of the Secretary of Labor (29 CFR Part 3) which are incorporated herein by reference.

6. WITHHOLDING OF FUNDS

(a) The Contracting Officer may withhold or cause to be withheld from the Government Prime Contractor so much of the accrued payments or advances as may be considered necessary (1) to pay laborers and mechanics, including apprentices, trainees, watchmen, and guards employed by the Contractor or any subcontractor on the work the full amount of wages required by the contract, and (2) to satisfy any liability of any Contractor and Subcontractor for liquidated damages under paragraph (b) of the clause entitled "Contract Work Hours and Safety Standards Act—Overtime Compensation."

(b) If any Contractor or subcontractor fails to pay any laborer, mechanic, apprentice, trainee, watchman, or guard employed or working on the site of work, all or part of the wages required by the contract, the Contracting Officer may, after written notice to the Government Prime Contractor, take such action as may be necessary to cause suspension of any further payments or advances until such violations have ceased.

7. SUBCONTRACTS

The Contractor agrees to insert the clauses hereof entitled "Davis-Bacon Act," "Contract Work Hours and Safety Standards Act—Overtime Compensation," "Apprentices and Trainees," "Payrolls and Basic Records," "Compliance with Copeland Regulations," "Withholding of Funds," "Subcontracts," and "Contract Termination—Debarment" in all subcontracts. The term "Contractor" as used in such clauses in any subcontract shall be deemed to refer to the subcontractor except in the phrase "Government Prime Contractor."

8. CONTRACT TERMINATION—DEBARMENT

A breach of the clauses hereof entitled "Davis-Bacon Act," "Contract Work Hours and Safety Standards Act—Overtime Compensation," "Apprentices and Trainees," "Payrolls and Basic Records," "Compliance with Copeland Regulations," "Withholding of Funds," and "Subcontracts" may be grounds for termination of the contract, and for debarment as provided in 29 CFR 5.6.

9. DISPUTES CONCERNING LABOR STANDARDS

Disputes arising out of the labor standards provisions of this contract shall be subject to the Disputes clause except to the extent such disputes involve the meaning of classifications or wage rates contained in the wage determination decision of the Secretary of Labor or the applicability of the labor provisions of this contract which questions shall be referred to the Secretary of Labor in accordance with the procedures of the Department of Labor.

☆ U.S. GOVERNMENT PRINTING OFFICE:1973—O-510-458 #40-C

SUPPLEMENT TO STANDARD FORM 19-A
LABOR STANDARDS PROVISIONS, NOVEMBER 1972 EDITION

10. Clause No. 3 "Apprentices and Trainees" and Clause No. 4 "Payrolls and Basic Records" are deleted in their entirety and the following clauses are substituted therefor:

(3) APPRENTICES AND TRAINEES (FPR 1-18.703-1(c) October 1975)

(a) Apprentices shall be permitted to work at less than the predetermined rate for the work they performed (1) when they are employed and individually registered in a bona fide apprenticeship program registered with the U. S. Department of Labor, Manpower Administration, Bureau of Apprenticeship and Training, or with a State Apprenticeship Agency recognized by the Bureau, or (2) if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program but who has been certified by the Bureau of Apprenticeship and Training or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen in any craft classification shall not be greater than the ratio permitted to the Contractor as to its entire work force under the registered program. Any employee listed on a payroll at an apprentice wage rate, who is not a trainee as defined in paragraph (b) of this clause and who is not registered or otherwise employed as stated above, shall be paid the wage rate determined by the Secretary of Labor for the classification of work he or she actually performed. The Contractor shall furnish to the Contracting Officer or a representative of the Wage-Hour Division of the U. S. Department of Labor written evidence of the registration of its program and apprentices as well as the appropriate ratio allowed and wage rates (expressed in percentages of the

journeymen hourly rates) for the area of construction prior to using any apprentices on the contract work. The wage rate paid apprentices shall not be less than the appropriate percentage of the journeyman's rate contained in the applicable wage determination.

(b) Except as provided in 29 CFR 5.15 trainees shall not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification, by the U. S. Department of Labor, Manpower Administration, Bureau of Apprenticeship and Training. The term "trainee" means a person registered and receiving on-the-job training in a construction occupation under a program which has been approved in advance by the U. S. Department of Labor, Manpower Administration, Bureau of Apprenticeship and Training, as meeting its standards for on-the-job training programs and which has been so certified by the Bureau. The ratio of trainees to journeymen shall not be greater than the ratio permitted under the plan approved by the Bureau of Apprenticeship and Training. Every trainee must be paid at not less than the rate specified in the approved program for his or her level of progress. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Bureau of Apprenticeship and Training shall be paid not les than the wage rate determined by the Secretary of Labor for the classification of work he or she actually performed. The Contractor shall furnish the Contracting Officer or a representative of the Wage-Hour Division of the U. S. Department of Labor written evidence of the certification of its program, the registration of the trainees and the ratios and wage rates prescribed in that

program. In the event the Bureau of Apprenticeship and Training withdraws approval of a training program, the Contractor shall no longer utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(c) The utilization of apprentices, trainees, and journeymen under this clause shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR Part 30.

(d) If at any time the Bureau of Apprenticeship and Training determines, after opportunity for a hearing, that the standards of a training program have not been complied with, or that such a program fails to provide adequate training for participants, the Contractor shall not utilize trainees at less than the predetermined rate for the classification of work actually performed until an acceptable program is approved. If the Contractor brings an appeal pursuant to 29 CRF 5.17 within 30 days of its receipt of a certified letter withdrawing the Bureau of Apprenticeship and Training's approval, the effect of the withdrawal of approval of the program will be delayed until a decision is rendered on the appeal pursuant to 29 CFR 5.17.

(4) PAYROLLS AND BASIC RECORDS (FPR 1-18.703-1(d), October 1975)

(a) The Contractor shall maintain payrolls and basic records relating thereto during the course of the work and shall preserve them for a period of three years thereafter for all laborers and mechanics, including apprentices, trainees, watchmen, and guards working at the site of the work. Such records shall contain the name and address of each such employee, his

or her correct classification, rate of pay (including rates of contribution for or costs assumed to provide, fringe benefits), daily and weekly number of hours worked, deductions made, and actual wages paid. Whenever the Contractor has obtained approval from the Secretary of Labor as provided in paragraph (c) of the clause entitled "Davis-Bacon Act," the Contractor shall maintain records which show the commitment, its approval, written communication of the plan or program to the laborers or mechanics affected, and the cost anticipated or incurred under the plan or program.

(b) The Contractor shall submit weekly a copy of all payrolls to the Contracting Officer. The Government Prime Contractor shall be responsible for the submission of copies of payrolls for all subcontractors. The copy shall be accompanied by a statement signed by the Contractor indicating that the payrolls are correct and complete, that the wage rates contained therein are not less than those determined by the Secretary of Labor, and that the classifications set forth for each laborer or mechanic, including apprentices and trainees, conform with the work he or she performed. Submission of the "Weekly Statement of Compliance" required under the contract and the Copeland Regulations of the Secretary of Labor (29 CFR Part 3) shall satisfy the requirements for submission of the above statement. The Contractor shall also submit a copy of any approval by the Secretary of Labor with respect to fringe benefits which is required by paragraph (c) of the clause entitled "Davis-Bacon Act." Contractors employing apprentices or trainees under approved programs shall include a notation of the first weekly certified payrolls submitted to the contracting agencies that their employment is pursuant to an approved program and shall identify the program.

(c) The Contractor shall make the records required under this clause available for inspection by authorized representatives of the Contracting Officer and the Department of Labor, and shall permit such representatives to interview employees during working hours on the job.

(5) RATES OF WAGES

The wage rates and fringe benefits contained in the following determination of the Department of Labor (including any modifications threof which are included in these specifications or are issued by addendum) shall be the minimum rates paid by the Contractor and his subcontractors for the work covered by this contract.

STATE: New Mexico COUNTY: Statewide
DECISION NO.: NM79-4103 DATE: Date of Publication
Supersedeas Decision No. NM79-4079 dated September 7, 1979 in 44 FR 52557

DESCRIPTION OF WORK: BUILDING AND HEAVY PROJECTS (also including RESIDENTIAL PROJECT in Santa Fe, Bernalillo, Rio Arriba, Taos, Sandoval and Valencia Counties).

BUILDING & HEAVY CONSTRUCTION	Basic Hourly Rates	Fringe Benefits Payments			
		H & W	Pensions	Vacation	Education and/or Appr. Tr.
ASBESTOS WORKERS:					
(Statewide, except Union, Lea, Harding, Curry, Roosevelt and Quay Cos.)	13.28	.50	1.37a		.06
Union, Harding, Lea, Roosevelt, Curry and Quay Cos.	10.00	.65	.55		.07
BOILERMAKERS	11.76	1.175	1.25	.75	
BRICKLAYERS-STONEMASONS:					
Zone I-A	11.31	.77	.50		.10
Zone I-B	12.56	.77	.50		.10
Zone I-C	13.56	.77	.50		.10
Zone II	11.41	.77	.50		.10
Zone III	12.41	.77	.50		.10
Zone IV	11.51	.77	.40		.10
Zone V	12.51	.77	.40		.10
Zone VI	10.81	.77	.40		.10
Zone VII	11.61	.77	.40		.10
Zone VIII	12.24	.77	.30		.10
Zone IX	10.99	.77	.30		.10

BRICKLAYERS' ZONE DEFINITIONS

ZONE I - Union, Harding, Santa Fe, Valencia, Torrence, Taos, Socorro, Mora, McKinley, Colfax, Catron, San Miguel, San Juan, Sandoval, Rio Arriba, Bernalillo and Los Alamos Counties
From basing point of Albuquerque Main Post Office:
Zone I-A - 0 to 25 road miles
Zone I-B - 25 to 50 road miles
Zone I-C - Over 50 road miles
ZONE II - Curry and Roosevelt Counties
ZONE III - DeBaca, Guadalupe and Quay Counties
ZONE IV - Chaves County
ZONE V - Lincoln County
ZONE VI - Lee and Eddy Counties
ZONE VII - Otero Counties
ZONE VIII - Luna and Grant Counties, communities of Silver City, Bayard, Central, Hurley and new town site of Tyrone; Hidalgo and Sierra Counties
ZONE IX - Dona Ana County

BUILDING & HEAVY CONSTRUCTION	Basic Hourly Rates	Fringe Benefits Payments			
		H & W	Pensions	Vacation	Education and/or Appr. Tr.
CARPENTERS:					
Dwelling houses & apartments not to exceed two stories in height:					
Zone I-A	7.50	1.10	1.20	.65	.20
Zone I-B	8.75	1.10	1.20	.65	.20
Zone I-C	9.50	1.10	1.20	.65	.20
General Building, Heavy & Residential Construction (Dwelling houses and apartments over two stories in height):					
Zone 2-A	11.40	1.10	1.20		.20
Zone 2-B	12.90	1.10	1.20		.20
Zone 2-C	13.65	1.10	1.20		.20

CARPENTERS' ZONE DEFINITIONS

CARPENTER (STATEWIDE) - From nearest basing points of the following cities of Towns: Alamogordo, Albuquerque, Artesia, Bayard, Belen, Carlsbad, Clovis, Deming, Espanola, Eunice, Farmington, Gallup, Grants, Hobbs, Las Cruces, Las Vegas, Lordsburg, Lovington, Portales, Raton, Roswell, Ruidoso, Santa Fe, Santa Rosa, Silver City, Socorro, Taos, and Tucumcari:
ZONE I - Dwelling houses & apartments not to exceed two stories in height:
Zone I-A - 0 - 15 road miles from nearest basing point
Zone I-B - 15 to 35 road miles from nearest basing point
Zone I-C - Over 35 road miles from nearest basing poing
ZONE II - General Building & Heavy Construction & Residential Construction (Dwelling houses & apartments over two stories in height:
Zone 2-A - 0 - 15 road miles from nearest basing point
Zone 2-B - 15 to 35 road miles from nearest basing point
Zone 2-C - Over 35 road miles from nearest basing point

CARPENTERS - San Juan County Only					
Zone I	11.40	1.10	1.20		.20
Zone II	13.65	1.10	1.20		.20
Zone III	13.65	1.10	1.20		.20

SAN JUAN COUNTY ZONE DEFINITIONS FOR CARPENTERS

ZONE I - Within 15 road miles of the City of Farmington
ZONE II - More than 15 miles, but less than 35 miles from Farmington
ZONE III - 35 miles or more from the City of Farmington

	Basic Hourly Rates	Fringe Benefits Payments			
		H & W	Pensions	Vacation	Education and/or Appr. Tr.
CEMENT MASON:					
Area I	9.77	.77	.60		.20
Area II:					
Zone 1	9.77	.77	.60		.20
Zone 2	10.75	.77	.60		.20
Zone 3	10.97	.77	.60		.20
Cement masons (Residential)	6.00	.77	.60		.20
Cement masons (Heavy)	9.77	.77	.60		.20
CEMENT MASONS:					
Composition & Machine Oprs.					
Area I	10.02	.77	.60		.20
Area II:					
Zone 1	10.02	.77	.60		.20
Zone 2	10.97	.77	.60		.20
Zone 3	11.22	.77	.60		.20

CEMENT MASONS AREA DEFINITIONS

AREA I - Statewide except Farmington, San Juan County

AREA II - Farmington, San Juan County
Zone I - 0 - 15 miles from Farmington City Hall
Zone II - 15-35 miles from Farmington City Hall
Zone III - 35 miles and over from Farmington City Hall

	Basic Hourly Rates	Fringe Benefits Payments			
		H & W	Pensions	Vacation	Education and/or Appr. Tr.
ELECTRICIANS:					
Zone I					
1-A	12.15	.60	3%+.70		4%
1-B	13.00	.60	3%+.70		4%
1-C	13.73	.60	3%+.70		4%
1-D	14.58	.60	3%+.70		4%
Zone II	13.73	.60	3%+.70		4%
Zone III					
3-A	9.60	.30	3%		1/10%
3-B	11.05	.30	3%		1/10%
Zone IV					
4-A	11.75	.60	3%		.01
4-B	12.10	.60	3%		.01
4-C	12.25	.60	3%		.01
4-D	12.50	.60	3%		.01

	Basic Hourly Rates	Fringe Benefits Payments			
		H & W	Pensions	Vacation	Education and/or Appr. Tr.
CABLE SPLICERS:					
Zone I					
1-A	13.37	.60	3%+.70		4%
1-B	14.22	.60	3%+.70		4%
1-C	14.95	.60	3%+.70		4%
1-D	15.80	.60	3%+.70		4%
Zone II	14.95	.60	3%+.70		4%
Zone III					
3-A	9.85	.30	3%		1/10%
3-B	11.30	.30	3%		1/10%
Zone IV					
4-A	12.10	.60	3%		.01
4-B	12.45	.60	3%		.01
4-C	12.60	.60	3%		.01
4-D	12.85	.60	3%		.01

ELECTRICIANS-CABLE SPLICERS ZONE DEFINITIONS

ZONE I
Area 1 - Bernalillo, Santa Fe, Torrance, DeBaca, Guadalupe, Quay, San Miguel, Mora, Harding, Union, Colfax, Taos, Rio Arriba, Grant, Sandoval, Valencia, Socorro, Catron, McKinley, Sierra, San Juan, Chaves, Curry, Lincoln and Roosevelt Counties

Area 1-A - From nearest basing point cities, towns and mileage from main post office in the following towns:
Albuquerque - 15 miles from main post office
Santa Fe - 15 miles from main post office
Las Vegas - 8 miles from main post office
Farmington - 8 miles from main post office
Raton - 6 miles from main post office
Tucumari - 6 miles from main post office
Aztec - 6 miles from main post office
Roswell - 12 miles from main post office
Ruidoso - 12 miles from main post office
Portales - 12 miles from main post office
Carrizozo - 12 miles from main post office
Clovis - 12 miles from main post office
Gallup - 10 miles from main post office
*Pojoaque - 2 miles from main post office

*All areas adjacent to Pojoaque that are over two (2) miles distant from the main post office in that town will be zoned out of Santa Fe.

ZONE I CONTD:
Area 1-B - extending up to 20 miles beyond Area 1-A

Area 1-C - extending up to 30 miles from Area 1-A

Area 1-D - anything beyond 30 miles from Area 1-A
ZONE II - Los Alamos County
ZONE III - Dona Ana, Otero, Luna, Hidalgo Counties
Zone 3-A - Within 10 miles radius from the post office in Las Cruces and within a 5 mile radius from the post office in Alamogordo.
Zone 3-B - Dona Ana, Otero, Luna, and Hidalgo Counties (except that area specified in Zone 3-A)
ZONE IV - Eddy and Lea Counties - the following zones shall be designated from the main post office in Artesia, Carlsbad, Hobbs and Lovington:
Zone 4-A - 0 -12 miles from main post office
Zone 4-B - 12 - 22 miles from main post office
Zone 4-C - 22 - 40 miles beyond main post office
Zone 4-D - 40 miles and beyond main post office

	Basic Hourly Rates	Fringe Benefits Payments			
		H & W	Pensions	Vacation	Education and/or Appr. Tr.
ELEVATOR CONSTRUCTORS:					
Bernalillo, Catron, Colfax, Curry, DeBaca, Guadalupe, Harding, Lincoln, Los Alamos, McKinley, Mora, Quay, Rio Arriba, Roosevelt, Sandoval, San Juan, San Miguel, Santa Fe, Socorro, Taos, Torrance, Union and Valencia Cos.:					
Elevator constructors	11.50	.545	.35	4%+b+c	.02
Elevator constructors helpers	70%JR	.545	.35	4%+b+c	.02
Elevator constructors, prob.	50%JR				
Chaves, Hidalgo, Dona Ana, Eddy, Grant, Lea, Luna, Otero and Sierra Cos.:					
Elevator constructors	8.68	.895	.69	4%+b+c	.035
Elevator constructors helper	70%JR	.895	.69	4%+b+c	.035
Elevator constructors, prob.	50%JR				
GLAZIERS	9.79	.70	.30		.04

	Basic Hourly Rates	Fringe Benefits Payments			
		H & W	Pensions	Vacation	Education and/or Appr. Tr.
IRONWORKERS:					
ZONE I	11.80	.75	1.25		.18
ZONE II					
Area 1	11.80	.75	1.25		.18
Area 2	13.05	.75	1.25		.18
Area 3	13.80	.75	1.25		.18
Area 4	14.05	.75	1.25		.18
ZONE III	11.05	.55	1.40		.15
ZONE IV	12.05	.55	1.40		.15

IRONWORKERS ZONE DEFINITIONS

ZONE I - Bernalillo, Catron, Colfax, DeBaca, Guadalupe, Lincoln, Los Alamos, McKinley, Mora, Rio Arriba, Sandoval, Santa Fe, Socorro, Taos, Torrance, and Valencia Counties
ZONE II - Farmington, San Juan County
Area 1 - Shall extend a distance of 6 road miles inclusive beyond the City Hall
Area 2 - Shall extend a distance of 8 road miles inclusive beyond the outer perimeter of area 1
Area 3 - Shall extend a distance of 10 road miles inclusive beyond the outer limits of area 2
Area 4 - Shall extend a distance of 27 road miles inclusive beyond the outer limits of area 3
Other areas not within Area 1, 2, 3, and 4 shall revert to the $15.00 per day subsistence rate.
ZONE III - Dona Ana, county with the exception of that portion of the county that lies within the White Sands Missile Range; Chaves County, Eddy County except that Potash Basin and defined as the area 10 road miles on Highway 62 and Highway 180, east of Carlsbad.
ZONE IV - Curry, Harding, Quay, Union, Hidalgo, Grant, Lea, Luna, Otero and Sierra Counties; also Potash Basin, White Sands and McGregor Missile Ranges.

LABORERS: BUILDING					
Group I	7.61	.63	.77		.10
Group II	7.91	.63	.77		.10
Group III	7.91	.63	.77		.10
Group IV	8.21	.63	.77		.10
Group V	8.36	.63	.77		.10

BUILDING LABORERS CLASSIFICATION DEFINITIONS

GROUP I - Unskilled; building and common laborers, carpenter tenders, concrete workers, chainmen - stakedrivers, concrete buggy operators
GROUP II - Semi-skilled; air and power tool operator, asphalt rakers, demolition, gunite, rebound men, fog machine operator, power buggy operators, rodmen; sand blasterers (pot men), window washers, wagon, core and diamond drillers tenders; outside scaler, grade setter
GROUP III - Wagon core, diamond drillers
GROUP IV - Concrete burner, cement mason tenders, hod carriers, mortar mixers, plaster spreader operators, plaster tenders, gunite nozzlemen, pipelayers, pumpcrete nozzlemen
GROUP V - Powdermen and blasterers

LABORERS (HEAVY CONSTRUCTION & SITE PREPARATION & DIRT WORK)

ZONE I - Statewide including 15 miles from Farmington Hall
ZONE II - 15 to 35 miles from Farmington Hall
ZONE III - 35 miles and over from Farmington Hall

LABORERS (HEAVY CONSTRUCTION & SITE PREPARATION & DIRT WORK)	Basic Hourly Rates	Fringe Benefits Payments			
		H & W	Pensions	Vacation	Education and/or Appr. Tr.
ZONE I					
Group 1	7.61	.63	.77		.10
Group 2	7.91	.63	.77		.10
Group 3	8.01	.63	.77		.10
Group 4	8.21	.63	.77		.10
Group 5	8.36	.63	.77		.10
ZONE II					
Group 1	8.11	.63	.77		.10
Group 2	8.41	.63	.77		.10
Group 3	8.51	.63	.77		.10
Group 4	8.71	.63	.77		.10
Group 5	8.86	.63	.77		.10
ZONE III					
Group 1	8.61	.63	.77		.10
Group 2	8.91	.63	.77		.10
Group 3	9.01	.63	.77		.10
Group 4	9.21	.63	.77		.10
Group 5	9.36	.63	.77		.10

LABORERS (HEAVY CONSTRUCTION, SITE PREPARATION AND DIRT WORK) CLASSIFICATION DEFINITIONS

GROUP I - Unskilled - Construction and general laborers, carpenter tenders, concrete workers, stakedrivers, concrete buggy operators
GROUP II - Semi-skilled - Air and power tool operators, asphalt rakers, cutting torch operators, demolition, gunite rebound men, rod and chainmen, grade setters, power buggy operators, sand blasters (pot men), nozzlemen, wagon core and diamond drillers' tenders, outside scalers, fog machine operators
GROUP III - Wagon core, diamond drillers
GROUP IV - Miscellaneous - concrete burner, cement mason tenders, hod carriers, mortar mixers, plaster spreader operators, plaster tenders, gunite nozzlemen, pipelayers, pumpcrete nozzleman
GROUP V - Powdermen and blasters

LABORERS RESIDENTIAL CONSTRUCTION	Basic Hourly Rates	Fringe Benefits Payments			
		H & W	Pensions	Vacation	Education and/or Appr. Tr.
Group I	5.02	.63	.77		.10
Group II	5.32	.63	.77		.10
Group III	5.42	.63	.77		.10
Group IV	5.62	.63	.77		.10

RESIDENTIAL LABORERS' CLASSIFICATION DEFINITIONS

GROUP I - Unskilled - Building and common laborers, carpenter tenders, concrete workers, chainmen - stakedrivers, concrete buggy operators, hand
GROUP II - Semi-skilled - air and power tool operator, asphalt rakers, demolition, gunnite rebound men, fog machine operator, power buggy operator, rodmen, sand blasterers (pot men), window washers, wagon, core and diamond drillers, tender outside
GROUP III - Wagon core, diamond drillers
GROUP IV - Concrete burner, cement mason tenders, hod carriers, mortar mixers, plaster spreader operators, plaster tenders, gunnite nozzlemen, pipelayer, pumpcrete nozzlemen

LATHERS:	Basic Hourly Rates	Fringe Benefits Payments			
		H & W	Pensions	Vacation	Education and/or Appr. Tr.
Zone I	11.64	.77			.06
Zone II	12.14	.77			.01
Zone III	8.98	.77			.01

LATHERS ZONE DEFINITIONS

ZONE I - Catron, Grant, Bernalillo, Roosevelt, Union, Sandoval, San Juan, Socorro, Torrance and Valencia Counties
ZONE II - Colfax, Los Alamos, Mora, Rio Arriba, San Miguel, Santa Fe and Taos Counties
ZONE III - Dona Ana and Otero Counties

	Basic Hourly Rates	Fringe Benefits Payments			
		H & W	Pensions	Vacation	Education and/or Appr. Tr.
LEAD BURNERS					
Zone I	13.25	.68	1.42		.16
Zone II	13.75	.68	1.42		.16
Zone III	15.00	.68	1.42		.16
Zone IV	13.88	.68	1.42		.16

LEAD BURNERS BASING POINT & AREA DEFINITIONS

BASING POINT CITIES OR TOWNS:
Albuquerque, Alamorgordo, Anthony, Artesia, Belen, Carlsbad, Clovis, Deming, Espanola, Farmington, Gallup, Grants, Hobbs, Las Cruces, Las Vegas, Lovington, Portales, Raton, Socorro, Roswell, Ruidoso, Santa Fe, Silver City, Santa Rosa, Taos, Tucumcari and Truth of Consequence
Zone I - Shall include a distance of seven road miles inclusive beyond the city or town limits
Zone II - Shall extend a distance of 4 road miles inclusive beyond the outer perimeter of area I.
Zone III- Shall apply to all areas not within 1 or 2, or not within the specific areas.
Zone IV (SPECIFIC AREA) - Los Alamos, White Rock, South Mesa, McGregor Range, White Sands Missile Range, and/or Proving Grounds

COMMERCIAL LINE WORK

Bernalillo, Colfax, Catron, Chaves, Curry, DeBaca, Grant, Guadalupe, Harding, Lincoln, Los Alamos, McKinley, Mora, Quay, Rio Arriba, Roosevelt, Sandoval, San Juan, San Miguel, Santa Fe, Sierra, Socorro, Taos, Torrance, Union, Valencia and White Sands Missile Range and that portion of Fort Bliss in New Mexico

ZONE I
Cities and Towns Basing Points - Miles from Main Post Offices

Albuquerque - 15 miles
Santa Fe - 10 miles
Las Vegas - 8 miles
Farmington - 6 miles
Raton - 6 miles
Tucumcari - 6 miles
Aztec - 6 miles
Roswell - 12 miles
Ruidoso - 12 miles
Portales - 12 miles
Carrizozo - 12 miles
Clovis - 12 miles
Gallup - 12 miles
*Pojoaque - 2 miles

COMMERCIAL LINE WORK CONTD:

*All areas adjacent to Pojoaque that are over two miles distant from the main post office in that town will be zoned out of Santa Fe.

ZONE II - Extending up to 20 miles beyond zone 1

ZONE III - Extending up to 30 miles beyond zone 1

ZONE IV - Anything beyond 30 miles from zone 1

	Basic Hourly Rates	Fringe Benefits Payments			
		H & W	Pensions	Vacation	Education and/or Appr. Tr.
COMMERCIAL LINE WORK					
ZONE I					
Linemen - technicians	12.15	.60	3%+.70		4%
Cable splicers	13.37	.60	3%+.70		4%
Equipment Operator (includes helicopter op.)	11.54	.60	3%+.70		4%
Equipment Operator (includes Helicopter mechanic)	10.57	.60	3%+.70		4%
Powderman	10.57	.60	3%+.70		4%
Groundman & Jackhammer Oprs.	8.63	.60	3%+.70		4%
ZONE II					
Linemen - technicians	13.00	.60	3%+.70		4%
Cable splicers	14.22	.60	3%+.70		4%
Equipment Opr. (includes helicopter op.)	12.39	.60	3%+.70		4%
Equipment Opr. (includes Helicopter mechanic)	11.42	.60	3%+.70		4%
Powderman	11.42	.60	3%+.70		4%
Groundman & Jackhammer Oprs.	9.48	.60	3%+.70		4%
ZONE III					
Linemen - technicians	13.73	.60	3%+.70		4%
Cable splicers	14.95	.60	3%+.70		4%
Equipment Opr. (includes helicopter op.)	13.73	.60	3%+.70		4%
Equipment Opr. (includes helicopter mechanic)	12.15	.60	3%+.70		4%
Powderman	12.15	.60	3%+.70		4%
Groundman & Jackhammer Oprs.	10.21	.60	3%+.70		4%
ZONE IV					
Linemen - technicians	14.58	.60	3%+.70		4%
Cable splicers	15.80	.60	3%+.70		4%
Equipment Opr. (includes helicopter op.)	13.97	.60	3%+.70		4%
Equipment Opr. (includes helicopter mechanic)	13.00	.60	3%+.70		4%
Powderman		.60	3%+.70		4%
Groundman & Jackhammer Oprs.	11.06	.60	3%+.70		4%

Federal Register / Vol. 44, No. 214 / Friday, November 2, 1979 / Notices
WR 5
63447

Las Alamos County - Use ZONE III rates.

COMMERCIAL LINE WORK
Applies to switching stations and substations adjacent to power plants in Zone 1 and zone 2 in Luna, Dona Ana, Otero and Hidalgo Counties, exclusive of White Sands Missile Range and that portion of Fort Bliss in New Mexico.

ZONE I
The area within 25 miles radius from the downtown Post Office of El Paso, Texas. Fort Bliss and Biggs Field; the area within a five mile radius of any city, town or municipality within which an employer establishes or maintains his place of business; the area within ten mile radius from the post office in Las Cruces, New Mexico, and within a five mile radius from the post office in Alamogordo, New Mexico.

ZONE II
All other areas of the jurisdiction except those specified in zone 1

	Basic Hourly Rates	Fringe Benefits Payments			
		H & W	Pensions	Vacation	Education and/or Appr. Tr.
ZONE I					
Linemen - technicians	9.60	.30	3%		4%
Cable splicers	9.85	.30	3%		4%
Equipment opr. (includes helicopter opr.)	9.12	.30	3%		4%
Equipment opr. (includes helicopter mechanic)	8.40	.30	3%		4%
Powderman	8.40	.30	3%		4%
Groundman & Jackhammer Oprs.	6.82	.30	3%		4%
ZONE II					
Linemen - technicians	11.05	.30	3%		4%
Cable splicers	11.30	.30	3%		4%
Equipment Opr. (includes helicopter opr.)	10.50	.30	3%		4%
Equipment Opr. (includes helicopter mechanic)	9.67	.30	3%		4%
Powderman	9.67	.30	3%		4%
Groundman & Jackhammer Oprs.	7.85	.30	3%		4%

COMMERCIAL LINE WORK
Applies to switching stations adjacent to power plants in Eddy and Lea Counties; the following zones listed shall be designated from main Post Office of Artesia, Carlsbad, Hobbs & Lovington.
Zone A - 0 - 12 miles
Zone B - 12 - 22 miles
Zone C - 22 to 40 miles
Zone D - 40 miles and beyond

COMMERCIAL LINE WORK CONTD:	Basic Hourly Rates	Fringe Benefits Payments			
		H & W	Pensions	Vacation	Education and/or Appr. Tr.
ZONE A					
Linemen - technician	$11.75	.60	3%		4%
Cable splicers	12.10	.60	3%		4%
Equipment Opr. (includes helicopter opr.)	11.16	.60	3%		4%
Equipment Opr. (includes helicopter mechanic)	10.28	.60	3%		4%
Powderman	10.28	.60	3%		4%
Groundman & Jackhammer Oprs	8.34	.60	3%		4%
ZONE B					
Linemen - technician	12.10	.60	3%		4%
Cable splicers	12.45	.60	3%		4%
Equipment opr. (includes helicopter opr)	11.51	.60	3%		4%
Equipment opr. (includes helicopter mechanic)	10.63	.60	3%		4%
Powderman	10.63	.60	3%		4%
Groundman & Jackhammer Oprs.	8.69	.60	3%		4%
ZONE C					
Linemen - technician	12.25	.60	3%		4%
Cable splicers	12.60	.60	3%		4%
Equipment opr. (includes helicopter opr)	11.66	.60	3%		4%
Equipment opr. (includes helicopter mechanic)	10.78	.60	3%		4%
Powderman	10.78	.60	3%		4%
Groundman & Jackhammer Oprs.	8.84	.60	3%		4%
ZONE D					
Linemen - technician	12.50	.60	3%		4%
Cable splicers	12.85	.60	3%		4%
Equipment opr. (includes helicopter opr)	11.91	.60	3%		4%
Equipment opr. (includes helicopter mechanic)	11.13	.60	3%		4%
Powderman	11.13	.60	3%		4%
Groundman & Jackhammer Oprs.	9.09	.60	3%		4%

	Basic Hourly Rates	Fringe Benefits Payments			
		H & W	Pensions	Vacation	Education and/or Appr. Tr.
MARBLE, TILE & TERRAZZO WORKERS	9.80	.77			
MARBLE, TILE & TERRAZZO FINISHERS	8.09	.77			
MILLWRIGHTS & PILEDRIVERMEN:					
Zone 1	12.15	1.10	1.20		.20
Zone 2	13.65	1.10	1.20		.20
Zone 3	14.40	1.10	1.20		.20

MILLWRIGHTS & PILEDRIVERMEN ZONE DEFINITIONS

BASING POINT - FROM ALBUQUERQUE CITY LIMITS:
Zone 1 - 0 to 15 road miles from basing point
Zone 2 - 15 to 35 road miles from basing point
Zone 3 - Over 35 road miles from basing point

PAINTERS: ZONE I					
Class 1-A	9.47	.70	.40		.05
Class 1-B	9.97	.70	.40		.05
Class 1-C	9.72	.70	.40		.05
Class 1-D	10.05	.70	.40		.05
Class 1-E	9.80	.70	.40		.05
ZONE II:					
Class 2-A	8.60	.70	.40		.05
Class 2-B	8.82	.70	.40		.05
Class 2-C	9.25	.70	.40		.05
Class 2-D	8.70	.70	.40		.05
Class 2-E	9.35	.70	.40		.05
Class 2-F	8.60	.70	.40		.05
Class 2-G	9.10	.70	.40		.05
ZONE II (RESIDENTIAL)					
Brush & rollers	8.60	.70	.40		.05
Spray & sandblast	9.25	.70	.40		.05
Paperhangers	8.82	.70	.40		.05
Vinyl hangers	8.70	.70	.40		.05
ZONE III					
Class 3-A	8.23	.68			.02
Class 3-B	8.65	.68			.02
Class 3-C	8.375	.68			.02
Class 3-D	9.08	.68			.02

	Basic Hourly Rates	Fringe Benefits Payments			
		H & W	Pensions	Vacation	Education and/or Appr. Tr.
PAINTERS' CONTD:					
ZONE IV					
Class 4-A	7.12	.35	.20		.05
Class 4-B	7.62	.35	.20		.05
Class 4-C	7.37	.35	.20		.05
Class 4-D	7.22	.35	.20		.05
Class 4-E	7.70	.35	.20		.05
Class 4-F	7.45	.35	.20		.05

PAINTERS' ZONE AND CLASSIFICATION DEFINITIONS

ZONE I - San Juan, McKinley, Bernalillo, Torrance, Guadalupe, Quay, Catron, Socorro, Lincoln, DeBaca, Roosevelt, Chaves, Valencia, Sierra, Grant, Hidalgo, Curry, Lea and Eddy Counties, New Mexico.
- Class A - Painters, roller and hand textures
- Class B - Painters, spray, sandblasting, painter on steel bridges, tanks towers, pipe and structural
- Class C - Paperhanger
- Class D - Drywall finisher; ames tool operator
- Class E - Hand finisher machine texture

ZONE II - Colfax, Hardin, Los Alamos, Mora, Sandoval, San Miguel, Rio Arriba, Taos, Union and Santa Fe Counties
- Class A - Painters and roller
- Class B - Paperhangers
- Class C - Spray, sandblast, steel, special coating applicator
- Class D - Vinyl hangers
- Class E - Drywall finisher tool and machine texture
- Class F - Hand texture
- Class G - Hand finisher

ZONE III - Luna, Otero and Dona Ana Counties
- Class A - Brush, paperhangers
- Class B - Spray, sandblasting, swing stage, stripping machine
- Class C - Ames tool and steel brush after erection
- Class D - Radio towers, water tanks smoke stake 70 - 100 ft.

ZONE IV - Residential Construction in Santa Fe, Sandoval, Rio Arriba & Taos Counties
- Class A - Brush and roller
- Class B - Spray, parking lot stripping
- Class C - Paperhangers
- Class D - Vinyl hangers
- Class E - Drywall finishers - ames tool op., machine texture
- Class F - Drywall finishers - hand finisher

	Basic Hourly Rates	Fringe Benefits Payments			
		H & W	Pensions	Vacation	Education and/or Appr. Tr.
PLASTERERS:					
Statewide, except Otero, Grant, Sierra, Dona Ana, & Hidalgo Counties	11.01	.77	.60		.06
Otero, Grant, Sierra, Dona Ana, Luna and Hidalgo Counties	8.48	.77	.25		.01
PLUMBERS-PIPEFITTERS:					
Area I	12.75	.68	1.42		.16
Area II	13.25	.68	1.42		.16
Area III	14.50	.68	1.42		.16
Specific area	13.38	.68	1.42		.16
Residential	8.05	.68	.25		.16

PLUMBERS - PIPEFITTERS' ZONES DEFINITIONS

BASING POINT CITIES OR TOWNS:
Albuquerque, Alamogordo, Anthony, Artesia, Belen, Carlsbad, Clovis, Deming, Espanola, Farmington, Gallup, Grants, Hobbs, Las Cruces, Las Vegas, Lordsburg, Lovington, Portales, Raton, Roswell, Ruidoso, Santa Fe, Silver City, Santa Rosa, Taos, Tucumcari, Truth of Consequence and Socorro, New Mexico

Area I - Shall include a distance of seven road miles inclusive beyond the city or town limits.

Area II - Shall extend a distance of four road miles inclusive beyond the outer perimeter of area I.

Area III - Shall apply to all areas not within areas 1 or 2, or not within the specific area.

Specific Area - Los Alamos, White Rock, South Mesa, McGregor Range, White Sands Missile Range and/or Proving Grounds, Atlas Missile Complex Sites in Chaves and Lincoln Counties, and the Oro Grande Range Camp and Dona Ana and Otero Counties

POWER EQUIPMENT OPERATORS AREA DEFINITIONS:
AREA I - Farmington, San Juan County
Zone I - 0 - 15 miles from Farmington City Hall
Zone II - 15 - 35 miles from Farmington City Hall
Zone III - 35-50 miles from Farmington City Hall
AREA II - Statewide, except San Juan County

	Basic Hourly Rates	Fringe Benefits Payments			
		H & W	Pensions	Vacation	Education and/or Appr. Tr.
POWER EQUIPMENT OPERATORS					
AREA I (RESIDENTIAL & BUILDING CONSTRUCTION)					
ZONE I					
Group 1	$ 8.88	.70	.60		.15
Group 2	9.92	.70	.60		.15
Group 3	10.00	.70	.60		.15
Group 4	10.06	.70	.60		.15
Group 5	10.12	.70	.60		.15
Group 6	10.22	.70	.60		.15
Group 7	10.32	.70	.60		.15
Group 8	11.40	.70	.60		.15
ZONE II					
Group 1	10.63	.70	.60		.15
Group 2	11.67	.70	.60		.15
Group 3	11.75	.70	.60		.15
Group 4	11.81	.70	.60		.15
Group 5	11.87	.70	.60		.15
Group 6	11.97	.70	.60		.15
Group 7	12.07	.70	.60		.15
Group 8	13.15	.70	.60		.15
ZONE III					
Group 1	11.13	.70	.60		.15
Group 2	12.17	.70	.60		.15
Group 3	12.25	.70	.60		.15
Group 4	12.31	.70	.60		.15
Group 5	12.37	.70	.60		.15
Group 6	12.47	.70	.60		.15
Group 7	12.57	.70	.60		.15
Group 8	13.65	.70	.60		.15
AREA II (RESIDENTIAL & GENERAL BUILDING CONSTRUCTION)					
Group 1	8.88	.70	.60		.15
Group 2	9.92	.70	.60		.15
Group 3	10.00	.70	.60		.15
Group 4	10.06	.70	.60		.15
Group 5	10.12	.70	.60		.15
Group 6	10.22	.70	.60		.15
Group 7	10.32	.70	.60		.15
Group 8	11.40	.70	.60		.15

HEAVY CONSTRUCTION (POWER EQUIPMENT OPERATORS AREA DEFINITIONS)

AREA I - Statewide, except San Juan County
Basing points for zone pay shall be determined from the Center of the following cities - Albuquerque, Carlsbad, Gallup, Raton & Las Cruces
Zone I - 0 - 50 miles
Zone II - Over 50 miles
AREA II - Farmington, San Juan County
Zone I - 0 - 15 miles from Farmington City Hall
Zone II - 15 to 35 miles from Farmington City Hall
Zone III - Over 35 miles from Farmington City Hall

HEAVY CONSTRUCTION (AREA I):	Basic Hourly Rates	Fringe Benefits Payments			
		H & W	Pensions	Vacation	Education and/or Appr. Tr.
GROUP I					
Zone 1	$ 8.83	.75	.60		.15
Zone 2	10.08	.75	.60		.15
GROUP II					
Zone 1	9.87	.75	.60		.15
Zone 2	11.12	.75	.60		.15
GROUP III					
Zone 1	9.95	.75	.60		.15
Zone 2	11.20	.75	.60		.15
GROUP IV					
Zone 1	10.01	.75	.60		.15
Zone 2	11.26	.75	.60		.15
GROUP V					
Zone 1	10.07	.75	.60		.15
Zone 2	11.32	.75	.60		.15
GROUP VI					
Zone 1	10.17	.75	.60		.15
Zone 2	11.52	.75	.60		.15
GROUP VII					
Zone 1	10.27	.75	.60		.15
Zone 2	11.52	.75	.60		.15
GROUP VIII					
Zone 1	11.35	.75	.60		.15
Zone 2	12.60	.75	.60		.15
(HEAVY CONSTRUCTION) POWER EQUIPMENT OPERATORS HEAVY CONSTRUCTION (AREA II)					
GROUP I					
Zone 1	8.83	.75	.60		.15
Zone 2	10.08	.75	.60		.15
Zone 3	10.58	.75	.60		.15
GROUP II					
Zone 1	9.87	.75	.60		.15
Zone 2	11.12	.75	.60		.15
Zone 3	11.62	.75	.60		.15
GROUP III					
Zone 1	9.95	.75	.60		.15
Zone 2	11.20	.75	.60		.15
Zone 3	11.70	.75	.60		.15

HEAVY CONSTRUCTION AREA II CONTD:	Basic Hourly Rates	Fringe Benefits Payments			
		H & W	Pensions	Vacation	Education and/or Appr. Tr.
GROUP IV					
Zone 1	$10.01	.75	.60		.15
Zone 2	11.26	.75	.60		.15
Zone 3	11.76	.75	.60		.15
GROUP V					
Zone 1	10.07	.75	.60		.15
Zone 2	11.32	.75	.60		.15
Zone 3	11.82	.75	.60		.15
GROUP VI					
Zone 1	10.17	.75	.60		.15
Zone 2	11.42	.75	.60		.15
Zone 3	11.92	.75	.60		.15
GROUP VII					
Zone 1	10.27	.75	.60		.15
Zone 2	11.52	.75	.60		.15
Zone 3	12.02	.75	.60		.15
GROUP VIII					
Zone 1	11.35	.75	.60		.15
Zone 2	12.60	.75	.60		.15
Zone 3	13.10	.75	.60		.15

POWER EQUIPMENT OPERATORS AREA DEFINITIONS
AREA I - Farmington, San Juan County
Zone I - 0 - 15 miles from Farmington City Hall
Zone II - 15-35 miles from Farmington City Hall
Zone III - 35-50 miles from Farmington City Hall
AREA II - Statewide, except San Juan County

AREA I (SITE PREPARATION & DIRT WORK)	Basic Hourly Rates	Fringe Benefits Payments			
		H & W	Pensions	Vacation	Education and/or Appr. Tr.
ZONE I					
Group 1	8.88	.75	.60		.15
Group 2	9.92	.75	.60		.15
Group 3	10.00	.75	.60		.15
Group 4	10.06	.75	.60		.15
Group 5	10.12	.75	.60		.15
Group 6	10.22	.75	.60		.15
Group 7	10.32	.75	.60		.15
Group 8	11.40	.75	.60		.15

	Basic Hourly Rates	Fringe Benefits Payments			
		H & W	Pensions	Vacation	Education and/or Appr. Tr.
AREA I (SITE PREPARATION & DIRT WORK CONTD:)					
ZONE II					
Group 1	$10.63	.75	.60		.15
Group 2	11.67	.75	.60		.15
Group 3	11.75	.75	.60		.15
Group 4	11.81	.75	.60		.15
Group 5	11.87	.75	.60		.15
Group 6	11.97	.75	.60		.15
Group 7	12.07	.75	.60		.15
Group 8	13.15	.75	.60		.15
ZONE III					
Group 1	11.13	.75	.60		.15
Group 2	12.17	.75	.60		.15
Group 3	12.25	.75	.60		.15
Group 4	12.31	.75	.60		.15
Group 5	12.37	.75	.60		.15
Group 6	12.47	.75	.60		.15
Group 7	12.57	.75	.60		.15
Group 8	13.65	.75	.60		.15
AREA II (SITE PREPARATION & DIRT WORK)					
Group 1	8.88	.75	.60		.15
Group 2	9.92	.75	.60		.15
Group 3	10.00	.75	.60		.15
Group 4	10.06	.75	.60		.15
Group 5	10.12	.75	.60		.15
Group 6	10.22	.75	.60		.15
Group 7	10.32	.75	.60		.15
Group 8	11.40	.75	.60		.15

POWER EQUIPMENT OPERATORS CLASSIFICATION DEFINITIONS
BUILDING, RESIDENTIAL, HEAVY CONSTRUCTION & SITE PREPARATION & DIRT WORK

GROUP I - Fireman, oiler, screedman, scale operator such as bin-a batch, rubber tired farm type tractor, tractors under 50 HP without attachments, breakman, concrete paving curing machine (bridge-type), helper; (mechanic, welder, grease truck)

GROUP II - Rollers, sheepsfoot or pneumatic self propelled w/o dozer, concrete conveyor, service truck operator (head oiler), air compressor (300 CFM & over), pumps (6" and over), screening plants, concrete mixers (under 1 CY), concrete saw or grinder-span type, 1 drum hoist, air tugger, elevating belt type loaders, forklift, lumber stacker, tractor farm type (under 50 HP with attachments) motorman and industrial locomotive operator, winch truck, front end loaders, (under 2 CY), power plants which generate over 15 KW, welding machines

POWER EQUIPMENT OPERATORS CLASSIFICATION DEFINITIONS CONTD:
BUILDING, RESIDENTIAL, HEAVY CONSTRUCTION & SITE PREPARATION & DIRT WORK

GROUP III - Bituminous distributors, boilers, retort and hot oil heaters, concrete mixers (1 CY and over), concrete paver-single drum, drilling equipment, motor grades (rough), shaft and tunnel equipment; (refrigeration, slusher, jumbo forms), trenching machines (all types), pump crete and gunite machines, slipform paver, mechanical bullfloats, concrete slab spreading machine, concrete slab finishing machine, asphalt plants, bituminous finishing machines, crushing plants

GROUP IV - Front end loaders (2 thru 10 CY), rollers steel wheeled-all types, bulldozers, scrapers (motor or towed), elevating graders, concrete batching plants, self-propelled rollers -- equipped with dozer, twin-bowl scrapers and quad 8 or 9 pushers (35¢ over basic rate, three bowl scraper (60¢ over basic rate)

GROUP V - Hydraulic cranes-with less than 50 feet of boom (20 tons and under), concrete paver-double drum, cat cranes, hysters, side and swingboom cats, 2 drum hoists, auto fine grader

GROUP VI - Mucking machines - all types, motor grader (finish) mechanic - welder

GROUP VII - Steam engineers, loader (front end over 10 CY), concrete pump (snorkel type)

GROUP VIII - All shovel type equipment: cranes, draglines, backhoes, derricks, guy & stiff leg, pipemobile (No. 2 operator), piledriver, hydraulic cranes (20 tons & over), mine hoist, belt loader ("C.M.I." Type), booms & jibs 150 ft. through 199 ft. - 25¢ per hour above base pay. 200 ft. and over - 50¢ per hour above base pay. Shovel (wheel type), boring machine (tunnel or shaft mole), pipe mobile

	Basic Hourly Rates	Fringe Benefits Payments			
		H & W	Pensions	Vacation	Education and/or Appr. Tr.
ROOFERS (BLDG. CONST)	9.10	.50			
ROOFERS (RESIDENTIAL CONST)	7.90	.50			
SHEET METAL WORKERS:					
Zone 1	10.87	.53	1.00		.12
Zone 2	9.62	3%+.51	.385		.04
Zone 3	8.35	.20			.05
Zone 4	11.87	.93	1.00		.12

SHEET METAL WORKERS ZONE DEFINITIONS

Zone 1 - Bernalillo, Catron, Chaves, Colfax, Curry, DeBaca, Guadalupe, Harding, Lincoln, McKinley, Mora, Quay, Rio Arriba, Roosevelt, Sandoval, San Miguel, Santa Fe, Socorro, Union, Taos, Torrance, Valencia, San Juan Counties, Kirtland Air Force Base.

Zone 2 - Dona Ana, Eddy, Grant, Hidalgo, Lea, Luna, Sierra and Otero Counties

Zone 3 - Holloman Air Force Base, White Sands and McGregor Ranges

Zone 4 - Los Alamos County

	Basic Hourly Rates	Fringe Benefits Payments			
		H & W	Pensions	Vacation	Education and/or Appr. Tr.
SPRINKLER FITTERS	12.91	.75	1.05		.08
SOFT FLOOR LAYERS:					
Zone 1	8.50	.38	.10		.02
Zone 2	9.20	.70	.50		.04

SOFT FLOOR LAYERS' ZONE DEFINITIONS

Zone 1 - Dona Ana, Luna and Otero Counties
Zone 2 - Statewide (excluding Dona Ana, Luna and Otero Counties

SOUND INSTALLERS:					
SOUNDMAN					
Zone 1	10.35	.60	3%		4%
Zone 2	11.64	.60	3%		4%
Zone 3	14.23	.60	3%		4%
TECHNICIANS					
Zone 1	8.28	.60	3%		4%
Zone 2	9.57	.60	3%		4%
Zone 3	12.16	.60	3%		4%
SOUND INSTALLERS					
Zone 1	8.73	.60	3%		4%
Zone 2	8.02	.60	3%		4%
Zone 3	10.61	.60	3%		4%

SOUND INSTALLERS ZONE DEFINITIONS

ZONE I - Thirty mile radius of main post office in Albuquerque
ZONE II - Remainder of Valencia, Sandoval, Santa Fe, Torrance, and Socorro Counties, the hourly rates of pay shall be increased to twelve and one-half (12½) percent of journeyman rate of pay for Zone I.
ZONE III - Chaves, Curry, Roosevelt, Lincoln, Guadalupe, DeBaca, Quay, San Miguel, Mora, Harding, Union, Colfax, Taos, Rio Arriba, Catron, Sierra, Grant, Los Alamos, San Juan, McKinley Counties, the hourly rates of pay shall be increased by thirty-seven and one-half (37.5) percent of the journeyman rate of pay for Zone I.

TRUCK DRIVERS ZONE PAY BASING POINTS AND DEFINITIONS LISTED BELOW FOR BUILDING AND HEAVY CONSTRUCTION.

BASING POINTS ARE AS FOLLOWS:
Alamogordo, Albuquerque, Artesia, Bayard, Belen, Carlsbad, Clovis, Deming, Espanola, Eunice, Farmington, Gallup, Grants, Hobbs, La Cruces, Las Vegas, Lordsburg, Los Alamos, Lovington, Portales, Raton, Roswell, Ruidoso, Santa Fe, Santa Rosa, Silver City, Socorro, Taos, Tucumcari

ZONE I - Shall be jobs or projects within 15 road miles from the starting points listed above.
ZONE II - Shall be jobs or projects which are more than fifteen road miles, but less than thirty-five road miles from base points.
ZONE III - Shall be those jobs or projects which are thirty-five road miles or more from the base points.

	Basic Hourly Rates	Fringe Benefits Payments			
		H & W	Pensions	Vacation	Education and/or Appr. Tr.
BUILDING CONSTRUCTION:					
TRUCK DRIVERS (ZONE I)					
Group 1	$ 7.76	.77	.77		
Group 2	7.88	.77	.77		
Group 3	7.96	.77	.77		
Group 4	8.08	.77	.77		
Group 5	8.13	.77	.77		
Group 6	8.23	.77	.77		
Group 7	8.33	.77	.77		
Group 8	8.47	.77	.77		
Group 9	8.62	.77	.77		
TRUCK DRIVERS (ZONE II)					
Group 1	9.01	.77	.77		
Group 2	9.13	.77	.77		
Group 3	9.21	.77	.77		
Group 4	9.33	.77	.77		
Group 5	9.38	.77	.77		
Group 6	9.48	.77	.77		
Group 7	9.58	.77	.77		
Group 8	9.72	.77	.77		
Group 9	9.87	.77	.77		
TRUCK DRIVERS (ZONE III)					
Group 1	9.51	.77	.77		
Group 2	9.63	.77	.77		
Group 3	9.71	.77	.77		
Group 4	9.83	.77	.77		
Group 5	9.88	.77	.77		
Group 6	9.98	.77	.77		
Group 7	10.08	.77	.77		
Group 8	10.22	.77	.77		
Group 9	10.37	.77	.77		

	Basic Hourly Rates	Fringe Benefits Payments			
		H & W	Pensions	Vacation	Education and/or Appr. Tr.
RESIDENTIAL CONSTRUCTION:					
TRUCK DRIVERS					
Group 1	$7.46	.77	.77		
Group 2	7.58	.77	.77		
Group 3	7.66	.77	.77		
Group 4	7.78	.77	.77		
Group 5	7.83	.77	.77		
Group 6	7.93	.77	.77		
Group 7	8.03	.77	.77		
Group 8	8.17	.77	.77		
Group 9	8.32	.77	.77		
HEAVY CONSTRUCTION:					
TRUCK DRIVERS (ZONE I)					
Group 1	7.91	.77	.77		
Group 2	8.03	.77	.77		
Group 3	8.11	.77	.77		
Group 4	8.23	.77	.77		
Group 5	9.28	.77	.77		
Group 6	8.38	.77	.77		
Group 7	8.48	.77	.77		
Group 8	8.62	.77	.77		
Group 9	8.77	.77	.77		
TRUCK DRIVERS (ZONE II)					
Group 1	9.16	.77	.77		
Group 2	9.28	.77	.77		
Group 3	9.36	.77	.77		
Group 4	9.48	.77	.77		
Group 5	9.53	.77	.77		
Group 6	9.63	.77	.77		
Group 7	9.73	.77	.77		
Group 8	9.87	.77	.77		
Group 9	10.02	.77	.77		
TRUCK DRIVERS (ZONE III)					
Group 1	9.41	.77	.77		
Group 2	9.53	.77	.77		
Group 3	9.61	.77	.77		
Group 4	9.73	.77	.77		
Group 5	9.78	.77	.77		
Group 6	9.88	.77	.77		
Group 7	9.98	.77	.77		
Group 8	10.12	.77	.77		
Group 9	10.27	.77	.77		

TRUCK DRIVERS CLASSIFICATION DEFINITIONS (BUILDING, RESIDENTIAL CONSTRUCTION)

GROUP I - Pickup 3/4 ton and under, service station, including lubrication, light tire repair and washer, swamper or riding helper, 2 or 4 up

GROUP II- Bus or taxi driver, dump or batch truck under 8 C.Y.W.L.C.; flat bed (bobtail) 2 ton and under; mechanic and welder helper; fork lift under 5 tons MRC.

GROUP III - Dump trucks (including all highway and off highway) 8 up to 16 C.Y.W.L.C.; water, fuel or oil trucks less than 3,000 gal., flat bed (bobtail) over 2 tons

GROUP IV - Distributor driver; heavy tire repairman; lumber carrier driver; young buggy or similar equipment, transit mix or agitator 2 or 3 axle bobtail driver (flat-bed or van single axle); forklifts 5 ton and over MRC; field equipment servicemen

GROUP V - Dumpsters and dumpcrete driver; water, fuel or oil truck 3,000 to 6,000 gal; lowboys and light equipment driver; euclid type tank wagon under 6,000 gal.

GROUP VI - Vacuum truck; dump trucks (including all highway and off-highway 16 up to 22 C.Y.W.L.C.

GROUP VII - Transit mix or agitator semi or 4 axle equipment driver; flaherty truck type spreader box driver; slurry truck driver; bulk cement driver; semi-doubles; 4 axle bobtail; winch truck and "A" frame; dump truck (including all highway and off-highway) 22 CY up to 35 C.Y.W.L.C.; head field equipment servicement

GROUP VIII - Euclid diesel power turnarocker; terra cobra DW20-LeTourneau Pulls and similar diesel powered equipment when used to haul materials and assigned to a teamster-lowboy heavy equipment driver; water, fuel or oil trucks 6,000 gal. and over including tank wagon drivers, semi-trailer driver (flat-bed or van tandems); light equipment mechanic; dump trucks (including all highway and off-highway) 35 C.Y.W.L.C. and over; truck and trailer or semi-trailer (flatbed); eject all

GROUP IX - Lowboy (heavy equipment double gooseneck); heavy equipment mechanic; welder (body and fender men)

HEAVY CONSTRUCTION TRUCK DRIVERS CLASSIFICATION DEFINITIONS

GROUP I - Pickup 3/4 to and under, service station, lubrication, light tire repair or washer, swamper or riding helper, teamster 2 or 4 up

GROUP II - Bus or taxi driver, dump or batch truck, under 8 C.Y.W.L.C. flatbed (bobtail) 2 ton and under, warehouseman including material checker, cardex man, expeditor, mechanic and welder helper, forklift under 5 ton M.R.C.

GROUP III - Dump trucks (including all highway & off-highway) 8 up to 16 C.Y.W.L.C., water,fuel or oil trucks less than 3,000 gals., flatbed (bobtail) over 2 tons

GROUP IV - Distributor driver, heavy tire repair, lumber carrier driver, yound buggy or similar equipment, transit mix or agitator 2 or 3 axle bobtail equipment, scissor truck, bulk cement bobtail 2 or 3 axles, semi-trailer flatbed or van single axle, forklift 5 ton and over M.R.C., field equipment servicemen

GROUP V - Dumpster and dumpcrete driver, water, fuel or oil truck, 3,000 to 6,000 gals., capacity, lowboy, light equipment driver, euclid-type tank wagon under 6,000 gallons

GROUP VI - Vacuum truck, dump trucks (including all highway & off-highway) 16 up to 22 C.Y.W.L.C.

GROUP VII - Transit mix or agitator semi or 4 axle equipment driver, flaherty truck type spreader box driver, slurry truck driver, bulk cement driver, semi-doubles, 4 axle bobtail, winch truck & "A" frame, dump trucks (including all highway and off-highway) 22 C.Y. up to 35 C.Y.W.L.C. head field equipment servicemen

GROUP VIII - Euclid diesel powered turnarocker, terra cobra, DW 10, DW 20, LeTourneau pulls and similar diesel powered equipment when used to haul materials and assigned to a teamster, lowboy heavy equipment driver, water, fuel or oil truck 6,000 gallons and over (including tank wagon drivers), semi-trailer driver (flatbed or van tandems) light equipment mechanic, dump trucks (including all highway and off-highway) 35 C.Y.W.L.C. and over, truck and trailer or semi-trailer (flatbed), ejectall

GROUP IX - Lowboy (heavy equipment, double gooseneck), heavy equipment mechanic, welder (body and fender man)

PAID HOLIDAYS:
A-New Year's Day; B-Memorial Day; C-Independence Day; D-Labor Day; E-Thanksgiving Day; F-Christmas Day; G-Friday after Thanksgiving

FOOTNOTES:
a - Includes $.07 contribution to the Occupational Health Fund
b - 1st 6 months - none; 6 months to 5 years, 6%; over 5 years, 8% of basic hourly rate.
c - Holidays A through G

WELDERS - receive rate prescribed for craft performing operation to which welding is incidental.

"Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29 CFR, 5.5 (a)(ii)."

DECISION NO. NV80-5100 (Cont'd)

	Basic Hourly Rates	Fringe Benefits Payments			
		H & W	Pensions	Vacation	Education and/or Appr. Tr.
Line Equipment Operators	$14.78	.99	3%+1.37		.08
Linemen	16.43	.99	3%+1.37		.08
Cable Splicers	18.07	.99	3%+1.37		.08
Painters:					
Remaining Counties including Lake Tahoe Area:					
Brush and Roller	15.18	.70	.75		.02
Spray; Taper; Paperhangers	15.70	.70	.75		.02
Spray - Swing Stage, up to 40 ft.; Spray-Steel	15.95	.70	.75		.02
Brush - Swing Stage, up to 40 ft.; Brush-Steel; Sandblaster	15.45	.70	.75		.02
Plaster Hod Carriers:					
Statewide excluding Clark, Esmeralda, Lincoln, Nye County (south half):					
Plaster Hod Carriers serving Plasterers	12.20	.95	1.20		
Plaster Hod Carriers working on any type of gun	12.80	.95	1.20		
Plumbers; Steamfitters:					
Remaining Counties and Nye County (north half)	14.14	1.13	1.00	1.95	.20
Plumbers (Utility):					
Statewide except Clark, Esmeralda, Lincoln, Nye County (south half)	14.14	1.13	1.00	1.95	.20
Soft Floor Layers:					
Clark, Esmeralda, Lincoln, Nye Cos.	14.87	.90			.25

DECISION #DM79-4101 - Mod. #1
44 FR 63443-November 2, 1979
Statewide, New Mexico

CHANGE:

	Basic Hourly Rates	Fringe Benefits Payments			
		H & W	Pensions	Vacation	Education and/or Appr. Tr.
ELECTRICIANS -Zone I:					
1-A	$12.55	.60	3%+.70		1/2%
1-B	13.43	.60	3%+.70		1/2%
1-C	14.18	.60	3%+.70		1/2%
1-D	15.06	.60	3%+.70		1/2%
ELECTRICIANS - Zone II	14.18	.60	3%+.70		1/2%
ELECTRICIANS - Zone III:					
3-A	10.15	.45	3%		1/10%
3-B	11.60	.45	3%		1/10%
ELEVATOR CONSTRUCTORS:					
Bernalillo, Catron, Colfax, Curry, DeBaca, Guadalupe, Harding, Lincoln, Los Alamos, McKinley, Mora, Quay, Rio Arriba, Roosevelt, Sandoval, San Juan, San Miguel, Santa Fe, Taos, Socorro, Torrance, Union and Valencia Counties	12.16	.545	.35	4%+b+c	.02
Chaves, Hidalgo, Dona Ana, Eddy, Grant, Lea, Luna, Otero and Sierra Counties	8.88	.895	.69	4%+b+c	.035
CABLE SPLICERS - ZONE I:					
1-A	13.81	.60	3%+.70		1/2%
1-B	14.69	.60	3%+.70		1/2%
1-C	15.44	.60	3%+.70		1/2%
1-D	16.32	.60	3%+.70		1/2%
CABLE SPLICERS - ZONE II	15.44	.60	3%+.70		1/2%
CABLE SPLICERS - ZONE III:					
3-A	10.40	.45	3%		1/10%
3-B	11.85	.45	3%		1/10%
ELECTRICIANS -ZONE IV:					
4-A	12.20	.60	3%		.01
4-B	12.55	.60	3%		.01
4-C	12.70	.60	3%		.01
4-D	12.95	.60	3%		.01
CABLE SPLICERS - ZONE III:					
4-A	12.55	.60	3%		.01
4-B	12.90	.60	3%		.01
4-C	13.05	.60	3%		.01
4-D	13.30	.60	3%		.01

Page 2

DECISION #NM79-4103 - Mod. #1

	Basic Hourly Rates	Fringe Benefits Payments			
		H & W	Pensions	Vacation	Education and/or Appr. Tr.
CHANGE: (CONT'D)					
SHEET METAL WORKERS-					
Zone 2	10.72	3%+.51	.485		.06
SHEET METAL WORKERS DEFINITION ZONE 2 TO READ "Dona Ana, Eddy, Grant, Hidalgo, Lea, Luna, Sierra and Otero Counties, including Holloman Air Force Base, White Sands and McGregor Ranges.					
OMIT:					
SHEET METAL WORKERS:					
Zone 3	8.35	.20			.05
SHEET METAL WORKERS ZONE 3 DEFINITIONS.					

DECISION NO. NM79-4148 - MOD. #1 (44 FR 52858 - November 13 1979) Mahoning & Trumbull Counties, Ohio	Basic Hourly Rates	Fringe Benefits Payments			
		H & W	Pensions	Vacation	Education and/or Appr. Tr.
Changes:					
Bricklayers:					
Mahoning Co.	$12.59	.75	1.00		.02
Trumbull Co.	13.09	.75	.50		.02
Carpenters:					
Commercial Building	11.72	1.29	1.20		.05
Residential	10.55	1.29	1.20		.05
Electricians:					
Mahoning (Milton Twp.) & Trumbull (Including Hubbard & Liberty Twps.) Cos.	14.29	.75	7%		.7%
Mahoning (Austintown, Beaver, Berlin, Broadman, Canfield, Ellsworth, Coitsville, Goshen, Green, Jackson Poland, Springfield, & Youngstown Twps.) & Trumbull (Hubbard & Liberty Twps.) Cos.	13.73	.75	9%		.5%
Mahoning (Smith Twp.) Co.:					
Residential (4 units only)	9.40	.55	3%+.50		.3%
Elevator Constructors	11.99	.745	.56	a+b	.035
Glaziers	12.61	.75	1.00		
Line Construction:					
Mahoning (excluding Smith Twp.), & Trumbull Cos.:					
Linemen; Cable Splicer; Operator - Pole digging Equipment	14.90	.70	3%		4%
Marble Setters; Terrazzo Workers; Tile Setters:					
Mahoning Co.	14.00				
Millwrights; Piledrivermen	12.51	1.29	1.20		.05

STANDARD FEDERAL EQUAL EMPLOYMENT OPPORTUNITY CONSTRUCTION CONTRACT SPECIFICATIONS (EXECUTIVE ORDER 11246)

1. As used in these specifications:

a. "Covered area" means the geographical area described in the solicitation from which this contract resulted;

b. "Director" means Director, Office of Federal Contract Compliance Programs, United States Department of Labor, or any person to whom the Director delegates authority;

c. "Employer identification number" means the Federal Social Security number used on the Employer's Quarterly Federal Tax Return, U. S. Treasury Department Form 941.

d. "Minority" includes:

(i) Black (all persons having origins in any of the Black African racial groups not of Hispanic orgin);

(ii) Hispanic (all persons of Mexican, Puerto Rican, Cuban, Central or South America or other Spanish Culture or orgin, regardless of race);

(iii) Asian and Pacific Islander (all persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian Subcontinent, or the Pacific Islands); and

(iv) American Indian or Alaskan Native (all persons having orgins in any of the original peoples of North America and maintaining identifiable tribal affiliations through membership and participation or community identification).

2. Whenever the Contractor, or any Subcontractor at any tier, subcontracts a portion of the work involving any construction trade, it shall physically include in each subcontract in excess of $10,000 the provisions of these specifications and the Notice which contains the applicable goals for minority and female participation and which is set forth in the solicitations from which this contract resulted.

3. If the Contractor is participating (pursuant to 41 CFR 60-4.5) in a Hometown Plan approved by the U. S. Department of Labor in the covered area either individually or through an association, its affirmative action obligations on all work in the Plan area (including goals and timetables) shall be in accordance with that Plan for those trades which have unions participating in the Plan. Contractors must be able to demonstrate their participation in and compliance with the provisions of any such Hometown Plan. Each Contractor or Subcontractor participating in an approved Plan is individually required to comply with its obligations under the EEO clause, and to make a good faith effort to achieve each goal under the Plan in each trade in which it has employees. The overall good faith performance by other Contractors or Subcontractors toward a goal in an approved Plan does not excuse any covered Contractor's or Subcontractor's failure to take good faith efforts to achieve the Plan goals and timetables.

4. The Contractor shall implement the specific affirmative action standards provided in paragraphs 7.a. through p. of these specifications. The goals set forth in the solicitation from which this contract resulted are expressed as percentages of the total hours of employment and training of minority and female utilization the Contractor should reasonably be able to achieve in each construction trade in which it has employees in the covered area. The Contractor is expected to make substantially uniform progress toward its goals in each craft during the period specified.

5. Neither the provisions of any collective bargaining agreement, nor the failure by a union with whom the Contractor has a collective bargaining agreement, to refer either minorities or women shall excuse the Contractor's obligations under these specifications, Executive Order 11246, or the regulations promulgated pursuant thereto.

6. In order for the nonworking training hours of apprentices and trainees to be counted in meeting the goals, such apprentices and trainees must be employed by the Contractor during the training period, and the Contractor must have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities. Trainees must be trained pursuant to training programs approved by the U. S. Department of Labor.

7. The Contractor shall take specific affirmative actions to ensure equal employment opportunity. The evaluation of the Contractor's compliance with these specifications shall be based upon its effort to achieve maximum results from its actions. The Contractor shall document these efforts fully, and shall implement affirmative action steps at least as extensive as the following:

a. Ensure and maintain a working environment free of harassment, intimidation, and coercion at all sites, and in all facilities at which the Contractor's employees are assigned to work. The Contractor, where possible, will assign two or more women to each construction project. The Contractor shall specifically ensure that all foremen, superintendents, and other onsite supervisory personnel are aware of and carry out the Contractor's obligation to maintain such a working environment, with specific attention to minority or female individuals working at such sites or in such facilities.

b. Establish and maintain a current list of minority and female recruitment sources, provide written notification to minority and female recruitment sources and to community organizations when the Contractor or its unions have employment opportunities available, and maintain a record of the organizations' responses.

c. Maintain a current file of the names, addresses and telephone numbers of each minority and female off-the-street applicant and minority or female referral from a union, a recruitment source or community organization and of what action was taken with respect to each such individual. If such individual was sent to the union hiring hall for referral and was not referred back to the Contractor by the union or, if referred, not employed by the Contractor, this shall be documented in the file with the reason therefor, along with whatever additional actions the Contractor may have taken.

d. Provide immediate written notification to the Director when the union or unions with which the Contractor has a collective bargaining agreement has not referred to the Contractor a minority person or woman sent by the Contractor, or when the Contractor has other information that the union referral process has impeded the Contractor's efforts to meet its obligations.

e. Develop on-the-job training opportunities and/or participate in training programs for the area which expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the Contractor's employment needs, especially those programs funded or approved by the Department of Labor. The Contractor shall provide notice of these programs to the sources compiled under 7.b. above.

f. Disseminate the Contractor's EEO policy by providing notice of the policy to unions and training programs and requesting their cooperation in assisting the Contractor in meeting its EEO obligations; by including it in any policy manual and collective bargaining agreement; by publicizing it in the company newspaper, annual report, etc.; by specific review of the policy with all management personnel and with all minority and female employees at least once a year; and by posting the company EEO policy on bulletin boards accessible to all employees at each location where construction work is performed.

g. Review, at least annually, the company's EEO policy and affirative action obligations under these specifications with all employees having any responsibility for hiring, assignment, layoff, termination or other employment decisions including specific review of these items with onsite supervisory personnel such as Superintendents, General Foremen, etc., prior to the initiation of construction work at any jobsite. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed, and disposition of the subject matter.

h. Disseminate the Contractor's EEO policy externally by including it in any advertising in the news media, specifically including minority and female news media, and providing written notification to and discussing the Contractor's EEO policy with other Contractors and Subcontractors with whom the Contractor does or anticipates doing business.

i. Direct its recruitment efforts, both oral and written, to minority, female and community organizations, to

schools with minority and female students and to minority and female recruitment and training organizations serving the Contractor's recruitment area and employment needs. Not later than one month prior to the date for the acceptance of applications for apprenticeship or other training by any recruitment source, the Contractor shall send written notification to organizations such as the above, describing the openings, screening procedures, and tests to be used in the selection process.

j. Encourage present minority and female employees to recruit other minority persons and women and, where reasonable, provide after school, summer, and vacation employment to minority and female youth both on the site and in other areas of a Contractor's workforce.

k. Validate all tests and other selection requirements where there is an obligation to do so under 41 CFR Part 60-3.

l. Conduct, at least annually, an inventory and evaluation at least of all minority and female personnel for promotional opportunities and encourage these employees to seek or to prepare for, through appropriate training, etc., such opportunities.

m. Ensure that seniority practices, job classifications, work assignments and other personnel practices, do not have a discriminatory effect by continually monitoring all personnel and employment related activities to ensure that the EEO policy and the Contractor's obligations under these specifications are being carried out.

n. Ensure that all facilities and company activities are nonsegregated except that separate or single-user toilet and necessary changing facilities shall be provided to assure privacy between the sexes.

o. Document and maintain a record of all solicitations of offers for subcontracts from minority and female construction contractors and suppliers, including circulation of solicitations to minority and female contractor associations and other business associations.

p. Conduct a review, at least annually of all supervisors' adherence to any performance under the Contractor's EEO policies and affirmative action obligations.

8. Contractors are encouraged to participate in voluntary associations which assist in fulfilling one or more of their affirmative action obligations (7a through p). The efforts of a contractor-association, joint contractor-union, contractor-community, or other similar group of which the Contractor is a member and participant, may be asserted as fulfilling any one or more of its obligations under 7a through p of these Specifications provided that the Contractor actively participates in the group, makes every effort to assure that the group has a positive impact on the employment of minorities and women in the industry, ensures that the concrete benefits of the program are reflected in the Contractor's minority and female workforce participation, makes a good faith effort to meet its individual goals and timetables, and can provide access to documentation which demonstrates the effectiveness of actions taken on behalf of the Contractor. The obligation to comply, however, is the Contractor's and failure of such a group to fulfill an obligation shall not be a defense for the Contractor's noncompliance.

9. A single goal for minorities and a separate single goal for women have been established. The Contractor, however, is required to provide equal employment opportunity and to take affirmative action for all minority groups, both male and female, and all women, both minority and non-minority. Consequently, the Contractor may be in violation of the Executive Order if a particular group is employed in a substantially disparate manner (for example, even though the Contractor has achieved its goals for women generally, the Contractor may be in violation of the Executive Order if a specific minority group of women is underutilized).

10. The Contractor shall not use the goals and timetables or affirmative action standards to discriminate against any person because of race, color, religion, sex, or national orgin.

11. The Contractor shall not enter into any Subcontract with any person or firm debarred from Government contacts pursuant to Executive Order 11246.

12. The Contractor shall carry out such sanctions and penalties for violation of these specifications and of the Equal Opportunity Clause, including suspension, termination, and cancellation of existing subcontracts as may be imposed or ordered pursuant to Executive Order 11246, as amended, and its implementing regulations, by the Office of Federal Contract Compliance Programs. Any Contractor who fails to carry out such sanctions and penalties shall be in violation of these specifications and Executive Order 11246, as amended.

13. The Contractor, in fulfilling its obligations under these specifications, shall implement specific affirmative action steps, at least as extensive as those standards prescribed in paragraph 7 of these specifications, so as to achieve maximum results from its efforts to ensure equal employment opportunity. If the Contractor fails to comply with the requirements of the Executive Order, the implementing regulations or these specifications, the Director shall proceed in accordance with 41 CFR 60-4.8.

14. The Contractor shall designate a responsible official to monitor all employment related activity to ensure that the company EEO policy is being carried out, to submit reports relating to the provisions hereof as may be required by the Government and to keep records. Records shall at least include for each employee the name, address, telephone numbers, construction trade, union affiliation if any, employee identification number when assigned, social security number, race, sex, status (e.g., mechanic, apprentice, trainee, helper, or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and locations at which the work was performed. Records shall be maintained in an easily understandable and retrievable form; however, to the degree that existing records satisfy this requirement, contractors shall not be required to maintain separate records.

15. Nothing herein provided shall be construed as a limitation upon the application of other laws which establish different standards of compliance or upon the application of requirements for the hiring of local or other area residents (e.g., those under the Public Works Employment Act of 1977 and the Community Development Block Grant Program).

Wherever used in these General Conditions or in the other Contract Documents, the following terms have the meanings indicated which are applicable to both the singular and plural thereof:

Abbreviations—Wherever the following abbreviations or symbols are used, they are to be construed the same as the respective expressions represented:

AASHTO American Association of State Highway and Transportation Officials
AB ..... Aggregate Base
AC ..... Asphalt Concrete
ACB ..... Asphalt Concrete Base
ACI ..... American Concrete Institute
ACNM ..... Associated Contractors of New Mexico
ACP ..... Asbestos Cement Pipe
ACPA ..... American Concrete Pipe Association
AD ..... Assessment District
AGC ..... Associated General Contractors of America, Inc.
AIEE ..... American Institute of Electrical Engineers
AISC ..... American Institute of Steel Construction
ANSI ..... American National Standards Institute
APWA ..... American Public Works Association
AREA ..... American Railway Engineering Association
ASCE ..... American Society of Civil Engineers
ASME ..... American Society of Mechanical Engineers
Asph ..... Asphalt
ASTM ..... American Society for Testing and Materials
AWG ..... American Wire Gage (Nonferrous Wire)
AWPA ..... American Wood Preservers Association
AWPI ..... American Wood Preservers Institute
AWS ..... American Welding Society
AWWA ..... American Water Works Association
BC ..... Beginning of Curve or Back of Curb
BCR ..... Beginning of Curb Return or Back of Curb Radius
BM ..... Bench Mark
BWG ..... Birmingham Wire Gage (Iron and Steel Wire)
CB ..... Catch Basin
C.C. or C/C ..... Center to Center
Cem. ..... Cement
CF ..... Curb Face
CI ..... Cast Iron

CIP ..... Cast-iron Pipe
CIPP ..... Cast-in-Place Pipe
C.L. or CL ..... Center Line
CMP ..... Corrugated Metal Pipe
CMPA ..... Corrugated Metal Pipe Arch
CO ..... Clean Out
Col ..... Column
Conc ..... Concrete
Const ..... Construct
DF ..... Douglas Fir
DG ..... Decomposed Granite
DMH ..... Drop Manhole
D/W ..... Driveway
EC ..... End of Curve
El. or Elev. ..... Elevation
Ex. or Exist ..... Existing
F & C ..... Frame and Cover
FH ..... Fire Hydrant
FL ..... Flow Line
Fl. El. ..... Floor Elevation
FS ..... Federal Specifications of Finished Surface
FHWA ..... Federal Highway Administration, Department of Transportation
Galv. ..... Galvanized
GL ..... Ground Line
Gr. ..... Grade
H ..... Height or High
HC ..... House Connection Sewer
Hor. ..... Horizontal
ID ..... Inside Diameter
Inv. ..... Invert
IP ..... Iron Pipe
ITE ..... Institute of Traffic Engineers
Lin. ..... Linear
LL ..... Liquid Limit
Long ..... Longitudinal
Max. ..... Maximum
MH ..... Manhole
M ..... Thousand
m ..... meter or middle
Min. ..... Minutes or Minimum
Mon. ..... Monolithic or Monument
MTD ..... Multiple Tile Duct
NEC ..... National Electrical Code
NEMA ..... National Electrical Manufacturers Association

NFPA ..... National Fire Protection Association
NGS ..... National Geodetic Survey
NMSA ... New Mexico Statutes Annotated—1953 Compilation as Amended
NMSHD ..... New Mexico State Highway Department
OC ..... On Center
OD ..... Outside Diameter
PC ..... Point of Curvature
PCC ..... Point of Compound Curve or Portland Cement Concrete
PI ..... Point of Intersection or Plasticity Index
PL ..... Property Line or Plastic Limit
PP ..... Power Pole
ppm ..... Parts per Million
PRC ..... Point of Reverse Curve
Prop. ..... Proposed or Property
psf ..... Pounds per Square Foot
psi ..... Pounds per Square Inch
PT ..... Point of Tangency
Pvmt. ..... Pavement
PVCP ..... Polyvinylchloride Pipe
Q ..... Rate of Flow
R ..... Radius
RC ..... Reinforced Concrete
RCP ..... Reinforced Concrete Pipe
Rdwy. ..... Roadway
Ret. Wall ..... Retaining Wall
RGRCP ..... Rubber Gasket-Reinforced Concrete Pipe
R/W ..... Right-of-Way
s. ..... Slope
SAE ..... Society of Automotive Engineers
San. ..... Sanitary
SCCP ..... Steel Cylinder Concrete Pipe
SD ..... Storm Drain
Sdl. ..... Saddle
Sect. ..... Section
Spec. ..... Specifications
Sp. MH ..... Special Manhole
San. S ..... Sanitary Sewer
St. ..... Street
Sta. ..... Station
Std. ..... Standard
T ..... Tangent Distance
TH ..... Test Hole
TMH ..... Trap Manhole
UL ..... Underwriters' Laboratories, Inc.

USA ..... United Stotes of Americo Stondords Institute, Inc.
V ..... Velocity
VC ..... Vertical Curve
VCP ..... Vitrified Clay Pipe
VCPI ..... Vertical Curve Point of Intersection
Vert. ..... Vertical
W.I. ..... Wrought Iron

Reference Specifications, Test Methods, and Applicable Codes—All standard specifications and test methods of any society, association, or organization herein referred to are hereby made a part of these Contract Documents the same as if written in full. (Any reference to a paragraph or subparagraph within a section shall include all general provisions of the section to which reference is made.) Reference to such standards refer to the latest published issues as of the date of the Invitation to Bid. Reference to local or state codes and laws shall mean the latest adopted and published codes as of the date of the Invitation to Bid.

TECHNICAL PROVISIONS

INDEX

DIVISION I

SECTION 01100 - SPECIAL CONTRACT REQUIREMENTS

SECTION 01300 - SUBMITTALS

SECTION 01500 - TEMPORARY FACILITIES, CONTROLS AND SPECIAL PROJECT REQUIREMENTS

DIVISION 2

SITE WORK

02102	CLEARING AND GURBBING
02220	EXCAVATING AND BACKFILLING
02221	TRENCH, EXCAVATION AND BACKFILL
02501	SUBDRAINAGE SYSTEMS
02611	CRUSHED STONE PAVING
02710	FENCES AND GATES
02765	RIPRAP
02821	SEEDING

DIVISION 3

CONCRETE

03101	PORTLAND CEMENT CONCRETE
03210	STEEL REINFORCEMENT
03250	CONCRETE CURING COMPOUND AND ACCESSORIES
03251	EXPANSION AND JOINT FILLER
03310	CONCRETE STRUCTURES
03600	CEMENT MORTAR AND GROUT

DIVISION 4

MASONRY

04220	CONCRETE BLOCK MASONRY

DIVISION 5

METALS

05120	STRUCTURAL STEEL, BOLTS AND ANCHOR BOLTS
05301	METAL

DIVISION 6

WOOD AND PLASTICS

06100	ROUGH CARPENTRY
06200	FINISH CARPENTRY

DIVISION 7

THERMAL AND MOISTURE PROTECTION

07212	RIGID INSULATION
07240	ROOF AND DECK INSULATION
07500	MEMBRANE ROOFING AND ASPHALT ROOFING
07811	PLASTIC SKYLIGHTS

DIVISION 8

DOORS AND WINDOWS

08110	METAL DOORS AND FRAMES
08710	FINISH HARDWARE

DIVISION 9

FINISHES

09900	PAINTING

DIVISION 15

MECHANICAL

15060	PIPE AND PIPE FITTINGS
15061	STEEL PIPE
15062	CAST IRON PIPE
15063	COPPER PIPE
15101	GATE VALVES
15109	HYDRANTS
15110	CHECK VALVES
15111	SWING CHECK VALVES
15170	METERS, GAUGES AND PUMP CONTROL VALVES
15220	PIPING SYSTEM-INTERIOR PIPING
15230	BOOSTER PUMPING EQUIPMENT
15240	RESERVOIR LINER
15241	RESERVOIR LOUVER
15760	UNIT HEATER AND VENTILATION

DIVISION 16

ELECTRICAL

16100	BASIC MATERIALS AND METHODS

TECHNICAL PROVISIONS

SECTION 01100

SPECIAL PROJECT REQUIREMENTS

01101 SCOPE OF WORK

Unless otherwise specifically provided herein, this contract covers the furnishing of all plant, labor, equipment, supplies and materials and performing all work in strict accordance with the terms of the contract.

01102 CONTRACT DRAWINGS AND SPECIFICATIONS

The Contractor will be furnished, without charge, Five (5) sets of drawings and specifications. The drawings which constitute a part of the contract documents are as indexed on the title sheet of the drawings.

01103 PRIORITIES, ALLOCATIONS AND ALLOTMENTS

a. The Contractor shall follow the provisions of Defense Materials System Regulation 1 and all other applicable regulations and orders of the Bureau of Domestic and International Business Administration, Department of Commerce in obtaining controlled materials and other products and materials needed to perform this contract. DELETE

b. The Contractor further agrees to require the inclusion of paragraph a. of this clause in all subcontracts issued hereunder. DELETE

c. Except as specifically modified in these specifications, Priority DX E-1 certified for National Defense under DMS Regulation 1 applies to this contract. DELETE

01104 VALUE ENGINEERING INCENTIVE

General Provision 59, Value Engineering Incentive, is not applicable to this contract and is hereby deleted.

01105 STATE LIEN STATUTES

State lien statutes are not applicable to construction contracts of the Federal Government; therefore, Preliminary Notices to the Government will not be acknowledged. The Miller Act (40 USC 270a-270d) may provide a remedy for unpaid persons or firms furnishing labor and/or materials in the prosecution of the work provided for in Government contracts.

01106 LIQUIDATED DAMAGES

In case of failure on the part of the Contractor to complete the work within the time fixed in the contract or any extensions thereof, the Contractor shall pay to the Government as fixed, agreed and liquidated damages, pursuant to the clause of this contract entitled "Termination for Default - Damages for Delay - Time Extensions," the sum of One-Hundred dollars ($100.00) for each calendar day of delay.

DELETE

SECTION 01300

SUBMITTALS

01301 GENERAL (See General Provision 15)

a. Shop drawings, catalog data, equipment and material lists, elementary diagrams, wiring diagrams, installation instructions, maintenance manuals and instructions, and operation brochures, shall be submitted for the items of equipment and materials in accordance with the coded legend herein within the time specified unless otherwise directed by the Contracting Officer. If materials or equipment are required and are not specifically listed therein, the most closely related item listed will govern the type of submittal required. The submittal shall include a typewritten list showing each item and manufacturer for approval and shall be submitted concurrently with all equipment which forms a system or subsystem that must be reviewed simultaneously because of coordination requirements. These submittals shall be corrected to "as-built" conditions prior to the completion of the project and turned over to the Contracting Officer. Catalogs for submittal shall have unrelated pages removed with capacities and specified parameters relating to the item or items clearly marked. The maintenance manuals and instructions shall indicate routine-type work defined by step-by-step instructions, that should be performed to insure long life and proper operations; the recommended frequency of performance is also to be included. Instructions should include possible trouble spots with diagnosis and correction of each. These manuals shall be turned over to the Contracting Officer at the completion of the project. The theory of operation brochures shall describe the function of each component or subassembly in block-diagram-type presentation to a degree that a mechanic will understand the product well enough to operate and maintain it. These brochures will be submitted to the Contracting Officer at the completion of the project.

b. The Contractor shall submit to the Contracting Officer, for review, copies as required by the Contracting Officer, of descriptive submittals (as described in paragraph a., above) for all items it proposes to use in the project, complete, containing all required detailed information. After approval has been indicated on each copy by appropriate signature, stamp and date, three or more copies will be retained by the Contracting Officer and the balance will be returned to the Contractor.

c. Approval of descriptive submittals will not relieve the Contractor of the responsibility for correcting any errors which may exist or for meeting requirements of the specifications. No partial submittals will be accepted.

d. If required, samples and descriptive data shall be submitted within the time specified in these specifications or, if no time is specified, within a reasonable time before use to permit inspection and testing; and shall be shipped prepaid and delivered as specified in these specifications and shall be properly marked to show the name of the material, trade name of manufacturer, place of origin, name and location of work where the material represented by the sample is to be used, and name of Contractor submitting the sample. Samples not subject to destructive tests may be retained until completion of the work but thereafter will be returned to the Contractor, if the Contractor so requested in writing, at its own expense. Failure of any samples to pass the specified requirements will be sufficient cause for refusal to consider further any samples from the same manufacturer whose materials failed to pass the tests. Written authorization of the Contracting Officer is required for inclusion into

the work of items proposed to be substituted in lieu of those specified or referenced. (See the Clause of the General Provisions entitled "Materials and Workmanship.") The option of the Contracting Officer relating to the equality of items shall be final. Any changes required in the details and dimensions indicated on the drawings as a result of approved substitution shall be properly made, as approved by the Contracting Officer and at the expense of the Contractor. If the Contractor fails to submit for approval the required data within the specified time in accordance with the preceding paragraph, the Contracting Officer will select a complete line of materials and/or equipment. If the Contractor submits for inclusion in the work, materials and/or equipment not in accordance with the specifications, the Contracting Officer will have the right to reject them and select a full line of materials and/or equipment. The selection made by the Contracting Officer will be final and binding and the items shall be furnished and installed by the Contractor without change in the contract price.

e. This Provision shall be deemed superseded to the extent of conflict, if any, between this Provision and any Provision in the technical sections of the specifications.

01302 SPECIFIC REQUIREMENTS

a. The Contractor shall submit all forms, data, information, certificates, schedules, etc., as required in other sections of the specifications. Omission of an item from the above tabulation does not relieve the Contractor from the responsibility for submitting the item required.

b. Descriptive submittals shall be made for the items of equipment and materials set forth below, in accordance with the coded legend set forth below, within fourteen(14) days after receipt of Notice to Proceed. (Submittals marked with an asterisk must be in reproducible form, the same size and scale as the contract drawings, or as directed by the Contracting Officer at the preconstruction conference.)

LEGEND

a. Shop Drawings
b. Certifications
c. Equipment list
d. Material list
e. Elementary Diagrams and Wiring Diagrams
f. Installation Instructions
g. Maintenance Instructions
h. Operating Instructions
i. Samples, Colors
j. Welders' Certifications
k. Performance Curves
l. Catalog Data
m. Recommended Spare Parts Lists
n. Computations

SUBMITTAL LIST

Submittal Number	Legend	Spec. Code/Drawing Code	Description
		SITE WORK	
1.	b	2.710	Fence
		CONCRETE	
2.	b	3.310	Concrete Reinforcement
3.	a,d	3.310	"
		THERMAL AND MOISTURE PROTECTION	
4.	b,l	7.240	Insulation
5.	b,l	7.500	Roofing
6.	a,f	7.811	Skylight
		DOOR, WINDOW	
7.	a,b	8.110	Doors & Frames
		MECHANICAL	
8.	l	15.101	Valves
9.	l	15.170	Pressure Gauges
10.	l	15.170	Water Meter
11.	k	15.230	Pumps
12.	a	15.240	Liner
13.	a	15.210	Cover
		ELECTRICAL	
14	a,c,d,l,h	16.100	Electrical Equipment & Wiring

SECTION 01500

TEMPORARY FACILITIES, CONTROLS AND SPECIAL PROJECT REQUIREMENTS

.01501 FIRE PROTECTION DURING CONSTRUCTION

The fire protection system shall be activated by the Contractor when the building to be protected is _____ percent complete as evidenced by the Contractor's approved schedule and bid breakdown and the Contractor's request for payment. See General Provision 52, Schedules, Breakdowns, Subcontracts, Payments

or:

The existing automatic fire sprinklers shall be kept in operation by the Contractor throughout the term of the contract. Nipples and caps shall be furnished and installed in mains, branch lines and drops to keep the system in operation. Approval will be given to take portions of the system out of operation when required for construction and modifications. See General Provision 52, Schedules, Breakdowns, Subcontracts, Payments.

DELETE

01502 TEMPORARY FIELD OFFICE

(Instructions: If you want to require a temporary field office, adapt this clause to specific project requirements.)

The Contractor shall furnish and maintain during the performance of this contract adequate field office space for inspection personnel. The office shall be a minimum of 8' x 10' with work table and chair and with adequate heat, power and lighting as approved.

01503 GOVERNMENT-FURNISHED PROPERTY (See General Provision 47)

The Government shall not be obligated to furnish any property whatever to the Contractor except to the extent, if any, that provision is explicitly made in paragraph a. below of this clause or in the drawings of this contract for the furnishing by the Government to the Contractor, as free issue, of property to be incorporated or installed in the work or used in its performance.

DELETE

(Instructions: Include paragraphs a.-f. below when Government-furnished Property will be provided and give specific procedures to the Contractor for requesting Government-furnished Property and where it will be available.)

DELETE

a. The Government will furnish, as free issue the following property to be incorporated or installed in the work or used in its performance:

DELETE

Item or Equipment No.	Description
_____	_____
_____	_____

b. Such property will be furnished on or before _____.

DELETE

c. Such property will be furnished at _____.

DELETE

d. Except as specified elsewhere in the contract such property will be furnished f.o.b. railhead nearest the project, f.o.b. truck at the project site, or in storage at or near the job site, and the Contractor will be required to accept delivery when made, pay any demurrage incurred, and unload and transport the property to the job site and its own expense. All such property will be installed and/or incorporated into the work at the expense of the Contractor unless otherwise indicated herein. Any property so furnished which is in excess upon completion of the work, shall remain the property of the Government. The Contractor shall check the quantity and condition of such Government-furnished property when delivered to the Contractor, acknowledge receipt in writing to the Contracting Officer, and in case of damage to, or shortage of, such property, shall within 24 hours, report in writing such damage and/or shortage to the Contracting Officer.

DELETE

e. The Contractor shall uncrate, unpack, remove all shipping bolts, blocking, bracing, etc., as required prior to assembly and/or installation of Government-furnished equipment. The Contractor shall assemble, adjust, lubricate, align and perform all prestart up inspections, tests, operations and place equipment in operation as recommended by the manufacturer or manufacturers of equipment.

DELETE

f. Except for reasonable wear and tear or depreciation, or the utilization or disposition of such property in accordance with the provision of this contract, any such property shall be returned to the Government in as good condition as when received by the Contractor.

DELETE

01504 SALVAGE

(Instructions: List what items the Government desires to salvage, removal, crating and packaging, and final disposition instructions.)

DELETE

01505 SECURITY MEASURES

(Instructions: Paragraphs a. and b. should be included in all contracts requiring work in security areas. If the site has particular security measures and procedures, they may be used in lieu of, or in addition to, paragraphs a. and b. below. Any special access controls, such as the hours the site will be available for work, should be set out in this section.)

DELETE

a. The work under this contract will be performed in a security area and all employees of the Contractor and its subcontractors, regardless of tier, must be citizens of the United States and either possess proper access authorization from the DOE or be under escort, to be provided by the Government at no cost to the Contractor. All vehicles and packages, crates, toolboxes, etc., will be subject to search at any time.

DELETE

b. The Contractor shall provide upon request from the Contracting Officer the name of any Contractor or subcontractor employee together with said employee's address and citizenship. The Contractor shall furnish in writing to the Contracting Officer, information regarding any deviation from the normal workday or workweek at Los Alamos Scientific Laboratory. The Contracting Officer reserves the right to exclude from the construction site any employee as deemed appropriate.

DELETE

01506 VEHICULAR ACCESS AND CLOSING OF STREETS

(Instructions: Paragraphs a., b., and c. should be included in all contracts. In addition, some sites require special vehicle procedures. For example, base decals may be required, special gate access, special times for movement of trucks and machinery, etc. Any additional clause(s) must be tailored for the specific site.)

a. When operations in connection with project work necessitate the closing of streets, removal of traffic signs or interference with normal traffic, it shall be the responsibility of the Contractor

to arrange in advance with the Contracting Officer _____ for such street closing or sign removal and to provide appropriate barricades, signs, markers, flares and other devices as may be required by the Contracting Officer or the _____ for traffic guidance and public safety.

b. The Contractor shall maintain a minimum of one open traffic lane at all times during construction.

c. The Contractor, upon completion of his work or when directed by the Contracting Officer, immediately shall replace or relocate and install as directed all presently existing safety, security, utility and similar markers and signs affected by his construction. All damaged signs shall be replaced by the Government at the Contractor's expense.

01507 INTERRUPTIONS IN UTILITY SERVICES

(Instructions: Set out in this section any specific requirements related to utility outages, such as, for example, a requirement that no outages will be allowed during regular working hours. If there are no special requirements, include the following provision.)

There are no special requirements for interruptions of utility services, except those set out in General Provision 51.

SECTION 02102

CLEARING AND GRUBBING

1.01 GENERAL

This work shall consist of removing natural and artificial objectionable material from the right-of-way, construction areas, road approaches, material and borrow sites, and areas through which ditches and channels are to be excavated. Clearing and grubbing shall be performed in advance of grading operations except that in cuts over 3 feet in depth, grubbing may be done simulataneously with excavation, provided stumps, roots, and embedded wood are removed as specified. Clearing and grubbing shall be in accordance with the requirements herein specified, such as to erosion control requirements.

1.02 CONSTRUCTION METHODS

A. The area above the natural ground surface shall be cleared of vegetable growth such as trees, tree stumps, logs, roots or downed trees, brush, grass, and weeds.

B. The entire area of the project within the limit lines specified below shall be cleared and grubbed. No burning will be permitted without prior approval of the U. S. Forest Service.

1.03 LIMIT LINES

A. Except when limit lines for clearing and grubbing are shown on the plans or are staked by the C.O., clearing and grubbing shall extend only within reasonable limits of the work area.

1.04 REMOVAL AND DISPOSAL

Debris removed shall be disposed of outside the right-of-way at the Jemez Dump, except when burning of combustible debris is permitted by the Forest Service. The area to be graded and adjacent areas shall be left with a neat and finished appearance. No accumulation of flammable material shall remain on or adjacent to the property line. In case burning precedes construction operations, the piles may be placed in the center of the area; otherwise, the piles shall be placed in the most convenient location at the side of the area and beyond slope lines where they may be burned without damage to surrounding forest cover of adjacent property. Burning shall be done only with the approval of the Forest Service and at such times and in such a manner as to prevent the fire from spreading to areas adjoining the construction site.

SECTION 02220

EXCAVATING AND BACKFILLING
(STRUCTURES AND EARTH RESERVOIR)

1.01 GENERAL

The backfill material shall consist of naturally occurring native material such as soil pit-run gravel, sand, decomposed granite, or slide rock and shall be free from wood, vegetation, or other deleterious matter, but shall contain sufficient filler to permit proper compaction of the embankment. The maximum size of this material shall not be greater than 2/3 the compacted thickness of the course placed in the subgrade. The CONTRACTOR shall notify the CONTRACTING OFFICER (C.O.) sufficiently in advance of opening any material sites so that cross section elevations and measurement of the ground surface after stripping may be taken and sufficient time for testing the material will be allowed.

1.02 PLACING

A. Fill construction shall consist of constructing embankments except as may otherwise be specified, including the preparation of the areas upon which they are to be placed; the construction of dikes; the placing and compacting of approved material within areas where unsuitable material has been removed; and the placing the compacting of material in holes, pits, and other depressions.

B. Unless otherwise specified, the upper 6 inches of the original ground area upon which fills are to be constructed shall be compacted to a density of not less than 90 percent of maximum density as determined by ASTM D 1557, or in soils containing less than 5 percent passing the #200 sieve, a minimum relative density of 70 percent as determined by ASTM D 2049.

C. Rocks, broken concrete, or other solid materials which are larger than 4 inches in greatest dimensions shall not be placed in fill areas where smooth surfaces are required.

D. When fill is to be made and compacted on hillsides or where new fill is to be compacted against existing fill or where embankment is built 1/2 width at a time, the slopes of original hillsides and old or new fills shall be benched at a minimum of 4 feet horizontally as the fill is placed. A new bench shall be started wherever the vertical cut of the next lower bench intersects the existing ground.

E. Material thus cut out shall be recompacted along with the new embankment material.

F. Clods or hard lumps of earth of 6 inches in greatest dimension shall be broken up before compacting the material in embankment, except as provided in the following paragraph.

G. When the fill material includes large rocky material or hard lumps,

such as hardpan or cemented gravel which cannot be broken readily, such material shall be well distributed throughout the fill. Sufficient earth or other fine material shall be placed around the larger material as it is deposited so as to fill the interstices and produce a dense, compact fill. However, such material shall not be placed within 2 feet of the finished grade of the fill.

H. Embankment construction shall not be performed when material is frozen.

1.03 COMPACTING

A. Fill shall be constructed in compacted layers of uniform thickness and each layer shall be compacted in accordance with the requirements herein specified with the following exception.

B. Unless otherwise specified herein, the construction of dikes, the placing and compacting of approved material within the project where unsuitable material has been removed, and the filling of holes, pits, and other depressions within the area shall conform to all of the requirements herein specified for compacting fills. Trenches, holes, depressions, and pits outside of areas where fills are to be constructed shall be graded to provide a presentable and well-drained area.

C. The loose thickness of each layer of fill material before compacting shall not exceed 8 inches, except as provided in the following paragraph for rocky material. Each layer shall be compacted in accordance with the following requirements to a density of not less than 90 percent of maximum density, as determined by ASTM D 1557, or in soils containing less than 5 percent passing the #200 sieve, a minimum relative density of 70 percent as determined by ASTM 2049.

D. Fill material shall not contain rock larger than 6 inches in greatest dimension.

E. The interstices around the rock in each layer shall be filled with earth or other fine material and compacted.

F. At locations where it would be impractical to use mobile power compacting equipment, fill layer shall be compacted to the specified requirements of any approved method that will obtain the specified relative compaction.

G. At the time of compaction, the moisture content of fill material shall be optimum plus or minus 5%. Fill material which contains excessive moisture shall not be compacted until the material is dry enough to obtain the required relative compaction. Full compensation for any additional work involved in drying fill material to the required moisture content shall be considered as included in the contract price and no additional compensation will be allowed therefore. Fills shall be maintained to the grade and cross sections shown on the plans until the acceptance of the Contract.

H. Optimum densities will be determined in accordance with ASTM D 1557. Field control of density of in-place material will be determined in accordance with ASTM D 1556, D 2167, or the nuclear method ASTM D 2922.

SECTION 02221

TRENCH EXCAVATION AND BACKFILL

1.01 GENERAL

Trench excavation and backfill shall be performed in accordance with the notes and details shown on the drawings and the applicable provision of the Specifications.

1.02 EXCAVATION

Excavation for pipe and for the concrete curb around the pond shall be by open unsupported trenches unless otherwise specified or shown on the drawings. Where material is excavated from trenches and piled adjacent thereto, it shall be piled and maintained so that the toe of the slope of the material is at least 2 feet from the edge of the trench.

1.03 UNSUITABLE MATERIAL

Material encountered in trench excavation unsuitable for support of the pipe shall be removed to the depth necessary, as directed by the C.O. to properly support the pipe and provide a suitable base for backfilling.

1.04 MAXIMUM LENGTH OF TRENCH

No more than 300 feet of trench shall be opened in advance of pipe laying operations. Backfilling shall begin as soon as pipe is laid and inspected and shall keep pace with the pipe laying. Failure by the CONTRACTOR to comply with the limitations specified herein or as may be specifically authorized by the C.O. may result in written order from the C.O. to halt progress of the work until such time as compliance with this paragraph has been achieved and the work can be prosecuted in an orderly sequence of operations.

1.05 WIDTH OF TRENCHES

Trench widths from bottom of pipe to a point 12 inches above the top of the pipe shall be kept ot the practical minimum required for properly laying, aligning, grading, and jointing of the pipe, but not less than pipe outside diameter plus 16 inches. Trench widths at a point 12 inches above the top of pipe to the top of the trench shall be in accordance with applicable regulations. When soil will not stand vertical, the trench sides shall be sloped to provide not less than the outside diameter plus 16 inches at the pipe invert. The CONTRACTOR shall maintain all trenches in a safe condition protecting the men working and the general public in any case; trench protection shall be in accordance with applicable OSHA Regulations.

1.06 ACCESS TO TRENCHES

Safe and suitable ladders shall be provided for all excavation in accordance with OSHA Regulations.

1.07 BRACING EXCAVATIONS

Excavations shall be braced and sheeted as indicated on the plans to provide complete safety to persons working therein and shall comply with applicable Federal (OSHA) Standards. Support systems for trenches in excess of 20 feet and adjacent ot existing improvement or subject to vibrations or ground water shall be in accordance with OSHA Regulations. The CONTRACTOR shall be fully responsible for sufficiency and adequacy of bracing excavations with respect to work under construction and to adjacent utility lines and private property. If sheeting is used to support the excavated trench, the sheeting, after backfilling, shall be removed by the CONTRACTOR and no such sheeting will be permitted to remain in the trench except when, in the opinion of the C.O., field conditions or the type of sheeting or methods of construction used by the CONTRACTOR are such as to make the removal of sheeting impracticable. In such cases, the C.O. may permit portions of the sheeting to be cut off to such depth as he may approve and permit lower portions thereof to remain in the trench.

1.08 BACKFILL

The CONTRACTOR shall proceed with backfilling as soon as practicable. Compaction or consolidation shall follow as soon after the placing as is practicable. The joints shall not be covered until final testing of the line is completed.

A. MATERIALS

1.081 Pipe Zone - The area around the pipe within the trench/prism to a level 18 inches above the highest point of the pipe (top of pipe or service connection) shall be select cohesionless materials. Cohesionless material shall consist of natural soil from the excavation or imported material meeting the following gradation and plasticity requirements unless exceptions are approved by the C.O. When tested in accordance with ASTM D 422, the select material shall have 100% passing the 1-1/2" screen. The maximum percent passing the No. 200 sieve shall be based on the plasticity index determined in accordance with ASTM D 423 and D424 as indicated below:

PLASTICITY INDEX	MAXIMUM % PASSING NO. 200 SIEVE
0 - 3	50%
3 - 6	35%
6 - 10	25%
Over 10	Unsuitable

1.082 Backfill above pipe zone - The area within the trench prism above the pipe zone shall consist of the soil and rock excavated from the trench.

1.09 COMPACTION METHODS

Pipe Zone material shall be consolidated by saturation throughout the entire depth. After saturation, the upper 6 inches of select material shall be compacted by use of vibratory equipment to a density of not less than 90% of ASTM D 1557 maximum modified density. An alternate method for compaction of the entire pipe zone by use of hand tamping equipment may be used by the CONTRACTOR if approved by the C.O. Backfill above pipe zone shall be compacted by whatever method the CONTRACTOR chooses to a density not less than 90 percent of maximum density. Where the backfill contains more than 65 percent of material retained on the No. 4 sieve, the percent of compaction shall be waived.

SECTION 02501

SUBDRAINAGE

1.01 GENERAL

The subdrainage system shall be constructed in accordance with the notes and details shown on the drawings and the applicable provisions of the specifications.

1.02 CONCRETE

All concrete placed in drainage structures, subdrain outlets, pipe collars, and similar features of the subdrainage system shall conform to the applicable provision of SECTION 03300.

1.03 SUBDRAINAGE PIPE

Subdrainage pipe, both perforated and non-perforated, shall be corrugated metal pipe, as shown on the drawings. Pipe laying shall be in accordance with applicable sections of these specifications.

A. PIPE JOINTS

The coupling bands shall conform to the requirement of AASHO M-36. The coupling bands shall be the same base metal as the pipe and shall be galvanized, The thickness of the coupling bands may be two numerical thicknesses (as listed in AASHO M-218) less than that used for the pipe, but not more than 0.109 inches nor less than 0.064 inches thick.

The coupling bands shall have corrugations that mesh with the corrugations of the pipe and shall be connected at the ends by galvanized angles. Coupling bands less than 12 inches in width shall be connected by at least two galvanized bolts not less than 1/2-inch diameter. Bands 12-inches or greater in width shall have at least three 1/2-inch diameter galvanized bolts. Other equally effective types of coupling bands may be used if approved by the Owner's Representative.

The coupling bands shall be placed over a 1/4-inch thick neoprene gasket, O-ring type gasket, or a 1/4-inch layer of asbestos fiber asphalt caulking compound, except that the O-ring type gasket shall not be used with pipes with helical ends. The O-ring shall conform to Section 3 of ASTM C443 and have a minimum cross sectional diameter of 13/16-inch.

1.04 FILTER AND DRAIN MATERIALS

The filter and drain materials shall be placed within the limits shown on the drawings. The compositions of the filter and drain materials shall each conform to the following grading requirements:

Screen or Sieve Size	FT
1½"	
3/4"	
3/8"	100
No. 4	90 - 100
No. 8	75 - 90
No. 16	55 - 80
No. 30	30 - 60
No. 50	10 - 40
No. 100	0 - 15
No. 200	0 - 5

The materials used shall conform to requirements for concrete aggregates; however, the requirements for grading, and reactivity shall not apply. The minimum bulk specific gravity shall be 2.50.

1.05 PLACEMENT

The excavated subgrade shall be kept free of surface water. Mudholes, ruts, or soft spots due to the CONTRACTOR'S operations shall be repaired. Filter and drain material shall be placed around drainage pipe so as to provide even support throughout the entire length of the pipe and to permit the installed pipe to lie upon true alignment and grade. Filter of drain material shall be spread to such depth as to obtain the required thickness after compaction and shall be uniform and true to the line and grades indicated on the drawings. The surface under sloped bank lining or invert shall not show any variation or departure greater than 1/2 inch from the testing edge of a 10 foot straight edge. Ridges and humps shall be regraded, depressions filled and compacted, and tested for straightness until grading is accomplished within the tolerance specified. No relative density will be required. Pipe damage during placement or compaction shall be replaced at the CONTRACTOR'S expense. The CONTRACTOR shall exercise due care to prevent water from surface drainage or other sources, mud, muck, or debris from running into the filter or drain material placed both during and after its placement until the lining, backfill, or structure placed thereon is completed or set. The CONTRACTOR shall provide and operate drainage sumps and pumps or equivalent means satisfactory to the CONTRACTING OFFICER (C.O.) to prevent any such saturations of the filter or drain materials.

A. Those portions of filter and drain materials which become subgrade for sloped bank lining shall be compacted by 4 passes of small roller weighing not less than 600 pounds and 20 pounds per inch of roller width.

1.06 PLACEMENT

The excavated subgrade shall be kept free of surface water. Mudholes, ruts, or soft spots due to the CONTRACTOR'S operations shall be required at his expense, as ordered by the CONTRACTING OFFICER (C.O.). Filter and drain material shall be placed around drainage pipe so as to provide even support throughout the entire length of the pipe and to permit the installed pipe to lie upon true alignment and grade. Filter or drain material shall be spread to such depth as to obtain the required thickness after compaction and shall be uniform and true to the line and grades indicated on the drawings. The surface under sloped bank lining or invert shall not show any variation or departure greater than 1/2 inch from the testing edge of a 10 foot straight edge. Ridges and humps shall be regraded, depressions filled and compacted, and tested for straightness until grading is accomplished within the tolerance specified. No relative density will be required. Pipe damage during placement or compaction shall be replaced at the CONTRACTOR'S expense. The CONTRACTOR shall exercise due care to prevent water from surface drainage or other sources, mud, muck, or debris from running into the filter or drain material both during and after its placement until the lining, backfill, or structure placed thereon is completed or set. The CONTRACTOR shall provide and operate drainage sumps and pumps or equivalent means satisfactory to the CONTRACTING OFFICER (C.O.) to prevent any such saturations of the filter or drain materials.

A. Those portions of filter and drain materials which become subgrade for sloped bank lining shall be compacted by 4 passes of small roller weighing not less than 600 pounds and 20 pounds per inch of roller width.

SECTION 02611

CRUSHED STONE PAVING

1.01 DESCRIPTION

This work shall consist of furnishing and placing base course aggregate of the classes herein provided or shown on the plans in substantial compliance with the specifications and the lines, grades, dimensions, and typical sections shown on the plans and as directed by the CONTRACTING OFFICER (C.O.) Base course shall be replaced in existing road after pipeline installation.

1.02 MATERIALS

A. Base Course aggregate shall be composed of materials consisting of crushed stone, crushed or screened gravel, caliche, sand, or a combination of such materials. Base course aggregate shall be free from vegetable matter and all other deleterious materials. Base course aggregate will be tested for acceptance on samples taken from the watered and completely processed windrow. Base course aggregate will be tested in accordance with AASHTO Methods provided below:

Mechanical Analysis	AASHTO T 27
Passing No. 200 Sieve	AASHTO T 11
Liquid Limit	AASHTO T 89
Los Angeles Abrasion	AASHTO T 96
Soundness (5 cycle-Magnesium Sulfate Solution)	AASHTO T 14
Linear Shrinkage	Materials Testing Control Manual

Base course aggregate materials shall be combined in such proportions that the resulting composite blend meets the requirements of the following table:

BASE COURSE CLASSIFICATION
PERCENT PASSING

Sieve Size	Class I
1"	100
3/4"	80 - 100
No. 4	30 - 60
No. 10	20 - 45
No. 200	3 - 10
Soundness	18 or less
L.A. Abrasion	50 or less
L.L.	25 or less

when base course material is produced from pits or quarries listed on the plans, all oversize material up to and including rocks and boulders 10 inches in greatest dimension shall be crushed and mixed with other material.

1.03 CONSTRUCTION REQUIREMENTS

A. The CONTRACTOR shall produce material conforming with all the requirements of this section. When corrective material is required to be added in the windrow, such material shall not be incorporated until the quality and quantity has been approved by the C.O.

B. SURFACE TOLERANCE

The top surface of base course shall not deviate in excess of 3/8 inch when tested with a 10-foot straightedge in any direction. All deviations from this tolerance shall be corrected.

SECTION 02710

FENCE

1.01 GENERAL

This work shall consist of the construction of fence and gates in substantial compliance with the Specifications, lines, and grades shown on the plans or established by the CONTRACTING OFFICER.(C.O.).

1.02 MATERIALS

A. GENERAL

The CONTRACTOR shall submit the required number and type of test certificates to the C.O. certifying that the fencing materials conform with the requirements herein provided. When the locations of manufacturing plants allow, the plants will be inspected periodically for compliance with specified manufacturing methods, and material samples will be obtained for laboratory testing for compliance with materials quality requirements. This can be the basis for acceptance of manufacturing lots as to quality. All materials will be subject to inspection for acceptance as to condition at the latest practicable time the CONTRACTING OFFICER (C.O.) has the opportunity to check for compliance prior to or during incorporation of materials in the work.

B. CHAIN LINK FENCE

1.021 Posts shall be galvanized steel, H-column, conforming with the lengths, dimensions and weights shown on the plans. Tubular posts, braces, and top rails shall conform with the requirements of ASTM A 120 for galvanized standard weight pipe, except that the pipe shall not be threaded or subjected to hydrostatic test. H-column posts shall conform to ASTM A 36. The galvanizing shall conform to the requirements of Section 05301.

1.022 Post tops, stretcher bars, hardware, and other required fittings shall be of commercial quality steel and the galvanizing shall conform with the requirements of ASTM A 153.

1.023 Tie wires for fastening chain link fence to posts and rails shall be 9 gauge and galvanized. Galvanized steel or noncorrosive metal bands or fasteners may be used in lie of tie wires when approved by the C.O.

1.024 Compression braces shall conform with the same requirements as top rails. Tension truss rods shall be not less than 3/8 inch round galvanized rods with drop-forged turn buckles.

1.025 Chain link fabric shall conform to the requirements of AASHTO M 181 or Commercial Standard 246 published by the U.S. Department of Commerce. The wire shall be No. 11 gauge galvanized wire and the fabric shall be 2 inch mesh.

1.026 Gates may be double drive, single drive, or single walk and shall conform with the dimensions and details shown on the plans. Gate frames shall be fabricated from galvanized steel pipe conforming with ASTM A 120 and A 123. Chain link fabric filler shall conform to the requirements herein provided for chain link fabric.

1.03 CONSTRUCTION REQUIREMENTS

A. The CONTRACTOR shall perform such clearing and grubbing as may be necessary to construct the fence to the required grade and alignment. At locations where breaks in a run of fencing are required or at intersections with existing fences, appropriate adjustment in post spacing shall be made to conform to the requirements for the type of closure indicated. When the plans require that posts, braces, or anchors be embedded in concrete, the CONTRACTOR shall install temporary guys or braces as may be required to hold the posts in proper position until such time as the concrete has set sufficiently to hold the posts. Unless otherwise permitted, no materials shall be installed on posts or strain placed on guys and bracing set in concrete until 7 days have elapsed from the time of placing the concrete. The tops of all posts shall be set to the required depth and alignment. Cutting of the tops of posts shall be allowed only with the approval of the C.O. and under the conditions specified by him. Wire or fencing of the size and type required shall be firmly attached to the posts and braced in the manner indicated. All wire shall be stretched taut and be installed to the required elevations.

1.04 FENCE

A. Chain link fences shall be constructed in conformity with the details and at locations shown on the plans or staked by the C.O. Posts shall be spaced at not more than 10 foot intervals. The intervals shall be measured from center to center of post. All posts shall be set in concrete footings conforming with the dimensions and details shown on the plans. Posts set in rock shall be placed as directed by the C.O. Chain link fabric shall not be attached to posts until the concrete footings have completely set. Pull posts shall be line posts braced to adjacent line posts as shown on the plans. Pull posts shall be spaced at intervals not to exceed 500 feet. End posts shall be not less than 2.875 inches in outside diameter and braced in the same manner as corner posts. Braced tension rods or cables, hardware, and appurtenances shall be installed as shown on the plans.

B. Chain link fabric shall be stretched by mechanical stretcher or other device designed for such use. Stretching by motor vehicle will not be permitted.

C. FENCING GROUNDING

At 50 foot intervals, the fence post will be connected to a ground electrode by using a copper alloy body grounding connector with bronze U-bolts, nuts and lock washers, and a 1/0 AWG bare copper conductor.

1.041 Electrode in Rock or Tuff

Where the soil is less than 10 feet deep, the electrode will consist of the 1/0 AWG bare copper conductor buried in a 12" to 24" deep trench 12 feet long in sandy or gravelly soil. In no case will the electrode be buried between gate posts. Trenches shall be backfilled with top soil with no rocks larger than one inch in size.

1.042 Electrode in Soil

Where the soil is more than 10 feet deep, the electrode will consist of a 3/4" x 10 foot copperclad driven rod. The rod shall be fastened to the 1/0 AWG bare copper conductor with a copper alloy clamp which makes contact with the ground rod for a distance of 1-1/2" measured parallel to the axis of the ground rod.

D. REMOVING AND REBUILDING FENCE

Existing fences shall be removed and rebuilt as shown on the plans or directed by the C.O. Such fences shall be reconstructed to approximately the same condition as the original fence. The materials in existing fences to be removed and rebuilt shall be salvaged and incorporated in the rebuilt fences. Fence materials damaged beyond reuse during removal or rehandling shall be replaced by the CONTRACTOR at his own expense. Posts shall be firmly reset to line staked by the C.O. The spacing of the posts and the number of wires to be strung and stapled to the posts shall be the same as the original fence. New staples shall be used to fasten the wires to the posts and shall be furnished by the CONTRACTOR at his expense.

SECTION 02765

RIPRAP

1.01 GENERAL

The construction of riprap shall consist of furnishing and placing stone with wire mesh. The depth and type of riprap shall be as shown on the plans.

1.02 STONE

A. Stone for wire enclosed riprap shall be sound and durable, free from seams and coatings, and of such characteristics that it will not disintegrate when subjected to the action of water. Loss by abrasion shall not exceed 55%.

B. Stone shall be of shapes which will form a stable protection structure of the required depth. Rounded boulders or cobbles shall not be used on slopes steeper than 2 to 1 unless grouted. Angular shapes may be used on any slope. Flat or needle shapes will not be acceptable unless the thickness of the piece is more than 1/3 the length.

C. Waste concrete may be used if the pieces are sound, free from coatings, and meet the size requirements specified for stone.

1.021 SIZE OF STONE

Riprap stone shall be as large as can be conveniently placed in a layer of the required depth. In layers 2 feet or less in depth, the stones, excepting small stones and spalls used to chink interstices, shall weigh not less than 50 pounds; and at least 60 percent of the stone shall weigh not less than 100 pounds. In layers more than 2 feet in depth, at least 50 percent of the mass shall be stones having a volume of 2 cubic feet or more.

1.03 PREPARATION OF GROUND SURFACES

The bed for the riprap shall be shaped and trimmed to provide even surfaces. A footing trench shall be excavated along the toe of the slope as shown on the plans.

1.04 PLACING

When the required riprap is less than 20 inches in depth, stone shall be placed by hand. Stone shall be placed to provide a minimum of voids. The larger stone shall be placed in the toe return, foundation course, and on the outer surface of the riprap. Stones shall be placed with their longitudinal axis normal to the face of the embankment and so arranged that each rock above the foundation course has at least a 3 point bearing on the underlying stones. Bearing on smaller stones used to chink voids will not be acceptable. Interstices between stones shall be chinked with small stones and spalls. The finished surface shall be even and tight and shall not vary from the planned surface

by more than 3" per foot of depth.

1.05 WIRE ENCLOSED RIPRAP

Wire enclosed riprap shall consist of a layer of rock of the required thickness enclosed on all sides in wire fabric in conformity with the details shown on the plans. The wire fabric shall be drawn tightly against the rock on all sides and tied with galvanized wire of the required gauge. The ties shall be spaced approximately 2 feet on centers and shall be anchored to the bottom layer of wire fabric, extended through the rock layer, and tied securely to the top layer of wire fabric. Wire fabric used for riprap shall conform to the mesh, gauge, and weight shown on the plans. Tie wire shall be galvanized and of the gauge shown on the plans. Wire fabric shall be furnished in such lengths and widths as to reduce the number of splices to a minimum.

SECTION 02821

SEEDING

1.01 GENERAL

Work to be done under this section shall include the furnishing, seeding and spreading as specified herein.

1.02 SEEDS

All areas to receive seed shall be designated on the plans. The type of seeds and density of seeding are as follows:

Orchard Grass	1-1/2#/Acre
Western Wheat	1-1/2#/Acre
Spike Muly	1-1/2#/Acre
Burnet	1/2#/Acre
Yellow Sweet Clover	1/2#/Acre

Seeds shall be high quality, free from disease and defects.

SECTION 03101

PORTLAND CEMENT CONCRETE

1.01 GENERAL

Concrete will be laboratory design mix, identified by design mix number. No structural concrete mixture shall contain less than 5 sacks of cement per cubic yard. All concrete placed under this section shall be air-entrained in accordance with Section 1.05 of these Specifications. Weighing and metering devices used for the purpose of proportioning materials shall fulfill requirements as to accuracy and tolerance prescribed by the Superintendent of Weights and Measures, and such devices shall be sealed and certified by him or a certified representative. This certification shall not be over 12 months old and shall be renewed whenever deemed necessary by the CONTRACTING OFFICER (C.O.) When portable plants are set up at a new location, the scales and scale assembly shall be inspected and certificate issued before work commences regardless of the date when the scales were last tested. Concrete that will be exposed to freezing temperatures and all exterior concrete shall contain entrained air. The "Standard Specification for Ready-Mixed Concrete" (ASTM C 94) shall apply to all ready-mixed concrete produced in accordance with the provisions of this section. Chapter 5, "Building Code for Reinforced Concrete" (ACI 318) shall also apply to the mixing and placing of concrete.

1.02 PORTLAND CEMENT

A. Cement to be used or furnished under this specification shall be Portland Cement, conforming with the requirements of ASTM C 150. The type to be used shall be Type I or Type II. Where the presence of water soluble sulphates (as SO_4) in the soil exceed 0.20% or sulphate (as SO_4) in ground water exceeds 1,000 parts per million, the tricalcium aluminate in the cement shall be limited to 5 percent.

B. Cement shall be sampled and tested as prescribed in said ASTM specifications. The CONTRACTOR shall obtain a certification of compliance signed by the cement manufacturer identifying the cement and stating that the cement delivered to the batching site complies with these specifications. When requested by the C.O., the CONTRACTOR shall furnish him with three copies of said certification.

C. When suitable facilities (such as those recommended by the Concrete Plant Manufacturer's Bureau and/or approved by the C.O.) are available for handling and weighing bulk cement, such facilities shall be used. Otherwise, the cement shall be delivered in original unopened bags of the manufacturer and the type of cement plainly marked thereon, each bag to contain 94 pounds of cement.

D. Cement shall be stored in such a manner as to permit ready access for the purpose of inspection and be suitably protected against damage by contamination or moisture. Should any lot of bulk cement delivered to the site show evidence of contamination, the C.O. may require that such lot be removed from the site.

E. A cement shall not be mixed with any other brand or type unless written permission has first been obtained from the C.O.

F. Portland cement used in the manufacture of concrete for any individual structure shall be of the same brand unless otherwise approved by the C.O.

G. Cement used in the construction of sewer lines and appurtenances and other structures coming in contact with sewage and sewage gases shall be Type II or other types of equal quality and character as approved by the C.O.

1.03 AGGREGATES

A. Aggregates shall conform to ASTM C 33 and none shall be incorporated in the work unless they comply with these specifications as determined by and until approved by the C.O. Prior to the delivery for the aggregates, the CONTRACTOR will be required to furnish samples for testing and shall notify the C.O. as to when and where they will be available. Thereafter, additional samples shall be furnished at the expense of the CONTRACTOR, but the cost of testing and making the grading analyses will be borne by the Contracting Agency. Samples shall be taken at the direction of the C.O.

B. In placing materials in storage or in moving them from storage to the mixer, any method which may cause the segregation, degradation, or the combining of materials of different grading which will result in any stockpile not meeting specified requirements shall be discontinued.

C. Aggregates which are found to have a silica released to alkali reduced ratio greater than one, when tested in accordance with ASTM C 289, shall be used only when approved by the C.O., provided low-alkali cement is used. Low-alkali cement shall conform to the requirements for Portland cement, as specified in ASTM C 150 and, in addition, shall contain no more than 0.60 percent by weight of alkalis calculated as Na_2O plus 0.659 K_2O.

D. In the event the aggregates are considered reactive and/or a low-alkali cement is unavailable locally, the addition of fly ash to counteract the alkali-aggregate reaction shall be permitted.

E. The use of reactive aggregates shall be considered as solely for the benefit of the CONTRACTOR and no additional allowance will be made for the use of low-alkali cement.

1.031 AGGREGATE GRADING

A. Coarse aggregates shall meet the gradation limits as specified in Table 2 of ASTM C 33.

B. The maximum aggregate size shall be as specified in the applicable sections of the specifications.

C. Aggregates that are proportioned by volume shall be measured in containers of known capacity. Regardless of the method employed, either by weight or volume, each individually stored size of aggregate shall be proportioned separately.

D. Sand, rock, and cement for concrete shall be measured by weight except that when the amount of concrete required for any one job is 10 cubic yards or less, upon the approval of the C.O., and with a proportion design approved by the C.O., these materials may be measured either by weight or volume.

1.04 WATER

A. The amount of water shall be varied in accordance with the moisture content and the requirements of the workability of the aggregate.

B. The equipment for measuring and supplying the water to the mixer shall be so constructed and arranged that the amount of water to be added to the mixture can be measured, in gallons or by weight, positively and that the predetermined quantity of water required can be discharged rapidly in one operation into the mixing drum without dribbling. Tanks or other equipment for measuring and discharging water into the mixer shall be sufficiently accurate that the amount of water delivered to the mixer for any batch shall not vary more than one percent from the required quantity. Adequate means for determining and checking the accuracy of the equipment shall be provided and made available to the C.O.

C. The water used for mixing with concrete shall be free from oil, vegetable matter, and other deleterious substances and shall conform to the following requirements:

D. Water for prestressed concrete shall not contain chlorides calculated as sodium chloride in excess of 400 parts per million nor sulphates calculated as sodium sulphate in excess of 1,000 parts per million nor may sulphates calculated as sulphate in excess of 1,000 parts per million. Water shall not contain an amount of impurities that will cause a change in the time of setting of Portland Cement of more than 25 percent nor a reduction in the compressive strength of mortar of more than 5 percent compared to results obtained with distilled water.

1.05 ADMIXTURES

A. Admixtures of any type, except as otherwise specified herein, shall not be used unless written authorization has been obtained from the C.O. When additives are permitted, they shall not be used for the purpose of reducing the minimum cement requirement.

B. Air-entraining agent, conforming to ASTM C 260, shall be measured accurately by mechanical means into each batch by equipment and in a method approved by the C.O. Air content shall be in accordance with the following table:

Maximum-Size Coarse Aggregate	Air Content Percent by Volume
ASTM Size #2,357,467	5+2
ASTM Size #57,67	6+2
ASTM Size #7,8	7½+1

C. When an air-entraining agent is used for the sole purpose of increasing the workability of the mix, the air content should be 3 - 5%.

D. Other admixtures, if used, shall conform to appropriate ASTM standards. Admixtures shall be included in the bid price.

E. Slumps shall be in accordancd with Section 1.09 of these Specifications. If greater slump is required, additional water may be added with a proportional increase in cement to maintain the same water to cement ratio. Slumps may also be increased by use of approved dispersing agents and/or plasticizers without the addition of water.

1.06 PROPORTIONING

A. The determination of the concrete design proportions shall be solely the CONTRACTOR'S responsiblity and shall be established, using the cement and water contents on the basis either of laboratory trial batches designed in accordance with latest revision of ACI Standard 211.1 (Recommended Practice for Selecting Proportions for Normal Weight Concrete) or of field experience with the materials to be employed. If suitable data from trial batches of field experience cannot be obtained, concrete proportions may be used on the method recommended in paragraph 4.2.4, ACI 318 (Building Code Requirements for Reinforced Concrete). The proportions shall be selected to produce an average strength at the designated test age exceeding f'_c by the amount indicated in paragraphs 4.2.2.1 or 4.2.2.2, ACI 318. The aggregate proportions shall produce a workable mix, with coarse aggregate used in the greatest amount consistent with required workability.

Table I
CONCRETE DESIGN PROPORTIONS

Required Strength	Minimum Cement - Lbs.	Maximum Water - Cement Ratio
4500 psi	564	0.50
3500 psi	517	0.55
3000 psi	470	0.60

This table is set forth to establish minimum cement and maximum water/cement ratio only. Trial mixes may deem it necessary to increase cement and/or decrease w/c ratio to attain required strength.

B. Weigh hoppers shall be charged from bins located directly over the weigh hoppers or from other conveyors approved by the C.O. When conveyor belts are used, there shall be a separate belt for each size of aggregate.

C. Bulk cement shall be weighed in an individual hopper and shall be kept separate from the aggregates until the batch ingredients are released for discharge. The cement hopper shall be attached to a separate scale for individual weighing.

D. Scales utilized in the proportioning device may be of the springless dial type or the multiple beam type or other type approved by the C.O.

E. If the dial type, the dial shall be of such size and so arranged that it may be read easily from the operating platform.

F. If the multiple beam type, the scales shall be provided with an indicator operated by the main beam which will give positive visible evidence of over - underweight. The indicator shall be so designed that it will operate during the addition of the last 400 pounds of any weighing. The over travel of the indicator hand shall be at least one-third of the loading travel. Indicators shall be enclosed against moisture and dust.

G. Weighing equipment shall be as recommended by the Concrete Plant Manufacturer's Bureau and insulated against vibration or movement of other operating equipment in the plant. When the entire plant is running, the scale reading at cutoff shall not vary from the weight designated by the C.O. more than one percent for cement, one and one-half percent for any size aggregates nor none percent for the total aggregate in any batch.

H. When proportioned at a mixing plant there shall be an approved method of determining the moisture in the aggregate, accurate to within one-half percent. If requested by the C.O., details of the method and equipment for measuring and proportioning materials shall be submitted to him for approval.

1.07 MIXING

A. Machine mixing will be required in all cases other than those in which it would obviously prove to be impractical; in which latter event, hand mixing will be permitted only to the extent necessary. Regardless of the method employed, mixing shall be commenced as soon as possible after the cement is placed in contact with the aggregate.

B. In the event haul distances are such that mixing time shall surpass that allowed, a dry batch method may be employed when approved by the C.O.

C. All concrete mixers shall be of such design and construction and so operated as to provide a thoroughly and properly mixed concrete in which the ingredients are uniformly distributed.

D. An acceptable dry batch method is as follows: A quick latch hatch is removed from the drun and the opening in the drum is rotated to the high point of the drum. Water is then introduced through the opening of the stationary drum followed by a layer consisting of all of the coarse aggregate. The cement is layered on top of the fine aggregate; thus, cement does not come into contact with the water until the drum is rotated. The hatch is then replaced in the drum and mixing of the concrete does not occur until arrival at the jobsite. In the event free moisture content of fine aggregate exceeds 4.0%, this procedure shall be modified to allow transportation to the site of adjusted water and aggregate proportions. The cement shall be added at the site to conform to proper mix proportions of the accepted mix design. Measurement of cement shall be by standard bag amounts or an accepted scale approved by the C.O.

1.072 TRANSIT MIXERS

a. Transit mixers shall be high quality equipment and meet the general requirements herein below specified. They shall be equipped with modern type gauges capable of indicating all necessary load controls.

b. The total elapsed time between the addition of water at the batch plant and depositing the completed mix shall not exceed 90 minutes. Under conditions contributing to quick setting, the total elapsed time permitted may be reduced by the C.O. Each mixer and agitator shall have attached thereto in a prominent place a metal plate or plates, installed by the manufacturer, on which is plainly marked the capacity of the drum in terms of the volume of mixed concrete and the speed of rotation for the agitating and mixing speeds of the mixing drum or blades.

c. Each mixer shall have an identification number painted on the truck on such a location that it can be readily read from the batching platform.

d. The total volume of materials introduced into the mixer for mixing purposees shall not exceed the manufacturer's guaranteed mixing capacity. If the concrete so mixed does not meet the uniformity requirements of this section, the amount of materials charged into the mixer shall be reduced.

e. The total volume of materials mixed in any one batch shall neither exceed the water level capacity of the mixer nor the manufacturer's catalog rated capacity of the mixer.

f. Each batch of concrete placed in the mixer shall therein be mixed for not less than 70 nor more than 100 revolutions of the drum or blades, at the speed designated by the manufacturer of the equipment of the equipment agitating speed. The revolving of the drum shall be continuous until the concrete is completely emptied from the drum. Before any portion of the materials for any batch of concrete is placed therein, the drum of the mixer shall be emptied of the previously mixed batch, including wash-up water, before any batch is placed therein.

g. Before unloading concrete at the construction site, the C.O. shall be provided with a legible weigh-master's certificate (delivery ticket) which shall contain the following information concerning the concrete furnished by the manufacturer.

1. Name of ready-mix batch plant,
2. Serial number of ticket,
3. Date and truck number,
4. Name of CONTRACTOR
5. Specific designation of job (name and location)
6. Specific class or designation of the concrete in conformance with that employed in the job classifications,
7. Amount of concrete (cubic yards),
8. Time loaded or of first mixing of cement and aggregates,
9. Water added by the receiver of concrete and his initials.

h. Additional information designated by the C.O. and required by the job specifications shall be furnished also upon request of the C.O., such information may include:

1. Reading of revolution counter at the first addition of water,
2. Signature or initials of ready-mix representative,
3. Type and brand of cement,
4. Amount of cement,
5. Total water content by producer (or W/C ratio)
6. Maximum size of aggregate,
7. Weights of fine and coarse aggregate , and
8. Indication that all ingredients are as previously certified or approved.
9. Type of admixture and amount of same.

i. The type, capacity and manner of operation of the mixing and transporting equipment for ready-mixed concrete shall conform to the current "Standards for Operation of Truck Mixers and Agitators of the National Ready-Mix Concrete Association" and the "Truck Mixer and Agitators Standards of the Truck Mixer Manufacturers Bureau" and ASTM C 94. Adequate control may require that additional water be added and mixed into the batch for a minimum mixing time of three minutes at the point of discharge. Water shall not be added to the batch during transit.

1.09 TESTS

A. Concrete test samples for acceptance will be taken in the field by the C.O. or a qualified concrete technician from a testing laboratory approved by the C.O. in strict accordance with ASTM C 172, Method of Sampling Fresh Concrete. In no case shall concrete used for slump tests or air tests be used for molding specimens for strength tests.

B. Slump tests will be made in the field in accordance with ASTM C 143, Method of Test for Slump of Portland Cement Concrete. The slump shall fall within the following tabulation provided the requisite strength is obtained.

Type of Structure	Slump in Inches Minimum	Maximum
Massive section, pavement or slabs on ground	0	4
Heavy Slabs, beams or walls	3	5
Thin walls and columns, ordinary slabs or beams	3	5

C. Concrete cylinders for acceptance tests shall be molded in accordance with ASTM C 31, Method of Making and Curing Concrete Compressive and Flexural Strength Test Specimens in the Field. Curing done in the field shall be sealed in metal or plastic molds provided the conditions, including the maintenance of temperature range, are in accordance with ASTM C 31. Curing boxes approved by the C.O. shall be used for all conrete cured in the field. If the specified temperature range cannot be maintained, the samples shall be taken to the testing laboratory where they shall be molded as specified in ASTM C 31 and cured as specified in ASTM C 192, provided the cylinders can be molded within 15 minutes within sampling.

D. Specimens will be tested in accordance with ASTM C 39 for compressive strength, ASTM C 78 for flexural strength (simple beam third-point loading), and ASTM C 93 for flexural strength (center-point loading) in a laboratory designated by the C.O. Quantity of tests shall be set forth in specific subsections. One test shall consist of no less than 3 specimens cast using concrete from one load.

E. Evaluation and acceptance of concrete will meet the criteria established in Building Code Requirements for Reinforced Concrete - ACI 318. The strength level of concrete will be considered satisfactory if the averages of all sets of three consecutive strength test results equal or exceed the required f'_c and no individual strength test falls below the required f'_c by more than 500 psi.

F. If the seven (7) day compressive test is less than 70% of the required twenty-eight (28) day compressive strength, the job mix design shall be examined immediately to insure that the required compressive strength will be met.

G. If individual tests of laboratory-cured specimens for acceptance produce strengths more than 500 psi below f'_c and further investigation is deemed necessary, such investigation may include non-destructive tests such as the impact hammer test, use of the sonic testing device, if approved by the C.O. If computations indicate that the load carrying capacity may have been significantly reduced, tests of cores drilled from the area in question may be required in accordance with ASTM C 42, Method of Obtaining and Testing Drilled Cores and Sawed Beams of Concrete. Three cores shall be taken for each case of a cylinder test more than 500 psi below f_c. If the concrete in the structure will be dry under service conditions, the cores shall be air dried (temperature 60 to 80 degrees F, relative humidity less than 60 percent) for seven days before test and shall be tested dry. If the concrete in the structure will be more than superficially wet under service conditions, the cores shall be immersed in water for at least 40 hours and tested wet.

H. Concrete in the area represented by core tests shall be considered structurally adequate if the average of the three cores is equal to at last 85 percent of f'_c and if no single core is less than 75 percent of f'_c. To check testing accuracy, locations represented by erratic core strengths may be retested.

I. If these strength acceptance criteria are not met by core tests and if structural adequacy remain in doubt, the C.O. may order load tests as outlined in Chapter 20 of ACI 318 for the questionable portion of the structure or take action appropriate to the circumstances.

1.10 TEMPERATURE CONTROLS

A. When the atmospheric temperature at the time of placing is less than 40 degrees F, the temperature of the concrete, as placed, shall not be less than 50 degrees F.

B. If weather conditions prevail at the time concrete is being placed which may endanger the proper set and curing, such as excessive heat, wind, or low humidity, the CONTRACTOR shall provide adequate means for protecting the concrete against rapid or "flash" set during the initial curing period. The C.O. may approve the use of an admix that will retard setting time. However, if the C.O. approves the use of an admix for this purpose, the approval must be in writing and state the proportions of admix that may be added to the concrete mix.

1.11 POSSOLANIC MATERIALS

A. Pozzolanic materials to be used in concrete or furnished under this specification shall conform to the requirements of ASTM C 618 for Class C or Class F.

B. A maximum of 20 percent by weight of the minimum Portland Cement requirement may be replaced with Pozzolan per pound of Portland Cement.

C. Pozzolans shall be sampled and tested as prescribed in ASTM C 618 and ASTM C 311. The CONTRACTOR shall obtain and deliver to the C.O. a certification of compliance signed by the Pozzolan supplier identifying the Pozzolan and stating the Pozzolan delivered to the batching site complies with applicable specifications.

D. Pozzolan material shall be handled and stored in the same manner as Portland Cement. When facilities for handling bulk Pozzolan are not available, the Pozzolan shall be delivered in original unopened sacks bearing the name and brand of the supplier, the type and source of the Pozzolan, and weight contained in each sack plainly marked thereon. A Pozzolan shall not be mixed with any other brand or type unless written permission has first been obtained from the C.O. All Pozzolan used in the manufacture of concrete for any individual structure shall be of the same type and the same source, unless otherwise approved by the C.O.

E. No partial bags shall be used unless facilities are available to accurately weigh the partial bags.

F. All Pozzolan to be incorporated into the concrete as a separate ingredient shall be weighed. When the cement scales are used for weighing both cement and Pozzolan, the cement shall be weighed first. If separate scales are provided, they shall be accurate to ±0.3 percent of the scale capacity.

SECTION 03210

STEEL REINFORCEMENT

1.01 GENERAL

The following specifications set forth the requirements for bar reinforcement wire reinforcement, and wire mesh reinforcement. The reinforcement shall conform accurately to the dimensions and details indicated on the plans or otherwise prescribed; and before being placed in any concrete work shall be cleaned of all rust, mill scale, mortar, oil, dirt, or coating of any character which would be likely to destroy, reduce, or impair its proper bonding with the concrete. No reinforcing steel will be accepted under the specification until it has been approved by the CONTRACTING OFFICER (C.O.) as conforming with requirements prescribed therefor.

1.02 BAR REINFORCEMENT

A. Reinforcing steel bars shall be deformed intermediate grade billet steel conforming with ASTM A 615 or rail steel conforming with ASTM A 616 may be permitted by the C.O. The grade shall be 40 unless grade 60 is specified on the drawings.

B. In testing bar reinforcement, only the theoretical cross-sectional area will be used in all computations.

C. Bending of steel will conform to requirements of ACI 318. The various grades of steel shall not be used interchangeably in structures. If rail steel is used, shop and field bending shall comply with the following provisions:

1.021 Continuous and uniform application for force throughout the duration of the bending operation.

1.022 Unrestricted movement of the bar at point of contact with the apparatus.

1.023 Close wrapping of the specimen around the pin or mandrel during the bending operations.

D. Bending or straightening of reinforcing steel shall be accomplished in such a manner and by such means as to insure that no damage to the material will result as a consequence thereof. Bars with kinks shall not be used.

1.03 WIRE REINFORCEMENT

Wire reinforcement shall, in all respects, fulfill requirements prescribed in ASTM A 82.

1.04 WIRE MESH REINFORCEMENT

Mesh reinforcements shall conform to ASTM A 185. The gauge of the wire and the dimensions of the mesh will be shown on the plans. The wire mesh reinforcement shall be so constructed as to retain its original shape and form during the necessary handling. The effective cross-sectional area of the metal shall be equal to that specified or indicated on the plans.

1.05 WIRE TIES

Wire for ties shall be black, annealed, not lighter than 16 gauge.

SECTION 03250

CONCRETE CURING COMPOUND AND ACCESSORIES

1.01 GENERAL

The curing compound shall consist of a liquid which, when applied to fresh concrete by means of a spray gun, will form an impervious membrane over the exposed surfaces of the concrete. The material shall be approved by the CONTRACTING OFFICER (C.O.) prior to its use.

In no case shall the coverage required be so great that the compound forms more than a continuous, unbroken film when applied to the work; nor shall the coverage exceed 250 square feet per gallon. The C.O. will determine the coverage of a curing compound.

The curing compound shall be as specified in ASTM C 309, Type 1, 2, 3, or 4.

Type 1	Translucent, with red dye
Type 2	White Pigmented
Type 3	Light Gray Pigmented
Type 4	Black

1.02 TEST OF CURING COMPOUND

Tests of curing coumpounds shall be done in accordance with ASTM C 156 and Type 2 compound shall also be done in accordance with ASTM E 97.

SECTION 03251

EXPANSION JOINT FILLER

1.01 PREMOLDED JOINT FILLER

Expansion joint filler material shall consist of premolded strips of a durable resilient compound.

Where stiffness is lacking in premolded expansion joint filler, the strips shall be encased in saturated felt, asphalt impregnated cotton webbing, or other satisfactory material. Any material or fabric used for encasement shall be firmly sealed to the body of the joint filler and shall not be detached therefrom after immersion in water for a period of forty-eight (48) hours.

Unless otherwise specified, premolded joint filler may be either Premolded Expansion Joint Filler (nonextruding and Resilient Bituminous Types) conforming to the requirements of ASTM C 1751 or Preformed Expansion Joint Filler (Bituminous Type) conforming to the requirements of ASTM D 994.

Expansion joint filler material shall be manufactured in a workmanlike manner; and when ten percent (10%) or more of any lot or shipment is of nonuniform or improper construction, the entire lot or shipment may be rejected.

1.02 ASPHALT-LATEX JOINT FILLER

Asphalt-Latex joint filler shall consist of asphalt-latex emulsion and sodium fluosilicate furnished in separate containers and mixed on the site. The emulsion shall consist by volume of 60 parts 200-300 asphalt conforming to the requirements of Section 110-40 parts of synthetic latex (GRS Type 4 and 5) to 10 parts of sodium fluosilicate, half strength. The emulsion and sodium fluosilicate shall not be mixed until the joint is ready to be filled. The amount of fluosilicate to be mixed with the emulsion shall be approximately 3% to 5% by weight of the emulsion. The joint to be filled shall be thoroughly cleaned and surface dry.

The sealing compound shall consist of paving asphalt, Grade 200-300, conforming to the provisions of Section 1.10 of these specifications, emulsified with rubber latex in the presence of a suitable emulsifying agent; rubber latex designated as GRS Type 4; or any other approved type containing approximately 40 percent (40%) solids.

The resulting emulsion shall consist of a minimum of 55 percent (55%) of paving asphalt and a minimum of 36 percent (36%) of rubber latex and shall conform to the requirements set forth in the following table:

Specification Designation	Test Method	Limits	
Furol Viscosity at 77°F	AASHTO T 72	50-250 Seconds	Before adding gelling agent.
Sieve Test	AASHTO T 59	1% Max.	Before adding gelling agent.
Penetration at 77°F	ASTM D 217	50-250	The penetration test is made on a specimen prepared by stirring 5 percent of sodium fluosilicate into the asphalt-latex emulsion in a 6-ounce deep ointment can. The specimen is then allowed to stand in the air at a tempercture of 77°F ±2°F for a period of 30 minutes and is then penetrated with a grease cone under a total load of 150 grams in accordance with ASTM D 217.
Elasticity		70% Min.	After addition of 5 percent of sodium fluosilicate and curing for 24 hours at 100°F ±2°F the specimen shall have an elastic recovery of not less than 70%.
Dehydration		Loss 30%	Twenty-five grams of emulsion, prior to adding the gelling agent, is placed in an 8-ounce flat ointment can and dehydrated in a suitable oven maintained at a temperature of 200°F ±2°F for a period of 24 hours.
Time of "Set"		15 to 60	After mixing the emulsion with 1% to 4% by weight powdered sodium fluosilicate, the emulsion shall harden or develop a "set" in from 15 to 60 minutes, under field conditions.

1.03 APPLICATION

At no time shall the emulsion be subjected to a temperature below 4 degrees F. Prior to application, the material may be warmed, if necessary, to permit proper pouring of the joints. The method of heating shall be carefully controlled to avoid overheating of any part of the container or mixture and under no circumstances shall the emulsion be heated to a temperature greater than 130°F.

Joints and cracks shall be thoroughly cleaned by hand or mechanical means immediately in advance of pouring the filler material. When new pavement has been cured by the Pigmented Sealing Compound Method, the joints and cracks shall be thoroughly scrubbed by means of a wire brush or a cloth mop saturated with gasoline or by other approved means.

All joints and cracks shall be surface dry before application of the joint sealer. No sealer shall be placed during unsuitable weather or when the atmospheric temperature is below 50 degrees F or when weather conditions indicate that the temperature may fall to 32 degrees F within 24 hours. Immediately before pouring joints and cracks, the emulsion shall be mixed with from 1 percent to 4 percent by weight of powdered sodium fluosilicate.

The joints and cracks shall be filled in a neat and workmanlike manner by means of a cornucopia pot or other approved method.

SECTION 03310

CONCRETE STRUCTURES

1.01 GENERAL

Concrete footings, foundations, and similar structures shall be constructed in conformity with the plans and specifications. Concrete for use in work constructed under this section shall conform to the requirements of Section 03101 and as shown on the plans and as follows:

All concrete will be steel-reinforced and designed to develop a minimum compressive strength of 4,000 psi in 28 days. All exposed concrete will be air-entrained. All concrete will be desinged in accordance with the "Building Code Requirements for Reinforced Concrete", ACI 318-77, and manufactured and placed in accordance with the "Specifications for Structural Concrete for Buildings," ACI 301-72, Rev. 1975.

1.02 SUBGRADE FOR CONCRETE STRUCTURES

Earth subgrade upon which concrete is placed shall be firm and free from water and/or frost. Ground water shall be kept several inches below the subgrade until the concrete has set. When the subgrade is in dry earth, it shall be moistened with water from a spray nozzle immediately before concrete is placed. When concrete is to rest on rock, the rock shall be fully uncovered. The surface of the rock shall be removed to a depth sufficient to expose sound rock. Bedrock shall be roughly leveled off or cut to approximately horizontal and vertical steps.

1.03 FORMS

A. Forms shall be of suitable material and of type, size, shape, quality and strength to enable construction as designed. The forms shall be true to line and grade, mortar tight, and sufficiently rigid to resist any appreciable amount of springing out of shape during placing of the concrete. The responsiblity for their adequacy shall rest with the CONTRACTOR. All dirt, chips, sawdust, nails, and other foreign matter shall be completely removed from forms before any concrete is deposited therein. The surfaces of forms shall be smooth and free from irregularities, dents, sags, and holes that would appreciably deface the finished surface. Forms previously used shall be thoroughly cleaned of all dirt, mortar, and foreign matter before being reused, and the reuse of forms shall be subject to approval of the C.O. Before concrete is placed in forms, all inside surfaces of the forms shall be thoroughly treated with an approved releasing agent that will leave no objectionable film on the surface of the forms that can be absorbed by the concrete. Care shall be exercised that no releasing agent is deposited on previously placed concrete. Form clamps or bolts approved by the C.O. shall be used to fasten forms. The use of twisted wire loop ties to hold forms in position will not be permitted, nor shall wooden spreaders be used unless authorized by the C.O. Clamps or bolts shall be of sufficient strength and number to prevent spreading of the forms. They shall be of such type that they can be entirely removed or cut back 1 inch below the finished surface of the concrete. Forms for outside surfaces shall

be constructed with stiff wales at right angles to the studs and all form clamps shall extend through and fasten such wales, all based on the rate of concrete pour. The CONTRACTOR may, at his own option, pour such portions of the concrete directly against the sides of the excavation or sheathing without the use of outside forms, provided that the following conditions are met:

1.031 If concrete is poured directly against the sides of the excavation, the faces of the excavation must be firm and compact and be able to stand without sloughing off and be at all points outside the concrete lines shown on the drawings. Further, if necessary to prevent raveling or is specified by the drawings, the entire faces of the excavation, against which concrete is to be poured without the use of outside forms, shall be gunited to sufficient thickness to prevent raveling during the placing of reinforcing steel and inside forms and during the pouring of concrete.

B. The following stipulations shall hold:

1) The reinforcing steel shall be accurately set and held firmly in place, to the satisfaction of the C.O.

2) Should the method of construction of pouring directly against the sides of the excavation without the use of outside forms not prove satisfactory in the opinion of the C.O., the CONTRACTOR shall discontinue said method of construction and construct the structure by using outside forms.

1.04 PLACING REINFORCEMENT

Before placing reinforcing steel, copies of a list of all reinforcing steel and bending diagrams shall be furnished directly to the C.O.. Furnishing such lists to the C.O. shall not be construed to mean that the lists will be reviewed for accuracy. Reinforcing bars shall be accurately placed as shown on the plans and shall be firmly and securely held in position by wiring at intersections and elsewhere as necessary to prevent shifting of bars, with wire not smaller than No. 16, and by using concrete or metal charis, spacers, metal hangers, supporting wires, and other approved deivces of sufficient strength to resist crushing under full load. The use of wooden supports will not be permitted. Placing bars on layers of fresh concrete as the work progresses and adjusting bars during the placing of concrete will not be permitted. Before placing reinforcing steel in the forms, the reinforcing steel shall be thoroughly cleaned of mortar, oil, dirt, loose mill scale, loose or thick rust, and coatings of any character that would destroy or reduce the bonds. No concrete shall be deposited until the placing of the reinforcing steel has been inpsected and approved. Bundled bars shall be tied together at not more than 6 foot centers.

1.05 SPLICING

Splices of bars shall be made only where shown on the plans or as approved by the C.O. Where bars are spliced, they shall be lapped at least 30 diameters, unless otherwise shown on the plans. Welding of reinforcing steel will be permitted when authorized by the C.O. in writing and shall be in accordance with the American Welding Society (Standard Specifications for Welding Highway and Railroad Bridges).

1.06 BENDING REINFORCEMENT

Bends and hooks in bars shall be made in the manner prescribed by the American Concrete Institute. Bars shall not be bent nor straightened in a manner that will injure the material. Bars with kinks or unspecified bends shall not be used.

1.07 WELDED WIRE FABRIC

Welded wire fabric shall be held firmly in place. Welded wire fabric shall be spliced not less than two meshes.

1.08 PLACING CONCRETE

The placing of concrete for a given pour shall start at the low point and shall proceed up-grade, unless otherwise permitted by the C.O. All concrete shall be compacted by means of high-frequency internal vibrators. The number of vibrators employed shall be ample to consolidate the incoming concrete to a proper degree within 15 minutes after it is deposited in the forms. In all cases, at least 2 vibrators shall be available at the site of the structure in which more than 25 cubic yards of concrete is to be placed. The vibrators shall not be attached to or held against the forms or the reinforcing steel. The locations, manner, and duration of the vibrators shall be such as to secure maximum consolidation of the concrete without causing segregation of the mortar and coarse aggregate and without causing water or cement paste to flush to the surface.

Fresh concrete shall not be permitted to fall from a height greater than 6 feet without the use of adjustable length pipies or "elephant trunks". Spades or broad-tined forks shall be provided and used to produce the desired results.

1.09 JOINTS

The work shall be so prosecuted that construction joints will occur at designated places shown on drawings unless specifically permitted otherwise by the C.O. The CONTRACTOR shall complete, by continuous depositing of concrete sections of the work comprised between such joints. The joints shall be kept moist until adjacent concrete is placed. All construction joints at the bottom of walls or arches, at the top of walls, and all longitudinal construction joints having a keyed, stepped, or roughened surface shall be cleaned by sandblasting prior to pouring the adjacent concrete. Any quality of sand may be used which will accomplish the desired results. Other methods of cleaning joints may be used provided the method and result is approved by the C.O. Joint cleaning operations shall be continued until all unsatisfactory concrete and all laitance, coatings, stains, debris, and other foreign materials are removed. The surface of the concrete shall be washed thoroughly to remove all loose material. The method used in disposing of waste water will not stain, discolor, or affect exposed surfaces of the structures. The method of disposal will be subject to the approval of the C.O. All horizontal construction joints or those on slight slopes shall be covered with mortar. Expansion and con-

traction joints in the concrete structures shall be formed where shown on the drawings and as directed. In general, such joints shall have smooth abutting surfaces, painted, or separated and sealed as detailed on the drawings. No reinforcement shall be extended through the joints, except where specifically noted or detailed on the drawings.

1.10 PLACING CONCRETE UNDER ADVERSE WEATHER CONDITIONS

Concrete for structures shall not be placed on frozen ground nor shall it be mixed or placed while the atmospheric temperature is below 40° F, unless adequate means are employed to heat the aggregates and water and satisfactory provisions have been made for protecting the work. All concrete shall be effectively protected from freezing or frost for a period of 5 days after placing. Placing concrete shall be stopped when the quantity of rainfall is sufficient to cause a flow or wash the surface. Upon written notice from the C.O., all concrete which may have become damaged shall be replaced by the CONTRACTOR at his expense.

1.11 SURFACE FINISHES

The classes of surface finish described hereafter shall be applied to various parts of the concrete structures as specified.

A. ORDINARY SURFACE FINISHES

1.131 Ordinary surface finish shall be applied to all concrete surfaces either as a final finish or preparatory to a higher class finish. On surfaces which are to be buried underground, the removal of fins and form marks and the rubbing of mortared surfaces to a uniform color will not be required. Ordinary surface finish, unless otherwise specified, shall be considered as a final finish on all surfaces.

1.132 Immediately after the forms have been removed, all exterior form bolts shall be removed to a depth of at least 1 inch below the surface of the concrete and the resulting holes or depressions cleaned and filled with mortar, except on the interior surfaces of box girders the bolts shall be removed flush with the surface of the concrete. Mortar shall consist of 1 part by volume of cement to 2 parts of sand. Mortar shall be mixed approximatley 45 minutes in advance of use. Care shall be exercised to obtain a perfect bond with the concrete. After the mortar has thoroughly hardened, the surface shall be rubbed with a carborundum stone in order to obtain the same color in the mortar as in the surrounding concrete. All fins caused by form joints and other projects shall be removed and all pockets cleaned and filled. Mortar for filling pockets shall be treated as specified for bolt holes.

1.133 In the judgement of the C.O., if rock pockets or other defects are of such extent or character as to affect the strength of the structure materially or to endanger the life of the steel reinforcement, he may declare the concrete defective and require the removal and replacement of the structure affected.

1.12 CURING

As soon after the completion of the finishing operations as the condition of the concrete will permit without danger of consequent damage thereto, all exposed surface shall either be sprinkled with water; covered with earth, sand, or burlap; or, if approved by the C.O., sprayed with a curing compound conforming with Section 03250. Concrete that is water cured must be kept continuously wet for at least 10 days after being placed, preferably being covered, if possible, with at least 2 layers of not lighter than 7 ounce burlap. When an impervious membrane is used, it shall be applied under pressure through a spray nozzle in such manner and quantity as to entirely cover and seal all exposed surfaces being kept damp until the membrane is applied.

All surfaces on which a bond is required, such as construction joints, shear planes, reinforcing steel, and the like, shall be adequately covered and protected before starting the application of the sealing medium thereon; and any such surface with which the seal may have come in contact shall immediately thereafter be cleaned. Care shall be exercised to avoid and prevent any damage to the membrane seal during the curing period. Should the seal be broken or damaged before the expiration of 10 days after the placing of the concrete, the surface so exposed shall either be immediately sprayed with a coating of the membrane seal or kept continuously wet by the use of burlap or other suitable means until such concrete has cured for at least 10 days. When tops of walls are cured by the membrane sealing method, the side forms, except metal forms must be kept continuously wet for the 10 days following the placing of the concrete. If, due to weather conditions, materials used, or for any other reason, there is any likelihood of the fresh concrete checking or cracking prior to the commencement of the curing operations, it shall be kept damp by means of an indirect fine spray of water until all danger of such checking is past or until the curing operations are started in the particular area affected.

1.13 TESTS

Testing procedures shall be as provided for in Section 03101, Subsection 1.09. The number of test specimens to be taken for compression tests shall be 4 cylinders per 100 cubic yards over 10 cubic yards placed, with 3 cylinders broken and the fourth held for a 45-day break if the cylinders do not meet the 28 day strength requirement.

SECTION 03600

CEMENT MORTAR AND GROUT

1.01 GENERAL

Cement mortar prepared under this specification shall consist of a mixture of cementitious materials, aggregate, and water.

The designation of cement mortar according to type listed in the following tabulation indicate the proportions of materials to be used in the preparation thereof; the proportions indicated are on a volume basis. The type of mortar to be used shall be as specified herein.

Mortar Type	Portland Cement	Masonry Cement	Hydrated Lime or Lime Putty	Aggregate Measured In A Damp, Loose Condition
M	1	1(Type II)	0	Not less than 2¼ and not more than 3 times the sum of the volumes of the cements and lime used.
M	1	0	¼	

The different mortar types shall have a minimum average compressive strength at 28 days of 2500 psi.

Neat cement grout shall consist of cement mixed with water as necessary to obtain a fluid and workable mix.

1.02 CEMENT AND LIME

Cement to be used shall conform with the requirements in Section 1.01. Masonry cement shall conform to ASTM C 91. Quicklime shall conform to ASTM C 5. Hydrated lime shall conform to ASTM C 207.

1.03 AGGREGATES

Aggregates to be used shall conform with ASTM C 144.

1.04 WATER

Water shall be clean and free of deleterious amounts of acids, alkalis, or organic materials.

1.05 ADMIXTURES OR MORTAR COLORS

Admixtures or mortar colors shall not be added to the mortar.

1.06 ANTIFREEZE COMPOUNDS

No antifreeze liquid, salts, or other substances shall be used in mortar to lower the freezing point.

1.07 MEASUREMENT AND MIXING OF MATERIALS

The method of measuring materials for the mortar used in construction shall be such that the specified portions of the mortar materials can be controlled and accruately maintained.

All cementitious materials and aggregate shall be mixed for at least 3 minutes with the maximum amount of water to produce a workable consistency in a mechanical batch mixer.

Mortars that have stiffened because of evaporation of water from the mortar shall be retempered by adding water as frequently as needed to restore the required consistency. Mortars shall be used and placed in final position within 2½ hours after initial mixing.

1.08 TESTS

The mortar shall be designed and the laboratory mix tested in accordance with ASTM C 270.

SECTION 04220

CONCRETE BLOCK MASONRY

1.01 GENERAL

Work to be done under this section shall consist of the construction of concrete block masonry walls incorporated into and being part of a building or structure, and free standing and retaining walls, constructed of concrete block masonry units. Wall heights, thickness, pilaster locations, reinforcing length and other data shall be as shown on the plans.

1.02 MASONRY UNITS

Unless otherwise specified and except for manhole construction, concrete block masonry shall be constructed of Grade N-I or N-II hollow masonry units.

1.03 MORTAR AND GROUT

Except as otherwise herein specified, all mortar and grout shall conform to Section 1.06. Mortar and Grout for use in sewer manholes shall be prepared from Type II Cement or approved equal. All work shall be executed in the best workmanlike manner and in full compliance with the applicable building ordinances. Masonry walls shall be laid true, level, and plumb in accordance with the plans. Surfaces of masonry units shall be clean, dry, and free from dirt when laid in the walls.

1.04 CONSTRUCTION

All concrete block units shall be dry when laid. During construction, all partially laid walls, as well as units in storage, shall be protected from moisture. All concrete block units and any partially laid walls which become wet during the construction shall be permitted to dry for at least one week or longer if required by weather conditions before recommencing work. Proper masonry units shall be used to provide for all openings in walls, bond beams, lintels, pilasters, etc., with a minimum of unit cutting. Where masonry unit cutting is necessary, all cuts shall be neat and regular and edges exposed in the finished work shall be cut with a power-driven abrasive saw. Where no bond pattern is shown, the wall shall be laid up in straight uniform course with regular running bond. Intersecting masonry walls and partitions shall be bonded by staggering the joints to form a masonry bond and the use of 1/4 inch minimum diameter steel ties at 24 inches o.c. maximum. Where stack bond is indicated on the plans, approved metal ties shall be furnished and installed as directed by the CONTRACTING OFFICER (C.O.) Mortar joints shall be straight, clean and uniform in thickness. Unless otherwise specified or detailed on the plans, horizontal joints shall be approximately 3/8 inch thick with full mortar coverage on the face shells, shall have vertical joints buttered well for a thickness equal to the face shell of the block, and these joints shall be shoved tightly so that the mortar bonds to both blocks. Masonry to be plastered shall have all mortar joints trowel cut flush. Exposed walls shall have joints tooled with a round bar (or V shaped bar) to produce a dense, slightly concave surface well bonded to the block at the edges. Tooling shall be done when the mortar is partially set but still sufficiently plastic to bond. All

tooling shall be done with a tool which compacts the mortar, pressing the excess mortar out of the joint rather than dragging it out. If it is necessary to move a block so as to open a joint, the block shall be removed from the wall, cleaned and set in fresh mortar.

1.05 PLACING REINFORCING STEEL

Reinforcing steel and wire mesh type of reinforcing shall be placed as indicated on the plans. Splices shall be lapped a minimum of 40 diameters, except that dowels other than column dowels need be lapped only 30 diameters. Column dowels shall lap 50 diameters. Outside horizontal steel shall lap around corners 40 diameters and be carried through columns unless otherwise shown on the plans. Inside horizontal steel shall extend as far as possible and bend into corner core. A dowel shall be provided in the foundation for each vertical bar. Where horizontal courses are to be filled, metal stops shall be used. Use of paper stops will not be permitted. All horizontal reinforcing steel shall be laid in a course of bond beam blocks filled with grout. Vertical cores containing steel shall be filled solid with grout and thoroughly rodded. Where knockout blocks are used, steel shall be erected and wired in place before 3 courses have been laid. Vertical cores at steel locations shall be filled as construction progresses. Where knockout blocks are not used, vertical cores at steel locations shall be filled in lifts of not more than 4 feet. The maximum height of pour shall be 8 feet. Cores shall be cleaned of debris and mortar and shall have reinforcing steel held straight in place. If ordered by the C.O., inspection and cleanout holes shall be provided at the bottom of each core to be filled. Reinforcing shall be inspected prior to placing grout.

1.06 CURING

Newly constructed masonry shall be kept damp for at least 5 days with a nozzle regulated fog spray sufficient only to moisten faces of the masonry but not of such quantity as to cause water to flow down over the masonry or by the use of approved curing compounds.

SECTION 05120

STRUCTURAL AND RIVET STEEL, RIVETS,
BOLTS, PINS, AND ANCHOR BOLTS

1.01 GENERAL

All steel, the class of which is not definitely designated herein or on the plans, shall conform to the requirements of ASTM A 36.

A. MILL TOLERANCES

Rolling and cutting tolerances, permissible variations in weight and dimensions, defects and imperfections shall not exceed the limits for structural steel contained in ASTM A 6.

1.02 BOLTS

A. UNFINISHED BOLTS

The bolts shall have square heads and square nuts unless otherwise specified. The bolts shall be long enough to extend entirely through the nut but not more than 1/4 inch beyond. Washers shall not be furnished unless specified.

Steel bolts shall conform to the requirements of ASTM A 307, except that steel manufactured by the acid-Bessemer process shall not be used.

1.03 ANCHOR BOLTS

Anchor bolts shall be manufactured from steel conforming to ASTM A 36 or A 307.

1.04 MILD-STEEL FORGINGS FOR STRUCTURAL PURPOSES

Steel forgings shall be made from steel of forging quality and shall conform to the requirements of ASTM A 235. They shall be Class C forgings with a maximum carbon content of 0.35% and shall be given a thorough annealing. The metal shall have a minimum Brinell hardness number of 130 and a maximum of 190 when tested in accordance with ASTM Test E-10.

SECTION 05301

METAL

1.01 GENERAL

These specifications cover the hot-dip galvanizing of various metals where required by the detailed plans or specifications.

1.02 SPECIFICATIONS

Materials shall be hot-dip galvanized and the weight and uniformity of coating determined in accordance with the standard specifications given in the following table:

GALVANIZING SPECIFICATIONS

Material or Test	Std. Spec. ASTM	Class
Corrugated Metal Pipe	A 444	
Flat Steel or Iron Sheets	A 525	
Iron or Steel Wire	A 116	2
Chain-Link Fabric (Galv. after Fabrication)	A 392	1
Barbed Wire	A 121	2
Steel Pipe Rails	A 120	
Structural Shapes, Tie Rods, Ornamental Iron Railings, Handrails, Manhole and Catch Basin Steps, and Curb Armor	A 123	
Bolts, Nuts, Washers, Anchor Bolts, Packing Spools, Gray Iron and Malleable Iron Castings, and Steel Castings	A 153	
Guard Rails	A 525	

1.03 WORKMANSHIP

The galvanizing shall be applied in such a manner that the spelter will not peel off. The finished product shall be free from blisters and excess spelter; and the coating shall be even, smooth, and uniform throughout. Machine work, dye work, cutting, punching, bending, welding, drilling, thread cutting, and

other fabricating work shall be done as far as is practicable before the galvanizing. No member shall be galvanized which is out of alignment. All members, nuts, bolts, washers, etc. shall be galvanized before a structural unit is assembled. All uncoated spots or damaged coatings due to poor workmanship, rough handling, or any other reason shall be cause for rejection.

1.04 TEST COUPONS

Test coupons for determining the quality of the galvanizing shall be wired to the materials to be galvanized before immersion in such a manner as to represent the amount of coating deposited on the materials.

1.05 REPAIR OF GALVANIZED SURFACES

Unless otherwise specified, where galvanized surfaces are field or shop cut, broken, burned, or abraded, thus breaking the galvanizing, the locations thus damaged shall be coated with a paint containing zinc-dust such as "Galvalloy" or "Galvicon" or an approved equal.

SECTION 06100

ROUGH CARPENTRY

1.01 GENERAL

A. DESCRIPTION

1.011 Furnishing and installing, complete, all rough carpentry work as shown on the drawings and herein specified, including all necessary connectors, hangers, and anchors.

1.012 Setting door frames, installing doors, weatherstripping and hardware.

1.02 PRODUCTS

A. MATERIALS

1.021 All products of this Section, unless otherwise specifically approved in advance, shall meet or exceed the following minimums:

ITEM	MATERIAL AND GRADE
Blocking	Ponderosa Pine, Stud Grade
Plywood	3/4" Marine Grade, D.F.P. C-D
Gypsum Wallboard	Water-resistant board: ASTM C-630, 5/8" thick, Grade Type X, tapered edges
Fasteners; screws for gypsum wallboard	Self drilling, self-tapping, bugle head, for use with power driven tool. Type S for wallboard to sheet metal application. Type G for wallboard to wallboard application.
Joint Treatment materials for gypsum wallboard	Joint Tape: ASTM C-475, perforated tape. Joint compound: ASTM C-475. Ready-mixed joint compounds: Conform with ASTM A-36.
Steel Hardware	Use only galvanized hardware at exterior framing.
Nails	Common (except as shown), conforming with Federal Spec. F F-N-1-1. Use only galvanized nails at exterior locations. Shingles must be installed with self-locking nails.

B. All lumber shall be seasoned and shall have a maximum moisture content of 19%.

C. All lumber shall be protected, ventilated, and kept under cover at the job site.

D. Miscellaneous metals: Spikes, bolts, washers, lag screws, and connectors shall be galvanized in accordancd with ASTM 153.

1.03 WORKMANSHIP AND INSTALLATION OF ROUGH CARPENTRY

A. GENERAL

All work shall be well braced, closely fitted, thoroughly spiked, accurately set, leveled, plumbed, and rigidly secured in place.

SECTION 06200

FINISH CARPENTRY

1.01 WORKMANSHIP AND INSTALLATION OF FINISH CARPENTRY

A. FITTING, TRIMMING AND HANGING OF DOORS

Doors shall be fitted, hung and trimmed as hereinafter specified and as indicated on the drawings. All doors shall have 1/8" clearance at sides and top, and 3/16" clearance over threshold, unless otherwise directed. Doors in openings without thresholds shall have 3/8" clearance unless otherwise noted. Doors 1-3/4" or more thickness shall have the lock or latch edge bevelled at the rate of 1/8" in 2"; doors shall be hung and trimmed with hardware as specified.

B. INSTALLATION OF FINISHED HARDWARE

Install all finished hardware in accordance with Division 8 of these specifications, and in strict accordance with the manufacturer's recommendations. Do not drive screws with a hammer; unless otherwise indicated on the drawings, set all finished hardware at the following heights:

Cylinder Dead Locks ..... Center 52 inches above finished floor
Door Knobs ..... Center 36 inches above finished floor
Door Pulls ..... Center 40 inches above finished floor
Push Plates ..... Center 45 inches above finished floor
Top hinge ..... Top 7 inces below head of frame
Bottom hinge ..... Bottom 11 inches above finished floor
Middle hinge ..... Equal distance between top and bottom hinges

C. INSTALLATION OF ACCESSORIES

Install all accessories in strict accordance with the manufacturer's instructions, taking special care to install firmly and securely with all anchors drawn up tight.

D. CLEANING UP

Keep premises in a neat, safe, and orderly condition at all times during progress of this portion of the work. Do not allow the accumulation of sawdust, cut ends, or debris. At the end of each working day, or more often if required for safety, thoroughly sweep all surfaces where refuse has settled and remove the refuse to an area designated for its storage. At completion of this portion of the work, thoroughly broom clean all surfaces of the interior.

RIGID INSULATION

1.01 GENERAL

A. SUBMITTALS

1) Manufacturer's Literature

2) Certificates that materials meet specification requirements.

B. PRODUCT DELIVERY, STORAGE AND HANDLING

1) Deliver material in manufacturer's original, unopened packaging

2) Store in area protected from weather, moisture and open flames

C. ENVIRONMENTAL REQUIREMENTS

1) Do not install when temperature is below 55 degrees F.

2) Do not install when raining or on a wet surface.

1.02 PRODUCTS

A. ADHESIVE: Use manufacturer's recommended adhesive applied according to label directions.

B. MECHANICAL FASTENERS: Minimum length 1/2" longer than insulation

C. RIGID INSULATION - RIGID THERMAL INSULATION

2" thick extruded polystyrene insulation boards which shall have a minimum compressive strength of 25 psi and maximum water vapor transmission rate of 1.1 per -inch and shall conform to Federal Specification HH-1-5426, Type II, Class B.

1.03 EXECUTION

A. PREPARATION OF SURFACES

1) Walls shall be plumb, true to dimensions, and clean. Mortar joints shall be cut flush with masonry.

2) Use mechanical fasteners and styrofoam brand mastic applied to back of wood nailer in beads or spots 6" on center. Position until the adhesive sets.

1.04 INSTALLATION

A. After surfaces have been prepared, adhere insulation to walls in a horizontal position, closely butted and with vertical joints staggered. Apply mastic to the foam in accordance with one of the following methods:

1) Masonry Walls: Use manufacturer's recommended adhesive applied in spots or ribbons according to label directions.

2) Concrete Walls: Use Manufacturer's recommended mastic applied in spots or ribbons according to label directions. Supplement mechanical fasteners on 2- to 3- foot centers installed in accordance with manufacturer's specifications.

B. Apply firm uniform pressure over foam board to level surface and bond to substrate.

SECTION 07240

ROOF AND DECK INSULATION

1.01 GENERAL

A. RELATED WORK SPECIFIED ELSEWHERE

1.011 1) Roofing: Section 07510

1.021 PRODUCT DELIVERY, STORAGE, HANDLING

1) Deliver material in manufacturer's original unopened packaging.

2) Store in area protected from weather, moisture and open flames.

3) Do not install insulating materials until construction has progressed to the point that inclement weather will not damage or wet insulation.

1.02 MATERIALS

1.021 BATT INSULATION

A. Batt insulation shall be 9" thick batt insulation, Kraft faced, meeting requirements of Federal Specification HH-1-521E, Type 11, completely non-organic, and non-absorptive, with an "insulation only" R-value of 11 for heat flow horizontal. Provide flanges on the batt insulation for fastening the insulation to wood members. Other widths may be used to fit other spacings.

B. Fasteners: Fasterners used for installing batt insulation shall be only those specifically recommended by manufacturer of insulating material used.

1.03 EXECUTION

1.031 SURFACE CONDITIONS

Prior to work of this section, carefully inspect all areas in which insulation will be installed and verify that all work of other trades is sufficiently complete and approved to permit commencement of insulation installation. Verify that no conditions exist which will prevent achieving designed insulation values.

1.032 INSTALLATION

A. Install all insulation materials in accord with manufacturer's recommendations, directions, requirements and specifications employing workmen skilled in application of these materials.

B. No voids between structural members and the insulation, or between batts will be allowed. Install in exterior wall of all heated spaces where shown on the drawings. The insulation shall be attached to wood studs,as recommended by the manufacturer.

1.033 INSPECTION

Upon completion of this portion of the work, carefully inspect the entire installation and determine that all areas to be insulated have been properly and adequately insulated before application of wall finish.

SECTION 07500

MEMBRANE ROOFING AND ASPHALT SHINGLE ROOFING

1.01 GENERAL

A. DESCRIPTION

The asphalt shingle roofing for this work shall include, but is not necessarily limited to, all asphalt shingle roofing and base flashing not called for in other sections.

B. RELATED WORK SPECIFIED IN OTHER SECTIONS

Roof flashings may be required as part of the work described. Under ~~Section 07620 "Flashing and Trim" and~~ 16400 "Electrical". Coordinate as required all other trades to ensure completely watertight installation of all roofing and roof flashing.

C. CODES AND STANDARDS

In addition to conforming with all pertinent codes and regulations, conform with all requirements of Underwriters' Laboratories, Inc., for Class A rating.

D. SUBMITTALS

1) Manufacturer's Literature

2) Certificates that materials meet specifications requirements.

3) Use all means necessary to protect the roofing materials before, during and after installation and to protect the installed work of other trades.

1.02 MATERIALS

A. ASPHALT SHINGLE ROOFING

Shingle Roof Shingles shall be 235 lbs. asphalt shingles, smaples of which shall be submitted to CONTRACTING AGENCY for approval. Shingles shall be minimum weight 235 lbs. per square and shall be installed in strict accordance with manufacturer's instructions over a layer of 15 lbs. asphalt impregnated felt. Entire asphalt shingle roof shall be covered by a manufacturer's 20 year bond.

1.03 EXECUTION

A. SURFACE CONDITIONS

Prior to all work of this section, carefully inspect the roof deck and the installed work of other trades, and verify that all work is complete to the point where roofing installation may commence and that the completed

installation will be in strict accordance with the design as shown on the drawings and in these specifications. In the event of discrepancy, immediately notify the Contracting Agency and proceed as directed.

B. INSTALLATION

1) Install the complete roofing system in strict accordance with the manufacturer's current recommendations. Roof deck must be dry before roofing is installed. The first row of shingles on all shingle roof shall be doubled.

2) Base flashing shall be installed in accordance with the manufacturer's detail for a 20-year endorsement.

C. TESTING

The CONTRACTING OFFICER may, at his sole discretion and at any time during installation of the roofing or, therefore, during the guarantee period; order a sample, or samples, to be cut at random from the roof installation to determine whether the base felt has been properly lapped and whether the shingle roofing has been installed as specified. If the sample is immediately approved by the C.O., patch the area or areas of such test cuts to whatever size and dimension as needed to properly ensure the specified longevity of the roof. If the sample is not, for any reason, immediately approved by the C.O., install all temporary protection necessary to prevent penetration of water through the roof until final patches or new roofs are installed and, upon decision of the C.O., make all required patches and repairs. Test cuts and patching, if ordered by the C.O., shall be at no additional cost.

SECTION 07811

PLASTIC SKYLIGHTS

1.01 GENERAL

A. RELATED WORK SPECIFIED ELSEWHERE

1) Membrane Roofing and Asphalt Shingle Roofing: Section 07500

2) Flashing and Trim: Section 07620

B. QUALITY ASSURANCE : ACCEPTABLE MANUFACTURERS

1) Hillsdale Industries, Inc.

2) Naturalite, Inc.

3) Wasco Productions, Inc.

or approved equal.

1.02 PRODUCTS

A. INTEGRAL CURB SKYLIGHTS

Wasco #AS1-3636 Translucent Acrylic Double Dome

1.03 EXECUTION

A. INSTALLATION

1) Comply with manufacturer's instructions.

2) Set unit plumb, level and true with no stress on plastic.

3) Use strippable coating on plastic to protect during roofing and other operations.

4) Shingled roof applied extending up curb and under counter-flashing.

B. CLEANING AND ADJUSTING

1) After all adjacent operations are complete, clean and polish plastic dome.

2) Adjust for smooth operation.

SECTION 08110

HOLLOW METAL DOORS AND FRAMES

1.01 GENERAL

A. QUALITY CRITERIA - TEST REPORTS AND CERTIFICATIONS

Certification of labeled construction fire doors and frames shall be furnished for doors not requiring labels but requiring labeled construction

B. DELIVERY, STORAGE AND HANDLING

1.011 Deliver, store and handle hollow metal work in a manner to prevent damage and deterioration.

1.012 Provide packaging such as cardboard or other containers, separators banking, spreaders and paper wrappings to protect hollow metal items.

1.013 Store doors upright, in a protected dry area, at least 1" or more off the ground or floor and at least ¼" between individual pieces.

1.014 Follow special storage and handling requirements of the manufacturer.

1.02 PRODUCTS

A. BASIC MATERIAL

1.021 Sheet metal for frames shall be hot rolled prime quality carbon steel.

1.022 Sheet steel for doors shall be cold rolled stretcher level sheet steel.

B. FRAMES

1.023 Frames shall be combination buck, frame and trim type.

1.024 Minimum gages: 16 gauge interior, 14 gauge exterior.

1.025 Brake-form steel sheets:

1) Provide an anchor at each jamb for each 2'6" of foor height or fraction thereof.

2) Vary anchor types to provide positive fastening to adjacent construction.

3) Secure a metal clip angle at bottom of each jamb member for anchoring to floor, with a minimum of two fasteners.

C. STOPS AND TRIMS

Applied stops shall be formed of 18 gauge steel, corners made to a close, neat fit and secured at 12" intervals with countersunk sheet metal screws.

1.023 DOORS

A. Face sheets shall be of 16 gauge steel.

B. Internal Stiffeners:

1) Minimum 16 gauge steel.

2) Space at not over 6" centers.

3) Spot weld to face panels at a maximum 5" intervals.

4) Vertical edges of face panels shall be jointed and welded on maximum 6" centers, then ground smooth and filled with mineral filler to conceal seams.

C. Sound Deadening: Interior surfaces shall be treated with sound-deadening material to eliminate metallic ring.

D. Insulation: Insulation of the door shall provide a maximum U-Factor of 0.47

1.024 PREPARATION FOR FINISH HARDWARE

A. Prepare doors and frames to receive hardware:

1) Hardware supplier shall furnish hollow metal manufacturer approved hardware schedule, hardware templates and samples of physical hardware where necessary to insure correct fitting and installation.

2) Preparation includes sindages and cutouts for mortise and concealed hardware.

1.025 FINISH

A. Doors and frames shall be leveled and ground smooth.

B. Apply mineral filler to eliminate weld scars and other blemishes.

C. Give factory coat of zinc rich rust-inhibitive metal primer.

1.03 EXECUTION

1.031 INSTALLATION OF FRAMES

A. Exercise care in setting frames to maintain scheduled dimensions, hold head level and maintain jambs plumb and square.

B. Secure anchorages and connections to adjacent construction.

C. Wherever possible, leave frame spreader bars intact until frames are set perfectly square and plumb and anchors are securely attached.

D. Secure frames to 8" bond beam.

E. Allow for expansion movement as required.

F. All hollow metal frames shall be grouted solid in all wall assemblies.

1.032 INSTALLATION OF DOORS

A. Apply hardware in accord with hardware manufacturer's templates and instructions.

B. Adjust operable parts for correct function.

C. Remove hardware, with exception of prime-coated items, tag, box and reinstall after finish paint work is completed.

1.033 PRIME COAT TOUCH UP

A. Immediately after erection, areas where prime coat has been damaged shall be sanded smooth and touched up with same primer as applied at shop.

B. Remove rust before above specified touch-up is applied.

C. Touch up shall not be obvious.

D. Before job painting is started, finish on frame and doors shall comply with the finish on approved sample.

1.034 PROTECTION

Protect installed hollow metal work against damage from other construction work.

SECTION 08710

FINISH HARDWARE

1.01 GENERAL

1.011 DESCRIPTION

A. Related work specified elsewhere:

1) Rough Carpentry ; Section 06100

2) Hollow Metal Work: Section 08110

B. Description of System:

1) Finish hardware includes all items known commercially as builders' hardware.

2) Items generally furnished as a part of a complete assembly are not to be included herein. However, master keyed cylinders are to be provided for these products.

1.012 QUALITY ASSURANCE

A. Manufacturer: Obtain each kind of hardware from only one manufacturer.

B. Installer: Install hardware by experienced tradesman.

1.013 PRODUCT DELIVERY, STORAGE, HANDLING

A. Deliver individually packaged hardware items at times and locations for installations.

B. Provide secure lock-up facilities for hardware delivered but not yet installed.

1.02 PRODUCTS

1.021 MATERIALS

A. Base Metals: Produce units of base metal indicated using manufacturer's standard alloy, composition, temper and hardness.

B. Form into required shapes and sizes by method indicated.

C. Fasteners:

1) Provide Phillips flat-head screws finish to match, for installation.

2) Match to manufacturer's standard finish for the latch and lock sets.

B. Provide finishes established by BHMA.

C. Provide protective lacquer coating on all exposed hardware finishes on brass, bronze and aluminum.

1.022 FINISHES

A. General - US 10B

1) Match finish of every hardware unit at each door to extent possible.

2) Match to manufacturer's standard finish for the latch and lock sets.

B. Provide finishes established by BHMA.

C. Provide protective lacquer coating on all exposed hardware finishes on brass, bronze and aluminum.

1.023 BUTTS

A. Shall conform to Military Sepcification MIL-S-20107A, Notice 1.

1. Door shall have 1½" pair butts.

2. Door shall have 4½" butts.

3. All butts shall be sized in width to clear all trim.

1.024 LOCKS AND LATCHES

A. All locks and latches shall be 7 pin "BEST".

1.025 THRESHOLDS

A. Thresholds shall be made of aluminum.

1.026 SILENCERS

A. Hollow metal doors.

1) Three per door.

1.03 EXECUTION

1.031 INSPECTION

A. Review installation procedures related to doors and frames.

B. Examine hardware for unusual provisions, including special operational features, security devices, UL labels and similar considerations.

1.032 INSTALLATION

A. General

1) Install in compliance with manufacturer's directions

2) Install each item completely and remove and store during finish application.

3) Reinstall after completion of finishing operation.

4) Do not install surface-mounted items until finishing is complete.

B. Mounting: Mount units at heights listed in Section 06200-1.024

1.033 ADJUST AND CLEAN

A. Adjust and check each operating item and each door

1) Lubricate moving parts.

2) Replace units which cannot be adjusted to operate freely.

B. Cleaning: Clean items to restore proper function and finish.

SECTION 09900

PAINTING

1.01 GENERAL

This work shall consist of furnishing paint and other materials, cleaning the surfaces to be painted, and applying the paint in substantial compliance with the specifications and as shown on the plans or directed by the Contracting Officer. (C.O.)

1.02 MATERIALS

1.021 Acceptable paint products are manufactured by Engard, Amercoat, Koppers, Wellborn and DuPont, or approved equal.

1.03 CONSTRUCTION REQUIREMENTS

1.031 All surfaces to be painted shall be clean and dry before paint is applied. Paint shall be applied only when the atmospheric temperature is above 50 degrees F.

When paint is applied in cold or damp weather, adequate heated enclosures shall be provided and maintained until the paint is dry.

1.032 All paint shall be thoroughly mixed before and during application with approved mechanical mixers. Thinner shall not be added unless approved by the C.O. The amount of thinner to be added shall not exceed 5 percent by volume. For minor structural steel items, red lead paint for field applications by spraying may be thinned with not more than one part of mineral spirits to 8 parts of paint, as packaged by volume.

1.034 Contact surfaces which are to be riveted, welded, or bolted with high strength bolts, in the shop or in the field and surfaces that will be inaccessible after fabrication or field erection shall be painted prior to erection.

1.035 After erection, rust, dirt, grease, and other deleterious material shall be removed from the steel members as directed by the C.O. The heads of rivets and bolts, field welds edges of contact surfaces, and all surfaces from which the shop coat was omitted shall be thoroughly cleaned and painted with one coat of the same type of paint as the shop coat. Field painting shall consist of the type of paint and the number of coats shown on the plans. Where successive paint coats are of the same color, the initial coat shall be tinted slightly to permit distinction between the coverage of each coat. The final coat shall not be tinted.

1.036 Wood surfaces shall be painted in conformity with the details shown on the plans

SECTION 15060

PIPE AND PIPE FITTINGS

1.01 GENERAL

The water line and appurtenences shall be installed as shown on the plans and details, and as specified herein and subject to the terms and conditions of the contract.

1.02 MATERIALS

1.021 PIPE

Main line pipe and fittings shall be as specified in AWWA as follows:

Plastic Pipe	C 900
Asbestos - Cement Pipe	C 400-77
Concrete Cylinder Pipe	C 300
Cast-Iron or Ductile Iron Pipe	C 101-67
Steel Pipe	C 200

1.022 VALVE BOXES

Valve boxes and lids shall be the type and size shown on the plans or as specified in the Supplementary Specifications.

1.023 TAPPING SADDLES

Tapping saddles shall be of bronze, cast-iron malleable iron, or ductile iron with straps of bronze, iron, or steel. Iron or steel straps and nuts shall have a heavy cadmium or galvanized plating applied after the threads have been cut and finished. All saddle straps and nuts or material other than bronze shall be field coated with tar enamel after installation. The saddles will be clean and dry when the tar enamel is applied. Gaskets for all saddles shall be of rubber or neoprene. The saddles shall be tapped for the type of thread being used on the corporation stop. As an alternate to tapping saddles, pretapped couplings may be utilized in conjunction with asbestos-cement pipe when approved by the Contracting Officer (C.O.).

1.03 INSTALLATION

1.031 GENERAL

A. Pipe and accessories shall be new and unused. The type of pipe to be installed shall be as shown on the drawings. Steel or ductile iron pipe shall be used. Pipe and accessories shall be handled in such a manner as to insure delivery to the trench in sound, undamaged condition. Particular care shall be taken not to injure the pipe coating. No other pipe or material of any kind shall be placed inside of a pipe or fitting after the coating has been applied.

B. The interior of the pipe shall be thoroughly cleaned of foreign matter before being lowered into the trench and shall be kept clean during operations by plugging or other approved methods. When work is not in progress, open ends of pipe and fittings shall be securely closed so that no other substances will enter the pipes or fittings. Any section of the pipe found to be defective before or after laying shall be replaced with sound pipe.

C. All nuts and bolts utilized in underground pipe connections shall be stainless steel, high strength cast iron or high strength wrought iron. The full length of each section of pipe shall rest solidly upon the bed, with recesses excavated to accomodate bells and joints. Any pipe that has the grade or joint disturbed after laying shall be taken up and relaid. Pipe shall not be laid in water or when trench or weather conditions are unsuitable for the work except by permission of the C.O. All unconnected ends of pipes shall have a valve, plug, or cap installed on it.

D. Plastic identification tape shall be installed two feet above all underground utility runs, but not less than 12 inches below finished grade. The type of utility shall be indicated on the tape.

1.032 TRENCHING AND BACKFILLING

All trenching and backfilling shall be in full accordance with Section 02221 of these specifications and as modified above for pipe laying in general.

1.04 PIPE LAYING

1.041 Pipe shall be laid to line and/or grade shown on the plans. Changes in horizontal or vertical alignment of the pipe at a joint shall not exceed the manufacturer's recommended deflection for the type and size pipe being laid. When the change required is more than the recommended, a fitting or several short joints of pipe shall be used.

1.042 On all push-on type joints (bell and spigot, fluid-tite, and ring-tite) the rubber gasket shall be removed, cleaned, the groove cleaned, the gasket replaced, and the bell or plan end cleaned before jointing. The gasket and the bell or plan end of the pipe to be jointed shall both be lubricated with a suitable soft vegetable soap compound to facilitate jointing. Care shall be taken to insure that neither the bell or collar, or the pipe being jointed is damaged as it is being homed.

1.043 Flange and mechanical joints shall be made with machine bolts and nuts of the proper size only. All components of these types of joints shall be cleaned before jointing. Only one (1) gasket will be permitted in a flange joint. In a mechanical joint the plain end pipe shall be fully seated before the gasket and gland is slipped up to the bell. Nuts on both types of joints shall be tightened by alternating nuts 180° apart.

1.044 Ductile iron pipe shall be installed in accordance with AWWA Specification C 600 and as herein specified.

1.045 Steel pipe shall be installed in accordance with AWWA Specification C 600 or AWWA Specification C 206 for welded joint and as herein specified. All field welded joints shall have one (1) primer coat, one (1) coat of coal-tar enamel of 3/32 inch thickness and one (1) wrapping of bonded asbestos felt applied to the outside of the joint and one (1) coat of primer applied to the inside of the pipe after jointing.

1.046 All fittings and valves shall be installaed as per the type of joint as stated above and as shown on the plans.

1.047 All couplings, camps, sleeves, etc. shall be installed as per the manufacturer's recommendations.

1.048 The following table specifies the type of tap required for various sizes and types of water pipes:

Size of Main	Size of taps where saddles are required	Size of taps Where insertion of fitting is required
4" C.I.	1-1/4"	All larger
6" C.I. & Up	1-1/2" & 2"	All larger

1.05 CUTTING

The cutting of any type of pipe shall be done as per the manufacturer's recommendations. Care shall be taken in cutting any pipe that has an internal and/or external lining or coating.

1.06 BLOCKING AND RIGID JOINTS

All tees, crosses, bends and valves not called out on the plans as rigid joints shall have concrete poured in the general shape and to the minimum dimensions shown on the plans, between the pipe and the undisturbed wall of the trench. The concrete shall be placed in such a manner that no concrete is in contact with any bolts or nuts on the pipe line.

All caps, plugs and valves on dead end lines will be blocked.

1.08 HYDROSTATIC TESTS

The CONTRACTOR shall be required to hydrostatic test all water mains, laterals, dead ends, and service lines in accordance with AWWA Specifications C 600. The test shall be conducted in the presence of the C.O. or his authorized representative. The testing of the lines shall be done without being connected to existing lines unless approved by the C.O. The CONTRACTOR shall provide all temporary plugs required. If connections to the existing lines are allowed by the C.O., it is with the understanding that the CONTRACTOR assumes any and all responsibility in case of damage or failure of the existing system. Leakage through connections to the existing system, leaks in the existing lines, or leaking existing valves under the test pressure will invalidate the test. The lines shall be tested at 150 pounds or 1.5 times the normal working pressure of the line, whichever is greater, for not less than two (2) hours. All taps, gauges and necessary equipment shall be provided by the CONTRACTOR as approved by the C.O., however, the C.O. may utilize gauges provided by him if he so elects. Each section of the new line, between valves shall be tested to demonstrate that each valve will hold the test pressure. No pipe installed will be accepted if the leakage is greater than that determined by the following formula:

$$L = \frac{ND\sqrt{P}}{7400}$$

in which L is the allowable leakage in gallons per hour; N is the number of joints in the length of pipeline tested; D is the nominal diameter of the pipe in inches; and P is the test pressure in pounds per square inch gauge. During the test the test pressure should not lose more than 10psig without being pumped back up to test pressure. The totals of the gallons of water required to hold the test pressure during the two (2) hours and the amount of water required to return the line to the test pressure at the end of the test period is the total leakage. If the total leakage is less than the allowable, the line can be accepted. All visible leaks will be repaired regardless of the amount of leakage.

SECTION 15061

STEEL WATER PIPE

1.01 GENERAL

This specification covers steel pipe and the interior and exterior protective coating for use in water supply and distribution systems carrying water and pressure.

1.02 PIPE

1.021 Pipe 6 inches and larger in diameter of either the fabricated or mill type shall be manufactured in accordance with AWWA C200.

1.022 Wall thickness for steel pipe 6 inches and larger shall be based on the computation techniques contained in AWWA M-11, Steel Pipe Design Manual, computations shall take into consideration internal pressure, external pressure and any special physical loading.

1.023 Pipe in sizes less than 6 inches in diameter shall be in accordance with ASTM A53, standard weight (Schedule 40).

1.03 FITTINGS

1.031 Fittings for pipe 4 inches and larger in diameter shall be fabricated of the same kind of steel and same wall thickness as the pipe to which they are to be connected. Dimensions shall be as shown in AWWA C208.

1.032 Fittings for pipe 2½, 3 and 3½ inches in diameter shall be in accordance with ASTM A234, Grade B, butt weld type, for use with standard weight pipe.

1.033 Fittings for pipe less than 2½ inches in diameter shall conform to Federal Specification WW-P-521, Type II (zinc coated). Unions shall conform to Federal Specification WW-P-531, Type B., galvanized with steel to brass or bronze seats.

1.04 FLANGES

Flanges shall be slip-on type conforming to AWWA C207 drilled as specified in ASA B16.5.

1.05 JOINTS

Steel pipe shall be prepared for one of the following types of joints as noted on the plans.

A. Bell-and-spigot ends prepared for O-ring rubber gaskets.
B. Lap joints for field welding.
C. Beveled ends for field butt welding.
D. Plain ends fitted with butt straps for field welding.
E. Ends prepared for mechanical coupled field joints.
F. Plain ends fitted with flanges.

Unless otherwise shown on the plans, the pipe joints shall comply with AWWA Standards. Joints tolerances shall not exceed those specified in AWWA C201.

1.06 LININGS AND COATINGS

1.061 GENERAL

Underground pipe shall be coated on the exterior with coal-tar enamel and wrapped.

1.062 Coal-tar enamel lining and coating shall be in accordance with AWWA C203. The coating on exterior surfaces 2½ inches and larger shall be as follows: A uniform coat of coal-tar primer shall be applied, followed by a coat of hot coal-tar enamel into which shall be bonded, using a wrapping machine, a layer of 23½ pound asbestos or 40 pound rag felt or a layer of fibrous glass and finished by wrapping with Kraft paper.

1.063 Asphalt mastic coating shall be in accordance with The Asphalt Institute Construction Series No. 96, Specification M-2.

1.064 Asphalt Coated and Wrapped-The exterior surfaces of the pipe and fitting shall be sand or grit blasted followed by a uniform coat of asphalt primer followed by a coat of hot asphalt not less than 3/32 inch in thickness and wrapped as specified for coal-tar coatings.

1.065 Pipe installed above ground shall have exterior coatings of Chlorinated Rubber Aklyd Paint in accordance with AWWA C204.

SECTION 15062

CAST IRON PIPE
(STANDARD AND DUCTILE)

1.01 GENERAL

Cast-iron pipe shall be of the sizes and type shown or specified and shall conform to the following specifications:

1.02 DUCTILE IRON PIPE

Ductile iron water pipe shall conform to AWWA Specification C151.

1.021 FITTINGS

Ductile iron fittings of the mechanical joint, push-on joint or flanged type, as specified, shall conform to AWWA Specification C110.

1.022 THICKNESS

Wall thickness of ductile iron pipe shall be determined in accordance with AWWA Specification C150 for trench condition 4, 5 foot cover and truck loading unless otherwise specified. Pipe shall be of class 200 for 5 foot earth cover.

1.023 LINING

Ductile iron water pipe and fittings shall be cement mortar and bituminous seal coated inside in accordance with AWWA Specification C104.

SECTION 15063

COPPER PIPE

1.01 COPPER TUBING

Copper tubing shall conform to the requirements of ASTM B 88 and shall be Type K, hard for exposed service and soft for buried service. Fittings shall be cast bronze or forged brass containing 85% copper. Joints may be soldered, flared or compression for soft tubing. Joints shall be soldered for hard tubing. Solder shall be 50-50 tin-lead or 95-5 tin-antimony. Bends in soft copper tubing shall be made with the appropriate equipment.

SECTION 15101

GATE VALVES

1.01 GATE VALVES

Gate valves shall conform to AWWA C 500. Gate valves shall be designed for an operating pressure of 150 psi or better and shall be double-risk, parallel seat-type, iron body, bronze mounted, inside screw, non-rising stem, with "O" ring seals, with standard hub nut. Gate valves shall open counter-clockwise and shall have mechanical joint ends, unless otherwise required.

SECTION 15109

FIRE HYDRANTS

1.01 FIRE HYDRANTS

Fire hydrants and their extensions shall be in accordance with UL listed and FM approved traffic type. Fire hydrants shall have one 5¼ inch diameter valve opening; 6 inch mechanical joint of slip-on inlet connection; two 2½ inch hose nozzle connections; and one 4½ inch steamer nozzle with National Standard Fire Hose Coupling Screw Threads or as specified by the owner. Fire hydrants shall have a pentagon operating nut, be designed for 150 psi working pressure service, and have a normal bury of 3½ to 4 feet unless field conditions require a deeper bury, in which case extensions will be used as as to bring the bottom of the break-off flange 2 to 8 inches above the top of finish grade.

The pipe fittings and fire hydrants starting at the street main and ending at the fire hydrant itself shall be lying in a line perpendicular to the street's centerline. Fire hydrants shall be installed in as near a vertical position as possible and shall have no more than ½ inch variation from a vertical line between the breakway flange and the top of the fire hydrant.

Fire hydrants shall be painted from the top to a point 1 foot below the ground level flange. The color shall be red.

SECTION 15110

DIAPHRAGM STYLE CHECK VALVE

1.01 GENERAL

A. This valve shall open to permit flow when inlet pressure is greater than the discharge pressure. When the discharge pressure is greater the valve shall close tightly to prevent return flow.

This valve shall be a diaphragm type globe or angle valve, hydraulically operated by line pressure. It shall be springloaded and have a single removeable seat and a resilient disc. The valve stem shall be guided at both ends by a bearing in the valve cover and an integral bearing in the valve seat (sizes 2" - 16").

No external packing glands are permitted. The diaphragm shall not be used as a seating surface, and there shall be no pistons operating the valve. All necessary repairs other than replacement of the valve body shall be possible without removing valve from the line.

This valve shall contain auxiliary controls which permit adjustment of the opening and closing speeds.

SECTION 15111

RUBBER FLAPPER CHECK VALVE

1.01 GENERAL

The rubber flapper swing check valve shall have a heavily constructed cast iron body and cover. The body shall be long pattern design (not wafer), with integrally cast on end flanges. The flapper shall be Buna-N having an "O" ring seating edge and be internally reinforced with steel.

Flapper to be captured between the body and the body cover in a manner to permit the flapper to flex from closed to full open position during flow through the valve. Flapper shall be easily removed without need to remove valve from line. Check valves to have full pipe size flow area. Seating surface to be on a 45 degrees angle requiring the flapper to travel on 45 degrees from closed to full open position, for minimum head loss and non-slam closure.

Buna-N flapper to have an elastic spring, molded integrally, to assist the flapper to close against a slight head to prevent slamming.

Valve designed for 175 psi working pressure for water. The valve shall be suitable for buried service, in which case, stainless cover bolts must be furnished.

SECTION 15170

METERS, GAUGES, PUMP CONTROL VALVES

1.01 GENERAL

A. PUMP CONTROL VALVES

Valve shall be a diaphragm actuated, single seated, composition disc, hydraulically operated globe-type valve. It shall have two operating chambers sealed from each other by a flexible synthetic rubber fully-supported diaphragm. The valve disc shall have a rectangular cross section and shall be retained on three sides.

Control of valve operation shall be by means of an externally mounted, four-way solenoid pilot valve. Self-cleaning strainers shall be used to protect the control system. Check valves in the control system shall be of the diaphragm type. Valve shall utilize line pressure for operation. A Limit-switch must be installed to be adjustable over entire valve travel. Valve shall be equipped with a built-in type check feature to prevent reverse flow.

Valve shall be rated for 150 psi service. The valves shall be wired and piped to remain closed after the pump has started until the pump discharge has reached a predetermined, adjustable pressure at which time the valve will slowly open at a field adjustable rate. Upon a stop signal, the valve will slowly close while the pump is still running, closing rate shall be field adjustable. The valve shall be adjusted for quick closure in the vent of power failure or other malfunctions which stop the pump while the pump control valve is open.

B. AIR RELEASE AND VACUUM VALVES:

Air and vacuum valves shall be provided at locations shown on the drawings. Valves shall be set on the discharge header between the pump and the victaulic coupling. Valve shall be 1" 200 psi or equal, and shall be equipped with a stop valve.

C. PRESSURE SWITCH:

There shall be provided on the discharge pressure gauge and suction pressure gauge a pressure switch complete with shut-off cock. Capacity shall be equal to the pressure gauge with manual adjustment for proper setting. Pressure switches shall be a mercury , with normally open contacts. Pressure gauges and switch shall be rigidly attached to a suitable mounting.

D. PRESSURE GAUGES:

Each pump shall be provided with a discharge and suction pressure gauge of the direct reading Bourdon Tube Type equipped with an individual

shut-off cock. The gauges shall have iron bodies and be calibrated in pounds per square inch (psi) in not more than 2 lb. increments from 0 to 30 for the suction gauges and 0 to 200 for the discharge gauges.

E. PIPE SUPPORTS:

Pipe supports shall be provided where indicated on the drawings.

F. METERS

Meter shall be vertical flow meter of the propeller type suitable for mounting on a standard flanged tee. 150 pound flanged. The meterhead shall consist of a totalizing register, cover plate, drop pipe, propeller and drive mechanism. The cover plate shall be of cast iron sized to permit removal and insertion of the complete propeller and drive assembly through the top flange of tee. The drop pipe shall be affixed to the cover plate by means of a flanged connections, to provide rigid support to prevent vibration. The propeller shall be polyethylene plastic.

Meter shall register within plus or minus 2% of the true flow of water at all flows between 90 and 900 GPM. Register shall be a six digit straight reading in GPM. Meter shall be suitable for adaptation of electric transmission unit for remote instrumentation. It shall be equipped with a wall mounted 4" strip chart 120 day recorder with primary recording in GPM, secondary recording in MGD. The totalizer shall record in gallons.

SECTION 15220

PIPING SYSTEM - INTERIOR PIPING

1.01 GENERAL

A. SCOPE

The work covered by this section of the specifications consists of furnishing all plant, labor, equipment, appliances and materials and in performing all operations in connection with this section of the specifications, the applicable drawings and subject to the terms and conditions of the contract.

1.02 APPLICABLE SPECIFICATIONS

The following standard specifications or the latest revision thereto form a part of these specifications.

A. AMERICAN WATER WORKS ASSOCIATION STANDARDS

For Suction and/or Discharge Headers
C2202 Steel Water Pipe
Wall thickness 3/8" Grade B all sizes pipe
C201 Fabricated Electrically welded steel water pipe
C203 Coal-tar enamel protective coatings for steel water pipe
C206 Field Welding of Steel Water Pipe Joints
C207 Steel Pipe Flanges
C208 Dimensions for steel water pipe fittings

B. AMERICAN STANDARD SPECIFICATIONS

For piping smaller than 8" diameter
A 21.6 Cast Iron pipe centrifugally cast in metal molds, for water or other liquids.
A 21.10 Cast Iron fittings, 2" through 48"
A 21.50 Thickness of Ductile Iron Pipe

C. Pipe for water lines within the pump station shall be steel unless otherwide specified on the plans. All pipe form a point five feet outside the pump station shall be as specified in Section 15060, "Pipe and Pipe Fittings". The pipe and accessories shall be new and unused. The interior of the pipe shall be thoroughly cleaned of foreign matter, and shall be kept clean during operations by plugging or other approved method.

1.021 PUMP HEADER

The pump header including all interior pump piping, suction and discharge pipe saddled shall be shop fabricated steel conforming to the requirements contained herein. The shop fabricated steel header shall consist of header lengths with flanged connections to valves and future inlets with elbows miter cut and welded, reinforcing as

required at bends and over pipe supports as shown on the drawings and with the provision of Dresser Type Couplings at locations to be selected by the Contractor and approved by the Contracting Officer, (C.O.). The steel pipe saddles or supports shall be constructed by the header fabricator. Pipe design pressure shall be 150 psi.

1.022 STEEL PIPE

A. MATERIAL

Steel pipe for both the interior header and exterior piping shall conform to the requirements of American Water Works Specifications C202 and C210 the latest revisions thereof unless otherwise specified. The diameter of the steel pipe as required shall be construed as meaning the nominal size as indicated in the above referenced AWWA Specifications. The steel pipe shall have a minimum wall thickness based on an allowable stress of 13,500 psi, plus a corrosion and mechanical strength thickness of 0.05
Steel pipe shall have not more than one circumferential nor more than one longitudinal seam per regular section.

1. SPECIALS AND FITTINGS

Steel pipe specials and fittings shall be of the same material and thickness as the pipe. Specials and fittings may be of standard steel tube turns or segmentally welded sections, with ends to accomodate the type of coupling or joint specified for the pipe. Specials and fittings that cannot be mechanically lined or coated shall be lined as well as coated and wrapped by hand, using the same materials as are used for pipe, with the same number of applications of each material carefully, smoothly applied.

2. JOINTS

Joints shall be welded or flanged where shown on the drawings or specified herein conforming to the requirements of American Water Works Specification C207 and C206 and shall be designed for a minimum operating pressure of 150 psi. Flanges shall be faced and drilled for the connection of gate valves and other fittings as specified herein. The jointing of steel pipe sections or fittings shall be by the use of bolted

couplings such as the Locking Dresser Coupling or equal. Welding shall not be permitted except where it is deemed necessary and approved by the C.O.

3. PROTECTIVE COATING

A. External

Interior header - Steel Pipe, fittings and joints utilized for the steel header and not buried shall receive a prime and finish coat or paint in accordance with the section PAINTING of these specifications. Steel pipe utilized for the steel header but buried under the floor shall conform to the provisions contained herein for exterior piping.

B. Internal

Interior Header - Steel Pipe, fittings and joints utilized for steel header within the pump house shall receive coal-tar enamel protective coating in accordance with American Water Works Specification C203.

B. INSTALLATION

1. Handling

While being shipped, delivered and installed, pipe and accessories shall be handled in a manner to insure a sound, undamaged condition. Particular care shall be taken not to injure the pipe coating or lining. Pipe shall be adequately protected against bending and flexure cracking or lining during handling and shipment. Rigid inspection of all pipe sections and fittings will be made by the C.O. prior to the installation. No other pipe material of any kind shall be placed inside the pipe or fitting after the coating has been applied.

2. Cutting

Cutting shall be done in a neat and workmanlike manner and shall conform strictly with the manufacturer's recommendations.

3. Tests

After pipe is placed, the joints made, the pipe shall be subjected to a pressure test equal to the specified working pressure and proved tight at the pressure. Portions of the system may be tested in order to facilitate the construction, all pipe which are to be embedded in concrete or lay under concrete shall be tested before placing the concrete. The Contractor shall provide all equipment and apparatus necessary to perform the tests. The test shall be the responsibility of the Contractor and certified by the C.O.

SECTION 15230

BOOSTER PUMPING EQUIPMENT

1.01 GENERAL

The Booster Pumping Equipment and appurtenances called for in this section and on the plans shall be installed as shown on the accompanying plans and in conformance with recommendations as specified by the manufacturer.

1.02 CLOSE COUPLED VERTICAL TURBINE PUMPS

Close coupled vertical turbine pumps shall be constructed in accordance with Standards of the Hydraulic Institute and American Water Works Specification E 101, except as hereinafter modified.

1.021 PUMP DISCHARGE HEADS

Pumps shall have heads to provide for above base, horizontal discharge of water. The discharge outlets shall be flanged (150 psi) of the size required by the pump design, but in no case shall the discharge velocity (average) be greater than 10 fps at the rated capacity.

The pump discharge heads shall be designed and constructed for installation as shown on the drawings. Design shall provide for a maximum bearing stress on the concrete of 750 psi which loads shall include all dead loads, moments, torques, and thrusts caused by operating the pump in the manner proposed.

The pump dishcarge heads shall provide for connection to the flanged suction pipe, (complete with gasket and bolts), connection of pump motor, connection of the discharge column outer pipe, and installation of mechanical shaft seal.

The pump discharge head shall be provided with piping and air relief valve to release any air which might be entrapped in the suction pipe outside of the discharge column. Such piping shall also provide for installation of suction pressure gauges.

1.022 MECHANICAL SEAL

The mechanical shaft seal to be utilized on the pump discharge head shall be of stainless steel construction utilizing a hardface material such as stellite or a ceramic overlay. The seal shall consist of Buna-N "O" or "Quad" rings, a dense pure carbon and steel gland housing. The mechanical seal may be of the balanced or unbalanced design in accordance with the seal manufacturers pressure-velocity ratings. A spare seal shall be furnished with each pump. All mechanical seals shall be approved by the seal manufacturer for the specific operating conditions convered under these specifications. Mechanical seal to be furnished with integral shaft sleeve of 600 brinnel hardness.

1.024 HEADSHAFT COUPLING

The motor to pump shaft coupling shall be spacer type, flanged, readily accessible and removable without removal of motor. Shaft coupling shall provide for removal of mechanical shaft seal without removal of motor. Shaft coupling shall be rated for 100% of maximum torque and axial loads computed for the pump furnished.

1.025 DISCHARGE COLUMN

The discharge column between bowl assembly and the pump discharge head shall be minimum length for water lubricated shaft.

A) OUTER PIPE

The outer pipe shall be standard steel water pipe conforming to AWWA C 200-75 psi working pressure. Pipe shall be coated inside and out with coal-tar enamel. Pipe may either be screwed or flanged to pump discharge head and bowl assembly.

B) SHAFT BEARINGS

If required, shaft bearings shall be pump manufacturer's standard with natural rubber bearing surface and stainless steel shaft sleeve, water lubricated.

C) SHAFT

The pump shaft shall be an extension of the impeller shaft, one piece from impellers to headshaft coupling.

Shafting shall be 216SS stainless steel of adequate size and strength to do the work required.

Shafts shall be furnished with a shaft sleeve at the mechanical seal. Shaft sleeve shall be hardfaced stainless steel with a brinnel hardness of 600.

1.026 THRUST BEARING

The thrust value for each pump shall be computed from shut-off through all head capacities and shall include the static load of the impeller shaft and motor rotor. A thrust bearing shall be provided which is rated for five year average life, continuous operation for 133% of thrust value at the design head and/or 100% of thrust value at shut-off head, whichever is greater.

1.027 BOWL ASSEMBLY

A) GENERAL

The bowl and impeller units shall be of high pressure construction and shall include the following features.

B) BOWL OUTER WALL

Bowl outer wall shall be increased in thickness to accomodate stress limitation of class 31 cast iron tensile strength.

C) BOWLS

Bowls shall be close grained cast iron or semi-steel with the interior surfaces finished smooth. The bowls shall be assembled in a manner to assure perfect alignment at all times. Guide passages for water shall be designed so as to reduce friction to a minimum. Guide bearings shall be provided in each stage to insure proper alignment of the impellers, together with a water-lubricated bronze bushing or bearing at the bowl assembly intake to serve as the bottom bearing of the impeller shaft.

D) IMPELLERS:

Impellers shall be bronze or red brass containing not less than 79% copper and shall be cast in one piece, accurately machined and precision-tested for dynamic and static balance. Impellers shall have characteristics such that the motor will not be overloaded at any point on the curve and the head characteristic shall be as steep as possible so that an increase or decrease in the operating head above or below the design point will not cause excessive variations in the pump capacity. All impellers shall be fixed rigidly and concentrically to the impeller shaft in such manner that they will not work loose but will be easily removable. Impellers shall be of the enclosed type with replaceable impeller seal rings.

E) IMPELLER SHAFT

The impeller shaft shall be as specified in paragraph 5.c. above and will be 416 stainless steel.

1.03 AIR AND VACUUM VALVES

As indicated in paragraph1.021there shall be provided for each pump installation an air and vacuum relief valve piped to the top of the suction line for release of entrapped air. They shall be of one inch (1") size and shall be complete with gate valve and necessary piping to waste.

1.04 TOOLS

Any special tools required for the maintenance or operation of the pumping units shall be provided without additional cost to the

1.05 ANTIVORTEXING DEVICES

The pumps shall be included with an antivortexing device.

1.06 PUMP CHARACTERISTICS

A) GENERAL

Performance characteristics which are outlined by this specification are minimum required, and are referenced to the centerline of pipe at the face of the pump discharge and bell. All internal losses inherent in the construction of a particular pump shall be included in the selection of the pump to yield the specified net result.

B) AVAILABLE NPSH

The hydraulic conditions will provide 25 feet abs available NPSH. All pumps furnished shall have a required NPSH less than 25 feet abs for all capacities up to that pumped at 53.0 feet TDH for Pump #1 and 48.0 feet TDH for Pump #2.

PUMP #1 (Electric Motor Driven)

			Design Pt.
Capacity (GPM)	330	420	500
TDH	53	43	34
Efficiency (Bowl)	74	76	72
Speed	1770 RPM	1770 RPM	1770 RPM

Available NPSH: 24.95 feet

PUMP #2 (Gasoline Motor Driven)

			Design Pt.
Capacity (GPM)	54	80	105
TDH	48	36	26
Efficiency	64	72	64
Speed	3500 RPM	3500 RPM	3500RPM

Three head-capacity-efficiency conditions are shown for the pump to indicate the general slope of the head-capacity curve in the region of normal operation. Pumps to be furnished shall have a head capacity characteristic curve within a tolerance of minus 0 to plus 5% of the capacity of the given heads. Tolerances shown above refer to head capacity in GPM vs TDH.

C) ELECTRIC MOTORS

One pump shall be driven by a continuous duty polyphase electric motor, suitable for operation on a 60 cycle 3 phase alternating current of the voltage indicated on the drawings. Motors shall

conform to the requirements of ASA 50.2 and shall be rated for 60° C. rise design. Polyphase motors shall be vertical, squirrel-cage type, having normal starting torque and low starting current characteristics.

D) GASOLINE ENGINE

One pump shall be driven by a gasoline engine capable of turning the pump at 3500 RPM loaded at the design head conditions shown above. The engine shall be battery started and equipped with a clutch connecting assembly compatible with the pump drive assembly. The engine clutch assembly must be flexible and provide for both drive and engine disengagement positions allowing the engine to be started, run and stopped without the pump being driven.

The engine shall be equipped with a starter-generator and 12 volt sealed (water not needed) battery and trickle charge system connected to a 110 volt wall outlet.

The engine exhaust shall be piped through the wall to the atmosphere.

1.07 OVER-ALL EFFICIENCY

A statement of the overall efficiency and the kilowatt-hour consumption per 1,000 gallon pumped against total dynamic head for each electric motor driven pump shall be submitted.

1.08 DATA SHEETS

Data sheets which show the following information for each pumping unit shall be submitted. Failure to fill in the data sheets completely will be sufficient cause for rejection.

1) Name of manufacturer
2) Type of pump
3) Number of stages and speed
4) Diameter of impeller
5) Type of bearings
6) Size of suction and discharge piping
7) Shut-off Pressure
8) Impeller material
9) Pump shaft material and diameter
10) Head and capacity
11) Make and type of motor
12) Horsepower of motor at 60° C. temperature rise
13) Type of motor bearings
14) Net weight of complete unit
15) Guaranteed KWH required to pump 1,000 gallons against Specified Head
16) Combined overall efficiency of pump and motor operating at rated conditions

17) Does equipment offered differ from specification requirements:
18) Minimum external reactive forces, torques and moments necessary to anchor pump during operation, including starting and stopping.
19) Thrust Bearings: Pump thrust at all head capacities
Rated Bearing Capacity
Bearing Manufacturer
Method of cooling and installation

1.09 TESTS AND GUARANTEE

A. TESTS

The pumps shall be factory tested and certified test curves for the pumps shall be supplied to the Contracting Officer. Test curves showing efficiencies less than that specified herein shall be cause for rejection of the unit. Field tests shall be performed after installation. The Contractor shall be responsible for the proper testing of the units. No tests shall be performed except in the presence of the C.O. The Contractor shall guarantee in writing the pumping units to operate satisfactorily at the rated head and capacity. The Contractor shall state the guaranteed overall efficiency of the unit when operating at specified conditions.

SECTION 15240

RESERVOIR LINING

1.01 GENERAL

The work includes furnishing all materials, tools, synthetic rubber, etc., required to provide and install a nylon/polyester reinforced membrane as a lining for potable water reservoirs, as shown on the drawings and these specifications, subject to the terms and conditions of the contract.

1.02 CONTRACTOR'S EXPERIENCE

The firm to perform the lining work shall have demonstrated by previous experience its ability to do the work. The required previous experience shall consist of having successfully installed not less than 200,000 Sq. Meters, (2,152,000 sq. ft.), of continuous, flexible, membrane lining systems meeting these specifications on at least ten (10) successful chlorinated polyethylene lined reservoirs. The Contractor shall include a list of installations, giving owner's name, location, telephone number, size of job, superintendent, and date completed. The firm shall have been continuously in the business of installing the chlorinated ploye thylene lining systems for at least five (5) years prior to the bid date and shall be approved for this work by the membrane manufacturer.

1.03 LINING MATERIAL - TO BE 30 MIL. - 3 PLY

The membrane shall be of nylon/polyester reinforced or chlorosulfonated polyethylene synthetic rubber. The material shall be manufactured specifically for application as a lining for water storage facilities.

The membrane manufacturer shall have manufactured a minimum of 1,860,000 M^2 (20,000,000 sq.ft.) of material meeting these specifications.

LINER

3 PLY 30 MIL TYPE

MUST MEET THESE STANDARDS

Property	Test Method	Requirement
Weight	- - - -	.220 lbs/sq. ft. nominal
Thickness	ASTM D 374 - Method C	0.027" Minimum
Puncture Resistance	FTMS 101B - Method 2031	100 Pounds Average
Breaking Strength	ASTM D751 - Grab Method	160 Pounds Minimum
Elongation	ASTM D751 - Grab Method	15% Minimum
Tear Strength	ASTM D751 - Tongue Tear	20 Pounds Minimum both directions
Ozone Resistance	ASTM D1149 and ASTM D518 - Method A: 50 pphm 20% strain, 100° F 10 days exposure	No cracks at 7 x magnification
Cold Bend	ASTM D2136 at -45° F	No cracks
Seam Strength	ASTM D816 - Method B	Exceeds that of parent material

B. The synthetic rubber sheeting shall be manufactured from a synthetic rubber compound containing not less than 45% (by weight) of chlorinated polyethylene or chlorosulfonated polyethylene synthetic rubber as the sole elastomer.

C. The synthetic rubber sheeting shall be manufactured totally by calendering to produce a uniform sheet free of holes, hardened modules and delamination.

D. The reinforcing fabric shall be one of the following:

a. 8 x 8 x 250 denier (16 x 8 2:1 leno 140 warp/250 fill) polyester

b. 8 x 8 x 250 denier palin weave polyester

c. 8 x 8 x 210 denier (16 x 8 2:1 leno 100 warp/210 fill) nylon

d. 8 x 8 x 250 denier (16 x 8 2:1 leno 140 warp/250 fill) nylon

e. 10 x 10 x 100 denier Polyester

The fabric shall be totally encapsulated within 0.38 cm (0.15 inch) sheets by the calendering process. The reinforcing fabric shall extend to between 1.27 cm (0.5 inch) and 2.54 cm (1.0 inch) of the sheet edge. Exposed fabric or indication of delaminating will not be permitted.

E. The material shall consist of two plies synthetic rubber, 1 ply fabric (3 ply).

F. The material shall be furnished with the exposed side black. The color shall be "built in" to the material.

G. SEAMING

1. The finished roll goods shall be fabricated into panels up to 1,850 M^2 (20,000 square feet) in size 30 mil and 1300 M^2 (14,000 sq.ft.) 45 mil, using either an adhesive or a heat seaming method, as prescribed by the manufacturers to provide a "film tearing bond". This type bond is considered to be a bond sufficiently strong that a failure of the seam will not occur at the bonded surfaces.

2. All factory seams for either fabrication or repairs shall provide a minimum overlap of the reinforcing fabric of 1" and shall extend to the edge of the sheet so that no loose edge is present on the top side of the sheet. Loose edge on the underside of the sheet is permissible as long as the 1" minimum overlap of the reinforcing fabric is maintained and a minimum of 1" bonded seam is maintained within the overlap.

3. All field seams shall provide a minimum overlap of the reinforcing fabric of 2" and shall extend to the edge of the sheet so that no loose edge is present on the top side of the sheet. Loose edge on the underside of the sheet is permissible as long as the 2" minimum bonded overlap of the reinforcing fabric is maintained. A nominal 6" overlap of liner panels shall be allowed to keep dirt out of the field seams.

1.031 PREPARATION OF UNDERLYING SURFACE

A. Preparation of Earth Subgrade: The previously excavated and filled surfaces shall be trimmed to the elevations and contours indicated on the drawings, and all loose earth, rock, cobbles, wire, stakes, and other foreign matter shall be completely removed. Where grade changed occur, the sharp break shall be eased by rounding the edge to approximately a 0.3M (12 inch) radius. The surface of the completed subgrade shall be smooth, uniform and free from inequalities or sudden change in grade.

B. Removal of Unsuitable Materials: In areas where the lining is to be placed, gravelly material containing cobbles or boulders shall be removed to a depth of at least 0.2M (8 inches) below the elevations shown on the drawings. Where unsuitable materials have been removed, the areas shall be restored to grade with selected material from the excavation or with borrow of earth, sand or other approved materials.

1. Materials for the embankment shall consist of inorganic soils free of vegetation, trash, wood, brick, broken concrete, cinders or other debris and organic materials.

2. The maximum size of stone or gravel in the embankment shall not exceed 10 cms (4 inches). The liquid limit as determined by ASTM designation D-423, shall not be greater than 40 and the plasticity index, as determined by ASTM designation D-424, shall not be any more than 10.

3. The embankment materials shall be placed in layers or lifts not to exceed 0.20 M (8 inches). Each layer shall be compacted to the specified density before another layer of loose material is placed. Each layer shall be compacted to a minimum of 90% of the maximum dry density, as determined for the embankment material by ASTM designation D-1557. The moisture content of the backfill shall be within 2 percentage points of the optimum moisture content for material as determined by the specified compaction test.

4. Water shall be added or material dried in a manner that will result in a uniform distribution of moisture in the material.

C. Sand Bedding: The bottom of the reservoir shall consist of a 6" layer of concrete sand, with grading as specified in Section 02502, 1.04.

D. Raking Subgrade: After completion of rolling the entire subgrade shall be lightly hand raked to remove all surface inequalities, irregularities, debris and foreign substances, and shall be approved by the C.O.

E. Maintenance: The subgrade shall be maintained by the general or earthwork contractor in a smooth, uniform, compacted condition until the lining is placed.

1.032 PLACING LINING

The lining shall be placed on the prepared suface in a regular pattern and sealed to all concrete structures and other opening through the lining in accordance with layout plans and details shown on drawings submitted by the Contractor and approved by the C.O. The sheeting for both bottom and side walls shall be of such lengths and shall be placed in a manner to reduce jointing to a minimum. Lap type joints shall be used as shown on the plans or noted in the specifications. Sheeting shall be closely fit and sealed around inlets, outlets, and other projections through the lining as detailed on the shop drawings.

1.033 JOINTING TO CONCRETE STRUCTURES

No curing compounds shall be used on any concrete areas to which the lining is to be sealed, such as column bases, structures and concrete pipe pads. Unless otherwise shown on the drawings, the minimum width of concrete shelf provided for the seal to structures shall be 0.2M (8 inches)

SECTION 15241

RESERVOIR COVER

1.01 GENERAL

The work includes furnishing all materials, tools, synthetic rubber, etc., required to provide and install a nylon/polyester reinforced membrane as a cover for potable water reservoirs, as shown on the drawings and these specifications, subject to the terms and conditions of the contract.

1.02 CONTRACTOR'S EXPERIENCE

The firm to perform the cover work shall have deonstrated by previous experience its ability to do the work. The required previous experience shall consist of having successfully installed not less than 2,000 Sq. Meters, (21,500 sq.ft.) of continuous, flexible, membrane cover systems meeting these specifications on at least ten (10) successful chlorinated polyethylene covered reservoirs. The Contractor shall include a list of installations, giving owner's name, location, telephone number, size of job, superintendent, and date completed. The firm shall have been continuously in the business of installing the chlorinated polyethylene lining systems for at least five (5) years prior to the bid date and shall be approved for this work by the membrane manufacturer.

1.03 COVER MATERIAL - to be 45 Mil - 5 ply

A. The membrane shall be fabric reinforced chlorinated polyethylene or chlorsulfonated polyethylene. The material shall be manufactured specifically for application as a floating cover for water storage reservoirs. For a period of time at least 5 years prior to the bid date, the membrane manufacturer shall have manufactured a minimum of 2,000 Sq. Meters (21,500 sq.ft)of the 45 mil 5-ply material for floating roof projects.

The reinforced membrane shall be compounded synthetic rubber elastomer-coated nylon fabric conforming to the following requirements:

COVER

5-Ply 45-Mil Type

MUST MEET THESE STANDARDS

Property	Test Method	Requirement
Weight	- - - - - - - - - -	.332 lbs./sq. ft. nominal
Thickness	ASTM D374 - Method C	0.041" minimum
Puncture Resistance	FTMS 101B - Method 2031	165 pounds average
Breaking Strength	ASTM D751 - Grab Method	200 pounds minimum
Elongation	ASTM D751 - Grab Method	15% minimum
Tear Strength	ASTM D751 - Tongue Tear	30 pounds average
Ozone Resistance	ASTM D1149 and ASTM D518 - Method A: 50 pphm, 20% Strain, 100° F, 30 days exposure	No cracks at 7x magnification
Cold Bend	ASTM D2136 at -45°F.	No Cracks
Seam Strength	ASTM D816 - Method B	Exceeds that of parent material

Property	Test Method	Typical Data
Breaking Strength	ASTM D751, Grab Method	
Fabric		64.04 Kg. (150 lbs.)
Rubber		113.40 Kg. (250 lbs.)
Elongation	ASTM D751	
Fabric		30%
Rubber		100%
Puncture Resistance	FTMS 1018-Method 2031	81.63 Kg. (180 lbs.)

B. The synthetic rubber sheeting shall be manufactured from a synthetic rubber compound containing not less than 48% (by weight) of chlorinated polyethylene or chlorosulfonated polyethylene synthetic rubber as the sole elastomer.

C. The synthetic rubber sheeting shall be manufactured totally by calendering to produce a uniform sheet free of holes, hardened modules and delamination. There must be a minimum of 24% by formula weight of Rutile Titanium Dioxide pigment in the blue compound and a minimum of 39% Carbon Balck in the black compound to insure adequate protection from ultraviolet degradation.

The reinforcing fabric shall be one of the following:

1) 8 x 8 x 250 denier (16 x 8 2:1 leno 140 warp/250 fill) polyester
2) 8 x 8 x 250 denier plan weave polyester
3) 8 x 8 x 210 denier (16 x 8 2:1 leno 100 warp/210 fill) nylon
4) 8 x 8 x 250 denier (16 x 8 2:1 Leno 140 warp/250 fill) nylon
5) 10 x 10 x 1000 denier polyester

The fabric shall be totally encapsulated within the two 0.38 mm (0.15 inch) sheets by the calendering process. The reinforcing fabric shall extend to between 12.7 mm (0.5 inch) and 25.4 mm (1.0 inch) of the sheet edge. Exposed fabric or indication of delaminating will not be permitted.

D. The material shall consist of not less than 3 plies of synthetic rubber with two plies of nylon reinforcement. Basic calendered sheet size shall be 54" minimum width and fabricated at the membrane manufacturer's plant into large sheets up to 12,000 sq.ft. size to effectively fit the layout pattern for the facility.

E. The material shall be furnished with the exposed side black. The color shall be "built in" to the material.

1.031 FLOAT SYSTEM

A. The floats shall be composed of a closed cell polyethylene flexi-rigid foam, encased in minimum 0.76 mm (0.030 inch) synthetic rubber and adhered with an adhesive to the under side of the cover.

B. The flotation system will float the central portion of the cover in a manner such that the excess cover material will form depending folds or sumps next to the reservoir walls for the purpose of collecting rainwater. Minimum float size shall be 10.16 cms x 30.48 cms (4" x 12") in cross section. Each float system shall be in a grid pattern with sufficient capabilities to support the floating cover dead load plus an average live load of 26.9 Kg/M^2 (5.5 lbs./ sq.ft.).

1.032 SHOP DRAWINGS

The reservoir cover shall be laid out and installed in accordance with shop drawings prepared and submitted by the installation contractor. All shop drawings shall be approved by the Engineer prior to any actual work being performed. The area of the cover shall be greater than the plan area of the reservoir at its upper periphery, so that excess cover material will be available to allow the cover to remain in contact with the water surface when the reservoir water level drops. The layout shall be designed to keep field jointing of the cover to a minimum, consistent with proper operation of the cover system. Shop drawings shall show joint details, float details, type and spacing of the top anchor system, details of hatch entry, etc.

1.033 SEAMING

A. All necessary field jointing between panels shall be made on the top of the float where possible. These seams shall lap a minimum of 6.5 cms (2.5 inches) and shall be sealed using the membrane manufacturer's recommended method. All field seams shall be kept dry for at least twelve hours to allow the seam to achieve its optimum strength.

B. All factory seams for either fabrication or repairs shall provide a minimum overlap of the reinforcing fabric of 1" and shall extend to the edge of the sheet so that no loose edge is present on the top side of the sheet. Loose edge on the underside of the sheet is permissible so long as the 1" minimum overlap of the reinforcing fabric is maintained and a minimum of 1" bonded seam is maintained within the overlap.

C. All field seams shall provide a minimum overlap of the reinforcing fabric of 2" and shall extend to the edge of the sheet so that no loose edge is present on the top side of the sheet. Loose edge on the underside of the sheet is permissible as long as the 2" minimum bonded overlap of the reinforcing fabric is maintained. A nominal 6" overlap of liner panels shall be allowed to keep dirt out of the field seams.

1.034 ANCHORING SYSTEMS

The cover shall be attached to the upper periphery of the reservoir, using 4.76 mm x 50.8 mm (3/16" x 2") galvanized steel bars and 15.9 mm (5/8") dia. expansion bolts at 30.5 cms (12") O.C. or equal. A chafer strip shall be provided between all supporting points and inside edges of the concrete and the membrane system. There shall be no attachment of the cover to any part of the reservoir below its upper periphery. The cover must be perfectly free to rise and fall with the changing water level without constraint at any point, except for the attachment points at the upper periphery of the reservoir.

SECTION 15760

UNIT HEATERS AND VENTILATION

1.01 GENERAL

Work done under this section shall include the furnishing and installing of Unit Heaters and Fans in the location(s) shown on the plans and in accordance with all codes and regulations regulating such Unit Heaters.

1.02 MATERIALS AND EQUIPMENT

A. CEILING AND HUNG ELECTRIC SPACE HEATER

40,000 BTU output rating
3 Ø 700 c.f.m. fan 480 volts w/internal thermostat and contacts.

B. WALL MOUNTED "SHUTTER TYPE" EXHAUST FAN

10" blade diameter capable of providing 500 c.f.m. of exhaust air. The exhaust fan will be connected to a metal frame with motorized louvers, and thermostatically controlled. (AMCA Test Code.)

C. DOOR MOUNTED INTAKE LOUVER W/INSECT SCREEN

The louver will be metal framed, 12" square gravity operated, capable of passing 750 c.f.m. of air at a velocity less than 700 ft./min.

1.03 INSTALLATION

The items shall be installed at locations and at elevations, heights, grades and positions as called for on the plans.

ELECTRICAL - BASIC MATERIALS AND METHODS

1.01 The work covered under this section consists of furnishing all labor, equipment, supplies and materials, and performing all operations necessary for the installation of a complete system for power and lighting at the Pump House. Mention herein or indication on the drawings of articles, materials, operations, or methods requires that the Contractor provide each item mentioned, indicated or implied of quality and subject to the qualifications noted.

A. CODES AND ORDINANCES

All work performed under this contract shall be done in strict accordance with the current edition of the National Electrical Code, whether shown on the drawings or not, and all modifications required by any of the above authorities shall be made by the Contractor without additional charge to the Contracting Officer (C.O.)

B. APPROVAL OF MATERIALS AND EQUIPMENT

1. Within fourteen days after award of the Contract, and before any material is ordered, the Contractor shall submit the the C.O. for approval a complete list in quintuplicate of all materials and equipment he proposes to use. This list shall give the manufacturer's names and designations for each item. No consideration will be given to partial lists submitted from time to time. Items as specified may be listed only without shop drawings.

C. CUTTING AND PATCHING

All necessary cutting, drilling and patching walls, floors, partitions, ceilings, structural members, etc. as required for the proper installation of the work under this contract, shall be done by the Contractor in a neat and workmanlike manner and subject to the approval by the C.O. No structural members shall be cut by this Contractor without first obtaining written permission from the C.O.

1.02 LOCATION OF OUTLETS

A. The approximate locations of cabinets, panelboards, switches, light outlets, power outlets, etc. are indicated on the drawings. However, they are not intended to give complete and accurate information. The Contractor shall determine the exact locations after thoroughly examining the general building plans and by actual measurements during construction.

1.04 WIRING METHODS AND MATERIALS

A. Raceways shall be rigid steel conduit, electrical metallic tubing or flexible metal conduit, unless noted. Rigid steel (threaded, thick-wall) conduit shall be used for all underground runs, runs in slabs, feeder circuits and where required by the National Electrical Code for mechanical protections, etc. Flexible metal conduit shall be used for motor or equipment connections and then only to the extent of minimum lengths required for the connection. Rigid conduit and electrical metallic tubing shall be galvanized or sheradized mild steel. Conduits in direct contact with earth shall be wrapped with Scotchwrap No. 51. All flexible metal conduit shall be liquid-tight.

B. Conduit systems shall be installed concealed where possible. Exposed conduits shall be run parallel with the building walls in a neat and workmanlike manner. Locations of exposed runs shall be subject to the CONTRACTING OFFICER's approval.

C. Conduit and wire sizes not shown on the drawings shall be in accordance with the National Electrical Code.

D. Where conduits are installed in slabs, it must be done as soon as forms are in place and located in the center section of the slab in such a manner as not to impair the strength of the slab.

E. Horizontal runs of conduit shall be so installed where possible to provide a natural drain of condensation with no pockets or traps.

F. Conductors shall be No. 12 minimum. All conductors shall be color-coded in accordance with the National Electrical Code and all conductors of the same color shall be connected to the same ungrounded phase conductor throughout the entire installation. All conductors to be copper.

G. Primary cable shall be shielded. Cables shall be insulated with cross-linked polyethylene. 5 KV cable shall be equal to General Electric S1-58065. Stress cones as recommended by the cable manufacturer shall be provided for the shielded cable at all terminations.

H. Conductor insulation for 600 volts or less shall be Type TW. Heat resistant wire shall be used where subject to high ambient temperatures and where otherwise noted on the drawings. Where Type RHW is specified, it shall have a neoprene jacket.

I. All conductor splices for 600 volts or less shall utilize compression fittings.

J. Where underfloor conduits rise through the slab, the conduit shall extend unbroken approximately six inches above the slab to the first coupling, box or fitting.

K. All control relays, pushbuttons and switches shall be heavy-duty type.

1.05 OUTLET BOXES

A. Where more than one switch or device occurs at the same location, use multiple-gang outlet boxes covered with a single plate.

B. Outlet boxes shall be galvanized or sheradized pressed steel, one-piece and fitted with covers suitable for the particular devices or fixture intended. Boxes shall be four-inch square, minimum, for wall-mounting. Boxes shall be watertight where location is below floor or ground level, at all pump locations and where indicated.

C. Outlet boxes occuring in concrete or masonry shall be installed and secured before the concrete is poured or the masonry erected.

1.06 SAFETY SWITCHES

The Contractor shall furnish and install in each location indicated on the drawings and elsewhere as required by the National Electrical Code, fusible safety switches of the sizes and capacities indicated or required. All fuses shall be dual element time-delay fusetrons. All switches to be NEMA, Type HD per NEMA KS1-1969.

1.07 GROUNDING

All conduits, cabinets, outlets and other equipment shall be properly grounded in accordance with the National Electrical Code as as shown on the drawings. Grounding conductors shall be provided as shown on the drawings. Conductors to have green insulation.

1.08 ELECTRICAL CONNECTIONS TO SPECIAL EQUIPMENT

The Contractor shall make all electrical connections to equipment furnished under other sections of these specifications and shall furnish wiring, conduit, outlet boxes, etc. as required for same throughout the installation. The Contractor shall check all building plans and specifications to inform himself as to the amount of wiring that may be required and include same in the bid.

1.09 SIGNS AND NAMEPLATES

All equipment operating at more than 240 volts shall have a warning sign painted on a conspicuous surface. The sign shall read "DANGER___(write the number of volts inserted when actual number known) VOLTS" with red letters on a white background, of standard code size. Each motor starter, disconnect switch, pushbutton station and other control components that are separately mounted shall have laminated nameplate or other approved means of identifying each item with its respective motor or control device. All signs to be in accordance with latest OSHA Standards.

1.10 BOOSTER PUMP CONTROLLER

Reduced voltage reactor type, non-reversing with 200 amp contactor rating. KVA interrupting rating to be 50,000 KVA at 480. Equipment to be Class 52. Starter unit to contain the following equipment:

1. Three isolated vertical line connectors.
2. One drawout three-pole gang-operated line isolating switch assembly with two-direction driven isolating shutter, external operating handle interlocked to prevent opening the high voltage compartment door until the isolating switch is open and grounded.
3. Three vertically mounted current limiting power fuses with indicators.
4. One three-pole oil-blast start contactor immersed in oil with electrical interlocks and mechanical interlock to prevent opening isolating switch when contactor is closed.
5. One control circuit single phase transformer (115 volt secondary).
6. Two vertically mounted control circuit primary current limiting fuses.
7. Two control circuit secondary fuses.
8. One run-test circuit.
9. One economizing resistor.
10. One control circuit disconnect plug.
11. Three current transformers.
12. Three load terminals.
13. One relay panel with one adjustable thermal overload relay, temperature compensated, three-pole, hand reset; one control relay; one silicone rectifier; one motor driven timing relay (adjustable).
14. One set of control circuit terminal blocks.
15. One operating and maintenance instructions.
16. One three-phase starting reactor (50-65-80% taps).
17. Surge protection consisting of three-phase capacitor and three-station class arresters. Surge protection to be connected between contactor and motor.
18. Ammeter and voltmeter with selector switches and required C.T.'s.
19. Hand-Off-Automatic Switch on door.
20. Minimum of 2NO and 2NC auxiliary contacts for low voltage interlocks or indicator functions.

21. Incomplete sequence timer and relay to provide incomplete sequence lock-out and indication to central control panel.

22. Running time meter.

1.11 CONTROL EQUIPMENT AND INSTALLATION

A. FUNCTIONAL CONTROL AND COORDINATION

All equipment furnished or installed under this section of the specifications shall be fully coordinated with all equipment specified in other sections of this specification. It is the Contractor's responsibility to assure that all control wiring is furnished and installed to provide for all functions (control, local alarm, remote alarm and all indicating functions) speicified under other sections of this specification. It is a requirement that all pump motors have running time meters installed. This can be provided as a part of and mounted in starters.

B. Equipment for controlling pump starter shall be coordinated with the control section of this specification. The system shall incorporate all functions described in other sections of these specifications. All conduit, wiring and connections within the station which are required to comply with these functions are to be furnished and installed under this section of the specifications.

C. SUBMITTALS

All control equipment furnished under this section of the specifications shall have complete ladder control diagrams submitted indicating all interconnections with control or alarm equipment specified under other sections of this specification. The submittal shall clearly show what wiring is external to the control equipment and shall show the identification proposed for each conductor.

D. CONTROLLERS FOR 600 VOLTS OR LESS

Each motor shall be provided with a motor starter, either manual or magnetic, which provides that motor with thermal overload protection, unless specifically excluded by the National Electrical Code. Controllers shall be as manufactured by Square D, Cutler Hammer, General Electric, Westinghouse or Allen-Bradley or approved equal. Enclosure for starters shall be suitable for the location where they are installed.

1. Manual Motor Starters shall be provided for all fractional horsepower motors and other single phase motors as indicated on the drawings or required. Starters for motors smaller than 1/4 horsepower need not be manual reset type. All other shall be manual reset type. Overloads shall be provided in all ungrounded supply conductors.

2. Magnetic Motor Starters shall be provided for all motors required. Overloads shall be provided in all phase motors. Overloads shall be manual reset type. The control circuit power shall be obtained from a control transformer mounted in the case of the controller, unless specifically noted otherwise on the plans.

E. CONTROL WIRING INSTALLATION

The installation and wiring of all electrical equipment furnished and installed as a part of this contract shall meet all conditions of this specification. Special attention is called to the following:

1. All wiring to be in conduit.

2. All control wiring to be color coded throughout.

3. All control wiring to terminate on terminal strips.

4. All signal and control wiring shall be marked at all termination points such as cabinets, terminal boxes, equipment racks, control panels, consoles, etc. Marking shall be according to approved control schedules of the manufacturer or as prepared by the Contractor, pre-marked, self-adhesive wrap around cloth-type markers shall be used.