GW - 21

REPORTS

YEAR(S):

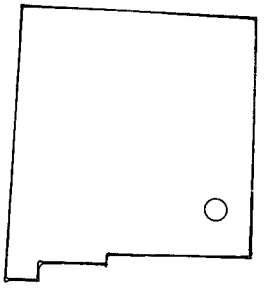
1989

Public Copy

MARATHON OIL COMPANY
MID-CONTINENT REGION

GROUNDWATER DISCHARGE PLAN
GW-21

INDIAN BASIN GAS PLANT



EDDY COUNTY
NEW MEXICO

Mid-Continent Region
Production United States

Marathon Oil Company

P.O. Box 552
Midland, Texas 79702
Telephone 915/682-1626

August 18, 1989

Mr. David G. Boyer
Chief, Environmental Bureau
New Mexico Oil Conservation Division
P. O. Box 2088
State Land Office Building
Santa Fe, New Mexico 87504

Re: Discharge Plan GW-21
Indian Basin Gas Plant
Eddy County, New Mexico

Dear Mr. Boyer:

Marathon Oil Company operates the Indian Basin Gas Plant located in Eddy County, New Mexico. The plant is currently operating under the approved Groundwater Discharge Plan GW-21. This approval will expire on November 26, 1989.

Attached is the document for renewal. This plan was prepared in accordance with Part 3 of the New Mexico Water Quality Control Commission Regulations and covers all discharges from the plant. All discharges are gathered, commingled and injected for disposal purposes into the Paddock formation through the Marathon Federal SWD Well No. 1. Therefore, under normal operating conditions, discharges onto the surface of the natural ground from the plant do not occur.

As requested, three copies of the discharge plant document are enclosed.

Any questions concerning this application should be directed to R. F. Morgan, P. O. Box 552, Midland, Texas 79702, 915/682-1626.

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

Sincerely,

W. O. Snyder
Production Manager

WOS/DMS/elg

RECEIVED
AUG 22 1989
OIL CONSERVATION DIV.
SANTA FE

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MARATHON OIL COMPANY

INDIAN BASIN GAS PLANT DISCHARGE PLAN

SUBMITTED TO

STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

AUGUST 18, 1989

RECEIVED

AUG 22 1989

OIL CONSERVATION DIV.
SANTA FE

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NAME OF DISCHARGER/LEGALLY RESPONSIBLE PARTY

Marathon Oil Company

P. O. Box 552

Midland, Texas 79702

915/682-1626

LOCAL REPRESENTATIVE OR CONTACT

Stephen D. York

Plant Superintendent

Indian Basin Gas Plant

429 Marathon Road (County Road 401)

P. O. Box 1324

Artesia, New Mexico 88210

505/457-2621

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LOCATION OF DISCHARGE

The Indian Basin Gas Plant is located in Section 23, Township 21 South, Range 23 East, NMPM, Eddy County, New Mexico. Refer to Exhibit 1, Topographic map of the Indian Basin Gas Plant, located in Exhibits section.

Under normal operating conditions, no discharges onto the surface of the natural ground from the plant occur.

Plant effluent is collected, commingled and injected into an injection well. This injection well is the Marathon Federal SWD Well No. 1 located in Unit K of Section 24, Township 21S, Range 23E, Eddy County, New Mexico. Exhibit 2 indicates this well as SWD in Section 24.

PLANT HISTORY

The Indian Basin Gas Field was discovered in 1962 in the west central portion of Eddy County, New Mexico. The field is approximately 20 miles west-northwest of Carlsbad and 28 miles south-southwest of Artesia.

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In 1965 construction of the Indian Basin Gas Plant was initiated and the plant was put on-line in early 1966 with a design capacity of 180 MMSCFD.

An expansion to the plant in 1968 increased residue gas sales in excess of 200 MMSCFD.

A cryogenic modification to the plant was completed in early 1981. This modification resulted in the shutdown of a portion of the old process equipment.

The replacement of a three-stage Claus Sulfur Recovery Unit (SRU) in 1983 decreased plant capacity to about 137 MMSCFD due to the lower design capacity and recovery efficiency of the new SRU.

On May 31, 1989 installation of the first of two turbine-driven compressors was initiated. The Solar Centaur, a 5,500 horsepower natural gas-fired turbine compressor will be commissioned on or before September 1, 1989. Construction for installation of the second turbine is scheduled to begin in mid-1993. Marathon has the option of requesting an extension for the second phase of construction. The two phase modification of the plant is designed to decrease reservoir abandonment pressure in the field gas gathering

system, and thereby, increase gas recovery. Prevention of Significant Deterioration Air Quality Permit No. PSD-NM-295-M-2 was issued to Marathon Oil Company by the New Mexico Air Quality Bureau of the New Mexico Environmental Improvement Division (EID) pursuant to Section 74-2-7 NMSA 1978 and Air Quality Control Regulation No. 707 (AQCR 707).

OPERATIONS

The Indian Basin Gas Plant produces natural gas, demethanized hydrocarbon mix, stabilized condensate and sulfur on a continuous basis. Personnel are present at the plant 24 hours per day. Exhibit 3, Indian Basin Gas Plant Process Flow Schematic, illustrates the plant operations.

Currently, the feed gas to the plant is gathered from approximately 40 producing wells and the Dagger Draw Field located approximately eight miles north of the plant and flows to the plant at a pressure of about 950 psig. Free liquids are separated from the gas at the wells.

The liquids are transferred to the inlet condensate tank where the produced water and liquid hydrocarbons are separated. The produced water flows to the Salt Water Tank.

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The condensate flows to the condensate stabilizer system where the condensate is stabilized, cooled and placed in storage tanks. The condensate stabilized overhead vapors are cooled, recompressed and injected back into the inlet gas stream. The stored condensate is transported via truck for sales.

Carbon dioxide (CO_2) and hydrogen sulfide (H_2S) gases are removed from the inlet gas/stabilizer gas stream in a sweetening unit using diethanolamine (DEA) as the sweetening solvent.

The H_2S recovered in the sweetening unit is converted to elemental sulfur in a three-bed Claus Sulfur Recovery Unit. The CO_2 is vented out the incinerator stack. The molten sulfur is transported via truck for sales. Discharge water from the SRU waste heat boiler and condenser blowdown is collected in the Salt Water Tank.

Sweetened gas from the sweetening unit is dehydrated by contact with triethylene glycol (TEG) followed by a molecular sieve. Following dehydration, the gas is processed in a turbo-expander based cryogenic process which produces about 1.75 gallons of LPG per MSCF of gas processed. The recovered liquids are transported to market via Mid-American Pipeline Company's connecting line for sales.

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The residual gas from the liquid recovery process, at a pressure of 450 psig, is then compressed to 975 psig utilizing centrifugal compressors driven by gas turbines. The gas is piped to the Natural Gas Pipeline Company of America via a connecting line and transported to various customers.

Waste heat is recovered from the gas turbines to produce 120 psig steam for consumption in the plant. Discharge water from the waste heat boiler and process steam boiler blowdown flows to the skimmer basin. All waste water collected in the skimmer basin flows to the Salt Water Tank. The commingled waste water is injected into the Marathon Federal SWD Well No. 1 using a positive displacement pump.

The plant also generates about 700 KW of 480 volt electricity for local plant consumption. The generators are gas turbine driven without waste heat recovery.

Three parallel compressors supply 80 psig air for the plant instrument air system.

The cooling tower handles approximately 4,000 gpm of water and includes a continuous water blowdown to control concentration cycles. This discharge flows to the Salt Water Tank.

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EFFLUENT SOURCES AND QUANTITIES

Effluent and process fluid sources associated with the Indian Basin Gas Plant include produced water, cooling tower blowdown, Sulfur Recovery Unit waste heat boiler and condenser blowdown, turbine waste heat boiler and process steam boiler blowdown, domestic sewage and cleaning operations.

Volumes from these sources are dependent upon plant and/or field operations. Effluent sources and their current estimated volumes are:

- Produced water: 200 - 400 bpd
- Cooling tower blowdown: 200 bpd
- Boiler/Condenser blowdown: 50 - 100 bpd

No additives are placed in the produced water. However, the produced water, cooling tower blowdown, and boiler and condenser blowdown are commingled in the Salt Water Tank prior to injection in the Marathon Federal SWD Well No. 1.

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Major additives to the cooling tower system include:

Calgon Conductor 5721 - Scale control

Sulfuric Acid - pH control

Calcium Hypochlorite tablets - microbiocide

Calgon H-5228 - microbiocide

Calgon H-300 Microbiocide - microbiocide

Major additives to the boiler and condenser waters include:

Calgon Ultra Amine 130 - Corrosion control

Calgon BLR-3152 - Boiler scale control

Calgon BLR - 3430 - Oxygen scavenger

The chemicals listed above are currently used for water treatment. Marathon Oil Company reserves the right to periodically review and update the water treatment and change the chemicals used as needed.

Domestic sewage is kept completely separate from other effluents and is under the jurisdiction of the New Mexico Environmental Improvement Division.

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Cleaning operations using solvents are minimal. A Safety-Kleen Parts Cleaning Unit is located in the plant shop. Used solvent is recycled by the Safety-Kleen Corporation who also services and maintains the cleaning unit. An application has been submitted for an EPA Small Quantity Generator Number.

Periodic cleaning operations using soapy water, solvent or steam occur at the plant. In some instances, effluent from such cleaning operations is collected in the open drains. Pursuant to requirements of the Oil Conservation Division, provisions to collect such effluent will be implemented.

EFFLUENT QUALITY CHARACTERISTICS

Produced water, cooling tower blowdown and boiler/condenser blowdown waste waters are commingled within the gas plant and then injected into Marathon Federal SWD Well No. 1.

Grab samples of the commingled effluent and cooling tower blowdown were collected at the salt water disposal pumps and cooling tower blowdown sampling port, respectively, on June 15, 1989. Analyses of the effluent samples were conducted by Enseco Rocky Mountain Analytical Laboratory in Arvada, Colorado. The analytical report,

including methodology, is in Appendix A.

Trace quantities of toxic pollutants, (WQCC 1-101.UU definition) occur naturally in the produced water, and therefore; the analysis of the commingled effluent indicates the presence of these pollutants. Refer to Appendix A for the analytical results.

Material Safety Data Sheets (MSDS) are included in Appendix B for chemicals used in the plant.

TRANSFER AND STORAGE OF EFFLUENT

Two types of drain systems are used to transfer effluent at the gas plant. These systems are the open and closed drains. Exhibit 4, Indian Basin Gas Plant Wastewater Flow Schematic, illustrates the location of the open drain system and the storage units where wastewater flow is collected.

The open drain consists of steel collection pots and lines connected to a concrete sump. The system operates under atmospheric conditions. Effluent collected in the system flows to the skimmer basin located on the southwest side of the plant. The skimmer basin is a series of three fiberglass tanks open to the atmosphere.

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An integrity test of the open drain system was conducted on June 22, 1989. The system was filled to grade level with water at 10:00AM and was allowed to stand full of water until 3:00PM. During the test all influx was diverted away from the drain system. The water level remained unchanged during the hydrostatic test indicating the drain system is intact.

The closed drain system is mainly **above ground**. This system is used when a process malfunction occurs and pressure must be relieved from a particular process. The closed drain system is connected to the following process vessels:

Filter Separator	Product Contactor
Expander/Compressor	New Fuel Gas Scrubber
Amine Contactor	Old Fuel Gas Scrubber
Glycol Contactor	Regen Scrubber
Amine Scrubber	Stabilizer Compressor Suction Scrubber
Glycol Scrubber	Vertical Inlet Separator
Amine Flashtank	Horizontal Inlet Separator
Amine Still	Charcoal Filter

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Steel piping leads from the process vessels to the closed blowdown drain tank on the southwest corner of the plant. Liquids collected in this open fiberglass tank can be sent to the skimmer basin for recovery or to the Salt Water Tank for disposal. No pressure is placed on the closed drain system during normal operating conditions. During malfunctions and emergency discharges, the pressure can reach up to 50 psi. The closed drain system was constructed in 1980 and modified in 1984.

Prior to disposal, the commingled effluent is stored under atmospheric conditions in the Salt Water Tank. This tank has a capacity of 1,000 barrels and is constructed of steel. The tank is usually filled to a volume of approximately 700 barrels prior to injection into the salt water disposal well via the wastewater disposal line.

The wastewater disposal line is constructed of three inch, SCH 80 pipe. The pipeline was installed in 1977.

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SPILL/LEAK PREVENTION AND HOUSEKEEPING PRACTICES

Marathon Oil is actively involved in maintaining and improving spill/leak prevention and good housekeeping practices. These goals are achieved by utilizing a program that stresses:

- Observation
- Notification
- Correction
- Prevention

Plant personnel are trained to continually observe plant equipment (i.e., tanks, pipes, fittings, valves, etc.) for leaks and spills as they go about their daily tasks. In addition, four plant tours are conducted by personnel during each eight-hour shift. An important part of these tours is the detection of equipment leaks and spills. The plant is in continuous operation and is manned 24 hours per day.

The plant supervisor conducts a weekly visual inspection of the plant grounds to observe for leaks or spills using inspection procedures outlined in the Spill Prevention Control and Countermeasure Plan (SPCC Plan). This weekly inspection is recorded on a

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Site Security Inspection Form. An example of this form is included in the current SPCC Plan located in Appendix C of this document.

Any discovered leaks or spills are reported and corrective action is taken immediately. A May, 1988 Marathon Policy requires any employee discovering a spill to complete a Mid-Continent Region Spill Report. This report, Figure 1, must be completed as soon as practical after the spill has been investigated and the source and affected area secured.

The Oil Conservation Division will be notified of spills or leaks using the notification procedures outlined in Rule 116 of the New Mexico Oil Conservation Division Rules and Regulations. The National Response Center will be notified in accordance with regulations located in 40 CFR 110.10. Table I outlines these notification procedures.

Corrective actions for discovered spills/leaks, and breaks include:

- Source identification
- Containment of spill/leak

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- Recapture of fluids where possible
- Elimination of the spill/leak source
- Cleanup of spill area

The prevention of spills and leaks is accomplished by training personnel and identifying and eliminating potential spill situations. Plant personnel are given instructions on how to operate and maintain equipment in a manner that will prevent undesired discharges. Environmental standards are reviewed periodically in safety meetings. Employees are encouraged to identify and report potential spill situations. The identified problem areas are promptly dealt with to prevent spill events. For example, lube oil make-up lines were installed on existing turbines in 1980 to eliminate lube oil spills. Additional lines were added in 1987 when new equipment was placed in-service.

Several improvements are planned over the next three and one-half years. These improvements include the construction of:

- Containment berms for above ground storage tanks
- Catchment facilities for small volume leaks
- Drum storage pads and curbing

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Details of these and other scheduled improvements are outlined in Scheduled Improvement section. Marathon agrees to address improvements required by the Oil Conservation Division following a facility inspection conducted on June 23, 1989.

For any type of spill event that may occur, containment and clean-up procedures listed in the Oil Spill Contingency Plan (SPCC Plan, Appendix B) will be followed.

A diversion berm placed on the north and west sides of the plant diverts precipitation runoff away from the plant grounds and protects the plant facility from flash flooding. In-plant precipitation not collected in the open drain system is not contained.

Marathon Federal SWD Well No. 1 is used for effluent disposal. The commingled effluent collected in the Salt Water Tank is injected daily.

In the event of disposal pipeline failure, the line could be repaired within twenty-four hours. The commingled effluent would be held in the Salt Water Tank which can hold 1,000 bbls (the daily effluent output ranges from 450 to 700 barrels). In the unlikely event that the disposal line repair would take longer, a temporary tank would be brought in to store additional effluent.

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If the disposal well is shut-in for repairs the following actions would be taken:

1. Effluent storage in the Salt Water Tank.
2. Extra storage tanks brought on-site.
3. Shipment off-site for disposal in state approved SWD wells.

In the event off-site disposal of the plant effluents is required, Marathon Oil Company will use transporters who comply with the following state regulations:

1. Form C-133 has been filed with the state of New Mexico (Figure 2).
2. Transporter has a Current State Corporation Commission Permit.

Figure 1

MARATHON OIL COMPANY - MID-CONTINENT REGION
SPILL REPORT

This form is to be completed for any spill (regardless of size) of any oilfield liquid onto the surface of the ground.

NOTE: Completion of this form does not eliminate the need to verbally report all discharges to your supervisor as soon as practicable after the source has been stopped and containment/cleanup operations have been mobilized as appropriate.

SPILL DATE MO DA YR	EST. SPILL TIME	AM PM	ESTIMATED SPILL VOLUME	TYPE OF FLUID SPILLED	VOLUME RECOVERED

LOCATION OF SPILL (State, County, Field, Lease, Well or Rig): _____

_____

CAUSE OF SPILL: _____

_____

_____

Did the spill occur on location within a company made containment or drainage catchment area? __ Yes __ No If you checked "Yes" to the proceding question, provided such system adequately contained the spill, it is not necessary to complete the remainder of this form. Simply sign and date the report and forward to your supervisor.

DESCRIPTION OF SPILL AREA (Including proximity to watercourse): _____

_____

ACTION TAKEN TO CONTAIN OR CLEANUP SPILL: _____

_____

_____

SURFACE: Sandy __ Sandy Loam __ Clay __ Rocky __ Wet __ Dry __ Snow __
Cultivated __ Grazing __ Vacant __ Rural __ Residential __

APPARENT DAMAGE TO ENVIRONMENT AND PROPERTY: _____

_____

PROPERTY OWNER NOTIFIED: Yes __ No __ Date: _____ By: _____

Name of Property Owner: _____

HOW WAS SPILL FIRST NOTED: _____

_____

_____ _____ _____
Person Initiating Report/Date Supervisor Review/Date Supervisor Review/Date

LOCATION OF SPILL (State, County, Field, Lease, Well or Rig): _____

_____

DATE OF SPILL: _____

NOTIFICATION OF REGULATORY AGENCIES:

A. Agency _____ Telephone No. _____ Time _____
Date _____ Person Contacted _____
Comments _____

B. Agency _____ Telephone No. _____ Time _____
Date _____ Person Contacted _____
Comments _____

C. Agency _____ Telephone No. _____ Time _____
Date _____ Person Contacted _____
Comments _____

PERSON MAKING CONTACT WITH AGENCIES: _____

DISTRIBUTION -

ORIGINAL COPY: Environmental and Safety Dept.

OTHER COPIES: _____
(To Be Completed by Supt.) _____
_____

SUPERINTENDENT COMPLETING THIS SECTION: _____

IF CORPORATE OFFICE NOTIFIED:

Person Contacted: _____ Time _____ Date _____

Person Filing Report: _____ _____ _____
Print Name Signature Date

Figure 2

Submit in triplicate to
Santa Fe Office

State of New Mexico
Energy, Minerals and Natural Resources Department

Form C-133
Revised 1-1-89

OIL CONSERVATION DIVISION
P.O. Box 2088
Santa Fe, New Mexico 87504-2088

AUTHORIZATION TO MOVE PRODUCED WATER

Transporter Name_____

Address_____ Office Location (If different)_____

_____ _____

_____ _____

Phone Number (s)_____

State Corporation Commission Permit No._____

NOTE: It is the responsibility of each holder of an approved Form C-133 to familiarize its personnel with the content of Division Rules 709 and 710 and to assure operations in compliance therewith. Failure to move and dispose of produced water in accordance with Division Rules 709 and 710 are cause for cancellation of Form C-133 and the authority to move produced water.

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

Signature_____ Date_____

Printed Name_____ Title_____

(This space for State Use)

Approved by_____ Title_____

Date_____

TABLE I. NOTIFICATION PROCEDURES FOR SPILLS, LEAKS OR BREAKS

SPILL TYPE	SPILL VOLUME (bbls)	DOES SPILL ENTER A WATERCOURSE?	OIL CONSERVATION DIVISION NOTIFICATION PROCEDURES
CRUDE OIL OR CONDENSATE	25 OR MORE	NO	IN PERSON OR BY TELEPHONE * WRITTEN REPORT**
	1 OR MORE	YES	IN PERSON OR BY TELEPHONE* WRITTEN REPORT**
	5 OR MORE BUT LESS THAN 25	NO	WRITTEN REPORT**
SALT WATER	100 OR MORE	NO	IN PERSON OR BY TELEPHONE* WRITTEN REPORT**
	25 OR MORE	YES	IN PERSON OR BY TELEPHONE* WRITTEN REPORT**
	25 OR MORE BUT LESS THAN 100	NO	WRITTEN REPORT**
HYDROCARBONS HYDROCARBON WASTES OR RESIDUES SALT WATER STRONG ACIDS STRONG CAUSTICS GASES DELETERIOUS CHEMICALS	ANY VOLUME WHICH MAY WITH REASONABLE PROBABILITY ENDANGER HUMAN HEALTH OR RESULTS IN SUBSTANTIAL DAMAGE TO PROPERTY.		IN PERSON OR BY TELEPHONE* WRITTEN REPORT**

SPILL TYPE	REPORTABLE QUANTITIES	NATIONAL RESPONSE CENTER NOTIFICATION PROCEDURES
OIL -ANY KIND ANY FORM INCLUDING: PETROLEUM FUEL OIL SLUDGE OIL REFUSE OIL MIXED WITH WASTES OTHER THAN DREDGED SPOIL	QUANTITIES WHICH MAY BE HARMFUL TO THE PUBLIC HEALTH OR WELFARE INCLUDING DISCHARGES OF OIL THAT: a. VIOLATE APPLICABLE WATER QUALITY STANDARDS b. CAUSE A FILM OR SHEEN UPON OR DISCOLORATION OF THE SURFACE OF THE WATER OR ADJOINING SHORELINES	IMMEDIATELY NOTIFY THE NATIONAL RESPONSE CENTER

CONTACT INFORMATION:

OIL CONSERVATION DIVISION:

OCD DISTRICT II OFFICE
324 W. MAIN ST
P.O. DRAWER DD
ARTESIA, NM 88210
(505)748-1283

NATIONAL RESPONSE CENTER:

1-800-424-8802

* AS SOON AS POSSIBLE
** SUBMIT IN DUPLICATE WITHIN 10 DAYS

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EFFLUENT DISPOSAL

Plant effluent is commingled and injected into the Marathon Federal SWD Well No. 1 located in Unit K of Section 24, Township 21S, Range 23E, Eddy County, New Mexico. The disposal well is located about one mile east-southeast of the gas plant. Exhibit 2, indicates this Class II injection well as SWD.

The commingled effluent consists of produced waters brought to the surface during the production of natural gas and the wastewaters associated with gas plant operations. This effluent is not classified as a hazardous waste due to exclusion under 40 CFR 261.4.

The commingled effluent is disposed of by injection into the Paddock formation. Injection occurs at a depth of approximately 2,534 feet to approximately 2,726 feet through two and three-eighths inch tubing with a packer set at approximately 2,450 feet in a four and one-half inch casing. Figure 3 is a diagrammatic sketch of Marathon Federal SWD Well No. 1.

Administrative Order No. SWD-55, issued on October 30, 1965, granted Marathon Oil Company the authority to complete and use Marathon Federal SWD Well No. 1 for salt water disposal purposes. On March 14, 1984 Marathon requested that Administrative Order

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SWD-55 be amended by the Oil Conservation Division to permit the injection of the commingled effluent described above. This request was based on the regulatory interpretation that disposal wells injecting produced water commingled with waste waters from natural gas plants would continue to be identified as a Class II well under New Mexico's Underground Injection Control Program.

No surface impoundments, leach fields, drying beds or pits are used to store or dispose of effluents at the Indian Basin Gas Plant.

SOLID WASTE DISPOSAL

Solid wastes associated with the Indian Basin Gas Plant include:

- Used filters
- Spent molecular sieve
- Glycol filters
- Used amine filter media
- Oily debris (No free oil)
- Downhole and equipment scale
- Office trash
- Spent sock and cartridge filters
- Other gas plant related wastes

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Guidance outlined in the most current API Environmental Guidance Document (Order Number 11-10850) is used for handling and disposal of all wastes generated at the gas plant. The Oil Conservation Division was provided with a copy of the January 15, 1989 version of the guidance document during the facility inspection conducted on June 23, 1989.

Indian Basin Gas Plant maintains a landfill area for the disposal of solid wastes. The landfill area consists of two waste cells. One cell is used for the disposal of office trash. The other cell is used for the disposal of industrial solid waste.

A minimal amount of office trash is placed in the appropriate cell once a week and burned in accordance with New Mexico AQCR 301, Subsections C and E. All burning is conducted under the following conditions:

1. The emission of smoke shall not be allowed to pass onto or across a public road or landing strip such that a hazard is created by impairment of visibility;
2. No natural or synthetic rubber or petroleum products may be burned.
3. Care must be taken to minimize the amount of dirt on the material being burned;

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4. All burning, except agricultural burning, must take place between the hours of 10:00AM and 4:00PM;

5. The material to be burned must be as dry as possible; and

6. The wind direction at the site of agricultural burning must be such that the smoke will generally be carried away from areas of human habitation.

All wastes placed in the solid waste cell must be solid or semi-solid, low salt, low hydrocarbon content inert material. The following wastes are **not** placed in the solid waste cell under any circumstances:

- Used storage batteries
- Used tires
- Hazardous wastes
- Liquids
- Drums
- Chemicals

If the potential for EP toxicity or other hazardous waste characteristics exits, an analysis is done on the waste prior to disposal.

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OFF-SITE DISPOSAL

Wastes that can not be disposed of at the gas plant are taken to the appropriate disposal or recycling facility following applicable state and federal regulations.

Recycled wastes include:

- Safety-Kleen solvent
- Used drums

The Safety-Kleen solvent is recycled by the Safety-Kleen Corporation at regularly scheduled intervals. The solvent is shipped by truck to the Safety-Kleen Corporation located in the Warfield Industrial Park in Midland, Texas.

Used drums are periodically recycled. Empty drums are either shipped to the vendor or a reputable recycler.

Used storage batteries and tires are generally exchanged at the garage servicing the gas plant vehicles.

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Marathon Oil Company underwent three asbestos removal projects at the gas plant during the two year period from February, 1986 to February, 1988. A total of 655 cubic yards of friable asbestos was removed at a cost of about $389,000. The asbestos was disposed of in Browning-Ferris, Inc. landfills.

NORM

Naturally Occurring Radioactive Material (NORM) is present at the Indian Basin Gas Plant. This low level radiation is a naturally occurring phenomenon in scale deposits that have accumulated over the twenty-five year life of the plant.

Marathon Oil Company is in the process of developing a plan for the handling and disposal of NORM wastes. Options for disposal are currently being reviewed to assure compliance with state and federal regulations.

A recent analysis of the sludge in the skimmer basin indicates the presence of NORM. Marathon Oil Company is continuing to investigate the options for handling the sludge.

Waste disposal procedures for wastes generated at the Indian Basin Gas Plant are outlined in Table II.

FIGURE 3

MARATHON OIL COMPANY

DIAGRAMMATIC SKETCH OF DISPOSAL WELL
MARATHON FEDERAL SWD WELL NO. 1
INDIAN BASIN AREA
EDDY COUNTY, NEW MEXICO
SCALE: NONE

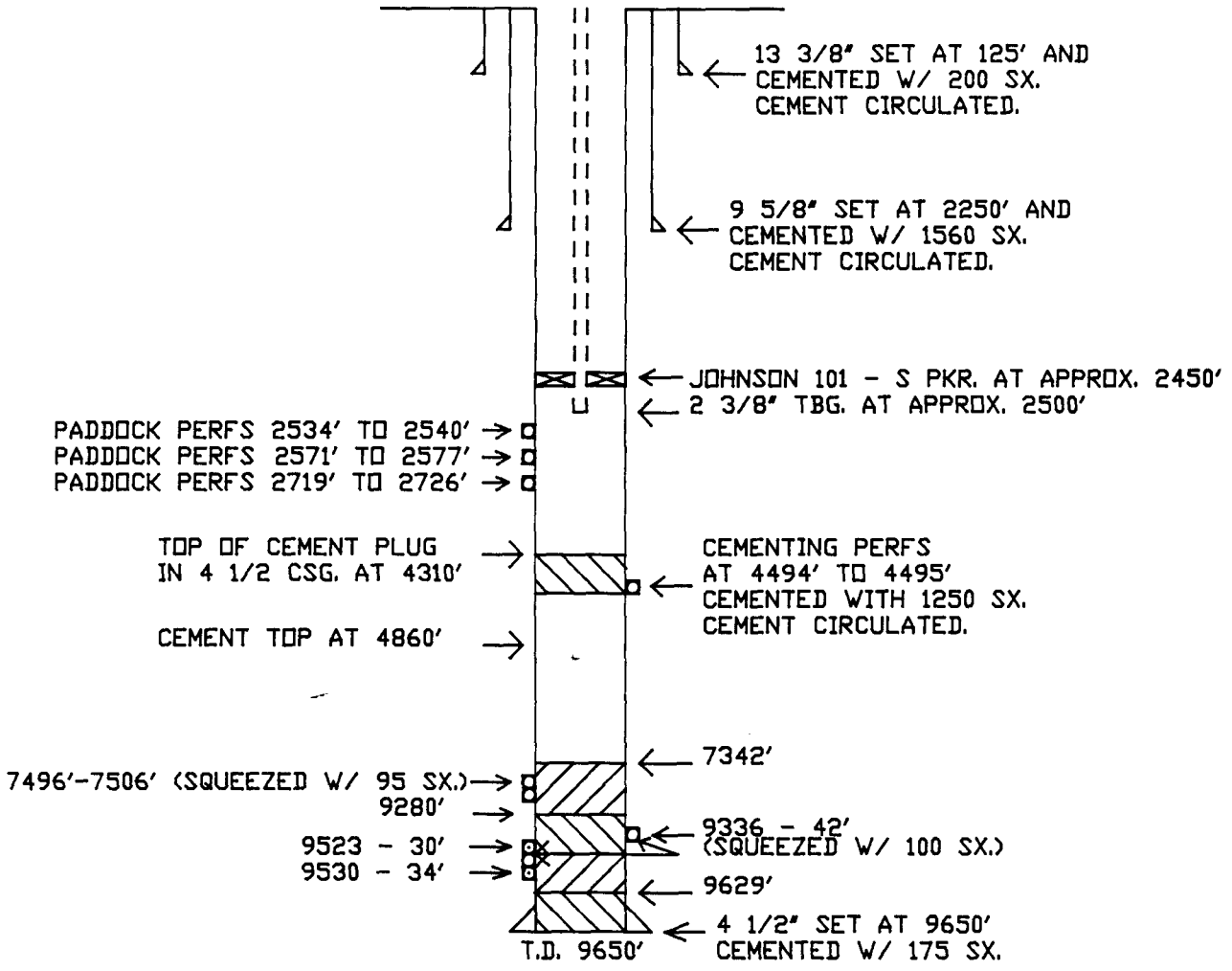


TABLE II WASTE DISPOSAL

DISPOSAL METHOD	DISPOSAL SITE	ALLOWED WASTES	HANDLING PROCEDURES
INJECTION	MARATHON FEDERAL SWD WELL # 1	PRODUCED WATERS PRODUCTION WASTE FLUIDS	USE FOR DISPOSAL OF NONHAZARDOUS AND EXEMPT EXPLORATION AND PRODUCTION WASTE FLUIDS
LANDFILL	WASTE CELL # 1	USED FILTERS SPENT MOLECULAR SIEVE GLYCOL FILTERS USED AMINE FILTER MEDIA OILY DEBRIS * SPENT SOCK FILTERS SPENT CARTRIDGE FILTERS	WASTES MUST BE SOLID OR SEMISOLID, LOW SALT, LOW HYDROCARBON CONTENT MATERIAL. * ALL FREE OIL MUST BE DRAINED FROM FILTERS AND OILY DEBRIS
	WASTE CELL # 2	OFFICE TRASH	BURN AS SOON AS PLACED FOLLOW AQCR 301 SUBSECTIONS C & E NO LIQUIDS, PETROLEUM PRODUCTS OR RUBBER
RECYCLE	SAFETY-KLEEN CORPORATION	SAFETY-KLEEN SOLVENT	SAFETY-KLEEN PERSONNEL REMOVE AND REPLACE SOLVENT
	VENDOR OR REPUTABLE DRUM RECYCLER	USED DRUMS	RETURN TO VENDOR OR REPUTABLE RECYCLER
	SERVICE STATION	USED STORAGE BATTERIES USED TIRES	EXCHANGE AT GARAGE WHERE VEHICLE IS SERVICED
ON-SITE STORAGE	NORM STORAGE AREA	NORM WASTES ** - SLUDGE - SCALE DEPOSITS	PLACE NORM MATERIAL IN DOT APPROVED CONTAINERS FOLLOW HANDLING PROCEDURES OUTLINED BY THE E & S DEPT. ** STILL INVESTIGATING POSSIBLITIES FOR HANDLING

DATE: 8/18/89 REVISED:	SITE CHARACTERISTICS	PAGE 1 of 4

HYDROLOGIC FEATURES

No bodies of water or streams are located within one mile of the outside perimeter of the Indian Basin Gas Plant. Rocky Arroyo, a normally dry arroyo, is located one-fourth of a mile south of the gas plant. The arroyo runs in an east/west direction in the area near the plant. Water only flows in Rocky Arroyo during heavy rainfall events.

Marathon Oil Company maintains two water wells on the plant property. Both wells produce water from the lower Queen aquifer.

Water Well #1 is the primary water well at the plant. Well #1 supplies process water to the plant and produces from a tubing depth of 230 feet. Water Well #2 is considered an auxiliary well and is primarily used for fire protection. Well #2 produces from a depth of approximately 270 feet. No other known groundwater discharge sites are within one mile of the outside perimeter of the gas plant.

The memorandum report "Queen and Related Aquifers in the Indian Basin" (Appendix D) states that there is no evidence indicating the presence of an upper Queen aquifer in the area of the Indian

DATE: 8/18/89 REVISED:	SITE CHARACTERISTICS	PAGE 2 of 4

Basin Gas Plant. The author of the memorandum reported that no water was encountered above approximately 240 feet during the drilling of Marathon's Water Well #1 in July, 1965. This evidence indicates that the upper Queen aquifer does not exist in the vicinity of the gas plant and the shallowest fresh water aquifer in this area is the lower Queen. The depth to the lower Queen aquifer is approximately 240 feet based on Marathon's Water Well #1 records.

Since the evidence indicates that the upper Queen aquifer does not exist in the area of the Indian Basin Gas Plant, the most appropriate wells to use for groundwater monitoring purposes are the Marathon water wells. These two wells produce from the lower Queen aquifer.

A sample of the water from Well #1 was collected on June 15, 1989. Analysis was completed by Enseco Rocky Mountain Analytical Laboratory. The results of this analysis are listed in Appendix A as Indian Basin Gas Plant Drinking Water. The total dissolved solids concentration of this groundwater is 530 mg/L.

DATE: 8/18/89 REVISED:	SITE CHARACTERISTICS	PAGE 3 of 4

GEOLOGIC DESCRIPTION OF DISCHARGE SITE

The memorandum "Queen and Related Aquifers in the Indian Basin" by R. B. Collins, Jr., (Appendix D) states that no water was encountered above about 240 feet when the Marathon Water Well #1 was drilled in July, 1965. This well is referred to as Water Well 21.23.23.232 in the Collins report. The upper Queen aquifer is not in the vicinity of the gas plant. The available evidence indicates that the upper and lower Queen aquifers are not interconnected.

Information from core hole I-24-21S-23E drilled by Marathon in an adjacent section was correlated with the log of well E-23-21S-23E drilled near the Indian Basin Gas Plant. The formation characteristics from the surface to the lower Queen aquifer are:

0-60' Mainly sandstone with some dolomite

60-130' Mainly dolomite

130-530' Dolomite and Anhydrite

The interpretation of this information indicates the interval from approximately 60 feet to the lower Queen aquifer is a tight formation. This geological condition should protect the lower Queen

DATE: 8/18/89 REVISED:	SITE CHARACTERISTICS	PAGE 4 of 4

aquifer from surface contaminants.

FLOOD PROTECTION

The potential for flooding at the Indian Basin Gas Plant is virtually non-existent. Rocky Arroyo is located at a lower elevation than the gas plant. The arroyo periodically has flowing water due to runoff, but does not pose a threat to the plant.

A diversion berm has been placed on the north and west sides of the gas plant to divert flow that may occur during a major precipitation and runoff event. Runoff tends to flow in a southeasterly direction towards Rocky Arroyo.

DATE: 8/18/89 REVISED:	SCHEDULED IMPROVEMENTS	PAGE 1 of 6

On June 23, 1989 the Oil Conservation Division conducted a facility inspection at the Indian Basin Gas Plant as part of the Discharge Plan renewal. Several recommendations were made and improvements specified for several locations on the plant grounds. These required improvements were addressed in an Oil Conservation Division letter dated June 29, 1989 (Appendix F) and are listed below:

1. Secondary containment for above grade storage tanks.
2. Containment/elimination of small volume leaks.
3. Containment for drum storage areas.
4. Elimination/cleanup of existing ground contamination (pipe run north of generators).
5. Sump at water softener building (eliminate/contain sump overflows).
6. Integrity of closed drain system tank.
7. Fencing to prevent unauthorized access to landfill area.

All scheduled improvements will be completed according to the time table set up and illustrated in Figure 4. Descriptions of the scheduled improvements proposed are outlined below.

DATE: 8/18/89 REVISED:	SCHEDULED IMPROVEMENTS	PAGE 2 of 6

PROPOSED PROJECTS FOR 1989

Marathon Oil has scheduled the following projects for completion by December 31, 1989.

1. Marathon Oil Company will initiate a landfarming project on soil contaminated areas identified by the June 23, 1989 Oil Conservation Division site inspection. Prior to the actual landfarming operation, all leak sources will be eliminated or contained in these areas. Details of the landfarming project are still being worked in consultation with Marathon's Exploration and Production Technology Division consultants. Consultation with the Oil Conservation Division staff will occur prior to the initiation of any landfarming activity. The completion date for the landfarming project is unknown at this time.

2. The bottom of the sump in the water softening building will be lined with concrete or another suitable material. Past overflows have been caused by the level controller float sticking due to corrosion. Such overflows will be controlled by placing a catch pan under the water softening unit and through the closed drain system.

3. The soil around the closed drain system tank will be graded. The tank is not physically below grade but does have soil around part of its perimeter. By removing this soil, the tank will be, by definition, an above grade storage tank. (A berm will be placed around this tank in 1990 See Proposed Projects for 1990.)

4. The landfill area located west of the facility fence will be fenced to prevent unauthorized access. A locked gate will be placed at the road entrance leading to the landfill. A fence and additional locked gate will be placed approximately twenty-five feet from the main road. The fence will stretch from the facility fence to a large berm which is a

natural fence. Access from the rear is blocked by the fence located around the flare. The sketch in Figure 5 illustrates the fenced area. All potential blowing trash (office trash) will be burned in a separate waste cell within the landfill fence in accordance with New Mexico AQCR 301 Subsections C and E. Since blowing trash will not exist on-site, covering of wastes in the waste pit with soil will not be necessary. Details of solid waste disposal are outlined in the Facility Wastes and Disposal Section.

5. The integrity of the Salt Water Disposal Tank will be established. The location of the Salt Water Tank prohibits the construction of a dike due to the close proximity of other tanks and valves that require ready access for daily plant operations. Rather than **assuming** tank failure will occur, Marathon Oil Company is taking the position of **preventing** a catastrophic failure. Prevention will be accomplished by the following measures:

   a. The installation of a high level alarm in the tank. The alarm will sound in the control room which is manned twenty-four hours per day.

   b. An annual wall metal thickness test will be conducted. The sampling grid will be established by Marathon Oil Company metallurgical staff. Personnel will be trained to conduct the wall metal thickness test by qualified staff from Marathon's Exploration and Production Technology division. Records of the wall metal thickness tests will be maintained at the plant facility.

PROPOSED PROJECTS FOR 1990

The above ground storage tanks identified by the Oil Conservation Division as requiring containment will be bermed by December 31, 1990. The bermed areas will be large enough to hold one and one-

DATE: 8/18/89 REVISED:	SCHEDULED IMPROVEMENTS	PAGE 4 of 6

third times (Reference OCD letter to Marathon of June 29, 1989) the volume of the largest vessel or one and one-third times the volume of all interconnected vessels contained within the berm. Containment within this area will allow maximum recovery of spilled fluids and will minimize the potential for infiltration.

1. Berms will be placed around the following tanks:

   - The above ground saddle tanks on the north side of the facility that contain fuel, amine, methanol and varsol.
   - The above ground saddle tank containing oil at the stabilizer overhead compressor.
   - DEA storage tanks.
   - The skimmer basin tanks south of the process area.
   - The closed drain system collection tank.
   - Lube oil storage tank.

2. A berm will not be placed around the condensate storage tanks as per discussion with the Oil Conservation Division on June 23, 1989. This area is adjacent to the LPG storage area and berming would create a fire hazard if an LPG tank were to rupture and its contents spilled into the condensate tank berm. Both the condensate and LPG tanks are above ground bullet tanks.

DATE: 8/18/89 REVISED:	SCHEDULED IMPROVEMENTS	PAGE 5 of 6

3. Berms will not be placed around the chemical storage tanks at the cooling tower during 1990. A study will be conducted to determine the feasibility of continuing the use of the cooling tower. If the study recommends continued use of the cooling tower, berms will be placed around the chemical storage tanks by December 31, 1992.

PROPOSED PROJECTS FOR 1991

Small volume leaks will either be eliminated or contained by December 31, 1991. Corrective maintenance will be implemented where practical. When all other means of eliminating leaks have been exhausted, containment of small volume leaks will be used. The following areas are scheduled for containment:

1. The pump south of the stabilizer overhead compressor.
2. Recompressors.
3. Lube-oil storage transfer pumps.
4. Expander and lube oil skid system.
5. The drains below the inlet condensate tanks.
6. The area between the sidewalk and the amine circulation pumps.
7. The pump on the south tank east of the DEA tank.

DATE: 8/18/89 REVISED:	SCHEDULED IMPROVEMENTS	PAGE 6 of 6

PROPOSED PROJECTS FOR 1992

The following projects have been scheduled for completion by December 31, 1992.

1. All drummed chemicals will be stored on pads with containment. Wherever possible, drum storage will be consolidated.

2. If the cooling tower study results recommend continued use of the cooling tower, the following improvements will be done:

   a. Berms will be placed around the chemical storage tanks at the cooling tower.

   b. Containment for the cooling tower pumps and the area around the cooling tower where spray drift ponds on the ground will be constructed.

FIGURE 4.

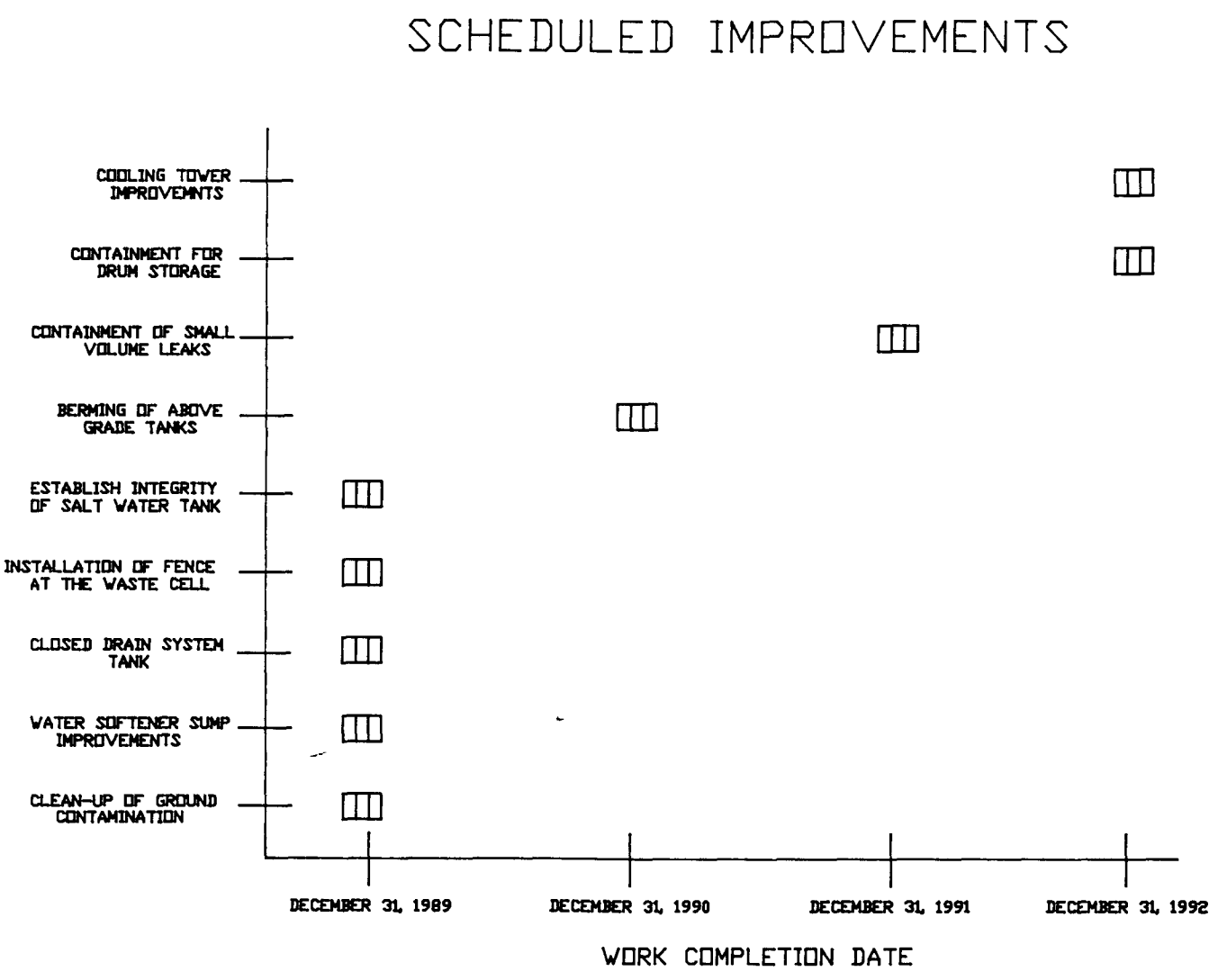
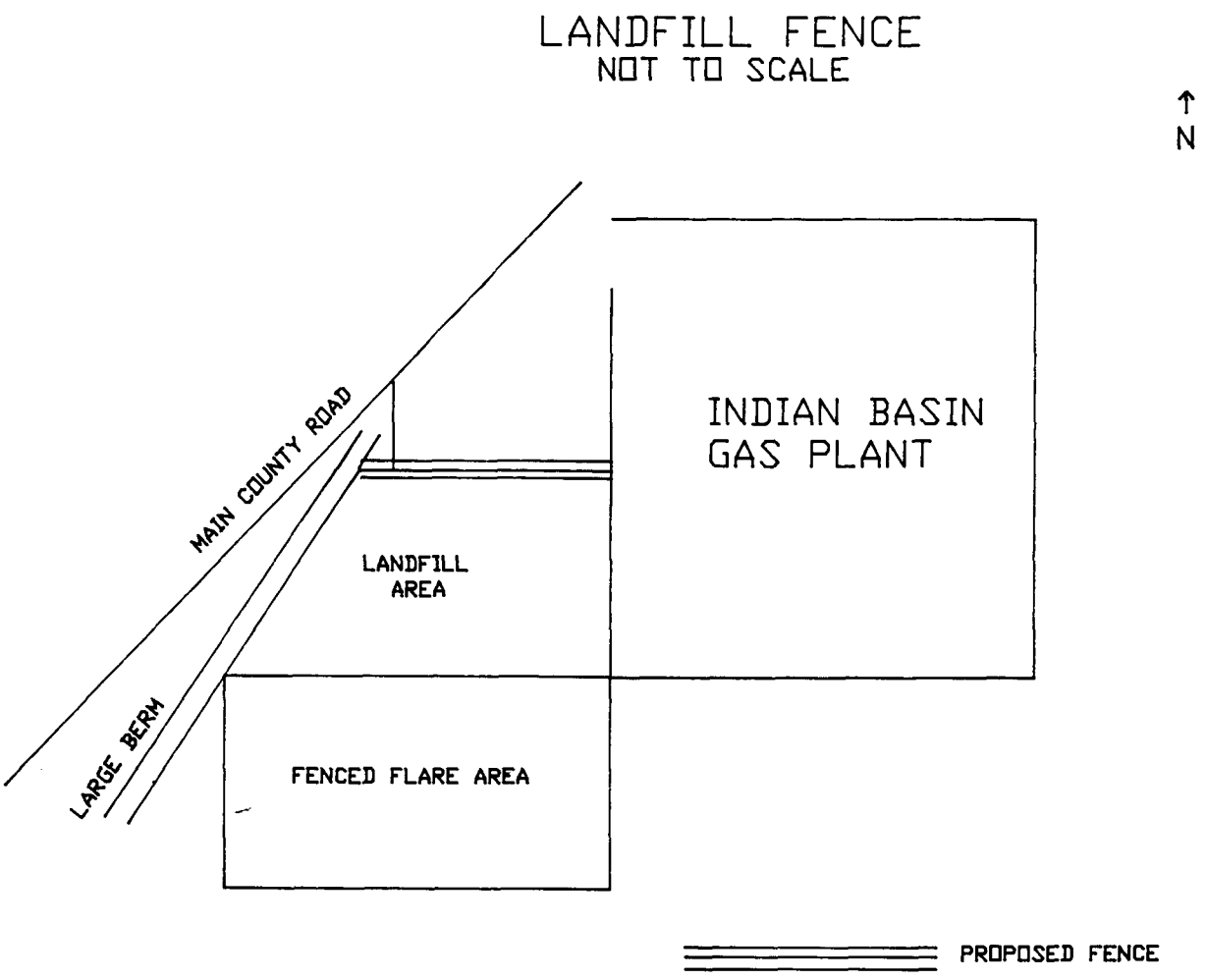
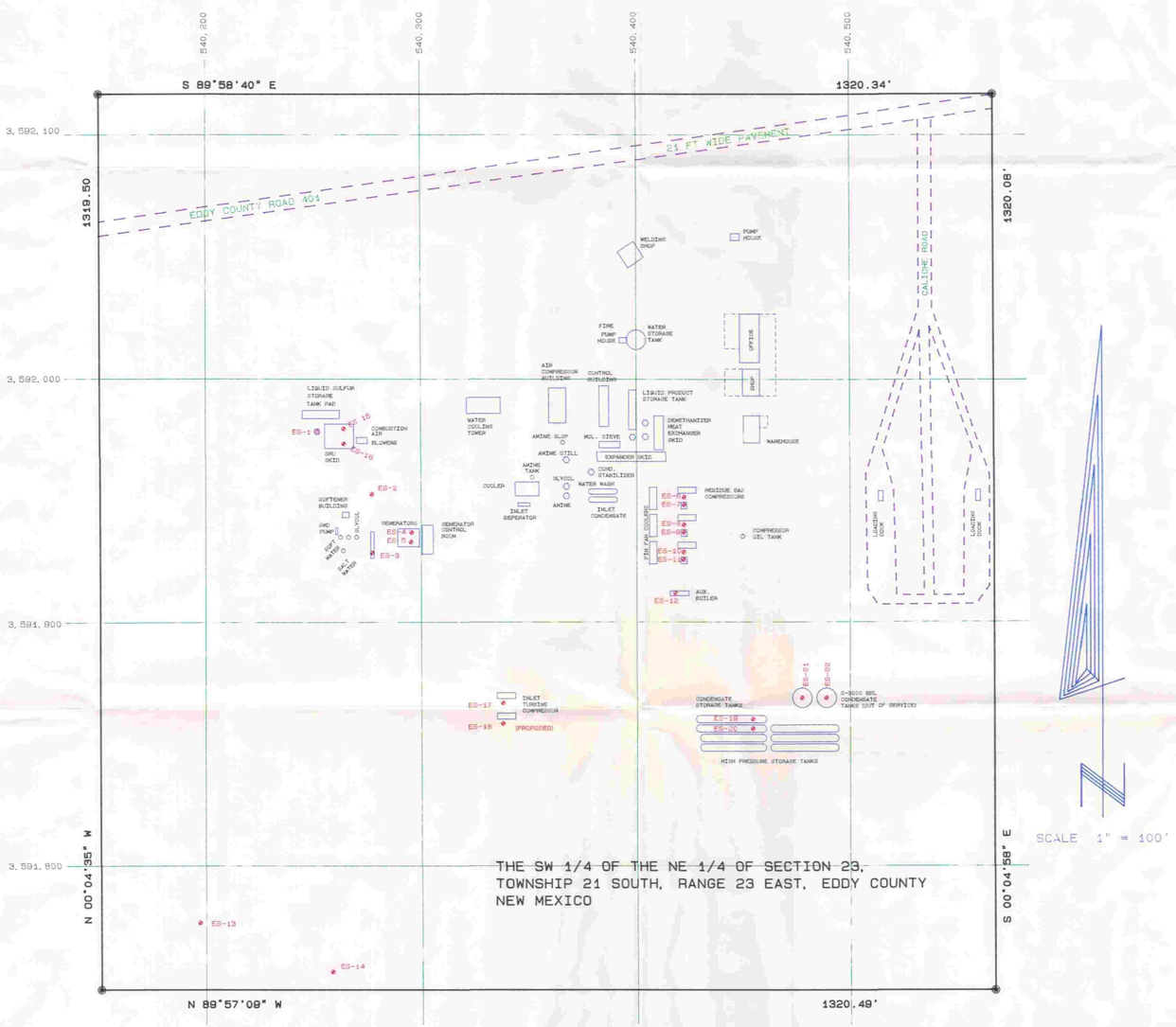

SCHEDULED IMPROVEMENTS
COOLING TOWER IMPROVEMNTS
CONTAINMENT FOR DRUM STORAGE
CONTAINMENT OF SMALL VOLUME LEAKS
BERMING OF ABOVE GRADE TANKS
ESTABLISH INTEGRITY OF SALT WATER TANK
INSTALLATION OF FENCE AT THE WASTE CELL
CLOSED DRAIN SYSTEM TANK
WATER SOFTENER SUMP IMPROVEMENTS
CLEAN-UP OF GROUND CONTAMINATION
DECEMBER 31, 1989
DECEMBER 31, 1990
DECEMBER 31, 1991
DECEMBER 31, 1992
WORK COMPLETION DATE

FIGURE 5.


LANDFILL FENCE
NOT TO SCALE
N
MAIN COUNTY ROAD
LARGE BERM
LANDFILL AREA
INDIAN BASIN GAS PLANT
FENCED FLARE AREA
PROPOSED FENCE



SCALE 1" = 100'

EMISSION POINT	DESCRIPTION	LATITUDE	LONGITUDE	GROUND ELEV.	HEIGHT OF STACK	UTM COORDINATES (IN METERS) NORTH	EAST
ES-1	SULFUR TAIL GAS	32°27'57.5"	104°34'18.1"	3810.7	122 FT	3,591,978.6	540,250.8
ES-2	REGENERATION GAS HEATER	32°27'56.6"	104°34'17.1"	3808.9	77 FT	3,591,951.0	540,277.1
ES-3	GLYCOL REGENERATOR	32°27'55.8"	104°34'17.1"	3808.9	30 FT	3,591,926.3	540,277.1
ES-4	GENERATOR STACK	32°27'56.1"	104°34'16.4"	3808.9	12 FT	3,591,935.6	540,295.4
ES-5	GENERATOR STACK	32°27'56.0"	104°34'16.4"	3808.9	10 FT	3,591,932.6	540,295.4
ES-6	COMPRESSOR STACK	32°27'56.6"	104°34'11.5"	3806.7	28 FT	3,591,951.6	540,423.2
ES-7	COMPRESSOR STACK	32°27'56.5"	104°34'11.5"	3806.7	28 FT	3,591,948.5	540,423.2
ES-8	COMPRESSOR STACK	32°27'56.2"	104°34'11.5"	3806.7	28 FT	3,591,939.2	540,423.3
ES-9	COMPRESSOR STACK	32°27'56.1"	104°34'11.5"	3806.7	28 FT	3,591,936.2	540,423.3
ES-10	COMPRESSOR STACK	32°27'55.9"	104°34'11.5"	3806.7	28 FT	3,591,930.0	540,423.3
ES-11	COMPRESSOR STACK	32°27'55.8"	104°34'11.5"	3806.7	28 FT	3,591,926.9	540,423.3
ES-12	AUXILIARY BOILER	32°27'55.3"	104°34'11.7"	3806.4	19 FT	3,591,911.5	540,418.2
ES-13	FLARE NO. 2	32°27'50.9"	104°34'20.2"	3812.2	167 FT	3,591,775.1	540,196.8
ES-14	FLARE NO. 1	32°27'50.2"	104°34'17.9"	3810.8	67 FT	3,591,753.8	540,257.0
ES-15	NORTH SRU SALT BATH HEATER STACK	32°27'57.5"	104°34'17.6"	3809.7	34 FT	3,591,978.6	540,263.9
ES-16	SOUTH SRU SALT BATH HEATER STACK	32°27'57.3"	104°34'17.6"	3809.7	34 FT	3,591,972.5	540,263.9
ES-17	INLET COMPRESSOR STACK	32°27'53.8"	104°34'14.8"	3807.2	14 FT*	3,591,865.0	540,377.4
ES-18	PROPOSED INLET COMPRESSOR STACK	32°27'53.6"	104°34'14.8"	3807.2	14 FT*	3,591,858.8	540,377.5
ES-19	CONDENSATE STORAGE	32°27'53.6"	104°34'10.3"	3806.0	27 FT	3,591,859.3	540,454.9
ES-20	CONDENSATE STORAGE	32°27'53.5"	104°34'10.3"	3806.0	27 FT	3,591,856.2	540,454.9
ES-21	CONDENSATE STORAGE	32°27'53.9"	104°34'09.4"	3805.3	30 FT	3,591,868.6	540,478.4
ES-22	CONDENSATE STORAGE	32°27'53.9"	104°34'09.0"	3805.3	30 FT	3,591,868.7	540,488.8

* ESTIMATED

NOTE: LATITUDE, LONGITUDE, and UTM COORDINATES ARE BASED ON ZONE 13, CLARKE 1866 ELLIPSOID, NAD 1927.

ES-21 and ES-22 ARE OUT OF SERVICE.

RECEIVED
AUG 22 1989
OIL CONSERVATION DIV.
SANTA FE

CERTIFICATE OF SURVEY:

I HEREBY CERTIFY THAT THIS PLAT WAS MADE FROM NOTES TAKEN IN THE FIELD OF A BONA FIDE SURVEY MADE UNDER MY SUPERVISION AND THAT THE SAME IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF.

JOHN W. WEST NM PE and LS No. 676

REGISTERED PROFESSIONAL ENGINEER AND LAND SURVEYOR NO. 676 NEW MEXICO JOHN W. WEST

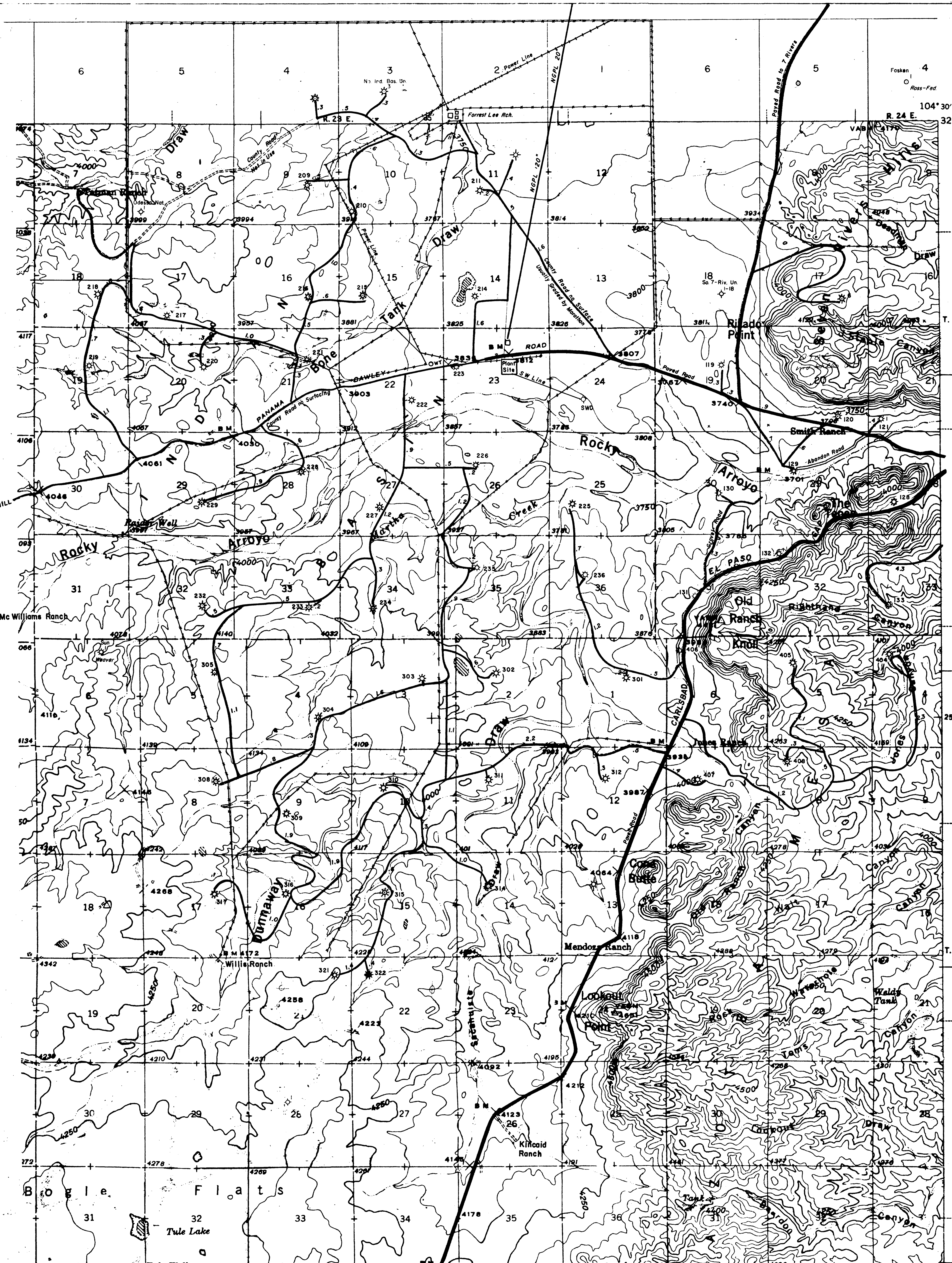
MARATHON OIL COMPANY

Exhibit 1

TOPO OF THE INDIAN BASIN GAS PLANT IN SECTION 23, TOWNSHIP 21 SOUTH, RANGE 23 EAST, NMPM EDDY COUNTY, NEW MEXICO

JOHN WEST ENGINEERING CO.
HOBBS CONSULTANTS NEW MEXICO

Surveyed By: E. JOHNSTON	Drawn By: GLJ	Date: 7-7-89	Drawing Number
Date Begin: 7-18-87	Chk. By: GLJ	Scale: 1"=100'	EC-2281-1
Date End: 7-31-87	Last Rev. Date: 7-7-89	Sheet 1 of 1	



FENCE
POWER & TELEPHONE LINE
ROADS

ROADS USED BY FIELD OPERATORS INDIAN BASIN GAS PLANT

INDIAN BASIN GAS FIELD

EDDY COUNTY, NEW MEXICO

Exhibit 2

SCALE
1000 0 1000 2000

Marathon Oil Company ——— Houston, Texas

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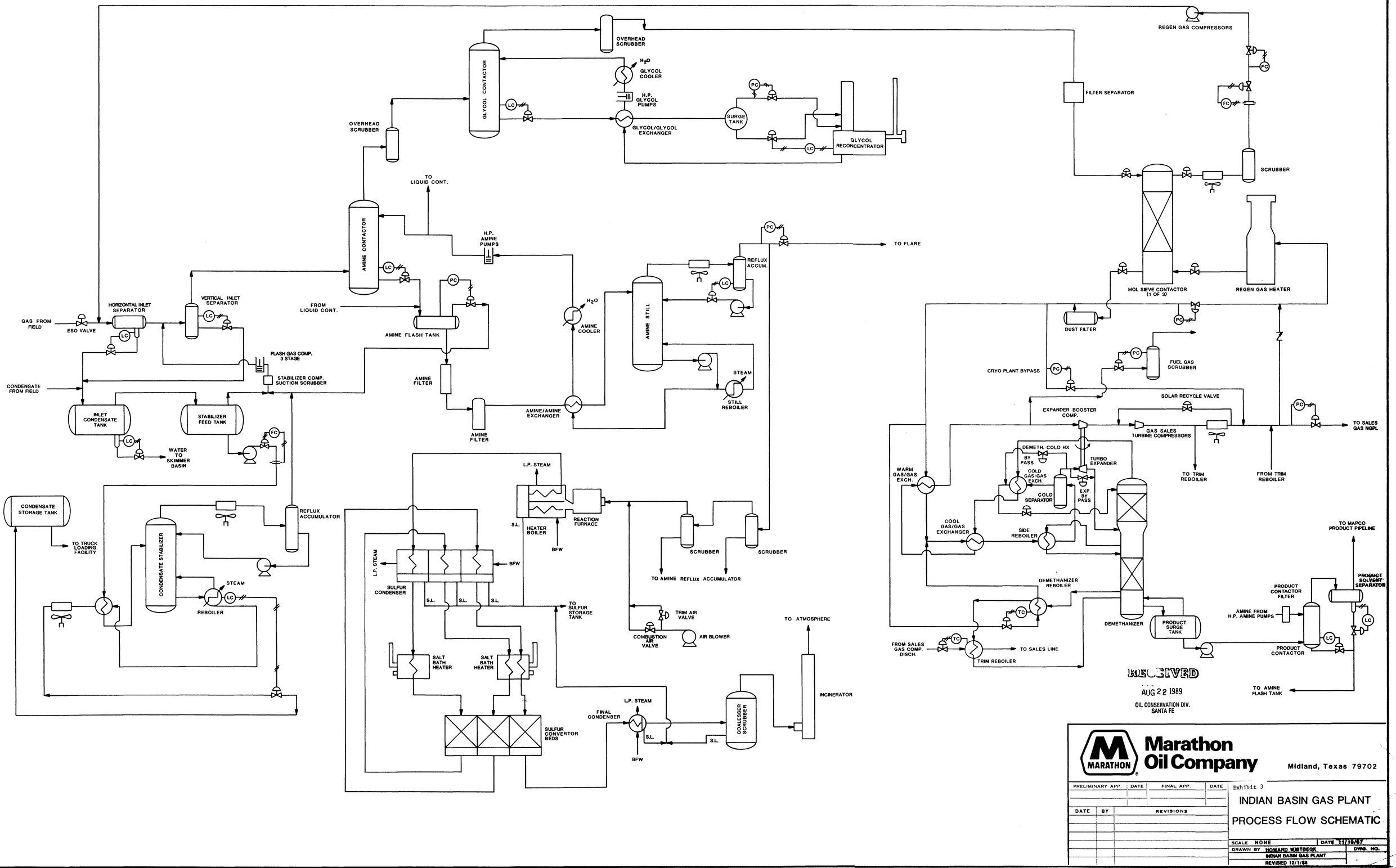
AUG 22 1989
OIL CONSERVATION DIV.
SANTA FE



RECEIVED
AUG 22 1989
OIL CONSERVATION DIV.
SANTA FE

Marathon Oil Company
Midland, Texas 79702

PRELIMINARY APP.	DATE	FINAL APP.	DATE

DATE	BY	REVISIONS

Exhibit 3

INDIAN BASIN GAS PLANT
PROCESS FLOW SCHEMATIC

SCALE NONE | DATE 11/15/87
DRAWN BY HOWARD WHITBECK | DWG. NO.
INDIAN BASIN GAS PLANT
REVISED 12/1/88

DRAPHIX #206632

MARATHON

Exhibit 4

INDIAN BASIN GAS PLANT
WASTEWATER FLOW SCHEMATIC

RECEIVED
AUG 22 1989
OIL CONSERVATION DIV.
SANTA FE

INDIAN BASIN GAS PLANT

SCALE: 1"=25'

N

WELDING SHOP

TANK STORAGE

FRESH WATER TANK

FIRE PUMP BUILDING

FRESH WATER PUMP BUILDING

STABILIZER COMPRESSOR

PARKING

OFFICE

PARKING

PARKING

WORK SHOP

WAREHOUSE

LIQUID SULFUR STORAGE (UNDERGROUND)

ACID GAS SCRUBBER

SULFUR TICKET BUILDING

SULFUR STACK INCINERATOR

SRU SKID (SEE ADDT'N MAP)

AIR COMPRESSORS

SULFUR CONTROL ROOMS

ACID GAS SCRUBBER

ULTRAMINE TANK

CALGON TANK

WATER COOLING TOWER

SULFURIC ACID

WATER PUMPS

INSTRUMENT AIR COMPRESSOR AND WAREHOUSE BUILDING

INSTR. AIR SCRUBBERS

OVERFLOW AMINE SLOP TANK

STABILIZER COMPRESSOR SUCTION SCRUBBER

CONTROL ROOM

PRODUCT PUMPS

PRODUCT SURGE TANK

DEMETHANIZER

HIGH PRESSURE SEPARATOR

MOLE SIEVE BEDS

PRODUCT CONTACTOR

CRYOGENIC SKIDS (SEE ADDT'N MAP)

AMINE SLOP TANK

AMINE STORAGE TANK 9

AMINE AND GLYCOL SYSTEMS (SEE ADDT'N MAP)

H.P. AMINE PUMPS

AMINE STORAGE TANK 8

AMINE REFLUX CONDENSER

4" SCH 40

STABILIZER REFLUX ACCUM.

STABILIZER TOWER

STABILIZER REBOILER

STABILIZER HX

STABILIZER FEED TANK

INLET CONDENSATE TANK

OLD CONTROL ROOM

INLET SEPARATORS (HORIZONTAL) (VERT.)

OLD FUEL GAS SCRUBBER

MOLECULAR SIEVE REGENERATION GAS HEATER

WATER SOFTENER BUILDING

SOFT WATER PUMPS

H.P. GLYCOL PUMPS

4" SCH40

GLYCOL REBOILER SCRUBBER

SOFT WATER TANKS

NORTH GENERATOR

SOUTH GENERATOR

GENERATOR BUILDING

GLYCOL STORAGE TANK

GLYCOL SURGE TANK

GLYCOL REBOILER (OVERHEAD) GLYCOL HX

4"SCH40

OLD LEAN OIL PROCESS (OUT OF SERVICE)

4" SCH 40

RESIDUE GAS COOLERS

UNIT A

UNIT B

UNIT C

RESIDUE GAS COMPRESSORS

UNIT A

UNIT B

UNIT C

RES. GAS COMP. BATTERY BUILDING

TURBINE OIL

SALT WATER PUMPS

SALT WATER TANK

4"PVC

4 yrs. 3"PVC

3"PVC 4 yrs.

4"PVC 2 yrs.

4" SCH40

4" SCH40

MAIN BOILER

TURBINE SITE (approx)

3"PVC

3"PVC

4" SCH 40 4yrs.

3" SCH80

5A

5B

OLD CONDENSATE TANKS

CONDENSATE STORAGE TANK

CONDENSATE STORAGE TANK

BUTANE 2A

BUTANE 2B

PROPANE 1A

PROPANE 1B

PROPANE 1C

FLARE SCRUBBER

SKIMMER BASIN PUMPS

SKIMMER BASIN

ESD VALVE

TO INJECTION WELL
(MARATHON FEDERAL SWD WELL No.1)

CLOSED BLOWDOWN DRAIN TANK

SRU SKID

NORTH SALT BATH HEATER

CATALYST BEDS (OVERHEAD)

SMALL CONDENSER

LARGE CONDENSER

SRU WASTE HEAT BOILER

SRU REACTION FURNACE

COALESCER SCRUBBER

SOUTH SALT BATH HEATER

AMINE AND GLYCOL SYSTEMS
(NO SCALE)

AMINE CIRC. PUMPS

AMINE CHARCOAL FILTER

AMINE STILL

AMINE REBOILER (OVERHEAD)

BOILER SURGE TANK

BOILER WATER PUMPS

AMINE HX

AMINE WATER HX

4" SCH 40

GLYCOL WATER HX

AMINE REFLUX ACCUM.

GLYCOL SCRUBBER

GLYCOL CONTACTOR

AMINE FILTER

AMINE FLASH TANK

AMINE SCRUBBER

AMINE CONTACTOR

AMINE SOCK FILTERS

INLET SEPARATOR (VERTICAL)

CRYOGENIC SKIDS

COLD GAS TO GAS HX

SIDE REBOILER

VESSELS BENEATH

DEMETHANIZER REBOILER

COOL GAS TO GAS HX

WARM GAS TO GAS HX

VESSELS ARE OVERHEAD

DEMETHANIZER TRIM REBOILER (TOP)

REGEN GAS COMPRESSORS

PRODUCT CONTACTOR FILTERS

REGEN GAS COOLERS (OVERHEAD)

FILTER SEPARATOR

REGEN SCRUBBER

DUST FILTER

FUEL GAS SCRUBBER

EXP. OIL PUMPS

N. EXPANDER/ COMPRESSOR S.

PRODUCT SOLVENT SEPARATOR

EXP. OIL SURGE TANK

DATE: 8/18/89 REVISED:	APPENDIX A	PAGE 1 of 2

WATER/WASTEWATER ANALYSES

DATE: 8/18/89 **REVISED:**	APPENDIX A	**PAGE** 2 **of** 2

A copy of the results of analytical tests performed on water and wastewater samples collected at the Indian Basin Gas Plant are attached. All samples were collected as grab samples and sent to Enseco Rocky Mountain Analytical Laboratory in Arvada, Colorado for analyses.

Donna M. Stevison and Stephen D. York collected the samples at the Indian Basin Gas Plant using sample bottles provided by Enseco Rocky Mountain Analytical Laboratory. The chain of custody seal was intact when the bottles were received. All samples were stored in blue ice to maintain a temperature of $4^{o}C$ and shipped to Enseco Rocky Mountain Analytical Laboratory by Federal Express for overnight delivery. Sampling occurred on June 15, 1989 and Enseco Rocky Mountain Analytical Laboratory received the samples on June 16, 1989.

Grab samples were collected in three separate locations. The commingled effluent samples, labeled IBGP Effluent, were collected at the salt water disposal pumps. Cooling tower blowdown samples, labeled IBGP Blowdown, were gathered at the cooling tower blowdown sampling port. Drinking water samples, IBGP Drinking Water, were collected at the plant laboratory.

Enseco

July 6, 1989

Mr. Wendell Nixon
Marathon Oil Company
Exploration and Production Tech.
P.O. Box 269
Littleton, CO 80160

Dear Mr. Nixon:

Enclosed is the report for three samples we received at Enseco-Rocky Mountain Analytical Laboratory on June 16, 1989 for the Midland, Texas project.

Included with the report is a quality control summary. Referenced at the end of the report are the analytical methodologies used for the various analyses performed.

Please call if you have any questions.

Sincerely,

Julie Essey-Hiatt
Program Administrator

Reviewed by:

Jerry L. Parr
Division Scientist

JEH/JLP/lw
Enclosures

RMAL #005347

Enseco Incorporated
4955 Yarrow Street
Arvada, Colorado 80002
303/421-6611 Fax: 303/431-7171

Rocky Mountain
Analytical Laboratory

ANALYTICAL RESULTS

FOR

MARATHON OIL COMPANY

ENSECO-RMAL NO. 005347

JULY 6, 1989

Enseco

Reviewed by:

Julie Essey-Hiatt

Jerry L. Parr

Enseco Incorporated
4955 Yarrow Street
Arvada, Colorado 80002
303/421-6611 Fax: 303/431-7171

Introduction

This report presents the analytical results as well as supporting information to aid in the evaluation and interpretation of the data and is arranged in the following order:

- Sample Description Information
- Analytical Test Requests
- Analytical Results
- Quality Control Report
- Description of Analytical Methodology

All analyses at Enseco are performed so that the maximum concentration of sample consistent with the method is analyzed. Dilutions are at times required to achieve linearity of the specific parameter or to reduce matrix interference. In this event, reporting limits are adjusted proportionately.

For this project, dilutions were performed for the tests and samples listed below:

Sample Number	Test	Dilution Required
005347-0001	601/602	500X
	ICP	10X
005347-0002	ICP	5X
005347-0003	TKN	5X

Sample Description Information

The Sample Description Information lists all of the samples received in this project together with the internal laboratory identification number assigned for each sample. Each project received at Enseco - RMAL is assigned a unique six digit number. Samples within the project are numbered sequentially. The laboratory identification number is a combination of the six digit project code and the sample sequence number.

Also given in the Sample Description Information is the Sample Type (matrix), Date of Sampling (if known) and Date of Receipt at the laboratory.

Analytical Test Requests

The Analytical Test Requests lists the analyses that were performed on each sample. The Custom Test column indicates where tests have been modified to conform to the specific requirements of this project.

SAMPLE DESCRIPTION INFORMATION
for
Marathon Oil Company

Lab ID	Client ID	Matrix	Sampled Date	Sampled Time	Received Date
005347-0001-SA	IBGP Effluent	AQUEOUS	15 JUN 89	12:25	16 JUN 89
005347-0002-SA	IBGP Blowdown	AQUEOUS	15 JUN 89	13:35	16 JUN 89
005347-0003-SA	IBGP Drinking Water	AQUEOUS	15 JUN 89	14:10	16 JUN 89

ANALYTICAL TEST REQUESTS
for
Marathon Oil Company

Lab ID: 005347	Group Code	Analysis Description	Custom Test?
0001 - 0003	A	Halogenated Volatile Organics	N
		Benzene, Toluene, Ethyl Benzene and Xylenes (BTEX)	N
		Arsenic, Furnace AA (Total)	N
		Prep - Total Metals, Furnace AA	N
		Lead, Furnace AA (Total)	N
		ICP Metals (Total)	Y
		Prep - Total Metals, ICP	N
		Ion Balance Cations done by ICP	N
		Ammonia	N
		Total Dissolved Solids (TDS)	N
		Alkalinity,	Y
		Total/Carbonate/Bicarbonate/Hydroxide	Y
		Chloride, Ion Chromatography	N
		Sulfate, Ion Chromatography	N
		Fluoride, Electrode	N
		Specific Conductance	N
		pH	N
		Nitrate Plus Nitrite	N
		Nitrite, as Nitrogen	N
		Total Kjeldahl Nitrogen (TKN)	N
		Ion Balance Calculation	N
		Ion Balance Components	N
		Chromium, Flame AA	N
		Prep - Total Metals, Flame AA	N

Analytical Results

The analytical results for this project are presented in the following data tables. Each data table includes sample identification information, and when available and appropriate, dates sampled, received, authorized, prepared and analyzed. The authorization data is the date when the project was defined by the client such that laboratory work could begin.

Data sheets contain a listing of the parameters measured in each test, the analytical results and the Enseco reporting limit. Reporting limits are adjusted to reflect dilution of the sample, when appropriate. Solid and waste samples are reported on an "as received" basis, i.e. no correction is made for moisture content.

Enseco-RMAL is no longer routinely blank-correcting analytical data. Uncorrected analytical results are reported, along with associated blank results, for all organic and metals analyses. Analytical results and blank results are reported for conventional inorganic parameters as specified in the method. This policy is described in detail in the Enseco Incorporated Quality Assurance Program Plan for Environmental Chemical Monitoring, Revision 3.3, April, 1989.

The results from the Standard Enseco QA/QC Program, which generates data which are independent of matrix effects, is provided subsequently.

Halogenated Volatile Organics

Method 601

Client Name: Marathon Oil Company
Client ID: IBGP Effluent
Lab ID: 005347-0001-SA Enseco ID: 1041863
Matrix: AQUEOUS Sampled: 15 JUN 89 Received: 16 JUN 89
Authorized: 16 JUN 89 Prepared: NA Analyzed: 20 JUN 89

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	2500
Bromomethane	ND	ug/L	2500
Vinyl chloride	ND	ug/L	500
Chloroethane	ND	ug/L	2500
Methylene chloride	ND	ug/L	2500
1,1-Dichloroethene	ND	ug/L	250
1,1-Dichloroethane	ND	ug/L	250
1,2-Dichloroethene (cis/trans)	ND	ug/L	250
Chloroform	ND	ug/L	250
1,1,2-Trichloro-2,2, 1-trifluoroethane	ND	ug/L	500
1,2-Dichloroethane	ND	ug/L	500
1,1,1-Trichloroethane	ND	ug/L	250
Carbon tetrachloride	ND	ug/L	250
Bromodichloromethane	ND	ug/L	500
1,2-Dichloropropane	ND	ug/L	500
trans-1,3-Dichloropropene	ND	ug/L	500
Trichloroethene	ND	ug/L	250
Chlorodibromomethane	ND	ug/L	500
cis-1,3-Dichloropropene	ND	ug/L	1000
1,1,2-Trichloroethane	ND	ug/L	500
EDB (1,2-Dibromoethane)	ND	ug/L	1000
Bromoform	ND	ug/L	2500
1,1,2,2-Tetrachloroethane	ND	ug/L	500
Tetrachloroethene	ND	ug/L	250
Chlorobenzene	ND	ug/L	1000

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Duane Newell Approved By: Kim Zilis

Enseco

Halogenated Volatile Organics

Method 601

Client Name: Marathon Oil Company
Client ID: IBGP Blowdown
Lab ID: 005347-0002-SA Enseco ID: 1041864
Matrix: AQUEOUS Sampled: 15 JUN 89 Received: 16 JUN 89
Authorized: 16 JUN 89 Prepared: NA Analyzed: 20 JUN 89

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	5.0
Bromomethane	ND	ug/L	5.0
Vinyl chloride	ND	ug/L	1.0
Chloroethane	ND	ug/L	5.0
Methylene chloride	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	0.50
1,1-Dichloroethane	ND	ug/L	0.50
1,2-Dichloroethene (cis/trans)	ND	ug/L	0.50
Chloroform	0.58	ug/L	0.50
1,1,2-Trichloro-2,2, 1-trifluoroethane	ND	ug/L	1.0
1,2-Dichloroethane	ND	ug/L	1.0
1,1,1-Trichloroethane	ND	ug/L	0.50
Carbon tetrachloride	ND	ug/L	0.50
Bromodichloromethane	ND	ug/L	1.0
1,2-Dichloropropane	ND	ug/L	1.0
trans-1,3-Dichloropropene	ND	ug/L	1.0
Trichloroethene	ND	ug/L	0.50
Chlorodibromomethane	ND	ug/L	1.0
cis-1,3-Dichloropropene	ND	ug/L	2.0
1,1,2-Trichloroethane	ND	ug/L	1.0
EDB (1,2-Dibromoethane)	ND	ug/L	2.0
Bromoform	ND	ug/L	5.0
1,1,2,2-Tetrachloroethane	ND	ug/L	1.0
Tetrachloroethene	ND	ug/L	0.50
Chlorobenzene	ND	ug/L	2.0

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Duane Newell

Approved By: Kim Zilis

Enseco

Halogenated Volatile Organics

Method 601

Client Name: Marathon Oil Company
Client ID: IBGP Drinking Water
Lab ID: 005347-0003-SA Enseco ID: 1041865
Matrix: AQUEOUS Sampled: 15 JUN 89 Received: 16 JUN 89
Authorized: 16 JUN 89 Prepared: NA Analyzed: 20 JUN 89

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	5.0
Bromomethane	ND	ug/L	5.0
Vinyl chloride	ND	ug/L	1.0
Chloroethane	ND	ug/L	5.0
Methylene chloride	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	0.50
1,1-Dichloroethane	ND	ug/L	0.50
1,2-Dichloroethene (cis/trans)	ND	ug/L	0.50
Chloroform	ND	ug/L	0.50
1,1,2-Trichloro-2,2, 1-trifluoroethane	ND	ug/L	1.0
1,2-Dichloroethane	ND	ug/L	1.0
1,1,1-Trichloroethane	ND	ug/L	0.50
Carbon tetrachloride	ND	ug/L	0.50
Bromodichloromethane	ND	ug/L	1.0
1,2-Dichloropropane	ND	ug/L	1.0
trans-1,3-Dichloropropene	ND	ug/L	1.0
Trichloroethene	ND	ug/L	0.50
Chlorodibromomethane	ND	ug/L	1.0
cis-1,3-Dichloropropene	ND	ug/L	2.0
1,1,2-Trichloroethane	ND	ug/L	1.0
EDB (1,2-Dibromoethane)	ND	ug/L	2.0
Bromoform	ND	ug/L	5.0
1,1,2,2-Tetrachloroethane	ND	ug/L	1.0
Tetrachloroethene	ND	ug/L	0.50
Chlorobenzene	ND	ug/L	2.0

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Duane Newell Approved By: Kim Zilis

Enseco

Benzene, Toluene, Ethyl Benzene and Xylenes (BTEX)

Method 602

Client Name: Marathon Oil Company
Client ID: IBGP Effluent
Lab ID: 005347-0001-SA Enseco ID: 1041863
Matrix: AQUEOUS Sampled: 15 JUN 89 Received: 16 JUN 89
Authorized: 16 JUN 89 Prepared: NA Analyzed: 20 JUN 89

Parameter	Result	Units	Reporting Limit
Benzene	5000	ug/L	250
Toluene	9200	ug/L	250
Ethyl benzene	390	ug/L	250
Total xylenes	3700	ug/L	500

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Duane Newell Approved By: Kim Zilis

Benzene, Toluene, Ethyl Benzene and Xylenes (BTEX)

Method 602

Client Name: Marathon Oil Company
Client ID: IBGP Blowdown
Lab ID: 005347-0002-SA Enseco ID: 1041864
Matrix: AQUEOUS Sampled: 15 JUN 89 Received: 16 JUN 89
Authorized: 16 JUN 89 Prepared: NA Analyzed: 20 JUN 89

Parameter	Result	Units	Reporting Limit
Benzene	ND	ug/L	0.50
Toluene	0.54	ug/L	0.50
Ethyl benzene	ND	ug/L	0.50
Total xylenes	1.8	ug/L	1.0

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Duane Newell Approved By: Kim Zilis

Enseco

Benzene, Toluene, Ethyl Benzene and Xylenes (BTEX)

Method 602

Client Name: Marathon Oil Company
Client ID: IBGP Drinking Water
Lab ID: 005347-0003-SA Enseco ID: 1041865
Matrix: AQUEOUS Sampled: 15 JUN 89 Received: 16 JUN 89
Authorized: 16 JUN 89 Prepared: NA Analyzed: 20 JUN 89

Parameter	Result	Units	Reporting Limit
Benzene	ND	ug/L	0.50
Toluene	ND	ug/L	0.50
Ethyl benzene	ND	ug/L	0.50
Total xylenes	ND	ug/L	1.0

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Duane Newell Approved By: Kim Zilis

Metals

Total Metals

Client Name: Marathon Oil Company
Client ID: IBGP Effluent
Lab ID: 005347-0001-SA Enseco ID: 1041863
Matrix: AQUEOUS Sampled: 15 JUN 89 Received: 16 JUN 89
Authorized: 16 JUN 89 Prepared: See Below Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Chromium	ND	mg/L	0.05	218.1	20 JUN 89	30 JUN 89
Aluminum	ND	mg/L	1	200.7	20 JUN 89	26 JUN 89
Arsenic	ND	mg/L	0.02	206.2	20 JUN 89	26 JUN 89
Barium	ND	mg/L	0.1	200.7	20 JUN 89	26 JUN 89
Boron	2.5	mg/L	0.2	200.7	20 JUN 89	26 JUN 89
Cadmium	ND	mg/L	0.05	200.7	20 JUN 89	26 JUN 89
Calcium	760	mg/L	2	200.7	20 JUN 89	26 JUN 89
Cobalt	ND	mg/L	0.1	200.7	20 JUN 89	26 JUN 89
Copper	ND	mg/L	0.1	200.7	20 JUN 89	26 JUN 89
Iron	5	mg/L	1	200.7	20 JUN 89	26 JUN 89
Lead	ND	mg/L	0.1	239.2	20 JUN 89	23 JUN 89
Magnesium	140	mg/L	2	200.7	20 JUN 89	26 JUN 89
Manganese	1.0	mg/L	0.1	200.7	20 JUN 89	26 JUN 89
Molybdenum	ND	mg/L	0.2	200.7	20 JUN 89	26 JUN 89
Nickel	ND	mg/L	0.4	200.7	20 JUN 89	26 JUN 89
Potassium	64	mg/L	50	200.7	20 JUN 89	26 JUN 89
Selenium	ND	mg/L	2	200.7	20 JUN 89	26 JUN 89
Silica as SiO2	34	mg/L	2	200.7	20 JUN 89	26 JUN 89
Silver	ND	mg/L	0.1	200.7	20 JUN 89	26 JUN 89
Sodium	4730	mg/L	50	200.7	20 JUN 89	26 JUN 89

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Fred Velasquez Approved By: Toni Stovall

Metals

Total Metals

Client Name: Marathon Oil Company
Client ID: IBGP Effluent
Lab ID: 005347-0001-SA Enseco ID: 1041863
Matrix: AQUEOUS Sampled: 15 JUN 89 Received: 16 JUN 89
Authorized: 16 JUN 89 Prepared: See Below Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Chromium	ND	mg/L	0.05	218.1	20 JUN 89	30 JUN 89
Aluminum	ND	mg/L	1	200.7	20 JUN 89	26 JUN 89
Arsenic	ND	mg/L	0.02	206.2	20 JUN 89	26 JUN 89
Barium	ND	mg/L	0.1	200.7	20 JUN 89	26 JUN 89
Boron	2.5	mg/L	0.2	200.7	20 JUN 89	26 JUN 89
Cadmium	ND	mg/L	0.05	200.7	20 JUN 89	26 JUN 89
Calcium	760	mg/L	2	200.7	20 JUN 89	26 JUN 89
Cobalt	ND	mg/L	0.1	200.7	20 JUN 89	26 JUN 89
Copper	ND	mg/L	0.1	200.7	20 JUN 89	26 JUN 89
Iron	5	mg/L	1	200.7	20 JUN 89	26 JUN 89
Lead	ND	mg/L	0.1	239.2	20 JUN 89	23 JUN 89
Magnesium	140	mg/L	2	200.7	20 JUN 89	26 JUN 89
Manganese	1.0	mg/L	0.1	200.7	20 JUN 89	26 JUN 89
Molybdenum	ND	mg/L	0.2	200.7	20 JUN 89	26 JUN 89
Nickel	ND	mg/L	0.4	200.7	20 JUN 89	26 JUN 89
Potassium	64	mg/L	50	200.7	20 JUN 89	26 JUN 89
Selenium	ND	mg/L	2	200.7	20 JUN 89	26 JUN 89
Silica as SiO2	34	mg/L	2	200.7	20 JUN 89	26 JUN 89
Silver	ND	mg/L	0.1	200.7	20 JUN 89	26 JUN 89
Sodium	4730	mg/L	50	200.7	20 JUN 89	26 JUN 89
Zinc	ND	mg/L	0.1	200.7	20 JUN 89	26 JUN 89

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Fred Velasquez Approved By: Toni Stovall

Enseco

Metals

Total Metals

Client Name: Marathon Oil Company
Client ID: IBGP Blowdown
Lab ID: 005347-0002-SA Enseco ID: 1041864
Matrix: AQUEOUS Sampled: 15 JUN 89 Received: 16 JUN 89
Authorized: 16 JUN 89 Prepared: See Below Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Chromium	0.36	mg/L	0.05	218.1	20 JUN 89	30 JUN 89
Aluminum	ND	mg/L	0.5	200.7	20 JUN 89	26 JUN 89
Arsenic	0.13	mg/L	0.01	206.2	20 JUN 89	26 JUN 89
Barium	0.16	mg/L	0.05	200.7	20 JUN 89	26 JUN 89
Boron	1.2	mg/L	0.1	200.7	20 JUN 89	26 JUN 89
Cadmium	ND	mg/L	0.03	200.7	20 JUN 89	26 JUN 89
Calcium	1030	mg/L	1	200.7	20 JUN 89	26 JUN 89
Cobalt	ND	mg/L	0.05	200.7	20 JUN 89	26 JUN 89
Copper	0.11	mg/L	0.05	200.7	20 JUN 89	26 JUN 89
Iron	2.4	mg/L	0.5	200.7	20 JUN 89	26 JUN 89
Lead	ND	mg/L	0.05	239.2	20 JUN 89	23 JUN 89
Magnesium	455	mg/L	1	200.7	20 JUN 89	26 JUN 89
Manganese	0.14	mg/L	0.05	200.7	20 JUN 89	26 JUN 89
Molybdenum	ND	mg/L	0.1	200.7	20 JUN 89	26 JUN 89
Nickel	ND	mg/L	0.2	200.7	20 JUN 89	26 JUN 89
Potassium	84	mg/L	30	200.7	20 JUN 89	26 JUN 89
Selenium	ND	mg/L	1	200.7	20 JUN 89	26 JUN 89
Silica as SiO2	150	mg/L	1	200.7	20 JUN 89	26 JUN 89
Silver	ND	mg/L	0.05	200.7	20 JUN 89	26 JUN 89
Sodium	1780	mg/L	30	200.7	20 JUN 89	26 JUN 89
Zinc	0.20	mg/L	0.05	200.7	20 JUN 89	26 JUN 89

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Fred Velasquez Approved By: Toni Stovall

Enseco

Metals

Total Metals

Client Name: Marathon Oil Company
Client ID: IBGP Drinking Water
Lab ID: 005347-0003-SA Enseco ID: 1041865
Matrix: AQUEOUS Sampled: 15 JUN 89 Received: 16 JUN 89
Authorized: 16 JUN 89 Prepared: See Below Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Chromium	ND	mg/L	0.05	218.1	20 JUN 89	30 JUN 89
Aluminum	ND	mg/L	0.1	200.7	20 JUN 89	26 JUN 89
Arsenic	ND	mg/L	0.005	206.2	20 JUN 89	26 JUN 89
Barium	0.03	mg/L	0.01	200.7	20 JUN 89	26 JUN 89
Boron	0.06	mg/L	0.03	200.7	20 JUN 89	26 JUN 89
Cadmium	ND	mg/L	0.005	200.7	20 JUN 89	26 JUN 89
Calcium	106	mg/L	0.2	200.7	20 JUN 89	26 JUN 89
Cobalt	ND	mg/L	0.01	200.7	20 JUN 89	26 JUN 89
Copper	ND	mg/L	0.01	200.7	20 JUN 89	26 JUN 89
Iron	ND	mg/L	0.1	200.7	20 JUN 89	26 JUN 89
Lead	ND	mg/L	0.005	239.2	20 JUN 89	20 JUN 89
Magnesium	41	mg/L	0.2	200.7	20 JUN 89	26 JUN 89
Manganese	ND	mg/L	0.01	200.7	20 JUN 89	26 JUN 89
Molybdenum	ND	mg/L	0.02	200.7	20 JUN 89	26 JUN 89
Nickel	ND	mg/L	0.04	200.7	20 JUN 89	26 JUN 89
Potassium	ND	mg/L	5	200.7	20 JUN 89	26 JUN 89
Selenium	ND	mg/L	0.2	200.7	20 JUN 89	26 JUN 89
Silica as SiO2	22	mg/L	0.2	200.7	20 JUN 89	26 JUN 89
Silver	ND	mg/L	0.01	200.7	20 JUN 89	26 JUN 89
Sodium	12	mg/L	5	200.7	20 JUN 89	26 JUN 89
Zinc	0.04	mg/L	0.01	200.7	20 JUN 89	26 JUN 89

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Fred Velasquez Approved By: Toni Stovall

Metals

Dissolved Metals

Client Name: Marathon Oil Company
Client ID: IBGP Effluent
Lab ID: 005347-0001-SA Enseco ID: 1041863
Matrix: AQUEOUS Sampled: 15 JUN 89 Received: 16 JUN 89
Authorized: 16 JUN 89 Prepared: See Below Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Calcium	800	mg/L	2	200.7	NA	21 JUN 89
Iron	5	mg/L	1	200.7	NA	21 JUN 89
Magnesium	150	mg/L	2	200.7	NA	21 JUN 89
Potassium	62	mg/L	50	200.7	NA	21 JUN 89
Sodium	4890	mg/L	50	200.7	NA	21 JUN 89

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Bryan Anderson Approved By: Toni Stovall

Metals

Dissolved Metals

Client Name: Marathon Oil Company
Client ID: IBGP Blowdown
Lab ID: 005347-0002-SA Enseco ID: 1041864
Matrix: AQUEOUS Sampled: 15 JUN 89 Received: 16 JUN 89
Authorized: 16 JUN 89 Prepared: See Below Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Calcium	1040	mg/L	1	200.7	NA	21 JUN 89
Iron	2.2	mg/L	0.5	200.7	NA	21 JUN 89
Magnesium	460	mg/L	1	200.7	NA	21 JUN 89
Potassium	82	mg/L	30	200.7	NA	21 JUN 89
Sodium	1760	mg/L	30	200.7	NA	21 JUN 89

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Bryan Anderson Approved By: Toni Stovall

Metals

Dissolved Metals

Client Name: Marathon Oil Company
Client ID: IBGP Drinking Water
Lab ID: 005347-0003-SA Enseco ID: 1041865
Matrix: AQUEOUS Sampled: 15 JUN 89 Received: 16 JUN 89
Authorized: 16 JUN 89 Prepared: See Below Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Calcium	110	mg/L	0.2	200.7	NA	21 JUN 89
Iron	ND	mg/L	0.1	200.7	NA	21 JUN 89
Magnesium	42	mg/L	0.2	200.7	NA	21 JUN 89
Potassium	ND	mg/L	5	200.7	NA	21 JUN 89
Sodium	12	mg/L	5	200.7	NA	21 JUN 89

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Bryan Anderson Approved By: Toni Stovall

General Inorganics

Client Name: Marathon Oil Company
Client ID: IBGP Effluent
Lab ID: 005347-0001-SA Enseco ID: 1041863
Matrix: AQUEOUS Sampled: 15 JUN 89 Received: 16 JUN 89
Authorized: 16 JUN 89 Prepared: See Below Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Alkalinity, Total as CaCO3 at pH 4.5	661	mg/L	5	310.1	NA	16 JUN 89
Chloride	7960	mg/L	3	300.0	NA	20 JUN 89
Fluoride	3.1	mg/L	0.1	340.2	NA	28 JUN 89
Ion Balance Difference	1.6	%	--	104C	NA	29 JUN 89
Total Anions	276	meq/L	0.3		NA	29 JUN 89
Total Cations	267	meq/L	0.1		NA	29 JUN 89
Ammonia as N	11	mg/L	0.1	350.1	NA	20 JUN 89
Nitrite as N	0.01	mg/L	0.01	354.1	NA	16 JUN 89
Nitrate plus Nitrite as N	ND	mg/L	0.1	353.2	NA	19 JUN 89
pH	7.3	units	--	150.1	NA	16 JUN 89
Sulfate	1840	mg/L	5	300.0	NA	20 JUN 89
Specific Conductance at 25 deg.C	23500	umhos/c	1	120.1	NA	16 JUN 89
Total Kjeldahl Nitrogen as N	13	mg/L	0.5	351.2	NA	20 JUN 89
Total Dissolved Solids	15700	mg/L	10	160.1	NA	20 JUN 89

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Pam Rosas Approved By: Tammy Bailey

General Inorganics

Client Name: Marathon Oil Company
Client ID: IBGP Blowdown
Lab ID: 005347-0002-SA Enseco ID: 1041864
Matrix: AQUEOUS Sampled: 15 JUN 89 Received: 16 JUN 89
Authorized: 16 JUN 89 Prepared: See Below Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Alkalinity, Total as CaCO3 at pH 4.5	53	mg/L	5	310.1	NA	16 JUN 89
Chloride	3030	mg/L	3	300.0	NA	20 JUN 89
Fluoride	3.3	mg/L	0.1	340.2	NA	28 JUN 89
Ion Balance Difference	1.4	%	--	104C	NA	29 JUN 89
Total Anions	173	meq/L	0.3		NA	29 JUN 89
Total Cations	168	meq/L	0.1		NA	29 JUN 89
Ammonia as N	ND	mg/L	0.1	350.1	NA	20 JUN 89
Nitrite as N	0.02	mg/L	0.01	354.1	NA	16 JUN 89
Nitrate plus Nitrite as N	0.3	mg/L	0.1	353.2	NA	19 JUN 89
pH	7.4	units	--	150.1	NA	16 JUN 89
Sulfate	4160	mg/L	5	300.0	NA	20 JUN 89
Specific Conductance at 25 deg.C	13800	umhos/c	1	120.1	NA	16 JUN 89
Total Kjeldahl Nitrogen as N	4.6	mg/L	0.5	351.2	NA	20 JUN 89
Total Dissolved Solids	10800	mg/L	10	160.1	NA	20 JUN 89

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Pam Rosas Approved By: Tammy Bailey

General Inorganics

Client Name: Marathon Oil Company
Client ID: IBGP Drinking Water
Lab ID: 005347-0003-SA Enseco ID: 1041865
Matrix: AQUEOUS Sampled: 15 JUN 89 Received: 16 JUN 89
Authorized: 16 JUN 89 Prepared: See Below Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Alkalinity, Total as CaCO3 at pH 4.5	252	mg/L	5	310.1	NA	16 JUN 89
Chloride	17	mg/L	3	300.0	NA	20 JUN 89
Fluoride	0.6	mg/L	0.1	340.2	NA	28 JUN 89
Ion Balance Difference	1.8	%	--	104C	NA	29 JUN 89
Total Anions	9.1	meq/L	0.3		NA	29 JUN 89
Total Cations	9.5	meq/L	0.1		NA	29 JUN 89
Ammonia as N	ND	mg/L	0.1	350.1	NA	20 JUN 89
Nitrite as N	ND	mg/L	0.01	354.1	NA	16 JUN 89
Nitrate plus Nitrite as N	3.1	mg/L	0.1	353.2	NA	19 JUN 89
pH	7.6	units	--	150.1	NA	16 JUN 89
Sulfate	162	mg/L	5	300.0	NA	20 JUN 89
Specific Conductance at 25 deg.C	851	umhos/c	1	120.1	NA	16 JUN 89
Total Kjeldahl Nitrogen as N	ND	mg/L	3	351.2	NA	20 JUN 89
Total Dissolved Solids	530	mg/L	10	160.1	NA	20 JUN 89

N.D. = Not Detected
N.A. = Not Applicable

Reported By: Pam Rosas Approved By: Tammy Bailey

Quality Control Results

The Enseco laboratories operate under a vigorous QA/QC program designed to ensure the generation of scientifically valid, legally defensible data by monitoring every aspect of laboratory operations. Routine QA/QC procedures include the use of approved methodologies, independent verification of analytical standards, use of duplicate Laboratory Control Samples to assess the precision and accuracy of the methodology on a routine basis, and a rigorous system of data review.

In addition, the Enseco laboratories maintain a comprehensive set of certifications from both state and federal governmental agencies which require frequent analyses of blind audit samples. Enseco - Rocky Mountain Analytical Laboratory is certified by the EPA under the EPA/CLP program for both Organic and Inorganic analyses, under the USATHAMA (U.S. Army) program, by the Army Corps of Engineers, and the states of Colorado, New Jersey, New York, Utah, and Florida, among others.

The standard laboratory QC package is designed to:

1) establish a strong, cost-effective QC program that ensures the generation of scientifically valid, legally defensible data

2) assess the laboratory's performance of the analytical method using control limits generated with a well-defined matrix

3) establish clear-cut guidelines for acceptability of analytical data so that QC decisions can be made immediately at the bench, and

4) provide a standard set of reportables which assures the client of the quality of his data.

The Enseco QC program is based upon monitoring the precision and accuracy of an analytical method by analyzing a set of Duplicate Control Samples (DCS) at frequent, well-defined intervals. Each DCS is a well-characterized matrix which is spiked with target compounds at 5-100 times the reporting limit, depending upon the methodology being monitored. The purpose of the DCS is not to duplicate the sample matrix, but rather to provide an interference-free, homogeneous matrix from which to gather data to establish control limits. These limits are used to determine whether data generated by the laboratory on any given day is in control.

Control limits for accuracy (percent recovery) are based on the average, historical percent recovery +/- 3 standard deviation units. Control limits for precision (relative percent difference) range from 0 (identical duplicate DCS results) to the average, historical relative percent difference + 3 standard deviation units. These control limits are fairly narrow based on the consistency of the matrix being monitored and are updated on a quarterly basis.

For each batch of samples analyzed, an additional control measure is taken in the form of a Single Control Sample (SCS). The SCS consists of a control matrix that is spiked with either representative target compounds or surrogate compounds appropriate to the method being used. An SCS is prepared for each sample lot for which the DCS pair are not analyzed.

Accuracy for DCS and SCS is measured by Percent Recovery.

$$\% \text{ Recovery} = \frac{\text{Measured Concentration}}{\text{Actual Concentration}} \times 100$$

Precision for DCS is measured by Relative Percent Difference (RPD).

$$\text{RPD} = \frac{\left| \text{Measured Concentration DCS1} - \text{Measured Concentration DCS2} \right|}{(\text{Measured Concentration DCS1} + \text{Measured Concentration DCS2})/2} \times 100$$

All samples analyzed concurrently by the same test are assigned the same QC lot number. Projects which contain numerous samples, analyzed over several days, may have multiple QC lot numbers associated with each test. The QC information which follows includes a listing of the QC lot numbers associated with each of the samples reported, DCS and SCS (where applicable) recoveries from the QC lots associated with the samples, and control limits for these lots. The QC data is reported by test code, in the order that the tests are reported in the analytical results section of this report. The test codes assigned are defined in Section V, Analytical Methodology.

QC LOT ASSIGNMENT REPORT
Volatile Organics by GC

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
005347-0001-SA	AQUEOUS	601-A	20 JUN 89-L	20 JUN 89-L
005347-0001-SA	AQUEOUS	602-A	20 JUN 89-L	20 JUN 89-L
005347-0002-SA	AQUEOUS	601-A	20 JUN 89-L	20 JUN 89-L
005347-0002-SA	AQUEOUS	602-A	20 JUN 89-L	20 JUN 89-L
005347-0003-SA	AQUEOUS	601-A	20 JUN 89-L	20 JUN 89-L
005347-0003-SA	AQUEOUS	602-A	20 JUN 89-L	20 JUN 89-L

DUPLICATE CONTROL SAMPLE REPORT
Volatile Organics by GC

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision (RPD) Limit
Category: 601-A Matrix: AQUEOUS QC Lot: 20 JUN 89-L Concentration Units: ug/L								
1,1-Dichloroethane	5.0	6.07	5.41	5.74	115	80-130	11	20
Chloroform	5.0	5.73	4.65	5.19	104	80-120	21	20
Bromodichloromethane	10	8.67	7.62	8.14	81	80-120	13	20
Trichloroethene	5.0	4.80	4.18	4.49	90	70-120	14	20
Chlorobenzene	5.0	5.20	4.53	4.86	97	80-120	14	20
Category: 602-A Matrix: AQUEOUS QC Lot: 20 JUN 89-L Concentration Units: ug/L								
Benzene	5.0	4.31	3.89	4.10	82	75-115	10	20
Toluene	5.0	5.13	4.70	4.92	98	75-115	8.7	20
Chlorobenzene	5.0	5.34	4.93	5.14	103	75-115	8.0	20
Ethyl benzene	5.0	5.10	4.65	4.88	98	75-115	9.2	20
Total xylenes	5.0	4.79	4.01	4.40	88	75-115	18	20
1,3-Dichlorobenzene	5.0	5.34	4.59	4.96	99	75-115	15	20

Calculations are performed before rounding to avoid round-off errors in calculated results.

SINGLE CONTROL SAMPLE REPORT
Volatile Organics by GC

Analyte	Concentration Spiked	Concentration Measured	Accuracy(%) SCS	Accuracy(%) Limits
Category: 601-A Matrix: AQUEOUS QC Lot: 20 JUN 89-L QC Run: 20 JUN 89-L Concentration Units: ug/L				
Bromochloromethane	30.0	43.3	144	20-160
Category: 602-A Matrix: AQUEOUS QC Lot: 20 JUN 89-L QC Run: 20 JUN 89-L Concentration Units: ug/L				
a,a,a-Trifluorotoluene	30.0	30.8	103	20-160

Calculations are performed before rounding to avoid round-off errors in calculated results.

METHOD BLANK REPORT
Volatile Organics by GC

Analyte	Result	Units	Reporting Limit
Test: 601-A			
Matrix: AQUEOUS			
QC Lot: 20 JUN 89-L QC Run: 20 JUN 89-L			
Chloromethane	ND	ug/L	5.0
Bromomethane	ND	ug/L	5.0
Vinyl chloride	ND	ug/L	1.0
Chloroethane	ND	ug/L	5.0
Methylene chloride	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	0.50
1,1-Dichloroethane	ND	ug/L	0.50
1,2-Dichloroethene (cis/trans)	ND	ug/L	0.50
Chloroform	ND	ug/L	0.50
1,1,2-Trichloro-2,2, 1-trifluoroethane	ND	ug/L	1.0
1,2-Dichloroethane	ND	ug/L	1.0
1,1,1-Trichloroethane	ND	ug/L	0.50
Carbon tetrachloride	ND	ug/L	0.50
Bromodichloromethane	ND	ug/L	1.0
1,2-Dichloropropane	ND	ug/L	1.0
trans-1,3-Dichloropropene	ND	ug/L	1.0
Trichloroethene	ND	ug/L	0.50
Chlorodibromomethane	ND	ug/L	1.0
cis-1,3-Dichloropropene	ND	ug/L	2.0
1,1,2-Trichloroethane	ND	ug/L	1.0
EDB (1,2-Dibromoethane)	ND	ug/L	2.0
Bromoform	ND	ug/L	5.0
1,1,2,2-Tetrachloroethane	ND	ug/L	1.0
Tetrachloroethene	ND	ug/L	0.50
Chlorobenzene	ND	ug/L	2.0
Test: 602-BTEX-A			
Matrix: AQUEOUS			
QC Lot: 20 JUN 89-L QC Run: 20 JUN 89-L			
Benzene	ND	ug/L	0.50
Toluene	ND	ug/L	0.50
Ethyl benzene	ND	ug/L	0.50
Total xylenes	ND	ug/L	1.0

QC LOT ASSIGNMENT REPORT
Metals Analysis and Preparation

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
005347-0001-SA	AQUEOUS	AS-FAA-AT	20 JUN 89-A	20 JUN 89-A
005347-0001-SA	AQUEOUS	PB-FAA-AT	20 JUN 89-A	20 JUN 89-A
005347-0001-SA	AQUEOUS	ICP-AT	20 JUN 89-A	20 JUN 89-A
005347-0001-SA	AQUEOUS	ICP-AD	21 JUN 89-D	
005347-0001-SA	AQUEOUS	CR-FLAA-AT	20 JUN 89-A	20 JUN 89-A
005347-0002-SA	AQUEOUS	AS-FAA-AT	20 JUN 89-A	20 JUN 89-A
005347-0002-SA	AQUEOUS	PB-FAA-AT	20 JUN 89-A	20 JUN 89-A
005347-0002-SA	AQUEOUS	ICP-AT	20 JUN 89-A	20 JUN 89-A
005347-0002-SA	AQUEOUS	ICP-AD	21 JUN 89-D	
005347-0002-SA	AQUEOUS	CR-FLAA-AT	20 JUN 89-A	20 JUN 89-A
005347-0003-SA	AQUEOUS	AS-FAA-AT	20 JUN 89-A	20 JUN 89-A
005347-0003-SA	AQUEOUS	PB-FAA-AT	20 JUN 89-A	20 JUN 89-A
005347-0003-SA	AQUEOUS	ICP-AT	20 JUN 89-A	20 JUN 89-A
005347-0003-SA	AQUEOUS	ICP-AD	21 JUN 89-D	
005347-0003-SA	AQUEOUS	CR-FLAA-AT	20 JUN 89-A	20 JUN 89-A

DUPLICATE CONTROL SAMPLE REPORT
Metals Analysis and Preparation

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	Measured AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision Limit
Category: AS-FAA-AT Matrix: AQUEOUS QC Lot: 20 JUN 89-A Concentration Units: mg/L								
Arsenic	0.04	0.047	0.049	0.048	120	75-125	4.2	20
Category: PB-FAA-AT Matrix: AQUEOUS QC Lot: 20 JUN 89-A Concentration Units: mg/L								
Lead	0.02	0.019	0.018	0.018	93	75-125	5.4	20
Category: ICP-AT Matrix: AQUEOUS QC Lot: 20 JUN 89-A Concentration Units: mg/L								
Aluminum	2.0	1.98	1.96	1.97	99	75-125	1.0	20
Antimony	0.5	0.49	0.49	0.49	98	75-125	0.0	20
Arsenic	2.0	1.97	1.98	1.98	99	75-125	0.5	20
Barium	2.0	1.93	1.93	1.93	97	75-125	0.0	20
Beryllium	0.05	0.049	0.049	0.049	98	75-125	0.0	20
Cadmium	0.05	0.051	0.052	0.052	103	75-125	1.9	20
Calcium	100	100	101	100	101	75-125	1.0	20
Chromium	0.2	0.19	0.19	0.19	95	75-125	0.0	20
Cobalt	0.5	0.47	0.48	0.48	95	75-125	2.1	20
Copper	0.25	0.26	0.26	0.26	104	75-125	0.0	20
Iron	1.0	1.01	1.02	1.02	102	75-125	1.0	20
Lead	0.5	0.48	0.49	0.48	97	75-125	2.1	20
Magnesium	50	50.0	50.6	50.3	101	75-125	1.2	20
Manganese	0.5	0.49	0.49	0.49	98	75-125	0.0	20
Nickel	0.5	0.48	0.49	0.48	97	75-125	2.1	20
Potassium	100	96.9	99.0	98.0	98	75-125	2.1	20
Selenium	0	NA	NA	NC	NC	75-125	NC	20
Silver	0.05	0.056	0.055	0.056	111	75-125	1.8	20
Sodium	100	102	104	103	103	75-125	1.9	20
Thallium	0	NA	NA	NC	NC	75-125	NC	20
Tin	0.4	0.41	0.42	0.42	104	75-125	2.4	20
Vanadium	0.5	0.48	0.48	0.48	96	75-125	0.0	20
Zinc	0.5	0.47	0.48	0.48	95	75-125	2.1	20

ND = Not detected
NC = Not calculated, calculation not applicable
NA = Not applicable

Calculations are performed before rounding to avoid round-off errors in calculated results.

DUPLICATE CONTROL SAMPLE REPORT
Metals Analysis and Preparation (cont.)

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision Limit
Category: ICP-AD								
Matrix: AQUEOUS								
QC Lot: 21 JUN 89-D								
Concentration Units: mg/L								
Aluminum	2.0	1.94	1.94	1.94	97	75-125	0.0	20
Antimony	0.5	0.48	0.48	0.48	96	75-125	0.0	20
Arsenic	2.0	1.97	1.94	1.96	98	75-125	1.5	20
Barium	2.0	1.91	1.90	1.90	95	75-125	0.5	20
Beryllium	0.05	0.047	0.047	0.047	94	75-125	0.0	20
Cadmium	0.05	0.049	0.053	0.051	102	75-125	7.8	20
Calcium	100	99.6	99.3	99.4	99	75-125	0.3	20
Chromium	0.2	0.19	0.20	0.20	98	75-125	5.1	20
Cobalt	0.5	0.48	0.47	0.48	95	75-125	2.1	20
Copper	0.25	0.25	0.25	0.25	100	75-125	0.0	20
Iron	1.0	0.96	1.00	0.98	98	75-125	4.1	20
Lead	0.5	0.48	0.49	0.48	97	75-125	2.1	20
Magnesium	50	50.0	49.8	49.9	100	75-125	0.4	20
Manganese	0.5	0.48	0.48	0.48	96	75-125	0.0	20
Nickel	0.5	0.48	0.48	0.48	96	75-125	0.0	20
Potassium	100	96.8	96.6	96.7	97	75-125	0.2	20
Selenium	0	NA	NA	NC	NC	75-125	NC	20
Silver	0.05	0.046	0.046	0.046	92	75-125	0.0	20
Sodium	100	100	100	100	100	75-125	0.0	20
Thallium	0	NA	NA	NC	NC	75-125	NC	20
Tin	0.4	0.41	0.42	0.42	104	75-125	2.4	20
Vanadium	0.5	0.48	0.47	0.48	95	75-125	2.1	20
Zinc	0.5	0.48	0.48	0.48	96	75-125	0.0	20
Category: CR-FLAA-AT								
Matrix: AQUEOUS								
QC Lot: 20 JUN 89-A								
Concentration Units: mg/L								
Chromium	2.0	2.1	2.0	2.1	103	75-125	4.4	20

ND = Not detected
NC = Not calculated, calculation not applicable
NA = Not applicable

Calculations are performed before rounding to avoid round-off errors in calculated results.

METHOD BLANK REPORT
Metals Analysis and Preparation

Analyte	Result	Units	Reporting Limit
Test: AS-FAA-AT			
Matrix: AQUEOUS			
QC Lot: 20 JUN 89-A QC Run: 20 JUN 89-A			
Arsenic	ND	mg/L	0.005
Test: PB-FAA-AT			
Matrix: AQUEOUS			
QC Lot: 20 JUN 89-A QC Run: 20 JUN 89-A			
Lead	ND	mg/L	0.005
Test: ICP-AT			
Matrix: AQUEOUS			
QC Lot: 20 JUN 89-A QC Run: 20 JUN 89-A			
Aluminum	ND	mg/L	0.1
Barium	ND	mg/L	0.01
Boron	0.03	mg/L	0.02
Cadmium	ND	mg/L	0.005
Calcium	ND	mg/L	0.2
Cobalt	ND	mg/L	0.01
Copper	ND	mg/L	0.01
Iron	ND	mg/L	0.1
Magnesium	ND	mg/L	0.2
Manganese	ND	mg/L	0.01
Molybdenum	ND	mg/L	0.02
Nickel	ND	mg/L	0.04
Potassium	ND	mg/L	5
Selenium	ND	mg/L	0.2
Silica as SiO2	0.2	mg/L	0.2
Silver	ND	mg/L	0.01
Sodium	ND	mg/L	5
Test: CR-FLAA-AT			
Matrix: AQUEOUS			
QC Lot: 20 JUN 89-A QC Run: 20 JUN 89-A			
Chromium	ND	mg/L	0.05

QC LOT ASSIGNMENT REPORT
Wet Chemistry Analysis and Preparation

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
005347-0001-SA	AQUEOUS	NH3-A	20 JUN 89-A	
005347-0001-SA	AQUEOUS	TDS-S	20 JUN 89-A	20 JUN 89-A
005347-0001-SA	AQUEOUS	ALK-A	16 JUN 89-B	
005347-0001-SA	AQUEOUS	CL-A	20 JUN 89-B	
005347-0001-SA	AQUEOUS	SO4-A	20 JUN 89-B	
005347-0001-SA	AQUEOUS	F-A	28 JUN 89-A	
005347-0001-SA	AQUEOUS	COND-A	16 JUN 89-B	
005347-0001-SA	AQUEOUS	PH-A	16 JUN 89-C	
005347-0001-SA	AQUEOUS	NO3-A	19 JUN 89-A	
005347-0001-SA	AQUEOUS	NO2-A	16 JUN 89-A	
005347-0001-SA	AQUEOUS	TKN-A	20 JUN 89-A	20 JUN 89-A
005347-0002-SA	AQUEOUS	NH3-A	20 JUN 89-A	
005347-0002-SA	AQUEOUS	TDS-S	20 JUN 89-A	20 JUN 89-A
005347-0002-SA	AQUEOUS	ALK-A	16 JUN 89-B	
005347-0002-SA	AQUEOUS	CL-A	20 JUN 89-B	
005347-0002-SA	AQUEOUS	SO4-A	20 JUN 89-B	
005347-0002-SA	AQUEOUS	F-A	28 JUN 89-A	
005347-0002-SA	AQUEOUS	COND-A	16 JUN 89-B	
005347-0002-SA	AQUEOUS	PH-A	16 JUN 89-C	
005347-0002-SA	AQUEOUS	NO3-A	19 JUN 89-A	
005347-0002-SA	AQUEOUS	NO2-A	16 JUN 89-A	
005347-0002-SA	AQUEOUS	TKN-A	20 JUN 89-A	20 JUN 89-A
005347-0003-SA	AQUEOUS	NH3-A	20 JUN 89-A	
005347-0003-SA	AQUEOUS	TDS-S	20 JUN 89-A	20 JUN 89-A
005347-0003-SA	AQUEOUS	ALK-A	16 JUN 89-B	
005347-0003-SA	AQUEOUS	CL-A	20 JUN 89-B	
005347-0003-SA	AQUEOUS	SO4-A	20 JUN 89-B	
005347-0003-SA	AQUEOUS	F-A	28 JUN 89-A	
005347-0003-SA	AQUEOUS	COND-A	16 JUN 89-B	
005347-0003-SA	AQUEOUS	PH-A	16 JUN 89-C	
005347-0003-SA	AQUEOUS	NO3-A	19 JUN 89-A	
005347-0003-SA	AQUEOUS	NO2-A	16 JUN 89-A	
005347-0003-SA	AQUEOUS	TKN-A	20 JUN 89-A	20 JUN 89-A

DUPLICATE CONTROL SAMPLE REPORT
Wet Chemistry Analysis and Preparation

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	Measured AVG	Accuracy Average(%) DCS	Accuracy Average(%) Limits	Precision (RPD) DCS	Precision (RPD) Limit
Category: NH3-A Matrix: AQUEOUS QC Lot: 20 JUN 89-A Concentration Units: mg/L								
Ammonia as N	8.0	7.70	7.60	7.65	96	93-107	1.3	10
Category: TDS-S Matrix: AQUEOUS QC Lot: 20 JUN 89-A Concentration Units: mg/L								
Total Dissolved Solids	1410	1380	1320	1350	96	90-110	4.4	10
Category: ALK-A Matrix: AQUEOUS QC Lot: 16 JUN 89-B Concentration Units: mg/L								
Alkalinity, Total as CaCO3 at pH 4.5	133	129	130	130	97	90-110	0.8	10
Category: CL-A Matrix: AQUEOUS QC Lot: 20 JUN 89-B Concentration Units: mg/L								
Chloride	100	99.6	104	102	102	92-108	4.3	10
Category: SO4-A Matrix: AQUEOUS QC Lot: 20 JUN 89-B Concentration Units: mg/L								
Sulfate	200	201	210	206	103	93-107	4.4	15

Calculations are performed before rounding to avoid round-off errors in calculated results.

DUPLICATE CONTROL SAMPLE REPORT
Wet Chemistry Analysis and Preparation (cont.)

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	Measured AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision Limit
Category: F-A Matrix: AQUEOUS QC Lot: 28 JUN 89-A Concentration Units: mg/L								
Fluoride	14.1	13.6	13.7	13.6	97	88-112	0.7	15
Category: COND-A Matrix: AQUEOUS QC Lot: 16 JUN 89-B Concentration Units: umhos/cm								
Specific Conductance at 25 deg.C	1860	1920	1850	1880	101	95-105	3.7	5
Category: PH-A Matrix: AQUEOUS QC Lot: 16 JUN 89-C Concentration Units: units								
pH	9.1	9.02	9.03	9.02	99	98-102	0.1	5
Category: NO3-A Matrix: AQUEOUS QC Lot: 19 JUN 89-A Concentration Units: mg/L								
Nitrate as N	5.4	5.20	5.34	5.27	98	91-109	2.7	10
Category: NO2-A Matrix: AQUEOUS QC Lot: 16 JUN 89-A Concentration Units: mg/L								
Nitrite as N	0.10	0.0990	0.0980	0.0985	99	90-110	1.0	10

Calculations are performed before rounding to avoid round-off errors in calculated results.

DUPLICATE CONTROL SAMPLE REPORT
Wet Chemistry Analysis and Preparation (cont.)

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	Measured AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision Limit
Category: TKN-A Matrix: AQUEOUS QC Lot: 20 JUN 89-A Concentration Units: mg/L								
Total Kjeldahl Nitrogen as N	4.6	3.66	3.77	3.72	81	78-122	3.0	20

Calculations are performed before rounding to avoid round-off errors in calculated results.

METHOD BLANK REPORT
Wet Chemistry Analysis and Preparation

Analyte	Result	Units	Reporting Limit
Test: TDS-BAL-A Matrix: AQUEOUS QC Lot: 20 JUN 89-A QC Run: 20 JUN 89-A			
Total Dissolved Solids	ND	mg/L	10
Test: TKN-TEC-A Matrix: AQUEOUS QC Lot: 20 JUN 89-A QC Run: 20 JUN 89-A			
Total Kjeldahl Nitrogen as N	ND	mg/L	0.5

Analytical Methodology

Enseco - Rocky Mountain Analytical Laboratory performs analytical services according to methods approved by EPA and other regulatory agencies, whenever possible.

Methods for metals and organic compounds are primarily derived from three sources of EPA methods, 1) the methods promulgated in 40 CFR 136 for priority pollutants, 2) the methods published in SW-846 and 3) methods developed by the EPA-EMSL/LV for Superfund investigations, as well as several documents published by the EPA and Enseco - Rocky Mountain Analytical Laboratory in 1984 and 1985. These methods all use the same generic technology as summarized below:

- Metals: acid digestion followed by analyses by ICP supported by graphite furnace AA
- Volatile Organics: purge and trap GC/MS or purge and trap GC with a selective detector.
- Semivolatile (base/neutral and acid) organics: solvent extraction followed by capillary column GC/MS, and
- Pesticides/Herbicides: solvent extraction, followed by gas chromatography.

Exact method references are provided in the Analytical Methodology Tables.

ANALYTICAL METHODOLOGY - ORGANIC TESTS

Test	Description	Methodology	Reference
VOA	Volatile Organics	Purge & Trap, GC/MS	624(1)/8240(2)
BNA	Semivolatile Organics	Extraction, GC/MS	625(1)/8270(2)
DXN	Dioxin	Extraction, GC/MS	613(1)/8280(2)
601	Halogenated Volatile Organics	Purge & Trap GC/Hall	601(1)/8010(2)
THM	Trihalomethanes	Purge & Trap GC/Hall	601(1)/8010(2)
602	Aromatic Volatile Organics	Purge & Trap GC/PID	602(1)/8020(2)
OCP	Organochlorine Pesticides	Extraction, GC/ECD	608(1)/8080(2)
OPP	Organophosphate Pesticides	Extraction, GC/FPD	614(1)/8140(2)
619	Triazine Pesticides	Extraction, GC/NPD	619(1)
LC CARB	Carbamate and Urea Pesticides	Extraction, HPLC	632(1)
PCB	PCB's	Extraction, GC/ECD	608(1)/8080(2)
HRB	Phenoxyacid Herbicides	Extraction, GC/ECD	615(1)/8150(2)
603	Acrolein & Acrylonitrile	Purge & Trap GC/FID	603(1)/8030(2)
604	Phenols	Extraction, GC/FID	604(1)/8040(2)
605	Benzidines	Extraction, HPLC	605(1)/8050(2)
606	Phthalate Esters	Extraction, GC/FID	606(1)/8060(2)
607	Nitrosamines	Extraction, GC/NPD	607(1)
609	Nitroaromatics & Cyclic Ketones	Extraction, GC/NPD	609(1)/8090(2)
PNA	Polynuclear Aromatic Hydrocarbons	Extraction, HPLC	610(1)/8310(2)
611	Haloethers	Extraction, GC/ECD	611(1)
612	Chlorinated Hydrocarbons	Extraction, GC/ECD	612(1)/8120(2)
GD FID	Hydrocarbon Scan	Extraction, GC/FID	D3328-78(3)
GC BPD	Boiling Point Determination	Extraction, GC/FID	D2887-84(4)

References

(1) Code of Federal Regulations, Chapter 40, Part 136 (40 CFR 136).
(2) SW-846, 3rd Edition, 1986.
(3) "Annual Book of ASTM Standards", Volume 11.01, 1985.
(4) "Annual Book of ASTM Standards", Volume 05.02, 1984.

ANALYTICAL METHODOLOGY - INORGANIC TESTS

Test	Description	Methodology	Reference
ICP	Trace Metals	ICP Emission Spectroscopy	200.7(1)/6010(2)
FSB	Antimony	Furnace Atomic Absorption	204.2(1)/7041(2)
FAS	Arsenic	Furnace Atomic Absorption	206.2(1)/7060(2)
FCD	Cadmium	Furnace Atomic Absorption	213.2(1)/7131(2)
FPB	Lead	Furnace Atomic Absorption	239.2(1)/7421(2)
FSE	Selenium	Furnace Atomic Absorption	270.2(1)/7740(2)
FAG	Silver	Furnace Atomic Absorption	272.2(1)/7761(2)
FTL	Thallium	Furnace Atomic Absorption	279.2(1)/7841(2)
CVHG	Mercury	Cold Vapor Atomic	245.1(1)/7471(2)
CR + 6	Chromium (VI)	Colorimetric	312B(3)
IC CL	Chloride	Ion Chromatography	300.0(1)
BURCL	Chloride	Manual Titrimetric	325.3(1)
METF	Fluoride	Electrode	340.2(1)
IC SO4	Sulfate	IC	300.0(1)
SPESO4	Sulfate	Manual Turbidimetric	375.4(1)
METALK	Alkalinity, Total	Titrimetric	310.1(1)
METACK	Alkalinity, Forms	Titrimetric	403(3)
TECNOXT	Nitrate+Nitrite as N	Cd Reduction Colorimetric	353.2(1)
METPH	pH	Meter	150.1(1)/9045(2)
CELSP	Specific Conductance at 25°C	Bridge	120.1(1)
BALTDS	Total Dissolved Solids	Gravimetric, 180°C	160.1(1)
BALTSS	Total Suspended Solids	Gravimetric, 105°C	160.2(1)
BALTS	Total Solids	Gravimetric, 105°C	160.3(1)
BALTVS	Total Volatile Solids	Gravimetric, 550°C	160.4(1)
TECO P	Ortho-Phosphate as P	Two Reagent Colorimetric	365.3(1)
TECT P	Total Phosphorus as P	Digestion-Colorimetric	365.3(1)
ICP	Total Phosphorus as P	Digestion-ICP/AES	200.7(1)
ICP	Silica as SiO_2	ICP/AES	200.7(1)
SPESIO2	Silica as SiO_2	Colorimetric	370.1(1)
METBOD	Biochemical Oxygen Demand	Dilution Bottle-D.O. probe	405.1(1)
METCOD	Chemical Oxygen Demand	Micro Colorimetric	410.4(1)
TOCTOC	Total Organic Carbon	UV Oxidation-IR	415.2(1)
METNH3	Ammonia as N	Electrode	350.3(1)
TECNH3	Ammonia as N	Automated Colorimetric	350.1(1)
METTKN	Total Kjeldahl Nitrogen as N	Digestion-Electrode	351.4(1)
TECTKN	Total Kjeldahl Nitrogen as N	Digestion-Colorimetric	351.2(1)
TOXTOX	Total Organic Halogen	Combustion-Titrimetric	9020(2)
TONO1	Total Organic Nitrogen	Calculation (TKN-NH_3)	-
BAL O&G	Oil and Grease	Freon Extraction-Gravimetric	413.1(1)
IR AO&G	Oil and Grease	Freon Extraction-IR	413.2(1)
TECCN F	Cyanide Amendable to Chlorination	Chlorination-Distillation-Colorimetric	335.1(1)
TECCN W	Weak & Dissolved Cyanide	Distillation-Colorimetric	412H(3)
TECCN T	Total Cyanide	Distillation-Colorimetric	335.2(1)/9010(2)
STEPHEN	Phenolics	Distillation-Colorimetric	420.1(1)
COLIF F	Fecal Coliform	Membrane Filter	909C(3)
COLIF T	Total Coliform	Membrane Filter	909A(3)

ANALYTICAL METHODOLOGY - INORGANIC TESTS (CONT.)

Test	Description	Methodology	Reference
IC BR	Bromide	Ion Chromatography	300.0(1)
POTCL2R	Residual Chlorine	Amperometric	330.2(1)
NESCOLR	Color	Pt-Co Colorimetric	110.2(1)
ICPHAR	Hardness as $CaCo_3$	Calculation	200.7(1)/314A(3)
TECNO2	Nitrite as N	Colorimetric	354.1(1)
SPES	Sulfide	Colorimetric	376.2(1)/9030(2)
BURSO3	Sulfite	Titrimetric	377.1(1)
SPEMBAS	MBAS (Surfactants)	Colorimetric	425.1(1)
SPETURB	Turbidity	Turbidimeter	180.1(1)
Gross Alpha		Proportional Counter	703(3)
Gross Beta		Proportional Counter	703(3)
Radium 226		Separation - Counter	705(3)
Radium 228		Separation - Counter	707(3)
Uranium		Fluorimetric	D2907.75(4)

References

(1) *Code of Federal Regulations, Chapter 40, Part 136 (40 CFR 136).*
(2) SW-846, 3rd Edition, 1986.
(3) "Standard Methods for the Examination of Water and Wastewater", 16th Edition, 1985.
(4) "Annual Book of ASTM Standards", Part 31, Water, 1980.

DATE: 8/18/89 REVISED:	APPENDIX B	PAGE 1 of 3

MSDS SHEETS FOR CHEMICALS USED ON-SITE

DATE: 8/18/89 REVISED:	APPENDIX B	PAGE 2 of 3

Material Safety Data Sheets that are attached include:

A. BULK CHEMICALS

Ashland 140 Solvent
Diethanolamine LFG
Diethanolamine Low Freezing Grade
Diethanolamine 85%
Methyl Alcohol
Regular Unleaded Gasoline
Silica 2
Triethylene Glycol
Triethylene Glycol - Technical

B. WATER TREATMENT

BLR-3152
BLR-3430
BLR-3570
Calcium Hypochlorite
Conductor 5721 Cooling Water Products
Dow Corning Antifoam 1410
H-300 Microbiocide
H-5228
Hercules 3152
Hercules 3430 Boiler Water Treatment
Hercules 3545 Boiler Water Treatment
Hercules 5203 Microbiocidal Compound
Hth Dry Chlorinating Compound
Sodium Chloride
Sodium Hydroxide
Sodium Nitrite
Sulfuric Acid
Ultramine 130

C. SHOP

Oakrite 32
Safety-Kleen Solvent
Neosol Proprietary Solvent

D. OILS

Chevron Delo 400 Motor Oil SAE 30
00701 Regal Oil R&O 46
01658 Rando Oil HD 46

DATE: 8/18/89 REVISED:	APPENDIX B	PAGE 3 of 3

D. OILS (CONT'D)

01841 ATF Dextron II
01891 Geotex LA SAE 30
02321 Meropa 220
0-2353 Texaco Anti-Freeze Coolant

E. LAB

Hardness Indicator Powder
Hercules Sulfite Indicator Powder
Low Hardness Indicator Powder
Mixed Indicator
Nitrite Reagent No. 1
Nitrite Reagent No. 2
Phenolphthalein Indicator, Code 212
Potassium Iodide - Iodate, 0.0125N Solution
Starch Indicator Solution
Sulfite Indicator with Plastic Dipper

F. PROCESS CHEMICALS

Benzene
Condensate, Hydrocarbon C6-C30
Corexit 76669 Antifoam
Hydrogen Sulfide
Natural Gas - Dry
Natural Gas - Raw Mixed Liquid
Petroleum Crude Oil
Sulfur

G. MISCELLANEOUS

Wasp and Hornet Spray

THIS MSDS COMPLIES WITH 29 CFR 1910.1200 (THE HAZARD COMMUNICATION STANDARD)

****

Product Name: SOLVENT 140 NONEXEMPT
CAS NUMBER: 64742-88-7

Data Sheet No: 0000596-003
Prepared: 03/04/86
Supersedes: 10/01/85

QUEEN OIL & GAS CO INC
PO BOX 959
CARLSBAD NM 88220

ATTN: PLANT MGR./SAFETY DIR.

05 50 039 7364680-001

PRODUCT: 2612000
INVOICE: 020981
INVOICE DATE: 01/10/89
TO: QUEEN OIL & GAS CO INC
606 W. RICHEY
ARTESIA NM 88210

SECTION I-PRODUCT IDENTIFICATION

General or Generic ID: ALIPHATIC HYDROCARBON

DOT Hazard Classification: COMBUSTIBLE (173.115)

SECTION II-COMPONENTS

IF PRESENT, IARC, NTP AND OSHA CARCINOGENS AND CHEMICALS SUBJECT TO THE REPORTING REQUIREMENTS OF SARA TITLE III SECTION 313 ARE IDENTIFIED IN THIS SECTION.
SEE DEFINITION PAGE FOR CLARIFICATION

INGREDIENT	% (by WT)	PEL	TLV	Note
ALIPHATIC PETROLEUM DISTILLATES CAS #: 64742-88-7	100	500 PPM	100 PPM	(1)

Notes:

(1) NIOSH RECOMMENDS A LIMIT OF 350 MG/CUM - 8 HOUR TIME WEIGHTED AVERAGE, 1800 MG/CUM AS DETERMINED BY A 15 MINUTE SAMPLE.

SECTION III-PHYSICAL DATA

Boiling Point	for PRODUCT	355.00 Deg F (179.44 Deg C) @ 760.00 mm Hg
Vapor Pressure	for PRODUCT	0.50 mm Hg @ 68.00 Deg F (20.00 Deg C)
Specific Vapor Density	AIR = 1	5.4
Specific Gravity		.780 @ 60.00 Deg F (15.55 Deg C)
Percent Volatiles		100.00%
Evaporation Rate	(ETHER = 1)	151.00

SECTION IV-FIRE AND EXPLOSION INFORMATION

FLASH POINT 140.0 Deg F (60.0 Deg C)

EXPLOSIVE LIMIT (PRODUCT) LOWER - 1.0%

EXTINGUISHING MEDIA: REGULAR FOAM OR CARBON DIOXIDE OR DRY CHEMICAL

HAZARDOUS DECOMPOSITION PRODUCTS: MAY FORM TOXIC MATERIALS:, CARBON DIOXIDE AND CARBON MONOXIDE, VARIOUS HYDROCARBONS, ETC.

FIREFIGHTING PROCEDURES: WEAR SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACEPIECE OPERATED IN THE POSITIVE PRESSURE DEMAND MODE WHEN FIGHTING FIRES.

SPECIAL FIRE & EXPLOSION HAZARDS: VAPORS ARE HEAVIER THAN AIR AND MAY TRAVEL ALONG THE GROUND OR BE MOVED BY VENTILATION AND IGNITED BY HEAT, PILOT LIGHTS, OTHER FLAMES AND IGNITION SOURCES AT LOCATIONS DISTANT FROM MATERIAL HANDLING POINT.

NEVER USE WELDING OR CUTTING TORCH ON OR NEAR DRUM (EVEN EMPTY) BECAUSE PRODUCT (EVEN JUST RESIDUE) CAN IGNITE EXPLOSIVELY.

SECTION V-HEALTH HAZARD DATA

PERMISSIBLE EXPOSURE LEVEL 500 PPM

THRESHOLD LIMIT VALUE 100 PPM

EFFECTS OF ACUTE OVEREXPOSURE: FOR PRODUCT

EYES - CAN CAUSE SEVERE IRRITATION, REDNESS, TEARING, BLURRED VISION.
SKIN - PROLONGED OR REPEATED CONTACT CAN CAUSE MODERATE IRRITATION, DEFATTING, DERMATITIS.
BREATHING - EXCESSIVE INHALATION OF VAPORS CAN CAUSE NASAL AND RESPIRATORY IRRITATION, CENTRAL NERVOUS SYSTEM EFFECTS INCLUDING DIZZINESS, WEAKNESS, FATIGUE, NAUSEA, HEADACHE AND POSSIBLE UNCONSCIOUSNESS, AND EVEN DEATH.
SWALLOWING - CAN CAUSE GASTROINTESTINAL IRRITATION, NAUSEA, VOMITING, AND DIARRHEA. ASPIRATION OF MATERIAL INTO THE LUNGS CAN CAUSE CHEMICAL PNEUMONITIS WHICH CAN BE FATAL.

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CONTINUED ON PAGE: 2

SECTION V-HEALTH HAZARD DATA (Continued)

FIRST AID:

IF ON SKIN: THOROUGHLY WASH EXPOSED AREA WITH SOAP AND WATER. REMOVE CONTAMINATED CLOTHING. LAUNDER CONTAMINATED CLOTHING BEFORE RE-USE.

IF IN EYES: FLUSH WITH LARGE AMOUNTS OF WATER, LIFTING UPPER AND LOWER LIDS OCCASIONALLY, GET MEDICAL ATTENTION.

IF SWALLOWED: DO NOT INDUCE VOMITING, KEEP PERSON WARM, QUIET, AND GET MEDICAL ATTENTION. ASPIRATION OF MATERIAL INTO THE LUNGS DUE TO VOMITING CAN CAUSE CHEMICAL PNEUMONITIS WHICH CAN BE FATAL.

IF BREATHED: IF AFFECTED, REMOVE INDIVIDUAL TO FRESH AIR. IF BREATHING IS DIFFICULT, ADMINISTER OXYGEN. IF BREATHING HAS STOPPED GIVE ARTIFICIAL RESPIRATION. KEEP PERSON WARM, QUIET AND GET MEDICAL ATTENTION.

PRIMARY ROUTE(S) OF ENTRY:

INHALATION, SKIN CONTACT

SECTION VI-REACTIVITY DATA

HAZARDOUS POLYMERIZATION: CANNOT OCCUR

STABILITY: STABLE

INCOMPATIBILITY: AVOID CONTACT WITH:, STRONG OXIDIZING AGENTS.

SECTION VII-SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED:

SMALL SPILL: ABSORB LIQUID ON PAPER, VERMICULITE, FLOOR ABSORBENT, OR OTHER ABSORBENT MATERIAL AND TRANSFER TO HOOD.

LARGE SPILL: ELIMINATE ALL IGNITION SOURCES (FLARES, FLAMES INCLUDING PILOT LIGHTS, ELECTRICAL SPARKS). PERSONS NOT WEARING PROTECTIVE EQUIPMENT SHOULD BE EXCLUDED FROM AREA OF SPILL UNTIL CLEAN-UP HAS BEEN COMPLETED. STOP SPILL AT SOURCE, DIKE AREA OF SPILL TO PREVENT SPREADING, PUMP LIQUID TO SALVAGE TANK. REMAINING LIQUID MAY BE TAKEN UP ON SAND, CLAY, EARTH, FLOOR ABSORBENT, OR OTHER ABSORBENT MATERIAL AND SHOVELED INTO CONTAINERS.

PREVENT RUN-OFF TO SEWERS, STREAMS OR OTHER BODIES OF WATER. IF RUN-OFF OCCURS, NOTIFY PROPER AUTHORITIES AS REQUIRED, THAT A SPILL HAS OCCURED.

WASTE DISPOSAL METHOD:

SMALL SPILL: ALLOW VOLATILE PORTION TO EVAPORATE IN HOOD. ALLOW SUFFICIENT TIME FOR VAPORS TO COMPLETELY CLEAR HOOD DUCT WORK. DISPOSE OF REMAINING MATERIAL IN ACCORDANCE WITH APPLICABLE REGULATIONS.

LARGE SPILL: DESTROY BY LIQUID INCINERATION.

CONTAMINATED ABSORBENT MAY BE DEPOSITED IN A LANDFILL IN ACCORDANCE WITH LOCAL, STATE AND FEDERAL REGULATIONS.

SECTION VIII-PROTECTIVE EQUIPMENT TO BE USED

RESPIRATORY PROTECTION: IF WORKPLACE EXPOSURE LIMIT(S) OF PRODUCT OR ANY COMPONENT IS EXCEEDED (SEE SECTION II), A NIOSH/MSHA APPROVED AIR SUPPLIED RESPIRATOR IS ADVISED IN ABSENCE OF PROPER ENVIRONMENTAL CONTROL. OSHA REGULATIONS ALSO PERMIT OTHER NIOSH/MSHA RESPIRATORS (NEGATIVE PRESSURE TYPE) UNDER SPECIFIED CONDITIONS (SEE YOUR SAFETY EQUIPMENT SUPPLIER). ENGINEERING OR ADMINISTRATIVE CONTROLS SHOULD BE IMPLEMENTED TO REDUCE EXPOSURE.

VENTILATION: PROVIDE SUFFICIENT MECHANICAL (GENERAL AND/OR LOCAL EXHAUST) VENTILATION TO MAINTAIN EXPOSURE BELOW TLV(S).

PROTECTIVE GLOVES: WEAR RESISTANT GLOVES SUCH AS:, NITRILE RUBBER

EYE PROTECTION: CHEMICAL SPLASH GOGGLES IN COMPLIANCE WITH OSHA REGULATIONS ARE ADVISED; HOWEVER, OSHA REGULATIONS ALSO PERMIT OTHER TYPE SAFETY GLASSES. (CONSULT YOUR SAFETY EQUIPMENT SUPPLIER)

OTHER PROTECTIVE EQUIPMENT: TO PREVENT REPEATED OR PROLONGED SKIN CONTACT, WEAR IMPERVIOUS CLOTHING AND BOOTS.

SECTION IX-SPECIAL PRECAUTIONS OR OTHER COMMENTS

CONTAINERS OF THIS MATERIAL MAY BE HAZARDOUS WHEN EMPTIED.SINCE EMPTIED CONTAINERS RETAIN PRODUCT RESIDUES (VAPOR, LIQUID, AND/OR SOLID), ALL HAZARD PRECAUTIONS GIVEN IN THE DATA SHEET MUST BE OBSERVED.

THE INFORMATION ACCUMULATED HEREIN IS BELIEVED TO BE ACCURATE BUT IS NOT WARRANTED TO BE WHETHER ORIGINATING WITH THE COMPANY OR NOT. RECIPIENTS ARE ADVISED TO CONFIRM IN ADVANCE OF NEED THAT THE INFORMATION IS CURRENT, APPLICABLE, AND SUITABLE TO THEIR CIRCUMSTANCES.

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P. O. BOX 2219, COLUMBUS, OHIO 43216 • (614) 889-3333

24-HOUR EMERGENCY TELEPHONE (606) 324-1133

Ashland

DEFINITIONS

This definition page is intended for use with Material Safety Data Sheets supplied by the Ashland Chemical Company. Recipients of these data sheets should consult the OSHA Safety and Health Standards (29 CFR 1910), particularly subpart G - Occupational Health and Environmental Control, and subpart I - Personal Protective Equipment, for general guidance on control of potential Occupational Health and Safety Hazards.

SECTION I
PRODUCT IDENTIFICATION

GENERAL OR GENERIC ID: Chemical family or product description.

DOT HAZARD CLASSIFICATION: Product meets DOT criteria for hazards listed.

SECTION II
COMPONENTS

Components are listed in this section if they present a physical or health hazard and are present at or above 1% in the mixture. If a component is identified as a CARCINOGEN by NTP, IARC or OSHA as of the date on the MSDS, it will be listed and footnoted in this section when present at or above 0.1% in the product. Negative conclusions concerning carcinogenicity are not reported. Additional health information may be found in Section V. Components subject to the reporting requirements of Section 313 of SARA Title III are identified in the footnotes in this section, along with typical percentages. Other components may be listed if deemed appropriate.

Exposure recommendations are for components. OSHA Permissible Exposure Limits (PELs) and American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLVs) appear on the line with the component identification. Other recommendations appear as footnotes.

SECTION III
PHYSICAL DATA

BOILING POINT: Of product if known. The lowest value of the components is listed for mixtures.

VAPOR PRESSURE: Of product if known. The highest value of the components is listed for mixtures.

SPECIFIC VAPOR DENSITY: Compared to AIR = 1. If Specific Vapor Density of product is not known, the value is expressed as lighter or heavier than air.

SPECIFIC GRAVITY: Compared to WATER = 1. If Specific Gravity of product is not known, the value is expressed as less than or greater than water.

pH: If applicable.

PERCENT VOLATILES: Percentage of material with initial boiling point below 425 degrees Fahrenheit.

EVAPORATION RATE: Indicated as faster or slower than ETHYL ETHER, unless otherwise stated.

SECTION IV
FIRE AND EXPLOSION DATA

FLASH POINT: Method identified.

EXPLOSION LIMITS: For product if known. The lowest value of the components is listed for mixtures.

HAZARDOUS DECOMPOSITION PRODUCTS: Known or expected hazardous products resulting from heating, burning or other reactions.

SECTION IV (cont.)

EXTINGUISHING MEDIA: Following National Fire Protection Association criteria.

FIREFIGHTING PROCEDURES: Minimum equipment to protect firefighters from toxic products of vaporization, combustion or decomposition in fire situations. Other firefighting hazards may also be indicated.

SPECIAL FIRE AND EXPLOSION HAZARDS: States hazards not covered by other sections.

NFPA CODES: Hazard ratings assigned by the National Fire Protection Association.

SECTION V
HEALTH HAZARD DATA

PERMISSIBLE EXPOSURE LIMIT: For product.

THRESHOLD LIMIT VALUE: For product.

EFFECTS OF ACUTE OVEREXPOSURE: Potential local and systemic effects due to single or short term overexposure to the eyes and skin or through inhalation or ingestion.

EFFECTS OF CHRONIC OVEREXPOSURE: Potential local and systemic effects due to repeated or long term overexposure to the eyes and skin or through inhalation or ingestion.

FIRST AID: Procedures to be followed when dealing with accidental overexposure.

PRIMARY ROUTE OF ENTRY: Based on properties and expected use.

SECTION VI
REACTIVITY DATA

HAZARDOUS POLYMERIZATION: Conditions to avoid to prevent hazardous polymerization resulting in a large release of energy.

STABILITY: Conditions to avoid to prevent hazardous or violent decomposition.

INCOMPATIBILITY: Materials and conditions to avoid to prevent hazardous reactions.

SECTION VII
SPILL OR LEAK PROCEDURES

Reasonable precautions to be taken and methods of containment, clean-up and disposal. Consult federal, state and local regulations for accepted procedures and any reporting or notification requirements.

SECTION VIII
PROTECTIVE EQUIPMENT TO BE USED

Protective equipment which may be needed when handling the product.

SECTION IX
SPECIAL PRECAUTIONS OR OTHER COMMENTS

Covers any relevant points not previously mentioned.

ADDITIONAL COMMENTS

Containers should be either reconditioned by CERTIFIED firms or properly disposed of by APPROVED firms. Disposal of containers should be in accordance with applicable laws and regulations. "EMPTY" drums should not be given to individuals. Serious accidents have resulted from the misuse of "EMPTIED" containers (drums, pails, etc.). Refer to Sections IV and IX.

PRODUCT NAME: DIETHANOLAMINE LFG
MSDS NO: 117DOW001

THE FOLLOWING INFORMATION IS FURNISHED SUBJECT TO THE DISCLAIMER ON THE BOTTOM OF THIS FORM

SECTION 1 - PRODUCT IDENTIFICATION

PRODUCT NAME: DIETHANOLAMINE LFG

SYNONYMS:
DIETHANOLAMINE LFG;

MANUFACTURER / DISTRIBUTOR:
DOW CHEMICAL U.S.A.
MIDLAND
MICHIGAN
48674

EMERGENCY PHONE NUMBERS:
(419) 422-2121 (MARATHON)
(800) 424-9300 (CHEMTREC)

CHEMICAL FAMILY:
CHEMICAL FORMULA:
CAS NO:

SECTION 2 - PHYSICAL PROPERTIES

BOILING POINT
514 F
C

MELTING POINT
-37 F
C

SPECIFIC GRAVITY(H2O=1)

% SOLUBILITY IN WATER
COMPLETELY

VAPOR DENSITY(AIR=1)
> 1

VAPOR PRESSURE

PH INFORMATION: PH: AT CONC.
APPEARANCE: LIQUID ODOR:

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT
342 PMCC F
C

AUTOIGNITION TEMP
F
C

EXPLOSIVE LIMITS (% BY VOLUME IN AIR)
LOWER/UPPER:

NFPA CLASS -- HEALTH: FIRE: REACTIVITY: OTHER:

SPECIFIC HAZARD: NONE

FIRE AND EXPLOSION HAZARDS

WILL BURN BUT DOES NOT IGNITE EASILY. MAY DECOMPOSE IN HEAT/FIRE RELEASING PRODUCTS OF GREATER HAZARDS.

EXTINGUISHING MEDIA

SMALL FIRES - USE DRY CHEMICAL OR CARBON DIOXIDE
LARGE FIRES - USE WATER FOG OR SPRAY OR ALCOHOL FOAM. DIKE RUNNOFF.
PREVENT ENTRY INTO SEWERS OR NATURAL WATERS.

SPECIAL FIRE FIGHTING INSTRUCTIONS

COOL CONTAINERS EXPOSED TO HEAT/FIRE WITH WATER.
WEAR FULL TURN OUT CLOTHING AND SELF-CONTAINED BREATHING EQUIPMENT.

PRODUCT NAME: DIETHANOLAMINE LFG
MSDS NO: 117DOW001

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA (CON'T)

STABILITY: THE MATERIAL IS AT 70 F, 760MM PRESSURE
CONDITIONS TO AVOID:

HAZARDOUS DECOMPOSITION PRODUCTS:

INCOMPATIBLE MATERIALS:
BRASS, BRONZE AND COPPER ALLOYS

HAZARDOUS POLYMERIZATION:

SECTION 4 - PRODUCT COMPOSITION AND EXPOSURE LIMITS

EXPOSURE LIMITS FOR PRODUCT:	TLV	SOURCE
DIETHANOLAMINE LFG	NONE ESTABLISHED	

COMPONENTS:	PERCENT RANGE	TLV			SOURCE
DIETHANOLAMINE	84.00- 86.00	3.00	PPM	(8 HR TWA)	ACGIH
		3.00	PPM	(8 HR TWA)	OSHA
WATER	14.00- 16.00			( )	

SECTION 5 - POTENTIAL HEALTH EFFECTS

-------- ROUTES OF EXPOSURE AND EFFECTS - EYE ---------

MAY CAUSE SEVERE PAIN, IRRITATION AND INJURY.

-------- ROUTES OF EXPOSURE AND EFFECTS - SKIN --------

UP TO MODERATE IRRITATION, EVEN A BURN ON REPEATED CONTACT.

----- ROUTES OF EXPOSURE AND EFFECTS - INHALATION -----

VAPORS IRRITATING.

------ ROUTES OF EXPOSURE AND EFFECTS - INGESTION -----

LOW SINGLE DOSE ORAL TOXICITY.

---------- ADDITIONAL TOXICITY INFORMATION ----------

PRODUCT NAME: DIETHANOLAMINE LFG
MSDS NO: 117DOW001

SECTION 5 - POTENTIAL HEALTH EFFECTS (CON'T)

EMERGENCY FIRST AID PROCEDURES

---------- FIRST AID - EYE ----------

IRRIGATE WITH FLOWING WATER IMMEDIATELY AND CONTINUOUSLY FOR 15 MIN. REFER TO MEDICAL PERSONNEL.

---------- FIRST AID - SKIN ----------

IMMEDIATELY FLUSH WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES WHILE REMOVING CONTAMINATED CLOTHING. CALL A PHYSICIAN.

---------- FIRST AID - INHALATION ----------

REMOVE TO FRESH AIR IF EFFECTS OCCUR. CALL PHYSICIAN AND/OR TAKE TO A MEDICAL FACILITY.

SECTION 6 - SPECIAL PROTECTION INFORMATION

---------- VENTILATION ----------

------ PERSONAL PROTECTIVE EQUIPMENT - RESPIRATOR -----

HAVE RESPIRATOR AVAILABLE.

---------- PERSONAL PROTECTIVE EQUIPMENT - EYE -------

CHEMICAL WORKERS GOGGLES

-------- PERSONAL PROTECTIVE EQUIPMENT - GLOVES -------

RUBBER

---------- OTHER PROTECTIVE EQUIPMENT ----------

HARD HAT, RUBBER BOOTS.

PRODUCT NAME: DIETHANOLAMINE LFG
MSDS NO: 117DOW001

SECTION 7 - SPILL OR LEAK PROCEDURES

---------- ENVIRONMENTAL EFFECTS ----------

AVOID ENTRY INTO NATURAL WATERS. MAY CAUSE LOCALIZED FISH KILL.

- STEPS TO BE TAKEN IN CASE OF SPILL, LEAK OR RELEASE -

IRRITATING. KEEP UPWIND. ISOLATE AND ROPE OFF AREA. PREVENT PERSONAL CONTACT. DO NOT BREATHE VAPORS. NO SMOKING OR OPEN FLAMES. SHUT OFF IGNITION AND LEAK IF WITHOUT RISK. AVOID ENTRY INTO SEWERS OR NATURAL WATERS. USE NONCOMBUSTIBLE ABSORBENT OR SAND ON SMALL SPILLS AND SWEEP OR SCOOP INTO WASTE CONTAINERS. DIKE LARGER SPILLS AND RECOVER.
CLOTHING - WEAR FULL PROTECTIVE CLOTHING AND SELF-CONTAINED BREATHING EQUIPMENT.

---------- DISPOSAL METHODS ----------

CONTACT MANUFACTURER AND AUTHORITIES.

SECTION 8 - HANDLING AND STORAGE PRECAUTIONS

PREVENT PERSONAL CONTACT. DO NOT BREATHE VAPORS.

SECTION 9 - HAZARD WARNING

SECTION 10 - COMMENTS

SECTION 11 - REGULATORY INFORMATION

SECTION 12 - REGULATIONS/COMMENTS CONTINUED

INFORMATION SUPPLIED BY: COORDINATOR, TOXICOLOGY AND PRODUCT SAFETY
PHONE: ( ) -

MSDS DATE: 05/01/79 DATE OF PREVIOUS MSDS: / /

PRODUCT NAME: DIETHANOLAMINE LOW FREEZING GRADE
MSDS NO: 122DOW001

THE FOLLOWING INFORMATION IS FURNISHED SUBJECT TO THE DISCLAIMER ON THE BOTTOM OF THIS FORM

SECTION 1 - PRODUCT IDENTIFICATION

PRODUCT NAME: DIETHANOLAMINE LOW FREEZING GRADE

SYNONYMS:
DIETHANOLAMINE LOW FREEZING GRADE;
DIETHANOLAMINE, LOW FREEZING GRADE; LOW FREEZING GRADE, DIETHANOLAMINE

MANUFACTURER / DISTRIBUTOR:
DOW CHEMICAL U.S.A.
MIDLAND
MICHIGAN
48674

EMERGENCY PHONE NUMBERS:
(419) 422-2121 (MARATHON)
(800) 424-9300 (CHEMTREC)

CHEMICAL FAMILY:
CHEMICAL FORMULA:
CAS NO:

SECTION 2 - PHYSICAL PROPERTIES

BOILING POINT		MELTING POINT		SPECIFIC GRAVITY(H2O=1)
244	F	28	F	1.08@25/4C
118	C	-2	C	

% SOLUBILITY IN WATER	VAPOR DENSITY(AIR=1)	VAPOR PRESSURE
MISCIBLE	N/D	LOW

PH INFORMATION: PH: AT CONC.
APPEARANCE: COLORLESS LIQUID ODOR: SLIGHT AMMONIACAL

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT		AUTOIGNITION TEMP		EXPLOSIVE LIMITS (% BY VOLUME IN AIR)
NONE	F		F	LOWER/UPPER: N/D/N/D
	C		C	

NFPA CLASS -- HEALTH: FIRE: REACTIVITY: OTHER:

SPECIFIC HAZARD: NONE

---------- FIRE AND EXPLOSION HAZARDS ----------

N/A

---------- EXTINGUISHING MEDIA ----------

WATER FOG, ALCOHOL FOAM, CO2, DRY CHEMICAL

--------- SPECIAL FIRE FIGHTING INSTRUCTIONS ----------

WEAR SELF-CONTAINED, POSITIVE-PRESSURE BREATHING APPARATUS.

PRODUCT NAME: DIETHANOLAMINE LOW FREEZING GRADE
MSDS NO: 122DOW001

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA (CON'T)

STABILITY: THE MATERIAL IS STABLE AT 70 F, 760MM PRESSURE
CONDITIONS TO AVOID:
STABLE UNDER NORMAL STORAGE CONDITIONS

HAZARDOUS DECOMPOSITION PRODUCTS:
SEE COMMENTS

INCOMPATIBLE MATERIALS:
STRONG OXIDIZERS, STRONG ACIDS

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

HAZARDOUS DECOMPOSITION PRODUCTS: POSSIBLE NITROGEN OXIDES. THIS PRODUCT SHOULD NOT BE HEATED ABOVE 60C IN THE PRESENCE OF ALUMINUM DUE TO EXCESSIVE CORROSION AND POTENTIAL CHEMICAL REACTION RELEASING FLAMMABLE HYDROGEN GAS.

SECTION 4 - PRODUCT COMPOSITION AND EXPOSURE LIMITS

EXPOSURE LIMITS FOR PRODUCT:	TLV	SOURCE
DIETHANOLAMINE LOW FREEZING GRADE	NONE ESTABLISHED	

COMPONENTS:	PERCENT RANGE	TLV			SOURCE
DIETHANOLAMINE	85.00	3.00	PPM	(8 HR TWA)	ACGIH
		3.00	PPM	(8 HR TWA)	OSHA
WATER	15.00			( )	

PRODUCT NAME: DIETHANOLAMINE LOW FREEZING GRADE
MSDS NO: 122DOW001

SECTION 5 - POTENTIAL HEALTH EFFECTS

-------- ROUTES OF EXPOSURE AND EFFECTS - EYE ---------

MAY CAUSE SEVERE IRRITATION WITH CORNEAL INJURY.

-------- ROUTES OF EXPOSURE AND EFFECTS - SKIN --------

CONTACT: PROLONGED OR REPEATED EXPOSURE MAY CAUSE SKIN IRRITATION, EVEN A BURN. ABSORPTION: A SINGLE PROLONGED EXPOSURE IS NOT LIKELY TO RESULT IN THE MATERIAL BEING ABSORBED THROUGH SKIN IN HARMFUL AMOUNTS.

----- ROUTES OF EXPOSURE AND EFFECTS - INHALATION -----

AT ROOM TEMPERATURE, EXPOSURES TO VAPORS ARE UNLIKELY DUE TO PHYSICAL PROPERTIES; HIGHER TEMPERATURES MAY GENERATE VAPOR LEVELS SUFFICIENT TO CAUSE IRRITATION AND OTHER EFFECTS. EXCESSIVE EXPOSURE MAY CAUSE LIVER AND KIDNEY INJURY.

------ ROUTES OF EXPOSURE AND EFFECTS - INGESTION -----

AMOUNTS INGESTED INCIDENTIAL TO INDUSTRIAL HANDLING ARE NOT LIKELY TO CAUSE INJURY; HOWEVER INGESTION OF LARGER AMOUNTS MAY CAUSE INJURY.

SYSTEMIC AND OTHER EFFECTS: REPEATED EXCESSIVE EXPOSURES MAY CAUSE LIVER AND KIDNEY INJURY.

---------- ADDITIONAL TOXICITY INFORMATION ----------

RESULTS OF IN VITRO (TEST TUBE) MUTAGENICITY TESTS HAVE BEEN NEGATIVE. (FOR DIETHANOLAMINE).

ORAL LD50 FOR SKIN ABSORPTION IN RABBITS IS APPROXIMATELY 12,000 MG/KG (FOR DIETHANOLAMINE)

INGESTION: SINGLE DOES ORAL TOXICITY IS LOW. THE ORAL LD50 FOR RATS IS BETWEEN 710-1820 MG/KG (FOR DIETHANOLAMINE)

SKIN ABSORPTION: THE LD50 FOR SKIN ABSORPTION IN RABBITS IS APPROXIMATELY 12,000 MG/KG (FOR DIETHANOLAMINE).

PRODUCT NAME: DIETHANOLAMINE LOW FREEZING GRADE
MSDS NO: 122DOW001

SECTION 5 - POTENTIAL HEALTH EFFECTS (CON'T)

EMERGENCY FIRST AID PROCEDURES

FIRST AID - EYE

IRRIGATE WITH FLOWING WATER IMMEDIATELY AND CONTINUOUSLY FOR 15 MINUTES. CONSULT MEDICAL PERSONNEL.

FIRST AID - SKIN

WASH OFF IN FLOWING WATER OR SHOWER. REMOVE CONTAMINATED CLOTHING IMMEDIATELY AND WASH BEFORE REUSE. REMOVE AND DESTROY CONTAMINATED LEATHER ARTICLES, SUCH AS SHOES, BELTS, AND WATCHBANDS.

FIRST AID - INHALATION

REMOVE TO FRESH AIR IF EFFECTS OCCUR. CONSULT A PHYSICIAN.

FIRST AID - INGESTION

INDUCE VOMITING IF LARGE AMOUNTS ARE INGESTED. CONSULT MEDICAL PERSONNEL.

NOTE TO PHYSICIAN: IF BURN IS PRESENT, TREAT AS ANY THERMAL BURN, AFTER DEONTAMINATION. NO SPECIFIC ANTIDOTE. SUPPORTIVE CARE. TREATMENT BASED ON JUDGMENT OF THE PHYSICIAN IN RESPONSE TO REACTIONS OF THE PATIENT.

SECTION 6 - SPECIAL PROTECTION INFORMATION

VENTILATION

GOOD GENERAL VENTILATION SHOULD BE SUFFICIENT FOR MOST CONDITIONS. LOCAL EXHAUST VENTILATION MAY BE NECESSARY FOR SOME OPERATIONS.

PERSONAL PROTECTIVE EQUIPMENT - RESPIRATOR

IF RESPIRATORY IRRITATION IS EXPERIENCED, USE AN APPROVED AIR-PURIFYING RESPIRATOR.

PERSONAL PROTECTIVE EQUIPMENT - EYE

USE CHEMICAL GOGGLES.

PERSONAL PROTECTIVE EQUIPMENT - GLOVES

USE PROTECTIVE CLOTHING IMPERVIOUS TO THIS MATERIAL. SELECTION OF SPECIFIC ITEMS SUCH AS GLOVES WILL DEPEND ON OPERATION.

OTHER PROTECTIVE EQUIPMENT

USE PROTECTIVE CLOTHING IMPERVIOUS TO THIS MATERIAL. SELECTION OF SPECIFIC ITEMS SUCH AS BOOTS, APRON, OR FULL-BODY SUIT WILL DEPEND ON OPERATION.

PRODUCT NAME: DIETHANOLAMINE LOW FREEZING GRADE
MSDS NO: 122DOW001

SECTION 7 - SPILL OR LEAK PROCEDURES

- STEPS TO BE TAKEN IN CASE OF SPILL, LEAK OR RELEASE -

SOAK UP WITH ABSORBENT MATERIAL OR SAND. SCOOP INTO WASTE CONTAINERS.

---------- WASTE DISPOSAL METHOD ----------

BURN IN APPROVED INCINERATOR. FOLLOW ALL LOCAL, STATE, AND FEDERAL REQUIREMENTS FOR DISPOSAL.

SECTION 8 - HANDLING AND STORAGE PRECAUTIONS

PREVENT EYE CONTACT. AVOID SKIN CONTACT. AVOID BREATHING VAPORS IF GENERATED. DO NOT USE SODIUM NITRITE OR OTHER NITROSATING AGENTS IN FORMULATIONS CONTAINING THIS PRODUCT. SUSPECTED CANCER-CAUSING NITROSAMINES COULD BE FORMED.

SECTION 9 - HAZARD WARNING

SECTION 10 - COMMENTS

TRACE QUANTITIES OF ETHYLENE OXIDE (EO) MAY BE PRESENT IN THIS PRODUCT. WHILE THESE TRACE QUANTITIES COULD ACCUMULATE IN HEADSPACE AREAS OF STORAGE AND TRANSPORT VESSELS, THEY ARE NOT EXPECTED TO CREATE A CONDITION WHICH WILL RESULT IN EO CONCENTRATIONS GREATER THAN 0.5PPM (8 HOUR TWA) IN THE BREATHING ZONE OF THE WORKPLACE FOR APPROPRIATE APPLICATIONS. OSHA HAS ESTABLISHED A PERMISSIBLE EXPOSURE LIMIT OF 1.0PPM 8 HR TWA FOR EO. (CODE OF FEDERAL REGULATIONS PART 1910.1047 OR TITLE 29).

SECTION 11 - REGULATORY INFORMATION

SARA HAZARD CATEGORY: THIS PRODUCT AHS BEEN REVIEWED ACCORDING TO THE EPA "HAZARD CATEGORIES" PROMULGATED UNDER SECTIONS 311 AND 312 OF THE SUPERFUND AMENDMENT AND REAUTHORIZATION ACT OF 1986 (SARA TITLE III) AND IS CONSIDERED, UNDER APPLICABLE DEFINITIONS, TO MEET THE FOLLOWING CATEGORIES: AN IMMEDIATE HEALTH HAZARD. A DELAYED HEALTH HAZARD.

SECTION 12 - REGULATIONS/COMMENTS CONTINUED

PRODUCT NAME: DIETHANOLAMINE LOW FREEZING GRADE
MSDS NO: 122DOW001

INFORMATION SUPPLIED BY: COORDINATOR, TOXICOLOGY AND PRODUCT SAFETY
PHONE: ( ) -

MSDS DATE: 03/20/88 DATE OF PREVIOUS MSDS: 12/03/85

PRODUCT NAME: DIETHANOLAMINE 85%
MSDS NO: 105ASH001

THE FOLLOWING INFORMATION IS FURNISHED SUBJECT TO THE DISCLAIMER ON THE BOTTOM OF THIS FORM

SECTION 1 - PRODUCT IDENTIFICATION

PRODUCT NAME: DIETHANOLAMINE 85%

SYNONYMS:
ALKANOLAMINES; DIETHANOLAMINE 85%;

MANUFACTURER / DISTRIBUTOR:
ASHLAND CHEMICAL COMPANY
P.O. BOX 2219
COLUMBUS, OH
43216
EMERGENCY PHONE NUMBERS:
(419) 422-2121 (MARATHON)
(800) 424-9300 (CHEMTREC)

CHEMICAL FAMILY: ALKANOLAMINES
CHEMICAL FORMULA:
CAS NO: 111-42-2

SECTION 2 - PHYSICAL PROPERTIES

BOILING POINT		MELTING POINT		SPECIFIC GRAVITY(H2O=1)
244.00	F		F	1.092 @68F
117.77	C		C	

% SOLUBILITY IN WATER	VAPOR DENSITY(AIR=1)	VAPOR PRESSURE
	3.6	<0.01 MMHG @68F(20C)

PH INFORMATION: PH: AT CONC.
APPEARANCE: ODOR:

PERCENT VOLATILES: 15 - 20%

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT		AUTOIGNITION TEMP		EXPLOSIVE LIMITS (% BY VOLUME IN AIR)
336	F		F	LOWER/UPPER: 1.6
168.9	C		C	

NFPA CLASS -- HEALTH: FIRE: REACTIVITY: OTHER:

SPECIFIC HAZARD: NONE

---------- FIRE AND EXPLOSION HAZARDS ----------

MATERIAL DECOMPOSES AT >750F.

---------- EXTINGUISHING MEDIA ----------

CARBON DIOXIDE OR DRY CHEMICAL

--------- SPECIAL FIRE FIGHTING INSTRUCTIONS ----------

WATER OR FOAM MAY CAUSE FROTHING WHICH CAN BE VIOLENT AND POSSIBLY ENDANGER THE LIFE OF THE FIREFIGHTER, ESPECIALLY IF SPRAYED INTO CONTAINERS OF HOT, BURNING LIQUID. WATER MAY BE USED TO KEEP FIRE-EXPOSED CONTAINERS COOL UNTIL FIRE IS OUT. WEAR SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACEPIECE OPERATED IN THE POSITIVE PRESSURE DEMAND MODE WHEN FIGHTING FIRES.

PRODUCT NAME: DIETHANOLAMINE 85%
MSDS NO: 105ASH001

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA (CON'T)

STABILITY: THE MATERIAL IS STABLE AT 70 F, 760MM PRESSURE
CONDITIONS TO AVOID:

HAZARDOUS DECOMPOSITION PRODUCTS:
MAY FORM TOXIC MATERIALS: CARBON DIOXIDE AND CARBON MONOXIDE, NITROGEN COMPOUNDS, ETC.

INCOMPATIBLE MATERIALS:
SEE COMMENTS.

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

INCOMPATIBLE MATERIALS: AVOID CONTACT WITH STRONG MINERAL ACIDS, STRONG ORGANIC ACIDS, ALUMINUM.

SECTION 4 - PRODUCT COMPOSITION AND EXPOSURE LIMITS

EXPOSURE LIMITS FOR PRODUCT:	TLV	SOURCE
DIETHANOLAMINE 85%	NONE ESTABLISHED	

COMPONENTS:	PERCENT RANGE	TLV			SOURCE
DIETHANOLAMINE	84.00	3.00	PPM	(8 HR TWA)	ACGIH
		3.00	PPM	(8 HR TWA)	OSHA

SECTION 5 - POTENTIAL HEALTH EFFECTS

-------- ROUTES OF EXPOSURE AND EFFECTS - EYE ---------

CAUSES IRRITATION, BURNS IF NOT REMOVED.

-------- ROUTES OF EXPOSURE AND EFFECTS - SKIN --------

PRIMARY ROUTE OF EXPOSURE. CAN CAUSE IRRITATION. BURNS CAN RESULT FROM PROLONGED CONTACT.

----- ROUTES OF EXPOSURE AND EFFECTS - INHALATION -----

PRIMARY ROUTE OF EXPOSURE. EXCESSIVE INHALATION OF VAPORS CAN CAUSE NASAL AND RESPIRATORY IRRITATION.

------ ROUTES OF EXPOSURE AND EFFECTS - INGESTION -----

CAN CAUSE GASTROINTESTINAL IRRITATION, NAUSEA, VOMITING, AND DIARRHEA.

---------- ADDITIONAL TOXICITY INFORMATION ----------

PRODUCT NAME: DIETHANOLAMINE 85%
MSDS NO: 105ASH001

SECTION 5 - POTENTIAL HEALTH EFFECTS (CON'T)

EMERGENCY FIRST AID PROCEDURES

---------- FIRST AID - EYE ----------

FLUSH WITH LARGE AMOUNTS OF WATER, LIFTING UPPER AND LOWER LIDS OCCASIONALLY, GET MEDICAL ATTENTION.

---------- FIRST AID - SKIN ----------

THOROUGHLY WASH EXPOSED AREA WITH SOAP AND WATER. REMOVE CONTAMINATED CLOTHING. LAUNDER CONTAMINATED CLOTHING BEFORE REUSE.

---------- FIRST AID - INHALATION ----------

IF AFFECTED, REMOVE INDIVIDUAL TO FRESH AIR. IF BREATHING IS DIFFIFULT, ADMINISTER OXYGEN IF BREATHING HAS STOPPED, GIVE ARTIFICIAL RESPIRATION. KEEP PERSON WARM, QUIET AND GET MEDICAL ATTENTION.

---------- FIRST AID - INGESTION ----------

IMMEDIATELY DRINK TWO GLASSES OF WATER AND INDUCE VOMITING BY EITHER GIVING IPECAC SYRUP OR BY PLACING FINGER AT BACK OF THROAT. NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON. GET MEDICAL ATTENTION IMMEDIATELY.

SECTION 6 - SPECIAL PROTECTION INFORMATION

---------- VENTILATION ----------

PROVIDE SUFFICIENT MECHANICAL (GENERAL AND/OR LOCAL EXHAUST) VENTILATION TO MAINTAIN EXPOSURE BELOW LEVEL TLV(S).

------ PERSONAL PROTECTIVE EQUIPMENT - RESPIRATOR -----

IF WORKPLACE EXPOSURE LIMIT(S) OF PRODUCT OR ANY COMPONENT IS EXCEEDED, A NIOSH/MSHA APPROVED AIR SUPPLIED RESPIRATOR IS ADVISED IN ABSENCE OF PROPER ENVIRONMENTAL CONTROL. OSHA REGULATIONS ALSO PERMIT OTHER NIOSH/MSHA RESPIRATORS (NEGATIVE PRESSURE TYPE) UNDER SPECIFIED CONDITIONS (SEE YOUR SAFETY EQUIPMENT SUPPLIER). ENGINEERING OR ADMINISTRATIVE CONTROLS SHOULD BE IMPLEMENTED TO REDUCE EXPOSURE.

---------- PERSONAL PROTECTIVE EQUIPMENT - EYE -------

CHEMICAL SPLASH GOGGLES IN COMPLIANCE WITH OSHA REGULATIONS ARE ADVISED; HOWEVER, OSHA REGULATIONS ALSO PERMIT OTHER TYPE SAFETY GLASSES. (CONSULT YOUR SAFETY EQUIPMENT SUPPLIER)

-------- PERSONAL PROTECTIVE EQUIPMENT - GLOVES -------

WEAR RESISTANT GLOVES SUCH AS: NEOPRENE, POLYVINYL CHLORIDE.

---------- OTHER PROTECTIVE EQUIPMENT ----------

TO PREVENT REPEATED OR PROLONGED SKIN CONTACT, WEAR IMPERVIOUS CLOTHING AND BOOTS.

PRODUCT NAME: DIETHANOLAMINE 85%
MSDS NO: 105ASH001

SECTION 7 - SPILL OR LEAK PROCEDURES

- STEPS TO BE TAKEN IN CASE OF SPILL, LEAK OR RELEASE -

SMALL SPILL: ABSORB LIQUID ON PAPER, VERMICULITE, FLOOR ABSORBENT, OR OTHER ABSORBENT MATERIAL AND TRANSFER TO HOOD. LARGE SPILL: ELIMINATE ALL IGNITION SOURCES (FLARES, FLAMES INCLUDING PILOT LIGHTS, ELECTRICAL SPARKS). PERSONS NOT WEARING PROTECTIVE EQUIPMENT SHOULD BE EXCLUDED FROM AREA OF SPILL UNTIL CLEAN-UP HAS BEEN COMPLETED. STOP SPILL AT SOURCE, DIKE AREA OF SPILL TO PREVENT SPREADING, PUMP LIQUID TO SALVAGE TANK. REMAINING LIQUID MAY BE TAKEN UP ON SAND, CLAY, EARTH, FLOOR ABSORBENT, OR OTHER ABSORBENT MATERIAL AND SHOVELED INTO CONTAINERS.

---------- WASTE DISPOSAL METHOD ----------

SMALL/LARGE SPILL: DISPOSE OF IN ACCORDANCE WITH ALL LOCAL, STATE AND FEDERAL REGULATIONS.

SECTION 8 - HANDLING AND STORAGE PRECAUTIONS

CONTAINERS OF THIS MATERIAL MAY BE HAZARDOUS WHEN EMPTIED. SINCE EMPTIED CONTAINERS RETAIN PRODUCT RESIDUES (VAPOR, LIQUID, AND/OR SOLID), ALL HAZARD PRECAUTIONS GIVEN IN THE DATA SHEET MUST BE OBSERVED.

SECTION 9 - HAZARD WARNING

SECTION 10 - COMMENTS

SECTION 11 - REGULATORY INFORMATION

DOT HAZARD CLASSIFICATION: N/A

SECTION 12 - REGULATIONS/COMMENTS CONTINUED

INFORMATION SUPPLIED BY: COORDINATOR, TOXICOLOGY AND PRODUCT SAFETY
PHONE: (614)889-3333

MSDS DATE: 05/31/89 DATE OF PREVIOUS MSDS: 02/01/87

PRODUCT NAME: METHYL ALCOHOL
MSDS NO: 103LY0001

THE FOLLOWING INFORMATION IS FURNISHED SUBJECT TO THE DISCLAIMER ON THE BOTTOM OF THIS FORM

SECTION 1 - PRODUCT IDENTIFICATION

PRODUCT NAME: METHYL ALCOHOL

SYNONYMS:
CARBINOL; COLONIAL SPIRIT; METHANOL; METHYL ALCOHOL; METHYL HYDROXIDE; WOOD ALCOHOL; WOOD SPIRIT

MANUFACTURER / DISTRIBUTOR:
LYONDELL PETROCHEMICAL (ARCO)
P O BOX 2451, 12000 LAWNDALE
HOUSTON, TX
77001
EMERGENCY PHONE NUMBERS:
(419) 422-2121 (MARATHON)
(800) 424-9300 (CHEMTREC)

CHEMICAL FAMILY: ALIPHATIC ALCOHOL
CHEMICAL FORMULA:
CAS NO: 67-56-1

SECTION 2 - PHYSICAL PROPERTIES

BOILING POINT	MELTING POINT	SPECIFIC GRAVITY(H2O=1)
147 F	-144 F	0.79@39.2F
C	C	

% SOLUBILITY IN WATER	VAPOR DENSITY(AIR=1)	VAPOR PRESSURE
COMPLETE		96 MM HG @68F

PH INFORMATION: PH: N/AP AT CONC.
APPEARANCE: CLEAR, COLORLESS LIQUID ODOR: SEE COMMENTS

VISCOSITY UNITS, TEMP. (METHOD): N/AP
VAPOR SP. GR. (AIR=1.0 @60-90F): 1.1
DRY POINT: N/AP
VOLATILE CHARACTERISTICS: MODERATE

ODOR: FAINT ALCOHOL ODOR; ODOR IS NOT A GOOD INDICATOR OF EXPOSURE LEVEL

PRODUCT NAME: METHYL ALCOHOL
MSDS NO: 103LY0001

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT		AUTOIGNITION TEMP		EXPLOSIVE LIMITS (% BY VOLUME IN AIR)
50 CC	F	725	F	LOWER/UPPER: 6/36
	C		C	

NFPA CLASS -- HEALTH: FIRE: REACTIVITY: OTHER:

SPECIFIC HAZARD: NONE

---------- FIRE AND EXPLOSION HAZARDS ----------

RELEASES FLAMMABLE VAPORS BELOW NORMAL AMBIENT TEMPERATURES. WHEN MIXED WITH AIR AND EXPOSED TO IGNITION SOURCE, CAN BURN IN OPEN OR EXPLODE IF CONFINED. MIXTURES WITH WATER AND AS LITTLE AS 21% (BY VOL) METHANOL ARE STILL FLAMMABLE (FLASH PT. <100F). UNDER SOME CIRCUMSTANCES, MAY CORRODE CERTAIN METALS, INCLUDING ALUMINUM AND ZINC, AND GENERATE HYDROGEN GAS.

---------- EXTINGUISHING MEDIA ----------

DRY CHEMICAL, CO2, WATERSPRAY, FOAM FOR ALCOHOLS, WATER FOG

--------- SPECIAL FIRE FIGHTING INSTRUCTIONS ----------

A METHANOL FIRE MAY NOT BE VISIBLE TO THE NAKED EYE. DO NOT ENTER FIRE AREA W/O PROPER PROTECTION. DECOMPOSITION PRODUCTS POSSIBLE. FIGHT FIRE FROM SAFE DISTANCE/PROTECTED LOCATION. HEAT MAY BUILD PRESSURE/RUPTURE CLOSED CONTAINERS, SPREADING FIRE, INCREASING RISK OF BURNS/INJURIES. APPLY AQUEOUS EXTINGUISHING MEDIA CAREFULLY TO AVOID FROTHING AND LIMIT EXPOSURE OF NEARBY EQUIPMENT. NOTIFY AUTHORITIES IF LIQUID ENTERS SEWER/PUBLIC WATERS.

STABILITY: THE MATERIAL IS STABLE AT 70 F, 760MM PRESSURE
CONDITIONS TO AVOID:
HEAT, SPARKS, OPEN FLAME, OXIDIZING CONDITIONS

HAZARDOUS DECOMPOSITION PRODUCTS:
SEE COMMENTS

INCOMPATIBLE MATERIALS:
SEE COMMENTS

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

INCOMPATIBLE MATERIALS: STRONG OXIDIZING AGENTS; ALUMINUM; ZINC; ANY REACTIVE METAL WHICH WILL DISPLACE HYDROGEN; CERTAIN FORMS OF PLASTICS, RUBBER AND COATINGS

HAZARDOUS DECOMPOSITION PRODUCTS: INCOMPLETE COMBUSTION WILL GENERATE HIGHLY POISONOUS CARBON MONOXIDE AND PERHAPS OTHER TOXIC VAPORS SUCH AS FORMALDEHYDE

PRODUCT NAME: METHYL ALCOHOL
MSDS NO: 103LY0001

SECTION 4 - PRODUCT COMPOSITION AND EXPOSURE LIMITS

EXPOSURE LIMITS FOR PRODUCT:	TLV			SOURCE
METHYL ALCOHOL	200.00	PPM	(8 HR TWA)	ACGIH
	250.00	PPM	(STEL)	ACGIH
	200.00	PPM	(8 HR TWA)	OSHA
	250.00	PPM	(STEL)	OSHA

COMPONENTS:	PERCENT RANGE	TLV			SOURCE
METHYL ALCOHOL	99.85	200.00	PPM	(8 HR TWA)	ACGIH
		250.00	PPM	(STEL)	ACGIH
		200.00	PPM	(8 HR TWA)	OSHA
		250.00	PPM	(STEL)	OSHA

SECTION 5 - POTENTIAL HEALTH EFFECTS

-------- ROUTES OF EXPOSURE AND EFFECTS - EYE ---------

PRIMARY ROUTE OF EXPOSURE. MAY CAUSE MODERATE IRRITATION, INCLUDING BURNING SENSATION, TEARING, REDNESS OR SWELLING.

-------- ROUTES OF EXPOSURE AND EFFECTS - SKIN --------

ABSORPTION: PRIMARY ROUTE OF EXPOSURE. EXPOSURE TO THIS MATERIAL CAN RESULT IN ABSORPTION THROUGH SKIN CAUSING HEALTH HAZARD. IRRITATION: MAY PRODUCE SKIN IRRITATION.

----- ROUTES OF EXPOSURE AND EFFECTS - INHALATION -----

PRIMARY ROUTE OF EXPOSURE. OVEREXPOSURE MAY CAUSE COUGHING, SHORTNESS OF BREATH, DIZZINESS, INTOXICATION AND COLLAPSE.

------ ROUTES OF EXPOSURE AND EFFECTS - INGESTION -----

PRIMARY ROUTE OF EXPOSURE. INGESTION OF THIS PRODUCT, EVEN IN SMALL AMOUNTS, CAN CAUSE BLINDNESS AND DEATH. ONSET OF SYMPTOMS MAY BE DELAYED FOR 18-24 HOURS; TREATMENT PRIOR TO ONSET OF OBVIOUS SYMPTOMS MAY BE LIFE-SAVING. METHANOL IS RAPIDLY ABSORBED AND EMESIS SHOULD BE INITIATED EARLY TO BE EFFECTIVE. WITHIN 30 MINUTES OF INGESTION, IF POSSIBLE, ADMINISTER SYRUP OF IPECAC. AFTER THE DOSE IS GIVEN, ENCOURAGE PATIENT TO TAKE 6-8 OUNCES OF CLEAR NONCARBONATED FLUID. DOSE MAY BE REPEATED ONCE IF EMESIS DOES NOT OCCUR WITHIN 20-30 MINUTES. ADMINISTRATION OF AN AQUEOUS SLURRY OF ACTIVATED CHARCOAL WITH MAGNESIUM CIRTATE OR SORBITOL AS A CATHARTIC HAS BEEN REPORTED HELPFUL.

ETHANOL INHIBITS THE FORMATION OF TOXIC METABOLITIES. IF ETHANOL THERAPY IS INDICATED, ADMINISTER A LOADING DOSE OF 7.6-10ML/KG OF BODY WEIGHT OF 10% ETOH IN D5W OVER 30-60 MINUTES. MAINTENANCE DOSE IS 1.4ML/KG/HR OF 10% ETOH, TO ACHIEVE A 100-130MG/DL BLOOD ETOH LEVEL DURING ETHANOL THERAPY. (IF CHARCOAL IS ADMINISTERED, ETHANOL SHOULD BE ADMINISTERED INTRAVENOUSLY AND NOT ORALLY.)

MAINTAIN CONTACT WITH POISON CONTROL CENTER DURING ALL ASPECTS OF DIAGNOSIS AND TREATMENT.

PRODUCT NAME: METHYL ALCOHOL
MSDS NO: 103LY0001

SECTION 5 - POTENTIAL HEALTH EFFECTS (CON'T)

ADDITIONAL TOXICITY INFORMATION

SWALLOWING AS LITTLE AS 1 TO 4 OUNCES OF METHANOL HAS BEEN REPORTED TO CAUSE DEATH OR SERIOUS IRREVERSIBLE INJURY SUCH AS BLINDNESS IN HUMANS. STUDIES IN EXPERIMENTAL ANIMALS INDICATE THAT THE METABOLISM OF METHANOL TO FORMIC ACID RESULTS IN METABOLIC ACIDOSIS AND REVERSIBLE OR IRREVERSIBLE DAMAGE TO THE OPTIC NERVE. SEE THE MEDICAL TREATMENT SECTION OF THIS DATA SHEET FOR INFORMATION ON TREATING METHANOL POISONING.

A RECENT ARTICLE HAS REPORTED EFFECTS OF EXPOSURE TO METHANOL VAPORS (AM. IND. HYG. ASSOC. J. 45(1): 57-55, 1984), IN THIS REPORT TEACHERS AIDES EXPOSED TO METHANOL VAPORS (365-3080PPM) IN DIRECT-PROCESS SPIRIT DUPLICATING OPERATIONS REPORTED SIGNIFICANTLY MORE OF THE FOLLOWING COMPLAINTS THAN A COMPARISON GROUP: BLURRED VISION, HEADACHE, DIZZINESS, AND NAUSEA.

EMERGENCY FIRST AID PROCEDURES

FIRST AID - EYE

IN CASE OF EYE CONTACT, IMMEDIATELY RINSE WITH CLEAN WATER FOR 20-30 MINUTES. RETRACT EYELIDS OFTEN. OBTAIN EMERGENCY MEDICAL ATTENTION.

FIRST AID - SKIN

IMMEDIATELY REMOVE CONTAMINATED CLOTHING. WASH SKIN THOROUGHLY WITH MILD SOAP/WATER. FLUSH W/LUKEWARM WATER FOR 15 MINUTES. IF STICKY, USE WATERLESS CLEANER FIRST. SEEK MEDICAL ATTENTION IF ILL EFFECT OR IRRITATION DEVELOPS.

FIRST AID - INHALATION

IF OVERCOME BY EXPOSURE, REMOVE VICTIM TO FRESH AIR IMMEDIATELY. GIVE OXYGEN OR ARTIFICIAL RESPIRATION AS NEEDED. OBTAIN EMERGENCY MEDICAL ATTENTION. PROMPT ACTION IS ESSENTIAL.

FIRST AID - INGESTION

IF SWALLOWED, GIVE LUKEWARM WATER (PINT) IF VICTIM COMPLETELY CONSCIOUS/ALERT. INDUCE VOMITING. OBTAIN EMERGENCY MEDICAL ATTENTION. PROMPT ACTION IS ESSENTIAL.

METHANOL INGESTION IS LIFE-THREATENING. INDUCE VOMITING WITH SYRUP OF IPECAC. FOLLOW EMESIS WITH MODERATE AMOUNTS OF WATER ORALLY. SYMPTOM ONSET MAY BE DELAYED. ETHANOL THERAPY MAY BE INDICATED.

SECTION 6 - SPECIAL PROTECTION INFORMATION

VENTILATION

GENERAL ROOM OR LOCAL EXHAUST VENTILATION IS USUALLY REQUIRED TO MEET EXPOSURE STANDARD(S).

PRODUCT NAME: METHYL ALCOHOL
MSDS NO: 103LY0001

SECTION 6 - SPECIAL PROTECTION INFORMATION (CON'T)

------ PERSONAL PROTECTIVE EQUIPMENT - RESPIRATOR -----

DO NOT USE AIR-PURIFYING RESPIRATOR. ONLY NIOSH/MSHA APPROVED SUPPLIED AIR OR SELF-CONTAINED BREATHING APPARATUS OPERATED IN POSITIVE PRESSURE MODE ARE SATISFACTORY, IF EXPOSURE CAN EXCEED THE PEL/TLV.

---------- PERSONAL PROTECTIVE EQUIPMENT - EYE -------

EYE PROTECTION SUCH AS CHEMICAL SPLASH GOGGLES AND/OR FACE SHIELD MUST BE WORN WHEN POSSIBILITY EXISTS FOR EYE CONTACT DUE TO SPLASHING OR SPRAYING LIQUID, AIRBORNE PARTICLES, OR VAPOR. CONTACT LENSES SHOULD NOT BE WORN.

-------- PERSONAL PROTECTIVE EQUIPMENT - GLOVES -------

WHEN SKIN CONTACT IS POSSIBLE, PROTECTIVE CLOTHING INCLUDING GLOVES SHOULD BE WORN. THIS EQUIPMENT MUST BE CLEANED THOROUGHLY AFTER EACH USE.

---------- OTHER PROTECTIVE EQUIPMENT ----------

WHEN SKIN CONTACT IS POSSIBLE, PROTECTIVE CLOTHING INCLUDING APRON, SLEEVES, BOOTS, HEAD AND FACE PROTECTION SHOULD BE WORN. THIS EQUIPMENT MUST BE CLEANED THOROUGHLY AFTER EACH USE.

EMERGENCY EYEWASH FOUNTAINS AND SAFETY SHOWERS SHOULD BE AVAILABLE IN THE IMMEDIATE VICINITY OF ANY POTENTIAL EXPOSURE. USE GOOD PERSONAL HYGIENE PRACTICES. WASH HANDS BEFORE EATING, DRINKING, SMOKING OR USING TOILET FACILITIES. PROMPTLY REMOVE SOILED CLOTHING/WASH THOROUGHLY BEFORE REUSE. SHOWER AFTER WORK USING PLENTY OF SOAP AND WATER.

PRODUCT NAME: METHYL ALCOHOL
MSDS NO: 103LY0001

SECTION 7 - SPILL OR LEAK PROCEDURES

ENVIRONMENTAL EFFECTS

- STEPS TO BE TAKEN IN CASE OF SPILL, LEAK OR RELEASE -

EXTREMELY FLAMMABLE LIQUID. RELEASE CAUSES IMMEDIATE FIRE/EXPLOSION HAZARD. LIQUIDS/VAPORS MAY IGNITE. EVACUATE/LIMIT ACCESS. EQUIP RESPONDERS WITH PROPER PROTECTION. KILL ALL IGNITION SOURCES. STOP RELEASE. PREVENT FLOW TO SEWERS/PUBLIC WATERS. RESTRICT WATER USE FOR CLEANUP. NOTIFY FIRE/ENVIRONMENTAL AUTHORITIES. IMPOUND/RECOVER LARGE LAND SPILL. BLANKET WITH FIREFIGHTING FOAM. SOAK UP SMALL SPILL WITH INERT SOLIDS. USE SUITABLE DISPOSAL CONTAINERS. ON WATER, MATERIAL SOLUBLE/MAY FLOAT OR SINK. MAY BIODEGRADE. CONTAIN/MINIMIZE DISPERSION/COLLECT. DISPERSE RESIDUE TO REDUCE AQUATIC HARM. REPORT PER REGULATORY REQUIREMENTS.

WASTE DISPOSAL METHOD

CONTAMINATED PROUCT/SOIL/WATER MAY BE RCRA/OSHA HAZARDOUS WASTE (SEE 40 CFR 261 AND 29 CFR 1910). IF SPENT SOLVENT INTENDED FOR DISPOSAL, MAY BE DESIGNATED F005; IF SPILL CLEANUP RESIDUE, U154 UNDER RCRA LISTINGS. LANDFILL SOLIDS AT PERMITTED SITES. USE REGISTERED TRANSPORTERS. BURN CONCENTRATED LIQUIDS IN SYSTEMS DESIGNED FOR LOW FLASH POINT MATERIAL. AVOID FLAMEOUTS. ASSURE EMISSIONS COMPLY WITH APPLICABLE REGULATIONS. DILUTE AQUEOUS WASTE MAY BIODEGRADE. AVOID OVERLOADING/POISONING PLANT BIOMASS. ASSURE EFFLUENT COMPLIES WITH APPLICABLE REGULATIONS.

SECTION 8 - HANDLING AND STORAGE PRECAUTIONS

STORE ONLY IN TIGHTLY CLOSED/PROPERLY VENTED CONTAINERS AWAY FROM HEAT/SPARKS/OPEN FLAMES/STRONG OXIDIZING AGENTS. USE ONLY NON-SPARKING TOOLS. BLANKET STORAGE WITH DRY INERT GAS. STORE DRUMS WITH BUNG IN UP POSITION. CAREFULLY VENT INTERNAL PRESSURE BEFORE REMOVING CLOSURE. GROUND CONTAINERS BEFORE TRANSFER. WILL ABSORB ATMOSPHERIC MOISTURE. ELECTRICAL EQUIPMENT SHOULD CONFORM TO NATIONAL ELECTRICAL CODE. CARBON STEEL IS SATISFACTORY MATERIAL OF CONSTRUCTION. DO NOT STORE IN ALUMINUM OR ZINC (GALVANIZED). HANDLE "EMPTY" DRUMS WITH CARE/VAPOR RESIDUE MAY BE FLAMMABLE/ POISONOUS,

ISOLATE, VENT, DRAIN, WASH AND PURGE SYSTEMS OR EQUIPMENT BEFORE MAINTENANCE OR REPAIR. REMOVE ALL IGNITION SOURCES. CHECK ATMOS-PHERE FOR EXPLOSIVENESS AND OXYGEN DEFICIENCIES. USE ADEQUATE PERSONAL PROTECTIVE EQUIPMENT. OBSERVE PRECAUTIONS PERTAINING TO CONFINED SPACE ENTRY.

PRODUCT NAME: METHYL ALCOHOL
MSDS NO: 103LY0001

SECTION 9 - HAZARD WARNING

DANGER!

PHYSICAL HAZARDS: EXTREMELY FLAMMABLE-MAY BURN WITH INVISIBLE FLAME.

ACUTE HEALTH EFFECTS (SHORT-TERM): MODERATE INHALATION HAZARD. MODERATE EYE IRRITANT. MODERATE SKIN ABSORPTION HAZARD. MODERATE INGESTION HAZARD. SLIGHT SKIN IRRITANT.

CHRONIC HEALTH EFFECTS (LONG-TERM): SWALLOWING AS LITTLE AS ONE TO FOUR OUNCES OF METHANOL HAS BEEN REPORTED TO CAUSE DEATH OR SERIOUS IRREVERSIBLE INJURY SUCH AS BLINDNESS.

DOT HAZARDOUS MATERIALS PROPER SHIPPING NAME: METHYL ALCOHOL

DOT HAZARD CLASS: FLAMMABLE LIQUID

UN/NA ID NO.: UN 1230

SECTION 10 - COMMENTS

MANUFACTURER LISTS AN ADDITIONAL EMERGENCY TELEPHONE NUMBER AS FOLLOWS: 800-424-9300 (CHEMTREC)

SOME OF THE INFORMATION PRESENTED AND CONCLUSIONS DRAWN HEREIN ARE FROM SOURCES OTHER THAN DIRECT TEST DATA ON THE MATERIAL ITSELF.

SECTION 11 - REGULATORY INFORMATION

SECTION 12 - REGULATIONS/COMMENTS CONTINUED

INFORMATION SUPPLIED BY: COORDINATOR, TOXICOLOGY AND PRODUCT SAFETY
PHONE: (713)652-7200

MSDS DATE: 02/18/86 DATE OF PREVIOUS MSDS: / /

PRODUCT NAME: REGULAR UNLEADED GASOLINE
MSDS NO: 115MAR001

THE FOLLOWING INFORMATION IS FURNISHED SUBJECT TO THE DISCLAIMER ON THE BOTTOM OF THIS FORM

SECTION 1 - PRODUCT IDENTIFICATION

PRODUCT NAME: REGULAR UNLEADED GASOLINE

SYNONYMS:
GASOLINE, REGULAR UNLEADED; LEAD-FREE GASOLINE; MILE-MAKER LEAD-FREE GASOLINE; REGULAR UNLEADED GASOLINE; UNLEADED REGULAR GASOLINE

MANUFACTURER / DISTRIBUTOR:
MARATHON PETROLEUM COMPANY
539 SOUTH MAIN STREET
FINDLAY, OH
45840

EMERGENCY PHONE NUMBERS:
(419) 422-2121 (MARATHON)
(800) 424-9300 (CHEMTREC)

CHEMICAL FAMILY: PETROLEUM HYDROCARBON
CHEMICAL FORMULA: MIXTURE

CAS NO: MIXTURE

SECTION 2 - PHYSICAL PROPERTIES

BOILING POINT		MELTING POINT		SPECIFIC GRAVITY(H2O=1)
10-437	F	N.A.	F	0.71-0.77
	C		C	

% SOLUBILITY IN WATER	VAPOR DENSITY(AIR=1)	VAPOR PRESSURE
NEGLIGIBLE	3-4	414-776 MM HG @ 100F

PH INFORMATION: PH: N.A. AT CONC.
APPEARANCE: BLUE OR CLEAR LIQUID ODOR: GASOLINE

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT		AUTOIGNITION TEMP		EXPLOSIVE LIMITS (% BY VOLUME IN AIR)
-50	F	C.A. 495	F	LOWER/UPPER: 1.4/ 7.6
	C		C	

NFPA CLASS -- HEALTH: FIRE: REACTIVITY: OTHER:

SPECIFIC HAZARD: NONE

EXTINGUISHING MEDIA:

CLASS B FIRE EXTINGUISHING MEDIA SUCH AS HALON, CO2, OR DRY CHEMICAL CAN BE USED. FIRE FIGHTING SHOULD BE ATTEMPTED ONLY BY THOSE WHO ARE ADEQUATELY TRAINED.

SPECIAL FIRE FIGHTING INSTRUCTIONS:

FLASHBACK MAY OCCUR ALONG VAPOR TRAIL. AVOID USE OF SOLID WATER STREAMS. WATER MAY BE INEFFECTIVE IN EXTINGUISHING LOW FLASH POINT FIRES, BUT CAN BE USED TO COOL EXPOSED SURFACES. AVOID EXCESSIVE WATER SPRAY APPLICATION.

PRODUCT NAME: REGULAR UNLEADED GASOLINE
MSDS NO: 115MAR001

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA (CON'T)

STABILITY: THE MATERIAL IS STABLE AT 70 F, 760MM PRESSURE
CONDITIONS TO AVOID:
EXCESSIVE HEAT, SOURCES OF IGNITION

HAZARDOUS DECOMPOSITION PRODUCTS:
CARBON MONOXIDE, ALDEHYDES, AROMATIC HYDROCARBONS

INCOMPATIBLE MATERIALS:
STRONG OXIDIZERS

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

SECTION 4 - PRODUCT COMPOSITION AND EXPOSURE LIMITS

EXPOSURE LIMITS FOR PRODUCT:	TLV			SOURCE
REGULAR UNLEADED GASOLINE	300.00	PPM	(8 HR TWA)	ACGIH
	500.00	PPM	(STEL)	ACGIH

COMPONENTS:	PERCENT RANGE	TLV			SOURCE
SATURATED HYDROCARBONS (PARAFFINS & CYCLOPARAFFINS)	55.00- 70.00			( )	
UNSATURATED HYDROCARBONS (OLEFINS)	1.00- 10.00			( )	
AROMATIC HYDROCARBONS (INCLUDING BENZENE, TOLUENE, XYLENES, ETHYLBENZENE AND TRIMETHYL BENZENES)	20.00- 40.00			( )	
ETHYL BENZENE	1.00- 3.00	100.00	PPM	(8 HR TWA)	ACGIH
		125.00	PPM	(STEL)	ACGIH
		100.00	PPM	(8 HR TWA)	OSHA
		125.00	PPM	(STEL)	OSHA
1,2,4-TRIMETHYLBENZENE	2.00- 5.00	25.00	PPM	(8 HR TWA)	ACGIH
		25.00	PPM	(8 HR TWA)	OSHA
TOLUENE	3.00- 15.00	100.00	PPM	(8 HR TWA)	ACGIH
		150.00	PPM	(STEL)	ACGIH
		100.00	PPM	(8 HR TWA)	OSHA
		150.00	PPM	(STEL)	OSHA
XYLENE	5.00- 15.00	100.00	PPM	(8 HR TWA)	ACGIH
		150.00	PPM	(STEL)	ACGIH
		100.00	PPM	(8 HR TWA)	OSHA
		150.00	PPM	(STEL)	OSHA
METHYL TERTIARY BUTYL ETHER	.01- 15.00			( )	
BENZENE	.50- 3.50	10.00	PPM	(8 HR TWA)	ACGIH
		1.00	PPM	(8 HR TWA)	OSHA
		5.00	PPM	(STEL)	OSHA

PRODUCT NAME: REGULAR UNLEADED GASOLINE
MSDS NO: 115MAR001

SECTION 4 - PRODUCT COMPOSITION AND EXPOSURE LIMITS (CON'T)

COMPONENTS:	PERCENT RANGE	TLV	SOURCE
		OSHA ACTION LEVEL 0.50 PPM (8 HR TWA)	

***
COMPLEX MIXTURE OF PARAFFINIC, CYCLOPARAFFINIC, OLEFINIC AND AROMATIC HYDROCARBONS (PREDOMINANTLY C4-C12).
***
CONTAINS SMALL AMOUNTS (0.02%) OF DYES AND OTHER ADDITIVES WHICH ARE NOT CONSIDERED TO BE HAZARDOUS AT THE CONCENTRATIONS USED.

SECTION 5 - POTENTIAL HEALTH EFFECTS

EYE:

EYE IRRITATION MAY RESULT FROM CONTACT WITH THE LIQUID OR EXPOSURE TO VAPOR CONCENTRATIONS ABOVE THE TLV.

SKIN:

PROLONGED OR REPEATED LIQUID CONTACT CAN DEFAT THE SKIN AND LEAD TO IRRITATION AND/OR DERMATITIS.

INHALATION:

EXPOSURE TO VAPOR CONCENTRATIONS EXCEEDING 1000 PPM CAN CAUSE RESPIRATORY IRRITATION, HEADACHE, DIZZINESS, NAUSEA AND LOSS OF COORDINATION. HIGHER CONCENTRATIONS MAY CAUSE LOSS OF CONSCIOUSNESS, CARDIAC SENSITIZATION, COMA AND DEATH RESULTING FROM RESPIRATORY FAILURE.

INGESTION:

INGESTION MAY RESULT IN NAUSEA, VOMITING, DIARRHEA AND RESTLESSNESS. ASPIRATION (BREATHING) OF VOMITUS INTO THE LUNGS MUST BE AVOIDED AS EVEN SMALL QUANTITIES IN THE LUNGS CAN PRODUCE CHEMICAL PNEUMONITIS AND PULMONARY EDEMA/HEMORRHAGE.

PRODUCT NAME: REGULAR UNLEADED GASOLINE
MSDS NO: 115MAR001

SECTION 5 - POTENTIAL HEALTH EFFECTS (CON'T)

ADDITIONAL TOXICITY INFORMATION:

TWO YEAR INHALATION TOXICITY STUDIES WITH FULLY VAPORIZED GASOLINE (67,292 & 2056 PPM) PRODUCED KIDNEY DAMAGE & KIDNEY TUMORS IN MALE RATS BUT NOT IN FEMALE RATS OR MALE AND FEMALE MICE. FEMALE MICE DEVELOPED A SLIGHTLY HIGHER INCIDENCE OF LIVER TUMORS COMPARED TO CONTROLS AT THE HIGHEST EXPOSURE LEVEL. RESULTS FROM SUBSEQUENT SCIENTIFIC STUDIES SUGGEST THAT THE KIDNEY DAMAGE AND PROBABLY THE KIDNEY TUMOR RESPONSE ARE UNIQUE TO THE MALE RAT. THE BIOLOGIC SIGNIFICANCE OF THE MOUSE LIVER TUMOR RESPONSE IN TERMS OF HUMAN HEALTH IS QUESTIONABLE.

REPEATED OR PROLONGED EXPOSURE TO BENZENE EVEN AT RELATIVELY LOW CONCENTRATIONS MAY CAUSE SERIOUS INJURY TO BLOOD-FORMING ORGANS. SIGNIFICANT CHRONIC EXPOSURE TO BENZENE VAPOR HAS BEEN REPORTED TO PRODUCE VARIOUS BLOOD DISORDERS, RANGING FROM ANEMIA TO LEUKEMIA (CANCER) IN MAN. BENZENE PRODUCED TUMORS IN RATS AND MICE IN LIFETIME CHRONIC TOXICITY STUDIES, BUT THE RESPONSE HAS NOT BEEN CONSISTENT ACROSS SPECIES, STRAIN, SEX OR ROUTE OF EXPOSURE. ANIMAL STUDIES ON BENZENE HAVE DEMONSTRATED IMMUNE TOXICITY, TESTICULAR EFFECTS AND ALTERATIONS IN REPRODUCTIVE CYCLES, EVIDENCE OF CHROMOSOMAL DAMAGE OR OTHER CHROMOSOMAL CHANGES, AND EMBRYO/FETOTOXICITY, BUT NOT TERATOGENICITY.

EMERGENCY FIRST AID PROCEDURES

EYE:

FLUSH EYES WITH LARGE AMOUNTS OF WATER FOR AT LEAST 15 MINUTES. IF SYMPTOMS OR IRRITATION OCCUR, CALL A PHYSICIAN.

SKIN:

WASH WITH SOAP AND LARGE AMOUNTS OF WATER. REMOVE CONTAMINATED CLOTHING. IF SYMPTOMS OR IRRITATION OCCUR, CALL A PHYSICIAN.

INHALATION:

MOVE PERSON TO FRESH AIR. IF NOT BREATHING OR IF NO HEARTBEAT, GIVE ARTIFICIAL RESPIRATION OR CARDIOPULMONARY RESUSCITATION (CPR). IMMEDIATELY CALL A PHYSICIAN.

INGESTION:

DO NOT INDUCE VOMITING. DO NOT GIVE LIQUIDS. IMMEDIATELY CALL A PHYSICIAN.

SECTION 6 - SPECIAL PROTECTION INFORMATION

VENTILATION:

LOCAL OR GENERAL EXHAUST REQUIRED IN ENCLOSED AREAS OR WITH INADEQUATE VENTILATION.

PRODUCT NAME: REGULAR UNLEADED GASOLINE
MSDS NO: 115MAR001

SECTION 6 - SPECIAL PROTECTION INFORMATION (CON'T)

RESPIRATORY PROTECTION:

APPROVED ORGANIC VAPOR CHEMICAL CARTRIDGE OR SUPPLIED AIR RESPIRATORS SHOULD BE WORN FOR EXPOSURES EXCEEDING THE TLV OR STEL. OBSERVE RESPIRATOR PROTECTION FACTOR CRITERIA CITED IN ANSI Z88.2 (1980). SELF-CONTAINED BREATHING APPARATUS SHOULD BE USED FOR FIRE FIGHTING.

PROTECTIVE GLOVES:

NITRILE, VITON OR PVA GLOVES FOR REPEATED OR PROLONGED SKIN EXPOSURE.

OTHER PROTECTIVE EQUIPMENT:

USE EXPLOSION-PROOF EQUIPMENT.

SECTION 7 - SPILL OR LEAK PROCEDURES

ENVIRONMENTAL EFFECTS:

LIQUID CAN BE TOXIC TO AQUATIC LIFE.

STEPS TO BE TAKEN IN CASE OF SPILL, LEAK OR RELEASE:

KEEP PUBLIC AWAY. SHUT OFF SOURCE IF POSSIBLE TO DO SO WITHOUT HAZARD. ELIMINATE ALL IGNITION SOURCES. ADVISE NATIONAL RESPONSE CENTER (800-424-8802) IF PRODUCT HAS ENTERED A WATERCOURSE. ADVISE LOCAL AND STATE EMERGENCY SERVICES AGENCIES, IF APPROPRIATE. CONTAIN LIQUID WITH SAND OR SOIL. RECOVER AND RETURN FREE LIQUID TO SOURCE. USE SUITABLE SORBENTS TO CLEAN UP RESIDUAL LIQUIDS.

WASTE DISPOSAL METHOD:

DISPOSE OF CLEANUP MATERIALS IN ACCORDANCE WITH APPLICABLE LOCAL, STATE AND FEDERAL REGULATIONS.

SECTION 8 - HANDLING AND STORAGE PRECAUTIONS

PRODUCT SHOULD BE HANDLED AND STORED IN ACCORDANCE WITH INDUSTRY ACCEPTED PRACTICES. IN THE ABSENCE OF SPECIFIC LOCAL CODE REQUIREMENTS, NFPA OR OSHA REQUIREMENTS SHOULD BE FOLLOWED. USE APPROPRIATE GROUNDING AND BONDING PRACTICES. STORE IN PROPERLY CLOSED CONTAINERS THAT ARE APPROPRIATELY LABELED. DO NOT EXPOSE TO HEAT, OPEN FLAME, OXIDIZERS OR OTHER SOURCES OF IGNITION. AVOID SKIN CONTACT. EXERCISE GOOD PERSONAL HYGIENE INCLUDING REMOVAL OF SOILED CLOTHING AND PROMPT WASHING WITH SOAP AND WATER.

PRODUCT NAME: REGULAR UNLEADED GASOLINE
MSDS NO: 115MAR001

SECTION 9 - HAZARD WARNING

DANGER!

EXTREMELY FLAMMABLE

HARMFUL OR FATAL IF SWALLOWED

CONTAINS BENZENE WHICH MAY CAUSE
CANCER OR BE TOXIC TO BLOOD-FORMING ORGANS.

SECTION 10 - COMMENTS

PRODUCT NAME: REGULAR UNLEADED GASOLINE
MSDS NO: 115MAR001

SECTION 11 - REGULATORY INFORMATION

SARA TITLE III/SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 - SECTIONS 302, 304, 311, 312 AND 313.

THE FOLLOWING REGULATIONS APPLY TO THIS PRODUCT:

SECTIONS 311 AND 312 - MATERIAL SAFETY DATA SHEET REQUIREMENTS:

40 CFR PART 370 (52 FR 38344 - OCTOBER 15, 1987).

DEPENDING ON LOCAL, STATE, AND FEDERAL REGULATIONS, MATERIAL SAFETY DATA SHEETS (MSDS'S) OR LISTS OF MSDS'S (PRODUCT NAMES) MAY BE REQUIRED TO BE SUBMITTED TO THE STATE EMERGENCY RESPONSE COMMISSION, LOCAL EMERGENCY PLANNING COMMITTEE, AND LOCAL FIRE DEPARTMENT IF YOU HAVE:

10,000 POUNDS OR MORE OF AN OSHA HAZARDOUS SUBSTANCE* OR
500 POUNDS OR THE THRESHOLD PLANNING QUANTITY WHICHEVER IS LESS, OF AN EXTREMELY HAZARDOUS SUBSTANCE.

* REPORTABLE QUANTITY LEVELS CAN VARY FROM STATE TO STATE AND YEAR TO YEAR DEPENDING ON APPLICABLE STATE AND/OR FEDERAL REGULATIONS.

THIS PRODUCT IS COVERED UNDER THE CRITERIA DEFINED IN OSHA'S HAZARD COMMUNICATION STANDARD 29 CFR 1910.1200 (52 FR 31852 - AUGUST 24, 1987) AND SHOULD BE REPORTED UNDER THE FOLLOWING EPA HAZARD CATEGORIES:

XX IMMEDIATE (ACUTE) HEALTH HAZARD
XX DELAYED (CHRONIC) HEALTH HAZARD
XX FIRE HAZARD
SUDDEN RELEASE OF PRESSURE HAZARD
REACTIVE HAZARD

SECTION 313 - TOXIC CHEMICAL RELEASE REPORTING:

40 CFR PART 372 (53 FR 4500 - FEBRUARY 16, 1988; 53 FR 12728 - APRIL 18, 1988; 53 FR 23108 - JUNE 20, 1988).

THIS PRODUCT CONTAINS THE FOLLOWING COMPONENT(S) (AT A LEVEL OF 1% OR GREATER IF HAZARDOUS; 0.1% OR GREATER IF CARCINOGENIC) THAT IS/ARE IDENTIFIED ON THE SECTION 313 TOXIC CHEMICAL LIST:

----COMPONENT----	----CAS NUMBER----
BENZENE	71-43-2
ETHYL BENZENE	100-41-4
1,2,4-TRIMETHYLBENZENE (PSEUDOCUMENE)	1582-09-8
TOLUENE	108-88-3
XYLENE	1330-20-7
METHYL TERTIARY BUTYL ETHER	1634-04-4

SECTION 12 - REGULATIONS/COMMENTS CONTINUED

DEPARTMENT OF TRANSPORTATION:

49 CFR 172.101 AS REVISED ON OCTOBER 1, 1988.

PROPER SHIPPING NAME -- GASOLINE
DOT CLASSIFICATION -- FLAMMABLE LIQUID
DOT IDENTIFICATION NUMBER -- UN 1203

PRODUCT NAME: REGULAR UNLEADED GASOLINE
MSDS NO: 115MAR001

INFORMATION SUPPLIED BY: COORDINATOR, TOXICOLOGY AND PRODUCT SAFETY
CRAIG M. PARKER PHONE: (419)422-2121

MSDS DATE: 04/10/87 DATE OF PREVIOUS MSDS: / /

PRODUCT NAME: SILICA 2
MSDS NO: 100TAY001

THE FOLLOWING INFORMATION IS FURNISHED SUBJECT TO THE DISCLAIMER ON THE BOTTOM OF THIS FORM

SECTION 1 - PRODUCT IDENTIFICATION

PRODUCT NAME: SILICA 2

SYNONYMS:
SILICA 2; SODIUM MOLYBDATE SOLUTION;

MANUFACTURER / DISTRIBUTOR:
TAYLOR TECHNOLOGIES, INC.
31 LOVETON CIRCLE
SPARKS, MD
21152
EMERGENCY PHONE NUMBERS:
(419) 422-2121 (MARATHON)
(800) 424-9300 (CHEMTREC)

CHEMICAL FAMILY: SALT SOLUTION
CHEMICAL FORMULA: CAS NO:

SECTION 2 - PHYSICAL PROPERTIES

BOILING POINT	MELTING POINT	SPECIFIC GRAVITY(H2O=1)
213 F	F	1.13
C	C	

% SOLUBILITY IN WATER	VAPOR DENSITY(AIR=1)	VAPOR PRESSURE
COMPLETE	.6	17 MM HG

PH INFORMATION: PH: AT CONC.
APPEARANCE: COLORLESS, WATERLIKE LIQUID ODOR: ODORLESS

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT	AUTOIGNITION TEMP	EXPLOSIVE LIMITS (% BY VOLUME IN AIR)
F	F	LOWER/UPPER:
C	C	

NFPA CLASS -- HEALTH: FIRE: REACTIVITY: OTHER:

SPECIFIC HAZARD: NONE

---------- FIRE AND EXPLOSION HAZARDS ----------

---------- EXTINGUISHING MEDIA ----------

--------- SPECIAL FIRE FIGHTING INSTRUCTIONS ----------

N/A

PRODUCT NAME: SILICA 2
MSDS NO: 100TAY001

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA (CON'T)

STABILITY: THE MATERIAL IS AT 70 F, 760MM PRESSURE
CONDITIONS TO AVOID:

HAZARDOUS DECOMPOSITION PRODUCTS:

INCOMPATIBLE MATERIALS:

HAZARDOUS POLYMERIZATION:

SECTION 4 - PRODUCT COMPOSITION AND EXPOSURE LIMITS

EXPOSURE LIMITS FOR PRODUCT:	TLV	SOURCE
SILICA 2	NONE ESTABLISHED	

COMPONENTS:	PERCENT RANGE	TLV	SOURCE
SILICA 2	100.00	( )	

SECTION 5 - POTENTIAL HEALTH EFFECTS

-------- ROUTES OF EXPOSURE AND EFFECTS - EYE ---------

-------- ROUTES OF EXPOSURE AND EFFECTS - SKIN --------

----- ROUTES OF EXPOSURE AND EFFECTS - INHALATION -----

------ ROUTES OF EXPOSURE AND EFFECTS - INGESTION -----

---------- ADDITIONAL TOXICITY INFORMATION ----------

PRODUCT NAME: SILICA 2
MSDS NO: 100TAY001

SECTION 5 - POTENTIAL HEALTH EFFECTS (CON'T)

EMERGENCY FIRST AID PROCEDURES

---------- FIRST AID - EYE ----------

---------- FIRST AID - SKIN ----------

---------- FIRST AID - INHALATION ----------

---------- FIRST AID - INGESTION ----------

SECTION 6 - SPECIAL PROTECTION INFORMATION

---------- VENTILATION ----------

------ PERSONAL PROTECTIVE EQUIPMENT - RESPIRATOR -----

---------- PERSONAL PROTECTIVE EQUIPMENT - EYE -------

-------- PERSONAL PROTECTIVE EQUIPMENT - GLOVES -------

---------- OTHER PROTECTIVE EQUIPMENT ----------

SECTION 7 - SPILL OR LEAK PROCEDURES

- STEPS TO BE TAKEN IN CASE OF SPILL, LEAK OR RELEASE -

FLUSH TO SEWER.

---------- WASTE DISPOSAL METHOD ----------

FLUSH TO SEWER.

SECTION 8 - HANDLING AND STORAGE PRECAUTIONS

SECTION 9 - HAZARD WARNING

PRODUCT NAME: SILICA 2
MSDS NO: 100TAY001

SECTION 10 - COMMENTS

SECTION 11 - REGULATORY INFORMATION

SECTION 12 - REGULATIONS/COMMENTS CONTINUED

INFORMATION SUPPLIED BY: COORDINATOR, TOXICOLOGY AND PRODUCT SAFETY
PHONE: ( ) -

MSDS DATE: 08/08/85 DATE OF PREVIOUS MSDS: / /

PRODUCT NAME: TRIETHYLENE GLYCOL
MSDS NO: 108ASH001

THE FOLLOWING INFORMATION IS FURNISHED SUBJECT TO THE DISCLAIMER ON THE BOTTOM OF THIS FORM

SECTION 1 - PRODUCT IDENTIFICATION

PRODUCT NAME: TRIETHYLENE GLYCOL

SYNONYMS:
TRIETHYLENE GLYCOL; 2,2'-ETHYLENE DIOXYDIETHANOL; TEXACO TRIETHYLENE GLYCOL; GLYCOL, TRIETHYLENE

CHEMICAL FAMILY:
CHEMICAL FORMULA:

MANUFACTURER / DISTRIBUTOR:
ASHLAND CHEMICAL COMPANY
P.O. BOX 2219
COLUMBUS, OH
43216

EMERGENCY PHONE NUMBERS:
(419) 422-2121 (MARATHON)
(800) 424-9300 (CHEMTREC)

CAS NO: 112-27-6

SECTION 2 - PHYSICAL PROPERTIES

BOILING POINT		MELTING POINT		SPECIFIC GRAVITY(H2O=1)
532-572	F		F	1.124
277-300	C		C	

% SOLUBILITY IN WATER	VAPOR DENSITY(AIR=1)	VAPOR PRESSURE
	5.2	<0.01 MM HG @68F

PH INFORMATION: PH: AT CONC.
APPEARANCE: ODOR:

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT		AUTOIGNITION TEMP		EXPLOSIVE LIMITS (% BY VOLUME IN AIR)
331	F		F	LOWER/UPPER: .9
166.1	C		C	

NFPA CLASS -- HEALTH: 1 FIRE: 1 REACTIVITY: 0 OTHER:

SPECIFIC HAZARD: NONE

---------- FIRE AND EXPLOSION HAZARDS ----------

NEVER USE WELDING OR CUTTING TORCH ON OR NEAR DRUM (EVEN EMPTY) BECAUSE PRODUCT (EVEN JUST RESIDUE) CAN IGNITE EXPLOSIVELY.

---------- EXTINGUISHING MEDIA ----------

ALCOHOL FOAM OR WATER FOG OR CARBON DIOXIDE OR DRY CHEMICAL

--------- SPECIAL FIRE FIGHTING INSTRUCTIONS ----------

SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACEPIECE OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE WHEN FIGHTING FIRES.

WATER OR FOAM MAY CAUSE FROTHING WHICH CAN BE VIOLENT AND POSSIBLY ENDANGER THE LIFE OF THE FIREFIGHTER, EXPECIALLY IF SPRAYED INTO CONTAINERS OF HOT, BURNING LIQUID. WATER MAY BE USED TO KEEP FIRE-EXPOSED CONTAINERS COOL UNTIL FIRE IS OUT.

PRODUCT NAME: TRIETHYLENE GLYCOL
MSDS NO: 108ASH001

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA (CON'T)

STABILITY: THE MATERIAL IS STABLE AT 70 F, 760MM PRESSURE
CONDITIONS TO AVOID:

HAZARDOUS DECOMPOSITION PRODUCTS:
MAY FORM TOXIC MATERIALS:, CARBON DIOXIDE, AND
CARBON MONOXIDE

INCOMPATIBLE MATERIALS:
STRONG OXIDIZING AGENTS

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

SECTION 4 - PRODUCT COMPOSITION AND EXPOSURE LIMITS

EXPOSURE LIMITS FOR PRODUCT:	TLV	SOURCE
TRIETHYLENE GLYCOL	NONE ESTABLISHED	

COMPONENTS:	PERCENT RANGE	TLV	SOURCE
MERCAPTAN SALT, ORGANIC	95.00	( )	
WATER	1.00- 5.00	( )	

SECTION 5 - POTENTIAL HEALTH EFFECTS

-------- ROUTES OF EXPOSURE AND EFFECTS - EYE ---------

MAY CAUSE IRRITATION

-------- ROUTES OF EXPOSURE AND EFFECTS - SKIN --------

PRIMARY ROUTE OF EXPOSURE. MAY CAUSE IRRITATION

----- ROUTES OF EXPOSURE AND EFFECTS - INHALATION -----

PRIMARY ROUTE OF EXPOSURE. BREATHING OF MIST CAN CAUSE IRRITATION OF NASAL AND RESPIRATORY PASSAGES.

------ ROUTES OF EXPOSURE AND EFFECTS - INGESTION -----

MAY CAUSE GASTROINTESTINAL IRRITATION

---------- ADDITIONAL TOXICITY INFORMATION ----------

PRODUCT NAME: TRIETHYLENE GLYCOL
MSDS NO: 108ASH001

SECTION 5 - POTENTIAL HEALTH EFFECTS (CON'T)

EMERGENCY FIRST AID PROCEDURES

FIRST AID - EYE

FLUSH WITH LARGE AMOUNTS OF WATER, LIFTING UPPER AND LOWER LIDS OCCASIONALLY.

FIRST AID - SKIN

THOROUGHLY WASH EXPOSED AREA WITH SOAP AND WATER. REMOVE CONTAMINATED CLOTHING. LAUNDER CONTAMINATED CLOTHING BEFORE REUSE.

FIRST AID - INHALATION

IF AFFECTED, REMOVE INDIVIDUAL TO FRESH AIR. IF BREATHING IS DIFFIFULT, ADMINISTER OXYGEN. IF BREATHING HAS STOPPED, GIVE ARTIFICIAL RESPIRATION. KEEP PERSON WARM, QUIET AND GET MEDICAL ATTENTION.

FIRST AID - INGESTION

IMMEDIATELY DRINK TWO GLASSES OF WATER AND INDUCE VOMITING BY EITHER GIVING IPECAC SYRUP OR BY PLACING FINGER AT BACK OF THROAT. NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON. GET MEDICAL ATTENTION IMMEDIATELY.

SECTION 6 - SPECIAL PROTECTION INFORMATION

VENTILATION

PROVIDE SUFFICIENT MECHANICAL (GENERAL AND/OR LOCAL EXHAUST) VENTILATION TO MAINTAIN EXPOSURE BELOW LEVEL OF OVEREXPOSURE (FROM KNOWN, SUSPECTED OR APPARENT ADVERSE EFFECTS).

PERSONAL PROTECTIVE EQUIPMENT - RESPIRATOR

IF OVEREXPOSURE HAS BEEN DETERMINED OR DOCUMENTED, A NIOSH/MSHA JOINTLY APPOINTED AIR SUPPLIED RESPIRATOR IS ADVISED IN ABSENCE OF PROPER ENVIRONMENTAL CONTROL. OSHA REGULATIONS ALSO PERMIT OTHER NIOSH/MSHA RESPIRATORS UNDER SPECIFIED CONDITIONS. (SEE YOUR SAFETY EQUIPMENT SUPPLIER). ENGINEERING OR ADMINISTRATIVE CONTROLS SHOULD BE IMPLEMENTED TO REDUCE EXPOSURE.

PERSONAL PROTECTIVE EQUIPMENT - EYE

CHEMICAL SPLASH GOGGLES IN COMPLIANCE WITH OSHA REGULATIONS ARE ADVISED; HOWEVER, OSHA REGULATIONS ALSO PERMIT OTHER TYPE SAFETY GLASSES. (CONSULT YOUR SAFETY EQUIPMENT SUPPLIER)

PERSONAL PROTECTIVE EQUIPMENT - GLOVES

WEAR RESISTANT GLOVES SUCH AS: POLYVINYL CHLORIDE.

OTHER PROTECTIVE EQUIPMENT

TO PREVENT REPEATED OR PROLONGED SKIN CONTACT, WEAR IMPERVIOUS CLOTHING AND BOOTS.

PRODUCT NAME: TRIETHYLENE GLYCOL
MSDS NO: 108ASH001

SECTION 7 - SPILL OR LEAK PROCEDURES

- STEPS TO BE TAKEN IN CASE OF SPILL, LEAK OR RELEASE -

SMALL SPILL: ABSORB LIQUID ON PAPER, VERMICULITE, FLOOR ABSORBENT, OR OTHER ABSORBENT MATERIAL AND TRANSFER TO HOOD. LARGE SPILL: ELIMINATE ALL IGNITION SOURCES (FLARES, FLAMES INCLUDING PILOT LIGHTS, ELECTRICAL SPARKS). PERSONS NOT WEARING PROTECTIVE EQUIPMENT SHOULD BE EXCLUDED FROM AREA OF SPILL UNTIL CLEAN-UP HAS BEEN COMPLETED. STOP SPILL AT SOURCE, DIKE AREA OF SPILL TO PREVENT SPREADING, PUMP LIQUID TO SALVAGE TANK. REMAINING LIQUID MAY BE TAKEN UP ON SAND, CLAY, EARTH, FLOOR ABSORBENT, OR OTHER ABSORBENT MATERIAL AND SHOVELED INTO CONTAINERS. PREVENT RUNOFF TO SEWERS, STREAMS OR OTHER DOBIES OF WATER. IF RUNOFF OCCURS, NOTIFY PROPER AUTHORITIES AS REQUIRED, THAT A SPILL HAS OCCURRED.

---------- WASTE DISPOSAL METHOD ----------

SMALL SPILL: DESTROY BY INCINERATION IN ACCORDANCE WITH APPLICABLE REGULATIONS. LARGE SPILL: DESTROY BY LIQUID INCINERATION. CONTAMINATED ABSORBENT MAY BE DEPOSITED IN A LANDFILL IN ACCORDANCE WITH LOCAL, STATE AND FEDERAL REGULATIONS.

SECTION 8 - HANDLING AND STORAGE PRECAUTIONS

CONTAINERS OF THIS MATERIAL MAY BE HAZARDOUS WHEN EMPTIED. SINCE EMPTIED CONTAINERS RETAIN PRODUCT RESIDUES (VAPOR, LIQUID, AND/OR SOLID), ALL HAZARD PRECAUTIONS IN THIS DATA SHEET MUST BE OBSERVED.

SECTION 9 - HAZARD WARNING

GENERAL OR GENERIC ID: GLYCOL
D.O.T. HAZARD CLASSIFICATION: NOT APPLICABLE

SECTION 10 - COMMENTS

SECTION 11 - REGULATORY INFORMATION

SECTION 12 - REGULATIONS/COMMENTS CONTINUED

INFORMATION SUPPLIED BY: COORDINATOR, TOXICOLOGY AND PRODUCT SAFETY
PHONE: (614)889-3333

MSDS DATE: 03/01/86 DATE OF PREVIOUS MSDS: 10/01/84

PRODUCT NAME: TRIETHYLENE GLYCOL - TECHNICAL
MSDS NO: 123DOW001

THE FOLLOWING INFORMATION IS FURNISHED SUBJECT TO THE DISCLAIMER ON THE BOTTOM OF THIS FORM

SECTION 1 - PRODUCT IDENTIFICATION

PRODUCT NAME: TRIETHYLENE GLYCOL - TECHNICAL

SYNONYMS:
TRIETHYLENE GLYCOL - TECHNICAL; TRIETHYLENE GLYCOL, TECHNICAL

MANUFACTURER / DISTRIBUTOR:
DOW CHEMICAL U.S.A.
MIDLAND
MICHIGAN
48674
EMERGENCY PHONE NUMBERS:
(419) 422-2121 (MARATHON)
(800) 424-9300 (CHEMTREC)

CHEMICAL FAMILY:
CHEMICAL FORMULA:
CAS NO:

SECTION 2 - PHYSICAL PROPERTIES

BOILING POINT	MELTING POINT	SPECIFIC GRAVITY(H2O=1)
545.9 F	F	1.1 @25C
286 C	C	

% SOLUBILITY IN WATER	VAPOR DENSITY(AIR=1)	VAPOR PRESSURE
COMPLETELY	5.18	<1.0 MM HG @20C

PH INFORMATION: PH: AT CONC.
APPEARANCE: COLORLESS LIQUID ODOR: MILD

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT	AUTOIGNITION TEMP	EXPLOSIVE LIMITS (% BY VOLUME IN AIR)
350 PMCC F	F	LOWER/UPPER: 0.9/9.2
177 PMCC C	C	

NFPA CLASS -- HEALTH: FIRE: REACTIVITY: OTHER:

SPECIFIC HAZARD: NONE

---------- FIRE AND EXPLOSION HAZARDS ----------

N/A

---------- EXTINGUISHING MEDIA ----------

WATER FOG, ALCOHOL RESISTANT FOAM, CO2, DRY CHEMICAL

--------- SPECIAL FIRE FIGHTING INSTRUCTIONS ----------

WEAR POSITIVE PRESSURE SELF-CONTAINED BREATHING APPARATUS.

PRODUCT NAME: TRIETHYLENE GLYCOL - TECHNICAL
MSDS NO: 123DOW001

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA (CON'T)

STABILITY: THE MATERIAL IS AT 70 F, 760MM PRESSURE
CONDITIONS TO AVOID:
WILL IGNITE IN AIR AT 700F

HAZARDOUS DECOMPOSITION PRODUCTS:
BURNING PRODUCES NORMAL PRODUCTS OF COMBUSTION, INCLUDING CARBON MONOXIDE/DIOXIDE AND WATER

INCOMPATIBLE MATERIALS:
OXIDIZING MATERIAL

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

SECTION 4 - PRODUCT COMPOSITION AND EXPOSURE LIMITS

EXPOSURE LIMITS FOR PRODUCT:	TLV	SOURCE
TRIETHYLENE GLYCOL - TECHNICAL	NONE ESTABLISHED	

COMPONENTS:	PERCENT RANGE	TLV	SOURCE
TRIETHYLENE GLYCOL	99.00	( )	

SECTION 5 - POTENTIAL HEALTH EFFECTS

-------- ROUTES OF EXPOSURE AND EFFECTS - EYE ---------

ESSENTIALLY NONIRRITATING TO EYES.

-------- ROUTES OF EXPOSURE AND EFFECTS - SKIN --------

CONTACT: PROLONGED OR REPEATED EXPOSURE MAY CAUSE SKIN IRRITATION. MAY CAUSE MORE SEVERE RESPONSE IF SKIN IS ABRADED (SCRATCHED OR CUT).
ABSORPTION: A SINGLE PROLONGED EXPOSURE IS NOT LIKELY TO RESULT IN THE MATERIAL BEING ABSORBED THROUGH SKIN IN HARMFUL AMOUNTS.

----- ROUTES OF EXPOSURE AND EFFECTS - INHALATION -----

NO ADVERSE EFFECTS ARE ANTICIPATED FROM INHALATION.

------ ROUTES OF EXPOSURE AND EFFECTS - INGESTION -----

AMOUNTS INGESTED INCIDENTAL TO INDUSTRIAL HANDLING ARE NOT LIKELY TO CAUSE INJURY; HOWEVER, INGESTION OF LARGER AMOUNTS MAY CAUSE INJURY.

---------- ADDITIONAL TOXICITY INFORMATION ----------

THE DERMAL LD50 HAS NOT BEEN DETERMINED

SINGLE DOSE ORAL TOXICITY IS LOW. THE ORAL LD50 FOR RATS IS 16,800-22,060 MG/KG

BASED ON AVAILABLE DATA, REPEATED EXPOSURES ARE NOT ANTICIPATED TO CAUSE ANY SIGNIFICANT ADVERSE EFFECTS. DID NOT CAUSE CANCER IN LONG-TERM ANIMAL STUDIES. BIRTH DEFECTS ARE UNLIKELY. EXPOSURES HAVING NO ADVERSE EFFECTS ON THE MOTHER SHOULD HAVE NO EFFECT ON THE FETUS. IN ANIMAL STUDIES, HAS BEEN SHOWN NOT TO INTERFERE WITH REPRODUCTION.

PRODUCT NAME: TRIETHYLENE GLYCOL - TECHNICAL
MSDS NO: 123DOW001

SECTION 5 - POTENTIAL HEALTH EFFECTS (CON'T)

EMERGENCY FIRST AID PROCEDURES

---------- FIRST AID - EYE ----------

IRRIGATE IMMEDIATELY WITH WATER FOR AT LEAST FIVE MINUTES.

---------- FIRST AID - SKIN ----------

WASH OFF IN FLOWING WATER OR SHOWER.

---------- FIRST AID - INHALATION ----------

REMOVE TO FRESH AIR IF EFFECTS OCCUR. CALL A PHYSICIAN.

---------- FIRST AID - INGESTION ----------

INDUCE VOMITING IF LARGE AMOUNTS ARE INGESTED. CONSULT MEDICAL PERSONNEL.

NOTE TO PHYSICIAN: NO SPECIFIC ANTIDOTE. SUPPORTIVE CARE. TREATMENT BASED ON JUDGMENT OF THE PHYSICIAN IN RESPONSE TO THE PATIENT.

SECTION 6 - SPECIAL PROTECTION INFORMATION

---------- VENTILATION ----------

GOOD GENERAL VENTILATION SHOULD BE SUFFICIENT.

------ PERSONAL PROTECTIVE EQUIPMENT - RESPIRATOR -----

IN MISTY ATMOSPHERES, USE AN APPROVED MIST RESPIRATOR.

---------- PERSONAL PROTECTIVE EQUIPMENT - EYE -------

USE SAFETY GLASSES.

-------- PERSONAL PROTECTIVE EQUIPMENT - GLOVES -------

---------- OTHER PROTECTIVE EQUIPMENT ----------

FOR BRIEF CONTACT, NO PRECAUTIONS OTHER THAN CLEAN BODY-COVERING CLOTHING SHOULD BE NEEDED.

PRODUCT NAME: TRIETHYLENE GLYCOL - TECHNICAL
MSDS NO: 123DOW001

SECTION 7 - SPILL OR LEAK PROCEDURES

- STEPS TO BE TAKEN IN CASE OF SPILL, LEAK OR RELEASE -

SMALL SPILLS: SOAK UP WITH ABSORBENT MATERIAL AND COLLECT FOR DISPOSAL. LARGE SPILLS: DIKE TO PREVENT CONTAMINATION OF WATERWAYS, THEN PUMP INTO SUITABLE CONTAINERS FOR DISPOSAL.

---------- WASTE DISPOSAL METHOD ----------

BURN IN AN APPROVED INCINERATOR IN ACCORDANCE WITH ALL LOCAL, STATE AND FEDERAL REQUIREMENTS.

SECTION 8 - HANDLING AND STORAGE PRECAUTIONS

PRACTICE REASONABLE CARE TO AVOID EXPOSURE.

SECTION 9 - HAZARD WARNING

SECTION 10 - COMMENTS

TRACE QUANTITIES OF ETHYLENE OXIDE (EO) MAY BE PRESENT IN THIS PRODUCT. WHILE THESE TRACE QUANTITIES COULD ACCUMULATE IN HEADSPACE AREAS OF STORAGE AND TRANSPORT VESSELS, THEY ARE NOT EXPECTED TO CREATE A CONDITION WHICH WILL RESULT IN EO CONCENTRATIONS GREATER THAN 0.5PPM (8 HOUR TWA) IN THE BREATHING ZONE OF THE WORKPLACE FOR APPROPRIATE APPLICATIONS. OSHA HAS ESTABLISHED A PERMISSIBLE EXPOSURE LIMIT OF 1.0PPM 8 HR TWA FOR EO. (CODE OF FEDERAL REGULATIONS PART 1910.1047 OF TITLE 29).

SECTION 11 - REGULATORY INFORMATION

SARA HAZARD CATEGORY: THIS PRODUCT HAS BEEN REVIEWED ACCORDING TO THE EPA 'HAZARD CATEGORIES' PROMULGATED UNDER SECTIONS 311 AND 312 OF THE SUPERFUND AMENDMENT AND REAUTHORIZATION ACT OF 1986 (SARA TITLE III) AND IS CONSIDERED, UNDER APPLICABLE DEFINITIONS, TO MEET THE FOLLOWING CATEGORIES: NOT TO HAVE MET ANY HAZARD CATEGORY.

SECTION 12 - REGULATIONS/COMMENTS CONTINUED

PRODUCT NAME: TRIETHYLENE GLYCOL - TECHNICAL
MSDS NO: 123DOW001

INFORMATION SUPPLIED BY: COORDINATOR, TOXICOLOGY AND PRODUCT SAFETY
PHONE: ( ) -

MSDS DATE: 03/20/88 DATE OF PREVIOUS MSDS: 12/11/85

PRODUCT NAME: BLR-3152
MSDS NO: 125CAL001

THE FOLLOWING INFORMATION IS FURNISHED SUBJECT TO THE DISCLAIMER ON THE BOTTOM OF THIS FORM

SECTION 1 - PRODUCT IDENTIFICATION

PRODUCT NAME: BLR-3152

SYNONYMS:
BLR-3152; BLR3152;

MANUFACTURER / DISTRIBUTOR:
CALGON CORPORATION
P.O. BOX 1346
PITTSBURGH, PA
15230
EMERGENCY PHONE NUMBERS:
(419) 422-2121 (MARATHON)
(800) 424-9300 (CHEMTREC)

CHEMICAL FAMILY:
CHEMICAL FORMULA:

CAS NO:

SECTION 2 - PHYSICAL PROPERTIES

BOILING POINT		MELTING POINT		SPECIFIC GRAVITY(H2O=1)
210-216	F	18-25	F	1.10
99-102	C	-8 TO -4	C	

% SOLUBILITY IN WATER	VAPOR DENSITY(AIR=1)	VAPOR PRESSURE
COMPLETE	N/D	N/D

PH INFORMATION: PH: 8.3 AT CONC.
APPEARANCE: COLORLESS LIQUID ODOR: SLIGHT AMMONIA

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT		AUTOIGNITION TEMP		EXPLOSIVE LIMITS (% BY VOLUME IN AIR)
NOT FLAM.	F	N/D	F	LOWER/UPPER: N/A/N/A
	C		C	

NFPA CLASS -- HEALTH: FIRE: REACTIVITY: OTHER:

SPECIFIC HAZARD: NONE

---------- FIRE AND EXPLOSION HAZARDS ----------

NONE

---------- EXTINGUISHING MEDIA ----------

N/A

--------- SPECIAL FIRE FIGHTING INSTRUCTIONS ----------

NONE

PRODUCT NAME: BLR-3152
MSDS NO: 125CAL001

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA (CON'T)

STABILITY: THE MATERIAL IS STABLE AT 70 F, 760MM PRESSURE
CONDITIONS TO AVOID:

HAZARDOUS DECOMPOSITION PRODUCTS:
WHEN HEATED TO DECOMPOSITION, CAN EMIT HIGHLY TOXIC FUMES OF POX AND COX

INCOMPATIBLE MATERIALS:
NONE

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

SECTION 4 - PRODUCT COMPOSITION AND EXPOSURE LIMITS

EXPOSURE LIMITS FOR PRODUCT:	TLV	SOURCE
BLR-3152	NONE ESTABLISHED	

COMPONENTS:	PERCENT RANGE	TLV	SOURCE
TETRAPOTASSIUM PYROPHOSPHATE		( )	

SECTION 5 - POTENTIAL HEALTH EFFECTS

-------- ROUTES OF EXPOSURE AND EFFECTS - EYE ---------

PRIMARY ROUTE OF EXPOSURE. MAY CAUSE EYE IRRITATION.

-------- ROUTES OF EXPOSURE AND EFFECTS - SKIN --------

NONE EXPECTED.

----- ROUTES OF EXPOSURE AND EFFECTS - INHALATION -----

NONE EXPECTED.

------ ROUTES OF EXPOSURE AND EFFECTS - INGESTION -----

NONE EXPECTED.

---------- ADDITIONAL TOXICITY INFORMATION ----------

NONE OF THE COMPONENTS OF THIS PRODUCT ARE LISTED AS CARCINOGENS BY NTP (NATIONAL TOXICOLOGY PROGRAM); NOT REGULATED AS CARCINOGENS BY OSHA (OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION); NOT EVALUATED BY IARC (INTERNATIONAL AGENCY FOR RESEARCH ON CANCER).

REPORTED HUMAN EFFECTS: CALGON CORPORATION HAS NOT RECEIVED ANY REPORTS OF ADVERSE EFFECTS FROM WORKERS HANDLING THIS PRODUCT.

REPORTED ANIMAL EFFECTS: CALGON CORPORATION HAS NOT CONDUCTED ANY TOXICITY TESTING ON THIS PRODUCT.

PRODUCT NAME: BLR-3152
MSDS NO: 125CAL001

SECTION 5 - POTENTIAL HEALTH EFFECTS (CON'T)

EMERGENCY FIRST AID PROCEDURES

---------- FIRST AID - EYE ----------

IN CASE OF CONTACT, IMMEDIATELY FLUSH WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES. SEEK MEDICAL AID.

---------- FIRST AID - SKIN ----------

N/A

---------- FIRST AID - INHALATION ----------

N/A

---------- FIRST AID - INGESTION ----------

N/A

SECTION 6 - SPECIAL PROTECTION INFORMATION

---------- VENTILATION ----------

PROVIDE ADEQUATE VENTILATION.

------ PERSONAL PROTECTIVE EQUIPMENT - RESPIRATOR -----

---------- PERSONAL PROTECTIVE EQUIPMENT - EYE -------

CHEMICAL SPLASH GOGGLES

-------- PERSONAL PROTECTIVE EQUIPMENT - GLOVES -------

---------- OTHER PROTECTIVE EQUIPMENT ----------

EYEWASH FOUNTAINS AND SAFETY SHOWERS SHOULD BE EASILY ACCESSIBLE.

PRODUCT NAME: BLR-3152
MSDS NO: 125CAL001

SECTION 7 - SPILL OR LEAK PROCEDURES

- STEPS TO BE TAKEN IN CASE OF SPILL, LEAK OR RELEASE -

SMALL SPILLS: ADD ABSORBENT, SWEEP UP AND DISCARD. LARGE SPILLS: DIKE TO CONTAIN AND PUMP INTO DRUMS FOR USE OR DISPOSAL.

---------- WASTE DISPOSAL METHOD ----------

THIS PRODUCT AT NORMAL USE CONCENTRATIONS IS ROUTINELY HANDLED IN INDUSTRIAL WASTEWATER SYSTEMS. HOWEVER, DISCHARGE MUST MEET LOCAL, STATE AND FEDERAL REGULATIONS.

THIS PRODUCT IS NOT LISTED IN FEDERAL HAZARDOUS WASTE REGULATIONS 40 CFR 261.33 PARAGRAPHS (E) AND (F), I.E. CHEMICAL PRODUCTS THAT ARE CONSIDERED HAZARDOUS IF THEY BECOME WASTES. IT DOES NOT EXHIBIT ANY OF THE HAZARDOUS CHARACTERISTICS LISTED IN 49 CFR 261 SUBPART C. STATE OR LOCAL HAZARDOUS WASTE REGULATIONS MAY APPLY IF DIFFERENT FROM FEDERAL.

WHEN DRUM IS EMPTY, RINSE IT WITH PLENTY OF WATER BEFORE DISCARDING.

SECTION 8 - HANDLING AND STORAGE PRECAUTIONS

AVOID CONTACT WITH EYES. WASH THOROUGHLY AFTER HANDLING, AND BEFORE EATING, DRINKING OR SMOKING.

SECTION 9 - HAZARD WARNING

WARNING! MAY CAUSE EYE IRRITATION.

SECTION 10 - COMMENTS

SECTION 11 - REGULATORY INFORMATION

SECTION 12 - REGULATIONS/COMMENTS CONTINUED

INFORMATION SUPPLIED BY: COORDINATOR, TOXICOLOGY AND PRODUCT SAFETY
PHONE: ( ) -

MSDS DATE: 03/05/87 DATE OF PREVIOUS MSDS: / /

PRODUCT NAME: BLR-3430
MSDS NO: 128CAL001

THE FOLLOWING INFORMATION IS FURNISHED SUBJECT TO THE DISCLAIMER ON THE BOTTOM OF THIS FORM

SECTION 1 - PRODUCT IDENTIFICATION

PRODUCT NAME: BLR-3430

SYNONYMS:
BLR-3430; BLR3430;

MANUFACTURER / DISTRIBUTOR:
CALGON CORPORATION
P.O. BOX 1346
PITTSBURGH, PA
15230
EMERGENCY PHONE NUMBERS:
(419) 422-2121 (MARATHON)
(800) 424-9300 (CHEMTREC)

CHEMICAL FAMILY:
CHEMICAL FORMULA: CAS NO:

SECTION 2 - PHYSICAL PROPERTIES

BOILING POINT		MELTING POINT		SPECIFIC GRAVITY(H2O=1)
219	F	1	F	1.29
104	C	-16.5	C	

% SOLUBILITY IN WATER	VAPOR DENSITY(AIR=1)	VAPOR PRESSURE
COMPLETE	N/D	N/D

PH INFORMATION: PH: 4.1 AT CONC.
APPEARANCE: LIGHT STRAW-COLORED LIQUID ODOR: SLIGHT SULFUROUS

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT		AUTOIGNITION TEMP		EXPLOSIVE LIMITS (% BY VOLUME IN AIR)
NONFLAM	F	N/D	F	LOWER/UPPER: N/A/N/A
	C		C	

NFPA CLASS -- HEALTH: FIRE: REACTIVITY: OTHER:

SPECIFIC HAZARD: NONE

---------- FIRE AND EXPLOSION HAZARDS ----------

NONE

---------- EXTINGUISHING MEDIA ----------

NONE. THIS PRODUCT IS NOT COMBUSTIBLE NOR DOES IT SUPPORT COMBUSTION.

--------- SPECIAL FIRE FIGHTING INSTRUCTIONS ----------

NONE

PRODUCT NAME: BLR-3430
MSDS NO: 128CAL001

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA (CON'T)

STABILITY: THE MATERIAL IS STABLE AT 70 F, 760MM PRESSURE
CONDITIONS TO AVOID:

HAZARDOUS DECOMPOSITION PRODUCTS:
WHEN HEATED TO DECOMPOSITION, WILL EMIT SULFUR DIOXIDE

INCOMPATIBLE MATERIALS:
ACIDS AND OXIDIZERS

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

SECTION 4 - PRODUCT COMPOSITION AND EXPOSURE LIMITS

EXPOSURE LIMITS FOR PRODUCT:	TLV	SOURCE
BLR-3430	NONE ESTABLISHED	

COMPONENTS:	PERCENT RANGE	TLV	SOURCE
SODIUM BISULFITE		5.00 MG/M3 (8 HR TWA)	ACGIH
		5.00 MG/M3 (8 HR TWA)	OSHA

SECTION 5 - POTENTIAL HEALTH EFFECTS

-------- ROUTES OF EXPOSURE AND EFFECTS - EYE ---------

MAY CAUSE EYE IRRITATION; PAIN, TEARING, CONJUNCTIVAL SWELLING (EDEMA) REDNESS AND CONJUNCTIVITIS MAY ALSO BE SEEN.

-------- ROUTES OF EXPOSURE AND EFFECTS - SKIN --------

PRIMARY ROUTE OF EXPOSURE. MAY CAUSE SKIN IRRITATION, PAIN, BURNS, STAINS, REDNESS AND DERMATITIS MAY ALSO BE SEEN.

-------ROUTES OFEXPOSURE AND EFFECTS - INHALATION -----

PRIMARY ROUTE OF EXPOSURE. INHALING MISTS MAY CAUSE RESPIRATORY IRRITATION; SORE THROAT, COUGHING, NAUSEA, DYSPNEA, RESPIRATORY DISTRESS AND HYPOTENSION MAY ALSO BE SEEN.

------ ROUTES OF EXPOSURE AND EFFECTS - INGESTION -----

ALTHOUGH INGESTION IS NOT A COMMON ROUTE OF INDUSTRIAL EXPOSURE, THIS MATERIAL IS EXPECTED TO BE A GASTRIC IRRITANT AND MAY CAUSE ABDOMINAL PAIN, NAUSEA, VOMITING, DIARRHEA, HYPOTENSION AND POSSIBLE SUFFOCATION (ASPHYXIA) DUE TO GLOTTAL EDEMA.

PRODUCT NAME: BLR-3430
MSDS NO: 128CAL001

SECTION 5 - POTENTIAL HEALTH EFFECTS (CON'T)

ADDITIONAL TOXICITY INFORMATION

NONE OF THE COMPONENTS OF THIS PRODUCT ARE LISTED AS CARCINOGENS BY NTP (NATIONAL TOXICOLOGY PROGRAM); NOT REGULATED AS CARCINOGENS BY OSHA (OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION); NOT EVALUATED BY IARC (INTERNATIONAL AGENCY FOR RESEARCH ON CANCER).

REPORTED HUMAN EFFECTS: CALGON CORPORATION HAS NOT RECEIVED ANY REPORTS OF ADVERSE EFFECTS FROM WORKERS HANDLING THIS PRODUCT.

REPORTED ANIMAL EFFECTS: CALGON CORPORATION HAS NOT CONDUCTED ANY TOXICOLOGY TESTING WITH THIS FORMULATED PRODUCT. SODIUM BISULFITE HAS REPORTED RAT LD50 OF 2000MG/KG ORALLY, 650MG/KG BY INTRAPERITONEAL INJECTION, AND 115MG/KG UPON INTRAVENOUS ADMINISTRATION. DATA ON MUTAGENIC EFFECTS OF SODIUM BISULFITE ARE ALSO REPORTED IN THE LITERATURE.

EMERGENCY FIRST AID PROCEDURES

FIRST AID - EYE

IN CASE OF CONTACT, IMMEDIATELY FLUSH WITH PLENTY OF LOW PRESSURE WATER FOR AT LEAST 15 MINUTES. REMOVE ANY CONTACT LENSES TO ASSURE THOROUGH FLUSHING. CALL A PHYSICIAN.

FIRST AID - SKIN

PROMPTLY FLUSH WITH RUNNING WATER. REMOVE CONTAMINATED CLOTHING. WASH CLOTHING BEFORE REUSE.

FIRST AID - INHALATION

REMOVE TO FRESH AIR. TREAT ANY IRRITATION SYMPTOMATICALLY. IF BREATHING IS DIFFICULT, GIVE OXYGEN. IF BREATHING HAS STOPPED, GIVE ARTIFICIAL RESPIRATION. CALL A PHYSICIAN.

FIRST AID - INGESTION

IF CONSCIOUS, THE PERSON SHOULD IMMEDIATELY DRINK LARGE QUANTITIES OF MILK OR WATER TO DILUTE THIS PRODUCT. DO NOT INDUCE VOMITING. CALL A PHYSICIAN. NEVER GIVE LIQUIDS TO AN UNCONSCIOUS PERSON.

NOTE TO PHYSICIAN: NO SPECIFIC ANTIDOTE. SUPPORTIVE CARE. TREATMENT BASED ON JUDGMENT OF THE PHYSICIAN IN RESPONSE TO REACTIONS OF THE PATIENT.

SECTION 6 - SPECIAL PROTECTION INFORMATION

VENTILATION

ADEQUATE VENTILATION SHOULD BE PROVIDED TO KEEP MIST AND VAPOR CONCENTRATIONS BELOW ACCEPTABLE EXPOSURE LIMITS.

PRODUCT NAME: BLR-3430
MSDS NO: 128CAL001

SECTION 6 - SPECIAL PROTECTION INFORMATION (CON'T)

------ PERSONAL PROTECTIVE EQUIPMENT - RESPIRATOR -----

APPROPRIATE RESPIRATOR IS RECOMMENDED WHEN EXPOSURE TO AIRBORNE CONTAMINANT IS LIKELY TO EXCEED ACCEPTABLE LIMITS.

---------- PERSONAL PROTECTIVE EQUIPMENT - EYE -------

SAFETY GLASSES

-------- PERSONAL PROTECTIVE EQUIPMENT - GLOVES -------

IMPERVIOUS GLOVES

------------ OTHER PROTECTIVE EQUIPMENT --------------

EYEWASH FOUNTAINS AND SAFETY SHOWERS SHOULD BE EASILY ACCESSIBLE.

SECTION 7 - SPILL OR LEAK PROCEDURES

- STEPS TO BE TAKEN IN CASE OF SPILL, LEAK OR RELEASE -

SMALL SPILLS: ADD ABSORBENT, SWEEP UP AND DISCARD. LARGE SPILLS: DIKE TO CONTAIN AND PUMP INTO DRUMS FOR USE OR DISPOSAL.

---------- WASTE DISPOSAL METHOD ----------

THIS PRODUCT AT NORMAL USE CONCENTRATIONS IS ROUTINELY HANDLED IN INDUSTRIAL WASTEWATER TREATING SYSTEMS. HOWEVER, DISCHARGE MUST MEET LOCAL, STATE AND FEDERAL DISCHARGE REGULATIONS.

THIS PRODUCT IS NOT LISTED IN FEDERAL HAZARDOUS WASTE REGULATIONS 40 CFR 261.33 PARAGRAPHS (E) AND (F), I.E. CHEMICAL PRODUCTS THAT ARE CONSIDERED HAZARDOUS IF THEY BECOME WASTES. IT DOES NOT EXHIBIT ANY OF THE HAZARDOUS CHARACTERISTICS LISTED IN 49 CFR 261 SUBPART C. STATE OR LOCAL HAZARDOUS WASTE REGULATIONS MAY APPLY IF DIFFERENT FROM FEDERAL.

EPA REPORTABLE QUANTITY (RQ): BLR-3430 CONTAINS SODIUM BISULFITE THAT IS A "HAZARDOUS SUBSTANCE" LISTED IN 40 CFR 302.4. BLR-3430 HAS A "REPORTABLE QUANTITY" OF 13,157 LBS.

WHEN DRUM IS EMPTY, RINSE IT WITH PLENTY OF WATER BEFORE DISCARDING.

SECTION 8 - HANDLING AND STORAGE PRECAUTIONS

STORE IN COOL, DRY PLACE. KEEP CONTAINER TIGHTLY CLOSED. THIS PRODUCT MAY REACT WITH ACIDS AND OXIDIZERS AND SHOULD NOT BE STORED NEAR SUCH MATERIALS.

AVOID CONTACT WITH SKIN AND CLOTHING. REMOVE CONTAMINATED CLOTHING PROMPTLY AND CLEAN THOROUGHLY BEFORE REUSE. AVOID BREATHING MISTS OR VAPORS. WASH THOROUGHLY AFTER HANDLING.

PRODUCT NAME: BLR-3430
MSDS NO: 128CAL001

SECTION 9 - HAZARD WARNING

WARNING! MAY CAUSE EYE AND SKIN IRRITATION.

SECTION 10 - COMMENTS

SECTION 11 - REGULATORY INFORMATION

SECTION 12 - REGULATIONS/COMMENTS CONTINUED

INFORMATION SUPPLIED BY: COORDINATOR, TOXICOLOGY AND PRODUCT SAFETY
PHONE: ( ) -

MSDS DATE: 02/24/87 DATE OF PREVIOUS MSDS: / /

PRODUCT NAME: BLR-3570
MSDS NO: 127CAL001

THE FOLLOWING INFORMATION IS FURNISHED SUBJECT TO THE DISCLAIMER ON THE BOTTOM OF THIS FORM

SECTION 1 - PRODUCT IDENTIFICATION

PRODUCT NAME: BLR-3570

SYNONYMS:
BLR-3570; BLR3570;

MANUFACTURER / DISTRIBUTOR:
CALGON CORPORATION
P.O. BOX 1346
PITTSBURGH, PA
15230
EMERGENCY PHONE NUMBERS:
(419) 422-2121 (MARATHON)
(800) 424-9300 (CHEMTREC)

CHEMICAL FAMILY:
CHEMICAL FORMULA: CAS NO:

SECTION 2 - PHYSICAL PROPERTIES

BOILING POINT		MELTING POINT		SPECIFIC GRAVITY(H2O=1)
212	F	31	F	0.97
100	C	-0.7	C	

% SOLUBILITY IN WATER	VAPOR DENSITY(AIR=1)	VAPOR PRESSURE
COMPLETE	N/D	N/D

PH INFORMATION: PH: 12.1 AT CONC.
APPEARANCE: YELLOW LIQUID ODOR: FISHY

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT		AUTOIGNITION TEMP		EXPLOSIVE LIMITS (% BY VOLUME IN AIR)
NOT FLAM.	F	N/A	F	LOWER/UPPER: N/A/N/A
	C		C	

NFPA CLASS -- HEALTH: FIRE: REACTIVITY: OTHER:

SPECIFIC HAZARD: NONE

---------- FIRE AND EXPLOSION HAZARDS ----------

CYCLOHEXYLAMINE VAPORS FORM EXPLOSIVE MIXTURES WITH AIR.

---------- EXTINGUISHING MEDIA ----------

DRY CHEMICAL, CARBON DIOXIDE, FOAM, WATER SPRAY

--------- SPECIAL FIRE FIGHTING INSTRUCTIONS ----------

USE SELF-CONTAINED BREATHING APPARATUS. USE WATER TO KEEP FIRE-EXPOSED CONTAINERS COOL.

PRODUCT NAME: BLR-3570
MSDS NO: 127CAL001

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA (CON'T)

STABILITY: THE MATERIAL IS STABLE AT 70 F, 760MM PRESSURE
CONDITIONS TO AVOID:

HAZARDOUS DECOMPOSITION PRODUCTS:
WHEN HEATED TO DECOMPOSITION, CAN EMIT HIGHLY TOXIC FUMES OF NOX

INCOMPATIBLE MATERIALS:
OXIDIZING MATERIALS

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

SECTION 4 - PRODUCT COMPOSITION AND EXPOSURE LIMITS

EXPOSURE LIMITS FOR PRODUCT:	TLV	SOURCE
BLR-3570	NONE ESTABLISHED	

COMPONENTS:	PERCENT RANGE	TLV			SOURCE
CYCLOHEXYLAMINE		10.00	PPM	(8 HR TWA)	ACGIH
		10.00	PPM	(8 HR TWA)	OSHA

SECTION 5 - POTENTIAL HEALTH EFFECTS

-------- ROUTES OF EXPOSURE AND EFFECTS - EYE ---------

PRIMARY ROUTE OF EXPOSURE. MAY CAUSE SEVERE EYE DAMAGE.

-------- ROUTES OF EXPOSURE AND EFFECTS - SKIN --------

PRIMARY ROUTE OF EXPOSURE. MAY CAUSE SKIN IRRITATION. PROLONGED CONTACT MAY CAUSE SKIN DAMAGE.

-------ROUTES OFEXPOSURE AND EFFECTS - INHALATION -----

NONE EXPECTED.

------ ROUTES OF EXPOSURE AND EFFECTS - INGESTION -----

NONE EXPECTED.

---------- ADDITIONAL TOXICITY INFORMATION ----------

NONE OF THE COMPONENTS OF THIS PRODUCT ARE LISTED AS CARCINOGENS BY NTP (NATIONAL TOXICOLOGY PROGRAM); NOT REGULATED AS CARCINOGENS BY OSHA (OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION); NOT EVALUATED BY IARC (INTERNATIONAL AGENCY FOR RESEARCH ON CANCER).

REPORTED HUMAN EFFECTS: CALGON CORPORATION HAS NOT RECEIVED ANY REPORTS OF ADVERSE EFFECTS FROM WORKERS HANDLING THIS PRODUCT.

REPORTED ANIMAL EFFECTS: CALGON CORPORATION HAS NOT CONDUCTED ANY TOXICITY TESTING ON THIS PRODUCT.

PRODUCT NAME: BLR-3570
MSDS NO: 127CAL001

SECTION 5 - POTENTIAL HEALTH EFFECTS (CON'T)

EMERGENCY FIRST AID PROCEDURES

---------- FIRST AID - EYE ----------

IN CASE OF CONTACT, IMMEDIATELY FLUSH WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES. SEEK MEDICAL AID.

---------- FIRST AID - SKIN ----------

PROMPTLY FLUSH WITH RUNNING WATER. REMOVE CONTAMINATED CLOTHING. WASH CLOTHING BEFORE REUSE.

---------- FIRST AID - INHALATION ----------

N/A

---------- FIRST AID - INGESTION ----------

N/A

SECTION 6 - SPECIAL PROTECTION INFORMATION

---------- VENTILATION ----------

PROVIDE ADEQUATE VENTILATION.

---------- PERSONAL PROTECTIVE EQUIPMENT - RESPIRATOR -----

---------- PERSONAL PROTECTIVE EQUIPMENT - EYE -------

CHEMICAL GOGGLES, FACE SHIELD

---------- PERSONAL PROTECTIVE EQUIPMENT - GLOVES -------

IMPERVIOUS GLOVES

---------- OTHER PROTECTIVE EQUIPMENT ----------

APPROPRIATE PROTECTIVE CLOTHING. EYEWASH FOUNTAINS AND SAFETY SHOWER SHOULD BE EASILY ACCESSIBLE.

PRODUCT NAME: BLR-3570
MSDS NO: 127CAL001

SECTION 7 - SPILL OR LEAK PROCEDURES

- STEPS TO BE TAKEN IN CASE OF SPILL, LEAK OR RELEASE -

SMALL SPILLS: ADD ABSORBENT, SWEEP UP AND DISCARD. LARGE SPILLS: DIKE TO CONTAIN AND PUMP INTO DRUMS FOR USE OR DISPOSAL.

---------- WASTE DISPOSAL METHOD ----------

THIS PRODUCT AT NORMAL USE CONCENTRATIONS IS ROUTINELY HANDLED IN INDUSTRIAL WASTEWATER SYSTEMS. HOWEVER, DISCHARGE MUST MEET LOCAL, STATE AND FEDERAL REGULATIONS.

THIS PRODUCT IS NOT LISTED IN FEDERAL HAZARDOUS WASTE REGULATIONS 40 CFR 261.33 PARAGRAPHS (E) AND (F), I.E. CHEMICAL PRODUCTS THAT ARE CONSIDERED HAZARDOUS IF THEY BECOME WASTES. IT DOES NOT EXHIBIT ANY OF THE HAZARDOUS CHARACTERISTICS LISTED IN 49 CFR 261 SUBPART C. STATE OR LOCAL HAZARDOUS WASTE REGULATIONS MAY APPLY IF DIFFERENT FROM FEDERAL.

WHEN DRUM IS EMPTY, RINSE IT WITH PLENTY OF WATER BEFORE DISCARDING.

SECTION 8 - HANDLING AND STORAGE PRECAUTIONS

STORE IN COOL, DRY, WELL-VENTILATED AREA. KEEP CONTAINERS CLOSED. THIS PRODUCT, IN ITS CONCENTRATED FORM, IS CORROSIVE TO ALUMINUM.

AVOID CONTACT WITH SKIN AND CLOTHING. AVOID BREATHING LIST. DO NOT ALLOW EYE CONTACT. WASH THOROUGHLY AFTER HANDLING, AND BEFORE EATING, DRINKING OR SMOKING. REMOVE CONTAMIANTED CLOTHING PROMPTLY AND CLEAN THOROUGHLY BEFORE REUSE.

SECTION 9 - HAZARD WARNING

DANGER! MAY CAUSE SEVERE EYE DAMAGE AND SKIN IRRITATION.

SECTION 10 - COMMENTS

SECTION 11 - REGULATORY INFORMATION

SECTION 12 - REGULATIONS/COMMENTS CONTINUED

PRODUCT NAME: BLR-3570
MSDS NO: 127CAL001

INFORMATION SUPPLIED BY: COORDINATOR, TOXICOLOGY AND PRODUCT SAFETY
PHONE: ( ) -

MSDS DATE: 03/10/87 DATE OF PREVIOUS MSDS: / /

PRODUCT NAME: CALCIUM HYPOCHLORITE
MSDS NO: 108VAN001

THE FOLLOWING INFORMATION IS FURNISHED SUBJECT TO THE DISCLAIMER ON THE BOTTOM OF THIS FORM

SECTION 1 - PRODUCT IDENTIFICATION

PRODUCT
NAME: CALCIUM HYPOCHLORITE

SYNONYMS:
CALCIUM HYPOCHLORITE;

MANUFACTURER / DISTRIBUTOR:
VAN WATERS & ROGERS INC.
2256 JUNCTION AVENUE
SAN JOSE, CA
95131
EMERGENCY PHONE NUMBERS:
(419) 422-2121 (MARATHON)
(800) 424-9300 (CHEMTREC)

CHEMICAL FAMILY:
CHEMICAL FORMULA: CA O2 C12 CAS NO: 7778-54-3

SECTION 2 - PHYSICAL PROPERTIES

BOILING POINT		MELTING POINT		SPECIFIC GRAVITY(H2O=1)
N/A	F	350.6	F	2.35
	C		C	

% SOLUBILITY IN WATER	VAPOR DENSITY(AIR=1)	VAPOR PRESSURE
21	N/A	N/A

PH INFORMATION: PH: AT CONC.
APPEARANCE: WHITE GRANULES ODOR: CHLORINE

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT		AUTOIGNITION TEMP		EXPLOSIVE LIMITS (% BY VOLUME IN AIR)
N/A	F		F	LOWER/UPPER: N/A/N/A
	C		C	

NFPA CLASS -- HEALTH: 1 FIRE: 0 REACTIVITY: 2 OTHER:

SPECIFIC HAZARD: OXY

---------- FIRE AND EXPLOSION HAZARDS ----------

WHILE CALCIUM HYPOCHLORITE IS NOT COMBUSTIBLE, CONTAMINATION OR MIXING WITH ANY FOREIGN MATERIAL, ACIDS, OR ACID FUMES MAY RESULT IN EXPLOSION OR FIRE OF GREAT INTENSITY. HIGHLY TOXIC AND CORROSIVE FUMES MAY BE PRODUCED UNDER FIRE CONDITIONS.

---------- EXTINGUISHING MEDIA ----------

FLOOD WITH WATER

--------- SPECIAL FIRE FIGHTING INSTRUCTIONS ----------

FIRE FIGHTERS SHOULD WEAR SELF-CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE CLOTHING. USE WATER SPRAY TO COOL NEARBY CONTAINERS AND STRUCTURES EXPOSED TO FIRE. WET MATERIAL WILL RELEASE CORROSIVE CHLORINE GAS.

PRODUCT NAME: CALCIUM HYPOCHLORITE
MSDS NO: 108VAN001

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA (CON'T)

STABILITY: THE MATERIAL IS STABLE AT 70 F, 760MM PRESSURE
CONDITIONS TO AVOID:
EXCESSIVE HEAT, MOISTURE, AND CONTAMINATION OF ANY KIND

HAZARDOUS DECOMPOSITION PRODUCTS:
SEE COMMENTS

INCOMPATIBLE MATERIALS:
SEE COMMENTS

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

INCOMPATIBLE MATERIALS: ACIDS, REDUCING AGENTS, COMBUSTIBLE MATERIALS SUCH AS WOOD, CLOTH OR ORGANIC MATERIALS, METALS SUCH AS IRON AND COPPER AND THEIR ALLOYS, WATER OR STEAM. CONTACT WITH THESE MATERIALS PRESENTS AN EXPLOSION AND FIRE HAZARD. TOXIC AND CORROSIVE FUMES MAY BE LIBERATED.

HAZARDOUS DECOMPOSITION PRODUCTS: TOXIC AND CORROSIVE FUMES OF CHLORINE GAS ARE EMITTED DURING DECOMPOSITION OR UPON EXPOSURE TO ACIDS OR WATER.

SECTION 4 - PRODUCT COMPOSITION AND EXPOSURE LIMITS

EXPOSURE LIMITS FOR PRODUCT:	TLV	SOURCE
CALCIUM HYPOCHLORITE	NONE ESTABLISHED	

COMPONENTS:	PERCENT RANGE	TLV	SOURCE
CALCIUM HYPOCHLORITE	65.00	( )	
INERTS	35.00	( )	

PRODUCT NAME: CALCIUM HYPOCHLORITE
MSDS NO: 108VAN001

SECTION 5 - POTENTIAL HEALTH EFFECTS

-------- ROUTES OF EXPOSURE AND EFFECTS - EYE ---------

PRIMARY ROUTE OF EXPOSURE. DUSTS OR FUMES ARE EXTREMELY CORROSIVE TO THE EYES.

-------- ROUTES OF EXPOSURE AND EFFECTS - SKIN --------

PRIMARY ROUTE OF EXPOSURE. DUSTS ARE EXTREMELY CORROSIVE TO THE SKIN AND MAY CAUSE SEVERE CHEMICAL BURNS. MOISTURE ON THE SKIN, SUCH AS FROM PERSPIRATION, WILL ACCELERATE TISSUE DESTRUCTION.

----- ROUTES OF EXPOSURE AND EFFECTS - INHALATION -----

DUSTS ARE CORROSIVE TO THE ENTIRE RESPIRATORY TRACT. BREATHING DUST CAN DAMAGE THE MUCOUS MEMBRANES. FUMES LIBERATED DURING DECOMPOSITION OR UPON CONTACT WITH ACIDS OR WATER ARE CORROSIVE TO THE RESPIRATORY TRACT AND CAN CAUSE CONFUSION, PULMONARY EDEMA AND COLLAPSE.

------ ROUTES OF EXPOSURE AND EFFECTS - INGESTION -----

PRIMARY ROUTE OF EXPOSURE. DUSTS OR SOLIDS ARE EXTREMELY CORROSIVE TO THE MOUTH AND THROAT. SWALLOWING DUSTS OR SOLIDS CAUSES BURNING OF THE MOUTH, THROAT, AND DIGESTIVE TRACT ACCOMPANIES BY SEVERE PAIN, VOMITING AND COLLAPSE. LARGE DOSES MAY BE FATAL.

CHRONIC EFFECTS OF EXPOSURE: NO SPECIFIC INFORMATION AVAILABLE.

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE: NONE REPORTED

---------- ADDITIONAL TOXICITY INFORMATION ----------

ORAL: RAT LD50=850MG/KG
DERMAL: RABBIT LD50=>2G/KG
INHALATION: RAT LC50=<20MG/L AND >2MG/L: 1 HR

CARCINOGENICITY: THIS MATERIAL IS NOT CONSIDERED TO BE A CARCINOGEN BY THE NATIONAL TOXICOLOGY PROGRAM, THE INTERNATIONAL AGENCY FOR RESEARCH ON CANCER, OR THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION.

PRODUCT NAME: CALCIUM HYPOCHLORITE
MSDS NO: 108VAN001

SECTION 5 - POTENTIAL HEALTH EFFECTS (CON'T)

EMERGENCY FIRST AID PROCEDURES

FIRST AID - EYE

IMMEDIATELY FLUSH EYES WITH LOTS OF RUNNING WATER FOR 15 MINUTES, LIFTING THE UPPER AND LOWER EYELIDS OCCASIONALLY. GET IMMEDIATE MEDICAL ATTENTION.

FIRST AID - SKIN

IMMEDIATELY FLUSH SKIN WITH LOTS OF RUNNING WATER FOR 15 MINUTES. REMOVE CONTAMINATED CLOTHING AND SHOES; WASH BEFORE REUSE. GET IMMEDIATE MEDICAL ATTENTION.

FIRST AID - INHALATION

REMOVE TO FRESH AIR. GIVE ARTIFICIAL RESPIRATION IF NOT BREATHING. GET IMMEDIATE MEDICAL ATTENTION.

FIRST AID - INGESTION

DO NOT INDUCE VOMITING. IF CONSCIOUS, GIVE LOTS OF WATER. GET IMMEDIATE MEDICAL ATTENTION. DO NOT GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS OR CONVULSING PERSON.

SECTION 6 - SPECIAL PROTECTION INFORMATION

VENTILATION

LOCAL MECHANICAL EXHAUST VENTILATION CAPABLE OF MINIMIZING DUST EMISSIONS AT THE POINT OF USE.

PERSONAL PROTECTIVE EQUIPMENT - RESPIRATOR

IF USE CONDITIONS GENERATE DUST, WEAR A NIOSH-APPROVED RESPIRATOR APPROPRIATE FOR THOSE EMISSION LEVELS. APPROPRIATE RESPIRATORS MAY BE A FULL FACEPIECE OR A HALF MASK AIR-PURIFYING CARTRIDGE RESPIRATOR WITH PARTICULATE FILTERS, A SELF-CONTAINED BREATHING APPARATUS IN THE PRESSURE DEMAND MODE, OR A SUPPLIED-AIR RESPIRATOR.

PERSONAL PROTECTIVE EQUIPMENT - EYE

CHEMICAL GOGGLES UNLESS A FULL FACEPIECE RESPIRATOR IS ALSO WORN. IT IS GENERALLY RECOGNIZED THAT CONTACT LENSES SHOULD NOT BE WORN WHEN WORKING WITH CHEMICALS BECAUSE CONTACT LENSES MAY CONTRIBUTE TO THE SEVERITY OF AN EYE INJURY.

PERSONAL PROTECTIVE EQUIPMENT - GLOVES

RUBBER GLOVES.

OTHER PROTECTIVE EQUIPMENT

LONG-SLEEVED SHIRT, TROUSERS, SAFETY SHOES, AND RUBBER APRON.
AN EYEWASH AND SAFETY SHOWER SHOULD BE NEARBY AND READY FOR USE.

PRODUCT NAME: CALCIUM HYPOCHLORITE
MSDS NO: 108VAN001

SECTION 7 - SPILL OR LEAK PROCEDURES

---------- ENVIRONMENTAL EFFECTS ----------

- STEPS TO BE TAKEN IN CASE OF SPILL, LEAK OR RELEASE -

WEAR PROTECTIVE EQUIPMENT INCLUDING RUBBER BOOTS, RUBBER GLOVES, RUBBER APRON, AND A SELF-CONTAINED BREATHING APPARATUS IN THE PRESSURE DEMAND MODE OR A SUPPLIED-AIR RESPIRATOR. IF THE SPILL OR LEAK IS SMALL, A FULL FACEPIECE AIR-PURIFYING CARTRIDGE RESPIRATOR EQUIPPED WITH PARTICULATE FILTERS/ACID GASES MAY BE SATISFACTORY. IN ANY EVENT, ALWAYS WEAR EYE PROTECTION. FOR SMALL SPILLS, SWEEP UP AND DISPOSE OF IN DOT-APPROVED WASTE CONTAINERS. FOR LARGE SPILLS, SHOVE INTO DOT-APPROVED WASTE CONTAINERS. SEWERS, STORM DRAINS, SURFACE WATERS, AND SOIL. USE EXTREME CARE TO PREVENT CONTAMINATION WITH ORGANIC OR COMBUSTIBLE MATERIAL WHICH MAY CAUSE A FIRE OR EXPLOSION. COMPLY WITH ALL APPLICABLE GOVERNMENTAL REGULATIONS ON SPILL REPORTING AND HANDLING AND DISPOSAL OF WASTE.

---------- WASTE DISPOSAL METHOD ----------

DISPOSE OF CONTAMINATED PRODUCT AND MATERIALS USED IN CLEANING UP SPILLS OR LEAKS IN A MANNER APPROVED FOR THIS MATERIAL. CONSULT APPROPRIATE FEDERAL, STATE AND LOCAL REGULATORY AGENCIES TO ASCERTAIN PROPER DISPOSAL PROCEDURES. NOTE: EMPTY CONTAINERS CAN HAVE RESIDUES, GASES AND MISTS AND ARE SUBJECT TO PROPER WASTE DISPOSAL, AS ABOVE.

SECTION 8 - HANDLING AND STORAGE PRECAUTIONS

STORE IN A COOL, DRY, WELL-VENTILATED PLACE AWAY FROM INCOMPATIBLE MATERIALS. KEEP BAGS OR FIBER DRUMS DRY AT ALL TIMES. WASH THOROUGHLY AFTER HANDLING. DO NOT GET IN EYES, ON SKIN, OR ON CLOTHING. KEEP AWAY FROM HEAT, SPARKS, AND OPEN FLAMES. USE ONLY CLEAN, DRY UTENSILS TO REMOVE PRODUCT FROM CONTAINERS. DO NOT REUSE THE EMPTY CONTAINER.

REPAIR AND MAINTENANCE PRECAUTIONS: NONE

OTHER PRECAUTIONS: CONTAINERS, EVEN THOSE THAT HAVE BEEN EMPTIED, WILL RETAIN PRODUCT RESIDUE AND VAPORS. ALWAYS OBEY HAZARD WARNINGS AND HANDLE EMPTY CONTAINERS AS IF THEY WERE FULL.

SECTION 9 - HAZARD WARNING

SECTION 10 - COMMENTS

PRODUCT NAME: CALCIUM HYPOCHLORITE
MSDS NO: 108VAN001

SECTION 11 - REGULATORY INFORMATION

SECTION 12 - REGULATIONS/COMMENTS CONTINUED

INFORMATION SUPPLIED BY: COORDINATOR, TOXICOLOGY AND PRODUCT SAFETY
DOUGLAS EISNER PHONE: (206)447-5911

MSDS DATE: 07/21/87 DATE OF PREVIOUS MSDS: / /

PRODUCT NAME: CONDUCTOR 5721 COOLING WATER PRODUCTS
MSDS NO: 116CAL001

THE FOLLOWING INFORMATION IS FURNISHED SUBJECT TO THE DISCLAIMER ON THE BOTTOM OF THIS FORM

SECTION 1 - PRODUCT IDENTIFICATION

PRODUCT NAME: CONDUCTOR 5721 COOLING WATER PRODUCTS

SYNONYMS:
CONDUCTOR 5721; CONDUCTOR 5721 COOLING WATER PRODUCT; CONDUCTOR 5721 COOLING WATER PRODUCTS; HERCULES 5721

MANUFACTURER / DISTRIBUTOR:
CALGON CORPORATION
P.O. BOX 1346
PITTSBURGH, PA
15230

EMERGENCY PHONE NUMBERS:
(419) 422-2121 (MARATHON)
(800) 424-9300 (CHEMTREC)

CHEMICAL FAMILY:
CHEMICAL FORMULA:
CAS NO:

SECTION 2 - PHYSICAL PROPERTIES

BOILING POINT		MELTING POINT		SPECIFIC GRAVITY(H2O=1)
216	F	18	F	1.37
102	C	-8	C	

% SOLUBILITY IN WATER	VAPOR DENSITY(AIR=1)	VAPOR PRESSURE
COMPLETE	N/D	N/D

PH INFORMATION: PH: 12.0-12.4 AT CONC.
APPEARANCE: BROWN LIQUID ODOR: ODORLESS

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT		AUTOIGNITION TEMP		EXPLOSIVE LIMITS (% BY VOLUME IN AIR)
NOT FLAMM	F	N/A	F	LOWER/UPPER: N/A/N/A
	C		C	

NFPA CLASS -- HEALTH: FIRE: REACTIVITY: OTHER:

SPECIFIC HAZARD: NONE

FIRE AND EXPLOSION HAZARDS

NONE

EXTINGUISHING MEDIA

NONE. THIS PRODUCT IS NOT COMBUSTIBLE NOR DOES IT SUPPORT COMBUSTION.

SPECIAL FIRE FIGHTING INSTRUCTIONS

NONE

PRODUCT NAME: CONDUCTOR 5721 COOLING WATER PRODUCTS
MSDS NO: 116CAL001

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA (CON'T)

STABILITY: THE MATERIAL IS AT 70 F, 760MM PRESSURE
CONDITIONS TO AVOID:
NONE

HAZARDOUS DECOMPOSITION PRODUCTS:
NONE

INCOMPATIBLE MATERIALS:
THIS CONCENTRATED PRODUCT IS CORROSIVE TO ALUMINUM

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

SECTION 4 - PRODUCT COMPOSITION AND EXPOSURE LIMITS

EXPOSURE LIMITS FOR PRODUCT:	TLV	SOURCE
CONDUCTOR 5721 COOLING WATER PRODUCTS	NONE ESTABLISHED	

COMPONENTS:	PERCENT RANGE	TLV			SOURCE
POTASSIUM HYDROXIDE				( )	
		2.00	MG/M3	(CEILING)	ACGIH
		2.00	MG/M3	(CEILING)	OSHA
SODIUM TOLYLTRIAZOLE				( )	

SECTION 5 - POTENTIAL HEALTH EFFECTS

-------- ROUTES OF EXPOSURE AND EFFECTS - EYE ---------

PRIMARY ROUTE OF ENTRY. CAUSES BURNS OF THE EYES

-------- ROUTES OF EXPOSURE AND EFFECTS - SKIN --------

PRIMARY ROUTE OF ENTRY. CAUSES SKIN IRRITATION. PROLONGED CONTACT MAY CAUSE POSSIBLE SKIN DAMAGE.

----- ROUTES OF EXPOSURE AND EFFECTS - INHALATION -----

NOT DETERMINED; INHALING MISTS WILL LIKELY CAUSE RESPIRATORY IRRITATION.

------ ROUTES OF EXPOSURE AND EFFECTS - INGESTION -----

NOT DETERMINED; ALTHOUGH INGESTION IS NOT A COMMON ROUTE OF INDUSTRIAL EXPOSURE, THIS MATERIAL MAY BE EXPECTED TO BE A GASTRIC IRRITANT.

---------- ADDITIONAL TOXICITY INFORMATION ----------

CALGON CORPORATION HAS NOT CONDUCTED ANY TOXICITY TESTING ON THIS PRODUCT. THE RAT ORAL LD50 OF A MAJOR ACTIVE INGREDIENT IN THIS PRODUCT IS REPORTED TO BE 675 MG/KG AND THE RABBIT DERMAL LD50 >2 G/KG. IT WAS NOT A PRIMARY IRRITANT IN RABBIT SKIN, BUT IS A RABBIT EYE IRRITANT. ITS INHALATION LC50 WAS REPORTED AT > 1.73 MG/L

NOT LISTED AS A CARCINOGEN BY NTP; NOT REGULATED AS A CARCINOGEN BY OSHA; NOT EVALUATED BY IARC.

PRODUCT NAME: CONDUCTOR 5721 COOLING WATER PRODUCTS
MSDS NO: 116CAL001

SECTION 5 - POTENTIAL HEALTH EFFECTS (CON'T)

EMERGENCY FIRST AID PROCEDURES

FIRST AID - EYE

IN CASE OF CONTACT, IMMEDIATELY FLUSH WITH PLENTY OF LOW PRESSURE WATER FOR AT LEAST 15 MINUTES. REMOVE ANY CONTACT LENSES TO ENSURE THOROUGH FLUSHING. CALL A PHYSICIAN.

FIRST AID - SKIN

PROMPTLY FLUSH WITH RUNNING WATER. REMOVE CONTAMINATED CLOTHING. WASH CLOTHING BEFORE REUSE.

FIRST AID - INHALATION

REMOVE TO FRESH AIR. TREAT ANY IRRITATION SYMPTOMATICALLY. CALL A PHYSICIAN.

FIRST AID - INGESTION

IF CONSCIOUS, THE PERSON SHOULD IMMEDIATELY DRINK LARGE QUANTITIES OF LIQUID TO DILUTE THIS PRODUCT. NEVER GIVE LIQUIDS TO AN UNCONSCIOUS PERSON. DO NOT INDUCE VOMITING. CALL A PHYSICIAN.

NOTE TO PHYSICIAN: NO SPECIFIC ANTIDOTE. SUPPORTIVE CARE. TREATMENT BASED ON JUDGMENT OF THE PHYSICIAN IN RESPONSE TO REACTIONS OF THE PATIENT.

SECTION 6 - SPECIAL PROTECTION INFORMATION

VENTILATION

PROVIDE ADEQUATE VENTILATION.

PERSONAL PROTECTIVE EQUIPMENT - RESPIRATOR

PERSONAL PROTECTIVE EQUIPMENT - EYE

CHEMICAL GOGGLES

PERSONAL PROTECTIVE EQUIPMENT - SKIN

IMPERVIOUS GLOVES. APPROPRIATE PROTECTIVE CLOTHING.

OTHER PROTECTIVE EQUIPMENT

EYEWASH FOUNTAINS AND SAFETY SHOWERS SHOULD BE EASILY ACCESSIBLE.

PRODUCT NAME: CONDUCTOR 5721 COOLING WATER PRODUCTS
MSDS NO: 116CAL001

SECTION 7 - SPILL OR LEAK PROCEDURES

----------ENVIRONMENTAL EFFECTS ----------

THIS FORMULATED PRODUCT HAS BEEN SHOWN TO BE NOT ACUTELY TOXIC TO FISH (RAINBOW TROUT; STATIC TLM96 600 PPM; NO OBSERVABLE EFFECT LEVEL 330 PPM).

- STEPS TO BE TAKEN IN CASE OF SPILL, LEAK OR RELEASE -

SMALL SPILLS: ADD ABSORBENT, SWEEP UP, AND DISCARD. LARGE SPILLS: DIKE TO CONTAIN AND PUMP INTO DRUMS FOR USE OR DISPOSAL

---------- WASTE DISPOSAL METHOD ----------

THIS PRODUCT AT NORMAL USE CONCENTRATIONS IS ROUTINELY HANDLED IN INDUSTRIAL WASTE WATER TREATMENT SYSTEMS. HOWEVER, DISCHARGE MUST MEET LOCAL, STATE AND FEDERAL REGULATIONS.
THIS PRODUCT IS NOT LISTED IN FEDERAL HAZARDOUS WASTE REGULAITONS 40 CFR 261.33 PARAGRAPHS (E) OR (F), I.E. CHEMICAL PRODUCTS THAT ARE CONSIDERED HAZARDOUS IF THEY BECOME WASTES. IT DOES NOT EXHIBIT ANY OF THE HAZARDOUS CHARACTERISTICS (LISTED IN 40 CFR 261 SUBPART C. STATE OR LOCAL HAZARDOUS WASTE REGULATIONS MAY APPLY IF DIFFERENT FROM THE FEDERAL.
WHEN DRUM IS EMPTY, RINSE IT WITH PLENTY OF WATER BEFORE DISCARDING.

SECTION 8 - HANDLING AND STORAGE PRECAUTIONS

STORE IN COOL, DRY, WELL-VENTILATED AREA.
KEEP CONTAINERS CLOSED.
THIS PRODUCT, IN ITS CONCENTRATED FORM, IS CORROSIVE TO ALUMINUM.

SECTION 9 - HAZARD WARNING

AVOID CONTACT WITH SKIN AND CLOTHING.
AVOID BREATHING MIST.
DO NOT ALLOW EYE CONTACT.
WASH THOROUGHLY AFTER HANDLING, AND BEFORE EATING, DRINKING OR SMOKING.
REMOVE CONTAMINATED CLOTHING PROMPTLY AND CLEAN THOROUGHLY BEFORE REUSE.

DANGER! MAY CAUSE SEVERE EYE DAMAGE AND SKIN IRRITATION.

SECTION 10 - COMMENTS

SECTION 11 - REGULATORY INFORMATION

PRODUCT NAME: CONDUCTOR 5721 COOLING WATER PRODUCTS
MSDS NO: 116CAL001

SECTION 12 - REGULATIONS/COMMENTS CONTINUED

INFORMATION SUPPLIED BY: COORDINATOR, TOXICOLOGY AND PRODUCT SAFETY
PHONE: ( ) -

MSDS DATE: 03/04/87 DATE OF PREVIOUS MSDS: 01/04/84

PRODUCT NAME: DOW CORNING ANTIFOAM 1410
MSDS NO: 103DOW002

THE FOLLOWING INFORMATION IS FURNISHED SUBJECT TO THE DISCLAIMER ON THE BOTTOM OF THIS FORM

SECTION 1 - PRODUCT IDENTIFICATION

PRODUCT NAME: DOW CORNING ANTIFOAM 1410

SYNONYMS:
DOW CORNING ANTIFOAM 1410; ANTIFOAM 1410; 1410; DOW CORNING 1410; 1410 ANTIFOAM

MANUFACTURER / DISTRIBUTOR:
DOW CORNING CORPORATION
SOUTH SAGINAW ROAD
MIDLAND, MI
48640

EMERGENCY PHONE NUMBERS:
(419) 422-2121 (MARATHON)
(800) 424-9300 (CHEMTREC)

CHEMICAL FAMILY: SILICONE EMULSION
CHEMICAL FORMULA: CAS NO:

SECTION 2 - PHYSICAL PROPERTIES

BOILING POINT		MELTING POINT		SPECIFIC GRAVITY(H2O=1)
212	F	N/A	F	1.0
100	C		C	

% SOLUBILITY IN WATER	VAPOR DENSITY(AIR=1)	VAPOR PRESSURE
>90%	N/A	N/D

PH INFORMATION: PH: AT CONC.
APPEARANCE: WHITE COLOR LIQUID ODOR: VERY LITTLE

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT		AUTOIGNITION TEMP		EXPLOSIVE LIMITS (% BY VOLUME IN AIR)
NONE	F	N/D	F	LOWER/UPPER: N/A/N/A
	C		C	

NFPA CLASS -- HEALTH: 1 FIRE: 1 REACTIVITY: 0 OTHER:

SPECIFIC HAZARD: NONE

---------- FIRE AND EXPLOSION HAZARDS ----------

HAZARDOUS OXIDES OF SULFUR AND NITROGEN AND CHLORINE COMPOUNDS FORM

---------- EXTINGUISHING MEDIA ----------

WATER FOG, CO2, DRY CHEMICAL, FOAM

---------- SPECIAL FIRE FIGHTING INSTRUCTIONS ----------

SELF-CONTAINED BREATHING APPARATUS AND PROTECTIVE CLOTHING SHOULD BE WORN IN FIGHTING FIRES INVOLVING CHEMICALS

PRODUCT NAME: DOW CORNING ANTIFOAM 1410
MSDS NO: 103DOW002

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA (CON'T)

STABILITY: THE MATERIAL IS STABLE AT 70 F, 760MM PRESSURE
CONDITIONS TO AVOID:
N/A

HAZARDOUS DECOMPOSITION PRODUCTS:
SEE COMMENTS

INCOMPATIBLE MATERIALS:
OXIDIZING AGENTS CAN CAUSE A REACTION

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR
CONDITIONS TO AVOID:
NOT APPLICABLE

HAZARDOUS DECOMPOSITION PRODUCTS: SULFUR OXIDES, NITROGEN OXIDES, CHLORINE COMPOUNDS, SILICON DIOXIDE, CARBON DIOXIDE, AND TRACES OF INCOMPLETELY BURNED CARBON PRODUCTS

SECTION 4 - PRODUCT COMPOSITION AND EXPOSURE LIMITS

EXPOSURE LIMITS FOR PRODUCT:	TLV	SOURCE
DOW CORNING ANTIFOAM 1410	NONE ESTABLISHED	

COMPONENTS:	PERCENT RANGE	TLV	SOURCE
DOW CORNING ANTIFOAM 1410	100.00	( )	

PRODUCT NAME: DOW CORNING ANTIFOAM 1410
MSDS NO: 103DOW002

SECTION 5 - POTENTIAL HEALTH EFFECTS

-------- ROUTES OF EXPOSURE AND EFFECTS - EYE ---------

MAY CAUSE TEMPORARY DISCOMFORT.

-------- ROUTES OF EXPOSURE AND EFFECTS - SKIN --------

SINGLE, PROLONGED EXPOSURE (HOURS) CAUSES NO KNOWN EFFECT. SEVERAL REPEATED, PROLONGED EXPOSURES MAY CAUSE SLIGHT IRRITATION.

----- ROUTES OF EXPOSURE AND EFFECTS - INHALATION -----

NO EFFECTS EXCEPT VERY SLIGHT IRRITATION OR PAIN TO THE EYES OR RESPIRATORY PASSAGES.

------ ROUTES OF EXPOSURE AND EFFECTS - INGESTION -----

AMOUNTS TRANSFERRED TO THE MOUTH BY FINGERS, ETC., DURING NORMAL OPERATIONS SHOULD NOT CAUSE INJURY.

COMMENT: NO KNOWN ADVERSE CHRONIC HEALTH EFFECTS, BUT UNNECESSARY EXPOSURE TO ANY CHEMICAL SHOULD BE AVOIDED. THIS PRODUCT, AS WITH ANY CHEMICAL, MAY ENHANCE ALLERGIC CONDITIONS ON CERTAIN PEOPLE. WE DO NOT KNOW OF ANY MEDICAL CONDITIONS THAT MIGHT BE AGGRAVATED BY EXPOSURE TO THIS PRODUCT.

---------- ADDITIONAL TOXICITY INFORMATION ----------

EMERGENCY FIRST AID PROCEDURES

------------------- FIRST AID - EYE -------------------

FLUSH WITH WATER.

------------------- FIRST AID - SKIN -------------------

WIPE OFF AND FLUSH WITH WATER.

--------------- FIRST AID - INHALATION ---------------

REMOVE TO FRESH AIR IF DISCOMFORT DEVELOPS.

----------------- FIRST AID - INGESTION --------------

NO FIRST AID SHOULD BE NEEDED.

SECTION 6 - SPECIAL PROTECTION INFORMATION

--------------------- VENTILATION ---------------------

LOCAL EXHAUST: NONE SHOULD BE NEEDED.
MECHANICAL (GENERAL): RECOMMENDED.

PRODUCT NAME: DOW CORNING ANTIFOAM 1410
MSDS NO: 103DOW002

SECTION 6 - SPECIAL PROTECTION INFORMATION (CON'T)

------ PERSONAL PROTECTIVE EQUIPMENT - RESPIRATOR -----

NO RESPIRATORY PROTECTION REQUIRED.

---------- PERSONAL PROTECTIVE EQUIPMENT - EYE -------

USE PROPER PROTECTION -- SAFETY GLASSES, AS A MINIMUM.

-------- PERSONAL PROTECTIVE EQUIPMENT - GLOVES -------

------------ OTHER PROTECTIVE EQUIPMENT -------------

WASH AT MEALTIME AND END OF SHIFT IS ADEQUATE.

THESE PRECAUTIONS ARE FOR ROOM TEMPERATURE HANDLING, USE AT ELEVATED TEMPERATURE MAY REQUIRE ADDED PRECAUTIONS.

GOOD PRACTICE REQUIRES THAT GROSS AMUNT OF ANY CHEMICAL BE REMOVED FROM THE SKIN AS SOON AS PRACTICAL, ESPECIALLY BEFORE EATING OR SMOKING.

SECTION 7 - SPILL OR LEAK PROCEDURES

- STEPS TO BE TAKEN IN CASE OF SPILL, LEAK OR RELEASE -

USE ABSORBENT MATERIAL TO COLLECT AND CONTAIN FOR SALVAGE OR DISPOSAL.

---------- WASTE DISPOSAL METHOD ----------

DOW CORNING SUGGESTS THAT ALL LOCAL, STATE AND FEDERAL REGULATIONS CONCERNING HEALTH AND POLLUTION BE REVIEWED TO DETERMINE APPROVED DISPOSAL PROCEDURES. CONTACT DOW CORNING IF THERE ARE ANY DISPOSAL QUESTIONS.

D.O.T. (49CFR 171.8)/E.P.A. (40CFR 117) SPILL REPORTING INFORMATION:
HAZARDOUS SUBSTANCE: NONE
REPORTABLE QUANTITY: N/A
CONCENTRATION OF HAZARDOUS SUBSTANCE: N/A
REPORTABLE QUANTITY OF PRODUCT: N/A

SECTION 8 - HANDLING AND STORAGE PRECAUTIONS

KEEP FROM FREEZING. USE REASONABLE CARE AND CAUTION.

PRODUCT NAME: DOW CORNING ANTIFOAM 1410
MSDS NO: 103DOW002

SECTION 9 - HAZARD WARNING

PROPER SHIPPING NAME (49CFR 172.101): NONE
D.O.T. HAZARD NAME (49CFR 172.101): NONE
D.O.T. ID NO (49CFR 172.101): NONE
D.O.T. HAZARD CLASS (49CFR 172.101): NONE
RCRA HAZARD CLASS (40CFR 261)(IF DISCARDED): NONE
E.P.A. PRIORITY POLLUTANTS (40CFR 122.53): NONE
DOW CORNING WARNING CODE: 76

SECTION 10 - COMMENTS

SECTION 11 - REGULATORY INFORMATION

SECTION 12 - REGULATIONS/COMMENTS CONTINUED

INFORMATION SUPPLIED BY: COORDINATOR, TOXICOLOGY AND PRODUCT SAFETY
JACK L. SHENEBERGER PHONE: ( ) -

MSDS DATE: 04/23/87 DATE OF PREVIOUS MSDS: / /

PRODUCT NAME: H-300 MICROBIOCIDE
MSDS NO: 129CAL001

THE FOLLOWING INFORMATION IS FURNISHED SUBJECT TO THE DISCLAIMER ON THE BOTTOM OF THIS FORM

SECTION 1 - PRODUCT IDENTIFICATION

PRODUCT NAME: H-300 MICROBIOCIDE

SYNONYMS:
H-300 MICROBIOCIDE; MICROBIOCIDE H-300; MICROBIOCIDE, H-300

MANUFACTURER / DISTRIBUTOR:
CALGON CORPORATION
P.O. BOX 1346
PITTSBURGH, PA
15230

EMERGENCY PHONE NUMBERS:
(419) 422-2121 (MARATHON)
(800) 424-9300 (CHEMTREC)

CHEMICAL FAMILY:
CHEMICAL FORMULA: GLUTARALDEHYDE SOLUTION CAS NO:

SECTION 2 - PHYSICAL PROPERTIES

BOILING POINT	MELTING POINT	SPECIFIC GRAVITY(H2O=1)
>212 F	F	1.11-1.13
C	C	

% SOLUBILITY IN WATER	VAPOR DENSITY(AIR=1)	VAPOR PRESSURE
COMPLETE	UNKNOWN	14.7

PH INFORMATION: PH: 3.7-4.5 AT CONC.
APPEARANCE: CLEAR LIQUID ODOR: ALDEHYDE

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT	AUTOIGNITION TEMP	EXPLOSIVE LIMITS (% BY VOLUME IN AIR)
NONFLAM F	F	LOWER/UPPER:
C	C	

NFPA CLASS -- HEALTH: FIRE: REACTIVITY: OTHER:

SPECIFIC HAZARD: NONE

---------- FIRE AND EXPLOSION HAZARDS ----------

NONE

---------- EXTINGUISHING MEDIA ----------

CO2, DRY CHEMICAL, FOAM

--------- SPECIAL FIRE FIGHTING INSTRUCTIONS ----------

RESPIRATORY PROTECTION IS ESSENTIAL WHEN FIGHTING ANY CHEMICAL FIRE.

PRODUCT NAME: H-300 MICROBIOCIDE
MSDS NO: 129CAL001

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA (CON'T)

STABILITY: THE MATERIAL IS STABLE AT 70 F, 760MM PRESSURE
CONDITIONS TO AVOID:

HAZARDOUS DECOMPOSITION PRODUCTS:
UNKNOWN

INCOMPATIBLE MATERIALS:
SEE COMMENTS

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

INCOMPATIBLE MATERIALS: STRONG OXIDIZERS (THIS PRODUCT CAN BE CORROSIVE TO STEEL, GALVANIZED IRON, ALUMINUM, TIN AND ZINC).

SECTION 4 - PRODUCT COMPOSITION AND EXPOSURE LIMITS

EXPOSURE LIMITS FOR PRODUCT:	TLV	SOURCE
H-300 MICROBIOCIDE	NONE ESTABLISHED	

COMPONENTS:	PERCENT RANGE	TLV			SOURCE
GLUTARALDEHYDE	45.00	.20	PPM	(8 HR TWA)	ACGIH
		0.20	PPM	(CEILING)	ACGIH

SECTION 5 - POTENTIAL HEALTH EFFECTS

-------- ROUTES OF EXPOSURE AND EFFECTS - EYE ---------

CAUSES EYE IRRITATION.

-------- ROUTES OF EXPOSURE AND EFFECTS - SKIN --------

HARMFUL IF ABSORBED THROUGH SKIN. CAUSES SKIN IRRITATION.

-------ROUTES OFEXPOSURE AND EFFECTS - INHALATION -----

HARMFUL IF INHALED.

------ ROUTES OF EXPOSURE AND EFFECTS - INGESTION -----

---------- ADDITIONAL TOXICITY INFORMATION ----------

ORAL LD50 (RAT): 239 MG/KG
DERMAL LD50 (RABBIT): 2,560 MG/KG

PRODUCT NAME: H-300 MICROBIOCIDE
MSDS NO: 129CAL001

SECTION 5 - POTENTIAL HEALTH EFFECTS (CON'T)

EMERGENCY FIRST AID PROCEDURES

---------- FIRST AID - EYE ----------

IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES. CALL A PHYSICIAN.

---------- FIRST AID - SKIN ----------

IN CASE OF CONTACT, IMMEDIATELY FLUSH SKIN WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES. REMOVE AND WASH CONTAMINATED CLOTHING BEFORE REUSE.

---------- FIRST AID - INHALATION ----------

---------- FIRST AID - INGESTION ----------

IF SWALLOWED, DRINK PROMPTLY A LARGE QUANTITY OF MILK, EGG WHITES, GELATIN SOLUTION OR, IF THESE ARE NOT AVAILABLE, DRINK LARGE QUANTITIES OF WATER. AVOID ALCOHOL. CALL A PHYSICIAN IMMEDIATELY.

NOTE TO PHYSICIAN: PROBABLE MUCOSAL DAMAGE MAY CONTRAINDICATE THE USE OF GASTRIC LAVAGE. MEASURES AGAINST CIRCULATORY SHOCK, RESPIRATORY DEPRESSION AND CONVULSION MAY BE NEEDED.

SECTION 6 - SPECIAL PROTECTION INFORMATION

---------- VENTILATION ----------

LOCAL EXHAUST/MECHANICAL (GENERAL): RECOMMENDED

------ PERSONAL PROTECTIVE EQUIPMENT - RESPIRATOR -----

A NIOSH-APPROVED RESPIRATOR IS RECOMMENDED IF THE ACGIH CEILING LEVEL OF 0.2PPM IS EXCEEDED.

---------- PERSONAL PROTECTIVE EQUIPMENT - EYE -------

EYE GOGGLES OR FULL-FACE SHIELD

-------- PERSONAL PROTECTIVE EQUIPMENT - GLOVES -------

RUBBER

---------- OTHER PROTECTIVE EQUIPMENT ----------

PROTECTIVE CLOTHING AND SHOES

PRODUCT NAME: H-300 MICROBIOCIDE
MSDS NO: 129CAL001

SECTION 7 - SPILL OR LEAK PROCEDURES

---------- ENVIRONMENTAL EFFECTS ----------

THIS PESTICIDE IS TOXIC TO FISH. DO NOT DISCHARGE INTO LAKES, STREAMS, PONDS, OR PUBLIC.

- STEPS TO BE TAKEN IN CASE OF SPILL, LEAK OR RELEASE -

DIKE AREA TO CONTAIN AS MUCH SPILLED MATERIAL AS POSSIBLE. REMOVE ANY REMAINING MATERIAL BY ABSORBING ON VERMICULITE OR OTHER SUITABLE ABSORBING MATERIAL AND PLACE IN A SEALED CONTAINER FOR DISPOSAL.

---------- WASTE DISPOSAL METHOD ----------

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

PESTICIDE, SPRAY MIXTURE OR RINSATE THAT CANNOT BE USED OR CHEMICALLY PROCESSED SHOULD BE DISPOSED OF IN A LANDFILL APPROVED FOR PESTICIDES OR BURIED IN A SAFE PLACE AWAY FROM WATER SUPPLIES.

CONTAINER DISPOSAL: RESEAL CONTAINER AND OFFER FOR RECONDITIONING OR TRIPLE RINSE (OR EQUIVALENT) AND OFFER FOR RECYCLING, RECONDITIONING, OR DISPOSAL IN AN APPROVED LANDFILL OR BURY IN A SAFE PLACE.

SECTION 8 - HANDLING AND STORAGE PRECAUTIONS

AVOID BREATHING VAPORS. AVOID CONTACT WITH EYES, SKIN AND CLOTHING. KEEP CONTAINER CLOSED. USE WITH ADEQUATE VENTILATION. WASH THOROUGHLY AFTER HANDLING.

SECTION 9 - HAZARD WARNING

SECTION 10 - COMMENTS

SECTION 11 - REGULATORY INFORMATION

SECTION 12 - REGULATIONS/COMMENTS CONTINUED

INFORMATION SUPPLIED BY: COORDINATOR, TOXICOLOGY AND PRODUCT SAFETY
PHONE: ( ) -

MSDS DATE: 09/04/84 DATE OF PREVIOUS MSDS: / /

PRODUCT NAME: H-5228
MSDS NO: 126CAL001

THE FOLLOWING INFORMATION IS FURNISHED SUBJECT TO THE DISCLAIMER ON THE BOTTOM OF THIS FORM

SECTION 1 - PRODUCT IDENTIFICATION

PRODUCT NAME: H-5228

SYNONYMS:
H-5228; H5228;

MANUFACTURER / DISTRIBUTOR:
CALGON CORPORATION
P.O. BOX 1346
PITTSBURGH, PA
15230
EMERGENCY PHONE NUMBERS:
(419) 422-2121 (MARATHON)
(800) 424-9300 (CHEMTREC)

CHEMICAL FAMILY:
CHEMICAL FORMULA:
CAS NO:

SECTION 2 - PHYSICAL PROPERTIES

BOILING POINT		MELTING POINT		SPECIFIC GRAVITY(H2O=1)
210	F	N/D	F	1.04
99	C		C	

% SOLUBILITY IN WATER	VAPOR DENSITY(AIR=1)	VAPOR PRESSURE
<5	N/D	N/D

PH INFORMATION: PH: 4.3 AT CONC.
APPEARANCE: BEIGE, CREAMY LIQUID ODOR: SLIGHT ORGANIC

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT		AUTOIGNITION TEMP		EXPLOSIVE LIMITS (% BY VOLUME IN AIR)
NONFLAM	F	N/D	F	LOWER/UPPER: N/D/N/D
	C		C	

NFPA CLASS -- HEALTH: FIRE: REACTIVITY: OTHER:

SPECIFIC HAZARD: NONE

FIRE AND EXPLOSION HAZARDS

NONE

EXTINGUISHING MEDIA

WATER SPRAY, DRY CHEMICAL, FOAM, OR CARBON DIOXIDE

SPECIAL FIRE FIGHTING INSTRUCTIONS

USE SELF-CONTAINED BREATHING APPRATUS.

PRODUCT NAME: H-5228
MSDS NO: 126CAL001

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA (CON'T)

STABILITY: THE MATERIAL IS STABLE AT 70 F, 760MM PRESSURE
CONDITIONS TO AVOID:

HAZARDOUS DECOMPOSITION PRODUCTS:
SEE COMMENTS

INCOMPATIBLE MATERIALS:
SEE COMMENTS

HAZARDOUS POLYMERIZATION: MAY OCCUR
CONDITIONS TO AVOID:
AVOID TEMPERATURES ABOVE 149C (300F)

INCOMPATIBLE MATERIALS: STRONG OXIDIZING AGENTS AND TEMPERATURES MORE THAN 100C (212F), AT WHICH PRODUCT DEGRADES.

HAZARDOUS DECOMPOSITION PRODUCTS: THERMAL DECOMPOSITION PRODUCES CARBON DIOXIDE, SULFUR DIOXIDE, NITROUS OXIDE, AND WATER.

HAZARDOUS PRODUCTS OF COMBUSTION: COMBUSTION PRODUCTS VARY DEPENDING ON FIRE CONDITIONS AND OTHER COMBUSTIBLES PRESENT IN THE FIRE. THE PREDOMINANT PRODUCTS WILL BE CARBON MONOXIDE AND CARBON DIOXIDE. UNDER CERTAIN CONDITIONS, KETONES, ALDEHYDES, SULFUR OXIDES, NITROGEN OXIDES, AND CARBOXYLIC ACIDS MAY BE FORMED WHICH WILL BE IRRITATING TO LUNGS, THROAT, NOSE, EYES AND OTHER MUCOUS MEMBRANES.

SECTION 4 - PRODUCT COMPOSITION AND EXPOSURE LIMITS

EXPOSURE LIMITS FOR PRODUCT:	TLV	SOURCE
H-5228	NONE ESTABLISHED	

COMPONENTS:	PERCENT RANGE	TLV	SOURCE
METHYLENE BIS (THIOCYANATE)		( )	

THIS MATERIAL IS A REGISTERED PESTICIDE. SEE PRODUCT LABEL FOR FURTHER INFORMATION.
*

PRODUCT NAME: H-5228
MSDS NO: 126CAL001

SECTION 5 - POTENTIAL HEALTH EFFECTS

-------- ROUTES OF EXPOSURE AND EFFECTS - EYE ---------

PRIMARY ROUTE OF EXPOSURE. PAIN, CLOUDY VISION, IRRITATION.

-------- ROUTES OF EXPOSURE AND EFFECTS - SKIN --------

PRIMARY ROUTE OF EXPOSURE. PAIN, RASH, REDNESS.

----- ROUTES OF EXPOSURE AND EFFECTS - INHALATION -----

MAY CAUSE SEVERE IRRITATION.

------ ROUTES OF EXPOSURE AND EFFECTS - INGESTION -----

PRIMARY ROUTE OF EXPOSURE. MAY CAUSE NAUSEA AND ABDOMINAL PAIN.

MEDICAL CONDITIONS GENERALLY RECOGNIZED AS BEING AGGRAVATED BY EXPOSURE: NONE KNOWN. THIS PRODUCT PROBABLY WOULD EXACERBATE ANY PREEXISTING IRRITATION.

---------- ADDITIONAL TOXICITY INFORMATION ----------

NOT LISTED AS A CARCINOGEN BY NTP (NATIONAL TOXICOLOGY PROGRAM); NOT REGULATED AS A CARCINOGEN BY OSHA (OCCUPATIONAL SAFETY & HEALTH ADMINISTRATION); NOT EVALUATED BY IARC (INTERNATIONAL AGENCY FOR RESEARCH ON CANCER).

REPORTED HUMAN EFFECTS: SKIN SENSITIZATION TESTS WERE INCONCLUSIVE IN A BIODICAL FORMULATION ALSO CONTAINING 10% METHYLENE BIS (THIOCYANATE).

REPORTED ANIMAL EFFECTS: A BIOCIDAL FORMULATION CONTAINING 10% METHYLENE BIS (THIOCYANATE) WAS REPORTED TO CAUSE AN ALLERGIC SKIN REACTION (SENSITIZATION) IN GUINEA PIGS.

PRODUCT NAME: H-5228
MSDS NO: 126CAL001

SECTION 5 - POTENTIAL HEALTH EFFECTS (CON'T)

EMERGENCY FIRST AID PROCEDURES

FIRST AID - EYE

IN CASE OF CONTACT, IMMEDIATELY FLUSH WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES. REMOVE ANY CONTACT LENSES TO ENSURE THOROUGH FLUSHING. CALL A PHYSICIAN.

FIRST AID - SKIN

IN CASE OF CONTACT, PROMPTLY WASH WITH PLENTY OF WATER. REMOVE CONTAMINATED CLOTHING. WASH CLOTHING BEFORE REUSE. IF IRRITATION PERSISTS, CONTACT A PHYSICIAN.

FIRST AID - INHALATION

TREAT ANY IRRITATION SYMPTOMATICALLY. REMOVE TO FRESH AIR. IF BREATHING HAS STOPPED, GIVE ARTIFICIAL RESPIRATION, PREFERABLY MOUTH-TO-MOUTH. IF BREATHING IS DIFFICULT, GIVE OXYGEN. CALL A PHYSICIAN.

FIRST AID - INGESTION

IF CONSCIOUS, THE PERSON SHOULD IMMEDIATELY DRINK PROMPTLY A LARGE QUANTITY OF MILK, EGG WHITES, OR GELETIN SOLUTION. IF THESE ARE NOT AVAILABLE, DRINK LARGE QUANTITIES OF WATER. NEVER GIVE LIQUIDS TO AN UNCONSCIOUS PERSON. CALL A PHYSICIAN IMMEDIATELY.

SECTION 6 - SPECIAL PROTECTION INFORMATION

VENTILATION

ADEQUATE VENTILATION SHOULD BE PROVIDED TO KEEP MIST AND VAPOR CONCENTRATIONS BELOW ACCEPTABLE EXPOSURE LIMITS.

PERSONAL PROTECTIVE EQUIPMENT - RESPIRATOR

APPROPRIATE RESPIRATOR WHEN EXPOSURE TO AIRBORNE CONTAMINANT IS LIKELY TO EXCEED ACCEPTABLE LIMITS.

PERSONAL PROTECTIVE EQUIPMENT - EYE

CHEMICAL GOGGLES, FACE SHIELD

PERSONAL PROTECTIVE EQUIPMENT - GLOVES

RUBBER GLOVES

OTHER PROTECTIVE EQUIPMENT

IMPERVIOUS CLOTHING, BOOTS. EYEWASH FOUNTAINS AND SAFETY SHOWERS SHOULD BE EASILY ACCESSIBLE. ENSURE CONTAINERS ARE TIGHTLY CLOSED WHEN NOT IN USE.

PRODUCT NAME: H-5228
MSDS NO: 126CAL001

SECTION 7 - SPILL OR LEAK PROCEDURES

---------- ENVIRONMENTAL EFFECTS ----------

LC50 (96 HR; BLUEGILLS): 0.4PPM
LC50 (96 HR; RAINBOW TROUT): 0.3PPM

- STEPS TO BE TAKEN IN CASE OF SPILL, LEAK OR RELEASE -

COLLECT ALL SPILLED MATERIAL. DO NOT FLUSH TO OPEN SEWER. DO NOT FLUSH TO OPEN SEWER OR WATER COURSES.

---------- WASTE DISPOSAL METHOD ----------

THIS MATERIAL IS A REGISTERED PESTICIDE. SEE PRODUCT LABEL FOR FURTHER INFORMATION.

SECTION 8 - HANDLING AND STORAGE PRECAUTIONS

KEEP FROM FREEZING. STORE AT TEMPERATURES BELOW 60C (140F). STORE IN A COOL, WELL-VENTILATED AREA.

DO NOT ALLOW EYE OR SKIN CONTACT. AVOID BREATHING VAPORS AND ISTS. WASH THOROUGHLY AFTER HANDLING, AND BEFORE EATING, DRINKING OR SMOKING. REMOVE CONTAMINATED CLOTHING PROMPTLY AND CLEAN THOROUGHLY BEFORE REUSE.

SECTION 9 - HAZARD WARNING

DANGER! CAUSES EYE DAMAGE AND SKIN IRRITATION. HARMFUL OR FATAL IF SWALLOWED OR ABSORBED THROUGH THE SKIN.

SECTION 10 - COMMENTS

SECTION 11 - REGULATORY INFORMATION

SECTION 12 - REGULATIONS/COMMENTS CONTINUED

INFORMATION SUPPLIED BY: COORDINATOR, TOXICOLOGY AND PRODUCT SAFETY
PHONE: ( ) -

MSDS DATE: 02/26/87 DATE OF PREVIOUS MSDS: / /

PRODUCT NAME: HERCULES 3152
MSDS NO: 108HER001

THE FOLLOWING INFORMATION IS FURNISHED SUBJECT TO THE DISCLAIMER ON THE BOTTOM OF THIS FORM

SECTION 1 - PRODUCT IDENTIFICATION

PRODUCT NAME: HERCULES 3152

SYNONYMS:
HERCULES 3152; HERCULES 3152 BOILER WATER TREATMENT

MANUFACTURER / DISTRIBUTOR:
HERCULES, INC.
HERCULES PLAZA
WILMINGTON, DE
19894
EMERGENCY PHONE NUMBERS:
(419) 422-2121 (MARATHON)
(800) 424-9300 (CHEMTREC)

CHEMICAL FAMILY: N/A
CHEMICAL FORMULA: N/A CAS NO:

SECTION 2 - PHYSICAL PROPERTIES

BOILING POINT		MELTING POINT		SPECIFIC GRAVITY(H2O=1)
210-216	F	12-25	F	1.10
99-102	C	-8 - -4	C	

% SOLUBILITY IN WATER	VAPOR DENSITY(AIR=1)	VAPOR PRESSURE
COMPLETE	NOT DETER.	NOT DETERMINED

PH INFORMATION: PH: 8.3 AT CONC.
APPEARANCE: COLORLESS LIQUID ODOR: SLIGHT AMMONIA ODOR

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT		AUTOIGNITION TEMP		EXPLOSIVE LIMITS (% BY VOLUME IN AIR)
NA	F	NA	F	LOWER/UPPER: NA/NA
	C		C	

NFPA CLASS -- HEALTH: FIRE: REACTIVITY: OTHER:

SPECIFIC HAZARD: NONE

---------- FIRE AND EXPLOSION HAZARDS ----------

SEE REACTIVITY DATA

---------- EXTINGUISHING MEDIA ----------

NONE. THIS PRODUCT IS NOT COMBUSTIBLE NOR DOES IT SUPPORT COMBUSTION.

--------- SPECIAL FIRE FIGHTING INSTRUCTIONS ----------

NONE

PRODUCT NAME: HERCULES 3152
MSDS NO: 108HER001

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA (CON'T)

STABILITY: THE MATERIAL IS STABLE AT 70 F, 760MM PRESSURE
CONDITIONS TO AVOID:
NONE

HAZARDOUS DECOMPOSITION PRODUCTS:
WHEN HEATED TO DECOMPOSITION, CAN EMIT HIGHLY TOX-
IC FUMES OF COX AND POX

INCOMPATIBLE MATERIALS:
NONE

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR
CONDITIONS TO AVOID:
NONE

SECTION 4 - PRODUCT COMPOSITION AND EXPOSURE LIMITS

EXPOSURE LIMITS FOR PRODUCT:	TLV	SOURCE
HERCULES 3152	NONE ESTABLISHED	

COMPONENTS:	PERCENT RANGE	TLV	SOURCE
HERCULES 3152	100.00	( )	

SECTION 5 - POTENTIAL HEALTH EFFECTS

-------- ROUTES OF EXPOSURE AND EFFECTS - EYE ---------

MAY CAUSE IRRITATION OF EYES

-------- ROUTES OF EXPOSURE AND EFFECTS - SKIN --------

----- ROUTES OF EXPOSURE AND EFFECTS - INHALATION -----

------ ROUTES OF EXPOSURE AND EFFECTS - INGESTION -----

---------- ADDITIONAL TOXICITY INFORMATION ----------

PRODUCT NAME: HERCULES 3152
MSDS NO: 108HER001

SECTION 5 - POTENTIAL HEALTH EFFECTS (CON'T)

EMERGENCY FIRST AID PROCEDURES

---------- FIRST AID - EYE ----------

IMMEDIATELY FLUSH EYES WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES.
CALL A PHYSICIAN.

---------- FIRST AID - SKIN ----------

---------- FIRST AID - INHALATION ----------

---------- FIRST AID - INGESTION ----------

SECTION 6 - SPECIAL PROTECTION INFORMATION

---------- VENTILATION ----------

MECHANICAL (GENERAL) - RECOMMENDED

------ PERSONAL PROTECTIVE EQUIPMENT - RESPIRATOR -----

NONE REQUIRED IN NORMAL USE.

---------- PERSONAL PROTECTIVE EQUIPMENT - EYE -------

SAFETY GLASSES

-------- PERSONAL PROTECTIVE EQUIPMENT - GLOVES -------

---------- OTHER PROTECTIVE EQUIPMENT ----------

SECTION 7 - SPILL OR LEAK PROCEDURES

- STEPS TO BE TAKEN IN CASE OF SPILL, LEAK OR RELEASE -

SMALL SPILLS: ADD ABSORBENT, SWEEP UP AND DISCARD.
LARGE SPILLS: DIKE TO CONTAIN AND PUMP INTO DRUMS FOR USE OR DISPOSAL

---------- WASTE DISPOSAL METHOD ----------

LANDFILL IN ACCORDANCE WITH LOCAL, STATE AND FEDERAL REGULATIONS.

SECTION 8 - HANDLING AND STORAGE PRECAUTIONS

AVOID CONTACT WITH EYES, SKIN, AND CLOTHING. WASH THOROUGHLY AFTER HANDLING. WHEN DRUM IS EMPTY, RINSE IT WITH PLENTY OF WATER AND DISCARD.

PRODUCT NAME: HERCULES 3152
MSDS NO: 108HER001

SECTION 9 - HAZARD WARNING

WARNING! MAY CAUSE IRRITATION OF EYES
AVOID CONTACT WITH EYES, SKIN, AND CLOTHING. WASH THOROUGHLY AFTER HANDLING.
FIRST AID:
EYES - IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES. CALL A PHYSICIAN.

SMALL SPILLS: ADD ABSORBENT, SWEEP UP AND DISCARD.
LARGE SPILLS: DIKE TO CONTAIN AND PUMP INTO DRUMS FOR USE OR DISPOSAL

WHEN DRUM IS EMPTY, RINSE IT WITH PLENTY OF WATER AND DISCARD.

SECTION 10 - COMMENTS

SECTION 11 - REGULATORY INFORMATION

SECTION 12 - REGULATIONS/COMMENTS CONTINUED

INFORMATION SUPPLIED BY: COORDINATOR, TOXICOLOGY AND PRODUCT SAFETY
PHONE: (302)575-5000

MSDS DATE: 11/24/80 DATE OF PREVIOUS MSDS: / /

PRODUCT NAME: HERCULES 3430 BOILER WATER TREATMENT
MSDS NO: 116HER001

THE FOLLOWING INFORMATION IS FURNISHED SUBJECT TO THE DISCLAIMER ON THE BOTTOM OF THIS FORM

SECTION 1 - PRODUCT IDENTIFICATION

PRODUCT NAME: HERCULES 3430 BOILER WATER TREATMENT

SYNONYMS:
HERCULES 3430; HERCULES 3430 BOILER WATER TREATMENT

MANUFACTURER / DISTRIBUTOR:
HERCULES, INC.
HERCULES PLAZA
WILMINGTON, DE
19894

EMERGENCY PHONE NUMBERS:
(419) 422-2121 (MARATHON)
(800) 424-9300 (CHEMTREC)

CHEMICAL FAMILY: N/A
CHEMICAL FORMULA: N/A

CAS NO:

SECTION 2 - PHYSICAL PROPERTIES

BOILING POINT		MELTING POINT		SPECIFIC GRAVITY(H2O=1)
219	F	1	F	1.29
104	C	-16.5	C	

% SOLUBILITY IN WATER	VAPOR DENSITY(AIR=1)	VAPOR PRESSURE
COMPLETE	NOT DETER.	NOT DETERMINED

PH INFORMATION: PH: 4.1 AT CONC.
APPEARANCE: LIGHT STRAW-COLORED LIQUID ODOR: SLIGHT SULFUROUS ODOR

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT		AUTOIGNITION TEMP		EXPLOSIVE LIMITS (% BY VOLUME IN AIR)
NA	F	NA	F	LOWER/UPPER: NA/NA
	C		C	

NFPA CLASS -- HEALTH: FIRE: REACTIVITY: OTHER:

SPECIFIC HAZARD: NONE

---------- FIRE AND EXPLOSION HAZARDS ----------

SEE REACTIVITY DATA

---------- EXTINGUISHING MEDIA ----------

NONE. THIS PRODUCT IS NOT COMBUSTIBLE NOR DOES IT SUPPORT COMBUSTION.

--------- SPECIAL FIRE FIGHTING INSTRUCTIONS ----------

NONE

PRODUCT NAME: HERCULES 3430 BOILER WATER TREATMENT
MSDS NO: 116HER001

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA (CON'T)

STABILITY: THE MATERIAL IS STABLE AT 70 F, 760MM PRESSURE
CONDITIONS TO AVOID:
NONE

HAZARDOUS DECOMPOSITION PRODUCTS:
WHEN HEATED TO DECOMPOSITION, MATERIALS CAN EMIT HIGHLY TOXIC FUMES OF SOX

INCOMPATIBLE MATERIALS:
ACIDS AND OXIDIZERS

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

SECTION 4 - PRODUCT COMPOSITION AND EXPOSURE LIMITS

EXPOSURE LIMITS FOR PRODUCT:	TLV	SOURCE
HERCULES 3430 BOILER WATER TREATMENT	NONE ESTABLISHED	

COMPONENTS:	PERCENT RANGE	TLV			SOURCE
SODIUM BISULFITE	35.00	5.00	MG/M3	(8 HR TWA)	ACGIH
		5.00	MG/M3	(8 HR TWA)	OSHA

SECTION 5 - POTENTIAL HEALTH EFFECTS

-------- ROUTES OF EXPOSURE AND EFFECTS - EYE ---------

MAY CAUSE EYE IRRITATION

-------- ROUTES OF EXPOSURE AND EFFECTS - SKIN --------

MAY CAUSE SKIN IRRITATION

----- ROUTES OF EXPOSURE AND EFFECTS - INHALATION -----

------ ROUTES OF EXPOSURE AND EFFECTS - INGESTION -----

---------- ADDITIONAL TOXICITY INFORMATION ----------

PRODUCT NAME: HERCULES 3430 BOILER WATER TREATMENT
MSDS NO: 116HER001

SECTION 5 - POTENTIAL HEALTH EFFECTS (CON'T)

EMERGENCY FIRST AID PROCEDURES

---------- FIRST AID - EYE ----------

IMMEDIATELY FLUSH WITH WATER FOR AT LEAST 15 MINUTES AND CONTACT PHYSICIAN.

---------- FIRST AID - SKIN ----------

PROMPTLY FLUSH WITH RUNNING WATER. REMOVE CONTAMINATED CLOTHING. WASH CLOTHING BEFORE REUSE.

---------- FIRST AID - INHALATION ----------

---------- FIRST AID - INGESTION ----------

SECTION 6 - SPECIAL PROTECTION INFORMATION

---------- VENTILATION ----------

MECHANICAL (GENERAL) - RECOMMENDED

------ PERSONAL PROTECTIVE EQUIPMENT - RESPIRATOR -----

NONE REQUIRED IN NORMAL USE.

---------- PERSONAL PROTECTIVE EQUIPMENT - EYE -------

SAFETY GLASSES

-------- PERSONAL PROTECTIVE EQUIPMENT - GLOVES -------

RUBBER

---------- OTHER PROTECTIVE EQUIPMENT ----------

SECTION 7 - SPILL OR LEAK PROCEDURES

- STEPS TO BE TAKEN IN CASE OF SPILL, LEAK OR RELEASE -

SMALL SPILLS - ADD ABSORBENT, SWEEP UP, AND DISCARD.
LARGE SPILLS - DIKE TO CONTAIN AND PUMP INTO DRUMS FOR USE OR DISPOSAL

---------- WASTE DISPOSAL METHOD ----------

DISPOSE OF IN ACCORDANCE WITH LOCAL, STATE AND FEDERAL REGULATIONS

PRODUCT NAME: HERCULES 3430 BOILER WATER TREATMENT
MSDS NO: 116HER001

SECTION 8 - HANDLING AND STORAGE PRECAUTIONS

SECTION 9 - HAZARD WARNING

WARNING! MAY CAUSE IRRITATION OF EYES AND SKIN. AVOID CONTACT WITH EYES, SKIN, AND CLOTHING. WASH THOROUGHLY AFTER HANDLING.

FIRST AID:
EYES - IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES AND CONTACT PHYSICIAN.
SKIN - PROMPTLY FLUSH WITH RUNNING WATER. REMOVE CONTAMINATED CLOTHING. WASH CLOTHING BEFORE REUSE

SMALL SPILLS - ADD ABSORBENT, SWEEP UP, AND DISCARD.
LARGE SPILLS - DIKE TO CONTAIN AND PUMP INTO DRUMS FOR USE OR DISPOSAL

STORE IN A COOL DRY PLACE.
WHEN DRUM IS EMPTY, RINSE IT WITH PLENTY OF WATER AND DISCARD.

SECTION 10 - COMMENTS

SECTION 11 - REGULATORY INFORMATION

SECTION 12 - REGULATIONS/COMMENTS CONTINUED

INFORMATION SUPPLIED BY: COORDINATOR, TOXICOLOGY AND PRODUCT SAFETY
PHONE: (302)575-5000

MSDS DATE: 11/14/83 DATE OF PREVIOUS MSDS: / /

PRODUCT NAME: HERCULES 3545 BOILER WATER TREATMENT
MSDS NO: 115HER001

THE FOLLOWING INFORMATION IS FURNISHED SUBJECT TO THE DISCLAIMER ON THE BOTTOM OF THIS FORM

SECTION 1 - PRODUCT IDENTIFICATION

PRODUCT NAME: HERCULES 3545 BOILER WATER TREATMENT

SYNONYMS:
HERCULES 3545; HERCULES 3545 BOILER WATER TREATMENT

MANUFACTURER / DISTRIBUTOR:
HERCULES, INC.
HERCULES PLAZA
WILMINGTON, DE
19894

EMERGENCY PHONE NUMBERS:
(419) 422-2121 (MARATHON)
(800) 424-9300 (CHEMTREC)

CHEMICAL FAMILY: N/A
CHEMICAL FORMULA: N/A

CAS NO:

SECTION 2 - PHYSICAL PROPERTIES

BOILING POINT		MELTING POINT		SPECIFIC GRAVITY(H2O=1)
199-219	F	-2	F	1.01
93-104	C	-19	C	

% SOLUBILITY IN WATER	VAPOR DENSITY(AIR=1)	VAPOR PRESSURE
COMPLETE	> 1	NOT DETERMINED

PH INFORMATION: PH: 12.6 AT CONC.
APPEARANCE: COLORLESS LIQUID ODOR: FISHY AMINE ODOR

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT		AUTOIGNITION TEMP		EXPLOSIVE LIMITS (% BY VOLUME IN AIR)
128 CC	F	NOT DETER.	F	LOWER/UPPER: NOT DETERMINED/NOT DETERMINED
53 CC	C		C	

NFPA CLASS -- HEALTH: FIRE: REACTIVITY: OTHER:

SPECIFIC HAZARD: NONE

---------- FIRE AND EXPLOSION HAZARDS ----------

CYCLOHEXYLAMINE VAPORS FORM EXPLOSIVE MIXTURES WITH AIR.

---------- EXTINGUISHING MEDIA ----------

DRY CHEMICAL, CARBON DIOXIDE, "ALCOHOL" FOAM, WATER SPRAY

--------- SPECIAL FIRE FIGHTING INSTRUCTIONS ----------

COOL CONTAINERS WITH WATER IF EXPOSED TO FIRE

PRODUCT NAME: HERCULES 3545 BOILER WATER TREATMENT
MSDS NO: 115HER001

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA (CON'T)

STABILITY: THE MATERIAL IS STABLE AT 70 F, 760MM PRESSURE
CONDITIONS TO AVOID:
NONE

HAZARDOUS DECOMPOSITION PRODUCTS:
WHEN HEATED TO DECOMPOSITION, CAN EMIT HIGHLY TOXIC FUMES OF NOX.

INCOMPATIBLE MATERIALS:
OXIDIZING MATERIALS AND MINERAL ACIDS.

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

SECTION 4 - PRODUCT COMPOSITION AND EXPOSURE LIMITS

EXPOSURE LIMITS FOR PRODUCT: TLV SOURCE

HERCULES 3545 BOILER WATER TREATMENT NONE ESTABLISHED

COMPONENTS:	PERCENT RANGE	TLV			SOURCE
MORPHOLINE	20.00	20.00	PPM	(8 HR TWA)	ACGIH
		20.00	PPM	(8 HR TWA)	OSHA
		30.00	PPM	(STEL)	OSHA
CYCLOHEXYLAMINE	10.00	10.00	PPM	(8 HR TWA)	ACGIH
		10.00	PPM	(8 HR TWA)	OSHA

SECTION 5 - POTENTIAL HEALTH EFFECTS

-------- ROUTES OF EXPOSURE AND EFFECTS - EYE ---------

CAUSES EYE BURNS

-------- ROUTES OF EXPOSURE AND EFFECTS - SKIN --------

CAUSES SKIN IRRITATION. PROLONGED OR REPEATED CONTACT MAY CAUSE SKIN SENSITIZATION IN SUSCEPTIBLE INDIVIDUALS.

----- ROUTES OF EXPOSURE AND EFFECTS - INHALATION -----

------ ROUTES OF EXPOSURE AND EFFECTS - INGESTION -----

---------- ADDITIONAL TOXICITY INFORMATION ----------

PRODUCT NAME: HERCULES 3545 BOILER WATER TREATMENT
MSDS NO: 115HER001

SECTION 5 - POTENTIAL HEALTH EFFECTS (CON'T)

EMERGENCY FIRST AID PROCEDURES

---------- FIRST AID - EYE ----------

IMMEDIATELY FLUSH EYES WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES. CALL A PHYSICIAN.

---------- FIRST AID - SKIN ----------

PROMPTLY FLUSH WITH PLENTY OF WATER. REMOVE CONTAMINATED CLOTHING. WASH CLOTHING BEFORE REUSE. DISCARD CONTAMINATED LEATHER ARTICLES.

---------- FIRST AID - INHALATION ----------

---------- FIRST AID - INGESTION ----------

SECTION 6 - SPECIAL PROTECTION INFORMATION

---------- VENTILATION ----------

LOCAL EXHAUST - RECOMMENDED

------ PERSONAL PROTECTIVE EQUIPMENT - RESPIRATOR -----

USE NIOSH/MSHA APPROVED RESPIRATOR FOR TEMPORARY OR EMERGENCY PROTECTION. SELF CONTAINED BREATHING APPARATUS FOR CONFINED SPACE EXPOSURE.

---------- PERSONAL PROTECTIVE EQUIPMENT - EYE -------

CHEMICAL GOGGLES.

-------- PERSONAL PROTECTIVE EQUIPMENT - GLOVES -------

RUBBER

---------- OTHER PROTECTIVE EQUIPMENT ----------

FACE SHIELD AND RUBBER APRON.

SECTION 7 - SPILL OR LEAK PROCEDURES

- STEPS TO BE TAKEN IN CASE OF SPILL, LEAK OR RELEASE -

ELIMINATE SOURCES OF IGNITION. CONTAIN SPILL IF POSSIBLE. VENTILATE AREA. AVOID BREATHING VAPORS AND PERSONAL CONTACT. REMOVE WITH INERT ABSORBENT INTO COVERED DRUMS FOR DISPOSAL.

---------- WASTE DISPOSAL METHOD ----------

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

PRODUCT NAME: HERCULES 3545 BOILER WATER TREATMENT
MSDS NO: 115HER001

SECTION 8 - HANDLING AND STORAGE PRECAUTIONS

WHEN HANDLING, WEAR GOGGLES, FACE SHIELD, RUBBER GLOVES AND APRON.
RELIEVE INTERNAL PRESSURE WHEN RECIEVED AND AT LEAST WEEKLY THEREAFTER
BY LOOSENING PLUG. RETIGHTEN IMMEDIATELY.
STORE IN A WELL VENTILATED SHADED AREA.
WHEN DRUM IS EMPTY, RINSE IT WITH PLENTY OF WATER AND DISCARD.

SECTION 9 - HAZARD WARNING

COMBUSTIBLE! DANGER!
CAUSES EYE BURNS AND SKIN IRRITATION.
PROLONGED OR REPEATED CONTACT MAY CAUSE SKIN SENSITIZATION IN SUSCEPTIBLE INDIVIDUALS.
DO NOT GET IN EYES, ON SKIN, AND CLOTHING. WASH THOROUGHLY AFTER HANDLING. USE WITH ADEQUATE VENTILATION.
KEEP AWAY FROM SPARKS, HEAT AND OPEN FLAME.
AVOID BREATHING VAPORS OR MIST.
FIRST AID:
EYES - IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES. CALL A PHYSICIAN.
SKIN - PROMPTLY FLUSH WITH PLENTY OF WATER. WASH CLOTHING BEFORE REUSE.

RELIEVE INTERNAL PRESSURE WHEN RECIEVED AND AT LEAST WEEKLY THEREAFTER
BY LOOSENING PLUG. RETIGHTEN IMMEDIATELY.
ELIMINATE SOURCES OF IGNITION. CONTAIN SPILL IF POSSIBLE. VENTILATE AREA. AVOID BREATHING VAPORS AND PERSONAL CONTACT. REMOVE WITH INERT ABSORBENT INTO COVERED DRUMS FOR DISPOSAL.
WHEN HANDLING, WEAR GOGGLES, FACE SHIELD, RUBBER GLOVES AND APRON.

IN CASE OF FIRE, USE WATER SPRAY, DRY CHEMICAL, "ALCOHOL" FOAM, OR CARBON DIOXIDE. USE WATER TO KEEP FIRE-EXPOSED CONTAINERS COOL. HEAT OR FIRE MAY EMIT TOXIC FUMES.
STORE IN A WELL-VENTILATED, SHADED AREA.
WHEN DRUM IS EMPTY, RINSE IT WITH PLENTY OF WATER AND DISCARD.

SECTION 10 - COMMENTS

SECTION 11 - REGULATORY INFORMATION

SECTION 12 - REGULATIONS/COMMENTS CONTINUED

INFORMATION SUPPLIED BY: COORDINATOR, TOXICOLOGY AND PRODUCT SAFETY
PHONE: (302)575-5000

MSDS DATE: / / DATE OF PREVIOUS MSDS: / /

PRODUCT NAME: HERCULES 5203 MICROBIOCIDAL COMPOUND
MSDS NO: 113HER001

THE FOLLOWING INFORMATION IS FURNISHED SUBJECT TO THE DISCLAIMER ON THE BOTTOM OF THIS FORM

SECTION 1 - PRODUCT IDENTIFICATION

PRODUCT NAME: HERCULES 5203 MICROBIOCIDAL COMPOUND

SYNONYMS:
HERCULES 5203; HERCULES 5203 MICROBIOCIDAL COMPOUND

MANUFACTURER / DISTRIBUTOR:
HERCULES, INC.
HERCULES PLAZA
WILMINGTON, DE
19894

EMERGENCY PHONE NUMBERS:
(419) 422-2121 (MARATHON)
(800) 424-9300 (CHEMTREC)

CHEMICAL FAMILY: N/A
CHEMICAL FORMULA: N/A

CAS NO:

SECTION 2 - PHYSICAL PROPERTIES

BOILING POINT		MELTING POINT		SPECIFIC GRAVITY(H2O=1)
199	F	23	F	1.01
92	C	-5	C	

% SOLUBILITY IN WATER	VAPOR DENSITY(AIR=1)	VAPOR PRESSURE
APPRECIABLE	NOT DETER.	NOT DETERMINED

PH INFORMATION: PH: 6.3 AT CONC.
APPEARANCE: YELLOW LIQUID ODOR: BENZALDEHYDE ODOR

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT		AUTOIGNITION TEMP		EXPLOSIVE LIMITS (% BY VOLUME IN AIR)
142 TCC	F	NOT DETER.	F	LOWER/UPPER: NOT DETERMINED/NOT DETERMINED
61 TCC	C		C	

NFPA CLASS -- HEALTH: FIRE: REACTIVITY: OTHER:

SPECIFIC HAZARD: NONE

---------- FIRE AND EXPLOSION HAZARDS ----------

SEE REACTIVITY DATA

---------- EXTINGUISHING MEDIA ----------

WATER SPRAY, DRY CHEMICAL, FOAM, CARBON DIOXIDE

--------- SPECIAL FIRE FIGHTING INSTRUCTIONS ----------

SELF-CONTAINED BREATHING APPARATUS. USE WATER TO KEEP FIRE-EXPOSED CONTAINERS COOL.

PRODUCT NAME: HERCULES 5203 MICROBIOCIDAL COMPOUND
MSDS NO: 113HER001

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA (CON'T)

STABILITY: THE MATERIAL IS STABLE AT 70 F, 760MM PRESSURE
CONDITIONS TO AVOID:
DO NOT STORE NEAR HEAT OR OPEN FLAME

HAZARDOUS DECOMPOSITION PRODUCTS:
THERMAL - TIN OXIDES, CARBON DIOXIDE, CARBON MONOXIDE, AMMONIA, NITROUS OXIDES, HYDROGEN CHLORIDE

INCOMPATIBLE MATERIALS:
STRONG OXIDIZING AND REDUCING AGENTS

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

SECTION 4 - PRODUCT COMPOSITION AND EXPOSURE LIMITS

EXPOSURE LIMITS FOR PRODUCT:	TLV	SOURCE
HERCULES 5203 MICROBIOCIDAL COMPOUND	NONE ESTABLISHED	

COMPONENTS:	PERCENT RANGE	TLV	SOURCE
ALKYL DIMETHYL BENZYL AMMONIUM CHLORIDE	2 5.00	0.00	( )
TRIBUTYLTIN NEODECANOATE	5.00		( )

SECTION 5 - POTENTIAL HEALTH EFFECTS

-------- ROUTES OF EXPOSURE AND EFFECTS - EYE ---------

CAUSES EYE DAMAGE

-------- ROUTES OF EXPOSURE AND EFFECTS - SKIN --------

CAUSES SEVERE BURNS OF THE SKIN

----- ROUTES OF EXPOSURE AND EFFECTS - INHALATION -----

PROLONGED BREATHING OF VAPORS COULD BE HAZARDOUS

------ ROUTES OF EXPOSURE AND EFFECTS - INGESTION -----

HARMFUL IF SWALLOWED

---------- ADDITIONAL TOXICITY INFORMATION ----------

PRODUCT NAME: HERCULES 5203 MICROBIOCIDAL COMPOUND
MSDS NO: 113HER001

SECTION 5 - POTENTIAL HEALTH EFFECTS (CON'T)

EMERGENCY FIRST AID PROCEDURES

---------- FIRST AID - EYE ----------

IMMEDIATELY FLUSH WITH WATER FOR AT LEAST 15 MINUTES AND CONTACT PHYSICIAN.

---------- FIRST AID - SKIN ----------

WASH WITH SOAP AND PLENTY OF WATER. IF IRRITATION PERSISTS, GET MEDICAL ATTENTION. WASH CONTAMINATED CLOTHING BEFORE REUSE.

---------- FIRST AID - INHALATION ----------

---------- FIRST AID - INGESTION ----------

DRINK PROMPTLY A LARGE QUANTITY OF MILK, EGG WHITES, OR GELATIN SOLUTION. IF THESE ARE NOT AVAILABLE, DRINK LARGE QUANTITIES OF WATER. AVOID ALCOHOL. CALL A PHYSICIAN IMMEDIATELY.

---------- NOTE TO PHYSICIAN ----------

PROBABLE MUCOSAL DAMAGE MAY CONTRAINDICATE THE USE OF GASTRIC LAVAGE. MEASURES AGAINST CIRCULATORY SHOCK, RESPIRTORY DEPRESSION, AND CONVULSIONS MAY BE NEEDED.

SECTION 6 - SPECIAL PROTECTION INFORMATION

---------- VENTILATION ----------

---------- PERSONAL PROTECTIVE EQUIPMENT - RESPIRATOR -----

NIOSH/MSHA APPROVED RESPIRATOR WHEN EXPOSURE TO VAPORS IS EXCESSIVE.

---------- PERSONAL PROTECTIVE EQUIPMENT - EYE -------

CHEMICAL GOGGLES.

---------- PERSONAL PROTECTIVE EQUIPMENT - GLOVES -------

RUBBER OR NEOPRENE

---------- OTHER PROTECTIVE EQUIPMENT ----------

SAFETY SHOWER, FACE SHIELD, EYEWASH.

PRODUCT NAME: HERCULES 5203 MICROBIOCIDAL COMPOUND
MSDS NO: 113HER001

SECTION 7 - SPILL OR LEAK PROCEDURES

- STEPS TO BE TAKEN IN CASE OF SPILL, LEAK OR RELEASE -

KEEP CONTAINER CLOSED. DO NOT CONTAMINATE WATER, FOOD OR FEED BY STORAGE OR DISPOSAL. OPEN DUMPING IS PROHIBITED. TRIPLE-RINSE CONTAINER AND OFFER FOR RECYCLING, RECONDITIONING, OR DISPOSAL IN APPROVED LANDFILL AWAY FROM WATER SUPPLIES. CONSULT FEDERAL, STATE, OR LOCAL DISPOSAL AUTHORITIES FOR APPROVED ALTERNATIVE PROCEDURES.

SECTION 8 - HANDLING AND STORAGE PRECAUTIONS

KEEP CONTAINER CLOSED. DO NOT CONTAMINATE WATER, FOOD OR FEED BY STORAGE OR DISPOSAL. OPEN DUMPING IS PROHIBITED. TRIPLE RINSE CONTAINER AND OFFER FOR RECYCLING OR RECONDITIONING, OR DISPOSAL IN APPROVED LANDFILL. CONTENTS THAT CANNOT BE USED SHOULD BE DISPOSED OF IN AN APPROVED LANDFILL AWAY FROM WATER SUPPLIES.

PRODUCT NAME: HERCULES 5203 MICROBIOCIDAL COMPOUND
MSDS NO: 113HER001

SECTION 9 - HAZARD WARNING

DANGER!
HAZARDOUS TO HUMANS AND DOMESTIC ANIMALS.
CORROSIVE!
CAUSES SEVERE SKIN AND EYE DAMAGE. HARMFUL IF SWALLOWED.
PROLONGED BREATHING OF VAPORS COULD BE HAZARDOUS.
DO NOT GET IN EYES, ON SKIN, OR ON CLOTHING. AVOID BREATHING VAPORS.
KEEP CONTAINER CLOSED. USE WITH ADEQUATE VENTILATION. WASH THOROUGHLY AFTER HANDLING.

FIRST AID:
EYES - IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES AND CONTACT PHYSICIAN.
SKIN - WASH WITH SOAP AND PLENTY OF WATER. IF IRRITATION PERSISTS GET MEDICAL ATTENTION. WASH CONTAMIANTED CLOTHING BEFORE REUSE
INGESTION - IF SWALLOWED, DRINK PROMPTLY A LARGE QUANTITY OF MILK, EGG WHITES, OR GELATIN SOLUTION. IF THESE ARE NOT AVAILABLE, DRINK LARGE QUANTITIES OF WATER. AVOID ALCOHOL. CALL PHYSICIAN IMMEDIATELY.
NOTE TO PHYSICIAN - PROBABLE MUCOSAL DAMAGE MAY CONTRAINDICATE THE USE OF GASTRIC LAVAGE. MEASURES AGAINST CIRCULATORY SHOCK, RESPIRATORY DEPRESSION, AND CONVULSIONS.

ENVIRONMENTAL HAZARDS - THIS PRODUCT IS TOXIC TO FISH AND OTHER AQUATIC LIFE. DO NOT DISCHARGE INTO LAKES, STREAMS, OR PONDS, OR PUBLIC WATERS UNLESS IN ACCORDANCE WITH AN NPDES PERMIT. FOR GUIDANCE, CONTACT YOUR REGIONAL OFFICE OF THE ENVIRONMENTAL PROTECTION AGENCY.

PHYSICAL OR CHEMICAL HAZARDS

COMBUSTIBLE. DO NOT USE OR STORE NEAR HEAT OR OPEN FLAME.

STORAGE AND DISPOSAL

KEEP THE CONTAINER CLOSED. DO NOT CONTAMINATE WATER, FOOD OR FEED BY STORAGE OR DISPOSAL. OPEN DUMPING IS PROHIBITED. TRIPLE RINSE CONTAINER AND OFFER FOR RECYCLING OR RECONDITIONING, OR DISPOSAL IN APPROVED LANDFILL. CONTENTS THAT CANNOT BE USED SHOULD BE DISPOSED OF IN APPROVED LANDFILL AWAY FROM WATER SUPPLIES. CONSULT FEDERAL, STATE, OR LOCAL DISPOSAL AUTHORITIES FOR APPROVED ALTERNATIVE PROCEDURES.

SECTION 10 - COMMENTS

SECTION 11 - REGULATORY INFORMATION

SECTION 12 - REGULATIONS/COMMENTS CONTINUED

INFORMATION SUPPLIED BY: COORDINATOR, TOXICOLOGY AND PRODUCT SAFETY
PHONE: (302)575-5000

MSDS DATE: 06/22/84 DATE OF PREVIOUS MSDS: / /

PRODUCT NAME: HTH DRY CHLORINATING COMPOUND
MSDS NO: 1040LI001

THE FOLLOWING INFORMATION IS FURNISHED SUBJECT TO THE DISCLAIMER ON THE BOTTOM OF THIS FORM

SECTION 1 - PRODUCT IDENTIFICATION

PRODUCT NAME: HTH DRY CHLORINATING COMPOUND

SYNONYMS:
HTH DRY CHLORINATING COMPOUND; HTH DRY CHLORINATOR GRANULAR; OLIN CALCIUM HYPOCHLORITE; OLIN HTH; CALCIUM HYPOCHLORITE 65%

MANUFACTURER / DISTRIBUTOR:
OLIN CORPORATION
120 LONG RIDGE ROAD
STAMFORD, CT
06904

EMERGENCY PHONE NUMBERS:
(419) 422-2121 (MARATHON)
(800) 424-9300 (CHEMTREC)

CHEMICAL FAMILY: HYPOCHLORITE
CHEMICAL FORMULA: CA(OCL)2*XH2O CAS NO:

SECTION 2 - PHYSICAL PROPERTIES

BOILING POINT	MELTING POINT	SPECIFIC GRAVITY(H2O=1)
N/A F	F	0.8 G/ML
C	DECOMP.177 C	

% SOLUBILITY IN WATER	VAPOR DENSITY(AIR=1)	VAPOR PRESSURE
21% @21C	N/A	NIL

PH INFORMATION: PH: AT CONC.
APPEARANCE: SEE COMMENTS ODOR: CHLORINOUS ODOR

PH: 1% SOL 11
0.8 G/ML (50 LBS/CU. FT.)
APPEARANCE: WHITE FREE FLOWING GRANULAR SOLID
DENSITY: LOOSELY PACKED.

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT	AUTOIGNITION TEMP	EXPLOSIVE LIMITS (% BY VOLUME IN AIR)
N/A F	F	LOWER/UPPER: N/D/N/D
C	C	

NFPA CLASS -- HEALTH: FIRE: REACTIVITY: OTHER:

SPECIFIC HAZARD: NONE

EXTINGUISHING MEDIA

NOT COMBUSTIBLE BUT MAY IGNITE COMBUSTIBLE MATERIALS OR ORGANIC MATTER UPON CONTACT. FLOOD WITH WATER TO KEEP FIRE-EXPOSED CONTAINERS COOL.

SPECIAL FIRE FIGHTING INSTRUCTIONS

USE NIOSH/MSHA APPROVED POSITIVE PRESSURE SELF-CONTAINED BREATHING APPARATUS WHEN ANY MATERIAL IS INVOLVED IN A FIRE.

FIRE AND EXPLOSION HAZARDS

FIRES CAN ERUPT AND SPREAD RAPIDLY. DRUMS MAY RUPTURE EXPLOSIVELY IF CONTAMINATED OR EXPOSED TO HEAT.

PRODUCT NAME: HTH DRY CHLORINATING COMPOUND
MSDS NO: 1040LI001

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA (CON'T)

STABILITY: THE MATERIAL IS UNSTABLE AT 70 F, 760MM PRESSURE
CONDITIONS TO AVOID:
WHEN HEATED TO 350F IT DECOMPOSES RAPIDLY WITH EVOLUTION OF OXYGEN AND HEAT.

HAZARDOUS DECOMPOSITION PRODUCTS:
CHLORINE

INCOMPATIBLE MATERIALS:
SEE COMMENTS

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

INCOMPATIBLE MATERIALS: SOLVENTS, ACIDS, POOL CHEMICALS, (ISOCYANURATES), ORGANIC MATERIALS. DO NOT MIX WITH ANYTHING BUT WATER.

SECTION 4 - PRODUCT COMPOSITION AND EXPOSURE LIMITS

EXPOSURE LIMITS FOR PRODUCT:	TLV	SOURCE
HTH DRY CHLORINATING COMPOUND	NONE ESTABLISHED	

COMPONENTS:	PERCENT RANGE	TLV	SOURCE
CALCIUM HYPOCHLORITE (CORROSIVE TO ALL TISSUES CONTACTED)		( )	

SECTION 5 - POTENTIAL HEALTH EFFECTS

----- ROUTES OF EXPOSURE AND EFFECTS - INHALATION -----

PRIMARY ROUTE OF EXPOSURE. CORROSIVE TO ALL TISSUE CONTACTED.

-------- ROUTES OF EXPOSURE AND EFFECTS - SKIN --------

PRIMARY ROUTE OF EXPOSURE. CORROSIVE TO ALL TISSUE CONTACTED.

--------- ROUTES OF EXPOSURE AND EFFECTS - EYE --------

PRIMARY ROUTE OF EXPOSURE. CORROSIVE TO ALL TISSUE CONTACTED.

------- ROUTES OF EXPOSURE AND EFFECTS - INGESTION ----

PRIMARY ROUTE OF EXPOSURE. CORROSIVE TO ALL TISSUE CONTACTED.

EFFECTS OF CHRONIC EXPOSURE: NONE KNOWN OTHER THAN THOSE SECONDARY TO ACUTE EFFECTS.

PRODUCT NAME: HTH DRY CHLORINATING COMPOUND
MSDS NO: 1040LI001

SECTION 5 - POTENTIAL HEALTH EFFECTS (CON'T)

ANIMAL TOXICITY

ACUTE ORAL LD50 850 MG/KG (RATS)
ACUTE DERMAL LD50 >2G/KG (RABBIT)
ACUTE INHALATION LC50: <20 MG/L AND > 2 MG/L OF INSPIRED AIR FOR 1 HOUR

CARCINOGENICITY: NOT KNOWN TO BE CARCINOGENIC
MUTAGENICITY: NEG. DOMINANT LETHAL MUTAGEN TEST
EYE IRRITATION: CORROSIVE
PRIMARY SKIN IRRITATION: CORROSIVE.

EMERGENCY FIRST AID PROCEDURES

FIRST AID - INHALATION

IMMEDIATELY REMOVE VICTIM TO FRESH AIR. CALL A PHYSICIAN.

FIRST AID - SKIN

IMMEDIATELY FLUSH WITH WATER FOR 15 MINUTES. CALL A PHYSICIAN.

FIRST AID - EYE

IMMEDIATELY FLUSH WITH WATER FOR 15 MINUTES. CALL A PHYSICIAN.

FIRST AID - INGESTION

IMMEDIATELY DRINK LARGE QUANTITIES OF WATER. DO NOT INDUCE VOMITING. CALL A PHYSICIAN.

SECTION 6 - SPECIAL PROTECTION INFORMATION

VENTILATION

LOCAL EXHAUST VENTILATION REQUIRED WHERE EXPOSURE TO DUST MIGHT OCCUR.

PERSONAL PROTECTIVE EQUIPMENT - RESPIRATOR

WEAR NIOAH/MSHA APPROVED CHLORINE GAS/DUST RESPIRATOR IF EXCESSIVE DUSTING OCCURS.

PERSONAL PROTECTIVE EQUIPMENT - EYE

GOGGLES

PEROSNAL PROTECTIVE EQUIPMENT - GLOVES

RUBBER, NEOPRENE OR PVC

PERSONAL PROTECTIVE EQUIPMENT - OTHERS

IMPERVIOUS COVERALLS AND BOOTS. WEAR NIOSH/MSHA APPROVED CHLORINE GAS/DUST RESPIRATOR IF EXCESSIVE DUSTING OCCURS.

PRODUCT NAME: HTH DRY CHLORINATING COMPOUND
MSDS NO: 1040LI001

SECTION 7 - SPILL OR LEAK PROCEDURES

---------- ENVIRONMENTAL EFFECTS ----------

- STEPS TO BE TAKEN IN CASE OF SPILL, LEAK OR RELEASE -

WEAR NIOSH/MSHA APPROVED CHLORINE/DUST RESPIRATOR. FOLLOW OSHA REGULATIONS FOR RESPIRATOR USE (SEE 29 CFR 1910.134). WEAR GOGGLES, IMPERVIOUS COVERALLS AND RUBBER, NEOPRENE OR PVC GLOVES AND IMPERVIOUS BOOTS. REMOVE ALL SOURCES OF IGNITION. CLEAN UP IN A MANNER TO MINIMIZE CONTAMINATION WITH ORGANIC MATERIAL. DO NOT RETURN MATERIAL TO ORIGINAL CONTAINER. PLACE IN A FRESH CONTAINER AND ISOLATE OUTSIDE OR IN A WELL-VENTILATED AREA. DO NOT SEAL THE CONTAINER. WASH ALL CONTAMINATED CLOTHING BEFORE REUSE. IN THE EVENT OF A LARGE SPILL, CALL THE EMERGENCY TELEPHONE NUMBER SHOWN ON THE FRONT OF THIS SHEET.

---------- WASTE DISPOSAL METHOD ----------

DISPOSE OF CONTAMINATED PRODUCT, EMPTY CONTAINERS AND MATERIALS USED IN CLEANING UP SPILLS OR LEAKS IN A MANNER APPROVED FOR THIS MATERIAL. CONSULT APPROPRIATE FEDERAL, STATE AND LOCAL REGULATORY AGENCIES TO ASCERTAIN PROPER DISPOSAL PROCEDURES.

SECTION 8 - HANDLING AND STORAGE PRECAUTIONS

MAY BE HARMFUL IF SWALLOWED. AVOID CONTACT WITH EYES, SKIN OR CLOTHING. UPON CONTACT WITH SKIN OR EYES, WASH OFF WITH WATER. AVOID BREATHING DUST. PROTECT AGAINST PHYSICAL DAMAGE. STORE IN A COOL, DRY, WELL-VENTILATED PLACE AWAY FROM COMBUSTIBLE MATERIALS. DRUMS MAY RUPTURE IF EXPOSED TO HEAT. WEAR NIOSH/MSHA APPROVED CHLORINE GAS/DUST RESPIRATOR IF EXCESSIVE DUSTING OCCURS.

SECTION 9 - HAZARD WARNING

SECTION 10 - COMMENTS

MANUFACTURER LISTS AN ADDITIONAL EMERGENCY TELEPHONE NUMBER AS:
800-424-9300 CHEMTREC

SECTION 11 - REGULATORY INFORMATION

OSHA GLASSIFICATION: OXIDIZER.

D.O.T.: CALCIUM HYPOCHLORITE, HYDRATED, OXIDIZER, UN 2880.

PRODUCT NAME: HTH DRY CHLORINATING COMPOUND
MSDS NO: 1040LI001

SECTION 12 - REGULATIONS/COMMENTS CONTINUED

INFORMATION SUPPLIED BY: COORDINATOR, TOXICOLOGY AND PRODUCT SAFETY
PHONE: (203)789-5436

MSDS DATE: 02/22/88 DATE OF PREVIOUS MSDS: 06/04/86

PRODUCT NAME: SODIUM CHLORIDE
MSDS NO: 162MAL001

THE FOLLOWING INFORMATION IS FURNISHED SUBJECT TO THE DISCLAIMER ON THE BOTTOM OF THIS FORM

SECTION 1 - PRODUCT IDENTIFICATION

PRODUCT NAME: SODIUM CHLORIDE

SYNONYMS:
HALITE; NACL; NATRIUM CHLORIDE; ROCK SALT; SALT; SODIUM CHLORIDE

MANUFACTURER / DISTRIBUTOR:
MALLINCKRODT, INC.
P.O. BOX M
PARIS, KENTUCKY
40361

EMERGENCY PHONE NUMBERS:
(419) 422-2121 (MARATHON)
(800) 424-9300 (CHEMTREC)

CHEMICAL FAMILY:
CHEMICAL FORMULA: NACL

CAS NO: 7647-14-5

SECTION 2 - PHYSICAL PROPERTIES

BOILING POINT		MELTING POINT		SPECIFIC GRAVITY(H2O=1)
2575	F	1474	F	2.16
1413	C	801	C	

% SOLUBILITY IN WATER	VAPOR DENSITY(AIR=1)	VAPOR PRESSURE
36G/100CC	N/A	1.0 MM HG @865C

PH INFORMATION: PH: AT CONC.
APPEARANCE: WHITE CRYSTALLINE ODOR: ODORLESS

MOLECULAR WEIGHT: 58.44

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT		AUTOIGNITION TEMP		EXPLOSIVE LIMITS (% BY VOLUME IN AIR)
F		F		LOWER/UPPER:
C		C		

NFPA CLASS -- HEALTH: FIRE: REACTIVITY: OTHER:

SPECIFIC HAZARD: NONE

---------- FIRE AND EXPLOSION HAZARDS ----------

NOT CONSIDERED TO BE A FIRE OR EXPLOSION HAZARD.

---------- EXTINGUISHING MEDIA ----------

USE ANY MEANS SUITABLE FOR EXTINGUISHING SURROUNDING FIRE.

--------- SPECIAL FIRE FIGHTING INSTRUCTIONS ----------

IN THE EVENT OF A FIRE, WEAR FULL PROTECTIVE CLOTHING AND NIOSH-APPROVED SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN THE PRESSURE DEMAND OR OTHER POSITIVE PRESSURE MODE.

PRODUCT NAME: SODIUM CHLORIDE
MSDS NO: 162MAL001

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA (CON'T)

STABILITY: THE MATERIAL IS STABLE AT 70 F, 760MM PRESSURE
CONDITIONS TO AVOID:
STABLE UNDER ORDINARY CONDITIONS OF USE AND STORAGE

HAZARDOUS DECOMPOSITION PRODUCTS:
WHEN HEATED TO ABOVE 801C (1474F) IT EMITS TOXIC FUMES OF CHLORIDE AND SODIUM OXIDE

INCOMPATIBLE MATERIALS:
LITHIUM, BROMIDE TRIFLUORIDE

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

SECTION 4 - PRODUCT COMPOSITION AND EXPOSURE LIMITS

EXPOSURE LIMITS FOR PRODUCT:	TLV	SOURCE
SODIUM CHLORIDE	NONE ESTABLISHED	

COMPONENTS:	PERCENT RANGE	TLV	SOURCE
SODIUM CHLORIDE	100.00	( )	

SECTION 5 - POTENTIAL HEALTH EFFECTS

-------- ROUTES OF EXPOSURE AND EFFECTS - EYE ---------

MAY CAUSE IRRITATION.

-------- ROUTES OF EXPOSURE AND EFFECTS - SKIN --------

NOT EXPECTED TO BE A HEALTH HAZARD.

----- ROUTES OF EXPOSURE AND EFFECTS - INHALATION -----

INHALATION OF DUST MAY CAUSE MILD IRRITATION TO MUCOUS MEMBRANES, NOSE AND THROAT. SYMPTOMS MAY INCLUDE COUGHING, DRYNESS AND SORE THROAT.

------ ROUTES OF EXPOSURE AND EFFECTS - INGESTION -----

VERY LARGE DOSES CAN CAUSE VOMITING, DIARRHEA, AND PROSTRATION. DEHYDRATION AND CONGESTION OCCUR IN MOST INTERNAL ORGANS. HYPERTONIC SALT SOLUTIONS CAN PRODUCE VIOLENT INFLAMMATORY REACTIONS IN THE GASTROINTESTINAL TRACT.

CHRONIC EXPOSURE: NO INFORMATION FOUND.

AGGRAVATION OF PREEXISTING CONDITIONS: NO INFORMATION FOUND

---------- ADDITIONAL TOXICITY INFORMATION ----------

ORAL RAT LD50: 3000MG/KG. REPRODUCTIVE EFFECT CITED.

PRODUCT NAME: SODIUM CHLORIDE
MSDS NO: 162MAL001

SECTION 5 - POTENTIAL HEALTH EFFECTS (CON'T)

EMERGENCY FIRST AID PROCEDURES

FIRST AID - EYE

WASH THOROUGHLY WITH RUNNING WATER. GET MEDICAL ADVICE IF IRRITATION DEVELOPS.

FIRST AID - SKIN

WASH EXPOSED AREA WITH SOAP AND WATER. GET MEDICAL ADVICE IF IRRITATION DEVELOPS.

FIRST AID - INHALATION

REMOVE TO FRESH AIR. GET MEDICAL ATTENTION FOR ANY BREATHING DIFFICULTY.

FIRST AID - INGESTION

IF LARGE AMOUNTS WERE SWALLOWED, GET MEDICAL ADVICE.

SECTION 6 - SPECIAL PROTECTION INFORMATION

VENTILATION

IN GENERAL, DILUTION VENTILATION IS A SATISFACTORY HEALTH HAZARD CONTROL FOR THIS SUBSTANCE. HOWEVER, IF CONDITIONS OF USE CREATE DISCOMFORT TO THE WORKER, A LOCAL EXHAUST SYSTEM SHOULD BE CONSIDERED.

PERSONAL PROTECTIVE EQUIPMENT - RESPIRATOR

(NIOSH APPROVED) FOR CONDITIONS OF USE WHERE EXPOSURE TO THE DUST IS APPARENT, A DUST/MIST RESPIRATOR MAY BE WORN. FOR EMERGENCIES, A SELF-CONTAINED BREATHING APPARATUS MAY BE NECESSARY.

PERSONAL PROTECTIVE EQUIPMENT - EYE

USE CHEMICAL SAFETY GOGGLES. CONTACT LENSES SHOULD NOT BE WORN WHEN WORKING WITH THIS MATERIAL. MAINTAIN EYEWASH FOUNTAIN AND QUICK-DRENCH FACILITIES IN WORK AREA.

PERSONAL PROTECTIVE EQUIPMENT - GLOVES

WEAR PROTECTIVE GLOVES AND CLEAN BODY-COVERING CLOTHING.

OTHER PROTECTIVE EQUIPMENT

PRODUCT NAME: SODIUM CHLORIDE
MSDS NO: 162MAL001

SECTION 7 - SPILL OR LEAK PROCEDURES

---------- ENVIRONMENTAL EFFECTS ----------

- STEPS TO BE TAKEN IN CASE OF SPILL, LEAK OR RELEASE -

SWEEP UP AND CONTAINERIZE FOR RECLAMATION OR DISPOSAL. VACUUMING OR WET SWEEPING MAY BE USED TO AVOID DUST DISPERSAL.

---------- WASTE DISPOSAL METHOD ----------

WHATEVER CANNOT BE SAVED FOR RECLAMATION MAY BE DELIVERED TO AN APPROVED WASTE DISPOSAL FACILITY, OR IF LOCAL ORDINANCES ALLOW, CAN BE DISSOLVED IN SUFFICIENT AMOUNTS OF WATER TO MEET WATER QUALITY STANDARDS, AND FLUSHED DOWN A SEWER DRAIN. ENSURE COMPLIANCE WITH LOCAL, STATE AND FEDERAL REGULATIONS.

SECTION 8 - HANDLING AND STORAGE PRECAUTIONS

KEEP IN A TIGHTLY CLOSED CONTAINER, STORED IN A COOL, DRY VENTILATED AREA. PROTECT AGAINST PHYSICAL DAMAGE.

SECTION 9 - HAZARD WARNING

WARNING! CAUSES EYE IRRITATION. AVOID CONTACT WITH EYES. WASH THOROUGHLY AFTER HANDLING.

EMERGENCY/FIRST AID: IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES. CALL A PHYSICIAN.

DOT HAZARD CLASS: NOT REGULATED

SECTION 10 - COMMENTS

SECTION 11 - REGULATORY INFORMATION

SECTION 12 - REGULATIONS/COMMENTS CONTINUED

PRODUCT NAME: SODIUM CHLORIDE
MSDS NO: 162MAL001

INFORMATION SUPPLIED BY: COORDINATOR, TOXICOLOGY AND PRODUCT SAFETY
PHONE: ( ) -

MSDS DATE: 08/08/86 DATE OF PREVIOUS MSDS: / /

PRODUCT NAME: SODIUM HYDROXIDE
MSDS NO: 128MAL001

THE FOLLOWING INFORMATION IS FURNISHED SUBJECT TO THE DISCLAIMER ON THE BOTTOM OF THIS FORM

SECTION 1 - PRODUCT IDENTIFICATION

PRODUCT
NAME: SODIUM HYDROXIDE

SYNONYMS:
LYE; SODA LYE; SODIUM HYDRATE; SODIUM HYDROXIDE; CAUSTIC ALKALI

MANUFACTURER / DISTRIBUTOR:
MALLINCKRODT, INC.
P.O. BOX M
PARIS, KENTUCKY
40361
EMERGENCY PHONE NUMBERS:
(419) 422-2121 (MARATHON)
(800) 424-9300 (CHEMTREC)

CHEMICAL FAMILY: INORGANIC BASE
CHEMICAL FORMULA: NAOH CAS NO: 1310-73-2

SECTION 2 - PHYSICAL PROPERTIES

BOILING POINT		MELTING POINT		SPECIFIC GRAVITY(H2O=1)
2534	F	604	F	2.13
1390	C	318	C	

% SOLUBILITY IN WATER	VAPOR DENSITY(AIR=1)	VAPOR PRESSURE
111 G/100 G	N/A	NEGLIGIBLE

PH INFORMATION: PH: AT CONC.
APPEARANCE: WHITE DELIQUESCENT PELLENTS ODOR: ODORLESS

MOLECULAR WEIGHT: 40.00

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT		AUTOIGNITION TEMP		EXPLOSIVE LIMITS (% BY VOLUME IN AIR)
F		F		LOWER/UPPER:
C		C		

NFPA CLASS -- HEALTH: 3 FIRE: 0 REACTIVITY: 1 OTHER:

SPECIFIC HAZARD: NONE

FIRE AND EXPLOSION HAZARDS

NOT CONSIDERED TO BE A FIRE HAZARD. HOT OR MOLTEN MATERIAL CAN REACT VIOLENTLY WITH WATER. CAN REACT WITH CERTAIN METALS, SUCH AS ALUMINUM TO GENERATE FLAMMABLE HYDROGEN GAS. NOT CONSIDERED TO BE AN EXPLOSION HAZARD.

EXTINGUISHING MEDIA

USE ANY MEANS SUITABLE FOR EXTINGUISHING SURROUNDING FIRE. ADDING WATER TO CAUSTIC SOLUTION GENERATES LARGE AMOUNTS OF HEAT.

SPECIAL FIRE FIGHTING INSTRUCTIONS

IN THE EVENT OF A FIRE, WEAR FULL PROTECTIVE CLOTHING AND NIOSH-APPROVED SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN THE PRESSURE DEMAND OR OTHER POSITIVE PRESSURE MODE.

PRODUCT NAME: SODIUM HYDROXIDE
MSDS NO: 128MAL001

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA (CON'T)

STABILITY: THE MATERIAL IS STABLE AT 70 F, 760MM PRESSURE
CONDITIONS TO AVOID:
SEE COMMENTS

HAZARDOUS DECOMPOSITION PRODUCTS:
SODIUM OXIDE.

INCOMPATIBLE MATERIALS:
SEE COMMENTS

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

STABILITY: CONDITIONS TO AVOID: STABLE UNDER ORDINARY CONDITIONS OF USE AND STORAGE. VERY HYGROSCOPIC. CAN SLOWLY PICK UP MOISTURE FROM AIR AND REACT WITH CARBON DIOXIDE FROM AIR TO FORM SODIUM CARBONATE.

INCOMPATIBLE MATERIALS: CONTACT WITH WATER, ACIDS, FLAMMABLE LIQUIDS, AND ORGANIC HALOGEN COMPOUNDS, ESPECIALLY TRICHLOROETHYLENE, MAY CAUSE FIRE OR EXPLOSION. CONTACT WITH NITROMETHANE AND OTHER SIMILAR NITRO COMPOUNDS CAUSES FORMATION OF SHOCK-SENSITIVE SALTS. CONTACT WITH METALS SUCH AS ALUMINUM, TIN, AND ZINC CAUSES FORMATION OF FLAMMABLE HYDROGEN GAS.

SECTION 4 - PRODUCT COMPOSITION AND EXPOSURE LIMITS

EXPOSURE LIMITS FOR PRODUCT:	TLV			SOURCE
SODIUM HYDROXIDE	2.00	MG/M3	(CEILING)	ACGIH
	2.00	MG/M3	(CEILING)	OSHA

COMPONENTS:	PERCENT RANGE	TLV			SOURCE
SODIUM HYDROXIDE	100.00			( )	
		2.00	MG/M3	(CEILING)	ACGIH
		2.00	MG/M3	(CEILING)	OSHA

PRODUCT NAME: SODIUM HYDROXIDE
MSDS NO: 128MAL001

SECTION 5 - POTENTIAL HEALTH EFFECTS

-------- ROUTES OF EXPOSURE AND EFFECTS - EYE ---------

CORROSIVE. MAY CAUSE IRRITATION OF EYES, AND WITH GREATER EXPOSURES, SEVERE BURNS WITH POSSIBLY BLINDNESS RESULTING.

-------- ROUTES OF EXPOSURE AND EFFECTS - SKIN --------

CORROSIVE. CONTACT OF SKIN CAN CAUSE IRRITATION OR SEVERE BURNS AND SCARRING WITH GREATER EXPOSURES.

----- ROUTES OF EXPOSURE AND EFFECTS - INHALATION -----

SEVERE IRRITANT. EFFECTS FROM INHALATION OF DUST OR MIST VARY FROM MILD IRRITATION TO SERIOUS DAMAGE OF THE UPPER RESPIRATORY TRACT, DEPENDING ON SEVERITY OF EXPOSURE. SEVERE PNEUMONITIS MAY OCCUR.

------ ROUTES OF EXPOSURE AND EFFECTS - INGESTION -----

CORROSIVE. SWALLOWING MAY CAUSE SEVERE BURNS OF MOUTH, THROAT, AND STOMACH. SEVERE SCARRING OF TISSUE AND DEATH MAY RESULT.

CHRONIC EXPOSURE: PROLONGED CONTACT WITH DILUTE SOLUTIONS OR DUST HAS A DESTRUCTIVE EFFECT UPON TISSUE.

AGGRAVATION OF PRE-EXISTING CONDITIONS: PERSONS WITH PRE-EXISTING SKIN DISORDERS OR EYE PROBLEMS OR IMPAIRED RESPIRATORY FUNCTION MAY BE MORE SUSCEPTIBLE TO THE EFFECTS OF THE SUBSTANCE.

---------- ADDITIONAL TOXICITY INFORMATION ----------

NO LD50/LC50 INFORMATION FOUND RELATING TO NORMAL ROUTES OF OCCUPATIONAL EXPOSURE. IRRITATION DATA: SKIN, RABBIT: 50 MG/24H SEVERE. EYE, RABBIT: 50 MG/24H SEVERE.

PRODUCT NAME: SODIUM HYDROXIDE
MSDS NO: 128MAL001

SECTION 5 - POTENTIAL HEALTH EFFECTS (CON'T)

EMERGENCY FIRST AID PROCEDURES

FIRST AID - EYE

WASH EYES WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES, LIFTING LOWER AND UPPER EYELIDS OCCASIONALLY. GET MEDICAL ATTENTION IMMEDIATELY.

FIRST AID - SKIN

IN CASE OF CONTACT, IMMEDIATELY FLUSH SKIN WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES WHILE REMOVING CONTAMINATED CLOTHING AND SHOES. WASH CLOTHING BEFORE REUSE. CALL A PHYSICIAN IMMEDIATELY.

FIRST AID - INHALATION

REMOVE TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN. CALL A PHYSICIAN.

FIRST AID - INGESTION

DO NOT INDUCE VOMITING. GIVE LARGE QUANTITIES OF WATER OR MILK IF AVAILABLE. NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON. GET MEDICAL ATTENTION IMMEDIATELY.

SECTION 6 - SPECIAL PROTECTION INFORMATION

VENTILATION

A SYSTEM OF LOCAL AND/OR GENERAL EXHAUST IS RECOMMENDED TO KEEP EMPLOYEE EXPOSURES BELOW THE AIRBORNE EXPOSURE LIMITS. LOCAL EXHAUST VENTILATION IS GENERALLY PREFERRED BECAUSE IT CAN CONTROL THE EMISSIONS OF THE CONTAMINANT AT ITS SOURCE, PREVENTING DISPERSION OF IT INTO THE GENERAL WORK AREA. PLEASE REFER TO THE ACGIH DOCUMENT, "INDUSTRIAL VENTILATION, A MANUAL OF RECOMMENDED PRACTICES", MOST RECENT EDITION, FOR DETAILS.

PERSONAL PROTECTIVE EQUIPMENT - RESPIRATOR

IF THE TLV IS EXCEEDED, A DUST/MIST RESPIRATOR WITH CHEMICAL GOGGLES MAY BE WORN, IN GENERAL, UP TO TEN TIMES THE TLV. CONSULT RESPIRATOR SUPPLIER FOR LIMITATIONS. ALTERNATIVELY, A SUPPLIED AIR FULL FACE-PIECE RESPIRATOR OR AIRLINED HOOD MAY BE WORN. NIOSH APPROVED.

PERSONAL PROTECTIVE EQUIPMENT - EYE

USE CHEMICAL SAFETY GOGGLES AND/OR A FULL FACE SHIELD WHERE SPLASHING IS POSSIBLE. CONTACT LENSES SHOULD NOT BE WORN WHEN WORKING WITH THIS MATERIAL.

PERSONAL PROTECTIVE EQUIPMENT - GLOVES

WEAR IMPERVIOUS GLOVES TO PREVENT SKIN CONTACT.

OTHER PROTECTIVE EQUIPMENT

WEAR IMPERVIOUS PROTECTIVE CLOTHING, INCLUDING BOOTS, LAB COAT, APRON OR COVERALLS TO PREVENT SKIN CONTACT.

MAINTAIN EYE WASH FOUNTAIN AND QUICK-DRENCH FACILITIES IN WORK AREA.

PRODUCT NAME: SODIUM HYDROXIDE
MSDS NO: 128MAL001

SECTION 7 - SPILL OR LEAK PROCEDURES

- STEPS TO BE TAKEN IN CASE OF SPILL, LEAK OR RELEASE -

THIS IS A TEST LINE. 1000C. CLEAN-UP PERSONNEL REQUIRE PROTECTIVE CLOTHING AND RESPIRATORY PROTECTION FROM DUST. SWEEP, SCOOP OR PICK UP SPILLED MATERIAL. AVOID DUSTING. COLLECTED WASTE MAY BE TRANSFERRED TO A CLOSED, PREFERABLY METAL, CONTAINER AND SENT TO A RCRA-APPROVED WASTE DISPOSAL FACILITY. DO NOT FLUSH TO THE SEWER. CAUTION. FLOOR AND OTHER SURFACES MAY BE SLIPPERY. DO NOT CONTACT WITH WATER. NEUTRALIZE TRACES WITH DILUTE ACID.

---------- WASTE DISPOSAL METHOD ----------

ENSURE COMPLIANCE WITH LOCAL, STATE AND FEDERAL REGULATIONS.

SECTION 8 - HANDLING AND STORAGE PRECAUTIONS

KEEP IN A TIGHTLY CLOSED CONTAINER. PROTECT FROM PHYSICAL DAMAGE. STORE IN A COOL, DRY, VENTILATED AREA AWAY FROM SOURCES OF HEAT, MOISTURE AND INCOMPATIBILITIES. ALWAYS ADD THE CAUSTIC TO WATER WHILE STIRRING; NEVER THE REVERSE.

SECTION 9 - HAZARD WARNING

DANGER. MAY BE FATAL IF SWALLOWED. CAUSES SEVERE BURNS.

DO NOT GET IN EYES, ON SKIN, OR ON CLOTHING.
AVOID BREATHING DUST.
KEEP CONTAINER CLOSED.
USE WITH ADEQUATE VENTILATION.
WASH THOROUGHLY AFTER HANDLING.
THIS SUBSTANCE IS CLASSIFIED AS A POISON UNDER THE FEDERAL CAUSTIC POISON ACT.

IF SWALLOWED, DO NOT INDUCE VOMITING. GIVE LARGE QUANTITIES OF WATER. NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON. CALL A PHYSICIAN IMMEDIATELY. IN CASE OF CONTACT, IMMEDIATELY FLUSH SKIN OR EYES WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES. IN ALL CASES CALL A PHYSICIAN.

SECTION 10 - COMMENTS

SECTION 11 - REGULATORY INFORMATION

DOT HAZARD CLASS: CORROSIVE MATERIAL.

PRODUCT NAME: SODIUM HYDROXIDE
MSDS NO: 128MAL001

SECTION 12 - REGULATIONS/COMMENTS CONTINUED

INFORMATION SUPPLIED BY: COORDINATOR, TOXICOLOGY AND PRODUCT SAFETY
PHONE: ( ) -

MSDS DATE: 11/03/85 DATE OF PREVIOUS MSDS: / /

PRODUCT NAME: SODIUM NITRITE
MSDS NO: 168BAK001

THE FOLLOWING INFORMATION IS FURNISHED SUBJECT TO THE DISCLAIMER ON THE BOTTOM OF THIS FORM

SECTION 1 - PRODUCT IDENTIFICATION

PRODUCT NAME: SODIUM NITRITE

SYNONYMS:
SODIUM NITRITE;

MANUFACTURER / DISTRIBUTOR:
J T BAKER CHEMICAL COMPANY
222 RED SCHOOL LANE
PHILLIPSBURG, NJ
08865
EMERGENCY PHONE NUMBERS:
(419) 422-2121 (MARATHON)
(800) 424-9300 (CHEMTREC)

CHEMICAL FAMILY: N/A
CHEMICAL FORMULA:
CAS NO: 7632-00-0

SECTION 2 - PHYSICAL PROPERTIES

BOILING POINT		MELTING POINT		SPECIFIC GRAVITY(H2O=1)
N/A	F	520	F	2.17
	C	271	C	

% SOLUBILITY IN WATER	VAPOR DENSITY(AIR=1)	VAPOR PRESSURE
>10	2.4	N/A

PH INFORMATION: PH: AT CONC.
APPEARANCE: WHITE-YELLOW GRANULES/POWDER ODOR: ODORLESS

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT		AUTOIGNITION TEMP		EXPLOSIVE LIMITS (% BY VOLUME IN AIR)
N/A	F		F	LOWER/UPPER: N/A/N/A
	C		C	

NFPA CLASS -- HEALTH: FIRE: REACTIVITY: OTHER:

SPECIFIC HAZARD: NONE

FIRE AND EXPLOSION HAZARDS

STRONG OXIDIZER. CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE. CAN REACT VIOLENTLY WITH SHOCK, FRICTION OR HEAT. TOXIC GASES PRODUCED: NITROGEN OXIDES.

EXTINGUISHING MEDIA

USE WATER SPRAY

SPECIAL FIRE FIGHTING INSTRUCTIONS

FIREFIGHTERS SHOULD WEAR PROPER PROTECTIVE EQUIPMENT AND SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN POSITIVE PRESSURE MODE. MOVE EXPOSED CONTAINERS FROM FIRE AREA, IF IT CAN BE DONE WITHOUT RISK. USE WATER TO KEEP FIRE-EXPOSED CONTAINERS COOL.

PRODUCT NAME: SODIUM NITRITE
MSDS NO: 168BAK001

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA (CON'T)

STABILITY: THE MATERIAL IS STABLE AT 70 F, 760MM PRESSURE
CONDITIONS TO AVOID:
SHOCK, FRICTION, HEAT, FLAME

HAZARDOUS DECOMPOSITION PRODUCTS:
OXIDES OF NITROGEN

INCOMPATIBLE MATERIALS:
SEE COMMENTS

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR
CONDITIONS TO AVOID:
N/A

INCOMPATIBLE MATERIALS: CYANIDES, STRONG ACIDS, STRONG REDUCING AGENTS, COMBUSTIBLLE MATERIALS, ORGANIC MATERIALS

SECTION 4 - PRODUCT COMPOSITION AND EXPOSURE LIMITS

EXPOSURE LIMITS FOR PRODUCT:	TLV	SOURCE
SODIUM NITRITE	NONE ESTABLISHED	

COMPONENTS:	PERCENT RANGE	TLV	SOURCE
SODIUM NITRITE	100.00	( )	

SECTION 5 - POTENTIAL HEALTH EFFECTS

-------- ROUTES OF EXPOSURE AND EFFECTS - EYE ---------

-------- ROUTES OF EXPOSURE AND EFFECTS - SKIN --------

----- ROUTES OF EXPOSURE AND EFFECTS - INHALATION -----

------ ROUTES OF EXPOSURE AND EFFECTS - INGESTION -----

INGESTION MAY CAUSE IRRITATION AND BURNING TO MOUTH AND STOMACH.

---------- ADDITIONAL TOXICITY INFORMATION ----------

SOME EXPERIMENTS WITH TEST ANIMALS INDICATED THAT THIS SUBSTANCE MAY BE ANTICIPATED TO BE A CARCINOGEN.

LD50 ORAL-RAT 85MG/KG
LD50 IPR-MOUSE 185MG/KG

PRODUCT NAME: SODIUM NITRITE
MSDS NO: 168BAK001

SECTION 5 - POTENTIAL HEALTH EFFECTS (CON'T)

EMERGENCY FIRST AID PROCEDURES

FIRST AID - EYE

IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES.

FIRST AID - SKIN

FLUSH SKIN WITH WATER.

FIRST AID - INHALATION

FIRST AID - INGESTION

IF SWALLOWED, IF CONSCIOUS, IMMEDIATELY INDUCE VOMITING.

SECTION 6 - SPECIAL PROTECTION INFORMATION

VENTILATION

USE ADEQUATE GENERAL OR LOCAL EXHAUST TO KEEP FUME AND DUST LEVELS LOW.

PERSONAL PROTECTIVE EQUIPMENT - RESPIRATOR

NONE REQUIRED WHERE ADEQUATE VENTILATION CONDITIONS EXIST. IF AIR-BORNE CONCENTRATION IS HIGH, USE AN APPROPRIATE RESPIRATOR OR DUST MASK.

PERSONAL PROTECTIVE EQUIPMENT - EYE

SAFETY GLASSES WITH SIDESHIELDS

PERSONAL PROTECTIVE EQUIPMENT - GLOVES

BUTYL RUBBER GLOVES

OTHER PROTECTIVE EQUIPMENT

UNIFORMS ARE RECOMMENDED.

PRODUCT NAME: SODIUM NITRITE
MSDS NO: 168BAK001

SECTION 7 - SPILL OR LEAK PROCEDURES

---------- ENVIRONMENTAL EFFECTS ----------

- STEPS TO BE TAKEN IN CASE OF SPILL, LEAK OR RELEASE -

WEAR SELF-CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE CLOTHING. KEEP COMBUSTIBLES (WOOD, PAPER, OIL, ETC.) AWAY FROM SPILLED MATERIAL. WITH CLEAN SHOVEL, CAREFULLY PLACE MATERIAL INTO CLEAN, DRY CONTAINER AND COVER, REMOVE FROM AREA. FLUSH SPILL AREA WITH WATER.

---------- WASTE DISPOSAL METHOD ----------

DISPOSE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE AND LOCAL ENVIRONMENTAL REGULATIONS. EPA HAZARDOUS WASTE NUMBER: D001, D003 (IGNITABLE, REACTIVE WASTE)

SECTION 8 - HANDLING AND STORAGE PRECAUTIONS

SAF-T-DATA TM STORAGE COLOR CODE: YELLOW

KEEP CONTAINER TIGHTLY CLOSED. STORE SEPARATELY AND AWAY FROM FLAMMABLE AND COMBUSTIBLE MATERIALS.

SECTION 9 - HAZARD WARNING

SECTION 10 - COMMENTS

SECTION 11 - REGULATORY INFORMATION

SECTION 12 - REGULATIONS/COMMENTS CONTINUED

INFORMATION SUPPLIED BY: COORDINATOR, TOXICOLOGY AND PRODUCT SAFETY
PHONE: ( ) -

MSDS DATE: 12/23/85 DATE OF PREVIOUS MSDS: / /

PRODUCT NAME: SULFURIC ACID
MSDS NO: 100ASA001

THE FOLLOWING INFORMATION IS FURNISHED SUBJECT TO THE DISCLAIMER ON THE BOTTOM OF THIS FORM

SECTION 1 - PRODUCT IDENTIFICATION

PRODUCT NAME: SULFURIC ACID

SYNONYMS:
BOV; DITHIONIC ACID; H2SO4; OIL OF VITRIOL; OLEUM; SULFURIC ACID

MANUFACTURER / DISTRIBUTOR:
ASARCO
180 MAIDEN LANE
NEW YORK, NY
10038

EMERGENCY PHONE NUMBERS:
(419) 422-2121 (MARATHON)
(800) 424-9300 (CHEMTREC)

CHEMICAL FAMILY: SULFURIC ACID, OIL OF VITRIOL
CHEMICAL FORMULA: H2SO4 CAS NO: 7664-93-9

SECTION 2 - PHYSICAL PROPERTIES

BOILING POINT		MELTING POINT		SPECIFIC GRAVITY(H2O=1)
276	F	SEE	F	1.835-1.84
281	C	COMMENTS	C	

% SOLUBILITY IN WATER	VAPOR DENSITY(AIR=1)	VAPOR PRESSURE
COMPLETE	N/A	0.005MM HG @ 20C

PH INFORMATION: PH: 0.9 AT CONC.
APPEARANCE: SEE COMMENTS ODOR:

VAPOR PRESSURE: 95%-0.0015MM HG AT 35C
APPEARANCE: OILY, COLORLESS TO SL. YELLOW, CLEAR TO TURBID LIQUID.
MELTING POINT: 93.19% @ -29C, 98% @ -1C

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT		AUTOIGNITION TEMP		EXPLOSIVE LIMITS (% BY VOLUME IN AIR)
N/A	F	N/A	F	LOWER/UPPER: N/A/N/A
	C		C	

NFPA CLASS -- HEALTH: FIRE: REACTIVITY: OTHER:

SPECIFIC HAZARD: NONE

FIRE AND EXPLOSION HAZARDS

FLAMMABLE AND POTENTIALLY EXPLOSIVE HYDROGEN GAS CAN BE GENERATED INSIDE METAL DRUMS AND STORAGE TANKS. CONCENTRATED ACID CAN IGNITE COMBUSTIBLE MATERIALS ON CONTACT. ACID PLUS AN ACTION METAL CAN ALSO FORM EXPLOSIVE CONCENTRATIONS OF HYDROGEN GAS.

EXTINGUISHING MEDIA

IF INVOLVED IN A FIRE, USE WATER SPRAY; AVOID SPRAYING WATER INTO CONTAINERS. IF ONLY A SMALL AMOUNT OF COMBUSTIBLES IS PRESENT, AMOTHER FIRE WITH DRY CHEMICAL.

SPECIAL FIRE FIGHTING INSTRUCTIONS

AT HIGH TEMPERATURES SULFURIC ACID OR SULFUR TRIOXIDE MISTS CAN BE RELEASED FORM VENTED OR RUPTURED CONTAINERS. IF WATER IS ADDED TO CONCENTRATED SULFURIC ACID, VIOLENT SPATTERING CAN OCCUR, AND CONSIDERABLE HEAT MAY BE EVOLVED.

PRODUCT NAME: SULFURIC ACID
MSDS NO: 100ASA001

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA (CON'T)

STABILITY: THE MATERIAL IS STABLE AT 70 F, 760MM PRESSURE
CONDITIONS TO AVOID:
N/A

HAZARDOUS DECOMPOSITION PRODUCTS:
SULFUR TRIOXIDE MIST.

INCOMPATIBLE MATERIALS:
SEE COMMENTS

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR
CONDITIONS TO AVOID:
N/A

INCOMPATIBLE MATERIALS: ACTIVE METAL PLUS SULFURIC ACID GENERATE HYDROGEN GAS WHICH MAY REACH EXPLOSIVE LIMITS.

SECTION 4 - PRODUCT COMPOSITION AND EXPOSURE LIMITS

EXPOSURE LIMITS FOR PRODUCT:	TLV			SOURCE
SULFURIC ACID	1.00	MG/M3	(8 HR TWA)	ACGIH
	3.00	MG/M3	(STEL)	ACGIH
	1.00	MG/M3	(8 HR TWA)	OSHA

COMPONENTS:	PERCENT RANGE	TLV			SOURCE
SULFURIC ACID	100.00	1.00	MG/M3	(8 HR TWA)	ACGIH
		3.00	MG/M3	(STEL)	ACGIH
		1.00	MG/M3	(8 HR TWA)	OSHA

PRODUCT NAME: SULFURIC ACID
MSDS NO: 100ASA001

SECTION 5 - POTENTIAL HEALTH EFFECTS

-------- ROUTES OF EXPOSURE AND EFFECTS - EYE ---------

LIQUID CONTACT CAN CAUSE IRRITATION, CORNEAL BURNS,AND CONJUNCTIVITIS. BLINDNESS MAY RESULT, OR SEVERE OR PERMANENT INJURY. MIST CONTACT MAY IRRITATE OR BURN.

-------- ROUTES OF EXPOSURE AND EFFECTS - SKIN --------

CAUSES SEVERE BURNS OR IRRITATION ON SKIN CONTACT.

----- ROUTES OF EXPOSURE AND EFFECTS - INHALATION -----

INHALATION OF FUMES OR MISTS CAN CAUSE IRRITATION OR CORROSIVE BURNS TO THE UPPER RESPIRATORY SYSTEM. LUNG IRRITATION AND PULMONARY EDEMA CAN OCCUR. ACUTE AND CHRONIC RESPIRATORY DISEASES.

------ ROUTES OF EXPOSURE AND EFFECTS - INGESTION -----

CAN CAUSE IRRITATION AND CORROSIVE BURNS TO THROAT, MOUTH, AND STOMACH. CAN BE FATAL IF SWALLOWED.

LONG TERM EXPOSURE TO HIGH LEVELS OF ACID FUMES MAY CAUSE EROSION OF TEETH FOLLOWED BY JAW NECROSIS, BRONCHIAL IRRITATION, COUGHING, AND BRONCHIAL PNEUMONIA, OR GASTROINTESTINAL DISTURBANCES.

---------- ADDITIONAL TOXICITY INFORMATION ----------

EMERGENCY FIRST AID PROCEDURES

------------------ FIRST AID - EYE ------------------

GET PROMPT MEDICAL ATTENTION. IMMEDIATELY FLUSH WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES.

------------------ FIRST AID - SKIN ------------------

GET PROMPT MEDICAL ATTENTION. IMMEDIATELY FLUSH WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES. REMOVE CONTAMINATED CLOTHING.

--------------- FIRST AID - INHALATION ---------------

GET PROMPT MEDICAL ATTENTION. REMOVE TO FRESH AIR. IF BREATHING HAS STOPPED, GIVE ARTIFICIAL RESPIRATION. IF BREATHING WITH DIFFICULTY, GIVE OXYGEN.

---------------- FIRST AID - INGESTION ---------------

GET PROMPT MEDICAL ATTENTION. DRINK LARGE AMOUNTS OF WATER (OR MILK, IF AVAILABLE) TO DILUTE THE ACID. DO NOT INDUCE VOMITING.

PRODUCT NAME: SULFURIC ACID
MSDS NO: 100ASA001

SECTION 6 - SPECIAL PROTECTION INFORMATION

---------- VENTILATION ----------

ADEQUATE VENTILATION TO REDUCE ACID MISTS BELOW PERMISSIBLE EXPOSURE LIMITS. PACKAGING, UNLOADING AREAS, OR OPEN PROCESSING EQUIPMENT MAY REQUIRE MECHANICAL VENTILATION.

------ PERSONAL PROTECTIVE EQUIPMENT - RESPIRATOR -----

NIOSH/MSHA APPROVED RESPIRATOR FOR SO2 AND/OR MIST FILTERS.

---------- PERSONAL PROTECTIVE EQUIPMENT - EYE -------

CHEMICAL GOGGLES OR FACE SHIELD REQUIRED.

-------- PERSONAL PROTECTIVE EQUIPMENT - GLOVES -------

RUBBER GLOVES AND APRONS OR EQUIVALENT REQUIRED WHEN HANDLING SULFURIC ACID.

---------- OTHER PROTECTIVE EQUIPMENT ----------

FULL PROTECTIVE CLOTHING RECOMMENDED WHEN HANDLING LARGE QUANTITIES OF SULFURIC ACID.

SECTION 7 - SPILL OR LEAK PROCEDURES

---------- ENVIRONMENTAL EFFECTS ----------

- STEPS TO BE TAKEN IN CASE OF SPILL, LEAK OR RELEASE -

DILUTE SMALL SPILLS OR LEAKS CAUTIOUSLY WITH PLENTY OF WATER. NEUTRALIZE WITH ALKALI SUCH AS SODA ASH OR LIME. ADEQUATE VENTILATION IS REQUIRED FOR SODA ASH DUE TO RELEASE OF CO2 GAS. NO SMOKING IN SPILL AREA. MAJOR SPILLS MUST BE HANDLED BY A PREDETERMINED PLAN. DIKING WITH SODA ASH IS RECOMMENDED. ATTEMPT TO KEEP OUT OF SEWER.

---------- WASTE DISPOSAL METHOD ----------

DISPOSAL OF SULFURIC ACID MAY BE SUBJECT TO FEDERAL, STATE, AND LOCAL REGULATIONS. (EPA CORROSIVE WASTE). USERS OF THIS PRODUCT SHOULD REVIEW THEIR OPERATIONS IN TERMS OF APPLICABLE LAWS AND CONSULT WITH APPROPRIATE REGULATORY AGENCIES PRIOR TO DISPOSAL.

PRODUCT NAME: SULFURIC ACID
MSDS NO: 100ASA001

SECTION 8 - HANDLING AND STORAGE PRECAUTIONS

DO NOT GET IN EYES, ON SKIN, OR ON CLOTHING. DO NOT BREATHE VAPOR OR MISTS. USE PROTECTIVE EQUIPMENT AS OUTLINED. DO NOT ADD WATER TO ACID. WHEN DILUTING ALWAYS ADD ACID TO WATER CAUTIOUSLY AND WITH AGITATION. USE WITH ADEQUATE VENTILATION.

PROTECT FROM PHYSICAL DAMAGE. STORE IN COOL, WELL-VENTILATED AREA AWAY FROM COMBUSTIBLES AND REACTIVE CHEMICALS. KEEP OUT OF SUN AND AWAY FROM HEAT. KEEP CONTAINERS IN UPRIGHT POSITION. NO SMOKING IN STORAGE AREA.

LOOSEN CLOSURES CAREFULLY. AVOID INHALATION, SKIN CONTACT OR INGESTION. PRACTICE GOOD HOUSEKEEPING AND PERSONAL HYGIENE PROCEDURES.

SECTION 9 - HAZARD WARNING

EPA HAZARDOUS SUBSTANCE - REPORTABLE QUANTITY - 1000.

EPA HAZARDOUS WASTE NO. D002 (CORROSIVE) IF DISCARDED.

LABEL SIGNAL WORD: DANGER

SECTION 10 - COMMENTS

ADDITIONAL TELEPHONE NUMBERS:
GENERAL INFORMATION - DEPT. OF ENVIRONMENTAL SCIENCES
DAY - 801-262-2459
NIGHT - 801-943-1754
FIRST AID INFORMATION - (DR. C.H. HINE)
DAY - 415-777-2213
NIGHT - 415-777-2214

SECTION 11 - REGULATORY INFORMATION

SECTION 12 - REGULATIONS/COMMENTS CONTINUED

INFORMATION SUPPLIED BY: COORDINATOR, TOXICOLOGY AND PRODUCT SAFETY
PHONE: (212)510-2000

MSDS DATE: 05/05/87 DATE OF PREVIOUS MSDS: / /

PRODUCT NAME: ULTRAMINE 130
MSDS NO: 130CAL001

THE FOLLOWING INFORMATION IS FURNISHED SUBJECT TO THE DISCLAIMER ON THE BOTTOM OF THIS FORM

SECTION 1 - PRODUCT IDENTIFICATION

PRODUCT NAME: ULTRAMINE 130

SYNONYMS:
ULTRAMINE 130; 130 ULTRAMINE; ULTRAMINE, 130;

MANUFACTURER / DISTRIBUTOR:
CALGON CORPORATION
P.O. BOX 1346
PITTSBURGH, PA
15230

EMERGENCY PHONE NUMBERS:
(419) 422-2121 (MARATHON)
(800) 424-9300 (CHEMTREC)

CHEMICAL FAMILY:
CHEMICAL FORMULA: MULTICOMPONENT LIQUID CAS NO:

SECTION 2 - PHYSICAL PROPERTIES

BOILING POINT	MELTING POINT	SPECIFIC GRAVITY(H2O=1)
>212 F	F	
C	C	
% SOLUBILITY IN WATER	VAPOR DENSITY(AIR=1)	VAPOR PRESSURE
COMPLETE	UNKNOWN	UNKNOWN

PH INFORMATION: PH: 12.8 AT CONC.
APPEARANCE: AMBER LIQUID ODOR: AMINE

SPECIFIC GRAVITY (H2O=1): 1.003-1.013

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT	AUTOIGNITION TEMP	EXPLOSIVE LIMITS (% BY VOLUME IN AIR)
131 F	F	LOWER/UPPER:
C	C	

NFPA CLASS -- HEALTH: FIRE: REACTIVITY: OTHER:

SPECIFIC HAZARD: NONE

---------- FIRE AND EXPLOSION HAZARDS ----------

NONE

---------- EXTINGUISHING MEDIA ----------

IN CASE OF FIRE, USE WATER, DRY CHEMICAL, CO2, OR "ALCOHOL" FOAM.

--------- SPECIAL FIRE FIGHTING INSTRUCTIONS ----------

EXERCISE CAUTION WHEN FIGHTING ANY CHEMICAL FIRE. RESPIRATORY PROTECTION IS ESSENTIAL.

PRODUCT NAME: ULTRAMINE 130
MSDS NO: 130CAL001

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA (CON'T)

STABILITY: THE MATERIAL IS STABLE AT 70 F, 760MM PRESSURE
CONDITIONS TO AVOID:
KEEP AWAY FROM HEAT AND FLAME

HAZARDOUS DECOMPOSITION PRODUCTS:
OXIDES OF NITROGEN

INCOMPATIBLE MATERIALS:
ACIDS, STRONG OXIDIZERS

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

SECTION 4 - PRODUCT COMPOSITION AND EXPOSURE LIMITS

EXPOSURE LIMITS FOR PRODUCT:	TLV	SOURCE
ULTRAMINE 130	NONE ESTABLISHED	

COMPONENTS:	PERCENT RANGE	TLV			SOURCE
MORPHOLINE	33.00	20.00	PPM	(8 HR TWA)	ACGIH
		20.00	PPM	(8 HR TWA)	OSHA
		30.00	PPM	(STEL)	OSHA
CYCLOHEXYLAMINE	11.00	10.00	PPM	(8 HR TWA)	ACGIH
		10.00	PPM	(8 HR TWA)	OSHA

SECTION 5 - POTENTIAL HEALTH EFFECTS

-------- ROUTES OF EXPOSURE AND EFFECTS - EYE ---------

CAUSES BURNS TO EYES.

-------- ROUTES OF EXPOSURE AND EFFECTS - SKIN --------

CAUSES BURNS TO SKIN.

-------ROUTES OFEXPOSURE AND EFFECTS - INHALATION -----

CAUSES BURNS TO MUCOUS MEMBRANES.

------ ROUTES OF EXPOSURE AND EFFECTS - INGESTION -----

HARMFUL IF SWALLOWED.

---------- ADDITIONAL TOXICITY INFORMATION ----------

MORPHOLINE:
ORAL LD50 (RAT): 1050MG/KG
DERMAL LD50 (RABBIT): 500MG/KG
CYCLOHEXYLAMINE:
ORAL LD50 (RAT): 156MG/KG
DERMAL LD50 (RABBIT): 1320MG/KG

PRODUCT NAME: ULTRAMINE 130
MSDS NO: 130CAL001

SECTION 5 - POTENTIAL HEALTH EFFECTS (CON'T)

EMERGENCY FIRST AID PROCEDURES

---------- FIRST AID - EYE ----------

IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES. SEEK MEDICAL AID.

---------- FIRST AID - SKIN ----------

IN CASE OF CONTACT, IMMEDIATELY FLUSH SKIN WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES WHILE REMOVING CONTAMINATED CLOTHING AND SHOES. SEEK MEDICAL AID. WASH CLOTHING BEFORE REUSE.

---------- FIRST AID - INHALATION ----------

---------- FIRST AID - INGESTION ----------

IF SWALLOWED, DO NOT INDUCE VOMITING. GIVE LARGE QUANTITIES OF WATER. SEEK MEDICAL AID IMMEDIATELY. NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON.

SECTION 6 - SPECIAL PROTECTION INFORMATION

---------- VENTILATION ----------

LOCAL EXHAUST/MECHANICAL (GENERAL): RECOMMENDED

------ PERSONAL PROTECTIVE EQUIPMENT - RESPIRATOR -----

A NIOSH-APPROVED RESPIRATOR IS RECOMMENDED IF THE TLV FOR MORPHOLINE AND CYCLOHEXYLAMINE ARE EXCEEDED.

---------- PERSONAL PROTECTIVE EQUIPMENT - EYE -------

EYE GOGGLES OR FULL-FACE SHIELD

-------- PERSONAL PROTECTIVE EQUIPMENT - GLOVES -------

RUBBER

---------- OTHER PROTECTIVE EQUIPMENT ----------

RUBBER APRON

PRODUCT NAME: ULTRAMINE 130
MSDS NO: 130CAL001

SECTION 7 - SPILL OR LEAK PROCEDURES

---------- ENVIRONMENTAL EFFECTS ----------

- STEPS TO BE TAKEN IN CASE OF SPILL, LEAK OR RELEASE -

DIKE AREA TO CONTAIN AS MUCH SPILLED MATERIAL AS POSSIBLE. REMOVE ANY REMAINING MATERIAL BY ABSORBING ON VERMICULITE OR OTHER SUITABLE ABSORBING MATERIAL AND PLACE IN A SEALED METAL CONTAINER FOR DISPOSAL.

---------- WASTE DISPOSAL METHOD ----------

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

INCINERATE OR LANDFILL IN ACCORDANCE WITH LOCAL, STATE AND FEDERAL REGULATIONS.

SECTION 8 - HANDLING AND STORAGE PRECAUTIONS

DO NOT GET IN EYES, ON SKIN OR ON CLOTHING. AVOID BREATHING VAPOR OR MIST. KEEP CONTAINER CLOSED. WASH THOROUGHLY AFTER HANDLING.

USE ONLY IN WELL-VENTILATED AREAS THAT WILL MAINTAIN AIR LEVELS BELOW LIMITS ESTABLISHED BY LOCAL, STATE AND FEDERAL REGULATIONS.

SECTION 9 - HAZARD WARNING

SECTION 10 - COMMENTS

SECTION 11 - REGULATORY INFORMATION

SECTION 12 - REGULATIONS/COMMENTS CONTINUED

INFORMATION SUPPLIED BY: COORDINATOR, TOXICOLOGY AND PRODUCT SAFETY
PHONE: ( ) -

MSDS DATE: 10/14/86 DATE OF PREVIOUS MSDS: / /

PRODUCT NAME: OAKITE 32
MSDS NO: 1060AK001

THE FOLLOWING INFORMATION IS FURNISHED SUBJECT TO THE DISCLAIMER ON THE BOTTOM OF THIS FORM

SECTION 1 - PRODUCT IDENTIFICATION

PRODUCT NAME: OAKITE 32

SYNONYMS:
OAKITE 32;

MANUFACTURER / DISTRIBUTOR:
OAKITE PRODUCTS INCORPORATED
50 VALLEY ROAD
BERKELEY HEIGHTS, NJ
07922
EMERGENCY PHONE NUMBERS:
(419) 422-2121 (MARATHON)
(800) 424-9300 (CHEMTREC)

CHEMICAL FAMILY:
CHEMICAL FORMULA: MIXTURE CAS NO:

SECTION 2 - PHYSICAL PROPERTIES

BOILING POINT	MELTING POINT	SPECIFIC GRAVITY(H2O=1)
182 F	F	1.160
C	C	

% SOLUBILITY IN WATER	VAPOR DENSITY(AIR=1)	VAPOR PRESSURE
COMPLETE	1.27	25 MM HG

PH INFORMATION: PH: <1 AT CONC.
APPEARANCE: LIGHT TO DARK BROWN LIQUID ODOR: PUNGENT

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT	AUTOIGNITION TEMP	EXPLOSIVE LIMITS (% BY VOLUME IN AIR)
NONE F	F	LOWER/UPPER: N/A/N/A
C	C	

NFPA CLASS -- HEALTH: 3 FIRE: 0 REACTIVITY: 0 OTHER:

SPECIFIC HAZARD: NONE

---------- FIRE AND EXPLOSION HAZARDS ----------

---------- EXTINGUISHING MEDIA ----------

USE MEDIA SUITABLE FOR SURROUNDING MATERIALS.

--------- SPECIAL FIRE FIGHTING INSTRUCTIONS ----------

WEAR SELF-CONTAINED BREATHING APPARATUS (SCBA).

PRODUCT NAME: OAKITE 32
MSDS NO: 1060AK001

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA (CON'T)

STABILITY: THE MATERIAL IS STABLE AT 70 F, 760MM PRESSURE
CONDITIONS TO AVOID:
NORMALLY STABLE. AVOID EXTREME HEAT.

HAZARDOUS DECOMPOSITION PRODUCTS:
HYDROGEN CHLORIDE, CHLORINE, HYDROGEN

INCOMPATIBLE MATERIALS:
SEE COMMENTS

HAZARDOUS POLYMERIZATION:

INCOMPATIBLE MATERIALS: OXIDIZERS, STRONG ALKALIES. CONTACT WITH METALS MAY YIELD EXPLOSIVE HYDROGEN GAS.

SECTION 4 - PRODUCT COMPOSITION AND EXPOSURE LIMITS

EXPOSURE LIMITS FOR PRODUCT:	TLV	SOURCE
OAKITE 32	NONE ESTABLISHED	

COMPONENTS:	PERCENT RANGE	TLV			SOURCE
HYDROGEN CHLORIDE	25.00- 35.00		(	)	
		5.00	PPM (CEILING	)	ACGIH
		5.00	PPM (CEILING	)	OSHA

MANUFACTURER STATES THAT THE BALANCE OF INGREDIENTS ARE NONHAZARDOUS.
*

PRODUCT NAME: OAKITE 32
MSDS NO: 1060AK001

SECTION 5 - POTENTIAL HEALTH EFFECTS

-------- ROUTES OF EXPOSURE AND EFFECTS - EYE ---------

EYE CONTACT CAUSES SEVERE OR PERMANENT DAMAGE.

-------- ROUTES OF EXPOSURE AND EFFECTS - SKIN --------

SEVERE SKIN BURNS.

----- ROUTES OF EXPOSURE AND EFFECTS - INHALATION -----

SEVERE IRRITATION OF THE NOSE, MOUTH AND RESPIRATORY TRACT WITH COUGHING AND A CHOKING SENSATION. CHRONIC OVEREXPOSURE TO MISTS OR VAPORS MAY CAUSE DENTAL EROSION.

------ ROUTES OF EXPOSURE AND EFFECTS - INGESTION -----

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: NONE KNOWN.

---------- ADDITIONAL TOXICITY INFORMATION ----------

THIS PRODUCT DOES NOT CONTAIN ANY CARCINOGENS (AT 0.1% OR GREATER) AS DEFINED BY IARC, NTP, OR OSHA.

EMERGENCY FIRST AID PROCEDURES

------------------ FIRST AID - EYE ------------------

IMMEDIATELY FLUSH WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES WHILE HOLDING THE EYELIDS OPEN. GET PROMPT MEDICAL ATTENTION.

------------------ FIRST AID - SKIN ------------------

IMMEDIATELY REMOVE CONTAMINATED CLOTHING; WASH SKIN WITH LARGE AMOUNTS OF WATER FOR AT LEAST 15 MINUTES. GET PROMPT MEDICAL ATTENTION.

--------------- FIRST AID - INHALATION ----------------

MOVE VICTIM TO FRESH AIR AND RESTORE BREATHING IF NECESSARY. STAY WITH VICTIM UNTIL ARRIVAL OF EMERGENCY MEDICAL PERSONNEL.

---------------- FIRST AID - INGESTION ---------------

CONTACT LOCAL POISON CONTROL CENTER OR PHYSICIAN IMMEDIATELY!

SECTION 6 - SPECIAL PROTECTION INFORMATION

--------------------- VENTILATION ---------------------

LOCAL EXHAUST MAY BE NECESSARY UNDER SOME HANDLING/USE CONDITIONS. SPECIFIC NEEDS SHOULD BE ADDRESSED BY SUPERVISORY OR HEALTH/SAFETY PERSONNEL.

PRODUCT NAME: OAKITE 32
MSDS NO: 1060AK001

SECTION 6 - SPECIAL PROTECTION INFORMATION (CON'T)

------ PERSONAL PROTECTIVE EQUIPMENT - RESPIRATOR -----

IF TLV IS EXCEEDED, OR FOR SYMPTOMS OF OVEREXPOSURE, WEAR A NIOSH-APPROVED ACID GAS RESPIRATOR.

---------- PERSONAL PROTECTIVE EQUIPMENT - EYE -------

IF SPLASH POTENTIAL EXISTS WEAR CHEMICAL SPLASH GOGGLES OR FACESHIELD.

-------- PERSONAL PROTECTIVE EQUIPMENT - GLOVES -------

IF POTENTIAL FOR SKIN CONTACT EXISTS, WEAR NEOPRENE OR OTHER CHEMICAL RESISTANT GLOVES, AS NEEDED.

------------ OTHER PROTECTIVE EQUIPMENT -------------

IF POTENTIAL FOR SKIN CONTACT EXISTS, WEAR APRON OR COVERALLS AND/OR FOOT COVERINGS AS NEEDED.

SECTION 7 - SPILL OR LEAK PROCEDURES

- STEPS TO BE TAKEN IN CASE OF SPILL, LEAK OR RELEASE -

WEAR PERSONAL PROTECTIVE EQUIPMENT. VENTILATE AREA. DILUTE WITH LARGE AMOUNTS OF WATER AND NEUTRALIZE WITH SODA ASH OR LIME.

----------------- WASTE DISPOSAL METHOD ---------------

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

SECTION 8 - HANDLING AND STORAGE PRECAUTIONS

CORROSIVE. STORE IN CLOSED CONTAINER IN COOL, WELL-VENTILATED AREA. NOTE: IF DILUTING, ALWAYS ADD THIS PRODUCT SLOWLY TO WATER WITH CONSTANT STIRRING. DO NOT ADD THIS PRODUCT TO CHLORINE RELEASING MATERIALS.

SECTION 9 - HAZARD WARNING

SECTION 10 - COMMENTS

PRODUCT NAME: OAKITE 32
MSDS NO: 1060AK001

SECTION 11 - REGULATORY INFORMATION

SECTION 12 - REGULATIONS/COMMENTS CONTINUED

INFORMATION SUPPLIED BY: COORDINATOR, TOXICOLOGY AND PRODUCT SAFETY
TIMOTHY J. COLLITON PHONE: (201)464-6900

MSDS DATE: 05/01/87 DATE OF PREVIOUS MSDS: 03/28/86

PRODUCT NAME: NEOSOL PROPRIETARY SOLVENT
MSDS NO: 111SHE001

THE FOLLOWING INFORMATION IS FURNISHED SUBJECT TO THE DISCLAIMER ON THE BOTTOM OF THIS FORM

SECTION 1 - PRODUCT IDENTIFICATION

PRODUCT NAME: NEOSOL PROPRIETARY SOLVENT

SYNONYMS:
NEOSOL PROPRIETARY SOLVENT; NEOSOL SOLVENT;

MANUFACTURER / DISTRIBUTOR:
SHELL CHEMICAL COMPANY
P.O. BOX 4320
HOUSTON, TX
77210
EMERGENCY PHONE NUMBERS:
(419) 422-2121 (MARATHON)
(800) 424-9300 (CHEMTREC)

CHEMICAL FAMILY: DENATURED ALCOHOL
CHEMICAL FORMULA: CAS NO:

SECTION 2 - PHYSICAL PROPERTIES

BOILING POINT		MELTING POINT		SPECIFIC GRAVITY(H2O=1)
163-174	F	N/A	F	.7955
	C		C	

% SOLUBILITY IN WATER	VAPOR DENSITY(AIR=1)	VAPOR PRESSURE
COMPLETE	1.8	42 @68F

PH INFORMATION: PH: AT CONC.
APPEARANCE: CLEAR, COLORLESS LIQUID ODOR: MILD

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT		AUTOIGNITION TEMP	EXPLOSIVE LIMITS (% BY VOLUME IN AIR)
55-60 TCC	F	F	LOWER/UPPER: 3.3/19.0
	C	C	

NFPA CLASS -- HEALTH: 3 FIRE: 3 REACTIVITY: 0 OTHER:

SPECIFIC HAZARD: NONE

---------- FIRE AND EXPLOSION HAZARDS ----------

CONTAINERS EXPOSED TO INTENSE HEAT FROM FIRES SHOULD BE COOLED WITH WATER TO PREVENT VAPOR PRESSURE BUILDUP WHICH COULD RESULT IN CONTAINER RUPTURE. CONTAINER AREAS EXPOSED TO DIRECT FLAME CONTACT SHOULD BE COOLED WITH LARGE QUANTITIES OF WATER AS NEEDED TO PREVENT WEAKENING OF CONTAINER STRUCTURE.

---------- EXTINGUISHING MEDIA ----------

USE WATER FOG, "ALCOHOL" FOAM, DRY CHEMICAL OR CO2.

--------- SPECIAL FIRE FIGHTING INSTRUCTIONS ----------

WARNING. FLAMMABLE. CLEAR FIRE AREA OF UNPROTECTED PERSONNEL. DO NOT ENTER CONFINED FIRE SPACE WITHOUT FULL BUNKER GEAR (HELMET WITH FACE SHIELD, BUNKER COATS, GLOVES AND RUBBER BOOTS). INCLUDING A POSITIVE PRESSURE NIOSH APPROVED SELF-CONTAINED BREATHING APPARATUS. COOL FIRE EXPOSED CONTAINERS WITH WATER.

PRODUCT NAME: NEOSOL PROPRIETARY SOLVENT
MSDS NO: 111SHE001

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA (CON'T)

STABILITY: THE MATERIAL IS STABLE AT 70 F, 760MM PRESSURE
CONDITIONS TO AVOID:
SEE COMMENTS

HAZARDOUS DECOMPOSITION PRODUCTS:
CARBON MONOXIDE AND UNIDENTIFIED ORGANIC COMPOUNDS
MAY BE FORMED DURING COMBUSTION.

INCOMPATIBLE MATERIALS:

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

CONDITIONS TO AVOID: AVOID HEAT, SPARKS, FLAME AND CONTACT WITH STRONG OXIDIZING AGENTS. DO NOT STORE OR HANDLE IN ALUMINUM EQUIPMENT AT TEMPERATURES OVER 120F.

SECTION 4 - PRODUCT COMPOSITION AND EXPOSURE LIMITS

EXPOSURE LIMITS FOR PRODUCT:	TLV	SOURCE
NEOSOL PROPRIETARY SOLVENT	NONE ESTABLISHED	

COMPONENTS:	PERCENT RANGE	TLV			SOURCE
ETHYL ALCOHOL	90.00- 95.00	1000.00	PPM	(8 HR TWA)	ACGIH
		1000.00	PPM	(8 HR TWA)	OSHA
METHYL ALCOHOL	3.00- 4.00	200.00	PPM	(8 HR TWA)	ACGIH
		250.00	PPM	(STEL)	ACGIH
		200.00	PPM	(8 HR TWA)	OSHA
		250.00	PPM	(STEL)	OSHA
ETHYL ACETATE	< 2.00	400.00	PPM	(8 HR TWA)	ACGIH
		400.00	PPM	(8 HR TWA)	OSHA
METHYL ISOBUTYL KETONE	< 2.00	50.00	PPM	(8 HR TWA)	ACGIH
		75.00	PPM	(STEL)	ACGIH
		50.00	PPM	(8 HR TWA)	OSHA
		75.00	PPM	(STEL)	OSHA
HYDROCARBON SOLVENT	< 2.00			( )	

PRODUCT NAME: NEOSOL PROPRIETARY SOLVENT
MSDS NO: 111SHE001

SECTION 5 - POTENTIAL HEALTH EFFECTS

-------- ROUTES OF EXPOSURE AND EFFECTS - EYE ---------

BASED ON PRESENCE OF COMPONENTS ETHYL ALCOHOL, METHYL ALCOHOL, AND METHYL ISOBUTYL KETONE, PRODUCT IS PRESUMED TO BE MILDLY TO SEVERELY IRRITATING TO THE EYES.

-------- ROUTES OF EXPOSURE AND EFFECTS - SKIN --------

BASED ON PRESENCE OF METHYL ALCOHOL AND METHYL ISOBUTYL KETONE, PRODUCT IS PRESUMED TO BE SLIGHTLY TO MODERATELY IRRITATING TO THE SKIN AND MAY BE SLIGHTLY TOXIC IF ABSORBED THROUGH THE SKIN. PROLONGED OR REPEATED LIQUID CONTACT CAN RESULT IN DEFATTING AND DRYING OF THE SKIN WHICH MAY RESULT IN SKIN IRRITATION AND DERMATITIS.

----- ROUTES OF EXPOSURE AND EFFECTS - INHALATION -----

BASED ON PRESENCE OF COMPONENT METHYL ALCOHOL, ETHYL ACETATE AND METHYL ISOBUTYL KETONE, PRODUCT MAY CAUSE IRRITATION TO THE NOSE, THROAT AND RESPIRATORY TRACT AND BASED ON PRESENCE OF COMPONENT ETHYL ACETATE, PRODUCT IS TOXIC. BASED ON PRESENCE OF ALL COMPONENTS, INHALATION MAY PRODUCE CNS DEPRESSION AND LIVER, KIDNEY AND OPTIC NERVE DAMAGE. INHALATION OF VAPORS OF COMPONENT HYDROCARBON SOLVENT MAY RESULT IN PERIPHERAL NEUROPATHY.

------ ROUTES OF EXPOSURE AND EFFECTS - INGESTION -----

BASED ON PRESENCE OF COMPONENT METHYL ISOBUTYL KETONE, PRODUCT IS PRESUMED TO BE MODERATELY TOXIC. INGESTION OF PRODUCE MAY PRODUCE CNS DEPRESSION AND LIVER DAMAGE. BASED ON THE PRESENCE OF COMPONENT HYDROCARBON SOLVENT, INGESTION OF PRODUCT MAY RESULT IN VOMITING; ASPIRATION (BREATHING) OF VOMITUS INTO THE LUNGS MUST BE AVOIDED AS EVEN SMALL QUANTITIES MAY RESULT IN ASPIRATION PNEUMONITIS.

SIGNS AND SYMPTOMS: IRRITATION AS NOTED ABOVE. EARLY TO MODERATE CNS (CENTRAL NERVOUS SYSTEM) DEPRESSION MAY BE EVIDENCED BY GIDDINESS, HEADACHE, DIZZINESS AND NAUSEA; IN EXTREME CASES. UNCONSCIOUSNESS AND DEATH MAY OCCUR. LIVER DAMAGE MAY BE EVIDENCED BY LOSS OF APPETITE. JAUNDICE (YELLOWISH SKIN COLOR) AND SOMETIMES PAIN IN THE UPPER ABDOMEN ON THE RIGHT SIDE. KIDNEY DAMAGE MAY BE EVIDENCED BY CHANGES IN URINE OUTPUT, URINE APPEARANCE OR EDEMA (SWELLING FROM FLUID RETENTION). OPTIC NERVE DAMAGE MAY BE EVIDENCED BY PARTIAL OR COMPLETE LOSS OF VISION. PERIPHERAL NERVE DAMAGE MAY BE EVIDENCE BY MUSCULAR WEAKNESS AND LOSS OF SENSATION IN THE ARMS AND LEGS. ASPIRATION PNEUMONITIS MAY BE EVIDENCE BY COUGHING. LABORED BREATHING AND CYANOSIS (BLUISH SKIN): IN SEVERE CASES DEATH MAY OCCUR.

AGGRAVATED MEDICAL CONDITIONS: PREEXISTING EYE, SKIN AND RESPIRATORY DISORDERS MAY BE AGGRAVATED BY EXPOSURE TO THIS PRODUCT. IMPAIRED LIVER , KIDNEY, OPTIC NERVE AND PERIPHERAL NERVE FUNCTIONS FROM PREEXISTING DISORDERS MAY BE AGGRAVATED BY EXPOSURE TO THIS PRODUCT.

PRODUCT NAME: NEOSOL PROPRIETARY SOLVENT
MSDS NO: 111SHE001

SECTION 5 - POTENTIAL HEALTH EFFECTS (CON'T)

---------- ADDITIONAL TOXICITY INFORMATION ----------

COMPONENT: ETHYL ALCOHOL
ACUTE ORAL LD50: 13.7G/KG-RAT
ACUTE DERMAL LD50: >2.0G/KG-RABBIT
ACUTE INHALATION LC50: NONE
COMPONENT: METHYL ALCOHOL
ACUTE ORAL LD50: 5.6G/KG-RAT
ACUTE DERMAL LD50: 20G/KG-RABBIT
ACUTE INHALATION LC50: 64000PPM-4H-RAT
COMPONENT: ETHYL ACETATE
ACUTE ORAL LD50: 11.0G/KG-RAT
ACUTE DERMAL LD50: NONE
ACUTE INHALATION LC50: 1600PPM-8HR-RAT
COMPONENT: METHYL ISOBUTYL KETONE
ACUTE ORAL LD50: 2.1G/KG-RAT
ACUTE DERMAL LD50: >20G/KG-RABBIT
ACUTE INHALATION LC50: APPROX. 3000PPM-4H-RAT
COMPONENT: HYDROCARBON SOLVENT
ACUTE ORAL LD50: >25G/KG-RAT
ACUTE DERMAL LD50: >5G/KG-RABBIT
ACUTE INHALATION LC50: 73.680PPM-1HR-RAT

PRODUCT NAME: NEOSOL PROPRIETARY SOLVENT
MSDS NO: 111SHE001

SECTION 5 - POTENTIAL HEALTH EFFECTS (CON'T)

EMERGENCY FIRST AID PROCEDURES

FIRST AID - EYE

IMMEDIATELY FLUSH EYES WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES WHILE HOLDING EYELIDS OPEN. GET MEDICAL ATTENTION.

FIRST AID - SKIN

FLUSH SKIN WITH WATER WHILE REMOVING CONTAMINATED CLOTHING AND SHOES. IF IRRITATION OCCURS, GET MEDICAL ATTENTION. DO NOT REUSE CLOTHING OR SHOES UNTIL CLEANED.

FIRST AID - INHALATION

REMOVE VICTIM TO FRESH AIR AND PROVIDE OXYGEN IF BREATHING IS DIFFICULT. GIVE ARTIFICIAL RESPIRATION IF NOT BREATHING. GET MEDICAL ATTENTION.

FIRST AID - INGESTION

DO NOT GIVE LIQUIDS IF VICTIM IS UNCONSCIOUS OR VERY DROWSY. OTHERWISE, GIVE NO MORE THAN 2 GLASSES OF WATER AND INDUCE VOMITING BY GIVING 30CC (2 TABLESPOONS) SYRUP OF IPECAC. IF IPECAC IS UNAVAILABLE GIVE 2 GLASSES OF WATER AND INDUCE VOMITING BY TOUCHING FINGER TO BACK OF VICTIM'S THROAT. KEEP VICTIM'S HEAD BELOW HIPS WHILE VOMITING. GET MEDICAL ATTENTION.

NOTE TO PHYSICIAN: IF VICTIM IS A CHILD, GIVE NO MORE THAN 1 GLASS OF WATER AND 15CC (1 TABLESPOON) SYRUP OF IPECAC. IF SYMPTOMS SUCH AS LOSS OF GAG REFLEX. CONVULSIONS OR UNCONSCIOUSNESS OCCUR BEFORE EMESIS, GASTRIC LAVAGE SHOULD BE CONSIDERED FOLLOWING INTUBATION WITH A CUFFED ENDOTRACHEAL TUBE.

PERSONS ON DISULFIRAM (ANTABUSE (R)) THERAPY SHOULD BE AWARE THAT THE ETHYL ALCOHOL IN THIS PRODUCT IS HAZARDOUS TO THEM JUST AS IS ALCOHOL FROM ANY SOURCE. DISULFIRAM REACTIONS (VOMITING, HEADACHE AND EVEN COLLAPSE) MAY FOLLOW INGESTION OF SMALL AMOUNTS OF ALCOHOL AND HAVE ALSO BEEN DESCRIBED FROM SKIN CONTACT.

COMPONENT HYDROCARBON SOLVENT OF THIS PRODUCT MAY CONTAIN CERTAIN ISOPARAFFINS THAT HAVE BEEN DEMONSTRATED TO CAUSE KIDNEY EFFECTS IN MALE RATS AND CARDIAC SENSITIZATION IN OTHER SPECIES. THE RELEVANCE OF THE KIDNEY EFFECTS TO MAN IS UNKNOWN. THERE IS NO EVIDENCE THAT EXPOSURE TO INDUSTRIALLY ACCEPTABLE LEVELS OF HYDROCARBONS (E.G. THE TLV) HAVE PRODUCED CARDIAC EFFECTS IN HUMANS. SUCH SENSITIZATION, HOWEVER, MAY CAUSE FATAL CHANGES IN HEART RHYTHM. THIS LATTER EFFECT HAS BEEN SHOWN TO BE ENHANCED BY HYPOXIA OR THE INJECTION OF ADRENALIN LIKE AGENTS.

SECTION 6 - SPECIAL PROTECTION INFORMATION

VENTILATION

USE EXPLOSION-PROOF VENTILATION AS REQUIRED TO CONTROL PARTICULATE CONCENTRATIONS.

PRODUCT NAME: NEOSOL PROPRIETARY SOLVENT
MSDS NO: 111SHE001

SECTION 6 - SPECIAL PROTECTION INFORMATION (CON'T)

------ PERSONAL PROTECTIVE EQUIPMENT - RESPIRATOR -----

AVOID BREATHING VAPOR. USE A NIOSH-APPROVED RESPIRATOR AS REQUIRED TO PREVENT OVEREXPOSURE. IN ACCORD WITH 29CFR 1910.134, USE EITHER A FULL-FACE, ATMOSPHERE-SUPPLYING RESPIRATOR OR AN AIR-PURIFYING RESPIRATOR FOR ORGANIC VAPORS.

---------- PERSONAL PROTECTIVE EQUIPMENT - EYE -------

AVOID CONTACT WITH EYES, WEAR CHEMICAL GOGGLES IF THERE IS LIKELIHOOD OF CONTACT WITH EYES.

-------- PERSONAL PROTECTIVE EQUIPMENT - GLOVES -------

AVOID PROLONGED OR REPEATED CONTACT WITH SKIN. WEAR GLOVES AND OTHER CLOTHING AS REQUIRED TO MINIMIZE CONTACT.

------------ OTHER PROTECTIVE EQUIPMENT -------------

EYEWASH FOUNTAINS AND SAFETY SHOWERS SHOULD BE AVAILABLE FOR EMERGENCY USE.

SECTION 7 - SPILL OR LEAK PROCEDURES

---------------- ENVIRONMENTAL EFFECTS ----------------

- STEPS TO BE TAKEN IN CASE OF SPILL, LEAK OR RELEASE -

WARNING. FLAMMABLE. ELIMINATE ALL IGNITION SOURCES. HANDLING EQUIPMENT MUST BE GROUNDED TO PREVENT SPARKING. LARGE SPILLS: EVACUATE THE HAZARD AREA OF UNPROTECTED PERSONNEL. WEAR APPROPRIATE RESPIRATOR AND PROTECTIVE CLOTHING. SHUT OFF SOURCE OF LEAK ONLY IF SAFE TO DO SO. DIKE AND CONTAIN. IF VAPOR CLOUD FORMS, WATER FOG MAY BE USED TO SUPPRESS; CONTAIN RUNOFF. REMOVE WITH VACUUM TRUCKS OR PUMP TO STORAGE/SALVAGE VESSELS. SOAK UP RESIDUE WITH AN ABSORBENT SUCH AS CLAY, SAND OR OTHER SUITABLE MATERIAL; PLACE IN NONLEAKING CONTAINERS FOR PROPER DISPOSAL. FLUSH AREA WITH WATER TO REMOVE TRACE RESIDUE; DISPOSE OF FLUSH SOLUTIONS AS ABOVE. SMALL SPILLS: TAKE UP WITH AN ABSORBENT MATERIAL AND PLACE IN NONLEAKING CONTAINERS; SEAL TIGHTLY FOR PROPER DISPOSAL.

----------------- WASTE DISPOSAL METHOD ---------------

UNDER EPA-RCRA (40 CFR 261.21). IF THIS PRODUCE BECOMES A WASTE MATERIAL, IT WOULD BE IGNITABLE HAZARDOUS WASTE. HAZARDOUS WASTE NUMBER D001. REFER TO LATEST EPA OR STATE REGULATIONS REGARDING PROPER DISPOSAL.

PRODUCT NAME: NEOSOL PROPRIETARY SOLVENT
MSDS NO: 111SHE001

SECTION 8 - HANDLING AND STORAGE PRECAUTIONS

VAPORS MAY ACCUMULATE AND TRAVEL TO IGNITION SOURCES DISTANT FROM THE HANDLING SITE; FLASH-FIRE CAN RESULT. KEEP CONTAINERS CLOSED WHEN NOT IN USE. USE (ONLY) WITH ADEQUATE VENTILATION.

WASH WITH SOAP AND WATER BEFORE EATING, DRINKING, SMOKING OR USING TOILET FACILITIES. LAUNDER CONTAMINATED CLOTHING BEFORE REUSE.

DO NOT STORE OR HANDLE IN ALUMINUM EQUIPMENT AT TEMPERATURES OVER 120F.

SECTION 9 - HAZARD WARNING

DEPARTMENT OF TRANSPORTATION CLASSIFICATION: FLAMMABLE LIQUID
D.O.T. PROPER SHIPPING NAME: DENATURED ALCOHOL
D.O.T. I.D. NO.: NA 1986, GUIDE 28

SECTION 10 - COMMENTS

ADDITIONAL EMERGENCY TELEPHONE NUMBER: 800-424-9300 (CHEMTREC)

THE COMPONENTS OF THIS PRODUCT ARE LISTED ON THE EPA/TSCA INVENTORY OF CHEMICAL SUBSTANCES.

SECTION 11 - REGULATORY INFORMATION

SECTION 12 - REGULATIONS/COMMENTS CONTINUED

INFORMATION SUPPLIED BY: COORDINATOR, TOXICOLOGY AND PRODUCT SAFETY
JOHN P. SEPESI PHONE: (713)241-4819

MSDS DATE: 10/10/85 DATE OF PREVIOUS MSDS: / /

MATERIAL SAFETY DATA SHEET

SAFETY-KLEEN CORP.
777 Big Timber Rd.
Elgin, IL 60123

safety-kleen corp.

IDENTITY (As Used on Label and List)	Note: Blank spaces are not permitted. If any item is not applicable, or no information is available, the space must be marked to indicate so.
Safety-Kleen 105 Solvent-MS	

Section I Part #6617

Manufacturer's Name Safety-Kleen Corp.	Emergency Telephone Number 312/697-8460
Address (Number, Street, City, State, and ZIP Code) 777 Big Timber Road	Telephone Number for Information 312/697-8460
Elgin, Illinois 60123	Date Prepared 9/12/86, Revised 5/26/87, 9/29/87
	Signature of Preparer (optional)

Section II—Hazardous Ingredients/Identity Information

Hazardous Components (Specific Chemical Identity; Common Name(s))	OSHA PEL	ACGIH TLV	Other Limits Recommended	% (optional)
Mineral Spirits C.A.S. Reg. No. 8032-32-4	500 ppm	100 ppm	N/A	99.9+
Dye proprietary	Unknown	Unknown	unk.	0.003
Anti-Static Agent mixture	Unknown	Unknown	100 est.	1 ppm

Section III—Physical/Chemical Characteristics

Boiling Point	310-400°F	Specific Gravity (H_2O = 1)	0.775-0.795
Vapor Pressure (mm Hg.) @ 68°F	2	Melting Point	N/A
Vapor Density (AIR = 1)	4.9	Evaporation Rate (Toluene = 1)	0.2

Solubility in Water
Negligible.

Appearance and Odor
Clear green liquid with characteristic hydrocarbon odor.

Section IV—Fire and Explosion Hazard Data

Flash Point (Method Used)	Flammable Limits	LEL	UEL
105°F TCC		0.7	6.0

Extinguishing Media
CO_2, foam, dry chemical, water (mist only)

Special Fire Fighting Procedures
None.

Unusual Fire and Explosion Hazards
None.

Section V—Reactivity Data

Stability	Unstable		Conditions to Avoid
	Stable	X	Heat, sparks, flame and fire.

Incompatability *(Materials to Avoid)*
Strong oxidizing agents.

Hazardous Decomposition or Byproducts
Normally none; however, incomplete burning may yield carbon monoxide.

Hazardous Polymerization	May Occur		Conditions to Avoid N/A
	Will Not Occur	X	

Section VI—Health Hazard Data

Route(s) of Entry: Inhalation? yes Skin? yes Ingestion? yes

Health Hazards *(Acute and Chronic)*
Skin - Can cause drying of skin. Eyes - Severe irritant. Inhalation - Excessive inhalation can cause headache, dizziness and nausea. Ingestion - Harmful or fatal if swallowed.

Carcinogenicity: NTP? Not listed IARC Monographs? Not listed OSHA Regulated? No

Not a known or suspected carcinogen.

Signs and Symptoms of Exposure
Drying of skin, eye irritation, headache, dizziness, nausea.

Medical Conditions
Generally Aggravated by Exposure Unknown.

Emergency and First Aid Procedures
Skin - Wash with soap and water. Eyes - Irrigate with water. Inhalation - Remove to fresh air source and call a physician. Ingestion - DO NOT induce vomiting. Call a physician.

Section VII—Precautions for Safe Handling and Use

Steps to Be Taken in Case Material is Released or Spilled
Catch and collect for recovery as soon as possible. Avoid exposure to sparks, fire, flame, hot surfaces.

Waste Disposal Method
Dispose of in accordance with company, local, state and federal regulations.

Precautions to Be Taken in Handling and Storing
Combustible. Keep away from heat, sparks, flame. Use with adequate ventilation. Avoid long and repeated contact with skin. If clothes are inadvertently saturated with solvent- DO NOT SMOKE. Remove the solvent saturated clothes immediately to avoid skin rash. Keep away from ignition sources. Keep out of reach of children.

Section VIII—Control Measures

Respiratory Protection *(Specify Type)*
Self-contained breathing apparatus for concentrations above TLV limits.

Ventilation	Local Exhaust: Normal room ventilation.	Special: None.
	Mechanical *(General)*: None.	Other: None.

Protective Gloves: In cases of prolonged contact, wear rubber gloves. Eye Protection: Yes - Eyeglasses, safety glasses.

Other Protective Clothing or Equipment
N/A

Work/Hygienic Practices
Do not smoke while using this solvent.

PRODUCT NAME: CHEVRON DELO 400 MOTOR OIL SAE 30
MSDS NO: 132CHE004

THE FOLLOWING INFORMATION IS FURNISHED SUBJECT TO THE DISCLAIMER ON THE BOTTOM OF THIS FORM

SECTION 1 - PRODUCT IDENTIFICATION

PRODUCT
NAME: CHEVRON DELO 400 MOTOR OIL SAE 30

SYNONYMS:
CHEVRON DELO 400 MOTOR OIL SAE 30; DELO 400 MOTOR OIL SAE 30; MOTOR OIL SAE 30, DELO 400

MANUFACTURER / DISTRIBUTOR:
CHEVRON ENVIR. HEALTH CENTER
P O BOX 4054
RICHMOND, CA
94804
EMERGENCY PHONE NUMBERS:
(419) 422-2121 (MARATHON)
(800) 424-9300 (CHEMTREC)

CHEMICAL FAMILY:
CHEMICAL FORMULA: CAS NO:

SECTION 2 - PHYSICAL PROPERTIES

BOILING POINT		MELTING POINT		SPECIFIC GRAVITY(H2O=1)
N/A	F	N/A	F	COMMENTS
	C		C	

% SOLUBILITY IN WATER	VAPOR DENSITY(AIR=1)	VAPOR PRESSURE
INSOLUBLE	N/A	N/A

PH INFORMATION: PH: AT CONC.
APPEARANCE: DARK BROWN LIQUID ODOR:

SPECIFIC GRAVITY: 0.88-0.92 @15.6C
POUR POINT: -18C (MAX.)
VISCOSITY: 11.7-12.5 CST @100C

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT		AUTOIGNITION TEMP		EXPLOSIVE LIMITS (% BY VOLUME IN AIR)
428 COC	F	NDA	F	LOWER/UPPER: N/A/N/A
220 COC	C		C	

NFPA CLASS -- HEALTH: FIRE: REACTIVITY: OTHER:

SPECIFIC HAZARD: NONE

---------- FIRE AND EXPLOSION HAZARDS ----------

---------- EXTINGUISHING MEDIA ----------

CO2, DRY CHEMICAL, FOAM, WATER FOG

--------- SPECIAL FIRE FIGHTING INSTRUCTIONS ----------

FOR FIRES INVOLVING THIS MATERIAL, DO NOT ENTER ANY ENCLOSED OR CONFINED FIRE SPACE WITHOUT PROPER PROTECTIVE EQUIPMENT, INCLUDING SELF-CONTAINED BREATHING APPARATUS.

PRODUCT NAME: CHEVRON DELO 400 MOTOR OIL SAE 30
MSDS NO: 132CHE004

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA (CON'T)

STABILITY: THE MATERIAL IS STABLE AT 70 F, 760MM PRESSURE
CONDITIONS TO AVOID:

HAZARDOUS DECOMPOSITION PRODUCTS:
SEE COMMENTS

INCOMPATIBLE MATERIALS:
MAY REACT WITH STRONG OXIDIZING MATERIALS

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

HAZARDOUS DECOMPOSITION PRODUCTS: NORMAL COMBUSTION FORMS CARBON DIOXIDE AND WATER VAPOR AND MAY PRODUCE OXIDES OF SULFUR, NITROGEN, AND PHOSPHORUS; INCOMPLETE COMBUSTION CAN PRODUCE CARBON MONOXIDE

SECTION 4 - PRODUCT COMPOSITION AND EXPOSURE LIMITS

EXPOSURE LIMITS FOR PRODUCT:	TLV	SOURCE
CHEVRON DELO 400 MOTOR OIL SAE 30	NONE ESTABLISHED	

COMPONENTS:	PERCENT RANGE	TLV	SOURCE
BASE OILS, HIGHLY REFINED	> 85.00	( )	
ADDITIVES	< 15.00	( )	

MANUFACTURER LISTS ADDITIVES COMPONENT AS INCLUDING INHIBITORS, DISPERSANTS, ZINC ALKYL DITHIOPHOSPHATE AND CALCIUM LONGCHAIN ALKYLPHENATE SULFIDE
*

PRODUCT NAME: CHEVRON DELO 400 MOTOR OIL SAE 30
MSDS NO: 132CHE004

SECTION 5 - POTENTIAL HEALTH EFFECTS

-------- ROUTES OF EXPOSURE AND EFFECTS - EYE ---------

EXPECTED TO CAUSE NO MORE THAN MINOR EYE IRRITATION. APPLICATION OF A SIMILAR MATERIAL INTO THE EYES OF RABBITS PRODUCED SLIGHT MEMBRANE IRRITATION WITHOUT CORNEAL INJURY.

-------- ROUTES OF EXPOSURE AND EFFECTS - SKIN --------

EXPECTED TO CAUSE NO MORE THAN MINOR SKIN IRRITATION FOLLOWING PROLONGED OR FREQUENTLY REPEATED CONTACT.

----- ROUTES OF EXPOSURE AND EFFECTS - INHALATION -----

NOT EXPECTED TO BE ACUTELY TOXIC BY INHALATION. BREATHING MINERAL OIL MIST AT CONCENTRATIONS IN AIR THAT EXCEED THE RECOMMENDED EXPOSURE STANDARD CAN CAUSE RESPIRATORY IRRITATION OR DISCOMFORT. SIGNS AND SYMPTOMS OF RESPIRATORY TRACT IRRITATION MAY INCLUDE, BUT MAY NOT BE LIMITED TO, ONE OR MORE OF THE FOLLOWING, DEPENDING ON CONCENTRATION AND LENGTH OF EXPOSURE: NASAL DISCHARGE, SORE THROAT, COUGHING, BRONCHITIS, PULMONARY EDEMA AND DIFFICULTY IN BREATHING.

------ ROUTES OF EXPOSURE AND EFFECTS - INGESTION -----

NOT EXPECTED TO BE ACUTELY TOXIC BY INGESTION.

PRODUCT NAME: CHEVRON DELO 400 MOTOR OIL SAE 30
MSDS NO: 132CHE004

SECTION 5 - POTENTIAL HEALTH EFFECTS (CON'T)

---------- ADDITIONAL TOXICITY INFORMATION ----------

SEVERAL ZINC ALKYL DITHIOPHOSPHATES (ZDDPS) HAVE BEEN REPORTED TO HAVE WEAK MUTAGENIC ACTIVITY IN CULTURED MAMMALIAN CELLS BUT ONLY AT CONCENTRATIOS THAT WERE TOXIC BO THE TEST CELLS. ALSO, IN THE PAST, A ZDDP SIMILAR TO THE ONE USED IN THIS PRODUCT WAS REPORTED TO CAUSE ADVERSE EFFECTS ON THE TESTICLES OF RABBITS BUT NOT OF RATS AFTER APPLICATIONS TO THE SKIN FOR SEVERAL WEEKS. HOWEVER, FOLLOW-UP STUDIES IN RABBITS INDICATED THAT THE TESTICULAR EFFECTS WERE DUE TO A SPECIES-SPECIFIC REACTION TO STRESS CAUSED BY SEVERE SKIN IRRITATION AND WEIGHT LOSS AND NOT A DIRECT CHEMICAL EFFECT OF THE ZDDP. WHILE TOXICOLOGISTS AT CHEVRON DO NOT BELIEVE THAT THERE IS ANY MUTAGENIC OR TESTICULAR RISK TO WORKERS EXPOSED TO ZDDPS AS DESCRIBED ABOVE, THE PRECAUTIONS OUTLINED IN THIS MSDS SHOULD BE FOLLOWED.

THIS PRODUCT ALSO CONTAINS CALCIUM LONGCHAIN ALKYLPHENATE SULFIDE (CALCIUM PHENATE). WHEN A SIMILAR CALCIUM PHENATE WAS APPLIED TO THE SKIN OF RABBITS FIVE DAYS/WEEK FOR FOUR WEEKS, THE ANIMALS DEVELOPED ADVERSE TESTICULAR EFFECTS. STUDIES WITH OTHER CHEMICALS HAVE SINCE SHOWN THAT RABBITS MAY DEVELOP SIMILAR TESTICULAR EFFECTS DUE TO STRESS RATHER THAN TO CHEMICAL TOXICITY. WE FURTHER INVESTIGATED THE EFFECTS OF CALCIUM PHENATES IN RATS, A SPECIES NOW RECOGNIZED AS MORE APPROPRIATE THAN RABBITS FOR INVESTIGATING TOXICITY BY REPEATED SKIN EXPOSURES. CALCIUM PHENATE APPLIED FIVE DAYS/WEEK FOR FOUR WEEKS TO THE SKIN OF RATS DID NOT PRODUCE ADVERSE TESTICULAR EFFECTS. BASED ON THESE DATA, WE BELIEVE THAT THEE IS NO RISK OF MALE REPRODUCTIVE IMPAIRMENT FROM EXPOSURE TO CALCIUM PHENATE IN THE WORKPLACE.

THIS PRODUCT CONTAINS BASE OILS WHICH THE INTERNATIONAL AGENCY FOR RESEARCH ON CANCER (IARC) CLASSIFIES AS HAVING NO EVIDENCE OF CARCINOGENIC POTENTIAL.

THIS PRODUCT MAY CONTAIN PETROLEUM BASE OILS REFINED BY A COMBINATION OF SEVERE HYDROCRACKING AND HYDROTREATING. THE CARCINOGENIC POTENTIAL OF PARAFFINIC BASE OILS PREPARED BY THIS PROCESS IS NOT SPECIFICALLY ADDRESSED BY OSHA, NTP, OR IARC. HOWEVER, THE PROCESS CONDITIONS, CHEMICAL ANALYSES, AND THE RESULTS OF AMES TESTS ALL SUPPORT OUR OPINION THAT THESE OILS ARE NOT CARCINOGENIC.

DURING USE IN ENGINES, CONTAMINATION OF OIL WITH LOW LEVELS OF CANCER-CAUSING COMBUSTION PRODUCTS OCCURS. USED MOTOR OILS HAVE BEEN SHOWN TO CAUSE SKIN CANCER IN MICE FOLLOWING REPEATED APPLICATION AND CONTINUOUS EXPOSURE. BRIEF OR INTERMITTENT SKIN CONTACT WITH USED MOTOR OIL IS NOT EXPECTED TO HAVE SERIOUS EFFECTS IN HUMANS IF THE OIL IS THOROUGHLY REMOVED BY WASHING WITH SOAP AND WATER.

SEE CHEVRON MATERIAL SAFETY DATA SHEET NO. 1793 FOR ADDITIONAL INFORMATION ON USED MOTOR OIL.

PRODUCT NAME: CHEVRON DELO 400 MOTOR OIL SAE 30
MSDS NO: 132CHE004

SECTION 5 - POTENTIAL HEALTH EFFECTS (CON'T)

EMERGENCY FIRST AID PROCEDURES

FIRST AID - EYE

FLUSH EYES IMMEDIATELY WITH FRESH WATER FOR AT LEAST 15 MINUTES WHILE HOLDING THE EYELIDS OPEN. IF IRRITATION PERSISTS, SEE A DOCTOR.

FIRST AID - SKIN

WASH SKIN THOROUGHLY WITH SOAP AND WATER. LAUNDER CONTAMINATED CLOTHING.

FIRST AID - INHALATION

IF RESPIRATORY DISCOMFORT OR IRRITATION OCCURS, MOVE THE PERSON TO FRESH AIR. SEE A DOCTOR IF DISCOMFORT OR IRRITATION CONTINUES.

FIRST AID - INGESTION

IF SWALLOWED, GIVE WATER OR MILK TO DRINK AND TELEPHONE FOR MEDICAL ADVICE. CONSULT MEDICAL PERSONNEL BEFORE INDUCING VOMITING. IF MEDICAL ADVICE CANNOT BE OBTAINED, THEN TAKE THE PERSON AND PRODUCT CONTAINER TO THE NEAREST MEDICAL EMERGENCY TREATMENT CENTER OR HOSPITAL.

SECTION 6 - SPECIAL PROTECTION INFORMATION

VENTILATION

USE ADEQUATE VENTILATION TO KEEP THE AIRBORNE CONCENTRATIONS OF THIS MATERIAL BELOW THE RECOMMENDED EXPOSURE STANDARD.

PERSONAL PROTECTIVE EQUIPMENT - RESPIRATOR

NO SPECIAL RESPIRATORY PROTECTION IS NORMALLY REQUIRED. HOWEVER, IF OPERATING CONDITIONS CREATE AIRBORNE CONCENTRATIONS WHICH EXCEED THE RECOMENDED EXPOSURE STANDARD, THE USE OF AN APPROVED RESPIRATOR IS RECOMMENDED.

PERSONAL PROTECTIVE EQUIPMENT - EYE

CHEMICAL GOGGLES (VAPOR-PROOF TYPE) MUST BE WORN IF THERE IS ANY CHANCE OF CONTACT WITH THE EYES.

PERSONAL PROTECTIVE EQUIPMENT - GLOVES

NO SPECIAL SKIN PROTECTION IS NECESSARY.

OTHER PROTECTIVE EQUIPMENT

PRODUCT NAME: CHEVRON DELO 400 MOTOR OIL SAE 30
MSDS NO: 132CHE004

SECTION 7 - SPILL OR LEAK PROCEDURES

---------- ENVIRONMENTAL EFFECTS ----------

THIS MATERIAL IS NOT EXPECTED TO PRESENT ANY ENVIRONMENTAL PROBLEMS OTHER THAN THOSE ASSOCIATED WITH OIL SPILLS.

- STEPS TO BE TAKEN IN CASE OF SPILL, LEAK OR RELEASE -

STOP THE SOURCE OF THE LEAK OR RELEASE. CLEAN UP RELEASES AS SOON AS POSSIBLE. CONTAIN LIQUID TO PREVENT FURTHER CONTAMINATION OF SOIL, SURFACE WATER OR GROUNDWATER. CLEAN UP SMALL SPILLS USING APPROPRIATE TECHNIQUES SUCH AS SORBENT MATERIALS OR PUMPING. WHERE FEASIBLE AND APPROPRIATE, REMOVE CONTAMINATED SOIL. FOLLOW PRESCRIBED PROCEDURES FOR REPORTING AND RESPONDING TO LARGER RELEASES.

---------- WASTE DISPOSAL METHOD ----------

PLACE CONTAMINATED MATERIALS IN DISPOSABLE CONTAINERS AND DISPOSE OF IN A MANNER CONSISTENT WITH APPLICABLE REGULATIONS. CONTACT LOCAL ENVIRONMENTAL OR HEALTH AUTHORITIES FOR APPROVED DISPOSAL OF THIS MATERIAL.

SECTION 8 - HANDLING AND STORAGE PRECAUTIONS

DO NOT WELD, HEAT OR DRILL CONTAINER. RESIDUE MAY IGNITE WITH EXPLOSIVE VIOLENCE IF HEATED SUFFICIENTLY.

CAUTION! DO NOT USE PRESSURE TO EMPTY DRUM OR EXPLOSION MAY RESULT.

SECTION 9 - HAZARD WARNING

A HAZARD WARNING STATEMENT IS NOT REQUIRED FOR THIS PRODUCT UNDER OSHA HAZARD COMMUNICATION STANDARD (29 CFR 1910.1200)

SECTION 10 - COMMENTS

SECTION 11 - REGULATORY INFORMATION

SECTION 12 - REGULATIONS/COMMENTS CONTINUED

PRODUCT NAME: CHEVRON DELO 400 MOTOR OIL SAE 30
MSDS NO: 132CHE004

INFORMATION SUPPLIED BY: COORDINATOR, TOXICOLOGY AND PRODUCT SAFETY
PHONE: ( ) -

MSDS DATE: 06/30/87 DATE OF PREVIOUS MSDS: / /

PRODUCT NAME: 00701 REGAL OIL R&O 46
MSDS NO: 122TEX001

THE FOLLOWING INFORMATION IS FURNISHED SUBJECT TO THE DISCLAIMER ON THE BOTTOM OF THIS FORM

SECTION 1 - PRODUCT IDENTIFICATION

PRODUCT NAME: 00701 REGAL OIL R&O 46

SYNONYMS:
00701 REGAL OIL R&O 46; 701 REGAL OIL R&O 46; REGAL OIL R&O 46, 00701; REGAL OIL R&O 46, 701; 701; 00701

MANUFACTURER / DISTRIBUTOR:
TEXACO, INC.
P.O. BOX 509
BEACON, NY
12508
EMERGENCY PHONE NUMBERS:
(419) 422-2121 (MARATHON)
(800) 424-9300 (CHEMTREC)

CHEMICAL FAMILY: TURBINE OILS
CHEMICAL FORMULA: CAS NO:

SECTION 2 - PHYSICAL PROPERTIES

BOILING POINT	MELTING POINT	SPECIFIC GRAVITY(H2O=1)
N/D F	F	.8735
C	C	

% SOLUBILITY IN WATER	VAPOR DENSITY(AIR=1)	VAPOR PRESSURE
N/D	N/D	N/D

PH INFORMATION: PH: N/A AT CONC.
APPEARANCE: LIGHT PALE ODOR:

VISCOSITY: 44.3 CST @40C

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT	AUTOIGNITION TEMP	EXPLOSIVE LIMITS (% BY VOLUME IN AIR)
400 COC F	N/D F	LOWER/UPPER: N/D/N/D
C	C	

NFPA CLASS -- HEALTH: 0 FIRE: 1 REACTIVITY: 0 OTHER:

SPECIFIC HAZARD: NONE

FIRE AND EXPLOSION HAZARDS

NONE

EXTINGUISHING MEDIA

ACCORDING TO THE NATIONAL FIRE PROTECTION ASSOCIATION GUIDE, USE WATER SPRAY, DRY CHEMICAL, FOAM, OR CARBON DIOXIDE. WATER OF FOAM MAY CAUSE FROTHING. USE WATER TO COOL FIRE-EXPOSED CONTAINERS. IF A LEAK OR SPILL HAS NOT IGNITED, USE WATER SPRAY TO DISPERSE THE VAPORS AND TO PROVIDE PROTECTION FOR PERSONS ATTEMPTING TO STOP THE LEAK.

SPECIAL FIRE FIGHTING INSTRUCTIONS

PRODUCT NAME: 00701 REGAL OIL R&O 46
MSDS NO: 122TEX001

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA (CON'T)

STABILITY: THE MATERIAL IS AT 70 F, 760MM PRESSURE
CONDITIONS TO AVOID:

HAZARDOUS DECOMPOSITION PRODUCTS:
SEE COMMENTS

INCOMPATIBLE MATERIALS:

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

HAZARDOUS DECOMPOSITION PRODUCTS: CARBON MONOXIDE, CARBON DIOXIDE, ALDEHYDES AND KETONES, COMBUSTION PRODUCTS OR NITROGEN AND SULFUR

SECTION 4 - PRODUCT COMPOSITION AND EXPOSURE LIMITS

EXPOSURE LIMITS FOR PRODUCT:	TLV	SOURCE
00701 REGAL OIL R&O 46	NONE ESTABLISHED	

COMPONENTS:	PERCENT RANGE	TLV	SOURCE
PETROLEUM DISTILLATES, SOLVENT-DE-	95.00- 99.99	( )	
WAXED HEAVY PARAFFINIC		0.00 ( )	

SECTION 5 - POTENTIAL HEALTH EFFECTS

-------- ROUTES OF EXPOSURE AND EFFECTS - EYE ---------

CAUSES MINIMAL EYE IRRITATION. TRANSIENT MINOR IRRITATION MAY BE NOTED FOLLOWING INITIAL CONTACT.

-------- ROUTES OF EXPOSURE AND EFFECTS - SKIN --------

EFFECTS OF DERMAL CONTACT SLIGHT, IF ANY.

----- ROUTES OF EXPOSURE AND EFFECTS - INHALATION -----

BELIEVED TO BE MINIMALLY IRRITATING IF NOT IN EXCESS OF PERMISSIBLE CONCENTRATIONS.

------ ROUTES OF EXPOSURE AND EFFECTS - INGESTION -----

PRODUCT NAME: 00701 REGAL OIL R&O 46
MSDS NO: 122TEX001

SECTION 5 - POTENTIAL HEALTH EFFECTS (CON'T)

---------- ADDITIONAL TOXICITY INFORMATION ----------

MEDIAN LETHAL DOSE (LD50 LC50)(SPECIES):
ORAL: BELIEVED TO BE >10G/KG (RAT); PRACTICALLY NONTOXIC
INHALATION: N/D
DERMAL: BELIEVED TO BE >8G/KG (RABBIT); PRACTICALLY NONTOXIC
OTHER: N/D
IRRITATION INDEX, ESTIMATION OF IRRITATION (SPECIES):
BELIEVED TO BE 0.13/8.0 (RABBIT); MINIMALLY IRRITATING
BELIEVED TO BE 2.33/110 (RABBIT); SLIGHTLY IRRITATING

EMERGENCY FIRST AID PROCEDURES

---------- FIRST AID - EYE ----------

AS WITH MOST FOREIGN MATERIALS, SHOULD EYE CONTACT OCCUR, FLUSH EYES WITH PLENTY OF WATER.

---------- FIRST AID - SKIN ----------

NONE CONSIDERED NECESSARY.

---------- FIRST AID - INHALATION ----------

NONE CONSIDERED NECESSARY.

---------- FIRST AID - INGESTION ----------

NONE CONSIDERED NECESSARY.

SECTION 6 - SPECIAL PROTECTION INFORMATION

---------- VENTILATION ----------

NORMAL

---------- PERSONAL PROTECTIVE EQUIPMENT - RESPIRATOR -----

NONE REQUIRED IF EXPOSURES ARE WITHIN PERMISSIBLE CONCENTRATIONS.

---------- PERSONAL PROTECTIVE EQUIPMENT - EYE -------

CHEMICAL TYPE GOGGLES OR FACE SHIELD OPTIONAL

---------- PERSONAL PROTECTIVE EQUIPMENT - GLOVES -------

---------- OTHER PROTECTIVE EQUIPMENT ----------

EXPOSED EMPLOYEES SHOULD EXERCISE REASONABLE PERSONAL CLEANLINESS; THIS INCLUDES CLEANSING EXPOSED SKIN AREAS SEVERAL TIMES DAILY WITH SOAP AND WATER, AND LAUNDERING OR DRY CLEANING SOILED WORK CLOTHING AT LEAST WEEKLY.

PRODUCT NAME: 00701 REGAL OIL R&O 46
MSDS NO: 122TEX001

SECTION 7 - SPILL OR LEAK PROCEDURES

---------- ENVIRONMENTAL EFFECTS ----------

- STEPS TO BE TAKEN IN CASE OF SPILL, LEAK OR RELEASE -

CONTAIN SPILL IF POSSIBLE. WIPE UP OR ABSORB ON SUITABLE MATERIAL AND SHOVEL UP.

---------- WASTE DISPOSAL METHOD ----------

UNDER RCRA, IT IS THE RESPONSIBILITY OF THE USER OF PRODUCTS TO DETERMINE, AT THE TIME OF DISPOSAL, WHETHER PRODUCT MEETS RCRA CRITERIA FOR HAZARDOUS WASTE. THIS IS BECAUSE PRODUCT USES, TRANSFORMATIONS, MIXTURE, PROCESSES, ETC. MAY RENDER THE RESULTING MATERIAL HAZARDOUS.

WASTE CLASSIFICATION: PRODUCT HAS BEEN EVALUATED FOR RCRA CHARACTERISTICS AND DOES NOT MEET CRITERIA OF A HAZARDOUS WASTE IF DISCARDED IN ITS PURCHASED FORM.

SECTION 8 - HANDLING AND STORAGE PRECAUTIONS

MINIMUM FEASIBLE HANDLING TEMPERATURES SHOULD BE MAINTAINED. PERIODS OF EXPOSURE TO HIGH TEMPERATURES SHOULD BE MINIMIZED. WATER CONTAMINATION SHOULD BE AVOIDED.

CAUTION: MISUSE OF EMPTY CONTAINERS CAN BE HAZARDOUS. EMPTY CONTAINERS CAN BE HAZARDOUS IF USED TO STORE TOXIC, FLAMMABLE, OR REACTIVE MATERIALS. CUTTING OR WELDING OF EMPTY CONTAINERS MIGHT CAUSE FIRE, EXPLOSION OR TOXIC FUMES FROM RESIDUES. DO NOT PRESSURIZE OR EXPOSE TO OPEN FLAME OR HEAT. KEEP CONTAINER CLOSED AND DRUM BUNGS IN PLACE.

SECTION 9 - HAZARD WARNING

NONE CONSIDERED NECESSARY.

DOT PROPER SHIPPING NAME: N/A
DOT HAZARD CLASS (IF APPLICABLE): N/A

TO THE BEST OF THE MANUFACTURER'S KNOWLEDGE, NONE OF THE LISTED COMPONENES ARE HAZARDOUS ACCORDING TO OSHA (1910.1200) OR ONE OF MORE STATE RIGHT-TO-KNOW LISTS.

TEXACO INTENDS TO COMPLY FULLY WITH PROVISIONS OF THE TOXIC SUBSTANCES CONTROL ACT STATE OF MICHIGAN CRITICAL MATERIALS ACT (REVISED 1985): NO CRITICAL MATERIALS PRESENT.

PRODUCT NAME: 00701 REGAL OIL R&O 46
MSDS NO: 122TEX001

SECTION 10 - COMMENTS

MANUFACTURER LISTS ADDITIONAL TELEPHONE NUMBERS AS FOLLOWS:
914-831-3400, EXT. 204 (FUELS/LUBRICANTS/ANTIFREEZES)
512-459-6543 (CHEMICALS)
800-424-9300 CHEMTREC (TRANSPORTATION SPILLS)

SECTION 11 - REGULATORY INFORMATION

SECTION 12 - REGULATIONS/COMMENTS CONTINUED

INFORMATION SUPPLIED BY: COORDINATOR, TOXICOLOGY AND PRODUCT SAFETY
R. T. RICHARDS PHONE: ( ) -

MSDS DATE: 11/27/85 DATE OF PREVIOUS MSDS: / /

PRODUCT NAME: 01658 RANDO OIL HD 46
MSDS NO: 121TEX001

THE FOLLOWING INFORMATION IS FURNISHED SUBJECT TO THE DISCLAIMER ON THE BOTTOM OF THIS FORM

SECTION 1 - PRODUCT IDENTIFICATION

PRODUCT NAME: 01658 RANDO OIL HD 46

SYNONYMS:
01658 RANDO OIL HD 46; 01658; 1658; RANDO OIL HD 46, 01658; RANDO OIL HD 46, 1658; 1658 RANDO OIL HD 46

MANUFACTURER / DISTRIBUTOR:
TEXACO, INC.
P.O. BOX 509
BEACON, NY
12508
EMERGENCY PHONE NUMBERS:
(419) 422-2121 (MARATHON)
(800) 424-9300 (CHEMTREC)

CHEMICAL FAMILY: HYDRAULIC OILS
CHEMICAL FORMULA: CAS NO:

SECTION 2 - PHYSICAL PROPERTIES

BOILING POINT		MELTING POINT		SPECIFIC GRAVITY(H2O=1)
N/D	F		F	.8735
	C		C	

% SOLUBILITY IN WATER	VAPOR DENSITY(AIR=1)	VAPOR PRESSURE
N/D	N/D	N/D

PH INFORMATION: PH: N/A AT CONC.
APPEARANCE: PALE LIQUID ODOR:

VISCOSITY: 44.3 CST @40C

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT		AUTOIGNITION TEMP		EXPLOSIVE LIMITS (% BY VOLUME IN AIR)
400 COC	F	N/D	F	LOWER/UPPER: N/D/N/D
	C		C	

NFPA CLASS -- HEALTH: 1 FIRE: 1 REACTIVITY: 0 OTHER:

SPECIFIC HAZARD: NONE

FIRE AND EXPLOSION HAZARDS

NONE

EXTINGUISHING MEDIA

ACCORDING TO THE NATIONAL FIRE PROTECTION ASSOCIATION GUIDE, USE WATER SPRAY, DRY CHEMICAL, FOAM, OR CARBON DIOXIDE. WATER OF FOAM MAY CAUSE FROTHING. USE WATER TO COOL FIRE-EXPOSED CONTAINERS. IF A LEAK OR SPILL HAS NOT IGNITED, USE WATER SPRAY TO DISPERSE THE VAPORS AND TO PROVIDE PROTECTION FOR PERSONS ATTEMPTING TO STOP THE LEAK.

SPECIAL FIRE FIGHTING INSTRUCTIONS

PRODUCT NAME: 01658 RANDO OIL HD 46
MSDS NO: 121TEX001

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA (CON'T)

STABILITY: THE MATERIAL IS AT 70 F, 760MM PRESSURE
CONDITIONS TO AVOID:

HAZARDOUS DECOMPOSITION PRODUCTS:
SEE COMMENTS

INCOMPATIBLE MATERIALS:

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

HAZARDOUS DECOMPOSITION PRODUCTS: CARBON MONOXIDE, CARBON DIOXIDE, ALDEHYDES AND KETONES, COMBUSTION PRODUCTS OR NITROGEN AND SULFUR

SECTION 4 - PRODUCT COMPOSITION AND EXPOSURE LIMITS

EXPOSURE LIMITS FOR PRODUCT:	TLV	SOURCE
01658 RANDO OIL HD 46	NONE ESTABLISHED	

COMPONENTS:	PERCENT RANGE	TLV		SOURCE
PETROLEUM DISTILLATES, SOLVENT-DE-	95.00- 99.99		( )	
WAXED HEAVY PARAFFINIC		0.00	( )	

SECTION 5 - POTENTIAL HEALTH EFFECTS

-------- ROUTES OF EXPOSURE AND EFFECTS - EYE ---------

BELIEVED TO BE MINIMALLY IRRITATING.

-------- ROUTES OF EXPOSURE AND EFFECTS - SKIN --------

BELIEVED TO BE SLIGHTLY IRRITATING WITH POSSIBLE REDNESS, EDEMA, OR DRYING OF THE SKIN.

----- ROUTES OF EXPOSURE AND EFFECTS - INHALATION -----

BELIEVED TO BE MINIMALLY IRRITATING IF NOT IN EXCESS OF PERMISSIBLE CONCENTRATIONS.

------ ROUTES OF EXPOSURE AND EFFECTS - INGESTION -----

PRODUCT NAME: 01658 RANDO OIL HD 46
MSDS NO: 121TEX001

SECTION 5 - POTENTIAL HEALTH EFFECTS (CON'T)

---------- ADDITIONAL TOXICITY INFORMATION ----------

MEDIAN LETHAL DOSE (LD50 LC50)(SPECIES):
ORAL: SIMILAR PRODUCT >22.4G/KG (RAT); PRACTICALLY NONTOXIC
INHALATION: N/D
DERMAL: SIMILAR PRODUCT >3G/KG (RABBIT); PRACTICALLY NONTOXIC
OTHER: N/D
IRRITATION INDEX, ESTIMATION OF IRRITATION (SPECIES):
SIMILAR PRODUCT 2.08/8.0 (RABBIT); SLIGHTLY IRRITATING
SIMILAR PRODUCT 9.83/110 (RABBIT); NO APPRECIABLE EFFECT

EMERGENCY FIRST AID PROCEDURES

---------- FIRST AID - EYE ----------

AS WITH MOST FOREIGN MATERIALS, SHOULD EYE CONTACT OCCUR, FLUSH EYES WITH PLENTY OF WATER.

---------- FIRST AID - SKIN ----------

WASH EXPOSED AREAS WITH SOAP AND WATER.

---------- FIRST AID - INHALATION ----------

NONE CONSIDERED NECESSARY.

---------- FIRST AID - INGESTION ----------

NONE CONSIDERED NECESSARY.

SECTION 6 - SPECIAL PROTECTION INFORMATION

---------- VENTILATION ----------

NORMAL

---------- PERSONAL PROTECTIVE EQUIPMENT - RESPIRATOR -----

NONE REQUIRED IF EXPOSURES ARE WITHIN PERMISSIBLE CONCENTRATIONS.

---------- PERSONAL PROTECTIVE EQUIPMENT - EYE -------

CHEMICAL TYPE GOGGLES OR FACE SHIELD OPTIONAL

---------- PERSONAL PROTECTIVE EQUIPMENT - GLOVES -------

---------- OTHER PROTECTIVE EQUIPMENT ----------

EXPOSED EMPLOYEES SHOULD EXERCISE REASONABLE PERSONAL CLEANLINESS; THIS INCLUDES CLEANSING EXPOSED SKIN AREAS SEVERAL TIMES DAILY WITH SOAP AND WATER, AND LAUNDERING OR DRY CLEANING SOILED WORK CLOTHING AT LEAST WEEKLY.

PRODUCT NAME: 01658 RANDO OIL HD 46
MSDS NO: 121TEX001

SECTION 7 - SPILL OR LEAK PROCEDURES

---------- ENVIRONMENTAL EFFECTS ----------

- STEPS TO BE TAKEN IN CASE OF SPILL, LEAK OR RELEASE -

CONTAIN SPILL IF POSSIBLE. WIPE UP OR ABSORB ON SUITABLE MATERIAL AND SHOVEL UP.

---------- WASTE DISPOSAL METHOD ----------

UNDER RCRA, IT IS THE RESPONSIBILITY OF THE USER OF PRODUCTS TO DETERMINE, AT THE TIME OF DISPOSAL, WHETHER PRODUCT MEETS RCRA CRITERIA FOR HAZARDOUS WASTE. THIS IS BECAUSE PRODUCT USES, TRANSFORMATIONS, MIXTURE, PROCESSES, ETC. MAY RENDER THE RESULTING MATERIAL HAZARDOUS.

WASTE CLASSIFICATION: PRODUCT (AS PRESENTLY CONSTITUTED) HAS THE RCRA CHARACTERISTICS OF BARIUM TOXICITY AND IF DISCARDED IN ITS PURCHASED FORM WOULD HAVE THE HAZARDOUS WATE NUMBER D005.

SECTION 8 - HANDLING AND STORAGE PRECAUTIONS

MINIMUM FEASIBLE HANDLING TEMPERATURES SHOULD BE MAINTAINED. PERIODS OF EXPOSURE TO HIGH TEMPERATURES SHOULD BE MINIMIZED. WATER CONTAMINATION SHOULD BE AVOIDED.

CAUTION: MISUSE OF EMPTY CONTAINERS CAN BE HAZARDOUS. EMPTY CONTAINERS CAN BE HAZARDOUS IF USED TO STORE TOXIC, FLAMMABLE, OR REACTIVE MATERIALS. CUTTING OR WELDING OF EMPTY CONTAINERS MIGHT CAUSE FIRE, EXPLOSION OR TOXIC FUMES FROM RESIDUES. DO NOT PRESSURIZE OR EXPOSE TO OPEN FLAME OR HEAT. KEEP CONTAINER CLOSED AND DRUM BUNGS IN PLACE.

SECTION 9 - HAZARD WARNING

NONE CONSIDERED NECESSARY.

DOT PROPER SHIPPING NAME: N/A
DOT HAZARD CLASS (IF APPLICABLE): N/A

TO THE BEST OF THE MANUFACTURER'S KNOWLEDGE, NONE OF THE LISTED COMPONENES ARE HAZARDOUS ACCORDING TO OSHA (1910.1200) OR ONE OF MORE STATE RIGHT-TO-KNOW LISTS.

TEXACO INTENDS TO COMPLY FULLY WITH PROVISIONS OF THE TOXIC SUBSTANCES CONTROL ACT STATE OF MICHIGAN CRITICAL MATERIALS ACT (REVISED 1985): 0.037% ZINC; CONVERSION FACTOR 7.3 POUNDS PER GALLON.

PRODUCT NAME: 01658 RANDO OIL HD 46
MSDS NO: 121TEX001

SECTION 10 - COMMENTS

MANUFACTURER LISTS ADDITIONAL TELEPHONE NUMBERS AS FOLLOWS:
914-831-3400, EXT. 204 (FUELS/LUBRICANTS/ANTIFREEZES)
512-459-6543 (CHEMICALS)
800-424-9300 CHEMTREC (TRANSPORTATION SPILLS)

SECTION 11 - REGULATORY INFORMATION

SECTION 12 - REGULATIONS/COMMENTS CONTINUED

INFORMATION SUPPLIED BY: COORDINATOR, TOXICOLOGY AND PRODUCT SAFETY
R. T. RICHARDS PHONE: ( ) -

MSDS DATE: 11/20/85 DATE OF PREVIOUS MSDS: / /

PRODUCT NAME: 01841 ATF DEXRON II
MSDS NO: 116TEX001

THE FOLLOWING INFORMATION IS FURNISHED SUBJECT TO THE DISCLAIMER ON THE BOTTOM OF THIS FORM

SECTION 1 - PRODUCT IDENTIFICATION

PRODUCT NAME: 01841 ATF DEXRON II

SYNONYMS:
01841 ATF DEXRON II; 01841; 1841; ATF DEXRON II, 01841; ATF DEXRON II, 1841; 1841 ATF DEXRON II

MANUFACTURER / DISTRIBUTOR:
TEXACO, INC.
P.O. BOX 509
BEACON, NY
12508

EMERGENCY PHONE NUMBERS:
(419) 422-2121 (MARATHON)
(800) 424-9300 (CHEMTREC)

CHEMICAL FAMILY: TRANSMISSION FLUIDS
CHEMICAL FORMULA: CAS NO:

SECTION 2 - PHYSICAL PROPERTIES

BOILING POINT	MELTING POINT	SPECIFIC GRAVITY(H2O=1)
N/D F	F	0.8794
C	C	

% SOLUBILITY IN WATER	VAPOR DENSITY(AIR=1)	VAPOR PRESSURE
N/D	N/D	N/D

PH INFORMATION: PH: N/A AT CONC.
APPEARANCE: CLEAR RED LIQUID ODOR: PETROLEUM

VISCOSITY: 35.2 CST @40C

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT	AUTOIGNITION TEMP	EXPLOSIVE LIMITS (% BY VOLUME IN AIR)
340 COC F	N/D F	LOWER/UPPER: N/D/N/D
C	C	

NFPA CLASS -- HEALTH: 0 FIRE: 1 REACTIVITY: 0 OTHER:

SPECIFIC HAZARD: NONE

FIRE AND EXPLOSION HAZARDS

NONE

EXTINGUISHING MEDIA

ACCORDING TO THE NATIONAL FIRE PROTECTION ASSOCIATION GUIDE, USE WATER SPRAY, DRY CHEMICAL, FOAM, OR CARBON DIOXIDE. WATER OF FOAM MAY CAUSE FROTHING. USE WATER TO COOL FIRE-EXPOSED CONTAINERS. IF A LEAK OR SPILL HAS NOT IGNITED, USE WATER SPRAY TO DISPERSE THE VAPORS AND TO PROVIDE PROTECTION FOR PERSONS ATTEMPTING TO STOP THE LEAK.

SPECIAL FIRE FIGHTING INSTRUCTIONS

PRODUCT NAME: 01841 ATF DEXRON II
MSDS NO: 116TEX001

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA (CON'T)

STABILITY: THE MATERIAL IS AT 70 F, 760MM PRESSURE
CONDITIONS TO AVOID:

HAZARDOUS DECOMPOSITION PRODUCTS:
SEE COMMENTS

INCOMPATIBLE MATERIALS:
STRONG OXIDIZERS

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

HAZARDOUS DECOMPOSITION PRODUCTS: CARBON MONOXIDE, CARBON DIOXIDE, ALDEHYDES AND KETONS, COMBUSTION PRODUCTS OF NITROGEN, ZINC, PHOSPHORUS AND SULFUR

SECTION 4 - PRODUCT COMPOSITION AND EXPOSURE LIMITS

EXPOSURE LIMITS FOR PRODUCT:	TLV	SOURCE
01841 ATF DEXRON II	NONE ESTABLISHED	

COMPONENTS:	PERCENT RANGE	TLV		SOURCE
ADDITIVES	4.00- 10.99		( )	
PETROLEUM DISTILLATES, SOLVENT-DE-	50.00- 64.99		( )	
WAXED HEAVY PARAFFINIC		0.00	( )	
PETROLEUM DISTILLATES, SEVERELY S-	20.00- 34.99		( )	
OLVENT-REFINED HYDROTREATED		0.00	( )	

MANUFACTURER STATES THAT ADDITIVES COMPONENT CONTAINS POLYISOBUTENYL SUCCINIC ANHYDRIDE NITROGEN FUNCTIONALIZED DISPERSANT, A ZINC SALT OF DIALKYL DITHIOPHOSPHORIC ACID, METHACRYLATE COPOLYMER IN SOLVENT EXTRACTED MINERAL OIL.
*

PRODUCT NAME: 01841 ATF DEXRON II
MSDS NO: 116TEX001

SECTION 5 - POTENTIAL HEALTH EFFECTS

-------- ROUTES OF EXPOSURE AND EFFECTS - EYE ---------

BELIEVED TO BE MINIMALLY IRRITATING.

-------- ROUTES OF EXPOSURE AND EFFECTS - SKIN --------

BELIEVED TO BE MINIMALLY IRRITATING.

----- ROUTES OF EXPOSURE AND EFFECTS - INHALATION -----

BELIEVED TO BE MINIMALLY IRRITATING IF NOT IN EXCESS OF PERMISSIBLE CONCENTRATIONS.

------ ROUTES OF EXPOSURE AND EFFECTS - INGESTION -----

---------- ADDITIONAL TOXICITY INFORMATION ----------

MEDIAN LETHAL DOSE (LD50 LC50)(SPECIES):
ORAL: BELIEVED TO BE >5G/KG (RAT); PRACTICALLY NONTOXIC
INHALATION: N/D
DERMAL: BELIEVED TO BE >3G/KG (RABBIT); PRACTICALLY NONTOXIC
OTHER: N/D
IRRITATION INDEX, ESTIMATION OF IRRITATION (SPECIES):
BELIEVED TO BE <0.5/8.0 (RABBIT); NO APPRECIABLE EFFECT
BELIEVED TO BE Z15/110 (RABBIT); NO APPRECIABLE EFFECT
SYMPTOMS OF EXPOSURE: NONE EXPECTED OTHER THAN POSSIBLE MINIMAL IRRITATION

EMERGENCY FIRST AID PROCEDURES

------------------ FIRST AID - EYE ------------------

AS WITH MOST FOREIGN MATERIALS, SHOULD EYE CONTACT OCCUR, FLUSH EYES WITH PLENTY OF WATER.

------------------ FIRST AID - SKIN ------------------

WASH EXPOSED AREAS WITH SOAP AND WATER.

--------------- FIRST AID - INHALATION ---------------

NONE CONSIDERED NECESSARY.

---------------- FIRST AID - INGESTION ---------------

NONE CONSIDERED NECESSARY.

SECTION 6 - SPECIAL PROTECTION INFORMATION

--------------------- VENTILATION ---------------------

ADEQUATE TO MEET COMPONENT PERMISSIBLE CONCENTRATIONS.

PRODUCT NAME: 01841 ATF DEXRON II
MSDS NO: 116TEX001

SECTION 6 - SPECIAL PROTECTION INFORMATION (CON'T)

------ PERSONAL PROTECTIVE EQUIPMENT - RESPIRATOR -----

NONE REQUIRED IF EXPOSURES ARE WITHIN PERMISSIBLE CONCENTRATIONS.

---------- PERSONAL PROTECTIVE EQUIPMENT - EYE -------

CHEMICAL TYPE GOGGLES OR FACE SHIELD OPTIONAL

-------- PERSONAL PROTECTIVE EQUIPMENT - GLOVES -------

---------- OTHER PROTECTIVE EQUIPMENT ----------

EXPOSED EMPLOYEES SHOULD EXERCISE REASONABLE PERSONAL CLEANLINESS; THIS INCLUDES CLEANSING EXPOSED SKIN AREAS SEVERAL TIMES DAILY WITH SOAP AND WATER, AND LAUNDERING OR DRY CLEANING SOILED WORK CLOTHING AT LEAST WEEKLY.

SECTION 7 - SPILL OR LEAK PROCEDURES

---------- ENVIRONMENTAL EFFECTS ----------

- STEPS TO BE TAKEN IN CASE OF SPILL, LEAK OR RELEASE -

CONTAIN SPILL IF POSSIBLE. WIPE UP OR ABSORB ON SUITABLE MATERIAL AND SHOVEL UP.

---------- WASTE DISPOSAL METHOD ----------

UNDER RCRA, IT IS THE RESPONSIBILITY OF THE USER OF PRODUCTS TO DETERMINE, AT THE TIME OF DISPOSAL, WHETHER PRODUCT MEETS RCRA CRITERIA FOR HAZARDOUS WASTE. THIS IS BECAUSE PRODUCT USES, TRANSFORMATIONS, MIXTURE, PROCESSES, ETC. MAY RENDER THE RESULTING MATERIAL HAZARDOUS.

WASTE CLASSIFICATION: PRODUCT HAS BEEN EVALUATED FOR RCRA CHARACTERISTICS AND DOES NOT MEET CRITERIA OF A HAZARDOUS WASTE IF DISCARDED IN ITS PURCHASED FORM.

SECTION 8 - HANDLING AND STORAGE PRECAUTIONS

MINIMUM FEASIBLE HANDLING TEMPERATURES SHOULD BE MAINTAINED. PERIODS OF EXPOSURE TO HIGH TEMPERATURES SHOULD BE MINIMIZED. WATER CONTAMINATION SHOULD BE AVOIDED.

CAUTION: MISUSE OF EMPTY CONTAINERS CAN BE HAZARDOUS. EMPTY CONTAINERS CAN BE HAZARDOUS IF USED TO STORE TOXIC, FLAMMABLE, OR REACTIVE MATERIALS. CUTTING OR WELDING OF EMPTY CONTAINERS MIGHT CAUSE FIRE, EXPLOSION OR TOXIC FUMES FROM RESIDUES. DO NOT PRESSURIZE OR EXPOSE TO OPEN FLAME OR HEAT. KEEP CONTAINER CLOSED AND DRUM BUNGS IN PLACE.

PRODUCT NAME: 01841 ATF DEXRON II
MSDS NO: 116TEX001

SECTION 9 - HAZARD WARNING

NONE CONSIDERED NECESSARY.

DOT PROPER SHIPPING NAME: N/A
DOT HAZARD CLASS (IF APPLICABLE): N/A

SECTION 10 - COMMENTS

MANUFACTURER LISTS ADDITIONAL TELEPHONE NUMBERS AS FOLLOWS:
914-831-3400, EXT. 204 (FUELS/LUBRICANTS/ANTIFREEZES)
512-459-6543 (CHEMICALS)
800-424-9300 CHEMTREC (TRANSPORTATION SPILLS)

SECTION 11 - REGULATORY INFORMATION

SECTION 12 - REGULATIONS/COMMENTS CONTINUED

INFORMATION SUPPLIED BY: COORDINATOR, TOXICOLOGY AND PRODUCT SAFETY
R. T. RICHARDS PHONE: ( ) -

MSDS DATE: 07/15/87 DATE OF PREVIOUS MSDS: / /

PRODUCT NAME: 01891 GEOTEX LA SAE 30
MSDS NO: 120TEX001

THE FOLLOWING INFORMATION IS FURNISHED SUBJECT TO THE DISCLAIMER ON THE BOTTOM OF THIS FORM

SECTION 1 - PRODUCT IDENTIFICATION

PRODUCT NAME: 01891 GEOTEX LA SAE 30

SYNONYMS:
01891 GEOTEX LA SAE 30; GEOTEX LA SAE 30, 01891; GEOTEX LA SAE 30, 1891; 1891 GEOTEX LA SAE 30; 01891; 1891

MANUFACTURER / DISTRIBUTOR:
TEXACO, INC.
P.O. BOX 509
BEACON, NY
12508

EMERGENCY PHONE NUMBERS:
(419) 422-2121 (MARATHON)
(800) 424-9300 (CHEMTREC)

CHEMICAL FAMILY: ENGINE OILS
CHEMICAL FORMULA:
CAS NO:

SECTION 2 - PHYSICAL PROPERTIES

BOILING POINT	MELTING POINT	SPECIFIC GRAVITY(H2O=1)
N/D F	F	.8899
C	C	

% SOLUBILITY IN WATER	VAPOR DENSITY(AIR=1)	VAPOR PRESSURE
N/D	N/D	N/D

PH INFORMATION: PH: N/A AT CONC.
APPEARANCE: CLEAR AND ORANGE ODOR:

VISCOSITY: 11.25 CST @100C

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT	AUTOIGNITION TEMP	EXPLOSIVE LIMITS (% BY VOLUME IN AIR)
435 COC F	N/D F	LOWER/UPPER: N/D/N/D
C	C	

NFPA CLASS -- HEALTH: 0 FIRE: 1 REACTIVITY: 0 OTHER:

SPECIFIC HAZARD: NONE

FIRE AND EXPLOSION HAZARDS

NONE

EXTINGUISHING MEDIA

ACCORDING TO THE NATIONAL FIRE PROTECTION ASSOCIATION GUIDE, USE WATER SPRAY, DRY CHEMICAL, FOAM, OR CARBON DIOXIDE. WATER OF FOAM MAY CAUSE FROTHING. USE WATER TO COOL FIRE-EXPOSED CONTAINERS. IF A LEAK OR SPILL HAS NOT IGNITED, USE WATER SPRAY TO DISPERSE THE VAPORS AND TO PROVIDE PROTECTION FOR PERSONS ATTEMPTING TO STOP THE LEAK.

SPECIAL FIRE FIGHTING INSTRUCTIONS

PRODUCT NAME: 01891 GEOTEX LA SAE 30
MSDS NO: 120TEX001

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA (CON'T)

STABILITY: THE MATERIAL IS AT 70 F, 760MM PRESSURE
CONDITIONS TO AVOID:

HAZARDOUS DECOMPOSITION PRODUCTS:
SEE COMMENTS

INCOMPATIBLE MATERIALS:

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

HAZARDOUS DECOMPOSITION PRODUCTS: CARBON MONOXIDE, CARBON DIOXIDE, ALDEHYDES AND KETONES, COMBUSTION PRODUCTS OR NITROGEN AND SULFUR

SECTION 4 - PRODUCT COMPOSITION AND EXPOSURE LIMITS

EXPOSURE LIMITS FOR PRODUCT:	TLV	SOURCE
01891 GEOTEX LA SAE 30	NONE ESTABLISHED	

COMPONENTS:	PERCENT RANGE	TLV	SOURCE
PETROLEUM DISTILLATES, SOLVENT-DE-	95.00- 99.99	( )	
WAXED HEAVY PARAFFINIC		0.00 ( )	

SECTION 5 - POTENTIAL HEALTH EFFECTS

-------- ROUTES OF EXPOSURE AND EFFECTS - EYE ---------

BELIEVED TO BE MINIMALLY IRRITATING.

-------- ROUTES OF EXPOSURE AND EFFECTS - SKIN --------

BELIEVED TO BE MINIMALLY IRRITATING.

----- ROUTES OF EXPOSURE AND EFFECTS - INHALATION -----

BELIEVED TO BE MINIMALLY IRRITATING IF NOT IN EXCESS OF PERMISSIBLE CONCENTRATIONS.

------ ROUTES OF EXPOSURE AND EFFECTS - INGESTION -----

PRODUCT NAME: 01891 GEOTEX LA SAE 30
MSDS NO: 120TEX001

SECTION 5 - POTENTIAL HEALTH EFFECTS (CON'T)

---------- ADDITIONAL TOXICITY INFORMATION ----------

MEDIAN LETHAL DOSE (LD50 LC50)(SPECIES):
ORAL: BELIEVED TO BE >5G/KG (RAT); PRACTICALLY NONTOXIC
INHALATION: N/D
DERMAL: BELIEVED TO BE >3G/KG (RABBIT); PRACTICALLY NONTOXIC
OTHER: N/D
IRRITATION INDEX, ESTIMATION OF IRRITATION (SPECIES):
BELIEVED TO BE <0.5-1.0/8.0 (RABBIT); NO APPRECIABLE EFFECT
BELIEVED TO BE <15/110 (RABBIT); NO APPRECIABLE EFFECT
SYMPTOMS OF EXPOSURE: NONE EXPECTED OTHER THAN POSSIBLE MINIMAL IRRITATION

NEW AND USED MOTOR OILS HAVE BEEN TESTED FOR POTENTIAL CARCINOGENICITY IN LABORATORY MICE. ONLY USED MOTOR OILS WERE SHOWN TO CAUSE CANCER WHEN REPEATEDLY APPLIED TO MICE WITHOUT ANY EFFORT TO REMOVE THE MATERIAL BETWEEN APPLICATIONS. STRICT COMPLIANCE TO THE OCCUPATIONAL CONTROL PROCEDURES OUTLINED IN THIS DATA SHEET IS BELIEVED TO BE ADEQUATE PROTECTION FROM SUCH HAZARDS.

EMERGENCY FIRST AID PROCEDURES

---------- FIRST AID - EYE ----------

AS WITH MOST FOREIGN MATERIALS, SHOULD EYE CONTACT OCCUR, FLUSH EYES WITH PLENTY OF WATER.

---------- FIRST AID - SKIN ----------

NONE CONSIDERED NECESSARY.

---------- FIRST AID - INHALATION ----------

NONE CONSIDERED NECESSARY.

---------- FIRST AID - INGESTION ----------

NONE CONSIDERED NECESSARY.

SECTION 6 - SPECIAL PROTECTION INFORMATION

---------- VENTILATION ----------

NORMAL

PRODUCT NAME: 01891 GEOTEX LA SAE 30
MSDS NO: 120TEX001

SECTION 6 - SPECIAL PROTECTION INFORMATION (CON'T)

------ PERSONAL PROTECTIVE EQUIPMENT - RESPIRATOR -----

NONE REQUIRED IF EXPOSURES ARE WITHIN PERMISSIBLE CONCENTRATIONS.

---------- PERSONAL PROTECTIVE EQUIPMENT - EYE -------

CHEMICAL TYPE GOGGLES OR FACE SHIELD OPTIONAL

-------- PERSONAL PROTECTIVE EQUIPMENT - GLOVES -------

---------- OTHER PROTECTIVE EQUIPMENT ----------

EXPOSED EMPLOYEES SHOULD EXERCISE REASONABLE PERSONAL CLEANLINESS; THIS INCLUDES CLEANSING EXPOSED SKIN AREAS SEVERAL TIMES DAILY WITH SOAP AND WATER, AND LAUNDERING OR DRY CLEANING SOILED WORK CLOTHING AT LEAST WEEKLY.

SECTION 7 - SPILL OR LEAK PROCEDURES

---------- ENVIRONMENTAL EFFECTS ----------

- STEPS TO BE TAKEN IN CASE OF SPILL, LEAK OR RELEASE -

CONTAIN SPILL IF POSSIBLE. WIPE UP OR ABSORB ON SUITABLE MATERIAL AND SHOVEL UP.

---------- WASTE DISPOSAL METHOD ----------

UNDER RCRA, IT IS THE RESPONSIBILITY OF THE USER OF PRODUCTS TO DETERMINE, AT THE TIME OF DISPOSAL, WHETHER PRODUCT MEETS RCRA CRITERIA FOR HAZARDOUS WASTE. THIS IS BECAUSE PRODUCT USES, TRANSFORMATIONS, MIXTURE, PROCESSES, ETC. MAY RENDER THE RESULTING MATERIAL HAZARDOUS.

WASTE CLASSIFICATION: PRODUCT HAS BEEN EVALUATED FOR RCRA CHARACTERISTICS AND DOES NOT MEET CRITERIA OF A HAZARDOUS WASTE IF DISCARDED IN ITS PURCHASED FORM.

SECTION 8 - HANDLING AND STORAGE PRECAUTIONS

MINIMUM FEASIBLE HANDLING TEMPERATURES SHOULD BE MAINTAINED. PERIODS OF EXPOSURE TO HIGH TEMPERATURES SHOULD BE MINIMIZED. WATER CONTAMINATION SHOULD BE AVOIDED.

CAUTION: MISUSE OF EMPTY CONTAINERS CAN BE HAZARDOUS. EMPTY CONTAINERS CAN BE HAZARDOUS IF USED TO STORE TOXIC, FLAMMABLE, OR REACTIVE MATERIALS. CUTTING OR WELDING OF EMPTY CONTAINERS MIGHT CAUSE FIRE, EXPLOSION OR TOXIC FUMES FROM RESIDUES. DO NOT PRESSURIZE OR EXPOSE TO OPEN FLAME OR HEAT. KEEP CONTAINER CLOSED AND DRUM BUNGS IN PLACE.

PRODUCT NAME: 01891 GEOTEX LA SAE 30
MSDS NO: 120TEX001

SECTION 9 - HAZARD WARNING

WARNING! AVOID SKIN CONTACT WITH USED MOTOR OILS.

USED MOTOR OILS HAVE CAUSED SKIN CANCER IN LABORATORY ANIMALS WHEN REPEATEDLY APPLIED AND LEFT IN PLACE BETWEEN APPLICATIONS. IN CASE OF SKIN CONTACT, PROMPTLY WASH THOROUGHLY WITH SOAP AND WATER. OIL-SOAKED CLOTHING SHOULD BE CLEANED BEFORE REUSE.

DOT PROPER SHIPPING NAME: N/A
DOT HAZARD CLASS (IF APPLICABLE): N/A

TO THE BEST OF MANUFACTURER'S KNOWLEDGE, NONE OF THE COMPONNETS ARE HAZARDOUS ACCORDING TO OSHA (1910.1200) OR ONE OR MORE STATE RIGHT-TO-KNOW LISTS.

TEXACO INTENDS TO COMPLY FULLY WITH PROVISIONS OF THE TOXIC SUBSTANCES CONTROL ACT STATE OF MICHIGAN CRITICAL MATERIALS ACT (REVISED 1985): 0.15% ZINC; CONVERSION FACTOR 7.4 POUNDS PER GALLON

SECTION 10 - COMMENTS

MANUFACTURER LISTS ADDITIONAL TELEPHONE NUMBERS AS FOLLOWS:
914-831-3400, EXT. 204 (FUELS/LUBRICANTS/ANTIFREEZES)
512-459-6543 (CHEMICALS)
800-424-9300 CHEMTREC (TRANSPORTATION SPILLS)

SECTION 11 - REGULATORY INFORMATION

SECTION 12 - REGULATIONS/COMMENTS CONTINUED

INFORMATION SUPPLIED BY: COORDINATOR, TOXICOLOGY AND PRODUCT SAFETY
R. T. RICHARDS PHONE: ( ) -

MSDS DATE: 11/20/85 DATE OF PREVIOUS MSDS: / /

PRODUCT NAME: 02321 MEROPA 220
MSDS NO: 118TEX001

THE FOLLOWING INFORMATION IS FURNISHED SUBJECT TO THE DISCLAIMER ON THE BOTTOM OF THIS FORM

SECTION 1 - PRODUCT IDENTIFICATION

PRODUCT NAME: 02321 MEROPA 220

SYNONYMS:
02321 MEROPA 220; 02321; 2321; 2321 MEROPA 220; MEROPA 220, 02321; MEROPA 220, 2321

MANUFACTURER / DISTRIBUTOR:
TEXACO, INC.
P.O. BOX 509
BEACON, NY
12508

EMERGENCY PHONE NUMBERS:
(419) 422-2121 (MARATHON)
(800) 424-9300 (CHEMTREC)

CHEMICAL FAMILY: GEAR OILS
CHEMICAL FORMULA:
CAS NO:

SECTION 2 - PHYSICAL PROPERTIES

BOILING POINT	MELTING POINT	SPECIFIC GRAVITY(H2O=1)
N/D F	F	0.8969
C	C	

% SOLUBILITY IN WATER	VAPOR DENSITY(AIR=1)	VAPOR PRESSURE
N/D	N/D	N/D

PH INFORMATION: PH: N/A AT CONC.
APPEARANCE: N/D ODOR: N/D

VISCOSITY: 205 CST @40C

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT	AUTOIGNITION TEMP	EXPLOSIVE LIMITS (% BY VOLUME IN AIR)
400 COC F	N/D F	LOWER/UPPER: N/D/N/D
C	C	

NFPA CLASS -- HEALTH: 0 FIRE: 1 REACTIVITY: 0 OTHER:

SPECIFIC HAZARD: NONE

FIRE AND EXPLOSION HAZARDS

NONE

EXTINGUISHING MEDIA

ACCORDING TO THE NATIONAL FIRE PROTECTION ASSOCIATION GUIDE, USE WATER SPRAY, DRY CHEMICAL, FOAM, OR CARBON DIOXIDE. WATER OF FOAM MAY CAUSE FROTHING. USE WATER TO COOL FIRE-EXPOSED CONTAINERS. IF A LEAK OR SPILL HAS NOT IGNITED, USE WATER SPRAY TO DISPERSE THE VAPORS AND TO PROVIDE PROTECTION FOR PERSONS ATTEMPTING TO STOP THE LEAK.

SPECIAL FIRE FIGHTING INSTRUCTIONS

PRODUCT NAME: 02321 MEROPA 220
MSDS NO: 118TEX001

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA (CON'T)

STABILITY: THE MATERIAL IS AT 70 F, 760MM PRESSURE
CONDITIONS TO AVOID:

HAZARDOUS DECOMPOSITION PRODUCTS:
SEE COMMENTS

INCOMPATIBLE MATERIALS:

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

HAZARDOUS DECOMPOSITION PRODUCTS: CARBON MONOXIDE, CARBON DIOXIDE, ALDEHYDES AND KETONES, COMBUSTION PRODUCTS OF NITROGEN AND SULFUR

SECTION 4 - PRODUCT COMPOSITION AND EXPOSURE LIMITS

EXPOSURE LIMITS FOR PRODUCT: TLV SOURCE

02321 MEROPA 220 NONE ESTABLISHED

COMPONENTS:	PERCENT RANGE	TLV		SOURCE
ADDITIVES	1.00- 3.99		( )	
LUBRICATING OIL, HYDROTREATED C25- BRIGHT STOCK-BASED	50.00- 64.99	0.00	( )	
PETROLEUM DISTILLATES, SOLVENT-DE-WAXED HEAVY PARAFFINIC	35.00- 49.99	0.00	( )	

SECTION 5 - POTENTIAL HEALTH EFFECTS

-------- ROUTES OF EXPOSURE AND EFFECTS - EYE ---------

BELIEVED TO BE MINIMALLY IRRITATING.

-------- ROUTES OF EXPOSURE AND EFFECTS - SKIN --------

BELIEVED TO BE MINIMALLY IRRITATING.

----- ROUTES OF EXPOSURE AND EFFECTS - INHALATION -----

BELIEVED TO BE MINIMALLY IRRITATING IF NOT IN EXCESS OF PERMISSIBLE CONCENTRATIONS.

------ ROUTES OF EXPOSURE AND EFFECTS - INGESTION -----

PRODUCT NAME: 02321 MEROPA 220
MSDS NO: 118TEX001

SECTION 5 - POTENTIAL HEALTH EFFECTS (CON'T)

---------- ADDITIONAL TOXICITY INFORMATION ----------

MEDIAN LETHAL DOSE (LD50 LC50)(SPECIES):
ORAL: BELIEVED TO BE >5G/KG (RAT); PRACTICALLY NONTOXIC
INHALATION: N/D
DERMAL: BELIEVED TO BE >3G/KG (RABBIT); PRACTICALLY NONTOXIC
OTHER: N/D
IRRITATION INDEX, ESTIMATION OF IRRITATION (SPECIES):
BELIEVED TO BE <0.5/8.0 (RABBIT); NO APPRECIABLE EFFECT
BELIEVED TO BE <15/110 (RABBIT); NO APPRECIABLE EFFECT
SYMPTOMS OF EXPOSURE: NONE EXPECTED OTHER THAN POSSIBLE MINIMAL IRRITATION

EMERGENCY FIRST AID PROCEDURES

---------- FIRST AID - EYE ----------

AS WITH MOST FOREIGN MATERIALS, SHOULD EYE CONTACT OCCUR, FLUSH EYES WITH PLENTY OF WATER.

---------- FIRST AID - SKIN ----------

WASH EXPOSED AREAS WITH SOAP AND WATER.

---------- FIRST AID - INHALATION ----------

NONE CONSIDERED NECESSARY.

---------- FIRST AID - INGESTION ----------

NONE CONSIDERED NECESSARY.

SECTION 6 - SPECIAL PROTECTION INFORMATION

---------- VENTILATION ----------

NORMAL

---------- PERSONAL PROTECTIVE EQUIPMENT - RESPIRATOR -----

NONE REQUIRED IF EXPOSURES ARE WITHIN PERMISSIBLE CONCENTRATIONS.

---------- PERSONAL PROTECTIVE EQUIPMENT - EYE -------

CHEMICAL TYPE GOGGLES OR FACE SHIELD OPTIONAL

-------- PERSONAL PROTECTIVE EQUIPMENT - GLOVES -------

---------- OTHER PROTECTIVE EQUIPMENT ----------

EXPOSED EMPLOYEES SHOULD EXERCISE REASONABLE PERSONAL CLEANLINESS; THIS INCLUDES CLEANSING EXPOSED SKIN AREAS SEVERAL TIMES DAILY WITH SOAP AND WATER, AND LAUNDERING OR DRY CLEANING SOILED WORK CLOTHING AT LEAST WEEKLY.

PRODUCT NAME: 02321 MEROPA 220
MSDS NO: 118TEX001

SECTION 7 - SPILL OR LEAK PROCEDURES

---------- ENVIRONMENTAL EFFECTS ----------

- STEPS TO BE TAKEN IN CASE OF SPILL, LEAK OR RELEASE -

CONTAIN SPILL IF POSSIBLE. WIPE UP OR ABSORB ON SUITABLE MATERIAL AND SHOVEL UP.

---------- WASTE DISPOSAL METHOD ----------

UNDER RCRA, IT IS THE RESPONSIBILITY OF THE USER OF PRODUCTS TO DETERMINE, AT THE TIME OF DISPOSAL, WHETHER PRODUCT MEETS RCRA CRITERIA FOR HAZARDOUS WASTE. THIS IS BECAUSE PRODUCT USES, TRANSFORMATIONS, MIXTURE, PROCESSES, ETC. MAY RENDER THE RESULTING MATERIAL HAZARDOUS.

WASTE CLASSIFICATION: PRODUCT HAS BEEN EVALUATED FOR RCRA CHARACTERISTICS AND DOES NOT MEET CRITERIA OF A HAZARDOUS WASTE IF DISCARDED IN ITS PURCHASED FORM.

SECTION 8 - HANDLING AND STORAGE PRECAUTIONS

MINIMUM FEASIBLE HANDLING TEMPERATURES SHOULD BE MAINTAINED. PERIODS OF EXPOSURE TO HIGH TEMPERATURES SHOULD BE MINIMIZED. WATER CONTAMINATION SHOULD BE AVOIDED.

CAUTION: MISUSE OF EMPTY CONTAINERS CAN BE HAZARDOUS. EMPTY CONTAINERS CAN BE HAZARDOUS IF USED TO STORE TOXIC, FLAMMABLE, OR REACTIVE MATERIALS. CUTTING OR WELDING OF EMPTY CONTAINERS MIGHT CAUSE FIRE, EXPLOSION OR TOXIC FUMES FROM RESIDUES. DO NOT PRESSURIZE OR EXPOSE TO OPEN FLAME OR HEAT. KEEP CONTAINER CLOSED AND DRUM BUNGS IN PLACE.

SECTION 9 - HAZARD WARNING

NONE CONSIDERED NECESSARY.

DOT PROPER SHIPPING NAME: N/A
DOT HAZARD CLASS (IF APPLICABLE): N/A

SECTION 10 - COMMENTS

MANUFACTURER LISTS ADDITIONAL TELEPHONE NUMBERS AS FOLLOWS:
914-831-3400, EXT. 204 (FUELS/LUBRICANTS/ANTIFREEZES)
512-459-6543 (CHEMICALS)
800-424-9300 CHEMTREC (TRANSPORTATION SPILLS)

PRODUCT NAME: 02321 MEROPA 220
MSDS NO: 118TEX001

SECTION 11 - REGULATORY INFORMATION

SECTION 12 - REGULATIONS/COMMENTS CONTINUED

INFORMATION SUPPLIED BY: COORDINATOR, TOXICOLOGY AND PRODUCT SAFETY
R. T. RICHARDS PHONE: ( ) -

MSDS DATE: 02/27/86 DATE OF PREVIOUS MSDS: / /

PRODUCT NAME: 02353 TEXACO ANTI-FREEZE COOLANT
MSDS NO: 119TEX001

THE FOLLOWING INFORMATION IS FURNISHED SUBJECT TO THE DISCLAIMER ON THE BOTTOM OF THIS FORM

SECTION 1 - PRODUCT IDENTIFICATION

PRODUCT NAME: 02353 TEXACO ANTI-FREEZE COOLANT

SYNONYMS:
02353 TEXACO ANTI-FREEZE COOLANT; 02353 TEXACO ANTIFREEZE COOLANT; 02353; 2353; TEXACO ANTI-FREEZE COOLANT, 02353; TEXACO ANTI-FREEZE COOLANT, 2353; TEXACO ANTIFREEZE COOLANT, 02353; TEXACO ANTIFREEZE COOLANT, 2353

CHEMICAL FAMILY: ANTIFREEZE
CHEMICAL FORMULA:

MANUFACTURER / DISTRIBUTOR:
TEXACO, INC.
P.O. BOX 509
BEACON, NY
12508
EMERGENCY PHONE NUMBERS:
(419) 422-2121 (MARATHON)
(800) 424-9300 (CHEMTREC)

CAS NO:

SECTION 2 - PHYSICAL PROPERTIES

BOILING POINT		MELTING POINT		SPECIFIC GRAVITY(H2O=1)
388	F		F	1.13
	C		C	

% SOLUBILITY IN WATER	VAPOR DENSITY(AIR=1)	VAPOR PRESSURE
SOLUBLE	2.14	<0.1

PH INFORMATION: PH: 11.0 AT CONC.
APPEARANCE: FLUORESCENT GREEN LIQUID ODOR: MILD

VISCOSITY: 24 CP @20C

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT		AUTOIGNITION TEMP		EXPLOSIVE LIMITS (% BY VOLUME IN AIR)
244 PM	F	N/D	F	LOWER/UPPER: 3.2/N/D
	C		C	

NFPA CLASS -- HEALTH: FIRE: REACTIVITY: OTHER:

SPECIFIC HAZARD: NONE

---------- FIRE AND EXPLOSION HAZARDS ----------

NONE

---------- EXTINGUISHING MEDIA ----------

ACCORDING TO THE NATIONAL FIRE PROTECTION ASSOCIATION GUIDE, USE WATER SPRAY, DRY CHEMICAL, FOAM, OR CARBON DIOXIDE. WATER OF FOAM MAY CAUSE FROTHING. USE WATER TO COOL FIRE-EXPOSED CONTAINERS. IF A LEAK OR SPILL HAS NOT IGNITED, USE WATER SPRAY TO DISPERSE THE VAPORS AND TO PROVIDE PROTECTION FOR PERSONS ATTEMPTING TO STOP THE LEAK.

--------- SPECIAL FIRE FIGHTING INSTRUCTIONS ----------

PRODUCT NAME: 02353 TEXACO ANTI-FREEZE COOLANT
MSDS NO: 119TEX001

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA (CON'T)

STABILITY: THE MATERIAL IS AT 70 F, 760MM PRESSURE
CONDITIONS TO AVOID:

HAZARDOUS DECOMPOSITION PRODUCTS:
CARBON MONOXIDE AND CARBON DIOXIDE MAY BE FORMED
ON BURNING IN LIMITED AIR SUPPLY

INCOMPATIBLE MATERIALS:
STRONG OXIDIZERS

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

SECTION 4 - PRODUCT COMPOSITION AND EXPOSURE LIMITS

EXPOSURE LIMITS FOR PRODUCT: TLV SOURCE

02353 TEXACO ANTI-FREEZE COOLANT NONE ESTABLISHED

COMPONENTS:	PERCENT RANGE	TLV			SOURCE
ETHYLENE GLYCOL	80.00- 94.99			( )	
		50.00	PPM	(CEILING)	ACGIH
		50.00	PPM	(CEILING)	OSHA
PHOSPHORIC ACID	1.00- 3.99	1.00	MG/M3	(8 HR TWA)	ACGIH
		3.00	MG/M3	(STEL)	ACGIH
		1.00	MG/M3	(8 HR TWA)	OSHA
SODIUM HYDROXIDE	1.00- 3.99			( )	
		2.00	MG/M3	(CEILING)	ACGIH
		2.00	MG/M3	(CEILING)	OSHA

SECTION 5 - POTENTIAL HEALTH EFFECTS

-------- ROUTES OF EXPOSURE AND EFFECTS - EYE ---------

BELIEVED TO CAUSE SLIGHT EYE IRRITATION.

-------- ROUTES OF EXPOSURE AND EFFECTS - SKIN --------

BELIEVED TO BE SLIGHTLY IRRITATING UPON PROLONED CONTACT.

----- ROUTES OF EXPOSURE AND EFFECTS - INHALATION -----

DROWSINESS, NARCOSIS, AND UNCONSCIOUSNESS POSSIBLE UPON EXPOSURE TO HIGH CONCENTRATIONS I POORLY VENTILATED CONFINED SPACES.

------ ROUTES OF EXPOSURE AND EFFECTS - INGESTION -----

PRODUCT NAME: 02353 TEXACO ANTI-FREEZE COOLANT
MSDS NO: 119TEX001

SECTION 5 - POTENTIAL HEALTH EFFECTS (CON'T)

---------- ADDITIONAL TOXICITY INFORMATION ----------

MEDIAN LETHAL DOSE (LD50 LC50)(SPECIES):
ORAL: BELIEVED TO BE 4.7-8.5 (RAT); MODERATELY TOXIC
INHALATION: N/D
DERMAL: BELIEVED TO BE 1-3G/KG (RABBIT); SLIGHTLY TOXIC
OTHER: N/D
IRRITATION INDEX, ESTIMATION OF IRRITATION (SPECIES):
BELIEVED TO BE 0.5-1.0/8.0 (RABBIT); SLIGHTLY IRRITATING
BELIEVED TO BE 15-25/110 (RABBIT); SLIGHTLY IRRITATING

CHRONIC EFFECTS OF EXPOSURE: LIVER AND KIDNEY DAMAGE IN 2-YEAR RAT FEEDING STUDY USING 1-2% ETHYLENE GLYCOL. ORAL ADMINISTRATION OF VERY HIGH DOSES OF ETHYLENE GLYCOL PRODUCED BIRTH DEFECTS IN LABORATORY ANIMALS.

LETHAL DOSE (HUMAN) 1.0-1.5G/KG. SYMPTOMS OF INGESTION: BEHAVIORAL CHANGES, DROWSINESS, VOMITING, DIARRHEA, THIRST, CONVULSIONS, CYANOSIS, RAPID HEART RATE, PULMONARY EDEMA AND RENAL FAILURE. ACUTE OR CHRONIC ORAL CONSUMPTION FOR PRODUCTS CONTAINING ETHYLENE GLYCOL CAN PRODUCE ADVERSE HEALTH EFFECTS IN HUMANS. SUCH PRODUCTS SHOULD NOT BE USED IN POTABLE WATER SYSTEMS OR OTHER SYSTEMS WHERE CONTAMINATION OF POTABLE WATER SUPPLIES IS POSSIBLE. THIS PRODUCT, WHEN INTRODUCED INTO WATER SYSTEMS WILL BE DEGRADED BIOLOGICALLY IN BOTH SURFACE WATERS AND WASTE TREATMENT PLANTS, AND WOULD THEREFORE PRESENT NO AQUATIC TOXICITY.

EMERGENCY FIRST AID PROCEDURES

---------- FIRST AID - EYE ----------

FLUSH WITH WATER FOR FIFTEEN MINUTES.

---------- FIRST AID - SKIN ----------

WASH EXPOSED AREAS WITH SOAP AND WATER.

---------- FIRST AID - INHALATION ----------

REMOVE TO FRESH AIR; IF NOT BREATHING APPLY ARTIFICIAL RESPIRATION. GET MEDICAL ATTENTION. KEEP AFFECTED PERSON WARM AND AT REST.

---------- FIRST AID - INGESTION ----------

GIVE LARGE QUANTITIES OF WATER, THEN INDUCE VOMITING IMMEDIATELY. GET IMMEDIATE MEDICAL ATTENTION. DO NOT MAKE AN UNCONSCIOUS PERSON VOMIT. NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON.

SECTION 6 - SPECIAL PROTECTION INFORMATION

---------- VENTILATION ----------

NORMAL

PRODUCT NAME: 02353 TEXACO ANTI-FREEZE COOLANT
MSDS NO: 119TEX001

SECTION 6 - SPECIAL PROTECTION INFORMATION (CON'T)

------ PERSONAL PROTECTIVE EQUIPMENT - RESPIRATOR -----

SUPPLIED AIR RESPIRATORY PROTECTION FOR CLEANING LARGE SPILLS OR UPON ENTRY INTO TANKS, VESSELS, OR OTHER CONFINED SPACES.

---------- PERSONAL PROTECTIVE EQUIPMENT - EYE -------

CHEMICAL TYPE GOGGLES OR FACE SHIELD OPTIONAL

-------- PERSONAL PROTECTIVE EQUIPMENT - GLOVES -------

------------- OTHER PROTECTIVE EQUIPMENT --------------

EXPOSED EMPLOYEES SHOULD EXERCISE REASONABLE PERSONAL CLEANLINESS; THIS INCLUDES CLEANSING EXPOSED SKIN AREAS SEVERAL TIMES DAILY WITH SOAP AND WATER, AND LAUNDERING OR DRY CLEANING SOILED WORK CLOTHING AT LEAST WEEKLY.

SECTION 7 - SPILL OR LEAK PROCEDURES

---------- ENVIRONMENTAL EFFECTS ----------

- STEPS TO BE TAKEN IN CASE OF SPILL, LEAK OR RELEASE -

CONTAIN SPILL IF POSSIBLE. WIPE UP OR ABSORB ON SUITABLE MATERIAL AND SHOVEL UP.

---------- WASTE DISPOSAL METHOD ----------

UNDER RCRA, IT IS THE RESPONSIBILITY OF THE USER OF PRODUCTS TO DETERMINE, AT THE TIME OF DISPOSAL, WHETHER PRODUCT MEETS RCRA CRITERIA FOR HAZARDOUS WASTE. THIS IS BECAUSE PRODUCT USES, TRANSFORMATIONS, MIXTURE, PROCESSES, ETC. MAY RENDER THE RESULTING MATERIAL HAZARDOUS.

WASTE CLASSIFICATION: PRODUCT HAS BEEN EVALUATED FOR RCRA CHARACTERISTICS AND DOES NOT MEET CRITERIA OF A HAZARDOUS WASTE IF DISCARDED IN ITS PURCHASED FORM.

SECTION 8 - HANDLING AND STORAGE PRECAUTIONS

MINIMUM FEASIBLE HANDLING TEMPERATURES SHOULD BE MAINTAINED. PERIODS OF EXPOSURE TO HIGH TEMPERATURES SHOULD BE MINIMIZED. WATER CONTAMINATION SHOULD BE AVOIDED.

CAUTION: MISUSE OF EMPTY CONTAINERS CAN BE HAZARDOUS. EMPTY CONTAINERS CAN BE HAZARDOUS IF USED TO STORE TOXIC, FLAMMABLE, OR REACTIVE MATERIALS. CUTTING OR WELDING OF EMPTY CONTAINERS MIGHT CAUSE FIRE, EXPLOSION OR TOXIC FUMES FROM RESIDUES. DO NOT PRESSURIZE OR EXPOSE TO OPEN FLAME OR HEAT. KEEP CONTAINER CLOSED AND DRUM BUNGS IN PLACE.

PRODUCT NAME: 02353 TEXACO ANTI-FREEZE COOLANT
MSDS NO: 119TEX001

SECTION 9 - HAZARD WARNING

WARNING! HARMFUL OR FATAL IF SWALLOWED. KEEP OUT OF REACH OF CHILDREN. MAY CAUSE IRRITATION TO EYES.

DO NOT DRINK ANTIFREEZE OR SOLUTION. AVOID CONTACT WITH EYES. WASH THOROUGHLY AFTER HANDLING. DO NOT STORE IN OPEN OR UNLABELED CONTAINERS. ETHYLENE GLYCOL BASE. ETHYLENE GLYCOL HAS PRODUCED BIRTH DEFECTS IN RODENTS.

IF SWALLOWED, INDUCE VOMITING IMMEDIATELY. CALL A DOCTOR. IN CASE OF CONTACT, FLUSH EYES WITH PLENTY OF WATER FOR AT LEAST FIFTEEN MINUTES. NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON.

DOT PROPER SHIPPING NAME: N/A
DOT HAZARD CLASS (IF APPLICABLE): N/A

COMPONENTS ARE ALL HAZARDOUS ACCORDING TO OSHA (1910.1200) OR ONE OR MORE STATE RIGHT-TO-KNOW LISTS.

TEXACO INTENDS TO COMPLY FULLY WITH PROVISIONS OF THE TOXIC SUBSTANCES CONTROL ACT STATE OF MICHIGAN CRITICAL MATERIALS ACT (REVISED 1985): NO CRITICAL MATERIALS PRESENT

SECTION 10 - COMMENTS

MANUFACTURER LISTS ADDITIONAL TELEPHONE NUMBERS AS FOLLOWS:
914-831-3400, EXT. 204 (FUELS/LUBRICANTS/ANTIFREEZES)
512-459-6543 (CHEMICALS)
800-424-9300 CHEMTREC (TRANSPORTATION SPILLS)

SECTION 11 - REGULATORY INFORMATION

SECTION 12 - REGULATIONS/COMMENTS CONTINUED

INFORMATION SUPPLIED BY: COORDINATOR, TOXICOLOGY AND PRODUCT SAFETY
R. T. RICHARDS PHONE: ( ) -

MSDS DATE: 03/12/86 DATE OF PREVIOUS MSDS: / /

PRODUCT NAME: HARDNESS INDICATOR POWDER
MSDS NO: 120CAL001

THE FOLLOWING INFORMATION IS FURNISHED SUBJECT TO THE DISCLAIMER ON THE BOTTOM OF THIS FORM

SECTION 1 - PRODUCT IDENTIFICATION

PRODUCT NAME: HARDNESS INDICATOR POWDER

SYNONYMS:
HARDNESS INDICATOR POWDER; INDICATOR POWDER, HARDNESS; POWDER, HARDNESS INDICATOR; CATALOG NUMBER 1317; 1317

MANUFACTURER / DISTRIBUTOR:
CALGON CORPORATION
P.O. BOX 1346
PITTSBURGH, PA
15230
EMERGENCY PHONE NUMBERS:
(419) 422-2121 (MARATHON)
(800) 424-9300 (CHEMTREC)

CHEMICAL FAMILY: SEE COMMENTS
CHEMICAL FORMULA: SEE COMMENTS CAS NO:

SECTION 2 - PHYSICAL PROPERTIES

BOILING POINT		MELTING POINT		SPECIFIC GRAVITY(H2O=1)
	F	N/A	F	2.16
1413	C		C	

% SOLUBILITY IN WATER	VAPOR DENSITY(AIR=1)	VAPOR PRESSURE
APPRECIABLE	N/A	1 MM HG @865C

PH INFORMATION: PH: 4.5 AT CONC. 1%
APPEARANCE: PURPLE-COLORED CRYSTALS ODOR: ODORLESS

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT		AUTOIGNITION TEMP		EXPLOSIVE LIMITS (% BY VOLUME IN AIR)
N/A	F	N/D	F	LOWER/UPPER: N/A/N/A
	C		C	

NFPA CLASS -- HEALTH: FIRE: REACTIVITY: OTHER:

SPECIFIC HAZARD: NONE

---------- FIRE AND EXPLOSION HAZARDS ----------

SEE REACTIVITY DATA

---------- EXTINGUISHING MEDIA ----------

USE MEDIA PROPER FOR PRIMARY CAUSE OF FIRE.

--------- SPECIAL FIRE FIGHTING INSTRUCTIONS ----------

NONE

PRODUCT NAME: HARDNESS INDICATOR POWDER
MSDS NO: 120CAL001

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA (CON'T)

STABILITY: THE MATERIAL IS STABLE AT 70 F, 760MM PRESSURE
CONDITIONS TO AVOID:
NONE

HAZARDOUS DECOMPOSITION PRODUCTS:
MINOR AMOUNTS OF TOXIC NOX FUMES EMITTED ON HEATING TO DECOMPOSITION

INCOMPATIBLE MATERIALS:
NONE

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

SECTION 4 - PRODUCT COMPOSITION AND EXPOSURE LIMITS

EXPOSURE LIMITS FOR PRODUCT:	TLV	SOURCE
HARDNESS INDICATOR POWDER	NONE ESTABLISHED	

COMPONENTS:	PERCENT RANGE	TLV	SOURCE
HARDNESS INDICATOR POWDER	100.00	( )	

AS HERCULES INTERPRETS THE U.S. OCCUPATIONAL SAFETY AND HEALTH ACT OF 1970, THIS PRODUCT SHOULD NOT BE CONSIDERED A HAZARDOUS MATERIAL.
*

SECTION 5 - POTENTIAL HEALTH EFFECTS

-------- ROUTES OF EXPOSURE AND EFFECTS - EYE ---------

MAY CAUSE EYE IRRITATION.

-------- ROUTES OF EXPOSURE AND EFFECTS - SKIN --------

MAY CAUSE SKIN IRRITATION.

----- ROUTES OF EXPOSURE AND EFFECTS - INHALATION -----

------ ROUTES OF EXPOSURE AND EFFECTS - INGESTION -----

---------- ADDITIONAL TOXICITY INFORMATION ----------

PRODUCT NAME: HARDNESS INDICATOR POWDER
MSDS NO: 120CAL001

SECTION 5 - POTENTIAL HEALTH EFFECTS (CON'T)

EMERGENCY FIRST AID PROCEDURES

---------- FIRST AID - EYE ----------

IN CASE OF CONTACT, IMMEDIATELY FLUSH WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES. CALL A PHYSICIAN.

---------- FIRST AID - SKIN ----------

WASH WITH RUNNING WATER.

---------- FIRST AID - INHALATION ----------

---------- FIRST AID - INGESTION ----------

SECTION 6 - SPECIAL PROTECTION INFORMATION

---------- VENTILATION ----------

---------- PERSONAL PROTECTIVE EQUIPMENT - RESPIRATOR -----

NONE REQUIRED IN NORMAL USE.

---------- PERSONAL PROTECTIVE EQUIPMENT - EYE -------

CHEMICAL GOGGLES

-------- PERSONAL PROTECTIVE EQUIPMENT - GLOVES -------

---------- OTHER PROTECTIVE EQUIPMENT ----------

SECTION 7 - SPILL OR LEAK PROCEDURES

- STEPS TO BE TAKEN IN CASE OF SPILL, LEAK OR RELEASE -

MECHANICALLY CLEAN UP FOR USE OR DISPOSAL.

---------- WASTE DISPOSAL METHOD ----------

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

SECTION 8 - HANDLING AND STORAGE PRECAUTIONS

NONE

PRODUCT NAME: HARDNESS INDICATOR POWDER
MSDS NO: 120CAL001

SECTION 9 - HAZARD WARNING

ANALYTICAL REAGENT FOR TEST PURPOSES ONLY.

WARNING! MAY BE TOXIC AND CAUSE IRRITATION. AVOID CONTACT WITH SKIN AND EYES.

FIRST AID:
EYES: FLUSH WITH RUNNING WATER FOR 15 MINUTES. CALL A PHYSICIAN.
SKIN: WASH WITH RUNNING WATER.

SECTION 10 - COMMENTS

CHEMICAL FORMULA: C10H12O8N2NA2MG + C20H12N3NAO7S IN NACl

CHEMICAL FAMILY: MIXTURE OF ORGANIC DYE AND ORGANIC SALT IN ORGANIC SALT

SECTION 11 - REGULATORY INFORMATION

SECTION 12 - REGULATIONS/COMMENTS CONTINUED

INFORMATION SUPPLIED BY: COORDINATOR, TOXICOLOGY AND PRODUCT SAFETY
PHONE: (412)777-8000

MSDS DATE: 12/15/82 DATE OF PREVIOUS MSDS: / /

PRODUCT NAME: HERCULES SULFITE INDICATOR POWDER
MSDS NO: 119CAL001

THE FOLLOWING INFORMATION IS FURNISHED SUBJECT TO THE DISCLAIMER ON THE BOTTOM OF THIS FORM

SECTION 1 - PRODUCT IDENTIFICATION

PRODUCT
NAME: HERCULES SULFITE INDICATOR POWDER

SYNONYMS:
HERCULES SULFITE INDICATOR POWDER; SULFITE INDICATOR POWDER, HERCULES; INDICATOR POWDER, SULFITE; SULFITE INDICATOR POWDER; CATALOG NO. 2219; 2219

MANUFACTURER / DISTRIBUTOR:
CALGON CORPORATION
P.O. BOX 1346
PITTSBURGH, PA
15230
EMERGENCY PHONE NUMBERS:
(419) 422-2121 (MARATHON)
(800) 424-9300 (CHEMTREC)

CHEMICAL FAMILY: N/A
CHEMICAL FORMULA: N/A CAS NO:

SECTION 2 - PHYSICAL PROPERTIES

BOILING POINT	MELTING POINT	SPECIFIC GRAVITY(H2O=1)
DECOMPOSES F	N/A F	1.1TYPICAL
C	C	

% SOLUBILITY IN WATER	VAPOR DENSITY(AIR=1)	VAPOR PRESSURE
APPRECIABLE	N/A	N/D

PH INFORMATION: PH: 1.25 AT CONC. 1.25%
APPEARANCE: WHITE POWDER ODOR: NONE

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT	AUTOIGNITION TEMP	EXPLOSIVE LIMITS (% BY VOLUME IN AIR)
N/A F	N/D F	LOWER/UPPER: N/A/N/A
C	C	

NFPA CLASS -- HEALTH: FIRE: REACTIVITY: OTHER:

SPECIFIC HAZARD: NONE

---------- FIRE AND EXPLOSION HAZARDS ----------

FLAMMABLE DUST WHEN FINELY DIVIDED AND SUSPENDED IN AIR.

---------- EXTINGUISHING MEDIA ----------

WATER SPRAY

--------- SPECIAL FIRE FIGHTING INSTRUCTIONS ----------

WEAR SELF-CONTAINED BREATHING APPARATUS.

PRODUCT NAME: HERCULES SULFITE INDICATOR POWDER
MSDS NO: 119CAL001

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA (CON'T)

STABILITY: THE MATERIAL IS STABLE AT 70 F, 760MM PRESSURE
CONDITIONS TO AVOID:
TEMPERATURES ABOVE 200C (392F)

HAZARDOUS DECOMPOSITION PRODUCTS:
SOX, NOX, NH3

INCOMPATIBLE MATERIALS:
SEE COMMENTS

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

INCOMPATIBLE MATERIALS: CHLORINE, HYPOCHLOROROUS ACID, SODIUM HYPOCHLORITE AND FUMING HNO3.

SECTION 4 - PRODUCT COMPOSITION AND EXPOSURE LIMITS

EXPOSURE LIMITS FOR PRODUCT:	TLV	SOURCE
HERCULES SULFITE INDICATOR POWDER	NONE ESTABLISHED	

COMPONENTS:	PERCENT RANGE	TLV	SOURCE
HERCULES SULFITE INDICATOR POWDER	100.00	( )	

AS HERCULES INTERPRETS THE U.S. OCCUPATIONAL SAFETY AND HEALTH ACT OF 1970, THIS PRODUCT SHOULD NOT BE CONSIDERED A HAZARDOUS MATERIAL.
*

SECTION 5 - POTENTIAL HEALTH EFFECTS

-------- ROUTES OF EXPOSURE AND EFFECTS - EYE ---------

CAUSES EYE IRRITATION.

-------- ROUTES OF EXPOSURE AND EFFECTS - SKIN --------

CAUSES SKIN IRRITATION.

----- ROUTES OF EXPOSURE AND EFFECTS - INHALATION -----

------ ROUTES OF EXPOSURE AND EFFECTS - INGESTION -----

---------- ADDITIONAL TOXICITY INFORMATION ----------

PRODUCT NAME: HERCULES SULFITE INDICATOR POWDER
MSDS NO: 119CAL001

SECTION 5 - POTENTIAL HEALTH EFFECTS (CON'T)

EMERGENCY FIRST AID PROCEDURES

---------- FIRST AID - EYE ----------

IN CASE OF CONTACT, IMMEDIATELY FLUSH WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES. CALL A PHYSICIAN.

---------- FIRST AID - SKIN ----------

PROMPTLY FLUSH WITH RUNNING WATER. REMOVE CONTAMIANTED CLOTHING. WASH CLOTHING BEFORE REUSE.

---------- FIRST AID - INHALATION ----------

---------- FIRST AID - INGESTION ----------

SECTION 6 - SPECIAL PROTECTION INFORMATION

---------- VENTILATION ----------

------ PERSONAL PROTECTIVE EQUIPMENT - RESPIRATOR -----

NONE REQUIRED IN NORMAL USE.

---------- PERSONAL PROTECTIVE EQUIPMENT - EYE -------

CHEMICAL GOGGLES

-------- PERSONAL PROTECTIVE EQUIPMENT - GLOVES -------

RUBBER

---------- OTHER PROTECTIVE EQUIPMENT ----------

SECTION 7 - SPILL OR LEAK PROCEDURES

- STEPS TO BE TAKEN IN CASE OF SPILL, LEAK OR RELEASE -

SWEEP UP SPILLED MATERIAL FOR USE OR DISPOSAL. FLUSH SPILL AREA WITH WATER SPRAY.

---------- WASTE DISPOSAL METHOD ----------

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

PRODUCT NAME: HERCULES SULFITE INDICATOR POWDER
MSDS NO: 119CAL001

SECTION 8 - HANDLING AND STORAGE PRECAUTIONS

STORE IN A COOL, DRY PLACE.

SECTION 9 - HAZARD WARNING

ANALYTICAL REAGENT FOR TEST PURPOSES ONLY.

CAUTION! MAY BE TOXIC OR IRRITANT. AVOID GETTING IN EYES OR ON SKIN.
IF SPLASHED OR IN THE EYES, WASH FOR 15 MINUTES WITH RUNNING WATER.

SECTION 10 - COMMENTS

SECTION 11 - REGULATORY INFORMATION

SECTION 12 - REGULATIONS/COMMENTS CONTINUED

INFORMATION SUPPLIED BY: COORDINATOR, TOXICOLOGY AND PRODUCT SAFETY
PHONE: (412)777-8000

MSDS DATE: 01/05/83 DATE OF PREVIOUS MSDS: / /

PRODUCT NAME: LOW HARDNESS INDICATOR POWDER
MSDS NO: 121CAL001

THE FOLLOWING INFORMATION IS FURNISHED SUBJECT TO THE DISCLAIMER ON THE BOTTOM OF THIS FORM

SECTION 1 - PRODUCT IDENTIFICATION

PRODUCT NAME: LOW HARDNESS INDICATOR POWDER

SYNONYMS:
LOW HARDNESS INDICATOR POWDER; INDICATOR POWDER, LOW HARDNESS; POWDER, LOW HARDNESS INDICATOR; CATALOG NUMBER 1353; 1353

MANUFACTURER / DISTRIBUTOR:
CALGON CORPORATION
P.O. BOX 1346
PITTSBURGH, PA
15230

EMERGENCY PHONE NUMBERS:
(419) 422-2121 (MARATHON)
(800) 424-9300 (CHEMTREC)

CHEMICAL FAMILY: ORGANIC DYE IN INORGANIC SALT
CHEMICAL FORMULA: C20H12N3NA07S IN NACl CAS NO:

SECTION 2 - PHYSICAL PROPERTIES

BOILING POINT		MELTING POINT		SPECIFIC GRAVITY(H2O=1)
	F	N/A	F	2.16
1413	C		C	

% SOLUBILITY IN WATER	VAPOR DENSITY(AIR=1)	VAPOR PRESSURE
APPRECIABLE	N/A	1 MM HG @865C

PH INFORMATION: PH: 5.0 AT CONC. 1%
APPEARANCE: PURPLE-COLORED CRYSTALS ODOR:

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT		AUTOIGNITION TEMP		EXPLOSIVE LIMITS (% BY VOLUME IN AIR)
N/A	F	N/D	F	LOWER/UPPER: N/A/N/A
	C		C	

NFPA CLASS -- HEALTH: FIRE: REACTIVITY: OTHER:

SPECIFIC HAZARD: NONE

---------- FIRE AND EXPLOSION HAZARDS ----------

SEE REACTIVITY DATA

---------- EXTINGUISHING MEDIA ----------

USE MEDIA PROPER FOR PRIMARY CAUSE OF FIRE.

--------- SPECIAL FIRE FIGHTING INSTRUCTIONS ----------

NONE

PRODUCT NAME: LOW HARDNESS INDICATOR POWDER
MSDS NO: 121CAL001

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA (CON'T)

STABILITY: THE MATERIAL IS STABLE AT 70 F, 760MM PRESSURE
CONDITIONS TO AVOID:
NONE

HAZARDOUS DECOMPOSITION PRODUCTS:
WHEN HEATED TO DECOMPOSITION, MATERIAL CAN EMIT
HIGHLY TOXIC FUMES OF NOX AND SOX

INCOMPATIBLE MATERIALS:
NONE

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

SECTION 4 - PRODUCT COMPOSITION AND EXPOSURE LIMITS

EXPOSURE LIMITS FOR PRODUCT:	TLV	SOURCE
LOW HARDNESS INDICATOR POWDER	NONE ESTABLISHED	

COMPONENTS:	PERCENT RANGE	TLV	SOURCE
LOW HARDNESS INDICATOR POWDER	100.00	( )	

AS HERCULES INTERPRETS THE U.S. OCCUPATIONAL SAFETY AND HEALTH ACT OF 1970, THIS PRODUCT SHOULD NOT BE CONSIDERED A HAZARDOUS MATERIAL.
*

SECTION 5 - POTENTIAL HEALTH EFFECTS

-------- ROUTES OF EXPOSURE AND EFFECTS - EYE ---------

MAY CAUSE EYE IRRITATION.

-------- ROUTES OF EXPOSURE AND EFFECTS - SKIN --------

----- ROUTES OF EXPOSURE AND EFFECTS - INHALATION -----

------ ROUTES OF EXPOSURE AND EFFECTS - INGESTION -----

---------- ADDITIONAL TOXICITY INFORMATION ----------

PRODUCT NAME: LOW HARDNESS INDICATOR POWDER
MSDS NO: I21CAL001

SECTION 5 - POTENTIAL HEALTH EFFECTS (CON'T)

EMERGENCY FIRST AID PROCEDURES

FIRST AID - EYE

IN CASE OF CONTACT, IMMEDIATELY FLUSH WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES. CALL A PHYSICIAN.

FIRST AID - SKIN

FIRST AID - INHALATION

FIRST AID - INGESTION

SECTION 6 - SPECIAL PROTECTION INFORMATION

VENTILATION

MECHANICAL: RECOMMENDED

PERSONAL PROTECTIVE EQUIPMENT - RESPIRATOR

NONE REQUIRED IN NORMAL USE.

PERSONAL PROTECTIVE EQUIPMENT - EYE

SAFETY GLASSES

PERSONAL PROTECTIVE EQUIPMENT - GLOVES

RUBBER

OTHER PROTECTIVE EQUIPMENT

SECTION 7 - SPILL OR LEAK PROCEDURES

- STEPS TO BE TAKEN IN CASE OF SPILL, LEAK OR RELEASE -

MECHANICALLY CLEAN UP FOR USE OR DISPOSAL.

WASTE DISPOSAL METHOD

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

PRODUCT NAME: LOW HARDNESS INDICATOR POWDER
MSDS NO: 121CAL001

SECTION 8 - HANDLING AND STORAGE PRECAUTIONS

NONE

SECTION 9 - HAZARD WARNING

ANALYTICAL REAGENT FOR TEST PURPOSES ONLY.

WARNING! MAY BE TOXIC AND CAUSE IRRITATION. AVOID CONTACT WITH SKIN AND EYES.

FIRST AID:
EYES: FLUSH WITH RUNNING WATER FOR 15 MINUTES. CALL A PHYSICIAN.
SKIN: WASH WITH RUNNING WATER.

SECTION 10 - COMMENTS

SECTION 11 - REGULATORY INFORMATION

SECTION 12 - REGULATIONS/COMMENTS CONTINUED

INFORMATION SUPPLIED BY: COORDINATOR, TOXICOLOGY AND PRODUCT SAFETY
PHONE: (412)777-8000

MSDS DATE: 12/15/82 DATE OF PREVIOUS MSDS: / /

PRODUCT NAME: MIXED INDICATOR
MSDS NO: 122CAL001

THE FOLLOWING INFORMATION IS FURNISHED SUBJECT TO THE DISCLAIMER ON THE BOTTOM OF THIS FORM

SECTION 1 - PRODUCT IDENTIFICATION

PRODUCT NAME: MIXED INDICATOR

SYNONYMS:
MIXED INDICATOR; INDICATOR, MIXED; CATALOG NOS. 1240/1243; 1240; 1243

MANUFACTURER / DISTRIBUTOR:
CALGON CORPORATION
P.O. BOX 1346
PITTSBURGH, PA
15230

EMERGENCY PHONE NUMBERS:
(419) 422-2121 (MARATHON)
(800) 424-9300 (CHEMTREC)

CHEMICAL FAMILY: SEE COMMENTS
CHEMICAL FORMULA: SEE COMMENTS

CAS NO:

SECTION 2 - PHYSICAL PROPERTIES

BOILING POINT		MELTING POINT		SPECIFIC GRAVITY(H2O=1)
155	F	N/D	F	8.84
68	C		C	

% SOLUBILITY IN WATER	VAPOR DENSITY(AIR=1)	VAPOR PRESSURE
COMPLETE	1.1	85 MM HG

PH INFORMATION: PH: 4.6 AT CONC.
APPEARANCE: DARK RED LIQUID ODOR:

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT		AUTOIGNITION TEMP		EXPLOSIVE LIMITS (% BY VOLUME IN AIR)
50	F	878	F	LOWER/UPPER: 5.5/36.5
10	C		C	

NFPA CLASS -- HEALTH: FIRE: REACTIVITY: OTHER:

SPECIFIC HAZARD: NONE

---------- FIRE AND EXPLOSION HAZARDS ----------

SEE REACTIVITY DATA

---------- EXTINGUISHING MEDIA ----------

CARBON DIOXIDE OR DRY CHEMICAL

--------- SPECIAL FIRE FIGHTING INSTRUCTIONS ----------

NONE

PRODUCT NAME: MIXED INDICATOR
MSDS NO: 122CAL001

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA (CON'T)

STABILITY: THE MATERIAL IS STABLE AT 70 F, 760MM PRESSURE
CONDITIONS TO AVOID:
HEAT, SPARKS AND OPEN FLAMES

HAZARDOUS DECOMPOSITION PRODUCTS:
RELEASES MINUTE AMOUNTS OF TOXIC FUMES OF NOX, SOX AND BROMIDES WHEN HEATED TO DECOMPOSITION

INCOMPATIBLE MATERIALS:
OXIDIZING AGENTS

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

SECTION 4 - PRODUCT COMPOSITION AND EXPOSURE LIMITS

EXPOSURE LIMITS FOR PRODUCT:	TLV	SOURCE
MIXED INDICATOR	NONE ESTABLISHED	

COMPONENTS:	PERCENT RANGE	TLV			SOURCE
METHYL ALCOHOL	75.00	200.00	PPM	(8 HR TWA)	ACGIH
		250.00	PPM	(STEL)	ACGIH
		200.00	PPM	(8 HR TWA)	OSHA
		250.00	PPM	(STEL)	OSHA

SECTION 5 - POTENTIAL HEALTH EFFECTS

-------- ROUTES OF EXPOSURE AND EFFECTS - EYE ---------

LIQUID MAY CAUSE EYE IRRITATION.

-------- ROUTES OF EXPOSURE AND EFFECTS - SKIN --------

LIQUID MAY CAUSE SKIN IRRITATION.

----- ROUTES OF EXPOSURE AND EFFECTS - INHALATION -----

BREATHING VAPORS MAY CAUSE DROWSINESS, NAUSEA, AND VOMITING.

------ ROUTES OF EXPOSURE AND EFFECTS - INGESTION -----

---------- ADDITIONAL TOXICITY INFORMATION ----------

PRODUCT NAME: MIXED INDICATOR
MSDS NO: 122CAL001

SECTION 5 - POTENTIAL HEALTH EFFECTS (CON'T)

EMERGENCY FIRST AID PROCEDURES

---------- FIRST AID - EYE ----------

IN CASE OF CONTACT, IMMEDIATELY FLUSH WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES. CALL A PHYSICIAN.

---------- FIRST AID - SKIN ----------

WASH WITH RUNNING WATER.

---------- FIRST AID - INHALATION ----------

REMOVE TO FRESH AIR. IF BREATHING HAS STOPPED, GIVE ARTIFICIAL RESPIRATION, PREFERABLY MOUTH-TO-MOUTH. IF BREATHING IS DIFFICULT, GIVE OXYGEN. CALL A PHYSICIAN.

---------- FIRST AID - INGESTION ----------

SECTION 6 - SPECIAL PROTECTION INFORMATION

---------- VENTILATION ----------

ADEQUATE TO CONTROL VAPORS.

------ PERSONAL PROTECTIVE EQUIPMENT - RESPIRATOR -----

IF NEEDED, RESPIRATOR APPROVED BY NIOSH/MSHA FOR HYDROCARBON VAPORS.

---------- PERSONAL PROTECTIVE EQUIPMENT - EYE -------

CHEMICAL GOGGLES

-------- PERSONAL PROTECTIVE EQUIPMENT - GLOVES -------

RUBBER

---------- OTHER PROTECTIVE EQUIPMENT ----------

SECTION 7 - SPILL OR LEAK PROCEDURES

- STEPS TO BE TAKEN IN CASE OF SPILL, LEAK OR RELEASE -

ELIMINATE SOURCES OF IGNITION, VENTILATE AREA. ADD ABSORBENT AND CLEAN UP.

---------- WASTE DISPOSAL METHOD ----------

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

PRODUCT NAME: MIXED INDICATOR
MSDS NO: 122CAL001

SECTION 8 - HANDLING AND STORAGE PRECAUTIONS

NONE

SECTION 9 - HAZARD WARNING

ANALYTICAL REAGENT FOR TEST PURPOSES ONLY.

WARNING! MAY BE TOXIC AND CAUSE IRRITATION. AVOID CONTACT WITH SKIN AND EYES.

FIRST AID:
EYES: FLUSH WITH RUNNING WATER FOR 15 MINUTES. CALL A PHYSICIAN.
SKIN: WASH WITH RUNNING WATER.

SECTION 10 - COMMENTS

CHEMICAL FORMULA: CH3OH+C21H14BR4O5S+C15H15N3O2 IN WATER

CHEMICAL FAMILY: ALCOHOL-ORGANIC DYES-WATER SOLUTION

SECTION 11 - REGULATORY INFORMATION

SECTION 12 - REGULATIONS/COMMENTS CONTINUED

INFORMATION SUPPLIED BY: COORDINATOR, TOXICOLOGY AND PRODUCT SAFETY
PHONE: (412)777-8000

MSDS DATE: 10/05/83 DATE OF PREVIOUS MSDS: / /

PRODUCT NAME: NITRITE REAGENT NO. 1
MSDS NO: 118CAL001

THE FOLLOWING INFORMATION IS FURNISHED SUBJECT TO THE DISCLAIMER ON THE BOTTOM OF THIS FORM

SECTION 1 - PRODUCT IDENTIFICATION

PRODUCT NAME: NITRITE REAGENT NO. 1

SYNONYMS:
NITRITE REAGENT NO. 1; NITRITE REAGENT #1; NITRITE REAGENT, NO. 1; #1 NITRITE REAGENT; NO. 1 NITRITE REAGENT; NITRITE REAGENT, #1; CATALOG NUMBER 2716; 2716

MANUFACTURER / DISTRIBUTOR:
CALGON CORPORATION
P.O. BOX 1346
PITTSBURGH, PA
15230

EMERGENCY PHONE NUMBERS:
(419) 422-2121 (MARATHON)
(800) 424-9300 (CHEMTREC)

CHEMICAL FAMILY: INORGANIC SALT
CHEMICAL FORMULA: NAHXO4.H2O CAS NO:

SECTION 2 - PHYSICAL PROPERTIES

BOILING POINT	MELTING POINT	SPECIFIC GRAVITY(H2O=1)
DECOMPOSES F	N/A F	2.44
C	C	

% SOLUBILITY IN WATER	VAPOR DENSITY(AIR=1)	VAPOR PRESSURE
APPRECIABLE	N/A	N/A

PH INFORMATION: PH: 1.7 AT CONC. 1%
APPEARANCE: YELLOW-WHITE CRYSTALS ODOR:

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT	AUTOIGNITION TEMP	EXPLOSIVE LIMITS (% BY VOLUME IN AIR)
N/A F	N/A F	LOWER/UPPER: N/A/N/A
C	C	

NFPA CLASS -- HEALTH: FIRE: REACTIVITY: OTHER:

SPECIFIC HAZARD: NONE

---------- FIRE AND EXPLOSION HAZARDS ----------

SEE REACTIVITY DATA

---------- EXTINGUISHING MEDIA ----------

USE MEDIA PROPER FOR PRIMARY CAUSE OF FIRE.

--------- SPECIAL FIRE FIGHTING INSTRUCTIONS ----------

NONE

PRODUCT NAME: NITRITE REAGENT NO. 1
MSDS NO: 118CAL001

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA (CON'T)

STABILITY: THE MATERIAL IS STABLE AT 70 F, 760MM PRESSURE
CONDITIONS TO AVOID:
KEEP DRY. CONTACT WITH MOISTURE LIBERATES H2SO4

HAZARDOUS DECOMPOSITION PRODUCTS:
WHEN HEATED TO DECOMPOSITION, MATERIAL CAN EMIT
HIGHLY TOXIC FUMES OF SOX

INCOMPATIBLE MATERIALS:
REACTS VIOLENTLY WITH AL AND MG

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

SECTION 4 - PRODUCT COMPOSITION AND EXPOSURE LIMITS

EXPOSURE LIMITS FOR PRODUCT:	TLV	SOURCE
NITRITE REAGENT NO. 1	NONE ESTABLISHED	

COMPONENTS:	PERCENT RANGE	TLV	SOURCE
NITRITE REAGENT NO. 1	100.00	( )	

SECTION 5 - POTENTIAL HEALTH EFFECTS

-------- ROUTES OF EXPOSURE AND EFFECTS - EYE ---------

CAUSES BURNS OF THE EYES.

-------- ROUTES OF EXPOSURE AND EFFECTS - SKIN --------

CAUSES IRRITATION OF THE SKIN.

----- ROUTES OF EXPOSURE AND EFFECTS - INHALATION -----

------ ROUTES OF EXPOSURE AND EFFECTS - INGESTION -----

---------- ADDITIONAL TOXICITY INFORMATION ----------

PRODUCT NAME: NITRITE REAGENT NO. 1
MSDS NO: 118CAL001

SECTION 5 - POTENTIAL HEALTH EFFECTS (CON'T)

EMERGENCY FIRST AID PROCEDURES

---------- FIRST AID - EYE ----------

IN CASE OF CONTACT, IMMEDIATELY FLUSH WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES. CALL A PHYSICIAN.

---------- FIRST AID - SKIN ----------

WASH WITH RUNNING WATER.

---------- FIRST AID - INHALATION ----------

---------- FIRST AID - INGESTION ----------

SECTION 6 - SPECIAL PROTECTION INFORMATION

---------- VENTILATION ----------

MECHANICAL: RECOMMENDED

------ PERSONAL PROTECTIVE EQUIPMENT - RESPIRATOR -----

NONE REQUIRED IN NORMAL USE.

---------- PERSONAL PROTECTIVE EQUIPMENT - EYE -------

CHEMICAL GOGGLES

-------- PERSONAL PROTECTIVE EQUIPMENT - GLOVES -------

RUBBER

---------- OTHER PROTECTIVE EQUIPMENT ----------

FACE SHIELD

SECTION 7 - SPILL OR LEAK PROCEDURES

- STEPS TO BE TAKEN IN CASE OF SPILL, LEAK OR RELEASE -

MECHANICALLY CLEAN UP FOR USE OR DISPOSAL.

---------- WASTE DISPOSAL METHOD ----------

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

PRODUCT NAME: NITRITE REAGENT NO. 1
MSDS NO: 118CAL001

SECTION 8 - HANDLING AND STORAGE PRECAUTIONS

STORE IN A COOL, DRY PLACE.

SECTION 9 - HAZARD WARNING

ANALYTICAL REAGENT FOR TEST PURPOSES ONLY.

DANGER! MAY CAUSE EYE BURNS AND SKIN IRRITATION. DO NOT GET IN EYES, ON SKIN, OR ON CLOTHING. WASH THOROUGHLY AFTER HANDLING.

FIRST AID:
EYES: FLUSH WITH RUNNING WATER FOR 15 MINUTES. CALL A PHYSICIAN.
SKIN: WASH WITH RUNNING WATER.

SECTION 10 - COMMENTS

SECTION 11 - REGULATORY INFORMATION

SECTION 12 - REGULATIONS/COMMENTS CONTINUED

INFORMATION SUPPLIED BY: COORDINATOR, TOXICOLOGY AND PRODUCT SAFETY
PHONE: (412)777-8000

MSDS DATE: 12/15/82 DATE OF PREVIOUS MSDS: / /

PRODUCT NAME: NITRITE REAGENT NO. 2
MSDS NO: 117CAL001

THE FOLLOWING INFORMATION IS FURNISHED SUBJECT TO THE DISCLAIMER ON THE BOTTOM OF THIS FORM

SECTION 1 - PRODUCT IDENTIFICATION

PRODUCT
NAME: NITRITE REAGENT NO. 2

SYNONYMS:
NITRITE REAGENT NO. 2; NITRITE REAGENT #2; NO. 2 NITRITE REAGENT; #2 NITRITE REAGENT; NITRITE REAGENT, NO. 2; CATALOG NUMBERS 2720/2722; 2720; 2722

MANUFACTURER / DISTRIBUTOR:
CALGON CORPORATION
P.O. BOX 1346
PITTSBURGH, PA
15230

EMERGENCY PHONE NUMBERS:
(419) 422-2121 (MARATHON)
(800) 424-9300 (CHEMTREC)

CHEMICAL FAMILY: INORGANIC SALT SOLUTION
CHEMICAL FORMULA: KMNO IN H2O CAS NO:

SECTION 2 - PHYSICAL PROPERTIES

BOILING POINT		MELTING POINT		SPECIFIC GRAVITY(H2O=1)
213	F	N/D	F	1.05
101	C	N/D	C	

% SOLUBILITY IN WATER	VAPOR DENSITY(AIR=1)	VAPOR PRESSURE
COMPLETE	0.65	17 MM HG

PH INFORMATION: PH: 10.1 AT CONC.
APPEARANCE: DARK PURPLE LIQUID ODOR: ODORLESS

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT		AUTOIGNITION TEMP		EXPLOSIVE LIMITS (% BY VOLUME IN AIR)
N/A	F	N/A	F	LOWER/UPPER: N/A/N/A
	C		C	

NFPA CLASS -- HEALTH: FIRE: REACTIVITY: OTHER:

SPECIFIC HAZARD: NONE

---------- FIRE AND EXPLOSION HAZARDS ----------

SEE REACTIVITY DATA

---------- EXTINGUISHING MEDIA ----------

USE MEDIA PROPER FOR PRIMARY CAUSE OF FIRE.

--------- SPECIAL FIRE FIGHTING INSTRUCTIONS ----------

NONE

PRODUCT NAME: NITRITE REAGENT NO. 2
MSDS NO: 117CAL001

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA (CON'T)

STABILITY: THE MATERIAL IS STABLE AT 70 F, 760MM PRESSURE
CONDITIONS TO AVOID:
DO NOT DRIVE WATER OFF.

HAZARDOUS DECOMPOSITION PRODUCTS:
NONE

INCOMPATIBLE MATERIALS:
SEE COMMENTS

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

INCOMPATIBLE MATERIALS: KMNO4 IS A POWERFUL OXIDIZING AGENT. KEEP AWAY FROM COMBUSTIBLE MATERIALS.

SECTION 4 - PRODUCT COMPOSITION AND EXPOSURE LIMITS

EXPOSURE LIMITS FOR PRODUCT:	TLV	SOURCE
NITRITE REAGENT NO. 2	NONE ESTABLISHED	

COMPONENTS:	PERCENT RANGE	TLV	SOURCE
NITRITE REAGENT NO. 2	100.00	( )	

AS HERCULES INTERPRETS THE U.S. OCCUPATIONAL SAFETY AND HEALTH ACT OF 1970, THIS PRODUCT SHOULD NOT BE CONSIDERED A HAZARDOUS MATERIAL.
*

SECTION 5 - POTENTIAL HEALTH EFFECTS

-------- ROUTES OF EXPOSURE AND EFFECTS - EYE ---------

MAY CAUSE EYE IRRITATION.

-------- ROUTES OF EXPOSURE AND EFFECTS - SKIN --------

MAY CAUSE SKIN IRRITATION.

----- ROUTES OF EXPOSURE AND EFFECTS - INHALATION -----

------ ROUTES OF EXPOSURE AND EFFECTS - INGESTION -----

---------- ADDITIONAL TOXICITY INFORMATION ----------

PRODUCT NAME: NITRITE REAGENT NO. 2
MSDS NO: 117CAL001

SECTION 5 - POTENTIAL HEALTH EFFECTS (CON'T)

EMERGENCY FIRST AID PROCEDURES

---------- FIRST AID - EYE ----------

IN CASE OF CONTACT, IMMEDIATELY FLUSH WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES. CALL A PHYSICIAN.

---------- FIRST AID - SKIN ----------

WASH WITH RUNNING WATER.

---------- FIRST AID - INHALATION ----------

---------- FIRST AID - INGESTION ----------

SECTION 6 - SPECIAL PROTECTION INFORMATION

---------- VENTILATION ----------

------ PERSONAL PROTECTIVE EQUIPMENT - RESPIRATOR -----

NONE REQUIRED IN NORMAL USE.

---------- PERSONAL PROTECTIVE EQUIPMENT - EYE -------

SAFETY GLASSES

-------- PERSONAL PROTECTIVE EQUIPMENT - GLOVES -------

RUBBER

---------- OTHER PROTECTIVE EQUIPMENT ----------

SECTION 7 - SPILL OR LEAK PROCEDURES

- STEPS TO BE TAKEN IN CASE OF SPILL, LEAK OR RELEASE -

ADD ABSORBENT, SWEEP UP, AND DISCARD.

---------- WASTE DISPOSAL METHOD ----------

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

SECTION 8 - HANDLING AND STORAGE PRECAUTIONS

NONE

PRODUCT NAME: NITRITE REAGENT NO. 2
MSDS NO: 117CAL001

SECTION 9 - HAZARD WARNING

ANALYTICAL REAGENT FOR TEST PURPOSES ONLY.

WARNING! MAY BE TOXIC AND CAUSE IRRITATION. AVOID CONTACT WITH SKIN AND EYES.

FIRST AID:
EYES: FLUSH WITH RUNNING WATER FOR 15 MINUTES. CALL A PHYSICIAN.
SKIN: WASH WITH RUNNING WATER.

SECTION 10 - COMMENTS

SECTION 11 - REGULATORY INFORMATION

SECTION 12 - REGULATIONS/COMMENTS CONTINUED

INFORMATION SUPPLIED BY: COORDINATOR, TOXICOLOGY AND PRODUCT SAFETY
PHONE: (412)777-8000

MSDS DATE: 12/15/82 DATE OF PREVIOUS MSDS: / /

PRODUCT NAME: PHENOLPHTHALEIN INDICATOR, CODE 212
MSDS NO: 131CAL001

THE FOLLOWING INFORMATION IS FURNISHED SUBJECT TO THE DISCLAIMER ON THE BOTTOM OF THIS FORM

SECTION 1 - PRODUCT IDENTIFICATION

PRODUCT NAME: PHENOLPHTHALEIN INDICATOR, CODE 212

SYNONYMS:
PHENOLPHTHALEIN INDICATOR, CODE 212; PHENOLPHTHALEIN SOLUTION; PHENOLPHTHALEIN INDICATOR SOLUTION

MANUFACTURER / DISTRIBUTOR:
CALGON CORPORATION
P.O. BOX 1346
PITTSBURGH, PA
15230

EMERGENCY PHONE NUMBERS:
(419) 422-2121 (MARATHON)
(800) 424-9300 (CHEMTREC)

CHEMICAL FAMILY:
CHEMICAL FORMULA:
CAS NO:

SECTION 2 - PHYSICAL PROPERTIES

BOILING POINT		MELTING POINT		SPECIFIC GRAVITY(H2O=1)
180	F	N/D	F	0.93
82	C		C	

% SOLUBILITY IN WATER	VAPOR DENSITY(AIR=1)	VAPOR PRESSURE
COMPLETE	1.6	70 MM HG @20C

PH INFORMATION: PH: 5.3 AT CONC.
APPEARANCE: COLORLESS LIQUID ODOR: ALCOHOL

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT		AUTOIGNITION TEMP		EXPLOSIVE LIMITS (% BY VOLUME IN AIR)
75 CC	F	N/D	F	LOWER/UPPER: N/A/N/A
24 CC	C		C	

NFPA CLASS -- HEALTH: FIRE: REACTIVITY: OTHER:

SPECIFIC HAZARD: NONE

---------- FIRE AND EXPLOSION HAZARDS ----------

NONE

---------- EXTINGUISHING MEDIA ----------

WATER SPRAY, DRY CHEMICAL, FOAM, OR CARBON DIOXIDE

--------- SPECIAL FIRE FIGHTING INSTRUCTIONS ----------

USE WATER TO KEEP FIRE-EXPOSED CONTAINERS COOL.

PRODUCT NAME: PHENOLPHTHALEIN INDICATOR, CODE 212
MSDS NO: 131CAL001

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA (CON'T)

STABILITY: THE MATERIAL IS STABLE AT 70 F, 760MM PRESSURE
CONDITIONS TO AVOID:

HAZARDOUS DECOMPOSITION PRODUCTS:
PRODUCTS OF COMBUSTION: CARBON MONOXIDE, CARBON DIOXIDE

INCOMPATIBLE MATERIALS:
STRONG OXIDIZING AGENTS

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

SECTION 4 - PRODUCT COMPOSITION AND EXPOSURE LIMITS

EXPOSURE LIMITS FOR PRODUCT:	TLV	SOURCE
PHENOLPHTHALEIN INDICATOR, CODE 212	NONE ESTABLISHED	

COMPONENTS:	PERCENT RANGE	TLV			SOURCE
ETHYL ALCOHOL		1000.00	PPM	(8 HR TWA)	ACGIH
		1000.00	PPM	(8 HR TWA)	OSHA

SECTION 5 - POTENTIAL HEALTH EFFECTS

-------- ROUTES OF EXPOSURE AND EFFECTS - EYE ---------

PRIMARY ROUTE OF EXPOSURE. PAIN, REDNESS, TEARING, BLURRED VISION.

-------- ROUTES OF EXPOSURE AND EFFECTS - SKIN --------

PROLONGED CONTACT MAY CAUSE DRYNESS AND CRACKING.

-------ROUTES OFEXPOSURE AND EFFECTS - INHALATION -----

------ ROUTES OF EXPOSURE AND EFFECTS - INGESTION -----

PRIMARY ROUTE OF EXPOSURE. GASTRITIS, PAIN, NAUSEA, VOMITING, DIARRHEA.

MEDICAL CONDITIONS GENERALLY RECOGNIZED AS BEING AGGRAVATED BY EXPOSURE: DIARRHEA

PRODUCT NAME: PHENOLPHTHALEIN INDICATOR, CODE 212
MSDS NO: 131CAL001

SECTION 5 - POTENTIAL HEALTH EFFECTS (CON'T)

ADDITIONAL TOXICITY INFORMATION

NOT LISTED AS A CARCINOGEY BY NTP (NATIONAL TOXICOLOGY PROGRAM); NOT REGULATED AS A CARCINOGEN BY OSHA (OCCUPATIONAL SAFETY & HEALTH ADMINISTRATION); NOT EVALUATED BY IARC (INTERNATIONAL AGENCY FOR RESEARCH ON CANCER).

REPORTED HUMAN EFFECTS: 100-200 MG OF PHENOLPHTHALEIN IS A TYPICAL HUMAN CATHARTIC DOSE. IT IS RELATIVELY NONTOXIC, EVEN BY INTRAVENOUS ADMINISTRATION. AS MUCH AS 8 GRAMS HAVE BEEN INGESTED BY CHILDREN WITH NO UNTOWARD EFFECTS. HOWEVER, ISOLATED ACUTE REACTIONS INCLUDING DEATH HAVE BEEN REPORTED AFTER CONSUMING MUCH LESS ALONG WITH CHOCOLATE.

ISOPROPYL ALCOHOL CAN CAUSE UNCOMFORTABLE BURNING AND STINGING OF THE EYES. THE PROBABLE LETHAL DOSE FOR AN ADULT HUMAN IS ABOUT 8 OZ.

REPORTED ANIMAL EFFECTS: ISOPROPYL ALCOHOL IS RELATIVELY NONTOXIC TO ANIMALS (ORAL LD50 IS 5,800MG/KG IN RATS). IT CAUSES MILD EYE AND SKIN IRRITATION. PHENOLPHTHALEIN IS ALSO RELATIVELY NONTOXIC TO RATS (LDL0-IP-500MG/KG). IT IS USED AS A CATHARTIC IN VETERNARY PRACTICE.

IN THE AMES TEST, ISOPROPYL ALCOHOL WAS NOT MUTAGENIC.

EMERGENCY FIRST AID PROCEDURES

FIRST AID - EYE

REMOVE CONTACT LENSES. FLUSH EYES WITH RUNNING WATER FOR 15 MINUTES. CALL A PHYSICIAN.

FIRST AID - SKIN

WASH WITH RUNNING WATER.

FIRST AID - INHALATION

FIRST AID - INGESTION

IF CONSCIOUS, THE PERSON SHOULD IMMEDIATELY DRINK LARGE QUANTITIES OF LIQUID TO DILUTE THIS PRODUCT. DO NOT INDUCE VOMITING. CALL A PHYSICIAN. NEVER GIVE LIQUIDS TO AN UNCONSCIOUS PERSON.

SECTION 6 - SPECIAL PROTECTION INFORMATION

VENTILATION

ADEQUATE VENTILATION SHOULD BE PROVIDED TO KEEP VAPOR CONCENTRATIONS BELOW ACCEPTABLE EXPOSURE LIMITS. DISCHARGE FROM THE VENTILATION SYSTEM SHOULD COMPLY WITH APPLICABLE AIR POLOUTION CONTROL REGULATIONS.

PRODUCT NAME: PHENOLPHTHALEIN INDICATOR, CODE 212
MSDS NO: 131CAL001

SECTION 6 - SPECIAL PROTECTION INFORMATION (CON'T)

------ PERSONAL PROTECTIVE EQUIPMENT - RESPIRATOR -----

APPROPRIATE RESPIRATORY PROTECTION REQUIRED WHEN EXPOSURE TO AIRBORNE CONTAMINANT IS LIKELY TO EXCEED ACCEPTABLE LIMITS. RESPIRATOR SHOULD BE SELECTED AND USED IN ACCORDANCE WITH OSHA SUBPART I (29CFR1910.134) AND MANUFACTURER'S RECOMMENDATIONS.

---------- PERSONAL PROTECTIVE EQUIPMENT - EYE -------

CHEMICAL GOGGLES

-------- PERSONAL PROTECTIVE EQUIPMENT - GLOVES -------

IMPERVIOUS GLOVES

------------ OTHER PROTECTIVE EQUIPMENT -------------

APPROPRIATE PROTECTIVE CLOTHING. EYEWASH FOUNTAINS AND SAFETY SHOWERS SHOULD BE EASILY ACCESSIBLE.

SECTION 7 - SPILL OR LEAK PROCEDURES

---------- ENVIRONMENTAL EFFECTS ----------

- STEPS TO BE TAKEN IN CASE OF SPILL, LEAK OR RELEASE -

ELIMINATE ALL SOURCES OF IGNITION. VENTILATE AREA. ADD INERT ABSORBENT, SWEEP UP, AND PLACE IN METAL DRUMS FOR DISPOSAL.

---------- WASTE DISPOSAL METHOD ----------

THIS PRODUCT AT NORMAL USE CONCENTRATIONS IS ROUTINELY HANDLED IN INDUSTRIAL WASTEWATER TREATING SYSTEMS. HOWEVER, DISCHARGE MUST MEET LOCAL, STATE, AND FEDERAL DISCHARGE.

THIS PRODUCT EXHIBITS THE CHARACTERISTIC OF IGNITABILITY AS DEFINED IN HAZARDOUS WASTE REGULATIONS 40 CFR 261 SUBPART C. THEREFORE, DISPOSAL OF UNUSED PRODUCT MUST COMPLY WITH HAZARDOUS WASTE REGULATIONS.

PRODUCT NAME: PHENOLPHTHALEIN INDICATOR, CODE 212
MSDS NO: 131CAL001

SECTION 8 - HANDLING AND STORAGE PRECAUTIONS

AVOID CONTACT WITH EYES, SKIN, AND CLOTHING. AVOID BREATHING VAPOR. WASH THOROUGHLY AFTER HANDLING, AND BEFORE EATING, DRINKING OR SMOKING. AVOID CONTAMINATION OF FOOD, BEVERAGES, OR SMOKING MATERIALS. DO NOW SWALLOW.

ELIMINATE IGNITION SOURCES AND PREVENT BUILDUP OF STATIC ELECTRIC CHARGES. KEEP AWAY FROM HEAT, SPARKS AND OPEN FLAME. THIS PRODUCT MAY REACT WITH STRONG OXIDIZING AGENTS AND SHOULD NOT BE STORED NEAR SUCH MATERIALS. KEEP CONTAINERS CLOSED.

PROTECTIVE MEASURES DURING REPAIR AND MAINTENANCE: ELIMINATE IGNITION SOURCES.

SECTION 9 - HAZARD WARNING

WARNING! FLAMMABLE LIQUID. MAY CUASE EYE AND SKIN IRRITATION. MAY BE TOXIC IF SWALLOWED.

SECTION 10 - COMMENTS

SECTION 11 - REGULATORY INFORMATION

SECTION 12 - REGULATIONS/COMMENTS CONTINUED

INFORMATION SUPPLIED BY: COORDINATOR, TOXICOLOGY AND PRODUCT SAFETY
PHONE: ( ) -

MSDS DATE: 07/11/86 DATE OF PREVIOUS MSDS: / /

PRODUCT NAME: POTASSIUM IODIDE-IODATE, 0.0125N SOLUTION
MSDS NO: 123CAL001

THE FOLLOWING INFORMATION IS FURNISHED SUBJECT TO THE DISCLAIMER ON THE BOTTOM OF THIS FORM

SECTION 1 - PRODUCT IDENTIFICATION

PRODUCT NAME: POTASSIUM IODIDE-IODATE, 0.0125N SOLUTION

SYNONYMS:
POTASSIUM IODIDE-IODATE, 0.0125N SOLUTION;
0.0125N SOLUTION, POTASSIUM IODIDE-IODATE;
CATALOG NOS. 2224/2225; 2224; 2225

MANUFACTURER / DISTRIBUTOR:
CALGON CORPORATION
P.O. BOX 1346
PITTSBURGH, PA
15230

EMERGENCY PHONE NUMBERS:
(419) 422-2121 (MARATHON)
(800) 424-9300 (CHEMTREC)

CHEMICAL FAMILY:
CHEMICAL FORMULA:

CAS NO:

SECTION 2 - PHYSICAL PROPERTIES

BOILING POINT		MELTING POINT		SPECIFIC GRAVITY(H2O=1)
217	F	N/D	F	1.01
103	C		C	

% SOLUBILITY IN WATER	VAPOR DENSITY(AIR=1)	VAPOR PRESSURE
COMPLETE	<1	14 MM HG @20C

PH INFORMATION: PH: 9 AT CONC.
APPEARANCE: CLEAR, COLORLESS LIQUID ODOR: ODORLESS

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT		AUTOIGNITION TEMP		EXPLOSIVE LIMITS (% BY VOLUME IN AIR)
N/A	F	N/A	F	LOWER/UPPER: N/A/N/A
	C		C	

NFPA CLASS -- HEALTH: FIRE: REACTIVITY: OTHER:

SPECIFIC HAZARD: NONE

---------- FIRE AND EXPLOSION HAZARDS ----------

NONE

---------- EXTINGUISHING MEDIA ----------

NONE. THIS PRODUCT IS NOT COMBUSTIBLE NOR DOES IT SUPPORT COMBUSTION.

--------- SPECIAL FIRE FIGHTING INSTRUCTIONS ----------

NONE

PRODUCT NAME: POTASSIUM IODIDE-IODATE, 0.0125N SOLUTION
MSDS NO: 123CAL001

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA (CON'T)

STABILITY: THE MATERIAL IS STABLE AT 70 F, 760MM PRESSURE
CONDITIONS TO AVOID:

HAZARDOUS DECOMPOSITION PRODUCTS:
WHEN HEATED TO DECOMPOSITION, MATERIAL CAN EMIT HIGHLY TOXIC IODINE FUMES

INCOMPATIBLE MATERIALS:
ACIDS OR REDUCING AGENTS

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

SECTION 4 - PRODUCT COMPOSITION AND EXPOSURE LIMITS

EXPOSURE LIMITS FOR PRODUCT:	TLV	SOURCE
POTASSIUM IODIDE-IODATE, 0.0125N SOLUTION	NONE ESTABLISHED	

COMPONENTS:	PERCENT RANGE	TLV	SOURCE
POTASSIUM IODIDE-IODATE, 0.0125N SOLUTION	100.00	( )	
		0.00 ( )	

AS HERCULES INTERPRETS THE U.S. OCCUPATIONAL SAFETY AND HEALTH ACT AND REGULATIONS, INCLUDING THE HAZARD COMMUNICATION STANDARD 29 CFR 1910.1200 DATED NOVEMBER 25, 1983, THIS PRODUCT SHOULD NOT BE CONSIDERED A HEALTH HAZARD.
*

SECTION 5 - POTENTIAL HEALTH EFFECTS

-------- ROUTES OF EXPOSURE AND EFFECTS - EYE ---------

NONE

-------- ROUTES OF EXPOSURE AND EFFECTS - SKIN --------

NONE

----- ROUTES OF EXPOSURE AND EFFECTS - INHALATION -----

NONE

------ ROUTES OF EXPOSURE AND EFFECTS - INGESTION -----

NONE

PRODUCT NAME: POTASSIUM IODIDE-IODATE, 0.0125N SOLUTION
MSDS NO: 123CAL001

SECTION 5 - POTENTIAL HEALTH EFFECTS (CON'T)

---------- ADDITIONAL TOXICITY INFORMATION ----------

NOT LISTED AS A CARCINOGEN BY NPT (NATIONAL TOXOCOLOGY PROGRAM); NOT REGULATED AS A CARCINOGEN BY OSHA (OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION); NOT EVALUATED BY IARC (INTERNATIONAL AGENCY FOR RESEARCH ON CANCER).

REPORTED HUMAN EFFECTS: HERCULES INCORPORATED HAS NOT RECEIVED ANY REPORTS OF ADVERSE EFFECTS FROM WORKERS HANDLING THIS PRODUCT.

REPORTED ANIMAL EFFECTS: HERCULES INCORPORATED HAS NOT CONDUCTED ANY ANIMAL TESTING WITH THIS PRODUCT.

EMERGENCY FIRST AID PROCEDURES

---------- FIRST AID - EYE ----------

NONE

---------- FIRST AID - SKIN ----------

NONE

---------- FIRST AID - INHALATION ----------

NONE

---------- FIRST AID - INGESTION ----------

NONE

SECTION 6 - SPECIAL PROTECTION INFORMATION

---------- VENTILATION ----------

PROVIDE ADEQUATE VENTILATION.

---------- PERSONAL PROTECTIVE EQUIPMENT - RESPIRATOR -----

---------- PERSONAL PROTECTIVE EQUIPMENT - EYE -------

SAFETY GLASSES

---------- PERSONAL PROTECTIVE EQUIPMENT - GLOVES -------

---------- OTHER PROTECTIVE EQUIPMENT ----------

PRODUCT NAME: POTASSIUM IODIDE-IODATE, 0.0125N SOLUTION
MSDS NO: 123CAL001

SECTION 7 - SPILL OR LEAK PROCEDURES

- STEPS TO BE TAKEN IN CASE OF SPILL, LEAK OR RELEASE -

ADD ABSORBENT, SWEEP UP, AND DISCARD.

---------- WASTE DISPOSAL METHOD ----------

THIS PRODUCT AT NORMAL USE CONCENTRATIONS IS ROUTINELY HANDLED IN INDUSTRIAL WASTEWATER TREATING SYSTEMS. HOWEVER, DISCHARGE MUST MEET LOCAL, STATE, AND FEDERAL DISCHARGE REGULATIONS.

THIS PRODUCT IS NOT LISTED IN FEDERAL HAZARDOUS WASTE REGULATIONS 40 CFR 261.33 PARAGRAPHS (E) OR (F), I.E. CHEMICAL PRODUCTS THAT ARE CONSIDERED HAZARDOUS IF THEY BECOME WASTES. IT DOES NOT EXHIBIT ANY OF THE HAZARDOUS CHARACTERISTICS LISTED IN 40 CFR 261 SUBPART C. STATE OR LOCAL HAZARDOUS WASTE REGULATIONS MAY APPLY IF DIFFERENT FROM THE FEDERAL.

SECTION 8 - HANDLING AND STORAGE PRECAUTIONS

THIS PRODUCT MAY REACT WITH ACIDS OR REDUCING AGENTS AND SHOULD NOT BE STORED NEAR SUCH MATERIALS.

AVOID CONTACT WITH EYES, SKIN, AND CLOTHING. WASH THOROUGHLY AFTER HANDLING, AND BEFORE EATING, DRINKING OR SMOKING.

SECTION 9 - HAZARD WARNING

SECTION 10 - COMMENTS

SECTION 11 - REGULATORY INFORMATION

SECTION 12 - REGULATIONS/COMMENTS CONTINUED

INFORMATION SUPPLIED BY: COORDINATOR, TOXICOLOGY AND PRODUCT SAFETY
PHONE: (412)777-8000

MSDS DATE: 07/11/86 DATE OF PREVIOUS MSDS: / /

PRODUCT NAME: STARCH INDICATOR SOLUTION
MSDS NO: 101LAN001

THE FOLLOWING INFORMATION IS FURNISHED SUBJECT TO THE DISCLAIMER ON THE BOTTOM OF THIS FORM

SECTION 1 - PRODUCT IDENTIFICATION

PRODUCT
NAME: STARCH INDICATOR SOLUTION

SYNONYMS:
STARCH INDICATOR SOLUTION; SOLUTION, STARCH INDICATOR; STARCH INDICATOR

MANUFACTURER / DISTRIBUTOR:
LANG'S STANDARD SOLUTIONS, INC
13445 S. HARRELL'S FERRY ROAD
BATON ROUGE, LA
70816
EMERGENCY PHONE NUMBERS:
(419) 422-2121 (MARATHON)
(800) 424-9300 (CHEMTREC)

CHEMICAL FAMILY: DILUTE AQUEOUS SOLUTION
CHEMICAL FORMULA: CAS NO:

SECTION 2 - PHYSICAL PROPERTIES

BOILING POINT		MELTING POINT		SPECIFIC GRAVITY(H2O=1)
	F		F	1.000
100	C	N/A	C	

% SOLUBILITY IN WATER: N/A

VAPOR DENSITY(AIR=1):

VAPOR PRESSURE: SAME AS WATER

PH INFORMATION: PH: AT CONC.
APPEARANCE: WHITISH, CLOUDY SOLUTION ODOR:

VAPOR DENSITY (AIR=1): SAME AS WATER
PERCENT VOLATILES BY VOLUME: SAME AS WATER

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT		AUTOIGNITION TEMP	
NONE	F		F
	C		C

EXPLOSIVE LIMITS (% BY VOLUME IN AIR)
LOWER/UPPER: N/A/N/A

NFPA CLASS -- HEALTH: FIRE: REACTIVITY: OTHER:

SPECIFIC HAZARD: NONE

---------- FIRE AND EXPLOSION HAZARDS ----------

NONE

---------- EXTINGUISHING MEDIA ----------

NONFLAMMABLE

--------- SPECIAL FIRE FIGHTING INSTRUCTIONS ----------

NONE

PRODUCT NAME: STARCH INDICATOR SOLUTION
MSDS NO: 101LAN001

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA (CON'T)

STABILITY: THE MATERIAL IS STABLE AT 70 F, 760MM PRESSURE
CONDITIONS TO AVOID:

HAZARDOUS DECOMPOSITION PRODUCTS:

INCOMPATIBLE MATERIALS:

HAZARDOUS POLYMERIZATION:

SECTION 4 - PRODUCT COMPOSITION AND EXPOSURE LIMITS

EXPOSURE LIMITS FOR PRODUCT: TLV SOURCE

STARCH INDICATOR SOLUTION NONE ESTABLISHED

COMPONENTS:	PERCENT RANGE	TLV	SOURCE
SODIUM BORATE MODERATELY TOXIC; MAY CAUSE IRRITATION	< 1.00	( )	
SALICYLIC ACID CAUSES EYE BURNS, VERY TOXIC	< 1.00	( )	
DEMINERALIZED WATER	<100.00	( )	

SECTION 5 - POTENTIAL HEALTH EFFECTS

-------- ROUTES OF EXPOSURE AND EFFECTS - EYE ---------

UNKNOWN AT THIS TIME.

-------- ROUTES OF EXPOSURE AND EFFECTS - SKIN --------

UNKNOWN AT THIS TIME.

----- ROUTES OF EXPOSURE AND EFFECTS - INHALATION -----

UNKNOWN AT THIS TIME.

------ ROUTES OF EXPOSURE AND EFFECTS - INGESTION -----

UNKNOWN AT THIS TIME.

---------- ADDITIONAL TOXICITY INFORMATION ----------

PRODUCT NAME: STARCH INDICATOR SOLUTION
MSDS NO: 101LAN001

SECTION 5 - POTENTIAL HEALTH EFFECTS (CON'T)

EMERGENCY FIRST AID PROCEDURES

---------- FIRST AID - EYE ----------

RINSE WITH SOAP AND WATER.

---------- FIRST AID - SKIN ----------

RINSE WITH SOAP AND WATER.

---------- FIRST AID - INHALATION ----------

---------- FIRST AID - INGESTION ----------

IF INGESTED, INDUCE VOMITING.

SECTION 6 - SPECIAL PROTECTION INFORMATION

---------- VENTILATION ----------

------ PERSONAL PROTECTIVE EQUIPMENT - RESPIRATOR -----

---------- PERSONAL PROTECTIVE EQUIPMENT - EYE -------

WEAR SAFETY GLASSES.

-------- PERSONAL PROTECTIVE EQUIPMENT - GLOVES -------

WEAR SAFETY GLOVES.

---------- OTHER PROTECTIVE EQUIPMENT ----------

SECTION 7 - SPILL OR LEAK PROCEDURES

---------- ENVIRONMENTAL EFFECTS ----------

- STEPS TO BE TAKEN IN CASE OF SPILL, LEAK OR RELEASE -

PICK UP WITH ABSORBENT -- WASH AREA WITH WATER.

---------- WASTE DISPOSAL METHOD ----------

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

PRODUCT NAME: STARCH INDICATOR SOLUTION
MSDS NO: 101LAN001

SECTION 8 - HANDLING AND STORAGE PRECAUTIONS

STORE AT MODERATE TEMPERATURE OUT OF DIRECT SUNLIGHT.

SECTION 9 - HAZARD WARNING

D.O.T.: NOT REGULATED

SECTION 10 - COMMENTS

SECTION 11 - REGULATORY INFORMATION

SECTION 12 - REGULATIONS/COMMENTS CONTINUED

INFORMATION SUPPLIED BY: COORDINATOR, TOXICOLOGY AND PRODUCT SAFETY
THOMAS C. LINK PHONE: ( ) -

MSDS DATE: 12/10/85 DATE OF PREVIOUS MSDS: / /

PRODUCT NAME: SULFITE INDICATOR W/PLASTIC DIPPER
MSDS NO: 218BET002

THE FOLLOWING INFORMATION IS FURNISHED SUBJECT TO THE DISCLAIMER ON THE BOTTOM OF THIS FORM

SECTION 1 - PRODUCT IDENTIFICATION

PRODUCT NAME: SULFITE INDICATOR W/PLASTIC DIPPER

SYNONYMS:
SULFITE INDICATOR W/PLASTIC DIPPER; SULFITE INDICATOR WITH PLASTIC DIPPER; INDICATOR SULFITE W/PLASTIC DIFFER; INDICATOR SULFITE WITH PLASTIC DIPPER

MANUFACTURER / DISTRIBUTOR:
BETZ LABORATORIES, INC.
4636 SOMERTON ROAD
TREVOSE, PA
19047

EMERGENCY PHONE NUMBERS:
(419) 422-2121 (MARATHON)
(800) 424-9300 (CHEMTREC)

CHEMICAL FAMILY: FIELD TEST REAGENT
CHEMICAL FORMULA: CAS NO:

SECTION 2 - PHYSICAL PROPERTIES

BOILING POINT	MELTING POINT	SPECIFIC GRAVITY(H2O=1)
F	N/A F	N/A
C	C	

% SOLUBILITY IN WATER	VAPOR DENSITY(AIR=1)	VAPOR PRESSURE
100	N/A	N/A

PH INFORMATION: PH: NO DATA AT CONC.
APPEARANCE: WHITE POWDER ODOR: NONE

VISC CPS70F: N/A

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT	AUTOIGNITION TEMP	EXPLOSIVE LIMITS (% BY VOLUME IN AIR)
N/A F	F	LOWER/UPPER:
C	C	

NFPA CLASS -- HEALTH: 1 FIRE: 0 REACTIVITY: 0 OTHER:

SPECIFIC HAZARD: NONE

---------- FIRE AND EXPLOSION HAZARDS ----------

---------- EXTINGUISHING MEDIA ----------

DRY CHEMICAL, CARBON DIOXIDE, FOAM OR WATER

--------- SPECIAL FIRE FIGHTING INSTRUCTIONS ----------

FIREFIGHTERS SHOULD WEAR POSITIVE PRESSURE SELF-CONTAINED BREATHING APPARATUS (FULL FACEPIECE TYPE).

PRODUCT NAME: SULFITE INDICATOR W/PLASTIC DIPPER
MSDS NO: 218BET002

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA (CON'T)

STABILITY: THE MATERIAL IS STABLE AT 70 F, 760MM PRESSURE
CONDITIONS TO AVOID:

HAZARDOUS DECOMPOSITION PRODUCTS:
THERMAL DECOMPOSITION (DESTRUCTIVE FIRES) YIELDS
ELEMENTAL OXIDES

INCOMPATIBLE MATERIALS:

HAZARDOUS POLYMERIZATION:

SECTION 4 - PRODUCT COMPOSITION AND EXPOSURE LIMITS

EXPOSURE LIMITS FOR PRODUCT:	TLV	SOURCE
SULFITE INDICATOR W/PLASTIC DIPPER	NONE ESTABLISHED	

COMPONENTS:	PERCENT RANGE	TLV	SOURCE
SULFAMIC ACID		( )	

MANUFACTURER LISTS SULFAMIC ACID COMPONENT AS (AMIDOSULFONIC ACID);
CORROSIVE TO EYES; IRRITANT TO SKIN; PEL:NONE; TLV:NONE
*

PRODUCT NAME: SULFITE INDICATOR W/PLASTIC DIPPER
MSDS NO: 218BET002

SECTION 5 - POTENTIAL HEALTH EFFECTS

-------- ROUTES OF EXPOSURE AND EFFECTS - EYE ---------

ACUTE EYE EFFECTS: CORROSIVE TO THE EYES.

-------- ROUTES OF EXPOSURE AND EFFECTS - SKIN --------

ACUTE SKIN EFFECTS: PRIMARY ROUTE OF EXPOSURE. MODERATELY IRRITATING TO THE SKIN. SKIN CONTACT CAN CAUSE MODERATE IRRITATION TO BURNS (DEPENDENT ON LENGTH OF EXPOSURE).

----- ROUTES OF EXPOSURE AND EFFECTS - INHALATION -----

ACUTE RESPIRATORY EFFECTS: DUSTS MAY CAUSE IRRITATION TO UPPER RESPIRATORY TRACT. INHALATION OF DUSTS MAY CAUSE IRRITATION AND/OR BURNS TO RESPIRATORY TRACT.

------ ROUTES OF EXPOSURE AND EFFECTS - INGESTION -----

CHRONIC EFFECTS OF OVEREXPOSURE: THE CHRONIC EFFECTS OF THIS PRODUCT ARE NOT YET FULLY EVALUATED.

---------- ADDITIONAL TOXICITY INFORMATION ----------

EMERGENCY FIRST AID PROCEDURES

------------------ FIRST AID - EYE ------------------

IMMEDIATELY FLUSH EYES WITH WATER FOR 15 MINUTES. IMMEDIATELY CONTACT A PHYSICIAN FOR ADDITIONAL TREATMENT.

------------------ FIRST AID - SKIN ------------------

REMOVE CONTAMINATED CLOTHING. WASH EXPOSED AREA WITH A LARGE QUANTITY OF SOAP SOLUTION OR WATER FOR 15 MINUTES.

--------------- FIRST AID - INHALATION ---------------

REMOVE VICTIM FROM CONTAMINATED AREA TO FRESH AIR. APPLY APPROPRIATE FIRST AID TREATMENT AS NECESSARY.

---------------- FIRST AID - INGESTION ---------------

DO NOT FEED ANYTHING BY MOUTH TO AN UNCONSCIOUS OR CONVULSIVE VICTIM. DO NOT INDUCE VOMITING. IMMEDIATELY CONTACT A PHYSICIAN. DILUTE CONTENTS OF STOMACH USING 3-4 GLASSES MILK OR WATER.

SECTION 6 - SPECIAL PROTECTION INFORMATION

--------------------- VENTILATION ---------------------

ADEQUATE VENTILATION TO MAINTAIN AIR CONTAMINANTS BELOW EXPOSURE LIMITS.

PRODUCT NAME: SULFITE INDICATOR W/PLASTIC DIPPER
MSDS NO: 218BET002

SECTION 6 - SPECIAL PROTECTION INFORMATION (CON'T)

------ PERSONAL PROTECTIVE EQUIPMENT - RESPIRATOR -----

IF VENTILATION IS INADEQUATE OR SIGNIFICANT REAGENT EXPOSURE IS LIKELY, USE A RESPIRATOR WITH DUST/MIST CARTRIDGES.

---------- PERSONAL PROTECTIVE EQUIPMENT - EYE -------

AIRTIGHT CHEMICAL GOGGLES.

-------- PERSONAL PROTECTIVE EQUIPMENT - GLOVES -------

RUBBER GLOVES, REPLACE AS NECESSARY.

---------- OTHER PROTECTIVE EQUIPMENT ----------

SECTION 7 - SPILL OR LEAK PROCEDURES

---------- ENVIRONMENTAL EFFECTS ----------

- STEPS TO BE TAKEN IN CASE OF SPILL, LEAK OR RELEASE -

VENTILATE AREA, USE SPECIFIED PROTECTIVE EQUIPMENT. SWEEP UP AND PLACE IN WASTE DISPOSAL CONTAINER. FLUSH AREA WITH WATER. WET AREA MAY BE SLIPPERY. IF SO, SPREAD SAND OR GRIT.

---------- WASTE DISPOSAL METHOD ----------

WATER CONTAMINATED WITH THIS REAGENT MAY BE SENT TO A SANITARY SEWER, IN ACCORDANCE WITH ANY LOCAL AGREEMENT, A TREATMENT FACILITY OR DISCHARGED UNDER A NPDES PERMIT. REAGENT (AS IS)-INCINERATE OR BURY IN APPROVED LANDFILL.

SECTION 8 - HANDLING AND STORAGE PRECAUTIONS

KEEP CONTAINER CLOSED. KEEP DRY.

IMMEDIATELY REMOVE CONTAMINATED CLOTHING, WASH BEFORE REUSE.
NORMAL CHEMICAL HANDLING.

PRODUCT NAME: SULFITE INDICATOR W/PLASTIC DIPPER
MSDS NO: 218BET002

SECTION 9 - HAZARD WARNING

OSHA(29CFR): FOR RESPIRATORY PROTECTION USE PROPERLY FITTED MSHA/NIOSH APPROVED RESPIRATORY EQUIPMENT WITHIN USE LIMITATION. OTHERWISE, USE SUPPLIED AIR APPARATUS.

RCRA(40CFR): IF DISCARDED, THIS MATERIAL BEARS HWI# NOT APPLICABLE

DOT(49CFR) CLASSIFICATION: NOT APPLICABLE

SECTION 10 - COMMENTS

SECTION 11 - REGULATORY INFORMATION

SECTION 12 - REGULATIONS/COMMENTS CONTINUED

INFORMATION SUPPLIED BY: COORDINATOR, TOXICOLOGY AND PRODUCT SAFETY
HAROLD M. HERSH PHONE: ( ) -

MSDS DATE: 12/01/85 DATE OF PREVIOUS MSDS: / /

PRODUCT NAME: BENZENE
MSDS NO: 106MAR001

THE FOLLOWING INFORMATION IS FURNISHED SUBJECT TO THE DISCLAIMER ON THE BOTTOM OF THIS FORM

SECTION 1 - PRODUCT IDENTIFICATION

PRODUCT NAME: BENZENE

SYNONYMS:
BENZENE; BENZOL; CYCLOHEXATRIENE; PHENE; PHENYL HYDRIDE

MANUFACTURER / DISTRIBUTOR:
MARATHON PETROLEUM COMPANY
539 SOUTH MAIN STREET
FINDLAY, OH
45840

EMERGENCY PHONE NUMBERS:
(419) 422-2121 (MARATHON)
(800) 424-9300 (CHEMTREC)

CHEMICAL FAMILY: AROMATIC HYDROCARBON
CHEMICAL FORMULA: C6H6 CAS NO: 71-43-2

SECTION 2 - PHYSICAL PROPERTIES

BOILING POINT		MELTING POINT		SPECIFIC GRAVITY(H2O=1)
176.2	F	N.A.	F	0.88
	C		C	

% SOLUBILITY IN WATER	VAPOR DENSITY(AIR=1)	VAPOR PRESSURE
NEGLIGIBLE	2.8	100 MM HG @ 79F

PH INFORMATION: PH: N.A. AT CONC.
APPEARANCE: COLORLESS LIQUID ODOR: AROMATIC ODOR

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT		AUTOIGNITION TEMP		EXPLOSIVE LIMITS (% BY VOLUME IN AIR)
12	F	1076	F	LOWER/UPPER: 1.3/ 7.9
	C		C	

NFPA CLASS -- HEALTH: FIRE: REACTIVITY: OTHER:

SPECIFIC HAZARD: NONE

EXTINGUISHING MEDIA:

CLASS B FIRE EXTINGUISHING MEDIA SUCH AS HALON, CO2, OR DRY CHEMICAL CAN BE USED. FIRE FIGHTING SHOULD BE ATTEMPTED ONLY BY THOSE WHO ARE ADEQUATELY TRAINED.

SPECIAL FIRE FIGHTING INSTRUCTIONS:

FLASHBACK MAY OCCUR ALONG VAPOR TRAIL. AVOID USE OF SOLID WATER STREAMS. WATER MAY BE INEFFECTIVE IN EXTINGUISHING LOW FLASH POINT FIRES, BUT CAN BE USED TO COOL EXPOSED SURFACES. AVOID EXCESSIVE WATER SPRAY APPLICATION.

PRODUCT NAME: BENZENE
MSDS NO: 106MAR001

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA (CON'T)

STABILITY: THE MATERIAL IS STABLE AT 70 F, 760MM PRESSURE
CONDITIONS TO AVOID:
EXCESSIVE HEAT, SOURCES OF IGNITION

HAZARDOUS DECOMPOSITION PRODUCTS:
CARBON MONOXIDE, BENZENE VAPOR

INCOMPATIBLE MATERIALS:
STRONG OXIDIZERS

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

SECTION 4 - PRODUCT COMPOSITION AND EXPOSURE LIMITS

EXPOSURE LIMITS FOR PRODUCT:	TLV			SOURCE
BENZENE	10.00	PPM	(8 HR TWA)	ACGIH
	1.00	PPM	(8 HR TWA)	OSHA
	5.00	PPM	(STEL)	OSHA

COMPONENTS:	PERCENT RANGE	TLV			SOURCE
BENZENE	> 99.00	10.00	PPM	(8 HR TWA)	ACGIH
		1.00	PPM	(8 HR TWA)	OSHA
		5.00	PPM	(STEL)	OSHA

OSHA ACTION LEVEL 0.50 PPM (8 HR TWA)

PRODUCT NAME: BENZENE
MSDS NO: 106MAR001

SECTION 5 - POTENTIAL HEALTH EFFECTS

EYE:

EYE IRRITATION MAY RESULT FROM CONTACT WITH THE LIQUID OR EXPOSURE TO VAPOR CONCENTRATIONS ABOVE THE TLV.

SKIN:

PROLONGED OR REPEATED LIQUID CONTACT CAN DEFAT THE SKIN AND LEAD TO IRRITATION AND/OR DERMATITIS.

INHALATION:

ACUTE EXPOSURE TO VAPOR CONCENTRATIONS OF 50-150 PPM CAN CAUSE RESPIRATORY IRRITATION, HEADACHE, DIZZINESS AND LOSS OF COORDINATION. CONCENTRATIONS EXCEEDING 500 PPM MAY CAUSE CENTRAL NERVOUS SYSTEM DEPRESSION, LOSS OF CONSCIOUSNESS, COMA AND DEATH RESULTING FROM RESPIRATORY FAILURE. EXCESSIVE BENZENE EXPOSURE MAY CAUSE CARDIAC SENSITIZATION.

INGESTION:

LIQUID INGESTION CAUSES GASTROINTESTINAL PAIN, NAUSEA, VOMITING, AND CENTRAL NERVOUS SYSTEM DEPRESSION. ASPIRATION (BREATHING) OF VOMITUS INTO THE LUNGS MUST BE AVOIDED AS EVEN SMALL QUANTITIES IN THE LUNGS CAN PRODUCE CHEMICAL PNEUMONITIS AND PULMONARY EDEMA/HEMORRHAGE.

ADDITIONAL TOXICITY INFORMATION:

REPEATED OR PROLONGED EXPOSURE TO BENZENE EVEN AT RELATIVELY LOW CONCENTRATIONS MAY CAUSE SERIOUS INJURY TO BLOOD-FORMING ORGANS. SIGNIFICANT CHRONIC EXPOSURE TO BENZENE VAPOR HAS BEEN REPORTED TO PRODUCE VARIOUS BLOOD DISORDERS, RANGING FROM ANEMIA TO LEUKEMIA (CANCER) IN MAN. BENZENE PRODUCED TUMORS IN RATS AND MICE IN LIFETIME CHRONIC TOXICITY STUDIES, BUT THE RESPONSE HAS NOT BEEN CONSISTENT ACROSS SPECIES, STRAIN, SEX OR ROUTE OF EXPOSURE. ANIMAL STUDIES ON BENZENE HAVE DEMONSTRATED IMMUNE TOXICITY, TESTICULAR EFFECTS AND ALTERATIONS IN REPRODUCTIVE CYCLES, EVIDENCE OF CHROMOSOMAL DAMAGE OR OTHER CHROMOSOMAL CHANGES, AND EMBRYO/FETOTOXICITY, BUT NOT TERATOGENICITY.

PRODUCT NAME: BENZENE
MSDS NO: 106MAR001

SECTION 5 - POTENTIAL HEALTH EFFECTS (CON'T)

EMERGENCY FIRST AID PROCEDURES

EYE:

IMMEDIATELY FLUSH EYES WITH LARGE AMOUNTS OF WATER FOR AT LEAST 15 MINUTES. IF SYMPTOMS OR IRRITATION OCCUR, CALL A PHYSICIAN.

SKIN:

WASH WITH SOAP AND LARGE AMOUNTS OF WATER. REMOVE CONTAMINATED CLOTHING. IF SYMPTOMS OR IRRITATION OCCUR, CALL A PHYSICIAN.

INHALATION:

MOVE PERSON TO FRESH AIR. IF NOT BREATHING OR NO HEARTBEAT, GIVE ARTIFICIAL RESPIRATION OR CARDIOPULMONARY RESUSCITATION (CPR). IMMEDIATELY CALL A PHYSICIAN.

INGESTION:

DO NOT INDUCE VOMITING. DO NOT GIVE LIQUIDS. IMMEDIATELY CALL A PHYSICIAN.

SECTION 6 - SPECIAL PROTECTION INFORMATION

VENTILATION:

LOCAL OR GENERAL EXHAUST REQUIRED IN ENCLOSED AREAS OR WITH INADEQUATE VENTILATION.

RESPIRATORY PROTECTION:

APPROVED ORGANIC VAPOR CHEMICAL CARTRIDGE OR SUPPLIED AIR RESPIRATORS SHOULD BE WORN FOR EXPOSURES EXCEEDING THE TLV OR STEL. OBSERVE RESPIRATOR PROTECTION FACTOR CRITERIA CITED IN OSHA BENZENE STANDARD (F.R. VOL. 52, NO. 176, PP. 34564-5, SEPTEMBER 11, 1987). SELF-CONTAINED BREATHING APPARATUS SHOULD BE USED FOR FIRE FIGHTING.

PROTECTIVE GLOVES:

IMPERMEABLE GLOVES, E.G. VITON, TO PREVENT SKIN CONTACT.

EYE PROTECTION:

GOGGLES OR FACESHIELD TO PREVENT EYE CONTACT.

OTHER PROTECTIVE EQUIPMENT:

USE EXPLOSION-PROOF EQUIPMENT.

PRODUCT NAME: BENZENE
MSDS NO: 106MAR001

SECTION 7 - SPILL OR LEAK PROCEDURES

ENVIRONMENTAL EFFECTS:

BENZENE IS TOXIC TO MANY AQUATIC ORGANISMS. THE AQUATIC 96 HOUR TLM IS 10-100 PPM.

STEPS TO BE TAKEN IN CASE OF SPILL, LEAK OR RELEASE;

KEEP PUBLIC AWAY. WEAR SELF-CONTAINED BREATHING APPARATUS. ELIMINATE SOURCES OF IGNITION. SHUT OFF SOURCE IF POSSIBLE TO DO SO WITHOUT HAZARD. ADVISE NATIONAL RESPONSE CENTER (800-424-8802) IF PRODUCT HAS ENTERED A WATERCOURSE. ADVISE LOCAL AND STATE EMERGENCY SERVICES AGENCIES, IF APPROPRIATE. CONTAIN LIQUID WITH SAND OR SOIL. RECOVER AND RETURN FREE LIQUID TO SOURCE. USE SUITABLE SORBENTS TO CLEAN UP RESIDUAL LIQUIDS.

WASTE DISPOSAL METHOD:

DISPOSE OF CLEANUP MATERIALS IN ACCORDANCE WITH APPLICABLE LOCAL, STATE AND FEDERAL REGULATIONS.

SECTION 8 - HANDLING AND STORAGE PRECAUTIONS

PRODUCT SHOULD BE HANDLED AND STORED IN ACCORDANCE WITH INDUSTRY ACCEPTED PRACTICES. IN THE ABSENCE OF SPECIFIC LOCAL CODE REQUIREMENTS, NFPA OR OSHA REQUIREMENTS SHOULD BE FOLLOWED. USE APPROPRIATE GROUNDING AND BONDING PRACTICES. STORE IN PROPERLY CLOSED CONTAINERS THAT ARE APPROPRIATELY LABELED. DO NOT EXPOSE TO HEAT, OPEN FLAME, OXIDIZERS OR OTHER SOURCES OF IGNITION. AVOID SKIN CONTACT. EXERCISE GOOD PERSONAL HYGIENE INCLUDING REMOVAL OF SOILED CLOTHING AND PROMPT WASHING WITH SOAP AND WATER.

SECTION 9 - HAZARD WARNING

DANGER!

CONTAINS BENZENE

CANCER HAZARD

EXTREMELY FLAMMABLE

OVEREXPOSURE CAN INJURE BLOOD-FORMING ORGANS

CHRONIC EXPOSURE HAS CAUSED CANCER IN HUMANS AND LABORATORY ANIMALS

SECTION 10 - COMMENTS

PRODUCT NAME: BENZENE
MSDS NO: 106MAR001

SECTION 11 - REGULATORY INFORMATION

SARA TITLE III/SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 - SECTIONS 302, 304, 311, 312 AND 313.

THE FOLLOWING REGULATIONS APPLY TO THIS PRODUCT:

SECTIONS 311 AND 312 - MATERIAL SAFETY DATA SHEET REQUIREMENTS:

40 CFR PART 370 (52 FR 38344 - OCTOBER 15, 1987).

DEPENDING ON LOCAL, STATE, AND FEDERAL REGULATIONS, MATERIAL SAFETY DATA SHEETS (MSDS'S) OR LISTS OF MSDS'S (PRODUCT NAMES) MAY BE REQUIRED TO BE SUBMITTED TO THE STATE EMERGENCY RESPONSE COMMISSION, LOCAL EMERGENCY PLANNING COMMITTEE, AND LOCAL FIRE DEPARTMENT IF YOU HAVE:

10,000 POUNDS OR MORE OF AN OSHA HAZARDOUS SUBSTANCE* OR
500 POUNDS OR THE THRESHOLD PLANNING QUANTITY WHICHEVER IS LESS, OF AN EXTREMELY HAZARDOUS SUBSTANCE.

* REPORTABLE QUANTITY LEVELS CAN VARY FROM STATE TO STATE AND YEAR TO YEAR DEPENDING ON APPLICABLE STATE AND/OR FEDERAL REGULATIONS.

THIS PRODUCT IS COVERED UNDER THE CRITERIA DEFINED IN OSHA'S HAZARD COMMUNICATION STANDARD 29 CFR 1910.1200 (52 FR 31852 - AUGUST 24, 1987) AND SHOULD BE REPORTED UNDER THE FOLLOWING EPA HAZARD CATEGORIES:

XX IMMEDIATE (ACUTE) HEALTH HAZARD
XX DELAYED (CHRONIC) HEALTH HAZARD
XX FIRE HAZARD
SUDDEN RELEASE OF PRESSURE HAZARD
REACTIVE HAZARD

SECTION 313 - TOXIC CHEMICAL RELEASE REPORTING:

40 CFR PART 372 (53 FR 4500 - FEBRUARY 16, 1988); 53 FR 12728 - APRIL 18, 1988; 53 FR 23108 - JUNE 20, 1988).

THIS PRODUCT CONTAINS THE FOLLOWING COMPONENT(S) (AT A LEVEL OF 1% OR GREATER IF HAZARDOUS; 0.1% OR GREATER IF CARCINOGENIC) THAT IS/ARE IDENTIFIED ON THE SECTION 313 TOXIC CHEMICAL LIST:

----COMPONENT----	----CAS NUMBER----
BENZENE	71-43-2

SECTION 12 - REGULATIONS/COMMENTS CONTINUED

DEPARTMENT OF TRANSPORTATION:

49 CFR 172.101 AS REVISED ON OCTOBER 1, 1988.

PROPER SHIPPING NAME -- BENZENE
DOT CLASSIFICATION -- FLAMMABLE LIQUID
DOT IDENTIFICATION NUMBER -- UN 1114

"RQ" OF 1,000 POUNDS MUST BE SHOWN ON SHIPPING PAPERS.
NOT REQUIRED WITH SHIPMENTS <1,000 POUNDS.

PRODUCT NAME: BENZENE
MSDS NO: 106MAR001

INFORMATION SUPPLIED BY: COORDINATOR, TOXICOLOGY AND PRODUCT SAFETY
CRAIG M PARKER PHONE: (419)422-2121

MSDS DATE: 05/08/86 DATE OF PREVIOUS MSDS: / /

PRODUCT NAME: CONDENSATE, HYDROCARBON C6-C30
MSDS NO: 263MAR003

THE FOLLOWING INFORMATION IS FURNISHED SUBJECT TO THE DISCLAIMER ON THE BOTTOM OF THIS FORM

SECTION 1 - PRODUCT IDENTIFICATION

PRODUCT NAME: CONDENSATE, HYDROCARBON C6-C30

SYNONYMS:
CONDENSATE, HYDROCARBON C6-C30; HYDROCARBON CONDENSATE, C6-C30

MANUFACTURER / DISTRIBUTOR:
MARATHON PETROLEUM COMPANY
539 SOUTH MAIN STREET
FINDLAY, OHIO
45840

EMERGENCY PHONE NUMBERS:
(419) 422-2121 (MARATHON)
(800) 424-9300 (CHEMTREC)

CHEMICAL FAMILY: HYDROCARBON CONDENSATE
CHEMICAL FORMULA: MIXTURE

CAS NO: 69430-33-7

SECTION 2 - PHYSICAL PROPERTIES

BOILING POINT		MELTING POINT		SPECIFIC GRAVITY(H2O=1)
155-850	F	N.A.	F	.66-.93LIQ
	C		C	

% SOLUBILITY IN WATER	VAPOR DENSITY(AIR=1)	VAPOR PRESSURE
NEGLIGIBLE	N.D.A.	N.D.A.

PH INFORMATION: PH: N.A. AT CONC.
APPEARANCE: LIGHT TO DARK BROWN LIQUID ODOR: HYDROCARBON

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT		AUTOIGNITION TEMP		EXPLOSIVE LIMITS (% BY VOLUME IN AIR)
<100	F	N.D.A.	F	LOWER/UPPER: 1.1/ 7.8
	C		C	

NFPA CLASS -- HEALTH: FIRE: REACTIVITY: OTHER:

SPECIFIC HAZARD: NONE

EXTINGUISHING MEDIA:

CLASS B FIRE EXTINGUISHING MEDIA SUCH AS HALON, CO2 OR DRY CHEMICAL CAN BE USED. FIRE FIGHTING SHOULD BE ATTEMPTED ONLY BY THOSE WHO ARE ADEQUATELY TRAINED.

SPECIAL FIRE FIGHTING PROCEDURES:

CAUTION MUST BE FOLLOWED AFTER EXTINGUISHMENT DUE TO EASE OF REIGNITION OF HOT VAPORS. FLASHBACK MAY OCCUR ALONG VAPOR TRAIL. AVOID USE OF SOLID WATER STREAMS. WATER MAY BE INEFFECTIVE IN EXTINGUISHING LOW FLASH POINT FIRES, BUT CAN BE USED TO COOL EXPOSED SURFACES. AVOID EXCESSIVE WATER APPPLICATION.

PRODUCT NAME: CONDENSATE, HYDROCARBON C6-C30
MSDS NO: 263MAR003

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA (CON'T)

STABILITY: THE MATERIAL IS STABLE AT 70 F, 760MM PRESSURE
CONDITIONS TO AVOID:
EXCESSIVE HEAT, SOURCES OF IGNITION

HAZARDOUS DECOMPOSITION PRODUCTS:
CARBON MONOXIDE, CARBON DIOXIDE, ALDEHYDES,
AROMATICS, OTHER HYDROCARBONS

INCOMPATIBLE MATERIALS:
STRONG OXIDIZERS

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

SECTION 4 - PRODUCT COMPOSITION AND EXPOSURE LIMITS

EXPOSURE LIMITS FOR PRODUCT:	TLV	SOURCE
CONDENSATE, HYDROCARBON C6-C30	NONE ESTABLISHED	

COMPONENTS:	PERCENT RANGE	TLV	SOURCE
CONDENSATE, HYDROCARBON C6-C30	100.00	( )	

***
COMPLEX MIXTURE OF HYDROCARBONS (PREDOMINANTLY C6-C30) OBTAINED AS A CONDENSATE FROM A NUMBER OF DIFFERENT REFINERY DISTILLATION OPERATIONS

SECTION 5 - POTENTIAL HEALTH EFFECTS

EYE:

LIQUID CONTACT MAY RESULT IN SLIGHT EYE IRRITATION.

SKIN:

PROLONGED OR REPEATED LIQUID CONTACT CAN CAUSE DEFATTING AND DRYING OF THE SKIN WHICH MAY PRODUCE SEVERE IRRITATION OR DERMATITIS.

INHALATION:

HIGH VAPOR CONCENTRATIONS MAY PRODUCE HEADACHE, GIDDINESS, VERTIGO, AND ANESTHETIC STUPOR.

INGESTION

INGESTION MAY RESULT IN NAUSEA, VOMITING, DIARRHEA AND RESTLESSNESS. ASPIRATION (BREATHING) OF VOMITUS INTO THE LUNGS MUST BE AVOIDED AS EVEN SMALL QUANTITIES IN THE LUNGS CAN PRODUCE PNEUMONITIS AND PULMONARY EDEMA/HEMORRHAGE.

PRODUCT NAME: CONDENSATE, HYDROCARBON C6-C30
MSDS NO: 263MAR003

SECTION 5 - POTENTIAL HEALTH EFFECTS (CON'T)

ADDITIONAL TOXICITY INFORMATION:

LIFETIME SKIN PAINTING STUDIES IN ANIMALS WITH COMPONENTS OF HYDROCARBON CONDENSATES HAVE PRODUCED TUMORS FOLLOWING PROLONGED AND REPEATED SKIN CONTACT. REPEATED DERMAL APPLICATION HAS PRODUCED SEVERE IRRITATION AND SYSTEMIC TOXICITY IN SUBACUTE TOXICITY STUDIES. SOME COMPONENTS OF HYDROCARBON CONDENSATES, I.E., PARAFFINS AND OLEFINS, HAVE BEEN SHOWN TO PRODUCE A SPECIES SPECIFIC, SEX HORMONAL DEPENDENT KIDNEY LESION IN MALE RATS FROM REPEATED ORAL OR INHALATION EXPOSURE. SOME COMPONENTS OF HYDROCARBON CONDENSATES WERE FOUND TO BE POSITIVE IN A FEW MUTAGENICITY TESTS WHILE NEGATIVE IN THE MAJORITY OF OTHERS. THE EXACT RELATIONSHIP BETWEEN THESE RESULTS AND HUMAN HEALTH IS NOT KNOWN. CHRONIC HUMAN HEALTH EFFECTS WOULD NOT BE EXPECTED AS LONG AS GOOD PERSONAL HYGIENE AND PROPER SAFETY PRECAUTIONS ARE PRACTICED.

EMERGENCY FIRST AID PROCEDURES

EYE:

FLUSH EYES WITH LARGE AMOUNTS OF WATER FOR AT LEAST 15 MINUTES. IF SYMPTOMS OR IRRITATION OCCUR, CALL A PHYSICIAN.

SKIN:

WASH WITH SOAP AND LARGE AMOUNTS OF WATER. REMOVE CONTAMINATED CLOTHING. IF SYMPTOMS OR IRRITATION OCCUR, CALL A PHYSICIAN.

INHALATION:

MOVE PERSON TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL RESPIRATION. CALL A PHYSICIAN.

INGESTION:

DO NOT INDUCE VOMITING. DO NOT GIVE LIQUIDS. IMMEDIATELY CALL A PHYSICIAN.

SECTION 6 - SPECIAL PROTECTION INFORMATION

VENTILATION:

LOCAL OR GENERAL EXHAUST REQUIRED WHEN USING AT ELEVATED TEMPERATURES.

RESPIRATORY PROTECTION:

APPROVED ORGANIC VAPOR CHEMICAL CARTRIDGE OR SUPPLIED AIR RESPIRATORS SHOULD BE WORN WHEN EXCESSIVE VAPORS OR MISTS ARE GENERATED.

PROTECTIVE GLOVES:

NITRILE OR VITON GLOVES TO PREVENT SKIN CONTACT.

OTHER PROTECTIVE EQUIPMENT:

USE MECHANICAL VENTILATION EQUIPMENT THAT IS EXPLOSION-PROOF.

PRODUCT NAME: CONDENSATE, HYDROCARBON C6-C30
MSDS NO: 263MAR003

SECTION 7 - SPILL OR LEAK PROCEDURES

ENVIRONMENTAL EFFECTS:

N.D.A.

STEPS TO BE TAKEN IN CASE OF SPILL, LEAK OR RELEASE:

KEEP PUBLIC AWAY. SHUT OFF SOURCE OF LEAK IF POSSIBLE TO DO SO WITHOUT HAZARD. ELIMINATE ALL IGNITION SOURCES. ADVISE NATIONAL RESPONSE CENTER (800-424-8802) IF PRODUCT HAS ENTERED A WATER COURSE. ADVISE LOCAL AND STATE EMERGENCY SEVICES AGENCIES, IF APPROPRIATE. CONTAIN LIQUID WITH SAND OR SOIL. RECOVER AND RETURN FREE LIQUID TO SOURCE. USE SUITABLE SORBENTS TO CLEAN UP RESIDUAL LIQUIDS.

WASTE DISPOSAL METHOD:

DISPOSE OF CLEANUP MATERIALS IN ACCORDANCE WITH APPLICABLE LOCAL, STATE AND FEDERAL REGULATIONS.

SECTION 8 - HANDLING AND STORAGE PRECAUTIONS

PRODUCT SHOULD BE HANDLED AND STORED IN ACCORDANCE WITH INDUSTRY ACCEPTED PRACTICES. IN THE ABSENCE OF SPECIFIC LOCAL CODE REQUIREMENTS, NFPA OR OSHA REQUIREMENTS SHOULD BE FOLLOWED. USE APPROPRIATE GROUNDING AND BONDING PRACTICES. STORE IN PROPERLY CLOSED CONTAINERS THAT ARE APPROPRIATELY LABELED. DO NOT EXPOSE TO HEAT, OPEN FLAME, STRONG OXIDIZERS OR OTHER SOURCES OF IGNITION. AVOID REPEATED OR PROLONGED SKIN CONTACT. EXERCISE GOOD PERSONAL HYGIENE INCLUDING REMOVAL OF SOILED CLOTHING AND PROMPT WASHING WITH SOAP AND WATER.

SECTION 9 - HAZARD WARNING

DANGER!

FLAMMABLE LIQUID
HARMFUL OR FATAL IF SWALLOWED
PRODUCES SKIN IRRITATION UPON PROLONGED OR REPEATED CONTACT

LONG-TERM SKIN EXPOSURE HAS CAUSED SKIN CANCER IN LABORATORY ANIMALS

SECTION 10 - COMMENTS

SECTION 11 - REGULATORY INFORMATION

PRODUCT NAME: CONDENSATE, HYDROCARBON C6-C30
MSDS NO: 263MAR003

SECTION 12 - REGULATIONS/COMMENTS CONTINUED

INFORMATION SUPPLIED BY: COORDINATOR, TOXICOLOGY AND PRODUCT SAFETY
CRAIG M PARKER PHONE: (419)422-2121

MSDS DATE: 06/27/86 DATE OF PREVIOUS MSDS: / /

PRODUCT NAME: COREXIT 7669 ANTIFOAM
MSDS NO: 153EXX002

THE FOLLOWING INFORMATION IS FURNISHED SUBJECT TO THE DISCLAIMER ON THE BOTTOM OF THIS FORM

SECTION 1 - PRODUCT IDENTIFICATION

PRODUCT NAME: COREXIT 7669 ANTIFOAM

SYNONYMS:
COREXIT 7669; COREXIT 7669 ANTIFOAM; 7669;

MANUFACTURER / DISTRIBUTOR:
EXXON CHEMICAL AMERICAS
P.O. BOX 3272
HOUSTON, TX
77001

EMERGENCY PHONE NUMBERS:
(419) 422-2121 (MARATHON)
(800) 424-9300 (CHEMTREC)

CHEMICAL FAMILY: ANTIFOAM
CHEMICAL FORMULA: CAS NO:

SECTION 2 - PHYSICAL PROPERTIES

BOILING POINT	MELTING POINT	SPECIFIC GRAVITY(H2O=1)
212 F	-20 F	1.01 @60F
C	C	

% SOLUBILITY IN WATER	VAPOR DENSITY(AIR=1)	VAPOR PRESSURE
INSOLUBLE		55.003 MM HG @100F

PH INFORMATION: PH: AT CONC.
APPEARANCE: LIGHT AMBER LIQUID ODOR: MILD

DENSITY, LBS/GAL: 8.43 @61F
SP. GRAVITY OF VAPOR, @1ATM (AIR=1): >1.00
VISCOSITY OF LIQUID, CST @F: N/A

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT	AUTOIGNITION TEMP	EXPLOSIVE LIMITS (% BY VOLUME IN AIR)
176 SCC F	N/A F	LOWER/UPPER: N/A/N/A
C	C	

NFPA CLASS -- HEALTH: FIRE: REACTIVITY: OTHER:

SPECIFIC HAZARD: NONE

---------- FIRE AND EXPLOSION HAZARDS ----------

COMBUSTIBLE LIQUID, CAN FORM COMBUSTIBLE MIXTURES AT TEMPERATURES AT OR ABOVE THE FLASHPOINT. TOXIC GASES WILL FORM UPON COMBUSTION. EMPTY PRODUCT CONTAINERS MAY CONTAIN PRODUCT RESIDUE. DO NOT PRESSURIZE, CUT, HEAT, WELD OR EXPOSE CONTAINERS TO FLAME OR OTHER SOURCES OF IGNITION.

---------- EXTINGUISHING MEDIA ----------

USE FOAM, DRY CHEMICAL, OR WATER SPRAY TO EXTINGUISH FIRE.

--------- SPECIAL FIRE FIGHTING INSTRUCTIONS ----------

USE WATER SPRAY TO COOL FIRE-EXPOSED SURFACES AND TO PROTECT PERSONNEL. ISOLATE "FUEL" SUPPLY FROM FIRE. RESPIRATORY AND EYE PROTECTION REQUIRED FOR FIRE FIGHTING PERSONNEL. AVOID SPRAYING WATER DIRECTLY INTO STORAGE CONTAINERS DUE TO DANGER OF BOILOVER.

PRODUCT NAME: COREXIT 7669 ANTIFOAM
MSDS NO: 153EXX002

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA (CON'T)

STABILITY: THE MATERIAL IS STABLE AT 70 F, 760MM PRESSURE
CONDITIONS TO AVOID:
NONE

HAZARDOUS DECOMPOSITION PRODUCTS:
HAZARDOUS COMBUSTION PRODUCTS: SMOKE, FUMES, CARBON MONOXIDE, CARBON DIOXIDE

INCOMPATIBLE MATERIALS:
SEE COMMENTS

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR
CONDITIONS TO AVOID:
N/A

INCOMPATIBLE MATERIALS: STRONG OXIDIZING AGENTS. MAY DISSOLVE SOME PLASTICS OR RUBBER.

SECTION 4 - PRODUCT COMPOSITION AND EXPOSURE LIMITS

EXPOSURE LIMITS FOR PRODUCT:	TLV	SOURCE
COREXIT 7669 ANTIFOAM	NONE ESTABLISHED	

COMPONENTS:	PERCENT RANGE	TLV	SOURCE
OXYALKYLATED POLYOL EYE IRRITANT; COMBUSTIBLE		( )	

SECTION 5 - POTENTIAL HEALTH EFFECTS

-------- ROUTES OF EXPOSURE AND EFFECTS - EYE ---------

SLIGHTLY IRRITATING, BUT DOES NOT INJURE EYE TISSUE.

-------- ROUTES OF EXPOSURE AND EFFECTS - SKIN --------

LOW ORDER OF TOXICITY. FREQUENT OR PROLONGED CONTACT MAY IRRITATE AND CAUSE DERMATITIS.

----- ROUTES OF EXPOSURE AND EFFECTS - INHALATION -----

IRRITATING TO EYES AND RESPIRATORY TRACT IN HIGH CONCENTRATIONS.

------ ROUTES OF EXPOSURE AND EFFECTS - INGESTION -----

NO HAZARD IN NORMAL INDUSTRIAL USE.

---------- ADDITIONAL TOXICITY INFORMATION ----------

ACUTE TOXICITY DATA IS AVAILABLE UPON REQUEST.

PRODUCT NAME: COREXIT 7669 ANTIFOAM
MSDS NO: 153EXX002

SECTION 5 - POTENTIAL HEALTH EFFECTS (CON'T)

EMERGENCY FIRST AID PROCEDURES

FIRST AID - EYE

FLUSH EYES WITH LARGE AMOUNTS OF WATER UNTIL IRRITATION SUBSIDES. IF IRRITATION PERSISTS, GET MEDICAL ATTENTION.

FIRST AID - SKIN

FLUSH WITH LARGE AMOUNTS OF WATER; USE SOAP IF AVAILABLE. REMOVE GROSSLY CONTAMINTED CLOTHING, INCLUDING SHOES, AND LAUNDER BEFORE RE-USE. IF IRRITATION PERSISTS, SEEK MEDICAL ATTENTION.

FIRST AID - INHALATION

USING PROPER RESPIRATORY PROTECTION, IMMEDIATELY REMOVE THE AFFECTED VICTIM FROM EXPOSURE. ADMINISTER ARTIFICIAL RESPIRATION IF BREATHING IS STOPPED. KEEP AT REST. CALL FOR PROMPT MEDICAL ATTENTION.

FIRST AID - INGESTION

FIRST AID IS NORMALLY NOT REQUIRED.

SECTION 6 - SPECIAL PROTECTION INFORMATION

VENTILATION

MAINTAIN AMBIENT CONCENTRATIONS BELOW RECOMMENDED EXPOSURE LIMITS.

PERSONAL PROTECTIVE EQUIPMENT - RESPIRATOR

WHERE OVEREXPOSURE BY INHALATION MAY OCCUR AND ENGINEERING, WORK PRACTICE OR OTHER MEANS OF EXPOSURE REDUCTION ARE NOT ADEQUATE, APPROVED RESPIRATORS MAY BE NECESSARY.

PERSONAL PROTECTIVE EQUIPMENT - EYE

FOR OPEN SYSTEMS WHERE CONTACT IS LIKELY, WEAR SAFETY GLASSES WITH SIDE SHIELDS. WHERE CONTACT MAY OCCUR, WEAR SAFETY GLASSES WITH SIDE SHIELDS.

PERSONAL PROTECTIVE EQUIPMENT - GLOVES

FOR OPEN SYSTEMS WHERE CONTACT IS LIKELY, WEAR CHEMICAL RESISTANT GLOVES.

OTHER PROTECTIVE EQUIPMENT

FOR OPEN SYSTEMS WHERE CONTACT IS LIKELY WEAR LONG SLEEVES.

PRODUCT NAME: COREXIT 7669 ANTIFOAM
MSDS NO: 153EXX002

SECTION 7 - SPILL OR LEAK PROCEDURES

- STEPS TO BE TAKEN IN CASE OF SPILL, LEAK OR RELEASE -

LAND SPILL: ELIMINATE SOURCES OF IGNITION. PREVENT ADDITIONAL DISCHARGE OF MATERIAL, IF POSSIBLE TO DO SO WITHOUT HAZARD. FOR SMALL SPILLS IMPLEMENT CLEANUP PROCEDURES; FOR LARGE SPILLS IMPLEMENT CLEANUP PROCEDURES AND, IF IN PUBLIC AREA, KEEP PUBLIC AWAY AND ADVISE AUTHORITIES. ALSO, IF THIS PRODUCT IS AN EPA HAZARDOUS SUBSTANCE NOTIFY THE U.S. EPA IF APPROPRIATE. PREVENT LIQUID FROM ENTERING SEWERS, WATERCOURSES, OR LOW AREAS. CONTAIN SPILLED LIQUID WITH SAND OR EARTH. DO NOT USE COMBUSTIBLE MATERIALS SUCH AS SAWDUST. RECOVER BY PUMPING (USE AN EXPLOSION PROOF OR HAND PUMP) OR WITH A SUITABLE ABSORBENT. WATER SPILL: MATERIAL WILL SINK. NO IMMEDIATE ACTION REQUIRED -- CONSULT AN EXPERT. CONSULT HEALTH INFORMATION AND PROTECTION REGARDING POSSIBLE HAZARDS.

---------- WASTE DISPOSAL METHOD ----------

LAND/WATER SPILL: CONSULT AN EXPERT ON DISPOSAL OF RECOVERED MATERIAL AND ENSURE CONFORMITY TO LOCAL DISPOSAL REGULATIONS.

SECTION 8 - HANDLING AND STORAGE PRECAUTIONS

ELECTROSTATIC ACCUMULATION HAZARD: UNKNOWN, USE PROPER GROUNDING PROCEDURE

STORAGE TEMPERATURE: AMBIENT
STORAGE/TRANSPORT PRESSURE, MM HG: ATMOSPHERIC
LOADING/UNLOADING TEMPERATURE, F: AMBIENT
VISCOSITY AT LOADING/UNLOADING TEMPERATURE, CST: N/A

SECTION 9 - HAZARD WARNING

U.S. DOT CLASSIFICATION: COMBUSTIBLE LIQUID

EPA HAZARDOUS SUBSTANCE: NONE

UNDER THE PROVISIONS OF TITLE III, SECTIONS 311/312 OF THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT, THIS PRODUCT IS CLASSIFIED INTO THE FOLLOWING HAZARD CATEGORIES: FIRE.

SECTION 10 - COMMENTS

THE MANUFACTURER LISTS AN ADDITIONAL EMERGENCY TELEPHONE NUMBER AS FOLLOWS: 800-424-9300 (CHEMTREC)

PRODUCT NAME: COREXIT 7669 ANTIFOAM
MSDS NO: 153EXX002

SECTION 11 - REGULATORY INFORMATION

SECTION 12 - REGULATIONS/COMMENTS CONTINUED

INFORMATION SUPPLIED BY: COORDINATOR, TOXICOLOGY AND PRODUCT SAFETY
PHONE: (713)870-6885

MSDS DATE: 11/28/87 DATE OF PREVIOUS MSDS: / /

PRODUCT NAME: HYDROGEN SULFIDE
MSDS NO: 102MAR001

THE FOLLOWING INFORMATION IS FURNISHED SUBJECT TO THE DISCLAIMER ON THE BOTTOM OF THIS FORM

SECTION 1 - PRODUCT IDENTIFICATION

PRODUCT NAME: HYDROGEN SULFIDE

SYNONYMS:
HYDROGEN SULFIDE; HYDROSULFURIC ACID; H2S; SULFURETTED HYDROGEN

MANUFACTURER / DISTRIBUTOR:
MARATHON PETROLEUM COMPANY
539 SOUTH MAIN STREET
FINDLAY, OH
45840

EMERGENCY PHONE NUMBERS:
(419) 422-2121 (MARATHON)
(800) 424-9300 (CHEMTREC)

CHEMICAL FAMILY: GAS
CHEMICAL FORMULA: H2S

CAS NO: 7783-06-4

SECTION 2 - PHYSICAL PROPERTIES

BOILING POINT		MELTING POINT		SPECIFIC GRAVITY(H2O=1)
-76	F	-116	F	1.53(LIQ.)
	C		C	

% SOLUBILITY IN WATER	VAPOR DENSITY(AIR=1)	VAPOR PRESSURE
SLIGHT	1.18	15,200 MM HG @ 77 F

PH INFORMATION: PH: N.A. AT CONC.
APPEARANCE: COLORLESS GAS ODOR: ROTTEN EGG ODOR

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT		AUTOIGNITION TEMP		EXPLOSIVE LIMITS (% BY VOLUME IN AIR)
N.D.A.	F	500	F	LOWER/UPPER: 4.3/46.0
	C		C	

NFPA CLASS -- HEALTH: FIRE: REACTIVITY: OTHER:

SPECIFIC HAZARD: NONE

EXTINGUISHING MEDIA:

CLASS B FIRE EXTINGUISHING MEDIA SUCH AS HALON, CO2, OR DRY CHEMICAL CAN BE USED. FIRE FIGHTING SHOULD BE ATTEMPTED ONLY BY THOSE WHO ARE ADEQUATELY TRAINED.

SPECIAL FIRE FIGHTING INSTRUCTIONS:

STOP THE FLOW OF GAS AND ALLOW FIRE TO BURN OUT. EXTINGUISHING THE FLAME BEFORE SHUTTING OFF THE SUPPLY CAN CAUSE THE FORMATION OF EXPLOSIVE MIXTURES. IN SOME CASES IT MAY BE PREFERRED TO ALLOW THE FLAME TO CONTINUE TO BURN. KEEP THE SURROUNDING AREA COOL WITH WATER SPRAY AND PREVENT FURTHER IGNITION OF COMBUSTIBLE MATERIAL.

PRODUCT NAME: HYDROGEN SULFIDE
MSDS NO: 102MAR001

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA (CON'T)

STABILITY: THE MATERIAL IS STABLE AT 70 F, 760MM PRESSURE
CONDITIONS TO AVOID:
SOURCES OF HEAT OR IGNITION

HAZARDOUS DECOMPOSITION PRODUCTS:
SULFUR DIOXIDE, OXIDES OF SULFUR

INCOMPATIBLE MATERIALS:
STRONG OXIDIZERS, MINERAL ACIDS

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

SECTION 4 - PRODUCT COMPOSITION AND EXPOSURE LIMITS

EXPOSURE LIMITS FOR PRODUCT:	TLV			SOURCE
HYDROGEN SULFIDE	10.00	PPM	(8 HR TWA)	ACGIH
	15.00	PPM	(STEL)	ACGIH
	10.00	PPM	(8 HR TWA)	OSHA
	15.00	PPM	(STEL)	OSHA

COMPONENTS:	PERCENT RANGE	TLV			SOURCE
HYDROGEN SULFIDE	98.00-100.00	10.00	PPM	(8 HR TWA)	ACGIH
		15.00	PPM	(STEL)	ACGIH
		10.00	PPM	(8 HR TWA)	OSHA
		15.00	PPM	(STEL)	OSHA

SECTION 5 - POTENTIAL HEALTH EFFECTS

EYE:

H2S IS IRRITATING TO THE EYES. REPEATED EXPOSURE ABOVE THE TLV MAY CAUSE BURNING OR TEARING AND VISUAL DISTURBANCES.

SKIN:

NON-IRRITATING TO SKIN (INTACT) DURING NORMAL USE. H2S MAY PRODUCE SLIGHT IRRITATION ON MOIST SKIN.

INHALATION:

SEE ADDITIONAL TOXICITY INFORMATION.

INGESTION:

NOT APPLICABLE.

ADDITIONAL TOXICITY INFORMATION:

HYDROGEN SULFIDE GAS (H2S) IS TOXIC BY INHALATION. PROLONGED BREATHING OF 50-100 PPM H2S VAPORS CAN PRODUCE EYE AND RESPIRATORY TRACT IRRITATION. HIGHER CONCENTRATIONS (250-600 PPM) FOR 15-30 MINUTES, CAN PRODUCE HEADACHE, DIZZINESS, NERVOUSNESS, NAUSEA AND PULMONARY EDEMA OR BRONCHIAL PNEUMONIA. CONCENTRATIONS OF >1000 PPM WILL CAUSE IMMEDIATE UNCONSCIOUSNESS AND DEATH THROUGH RESPIRATORY PARALYSIS.

PRODUCT NAME: HYDROGEN SULFIDE
MSDS NO: 102MAR001

SECTION 5 - POTENTIAL HEALTH EFFECTS (CON'T)

EMERGENCY FIRST AID PROCEDURES

EYE:

FLUSH EYES WITH LARGE AMOUNTS OF WATER FOR AT LEAST 15 MINUTES. CALL A PHYSICIAN IF SYMPTOMS OR IRRITATION OCCUR.

SKIN:

WASH WITH SOAP AND LARGE AMOUNTS OF WATER. CALL A PHYSICIAN IF SYMPTOMS OR IRRITATION OCCUR.

INHALATION:

MOVE PERSON TO FRESH AIR. IF NOT BREATHING OR NO HEARTBEAT, GIVE ARTIFICIAL RESPIRATION OR CARDIOPULMONARY RESUSCITATION (CPR). IMMEDIATELY CALL A PHYSICIAN. IF SYMPTOMS OR IRRITATION OCCUR WITH ANY EXPOSURE CALL A PHYSICIAN.

INGESTION:

NOT APPLICABLE.

SECTION 6 - SPECIAL PROTECTION INFORMATION

VENTILATION:

LOCAL OR GENERAL EXHAUST REQUIRED IN ENCLOSED AREAS OR WITH INADEQUATE VENTILATION.

RESPIRATORY PROTECTION:

ATMOSPHERE SUPPLYING RESPIRATOR IN CONFINED SPACES WHEN H2S CONCENTRATIONS EXCEED PERMISSIBLE LIMITS. SELF-CONTAINED BREATHING APPARATUS SHOULD BE USED FOR FIRE FIGHTING.

EYE PROTECTION:

GOGGLES.

OTHER PROTECTIVE EQUIPMENT:

USE MECHANICAL VENTILATION EQUIPMENT THAT IS EXPLOSION-PROOF.

PRODUCT NAME: HYDROGEN SULFIDE
MSDS NO: 102MAR001

SECTION 7 - SPILL OR LEAK PROCEDURES

ENVIRONMENTAL EFFECTS:

UNDISSOCIATED H2S CAN BE TOXIC TO FISH AND AQUATIC LIFE.

STEPS TO BE TAKEN IN CASE OF SPILL, LEAK OR RELEASE:

KEEP PUBLIC AWAY. STOP SOURCE OF LEAK IF POSSIBLE. ELIMINATE SOURCES OF IGNITION.

WASTE DISPOSAL METHOD:

CONTACT LOCAL OR STATE ENVIRONMENTAL AGENCY FOR GUIDANCE AS TO PROPER METHOD AND LOCATION OF DISPOSAL IN YOUR AREA.

SECTION 8 - HANDLING AND STORAGE PRECAUTIONS

PRODUCT SHOULD BE HANDLED AND STORED IN ACCORDANCE WITH INDUSTRY ACCEPTED PRACTICES. IN THE ABSENCE OF SPECIFIC LOCAL CODE REQUIREMENTS, NFPA OR OSHA REQUIREMENTS SHOULD BE FOLLOWED. USE APPROPRIATE GROUNDING AND BONDING PRACTICES. STORE IN PROPERLY CLOSED CONTAINERS THAT ARE APPROPRIATELY LABELED. DO NOT EXPOSE TO HEAT, OPEN FLAME, OXIDIZERS OR OTHER SOURCES OF IGNITION. H2S REACTS WITH MANY METALS FORMING SULFIDES AND CAUSING EMBRITTLEMENT AND CORROSION.

SECTION 9 - HAZARD WARNING

DANGER!

EXTREMELY FLAMMABLE GAS

HYDROGEN SULFIDE GAS CAN CAUSE
RESPIRATORY IRRITATION AND ASPHYXIATION

SECTION 10 - COMMENTS

THE PRONOUNCED AND EASILY-RECOGNIZED ROTTEN EGG ODOR OF H2S GAS CAN BE DETECTED AT CONCENTRATIONS AS LOW AS 0.1 PPM. SINCE HIGHER H2S CONCENTRATIONS (100-200 PPM) CAUSE OLFACTORY FATIGUE AND OTHER HYDROCARBON ODORS CAN "MASK" H2S, THE SENSE OF SMELL CANNOT BE USED AS A RELIABLE INDICATOR OF H2S EXPOSURE.

PRODUCT NAME: HYDROGEN SULFIDE
MSDS NO: 102MAR001

SECTION 11 - REGULATORY INFORMATION

SARA TITLE III/SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 - SECTIONS 302, 304, 311, 312 AND 313.

THE FOLLOWING REGULATIONS APPLY TO THIS PRODUCT:

SECTION 302 - EXTREMELY HAZARDOUS SUBSTANCES:

40 CFR PARTS 300 & 355 (52 FR 13378, 15412 - APRIL 28, 1987; 52 FR 48072 - DECEMBER 17, 1987; 53 FR 5574 - FEBRUARY 25, 1988).

THIS PRODUCT CONTAINS THE FOLLOWING COMPONENT(S) IDENTIFIED ON APPENDIX A AND B OF THE EXTREMELY HAZARDOUS SUBSTANCE LIST:

---COMPONENT---	REPORTABLE ---QUANTITY (LBS)---	THRESHOLD PLANNING --- QUANTITY (LBS)---
HYDROGEN SULFIDE	100	500

SECTION 304 - EMERGENCY RELEASE NOTIFICATIONS:

40 CFR PART 355 (52 FR 13378, 15412 - APRIL 28, 1987; 52 FR 48072 - DECEMBER 17, 1987; 53 FR 5574 - FEBRUARY 25, 1988).

THIS PRODUCT CONTAINS THE FOLLOWING COMPONENT(S) IDENTIFIED EITHER AS AN EXTREMELY HAZARDOUS SUBSTANCE (SEE SECTION 302) OR A CERCLA HAZARDOUS SUBSTANCE 40 CFR 302 (51 FR 34547 - SEPTEMBER 29, 1988) WHICH IN CASE OF A SPILL OR RELEASE MAY BE SUBJECT TO REPORTING REQUIREMENTS UNDER SECTION 304 OF TITLE III:

HYDROGEN SULFIDE

SECTIONS 311 AND 312 - MATERIAL SAFETY DATA SHEET REQUIREMENTS:

40 CFR PART 370 (52 FR 38344 - OCTOBER 15, 1987).

DEPENDING ON LOCAL, STATE, AND FEDERAL REGULATIONS, MATERIAL SAFETY DATA SHEETS (MSDS'S) OR LISTS OF MSDS'S (PRODUCT NAMES) MAY BE REQUIRED TO BE SUBMITTED TO THE STATE EMERGENCY RESPONSE COMMISSION, LOCAL EMERGENCY PLANNING COMMITTEE, AND LOCAL FIRE DEPARTMENT IF YOU HAVE:

10,000 POUNDS OR MORE OF AN OSHA HAZARDOUS SUBSTANCE* OR
500 POUNDS OR THE THRESHOLD PLANNING QUANTITY WHICHEVER IS LESS, OF AN EXTREMELY HAZARDOUS SUBSTANCE.

* REPORTABLE QUANTITY LEVELS CAN VARY FROM STATE TO STATE AND YEAR TO YEAR DEPENDING ON APPLICABLE STATE AND/OR FEDERAL REGULATIONS.

PRODUCT NAME: HYDROGEN SULFIDE
MSDS NO: 102MAR001

SECTION 12 - REGULATIONS/COMMENTS CONTINUED

THIS PRODUCT IS COVERED UNDER THE CRITERIA DEFINED IN OSHA'S HAZARD COMMUNICATION STANDARD 29 CFR 1910.1200 (52 FR 31852 - AUGUST 24, 1987) AND SHOULD BE REPORTED UNDER THE FOLLOWING EPA HAZARD CATEGORIES:

XX	IMMEDIATE (ACUTE) HEALTH HAZARD
	DELAYED (CHRONIC) HEALTH HAZARD
XX	FIRE HAZARD
	SUDDEN RELEASE OF PRESSURE HAZARD
	REACTIVE HAZARD

DEPARTMENT OF TRANSPORTATION:

49 CFR 172.101 AS REVISED ON OCTOBER 1, 1988.

PROPER SHIPPING NAME -- HYDROGEN SULFIDE
DOT CLASSIFICATION -- FLAMMABLE GAS
DOT IDENTIFICATION NUMBER -- UN 1053

"RQ" OF 100 POUNDS MUST BE SHOWN ON SHIPPING PAPERS.
NOT REQUIRED WITH SHIPMENTS <100 POUNDS.

INFORMATION SUPPLIED BY: COORDINATOR, TOXICOLOGY AND PRODUCT SAFETY
CRAIG M. PARKER PHONE: (419)422-2121

MSDS DATE: 08/05/85 DATE OF PREVIOUS MSDS: / /

PRODUCT NAME: NATURAL GAS - DRY
MSDS NO: 196MAR001

THE FOLLOWING INFORMATION IS FURNISHED SUBJECT TO THE DISCLAIMER ON THE BOTTOM OF THIS FORM

SECTION 1 - PRODUCT IDENTIFICATION

PRODUCT NAME: NATURAL GAS - DRY

SYNONYMS:
GAS PLANT NATURAL GAS; NATURAL GAS - DRY;

MANUFACTURER / DISTRIBUTOR:
MARATHON PETROLEUM COMPANY
539 SOUTH MAIN STREET
FINDLAY, OH
45840
EMERGENCY PHONE NUMBERS:
(419) 422-2121 (MARATHON)
(800) 424-9300 (CHEMTREC)

CHEMICAL FAMILY: NATURAL GAS
CHEMICAL FORMULA: MIXTURE

CAS NO: 68410-63-9

SECTION 2 - PHYSICAL PROPERTIES

BOILING POINT		MELTING POINT		SPECIFIC GRAVITY(H2O=1)
-259TO-43	F	N.A.	F	.37-.50LIQ
	C		C	

% SOLUBILITY IN WATER	VAPOR DENSITY(AIR=1)	VAPOR PRESSURE
SLIGHT	0.55-0.62	N.A.

PH INFORMATION: PH: N.A. AT CONC.
APPEARANCE: COLORLESS GAS ODOR: MERCAPTAN ODOR

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT		AUTOIGNITION TEMP		EXPLOSIVE LIMITS (% BY VOLUME IN AIR)
N.A.	F	N.D.A.	F	LOWER/UPPER: 3.2/14.0
	C		C	

NFPA CLASS -- HEALTH: FIRE: REACTIVITY: OTHER:

SPECIFIC HAZARD: NONE

EXTINGUISHING MEDIA:

CLASS B FIRE EXTINGUISHING MEDIA SUCH AS HALON, CO2 OR DRY CHEMICAL CAN BE USED. FIRE FIGHTING SHOULD BE ATTEMPTED ONLY BY THOSE WHO ARE ADEQUATELY TRAINED.

SPECIAL FIRE FIGHTING PROCEDURES:

STOP THE FLOW OF GAS AND ALLOW FIRE TO BURN OUT. EXTINGUISHING THE FLAME BEFORE SHUTTING OFF THE SUPPLY CAN CAUSE THE FORMATION OF EXPLOSIVE MIXTURES. IN SOME CASES IT MAY BE PREFERRED TO ALLOW THE FLAME TO CONTINUE TO BURN. KEEP THE SURROUNDING AREA COOL WITH WATER SPRAY AND PREVENT FURTHER IGNITION OF COMBUSTIBLE MATERIAL.

PRODUCT NAME: NATURAL GAS - DRY
MSDS NO: 196MAR001

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA (CON'T)

STABILITY: THE MATERIAL IS STABLE AT 70 F, 760MM PRESSURE
CONDITIONS TO AVOID:
SOURCES OF HEAT OR IGNITION

HAZARDOUS DECOMPOSITION PRODUCTS:
CARBON MONOXIDE, CARBON DIOXIDE

INCOMPATIBLE MATERIALS:
STRONG OXIDIZERS (E.G. CHLORINE), MINERAL ACIDS

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

SECTION 4 - PRODUCT COMPOSITION AND EXPOSURE LIMITS

EXPOSURE LIMITS FOR PRODUCT:	TLV	SOURCE
NATURAL GAS - DRY	NONE ESTABLISHED	

COMPONENTS:	PERCENT RANGE	TLV			SOURCE
METHANE	50.00- 95.00			( )	
ETHANE	1.00- 20.00			( )	
PROPANE	.10- 12.00			( )	
		1000.00	PPM	(8 HR TWA)	OSHA
CARBON DIOXIDE	.50- 5.00	5000.00	PPM	(8 HR TWA)	ACGIH
		30000.00	PPM	(STEL)	ACGIH
		10000.00	PPM	(8 HR TWA)	OSHA
		30000.00	PPM	(STEL)	OSHA
NITROGEN	.10- 18.00			( )	

COMPLEX COMBINATION OF HYDROCARBONS (PREDOMINANTLY C1 THROUGH C4) SEPARATED FROM NATURAL GAS. CONSISTS PREDOMINANTLY OF METHANE AND ETHANE.
***
METHANE, ETHANE AND PROPANE ARE SIMPLE ASPHYXIANTS BY ACGIH, OXYGEN LIMITING FACTOR. NITROGEN IS AN INERT GAS.

PRODUCT NAME: NATURAL GAS - DRY
MSDS NO: 196MAR001

SECTION 5 - POTENTIAL HEALTH EFFECTS

EYE:

NATURAL GAS IS GENERALLY NON-IRRITATING TO EYES. PRESSURIZED GAS CAN CAUSE MECHANICAL INJURY TO THE EYE.

SKIN:

NATURAL GAS IS GENERALLY NON-IRRITATING TO SKIN.

INHALATION:

NATURAL GAS ACTS AS AN ANESTHETIC AT HIGH CONCENTRATIONS, PRODUCING DIZZINESS, HEADACHE, INCOORDINATION AND NARCOSIS; EXTREMELY HIGH CONCENTRATIONS CAN CAUSE ASPHYXIATION BY EXCLUSION OF OXYGEN.

INGESTION:

INGESTION NOT LIKELY.

ADDITIONAL TOXICITY INFORMATION:

AT EXTREMELY HIGH CONCENTRATIONS AND EXCESSIVE EXPOSURE CONDITIONS, COMPONENTS OF NATURAL GAS MAY PRODUCE CARDIAC SENSITIZATION.

EMERGENCY FIRST AID PROCEDURES

EYE:

CALL A PHYSICIAN IF SYMPTOMS OR IRRITATION OCCUR.

SKIN:

CALL A PHYSICIAN IF SYMPTOMS OR IRRITATION OCCUR.

INHALATION:

MOVE PERSON TO FRESH AIR. IF NOT BREATHING OR IF NO HEARTBEAT, GIVE ARTIFICIAL RESPIRATION OR CARDIOPULMONARY RESUSCITATION (CPR). IMMEDIATELY CALL A PHYSICIAN.

INGESTION:

INGESTION NOT LIKELY.

SECTION 6 - SPECIAL PROTECTION INFORMATION

VENTILATION:

LOCAL OR GENERAL EXHAUST REQUIRED IF USED IN AN ENCLOSED AREA IN ORDER TO KEEP CONCENTRATIONS BELOW THE LOWER EXPLOSIVE LIMIT.

PRODUCT NAME: NATURAL GAS - DRY
MSDS NO: 196MAR001

SECTION 6 - SPECIAL PROTECTION INFORMATION (CON'T)

RESPIRATORY PROTECTION:

USE ATMOSPHERE SUPPLIED RESPIRATORS IN THE EVENT OF OXYGEN DEFICIENCY. SELF-CONTAINED BREATHING APPARATUS SHOULD BE USED FOR FIRE FIGHTING.

EYE PROTECTION:

GOGGLES OR FACESHIELD MAY BE NEEDED WHEN HANDLING PRESSURIZED GASES.

OTHER PROTECTIVE EQUIPMENT:

USE EXPLOSION-PROOF EQUIPMENT.

SECTION 7 - SPILL OR LEAK PROCEDURES

ENVIRONMENTAL EFFECTS:

MOST COMPONENTS OF NATURAL GAS ARE LIGHTER THAN AIR AND SHOULD DISSIPATE RAPIDLY IN UNCONFINED AREAS.

STEPS TO BE TAKEN IN CASE OF SPILL, LEAK OR RELEASE:

KEEP PUBLIC AWAY. SHUT OFF SOURCE IF POSSIBLE TO DO SO WITHOUT HAZARD. ADVISE LOCAL AND STATE EMERGENCY SERVICES AGENCIES, IF APPROPRIATE.

WASTE DISPOSAL METHOD:

PREFERRED METHOD OF DISPOSAL IS BURNING AS A VAPOR IN A PROPERLY DESIGNED FLARE. SPECIAL CARE MUST BE TAKEN TO ENSURE COMPLETE DISSIPATION OF GAS BELOW LOWER EXPLOSIVE LIMIT.

SECTION 8 - HANDLING AND STORAGE PRECAUTIONS

PRODUCT SHOULD BE HANDLED AND STORED IN ACCORDANCE WITH INDUSTRY ACCEPTED PRACTICES. IN THE ABSENCE OF SPECIFIC LOCAL CODE REQUIREMENTS, NFPA OR OSHA REQUIREMENTS SHOULD BE FOLLOWED. USE APPROPRIATE GROUNDING AND BONDING PRACTICES. STORE IN PROPERLY CLOSED CONTAINERS THAT ARE APPROPRIATELY LABELED. DO NOT EXPOSE TO HEAT, OPEN FLAME, STRONG OXIDIZERS OR OTHER SOURCES OF IGNITION.

SECTION 9 - HAZARD WARNING

DANGER!

EXTREMELY FLAMMABLE
GAS UNDER PRESSURE

PRODUCT NAME: NATURAL GAS - DRY
MSDS NO: 196MAR001

SECTION 10 - COMMENTS

SECTION 11 - REGULATORY INFORMATION

SARA TITLE III/SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 - SECTIONS 302, 304, 311, 312 AND 313.

THE FOLLOWING REGULATIONS APPLY TO THIS PRODUCT:

SECTIONS 311 AND 312 - MATERIAL SAFETY DATA SHEET REQUIREMENTS:

40 CFR PART 370 (52 FR 38344 - OCTOBER 15, 1987).

DEPENDING ON LOCAL, STATE, AND FEDERAL REGULATIONS, MATERIAL SAFETY DATA SHEETS (MSDS'S) OR LISTS OF MSDS'S (PRODUCT NAMES) MAY BE REQUIRED TO BE SUBMITTED TO THE STATE EMERGENCY RESPONSE COMMISSION, LOCAL EMERGENCY PLANNING COMMITTEE, AND LOCAL FIRE DEPARTMENT IF YOU HAVE:

10,000 POUNDS OR MORE OF AN OSHA HAZARDOUS SUBSTANCE* OR
500 POUNDS OR THE THRESHOLD PLANNING QUANTITY WHICHEVER IS LESS, OF AN EXTREMELY HAZARDOUS SUBSTANCE.

* REPORTABLE QUANTITY LEVELS CAN VARY FROM STATE TO STATE AND YEAR TO YEAR DEPENDING ON APPLICABLE STATE AND/OR FEDERAL REGULATIONS.

THIS PRODUCT IS COVERED UNDER THE CRITERIA DEFINED IN OSHA'S HAZARD COMMUNICATION STANDARD 29 CFR 1910.1200 (52 FR 31852 - AUGUST 24, 1987) AND SHOULD BE REPORTED UNDER THE FOLLOWING EPA HAZARD CATEGORIES:

	IMMEDIATE (ACUTE) HEALTH HAZARD
	DELAYED (CHRONIC) HEALTH HAZARD
XX	FIRE HAZARD
XX	SUDDEN RELEASE OF PRESSURE HAZARD
	REACTIVE HAZARD

DEPARTMENT OF TRANSPORTATION:

49 CFR 172.101 AS REVISED ON OCTOBER 1, 1988.

PROPER SHIPPING NAME -- HYDROCARBON GAS, NONLIQUIFIED
DOT CLASSIFICATION -- FLAMMABLE GAS
DOT IDENTIFICATION NUMBER -- UN 1964

SECTION 12 - REGULATIONS/COMMENTS CONTINUED

INFORMATION SUPPLIED BY: COORDINATOR, TOXICOLOGY AND PRODUCT SAFETY
CRAIG M PARKER PHONE: (419)422-2121

MSDS DATE: 11/12/87 DATE OF PREVIOUS MSDS: 06/05/86

PRODUCT NAME: NATURAL GAS - RAW LIQUID MIX
MSDS NO: 199MAR001

THE FOLLOWING INFORMATION IS FURNISHED SUBJECT TO THE DISCLAIMER ON THE BOTTOM OF THIS FORM

SECTION 1 - PRODUCT IDENTIFICATION

PRODUCT NAME: NATURAL GAS - RAW LIQUID MIX

SYNONYMS:
NATURAL GAS - RAW LIQUID MIX;

MANUFACTURER / DISTRIBUTOR:
MARATHON PETROLEUM COMPANY
539 SOUTH MAIN STREET
FINDLAY, OH
45840
EMERGENCY PHONE NUMBERS:
(419) 422-2121 (MARATHON)
(800) 424-9300 (CHEMTREC)

CHEMICAL FAMILY: ALIPHATIC HYDROCARBON
CHEMICAL FORMULA: MIXTURE CAS NO: 64741-48-6

SECTION 2 - PHYSICAL PROPERTIES

BOILING POINT	MELTING POINT	SPECIFIC GRAVITY(H2O=1)
-127TO257 F	N.A. F	0.3-0.7LIQ
C	C	

% SOLUBILITY IN WATER	VAPOR DENSITY(AIR=1)	VAPOR PRESSURE
SOLUBLE	1.0-3.9	N.D.A.

PH INFORMATION: PH: N.A. AT CONC.
APPEARANCE: COLORLESS LIQUID ODOR: HYDROCARBON ODOR

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT	AUTOIGNITION TEMP	EXPLOSIVE LIMITS (% BY VOLUME IN AIR)
-211 TO 55 F	N.D.A. F	LOWER/UPPER: 1/13
C	C	

NFPA CLASS -- HEALTH: FIRE: REACTIVITY: OTHER:

SPECIFIC HAZARD: NONE

EXTINGUISHING MEDIA:

CLASS B FIRE EXTINGUISHING MEDIA SUCH AS HALON, CO2 OR DRY CHEMICAL CAN BE USED. FIRE FIGHTING SHOULD BE ATTEMPTED ONLY BY THOSE WHO ARE ADEQUATELY TRAINED.

SPECIAL FIRE FIGHTING PROCEDURES:

STOP THE FLOW OF GAS AND ALLOW FIRE TO BURN OUT. EXTINGUISHING THE FLAME BEFORE SHUTTING OFF THE SUPPLY CAN CAUSE THE FORMATION OF EXPLOSIVE MIXTURES. IN SOME CASES IT MAY BE PREFERRED TO ALLOW THE FLAME TO CONTINUE TO BURN. KEEP THE SURROUNDING AREA COOL WITH WATER SPRAY AND PREVENT FURTHER IGNITION OF COMBUSTIBLE MATERIAL. WATER MAY BE INEFFECTIVE IN EXTINGUISHING LOW FLASH POINT FIRES, BUT MAY BE USED TO COOL EXPOSED SURFACES. AVOID CONTACT WITH SKIN. CONTACT WITH WATER AND LIQUIFIED PRODUCT CAN CAUSE INCREASED VAPORIZATION. AVOID EXCESSIVE WATER APPLICATION.

PRODUCT NAME: NATURAL GAS - RAW LIQUID MIX
MSDS NO: 199MAR001

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA (CON'T)

STABILITY: THE MATERIAL IS STABLE AT 70 F, 760MM PRESSURE
CONDITIONS TO AVOID:
SOURCES OF HEAT OR IGNITION

HAZARDOUS DECOMPOSITION PRODUCTS:
CARBON MONOXIDE, CARBON DIOXIDE

INCOMPATIBLE MATERIALS:
STRONG OXIDIZERS (E.G. CHLORINE), MINERAL ACIDS

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

SECTION 4 - PRODUCT COMPOSITION AND EXPOSURE LIMITS

EXPOSURE LIMITS FOR PRODUCT:	TLV	SOURCE
NATURAL GAS - RAW LIQUID MIX	NONE ESTABLISHED	

COMPONENTS:	PERCENT RANGE	TLV			SOURCE
ETHANE	< 1.00			( )	
PROPANE	15.00- 30.00			( )	
		1000.00	PPM	(8 HR TWA)	OSHA
N & ISO-BUTANE	20.00- 50.00	800.00	PPM	(8 HR TWA)	ACGIH
		800.00	PPM	(8 HR TWA)	OSHA
N & ISO-PENTANE	10.00- 30.00	600.00	PPM	(8 HR TWA)	ACGIH
		750.00	PPM	(STEL)	ACGIH
		600.00	PPM	(8 HR TWA)	OSHA
		750.00	PPM	(STEL)	OSHA
C6-C7 HYDROCARBONS	8.00- 20.00			( )	
C8 HYDROCARBONS	< 5.00			( )	
BENZENE	.01- 1.00	10.00	PPM	(8 HR TWA)	ACGIH
		1.00	PPM	(8 HR TWA)	OSHA
		5.00	PPM	(STEL)	OSHA

OSHA ACTION LEVEL 0.5 PPM (8 HR TWA)

***
COMPLEX COMBINATION OF SATURATED ALIPHATIC HYDROCARBONS (PREDOMINANTLY C2 THROUGH C8) SEPARATED AS A LIQUID FROM NATURAL GAS IN A GAS RECYCLING PLANT, BY PROCESSES SUCH AS REFRIGERATION OR ABSORPTION.

PRODUCT NAME: NATURAL GAS - RAW LIQUID MIX
MSDS NO: 199MAR001

SECTION 5 - POTENTIAL HEALTH EFFECTS

EYE:

VAPOR IS GENERALLY NON-IRRITATING TO EYES. DIRECT CONTACT WITH LIQUIFIED PRODUCT CAN CAUSE "COLD BURN" OR FROSTBITE.

SKIN:

VAPOR IS GENERALLY NON-IRRITATING TO SKIN. DIRECT CONTACT WITH LIQUIFIED PRODUCT CAN CAUSE "COLD BURN" OR FROSTBITE.

INHALATION:

COMPONENTS OF RAW LIQUID NATURAL GAS ARE ANESTHETIC AT HIGH CONCENTRATIONS, PRODUCING DIZZINESS, HEADACHE, INCOORDINATION AND NARCOSIS; EXTREMELY HIGH CONCENTRATIONS CAN CAUSE ASPHYXIATION BY EXCLUSION OF OXYGEN.

INGESTION

INGESTION NOT LIKELY.

ADDITIONAL TOXICITY INFORMATION:

AT EXTREMELY HIGH CONCENTRATIONS AND EXCESSIVE EXPOSURE CONDITIONS, COMPONENTS OF RAW LIQUID NATURAL GAS MAY PRODUCE CARDIAC SENSITIZATION.

REPEATED OR PROLONGED EXPOSURE TO BENZENE EVEN AT RELATIVELY LOW CONCENTRATIONS MAY CAUSE SERIOUS INJURY TO BLOOD-FORMING ORGANS. SIGNIFICANT CHRONIC EXPOSURE TO BENZENE VAPOR HAS BEEN REPORTED TO PRODUCE VARIOUS BLOOD DISORDERS, RANGING FROM ANEMIA TO LEUKEMIA (CANCER) IN MAN. BENZENE PRODUCED TUMORS IN RATS AND MICE IN LIFETIME CHRONIC TOXICITY STUDIES, BUT THE RESPONSE HAS NOT BEEN CONSISTENT ACROSS SPECIES, STRAIN, SEX OR ROUTE OF EXPOSURE. ANIMAL STUDIES ON BENZENE HAVE DEMONSTRATED IMMUNE TOXICITY, TESTICULAR EFFECTS AND ALTERATIONS IN REPRODUCTIVE CYCLES, EVIDENCE OF CHROMOSOMAL DAMAGE OR OTHER CHROMOSOMAL CHANGES, AND EMBRYO/FETOTOXICITY, BUT NOT TERATOGENICITY.

PRODUCT NAME: NATURAL GAS - RAW LIQUID MIX
MSDS NO: 199MAR001

SECTION 5 - POTENTIAL HEALTH EFFECTS (CON'T)

EMERGENCY FIRST AID PROCEDURES

EYE:

LIQUID - DO NOT FLUSH WITH WATER. IMMEDIATELY CALL A PHYSICIAN.
GAS - CALL A PHYSICIAN IF SYMPTOMS OR IRRITATION OCCUR.

SKIN:

REMOVE CONTAMINATED CLOTHING. THAW FROSTBITTEN AREAS SLOWLY WITH LUKEWARM WATER OR BY WRAPPING AFFECTED AREAS WITH BLANKETS. DO NOT RUB AFFECTED AREAS. LET CIRCULATION REESTABLISH ITSELF NATURALLY, EXERCISING AREA IF POSSIBLE. CALL A PHYSICIAN.

INHALATION:

MOVE PERSON TO FRESH AIR. IF NOT BREATHING OR IF NO HEARTBEAT, GIVE ARTIFICIAL RESPIRATION OR CARDIOPULMONARY RESUSCITATION (CPR). IMMEDIATELY CALL A PHYSICIAN.

INGESTION:

INGESTION NOT LIKELY. IF SWALLOWED, IMMEDIATELY CALL A PHYSICIAN.

SECTION 6 - SPECIAL PROTECTION INFORMATION

VENTILATION:

LOCAL OR GENERAL EXHAUST REQUIRED IF USED IN AN ENCLOSED AREA.

RESPIRATORY PROTECTION:

AIR SUPPLIED RESPIRATOR IN THE EVENT OF OXYGEN DEFICIENCY, OR FOR FIRE FIGHTING.

EYE PROTECTION:

GOGGLES OR FACESHIELD.

PROTECTIVE GLOVES:

INSULATED GLOVES TO PREVENT FROSTBITE.

OTHER PROTECTIVE EQUIPMENT:

USE EXPLOSION-PROOF EQUIPMENT.

PRODUCT NAME: NATURAL GAS - RAW LIQUID MIX
MSDS NO: 199MAR001

SECTION 7 - SPILL OR LEAK PROCEDURES

ENVIRONMENTAL EFFECTS:

POSSIBLE FREEZING EFFECT ON PLANT AND ANIMAL LIFE. LARGE LIQUID SPILLS WILL READILY VAPORIZE (CLOUD FORMATION) PRODUCING IGNITION AND ASPHYXIATION HAZARD.

STEPS TO BE TAKEN IN CASE OF SPILL, LEAK OR RELEASE:

KEEP PUBLIC AWAY. SHUT OFF SOURCE IF POSSIBLE. ELIMINATE ALL IGNITION SOURCES. ADVISE NATIONAL RESPONSE CENTER (800-424-8802) IF PRODUCT HAS ENTERED A WATERCOURSE. ADVISE LOCAL AND STATE EMERGENCY SERVICES AGENCIES, IF APPROPRIATE.

WASTE DISPOSAL METHOD:

PREFERRED METHOD OF DISPOSAL IS BURNING AS A VAPOR IN A PROPERLY DESIGNED FLARE. SPECIAL CARE MUST BE TAKEN TO ENSURE COMPLETE DISSIPATION OF GAS BELOW LOWER EXPLOSIVE LIMIT AND TO PREVENT CLOUD FORMATION.

SECTION 8 - HANDLING AND STORAGE PRECAUTIONS

PRODUCT SHOULD BE HANDLED AND STORED IN ACCORDANCE WITH INDUSTRY ACCEPTED PRACTICES. IN THE ABSENCE OF SPECIFIC LOCAL CODE REQUIREMENTS, NFPA OR OSHA REQUIREMENTS SHOULD BE FOLLOWED. USE APPROPRIATE GROUNDING AND BONDING PRACTICES. STORE IN PROPERLY CLOSED CONTAINERS THAT ARE APPROPRIATELY LABELED. DO NOT EXPOSE TO HEAT, OPEN FLAME, STRONG OXIDIZERS OR OTHER SOURCES OF IGNITION.

SECTION 9 - HAZARD WARNING

DANGER!

EXTREMELY FLAMMABLE
LIQUID AND GAS UNDER PRESSURE
LIQUID CAN CAUSE FROST BURNS.

CONTAINS BENZENE WHICH MAY CAUSE
CANCER OR BE TOXIC TO BLOOD-FORMING ORGANS.

SECTION 10 - COMMENTS

PRODUCT NAME: NATURAL GAS - RAW LIQUID MIX
MSDS NO: 199MAR001

SECTION 11 - REGULATORY INFORMATION

SARA TITLE III/SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 - SECTIONS 302, 304, 311, 312 AND 313.

THE FOLLOWING REGULATIONS APPLY TO THIS PRODUCT:

SECTIONS 311 AND 312 - MATERIAL SAFETY DATA SHEET REQUIREMENTS:

40 CFR PART 370 (52 FR 38344 - OCTOBER 15, 1987).

DEPENDING ON LOCAL, STATE, AND FEDERAL REGULATIONS, MATERIAL SAFETY DATA SHEETS (MSDS'S) OR LISTS OF MSDS'S (PRODUCT NAMES) MAY BE REQUIRED TO BE SUBMITTED TO THE STATE EMERGENCY RESPONSE COMMISSION, LOCAL EMERGENCY PLANNING COMMITTEE, AND LOCAL FIRE DEPARTMENT IF YOU HAVE:

10,000 POUNDS OR MORE OF AN OSHA HAZARDOUS SUBSTANCE* OR
500 POUNDS OR THE THRESHOLD PLANNING QUANTITY WHICHEVER IS LESS, OF AN EXTREMELY HAZARDOUS SUBSTANCE.

* REPORTABLE QUANTITY LEVELS CAN VARY FROM STATE TO STATE AND YEAR TO YEAR DEPENDING ON APPLICABLE STATE AND/OR FEDERAL REGULATIONS.

THIS PRODUCT IS COVERED UNDER THE CRITERIA DEFINED IN OSHA'S HAZARD COMMUNICATION STANDARD 29 CFR 1910.1200 (52 FR 31852 - AUGUST 24, 1987) AND SHOULD BE REPORTED UNDER THE FOLLOWING EPA HAZARD CATEGORIES:

XX IMMEDIATE (ACUTE) HEALTH HAZARD
XX DELAYED (CHRONIC) HEALTH HAZARD
XX FIRE HAZARD
XX SUDDEN RELEASE OF PRESSURE HAZARD
REACTIVE HAZARD

SECTION 313 - TOXIC CHEMICAL RELEASE REPORTING:

40 CFR PART 372 (53 FR 4500 - FEBRUARY 16, 1988; 53 FR 12728 - APRIL 18, 1988; 53 FR 23108 - JUNE 20, 1988).

THIS PRODUCT CONTAINS THE FOLLOWING COMPONENT(S) (AT A LEVEL OF 1% OR GREATER IF HAZARDOUS; 0.1% OR GREATER IF CARCINOGENIC) THAT IS/ARE IDENTIFIED ON THE SECTION 313 TOXIC CHEMICAL LIST:

----COMPONENT----	----CAS NUMBER----
BENZENE	71-43-2

SECTION 12 - REGULATIONS/COMMENTS CONTINUED

DEPARTMENT OF TRANSPORTATION:

49 CFR 172.101 AS REVISED ON OCTOBER 1, 1988.

PROPER SHIPPING NAME -- LIQUIFIED PETROLEUM GAS
DOT CLASSIFICATION -- FLAMMABLE GAS
DOT IDENTIFICATION NUMBER -- UN 1075

INFORMATION SUPPLIED BY: COORDINATOR, TOXICOLOGY AND PRODUCT SAFETY
CRAIG M PARKER PHONE: (419)422-2121

MSDS DATE: / / DATE OF PREVIOUS MSDS: / /

PRODUCT NAME: PETROLEUM CRUDE OIL
MSDS NO: 110MAR001

THE FOLLOWING INFORMATION IS FURNISHED SUBJECT TO THE DISCLAIMER ON THE BOTTOM OF THIS FORM

SECTION 1 - PRODUCT IDENTIFICATION

PRODUCT NAME: PETROLEUM CRUDE OIL

SYNONYMS:
CRUDE OIL; PETROLEUM CRUDE OIL;

MANUFACTURER / DISTRIBUTOR:
MARATHON PETROLEUM COMPANY
539 SOUTH MAIN STREET
FINDLAY, OH
45840

EMERGENCY PHONE NUMBERS:
(419) 422-2121 (MARATHON)
(800) 424-9300 (CHEMTREC)

CHEMICAL FAMILY: PETROLEUM HYDROCARBON
CHEMICAL FORMULA:

CAS NO: 8002-05-9

SECTION 2 - PHYSICAL PROPERTIES

BOILING POINT		MELTING POINT		SPECIFIC GRAVITY(H2O=1)
100-1000	F	N.A.	F	0.8-1.0
	C		C	

% SOLUBILITY IN WATER	VAPOR DENSITY(AIR=1)	VAPOR PRESSURE
NEGLIGIBLE	N.D.A.	0-724 MM HG

PH INFORMATION: PH: N.A. AT CONC.
APPEARANCE: BROWN/BLACK VISCOUS LIQUID ODOR: HYDROCARBON ODOR

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT		AUTOIGNITION TEMP		EXPLOSIVE LIMITS (% BY VOLUME IN AIR)
20-100	F	N.D.A.	F	LOWER/UPPER: N.D.A./N.D.A.
	C		C	

NFPA CLASS -- HEALTH: FIRE: REACTIVITY: OTHER:

SPECIFIC HAZARD: NONE

EXTINGUISHING MEDIA:

CLASS B FIRE EXTINGUISHING MEDIA SUCH AS HALON, CO2, DRY CHEMICAL OR WATER SPRAY CAN BE USED. FIRE FIGHTING SHOULD BE ATTEMPTED ONLY BY THOSE WHO ARE ADEQUATELY TRAINED.

SPECIAL FIRE FIGHTING PROCEDURES:

AVOID USING SOLID WATER STREAMS. WATER SPRAY AND FOAM MUST BE APPLIED CAREFULLY TO AVOID FROTHING. AVOID EXCESSIVE APPLICATION. WATER CAN BE USED TO COOL EXPOSED SURFACES.

PRODUCT NAME: PETROLEUM CRUDE OIL
MSDS NO: 110MAR001

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA (CON'T)

STABILITY: THE MATERIAL IS STABLE AT 70 F, 760MM PRESSURE
CONDITIONS TO AVOID:
EXCESSIVE HEAT, SOURCES OF IGNITION

HAZARDOUS DECOMPOSITION PRODUCTS:
CARBON MONOXIDE, HYDROGEN SULFIDE, ALDEHYDES, AROMATICS, OTHER HYDROCARBONS

INCOMPATIBLE MATERIALS:
STRONG OXIDIZERS

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

SECTION 4 - PRODUCT COMPOSITION AND EXPOSURE LIMITS

EXPOSURE LIMITS FOR PRODUCT:	TLV	SOURCE
PETROLEUM CRUDE OIL	NONE ESTABLISHED	

COMPONENTS:	PERCENT RANGE	TLV			SOURCE
PETROLEUM CRUDE OIL	98.00-100.00			( )	
SULFUR	.01- 4.00			( )	
HYDROGEN SULFIDE	< .05	10.00	PPM	(8 HR TWA)	ACGIH
		15.00	PPM	(STEL)	ACGIH
		10.00	PPM	(8 HR TWA)	OSHA
		15.00	PPM	(STEL)	OSHA
BENZENE	.01- 2.00	10.00	PPM	(8 HR TWA)	ACGIH
		1.00	PPM	(8 HR TWA)	OSHA
		5.00	PPM	(STEL)	OSHA

OSHA ACTION LEVEL 0.50 PPM (8 HR TWA) OSHA

***
COMPLEX MIXTURE OF PARAFFINIC, CYCLOPARAFFINIC, AND AROMATIC HYDROCARBONS. CAN CONTAIN MINOR AMOUNTS OF SULFUR, NITROGEN AND OXYGEN CONTAINING ORGANIC COMPOUNDS AS WELL AS TRACE AMOUNTS OF HEAVY METALS SUCH AS NICKEL, VANADIUM AND LEAD. MAY CONTAIN 5-10% POLYCYCLIC AROMATIC HYDROCARBONS. COMPOSITION VARIES DEPENDING ON SOURCE OF CRUDE.

PRODUCT NAME: PETROLEUM CRUDE OIL
MSDS NO: 110MAR001

SECTION 5 - POTENTIAL HEALTH EFFECTS

EYE:

LIQUID OR VAPOR CONTACT MAY RESULT IN SLIGHT EYE IRRITATION.

SKIN:

PROLONGED AND REPEATED LIQUID CONTACT CAN CAUSE DERMATITIS, FOLLICULITIS OR OIL ACNE.

INHALATION:

HIGH CONCENTRATIONS MAY PRODUCE HEADACHE, GIDDINESS, VERTIGO AND ANESTHETIC STUPOR. SEE SECTION EIGHT REGARDING POSSIBLE ACCUMULATION OF HYDROGEN SULFIDE GAS.

INGESTION:

MAY BE TOXIC BY INGESTION. ASPIRATION (BREATHING) OF VOMITUS OF THE LIGHT HYDROCARBON FRACTION INTO THE LUNG CAN PRODUCE CHEMICAL PNEUMONITIS.

ADDITIONAL TOXICITY INFORMATION:

LIFETIME SKIN PAINTING STUDIES WITH DIFFERENT WHOLE CRUDE OILS HAVE PRODUCED TUMORS IN ANIMALS FOLLOWING PROLONGED AND REPEATED SKIN CONTACT. THE EXACT RELATIONSHIP BETWEEN THESE RESULTS AND HUMAN HEALTH IS NOT KNOWN. CHRONIC HUMAN HEALTH EFFECTS WOULD NOT BE EXPECTED AS LONG AS GOOD PERSONAL HYGIENE AND PROPER SAFETY PRECAUTIONS ARE PRACTICED.

REPEATED OR PROLONGED EXPOSURE TO BENZENE EVEN AT RELATIVELY LOW CONCENTRATIONS MAY CAUSE SERIOUS INJURY TO BLOOD-FORMING ORGANS. SIGNIFICANT CHRONIC EXPOSURE TO BENZENE VAPOR HAS BEEN REPORTED TO PRODUCE VARIOUS BLOOD DISORDERS, RANGING FROM ANEMIA TO LEUKEMIA (CANCER) IN MAN. BENZENE PRODUCED TUMORS IN RATS AND MICE IN LIFETIME CHRONIC TOXICITY STUDIES, BUT THE RESPONSE HAS NOT BEEN CONSISTENT ACROSS SPECIES, STRAIN, SEX OR ROUTE OF EXPOSURE. ANIMAL STUDIES ON BENZENE HAVE DEMONSTRATED IMMUNE TOXICITY, TESTICULAR EFFECTS AND ALTERATIONS IN REPRODUCTIVE CYCLES, EVIDENCE OF CHROMOSOMAL DAMAGE OR OTHER CHROMOSOMAL CHANGES, AND EMBRYO/FETOTOXICITY, BUT NOT TERATOGENICITY.

HYDROGEN SULFIDE GAS (H2S) IS TOXIC BY INHALATION. PROLONGED BREATHING OF 50-100 PPM H2S VAPORS CAN PRODUCE EYE AND RESPIRATORY TRACT IRRITATION. HIGHER CONCENTRATIONS (250-600 PPM) FOR 15-30 MINUTES, CAN PRODUCE HEADACHE, DIZZINESS, NERVOUSNESS, NAUSEA AND PULMONARY EDEMA OR BRONCHIAL PNEUMONIA. CONCENTRATIONS OF >1000 PPM WILL CAUSE IMMEDIATE UNCONSCIOUSNESS AND DEATH THROUGH RESPIRATORY PARALYSIS.

PRODUCT NAME: PETROLEUM CRUDE OIL
MSDS NO: 110MAR001

SECTION 5 - POTENTIAL HEALTH EFFECTS (CON'T)

EMERGENCY FIRST AID PROCEDURES

EYE:

FLUSH EYES WITH LARGE AMOUNTS OF WATER FOR AT LEAST 15 MINUTES. IF SYMPTOMS OR IRRITATION OCCUR, CALL A PHYSICIAN.

SKIN:

WASH WITH SOAP AND LARGE AMOUNTS OF WATER. REMOVE CONTAMINATED CLOTHING. IF SYMPTOMS OR IRRITATION OCCUR, CALL A PHYSICIAN.

INHALATION:

MOVE PERSON TO FRESH AIR. IF NOT BREATHING OR IF NO HEARTBEAT, GIVE ARTIFICIAL RESPIRATION OR CARDIOPULMONARY RESUSCITATION (CPR). IMMEDIATELY CALL A PHYSICIAN. IF SYMPTOMS OR IRRITATION OCCUR WITH ANY EXPOSURE, CALL A PHYSICIAN.

INGESTION:

INGESTION NOT LIKELY. IF SWALLOWED, DO NOT INDUCE VOMITING AND DO NOT GIVE LIQUIDS. IMMEDIATELY CALL A PHYSICIAN.

SECTION 6 - SPECIAL PROTECTION INFORMATION

VENTILATION:

LOCAL OR GENERAL EXHAUST REQUIRED IN ENCLOSED AREAS OR WITH INADEQUATE VENTILATION.

RESPIRATORY PROTECTION:

NOT NORMALLY REQUIRED FOR ROUTINE OPERATIONS. APPROVED ORGANIC VAPOR CARTRIDGE OR SUPPLIED AIR RESPIRATORS SHOULD BE USED IF OPERATING CONDITIONS CREATE AIRBORNE CONCENTRATIONS WHICH EXCEED EXPOSURE LIMITS FOR ANY INDIVIDUAL COMPONENTS (INCLUDING H2S). OBSERVE RESPIRATOR PROTECTION FACTOR CRITERIA CITED IN ANSI Z88.2 (1980). SELF-CONTAINED BREATHING APPARATUS SHOULD BE USED FOR FIRE FIGHTING.

PROTECTIVE GLOVES:

NEOPRENE, NITRILE, OR PVA GLOVES TO PREVENT SKIN CONTACT.

OTHER PROTECTIVE EQUIPMENT:

USE EXPLOSION-PROOF EQUIPMENT.

PRODUCT NAME: PETROLEUM CRUDE OIL
MSDS NO: 110MAR001

SECTION 7 - SPILL OR LEAK PROCEDURES

ENVIRONMENTAL EFFECTS:

LIQUID CAN BE TOXIC TO AQUATIC LIFE.

STEPS TO BE TAKEN IN CASE OF SPILL, LEAK OR RELEASE:

KEEP PUBLIC AWAY. SHUT OFF SOURCE OF LEAK IF POSSIBLE TO DO SO WITHOUT HAZARD. ELIMINATE ALL IGNITION SOURCES. ADVISE NATIONAL RESPONSE CENTER (800-424-8802) IF PRODUCT HAS ENTERED A WATER COURSE. ADVISE LOCAL AND STATE EMERGENCY SERVICES AGENCIES, IF APPROPRIATE. CONTAIN LIQUID WITH SAND OR SOIL. RECOVER AND RETURN FREE LIQUID TO SOURCE. USE SUITABLE SORBENTS TO CLEAN UP RESIDUAL LIQUIDS.

WASTE DISPOSAL METHOD:

DISPOSE OF CLEANUP MATERIALS IN ACCORDANCE WITH APPLICABLE LOCAL, STATE AND FEDERAL REGULATIONS.

SECTION 8 - HANDLING AND STORAGE PRECAUTIONS

PRODUCT SHOULD BE HANDLED AND STORED IN ACCORDANCE WITH INDUSTRY ACCEPTED PRACTICES. IN THE ABSENCE OF SPECIFIC LOCAL CODE REQUIREMENTS, NFPA OR OSHA REQUIREMENTS SHOULD BE FOLLOWED. USE APPROPRIATE GROUNDING AND BONDING PRACTICES. STORE IN PROPERLY CLOSED CONTAINERS THAT ARE APPROPRIATELY LABELED. DO NOT EXPOSE TO HEAT, OPEN FLAME, OXIDIZERS OR OTHER SOURCES OF IGNITION.

HARMFUL CONCENTRATIONS OF HYDROGEN SULFIDE (H2S) GAS CAN ACCUMULATE IN STORAGE AND BULK TRANSPORT COMPARTMENTS. STAY UPWIND AND VENT OPEN HATCHES BEFORE UNLOADING. AVOID REPEATED OR PROLONGED SKIN CONTACT. EXERCISE GOOD PERSONAL HYGIENE INCLUDING REMOVAL OF SOILED CLOTHING AND PROMPT WASHING WITH SOAP AND WATER.

SECTION 9 - HAZARD WARNING

DANGER!

FLAMMABLE LIQUID

MAY VENT HARMFUL CONCENTRATIONS OF HYDROGEN SULFIDE (H2S) GAS WHICH CAN CAUSE RESPIRATORY IRRITATION AND ASPHYXIATION.

CONTAINS BENZENE WHICH MAY CAUSE CANCER OR BE TOXIC TO BLOOD-FORMING ORGANS.

SECTION 10 - COMMENTS

PRODUCT NAME: PETROLEUM CRUDE OIL
MSDS NO: 110MAR001

SECTION 11 - REGULATORY INFORMATION

SARA TITLE III/SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 - SECTIONS 302, 304, 311, 312 AND 313.

THE FOLLOWING REGULATIONS APPLY TO THIS PRODUCT:

SECTION 302 - EXTREMELY HAZARDOUS SUBSTANCES:

40 CFR PARTS 300 & 355 (52 FR 13378, 15412 - APRIL 28, 1987; 52 FR 48072 - DECEMBER 17, 1987; 53 FR 5574 - FEBRUARY 25, 1988).

THIS PRODUCT CONTAINS THE FOLLOWING COMPONENT(S) IDENTIFIED ON APPENDIX A AND B OF THE EXTREMELY HAZARDOUS SUBSTANCE LIST:

---COMPONENT---	REPORTABLE ---QUANTITY (LBS)---	THRESHOLD PLANNING --- QUANTITY (LBS) ---
HYDROGEN SULFIDE	100	500

SECTION 304 - EMERGENCY RELEASE NOTIFICATIONS:

40 CFR PART 355 (52 FR 13378, 15412 - APRIL 28, 1987; 52 FR 48072 - DECEMBER 17, 1987; 53 FR 5574 - FEBRUARY 25, 1988).

THIS PRODUCT CONTAINS THE FOLLOWING COMPONENT(S) IDENTIFIED EITHER AS AN EXTREMELY HAZARDOUS SUBSTANCE (SEE SECTION 302) OR A CERCLA HAZARDOUS SUBSTANCE 40 CFR 302 (51 FR 34547 - SEPTEMBER 29, 1988) WHICH IN CASE OF A SPILL OR RELEASE MAY BE SUBJECT TO REPORTING REQUIREMENTS UNDER SECTION 304 OF TITLE III:

HYDROGEN SULFIDE

SECTIONS 311 AND 312 - MATERIAL SAFETY DATA SHEET REQUIREMENTS:

40 CFR PART 370 (52 FR 38344 - OCTOBER 15, 1987).

DEPENDING ON LOCAL, STATE, AND FEDERAL REGULATIONS, MATERIAL SAFETY DATA SHEETS (MSDS'S) OR LISTS OF MSDS'S (PRODUCT NAMES) MAY BE REQUIRED TO BE SUBMITTED TO THE STATE EMERGENCY RESPONSE COMMISSION, LOCAL EMERGENCY PLANNING COMMITTEE, AND LOCAL FIRE DEPARTMENT IF YOU HAVE:

10,000 POUNDS OR MORE OF AN OSHA HAZARDOUS SUBSTANCE* OR
500 POUNDS OR THE THRESHOLD PLANNING QUANTITY WHICHEVER IS LESS, OF AN EXTREMELY HAZARDOUS SUBSTANCE.

* REPORTABLE QUANTITY LEVELS CAN VARY FROM STATE TO STATE AND YEAR TO YEAR DEPENDING ON APPLICABLE STATE AND/OR FEDERAL REGULATIONS.

PRODUCT NAME: PETROLEUM CRUDE OIL
MSDS NO: 110MAR001

SECTION 12 - REGULATIONS/COMMENTS CONTINUED

THIS PRODUCT IS COVERED UNDER THE CRITERIA DEFINED IN OSHA'S HAZARD COMMUNICATION STANDARD 29 CFR 1910.1200 (52 FR 31852 - AUGUST 24, 1987) AND SHOULD BE REPORTED UNDER THE FOLLOWING EPA HAZARD CATEGORIES:

XX IMMEDIATE (ACUTE) HEALTH HAZARD
XX DELAYED (CHRONIC) HEALTH HAZARD
XX FIRE HAZARD
SUDDEN RELEASE AOF PRESSURE HAZARD
REACTIVE HAZARD

SECTION 313 - TOXIC CHEMICAL RELEASE REPORTING:

40 CFR PART 372 (53 FR 4500 - FEBRUARY 16, 1988; 53 FR 12728 - APRIL 18, 1988; 53 FR 23108 - JUNE 20, 1988).

THIS PRODUCT CONTAINS THE FOLLOWING COMPONENT(S) (AT A LEVEL OF 1% OR GREATER IF HAZARDOUS; 0.1% OR GREATER IF CARCINOGENIC) THAT IS/ ARE IDENTIFIED ON THE SECTION 313 TOXIC CHEMICAL LIST:

----COMPONENT----	----CAS NUMBER----
BENZENE	71-43-2

DEPARTMENT OF TRANSPORTATION:

49 CFR 172.101 AS REVISED ON OCTOBER 1, 1988.

PROPER SHIPPING NAME -- CRUDE OIL, PETROLEUM
DOT CLASSIFICATION -- FLAMMABLE LIQUID
DOT IDENTIFICATION NUMBER -- UN 1267

INFORMATION SUPPLIED BY: COORDINATOR, TOXICOLOGY AND PRODUCT SAFETY
CRAIG M PARKER PHONE: (419)422-2121

MSDS DATE: 08/05/85 DATE OF PREVIOUS MSDS: / /

PRODUCT NAME: SULFUR
MSDS NO: 101MAR001

THE FOLLOWING INFORMATION IS FURNISHED SUBJECT TO THE DISCLAIMER ON THE BOTTOM OF THIS FORM

SECTION 1 - PRODUCT IDENTIFICATION

PRODUCT NAME: SULFUR

SYNONYMS:
BRIMSTONE; FLOWERS OF SULFUR; SULFUR; SULPHUR; ROLL ARROW SULFUR

MANUFACTURER / DISTRIBUTOR:
MARATHON PETROLEUM COMPANY
539 SOUTH MAIN STREET
FINDLAY, OH
45840
EMERGENCY PHONE NUMBERS:
(419) 422-2121 (MARATHON)
(800) 424-9300 (CHEMTREC)

CHEMICAL FAMILY: NON-METALLIC ELEMENT
CHEMICAL FORMULA: S OR S8 CAS NO: 7704-34-9

SECTION 2 - PHYSICAL PROPERTIES

BOILING POINT	MELTING POINT	SPECIFIC GRAVITY(H2O=1)
832 F	233 F	1.8 LIQUID
C	C	

% SOLUBILITY IN WATER	VAPOR DENSITY(AIR=1)	VAPOR PRESSURE
INSOLUBLE	N.A.	1 MM HG @ 362 F

PH INFORMATION: PH: N.A. AT CONC.
APPEARANCE: YELLOW POWDER OR MOLTEN LIQUID ODOR: FAINT ROTTEN EGG ODOR

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT	AUTOIGNITION TEMP	EXPLOSIVE LIMITS (% BY VOLUME IN AIR)
405 F	450 F	LOWER/UPPER: N.D.A.
C	C	

NFPA CLASS -- HEALTH: FIRE: REACTIVITY: OTHER:

SPECIFIC HAZARD: NONE

EXTINGUISHING MEDIA:

CLASS B FIRE EXTINGUISHING MEDIA SUCH AS HALON, CO2, OR DRY CHEMICAL CAN BE USED. FIRE FIGHTING SHOULD BE ATTEMPTED ONLY BY THOSE WHO ARE ADEQUATELY TRAINED.

SPECIAL FIRE FIGHTING INSTRUCTIONS:

AVOID USING SOLID WATER STREAMS. WATER SPRAY AND FOAM MUST BE APPLIED CAREFULLY TO AVOID FROTHOVER OR CREATION OF DUST CLOUDS. AVOID EXCESSIVE APPLICATION. USE WATER SPRAY TO COOL EXPOSED SURFACES.

PRODUCT NAME: SULFUR
MSDS NO: 101MAR001

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA (CON'T)

STABILITY: THE MATERIAL IS STABLE AT 70 F, 760MM PRESSURE
CONDITIONS TO AVOID:
OVERHEATING, SOURCES OF IGNITION. DUSTS OR VAPORS CAN FORM EXPLOSIVE MIXTURES WITH AIR.

HAZARDOUS DECOMPOSITION PRODUCTS:
COMBUSTION PRODUCES TOXIC OXIDES OF SULFUR, SULFUR DIOXIDE AND HYDROGEN SULFIDE.

INCOMPATIBLE MATERIALS:
STRONG OXIDIZERS

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

SECTION 4 - PRODUCT COMPOSITION AND EXPOSURE LIMITS

EXPOSURE LIMITS FOR PRODUCT:	TLV	SOURCE
SULFUR	NONE ESTABLISHED	

COMPONENTS:	PERCENT RANGE	TLV	SOURCE
SULFUR	100.00	( )	

NO TLV ESTABLISHED. THE ACGIH NUISANCE DUST TLV OF 10 MG/M3 CAN BE USED FOR SULFUR DUST.

SECTION 5 - POTENTIAL HEALTH EFFECTS

EYE:

MOLTEN SULFUR CAUSES SEVERE BURNS. SULFUR DUST IS MILDLY IRRITATING TO THE EYES.

SKIN:

MOLTEN SULFUR CAUSES SEVERE BURNS. REPEATED SKIN CONTACT (DUST) MAY CAUSE IRRITATION.

INHALATION:

INHALATION OF DUST CAN CAUSE RESPIRATORY TRACT IRRITATION. VAPORS AND FUMES CAN CAUSE RESPIRATORY AND NASAL IRRITATION. SEE SECTION EIGHT REGARDING POSSIBLE FORMATION/ACCUMULATION OF HYDROGEN SULFIDE GAS.

INGESTION:

SULFUR HAS A LOW ORDER OF ACUTE TOXICITY.

PRODUCT NAME: SULFUR
MSDS NO: 101MAR001

SECTION 5 - POTENTIAL HEALTH EFFECTS (CON'T)

ADDITIONAL TOXICITY INFORMATION:

HYDROGEN SULFIDE GAS (H2S) IS TOXIC BY INHALATION. PROLONGED BREATHING OF 50-100 PPM H2S VAPORS CAN PRODUCE EYE AND RESPIRATORY TRACT IRRITATION. HIGHER CONCENTRATIONS (250-600 PPM) FOR 15-30 MINUTES, CAN PRODUCE HEADACHE, DIZZINESS, NERVOUSNESS, NAUSEA AND PULMONARY EDEMA OR BRONCHIAL PNEUMONIA. CONCENTRATIONS OF >1000 PPM WILL CAUSE IMMEDIATE UNCONSCIOUSNESS AND DEATH THROUGH RESPIRATORY PARALYSIS.

EMERGENCY FIRST AID PROCEDURES

EYE:

MOLTEN (HOT LIQUID) - GENTLY FLUSH EYES WITH LARGE AMOUNTS OF WATER. IMMEDIATELY CALL A PHYSICIAN.
DUST - FLUSH EYES WITH LARGE AMOUNTS OF WATER FOR AT LEAST 15 MINUTES. CALL A PHYSICIAN IF SYMPTOMS OR IRRITATION OCCUR.

SKIN:

MOLTEN (HOT LIQUID) - DO NOT REMOVE SULFUR. IMMEDIATELY FLUSH WITH COOL WATER FOR AT LEAST 15 MINUTES. IMMEDIATELY CALL A PHYSICIAN.
DUST - WASH WITH SOAP AND LARGE AMOUNTS OF WATER. CALL A PHYSICIAN IF SYMPTOMS OR IRRITATION OCCUR.

INHALATION:

MOVE PERSON TO FRESH AIR. IF NOT BREATHING OR IF NO HEARTBEAT, GIVE ARTIFICIAL RESPIRATION OR CARDIOPULMONARY RESUSCITATION (CPR). IMMEDIATELY CALL A PHYSICIAN. IF SYMPTOMS OR IRRITATION OCCUR WITH ANY EXPOSURE CALL A PHYSICIAN.

INGESTION:

INGESTION NOT LIKELY. IF LARGE AMOUNTS ARE SWALLOWED, IMMEDIATELY CALL A PHYSICIAN.

SECTION 6 - SPECIAL PROTECTION INFORMATION

VENTILATION:

LOCAL OR GENERAL EXHAUST REQUIRED IN ENCLOSED AREAS OR WITH INADEQUATE VENTILATION.

PRODUCT NAME: SULFUR
MSDS NO: 101MAR001

SECTION 6 - SPECIAL PROTECTION INFORMATION (CON'T)

RESPIRATORY PROTECTION:

HOT LIQUID - USE ATMOSPHERE SUPPLYING RESPIRATOR IN CONFINED SPACES OR WHEN H2S CONCENTRATIONS EXCEED PERMISSIBLE LIMITS.
DUST - USE DUST RESPIRATOR WHEN EXPOSURES EXCEED 10 MG/M3 (NUISANCE DUST TLV). SELF-CONTAINED BREATHING APPARATUS SHOULD BE USED FOR FIRE FIGHTING.

EYE PROTECTION:

GOGGLES AND FACESHIELD (HOT LIQUID). GOGGLES (DUST).

PROTECTIVE GLOVES:

INSULATED GLOVES (MOLTEN SULFUR) TO PREVENT BURNS. RUBBER GLOVES FOR SULFUR DUST.

OTHER PROTECTIVE EQUIPMENT:

USE MECHANICAL VENTILATION EQUIPMENT THAT IS EXPLOSION-PROOF.

SECTION 7 - SPILL OR LEAK PROCEDURES

ENVIRONMENTAL EFFECTS:

N.D.A.

STEPS TO BE TAKEN IN CASE OF SPILL, LEAK OR RELEASE:

STOP SOURCE OF LEAK. ELIMINATE SOURCES OF IGNITION. CONTAIN BY DIKING OR IMPOUNDING. ABSORBENT CAN BE USED TO CONTAIN SPILL. AFTER COOLING, SULFUR MAY BE COLLECTED FOR DISPOSAL. MINIMIZE CREATING DUST CLOUDS DURING CLEANUP. ADVISE POLICE AND NATIONAL RESPONSE CENTER (800-424-8802) IF SUBSTANCE HAS ENTERED A WATER COURSE OR SEWER.

WASTE DISPOSAL METHOD:

CONTACT LOCAL OR STATE ENVIRONMENTAL AGENCY FOR GUIDANCE AS TO PROPER METHOD AND LOCATION OF DISPOSAL IN YOUR AREA.

SECTION 8 - HANDLING AND STORAGE PRECAUTIONS

PRODUCT SHOULD BE HANDLED AND STORED IN ACCORDANCE WITH INDUSTRY ACCEPTED PRACTICES. IN THE ABSENCE OF SPECIFIC LOCAL CODE REQUIREMENTS, NFPA OR OSHA REQUIREMENTS SHOULD BE FOLLOWED. USE APPROPRIATE GROUNDING AND BONDING PRACTICES. STORE IN PROPERLY CLOSED CONTAINERS THAT ARE APPROPRIATELY LABELED. DO NOT EXPOSE TO HEAT, OPEN FLAME, OXIDIZERS OR OTHER SOURCES OF IGNITION. AVOID SKIN CONTACT. EXERCISE GOOD PERSONAL HYGIENE INCLUDING REMOVAL OF SOILED CLOTHING AND PROMPT WASHING WITH SOAP AND WATER.

HYDROGEN SULFIDE (H2S) MAY ACCUMULATE IN VAPOR SPACE IN STORAGE TANKS AND BULK TRANSPORT COMPARTMENTS. STAY UPWIND AND VENT OPENED HATCHES BEFORE UNLOADING.

PRODUCT NAME: SULFUR
MSDS NO: 101MAR001

SECTION 9 - HAZARD WARNING

WARNING - HOT SULFUR

MOLTEN SULFUR CAUSES SEVERE BURNS

MAY VENT HARMFUL CONCENTRATIONS OF HYDROGEN SULFIDE (H_2S) GAS WHICH CAN CAUSE RESPIRATORY IRRITATION AND ASPHYXIATION.

SECTION 10 - COMMENTS

PRODUCT NAME: SULFUR
MSDS NO: 101MAR001

SECTION 11 - REGULATORY INFORMATION

SARA TITLE III/SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 - SECTIONS 302, 304, 311, 312 AND 313.

THE FOLLOWING REGULATIONS APPLY TO THIS PRODUCT:

SECTION 302 - EXTREMELY HAZARDOUS SUBSTANCES:

40 CFR PARTS 300 & 355 (52 FR 13378, 15412 - APRIL 28, 1987; 52 FR 48072 - DECEMBER 17, 1987; 53 FR 5574 - FEBRUARY 25, 1988).

THIS PRODUCT CONTAINS THE FOLLOWING COMPONENT(S) IDENTIFIED ON APPENDIX A AND B OF THE EXTREMELY HAZARDOUS SUBSTANCE LIST:

---COMPONENT---	REPORTABLE ---QUANTITY (LBS)---	THRESHOLD PLANNING --- QUANTITY (LBS)---
HYDROGEN SULFIDE	100	500

SECTION 304 - EMERGENCY RELEASE NOTIFICATIONS:

40 CFR PART 355 (52 FR 13378, 15412 - APRIL 28, 1987; 52 FR 48072 - DECEMBER 17, 1987; 53 FR 5574 - FEBRUARY 25, 1988).

THIS PRODUCT CONTAINS THE FOLLOWING COMPONENT(S) IDENTIFIED EITHER AS AN EXTREMELY HAZARDOUS SUBSTANCE (SEE SECTION 302) OR A CERCLA HAZARDOUS SUBSTANCE 40 CFR 302 (51 FR 34547 - SEPTEMBER 29, 1988) WHICH IN CASE OF A SPILL OR RELEASE MAY BE SUBJECT TO REPORTING REQUIREMENTS UNDER SECTION 304 OF TITLE III:

HYDROGEN SULFIDE

SECTION 311 AND 312 - MATERIAL SAFETY DATA SHEET REQUIREMENTS:

40 CFR PART 370 (52 FR 38344 - OCTOBER 15, 1987).

DEPENDING ON LOCAL, STATE, AND FEDERAL REGULATIONS, MATERIAL SAFETY DATA SHEETS (MSDS'S) OR LISTS OF MSDS'S (PRODUCT NAMES) MAY BE REQUIRED TO BE SUBMITTED TO THE STATE EMERGENCY RESPONSE COMMISSION, LOCAL EMERGENCY PLANNING COMMITTEE, AND LOCAL FIRE DEPARTMENT IF YOU HAVE:

10,000 POUNDS OR MORE OF AN OSHA HAZARDOUS SUBSTANCE* OR
500 POUNDS OR THE THRESHOLD PLANNING QUANTITY WHICHEVER IS LESS, OF AN EXTREMELY HAZARDOUS SUBSTANCE.

* REPORTABLE QUANTITY LEVELS CAN VARY FROM STATE TO STATE AND YEAR TO YEAR DEPENDING ON APPLICABLE STATE AND/OR FEDERAL REGULATIONS.

PRODUCT NAME: SULFUR
MSDS NO: 101MAR001

SECTION 12 - REGULATIONS/COMMENTS CONTINUED

THIS PRODUCT IS COVERED UNDER THE CRITERIA DEFINED IN OSHA'S HAZARD COMMUNICATION STANDARD 29 CFR 1910.1200 (52 FR 31852 - AUGUST 24, 1987) AND SHOULD BE REPORTED UNDER THE FOLLOWING EPA HAZARD CATEGORIES:

XX IMMEDIATE (ACUTE) HEALTH HAZARD
DELAYED (CHRONIC) HEALTH HAZARD
FIRE HAZARD
SUDDEN RELEASE OF PRESSURE HAZARD
REACTIVE HAZARD

DEPARTMENT OF TRANSPORTATION CLASSIFICATION:

49 CFR 172.101 AS REVISED ON OCTOBER 1, 1987.

PROPER SHIPPING NAME -- SULFUR, MOLTEN
DOT CLASSIFICATION -- ORM-C
DOT IDENTIFICATION NUMBER -- UN 2448

INFORMATION SUPPLIED BY: COORDINATOR, TOXICOLOGY AND PRODUCT SAFETY
CRAIG M. PARKER PHONE: (419)422-2121

MSDS DATE: 06/21/85 DATE OF PREVIOUS MSDS: / /

PRODUCT NAME: WASP AND HORNET SPRAY
MSDS NO: 115BOW001

THE FOLLOWING INFORMATION IS FURNISHED SUBJECT TO THE DISCLAIMER ON THE BOTTOM OF THIS FORM

SECTION 1 - PRODUCT IDENTIFICATION

PRODUCT NAME: WASP AND HORNET SPRAY

SYNONYMS:
WASP AND HORNET SPRAY; WASP & HORNET SPRAY; WASP-HORNET SPRAY

MANUFACTURER / DISTRIBUTOR:
BOWMAN DIST. BARNES GROUP INC.
850 E. 72ND STREET
CLEVELAND, OHIO
44103

EMERGENCY PHONE NUMBERS:
(419) 422-2121 (MARATHON)
(800) 424-9300 (CHEMTREC)

CHEMICAL FAMILY: PRESSURIZED PRODUCT
CHEMICAL FORMULA: TM-2072 CAS NO:

SECTION 2 - PHYSICAL PROPERTIES

BOILING POINT		MELTING POINT		SPECIFIC GRAVITY(H2O=1)
N/A	F		F	N/A
	C		C	

% SOLUBILITY IN WATER	VAPOR DENSITY(AIR=1)	VAPOR PRESSURE
<1	4.0	140 PSI @130F

PH INFORMATION: PH: N/A AT CONC.
APPEARANCE: CLEAR LIQUID GAS ODOR: SOLVENT

PERCENT SOLID BY WEIGHT (%): NONE

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT		AUTOIGNITION TEMP		EXPLOSIVE LIMITS (% BY VOLUME IN AIR)
NONE	F		F	LOWER/UPPER: NONE/NONE
	C		C	

NFPA CLASS -- HEALTH: FIRE: REACTIVITY: OTHER:

SPECIFIC HAZARD: NONE

---------- FIRE AND EXPLOSION HAZARDS ----------

AT ELEVATED TEMPERATURES (130 OR OVER) CONTAINERS MAY VENT, RUPTURE OR BURST.

---------- EXTINGUISHING MEDIA ----------

WATERFOG, FOAM, CO2, OR DRY CHEMICAL

--------- SPECIAL FIRE FIGHTING INSTRUCTIONS ----------

KEEP CONTAINERS COOL. USE EQUIPMENT OR SHIELDING REQUIRED TO PROTECT PERSONNEL AGAINST BURSTING AND VENTING CONTAINERS.

PRODUCT NAME: WASP AND HORNET SPRAY
MSDS NO: 115BOW001

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA (CON'T)

STABILITY: THE MATERIAL IS STABLE AT 70 F, 760MM PRESSURE
CONDITIONS TO AVOID:
PRESSURIZED CONTAINERS COULD RUPTURE ABOVE 130F

HAZARDOUS DECOMPOSITION PRODUCTS:
(FROM BURNING) CARBON DIOXIDE, CARBON MONOXIDE AND WATER

INCOMPATIBLE MATERIALS:
NONE

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR
CONDITIONS TO AVOID:
NONE

SECTION 4 - PRODUCT COMPOSITION AND EXPOSURE LIMITS

EXPOSURE LIMITS FOR PRODUCT: TLV SOURCE

WASP AND HORNET SPRAY NONE ESTABLISHED

COMPONENTS:	PERCENT RANGE	TLV			
PYRETHRINS	.07			( )	
PIPERONYL BUTOXIDE	.18			( )	
CARBARYL	.50	5.00	MG/M3	(8 HR TWA)	ACGIH
		5.00	MG/M3	(8 HR TWA)	OSHA
PETROLEUM DISTILLATES	24.20			( )	
		400.00	PPM	(8 HR TWA)	OSHA
INERT INGREDIENTS	25.80			( )	
1,1,1 TRICHLOROETHANE	46.30	350.00	PPM	(8 HR TWA)	ACGIH
CARBON DIOXIDE	3.00	5000.00	PPM	(8 HR TWA)	ACGIH
		30000.00	PPM	(STEL)	ACGIH
		10000.00	PPM	(8 HR TWA)	OSHA
		30000.00	PPM	(STEL)	OSHA

SECTION 5 - POTENTIAL HEALTH EFFECTS

-------- ROUTES OF EXPOSURE AND EFFECTS - EYE ---------

-------- ROUTES OF EXPOSURE AND EFFECTS - SKIN --------

PRIMARY ROUTE OF EXPOSURE.

----- ROUTES OF EXPOSURE AND EFFECTS - INHALATION -----

PRIMARY ROUTE OF EXPOSURE. MAY CAUSE DIZZINESS OR IN EXTREME CASE ABSENCE OF OXYGEN COULD PRODUCE NARCOSIS.

------ ROUTES OF EXPOSURE AND EFFECTS - INGESTION -----

PRODUCT NAME: WASP AND HORNET SPRAY
MSDS NO: 115BOW001

SECTION 5 - POTENTIAL HEALTH EFFECTS (CON'T)

---------- ADDITIONAL TOXICITY INFORMATION ----------

EMERGENCY FIRST AID PROCEDURES

---------- FIRST AID - EYE ----------

IF SPRAYED IN EYES, FLUSH IMMEDIATELY WITH LARGE QUANTITIES OF WATER.

---------- FIRST AID - SKIN ----------

---------- FIRST AID - INHALATION ----------

IF UNCONSCIOUS, REMOVE PERSON TO FRESH AIR AND CALL A PHYSICIAN.

---------- FIRST AID - INGESTION ----------

SECTION 6 - SPECIAL PROTECTION INFORMATION

---------- VENTILATION ----------

LOCAL EXHAUST: NORMAL USE -- NORMAL VENTILATION

------ PERSONAL PROTECTIVE EQUIPMENT - RESPIRATOR -----

AVOID BREATHING CONCENTRATED VAPORS OR PARTICLES FROM ALL PRODUCTS NOT SPECIFICALLY DESIGNED TO BE INHALED.

---------- PERSONAL PROTECTIVE EQUIPMENT - EYE -------

SAFETY GLASSES REQUIRED

-------- PERSONAL PROTECTIVE EQUIPMENT - GLOVES -------

N/A

---------- OTHER PROTECTIVE EQUIPMENT ----------

NONE

PRODUCT NAME: WASP AND HORNET SPRAY
MSDS NO: 115BOW001

SECTION 7 - SPILL OR LEAK PROCEDURES

---------- ENVIRONMENTAL EFFECTS ----------

- STEPS TO BE TAKEN IN CASE OF SPILL, LEAK OR RELEASE -

FLUSH WITH LARGE QUANTITIES OF WATER. VENTILATE AREA.

---------- WASTE DISPOSAL METHOD ----------

DO NOT PUNCTURE OR INCINERATE CONTAINERS. GIVE TO A DISPOSAL SERVICE EQUIPPED TO SAFELY HANDLE AND DISPOSE OF PRESSURIZED CONTAINERS.

SECTION 8 - HANDLING AND STORAGE PRECAUTIONS

READ AND FOLLOW CAUTIONS ON PRODUCT LABEL. DO NOT STORE IN TEMPERATURE ABOVE 130F.

SECTION 9 - HAZARD WARNING

HAZARDOUS MATERIAL DESCRIPTION, PROPER SHIPPING NAME, HAZARD CLASS, HAZARD ID NO. (49 CFR 172.101): CONSUMER COMMODITY, ORM-D, UN1954

ADDITIONAL HAZARD CLASSES (AS APPLICABLE): NONE

CERCLA (SUPERFUND) REPORTABLE QUANTITY (IN LBS): UNKNOWN

RCRA HAZARDOUS WASTE NO. (40 CFR 261.33): U226

VOLATILE ORGANIC COMPOUND (VOC) (AS PACKAGED, MINUS WATER): NONE
THEORETICAL: 8.2 LB/GAL
ANALYTICAL: 8.2 LB/GAL

SECTION 10 - COMMENTS

SECTION 11 - REGULATORY INFORMATION

SECTION 12 - REGULATIONS/COMMENTS CONTINUED

PRODUCT NAME: WASP AND HORNET SPRAY
MSDS NO: 115B0W001

INFORMATION SUPPLIED BY: COORDINATOR, TOXICOLOGY AND PRODUCT SAFETY
PHONE: ( ) -

MSDS DATE: 08/28/87 DATE OF PREVIOUS MSDS: / /

DATE: 8/18/89 REVISED:	APPENDIX C	PAGE 1 of 1

SPCC PLAN

(Prior to completing Part I, refer to regulations and instructions page 5.)

SPILL PREVENTION CONTROL & COUNTERMEASURE PLAN

PART I
GENERAL INFORMATION

1. Name of facility: Indian Basin Gas Plant
2. Type of facility: Onshore Production Facility
3. Location of facility: Eddy County, New Mexico, approximately 20 miles W-NW of Carlsbad, New Mexico
4. Name and address of owner or operator:
   - Name: Marathon Oil Company
   - Address: P. O. Box 552
     Midland, Texas 79702
5. Designated person accountable for oil spill prevention at facility:
   - Name and title: S. D. York, Plant Superintendent
6. Facility experienced a reportable oil spill event during the twelve months prior to Jan. 10, 1974 (effective date of 40 CFR, Part 112). (If YES, complete Attachment #1.) No

MANAGEMENT APPROVAL

This SPCC Plan will be implemented as herein described.

Signature: R. S. Keisler

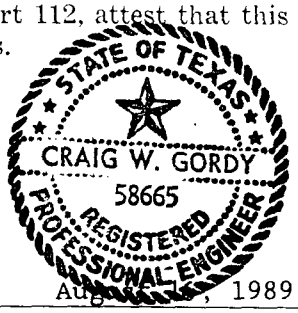
Name: R. S. Keisler

Title: Production Manager

CERTIFICATION

I hereby certify that I have examined the facility, and being familiar with the provisions of 40 CFR, Part 112, attest that this SPCC Plan has been prepared in accordance with good engineering practices.

(Seal)



Craig W. Gordy
Printed Name of Registered Professional Engineer

Craig W. Gordy
Signature of Registered Professional Engineer

Date: Aug [illegible], 1989

Registration No. PE-58865 State TX

PART I
GENERAL INFORMATION

7. Potential Spills — Prediction & Control:

	Source	Major Type of Failure	Total Quantity (bbls)	Rate (bbls/hr)	Direction of Flow*	Secondary Containment
2	Condensate Storage Tanks	Leaks, Tank Rupture	3400		S	No*
	Lube Oil Storage Tank	Leaks, Tank Rupture	210		S	No**
	Gasoline Storage Tank	Leaks, Tank Rupture	36		S	No**
	Temporary Lube Oil Storage Tank	Leaks, Tank Rupture	24		S	No**

Discussion:

Marathon Oil Company has not experienced a spill event at the gas plant during the entire time the gas plant has been in production.

* Currently in use are two horizontal vessels (old natural gasoline storage tanks) for condensate storage. These vessels do not have containment dikes, due to the fire hazard that would occur if an adjacent LPG tank failed and spilled its contents into the diked area.

**These vessels do not have containment dikes.

*Attach map if appropriate.

Name of facility Indian Basin Gas Plant

Operator Marathon Oil Company

PART I
GENERAL INFORMATION

[Response to statements should be: YES, NO, or NA (Not Applicable).]

8. Containment or diversionary structures or equipment to prevent oil from reaching navigable waters are practicable. (If NO, complete Attachment #2.) Yes

9. **Inspections and Records**
   A. The required inspections follow written procedures. Yes
   B. The written procedures and a record of inspections, signed by the appropriate supervisor or inspector, are attached. Yes
   Discussion:
   Marathon Oil Company makes periodic inspections of these facilities. Records are available at plant office.

   Daily visual inspection is made by operating personnel.
   Semi-annual inspection is conducted by the plant superintendent.
   In May, 1988, a new policy was implemented. A Mid-Continent Region spill report (see attached form) is to be completed by any employee following his/her knowledge of a spill into the environment as soon as practical after the spill has been investigated and the source and affected area secured. Such records serve to show the physical integrity of Marathon's operations. (CONTINUED BELOW)

10. **Personnel Training and Spill Prevention Procedures**
   A. Personnel are properly instructed in the following:
   (1) operation and maintenance of equipment to prevent oil discharges, and Yes
   (2) applicable pollution control laws, rules, and regulations. Yes
   Describe procedures employed for instruction: Instructions are narrative. Environmental Control and Site Security are discussed at safety meetings. Safety meetings are held on a monthly basis. Potential spill situations are reported immediately to the foreman and also reported by the safety committee on a monthly basis. Such situations are corrected.

   B. Scheduled prevention briefings for the operating personnel are conducted frequently enough to assure adequate understanding of the SPCC Plan. Yes
   Describe briefing program:
   Operation Management frequently reviews environmental standards at safety meetings. Such reviews assure an adequate understanding of SPCC. Operating superintendents are periodically requested to update Contingency Plans. Superintendents thereby assess and revise procedures when necessary.

   CONTINUED FROM ABOVE: Site security and loss prevention surveys also serve the inspection requirements of SPCC. Maintenance needs are expressed periodically at safety meetings. The minutes from safety meetings also serve to document Marathon's efforts in SPCC. Through the years, it was not considered practical to attach records to the plan.

Name of facility Indian Basin Gas Plant

Operator Marathon Oil Company

(Prior to completing Part II, Alternate A, refer to regulations and instructions pages 6-7.)

PART II. ALTERNATE A
DESIGN AND OPERATING INFORMATION
ONSHORE FACILITY (EXCLUDING PRODUCTION)

A. **Facility Drainage**

1. Drainage from diked storage areas is controlled as follows (include operating description of valves, pumps, ejectors, etc. *(Note: Flapper-type valves should not be used):*
By plant operators.
There are no drains in the dikes. It has not been necessary to remove any such oil in the history of the plant.

If a spill did occur, removal of oil within the dike would be done with a vacuum truck.

2. Drainage from undiked areas is controlled as follows (include description of ponds, lagoons, or catchment basins and methods of retaining and returning oil to facility):
~~(Attachment #2 applies.)~~

3. The procedure for supervising the drainage of rain water from secondary containment into a storm drain or an open watercourse is as follows (include description of (a) inspection for pollutants, and (b) method of valving security). (A record of inspection and drainage events is to be maintained on a form similar to Attachment #3):
Plant personnel visually inspects fluids.

There are no drains in the dikes. It has not been necessary to remove rain water in the history of the plant which is located in an arid area.

In any case, personnel are instructed not to dispose of such water into a storm drain or open water course.

Name of facility Indian Basin Gas Plant

Operator Marathon Oil Company

PART II. ALTERNATE A
DESIGN AND OPERATING INFORMATION
ONSHORE FACILITY (EXCLUDING PRODUCTION)

[Response to statements should be: YES, NO, or NA (Not Applicable).]

B. **Bulk Storage Tanks**

1. Describe tank design, materials of construction, fail-safe engineering features, and if needed, corrosion protection: The storage tanks are API design, welded steel. The storage tanks storing the product (stabilized condensate) under atmospheric conditions are above ground bullets. Both the lube oil storage tank and the gasoline storage tank are atmospheric tanks.

2. Describe secondary containment design, construction materials, and volume: Earthen dike around out-of-service vertical condensate storage tanks. Volume sufficient to hold total storage - 6,000 bbl.

3. Describe tank inspection methods, procedures, and record keeping: Marathon Oil Company conducts periodic surveys visually. Operating personnel visually inspect these tanks during each shift. Operating personnel gauge tanks at 7:00AM each morning. Office personnel calculate daily production.

4. Internal heating coil leakage is controlled by one or more of the following control factors:
   (a) Monitoring the steam return or exhaust lines for oil. NA
   Describe monitoring procedure:
   (b) Passing the steam return or exhaust lines through a settling tank, skimmer, or other separation system. NA
   (c) Installing external heating systems. NA

5. Disposal facilities for plant effluents discharged into navigable waters are observed frequently for indication of possible upsets which may cause an oil spill event. NA
   Describe method and frequency of observations: Continuous blow-down from the cooling tower and condensed steam blow-down from all boilers are commingled and injected with Indian Basin Field produced waters into an injection well (Marathon Federal SWD Well No. 1).

Name of facility Indian Basin Gas Plant

Operator Marathon Oil Company

PART II, ALTERNATE A
DESIGN AND OPERATING INFORMATION
ONSHORE FACILITY (EXCLUDING PRODUCTION)

[Response to statements should be: YES, NO, or NA (Not Applicable).]

C. **Facility Transfer Operations, Pumping, and In-plant Process**

1. Corrosion protection for buried pipelines:
   (a) Pipelines are wrapped and coated to reduce corrosion. Yes
   (b) Cathodic protection is provided for pipelines if determined necessary by electrolytic testing. Yes
   (c) When a pipeline section is exposed, it is examined and corrective action taken as necessary. Yes

2. Pipeline terminal connections are capped or blank-flanged and marked if the pipeline is not in service or on standby service for extended periods. Yes
   Describe criteria for determining when to cap or blank-flange: Continuous plant operation.

3. Pipe supports are designed to minimize abrasion and corrosion and allow for expansion and contraction. Yes
   Describe pipe support design: Steel stanchion.
   Wear plate protection at points of wear and contact.

4. Describe procedures for regularly examining all above-ground valves and pipelines (including flange joints, valve glands and bodies, catch pans, pipeline supports, locking of valves, and metal surfaces): Periodic inspection by Marathon Oil Company.
   Nondestructive testing when warranted.
   Visual observation by plant operator while on duty.
   Periodic site security inspections.

5. Describe procedures for warning vehicles entering the facility to avoid damaging above-ground piping: Signs and traffic barrier guards where needed.

Name of facility Indian Basin Gas Plant

Operator Marathon Oil Company

PART II, ALTERNATE A
DESIGN AND OPERATING INFORMATION
ONSHORE FACILITY (EXCLUDING PRODUCTION)

[Response to statements should be: YES, NO, or NA (Not Applicable).]

D. **Facility Tank Car & Tank Truck Loading/Unloading Rack**

Tank car and tank truck loading/unloading occurs at the facility. (If YES, complete 1 through 5 below.) Yes

1. Loading/unloading procedures meet the minimum requirements and regulations of the Department of Transportation. Yes

2. The unloading area has a quick drainage system. No

3. The containment system will hold the maximum capacity of any single compartment of a tank truck loaded/unloaded in the plant.

Describe containment system design, construction materials, and volume: Waterways not vulnerable to such a spill in this arid area.

Condensate is such a light specific gravity fluid that containment is not desirous due to fire hazard.

4. An interlocked warning light, a physical barrier system, or warning signs are provided in loading/unloading areas to prevent vehicular departure before disconnect of transfer lines. No

Describe methods, procedures, and/or equipment used to prevent premature vehicular departure: A LACT unit (Lease Automatic Custody Transfer) is used for loading of condensate. The truck must be grounded prior to the actual loading of the truck. The groundwire on the truck is necessary to activate the electric signal to the transfer pump. Hauling Company personnel must have an assigned key to activate the LACT Unit. The delivery tickets are made for each truck shipment.

5. Drains and outlets on tank trucks and tank cars are checked for leakage before loading/unloading or departure. Yes

Name of facility Indian Basin Gas Plant

Operator Marathon Oil Company

PART II. ALTERNATE A
DESIGN AND OPERATING INFORMATION
ONSHORE FACILITY (EXCLUDING PRODUCTION)

[Response to statements should be: YES, NO, or NA (Not Applicable).]

E. Security

1. Plants handling, processing, or storing oil are fenced. No*

2. Entrance gates are locked and/or guarded when the plant is unattended or not in production. NA

3. Any valves which permit direct outward flow of a tank's contents are locked closed when in non-operating or standby status. Yes

4. Starter controls on all oil pumps in non-operating or standby status are:
   (a) locked in the off position; No**
   (b) located at site accessible only to authorized personnel. Yes

5. Discussion of items 1 through 4 as appropriate:
   Gas plant is attended 24 hours per day each day of the year.

   *The gas plant is fenced; the condensate storage tanks are outside of the fenced area.

   **The LACT unit addressed in Item D.4 has a key lock security system which requires an assigned key to allow loading trucks.

6. Discussion of the lighting around the facility:
   Flood lighting and localized area lighting approved by Marathon Oil Company.

Name of facility Indian Basin Gas Plant

Operator Marathon Oil Company

SPCC PLAN, ATTACHMENT #2
OIL SPILL CONTINGENCY PLANS AND
WRITTEN COMMITMENT OF MANPOWER, EQUIPMENT, AND MATERIALS

Secondary containment or diversionary structures are impracticable for this facility for the following reasons (attach additional pages if necessary):

Secondary containment structures around the condensate storage tanks would create a fire hazard if an adjacent LPG tank failed and spilled its contents into the diked area.

	Yes
A strong oil spill contingency plan is attached.	Yes
A written commitment of manpower, equipment, and materials is attached.	Yes

Name of facility Indian Basin Gas Plant

Operator Marathon Oil Company

OIL SPILL CONTINGENCY PLAN

In the case of an oil spill from a producing well, a testing vessel, a tank, flowline or any other related oil field equipment, the following action will be implemented to protect human life and regain control of the spill as rapidly as possible. All steps should be carefully considered, to ensure control of the spill is effectively and efficiently regained.

1) Shut off the source contributing to the spill. Analyze the type of spill and determine the most appropriate immediate action to be taken to contain the spill.

2) If the spill contains hydrocarbons, collect lighters and matches from personnel working in the area.

3) Obtain labor and equipment to construct a containment barrier as rapidly as possible. (See the attached directory.)

4) As required have vacuum truck(s) pick up pooled or contained liquids.

5) As necessary the use of absorbent material (straw, dirt, lost circulation material, commercial sorbents, etc) should be utilized to remove standing volume which cannot be efficiently removed by a vacuum truck.

6) Restrict access to the affected area to only those persons involved in control, containment, and clean-up operations.

7) Notify the company representative in charge of the facility of the spill and action being taken who will in turn notify his respective supervisor.

8) As required, the Plant Superintendent will notify the regulatory agency of the spill.

9) Keep livestock from affected area and if necessary, as appropriate notify the landowner and other surface users of the situation.

10) The person in charge of the spill response activities shall keep a daily log of response activities. The log book shall be bound, not loose leaf. Entries shall be dated, timed and signed.

11) The Duty Officer at the National Response Center (1-800-424-8802) must be notified immediately when a spill reaches "waters of the U.S.," or it appears likely that the spill will reach "waters of the U.S."

LIST OF EMERGENCY EQUIPMENT AND SERVICES

Field Atoka Penn, Indian Basin, Revelation, North Shugart

SPILLS

Equipment and Services Available to Contain and Cleanup Spills on Land, Rivers, Creeks, and/or Coastal Bays

Available Equipment/Service	Source or Organization	Location	Telephone No.
Cleanup Service	Stevenson Roach Tank Co.	Artesia, NM	505-746-3222
Earth Moving	Ferguson Constr.	Lovington, NM	505-396-3689
	Truck & Tractor Works	Artesia, NM	505-748-1130
	M&M Excavating	Carlsbad, NM	505-236-6600
Fire Control	Carlsbad Fire Department	Carlsbad, NM	505-885-3124
	Artesia Fire Department	Artesia, NM	505-746-2701
Oil Field Haulers	Canal Well Service	Pecos, TX	915-445-5655
	A A Oilfield Equipment	Hobbs, NM	505-392-2557
Portable Tanks	Area Tanks	Odessa, TX	915-381-0120
	Diamond Rental, Inc.	Hobbs, NM	505-392-6498
	Palmer Tanks*	Andres, TX	915-563-4882
Vacuum Trucks	Parkem Industries	Odessa, TX	915-366-3688
	A A Oilfield Equipment	Hobbs, NM	505-392-2577

*Palmer is not approved vendor list but we have rented their tanks recently. They just drop them off at the location like a regular material purchase.

COMPANY PERSONNEL NOTIFICATION LIST

Indian Basin Gas Plant - (505) 457-2621		Home Telephone
York, Stephen D.	Plant Superintendent	(505) 746-3374
Miller, Kevin K.	Maintenance Foreman	
Hodges, Joe E.	Gang Pusher	(505) 746-9447
Barnett, Jimmy B.	Operator	(505) 746-2818
Moreno, Manuel S.	Roustabout	(505) 748-2175
Waldrip, Bruce W.	Operator	(505) 457-2252
Canada, Donald R.	Field Operator	(505) 748-1060
Case, Anthony W.	Operator	(505) 746-4014
Garrett, Kenton R.	Electrician	(505) 748-2932
Klein, Timothy P.	Mechanic	(505) 484-3675
Manthei, Don W.	Welder	(505) 457-2213
Rouse, David B.	Operator	(505) 746-2619
Winters, Timonthy L.	Field Operator	(505) 746-4662
Davis, Larry D.	Operator Helper	(505) 748-3752
Bowen, Patrick N.	Operator Helper	(505) 748-3570
Ivy, Jack L.	Operator Helper	(505) 746-9078
Rauch, Jack P.	Operator Helper	(505) 748-3121
London, Steve A.	Instrument Repairman	(505) 885-6843
Wilson, James E.	Tester	(505) 746-6481
Harrison, Jerry J.	Field Operator	(505) 365-2962
Harkness, Ginger J.	Clerk	(505) 746-9711

Midland, Texas - (915) 682-1626		
Gordy, Craig W.	E/S Supervisor	(915) 687-6051
Holmes, William D.	Operations Supt.	(915) 687-6305
Snyder, William O.	Production Manager	(915) 689-9911

Mid-Continent Region
Production United States

Marathon
Oil Company

P.O. Box 552
Midland, Texas 79702
Telephone 915/682-1626

SPCC PLAN

COMMITMENT OF MANPOWER, EQUIPMENT AND MATERIALS

TO: OPERATIONS SUPERVISORS

THIS IS YOUR AUTHORITY TO EXPEDITIOUSLY COMMIT MANPOWER, EQUIPMENT AND MATERIALS NECESSARY TO ARREST AND CONTAIN AND INITIATE CLEANUP OF ANY HARMFUL QUANTITY OF OIL OR HAZARDOUS MATERIAL DISCHARGED FROM THIS FACILITY. THIS AUTHORITY MAY BE DELEGATED BY YOURSELVES TO THE PERSON IN CHARGE OF THE FACILITY TO ENSURE THAT NECESSARY ACTIVITIES ARE IMPLEMENTED AS QUICKLY AS POSSIBLE AFTER A SPILL IS NOTED.

R. S. Keisler
Production Manager

RSK/elg

8/18/89

SITE SECURITY INSPECTION

(To be completed by pumper or site supervisor on a weekly basis.)

Date	Location	Inspection Results	Corrective Actions

Code

1.) Thief hatches not secured
2.) Sell line/valve on tank not secured
3.) LACT Unit not secured
4.) Heater treater not secured
5.) Header not secured
6.) Fencing not adequate
7.) Possible electrical hazard
8.) Possible hazard, other
9.) Signs/I.D. not adequate
10.) Oil spill
11.) Other
12.) No deficiencies found
13.) Does not conform to SPCC Plan or Spill Prevention measures.

11/83

MARATHON OIL COMPANY - MID-CONTINENT REGION

SPILL REPORT

This form is to be completed for any spill (regardless of size) of any oilfield liquid onto the surface of the ground.

NOTE: Completion of this form does not eliminate the need to verbally report all discharges to your supervisor as soon as practicable after the source has been stopped and containment/cleanup operations have been mobilized as appropriate.

SPILL DATE MO DA YR	EST. SPILL TIME	AM PM	ESTIMATED SPILL VOLUME	TYPE OF FLUID SPILLED	VOLUME RECOVERED

LOCATION OF SPILL (State, County, Field, Lease, Well or Rig): _____

_____

CAUSE OF SPILL: _____

_____

_____

Did the spill occur on location within a company made containment or drainage catchment area? __ Yes __ No If you checked "Yes" to the proceding question, provided such system adequately contained the spill, it is not necessary to complete the remainder of this form. Simply sign and date the report and forward to your supervisor.

DESCRIPTION OF SPILL AREA (Including proximity to watercourse): _____

_____

ACTION TAKEN TO CONTAIN OR CLEANUP SPILL: _____

_____

_____

SURFACE: Sandy __ Sandy Loam __ Clay __ Rocky __ Wet __ Dry __ Snow __
Cultivated __ Grazing __ Vacant __ Rural __ Residential __

APPARENT DAMAGE TO ENVIRONMENT AND PROPERTY: _____

_____

PROPERTY OWNER NOTIFIED: Yes __ No __ Date: _____ By: _____

Name of Property Owner: _____

HOW WAS SPILL FIRST NOTED: _____

_____

Person Initiating Report/Date	Supervisor Review/Date	Supervisor Review/Date

The back of this form to be completed by Superintendent and/or Environmental Dept., as applicable.

LOCATION OF SPILL (State, County, Field, Lease, Well or Rig): _____

_____

DATE OF SPILL: _____

NOTIFICATION OF REGULATORY AGENCIES:

A. Agency _____ Telephone No. _____ Time _____

Date _____ Person Contacted _____

Comments _____

B. Agency _____ Telephone No. _____ Time _____

Date _____ Person Contacted _____

Comments _____

C. Agency _____ Telephone No. _____ Time _____

Date _____ Person Contacted _____

Comments _____

PERSON MAKING CONTACT WITH AGENCIES: _____

DISTRIBUTION -

ORIGINAL COPY: Environmental and Safety Dept.

OTHER COPIES: _____

(To Be Completed by Supt.) _____

_____

SUPERINTENDENT COMPLETING THIS SECTION: _____

IF CORPORATE OFFICE NOTIFIED:

Person Contacted: _____ Time _____ Date _____

Person Filing Report: _____ _____ _____

Print Name Signature Date

DATE: 8/18/89 REVISED:	APPENDIX D	PAGE 1 of 1

MEMORANDUM REPORT - QUEEN AQUIFER

MEMORANDUM REPORT

Queen and Related Aquifers in the Indian Basin

This report deals with aquifers in and related to the Queen formation in the Queen outcrop area in Indian Basin from Township 23 South, Range 23 East north and northeast through Township 21 South, Range 24 East. A map, two cross sections and a well tabulation are attached hereto and made a part of this report. Only a part of the total Queen outcrop area is covered and will be incorporated in the complete Indian Basin Report when that report is finalized.

The Queen formation in this area outcrops in a band approximately 3 to 9 miles in width and is roughly parallel to the Azotez Mesa and Seven Rivers Hills. The strike is roughly northwest and dip is to the northeast, tending slightly more east than northeast at a rate of 100 to 125' per mile. The Queen formation in this area is of interbedded gypsum, sandstone, siltstone, and dolomite.

Material used in this report was obtained from a study of logs and well records available; notes made by the writer in 1964, 1965, and 1966 while studying the development of the Indian Basin Gas field; records in the Oil Conservation Commission Office, Artesia; from published and unpublished information available in the State Engineer Office including the Motts Report, the transcript of the "Carlsbad" hearings, Geologic Map of New Mexico by Dane and Bachman of 1965, Subsurface Geological methods by Leroy; and from conversations with long time residents of the area.

A study of all material available indicates there are three aquifers present in the area of study from land surface to the bottom of the Queen. They are: (1) The alluvium (2) The upper Queen aquifer, possibly the Shattuck member, more commonly known as the Red Sand or Artesia Red Sand and (3) The bottom Queen aquifer, in the base of the Queen and possibly along the Queen-Grayburg contact zone.

The alluvium is rather thin and found primarily on valley or arroyo floors and alluvial fans in and along Rocky Arroyo. In times of wet weather the alluvium aquifer contributed some flow to Indian Big Springs and Rocky Arroyo. Mr. William Shafer, a long time resident, reports that 30 to 40 years ago, there were many small springs and seeps into Rocky Arroyo but at that time there was much more rain than now.

The upper aquifer in the Queen formation, probably being the Shattuck member or the Artesia Red Sand can be picked on some of the available logs and followed to the area of Indian Big Springs. Referring to the two cross-sections, the well tabulation, and map; on cross-section X-X' wells #3, 4, and 5 and on cross-section Y-Y' wells #6, 7, 8, 9, and 10, and the wells marked B and D on the map, this aquifer is plotted from the logs. The wells Y-10 and X-5 are the same, being Lowe's #1 Staple oil test well.

A water well was drilled by Lowe at the site of the #1 Staples oil test well, to a reported depth of 250' and the water level was measured at S2'. This water level compares with the water level of Indian Big Springs as taken from the U.S.G.S. quadrangle map. Well No. 8 on cross-section Y-Y' is Shafer's commercial well located 21.24.26.443 with a reported total depth of 75' (Mott's Report) and the water level was measured at 40'. This water level at 40' projected into Y-Y' fits exceptionally well into the upper aquifer. Also wells marked "B" and "D" fit the pattern of the upper aquifer. Well "B" is Shafer's domestic well (Bar well, C-1136) with a reported depth of 138' and with the water level measured at 91'. This fits exceptionally well into the cross-sections X-X' and Y-Y' as deriving its water from the upper aquifer.

The lower aquifer in the Queen formation has no name I am aware of and is separated from the upper aquifer by 100 to 300 feet of sandstone, dolomite and sandy dolomite. From interpretation of the gamma ray logs available, this material is quite dense, and no water flows have been reported to have been encountered between the upper and lower aquifers.

The correlation points (C.P.) shown on the cross-sections, are, in my opinion, the top of the lower aquifer. One water well was drilled and was watched closely. This was Marathon Oil Company's well 21.23.23.232 with a T.D. of 255'. The driller of this well reported water from 195' to 255' on his well record, however, I watched the drilling very closely and notes made during July 1965 and personal recollection indicates no water was encountered above about 240'. This depth on Marathon's sample description log is correlated with and used as the top of the lower Queen aquifer on the cross-sections.

Summary:

In the course of this study approximately 70 well logs and well records were examined. Part of these logs and records are of wells to the north of Township 21 South, Range 24 East and will be used in the continuation of this study. The remainder are in the immediate area of study.

On these logs and records of wells lying within the area covered by this report, the top of the lower Queen aquifer could be picked with reasonable accuracy. The bottom of the upper aquifer could be picked in areas where it was present and in some cases the top could be picked, however, due to logging methods, if the upper aquifer was on the surface or very near the surface, the picking of top and bottom was sometimes questionable.

The logs and well records of wells spotted on the attached map are representative of all of the logs examined, and the picking of the two aquifers shown on cross-sections X-X' and Y-Y' are confirmed by the study and comparison of those not plotted.

Conclusion:

In the area under study, there are two distinct aquifers in the Queen formation. The upper aquifer, which supplies water to Shafer's commercial well 21.23.23.443, Shafer's domestic well (Bar well C-1136) 21.24.23.144, is also the main source of water to Indian Big Springs. Also probably tapping the upper aquifer may be a few ranch and stock wells on the eastern edge of the Queen outcrop. The lower aquifer supplies water to the Davidson well in 23.23.10.431 (C-1371) and to Marathon Oil Company's water well 21.23.23.232 (BA-5131). I know of no other wells using the lower aquifer as a source in this area.

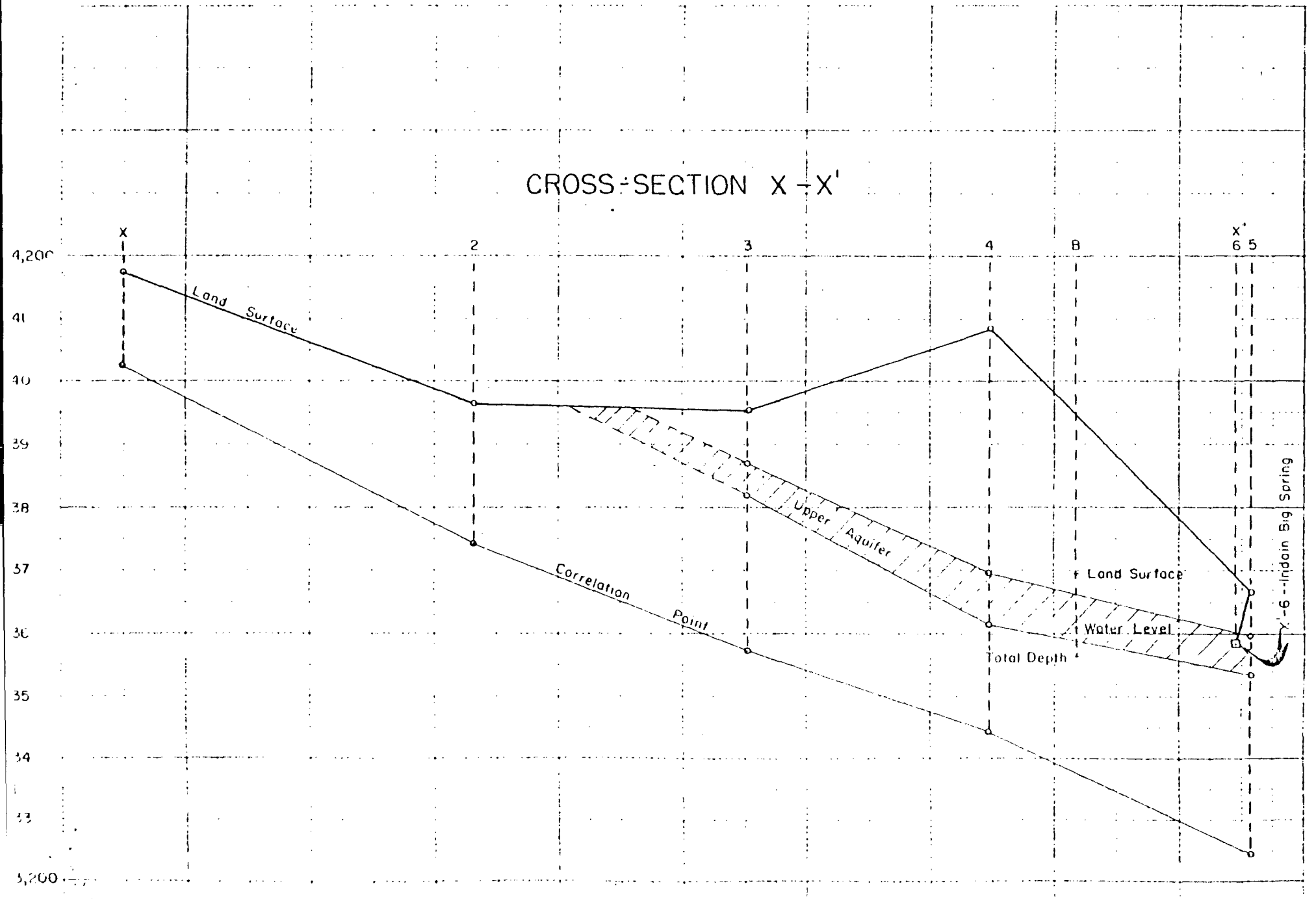
In this study, I have found no evidence which would indicate that the upper Queen aquifer and the lower Queen aquifer are interconnected. I do have notes made from conversations with the drillers that there is a dry zone between the upper and lower aquifers in the area where the upper aquifer is at or near the surface.

The natural discharge areas of the two Queen aquifers have not as yet been determined, but it is my opinion that the lower Queen aquifer does not contribute to the flow of Indian Big Springs or wells in Rocky Arroyo. It is hoped that in the continuation of this study, the discharge areas can be determined.

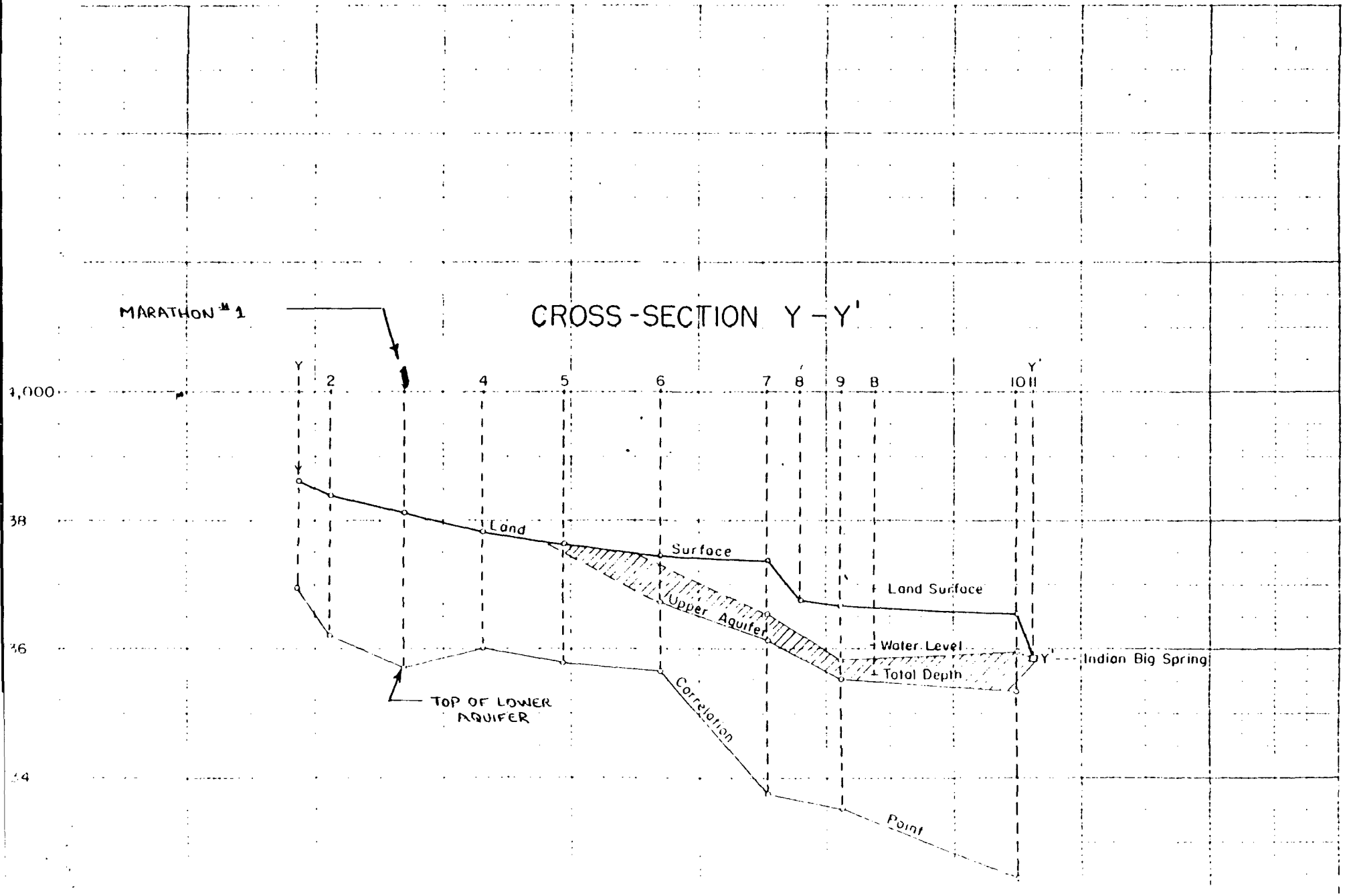
Original Signed By:
R. B. Collins, Jr.
Water Resources Engineer

September 23, 1987

To accompany Memorandum Report "Queen and Related Aquifers in the Indian Basin"



To accompany Memorandum Report "Queen and Related Aquifers in the Indian Basin"



WELL TABULATION

All surface Elevations are above sea level and are reported except where noted.

Cross-Section X-X'

Well #1 Location: 22.23.17.230
Elevations: surface - 4171'
top upper aquifer - not present
bottom upper aquifer - not present
correlation point - 4021'

Well #2 Location: 22.23.11.141
Elevations: surface - 3967'
top upper aquifer - not present
bottom upper aquifer - not present
correlation point - 3741'

Well #3 Location: 23.24.6.114
Elevations: surface - 3954'
top upper aquifer - 3871'
bottom upper aquifer - 3826'
correlation point - 3574'
Notes: Reliable report of first water at 456' (elevation 3498)'

Well #4 Location: 21.24.33.341
Elevations: surface 4068'
top upper aquifer - 3697'
bottom upper aquifer - 3612'
correlation point 3443'

Well #5 Location: 21.24.23.324
surface 3638'
top upper aquifer - 3596'
bottom upper aquifer - 3498'
correlation point - 3243'

Indian Big Springs Location: 21.24.27.210
Elevation: surface 3536' (USGS Quad)

Cross-section Y-Y'

Well #1 Location: 21.23.32.420
Elevations: surface - 3862'
top upper aquifer - not present
bottom upper aquifer - not present
correlation point - 3660'

Well #2 Location: 21.23.23.130
Elevations: surface 3843'
top upper aquifer - not present
bottom upper aquifer - not present
correlation point - 3618'

Well #3 Location: 21.23.23.232 RA-6131
Elevations: surface - 3812'
top upper aquifer - not present
bottom upper aquifer - not present
correlation point - 3572'

Well #4 Location: 21.23.24.323
Elevations: surface -3785'
top upper aquifer - probably on surface
bottom upper aquifer - at or near surface
correlation point - 3600'

Well #5 Location: 21.23.24.422
Elevations: surface - 3766'
top upper aquifer - probably on surface
bottom upper aquifer - 3700'7
correlation point - 3578'

Well #6 Location 21.24.19.414
Elevations: surface 3746'
top upper aquifer - probably on surface
bottom upper aquifer - 3672'
correlation point - 3508

Well #7 Location: 21.24.20.481
Elevations: surface - 3738'
top upper aquifer - 3653'
bottom upper aquifer - 3615'
correlation point - 3384'

Well #8 Location: 21.24.20.443 Shafer's commercial well
Elevations: surface - 3675' (USGS Quad)
total depth - 75'
water level 40'
Notes: Reported capable of producing 250 - 300 gpm with 15 h.p. motor through 4" discharge.

Well #9 Location 21.24.21.330
Elevations: surface - 3670'
top upper aquifer - 3556'
bottom upper aquifer - 3356'
correlation pint - 3351'

Well #10 (Same as well 5 on X-X' cross-station)
Location: 21.24.22.324
Elevations: surface - 3666'
top upper aquifer - 3598'
bottom upper aquifer - 3493'
correlation point - 3243'

Indian Big Springs Location: 21.24.27.210
Elevation: surface - 3536'

Wells Shown on Map but Not on Cross-Sections

Well "B" Shafer domestic well Location: 21.24.25.114 (C-1136)
Elevations from USGS Quad - 3695'
Reported depth 138'
Water Level 91'
Notes: Reported capable of producing 250 to 300 gpm.

Top of
red sand 205' from sample log
elevation
top red sand 3735'
elevation correlation point - 3415'
Notes: The log available is very poor print of original but the points in question compare very favorably.

Well "C" Location: 21.24.29.321
Elevations: surface - 3636'
top upper aquifer - could not make satisfactory pick, probably very close or at surface.

Well "D" oil test (driller's name not available) Location: 21.24.3.410
Elevation: 3946' (reported elevation 3960' is questionable USGS Quad sheet shows elevation to be 3560 to 3950)

Well "E" Location: 23.24.5.132
Elevations: surface - 4812'
top upper aquifer - could not make satisfactory pick
bottom upper aquifer - 3743'
correlation point 3577

DATE: 8/18/89 REVISED:	APPENDIX E	PAGE 1 of 1

HAZARD COMMUNICATION PLAN

MARATHON OIL COMPANY

MID-CONTINENT REGION

DOMESTIC PRODUCTION

HAZARD COMMUNICATION PLAN

MAY, 1988

APPROVALS

MID-CONTINENT REGION
DOMESTIC PRODUCTION
HAZARD COMMUNICATION PLAN

J. L. Smith — Date: 5/19/88
Prepared by: J. L. Smith/Safety Engineer

R. F. Morgan — Date: 5/19/88
R. F. Morgan/Environmental & Safety Supervisor

W. O. Snyder — Date: 5/20/88
W. O. Snyder/Production Manager
Midland Operations

for K. A. Thoma — Date: 5/21/88
K. A. Thoma/Production Manager
Yates Operations

J. F. Strong — Date: 5/23/88
J. F. Strong/Production Manager
Mid-Continent Region

TABLE OF CONTENTS

HAZARD COMMUNICATION PLAN:

HAZARD COMMUNICATION PLAN

Introduction

This Plan has been developed pursuant to Section 750 of Marathon's Corporate Risk and Environmental Affairs Guide to help assure that workers are informed about hazardous products or chemicals which may be encountered at company locations and protective measures for working safely with these substances. It is intended to meet the requirements for a hazard communication program pursuant to the Federal OSHA Hazard Communication standard, 29 CFR 1910.1200(e). The information within this Plan is updated as changes occur and is available for review from the Foreman or Supervisor responsible for the facility.

Hazard Determination

All chemical manufacturers and importers are required to evaluate chemicals produced in their workplace or imported by them to determine if they are hazardous. Chemicals listed in any one of the following sources are to be considered hazardous:

- 29 CFR 1910, Subpart Z, Toxic Hazardous Substances, Occupational Safety and Health Administration (OSHA).
- Threshold Limit Values for Chemical Substances and Physical Agents in the Work Environment, American Conference of Governmental Industrial Hygienists (ACGIH).

In addition, chemicals which have been evaluated and found to be a suspect or confirmed carcinogen in the following sources are to be reported as such:

- National Toxicology Program (NTP).
- International Agency for Research on Cancer (IARC) Monographs.
- 29 CFR 1910, Subpart Z, Toxic and Hazardous Substances, OSHA.

For chemicals or hazardous substances not listed in one of the above, manufacturers shall use evidence from scientific studies for determination of their potential to cause adverse health effects. If at least one significant scientific study shows a chemical to be hazardous, that chemical falls under OSHA's Hazard Communication standard.

Chemical Substance List

A listing of chemical substances present in Marathon locations which have been determined to be hazardous is provided in Appendix A. This listing is updated by the area Foreman or Supervisor when any new chemical or hazardous substance is received. A copy of all updated listings is forwarded to the Region Environmental and Safety Department on a quarterly basis. Each listed substance is referenced to the appropriate Material Safety Data Sheet (MSDS).

Material Safety Data Sheets (MSDSs)

MSDSs which meet the requirements of the Hazard Communication standard, 29 CFR 1910.1200(g) are obtained for each material listed in the chemical substance list and copies are maintained in Appendix B. This information is readily accessible to employees on all work shifts. All employees are provided training on how to obtain and use MSDS information.

MSDSs are obtained when a facility purchases a chemical substance for the first time, when manufacturers update MSDSs or when MSDSs are lost or damaged. The area Foreman or facility Supervisor is responsible for maintaining up-to-date MSDSs for the chemical substances utilized in his/her area of responsibility. The Purchasing Department can assist in obtaining MSDSs, as necessary.

Labels and Hazard Warnings

All portable containers of hazardous products or chemicals must be labeled by the manufacturer or distributor before they are accepted for purchase. Labels and hazard warnings which are affixed to containers by the manufacturer are maintained to inform employees of the necessary measures for working safely with the substance. At a minimum, portable containers of hazardous products or chemicals must be labeled in English with the identity of the substance (ex. petroleum crude oil), appropriate hazard warnings and the name and address of the manufacturer or other responsible party.

It is not necessary to label portable containers into which hazardous products or chemicals are transferred from labeled containers, and which are intended only for the immediate use of the employee that performs the transfer. If containers of hazardous products or chemicals are received unlabeled, or when these substances are transferred to unlabeled containers (not intended for immediate use by the individual performing the transfer), the container shall be marked with the proper Department of Transportation (DOT) shipping name (ex. acetylene), the hazard class (ex. flammable gas), Marathon Oil Company, and the facility name. Note: For transporting hazardous materials on public roads, additional information to that above may be required for DOT compliance.

Chemical substances that possess more than one hazard shall be classed according to the following order of hazards:

1. Radioactive material (except a limited quantity).
2. Poison A.
3. Flammable gas.
4. Non-flammable gas.
5. Flammable liquid.
6. Oxidizer.
7. Flammable solid.
8. Corrosive material (liquid).
9. Poison B.
10. Corrosive material (solid).
11. Irritating materials.
12. Combustible liquid (in containers having capacities exceeding 110 gallons).

13. ORM-B.
14. ORM-A.
15. Combustible liquid (in containers having capacities of 110 gallons or less).
16. ORM-E.

In the workplace, employees must not remove or deface existing labels (unless the container is immediately marked with the required information) and must ensure all container labels are legible. All labels and markings on portable containers leaving the workplace must not conflict with the requirements of the Hazardous Materials Transportation Act and regulations issued under that Act by the DOT.

Nonportable containers such as crude oil storage tanks, saltwater tanks, heater treaters, separators, chemical storage tanks, and other product storage tanks are clearly identified with labels that indicate the name of the product contained along with the applicable hazard warnings. These labels can be obtained from the Corporate Graphics Department in Findlay, Ohio. The following is a summary of the labels that are available (size 8½" x 11").

PROPANE

DANGER: Extremely flammable liquified petroleum gas under high pressure. Liquid contact can cause skin burns and frostbite.

NORMAL BUTANE

DANGER: Extremely flammable liquified petroleum gas under high pressure. Liquid contact can cause skin burns and frostbite.

ISOBUTANE

DANGER: Extremely flammable liquified petroleum gas under high pressure. Liquid contact can cause skin burns and frostbite.

C3-C4 ISOBUTANE MIX

DANGER: Extremely flammable liquified petroleum gas under high pressure. Liquid contact can cause skin burns and frostbite.

SULFUR

DANGER: Moltan sulfur can cause skin burns. May vent concentrations of hydrogen sulfide gas which can cause respiratory irritation and asphyxiation.

NATURAL GAS - DRY

DANGER: Extremely flammable gas under pressure.

NATURAL GAS - RAW LIQUID MIX

DANGER: Extremely flammable liquified petroleum gas under high pressure. Liquid contact can cause skin burns and frostbite. Contains benzene which may cause cancer or be toxic to blood-forming organs.

NATURAL GAS - CONDENSATE C2-C8

DANGER: Extremely flammable liquified petroleum gas under high pressure. Liquid contact can cause skin burns and frostbite. Contains benzene which may cause cancer or be toxic to blood-forming organs.

NATURAL GAS - CONDENSATE C2-C20

DANGER: CONTAINS BENZENE CANCER HAZARD. Flammable liquid. Harmful or fatal if swallowed. Produces skin irritation upon prolonged or repeated contact. Contains benzene which may cause cancer or be toxic to blood-forming organs.

PETROLEUM CRUDE OIL*

DANGER: Flammable liquid. Contains benzene which may cause cancer or be toxic to blood-forming organs. May vent concentrations of hydrogen sulfide gas which can cause respiratory irritation and asphyxiation.

NATURAL GASOLINE

DANGER: Flammable liquid. Harmful or fatal if swallowed. Produces skin irritation upon prolonged or repeated contact. Contains benzene which may cause cancer or be toxic to blood-forming organs.

PETROLEUM CRUDE OIL*

DANGER: Flammable liquid. Contains benzene which may cause cancer or be toxic to blood-forming organs.

PRODUCED WATER

DANGER: May contain a top layer of flammable hydrocarbon. May vent concentrations of hydrogen sulfide gas which can cause respiratory irritation and asphyxiation.

PRODUCED WATER

DANGER: May contain a top layer of flammable hydrocarbon.

Note: The above labels must be prominently displayed on each container so that it is easily noticed from the road(s) accessing the facility. In most cases, one label per container should be adequate, however it may be necessary to label more than one side of the container. When possible, labels should be installed on containers at approximately eye level or a location where the label can be conveniently reviewed.

*Normally displayed on oil storage tanks, heater treaters and separators.

For gas processing plants, in addition to labeling primary containers, a vessel identification summary has been prepared. This summary utilizes a plot plan and listing of the vessel along with the chemical manufacturer, name(s) of chemical(s) present in the vessel, and purpose of each chemical, as applicable. This vessel identification summary is provided in Appendix C.

Employee Information and Training

A copy of the OSHA Hazard Communication standard, 29 CFR 1910.1200 is provided in Appendix D. Employees are informed that copies of this standard are available upon request. Employees are also informed of the availability and location of this written Hazard Communication Plan.

At the time of initial assignment and when new substances are introduced into the work area, employees are provided appropriate training on the protective measures for working safely with the listed substances. The training addresses the requirements of OSHA's Hazard Communication standard, 29 CFR 1910.1200(h)(2). A description of the training program is provided in Appendix E.

APPENDIX

APPENDIX A

CHEMICAL SUBSTANCE LIST

APPENDIX B

MATERIAL SAFETY DATA SHEETS

Explanation of Terms Used on Marathon's Material Safety Data Sheet

This sheet accompanies the Marathon Material Safety Data Sheet and is designed to provide more detailed information on the terms commonly used. Frequently used abbreviations include: N.A. = not applicable, N.D.A. = no data available, < = less than, > = greater than, C.A. = approximately, F = temperature given in ° Fahrenheit. Specific terms and abbreviations are explained below.

Section 1 Product Identification

Product Name – Most common name or name under which the product is marketed.

Synonyms – Other common chemical or commercial names (aliases) that may be used to identify the product.

CAS Number – Chemical Abstract Service Registry number by which the product is identified.

Chemical Family – Generic classification or family in which the product belongs.

Chemical Formula – Empirical chemical formula of the product.

Emergency Phone Numbers – 24-hour emergency assistance numbers for use in event of accident or spill.

Section 2 Physical Properties

Boiling Point – Temperature (or range) at a pressure of 760 mm Hg, at which the liquid changes to a vapor.

Melting Point – Temperature (or range) at a pressure of 760 mm Hg, at which the solid changes to a liquid.

Specific Gravity – Ratio of the weight of a volume of product to the weight of an equal volume of water at 39.2°F.

Solubility in Water Solubility of the product by weight in water at 50°F. Categories include: Negligible = < 0.1%, Slight = 0.1-1.0%, Moderate = 1-10%, Appreciable = > 10%, Complete.

Vapor Density – Relative density or weight of a vapor or gas compared with an equal volume of air at ambient temperatures.

Vapor Pressure – Pressure of saturated vapor above a liquid product in mm Hg.

pH – Value given to represent the acidity or alkalinity of the product at the concentration specified. Strong acids give pHs of 1-3, while strong bases give pHs of 12-13. Water has a pH of 7.

Appearance – Physical description of the product.

Odor – Odor or smell given off by the product.

Section 3 Fire & Explosion Hazard Data

Flash Point – Minimum temperature at which a liquid will give off enough flammable vapor to form an ignitable mixture with air.

Autoignition Temperature – Lowest temperature at which the product will initiate self-sustained combustion in the absence of a spark or flame.

Explosive Limits – Lower and upper range of the gas or vapor concentration which will burn or explode if an ignition source is present.

Extinguishing Media – Fire fighting agents that can be used to extinguish fires.

Special Fire Fighting Instructions – Special procedures or unusual fire hazards that have been identified with this product.

Hazardous Decomposition Products – Breakdown products that may be evolved when this material is subjected to heat or combustion.

Stability – Indication if the product is stable or not stable under reasonably foreseeable conditions of storage or use. Conditions that could cause a dangerous reaction are listed.

Incompatible Materials – Those materials or conditions that may cause the product to react violently, releasing large amounts of energy or toxic vapors.

Hazardous Polymerization – Indication if the product has the potential to cause a reaction at a rate that releases large amounts of energy. Conditions that could cause a polymerization reaction are listed.

Section 4 Product Composition And Exposure Limit(s)

Exposure Limits For Product – The established occupational health exposure limit for airborne concentrations of the product, indicated in parts per million parts air (ppm) or milligrams per cubic meter air (mg/M3). The term TLV refers to Threshold Limit Value of which there are three categories. TWA is the time-weighted average concentration for a normal 8 hour workday and a 40-hour workweek to which nearly all workers may be repeatedly exposed without adverse effect. STEL is a 15-minute time-weighted average short-term exposure limit which should not be exceeded at any time during a workday and not repeated more than four times a day. A Ceiling Limit is a concentration that should not be exceeded at any time during the work period.

Source of Exposure Limits – Agencies or organizations responsible for the established exposure limits include: American Conference of Governmental Industrial Hygienists (ACGIH), the Occupational Safety and Health Administration (OSHA) or Marathon Oil Company's Corporate Limit.

Components – Major components and/or general composition description of the product. Minor components having potential toxicity, which were considered when evaluating the product, are given. When applicable, the TWA, Ceiling Limit or STEL of the individual components are listed. Inclusion of a component is not necessarily based on hazard criteria.

02/12/1988 11:46 TO 72 78 307 MARATHON FLY

Marathon Petroleum Company

PRODUCT NAME: HYDROGEN SULFIDE
MARATHON MSDS NO: 102MAR001

THE FOLLOWING INFORMATION IS FURNISHED SUBJECT TO THE DISCLAIMER ON THE BOTTOM OF THIS FORM

SECTION 1 - PRODUCT IDENTIFICATION

PRODUCT NAME: HYDROGEN SULFIDE

SYNONYMS:
HYDROGEN SULFIDE; HYDROSULFURIC ACID; H2S; SULFURETTED HYDROGEN

MANUFACTURER / DISTRIBUTOR:
MARATHON PETROLEUM COMPANY
539 SOUTH MAIN STREET
FINDLAY, OH
45840

EMERGENCY PHONE NUMBERS:
(419) 422-2121 (MARATHON)
(800) 424-9300 (CHEMTREC)

CHEMICAL FAMILY: ---
CHEMICAL FORMULA: H2S

CAS NO: 7783-06-4

SECTION 2 - PHYSICAL PROPERTIES

BOILING POINT	MELTING POINT	SPECIFIC GRAVITY(H2O=1)
-76 F	-116 F	1.53(LIQ.)
% SOLUBILITY IN WATER	VAPOR DENSITY(AIR=1)	VAPOR PRESSURE
SLIGHT	1.18	15,200 MM HG @ 77 F

PH INFORMATION: PH: N.A. AT CONC.
APPEARANCE: COLORLESS GAS ODOR: ROTTEN EGG ODOR

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT	AUTOIGNITION TEMP	EXPLOSIVE LIMITS (% BY VOLUME IN AIR)
N.D.A. F	500 F	LOWER/UPPER: 4.3/46.0

EXTINGUISHING MEDIA:

CARBON DIOXIDE, DRY CHEMICAL.

SPECIAL FIRE FIGHTING INSTRUCTIONS:

DO NOT EXTINGUISH FLAME DUE TO POSSIBLE EXPLOSIVE REIGNITION. SHUT OFF SOURCE OF GAS IF POSSIBLE AND ALLOW FIRE TO BURN OUT. EXTINGUISH SMALL FIRES WITH CO2 OR DRY CHEMICAL. WEAR SELF CONTAINED BREATHING APPARATUS. USE WATER SPRAY TO COOL EXPOSED SURFACES.

STABILITY: THE MATERIAL IS STABLE AT 70 F, 760MM PRESSURE
CONDITIONS TO AVOID:
SOURCES OF HEAT OR IGNITION

HAZARDOUS DECOMPOSITION PRODUCTS:
SULFUR DIOXIDE, OXIDES OF SULFUR

INCOMPATIBLE MATERIALS:
STRONG OXIDIZERS, MINERAL ACIDS

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

PRODUCT NAME: HYDROGEN SULFIDE
MARATHON MSDS NO: 102MAR001

SECTION 4 - PRODUCT COMPOSITION AND EXPOSURE LIMITS

EXPOSURE LIMITS FOR PRODUCT:	TLV			SOURCE
HYDROGEN SULFIDE	10.00	PPM	(8 HR TWA)	ACGIH
	15.00	PPM	(STEL)	ACGIH
	20.00	PPM	(CEILING)	OSHA
	50.00	PPM	(PEAK)	OSHA

COMPONENTS:	PERCENT RANGE	TLV			SOURCE
HYDROGEN SULFIDE	98.00-100.00	10.00	PPM	(8 HR TWA)	ACGIH
		15.00	PPM	(STEL)	ACGIH
		20.00	PPM	(CEILING)	OSHA
		50.00	PPM	(PEAK)	OSHA

SECTION 5 - POTENTIAL HEALTH EFFECTS

EYE:

H2S IS IRRITATING TO THE EYES. REPEATED EXPOSURE ABOVE THE TLV MAY CAUSE BURNING OR TEARING AND VISUAL DISTURBANCES.

SKIN:

NON-IRRITATING TO SKIN (INTACT) DURING NORMAL USE. H2S MAY PRODUCE SLIGHT IRRITATION ON MOIST SKIN.

INHALATION:

SEE ADDITIONAL TOXICITY INFORMATION.

INGESTION:

NOT APPLICABLE.

ADDITIONAL TOXICITY INFORMATION:

HYDROGEN SULFIDE GAS (H2S) IS TOXIC BY INHALATION. PROLONGED BREATHING OF 50-100 PPM H2S VAPORS CAN PRODUCE EYE AND RESPIRATORY TRACT IRRITATION. HIGHER CONCENTRATIONS (250-600 PPM) FOR 15-30 MINUTES, CAN PRODUCE HEADACHE, DIZZINESS, NERVOUSNESS, NAUSEA AND PULMONARY EDEMA OR BRONCHIAL PNEUMONIA. CONCENTRATIONS OF >1000 PPM WILL CAUSE IMMEDIATE UNCONSCIOUSNESS AND DEATH THROUGH RESPIRATORY PARALYSIS.

Marathon Petroleum Company

PRODUCT NAME: HYDROGEN SULFIDE
MARATHON MSDS NO: 102MAR001

SECTION 5 - POTENTIAL HEALTH EFFECTS (CON'T)

EMERGENCY FIRST AID PROCEDURES

EYE:

FLUSH EYES WITH LARGE AMOUNTS OF WATER FOR AT LEAST 15 MINUTES. CALL A PHYSICIAN IF SYMPTOMS OR IRRITATION OCCUR.

SKIN:

WASH WITH SOAP AND LARGE AMOUNTS OF WATER. CALL A PHYSICIAN IF SYMPTOMS OR IRRITATION OCCUR.

INHALATION:

MOVE PERSON TO FRESH AIR. IF NOT BREATHING OR NO HEARTBEAT, GIVE ARTIFICIAL RESPIRATION OR CARDIOPULMONARY RESUSCITATION (CPR). IMMEDIATELY CALL A PHYSICIAN. IF SYMPTOMS OR IRRITATION OCCUR WITH ANY EXPOSURE CALL A PHYSICIAN.

INGESTION:

NOT APPLICABLE.

SECTION 6 - SPECIAL PROTECTION INFORMATION

VENTILATION:

LOCAL OR GENERAL EXHAUST REQUIRED IF USED IN AN ENCLOSED AREA.

RESPIRATORY PROTECTION:

USE AIR SUPPLIED RESPIRATOR IN CONFINED SPACES WHEN H2S CONCENTRATIONS EXCEED PERMISSIBLE LIMITS.

EYE PROTECTION:

GOGGLES.

SECTION 7 - SPILL OR LEAK PROCEDURES

ENVIRONMENTAL EFFECTS:

UNDISSOCIATED H2S CAN BE TOXIC TO FISH AND AQUATIC LIFE.

STEPS TO BE TAKEN IN CASE OF SPILL, LEAK OR RELEASE:

KEEP PUBLIC AWAY. STOP SOURCE OF LEAK IF POSSIBLE. ELIMINATE SOURCES OF IGNITION.

WASTE DISPOSAL METHOD:

CONTACT LOCAL OR STATE ENVIRONMENTAL AGENCY FOR GUIDANCE AS TO PROPER METHOD AND LOCATION OF DISPOSAL IN YOUR AREA.

PRODUCT NAME: HYDROGEN SULFIDE
MARATHON MSDS NO: 102MAR001

SECTION 8 - HANDLING AND STORAGE PRECAUTIONS

DO NOT EXPOSE TO HEAT OR SOURCES OF IGNITION. H2S REACTS WITH MANY METALS FORMING SULFIDES AND CAUSING EMBRITTLEMENT AND CORROSION. USE EXPLOSION-PROOF VENTILATION EQUIPMENT.

SECTION 9 - HAZARD WARNING

DANGER!

EXTREMELY FLAMMABLE GAS
HARMFUL OR FATAL IF INHALED

SECTION 10 - ADDITIONAL COMMENTS

THE PRONOUNCED AND EASILY-RECOGNIZED ROTTEN EGG ODOR OF H2S GAS CAN BE DETECTED AT CONCENTRATIONS AS LOW AS 0.1 PPM. SINCE HIGHER H2S CONCENTRATIONS (100-200 PPM) CAUSE OLFACTORY FATIGUE AND OTHER HYDROCARBON ODORS CAN "MASK" H2S, THE SENSE OF SMELL CANNOT BE USED AS A RELIABLE INDICATOR OF H2S EXPOSURE.

INFORMATION SUPPLIED BY: COORDINATOR, TOXICOLOGY AND PRODUCT SAFETY
CRAIG M. PARKER PHONE: (419)422-2121

MSDS DATE: 08/05/85 DATE OF PREVIOUS MSDS: / /

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APPENDIX C

VESSEL ID SUMMARY
(Gas Plants Only)

APPENDIX D

OSHA HAZARD COMMUNICATION STANDARD

federal register

Monday
August 24, 1987

Part III

Department of Labor

Occupational Safety and Health Administration

29 CFR Parts 1910, 1915, 1917, 1918, 1926, and 1928

Hazard Communication; Final Rule

DEPARTMENT OF LABOR

Occupational Safety and Health Administration

29 CFR Parts 1910, 1915, 1917, 1918, 1926, and 1928

[Docket No. H-022D]

Hazard Communication

AGENCY: Occupational Safety and Health Administration (OSHA); Labor.

ACTION: Final rule.

SUMMARY: OSHA is revising its Hazard Communication Standard (HCS) (29 CFR 1910.1200), which currently applies to the manufacturing sector, to cover all employers with employees exposed to hazardous chemicals in their workplaces. Expansion of the scope of the HCS requires non-manufacturing employers to establish hazard communication programs to transmit information on the hazards of chemicals to their employees by means of labels on containers, material safety data sheets, and training programs. This action will reduce the incidence of chemically-related occupational illnesses and injuries in non-manufacturing workplaces.

DATES: Effective September 23, 1987. The revised standard published today requires that chemical manufacturers, importers, and distributors ensure that material safety data sheets are provided with the next shipment of hazardous chemicals to non-manufacturing employers or distributors after September 23, 1987. All employers in the non-manufacturing sector are to be in compliance with all provisions of the standard by May 23, 1988.

FOR FURTHER INFORMATION CONTACT: Mr. James F. Foster, Office of Information and Consumer Affairs, Occupational Safety and Health Administration, 200 Constitution Avenue, NW., Room N3637, Washington, DC, 20210; telephone (202)523-8151.

SUPPLEMENTARY INFORMATION: References to the rulemaking record are made in the text of this preamble, and the following abbreviations have been used:

H-022, Ex.: Exhibit number in Docket H-022, which includes Dockets H-022A and H-022B.

Ex.: Exhibit number in Docket H-022D for exhibits collected since the 1985 Court remand.

Tr.: Public hearing transcript page number.

Copies of the official list of entries in the record, as well as the exhibits themselves, are available from the OSHA Docket Office, Dockets H-022 and H-022D, Occupational Safety and Health Administration, 200 Constitution Avenue, NW., Room N3670, Washington, DC, 20210; telephone (202)523-7894.

I. Background

A. History of OSHA's Hazard Communication Standard

When Congress passed the Occupational Safety and Health Act of 1970, 29 U.S.C. 651 *et seq.* (the Act), it included language in section 6(b)(7) stating that any occupational safety or health standard promulgated by the Secretary of Labor under section 6(b) rulemaking authority "shall prescribe the use of labels or other appropriate forms of warning as are necessary to insure that employees are apprised of all hazards to which they are exposed, relevant symptoms and appropriate emergency treatment, and proper conditions and precautions of safe use or exposure." Whenever OSHA has promulgated a substance-specific rule to address the hazards of a particular chemical, this Congressional directive has been followed. However, given the universe of chemicals present in American workplaces (as many as 575,000 hazardous chemical products), and the time-consuming nature of OSHA's rulemaking process, it soon became clear that little information would be available to employees if this substance-by-substance approach were the only one pursued. The Agency thus decided to address the issue of hazard information transmittal on a generic basis. OSHA's experience, as well as our rulemaking record to date, supports the view that when employees have access to, and understand, the nature of the chemical hazards they are exposed to during the course of their employment, they are better able to participate in their employers' protective programs, and take steps to protect themselves. In addition, providing employers with complete chemical hazard information enables them to better design and implement protective programs. Together these actions will result in more effective worker protection and the occurrence of fewer illnesses and injuries due to exposure to chemicals. *See, e.g.*, 48 FR 53282-84, 53321, 53323-24, 53327-29 (Nov. 25, 1983); 47 FR 12093-12101 (Mar. 19, 1982).

In 1974, OSHA established a Standards Advisory Committee on Hazardous Materials Labeling under section 7(b) of the Act to develop guidelines for the implementation of section 6(b)(7). On June 6, 1975, the Committee submitted its final report to the Assistant Secretary for Occupational Safety and Health which recommended categorization and ranking of chemical hazards, as well as provisions for labels, material safety data sheets, and training programs for all workers.

The National Institute for Occupational Safety and Health (NIOSH) published a criteria document in 1974 which also recommended a standard to OSHA. The document, entitled "A Recommended Standard . . . An Identification System for Occupationally Hazardous Materials," included provisions for labels and material safety data sheets.

In 1976, Congressman Andrew Maguire from New Jersey and the Health Research Group petitioned OSHA to issue a standard to require the labeling of all workplace chemicals. The House of Representatives' Committee on Government Operations (1976 and 1977) recommended that OSHA enforce the health provisions of the Act by requiring manufacturers to disclose any toxic ingredients in their products, and by requiring all employers to disclose this information to workers.

On January 28, 1977, OSHA initiated the public participation phase of the rulemaking process on these issues by publishing an advance notice of proposed rulemaking (ANPR) on chemical labeling in the Federal Register (42 FR 5372). The ANPR requested comments and information on the need for such a standard, and the particular provisions that should be included. The Agency received eighty-one comments. Most supported the need for the rule, but opinions as to the specific approaches to be pursued varied significantly.

On January 16, 1981, OSHA published a notice of proposed rulemaking (NPRM) entitled "Hazards Identification" (46 FR 4412). The rule would have required manufacturing employers to assess the hazards in their workplaces using specified procedures, and to label containers. The requirements were quite different from the comprehensive approach previously recommended by the Standards Advisory Committee and NIOSH as they did not include provisions for material safety data sheet development or training.

OSHA withdrew the NPRM on February 12, 1981 (46 FR 12214) for further consideration of regulatory alternatives. A new NPRM was published on March 19, 1982, and was entitled "Hazard Communication" (47 FR 12092). It proposed to require producers of chemicals to evaluate them to determine their hazards, label

safety data sheets, and training, is not needed for workers in other sectors similarly exposed to hazardous chemicals. *Id.* at 738–39. Therefore, as previously indicated, OSHA was directed by the Court to reconsider the application of the standard to employees in the non-manufacturing industries and to order its application to these other sectors unless the Secretary can state reasons why this application would not be feasible. It should be noted that in previous OSHA litigation, the Courts have defined "feasibility" in terms of OSHA rules as meaning "capable of being done." *American Textile Manufacturers Institute v. Donovan*, 452 U.S. 490, 508–509 (1980)(ATMI).

OSHA decided not to appeal this decision. As stated in the preamble to the final rule (48 FR 53286):

> It should be emphasized that the Agency does not believe that employees in other industries are not exposed to hazardous chemicals, or that they should not be informed of those hazards. OSHA has merely exercised its discretion to establish rulemaking priorities, and chosen to first regulate those industries with the greatest demonstrated need.

OSHA was prepared to evaluate the HCS' effectiveness in getting information to downstream employers, and to extend the standard if necessary. In fact, the Agency initiated the process on March 4, 1985, prior to the Court decision, when the Assistant Secretary asked the National Advisory Committee on Occupational Safety and Health (NACOSH) to give OSHA its recommendation on the need and feasibility of expanding the scope of the HCS to other industries. On June 21, 1985, NACOSH adopted the following recommendation:

> [NACOSH] strongly endorses the OSHA effort to promulgate a Hazard Communication Standard and selection of the manufacturing sector for its initial scope of coverage. It is the consensus recommendation of the Committee that the scope of the current Hazard Communication Standard should be expanded to cover all employees in all industries at as early a time as possible. Complete implementation may require phasing in gradually. The BLS [Bureau of Labor Statistics] incidence rates of occupational illnesses, and other appropriate factors, should be primary considerations in expanding the coverage. The Committee further recommends that OSHA establish a task force to address these issues.

Meanwhile, OSHA's review of the rulemaking record showed that while there was considerable evidence concerning the need for hazard communication in other industries, and general support for a finding that the HCS would be feasible for non-manufacturing, there was a need for more direct evidence of the feasibility of expanded coverage, particularly in the area of economic feasibility. Accordingly, OSHA believed it was necessary and appropriate to initiate further rulemaking. OSHA commissioned a study of the economic impact of extending the HCS to the fifty major non-manufacturing industry groups within its jurisdiction, and issued an Advance Notice of Proposed Rulemaking (ANPR) seeking public comment on present hazard communication practices outside manufacturing, and the likely impact of extending the HCS to industries significantly different from the prototypical manufacturing worksites on which the original standard was based. 50 FR 48794 (Nov. 27, 1985). Over two hundred responses were received. Based on this newly acquired evidence and on the previous rulemaking record, OSHA was in the process of drafting a proposed rule which it expected to publish for notice and comment, followed by promulgation of a final rule in early 1988.

On January 27, 1987, however, the United Steelworkers of America, AFL–CIO–CLC and Public Citizen, Inc., petitioners in the 1985 challenge, filed a Motion For An Order Enforcing The Court's Judgment and Holding Respondent In Civil Contempt. Petitioners claimed that the Court's 1985 order had not authorized OSHA to embark on further fact gathering; that OSHA should have made a feasibility determination on the 1985 rulemaking record. Petitioners also argued that even if further fact gathering had been allowed by the Court's order, OSHA's pace was unduly slow.

In response, OSHA noted that the Court's 1985 order did not specify that OSHA should act on the then-existing record. OSHA believed that seeking further evidence on feasibility in non-manufacturing was appropriate in light of its statutory obligation to issue rules that are well grounded in a factual record. OSHA also asserted that, consistent with Supreme Court precedent, the Agency should be permitted to exercise its discretion in determining the appropriate rulemaking procedures for complying with the Court's remand order. Lastly, the Agency argued that its schedule to complete the rulemaking was reasonable and did not constitute undue delay.

On May 29, 1987, the Court issued a decision holding that the Court's 1985 remand order required consideration of the feasibility of an expanded standard without further rulemaking. *United Steelworkers of America, AFL–CIO–CLC v. Pendergrass*, No. 83–3554 (3d Cir.) (*United Steelworkers II*). The Court declared that adequate notice had been provided to non-manufacturers during the original rulemaking that they might be covered by the HCS, *id.* slip op. at 7–10, 16–17, that the answers to the remaining questions OSHA may have had regarding feasibility were "self-evident" or "readily ascertainable" from the original record, *id.* at 15, 17, and that further fact finding was "unnecessary", *id.* at 15. The Court ordered the Agency to issue, within 60 days of its order, "a hazard communication standard applicable to all workers covered by the OSHA Act, including those which have not been covered in the hazard communication standard as presently written, or a statement of reasons why, on the basis of the present administrative record, a hazard communication standard is not feasible." *Id.* at 19. OSHA is responding to the Court order by issuing this final rule expanding the scope of the HCS' coverage to all workers within OSHA's jurisdiction.

OSHA continues to believe that it should have been permitted to follow the rulemaking procedures in the Act by issuing a notice of proposed rulemaking and developing a public record prior to promulgating a final rule. However, as discussed in the following section regarding feasibility, the Agency does not have sufficient evidence in the current record to indicate that the rule would be infeasible for any part of the non-manufacturing sector. OSHA recognizes that information submitted during a normal rulemaking process might have resulted in further changes to the provisions to better address feasibility or practicality concerns.

In light of the fact that there may be additional information regarding the feasibility or practicality of the rule as it applies to some non-manufacturing sectors, the Agency invites persons to provide such information and any recommendations for further rulemaking within sixty days of the date of publication of this final rule. OSHA will then evaluate these submissions and determine whether any additional rulemaking is required. Data or evidence related to feasibility should be addressed to: Directorate of Health Standards Programs, Occupational Safety and Health Administration, Attention: Hazard Communication, 200 Constitution Avenue, NW., Room N3718, Washington, DC, 20210.

containers, and provide material safety data sheets to manufacturing purchasers of their products. The standard also proposed that all employers in the manufacturing sector have a hazard communication program, label in-plant containers, maintain and provide access to material safety data sheets, and train workers. The proposal also invited comments on whether non-manufacturing employers should be subject to the rule.

Following a period for written comments, informal public hearings, and a post-hearing comment period, OSHA published the final Hazard Communication Standard on November 25, 1983 (48 FR 53280). The provisions of the final rule are very similar to those described above for the proposal, *i.e.*, chemical manufacturers and importers are required to evaluate the hazards of the chemicals they produce or import, and all manufacturers are required to have hazard communication programs for their employees exposed to hazardous chemicals. This comprehensive standard was designed to reduce the hazards faced by manufacturing workers when they handle chemicals without adequate information on, among other things, the physical and health hazards of the chemicals, safe handling precautions, and emergency and first aid procedures. *See, e.g.*, 48 FR 53321. OSHA found that inadequate communication regarding chemical hazards presents a significant risk to workers. *See, e.g.*, 48 FR 53321. *Accord United Steelworkers of America v. Auchter*, 763 F.2d 728, 735 (3d cir. 1985) (*United Steelworkers I*) ("[I]nadequate communication is itself a hazard, which the standard can eliminate or mitigate.").

OSHA decided to limit the scope of coverage of the HCS to the manufacturing sector based on an analysis of the chemical source illnesses and injuries occurring in each industrial sector. (*See* discussion at 48 FR 53284–86.) In particular, since the purpose of the standard is to reduce the occurrence of such incidents, OSHA determined that the rule should focus on those industrial sectors where they are recorded most frequently. The Agency found that over half of these incidents occur in manufacturing, although manufacturing accounts for only about 30 percent of total employment. Thus OSHA decided that the greatest need for transmittal of chemical hazard information is in the manufacturing sector. The Agency further recognized that since chemicals are developed and produced in the manufacturing sector, the hazard information would have to be developed in the manufacturing sector first, regardless of the eventual coverage of the rule. OSHA believed that requiring the development of the chemical hazard information in manufacturing would lead to its increased availability in the other sectors without the standard specifically requiring the transmittal of hazard information to those sectors. The Agency acknowledged that hazardous chemicals are pervasive throughout industry and that chemical source injuries and illnesses have been recorded in all industry sectors. *See, e.g.*, 48 FR 53282–87. *See also United Steelworkers I*, 763 F.2d at 737. The Agency planned to make a decision regarding the explicit coverage of the non-manufacturing sectors once the HCS was in effect, and a determination could be made as to whether the other industries were, in fact, obtaining the information they needed. OSHA believed that the Act gives the Secretary of Labor and the Agency the authority to regulate the most hazardous industry first under section 6(g), 29 U.S.C. 655(g), which states in part:

> In determining the priority for establishing standards under this section, the Secretary shall give due regard to the urgency of the need for mandatory safety and health standards for particular industries, trades, crafts, occupations, businesses, workplaces or work environments.

B. Court Challenges

The HCS was challenged in the U.S. Court of Appeals for the Third Circuit (hereinafter referred to as "the Court" or "the Third Circuit") on several grounds. The Court issued its decision on May 24, 1985 (*United Steelworkers I*, 763 F.2d 728 (3d Cir. 1985)). The standard was upheld in most respects, but three issues were remanded to the Agency for reconsideration. The decision was not appealed.

First, the Court concluded that the definition of trade secrets incorporated by OSHA included chemical identity information that was readily discoverable through reverse engineering and, therefore, was "broader than the protection afforded trade secrets by state law." The Court directed the Secretary of Labor to reconsider a trade secret definition which would not include chemical identity information that is readily discoverable through reverse engineering. Second, the Court held the trade secret access rule in the standard invalid insofar as it limited access to health professionals, but found the access rule otherwise valid. The Secretary was directed to adopt a rule permitting access by employees and their collective bargaining representatives to trade secret chemical identities. OSHA complied with the Court orders regarding the two trade secret issues in a separate rule, published in final form on September 30, 1986 (51 FR 34590).

The third issue remanded to OSHA involved the scope of the standard's coverage. As noted, the HCS currently applies to employers and employees in the manufacturing sector. The Court rejected the Secretary's contention that section 6(g) gave him the flexibility to regulate the most hazardous sector first before commencing rulemaking for other sectors in which workers are exposed, to a lesser extent, to the same hazards. The Court agreed that section 6(g) "clearly permits the Secretary to set priorities for the use of the Agency's resources, and to promulgate standards sequentially." 763 F.2d at 738. The Court also acknowledged that "there is substantial evidence in the record that the manufacturing sector has the highest incidence rate of chemical exposures which the Agency has authority to regulate." *Id.* at 737. However, the Court held that it is not enough merely to establish that the sector selected for coverage presents greater hazards than those that have been left for later rulemaking. Given the record evidence of high levels of exposure to hazardous chemicals in several job settings outside the manufacturing sector, the Secretary was required to explain "why coverage of workers outside the manufacturing sector would have seriously impeded the rulemaking process" or "why it is not feasible for the same standard to be applied in other sectors where workers are exposed to similar hazards." *Id.* at 738.

The Court was not persuaded that the HCS would provide protection to uncovered workers because chemical hazard warnings would be found on container labels and detailed information on material safety data sheets would become increasingly available in the unregulated sectors as a result of being required in manufacturing. *Id.* There was considerable record evidence that indicated that workers in the non-manufacturing industries are exposed to chemical hazards. The Court concluded that the Secretary had not stated why it would not be feasible to require employers in non-manufacturing industries to give workers material safety data sheets and training as required in the manufacturing sector. The Court maintained that the Act required an explanation why the same information, that is, labels, material

C. Feasibility of the Standard

In the context of OSHA standard setting, feasibility constraints limit the extent to which standards can address health and safety concerns within the workplace. Section 6(b)(5) of the Act, 29 U.S.C 655(b)(5). Feasibility analysis involves an inquiry to determine whether a standard is both technologically and economically capable of being done. *ATMI*, 452 U.S. at 512–13 and 513 n.31 (1980). As the Third Circuit has indicated, "the Secretary was able to determine that the hazard communication standard could feasibly be applied in the manufacturing sector." *United Steelworkers II*, slip op. at 16. The Court further noted that OSHA had concluded in the final rule that importers and distributors could feasibly comply with the HCS based on the evidence in the record and that "this is equally true of all non-manufacturer user employers. Plainly, the ease with which the same information can be utilized by those employers can be easily determined from the information already in the record." *Id.* at 18. The Third Circuit has ordered expansion of the HCS to all workers *unless* OSHA can give reasons why the HCS is infeasible for particular industries, and has forbidden OSHA from gathering further evidence.

OSHA concludes that the original HCS rulemaking record (Docket H–022), does not contain credible evidence indicating the standard would be infeasible for any industrial sector. In fact, OSHA believes that the original record on the whole supports a finding that the performance-oriented HCS is feasible for all industries. In addition, the Agency's experience under the present HCS and other pertinent OSHA standards, the promulgation and implementation of State and local right-to-know laws, and evidence and data gathered by the Agency since the 1985 Court order (Docket H–022D), further supports OSHA's conclusion that non-manufacturing employers are "capable" of implementing the HCS for their employees potentially exposed to hazardous chemicals.

OSHA found that the HCS is technologically feasible for manufacturers, and believes it is clearly technologically feasible for non-manufacturers as well. Twelve of the OSHA-approved State plan States have already extended the rule to cover the non-manufacturing sector, and the requirements are being enforced in those States as workplace standards. This experience provides practical evidence of the technological feasibility of the requirements of the rule. The more technical aspects of the standard—scientific evaluation of chemicals to determine their hazards and creation of material safety data sheets and warning labels—remain a burden on those producing or importing hazardous chemicals. The technical expertise needed to develop the chemical hazard information, and its associated costs, is subsumed within the current rule covering manufacturers, and it has been found feasible. All other requirements in the HCS, such as maintaining material safety data sheets, developing a written hazard communication program, and designing and implementing chemical hazard training, are conventional and common business practices that are administrative in nature, and no technological barriers prevent their development and implementation. OSHA has mandated such practices for some non-manufacturing workplaces since the early 1970's. *See, e.g.*, 29 CFR 1915.97 (requiring material safety data sheets and chemical hazard training for shipyard workers); 1917.22 (requiring marine terminal workers be instructed as to the chemical hazards presented by cargo); 1918.86 (requiring chemical hazard instruction for longshore workers); 1926.21 (requiring chemical hazard training for construction workers). *See, also*, H–022, Ex. 99 (journal article regarding usefulness of material safety data sheets, written by Dow Chemical Company representatives and published in December 1957).

OSHA also believes that the economic feasibility of extending the current HCS to the non-manufacturing sector is supported by the record. Simply put, economic feasibility is established by evidence that the standard will not threaten the regulated industry's "long-term profitability." *ATMI*, 452 U.S. at 531 n.55. Costs associated with expanding the standard to cover non-manufacturing workplaces will stem from the initial start-up costs and the less substantial recurring program implementation and upkeep costs for: maintaining material safety data sheets received from manufacturers, importers, distributors, and other employers; creating labels for in-house containers of hazardous chemicals; developing a written hazard communication program, including a list of hazardous chemicals present in the workplace; and developing and implementing chemical hazard training.

After careful analysis of the original HCS rulemaking record, OSHA concludes that, as a whole, it supports a finding that non-manufacturers are economically capable of providing employees chemical hazard information in the manner prescribed by the HCS. As noted previously, development of the evidentiary record for the HCS began as early as 1974. In that year, NIOSH recommended that OSHA adopt a standard requiring *all* employers to implement a system of labels, placards and material safety data sheets in their workplaces to inform employees about the chemical hazards to which they may be exposed. (H–022, Ex. 4). The NIOSH recommended standard, like the HCS, included requirements that employers ensure that chemicals in the workplace are marked with hazard warnings and that material safety data sheets are "filed in the establishment" where they are "readily available for examination by workers". *Id.* at 3. This hazard identification and warning system was designed to additionally "help in the education of employees and provide the data necessary for employers to take proper action to safeguard their employees." *Id.* at 1. NIOSH concluded that such a chemical hazard communication program was appropriate for all employers. *See, also* comments of the Air Transport Association, H–022, Ex. 5–3 ("[T]he airlines have no general objection to the [NIOSH] Criteria . . . [except that it] should clearly delineate the responsibility of the manufacturer supplying the necessary data on the Material Safety Data Sheets.").

The 1975 report of the Standards Advisory Committee on Hazardous Materials Labeling (H–022, Ex. 3), recommended a "total system" approach to chemical hazard communication not unlike the comprehensive approach of the current HCS. The Advisory Committee, which included representatives of non-manufacturers, recommended labeling and placarding systems, the creation and availability of material safety data sheets, and employee education and training programs for all workers potentially exposed to hazardous chemicals. The Committee recognized that these practices "are not new and novel concepts" but "well established in many industries and professional associations as well as regulated by various governmental agencies and international agreements." *Id.* at 3. The Advisory Committee made "no distinction among employees in different sectors of the economy." *United Steelworkers II*, at 7.

As the Court has stated, *id.* at 8, the 1977 ANPR requested public comment from all interested persons on whether a chemical hazard communication standard should be promulgated by

OSHA. Comments on the Standards Advisory Committee's recommended standard were specifically requested. Although OSHA did not receive comment from employers in every industrial sector, those non-manufacturers that did respond supported a comprehensive hazard communication system for their workplaces. For example, Sea-Land Service, Inc. (H-022, Ex. 2A-6), supported requirements for container labels (consistent with transportation labels already in place), the availability of material safety data sheets to persons in the workplace, and individual training programs. Panhandle Eastern Pipe Line Company (H-022, Ex. 2A-7) and Truckline Gas Company (H-022, Ex. 2A-9) both "agree[d] that employees need information about the product with which they work" and that this could be accomplished by requiring suppliers of hazardous chemicals to label containers with the "degree and nature of the hazard" and by requiring user employers to "inform employees of the hazard." Those companies had already developed "a special manual of data for all chemicals, solvents and cleaners used in [their] operations and maintenance."

Wisconsin Electric Power Company (H-022, Ex. 2A-30), stated that given adequate labels and material safety data sheets from chemical manufacturers and suppliers, chemical users such as they "would be in a position to prepare their own Material Safety Data Sheets, hazard placard systems, proper labeling of auxiliary and secondary containers and training of personnel who may use or otherwise contact this material." Recognizing the need for "proper labeling, storage, handling and instructions in the use of hazardous materials," Wisconsin Electric Power Company had already "developed and put into effect a Hazardous Materials Control Program." Southern Gas Association (SGA) (H-022, Ex. 2A-75) also believed that suppliers and manufacturers of hazardous materials should be required to provide proper labeling, warnings and other hazard information to all employers using these materials. SGA further suggested that OSHA promulgate a standard directing all employers "to establish required training for employees that may handle or otherwise be exposed to any hazardous materials." These comments and others filed in response to OSHA's 1977 ANPR indicate that many non-manufacturers consider maintaining labels received on chemical containers, making material safety data sheets received from suppliers available to employees, and providing information and training to employees regarding the chemical hazards present in the workplace to be economically feasible. *See, also* H-022, Exs. 2A-2 (Schirmer Engineering Corporation); 2A-31 (Union Electric Company); 2A-32 (Texaco); 2A-36 (American Trucking Association, Inc.).

Moreover, comments received from non-manufacturers at later stages of the original rulemaking also indicate they are capable of implementing the performance-oriented HCS. In fact, there are comments which indicate that many of these requirements were already being implemented in the non-manufacturing sector.

For example, the Western Agricultural Chemicals Association indicated that its members provide material safety data sheets to anyone who requests them, including customers in the non-manufacturing sector (Tr. 2873). Their representative further stated that "[i]n the agricultural field, I would say most technical products have material safety data sheets. I would say maybe 75% to 80% of the inerts have them . . ." (Tr. 2881).

There was also testimony from employee representatives, including those in the non-manufacturing sector such as airline mechanics, that they requested and were able to obtain material safety data sheets from manufacturers for products in use in their facilities. Tr. 2819-21, 3131, 3828. One union testified that a joint employee-employer safety committee received every material safety data sheet it requested, and that the union then trained workers to be able to use the information. Tr. 2824-A.

Another non-manufacturing union representative, the International Brotherhood of Painters and Allied Trades, indicated that it shared collected material safety data sheets with employers who needed such information. "[T]o contractors who make requests of us for information, we do provide them material safety data sheets, write-ups on the chemicals and the products . . . We do everything—our union does everything they can as a service to our contractor members to provide them with the information they need to operate safely. . . ." Tr. 2101-2.

Other large companies with manufacturing as well as non-manufacturing establishments testified that information was made available throughout their corporations, and they provide information to all customers regardless of industry. For example, Atlantic Richfield Company testified that they have a company-wide material safety data sheet policy and program "[U]nder this program, a material safety data sheet is recognized as a basic source of information for practical health, safety and environmental information. The MSDS whether generated internally or obtained from a supplier is used to communicate relevant data within the company and to outside customers. It is the responsibility of our various operating companies to distribute copies of each MSDS to customers and company facilities for employee instruction and/or information." Tr. 2439. Their company facilities include such non-manufacturing operations as petroleum production.

Similarly, Exxon, Inc. testified that it too provides material safety data sheets to all customers: "[W]e consider a material safety data sheet a matter of public information that's part of our literature, regularly available to anyone who requests it." Tr. 1708-09. *See, also,* Shell testimony at Tr. 1712 and 2500, and Uniroyal Chemicals at Tr. 1464.

Therefore, based on the recommendations of NIOSH, the Standards Advisory Committee and the comments received from non-manufacturers and their representatives participating in the lengthy rulemaking, OSHA concludes that the original record as a whole indicates that non-manufacturers are capable of complying with the HCS. As long as chemical suppliers provide adequate chemical hazard information in the form of labels and material safety data sheets to non-manufacturers using the chemicals, those user employers, like the manufacturers who use hazardous chemicals which they themselves did not manufacture or import, can develop hazard communication programs and provide employees information and training on the chemical hazards in the workplace.

In light of the evidence in the original rulemaking record, OSHA concludes that non-manufacturers can incorporate the HCS' administrative practices and provide chemical hazard information to their employees. OSHA believes all employers can ensure that containers of chemicals are maintained with proper hazard warnings just as an employer would maintain labels or marks on containers to ensure that employees comprehend their contents and intended uses. Likewise, all employers are able to acquire and maintain up-to-date material safety data sheets for hazardous chemicals just as they are able to acquire and maintain up-to-date cost information and performance specifications on those very same

chemicals. OSHA also concludes that it is feasible for employers to inform and train their workers regarding the chemical hazards present in the workplace just as employers are capable of training their workers to perform their jobs in an efficient and speedy manner. These conclusions are further supported by the experience and evidence gathered by the Agency since promulgation of the HCS for manufacturers in 1983.

At this time, OSHA has no evidence indicating that the profitability of manufacturers generally, or even chemical manufacturers in SIC 28 (by far the most economically burdened by the HCS, *see* 48 FR 53333), has been threatened by complying with the HCS. Manufacturers have had the considerable costs of evaluating, collectively, hundreds of thousands of chemicals for their hazards and creating corresponding labels and material safety data sheets since November 1985, as well as the costs of implementing an in-plant program by May 1986. After thorough analysis, OSHA determined that the current HCS would not impose a substantial burden on manufacturers and that the HCS was economically feasible for them. *See* 48 FR 53333. Experience to date in implementation of the rule supports that finding. For example, if manufacturers were experiencing significant feasibility problems in complying with the rule, OSHA would have expected to receive numerous substantive comments regarding those problems in response to the 1985 ANPR questions addressing feasibility concerns. However, although some manufacturing employers objected to some requirements, substantive comments demonstrating infeasibility were not received, which appears to support OSHA's conclusion that compliance with the HCS was, and continues to be, economically feasible for manufacturers and indicates the standard is also feasible for non-manufacturers. In fact, some manufacturers took the opportunity to state their continuing support for the rule and its requirements. *See, e.g.*, H-022D, Ex. 2-14, (The Chemical Manufacturers Association "strongly believes that the substantive provisions of the Hazard Communication Standard are sound as a matter of science and policy."); Ex. 2-67 (Economics Laboratory, Inc. "considers hazard communication worth the effort.")

Generally, the HCS costs to non-manufacturers would be a function of the number of hazardous chemicals in the workplace, and the number of employees exposed to hazardous chemicals. If employees are not potentially exposed to hazardous chemicals in a particular work operation, the proposed standard does not apply. Also, to the extent that employers are voluntarily providing information, or providing information in order to comply with other regulations or laws, this should significantly reduce the burden of compliance with this rule. Approximately 32 States and several localities already have hazard communication/right-to-know laws covering non-manufacturing industries indicating that many others seeking to protect the safety and health of workers have concluded that industry can comply with these types of requirements. In fact, as evidenced in the original rulemaking record, many companies involved in interstate commerce would benefit from promulgation of a uniform Federal standard as it would preempt different and potentially conflicting State and local laws and lessen overall compliance burdens. 48 FR 53283. *See also, e.g.*, H-022D, Ex. 2-83 (The American Gas Association "believes that a Federal Standard, rather than a variety of differing state regulations, would best serve the needs of the natural gas industry, the employees in our industry, and the general public as well."); Ex. 2-198 (The National Constructors Association has found that "[i]t has been nearly impossible to establish uniform interstate policy" and "can clearly see the wisdom of having one workable/cost-effective government regulation that addresses hazard communication.")

Although the original HCS record contained no evidence to indicate the HCS would be economically infeasible for non-manufacturing, OSHA recognized that potential feasibility concerns could arise, for example, with small businesses, businesses with large employee turnover (such as retail stores and construction companies), and businesses with rapid turnover of hazardous chemicals in the workplace (such as warehouses and marine cargo operations). However, based on the original HCS rulemaking record, and additionally based on: (1) The apparent successful implementation of the present HCS by manufacturers; (2) the implementation of other Federal communication standards and of State plan States' laws by non-manfacturers; and, (3) on regulatory impact and regulatory flexibility analyses prepared by the Agency since the 1985 Court order and summarized in Section III of this document, OSHA concludes that the provisions in the current Hazard Communication Standard are economically feasible for all of the non-manufacturing industries.

OSHA is also aware that many employers in the manufacturing sector have been able to satisfy some of their responsibilities under the HCS by using compliance materials obtained from various sources. Trade associations, for example, have frequently been instrumental in assisting their members in developing programs suitable for their type of industrial facility. This is particularly appropriate given the performance orientation of the HCS, and the flexibility employers are permitted to design appropriate compliance programs. Sample written programs and other written materials, as well as training programs regarding the requirements of the rule, have been developed and provided to association members and have facilitated compliance efforts. The ability of associations to accomplish this successfully demonstrates technical feasibility and enhances economic feasibility. Trade associations in states covering non-manufacturing workplaces under their right-to-know rules have also been able to develop materials to assist their members to comply. Materials developed for these State laws or for the manufacturing sector under the current HCS could be adapted for the non-manufacturing workplaces newly covered by the HCS.

There have also been a number of services provided by consultants in the private sector. These range from very specific items, such as computer programs to manage information, to a comprehensive compliance strategy, where a consultant will devise an entire program to enable a facility to comply. Such services will often minimize the burden of compliance by minimizing the time the facility staff must spend to develop and implement a program. The availability of such programs also provides support for the conclusion that the rule is feasible.

For large companies, the burden per facility will often be minimized by corporate development of a standardized program. It can be expected that most corporations with multiple facilities will use this approach (this has occurred in the manufacturing sector as well).

Therefore, OSHA concludes that similar resources will be available to employers in the non-manufacturing sectors, which further demonstrates that the rule is feasible for implementation in all sectors. In fact, given the pre-existing coverage of non-manufacturing under various state rules, and the extent of the

materials developed in response to the current HCS which would also be applicable in non-manufacturing, additional development of such materials should require considerably less effort and be easier for non-manufacturers to obtain.

Nevertheless, OSHA recognizes that the unique characteristics of some businesses render certain provisions of the current standard unnecessary or ineffective in communicating the hazards of chemicals to workers. The Agency has thus made some modifications to the standard to ensure that its provisions are practical and effective in communicating hazards to all workers. *Cf. ATMI*, 452 U.S. at 531 n.32 (OSHA may use cost-effectiveness analyses and choose the less costly of two equally effective standards). The inclusion of these "tailoring" provisions is consistent with the Agency's action in tailoring the original HCS to make it practical and cost-effective for all manufacturers. *See* 29 CFR 1910.1200(b)(3)–(5). Now that the coverage of the standard is being expanded to non-manufacturing employers as well, it is necessary to tailor the standard to the unique characteristics of these non-manufacturing employers. The tailoring provisions, explained in Section II of this preamble, are based on the original record in the HCS rulemaking, and also on Agency experience in implementing the current rule; State plan State experience in implementing expanded versions of the current rule; and comments submitted to the Agency in response to the ANPR published in November 1985. OSHA believes that the knowledge and experience gained during the past few years of implementation and enforcement of the current rule must be taken into consideration when crafting a rule to appropriately apply to the non-manufacturing sector.

The Agency's position is that all employees are entitled to information regarding the chemical hazards they are exposed to in the workplace, and that a uniform Federal hazard communication standard is the best method to ensure that information is provided. This position is consistent with the Act (protecting all employees to the extent feasible), as well as with the Court's decision upon review of the rule. Therefore, this final rule addresses communicating chemical hazards to all exposed employees.

It should be emphasized that in preparing a detailed regulatory impact analysis for the expansion of the scope of the HCS, OSHA has accumulated evidence to indicate that some employees in every SIC code designation are exposed to hazardous chemicals, and that it is therefore not appropriate to exempt any particular industry sector. For example, OSHA has received suggestions that retail establishments be exempted since employee exposure to chemicals is believed to be unlikely in these types of facilities. However, there is testimony in the original rulemaking record from the United Food and Commercial Workers International Union (Tr. 3088–97) that demonstrates that workers in such facilities are exposed to hazardous chemicals, and therefore do need the protections afforded by coverage under the HCS:

> While supermarkets don't use hundreds of hazardous chemicals like some manufacturing industries, a large number of workers are exposed to the dozen or so they do use. Chemicals used include caustic and acid cleaning compounds, solvents, waxes, paints and disinfectants . . . Let me relate to you one case within our union where workers were overexposed to an unidentified substance. A group of supermarket workers began experiencing dizziness, upper respiratory tract irritation and headaches . . . Not until workers started to talk with one another did they start to suspect a possible link between their illness and a certain solvent that was used to remove old price labels from merchandise called Garvey XC–36.

See Tr. 3088–89. *See also* Tr. 414 and Tr. 1840–43. The testimony further relates other incidents, as well as the various activities the union had to pursue to obtain information for exposed workers—including chemical analysis of products to determine their contents. This illustrates the need for application of the standard in industries such as retail stores, as well as those industries where chemical exposures are more obvious. For additional testimony regarding the extent of chemical exposures in the non-manufacturing sector, *see, e.g.*, hospital workers: Tr. 411–14, 2736–41, and 3036 (". . . hospital workers are exposed to formaldehyde, ethylene oxide, cleaning agents which are often very caustic . . ."); (Tr. 411); barbers and beauticians: Tr. 415–16 (". . . work around hair dyes . . . known to cause cancer . . ."); longshore workers: Tr. 3143; utility workers: Tr. 417, 3078, 3130; workers in dry cleaners and laundries: Tr. 416, 4084–90 (" . . . [B]eyond the chlorinated solvents that your dry cleaners use, some cleaners and laundries also use dyes . . ."); farmworkers: Tr. 2260.

D. Construction Advisory Committee Recommendations

On June 23, 1987, the Construction Advisory Committee on Occupational Safety and Health met to discuss a draft proposed standard prepared by OSHA to expand the scope of the HCS to the non-manufacturing industries. The draft proposed rule was very similar to the final standard being promulgated herein. OSHA has reviewed the recommendations of the Construction Advisory Committee, and incorporated a number of the suggested revisions into this document to tailor the rule for the construction industry, and for other industries which have similar concerns due to similar differences in work operations from the typical manufacturing establishment. Other recommendations called for more substantive changes to the HCS, affecting the obligations of chemical manufacturers and others, and OSHA does not believe they are supported by the record or appropriate to incorporate into this final rule without further opportunity for notice and comment from those affected. It is important to note, however, that despite the recommended changes there were no indications that members of the Construction Advisory Committee believe that it is infeasible to implement hazard communication programs in the construction industry. In fact, as OSHA has noted previously, the construction industry has been subject to training requirements concerning chemical hazards for many years (*see* 29 CFR 1926.21).

In preparing the draft proposed rule, and subsequently this final rule, OSHA did review the *Report on Occupational Health Standards for the Construction Industry* which was submitted by the Construction Advisory Committee to the Assistant Secretary on May 16, 1980. In that report, the Committee addressed recommendations for labels, material safety data sheets, and training—all of the major components of the HCS.

Of particular concern to the Committee at that time was that construction employers do not have access to the necessary information upon which to develop appropriate signs and labels or material safety data sheets, and therefore must depend upon suppliers for such information. "[C]onstruction employers may not always be aware of the hazard associated with a particular product or device if the items are not accompanied upon purchase by appropriate labels and data sheets. . . ." OSHA agrees that this lack of information has been a problem for all downstream users of chemicals, and thus developed the approach incorporated into the HCS—producers or importers of chemicals are responsible for evaluating the hazards

and transmitting that information to downstream employers or users of the materials. Under the expanded rule, construction employers would be the recipients in this downstream flow of information.

The HCS did not exist at the time of the report, and the Committee thus recommended that a solution to the problem of lack of information "would be to modify and extend the existing OSHA standard for material safety data sheets which now applies only to ship repairing, shipbuilding, and ship breaking (29 CFR 1915, 1916 and 1917). The modified standard would require manufacturers or formulators of harmful materials or agents to supply material safety data sheets along with their products in such a fashion that they reach construction employers." Shipbuilding and ship repairing are in the manufacturing sector, and covered by the requirements of the 1983 final rule—ship breaking will be covered by these expanded provisions. Therefore, OSHA is doing what was recommended in 1980, *i.e.*, extending the existing OSHA standard for material safety data sheets to construction. The Advisory Committee concluded that although the hazard information may have been difficult for construction employers to acquire in the past, "such information was fundamental to the preparation of warning signs, labels, training programs, and other important job safety and health activities."

The Construction Advisory Committee is now recommending that the construction industry be regulated under a separate standard for Hazard Communication, rather than being treated as any other downstream employer who uses chemicals. The rationale is that construction sites are unique among industrial workplaces and should be addressed in a vertical standard specific to the industry. Although OSHA has found this argument persuasive for a few health standards, where there are fundamental differences in control strategies to achieve permissible exposures for a chemical in a fixed site facility versus the construction site, it does not appear to be appropriate in this situation which simply involves transmittal of information, that can be accomplished on any type of site. Arguments regarding transient workers, mobile work sites, etc. can appropriately be made for other non-manufacturing users of chemicals as well. The problems raised can be dealt with more effectively by modifying the provisions of the current rule to address them, rather than preparing completely separate standards for each industry.

It was interesting to note that although the Construction Advisory Committee was essentially maintaining that hazard communication in construction could be treated as a separate issue, many of the changes the members were recommending would often have required substantive changes in the requirements for the manufacturing sector. As noted above, the Committee expects to receive lables on containers and material safety data sheets from its suppliers. This is certainly consistent with OSHA's approach in the rule. But the Committee is also recommending that the labels on containers being shipped to construction contain additional information, and that the requirements for material safety data sheets be slightly different as well. They also recommended changes in the hazard determination provisions, while maintaining that hazard determinations must be accomplished in the manufacturing sector. These recommendations serve to support OSHA's view that in an approach which requires a downstream flow of information, the relationship between the requirements for producers and downstream users are so inter-dependent that separation of them into two separate standards would be logically inconsistent. And furthermore, since the requirements for hazard determinations, labels, and material safety data sheets were based on an extensive rulemaking record, and are not industry-specific, it would not be appropriate to modify those requirements at this point.

Two separate standards would also require cross-referencing provisions from one rule to another to ensure proper information transmittal, a regulatory format which would be unnecessarily confusing to the regulated community. OSHA believes it is more effective to list, in one standard, the obligations of chemical producers, importers, and suppliers with those of the users so that employers using hazardous chemicals will be aware of the content and quality of the hazard information they are entitled to receive from their suppliers. Furthermore, it would not be appropriate to indicate requirements for chemical manufacturers and importers in a standard which purports to cover solely the construction industry, as would have to be done to accommodate all of the recommendations of the Committee. Therefore, construction employers are included with all other employers in this standard. However, OSHA will print the rule in full in 29 CFR Part 1926 (in § 1926.59) for ease of reference for construction employers and employees. In addition, it will also be printed in 29 CFR Parts 1915, 1917, and 1918, for the use of maritime employers and employees (at new § 1915.99, 1917.28, and 1918.90, respectively), and will be referenced in Part 1928 covering agricultural employments.

E. Federal Community Right-to-Know Law

Expansion of OSHA's HCS will also have an impact on employers' obligations under another Federal law to inform State and local communities of the hazardous chemicals present in the workplace. On October 17, 1986, the President signed into law the Superfund Amendments and Reauthorization Act of 1986 ("SARA"). Part of the new law, Title III, the Emergency Planning and Community Right-to-Know Act of 1986, encourages and supports emergency planning efforts at the State and local level and provides citizens and local governments with information concerning potential chemical hazards present in their communities.

Two provisions in the new law, sections 311 and 312, mandate that employers required under the Occupational Safety and Health Act of 1970 and regulations under that Act to prepare or have available material safety data sheets for hazardous chemicals in their workplaces, must also submit chemical hazard information to State and local governments. Specifically, employers required by the OSHA HCS to create or maintain material safety data sheets for employees must also submit to the State emergency response commissions, the local emergency planning committee and the local fire department: (1) A material safety data sheet for each hazardous chemical for which a data sheet is available (section 311); and (2) an emergency and hazardous chemical inventory form (section 312). The public may request material safety data sheets and inventory information from the local planning committee.

Because all manufacturing employers are currently subject to the OSHA HCS and required to create or maintain data sheets for the hazardous chemicals present in their workplaces, they must also comply with the community reporting requirements of the Emergency Planning and Community Right-to-Know Act. An expanded HCS covering non-manufacturers will require non-manufacturers to provide chemical hazard information not only to their employees but also to the surrounding communities.

On January 27, 1987, EPA proposed regulations to implement the community data sheet and inventory reporting requirements. A detailed explanation of the EPA proposal can be found at 52 FR 2838 (January 27, 1987). A final rule is expected to be published in the near future. OSHA has prepared a preliminary estimate of the costs of expansion of the EPA requirements into the non-manufacturing sector. This estimate is addressed further in the section of this preamble dealing with the regulatory impact analysis for the final rule.

EPA has established a toll-free hotline to answer questions concerning the requirements: Chemical Emergency Preparedness Program Hotline, 1-800/535-0202; in Washington, DC at 1-202/479-2449.

II. Summary and Explanation of the Issues and the Provisions of the Final Standard

This final rule is both an expansion and revision of the current HCS. The regulatory text presented herein includes the unchanged provisions of the present rule, as well as those which OSHA is changing. This was done to ensure that readers can clearly follow where these changes would appear in the standard. As explained below, the substantive changes were found to be necessary and appropriate for a hazard communication standard covering all workers exposed to hazardous chemicals. OSHA is also making several corrections and minor technical amendments to the standard. OSHA finds prior public notice and comment for these minor amendments to be unnecessary because of their non-substantive nature. 5 U.S.C. 553(b); 29 CFR 1911.5.

The discussion which follows will address the changed provisions of the rule, as well as the issues related to these changes. A detailed summary and explanation of the current rule's provisions is only provided when necessary for the discussion of the modification. For a complete explanation of the existing provisions, please see the preamble to the current HCS (48 FR 53334-40). The current rule is codified at 29 CFR 1910.1200, and was published at 48 FR 53340-48. The modified trade secret provisions are discussed at 51 FR 34590.

This discussion is organized by paragraph of the standard, and is presented in the order these paragraphs appear in the HCS.

For ease of reference, OSHA will be printing the same rule in full in 29 CFR Part 1910 (in § 1910.1200) for general industry, 29 CFR Part 1926 (in § 1926.59) for construction, and in 29 CFR Parts 1915, 1917, and 1918, for the use of the maritime industry (at new §§ 1915.99, 1917.28, and 1918.90, respectively).

(a) Purpose

All references to the manufacturing sector, SIC Codes 20 to 39, have been deleted to reflect the expansion of the scope to all employers and employees. It should be noted that these changes have been made throughout the provisions of the rule, wherever the HCS currently addresses employers and employees in the manufacturing sector rather than employers and employees in general. Despite the expansion of covered employers from manufacturers to all employers, however, OSHA retains in this final rule the distinction between chemical manufacturers and importers who produce or import hazardous chemicals, and downstream employers who merely use the chemicals. Only the former are to prepare the technical hazard information for labels and materials safety data sheets accompanying hazardous chemicals, whereas all employers are to pass this information on to their workers potentially exposed to the chemicals through a comprehensive hazard communication program which includes individual training.

The original Hazard Communication Standard included, at 29 CFR 1910.1200(a)(2), a generally-worded statement concerning the Agency's position regarding the preemptive effect of the standard. This paragraph has been revised to more explicitly state the Agency's position regarding preemption based on the provisions of the Act and related legal actions. This final rule significantly expands the number of industrial groups to which the Federal standard applies, and thus it significantly expands the area in which state and local laws will be preempted.

Section 18(a) of the Act, 29 U.S.C. 667(a), provides that a state may assert jurisdiction through any court or agency over "any occupational safety or health issue with respect to which no standard is in effect under section 6." Conversely, where OSHA has issued a standard, section 18 expressly preempts states from asserting jurisdiction through any court or agency over the issue addressed by that standard, unless a Federally-approved State plan is in effect. 29 U.S.C. 667(a) and (b); 29 CFR 1901.2.

The express preemption provisions of the Act apply to all state or local laws which relate to an issue covered by a Federal standard, without regard to whether the state law would conflict with, complement, or supplement the Federal standard, and without regard to whether the state law appears to be "at least as effective as" the Federal standard. The "at least as effective as" test applies only to state standards adopted under an approved State plan. 29 U.S.C. 667(c)(2). In enacting OSHA, Congress rejected provisions which would have permitted states to enforce laws which were "not in conflict with" or "at least as effective as" Federal OSHA standards. *See* Senate Comm. on Labor and Public Welfare, 92d Cong., 1st Sess., Legislative History of the Occupational Safety and Health Act of 1970, at 58, 706 (Comm. Print 1971). Instead, Congress enacted section 18 providing that Federally-approved State plans are the exclusive alternative to preemption.

Since the promulgation of OSHA's original Hazard Communication Standard, a number of court decisions have dealt with the effect of express and implied Federal preemption upon state and local hazard communication or "right-to-know" laws. *United Steelworkers of America* v. *Auchter*, 763 F.2d 728, 733-38 (3d Cir. 1985) (Federal Hazard Communication Standard expressly preempts state hazard disclosure laws in manufacturing sector); *New Jersey State Chamber of Commerce* v. *Hughey*, 774 F.2d 587 (3d Cir. 1985) (provisions of New Jersey right-to-know law which pertain primarily to community or environmental safety and health are not expressly preempted; right-to-know laws subject to implied preemption if they make it impossible to comply with Federal law or pose an obstacle to objectives of the Federal Act); *Manufacturers Association of Tri-County* v. *Knepper*, 801 F.2d 130 (3d Cir. 1986) (similar holding in connection with Pennsylvania right-to-know law).

The revised paragraph (a)(2) specifically provides that both state and local laws pertaining to occupational hazard communication are preempted by the Federal standard. In the one court decision which has addressed the question, the United States Court of Appeals for the Sixth Circuit ruled that the Federal Hazard Communication Standard preempts local as well as state laws. *Ohio Manufacturers Association v. City of Akron*, 801 F.2d 824 (1986). The court noted that the text of § 1910.1200(a)(2) did not mention localities and referred only to preemption of "state" laws. *Id.* at 827, 831-832. Nevertheless, relying upon references to local as well as state laws in the preamble to the 1983 standard, the court correctly inferred that OSHA had intended to preempt all non-Federal occupational hazard communication

laws. *Id.* at 832. Therefore, in accordance with the Court decision, OSHA is making a technical amendment to paragraph (a)(2) so that it explicitly states that the HCS preempts local worker right-to-know laws.

The revised § 1910.1200(a)(2) not only defines hazard communication as an "issue" under the terms of the Act, but also enumerates the generic areas addressed by the standard for purposes of establishing the parameters of preemption. Thus any State or local government provision requiring the preparation of material safety data sheets, labeling of chemicals and identification of their hazards, development of written hazard communication programs including lists of hazardous chemicals present in the workplace, and development and implementation of worker chemical hazard training for the primary purpose of assuring worker safety and health, would be preempted by the HCS unless it was established under the authority of an OSHA-approved State plan.

(b) Scope and Application

Laboratories. With regard to the coverage of laboratories, specifically addressed in paragraph (b)(3), OSHA concludes that the current rule's provisions, requiring only that labels and material safety data sheets received with incoming chemicals be maintained and that the general training of paragraph (h) be provided, are feasible for non-manufacturing laboratories as well. *See, e.g.,* comments of the Massachusetts Institute of Technology, H–022D, Ex. 2–120 ("We agree that the Hazard Communication Standard's requirements for labs are adequate. . . . We expect our compliance costs to remain at the current level of spending because the majority of these are start-up costs and some activities have been absorbed and integrated within existing programs.") OSHA believes that these somewhat limited hazard communication requirements for manufacturing laboratories are also appropriate for non-manufacturing laboratories because both share the operating conditions that distinguish them from the typical industrial workplace: they commonly use small quantities of many different hazardous chemicals for short periods of time; the conditions and purposes of the use of the chemicals frequently change, often unpredictably; many substances are of unknown toxicity; and many workers are highly trained. *Compare* 48 FR 53287–88, *with* 51 FR 26668–64. OSHA concludes that the same HCS provisions tailored for manufacturing laboratories are appropriate for the protection of all laboratory workers within OSHA's jurisdiction.

It should also be noted that OSHA is currently proceeding with a specific rulemaking to directly address "Occupational Exposure to Toxic Substances in Laboratories" (51 FR 26660; July 24, 1986). When that rule becomes final, its provisions may supplement the information transmittal requirements of the HCS by directly reducing hazardous chemical exposures in laboratories by requiring, among other things, safe work practices. As noted in that proposal, the final rule might modify the general information and training requirements in the HCS to incorporate other aspects of that standard. Any changes in the application of the HCS provisions to laboratories will be addressed in detail in the final rule for laboratories and will be based on that rulemaking record (Docket H–150).

Coverage determined by "exposure." The HCS covers situations where employees "may be exposed" to hazardous chemicals (paragraph (b)(2)), and such exposure is defined to include potential exposure as well as actual exposure. This is to ensure that employees receive information about all chemical hazards in their work areas, and that they are prepared to deal with any unexpected releases or emergency situations, as well as exposures during the normal course of employment. OSHA concluded that employees are entitled to information regarding the chemicals to which they are exposed in their work areas. It should be noted, however, that individual facilities and workplaces may have some employees who are covered since their work involves exposure to hazardous chemicals, and others who are not covered because their work does not. For example, in a retail department store, maintenance workers or workers in a graphic arts department may be covered since their jobs involve exposure to chemicals, but an accountant in the billing department would not be likely to experience exposure that would require coverage by the HCS.

There are a number of work situations where employees only handle sealed containers of chemicals, and under normal conditions of use would not open the containers and would not expect to experience any measurable exposure to the chemicals. Such work operations include, for example, warehousing, retail sales, marine cargo handling, and trucking terminals. It is reasonable to assume, however, that all such containers are subject to leakage and breakage, and these employees are in fact potentially exposed by virtue of the presence of these hazardous chemicals in their workplaces. Because of this potential exposure, they need information to protect themselves from the hazards of these chemicals in the event such an emergency situation occurs.

However, OSHA has considered the extent of information necessary or appropriate in this type of operation, and the practicality of requiring such work operations to be subject to all of the provisions of the rule. The primary need is to ensure that these employees know how to acquire and use the hazard information available to them, and to handle an emergency exposure situation. As in laboratory operations, maintaining lists of chemicals where the chemicals present may change on short notice, sometimes on a daily basis, is not a useful requirement. Similarly, obtaining material safety data sheets for every chemical in a sealed container that passes through a facility—even if it is there less than a day in some situations—would result in a considerable amount of paperwork, with little discernable benefit for the employees involved. Therefore, OSHA has added a provision, paragraph (b)(4), to limit the duties of employers for those work operations where employees only handle sealed containers that are not intended to be opened under normal conditions of use. (Some States which have adopted right-to-know laws have also recognized the practical problems of coverage in this area, and have included provisions limiting coverage of workplaces where chemicals are handled in sealed containers. *See, e.g.,* Tennessee Hazardous Chemical Right to Know Law, Tennessee Code Annotated, 50–3–2001 through 50–3–20019.) In these situations, employers must not remove labels affixed to incoming containers of hazardous chemicals; must maintain and provide access to material safety data sheets that are received for hazardous chemicals while the chemicals are in the workplace, and obtain material safety data sheets when they are not received but an employee requests one; and must train employees in accordance with the provisions of the rule to ensure they are protected in the event of a spill or leak.

The employees in these operations will always have access to the label information, which will provide appropriate hazard warnings and be a visual reminder of the potential hazards if exposure occurs. Employees will also be trained regarding the general classes of chemical hazards faced and the means by which they can protect

themselves from these hazards when there is a spill or leak. The training must also address the availability and use of substance-specific information found on labels and material safety data sheets, where available. These requirements should provide employees handling only sealed containers of chemicals with the information they need.

This limited provision also addresses some of the concerns raised by representatives of industries with these types of workplaces. (*See, e.g.* Exs. 2-53, 2-75, 2-201, and 2-214). Although they generally were arguing that this type of operation warrants exclusion from the rule, OSHA does not agree that no protection under the HCS is required in these situations. As already described, a potential for exposure does exist, and therefore such employees must be appropriately covered. OSHA believes the limited coverage described will effectively protect employees while recognizing the constraints of the particular work operations involved with regard to the applicability of the current rule to these types of work.

Labeling exemptions. The HCS includes a number of labeling exemptions to ensure that OSHA does not provide duplicative coverage for products which are already labeled under the rules of another Federal agency. It should be reemphasized that these exemptions (in paragraph (b)(4) of the original rule; paragraph (b)(5) in this final rule) are only from the container labeling requirements under paragraph (f)—all other provisions of the rule are still in effect. A minor correction is being made, however, to these exemptions to indicate that when medical or veterinary devices are labeled in accordance with the labeling requirements of the Food and Drug Administration (FDA) under authority of the Federal Food, Drug, and Cosmetic Act (21 U.S.C. 301 *et seq.*), those items are exempted from HCS labeling requirements. All other items regulated by FDA under that Act were listed in the HCS labeling exemption. Medical and veterinary devices were inadvertently omitted from the list of items that might be subject to FDA labeling requirements under the Federal Food, Drug, and Cosmetic Act, and they are exempted from HCS labels for the same reasons that the other items are exempt when subject to labeling under FDA. *See* 48 FR 53289. To ensure that all these FDA regulated items are treated in the same manner and that devices are exempted from HCS labeling if subject to FDA labeling, paragraph (b)(5)(ii) is amended by adding medical and veterinary devices.

Other exemptions. The HCS includes a number of specific, total exemptions from the requirements of the rule for certain types of chemicals. This rule adds three categories of exemptions: food, drugs, cosmetics, or alcoholic beverages in a retail establishment packaged for retail sale (paragraph (b)(6)(vi); consumer products (paragraph (b)(6)(vii)); and certain pharmaceuticals (paragraph (b)(6)(viii)).

Food, drugs, cosmetics, alcoholic beverages. The current HCS includes an exemption for food, drugs, or cosmetics brought into the workplace for employee consumption. These types of exposures are not related to an employee's work, and therefore do not need to be covered under the HCS.

The expansion of the HCS into the non-manufacturing sector will result in many of these types of products being present in workplaces (*e.g.*, liquor stores) where they are not intended for employee consumption, and where they normally would not result in employee exposure because they are packaged for sale to consumers. Although some of these products may meet the definition of a "hazardous chemical" (*e.g.*, vinegar is acetic acid), when packaged for retail sale they do not pose a hazard to workers that is any different than the hazards of such products in their homes. The label information required by other Federal agencies for foods, drugs, cosmetics, and alcoholic beverages should thus provide sufficient protection for workers, and OSHA has exempted these products from coverage under the rule. It should be noted that this is not an exemption for facilities of any particular industry, as all facilities may have other chemicals in use that would be covered by the HCS. In addition, since these products are exempted, employers which package them for retail sale would not have to furnish material safety data sheets to distributors receiving the products.

Consumer products. The current rule provides a labeling exemption for consumer products when they are labeled in accordance with the requirements of the Consumer Product Safety Commission (CPSC). CPSC requires consumer products which contain hazardous substances to be appropriately labeled. Examples of consumer products would include such items as oven cleaner, paint stripper, and adhesive, which may be found in various types of workplaces. In addition to the specific labeling exemption, OSHA has been interpreting the rule as not being applicable to consumer products when used as a consumer would use them. OSHA is now adding this interpretation to the rule itself, paragraph (b)(6)(vi), stating that when such consumer products are used in the workplace in a a manner comparable to normal conditions of consumer use, resulting in a duration and frequency of exposure to employees which is no greater than exposures experienced by ordinary consumers, under such conditions the chemical would not have to be included in the employer's hazard communication program. This position is consistent with OSHA's reason for orginally limiting the exemption for hazardous consumer products used in the course of employment to only an exemption from HCS labeling, and not material safety data sheet and training requirments. "OSHA recognizes . . . that there may be situations where worker exposure is significantly greater than that of consumers, and that under these circumstances, substances which are safe for contemplated consumer use may pose unique hazards in the workplace." 48 FR 53289. However, to the extent that workers are exposed to the substances in a manner similar to that of the general public, there is no need for any HCS requirements.

One example of such a differentiation in exposure situations involves the use of abrasive cleaners in the workplace. Where these are used intermittently to clean a sink, much as they would be used at home, the cleaners would not be covered under the standard. But if they are used to clean out reactor vessels, thus resulting in a much greater level of exposure, they would be covered. Or if an employee cleans sinks all day long, thus resulting in more frequent exposures, the abrasive would also be included in the hazard communication program. Thus workplaces which only have chemicals which are consumer products used in the same way and as frequently as the general public would normally use them, would not have to have a hazard communication program.

It should be noted that OSHA intends to read this exemption narrowly. Where an employer is uncertain whether the duration and frequency of exposure to these products is comparable to consumer use, an employer should obtain or develop the material safety data sheet and make it available to employees.

In response to questions raised in the 1985 ANPR, OSHA received a few comments on the use of consumer products in the non-manufacturing sector. A number indicated that overexposure may occur from the use of such products, or that the frequency and duration of workplace exposure is typically greater than that experienced

by consumers (Exs. 2-59, 2-83, 2-100, 2-120, and 2-164). Others stated that the exposure was comparable to consumer use (Exs. 2-46 and 2-63). There were several that felt the label provided enough information, and no additional requirements were needed to protect employees (Exs. 2-75, 2-79, 2-99, 2-107, and 2-116), while others felt the employer should be required to request material safety data sheets because employees are not getting enough information (Exs. 2-109, 2-128, and 2-169). One suggested that the label note that a material safety data sheet is available on request (Ex. 2-100), while another contended that when a product is used by a professional, it is no longer a consumer product (Ex. 2-199). OSHA believes that the consumer product exemption in this final rule takes all of these concerns into consideration, and strikes a balance between the practical considerations of acquiring and maintaining material safety data sheets on CPSC regulated products which employees are exposed to at home as well as at work, and the worker's need for more hazard information than a CPSC label when exposures are greater or more frequent than typical public use of the chemical would generate.

A number of States adopting right-to-work laws have also developed consumer product exemptions. (*See, e.g.*, Wisconsin "Employees' Right to Know Law"; Illinois "Toxic Substances Disclosure to Employees Act.") However, most of these rules have taken a broader approach to the consumer product exemption, generally eliminating coverage of such products unless exposure is "significantly greater" than consumer exposure during the "principal consumer use." OSHA considered and rejected such language for the consumer product exemption. It would be very difficult from an enforcement perspective to determine when exposure to a consumer product is "significantly greater" than consumer exposure. The key elements of concern to OSHA are as stated in the consumer product exemption included in this rule—that the consumer product be used in the same manner as a consumer would use it (and therefore as intended by the manufacturer when preparing the label information), and that the duration and frequency of exposure be essentially the same as would be experienced by a consumer (and thus the label warnings would provide adequate protection.) A broader exemption than this would not be appropriate to protect workers from occupational exposures that were not anticipated by the manufacturer when the labels, and thus the protective measures, were developed.

Application to Office Products. A number of questions have been raised about the application of the rule to office products that may contain hazardous chemicals. It is OSHA's determination that office products such as pencils, pens, typewriter ribbons, and the like, are "articles" under the rule and therefore exempted, paragraph (b)(6)(iv). Employers are not therefore required to implement a program for such products. OSHA has also determined that intermittent, occasional use of a copying machine to make copies is not covered by the rule. The copying machine would also be considered an article for purposes of this standard. However, if a firm has a copying machine operator who is responsible for handling the chemicals associated with its use, or who operates the machine frequently, that individual would be entitled to information under the rule.

Medicine. The rule, paragraph (b)(6)(vii), also includes an exemption for drugs when they are solid, and are in final form for direct administration to the patient (*i.e.*, pills or tablets). Employees handling such finished drug products would not be exposed to the chemicals involved, and would not need information other than that supplied on the container label under FDA requirements. (The State of North Carolina adopted a similar exemption in their Hazard Communication Standard, 13 NCAC s7C.101(a)(99)).

Wood dust. As OSHA has received a number of questions regarding the application of the wood and wood products exemption to wood dust, OSHA would like to reiterate its interpretation regarding the wood and wood product exemption in paragraph (b)(6)(iii) of this final rule. The wood and wood products exemption was included in the HCS for two reasons. First, the presence and identity of wood and wood products in the workplace is "unmistakable" and second, their hazards (*i.e.*, flammability or combustibility) are well-known to workers. 48 FR 53289. Because wood and wood products, characteristic hazards are self-evident, regulations requiring formal notification were not thought to be necessary. Wood and wood products "are not expected to be hazardous for purposes of this standard." *Id.* at 53335. OSHA never intended, however, that wood dust be excluded from the standard's coverage under the wood and wood products exemption. Wood dust is not generally a wood "product," but is created as a byproduct during manufacturing operations involving sawing, sanding, and shaping of wood. Wood dust does not share solid wood products' "self-evident" hazard characteristics that supported the exemption of wood products from the HCS' coverage. Except for the chemical additives present in the wood, products such as lumber, plywood, and paper are easily recognizable in the workplace and pose a risk of fire that is obvious and well-known to the employees working with them. The potential for exposure to wood dust within the workplace, especially with regard to respirable particles, is not self-evident, nor are its hazards through inhalation so well-known that hazard communication programs are unnecessary.

"Wood dust" is a recognized health hazard, with exposure limits recommended by the American Conference of Governmental Industrial Hygienists (ACGIH) to control employee exposures to the substance. Under the provisions of the HCS, this means that wood dust is to be considered a hazardous chemical (paragraph (d)(3)(ii)), and therefore subject to the requirements of the rule including material safety data sheets and training.

(c) Definitions

The only changes to the definitions in the current HCS are those that need to be made to accomplish the expansion of the HCS.

The reference to SIC Codes 20 through 39 is being deleted from the definition of "chemical manufacturer" to be consistent with the extent scope of the rule. Any employer who produces a hazardous chemical for "use or distribution" is considered a "chemical manufacturer" under the HCS, and must prepare and provide the appropriate hazard information.

OSHA has modified the definition of "container" to exempt "engines, fuel tanks, or other operating systems in a vehicle." The Agency has received some questions regarding the need for labeling such parts of a vehicle in applying the rule to the manufacturing sector. Expansion into non-manufacturing will greatly increase the number of vehicles involved in work operations, and thus OSHA determined that this clarification will ensure that the Agency's position regarding this issue is clear—vehicles do not have to bear labels regarding hazardous chemicals used to operate them. This does not exempt such chemicals from coverage by the rule—it simply eliminates the need to label once they are placed into the vehicle.

The definition of "distributor" has also been changed to reflect the

extended scope of the rule. A "distributor" means "a business, other than a chemical manufacturer or importer, which supplies hazardous chemicals to other distributors or to employers." Among other things, distributors must transmit hazard information they receive from chemical manufacturers and importers to all their employer customers.

Under the current rule, OSHA defined "employee" as someone working in the manufacturing sector, and stated that those employees in manufacturing whose jobs did not involve routine potential exposure to hazardous chemicals would not generally be covered by the rule. Examples related to the manufacturing sector were provided. This was intended to limit the coverage primarily to those employees in the industry who were actually involved in production operations. However, since the scope of the entire standard is being expanded to cover employees in all types of work operations, the definition has been modified to clarify that workers who are exposed to hazardous chemicals as part of their assigned jobs would generally be covered under the rule, except for those who only encounter hazardous chemicals in non-routine, isolated instances. OSHA believes most office workers, and many other workers, are not exposed to the hazardous chemicals covered by the HCS in such a way that the rule would apply to those types of work operations. The rule, therefore, simply defines a covered "employee" as any "worker who is exposed to hazardous chemicals under normal operating conditions or in forseeable emergencies" and further states that "workers such as office workers or bank tellers who encounter hazardous chemicals only in non-routine, isolated instances are not covered." "Normal operating conditions" are those which employees encounter in performing their job duties in their assigned work areas. For example, if the receptionist in a facility receives and delivers a telephone message for someone in a different work area where hazardous chemicals are present, this does not mean that the receptionist would be covered under the rule by virtue of the one potential exposure from delivering the message. However, if performance of the receptionist's job entails walking through the production area every day, and thus being potentially exposed during the performance of regular duties, that job would be covered under the rule.

The definitions of "employer" and "importer" are also amended to indicate that all employers are covered by the standard. In addition, the definition of "employer" is amended to indicate that the term includes contractors and subcontractors. This reflects the definition of employer used in OSHA's construction standards. Similarly, the definition of "workplace" has been modified to specifically include job sites and projects.

Hazard warning. While OSHA is not modifying the definition of "hazard warning" contained in the current rule, the Agency wishes to reiterate the intent to help employers better understand and comply with the requirements. "Hazard warning" means "any words, pictures, symbols, or combination thereof which convey the hazard(s) of the chemical(s) in the container(s)." "Appropriate hazard warnings" are to be put on container labels. (*See* final rule paragraphs (f)(1)(ii) and (f)(5)(ii)). Since the rule covers "physical" and "health" *hazards*, specific information regarding these would be required on a label to comply.

Many labels at the time the HCS was promulgated includes only precautionary statements, rather than providing necessary information about the specific hazards of the chemicals. Thus employees encountered statements such as "avoid inhalation" on virtually every chemical container, but were not provided with statements regarding what type or severity of effect inhalation could be expected to produce.

Therefore, OSHA's standard requires identity and hazard information on labels. Although employers can choose to provide additional statements, OSHA's requirements are limited to that required to convey the hazards to the workers. Under the OSHA scheme, other data regarding protective measures, first aid, etc., are to be included on the material safety data sheet or in training, rather than appearing on the label itself. This approach is in keeping with the Agency's evaluation of available data on effectiveness of labels which indicates that the more detail there is on a label, the less likely it is that employees will read and act on the information. The purpose of the label is to serve as an immediate visual warning of the chemical hazards in the workplace. (*See generally*, 48 FR 53300–03).

There have been misinterpretations of the requirements made based on statements in the preamble to the current rule concerning various labeling systems (*see* 48 FR 53301). This preamble discussion involves format of labels, and is not an unqualified endorsement of any particular labeling system. It simply states that any format may be used, as long as the label includes the information regarding the chemical hazards required by the standard. It should be noted that it can be expected that some labels prepared in accordance with any of the available labeling systems can be expected to be found to be deficient. Again, the preamble discussion cited merely reemphasized that employers are not constrained to use any particular format or wording, but are constrained by the necessity to comply with the requirements of the rule concerning the information to be provided—the identity, the hazards, and for containers leaving the workplace, the name and address of the responsible party.

The terms "physical" and "health" hazards are already defined in the rule, and these are the specific hazards that are to be "conveyed" in an "appropriate" hazard warning. There are some situations where the specific target organ effect is not known. Where this is the case, a more general warning statement would be permitted. For example, if the only information available is an LC_{50} test result, "harmful if inhaled" may be the only type of statement supported by the data and thus may be appropriate.

It will not necessarily be "appropriate" to warn on the label about every hazard listed in the MSDS. The data sheet is to address essentially everything that is known about the chemical. The selection of hazards to be highlighted on the label will involve some assessment of the weight of the evidence regarding each hazard reported on the data sheet. This does not mean, however, that only acute hazards are to be covered on the label, or that well-substantiated hazards can be omitted from the label because they appear on the data sheet.

It may be "appropriate" to provide less detailed information on the chemical hazards in an in-plant labeling system, where MSDSs and training are readily available, than on a label placed on a container leaving the workplace, where it may provide the only hazard information in certain situations and where there is no guarantee that the downstream employees handling or using the chemical will fully understand the less detailed label. This difference in appropriateness allows employers to establish standardized in-plant labeling systems, as long as training regarding the use of these systems is conducted and MSDSs provide the required, detailed information.

Article. OSHA is not modifying the definition of "article" but would like to provide some clarification regarding the Agency's interpretation. Releases of very small quantities of chemicals are not considered to be covered by the rule. So if a few molecules or a trace amount are released, the item is still an article and therefore exempted. In an earlier discussion in this preamble, application of the rule to office products was discussed and it was stated that items such as pens or pencils are to be considered articles. Other examples would be: emissions from tires when in use; emissions from toner on pieces of paper; or emissions from newly varnished furniture.

Furthermore, it should be reiterated that the HCS is limited to hazardous chemicals "known to be present" (paragraph (b)(2)), and does not require any chemical analysis or testing to determine or verify such presence. *See* 48 FR 53334–35. Thus although one may assume that molecules are being emitted from an item, under the standard one does not "know" that a particular hazardous chemical is "present."

The article exemption applies solely to the ultimate end use—intermediate users which result in exposure are covered and require hazard information to be provided. The following are examples of items which would require information for intermediate use prior to being finally installed: encapsulated asbestos insulation where the normal installation involves hammering the material into openings, thus releasing the asbestos; tiles to be placed on a ship's hull which contain lead that is released during installation; and glass mercury switches to be installed in equipment, a percentage of which are expected to break during this installation process. In these cases, installation is the "normal condition of use" for the employees installing the items, and thus hazard information is required for these intermediate uses. Once installed, these items would be articles and thus exempted.

Although installation of an item may render the exemption temporarily void (until the item is installed, information must still be provided if there is a potential for exposure), OSHA does not believe that the possibility that exposure could occur when the item is repaired or worked on need be considered in the determination of when information must be transmitted downstream. Employers of employees performing repairs must provide the best information they have concerning the potential exposures. There would be no way to ensure, for example, that a material safety data sheet prepared for a lead pipe would be available to a worker repairing the pipe some years following installation. The employer would provide the employees with general information concerning the hazards of the operations they were performing in lieu of specific information on the pipe itself.

(d) Hazard Determination

OSHA is not modifying the current rule's hazard determination requirements. The burden of evaluating chemicals to determine whether they are hazardous remains on the chemical manufacturers and importers who produce or import them and on those user employers who choose not to rely on the evaluations made by their suppliers and instead evaluate the chemicals themselves. A detailed explanation of these provisions can be found at 48 FR 53296–99, 53335–36.

(e) Written Hazard Communication Program

Under the current rule, a written hazard communication program must be developed and implemented for each workplace. Since the current rule covers fixed manufacturing sites, it did not appear to be necessary to specifically state that the written program be available at the site. With expansion to non-manufacturing, however, particularly in the construction industry where a firm may have multiple sites, the standard must be tailored to specifically state that the intent is to maintain the written program at each site. Employees will then be able to access the information as required.

The current written hazard communication program requirements include a provision that requires manufacturing employers to provide hazard information to on-site contractor employers who have employees who may be exposed to the hazards generated by the manufacturer (current paragraph (e)(1)(iii)). The current standard does not address the reverse situation, *i.e.*, where a contractor employer brings hazardous materials on-site, and exposes the manufacturer's employees to them. Since the expanded rule will affect more worksites with work arrangements of this type (*e.g.*, construction), and the need for an exchange of hazard information is obvious, OSHA has revised the requirements to tailor it to address the multi-employer workplace. (This was suggested in comments submitted in response to the ANPR. *See* Ex. 2–225, comments from the National Constructors Association. In addition, this situation has also been addressed in existing State right-to-know laws: *See, e.g.*, Alabama Act 85–658; Tennessee "Hazardous Chemical Right to Know Law.")

Under these provisions (paragraph (e)(2)), the employers must exchange material safety data sheets, as well as information about precautionary measures necessary to protect employees and an indication of the type of labeling system in use, where exposures may occur to another employer's employees. Each employer will then have the information necessary to inform and train their employees. This will help ensure that all employees have sufficient information to protect themselves in the workplace, regardless of which employer uses the hazardous chemical.

Consistent with the performance-orientation of the rule, the provisions do not specify how this coordination is to be accomplished. This is best left to the discretion of the parties involved. In many cases, it would probably be most efficient for the general contractor to coordinate the function. For example, the general contractor could keep and make available material safety data sheets in the office on the site.

It should be emphasized that the exchange of information is limited to those situations where exposures of other employers' employees may occur. Given the nature of multi-employer work sites in construction, there would be many situations where subcontractors responsible for various phases of the building project would not have employees present during other phases and thus no such exchange would be required. For example, if the electricians are not working near, or at the same time as, the paving contractor, then no interchange is required. But if a painting contractor's workers are using flammable solvents in an area where another subcontractor is welding pipes, this information exchange is vital to ensure proper protection of employees.

(f) Labels and Other Forms of Warning

A tailoring provision has been added concerning shipments which consist of solid metal. OSHA considers this change to be necessary since the problem addressed will occur more frequently in shipments to the nonmanufacturing sector than has been the case in the manufacturing sector. (Paragraph (f)(2)). Solid metal is often considered to be an "article" under the rule, and thus exempt. Where the metal is not an "article" since its downstream use results in hazardous chemical exposure to employees working with it, a provision has been added which allows shippers of this type of material

to send the label information once, similar to material safety data sheet transmittal, as long as the material is the same and it is being shipped to the same customer. In these situations, there should be no hazard to anyone handling the metal from the time it is produced in solid form, until the time someone works on it in a way that releases a chemical hazard. Since the label information transmitted would only reflect the chemical hazards released when it is later worked on, the label would not provide any hazard information that is needed by those handling the material in transit. It must be emphasized that this exception is only for the solid metal itself—any hazardous chemicals present in conjunction with the metal in such a form that employees may be exposed when handling the material (*e.g.*, cutting fluids, lubricants, and greases), require labels with each shipment. This tailoring provision, therefore, does not diminish worker protection—workers get the hazard information they need.

(g) Material Safety Data Sheets

Under the hazard determination provisions, a requirement is included which indicates that there are situations where the percentage cut-off for mixtures would not apply—when the released chemical is particularly hazardous, or when it could exceed an established permissible exposure limit or Threshold Limit Value when released (paragraph (d)(5)(iv)). Although this is clearly a requirement of the rule, *see also* 48 FR 53336, the material safety data sheet provisions for disclosure of hazardous ingredient identities did not address that particular situation. Clearly it was OSHA's intent to have all hazardous ingredients of mixtures listed on a material safety data sheet, even those in very small concentrations, when the hazard determination provisions of paragraph (d) mandate that they are to be considered hazardous for purposes of the HCS. As noted in the HCS preamble discussion of the material safety data sheet provisions: "Employers must also list ingredients present in concentrations of less than one percent if there is evidence that the permissible exposure limit may be exceeded or if it could present a health hazard in those concentrations." *Id.* at 53337. This obvious oversight has been corrected by a minor amendment to the rule. Paragraph (g)(2)(i)(C)(*2*).

Another situation which raises practicality concerns because of the expansion of the scope of the rule involves employers who purchase hazardous chemicals from local retail distributors, rather than directly from the chemical manufacturer or importer, or from wholesale distributors as is more commonly done in the manufacturing sector. Under the current HCS, distributors of hazardous chemicals must automatically provide commercial customers material safety data sheets (paragraph (g)(7)). Retail distributors, however, often sell to businesses and the general public and frequently have no way of knowing who a particular purchaser is. Under the current rule, retail distributors might have to give material safety data sheets to each customer to ensure that commercial customers get the information they need under the HCS. A specific statement regarding retail distributors is, therefore, included in paragraph (g)(7) to address this practical problem. Those retail distributors who sell hazardous chemicals to employers must provide a material safety data sheet upon request, and must post a sign or otherwise inform the employers that an MSDS is available. According to Schneider Hardware of Banksville, Inc., this is a reasonable approach (Ex. 2–179):

> If OSHA does require commercial customers to get information through a retail outlet, I do not foresee any problems with that arrangement. The manufacturers could supply us with the information, as they are required to now for shipments to manufacturing plants, and we could make it available to customers upon request. We would merely keep the sheets in a file drawer and post a sign informing customers of their availability. We have less than 100 chemicals that would probably be affected, and keeping information on those would require at most, one file drawer. It would not be burdensome.

The retail distributors likely affected are those selling building supplies, hardware, etc. Retail distributors will have to assess their product lines, and whether or not they have commercial accounts, to determine whether they must comply with this provision. It is clear that most other types of retail establishments (*e.g.*, grocery stores, clothing stores, etc.) would not.

With regard to the maintenance of material safety data sheets so that they are readily available to employees, whereas manufacturing facilities are generally fixed work sites with fixed locations for these materials, in some types of nonmanufacturing work operations, employees must travel between work areas during a workshift. For example, employees involved in servicing oil and gas wells may have a central office location, but then travel by truck to the wells to perform their work. These remote locations may not have any staff, or may not have an office facility. OSHA has added a provision to the MSDS requirements to allow MSDSs to be kept at a central location in type of situation, as along as the employer ensures that the employee can immediately obtain the information in an emergency, paragraph (g)(9). OSHA believes that this provision tailors the HCS so that it remains practical, yet effective, in getting workers the hazard information they need. This was also supported by a number of ANPR commenters (*see, e.g.*, Exs. 2–83, 2–107, 2–114, 2–116, and 2–117).

The current rule, as well as the expanded standard, allows downstream employers to rely on upstream chemical manufacturers and importers to provide MSDSs. However, there is a duty for downstream users to request an MSDS when they don't receive one at the time of the first shipment. There have been some questions regarding how the downstream user will know a data sheet is required without doing a hazard evaluation. Such an evaluation is not necessary. If the label indicates a hazard, the employer will know he needs a data sheet and must request one if it is not received. If there are no hazards on the label, the downstream user can assume the product is not hazardous and a data sheet is not required.

(h) Employee Information and Training

OSHA is not making any modifications to the current rule's information and training provisions. These requirements remain performance-oriented and designed so that each employer will adequately address the hazards posed by chemicals in the workplace. An explanation of these provisions can be found at 48 FR 53310–12, 53337–38.

One question that does arise regarding training is whether it needs to be done specifically on each chemical, or whether employers can train regarding categories of hazards. Either method would be acceptable. *See* 48 FR 53312, 53338. If employees are exposed to a small number of chemicals, the employer may wish to discuss the particular hazards of each one. Where there are large numbers of chemicals, the training regarding hazards could be done on categories (*e.g.*, flammable liquids; carcinogens), with employees being referred to substance-specific information on the labels and MSDSs. Similarly, the re-training occurs when the hazard changes, not just when a chemical is introduced into the workplace. If the new chemical has hazards which employees have been trained about, no re-training occurs. If the chemical has a hazard they have not

been trained about, re-training would be limited to that hazard.

(i) Trade Secrets

Paragraph (i)(11) of the current rule states that "[i]f, following the issuance of a citation and any protective orders, the chemical manufacturer, importer, or employer continues to withhold the information, the matter is referrable to the Occupational Safety and Health Review Commission for enforcement of the citation. . . ." This provision was worded in such a manner that it left the impression that OSHA could refer the matter to the Review Commission. This is incorrect as a matter of law. An enforcement proceeding is referred to the Review Commission when a citation is issued by OSHA, and is subsequently contested by the employer receiving the citation. Therefore, OSHA has made a technical amendment to paragraph (i)(11) to reflect the applicable procedural law.

(j) Effective Dates

The expansion of the rule to cover all employers becomes effective nine months from the date of promulgation of the final standard. Since the chemical hazard information for labels and material safety data sheets has already been generated in the manufacturing sector, and in many cases has also been distributed in non-manufacturing due to State law requirements and voluntary transmittal by suppliers, one month should be sufficient time for chemical manufacturers, importers, and distributors to initiate provision of material safety data sheets to other distributors and to customers in the non-manufacturing sector. An additional eight months is being provided for non-manufacturers to complete preparation of a written hazard communication program for each facility and to conduct employee training. It should be noted that this eight month period for compliance only applies to those employers which are newly covered under the expanded provisions—employers in SIC Codes 20 through 39 are covered under the current HCS and are already required to be in compliance with the provisions of that rule. Those tailoring provisions that apply to manufacturing workplaces, such as the consumer product exemption, go into effect immediately for those facilities.

Appendices A and B

OSHA is not amending Appendix A's discussion of the health hazards posed by chemicals, or Appendix B's discussion of hazard determination. They remain applicable to all chemical manufacturers, importers, and employers performing hazard determinations.

Appendix C

The reference sources listed in this non-mandatory appendix have been updated to reflect currently available sources.

Appendix D

The recent rulemaking on trade secrets added a new Appendix D regarding the evaluation of the validity of trade secret claims. 51 FR 34590. The full text of this appendix has been reprinted in this document as well.

III. Analyses of Regulatory Impact, Regulatory Flexibility, and Environmental Impact

The following is a summary of the regulatory impact and regulatory flexibility analysis prepared by OSHA for the revision of the Hazard Communication Standard which extends the scope of the existing standard to the nonmanufacturing sector. The full text of the document may be examined and copied in OSHA's Docket Office, 200 Constitution Avenue, NW., Room N3670, Washington, DC 20210; telephone (202) 523-7894.

Economic Analysis

As part of OSHA's efforts to gather information concerning the economic feasibility of extending the coverage of the HCS to include workplaces in the nonmanufacturing sector, the JACA Corporation performed a study examining the benefits, costs, and overall economic impact of such a revision. This report was used as the basis for the regulatory impact analysis prepared by OSHA.

The analysis reflects the extent to which employers in the nonmanufacturing sector are currently subject to state right-to-know laws and are voluntarily implementing their own hazard communication programs. The analysis also takes into account OSHA's existing policy regarding the use of consumer products and training requirements already imposed on employers by other OSHA standards. With respect to consumer products covered by the HCS, OSHA Instruction CPL 2-2.38A ("Inspection Procedures for the Hazard Communication Standard, 29 CFR 1910.1200") states:

> A common sense approach must be employed whenever a product is used in a manner similar to which it could be used by a consumer, thus resulting in levels of exposure comparable to consumer exposure. The frequency and duration of use should be considered. For example, it may not be necessary to have a data sheet for a can of cleanser used to clean the sink in an employee restroom. However, if such cleanser is used in large quantities to clean process equipment, it should be addressed in the Hazard Communication Program.

This policy has been incorporated into the revisions to the HCS, and was taken into account when evaluating data describing the number of hazardous chemicals in the various two-digit SIC groups that could be affected by extension of the HCS to the nonmanufacturing sector.

Assessing the net impact of the training provisions required identifying and deducting the costs of existing OSHA standards which already require employers to provide the types of information and training activities prescribed in the HCS. This was done for construction (§ 1926.21), shipbreaking (§ 1915.97), marine terminals (§ 1917.22), and longshoring (§ 1918.86). However, it was not possible to separately identify and deduct the existing training costs for substance-specific standards that currently apply to the nonmanufacturing sector. Thus, the compliance costs presented in this analysis are somewhat overstated.

In extending the rule for manufacturing to the nonmanufacturing sector, OSHA has made revisions to reflect unique aspects of some work operations. For example, the standard allows MSDSs to be maintained at central locations in circumstances where employees must travel between work operations during a workshift, provided that the information can be obtained immediately in an emergency. This provision is expected to lower costs in SIC groups 07, 08, 09, 13, 46, 49, and 73. (*See* Table 1 for a description of the SICs.)

The standard also allows for limited coverage in those work situations where employees handle chemicals in sealed containers that are not opened under normal conditions of use, and thus have little potential for measurable exposures. Employers would be required to leave warning labels on containers, and make available any MSDSs received with the containers. Employers would also have to be trained in accordance with the standard, with particular emphasis on procedures to follow if there is a spill or leak of the hazardous chemicals in the normally sealed containers. Affected establishments would not have to make special efforts to obtain and keep MSDSs that are not received with the chemicals, and no written plan for complying with the HCS would be required. This provision is expected to

result in lower costs in SIC groups 42, 44, 45, 47, 51, and 52.

Thus the changes made to establish more appropriate provisions for unique work situations should result in lower costs than would be experienced if the HCS for manufacturing were extended to the nonmanufacturing sector without revision.

Table 1.—SIC Groups Covered in the OSHA Analysis

Division A. Agriculture, Forestry, and Fishing

Major Group 01. Agricultural production—crops
Major Group 02. Agricultural production—livestock
Major Group 07. Agricultural services
Major Group 08. Forestry
Major Group 09. Fishing, hunting, and trapping

Division B. Mining

Major Group 13. Oil and gas extraction

Division C. Construction

Major Group 15. Building construction—general contractors and operative builders
Major Group 16. Construction other than building construction—general contractors
Major Group 17. Construction—special trade contractors

Division E. Transportation, Communication, Electric, Gas, and Sanitary Services

Major Group 40. Railroad transportation
Major Group 41. Local and suburban transmit and interurban highway passenger transportation
Major Group 42. Motor freight transportation and warehousing
Major Group 44. Water transportation
Major Group 45. Transportation by air
Major Group 46. Pipe lines, except natural gas
Major Group 47. Transportation services
Major Group 48. Communication
Major Group 49. Electric, gas, and sanitary services

Division F. Wholesale Trade

Major Group 50. Wholesale trade—durable goods
Major Group 51. Wholesale trade—nondurable goods

Division G. Retail Trade

Major Group 52. Building materials, hardware, garden supply, and mobile home dealers
Major Group 53. General merchandise stores
Major Group 54. Food stores
Major Group 55. Automotive dealers and gasoline service stations
Major Group 56. Apparel and accessory stores
Major Group 57. Furniture, home furnishing, and equipment stores
Major Group 58. Eating and drinking places
Major Group 59. Miscellaneous retail

Division H. Finance, Insurance, and Real Estate

Major Group 60. Banking
Major Group 61. Credit agencies other than banks
Major Group 62. Security and commodity brokers, dealers, exchanges, and services
Major Group 63. Insurance
Major Group 64. Insurance agents, brokers, and service
Major Group 65. Real estate
Major Group 66. Combinations of real estate, insurance, loans, law office
Major Group 67. Holding and other investment offices

Division I. Services

Major Group 70. Hotels, rooming houses, camps, and other lodging places
Major Group 72. Personal services
Major Group 73. Business services
Major Group 75. Automotive repair, services, and garages
Major Group 76. Miscellaneous repair services
Major Group 78. Motion pictures
Major Group 79. Amusement and recreation services, except motion pictures
Major Group 80. Health Services
Major Group 81. Legal Services
Major Group 82. Education Services
Major Group 83. Social Services
Major Group 84. Museums, art galleries, botanical and zoological gardens
Major Group 86. Membership organizations
Major Group 89. Miscellaneous services

The analysis of the benefits, costs, and economic impacts of extending the HCS to the nonmanufacturing sector are projected for 40 years. As indicated, the analysis reflects requirements of state right-to-know laws and voluntarily implemented hazard communication programs.

Risk Evaluation/Benefits Analysis

For this analysis OSHA estimated the percentage of workers exposed to hazardous chemicals. The percentage and numbers of exposed workers are shown in Table 2 [1] by SIC group. The analysis of risks and benefits proceeds from the current annual incidence of chemical-related injuries and illnesses in the nonmanufacturing sector. For workers in this sector, measures of acute chemical source injuries and illnesses included nonlost workday (NLWD) injuries (13,671) and LWD illnesses (38,249); and fatalities (102). Measures for chronic illnesses include: chronic illness cases (17,153), cancer cases (25,388), and cancer deaths (12,890). The cancer cases category includes cancer deaths. (Note that tables used in the computer models for this analysis may vary slightly from these figures due to rounding.)

The benefits of the standard result from its expected reduction of occupational injuries and illnesses that are chemically related. Specifically, OSHA projects that the standard will avert 20 percent of these injuries and illnesses. (Five percent of all cancer cases are assumed to be occupationally related; the 20 percent reduction is applied to this 5 percent of all cases among occupationally exposed workers in the nonmanufacturing sector.) However, the full reduction of chronic illnesses and cancers will not occur immediately; rather, the reduction for these cases is phased in over time. For chronic illnesses, the standard is expected to reduce 1 percent of the cases in the first year, 2 percent in the second year, and so on, until it reaches the full reduction of 20 percent. For cancer cases and cancer deaths, the standard is expected not to have an effect for the first 10 years, then it is expected to reduce 2 percent of the cases in the eleventh year, 4 percent in the twelfth year, and so on until it reaches the full reduction of 20 percent.

Benefits were monetized using two independent approaches. The first took into account medical costs and lost earnings incurred by each victim. This "human capital" approach resulted in first-year benefits of $56.3 million, and a 40 year present value of $6.66 billion (summarized in Table 3).

A second estimate of benefits was made using the "willingness-to-pay" approach. This approach resulted in first-year benefits of $568.7 million, and a 40 year present value of $54.6 billion (Table 3).

To provide comparability with the estimates of compliance costs, benefits were attributed to the states with right-to-know laws in proportion to the share of hazard communication costs projected for firms in those states. Under the "human capital" approach the present value of the 40 year stream of benefits from the extension of the HCS, after deducting states with right-to-know-laws, is $3.80 billion (1985 dollars). Under the willingness-to-pay approach, the present value of the 40-year stream of benefits from extension of the HCS is $31.0 billion, after deducting the amount attributable to states with right-to-know laws.

The monetized benefits of hazard communication in the nonmanufacturing sector, whether monetized in terms of human capital or willingness to pay, are presented after discounting (at 10 percent). Such discounting does not convey the magnitude of the expected number of injuries, illnesses and deaths that should be averted by the extension of hazard communication to the nonmanufacturing sector. The actual number of NLWD cases, LWD cases, chronic illness cases, cancer cases, cancer deaths, and other fatalities that are expected to be averted in the first,

[1] Tables 2 to 10 appear at the end of this article.

twentieth, and fortieth years are presented in Table 4.

The numbers of cases presented in Table 4 are projections of cases that will be averted by the state right-to-know laws and the extension of the HCS. Approximately 43 percent of these cases will be averted as a result of the hazard communication (*i.e.*, right-to-know) laws of the states. The remaining 57 percent uniquely relate to the extension of HCS and translate into the following: 148,400 cancer cases and 74,200 cancer deaths, 119,200 chronic disabling illnesses, 448,500 lost work day cases, 702,000 non-lost work day cases, and about 653 non-cancer fatalities avoided over the next 40 years. This estimate is believed to be conservative since OSHA assumed that only 5 percent of all cancers are occupationally related.

The original Regulatory Impact Analysis (RIA) for the HCS in manufacturing included estimates of benefits arising from the reduction of the incidence of chemical fires in the manufacturing sector. Using the RIA's methodology and newer data obtained from the U.S. Fire Administration's National Fire Incidence Reporting System, OSHA has determined that extension of the HCS to the nonmanufacturing sector would yield first-year benefits (*i.e.*, the value of property damages and losses avoided) of $1.8 million (1985 dollars). For the twentieth and fortieth years, the estimates are $2.2 and $2.9 million, respectively. The present value of the 40-year stream of benefits is $20.3 million (using a 10 percent discount rate).

Extending the HCS to the nonmanufacturing sector will also yield benefits by eliminating the need for employers to comply with multiple state and local right-to-know laws with differing requirements. The estimated benefits for the first year amount to $39.6 million (1985 dollars). For the twentieth and fortieth years, the benefits are $69.5 and $125.5 million, respectively. The present value of the 40-year stream of benefits is $578 million (using a 10 percent discount rate).

Compliance Costs

Compliance costs were estimated for five items: preparation of a written hazard communication program; container labeling; provision of MSDSs; maintenance of MSDSs; and information and training.

Table 5 provides a summary of total regulatory costs, the costs attributable to state right-to-know laws and the costs attributable to the extension of the OSHA standard. Costs are presented for the first, twentieth, and fortieth year of the standard, as well as in terms of total present value over forty years. Present values were calculated using a 10 percent discount rate. Table 6 presents the costs by provision.

The total cost attributable to hazard communication laws during the first year the expanded HCS is effective is $1.28 billion (1985 dollars). The first year cost associated with compliance with state right-to-know laws is $597.3 million and $687.3 million with the Federal HCS. The present value of the total HCS-related compliance costs over the 40 year period is $1.57 billion.

Recordkeeping activities are required in the maintenance of MSDSs. As shown in Table 6, the Year 1 costs for this function amount to $44.9 million (1985 dollars). The costs for the twentieth and fortieth years are $6.0 and $13.3 million. The present value of the costs over 40 years is $84.8 million.

Economic Impacts

In order to assess the potential economic impacts of expanding the hazard communication standard, OSHA studied the impact of the first year costs on typical establishments that have not implemented any of the provisions. No allowance was made for partial compliance. If establishments can pass through or absorb first year costs, it is assumed that they can afford the minimal recurring costs related to training new employees and the introduction of new hazards. Table 7 presents the average compliance costs, assuming no current compliance, for typical establishments in each SIC Code. Typical establishments in the preponderance for SICs (over 80 percent) would incur compliance costs of less than $700 in the first year.

In only one of the SICs does the average total first year cost exceed $800 per establishment. The average first year cost per exposed employee in all SICs is less than $250, or less than $5.00 per worker per week.

Table 8 presents a comparison of the post-tax compliance costs to a typical firm's revenues and profits. A typical establishment's pre-tax compliance cost will be a negligible percentage (less than one-half of one percent) of the establishment's average annual revenue in over 98 percent of the SICs. The only exceptions, SIC 83 (Social Service) and SIC 86 (Membership Organizations), are primarily composed of nonprofit establishments that are characterized by relatively inelastic demand for their services. Given the magnitude of the compliance costs in relation to revenue, and the fact that the affected industry sectors are predominantly service providers, which are necessarily characterized by localized markets it appears likely that most firms will pass the compliance costs on to their customers. The post-tax compliance cost as a percent of profits is less than two percent in most (over 80 percent) of the SICs. Typical firms in these SICs should be able to absorb the costs even if they cannot pass them on to their customers. Given the small absolute magnitude of the compliance costs, and the fact that the analysis was conducted using first year compliance costs which are significantly higher than the recurring compliance costs for subsequent years, the expansion of the hazard communication standard should have little or no economic impact on typical firms.

Community Right-to-Know

The cost of extending the Superfund Amendments and Reauthorization Act (SARA) requirements for community right-to-know to the non-manufacturing sector was also estimated. Under Title III of SARA, establishments holding a given hazardous chemical in amounts greater than specified threshold quantities must report these chemicals and their quantities to State and local emergency planning committees and the local fire department. Cost estimates were based on EPA's projected phase-in threshold quantities of 10,000 pounds of hazardous chemicals in the first two years, and 500 pounds in the third and subsequent years that the requirements apply to the non-manufacturing sector. The estimated costs for the first and second years are $8,614,300 and $3,524,000, respectively. Third and fourth year costs were estimated to be $63,492,800 and $32,736,300.

The economic impact of extending SARA to nonmanufacturing was also estimated by OSHA. The third year average total cost of SARA was combined with OSHA's recurring average total costs of the Hazard Communication Standard to estimate the impact. The analysis indicated that the economic impact per facility of extending SARA to nonmanufacturing is minor, and that costs incurred by affected establishments could be passed on to the consumer. OSHA believes that the extension of SARA to nonmanufacturing will not affect the feasibility of the Hazard Communication Standard.

Regulatory Flexibility

As is shown in Table 9, a majority of establishments in all of the potentially impacted SICs are small businesses with fewer than 20 employees. Thus, the average compliance costs for small firms

are very similar to those for typical firms. No disproportionate economic impact is foreseen for small firms.

Most establishments in the potentially affected SICs are service providers, which typically compete on the basis of many factors (*e.g.*, location, specialized service, customer relations, etc.) in addition to price. Assuming all firms try to pass their compliance cost on to their customers, minor price differentials of less than one-half of one percent, shown in Table 10, are unlikely to adversely affect the overall competitive position of small entities.

As can be seen from Table 10, the cost differential between small and large firms in over 80 percent of the SICs is anticipated to be less than 0.2 percent of revenue. In SICs 83 and 86 the difference is about 2 percent. However, these SICs are dominated by non-profit firms which are less likely to be subject to price competition.

Environmental Impacts

At the time the current HCS was promulgated in the **Federal Register** (48 FR 53280), OSHA stated that the standard was unlikely to result in the occurrence of significant health or environmental impacts outside of the workplace. The extension of the HCS does not entail any change from the current HCS in terms of impacts outside the workplace. As concluded previously, the labeling of containers will not have a direct or significant impact on air or water quality, land or energy use, or solid waste disposal outside of the workplace. Similarly, the requirements for preparation of a written compliance plan, provision and maintenance of MSDSs, and provision of information and training should have no adverse environmental impact.

IV. Clearance of Information Collection Requirements

On March 31, 1983, the Office of Management and Budget (OMB) published a new 5 CFR Part 1320, implementing the information collection provisions of the Paperwork Reduction Act of 1980, 44 U.S.C. 3501 *et seq.* (48 FR 13666). Part 1320, which became effective on April 30, 1983, sets forth procedures for agencies to follow in obtaining OMB clearance for information collection requirements. The sections of the Hazard Communication Standard which may create recordkeeping requirements are paragraphs (d) hazard determination; (e) written hazard communication program; (f) labels and other appropriate forms of warning; (g) material safety data sheets; (h) information and training; and (i) trade secrets.

In accordance with the provisions of the Paperwork Reduction Act and the regulations issued pursuant thereto, OSHA certifies that it has submitted the information collection requirements contained in its rule on hazard communication to OMB for review under section 3504(h) of that Act.

V. State Plan Applicability

The 25 States with their own OSHA-approved occupational safety and health plans must adopt a comparable standard within six months of the publication date of a final standard. These States include: Alaska, Arizona, California, Connecticut (for State and local government employees only), Hawaii, Indiana, Iowa, Kentucky, Maryland, Michigan, Minnesota, Nevada, New Mexico, New York (for State and local government employees only), North Carolina, Oregon, Puerto Rico, South Carolina, Tennessee, Utah, Vermont, Virginia, Virgin Islands, Washington, and Wyoming. Until such time as a State standard is promulgated, Federal OSHA will provide interim enforcement assistance, as appropriate. (Thirteen (13) of these States (Alaska, California, Iowa, Maryland, Michigan, Minnesota, New Mexico, North Carolina, Oregon, Tennessee, Vermont, Washington, and Wyoming) have already expanded the scope of their hazard communication standard/right-to-know law to cover private sector, non-manufacturing workplaces.)

Although a State HCS becomes effective in accordance with State promulgation provisions, and is enforceable upon promulgation, OSHA must also review and approve the standard to assure that it is "at least as effective" as the Federal standard. OSHA intends to closely scrutinize State standards submitted under current or future State plans to assure not only equal or greater effectiveness, but also that any additional requirements do not conflict with, or adversely affect, the effectiveness of the national application of OSHA's standard. Because the HCS is "appliable to products" in that it permits the distribution and use of hazardous chemicals in commerce only if they are in labeled containers accompanied by material safety data sheets, OSHA must determine in its review whether any State plan standard provisions which differ from the Federal are "required by compelling local conditions and do not unduly burden interstate commerce." Section 18(c) of the Act, 29 U.S.C. 667(c).

VI. Authority, Signature, and the Final Rule

This document was prepared under the direction of John A. Pendergrass, Assistant Secretary of Labor for Occupational Safety and Health, U.S. Department of Labor, 200 Constitution Avenue, NW., Washington, DC 20210.

For the reasons set out in the preamble, and under the authority of section 41 of the Longshore and Harbor Workers' Compensation Act (33 U.S.C. 941), section 107 of the Contract Work Hours and Safety Standards Act (Construction Safety Act) (40 U.S.C. 333), sections 4, 6 and 8 of the Occupational Safety and Health Act of 1970 (29 U.S.C. 653, 655, 657), Secretary of Labor's Order No. 9–83 (48 FR 35736) and 29 CFR Part 1911, and 5 U.S.C. 553, the Occupational Safety and Health Administration hereby amends Parts 1910, 1915, 1917, 1918, 1926, and 1928 of Title 29 of the Code of Federal Regulations, as set forth below.

List of Subjects in 29 CFR Parts 1910, 1915, 1917, 1918, 1926, and 1928

Hazard communication, Occupational safety and health, Right-to-know, Labeling, Material safety data sheets; Employee training.

Signed at Washington, DC, this 18th day of August 1987.

John A. Pendergrass,

Assistant Secretary for Occupational Safety and Health.

TABLE 2.—WORKER EXPOSURE TO HAZARDOUS CHEMICALS

Industry	Total number of establishment	Total employment	Percent of workers exposed to hazardous chemicals	Number of exposed employ
SIC 01	31,739	504,025	70	352,818
SIC 02	10,994	126,039	70	88,227

TABLE 2.—WORKER EXPOSURE TO HAZARDOUS CHEMICALS—Continued

Industry	Total number of establishment	Total employment	Percent of workers exposed to hazardous chemicals	Number of exposed employees
SIC 07	65,704	459,479	70	321,635
SIC 08	2,117	20,223	70	14,156
SIC 09	3,886	13,549	20	2,710
SIC 13	31,572	591,714	70	414,200
SIC 15	166,012	1,137,853	70	796,497
SIC 16	44,702	791,892	70	554,324
SIC 17	320,208	2,406,916	70	1,684,841
SIC 40	18,539	324,206	40	129,682
SIC 41	15,539	285,578	20	57,116
SIC 42	99,805	1,323,495	20	264,699
SIC 44	8,346	178,013	70	124,609
SIC 45	8,691	490,395	40	196,158
SIC 46	959	18,405	60	11,043
SIC 47	30,783	267,113	40	106,845
SIC 48	22,910	1,321,116	5	66,056
SIC 49	15,571	890,586	40	356,234
SIC 50	300,972	3,357,168	10	335,717
SIC 51	191,745	2,295,451	25	573,863
SIC 52	66,756	662,051	50	331,026
SIC 53	29,818	2,230,449	5	111,522
SIC 54	137,393	2,696,839	20	539,368
SIC 55	173,902	1,850,359	60	1,110,215
SIC 56	99,022	1,004,666	5	50,233
SIC 57	93,338	714,264	5	35,713
SIC 58	309,650	5,479,633	25	1,369,908
SIC 59	261,694	2,133,614	20	426,723
SIC 60	24,949	1,681,408	5	84,070
SIC 61	43,408	733,201	5	36,660
SIC 62	17,995	346,214	5	17,311
SIC 63	30,139	1,190,103	5	59,505
SIC 64	96,706	536,223	5	26,811
SIC 65	191,400	1,077,550	5	53,878
SIC 66	2,937	13,752	5	688
SIC 67	15,792	138,488	5	6,924
SIC 70	44,697	1,273,343	25	318,336
SIC 72	158,272	1,068,670	50	534,335
SIC 73	284,684	4,092,820	50	2,046,410
SIC 75	121,431	713,798	50	356,899
SIC 76	57,900	316,365	60	189,819
SIC 78	15,338	216,806	30	65,042
SIC 79	58,064	757,287	20	151,457
SIC 80	365,758	6,167,908	60	3,700,745
SIC 81	119,861	670,317	5	33,516
SIC 82	23,280	1,174,052	10	117,405
SIC 83	66,380	1,182,651	5	59,133
SIC 84	1,592	39,021	25	9,755
SIC 86	83,774	724,283	5	36,214
SIC 89	117,155	1,200,885	5	60,044
Totals	4,503,879	58,890,236		18,391,096

Source: U.S. Department of Labor, OSHA, Office of Regulatory Analysis.

TABLE 3.—ESTIMATED BENEFITS OF HAZARD COMMUNICATION

[Millions of 1985 dollars]

Type of injury/illness	Benefits—Year			
	1	20	40	TPV
HUMAN CAPITAL APPROACH				
NLWD:				
Lost earnings	0.7	1.3	2.5	9.3
Medical costs	1.7	4.6	13.4	30.3
LWD:				
Lost earnings	15.2	28.3	57.1	209.3

TABLE 3.—ESTIMATED BENEFITS OF HAZARD COMMUNICATION—Continued

[Millions of 1985 dollars]

Type of injury/illness	Benefits—Year			
	1	20	40	TPV
Medical costs	10.9	29.2	86.5	192.2
Chronic:				
Lost earnings	20.5	722.8	1,365.8	2,967.5
Medical costs	2.8	143.4	404.1	582.8
Cancer:				
Lost earnings	0	651.6	1,309.6	1,735.2
Medical costs	0	298.9	906.4	875.8
Fatalities: Lost earnings	4.4	7.3	13.0	56.6
Total	56.3	1,887.3	4,158.3	6,659.1
WILLINGNESS-TO-PAY APPROACH				
NLWD	59.6	107.8	211.9	804.5
LWD	374.4	686.4	1,371.1	5,099.8
Chronic	61.7	2,173.7	4,121.6	8,924.3
Cancer	0	14,529.0	29,651.2	38,812.0
Fatalities	72.9	123.4	255.3	946.9
Total	568.7	17,620.7	35,581.2	54,587.4

Source: JACA Corporation Report.

TABLE 4.—INJURIES, ILLNESSES, AND FATALITIES AVERTED BY HAZARD COMMUNICATION IN THE NONMANUFACTURING SECTOR

Year	1	20	40	Commu-lative to [redacted]
FEDERAL AND STATE STANDARDS COMBINED				
NLWD	17,000	30,800	60,600	1,354,500
LWD	10,700	19,600	39,200	865,800
Chronic	150	6,200	11,800	230,100
Cancer cases	0	8,200	17,000	286,500
Cancer deaths	0	4,100	8,500	143,300
Noncancer deaths	0	20	80	1,260
IMPACT OF FEDERAL STANDARD ALONE				
NLWD	8,800	16,000	31,400	702,000
LWD	5,500	10,200	20,300	448,500
Chronic	78	3,200	6,100	119,200
Cancer cases	0	4,248	8,806	148,400
Cancer deaths	0	2,100	4,400	74,200
Noncancer deaths	0	10	41	653

Source: U.S. Department of Labor, OHSA, Office of Regulatory Analysis.

TABLE 5.—SUMMARY OF HAZARD COMMUNICATION COSTS

[Millions of 1985 dollars]

Year	Total	State	OHSA
1	1,284.5	597.3	687.2
20	214.5	101.3	113.2
40	384.0	184.0	200.0

TABLE 5.—SUMMARY OF HAZARD COMMUNICATION COSTS—Continued

[Millions of 1985 dollars]

Year	Total	State	OHSA
Total present value	2,926.4	1,356.3	1,570.1

Source: U.S. Department of Labor, OHSA, Office of Regulatory Analysis.

TABLE 6.—SUMMARY OF FEDERAL HCS COSTS BY PROVISION

[Millions of 1985 dollars]

Year	Maintain MSDS's	Labeling	Written	Training	Provide MSDS's	Totals
1	44.9	12.8	137.4	472.9	19.3	687.2
20	6.0	20.3	5.7	78.7	2.5	113.2
40	13.3	35.2	9.4	136.5	5.6	200.0
TPV	84.8	170.9	170.9	1054.6	88.9	1570.1

Source: U.S. Department of Labor, OHSA, Office of Regulatory Analysis.

TABLE 7.—SUMMARY OF HCS COSTS PER ESTABLISHMENT NOT IN COMPLIANCE WITH HCS

[1985 dollars]

Industry	First year		Second year	
	Average costs per establishment	Average costs per exposed employee	Average costs per establishment	Average costs per exposed employee
SIC 01	502	45	32	3
SIC 02	475	59	23	3
SIC 07	490	100	28	6
SIC 08	358	54	26	4
SIC 09	304	242	6	5
SIC 13	497	38	72	5
SIC 15	150	31	12	3
SIC 16	225	18	34	3
SIC 17	169	32	14	3
SIC 40	603	86	51	7
SIC 41	285	76	11	3
SIC 42	273	98	12	4
SIC 44	442	30	55	4
SIC 45	892	40	72	3
SIC 46	461	40	55	5
SIC 47	398	115	15	4
SIC 48	319	50	15	2
SIC 49	798	35	64	3
SIC 50	472	238	14	7
SIC 51	700	234	32	11
SIC 52	335	68	20	4
SIC 53	372	50	27	4
SIC 54	323	82	18	5
SIC 55	437	68	31	5
SIC 56	265	149	6	3
SIC 57	288	190	6	4
SIC 58	337	76	17	4
SIC 59	321	184	7	4
SIC 60	410	61	21	3
SIC 61	217	76	9	3
SIC 62	312	79	18	5
SIC 63	250	46	16	3
SIC 64	236	155	5	3
SIC 65	306	186	8	5
SIC 66	238	181	5	4
SIC 67	415	167	12	5
SIC 70	408	57	37	5
SIC 72	500	148	16	5
SIC 73	444	62	43	6
SIC 75	381	130	14	5
SIC 76	325	99	15	5
SIC 78	351	83	26	6
SIC 79	346	117	20	7
SIC 80	581	57	57	6
SIC 81	242	153	7	5
SIC 82	287	46	10	2
SIC 83	337	132	11	4
SIC 84	608	99	39	6
SIC 86	273	149	6	3

TABLE 7.—SUMMARY OF HCS COSTS PER ESTABLISHMENT NOT IN COMPLIANCE WITH HCS—Continued

[1985 dollars]

Industry	First year		Second year	
	Average costs per establishment	Average costs per exposed employee	Average costs per establishment	Average costs per exposed employee
SIC 89	312	146	10	5

Source: U.S. Department of Labor, OSHA, Office of Regulatory Analysis.

TABLE 8.—ANALYSIS OF POST-TAX FIRST-YEAR COMPLIANCE COSTS

[1985 dollars]

Industry	Average annual revenue per establishment	Average cost as a percent of revenue per establishment	Average net income per establishment	Average post-tax cost per establishment	Post tax cost as a percent of net income per establishment
SIC 01	2,794,100	0.018	103,382	377	0.36
SIC 02	11,275,400	0.004	417,190	356	0.09
SIC 07	286,600	0.171	7,165	368	5.13
SIC 08	1,689,100	0.021	42,228	268	0.64
SIC 09	797,500	0.008	19,938	228	1.14
SIC 13	6,185,800	0.008	346,405	373	0.11
SIC 15	816,700	0.018	19,601	113	0.57
SIC 16	1,419,700	0.016	56,788	169	0.30
SIC 17	372,400	0.045	10,800	127	1.17
SIC 40	2,584,100	0.023	111,116	453	0.41
SIC 41	411,400	0.069	13,165	214	1.62
SIC 42	730,100	0.027	21,903	205	[illegible]
SIC 44	2,214,300	0.020	141,715	331	[illegible]
SIC 45	5,900,000	0.015	70,800	669	[illegible]
SIC 46	20,569,600	0.002	1,069,619	346	[illegible]
SIC 47	831,900	0.048	14,974	299	1.99
SIC 48	5,347,900	0.006	390,397	239	0.06
SIC 49	16,269,000	0.005	732,105	599	0.08
SIC 50	1,866,900	0.025	28,004	354	1.26
SIC 51	3,371,500	0.021	57,316	525	0.92
SIC 52	793,800	0.042	20,639	251	1.22
SIC 53	5,702,000	0.007	136,848	279	0.20
SIC 54	2,089,700	0.015	25,076	242	0.96
SIC 55	2,016,100	0.022	16,129	327	2.03
SIC 56	507,600	0.052	19,796	199	1.00
SIC 57	371,400	0.078	11,513	216	1.88
SIC 58	383,500	0.088	11,122	252	2.27
SIC 59	829,100	0.039	20,728	241	1.16
SIC 60	14,970,800	0.003	509,007	307	0.06
SIC 61	2,585,300	0.008	41,365	163	0.39
SIC 62	1,856,900	0.017	135,554	234	0.17
SIC 63	12,911,400	0.002	438,988	187	0.04
SIC 64	220,400	0.107	15,869	177	1.11
SIC 65	338,400	0.090	27,749	230	0.83
SIC 66	661,600	0.036	54,251	178	0.33
SIC 67	798,300	0.052	167,643	311	0.19
SIC 70	607,000	0.067	34,599	306	0.88
SIC 72	228,500	0.219	10,283	375	3.64
SIC 73	531,600	0.084	21,264	333	1.57
SIC 75	351,800	0.103	8,795	286	3.25
SIC 76	187,100	0.174	7,671	244	3.18
SIC 78	815,900	0.043	31,820	263	0.83
SIC 79	782,100	0.044	51,619	260	0.50
SIC 80	198,200	0.203	6,342	436	6.87
SIC 81	456,000	0.053	10,032	182	1.81
SIC 82	NA	0.168	NA	215	[illegible]
SIC 83	NA	1.763	NA	252	[illegible]
SIC 83	NA	1.763	NA	252	[illegible]
SIC 84	NA	0.094	NA	456	[illegible]
SIC 86	NA	1.007	NA	205	[illegible]

TABLE 8.—ANALYSIS OF POST-TAX FIRST-YEAR COMPLIANCE COSTS—Continued

[1985 dollars]

Industry	Average annual revenue per establishment	Average cost as a percent of revenue per establishment	Average net income per establishment	Average post-tax cost per establishment	Post tax cost as a percent of net income per establishment
SIC 89	290,500	0.107	11,039	234	2.12

Source: U.S. Department of Labor, OSHA, Office of Regulatory Analysis.

TABLE 9.—ESTABLISHMENTS WITH FEWER THAN TWENTY EMPLOYEES

SIC code	Total number of establishments	Number of establishments with 1 to 19 employees	Percent of establishments with 1 to 19 employees
01	31,739	27,440	86
02	10,994	9,574	87
07	65,704	61,928	94
08	2,117	1,852	87
09	2,160	2,088	97
13	31,572	26,037	82
15	166,012	154,819	93
16	44,702	37,484	84
17	320,208	294,850	92
40	18,539	15,756	85
41	15,267	11,998	79
42	94,561	80,822	85
44	8,346	6,917	83
45	8,691	6,514	75
46	959	724	75
47	30,783	28,420	92
48	10,319	6,612	64
49	15,571	10,922	70
50	169,451	133,233	79
51	191,745	166,562	87
52	66,756	60,097	90
53	14,909	8,963	60
54	137,393	114,738	84
55	173,902	152,020	88
56	28,181	23,874	85
57	23,582	20,474	87
58	309,650	241,282	78
59	244,849	227,803	93
60	12,475	6,318	51
61	12,912	9,561	74
62	4,380	3,079	70
63	10,998	7,263	66
64	17,577	15,608	89
65	32,714	28,099	86
66	524	488	93
67	2,790	2,239	80
70	44,697	34,693	78
72	158,272	149,812	95
73	284,684	249,553	88
75	121,431	116,344	96
76	57,900	55,543	96
78	15,338	13,314	87
79	50,981	42,916	84
80	365,758	338,396	93
81	21,210	18,659	88
82	18,661	11,197	60
83	23,148	17,068	74
84	1,592	1,250	79
86	19,757	16,416	83
89	28,103	23,179	82

TABLE 9.—ESTABLISHMENTS WITH FEWER THAN TWENTY EMPLOYEES—Continued

TABLE 9.—ESTABLISHMENTS WITH FEWER THAN TWENTY EMPLOYEES—Continued

Source: U.S. Department of Labor, OSHA, Office of Regulatory Analysis.

[a] From Chapter 5 of the JACA Report [4].

[b] Column 2 divided by Column 1.

TABLE 10.—ANALYSIS OF IMPACT ON SMALLEST VERSUS LARGEST ESTABLISHMENTS

[Comparing average costs as a percent of revenue]

SIC code	Average cost as a percent of revenue per establishment 250+ employees	Average cost as a percent of revenue per establishment 1–19 employees	Difference in cost as a percent of revenue due to size of establishments
01	0.003	0.044	0.040
02	0.001	0.009	0.008
07	0.038	0.189	0.151
08	0.007	0.018	0.011
09	0.002	0.021	0.019
13	0.002	0.035	0.033
15	0.003	0.044	0.042
16	0.007	0.064	0.057
17	0.017	0.065	0.048
40	0.008	0.082	0.075
41	0.007	0.248	0.240
42	0.007	0.103	0.096
44	0.007	0.060	0.053
45	0.009	0.105	0.096
46	0.000	0.174	0.174
47	0.003	0.101	0.098
48	0.002	0.041	0.039

TABLE 10.—ANALYSIS OF IMPACT ON SMALLEST VERSUS LARGEST ESTABLISHMENTS—Continued

[Comparing average costs as a percent of revenue]

SIC code	Average cost as a percent of revenue per establishment 250+ employees	Average cost as a percent of revenue per establishment 1-19 employees	Difference in cost as a percent of revenue due to size of establishments
49	0.002	0.049	0.047
50	0.003	0.037	0.034
51	0.006	0.038	0.032
52	0.008	0.046	0.038
53	0.002	0.029	0.026
54	0.002	0.054	0.052
55	0.006	0.044	0.038
56	0.002	0.104	0.102
57	0.003	0.117	0.114
58	0.008	0.158	0.150
59	0.003	0.055	0.051
60	0.001	0.012	0.011
61	0.000	0.038	0.038
62	0.003	0.028	0.025
63	0.000	0.069	0.069
64	0.002	0.179	0.177
65	0.005	0.124	0.119
66	0.001	0.054	0.053
67	0.003	0.096	0.093
70	0.021	0.283	0.262
72	0.007	0.346	0.339
73	0.028	0.204	0.175
75	0.004	0.151	0.148
76	0.099	0.205	0.106
78	0.007	0.113	[illegible]106
79	0.016	0.071	[illegible]55
80	0.269	0.370	[illegible]1
81	0.118	0.077	[illegible]1
82	0.025	0.915	0.890
83	0.428	2.293	1.865
84	0.033	0.259	0.226
86	0.035	2.109	2.074
89	0.008	0.210	0.202

Source: U.S. Department of Labor, OHSA, Office of Regulatory Analysis.

OSHA is amending Parts 1910, 1915, 1917, 1918, 1926, and 1928 of Title 29 of the Code of Federal Regulations as follows:

PART 1910—OCCUPATIONAL SAFETY AND HEALTH STANDARDS

1. The authority citation for Subpart Z of Part 1910 continues to read as follows:

Authority: Secs. 6, 8, Occupational Safety and Health Act (29 U.S.C. 655, 657); Secretary of Labor's Order No. 12-71 (36 FR 8754); 8-76 (41 FR 2509); or 9-83 (48 FR 35736) as applicable; and 29 CFR Part 1911.

Section 1910.1000 Tables Z-1, Z-2, Z-3 also issued under 5 U.S.C. 553.

Section 1910.1000 not issued under 29 CFR Part 1911, except for "Arsenic" and "Cotton Dust" listings in Table Z-1.

Section 1910.1001 not issued under Sec. 107 of Contract Work Hours and Safety Standards Act, 40 U.S.C. 333.

Section 1910.1002 not issued under 29 U.S.C. 655 or 29 CFR Part 1911; also issued under 5 U.S.C. 553.

Sections 1910.1003 through 1910.1018 also issued under 29 U.S.C. 653.

Section 1910.1025 also issued under 29 U.S.C. 653 and 5 U.S.C. 553.

Section 1910.1043 also issued under 5 U.S.C. 551 *et seq.*

Sections 1910.1045 and 1910.1047 also issued under 29 U.S.C. 653.

Sections 1910.1200, 1910.1499 and 1910.1500 also issued under 5 U.S.C. 553.

PART 1915—OCCUPATIONAL SAFETY AND HEALTH STANDARDS FOR SHIPYARD EMPLOYMENT

2. The authority citation for Part 1915 is revised to read as follows:

Authority: Sec. 41, Longshore and Harbor Workers' Compensation Act (33 U.S.C. 941); secs. 4, 6, 8, Occupational Safety and Health Act of 1970 (29 U.S.C. 653, 655, 657); Secretary of Labor's Order No. 12-71 (36 FR 8754), 8-76 (41 FR 25059), or 9-83 (48 FR 35736), as applicable; 29 CFR Part 1911.

Section 1915.99 also issued under 5 U.S.C. 553.

PART 1917—MARINE TERMINALS

3. The authority citation for Part 1917 is revised to read as follows:

Authority: Sec. 41, Longshore and Harbor Workers' Compensation Act (33 U.S.C. 941); secs. 4, 6, 8, Occupational Safety and Health Act of 1970 (29 U.S.C. 653, 655, 657); Secretary of Labor's Order No. 12-71 (36 FR 8754), 8-76 (41 FR 25059), or 9-83 (48 FR 35736), as applicable; 29 CFR Part 1911.

Section 1917.28 also issued under 5 U.S.C. 553.

PART 1918—SAFETY AND HEALTH REGULATIONS FOR LONGSHORING

4. The authority citation for Part [illegible] is revised to read as follows:

Authority: Sec. 41, Longshore and Har[illegible] Workers' Compensation Act (33 U.S.C. 94[illegible]

secs. 4, 6, 8, Occupational Safety and Health Act of 1970 (29 U.S.C. 653, 655, 657); Secretary of Labor's Order No. 12–71 (36 FR 8754), 8–76 (41 FR 25059), or 9–83 (48 FR 35736), as applicable.

Section 1918.90 also issued under 5 U.S.C. 553 and 29 CFR Part 1911.

PART 1926—SAFETY AND HEALTH REGULATIONS FOR CONSTRUCTION

5. The authority citation for Subpart D of Part 1926 is revised to read as follows:

Authority: Sec. 107, Contract Work Hours and Safety Standards Act (Construction Safety Act) (40 U.S.C. 333); secs. 4, 6, 8, Occupational Safety and Health Act of 1970 (29 U.S.C. 653, 655, 657); Secretary of Labor's Order No. 12–71 (36 FR 8754), 8–76 (41 FR 25059), or 9–83 (48 FR 35736), as applicable.

Section 1926.59 also issued under 5 U.S.C. 553 and 29 CFR Part 1911.

PART 1928—OCCUPATIONAL SAFETY AND HEALTH STANDARDS FOR AGRICULTURE

6. The authority citation for Part 1928 is revised to read as follows:

Authority: Secs. 6 and 8, Occupational Safety and Health Act of 1970 (29 U.S.C. 655, 657); Secretary of Labor's Orders 12–71 (36 FR 8754), 8–76 (41 FR 25059), or 9–83 (48 FR 35736), as applicable; 29 CFR Part 1911.

Section 1928.21 also issued under 5 U.S.C. 553.

PARTS 1910, 1915, 1917, 1918, 1926 and 1928—[AMENDED]

7. Parts 1910, 1915, 1917, 1918, and 1928 are amended by revising § 1910.1200 as set forth below, and by adding §§ 1915.99, 1917.28, 1918.90, and 1926.59 to contain the identical text of the revised § 1910.1200, including Apendices A, B, C, and D of 1910.1200:

§ ——— Hazard communication.

(a) *Purpose.* (1) The purpose of this section is to ensure that the hazards of all chemicals produced or imported are evaluated, and that information concerning their hazards is transmitted to employers and employees. This transmittal of information is to be accomplished by means of comprehensive hazard communication programs, which are to include container labeling and other forms of warning, material safety data sheets and employee training.

(2) This occupational safety and health standard is intended to address comprehensively the issue of evaluating the potential hazards of chemicals, and communicating information concerning hazards and appropriate protective measures to employees, and to preempt any legal requirements of a state, or political subdivision of a state, pertaining to the subject. Evaluating the potential hazards of chemicals, and communicating information concerning hazards and appropriate protective measures to employees, may include, for example, but is not limited to, provisions for: developing and maintaining a written hazard communication program for the workplace, including lists of hazardous chemicals present; labeling of containers of chemicals in the workplace, as well as of containers of chemicals being shipped to other workplaces; preparation and distribution of material safety data sheets to employees and downstream employers; and development and implementation of employee training programs regarding hazards of chemicals and protective measures. Under section 18 of the Act, no state or political subdivision of a state may adopt or enforce, through any court or agency, any requirement relating to the issue addressed by this Federal standard, except pursuant to a Federally-approved state plan.

(b) *Scope and application.* (1) This section requires chemical manufacturers or importers to assess the hazards of chemicals which they produce or import, and all employers to provide information to their employees about the hazardous chemicals to which they are exposed, by means of a hazard communication program, labels and other forms of warning, material safety data sheets, and information and training. In addition, this section requires distributors to transmit the required information to employers.

(2) This section applies to any chemical which is known to be present in the workplace in such a manner that employees may be exposed under normal conditions of use or in a foreseeable emergency.

(3) This section applies to laboratories only as follows:

(i) Employers shall ensure that labels on incoming containers of hazardous chemicals are not removed or defaced;

(ii) Employers shall maintain any material safety data sheets that are received with incoming shipments of hazardous chemicals, and ensure that they are readily accessible to laboratory employees; and,

(iii) Employers shall ensure that laboratory employees are apprised of the hazards of the chemicals in their workplaces in accordance with paragraph (h) of this section.

(4) In work operations where employees only handle chemicals in sealed containers which are not opened under normal conditions of use (such as are found in marine cargo handling, warehousing, or retail sales), this section applies to these operations only as follows:

(i) Employers shall ensure that labels on incoming containers of hazardous chemicals are not removed or defaced;

(ii) Employers shall maintain copies of any material safety data sheets that are received with incoming shipments of the sealed containers of hazardous chemicals, shall obtain a material safety data sheet for sealed containers of hazardous chemicals received without a material safety data sheet if an employee requests the material safety data sheet, and shall ensure that the material safety data sheets are readily accessible during each work shift to employees when they are in their work area(s); and,

(iii) Employers shall ensure that employees are provided with information and training in accordance with paragraph (h) of this section (except for the location and availability of the written hazard communication program under paragraph (h)(1)(iii)), to the extent necessary to protect them in the event of a spill or leak of a hazardous chemical from a sealed container.

(5) This section does not require labeling of the following chemicals:

(i) Any pesticide as such term is defined in the Federal Insecticide, Fungicide, and Rodenticide Act (7 U.S.C. 136 et seq.), when subject to the labeling requirements of that Act and labeling regulations issued under that Act by the Environmental Protection Agency;

(ii) Any food, food additive, color additive, drug, cosmetic, or medical or veterinary device, including materials intended for use as ingredients in such products (e.g. flavors and fragrances), as such terms are defined in the Federal Food, Drug, and Cosmetic Act (21 U.S.C. 301 *et seq.*) and regulations issued under that Act, when they are subject to the labeling requirements under that Act by the Food and Drug Administration;

(iii) Any distilled spirits (beverage alcohols), wine, or malt beverage intended for nonindustrial use, as such terms are defined in the Federal Alcohol Administration Act (27 U.S.C. 201 *et seq.*) and regulations issued under that Act, when subject to the labeling requirements of that Act and labeling regulations issued under that Act by the Bureau of Alcohol Tobacco, and Firearms; and,

(iv) Any consumer product or hazardous substance as those terms are defined in the Consumer Product Safety Act (15 U.S.C. 2051 et seq.) and Federal Hazardous Substances Act (15 U.S.C. 1261 et seq.) respectively, when subject to a consumer product safety standard or labeling requirement of those Acts, or regulations issued under those Acts by

the Consumer Product Safety Commission.

(6) This section does not apply to:

(i) Any hazardous waste as such term is defined by the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, as amended (42 U.S.C. 6901 et seq.), when subject to regulations issued under that Act by the Environmental Protection Agency;

(ii) Tobacco or tobacco products;

(iii) Wood or wood products;

(iv) Articles;

(v) Food, drugs, cosmetics, or alcoholic beverages in a retail establishment which are packaged for sale to consumers;

(vi) Foods, drugs, or cosmetics intended for personal consumption by employees while in the workplace;

(vii) Any consumer product or hazardous substance, as those terms are defined in the Consumer Product Safety Act (15 U.S.C. 2051 *et seq.*) and Federal Hazardous Substances Act (15 U.S.C. 1261 *et seq.*) respectively, where the employer can demonstrate it is used in the workplace in the same manner as normal consumer use, and which use results in a duration and frequency of exposure which is not greater than exposures experienced by consumers; and,

(viii) Any drug, as that term is defined in the Federal Food, Drug, and Cosmetic Act (21 U.S.C. 301 *et seq.*), when it is in solid, final form for direct administration to the patient (i.e. tablets or pills).

(c) *Definitions.*

"Article" means a manufactured item: (i) Which is formed to a specific shape or design during manufacture; (ii) which has end use function(s) dependent in whole or in part upon its shape or design during end use; and (iii) which does not release, or otherwise result in exposure to, a hazardous chemical, under normal conditions of use.

"Assistant Secretary" means the Assistant Secretary of Labor for Occupational Safety and Health, U.S. Department of Labor, or designee.

"Chemical" means any element, chemical compound or mixture of elements and/or compounds.

"Chemical manufacturer" means an employer with a workplace where chemical(s) are produced for use or distribution.

"Chemical name" means the scientific designation of a chemical in accordance with the nomenclature system developed by the International Union of Pure and Applied Chemistry (IUPAC) or the Chemical Abstracts Service (CAS) rules of nomenclature, or a name which will clearly identify the chemical for the purpose of conducting a hazard evaluation.

"Combustible liquid" means any liquid having a flashpoint at or above 100 °F (37.8 °C), but below 200 ° F (93.3 ° C), except any mixture having components with flashpoints of 200 °F (93.3 °C), or higher, the total volume of which make up 99 percent or more of the total volume of the mixture.

"Common name" means any designation or identification such as code name, code number, trade name, brand name or generic name used to identify a chemical other than by its chemical name.

"Compressed gas" means:

(i) A gas or mixture of gases having, in a container, an absolute pressure exceeding 40 psi at 70 °F (21.1 °C); or

(ii) a gas or mixture of gases having, in a container, an absolute pressure exceeding 104 psi at 130 °F (54.4 °C), regardless of the pressure at 70 °F (21.1 °C); or

(iii) A liquid having a vapor pressure exceeding 40 psi at 100 °F (37.8 °C) as determined by ASTM D–323–72.

"Container" means any bag, barrel, bottle, box, can, cylinder, drum, reaction vessel, storage tank, or the like that contains a hazardous chemical. For purposes of this section, pipes or piping systems, and engines, fuel tanks, or other operating systems in a vehicle, are not considered to be containers.

"Designated representative" means any individual or organization to whom an employee gives written authorization to exercise such employee's rights under this section. A recognized or certified collective bargaining agent shall be treated automatically as a designated representative without regard to written employee authorization.

"Director" means the Director, National Institute for Occupational Safety and Health, U.S. Department of Health and Human Services, or designee.

"Distributor" means a business, other than a chemical manufacturer or importer, which supplies hazardous chemicals to other distributors or to employers.

"Employee" means a worker who may be exposed to hazardous chemicals under normal operating conditions or in foreseeable emergencies. Workers such as office workers or bank tellers who encounter hazardous chemicals only in non-routine, isolated instances are not covered.

"Employer" means a person engaged in a business where chemicals are either used, distributed, or are produced for use or distribution, including a contractor or subcontractor.

"Explosive" means a chemical that causes a sudden, almost instantaneous release of pressure, gas, and heat when subjected to sudden shock, pressure, or high temperature.

"Exposure" or "exposed" means that an employee is subjected to a hazardous chemical in the course of employment through any route of entry (inhalation, ingestion, skin contact or absorption, etc.), and includes potential (e.g. accidental or possible) exposure.

"Flammable" means a chemical that falls into one of the following categories:

(i) "Aerosol, flammable" means an aerosol that, when tested by the method described in 16 CFR 1500.45, yields a flame projection exceeding 18 inches at full valve opening, or a flashback (a flame extending back to the valve) at any degree of valve opening;

(ii) "Gas, flammable" means:

(A) A gas that, at ambient temperature and pressure, forms a flammable mixture with air at a concentration of thirteen (13) percent by volume or less; or

(B) A gas that, at ambient temperature and pressure, forms a range of flammable mixtures with air wider than twelve (12) percent by volume, regardless of the lower limit;

(iii) "Liquid, flammable" means any liquid having a flashpoint below 100 °F (37.8 °C), except any mixture having components with flashpoints of 100 °F (37.8 °C) or higher, the total of which make up 99 percent or more of the total volume of the mixture;

(iv) "Solid, flammable" means a solid, other than a blasting agent or explosive as defined in § 190.109(a), that is liable to cause fire through friction, absorption of moisture, spontaneous chemical change, or retained heat from manufacturing or processing, or which can be ignited readily and when ignited burns so vigorously and persistently as to create a serious hazard. A chemical shall be considered to be a flammable solid if, when tested by the method described in 16 CFR 1500.44, it ignites and burns with a self-sustained flame at a rate greater than one-tenth of an inch per second along its major axis.

"Flashpoint" means the minimum temperature at which a liquid gives off a vapor in sufficient concentration to ignite when tested as follows:

(i) Tagliabue Closed Tester (See American National Standard Method of Test for Flash Point by Tag Closed Tester, Z11.24–1979 (ASTM D 56–79)) liquids with a viscosity of less than 45 Saybolt University Seconds (SUS) at 1 °F (37.8 °C), that do not contain suspended solids and do not have a

tendency to form a surface film under test; or

(ii) Pensky-Martens Closed Tester (See American National Standard Method of Test for Flash Point by Pensky-Martens Closed Tester, Z11.7–1979 (ASTM D 93–79)) for liquids with a viscosity equal to or greater than 45 SUS at 100 °F (37.8 °C), or that contain suspended solids, or that have a tendency to form a surface film under test; or

(iii) Setaflash Closed Tester (see American National Standard Method of Test for Flash Point by Setaflash Closed Tester (ASTMD 3278–78))

Organic peroxides, which undergo autoaccelerating thermal decomposition, are excluded from any of the flashpoint determination methods specified above.

"Foreseeable emergency" means any potential occurrence such as, but not limited to, equipment failure, rupture of containers, or failure of control equipment which could result in an uncontrolled release of a hazardous chemical into the workplace.

"Hazardous chemical" means any chemical which is a physical hazard or a health hazard.

"Hazard warning" means any words, pictures, symbols, or combination thereof appearing on a label or other appropriate form of warning which convey the hazard(s) of the chemical(s) in the container(s).

"Health hazard" means a chemical for which there is statistically significant evidence based on at least one study conducted in accordance with established scientific principles that acute or chronic health effects may occur in exposed employees. The term "health hazard" includes chemicals which are carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizers, hepatotoxins, nephrotoxins, neurotoxins, agents which act on the hematopoietic system, and agents which damage the lungs, skin, eyes, or mucous membranes. Appendix A provides further definitions and explanations of the scope of health hazards covered by this section, and Appendix B describes the criteria to be used to determine whether or not a chemical is to be considered hazardous for purposes of this standard.

"Identity" means any chemical or common name which is indicated on the material safety data sheet (MSDS) for the chemical. The identity used shall permit cross-references to be made among the required list of hazardous chemicals, the label and the MSDS.

"Immediate use" means that the hazardous chemical will be under the control of and used only by the person who transfers it from a labeled container and only within the work shift in which it is transferred.

"Importer" means the first business with employees within the Customs Territory of the United States which receives hazardous chemicals produced in other countries for the purpose of supplying them to distributors or employers within the United States.

"Label" means any written, printed, or graphic material, displayed on or affixed to containers of hazardous chemicals.

"Material safety data sheet (MSDS)" means written or printed material concerning a hazardous chemical which is prepared in accordance with paragraph (g) of this section.

"Mixture" means any combination of two or more chemicals if the combination is not, in whole or in part, the result of a chemical reaction.

"Organic peroxide" means an organic compound that contains the bivalent -O-O-structure and which may be considered to be a structural derivative of hydrogen peroxide where one or both of the hydrogen atoms has been replaced by an organic radical.

"Oxidizer" means a chemical other than a blasting agent or explosive as defined in § 1910.109(a), that initiates or promotes combustion in other materials, thereby causing fire either of itself or through the release of oxygen or other gases.

"Physical hazard" means a chemical for which there is scientifically valid evidence that it is a combustible liquid, a compressed gas, explosive, flammable, an organic peroxide, an oxidizer, pyrophoric, unstable (reactive) or water-reactive.

"Produce" means to manufacture, process, formulate, or repackage.

"Pyrophoric" means a chemical that will ignite spontaneously in air at a temperature of 130 °F (54.4 °C) or below.

"Responsible party" means someone who can provide additional information on the hazardous chemical and appropriate emergency procedures, if necessary.

"Specific chemical identity" means the chemical name, Chemical Abstracts Service (CAS) Registry Number, or any other information that reveals the precise chemical designation of the substance.

"Trade secret" means any confidential formula, pattern, process, device, information or compilation of information that is used in an employer's business, and that gives the employer an opportunity to obtain an advantage over competitors who do not know or use it. Appendix D sets out the criteria to be used in evaluating trade secrets.

"Unstable (reactive)" means a chemical which in the pure state, or as produced or transported, will vigorously polymerize, decompose, condense, or will become self-reactive under conditions of shocks, pressure or temperature.

"Use" means to package, handle, react, or transfer.

"Water-reactive" means a chemical that reacts with water to release a gas that is either flammable or presents a health hazard.

"Work area" means a room or defined space in a workplace where hazardous chemicals are produced or used, and where employees are present.

"Workplace" means an establishment, job site, or project, at one geographical location containing one or more work areas.

(d) *Hazard determination.* (1) Chemical manufacturers and importers shall evaluate chemicals produced in their workplaces or imported by them to determine if they are hazardous. Employers are not required to evaluate chemicals unless they choose not to rely on the evaluation performed by the chemical manufacturer or importer for the chemical to satisfy this requirement.

(2) Chemical manufacturers, importers or employers evaluating chemicals shall identify and consider the available scientific evidence concerning such hazards. For health hazards, evidence which is statistically significant and which is based on at least one positive study conducted in accordance with established scientific principles is considered to be sufficient to establish a hazardous effect if the results of the study meet the definitions of health hazards in this section. Appendix A shall be consulted for the scope of health hazards covered, and Appendix B shall be consulted for the criteria to be followed with respect to the completeness of the evaluation, and the data to be reported.

(3) The chemical manufacturer, importer or employer evaluating chemicals shall treat the following sources as establishing that the chemicals listed in them are hazardous:

(i) 29 CFR Part 1910, Subpart Z, Toxic and Hazardous Substances, Occupational Safety and Health Administration (OSHA); or,

(ii) *Threshold Limit Values for Chemical Substances and Physical Agents in the Work Environment,* American Conference of Governmental Industrial Hygienists (ACGIH) (latest edition).

The chemical manufacturer, importer, or employer is still responsible for evaluating the hazards associated with the chemicals in these source lists in accordance with the requirements of this standard.

(4) Chemical manufacturers, importers and employers evaluating chemicals shall treat the following sources as establishing that a chemical is a carcinogen or potential carcinogen for hazard communication purposes:

(i) National Toxicology Program (NTP), *Annual Report on Carcinogens* (latest edition);

(ii) International Agency for Research on Cancer (IARC) *Monographs* (latest editions); or

(iii) 29 CFR Part 1910, Subpart Z, Toxic and Hazardous Substances, Occupational Safety and Health Administration.

Note.—The *Registry of Toxic Effects of Chemical Substances* published by the National Institute for Occupational Safety and Health indicates whether a chemical has been found by NTP or IARC to be a potential carcinogen.

(5) The chemical manufacturer, importer or employer shall determine the hazards of mixtures of chemicals as follows:

(i) If a mixture has been tested as a whole to determine its hazards, the results of such testing shall be used to determine whether the mixture is hazardous;

(ii) If a mixture has not been tested as a whole to determine whether the mixture is a health hazard, the mixture shall be assumed to present the same health hazards as do the components which comprise one percent (by weight or volume) or greater of the mixture, except that the mixture shall be assumed to present a carcinogenic hazard if it contains a component in concentrations of 0.1 percent or greater which is considered to be a carcinogen under paragraph (d)(4) of this section;

(iii) If a mixture has not been tested as a whole to determine whether the mixture is a physical hazard, the chemical manufacturer, importer, or employer may use whatever scientifically valid data is available to evaluate the physical hazard potential of the mixture; and,

(iv) If the chemical manufacturer, importer, or employer has evidence to indicate that a component present in the mixture in concentrations of less than one percent (or in the case of carcinogens, less than 0.1 percent) could be released in concentrations which would exceed an established OSHA permissible exposure limit or ACGIH Threshold Limit Value, or could present a health hazard to employees in those concentrations, the mixture shall be assumed to present the same hazard.

(6) Chemical manufacturers, importers, or employers evaluating chemicals shall describe in writing the procedures they use to determine the hazards of the chemical they evaluate. The written procedures are to be made available, upon request, to employees, their designated representatives, the Assistant Secretary and the Director. The written description may be incorporated into the written hazard communication program required under paragraph (e) of this section.

(e) *Written hazard communication program.* (1) Employers shall develop, implement, and maintain at the workplace, a written hazard communication program for their workplaces which at least describes how the criteria specified in paragraphs (f), (g), and (h) of this section for labels and other forms of warning, material safety data sheets, and employee information and training will be met, and which also includes the following:

(i) A list of the hazardous chemicals known to be present using an identity that is referenced on the appropriate material safety data sheet (the list may be compiled for the workplace as a whole or for individual work areas); and,

(ii) The methods the employer will use to inform employees of the hazards of non-routine tasks (for example, the cleaning of reactor vessels), and the hazards associated with chemicals contained in unlabeled pipes in their work areas.

(2) *Multi-employer workplaces.* Employers who produce, use, or store hazardous chemicals at a workplace in such a way that the employees of other employer(s) may be exposed (for example, employees of a construction contractor working on-site) shall additionally ensure that the hazard communication programs developed and implemented under this paragraph (e) include the following:

(i) The methods the employer will use to provide the other employer(s) with a copy of the material safety data sheet, or to make it available at a central location in the workplace, for each hazardous chemical the other employer(s)' employees may be exposed to while working;

(ii) The methods the employer will use to inform the other employer(s) of any precautionary measures that need to be taken to protect employees during the workplace's normal operating conditions and in foreseeable emergencies; and,

(iii) The methods the employer will use to inform the other employer(s) of the labeling system used in the workplace.

(3) The employer may rely on an existing hazard communication program to comply with these requirements, provided that it meets the criteria established in this paragraph (e).

(4) The employer shall make the written hazard communication program available, upon request, to employees, their designated representatives, the Assistant Secretary and the Director, in accordance with the requirements of 29 CFR 1910.20(e).

(f) *Labels and other forms of warning.* (1) The chemical manufacturer, importer, or distributor shall ensure that each container of hazardous chemicals leaving the workplace is labeled, tagged or marked with the following information:

(i) Identity of the hazardous chemical(s);

(ii) Appropriate hazard warnings; and

(iii) Name and address of the chemical manufacturer, importer, or other responsible party.

(2) For solid metal (such as a steel beam or a metal casting) that is not exempted as an article due to its downstream use, the required label may be transmitted to the customer at the time of the intial shipment, and need not be included with subsequent shipments to the same employer unless the information on the label changes. The label may be tranamitted with the initial shipment itself, or with the material safety data sheet that is to be provided prior to or at the time of the first shipment. This exception to requiring labels on every container of hazardous chemicals is only for the solid metal itself and does not apply to hazardous chemicals used in conjunction with, or known to be present with, the metal and to which employees handling the metal may be exposed (for example, cutting fluids or lubricants).

(3) Chemical manufacturers, importers, or distributors shall ensure that each container of hazardous chemicals leaving the workplace is labeled, tagged, or marked in accordance with this section in a manner which does not conflict with the requirements of the Hazardous Materials Transportation Act (49 U.S.C. 1801 *et seq.*) and regulations issued under that Act by the Department of Transportation.

(4) If the hazardous chemical is regulated by OSHA in a substance-specific health standard, the chemical manufacturer, importer, distributor or employer shall ensure that the labels or

other forms of warning used are in accordance with the requirements of that standard.

(5) Except as provided in paragraphs (f)(6) and (f)(7) the employer shall ensure that each container of hazardous chemicals in the workplace is labeled, tagged or marked with the following information:

(i) Identity of the hazardous chemical(s) contained therein; and

(ii) Appropriate hazard warnings.

(6) The employer may use signs, placards, process sheets, batch tickets, operating procedures, or other such written materials in lieu of affixing labels to individual stationary process containers, as long as the alternative method identifies the containers to which it is applicable and conveys the information required by paragraph (f)(5) of this section to be on a label. The written materials shall be readily accessible to the employees in their work area throughout each work shift.

(7) The employer is not required to label portable containers into which hazardous chemicals are transferred from labeled containers, and which are intended only for the immediate use of the employee who performs the transfer.

(8) The employer shall not remove or deface existing labels on incoming containers of hazardous chemicals, unless the container is immediately marked with the required information.

(9) The employer shall ensure that labels or other forms of warning are legible, in English, and prominently displayed on the container, or readily available in the work area throughout each work shift. Employers having employees who speak other languages may add the information in their language to the material presented, as long as the information is presented in English as well.

(10) The chemical manufacturer, importer, distributor or employer need not affix new labels to comply with this section if existing labels already convey the required information.

(g) *Material safety data sheets.* (1) Chemical manufacturers and importers shall obtain or develop a material safety data sheet for each hazardous chemical they produce or import. Employers shall have a material safety data sheet for each hazardous chemical which they use.

(2) Each material safety data sheet shall be in English and shall contain at least the following information:

(i) The identity used on the label, and, except as provided for in paragraph (i) of this section on trade secrets:

(A) If the hazardous chemical is a single substance, its chemical and common name(s);

(B) If the hazardous chemical is a mixture which has been tested as a whole to determine its hazards, the chemical and common name(s) of the ingredients which contribute to these known hazards, and the common name(s) of the mixture itself; or,

(C) If the hazardous chemical is a mixture which has not been tested as a whole:

(*1*) The chemical and common name(s) of all ingredients which have been determined to be health hazards, and which comprise 1% or greater of the composition, except that chemicals identified as carcinogens under paragraph (d)(4) of this section shall be listed if the concentrations are 0.1% or greater; and,

(*2*) The chemical and common name(s) of all ingredients which have been determined to be health hazards, and which comprise less than 1% (0.1% for carcinogens) of the mixture, if there is evidence that the ingredient(s) could be released from the mixture in concentrations which would exceed an established OSHA permissible exposure limit or ACGIH Threshold Limit Value, or could present a health hazard to employees; and,

(*3*) The chemical and common name(s) of all ingredients which have been determined to present a physical hazard when present in the mixture;

(ii) Physical and chemical characteristics of the hazardous chemical (such as vapor pressure, flash point);

(iii) The physical hazards of the hazardous chemical, including the potential for fire, explosion, and reactivity;

(iv) The health hazards of the hazardous chemical, including signs and symptoms of exposure, and any medical conditions which are generally recognized as being aggravated by exposure to the chemical;

(v) The primary route(s) of entry;

(vi) The OSHA permissible exposure limit, ACGIH Threshold Limit Value, and any other exposure limit used or recommended by the chemical manufacturer, importer, or employer preparing the material safety data sheet, where available;

(vii) Whether the hazardous chemical is listed in the National Toxicology Program (NTP) *Annual Report on Carcinogens* (latest edition) or has been found to be a potential carcinogen in the International Agency for Research on Cancer (IARC) *Monographs* (latest editions), or by OSHA;

(viii) Any generally applicable precautions for safe handling and use which are known to the chemical manufacturer, importer or employer preparing the material safety data sheet, including appropriate hygienic practices, protective measures during repair and maintenance of contaminated equipment, and procedures for clean-up of spills and leaks;

(ix) Any generally applicable control measures which are known to the chemical manufacturer, importer or employer preparing the material safety data sheet, such as appropriate engineering controls, work practices, or personal protective equipment;

(x) Emergency and first aid procedures;

(xi) The date of preparation of the material safety data sheet or the last change to it; and,

(xii) The name, address and telephone number of the chemical manufacturer, importer, employer or other responsible party preparing or distributing the material safety data sheet, who can provide additional information on the hazardous chemical and appropriate emergency procedures, if necessary.

(3) If not relevant information is found for any given category on the material safety data sheet, the chemical manufacturer, importer or employer preparing the material safety data sheet shall mark it to indicate that no applicable information was found.

(4) Where complex mixtures have similar hazards and contents (i.e. the chemical ingredients are essentially the same, but the specific composition varies from mixture to mixture), the chemical manufacturer, importer or employer may prepare one material safety data sheet to apply to all of these similar mixtures.

(5) The chemical manufacturer, importer or employer preparing the material safety data sheet shall ensure that the information recorded accurately reflects the scientific evidence used in making the hazard determination. If the chemical manufacturer, importer or employer preparing the material safety data sheet becomes newly aware of any significant information regarding the hazards of a chemical, or ways to protect against the hazards, this new information shall be added to the material safety data sheet within three months. If the chemical is not currently being produced or imported the chemical manufacturer or importer shall add the information to the material safety data sheet before the chemical is introduced into the workplace again.

(6) Chemical manufacturers or importers shall ensure that distributors and employers are provided an appropriate material safety data sheet with their initial shipment, and with the first shipment after a material safety

data sheet is updated. The chemical manufacturer or importer shall either provide material safety data sheets with the shipped containers or send them to the employer prior to or at the time of the shipment. If the material safety data sheet is not provided with a shipment that has been labeled as a hazardous chemical, the employer shall obtain one from the chemical manufacturer, importer, or distributor as soon as possible.

(7) Distributors shall ensure that material safety data sheets, and updated information, are provided to other distributors and employers. Retail distributors which sell hazardous chemicals to commercial customers shall provide a material safety data sheet to such employers upon request, and shall post a sign or otherwise inform them that a material safety data sheet is available. Chemical manufacturers, importers, and distributors need not provide material safety data sheets to retail distributors which have informed them that the retail distributor does not sell the product to commercial customers or open the sealed container to use it in their own workplaces.

(8) The employer shall maintain copies of the required material safety data sheets for each hazardous chemical in the workplace, and shall ensure that they are readily accessible during each work shift to employees when they are in their work area(s).

(9) Where employees must travel between workplaces during a workshift, *i.e.*, their work is carried out at more than one geographical location, the material safety data sheets may be kept at a central location at the primary workplace facility. In this situation, the employer shall ensure that employees can immediately obtain the required information in an emergency.

(10) Material safety data sheets may be kept in any form, including operating procedures, and may be designed to cover groups of hazardous chemicals in a work area where it may be more appropriate to address the hazards of a process rather than individual hazardous chemicals. However, the employer shall ensure that in all cases the required information is provided for each hazardous chemical, and is readily accessible during each work shift to employees when they are in in their work areas(s).

(11) Material safety data sheets shall also be made readily available, upon request, to designated representatives and to the Assistant Secretary, in accordance with the requirements of 29 CFR 1910.20 (e). The Director shall also be given access to material safety data sheets in the same manner.

(h) *Employee information and training.* Employers shall provide employees with information and training on hazardous chemicals in their work area at the time of their initial assignment, and whenever a new hazard is introduced into their work area.

(1) *Information.* Employees shall be informed of:

(i) The requirements of this section;

(ii) Any operations in their work area where hazardous chemicals are present; and,

(iii) The location and availability of the written hazard communication program, including the required list(s) of hazardous chemicals, and material safety data sheets required by this section.

(2) *Training.* Employee training shall include at least:

(i) Methods and observations that may be used to detect the presence or release of a hazardous chemical in the work area (such as monitoring conducted by the employer, continuous monitoring devices, visual appearance or odor of hazardous chemicals when being released, etc.);

(ii) The physical and health hazards of the chemicals in the work area;

(iii) The measures employees can take to protect themselves from these hazards, including specific procedures the employer has implemented to protect employees from exposure to hazardous chemicals, such as appropriate work practices, emergency procedures, and personal protective equipment to be used; and,

(iv) The details of the hazard communication program developed by the employer, including an explanation of the labeling system and the material safety data sheet, and how employees can obtain and use the appropriate hazard information.

(i) *Trade secrets.* (1) The chemical manufacturer, importer, or employer may withhold the specific chemical identity, including the chemical name and other specific identification of a hazardous chemical, from the material safety data sheet, provided that:

(i) The claim that the information withheld is a trade secret can be supported;

(ii) Information contained in the material safety data sheet concerning the properties and effects of the hazardous chemical is disclosed;

(iii) The material safety data sheet indicates that the specific chemical identity is being withheld as a trade secret; and,

(iv) The specific chemical identity is made available to health professionals, employees, and designated representatives in accordance with the applicable provisions of this paragraph.

(2) Where a treating physician or nurse determines that a medical emergency exists and the specific chemical identity of a hazardous chemical is necessary for emergency or first-aid treatment, the chemical manufacturer, importer, or employer shall immediately disclose the specific chemical identity of a trade secret chemical to that treating physician or nurse, regardless of the existence of a written statement of need of a confidentiality agreement. The chemical manufacturer, importer, or employer may require a written statement of need and confidentiality agreement, in accordance with the provisions of paragraphs (i)(3) and (4) of this section, as soon as circumstances permit.

(3) In non-emergency situations, a chemical manufacturer, importer, or employer shall, upon request, disclose a specific chemical identity, otherwise permitted to be withheld under paragraph (i)(1) of this section, to a health professional (i.e. physician, industrial hygienist, toxicologist, epidemiologist, or occupational health nurse) providing medical or other occupational health services to exposed employee(s), and to employees or designated representatives, if:

(i) The request is in writing;

(ii) The request describes with reasonable detail one or more of the following occupational health needs for the information:

(A) To assess the hazards of the chemicals to which employees will be exposed;

(B) To conduct or assess sampling of the workplace atmosphere to determine employee exposure levels;

(C) To conduct pre-assignment or periodic medical surveillance of exposed employees;

(D) To provide medical treatment to exposed employees;

(E) To select or assess appropriate personal protective equipment for exposed employees;

(F) To design or assess engineering controls or other protective measures for exposed employees; and,

(G) To conduct studies to determine the health effects of exposure.

(iii) The request explains in detail why the disclosure of the specific chemical identity is essential and that, in lieu thereof, the disclosure of the following information to the health professional, employee, or designated representative, would not satisfy the purposes described in paragraph (i)(3)(ii) of this section:

(A) The properties and effects of the chemical;

(B) Measures for controlling workers' exposure to the chemical;

(C) Methods of monitoring and analyzing worker exposure to the chemical; and,

(D) Methods of diagnosing and treating harmful exposures to the chemical;

(iv) The request includes a description of the procedures to be used to maintain the confidentiality of the disclosed information; and,

(v) The health professional, and the employer or contractor of the services of the health professional (i.e. downstream employer, labor organization, or individual employee), employee, or designated representative, agree in a written confidentiality agreement that the health professional, employee, or designated representative, will not use the trade secret information for any purpose other than the health need(s) asserted and agree not to release the information under any circumstances other than to OSHA, as provided in paragraph (i)(8) of this section, except as authorized by the terms of the agreement or by the chemical manufacturer, importer, or employer.

(4) The confidentiality agreement authorized by paragraph (i)(3)(iv) of this section:

(i) May restrict the use of the information to the health purposes indicated in the written statement of need;

(ii) May provide for appropriate legal remedies in the event of a breach of the agreement, including stipulation of a reasonable pre-estimate of likely damages; and,

(iii) May not include requirements for the posting of a penalty bond.

(5) Nothing in this standard is meant to preclude the parties from pursuing non-contractual remedies to the extent permitted by law.

(6) If the health professional, employee, or designated representative receiving the trade secret information decides that there is a need to disclose it to OSHA, the chemical manufacturer, importer, or employer who provided the information shall be informed by the health professional, employee, or designated representative prior to, or at the same time as, such disclosure.

(7) If the chemical manufacturer, importer, or employer denies a written request for disclosure of a specific chemical identity, the denial must:

(i) Be provided to the health professional, employee, or designated representative, within thirty days of the request;

(ii) Be in writing;

(iii) Include evidence to support the claim that the specific chemical identity is a trade secret;

(iv) State the specific reasons why the request is being denied; and,

(v) Explain in detail how alternative information may satisfy the specific medical or occupational health need without revealing the specific chemical identity.

(8) The health professional, employee, or designated representative whose request for information is denied under paragraph (i)(3) of this section may refer the request and the written denial of the request to OSHA for consideration.

(9) When a health professional, employee, or designated representative refers the denial to OSHA under paragraph (i)(8) of this section, OSHA shall consider the evidence to determine if:

(i) The chemical manufacturer, importer, or employer has supported the claim that the specific chemical identity is a trade secret;

(ii) The health professional, employee, or designated representative has supported the claim that there is a medical or occupational health need for the information; and,

(iii) The health professional, employee, or designated representative has demonstrated adequate means to protect the confidentiality.

(10)(i) If OSHA determines that the specific chemical identity requested under paragraph (i)(3) of this section is not a *bona fide* trade secret, or that it is a trade secret, but the requesting health professional, employee, or designated representative has a legitimate medical or occupational health need for the information, has executed a written confidentiality agreement, and has shown adequate means to protect the confidentiality of the information, the chemical manufacturer, importer, or employer will be subject to citation by OSHA.

(ii) If a chemical manufacturer, importer, or employer demonstrates to OSHA that the execution of a confidentiality agreement would not provide sufficient protection against the potential harm from the unauthorized disclosure of a trade secret specific chemical identity, the Assistant Secretary may issue such orders or impose such additional limitations or conditions upon the disclosure of the requested chemical information as may be appropriate to assure that the occupational health services are provided without an undue risk of harm to the chemical manufacturer, importer, or employer.

(11) If a citation for a failure to release specific chemical identity information is contested by the chemical manufacturer, importer, or employer, the matter will be adjudicated before the Occupational Safety and Health Review Commission in accordance with the Act's enforcement scheme and the applicable Commission rules of procedure. In accordance with the Commission rules, when a chemical manufacturer, importer, or employer continues to withhold the information during the contest, the Administrative Law Judge may review the citation and supporting documentation *in camera* or issue appropriate orders to protect the confidentiality or such matters.

(12) Notwithstanding the existence of a trade secret claim, a chemical manufacturer, importer, or employer shall, upon request, disclose to the Assistant Secretary any information which this section requires the chemical manufacturer, importer, or employer to make available. Where there is a trade secret claim, such claim shall be made no later than at the time the information is provided to the Assistant Secretary so that suitable determinations of trade secret status can be made and the necessary protections can be implemented.

(13) Nothing in this paragraph shall be construed as requiring the disclosure under any circumstances of process or percentage of mixture information which is a trade secret.

(j) *Effective dates.* (1) Chemical manufacturers, importers, and distributors shall ensure that material safety data sheets are provided with the next shipment of hazardous chemicals to employers after September 23, 1987.

(2) Employers in the non-manufacturing sector shall be in compliance with all provisions of this section by May 23, 1988. (Note: Employers in the manufacturing sector (SIC Codes 20 through 39) are already required to be in compliance with this section.)

Appendix A to § ——— Health Hazard Definitions (*Mandatory*)

Although safety hazards related to the physical characteristics of a chemical can be objectively defined in terms of testing requirements (e.g. flammability), health hazard definitions are less precise and more subjective. Health hazards may cause measurable changes in the body—such as decreased pulmonary function. These changes are generally indicated by the occurrence of signs and symptoms in the exposed employees—such as shortness of breath, a non-measurable, subjective feeling. Employees exposed to such hazards must be apprised of both the change in body function and the signs and symptoms that may occur to signal that change.

The determination of occupational health hazards is complicated by the fact that many of the effects or signs and symptoms occur commonly in non-occupationally exposed populations, so that effects of exposure are difficult to separate from normally occurring illnesses. Occasionally, a substance causes an effect that is rarely seen in the population at large, such as angiosarcomas caused by vinyl chloride exposure, thus making it easier to ascertain that the occupational exposure was the primary causative factor. More often, however, the effects are common, such as lung cancer. The situation is further complicated by the fact that most chemicals have not been adequately tested to determine their health hazard potential, and data do not exist to substantiate these effects.

There have been many attempts to categorize effects and to define them in various ways. Generally, the terms "acute" and "chronic" are used to delineate between effects on the basis of severity or duration. "Acute" effects usually occur rapidly as a result of short-term exposures, and are of short duration. "Chronic" effects generally occur as a result of long-term exposure, and are of long duration.

The acute effects referred to most frequently are those defined by the American National Standards Institute (ANSI) standard for Precautionary Labeling of Hazardous Industrial Chemicals (Z129.1–1982)—irritation, corrosivity, sensitization and lethal dose. Although these are important health effects, they do not adequately cover the considerable range of acute effects which may occur as a result of occupational exposure, such as, for example, narcosis.

Similarly, the term chronic effect is often used to cover only carcinogenicity, teratogenicity, and mutagenicity. These effects are obviously a concern in the workplace, but again, do not adequately cover the area of chronic effects, excluding, for example, blood dyscrasias (such as enemia), chronic bronchitis and liver atrophy.

The goal of defining precisely, in measurable terms, every possible health effect that may occur in the workplace as a result of chemical exposures cannot realistically be accomplished. This does not negate the need for employees to be informed of such effects and protected from them. Appendix B, which is also mandatory, outlines the principles and procedures of hazardous assessment.

For purposes of this section, any chemicals which meet any of the following definitions, as determined by the criteria set forth in Appendix B are health hazards:

1. *Carcinogen:* A chemical is considered to be a carcinogen if:

(a) It has been evaluated by the International Agency for Research on Cancer (IARC), and found to be a carcinogen or potential carcinogen; or

(b) It is listed as a carcinogen or potential carcinogen in the *Annual Report on Carcinogens* published by the National Toxicology Program (NTP) (latest edition); or,

(c) It is regulated by OSHA as a carcinogen.

2. *Corrosive:* A chemical that causes visible destruction of, or irreversible alterations in, living tissue by chemical action at the site of contact. For example, a chemical is considered to be corrosive if, when tested on the intact skin of albino rabbits by the method described by the U.S. Department of Transportation in Appendix A to 49 CFR Part 173, it destroys or changes irreversibly the structure of the tissue at the site of contact following an exposure period of four hours. This term shall not refer to action on inanimate surfaces.

3. *Highly toxic:* A chemical falling within any of the following categories:

(a) A chemical that has a median lethal dose (LD_{50}) of 50 milligrams or less per kilogram of body weight when administered orally to albino rats weighing between 200 and 300 grams each.

(b) A chemical that has a median lethal does (LD_{50}) of 200 milligrams or less per kilogram of body weight when administered by continuous contact for 24 hours (or less if death occurs within 24 hours) with the bare skin of albino rabbits weighing between two and three kilograms each.

(c) A chemical that has a median lethal concentration (LC_{50}) in air of 200 parts per million by volume or less of gas or vapor, or 2 milligrams per liter or less of mist, fume, or dust, when administered by continuous inhalation for one hour (or less if death occurs within one hour) to albino rats weighing between 200 and 300 grams each.

4. *Irritant:* A chemical, which is not corrosive, but which causes a reversible inflammatory effect on living tissue by chemical action at the site of contact. A chemical is a skin irritant if, when tested on the intact skin of albino rabbits by the methods of 16 CFR 1500.41 for four hours exposure or by other appropriate techniques, it results in an empirical score of five or more. A chemical is an eye irritant if so determined under the procedure listed in 16 CFR 1500.42 or other appropriate techniques.

5. *Sensitizer:* A chemical that causes a substantial proportion of exposed people or animals to develop an allergic reaction in normal tissue after repeated exposure to the chemical.

6. *Toxic.* A chemical falling within any of the following categories:

(a) A chemical that has a median lethal dose (LD_{50}) of more than 50 milligrams per kilogram but not more than 500 milligrams per kilogram of body weight when administered orally to albino rats weighing between 200 and 300 grams each.

(b) A chemical that has a median lethal dose (LD_{50}) of more than 200 milligrams per kilogram but not more than 1,000 milligrams per kilogram of body weight when administered by continuous contact for 24 hours (or less if death occurs within 24 hours) with the bare skin of albino rabbits weighing between two and three kilograms each.

(c) A chemical that has a median lethal concentration (LC_{50}) in air of more than 200 parts per million but not more than 2,000 parts per million by volume of gas or vapor, or more than two milligrams per liter but not more than 20 milligrams per liter of mist, fume, or dust, when administered by continuous inhalation for one hour (or le[illegible] death occurs within one hour) to albino r[illegible] weighing between 200 and 300 grams each.

7. *Target organ effects.* The following is a target organ categorization of effects which may occur, including examples of signs and symptoms and chemicals which have been found to cause such effects. These examples are presented to illustrate the range and diversity of effects and hazards found in the workplace, and the broad scope employers must consider in this area, but are not intended to be all-inclusive.

a. Hepatotoxins: Chemicals which produce liver damage
   Signs & Symptoms: Jaundice; liver enlargement
   Chemicals: Carbon tetrachloride; nitrosamines
b. Nephrotoxins: Chemicals which produce kidney damage
   Signs & Symptoms: Edema; proteinuria
   Chemicals: Halogenated hydrocarbons; uranium
c. Neurotoxins: Chemicals which produce their primary toxic effects on the nervous system
   Signs & Symptoms: Narcosis; behavioral changes; decrease in motor functions
   Chemicals: Mercury; carbon disulfide
d. Agents which act on the blood or hematopoietic system: Decrease hemoglobin function; deprive the body[illegible] tissues of oxygen
   Signs & Symptoms: Cyanosis; loss of consciousness
   Chemicals: Carbon monoxide; cyanides
e. Agents which damage the lung: Chemicals which irritate or damage the pulmonary tissue
   Signs & Symptoms: Cough; tightness in chest; shortness of breath
   Chemicals: Silica; asbestos
f. Reproductive toxins: Chemicals which affect the reproductive capabilities including chromosomal damage (mutations) and effects on fetuses (teratogenesis)
   Signs & Symptoms: Birth defects; sterility
   Chemicals: Lead; DBCP
g. Cutaneous hazards: Chemicals which affect the dermal layer of the body
   Signs & Symptoms: Defatting of the skin; rashes; irritation
   Chemicals: Ketones; chlorinated compounds
h. Eye hazards: Chemicals which affect the eye or visual capacity
   Signs & Symptoms: Conjunctivitis; corneal damage
   Chemicals: Organic solvents; acids

Appendix B to § ——, Hazard Determination (Mandatory)

The quality of a hazard communication program is largely dependent upon the adequacy and accuracy of the hazard determination. The hazard determination requirement of this standard is performance oriented. Chemical manufacturers, importers, and employers evaluating chemicals are not required to follow any specific methods for

determining hazards, but they must be able to demonstrate that they have adequately ascertained the hazards of the chemicals produced or imported in accordance with the criteria set forth in this Appendix.

Hazard evaluation is a process which relies heavily on the professional judgment of the evaluator, particularly in the area of chronic hazards. The performance-orientation of the hazard determination does not diminish the duty of the chemical manufacturer, importer or employer to conduct a thorough evaluation, examining all relevant data and producing a scientifically defensible evaluation. For purposes of this standard, the following criteria shall be used in making hazard determinations that meet the requirements of this standard.

1. *Carcinogenicity*: As described in paragraph (d)(4) and Appendix A of this section, a determination by the National Toxicology Program, the International Agency for Research on Cancer, or OSHA that a chemical is a carcinogen or potential carcinogen will be considered conclusive evidence for purposes of this section.

2. *Human data*: Where available, epidemiological studies and case reports of adverse health effects shall be considered in the evaluation.

3. *Animal data*: Human evidence of health effects in exposed populations is generally not available for the majority of chemicals produced or used in the workplace. Therefore, the available results of toxicological testing in animal populations shall be used to predict the health effects that may be experienced by exposed workers. In particular, the definitions of certain acute hazards refer to specific animal testing results (see Appendix A).

4. *Adequacy and reporting of data*. The results of any studies which are designed and conducted according to established scientific principles, and which report statistically significant conclusions regarding the health effects of a chemical, shall be a sufficient basis for a hazard determination and reported on any material safety data sheet. The chemical manufacturer, importer, or employer may also report the results of other scientifically valid studies which tend to refute the findings of hazard.

Appendix C to §— Information Sources (Advisory)

The following is a list of available data sources which the chemical manufacturer, importer, distributor, or employer may wish to consult to evaluate the hazards of chemicals they produce or import:

—Any information in their own company files, such as toxicity testing results or illness experience of company employees.

—Any information obtained from the supplier of the chemical, such as material safety data sheets or product safety bulletins.

—Any pertinent information obtained from the following source list (latest editions should be used):

Condensed Chemical Dictionary
Van Nostrand Reinhold Co., 135 West 50th Street, New York, NY 10020.

The Merck Index: An Encyclopedia of Chemicals and Drugs
Merck and Company, Inc., 126 E. Lincoln Ave., Rahway, NJ 07065.

IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man
Geneva: World Health Organization, International Agency for Research on Cancer, 1972–Present. (Multivolume work). Summaries are available in supplement volumes. 49 Sheridan Street, Albany, NY 12210.

Industrial Hygiene and Toxicology, by F.A. Patty
John Wiley & Sons, Inc., New York, NY (Multivolume work).

Clinical Toxicology of Commercial Products
Gleason, Gosselin, and Hodge

Casarett and Doull's Toxicology: The Basic Science of Poisons
Doull, Klaassen, and Amdur, Macmillan Publishing Co., Inc., New York, NY.

Industrial Toxicology, by Alice Hamilton and Harriet L. Hardy
Publishing Sciences Group, Inc., Acton, MA.

Toxicology of the Eye, by W. Morton Grant
Charles C. Thomas, 301–327 East Lawrence Avenue, Springfield, IL.

Recognition of Health Hazards in Industry
William A. Burgess, John Wiley and Sons, 605 Third Avenue, New York, NY 10158.

Chemical Hazards of the Workplace
Nick H. Proctor and James P. Hughes, J.P. Lipincott Company, 6 Winchester Terrace, New York, NY 10022.

Handbook of Chemistry and Physics
Chemical Rubber Company, 18901 Cranwood Parkway, Cleveland, OH 44128.

Threshold Limit Values for Chemical Substances and Physical Agents in the Work Environment and Biological Exposure Indices with Intended Changes
American Conference of Governmental Industrial Hygienists (ACGIH), 6500 Glenway Avenue, Bldg. D–5, Cincinnati, OH 45211.

Information on the physical hazards of chemicals may be found in publications of the National Fire Protection Association, Boston, MA.

Note.—The following documents may be purchased from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

Occupational Health Guidelines
NIOSH/OSHA (NIOSH Pub. No. 81–123)

NIOSH Pocket Guide to Chemical Hazards
NIOSH Pub. No. 85–114

Registry of Toxic Effects of Chemical Substances
NIOSH Pub. No. 80–102

Miscellaneous Documents published by the National Institute for Occupational Safety and Health:
Criteria documents.
Special Hazard Reviews.
Occupational Hazard Assessments.
Current Intelligence Bulletins.

OSHA's General Industry Standards (29 CFR Part 1910)

NTP Annual Report on Carcinogens and *Summary of the Annual Report on Carcinogens*.
National Technical Information Service (NTIS), 5285 Port Royal Road, Springfield, VA 22161; (703) 487–4650.

BIBLIOGRAPHIC DATA BASES

Service provider	File name
Bibliographic Retrieval Services (BRS), 1200 Route 7, Latham, NY 12110.	Biosis Previews CA Search Medlars NTIS Hazardline American Chemical Society Journal Excerpta Medica IRCS Medical Science Journal Pre-Med Ind Pharmaceutical Abstracts Paper Chem
Lockheed—DIALOG Information Service, Inc., 3460 Hillview Avenue, Palo Alto, CA 94304.	Biosis Prev. Files CA Search Files CAB Abstracts Chemical Exposure Chemname Chemsis Files Chemzero Embase Files Environmental Bibliographies Enviroline Federal Research in Progress IRL Life Science Collection NTIS Occupational Safety and Health (NIOSH) Paper Chem
SDC—Orbit, SDC Information Service, 2500 Colorado Avenue, Santa Monica, CA 90406.	CAS Files Chemdex, 2, 3 NTIS
National Library of Medicine, Department of Health and Human Services, Public Health Service, National Institutes of Health, Bethesda, MD 20209.	Hazardous Substances Data Bank (NSDB) Medline files Toxline Files Cancerlit RTECS Chemline
Pergamon International Information Corp., 1340 Old Chain Bridge Rd., McLean, VA 22101.	Laboratory Hazard Bulletin
Questel, Inc., 1625 Eye Street, NW., Suite 818, Washington, DC 20006.	CIS/ILO Cancernet
Chemical Information System ICI (ICIS), Bureau of National Affairs, 1133 15th Street, NW., Suite 300, Washington, DC 20005.	Structure and Nomenclature Search System (SANSS) Acute Toxicity (RTECS) Clinical Toxicology of Commercial Products Oil and Hazardous Materials Technical Assistance Data System CCRIS CESARS
Occupational Health Services, 400 Plaza Drive, Secaucus, NJ 07094.	MSDS Hazardline

Appendix D to §_____Definition of "Trade Secret" (Mandatory)

The following is a reprint of the *Restatement of Torts* section 757, comment *b* (1939):

b. Definition of trade secret. A trade secret may consist of any formula, pattern, device or compilation of information which is used in one's business, and which gives him an opportunity to obtain an advantage over competitors who do not know or use it. It may be a formula for a chemical compound, a process of manufacturing, treating or preserving materials, a pattern for a machine or other device, or a list of customers. It differs from other secret information in a business (see § 759 of the *Restatement of Torts* which is not included in this Appendix) in that it is not simply information as to single or ephemeral events in the conduct of the business, as, for example, the amount or

other terms of a secret bid for a contract or the salary of certain employees, or the security investments made or contemplated, or the date fixed for the announcement of a new policy or for bringing out a new model or the like. A trade secret is a process or device for continuous use in the operations of the business. Generally it relates to the production of goods, as, for example, a machine or formula for the production of an article. It may, however, relate to the sale of goods or to other operations in the business, such as a code for determining discounts, rebates or other concessions in a price list or catalogue, or a list of specialized customers, or a method of bookkeeping or other office management.

Secrecy. The subject matter of a trade secret must be secret. Matters of public knowledge or of general knowledge in an industry cannot be appropriated by one as his secret. Matters which are completely disclosed by the goods which one markets cannot be his secret. Substantially, a trade secret is known only in the particular business in which it is used. It is not requisite that only the proprietor of the business know it. He may, without losing his protection, communicate it to employees involved in its use. He may likewise communicate it to others pledged to secrecy. Others may also know of it independently, as, for example, when they have discovered the process or formula by independent invention and are keeping it secret. Nevertheless, a substantial element of secrecy must exist, so that, except by the use of improper means, there would be difficulty in acquiring the information. An exact definition of a trade secret is not possible. Some factors to be considered in determining whether given information is one's trade secret are: (1) The extent to which the information is known outside of his business; (2) the extent to which it is known by employees and others involved in his business; (3) the extent of measures taken by him to guard the secrecy of the information; (4) the value of the information to him and his competitors; (5) the amount of effort or money expended by him in developing the information; (6) the ease or difficulty with which the information could be properly acquired or duplicated by others.

Novelty and prior art. A trade secret may be a device or process which is patentable; but it need not be that. It may be a device or process which is clearly anticipated in the prior art or one which is merely a mechanical improvement that a good mechanic can make. Novelty and invention are not requisite for a trade secret as they are for patentability. These requirements are essential to patentability because a patent protects against unlicensed use of the patented device or process even by one who discovers it properly through independent research. The patent monopoly is a reward to the inventor. But such is not the case with a trade secret. Its protection is not based on a policy of rewarding or otherwise encouraging the development of secret processes or devices. The protection is merely against breach of faith and reprehensible means of learning another's secret. For this limited protection it is not appropriate to require also the kind of novelty and invention which is a requisite of patentability. The nature of the secret is, however, an important factor in determining the kind of relief that is appropriate against one who is subject to liability under the rule stated in this section. Thus, if the secret consists of a device or process which is a novel invention, one who acquires the secret wrongfully is ordinarily enjoined from further use of it and is required to account for the profits derived from his past use. If, on the other hand, the secret consists of mechanical improvements that a good mechanic can make without resort to the secret, the wrongdoer's liability may be limited to damages, and an injunction against future use of the improvements made with the aid of the secret may be inappropriate.

8. Section 1915.97 would be revised to read as follows:

§ 1915.97 Health and sanitation.

The provisions of this section shall apply to ship repairing, shipbuilding and shipbreaking, except where indicated otherwise.

(a) The employer shall provide all necessary controls, and the employees shall be protected by suitable personal protective equipment against the hazards identified under § 1915.99 of this part and those hazards for which specific precautions are required in Subparts B, C, and D of this part.

(b) The employer shall provide adequate washing facilities for employees engaged in the application of paints or coatings or in other operations where contaminants can, by ingestion or absorption, be detrimental to the health of the employees. The employer shall encourage good personal hygiene practices by informing the employees of the need for removing surface contaminants by thorough washing or hands and face prior to eating or smoking.

(c) The employer shall not permit employees to eat or smoke in areas undergoing surface preparation or preservation or where shipbreaking operations produce atmospheric contaminants.

(d) The employer shall not permit employees engaged in ship repair work on a vessel to work in the immediate vicinity of uncovered garbage and shall ensure that employees working beneath or on the outboard side of a vessel are not subject to contamination by drainage or waste from overboard discharges.

(e) No minor under 18 years of age shall be employed in shipbreaking or related employments.

9. Section 1928.21 would be amended by adding paragraph (a)(5) as follows:

§ 1928.21 Applicable standards in 29 CFR Part 1910.

(a) * * *

(5) Hazard communication—§ 1910.1200.

* * * * *

[FR Doc. 87-19137 Filed 8-19-87; 8:45 am]
BILLING CODE 4510-26-M

APPENDIX E

EMPLOYEE TRAINING PROGRAM

APPENDIX E

EMPLOYEE TRAINING PROGRAM

Overview

Pursuant to the requirements of the Hazard Communication standard, employee training shall include at least:

1. Methods and observations that may be used to detect the presence or releases of a hazardous chemical or substance in the work area (such as ambient hydrogen sulfide monitoring and alarm equipment, odor of sulfur dioxide and hydrogen sulfide, etc.).

2. The potential health and physical hazards of chemicals in the work area. This is based upon a review of the MSDSs for the chemicals used.

3. The measures employees can take to protect themselves from the hazards (such as the use of goggles, gloves, faceshield and lab apron for dispensing harmful substances, use of self-contained respiratory protection for hydrogen sulfide and sulfur dioxide, etc.).

4. The details of the Hazard Communication Plan should be discussed including an explanation of the labeling system and use of MSDSs, and how employees can obtain and use the appropriate hazard information.

The initial training program will be presented during the monthly safety meeting that is conducted by the area Foreman. The meeting will address the purpose of the Hazard Communication Plan, safety chemical handling procedures, use of protective equipment, availability and use of MSDSs. Employees are also informed of the location of the Region's Hazard Communication Plan, including the applicable MSDSs and copy of the OSHA standard. Region employees are also informed of their responsibilities, as indicated in the Plan. Visual aids, such as films on chemical handling are used, as available.

The following outline is used for hazard communication training purposes:

1. Introduction (including purpose of the Hazard Communication Plan).

2. Material Safety Data Sheets (MSDSs).

    a. Explanation of what MSDSs are and their use.

    b. Advise employees of the location where MSDSs are available (normally this will be the area Foreman's office or field office).

    c. Encourage employees to always abide by the hazard warnings on chemical containers and consult the MSDSs if they have any questions.

    d. MSDSs for new chemicals or hazardous substances must be obtained and incorporated into the Region's Plan.

3. Availability and Use of Protective Equipment.

   a. Brief explanation of chemical safety considerations and protective measures.

   b. Make employees aware of the available personal protective equipment (such as goggles, faceshields, gloves, respirators, hydrogen sulfide detectors, etc.).

4. Discussion of the Hazardous Chemicals or Substances in the Work Area.

   a. Examples: Crude oil, hydrogen sulfide, propane, condensate, ethylene glycol, methyl alcohol, well treatment chemicals, etc.

5. Questions and Answers.

EMPLOYEE TRAINING PROGRAM

HAZARD COMMUNICATION PLAN

Introduction

The purpose of the Hazard Communication standard is to ensure that the hazards of all chemicals produced or imported are evaluated and that information concerning their hazards is transmitted to employers and employees. Transmittal of this information is to be accomplished by implementing a hazard communication program, which addresses container labeling and other forms of warning, MSDSs and employee training.

Specific requirements of the program are:

1. Development of a written Hazard Communication Plan.

2. The written Plan shall include a current listing of hazardous chemicals and substances present at the location(s).

3. Copies of MSDSs must be obtained for the chemicals present in the workplace and the sheets must be readily available to all employees that may be required to work around the listed chemicals.

4. The employee shall not remove or deface labels on incoming containers of hazardous chemicals or substances unless the container is immediately marked with the required information.

5. Employees shall be provided information concerning the Hazard Communication Plan and shall be given appropriate training for working safely with covered substances.

6. Procedures shall be established to inform contractors of the requirements of the Hazard Communication Plan.

Material Safety Data Sheets (MSDSs)

The Occupational Safety and Health Administration (OSHA) requires manufacturers of hazardous chemicals and substances to assess the hazards of these substances and provide that information by means of container labels and warnings, and MSDSs. Each container of hazardous chemicals leaving the manufacturer's (or importer's) location must be labeled, tagged or marked with the identity of the chemical, hazard warnings, the name and address of the chemical manufacturer and importer or distributor. The manufacturer must provide MSDSs to distributors and purchasers with the initial shipment of chemical and within three months after any MSDS is revised. **It is the responsibility of all purchasers of hazardous chemicals and substances to maintain the MSDSs at each work location where the chemicals are used.**

The MSDS contains a wide range of information pertaining to the hazards, proper handling and emergency procedures of a hazardous chemical or substance.

1. Chemical Name and Formula of the Substance.
2. Manufacturers Name, Address and Telephone Number.
3. Hazardous Ingredients.
4. Physical Information.
5. Fire and Explosion Hazard Data.
6. Health and Hazard Data.
7. Reactivity Data.
8. Spill or Leak Procedures.
9. Special Protection Information.
10. Special Precautions.
11. Additional Information.

Note: Employees should always consult the MSDS or hazard warnings before handling potentially hazardous chemicals or substances.

MSDSs are available from the area Foreman or facility Supervisor along with a MSDS users guide. More information on the exact location of this information is available from the Foreman or facility Supervisor.

Chemical Safety

Many chemicals can cause serious harm to the human body (or environment) if handled improperly. Therefore, it is extremely important that hazardous chemicals and substances be handled properly. Always read the hazard warning on the container and consult the MSDS. This should inform employees what potential dangers are associated with the substance and what precautions should be taken.

Personal protective equipment (ex. goggles, gloves, faceshield, lab apron, respirators) should be readily available to employees that handle hazardous chemicals and substances. When protective equipment needs replacement, please advise your supervisor so that it may be obtained.

Hazardous Chemicals and Substances in the Workplace

Discuss what hazardous substances are present in the workplace that may require special precautions. Also, review with personnel the MSDS for crude oil (including hydrogen sulfide), natural gas, propane, methyl alcohol, naptha, ethylene glycol and polymer. The area Foreman or Supervisor should discuss hazards of any chemicals in his/her area of responsibility that should be addressed.

Conclusion

- A written Hazard Communication Plan with a listing of hazardous chemicals and substances has been developed and is available for employee review.
- MSDSs must be available for all chemicals handled.
- Labels and hazard warnings must be affixed to containers.
- Employees are expected to know where and how to obtain MSDS information, and abide by the recommendations contained in the MSDS.
- Contractors must be informed of the Plan requirements and of this responsibility to inform their employees of the protective measures for working safely with the listed chemicals.

Questions and Answers

Area Foreman and/or facility Supervisor.

APPENDIX F

CONTRACTOR INDOCTRINATION

APPENDIX F

CONTRACTOR INDOCTRINATION

Contractors that normally enter Marathon work locations are provided a copy of the Region's Hazard Communication Plan. Contractor representatives are responsible for informing their employees of the Plan, the chemicals they may be exposed to and protective measures for safely working with these chemicals. Contractor representatives shall provide, to the local Marathon supervisor in charge, information about the chemicals used by the contractor on the Marathon location. Normally, this information will include an MSDS for the chemical. Also, contractor representatives shall ensure all containers of hazardous chemicals and substances transported onto Marathon operated premises are properly labeled with the substance name and hazard warnings.

The area Foreman or facility Supervisor is responsible for coordinating the exchange of chemical information between contractors at multi-employer worksites. If a contractor is summoned on short notice, it is the responsibility of the person requesting the service to inform facility personnel of any special precautions, training, or equipment required while the contractor is performing the work (ex. sandblasting work is initiated in an area where other contractor work is underway).

All contractors utilized by Marathon must be in compliance with OSHA's Hazard Communication standard, 29 CFR Part 1910.1200.

APPENDIX G

TRAINING DOCUMENTATION

MID-CONTINENT REGION
HAZARD COMMUNICATION PROGRAM

DATE: _____ AREA: _____

On the above date, the following employees received training on the Region's Hazard Communication Program, including a discussion of hazardous chemicals and substances utilized in the area, a review of applicable material safety data sheets, the use of labels and other forms of warning, training requirements, and the other requirements of the Hazard Communication Plan.

1.	_____	21.	_____
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_____
Foreman/Supervisor

JLS-5/18/88

MID-CONTINENT REGION
HAZARD COMMUNICATION PROGRAM

DATE: _____ AREA: _____

On the above date, the following employees received training on the Region's Hazard Communication Program, including a discussion of hazardous chemicals and substances utilized in the area, a review of applicable material safety data sheets, the use of labels and other forms of warning, training requirements, and the other requirements of the Hazard Communication Plan.

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Foreman/Supervisor

JLS-5/18/88

MID-CONTINENT REGION
HAZARD COMMUNICATION PROGRAM

DATE: _____ AREA: _____

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Foreman/Supervisor

JLS-5/18/88

MID-CONTINENT REGION
HAZARD COMMUNICATION PROGRAM

DATE: _____ AREA: _____

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_____
Foreman/Supervisor

JLS-5/18/88

MID-CONTINENT REGION
HAZARD COMMUNICATION PROGRAM

DATE: _____ AREA: _____

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_____
Foreman/Supervisor

JLS-5/18/88

DATE: 8/18/89 REVISED:	APPENDIX F	PAGE 1 of 1

OIL CONSERVATION DIVISION CORRESPONDENCE

STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

GARREY CARRUTHERS
GOVERNOR

May 15, 1989

RECEIVED
MAY 22 1989

MARATHON OIL CO.
Production Manager
Midland Operations
Midland, Texas

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87504
(505) 827-5800

CERTIFIED MAIL - RETURN
RECEIPT NO. P-106 675 056

Environmental & Safety
Mid-Continent Region

Issue	Action
	CWG
✓	RFM
	JLS
	CJR
	DTW
✓	DS
	ELK
	FILE

Manager, Houston Division
Marathon Oil Company
Onshore Operations Production, U.S.
P. O. Box 3128
Houston, Texas 77253

Re: Discharge Plan GW-21
Indian Basin Gas Plant
Eddy County, New Mexico

Dear Sir:

On November 26, 1984, the ground water discharge plan, GW-21 for the Indian Basin Gas Plant located in Eddy County was approved by the Director of the Oil Conservation Division (OCD). This discharge plan was required and submitted pursuant to Water Quality Control Commission Regulations and it was approved for a period of five years. The approval will expire on November 26, 1989.

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 intend 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 disposal of all solid waste generated at your facility will be addressed in your discharge plan renewal. The guidelines are being revised to include the solid waste provisons as enacted by the New Mexico Legislature in the 1989 Legislative session.

If you no longer have discharges and discharge plan renewal is not needed, please notify this office.

If you have any questions, please do not hesitate to contact Roger Anderson at (505) 927-5884.

Sincerely,

DAVID G. BOYER, Chief
Environmental Bureau

DGB/dr

cc: Oil Conservation Division
Artesia, New Mexico

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

June 29, 1989

CERTIFIED MAIL
RETURN RECEIPT NO. P-106-675-047

Mr. Stephen D. York, Superintendent
MARATHON OIL COMPANY
P. O. Box 1324
Artesia, New Mexico 88211

RE: Discharge Plan GW-21
Indian Basin Gas Plant
Eddy County, New Mexico

Dear Mr. York:

On June 23, 1989, members of the Oil Conservation Division (OCD) Environmental Bureau conducted a facility inspection as part of the discharge plan renewal of the above referenced facility. The following observations made during the inspection should be addressed in your renewal application:

1. There were a number of above grade storage tanks that contained oils or chemicals that were not bermed. The OCD is requiring that above grade tanks that contain materials with constituents that can be harmful to fresh water and the environment, if a sudden and catastrophic spill were to occur, must be contained at the site of the spill and mitigated immediately. Containment in a small area at the tank site allows for maximum recovery of fluids and small volumes of contaminants available for infiltration. Without berming, the rupture of a tank will spread its contents over a large area minimizing the amount that can be recovered and increasing the surface area of contaminated soil available to leach contaminants. All tanks that contain these types of materials must be bermed to prevent migration of the fluids and decrease the potential for infiltration. Therefore a commitment and completion schedule is required for the berming of vessels that contain fluids other than fresh water. The bermed areas shall be large enough to hold one-third more than the volume of the largest vessel or one-third larger than the total volume of all interconnected vessels contained within the berm.

The following are specific areas identified during the inspection that require containment:

a. The above ground saddle tanks on the North side of the facility that contain fuel, amine, etc.

b. The above ground saddle tank containing oil at the stabilizer overhead compressor.

c. Chemical storage tanks at the cooling tower.

d. D.E.A. storage tanks.

e. The skimmer tanks south of the process area.

f. Lube oil storage.

2. A number of areas were identified where valves, fittings, flanges, pumps, etc. have been leaking. Containment of these spills and/or leaks by paving or curbing or other effective means is required. The purpose of curbing and paving process areas is to prevent migration and infiltration of any spilled or leaked materials from the process units. The total process area does not need to be curbed and paved. Small containment facilities should be placed under and around valves and pumps. Vessels that have overflowed or leaked or have the potential to overflow or leak should also have containment:

The following are specific areas that require containment.

a. The pump south of the stabilizer overhead compressor.

b. The cooling tower pumps and the area around the cooling tower where spray drift ponds on the ground.

c. Recompressors.

d. Lube oil storage transfer pumps.

e. Expander and lube oil skid system.

f. The drains below the inlet condensate tanks.

g. The area between the sidewalk and the amine circulation pumps.

h. The pump on the south tank east of the D.E.A. tank.

Submit plans and a completion schedule for paving and berming, or other proposed containment methods, the above areas or any other areas where leaks or spills can occur.

3. Drummed chemicals are used throughout the facility. Some of these drums were on concrete pads with and without containment and some were on the ground. The OCD is requiring that all drums containing fluids, whether in storage or in use, be on pads with containment ample enough to hold any spills and/or leaks from the drums. Submit a plan and completion schedule for the containment of all drum areas.

4. Oil was observed pooling on the ground under the pipe run north of the generators. Submit a proposal and completion schedule for the identification of the source of the leak, cleanup of the area and elimination or containment of the source.

5. The sump in the water softener building appeared to have only an earthen bottom and to have overflowed several times. Submit a plan and completion schedule for installing an impermeable bottom in the sump and for the elimination or containment of future slump overflows.

6. The closed drain system tank was partially below grade without leak detection. Propose a method to test the integrity of this tank. If any below grade tank not presently equiped with leak detection is replaced, leak detection is required on reinstallation.

7. If Marathon desires continued use of the landfill west of the facility fence, the landfill should be fenced to prevent unauthorized access and dumping and covered to prevent blowing trash. Provide complete information on solid waste disposal practices with the renewal application.

Thank you for the courtesy extended to us during the visit. If you have any questions, please do not hesitate to contact me at (505) 827-5884.

Sincerely,

Roger C. Anderson
Environmental Engineer

RCA/sl

cc: OCD Artesia Office
Ronald F. Morgan, Marathon, Midland

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

August 2, 1989

Mr. Stephen D. York, Superintendent
MARATHON OIL COMPANY
P. O. Box 1324
Artesia, New Mexico 88211

RE: Discharge Plan GW-21
Indian Basin Gas Plant
Eddy County, New Mexico

Dear Mr. York:

Enclosed are copies of the results of the chemical analyses from samples taken during our last sampling trip at your facility.

If you have any questions regarding the results, please contact me at (505) 827-5884.

Sincerely,

Roger C. Anderson
Environmental Engineer

RCA/sl

Environmental & Safety
Mid-Continent Region

Name	Action
CW'G	
RFM	
JES	
CJR	
DTW	
ELK	
FILE	

754
WPL

SCIENTIFIC LABORATORY DIVISION
ORGANIC ANALYSIS REQUEST FORM
Organic Section - Phone: 841-2570

OR89-0907-C

REPORT TO: DAVID BOYER
N.M. OIL CONSERVATION DIVISION
P.O. Box 2088
Santa Fe, NM 87504-2088

S.L.D. No. OR-
DATE REC. 6-27-89
PRIORITY 3
PHONE(S): 827-5812

COLLECTION CITY: Carlsbad ; COUNTY: Eddy

COLLECTION DATE/TIME CODE: (Year-Month-Day-Hour-Minute) | 8 9 | 0 6 | 2 3 | 1 0 | 1 5 |

LOCATION CODE: (Township-Range-Section-Tracts) | 2 1 S + 2 3 E + 2 3 + 1 1 |(10N06E24342)

USER CODE: | 8 | 2 | 2 | 3 | 5 | SUBMITTER: David Boyer CODE: | 2 | 6 | 0 |

SAMPLE TYPE: WATER [X], SOIL [ ], FOOD [ ], OTHER:

This form accompanies 2 Septum Vials, ____ Glass Jugs, and/or ____ ____

Samples were preserved as follows:

- [ ] NP: No Preservation; Sample stored at room temperature.
- [X] P-Ice Sample stored in an ice bath (Not Frozen).
- [ ] P-AA Sample Preserved with Ascorbic Acid to remove chlorine residual.
- [X] P-HCl Sample Preserved with Hydrochloric Acid (2 drops/40 ml)

ANALYSES REQUESTED: Please check the appropriate box(es) below to indicate the type of analytical screens required. Whenever possible list specific compounds suspected or required.

PURGEABLE SCREENS

- [ ] (753) Aliphatic Headspace (1-5 Carbons)
- [X] (754) Aromatic & Halogenated Purgeables
- [ ] (765) Mass Spectrometer Purgeables
- [ ] (766) Trihalomethanes
- [ ] (774) SDWA VOC's I (8 Regulated +)
- [ ] (775) SDWA VOC's II (EDB & DBCP)

Other Specific Compounds or Classes

- [ ] _____
- [ ] _____

EXTRACTABLE SCREENS

- [ ] (751) Aliphatic Hydrocarbons
- [ ] (755) Base/Neutral Extractables
- [ ] (758) Herbicides, Chlorophenoxy acid
- [ ] (759) Herbicides, Triasines
- [ ] (760) Organochlorine Pesticides
- [ ] (761) Organophosphate Pesticides
- [ ] (767) Polychlorinated Biphenyls (PCB's)
- [ ] (764) Polynuclear Aromatic Hydrocarbons
- [ ] (762) SDWA Pesticides & Herbicides

Remarks: _____

FIELD DATA: * From Tank storage instead of Dump.

pH= 7 ; Conductivity= 700 umho/cm at 20 °C; Chlorine Residual= _____ mg/l

Dissolved Oxygen= _____ mg/l; Alkalinity= _____ mg/l; Flow Rate _____ ____/____

Depth to water _____ ft.; Depth of well _____ ft.; Perforation Interval ____ - ____ ft.; Casing: _____

Sampling Location, Methods and Remarks (i.e. odors, etc.)
Marathon Indian Basin Gas Plant - Raw Water (From West well) - Sample From Tap at Pump House *

I certify that the results in this block accurately reflect the results of my field analyses, observations and activities.(signature collector): (David Boyer) Method of Shipment to the Lab: State Car

CHAIN OF CUSTODY

I certify that this sample was transferred from _____ to _____

at (location) _____ on ____/____/____ - ____:____ and that

the statements in this block are correct. Evidentiary Seals: Not Sealed [ ] OR Seals Intact: Yes [ ] No [ ]

Signatures _____ _____

For OCD use: Date owner notified: 8/3/89 Phone or (Letter?) Initials RLS

STATE OF NEW MEXICO HEALTH AND ENVIRONMENT DEPARTMENT
SCIENTIFIC LABORATORY DIVISION
700 Camino de Salud, NE
Albuquerque, NM 87106 [505]-841-2500
ORGANIC CHEMISTRY SECTION [505]-841-2570

July 25, 1989

ANALYTICAL REPORT
SLD Accession No. OR-89-0907

Distribution
(■) Submitter
(※) SLD Files

To: NM Oil Consv. Div.
State Land Office Bldg.
P. O. Box 2088
Santa Fe, NM 87504-2088

From: Organic Chemistry Section
Scientific Laboratory Div.
700 Camino de Salud, NE
Albuquerque, NM 87106

Re: **A purgeable water sample submitted to this laboratory on June 27, 1989**

User:
OIL CONSERVATION DIV
State Land Office Bldg.
P. O. Box 2088
Santa Fe, NM 87504-2088

DEMOGRAPHIC DATA

COLLECTION

On: 23-Jun-89 *By:* Boy . . .
At: 10:45 hrs. *In/Near:* Carlsbad

LOCATION

ANALYTICAL RESULTS: Aromatic & Halogenated Purgeable Screen

Parameter	Value	Note	MDL	Units
Halogenated Purgeables (33)	0.00	N	5.00	ppb
Aromatic Purgeables (6)	0.00	N	10.00	ppb

Notations & Comments:

MDL = Minimal Detectable Level.

A = Approximate Value; N = None Detected above Detection Limit; P = Compound Present, but not quantified;
T = Trace (<Detection Limit); U = Compound Identity Not Confirmed.

Evidentiary Seals: Not Sealed [X]; Intact: No [ ], Yes [ ] & Broken By: _____ Date: _____

Laboratory Remarks: Marathon Indian Resin Raw Wtr

Analyst: _____ 7-12-89 **Reviewed By:** _____
Michael J. Owen — Analysis Date — Richard F. Meyerhein 07/25/89
Analyst, Organic Chemistry — *Supervisor, Organic Chemistry Section*

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JUL 31 1989
OIL CONSERVATION DIV.
SANTA FE

SCIENTIFIC LABORATORY DIVISION
ORGANIC ANALYSIS REQUEST FORM
Organic Section - Phone: 841-2570

7/5? wpl

OR89-0912-C

REPORT TO: DAVID BOYER
N.M. OIL CONSERVATION DIVISION
P.O. Box 2088
Santa Fe, NM 87504-2088

S.L.D. No. OR-
DATE REC. 6-27-89
PRIORITY 3
PHONE(S): 827-5812

COLLECTION CITY: Carlsbad ; COUNTY: Eddy

COLLECTION DATE/TIME CODE: (Year-Month-Day-Hour-Minute) |8|9|0|6|2|3|1|1|1|0|

LOCATION CODE: (Township-Range-Section-Tracts) |0|1|5|+|3|1|E|+|1|3|+|1|-|1| (10N06E24342)

USER CODE: |8|2|2|3|5| SUBMITTER: David Boyer CODE: |2|6|0|

SAMPLE TYPE: WATER [X], SOIL [ ], FOOD [ ], OTHER:

This form accompanies 3 Septum Vials, ____ Glass Jugs, and/or ____ ____

Samples were preserved as follows:

- [ ] NP: No Preservation; Sample stored at room temperature.
- [X] P-Ice Sample stored in an ice bath (Not Frozen).
- [ ] P-AA Sample Preserved with Ascorbic Acid to remove chlorine residual.
- [X] P-HCl Sample Preserved with Hydrochloric Acid (2 drops/40 ml)

ANALYSES REQUESTED: Please check the appropriate box(es) below to indicate the type of analytical screens required. Whenever possible list specific compounds suspected or required.

PURGEABLE SCREENS

- [ ] (753) Aliphatic Headspace (1-5 Carbons)
- [X] (754) Aromatic & Halogenated Purgeables
- [ ] (765) Mass Spectrometer Purgeables
- [ ] (766) Trihalomethanes
- [ ] (774) SDWA VOC's I (8 Regulated +)
- [ ] (775) SDWA VOC's II (EDB & DBCP)

Other Specific Compounds or Classes

- [ ] _____
- [ ] _____

EXTRACTABLE SCREENS

- [ ] (751) Aliphatic Hydrocarbons
- [ ] (755) Base/Neutral Extractables
- [ ] (758) Herbicides, Chlorophenoxy acid
- [ ] (759) Herbicides, Triazines
- [ ] (760) Organochlorine Pesticides
- [ ] (761) Organophosphate Pesticides
- [ ] (767) Polychlorinated Biphenyls (PCB's)
- [ ] (764) Polynuclear Aromatic Hydrocarbons
- [ ] (762) SDWA Pesticides & Herbicides

Remarks: Low detection limit (10 ppb or less) requested for halogenated purgeables

FIELD DATA:

pH= 9.5 ; Conductivity= 13,900 umho/cm at 25 °C; Chlorine Residual=_____mg/l

Dissolved Oxygen=_____mg/l; Alkalinity=_____mg/l; Flow Rate_____ ____/____

Depth to water _____ft.; Depth of well_____ft.; Perforation Interval _____-_____ft.; Casing:_____

Sampling Location, Methods and Remarks (i.e. odors, etc.)

Marathon Indian Basin Gas Plant - Final Effluent ~~Coming~~ commingled to injection well oily waste

I certify that the results in this block accurately reflect the results of my field analyses, observations and activities.(signature collector): [signature] Method of Shipment to the Lab: Tobin

CHAIN OF CUSTODY

I certify that this sample was transferred from _____ to _____

at (location) _____ on ____/____/____ - ____:____ and that the statements in this block are correct. Evidentiary Seals: Not Sealed [ ] OR Seals Intact: Yes [ ] No [ ]

Signatures _____ _____

For OCD use: Date owner notified: 8/3/89 Phone or Letter? Initials RLS

STATE OF NEW MEXICO HEALTH AND ENVIRONMENT DEPARTMENT
SCIENTIFIC LABORATORY DIVISION
700 Camino de Salud, NE
Albuquerque, NM 87106 [505]-841-2500
ORGANIC CHEMISTRY SECTION [505]-841-2570

July 25, 1989

ANALYTICAL REPORT
SLD Accession No. OR-89-0912

Distribution
(■) Submitter
(※) SLD Files

To: NM Oil Consv. Div.
State Land Office Bldg.
P. O. Box 2088
Santa Fe, NM 87504-2088

From: Organic Chemistry Section
Scientific Laboratory Div.
700 Camino de Salud, NE
Albuquerque, NM 87106

Re: **A purgeable water sample submitted to this laboratory on June 27, 1989**

User:
OIL CONSERVATION DIV
State Land Office Bldg.
P. O. Box 2088
Santa Fe, NM 87504-2088

DEMOGRAPHIC DATA

COLLECTION
On: 23-Jun-89 *By:* Boy . . .
At: 11:10 hrs. *In/Near:* Carlsbad

LOCATION

ANALYTICAL RESULTS: Aromatic & Halogenated Purgeable Screen

Parameter	Value	Note	MDL	Units
Halogenated Purgeables (33)	0.00	N	5.00	ppb
Benzene	3700.00		100.00	ppb
Toluene	6600.00		100.00	ppb
Ethylbenzene	200.00		100.00	ppb
p- & m-Xylene	2000.00		100.00	ppb
1,2-Dimethylbenzene	2200.00		100.00	ppb

See Laboratory Remarks for Additional Information

Notations & Comments:
MDL = Minimal Detectable Level.
A = Approximate Value; N = None Detected above Detection Limit; P = Compound Present, but not quantified;
T = Trace (<Detection Limit); U = Compound Identity Not Confirmed.
Evidentiary Seals: Not Sealed☒; Intact: No☐, Yes☐ & Broken By: _____ Date: _____

Laboratory Remarks: Marathon Indian Basin- Fnl Eff
10-12 unidentified unsaturated compounds at trace to 200ppb were detected.

Analyst: Michael J. Owen, *Analyst, Organic Chemistry* — 7-12-89 Analysis Date

Reviewed By: Richard F. Meyerhein, *Supervisor, Organic Chemistry Section* — 07/25/89

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JUL 31 1989
OIL CONSERVATION DIV.
SANTA FE

154 WPU

SCIENTIFIC LABORATORY DIVISION
ORGANIC ANALYSIS REQUEST FORM
Organic Section - Phone: 841-2570

OR89-0910-C

REPORT TO: DAVID BOYER
N.M. OIL CONSERVATION DIVISION
P.O. Box 2088
Santa Fe, NM 87504-2088

S.L.D. No. OR-
DATE REC. 6-27-89
PRIORITY 3
PHONE(S): 827-5812

COLLECTION CITY: Carlsbad ; COUNTY: Eddy

COLLECTION DATE/TIME CODE: (Year-Month-Day-Hour-Minute) 8 9 1 0 6 2 3 1 1 5 1 5

LOCATION CODE: (Township-Range-Section-Tracts) 2 1 S + 2 3 E + 2 3 + 1 1 - 1 - (10N06E24342)

USER CODE: 8 2 2 3 5 SUBMITTER: David Boyer CODE: 2 6 1 0

SAMPLE TYPE: WATER [X], SOIL [ ], FOOD [ ], OTHER:

This form accompanies 2 Septum Vials, ____ Glass Jugs, and/or ____

Samples were preserved as follows:

- [ ] NP: No Preservation; Sample stored at room temperature.
- [X] P-Ice Sample stored in an ice bath (Not Frozen).
- [ ] P-AA Sample Preserved with Ascorbic Acid to remove chlorine residual.
- [X] P-HCl Sample Preserved with Hydrochloric Acid (2 drops/40 ml)

ANALYSES REQUESTED: Please check the appropriate box(es) below to indicate the type of analytical screens required. Whenever possible list specific compounds suspected or required.

PURGEABLE SCREENS

- [ ] (753) Aliphatic Headspace (1-5 Carbons)
- [X] (754) Aromatic & Halogenated Purgeables
- [ ] (765) Mass Spectrometer Purgeables
- [ ] (766) Trihalomethanes
- [ ] (774) SDWA VOC's I (8 Regulated +)
- [ ] (775) SDWA VOC's II (EDB & DBCP)

Other Specific Compounds or Classes

- [ ] _____
- [ ] _____

EXTRACTABLE SCREENS

- [ ] (751) Aliphatic Hydrocarbons
- [ ] (755) Base/Neutral Extractables
- [ ] (758) Herbicides, Chlorophenoxy acid
- [ ] (759) Herbicides, Triasines
- [ ] (760) Organochlorine Pesticides
- [ ] (761) Organophosphate Pesticides
- [ ] (767) Polychlorinated Biphenyls (PCB's)
- [ ] (764) Polynuclear Aromatic Hydrocarbons
- [ ] (762) SDWA Pesticides & Herbicides

Remarks: _____

FIELD DATA:

pH= 6.5 ; Conductivity= 3000 umho/cm at 18 °C; Chlorine Residual= _____ mg/l

Dissolved Oxygen= _____ mg/l; Alkalinity= _____ mg/l; Flow Rate _____ ____/____

Depth to water _____ ft.; Depth of well _____ ft.; Perforation Interval ____ - ____ ft.; Casing: _____

Sampling Location, Methods and Remarks (i.e. odors, etc.)
Warathon Indian Basin Gas Plant - Cooling Tower Water
from circulation line near amine pumps

I certify that the results in this block accurately reflect the results of my field analyses, observations and activities.(signature collector): [signature] Method of Shipment to the Lab: Hole Car

CHAIN OF CUSTODY

I certify that this sample was transferred from _____ to _____

at (location) _____ on ____/____/____ - ____:____ and that

the statements in this block are correct. Evidentiary Seals: Not Sealed [ ] OR Seals Intact: Yes [ ] No [ ]

Signatures _____ _____

For OCD use: Date owner notified: 6/3/89 Phone or (Letter?) Initials RH

STATE OF NEW MEXICO HEALTH AND ENVIRONMENT DEPARTMENT
SCIENTIFIC LABORATORY DIVISION
700 Camino de Salud, NE
Albuquerque, NM 87106 [505]-841-2500
ORGANIC CHEMISTRY SECTION [505]-841-2570

July 25, 1989

ANALYTICAL REPORT
SLD Accession No. OR-89-0910

Distribution
(■) Submitter
(※) SLD Files

To: NM Oil Consv. Div.
State Land Office Bldg.
P. O. Box 2088
Santa Fe, NM 87504-2088

From: Organic Chemistry Section
Scientific Laboratory Div.
700 Camino de Salud, NE
Albuquerque, NM 87106

Re: **A purgeable water sample submitted to this laboratory on June 27, 1989**

User:
OIL CONSERVATION DIV
State Land Office Bldg.
P. O. Box 2088
Santa Fe, NM 87504-2088

DEMOGRAPHIC DATA

COLLECTION *LOCATION*

On: 23-Jun-89 *By:* Boy . . .
At: 10:55 hrs. *In/Near:* Carlsbad

ANALYTICAL RESULTS: Aromatic & Halogenated Purgeable Screen

Parameter	Value	Note	MDL	Units
Chloroform	8.00		0.50	ppb
Bromodichloromethane	3.00		0.50	ppb
Dibromochloromethane	4.00		0.50	ppb
Bromoform	2.00		0.50	ppb
Aromatic Purgeables (6)	0.00	N	0.50	ppb

See Laboratory Remarks for Additional Information

Notations & Comments:

MDL = Minimal Detectable Level.

A = Approximate Value; N = None Detected above Detection Limit; P = Compound Present, but not quantified; T = Trace (<Detection Limit); U = Compound Identity Not Confirmed.

Evidentiary Seals: Not Sealed [X]; Intact: No [ ], Yes [ ] & Broken By: _____ Date: _____

Laboratory Remarks: Marathon Indian Basin- Twr Wtr
Three unidentified unsaturated compounds at trace to 5ppb were detected.

Analyst: _____ 7-12-89
Michael J. Owen — Analysis Date
Analyst, Organic Chemistry

Reviewed By: _____ 07/25/89
Richard F. Meyerhein
Supervisor, Organic Chemistry Section

RECEIVED
JUL 31 1989
OIL CONSERVATION DIV.
SANTA FE

ARCADIS GERAGHTY & MILLER

RECEIVED

APR 0 5 1999

ENVIRONMENTAL BUREAU
OIL CONSERVATION DIVISION

Annual Groundwater Monitoring Report, January - December 1998

Indian Basin Remediation Project
Eddy County, New Mexico

PREPARED FOR

Marathon Oil Company

ARCADIS GERAGHTY&MILLER

Annual Groundwater Monitoring Report, January - December 1998

Indian Basin Remediation Project
Eddy County, New Mexico

John F. Horst
Staff Engineer

Michael A. Hansen
Senior Engineer

Michael M. Gates
Principal Hydrogeologist/Associate

Prepared for:
Marathon Oil Company

Prepared by:
ARCADIS Geraghty & Miller, Inc.
3000 Cabot Boulevard West
Suite 3004
Langhorne
Pennsylvania 19047
Tel 215 752 6840
Fax 215 752 6879

Our Ref.:
NP000443.0001

Date:
April 1, 1999

This document is intended only for the use of the individual or entity for which it was prepared and may contain information that is privileged, confidential, and exempt from disclosure under applicable law. Any dissemination, distribution, or copying of this document is strictly prohibited.

Tables

Figures

Figures *(continued)*

Figures *(continued)*

Appendices

Executive Summary

The Indian Basin Gas Plant (site) is located approximately 20 miles northwest of Carlsbad, in Eddy County, New Mexico. Cleanup efforts at the site, collectively known as the Indian Basin Remedation Project (IBRP), were initiated in April 1991 to recover free phase petroleum hydrocarbons related to the release of a liquid by-product of natural gas production known as "condensate". The subsurface at the site includes two distinct geologic zones known as the "Shallow Zone" and the "Lower Queen", both with saturated and unsaturated strata. There are a total of 128 wells present at the site related to the IBRP. These wells are used for a combination of groundwater monitoring, groundwater and condensate recovery, treated groundwater infiltration, and condensate vapor extraction.

In order to determine and evaluate the groundwater flow conditions and separate-phase condensate occurrences, site-wide well gauging events were performed in January, April, June, and October 1998. The liquid level measurements from each well from each gauging event and the surveyed well elevations were used to calculate groundwater elevations for the wells, with density corrections where condensate was present, and these elevation data were used to generate groundwater flow contour maps. Review of these maps and the elevation data indicate Shallow Zone and Lower Queen groundwater flow were consistent with patterns observed in 1997. Flow in the Shallow Zone is to the southeast at an approximate gradient of 0.015 feet per foot and flow in the Lower Queen is to the north/northeast at an approximate gradient of 0.0002 feet per foot.

Groundwater samples were also collected from selected wells during each of the quarterly gauging events (sampling was performed by Fluor Daniel GTI of Albuquerque, New Mexico) to evaluate groundwater quality at the site. Groundwater samples were primarily analyzed for benzene, toluene, ethylbenzene, and xylenes (BTEX). The analytical results indicate that total BTEX concentrations in both water-bearing units have remained consistent or declined slightly in most wells. Fluctuations in dissolved BTEX concentrations observed in some wells may be attributable to seasonal fluctuations in water levels.

Remediation efforts completed at the site in 1998 included pumping and treatment (including dual pump recovery) of groundwater in the Lower Queen and Vapor Extraction Systems (VES) in both the Shallow Zone and the Lower Queen. The pump and treat remedy was operated to both recover and control possible migration of condensate in both the liquid and dissolved phase. Recovered groundwater was treated

and then infiltrated in upgradient wells. VES was operated to enhance the recovery (in the vapor phase) and biodegradation of condensate.

During 1998, a total of approximately 670 barrels of condensate were recovered at the site, as follows:

- Approximately 511 barrels of condensate were removed in the liquid phase through pump and treat efforts in the Lower Queen;
- The equivalent of approximately 65 barrels of condensate were removed in the vapor phase by VES wells in the Shallow Zone; and,
- The equivalent of approximately 94 barrels of condensate were removed in the vapor phase by VES wells in the Lower Queen.

Cumulatively, from the initiation of remedial efforts in April 1991 through December 1998, a total of approximately 10,650 barrels of condensate have been recovered. This represents roughly 30 percent of the total estimated spill volume (35,000 barrels).

Through the operation of the VES and groundwater recovery systems, Marathon has maintained hydraulic control of the condensate and dissolved hydrocarbons in groundwater at the site. Routine operation and maintenance of the remediation systems, compliance monitoring and reporting, and quarterly groundwater monitoring will continue at the site in 1999.

1. Introduction

ARCADIS Geraghty & Miller, Inc. has prepared this Annual Groundwater Monitoring report on behalf of Marathon Oil Company (Marathon). This report presents the results of the cleanup activities conducted between January and December 1998 at the Indian Basin Gas Plant located in Eddy County, New Mexico. These activities are collectively known as the Indian Basin Remedation Project (IBRP). This report has been prepared in accordance with the Groundwater Remediation Monitoring Modifications approved by the New Mexico Energy, Minerals, and Natural Resources Department, Oil Conservation Division (OCD) in correspondence to Marathon dated March 12, 1997.

The following section presents a brief summary of the project background. The remaining sections discuss the field activities and monitoring results associated with monitoring well gauging, groundwater sampling, and operation and maintenance of the remediation system conducted during 1998.

2. Background

The Indian Basin Gas Plant (site) and IBRP are located approximately 20 miles northwest of Carlsbad, New Mexico, as shown on Figure 1. The site is situated in Township 21 South, in Eddy County, and occupies portions of Range 23 East (sections 13, 23, 24, 25, and 26) and Range 24 East (sections 19 and 30). Remediation efforts at the site have been ongoing since April 1991 and are designed to remove separate phase petroleum hydrocarbons (condensate - the liquid by-product of natural gas production) present in the subsurface related to a release of this condensate.

The geology underlying the site is comprised of two distinct zones, both with saturated and unsaturated strata. The geologic units are known as the Shallow Zone and the Lower Queen. A total of 76 monitoring wells and 1 infiltration well have been installed in the Shallow Zone. A total of 39 monitoring wells, 2 infiltration wells, and 10 vapor extraction wells have been installed in the Lower Queen. A summary of the well completion details is provided in Tables 1A and 1B. The site layout is shown on Figure 2. Additional details regarding local and regional geology and hydrogeology are presented in "Comprehensive Site Characterization Report for the IBRP - IT Corporation, December, 1998)" submitted to the OCD in December, 1998.

3. Groundwater and Condensate Gauging

In order to determine and evaluate the groundwater flow conditions and separate-phase condensate occurrences at the site, as well as changes in these conditions, site-wide

well gauging events were performed in January, April, June, and October 1998. The gauging events consisted of collecting liquid level measurements from both the Shallow Zone and Lower Queen. The results of these gauging events as well as precipitation recharge (rainfall) are discussed in the following sections. A summary of historical liquid level data for the site from May 1991 through October 1998 is presented in Appendix A. Hydrographs that depict groundwater elevation fluctuations over time for individual wells are presented in Appendix B.

3.1 Shallow Zone

A total of 76 wells completed in the Shallow Zone were gauged during one or more quarterly event in 1998. The liquid level measurements from each gauging event and the top of casing elevations for the wells were then used to calculate groundwater elevation at each well (density corrections were made as required where condensate was present).

As data in Appendix A indicate, 46 of the 76 Shallow Zone wells gauged in 1998 did not contain groundwater for one or more of the 1998 gauging events. Total fluctuations in groundwater elevation throughout the Shallow Zone in 1998 ranged from 0.04 feet in Well MW-48, to 53.42 feet in Well MW-90, as depicted by hydrographs presented in Appendix B.

Based on the groundwater elevation measurements from each gauging event, groundwater flow contour maps were generated for each event. These maps are included as Figures 2 through 5. As shown on the figures, the observed groundwater flow direction tends to be to the southeast at an approximate gradient of 0.015 feet per foot. This flow direction and gradient is consistent with patterns observed in previous years.

During 1998, a measurable thickness of condensate was detected in only one well screened in the Shallow Zone (Well MW-69). Condensate levels in Well MW-69 varied from 2.45 feet in January 1998 to 0.79 feet in June 1998. No condensate was observed in MW-69 during either the April or October 1998 gauging events. Figures 10 through 13 reflect the observed condensate distribution for the Shallow Zone during each monitoring event.

3.2 Lower Queen

A total of 53 wells completed in the Lower Queen were gauged during one or more quarterly event in 1998. The liquid level measurements from each gauging event and the top of casing elevations for the wells were then used to calculate groundwater

elevation at each well (density corrections were made as required where condensate was present).

As data in Appendix A indicate, none of the wells completed in the Lower Queen were found to be dry during the 1998 quarterly gauging events. Total fluctuations in groundwater elevation throughout the Lower Queen aquifer in 1998 ranged from 0.27 feet in Well MW-73, to 49.39 feet in Well MW-82, as depicted by hydrographs presented in Appendix B.

Based on the groundwater elevation measurements from each gauging event, groundwater flow contour maps were generated for each event. These maps are included as Figures 6 through 9. As shown on the figures, the observed groundwater flow direction tends to be to the north-northeast in the Lower Queen at an approximate gradient of 0.0002 feet per foot. This flow direction and gradient is consistent with patterns observed in previous years.

During one or more of the gauging events in 1998, condensate was observed in Lower Queen Wells MW-59, MW-65A, MW-67, MW-68, MW-75, MW-81, MW-83, MW-84, MW-85, MW-98, MW-110, and VE-19. Observed condensate thicknesses in these wells ranged from a low of 0.05 feet in Well MW-67 in October 1998, to a high of 9.51 feet in well MW-83 in June 1998. Figures 14 through 17 reflect the observed condensate distribution for the Lower Queen during each monitoring event.

3.3 Precipitation Recharge

The site has historically received the highest amounts of precipitation between June and October. The average annual rainfall measured at the site over the past four years is approximately 11 inches. During 1998, the rain gauge maintained at the site indicated that the highest amount of precipitation was received in October (2.0 inches), with a total of 3.95 inches for the year. This level of rainfall is significantly lower than that observed in the past four years. Table 2 summarizes weekly rainfall received at the site during 1998.

4. Groundwater Sampling and Analysis

Four quarters of groundwater sampling were completed at the site in 1998 by personnel from Fluor Daniel, GTI of Albuquerque, New Mexico. Quarterly sampling events were performed according to the modified Groundwater Monitoring Plan, as approved by the OCD in March 1997. The sampling involved the following:

- In January 1998 groundwater samples were collected from 12 Lower Queen wells. These samples were submitted for BTEX analysis using United States Environmental Protection Agency (USEPA) Method 8021.
- In April 1998 groundwater samples were collected from 17 Shallow Zone and 11 Lower Queen wells. These samples were submitted for BTEX analysis using USEPA Method 8021.
- In June of 1998 groundwater samples were collected from 18 Shallow Zone wells and 41 Lower Queen wells. These samples were submitted for volatile organic compound (VOC) and semi-volatile organic compound (SVOC) analysis by USEPA Methods 8240 and 8310, respectively. Other select samples were analyzed for pesticides, polychlorinated biphenyls (PCBs), metals, radio-isotopes, and other general chemistry parameters.
- In October 1998 groundwater samples were collected from 15 Lower Queen wells. Samples from 10 of the 15 wells were submitted for BTEX analysis using USEPA Method 8021. Other select samples were analyzed for sulfate.

In order to ensure the quality of the analytical data, trip and field blanks were collected for each event and submitted for analysis. Tables 3 through 6 summarize the BTEX analytical results for each of the four sampling events. A summary of historical BTEX analytical data is presented in Appendix C, while BTEX concentration vs. time trend plots for individual wells are included in Appendix D.

Although some groundwater samples collected in 1998 were analyzed for an expanded list of parameters, this report focuses on BTEX compounds. Additional parameters were analyzed as part of site characterization work completed throughout 1998, the results of which were previously submitted to the OCD in December 1998 as part of the "Comprehensive Site Characterization Report for the IBRP - IT Corporation" dated December, 1998. The site investigation report also included the complete laboratory analytical reports for the January, April, and June groundwater sampling events, which have not been resubmitted here. The complete laboratory analytical report for the October groundwater sampling event is presented in Appendix E.

The groundwater monitoring analytical results (BTEX) for both the Shallow Zone and Lower Queen are discussed in the following sections.

4.1 Shallow Zone

During 1998, groundwater samples were collected from a total of 20 wells completed in the Shallow Zone. These samples were collected in April and June 1998, no

Shallow Zone wells were sampled in January or October 1998. The results of the laboratory analysis of these groundwater samples are summarized as follows:

- Benzene concentrations ranged from a low of 1.4 micrograms per liter (µg/L) in MW-78 (April 1998) to a high of 1700 µg/L in MW-46 (June 1998);
- Toluene concentrations ranged from a low of 1.5 µg/L in MW-79 to 41 µg/L in MW-46 (both in April 1998);
- Ethylbenzene concentrations ranged from a low of 2.0 µg/L in MW-78 (April 1998) to 840 µg/L in MW-14 (June 1998); and,
- Total xylene concentrations ranged from a low of 1.1 µg/L in MW-79 to 530 µg/L in MW-69 (both in April 1998).

Figures 10 through 13 illustrate the distribution of dissolved BTEX compounds in the Shallow Zone aquifer during 1998. As indicated by the trend plots in Appendix D, total BTEX concentrations in this water-bearing zone have generally remained stable or declined slightly in most wells. Fluctuations in dissolved BTEX concentrations observed in some wells may be attributable to seasonal fluctuations in water levels.

4.2 Lower Queen

During 1998, groundwater samples were collected from a total of 41 Lower Queen wells. The laboratory analysis of these samples are summarized as follows:

- Benzene concentrations ranged from a low of 1.1 µg/L in MW-73 to 390 µg/L in MW-68 (both in June 1998);
- Toluene concentrations ranged from a low of 1.6 µg/L in MW-66 to 26 µg/L in MW-68 (both in June 1998);
- Ethylbenzene concentrations ranged from a low of 3.5 µg/L in MW-67 to 140 µg/L in MW-68 (both in June 1998); and,
- Total xylene concentrations ranged from a low of 1.5 µg/L in MW-81 (June 1998) to 1010 µg/L in MW-98 (both in June 1998).

Figures 14 through 17 illustrate the distribution of dissolved BTEX compounds in the Lower Queen during 1998. Similar to that observed in the Shallow Zone, trend plots in Appendix D indicate that total BTEX concentrations in the Lower Queen have generally remained stable or declined slightly in most wells – fluctuations in dissolved BTEX concentrations observed in some wells may be attributable to seasonal fluctuations in water levels.

5.0 Remediation System Operation and Maintenance

Remediation efforts completed at the site as part of the IBRP from April 1991 to December 1998 have included emergency excavation work; pumping in Rocky Arroyo sumps, open excavations, and Shallow Zone wells; condensate recovery from Shallow Zone Well MW-069; groundwater recovery (and treatment) including dual pump recovery from the Lower Queen; and vapor extraction in both the Shallow Zone and Lower Queen. The following sections discuss remedial activities conducted at the site during 1998.

5.1 Groundwater Recovery and Infiltration

Groundwater and total fluids (condensate and groundwater) recovery wells operating at the site currently include MW-58, MW-65A, MW-68, MW-72, MW-75, MW-76, MW-81, MW-82, MW-83, MW-84, MW-85, MW-86, MW-94, and MW-110. Recovered groundwater is treated and then infiltrated in upgradient wells in both aquifers (Lower Queen Wells IW-01 and IW-02, and Shallow Zone Well MW-51).

During 1998, there was no active groundwater recovery from the Shallow Zone. Free product skimming was performed in well MW-69 during 1998. The total fluids recovery rate from the Lower Queen ranged from approximately 4 to 196 gallons per minute (gpm). Approximately 1,699,629 barrels of total fluids were recovered and treated, removing approximately 511 barrels of condensate. Subsequently, approximately 1,756,564 barrels of treated water were infiltrated in Lower Queen infiltration wells IW-01 and IW-02 and 9,042 barrels of treated water were infiltrated in Shallow Zone well MW-51, for a total of 1,765,606 barrels infiltrated in 1998. Typically, the amount infiltrated is less than the amount recovered due to the removal of condensate, evaporation, and meter error. The discrepancy in the 1998 data appears to be the result of meter error.

Operation of the recovery and infiltration wells is permitted by the New Mexico State Engineer's Office (NMSEO), which requires monthly reports of groundwater withdrawal and infiltration volumes. A summary of quarterly and cumulative recovery and infiltration data for the site is presented in Table 7.

5.2 Groundwater Treatment

Recovered groundwater at the site is treated by two air-strippers, designated "east" and "west". During 1998, monthly water samples were collected from the influent and effluent of the air strippers by Marathon personnel. The monthly sampling events were performed according to the Groundwater Discharge Plan GW-21. The samples

were submitted for BTEX analysis using USEPA Method 8021. The complete laboratory analytical reports for each sampling event can be found in Appendix E. Table 8 summarizes the analytical data for each sampling event. The BTEX concentrations in the groundwater were reduced below the New Mexico Water Quality Control Commission groundwater quality standards.

5.3 Vapor Extraction

A vapor extraction system (VES) was first started at the site in March 1992, using Shallow Zone Wells MW-19, MW-20, MW-21, MW-35, and MW-56. The Shallow Zone VES operated from 1992 through 1994, removing the equivalent of 135 barrels of condensate in the vapor phase, as calculated from effluent vapor concentrations and vapor extraction flow rates. Vapor extraction in the Shallow Zone recommenced in August 1997, using Wells MW-11, MW-19, MW-26, and MW-41.

VES was initiated in the Lower Queen in January 1997, using Wells VE-1 through VE-5 and MW-61A. The system operated through June 1997, removing the equivalent of approximately 13 barrels of condensate in the vapor phase. Based on the low mass removal rates generated by this system it was decided to discontinue VES operation in this location. Five new vapor extraction wells (VE-16 through VE-20) were installed in 1997, and the system was then switched over to these new wells in June 1997.

VES emissions are regulated by the New Mexico Environment Department Bureau of Air Quality under Permit No. 1859-M-1. The permit requires monthly sampling and quarterly reporting to track mass removal and emissions concentrations. The following sections discuss VES performance in both hydrogeologic zones at the site.

5.3.1 Shallow Zone Vapor Extraction

During 1998, the combined vapor extraction from the Shallow Zone VES wells ranged from the equivalent of 0.1 barrels of condensate in March, to the equivalent of 24.3 barrels of condensate in December. For the year, a total equivalent of approximately 65 barrels of condensate were removed in the vapor phase by the Shallow Zone VES. The system was operational for the entire year.

5.3.2 Lower Queen Vapor Extraction

During 1998, the combined vapor extraction from the Lower Queen VES wells ranged from the equivalent of 0.1 barrels of condensate in February and June, to the equivalent of 18.9 barrels of condensate in July. For the year, a total equivalent of approximately

94 barrels of condensate were removed in the vapor phase by the Lower Queen VES. The system was operational for the entire year.

6. Summary and Conclusions

During 1998, a total of approximately 670 barrels of condensate were recovered at the site, as follows:

- Approximately 511 barrels of condensate were removed in the liquid phase through pump and treat efforts in the Lower Queen;
- The equivalent of approximately 65 barrels of condensate were removed in the vapor phase by VES wells in the Shallow Zone; and,
- The equivalent of approximately 94 barrels of condensate were removed in the vapor phase by VES wells in the Lower Queen.

Cumulatively, from the initiation of remedial efforts in April 1991 through December 1998, a total of approximately 10,650 barrels of condensate have been recovered. This represents roughly 30 percent of the total estimated spill volume (35,000 barrels). Of the 10,650 barrels of condensate recovered to date, approximately 1,734 barrels have been removed in the liquid phase from recovery wells and sumps, and the equivalent of approximately 311 barrels have been removed in the vapor phase by VES operation. A summary of monthly and cumulative condensate removed from May 1991 through December 1998 is presented in Table 9.

Through the operation of VES and groundwater recovery systems, Marathon has provided hydraulic control of the condensate and dissolved hydrocarbon in groundwater at the site (as demonstrated by routine gauging and sampling data). Routine operation and maintenance of the remediation systems, compliance monitoring and reporting, and quarterly groundwater monitoring will continue at the site in 1999.

7. Proposed Groundwater Monitoring Plan Modifications

Site investigation activities and long-term groundwater monitoring conducted at the site since May 1991 have completed characterization of the IBRP. The completed site characterization was documented in a "Comprehensive Site Characterization Report for the IBRP", submitted to the OCD in December 1998. Based on the completed characterization, the December 1998 report proposed modifications to the existing Groundwater Monitoring Plan. The proposed modifications were subsequently

approved by the OCD (with conditions) in correspondence with Marathon dated March 4, 1999.

The following sections present revisions to the Groundwater Monitoring Plan presented in the December 1998 Site Characterization report. The revisions incorporate conditions required by the OCD in their March 4, 1999 correspondence, along with proposed modifications to the sampling schedule and procedure. A summary of the proposed Groundwater Monitoring Plan is presented in Table 10.

7.1 Monitoring Well Gauging

In order to determine and evaluate the groundwater flow conditions and separate-phase condensate occurrences at the site, as well as changes in these conditions, site-wide monitoring well gauging events will be performed on a semi-annual basis (April and October). During each gauging event, liquid level measurements (depth to water and condensate thickness) will be collected from each accessible monitoring well.

In the Shallow Zone, there are a number of monitoring wells that have been consistently dry during previous gauging events. These wells will no longer be included in the groundwater monitoring program at the site. Specifically, Wells MW-1, MW-2, MW-3, MW-5, MW-6, MW-7, MW-8, MW-9, MW-12, MW-23, MW-24, MW-25, MW-27, MW-29, MW-30, MW-32, MW-40, MW-52, MW-53, MW-80, MW-92, MW-93, MW-99, MW-100, MW-101, MW-102, MW-103, and MW-107 will be eliminated.

7.2 Groundwater Monitoring

Proposed groundwater monitoring in the Shallow Zone will involve semi-annual sampling (April and October) of 18 wells: MW-14, MW-39, MW-43, MW-46, MW-49, MW-50, MW-54, MW-55, MW-61, MW-65, MW-69, MW-77, MW-78, MW-79, MW-90, MW-91, MW-105, and MW-106. The selected wells are primarily in downgradient and perimeter positions, with a limited number of wells within the dissolved hydrocarbon plume. Wells within the hydrocarbon plume were selected to provide data on constituent concentration trends and to help guide remedial efforts.

Proposed groundwater monitoring in the Lower Queen will include each well that is not currently utilized for groundwater recovery. A total of 19 wells will be sampled on a semi-annual basis (April and October): MW-60, MW-61A, MW-64, MW-66, MW-67, MW-71, MW-73, MW-74, MW-87, MW-87A, MW-88, MW-89, MW-94, MW-96, MW-97, MW-98, MW-104, MW-108, and MW-111. An additional five wells will be sampled on an annual basis (April): MW-57, MW-59, MW-62, MW-63, and

MW-70. The wells selected for annual monitoring are either upgradient or in positions that provide limited data regarding the dissolved hydrocarbon plume.

7.3 Groundwater Sampling Procedure and Analytical Parameters

Prior to sampling, a site-wide gauging event will be completed (Section 7.1). No groundwater sample will be collected from designated wells that are found to contain measurable amounts of separate-phase condensate.

At each designated well, the volume of the water column within the well will be calculated using the depth to water measurements obtained during the gauging event, the total well depth, and the well diameter. To ensure collection of representative groundwater samples, three volumes will be purged from each well using a submersible pump and dedicated tubing prior to sampling. If a well runs dry during purging, a sample will be collected after it has adequately recharged. Groundwater samples will be collected directly from the submersible pump using the dedicated tubing.

Groundwater samples collected during each semi-annual event (April and October) will be submitted for BTEX analysis. On an annual basis (April), groundwater samples will also be analyzed for total dissolved solids (TDS) and chloride. Every other year, a sufficient volume of additional groundwater sample will collected for possible semi-volatile organic compound (SVOC) analysis. This additional sample volume will be submitted along with the BTEX portion of the designated sample and kept on hold at the laboratory. If the individual sample is found to contain BTEX compounds in excess of the clean-up goals for the site, the SVOC analysis will then be performed for that sample. This rationale has been selected given the much lower mobility of the SVOCs as compared to the BTEX compounds in groundwater. Marathon does not propose to perform any groundwater analyses for New Mexico Water Quality Control Commission (WQCC) metals (total and dissolved). Historical groundwater monitoring data indicates the only metals consistently detected in groundwater above the groundwater criteria are iron and manganese, and these exceedences are normally within the hydrocarbon plume area, suggesting the metal levels are the result of the biologically reducing conditions and not directly related to the released material.

For quality assurance/quality control (QA/QC) purposes, two rinsate samples (field blanks), and two replicate samples will be submitted during each sampling event. One trip blank will also be submitted for each cooler utilized to transport samples to the laboratory.

Table 1A. Shallow Zone Monitoring Well Construction Details,
Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico.

Well ID	Well Type	Measuring Point Elevation (feet amsl)	Total Depth (feet btoc)	Top of Screen Interval (feet btoc)	Casing Diameter (inches)
MW-1	monitoring	3792.50	16.1	10.06	2
MW-2	monitoring	3788.72	15.52	5.61	2
MW-3	monitoring	3787.50	16.9	6.87	2
MW-4	monitoring	3785.88	18.68	8.65	2
MW-5	monitoring	3801.69	12.77	7.86	2
MW-6	monitoring	3785.17	13.66	8.69	2
MW-7	monitoring	3784.46	17.01	7.23	2
MW-8	monitoring	3795.04	16.97	7.19	2
MW-9	monitoring	3807.85	13.65	8.74	2
MW-10	monitoring	3790.78	19.08	8.97	4
MW-11	monitoring	3806.96	24.85	14.68	4
MW-12	monitoring	3809.86	25.21	15.13	2
MW-13	monitoring	3801.58	22.07	11.64	2
MW-14	monitoring	3803.61	24.30	14.18	4
MW-15	monitoring	3803.59	19.47	9.39	2
MW-16	monitoring	3801.04	22.66	12.71	4
MW-17	monitoring	3799.55	19.75	9.71	2
MW-18	monitoring	3795.82	17.42	7.21	4
MW-19	monitoring	3797.21	19.11	8.96	4
MW-20	monitoring	3797.59	16.89	6.89	2
MW-21	monitoring	3798.21	23.31	12.74	2
MW-22	monitoring	3799.20	17.30	7.29	2
MW-23	monitoring	3794.48	12.08	7.04	2
MW-24	monitoring	3794.09	14.09	9.05	2
MW-25	monitoring	3786.97	10.27	4.94	2
MW-26	monitoring	3793.01	21.11	11.11	2
MW-27	monitoring	3790.93	18.23	13.16	2
MW-28	monitoring	3797.03	18.59	8.74	2
MW-29	monitoring	3794.06	14.76	9.68	2
MW-30	monitoring	3788.30	14.82	7.80	2
MW-31	monitoring	3791.15	19.93	7.95	4
MW-32	monitoring	3797.47	16.77	11.87	2
MW-33	monitoring	3802.48	20.29	10.14	4
MW-34	monitoring	3806.00	19.97	10.12	2
MW-35	monitoring	3800.81	20.71	15.78	4
MW-36	monitoring	3792.94	8.77	6.96	2
MW-37	monitoring	3795.03	20.83	10.24	4
MW-38	monitoring	3797.32	20.57	10.40	4
MW-39	monitoring	3796.20	20.54	10.17	4
MW-40	monitoring	3803.12	12.15	7.02	2
MW-41	monitoring	3799.04	24.04	13.87	4
MW-42	monitoring	3804.73	22.00	11.53	2
MW-43	monitoring	3802.05	24.55	14.40	4
MW-44	monitoring	3804.14	25.24	15.09	4

Notes:
feet amsl Feet above mean sea level
feet btoc Feet below top of casing
-- Data not available

Table 1A. Shallow Zone Monitoring Well Construction Details,
Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico.

Well ID	Well Type	Measuring Point Elevation (feet amsl)	Total Depth (feet btoc)	Top of Screen Interval (feet btoc)	Casing Diameter (inches)
MW-45	monitoring	3808.68	26.62	11.58	2
MW-46	monitoring	3805.54	20.24	9.69	4
MW-47	monitoring	3805.09	21.79	11.75	2
MW-48	monitoring	3806.18	19.98	9.94	2
MW-49	monitoring	3805.61	25.91	15.82	2
MW-50	monitoring	3813.35	37.15	22.11	2
MW-51	infiltration	3810.86	20.06	10.02	2
MW-52	monitoring	3817.49	21.44	11.40	2
MW-53	monitoring	3809.92	15.32	8.59	2
MW-54	monitoring	3823.86	78.15	42.92	4
MW-55	monitoring	3794.40	66.32	21.43	4
MW-56	monitoring	3782.45	43.76	28.79	4
MW-61	monitoring	3816.20	57.97	47.83	4
MW-65	monitoring	3763.31	57.69	37.58	4
MW-69	recovery	3805.11	51.27	16.56	4
MW-77	monitoring	3775.48	82.20	--	8
MW-78	monitoring	3785.82	86.62	--	8
MW-79	monitoring	3788.39	82.90	--	8
MW-80	monitoring	3821.64	91.80	--	8
MW-90	monitoring	3781.73	62.50	12.50	4
MW-91	monitoring	3783.07	72.50	12.50	4
MW-92	monitoring	3785.29	72.50	12.50	4
MW-93	monitoring	3817.50	72.50	12.50	4
MW-99	monitoring	3770.05	72.50	12.50	4
MW-100	monitoring	3773.31	72.50	12.50	4
MW-101	monitoring	3762.71	72.50	12.50	4
MW-102	monitoring	3753.69	82.50	12.50	4
MW-103	monitoring	3743.14	72.50	12.50	4
MW-105	monitoring	3736.93	82.50	12.50	4
MW-106	monitoring	3721.97	94.50	12.50	4
MW-107	monitoring	3726.27	72.50	12.50	4
MW-109	monitoring	3809.53	21.00	--	2
Sump A10	monitoring	3800.99	13.42	--	24
Sump 16A	monitoring	3785.14	17.45	--	24

Notes:
feet amsl Feet above mean sea level
feet btoc Feet below top of casing
-- Data not available

Table 1B. Lower Queen Monitoring Well Construction Details,
Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico.

Well ID	Well Type	Measuring Point Elevation (feet amsl)	Total Depth (feet btoc)	Cased Interval (feet btoc)	Casing Diameter (inches)
MW-57	monitoring	3787.70	179.30	157.1	4
MW-58	recovery	3824.07	234.10	--	8
MW-59	monitoring	3819.59	211.29	182.52	4
MW-60	monitoring	3815.28	226.08	172.86	4
MW-61A	monitoring	3819.97	214.00	173.5	4
MW-62	monitoring	3819.90	224.69	177.00	4
MW-63	monitoring	3826.16	221.68	175.39	4
MW-64	monitoring	3798.57	204.36	156.68	4
MW-65A	recovery	3763.26	168.56	115.34	4
MW-66	monitoring	3828.98	237.86	184.81	4
MW-67	monitoring	3765.87	168.54	114.78	4
MW-68	recovery	3797.83	200.00	148.38	4
MW-70	monitoring	3822.57	228.14	175.32	4
MW-71	monitoring	3778.05	235.41	167.07	4
MW-72	dual recovery	3819.32	236.55	177.32	8
MW-73	monitoring	3820.09	222.50	--	8
MW-74	monitoring	3820.82	222.50	--	8
MW-75	dual recovery	3816.12	222.50	--	8
MW-76	recovery	3796.01	222.50	--	8
MW-81	dual recovery	3817.03	228.50	--	8
MW-82	recovery	3825.07	252.50	--	8
MW-83	recovery	3794.12	205.80	--	8
MW-84	recovery	--	172.50	--	8
MW-85	dual recovery	--	237.50	--	8
MW-86	recovery	3823.99	227.50	--	8
MW-87	monitoring	3740.50	173.10	148.10	4
MW-87A	monitoring	3739.53	132.00	--	8
MW-88	monitoring	3789.7	177.65	142.00	8
MW-89	monitoring	3827.68	232.53	189.75	4
MW-94	recovery	--	230.10	--	8
MW-95	monitoring	3746.26	147.50	111.00	4
MW-96	monitoring	3739.80	137.50	97.50	4
MW-97	monitoring	3750.16	150.50	107.50	4
MW-98	monitoring	3770.15	142.50	128.00	4
MW-104	monitoring	3793.64	222.50	--	8
MW-108	monitoring	3747.13	172.50	--	8
MW-110	recovery	3812.61	230.00	--	8
MW-111	monitoring	3824.44	230.00	--	4
IW-1	infiltration	3808.55	232.50	--	11
IW-2	infiltration	3835.86	302.50	--	11
SW-1	monitoring	3808.19	255.00	--	10
SW-2	monitoring	3808.79	292.00	163.0	10
SW-3	monitoring	3842.29	232.70	--	8
VE-1	vapor extraction	--	214.00	--	8
VE-2	vapor extraction	--	210.00	--	8
VE-3	vapor extraction	--	184.00	--	8
VE-4	vapor extraction	--	183.00	--	8
VE-5	vapor extraction	--	168.00	--	8
VE-16	vapor extraction	3750.96	152.50	--	8
VE-17	vapor extraction	3756.73	132.50	--	8
VE-18	vapor extraction	3756.82	165.50	--	8
VE-19	vapor extraction	3761.18	152.50	--	8
VE-20	vapor extraction	3768.41	162.50	--	8

Notes:

feet amsl	Feet above mean sea level
feet btoc	Feet below top of casing
--	Data not available

Table 2. Summary of Historical Rainfall with Weekly Rainfall During 1998, Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico.

Historical Totals

Year	Rainfall (inches)
1994	9.31
1995	7.84
1996	16.60
1997	10.65
1998	3.95

Monthly/1998

Month	Rainfall (inches)
January	0.00
February	0.00
March	0.10
April	0.00
May	0.00
June	0.20
July	0.60
August	0.90
September	0.15
October	2.00
November	0.00
December	0.00

Source: Rain gauge at Indian River Gas Plant

Table 3. Summary of BTEX Analytical Results, January 1998 Groundwater Sampling Event, Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico.

Lower Queen

Well ID	MW-58	MW-60	MW-61A	MW-66	MW-71	MW-87	MW-87A	MW-88	MW-89
Sample Date	1/30/98	1/30/98	1/29/98	1/29/98	1/29/98	1/29/98	1/29/98	1/29/98	1/29/98
Parameter									
Benzene	350	<0.5	15	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	23	<0.5	16	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	42	<0.5	26	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Total Xylenes	96	<0.5	130	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5

Well ID	MW-95	MW-96	MW-97
Sample Date	1/30/98	1/30/98	1/30/98
Parameter			
Benzene	<0.5	<0.5	<0.5
Toluene	<0.5	<0.5	<0.5
Ethylbenzene	<0.5	<0.5	<0.5
Total Xylenes	<0.5	<0.5	<0.5

Notes:

Concentrations listed in micrograms per liter (µg/L)

Results listed for BTEX only, results for other parameters (if any) are included in Appendix D

Table includes monitoring wells and supply wells, results for other sampling points (sumps) are included in Appendix D

<0.05 Constituent not detected above noted laboratory detection limit

Table 4. Summary of BTEX Analytical Results, April 1998 Groundwater Sampling Event, Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico.

Shallow Zone

Well ID	MW-39	MW-41	MW-43	MW-44	MW-46	MW-49	MW-50	MW-54	MW-55
Sample Date	4/30/98	4/30/98	4/30/98	4/30/98	4/30/98	4/30/98	4/30/98	4/29/98	4/29/98
Parameter									
Benzene	<0.5	<0.5	29	520	1600	130	<0.5	<0.5	110
Toluene	<0.5	7.1	5.8	22	41	39	<0.5	<0.5	12
Ethylbenzene	<0.5	4.5	2.8	17	140	41	<0.5	<0.5	31
Total Xylenes	<0.5	21	26	44	290	69	<0.5	<0.5	7.7

Well ID	MW-61	MW-65	MW-69	MW-78	MW-79	MW-90	MW-91	MW-106
Sample Date	4/29/98	4/30/98	4/30/98	4/30/98	4/29/98	4/29/98	4/30/98	4/30/98
Parameter								
Benzene	<0.5	<0.5	970	1.4	<0.5	<0.5	17	<0.5
Toluene	<0.5	<0.5	22	4.9	1.5	<0.5	32	<0.5
Ethylbenzene	<0.5	<0.5	500	2	<0.5	<0.5	19	<0.5
Total Xylenes	<0.5	<0.5	530	7.7	1.1	<0.5	200	<0.5

Lower Queen

Well ID	MW-57	MW-60	MW-61A	MW-66	MW-71	MW-87	MW-87A	MW-88	MW-89
Sample Date	4/29/98	4/28/98	4/29/98	4/28/98	4/29/98	4/28/98	4/28/98	4/28/98	4/28/98
Parameter									
Benzene	<0.5	<0.5	7.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	<0.5	<0.5	9.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	<0.5	<0.5	24	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Total Xylenes	0.9	<0.5	93	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5

Well ID	MW-96	MW-97
Sample Date	4/28/98	4/28/98
Parameter		
Benzene	<0.5	<0.5
Toluene	<0.5	<0.5
Ethylbenzene	<0.5	<0.5
Total Xylenes	<0.5	<0.5

Notes:

Concentrations listed in micrograms per liter (µg/L)

Results listed for BTEX only, results for other parameters (if any) are included in Appendix D

Table includes monitoring wells and supply wells, results for other sampling points (sumps) are included in Appendix D

<0.05 Constituent not detected above noted laboratory detection limit

Table 5. Summary of BTEX Analytical Results, June 1998 Groundwater Sampling Event, Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico.

Shallow Zone

Well ID	MW-13	MW-14	MW-39	MW-41	MW-43	MW-44	MW-46	MW-49	MW-50
Date Sampled	7/1/98	6/22/98	7/1/98	6/28/98	6/22/98	6/22/98	7/1/98	7/1/98	6/28/98
Parameter									
Benzene	800	820	<1	41	7.3	440	1700	78	<1
Toluene	<10	<10	<1	<1	<1	<5	<5	<1	<1
Ethylbenzene	640	840	<1	<1	<1	9.2	97	15	<1
Total Xylenes	170	<10	<1	<1	<1	<5	120	<1	<1

Well ID	MW-54	MW-55	MW-61	MW-69	MW-78	MW-79	MW-90	MW-105	MW-106
Date Sampled	6/25/98	6/25/98	6/28/98	6/29/98	6/28/98	6/28/98	6/17/98	6/28/98	6/28/98
Parameter									
Benzene	<1	180	<1	1200	<1	<1	<1	<1	<1
Toluene	<1	<1	<1	<10	<1	<1	<1	<1	<1
Ethylbenzene	<1	31	<1	520	<1	<1	<1	<1	<1
Total Xylenes	<1	<1	<1	510	<1	<1	<1	<1	<1

Lower Queen

Well ID	MW-57	MW-58	MW-59	MW-60	MW-61A	MW-62	MW-63	MW-64	MW-65A
Date Sampled	6/24/98	6/22/98	6/24/98	7/1/98	6/28/98	6/26/98	6/25/98	6/23/98	6/25/98
Parameter									
Benzene	<1	22	<5	<1	1.5	<10	<1	<1	<1
Toluene	<1	<1	<5	<1	<1	<10	<1	<1	<1
Ethylbenzene	<1	28	79	<1	7.9	41	<1	<1	16
Total Xylenes	<1	35	42	<1	20	56	<1	<1	415

Well ID	MW-66	MW-67	MW-68	MW-70	MW-71	MW-72	MW-73	MW-74	MW-75
Date Sampled	6/17/98	6/24/98	6/26/98	6/16/98	6/28/98	6/30/98	6/30/98	6/24/98	6/30/98
Parameter									
Benzene	<1	1.3	390	<1	<1	56	1.1	220	200
Toluene	1.6	2.7	26	<1	<1	<10	<1	<10	<10
Ethylbenzene	<1	3.5	140	<1	<1	100	<1	<10	89
Total Xylenes	<1	45.3	990	<1	<1	<10	<1	<10	270

Well ID	MW-76	MW-81	MW-82	MW-83	MW-84	MW-85	MW-86	MW-87	MW-87A
Date Sampled	6/29/98	6/29/98	6/25/98	6/25/98	6/23/98	6/23/98	6/26/98	6/27/98	6/27/98
Parameter									
Benzene	<1	<1	70	<10	93	280	91	<1	<1
Toluene	<1	<1	<5	<10	13	<5	<10	<1	<1
Ethylbenzene	<1	<1	75	16	55	120	28	<1	<1
Total Xylenes	<1	1.5	510	31	458	6.3	360	<1	<1

Notes:

Concentrations listed in micrograms per liter (µg/L)

Results listed for BTEX only, results for other parameters (if any) are included in Appendix D

Table includes monitoring wells and supply wells, results for other sampling points (sumps) are included in Appendix D

<0.05 Constituent not detected above noted laboratory detection limit

Table 5. Summary of BTEX Analytical Results, June 1998 Groundwater Sampling Event, Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico.

Lower Queen (continued)

Well ID	MW-88	MW-89	MW-94	MW-95	MW-96	MW-97	MW-98	MW-104	MW-108
Date Sampled	6/27/98	6/17/98	6/26/98	6/22/98	7/1/98	7/1/98	6/29/98	7/1/98	6/22/98
Parameter									
Benzene	<1	<1	<1	<1	<1	<1	<1	<1	<1
Toluene	<1	<1	<1	<1	<1	<1	7.1	<1	<1
Ethylbenzene	<1	<1	<1	<1	<1	<1	20	<1	<1
Total Xylenes	<1	<1	<1	<1	<1	<1	1010	<1	<1

Well ID	MW-110	MW-111	SW-01	SW-02	SW-03
Date Sampled	6/30/98	6/29/98	6/30/98	6/24/98	6/24/98
Parameter					
Benzene	170	<1	<1	<1	<1
Toluene	<10	<1	<1	<1	<1
Ethylbenzene	150	<1	<1	<1	<1
Total Xylenes	160	<1	<1	<1	<1

Notes:

Concentrations listed in micrograms per liter (µg/L)

Results listed for BTEX only, results for other parameters (if any) are included in Appendix D

Table includes monitoring wells and supply wells, results for other sampling points (sumps) are included in Appendix D

<0.05 Constituent not detected above noted laboratory detection limit

Table 6. Summary of BTEX Analytical Results, October 1998 Groundwater Sampling Event, Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico.

Lower Queen

Well ID	MW-60	MW-61A	MW-63	MW-66	MW-71	MW-87	MW-88	MW-96	MW-97
Date Sampled	10/12/98	10/11/98	10/11/98	10/11/98	10/11/98	10/12/98	10/11/98	10/12/98	10/12/98
Parameter									
Benzene	<0.5	4.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<2.5
Toluene	<0.5	22	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<2.5
Ethylbenzene	<0.5	15	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<2.5
Total Xylenes	<0.5	61	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<2.5

Well ID	MW-111
Date Sampled	10/11/98
Parameter	
Benzene	<0.5
Toluene	<0.5
Ethylbenzene	<0.5
Total Xylenes	<0.5

Notes:

Concentrations listed in micrograms per liter (µg/L)

Results listed for BTEX only, results for other parameters (if any) are included in Appendix D

Table includes monitoring wells and supply wells, results for other sampling points (sumps) are included in Appendix D

<0.05 Constituent not detected above noted laboratory detection limit

Table 7. Summary of 1998 Pumping and Infiltration Data,
Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico.

Month	Shallow Zone Recovery	Shallow Zone Infiltration (MW-51)	Lower Queen Recovery	Lower Queen Infiltration (IW-2 & IW-1)	Total Recovery	Total Infiltration
January	0	798	130,726	125,779		
February	0	1,453	149,997	146,806		
March	0	1,345	164,903	140,515		
April	0	1,284	146,615	143,251		
May	0	1,222	142,705	138,895		
June	0	1,216	143,580	140,217		
July	0	1,195	132,585	150,408		
August	0	511	146,469	160,491		
September	0	17	124,762	158,656		
October	0	0	112,250	142,290		
November	0	0	155,407	154,948		
December	0	0	149,632	154,308		
Totals	0	9,042	1,699,629	1,756,564	1,699,629	1,765,606

Notes:
Amounts listed in barrels, one barrel is the equivalent of 42 gallons

Table 8. Summary of 1998 Air Stripper Analytical Results,
Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico.

Sample Date	East Stripper								West Stripper							
	Benzene		Toluene		Ethylbenzene		Xylenes		Benzene		Toluene		Ethylbenzene		Xylenes	
	influent	effluent	influent	effluent	influent	effluent	influent	effluent	influent	effluent	influent	effluent	influent	effluent	influent	effluent
01/13/98	98	3.4	170	11	220	4.8	1200	31	56	2.5	30	11	93	4.8	380	29
02/25/98	100	9.1	56	44	240	32	1100	180	86	3.2	34	14	220	7.2	990	35
03/24/98	STRIPPER WAS CLEANED								STRIPPER WAS CLEANED							
04/30/98	69	<0.5	69	9.8	23	3.6	530	21	59	<2.5	23	14	66	8.3	470	59
06/02/98	88	1.8	24	6.4	120	3.9	510	21	76	1.2	19	5.7	90	3	430	18
07/01/98	60	0.5	24	2.2	86	1.9	430	15	43	0.6	18	2.5	58	2.2	310	17
07/09/98	STRIPPER WAS CLEANED								STRIPPER WAS CLEANED							
08/04/98	22	1.2	19	5.5	49	3.3	170	21	22	<2.5	17	8	48	5.1	150	26
08/28/98	45	1.6	18	7.7	94	6.3	140	34	47	3.9	19	8.4	91	3.4	140	20
09/24/98	420	2.5	<50	6.6	160	2.7	2300	21	14	<2.5	67	5.9	10	<2.4	7.7	17
10/28/98	STRIPPER WAS CLEANED								STRIPPER WAS CLEANED							
10/29/98	68	0.8	17	4.6	49	3.4	78	16	74	0.6	30	2.5	62	1.3	130	8.7
11/19/98	59	2.1	34	4.9	44	3.9	140	19	48	<0.5	21	4.1	42	2.7	91	16
12/30/98	43	1.4	20	5.5	66	3.4	97	15	47	0.8	21	3.7	70	3.1	92	23

Notes:

Concentrations listed in micrograms per liter (μg/L)

<2.5 Constituent not detected above noted laboratory detection limit

Table 9. Summary of Historical Condensate Recovery Data, April 1991 to October 1998
Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico.

Date	Emergency Reponse Pumping	Vacuum Truck Recovery	Open Pit Volatilization	Open Frac Tank Volatilization	Shallow Zone Sump 16A	Shallow Zone Sump A-11	Shallow Zone MW-69	Shallow Zone MW-86	LQ Pump & Treat Pumping	Vapor Extraction Shallow Zone	Vapor Extraction Lower Queen	Total Condensate Recovery
Apr-91	717.3	33.0	465.0	4,447.0								5,662.3
May-91	2,041.0											2,041.0
Jun-91	714.0											714.0
Jul-91	220.0											220.0
Aug-91	0.0											0.0
Sep-91												0.0
Oct-91												0.0
Nov-91									26.0			26.0
Dec-91									12.5			12.5
Jan-92									13.0			13.0
Feb-92									1.5			1.5
Mar-92									3.1	5.1		8.2
Apr-92									4.8	4.9		9.7
May-92									8.5	5.1		13.6
Jun-92									1.2	4.9		6.1
Jul-92									7.3	5.1		12.4
Aug-92									7.9	5.1		13.0
Sep-92									0.0	0.5		0.5
Oct-92									4.8	5.1		9.9
Nov-92									0.6	4.9		5.5
Dec-92									0.8	5.1		5.9
Jan-93						1.2			0.0	4.2		5.4
Feb-93						2.6			0.3	0.0		2.9
Mar-93						2.8			1.9	0.0		4.7
Apr-93						0.0			0.0	3.7		3.7
May-93					3.4	0.0			1.1	5.1		9.6
Jun-93					0.0	0.0			0.8	4.6		5.4
Jul-93					0.0	0.0			1.6	0.0		1.6
Aug-93					0.0	0.0	1.8		4.7	0.0		6.4
Sep-93					0.0	0.0	4.7		3.7	0.0		8.3
Oct-93					0.0	0.0	6.2		5.5	10.6		22.3
Nov-93					0.0	0.0	8.8		1.6	12.2		22.6
Dec-93					0.0	0.0	15.3		1.8	12.7		29.8
Jan-94					0.0	0.0	5.4		2.5	10.1		18.0
Feb-94					0.0	0.0	6.7		4.2	9.6		20.5
Mar-94					0.0	0.0	17.8		3.2	9.0		30.0
Apr-94					0.0	0.0	10.8		2.3	8.0		21.1
May-94					0.0	0.0	30.1		2.6	0.0		32.7
Jun-94					0.0	0.0	23.8		2.9	0.0		26.7
Jul-94					0.0	0.0	6.9		4.1	0.0		11.0
Aug-94					0.0	0.0	0.0		1.9	0.0		1.9
Sep-94					0.0	0.0	6.1		1.6	0.0		7.7
Oct-94					0.0	0.0	3.1		1.5	0.0		4.6
Nov-94					0.0	0.0	3.1		3.9	0.0		7.0
Dec-94					0.0	0.0	0.7		3.8	0.0		4.5
Jan-95					0.0	0.0	1.1		5.1	0.0		6.2
Feb-95					0.0	0.0	7.6		2.6	0.0		10.2
Mar-95					0.0	0.0	5.0		2.1	0.0		7.1
Apr-95					0.0	0.0	1.5		5.3	0.0		6.8
May-95					0.0	0.0	1.6		2.5	0.0		4.1
Jun-95					0.0	0.0	1.5		2.3	0.0		3.8
Jul-95					0.0	0.0	1.0		4.1	0.0		5.1
Aug-95					0.0	0.0	1.0		9.9	0.0		10.9
Sep-95					0.0	0.0	0.1		3.9	0.0		4.0
Oct-95					0.0	0.0	0.0		6.3	0.0		6.3
Nov-95					0.0	0.0	0.0		5.3	0.0		5.3
Dec-95					0.0	0.0	0.0		8.8	0.0		8.8
Jan-96					0.0	0.0	0.0		7.9	0.0		7.9

Date	Emergency Reponse Pumping	Vacuum Truck Recovery	Open Pit Volatilization	Open Frac Tank Volatilization	Shallow Zone Sump 16A	Shallow Zone Sump A-11	Shallow Zone MW-69	Shallow Zone MW-86	LQ Pump & Treat Pumping	Vapor Extraction Shallow Zone	Vapor Extraction Lower Queen	Total Condensate Recovery
Feb-96					0.0	0.0	0.0		65.9	0.0		65.9
Mar-96					0.0	0.0	1.2		56.0	0.0		57.2
Apr-96					0.0	0.0	7.9		45.5	0.0		53.4
May-96					0.0	0.0	0.1	0.0	64.8	0.0		64.9
Jun-96					0.0	0.0	0.0	139.0	49.0	0.0		188.0
Jul-96					0.0	0.0	0.0	25.0	27.5	0.0		52.5
Aug-96					0.0	0.0	0.0	0.0	22.3	0.0		22.3
Sep-96					0.0	0.0	0.0	0.0	16.4	0.0		16.4
Oct-96					0.0	0.0	0.0	0.0	0.7	0.0		0.7
Nov-96					0.0	0.0	0.0	0.0	2.6	0.0		2.6
Dec-96					0.0	0.0	0.0	0.0	4.0	0.0	0.0	4.0
Jan-97					0.0	0.0	0.0	0.0	1.2	0.0	0.1	1.3
Feb-97					0.0	0.0	0.0	0.0	7.2	0.0	3.9	11.1
Mar-97					0.0	0.0	0.0	0.0	32.2	0.0	2.1	34.3
Apr-97					0.0	0.0	0.0	0.0	9.7	0.0	3.1	12.8
May-97					0.0	0.0	0.0	0.0	37.8	0.0	2.4	40.2
Jun-97					0.0	0.0	0.0	0.0	28.3	0.0	1.2	29.5
Jul-97					0.0	0.0	0.0	0.0	44.0	0.0	0.3	44.3
Aug-97					0.0	0.0	0.0	0.0	26.5	1.7	0.4	28.6
Sep-97					0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.3
Oct-97					0.0	0.0	0.0	0.0	31.8	0.0	0.1	31.9
Nov-97					0.0	0.0	0.0	0.0	20.5	0.0	0.1	20.6
Dec-97					0.0	0.0	0.0	0.0	26.4	0.0	0.1	26.5
Jan-98					0.0	0.0	0.0	0.0	23.5	0.0	0.3	23.8
Feb-98					0.0	0.0	0.0	0.0	83.5	0.0	0.1	83.6
Mar-98					0.0	0.0	0.0	0.0	37.7	0.1	0.4	38.2
Apr-98					0.0	0.0	0.0	0.0	27.5	0.5	1.6	29.6
May-98					0.0	0.0	0.0	0.0	38.4	0.0	1.3	39.7
Jun-98					0.0	0.0	0.0	0.0	43.9	2.8	0.1	46.8
Jul-98					0.0	0.0	0.0	0.0	17.7	8.7	16.6	43.0
Aug-98					0.0	0.0	0.0	0.0	17.7	5.2	14.7	37.6
Sep-98					0.0	0.0	0.0	0.0	72.1	5.5	10.2	87.8
Oct-98					0.0	0.0	0.0	0.0	53.0	7.7	18.9	79.6
Nov-98					0.0	0.0	0.0	0.0	42.0	10.8	12.5	65.3
Dec-98					0.0	0.0	0.0	0.0	54.3	24.3	16.9	95.5
Total	3,692.3	33.0	465.0	4,447.0	3.4	6.6	180.8	164.0	1,347.2	203.0	107.6	10,649.9

Notes:
Amounts listed in barrels, one barrel is the equivalent of 42 gallons

Table 10. Proposed Groundwater Monitoring Plan
Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico.

Shallow Zone

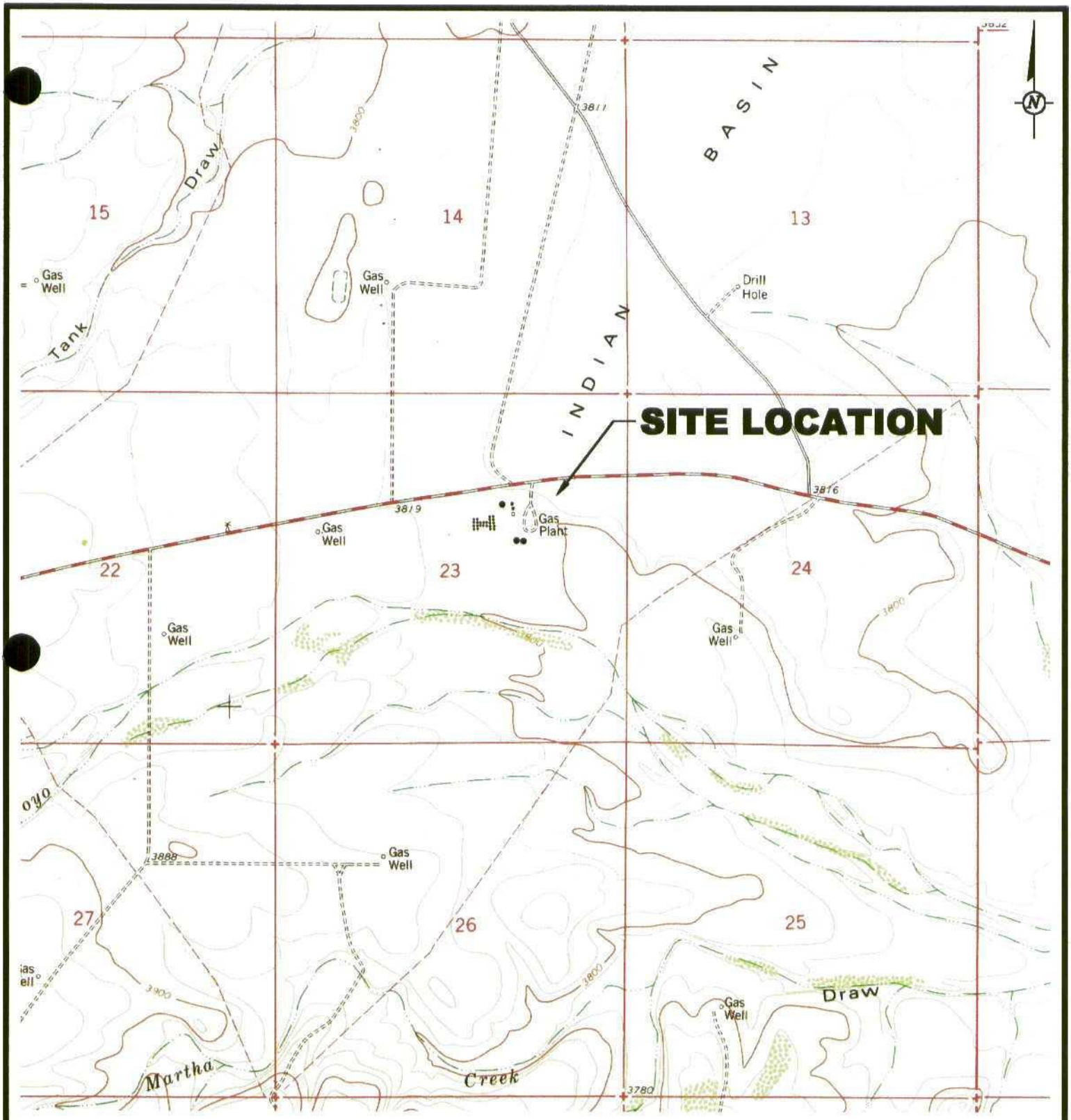
	Sampling Schedule					
	Month	Analytical Paramenters			Month	Analytical Paramenters
Well ID	April	semi-annual	annual	e/o year	October	semi-annual
MW-14	X	BTEX	Chloride, TDS	SVOCs (1)	X	BTEX
MW-39	X	BTEX	Chloride, TDS	SVOCs (1)	X	BTEX
MW-43	X	BTEX	Chloride, TDS	SVOCs (1)	X	BTEX
MW-46	X	BTEX	Chloride, TDS	SVOCs (1)	X	BTEX
MW-49	X	BTEX	Chloride, TDS	SVOCs (1)	X	BTEX
MW-50	X	BTEX	Chloride, TDS	SVOCs (1)	X	BTEX
MW-54	X	BTEX	Chloride, TDS	SVOCs (1)	X	BTEX
MW-55	X	BTEX	Chloride, TDS	SVOCs (1)	X	BTEX
MW-61	X	BTEX	Chloride, TDS	SVOCs (1)	X	BTEX
MW-65	X	BTEX	Chloride, TDS	SVOCs (1)	X	BTEX
MW-69	X	BTEX	Chloride, TDS	SVOCs (1)	X	BTEX
MW-77	X	BTEX	Chloride, TDS	SVOCs (1)	X	BTEX
MW-78	X	BTEX	Chloride, TDS	SVOCs (1)	X	BTEX
MW-79	X	BTEX	Chloride, TDS	SVOCs (1)	X	BTEX
MW-90	X	BTEX	Chloride, TDS	SVOCs (1)	X	BTEX
MW-91	X	BTEX	Chloride, TDS	SVOCs (1)	X	BTEX
MW-105	X	BTEX	Chloride, TDS	SVOCs (1)	X	BTEX
MW-106	X	BTEX	Chloride, TDS	SVOCs (1)	X	BTEX

Lower Queen

	Sampling Schedule					
	Month	Analytical Paramenters			Month	Analytical Paramenters
Well ID	April	semi-annual	annual	e/o year	October	semi-annual
MW-57	X	BTEX	Chloride, TDS	SVOCs (1)		BTEX
MW-59	X	BTEX	Chloride, TDS	SVOCs (1)		BTEX
MW-60	X	BTEX	Chloride, TDS	SVOCs (1)	X	BTEX
MW-61A	X	BTEX	Chloride, TDS	SVOCs (1)	X	BTEX
MW-62	X	BTEX	Chloride, TDS	SVOCs (1)		BTEX
MW-63	X	BTEX	Chloride, TDS	SVOCs (1)		BTEX
MW-64	X	BTEX	Chloride, TDS	SVOCs (1)	X	BTEX
MW-66	X	BTEX	Chloride, TDS	SVOCs (1)	X	BTEX
MW-67	X	BTEX	Chloride, TDS	SVOCs (1)	X	BTEX
MW-70	X	BTEX	Chloride, TDS	SVOCs (1)		BTEX
MW-71	X	BTEX	Chloride, TDS	SVOCs (1)	X	BTEX
MW-73	X	BTEX	Chloride, TDS	SVOCs (1)	X	BTEX
MW-74	X	BTEX	Chloride, TDS	SVOCs (1)	X	BTEX
MW-87	X	BTEX	Chloride, TDS	SVOCs (1)	X	BTEX
MW-87A	X	BTEX	Chloride, TDS	SVOCs (1)	X	BTEX
MW-88	X	BTEX	Chloride, TDS	SVOCs (1)	X	BTEX
MW-89	X	BTEX	Chloride, TDS	SVOCs (1)	X	BTEX
MW-95	X	BTEX	Chloride, TDS	SVOCs (1)	X	BTEX
MW-96	X	BTEX	Chloride, TDS	SVOCs (1)	X	BTEX
MW-97	X	BTEX	Chloride, TDS	SVOCs (1)	X	BTEX
MW-98	X	BTEX	Chloride, TDS	SVOCs (1)	X	BTEX
MW-104	X	BTEX	Chloride, TDS	SVOCs (1)	X	BTEX
MW-108	X	BTEX	Chloride, TDS	SVOCs (1)	X	BTEX
MW-111	X	BTEX	Chloride, TDS	SVOCs (1)	X	BTEX

Notes:

SVOCs	Semi-Volatile Organic Compounds
TDS	Total Dissolved Solids
e/o year	Every other year
(1)	SVOC analysis will only be performed if BTEX is detected in corresponding sample



NEW MEXICO

SOURCE: USGS 7.5 MIN. TOPOGRAPHICAL QUADRANGLE:
MARTHA CREEK, N. MEX., 1978

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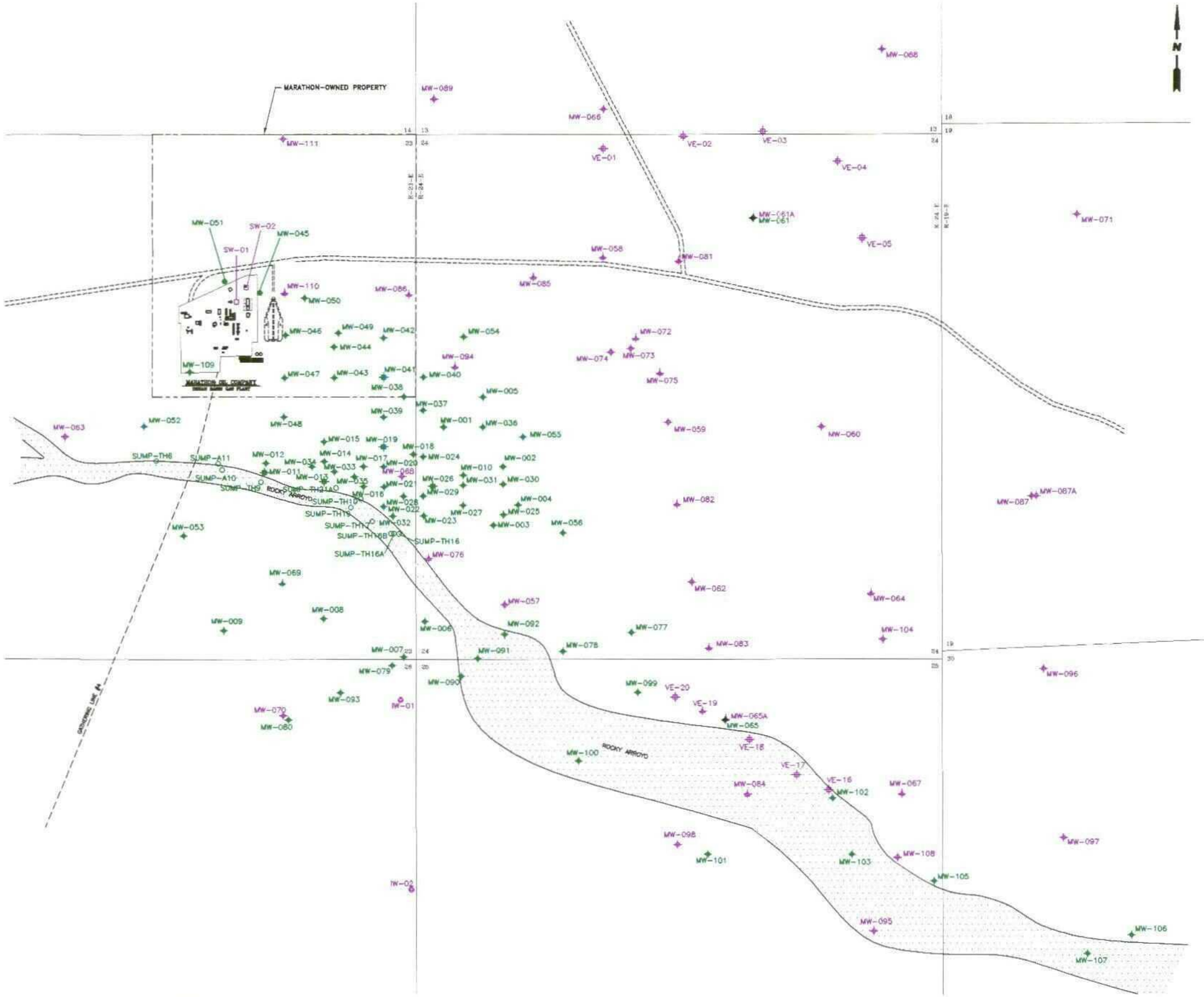
ARCADIS GERAGHTY & MILLER

DRAWN M. WASILEWSKI	DATE 3/25/99	PROJECT MANAGER M. HANSEN	DEPARTMENT MANAGER D. SOUSA
SITE LOCATION		LEAD DESIGN PROF.	CHECKED J. HORST
MARATHON OIL COMPANY INDIAN BASIN REMEDIATION PROJECT EDDY COUNTY, NEW MEXICO		PROJECT NUMBER NP000443.0001	DRAWING NUMBER 1



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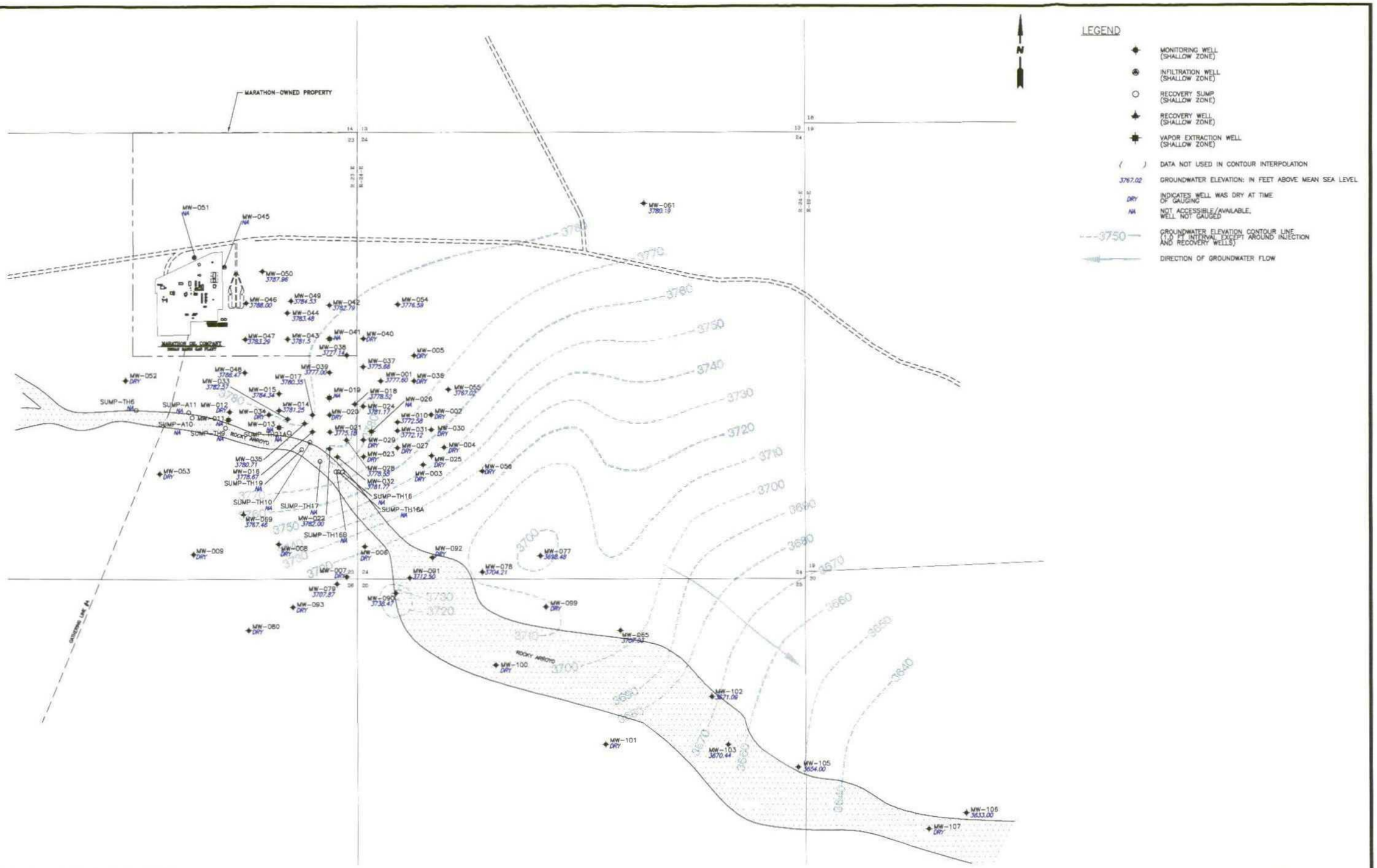
3000 Cabot Blvd West
Suite 3004, Langhorne, Pa 19047
Tel: 215/752-6840 Fax: 215/752-6879

MARATHON OIL COMPANY
INDIAN BASIN REMEDIATION PROJECT
EDDY COUNTY, NEW MEXICO

SITE LAYOUT

DRAWN	DATE	PROJECT MANAGER	DEPARTMENT MANAGER
M. WASILEWSKI	2/19/99	M. HANSEN	D. SOUSA
		LEAD DESIGN PROF.	CHECKED
			M. HANSEN
		PROJECT NUMBER	DRAWING NUMBER
		NP000443.0001	2



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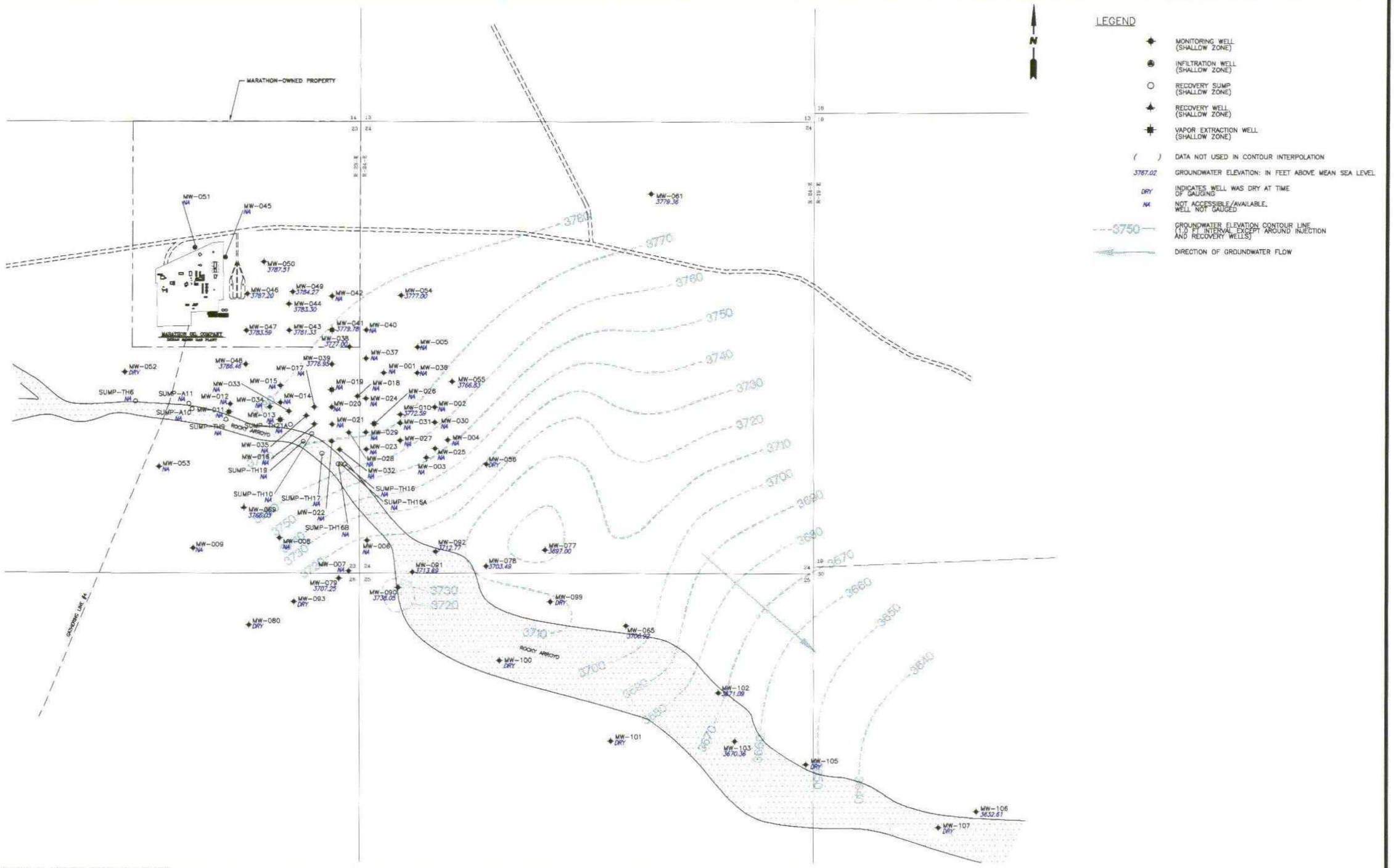
Tel: 215/752-6840 Fax: 215/752-6879

MARATHON OIL COMPANY
INDIAN BASIN REMEDIATION PROJECT
EDDY COUNTY, NEW MEXICO

GROUNDWATER ELEVATION CONTOURS, SHALLOW ZONE AQUIFER JANUARY 1998

DRAWN	DATE	PROJECT MANAGER	DEPARTMENT MANAGER
M. WASILEWSKI	2/3/98	M. HANSEN	D. SOUSA
		LEAD DESIGN PROF.	CHECKED
			M. HANSEN
		PROJECT NUMBER	DRAWING NUMBER
		NP000443.0001	3



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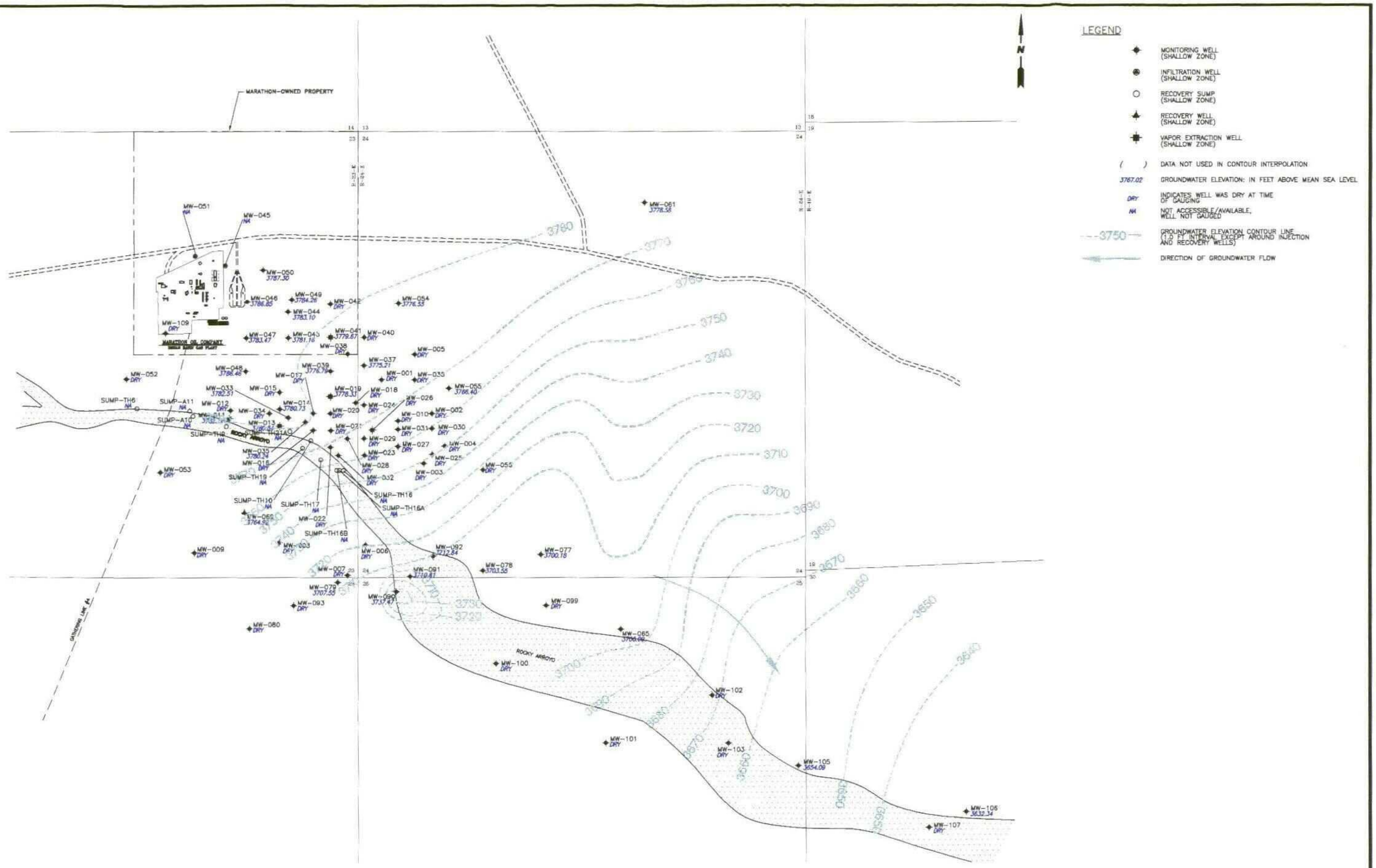
Tel: 215/752-6840 Fax: 215/752-6879

MARATHON OIL COMPANY
INDIAN BASIN REMEDIATION PROJECT
EDDY COUNTY, NEW MEXICO

GROUNDWATER ELEVATION CONTOURS, SHALLOW ZONE AQUIFER
APRIL 1998

DRAWN	DATE	PROJECT MANAGER	DEPARTMENT MANAGER
M. WASILEWSKI	2/3/98	M. HANSEN	D. SOUSA
		LEAD DESIGN PROF.	CHECKED
		PROJECT NUMBER	M. HANSEN
		NP000443.0001	DRAWING NUMBER 4



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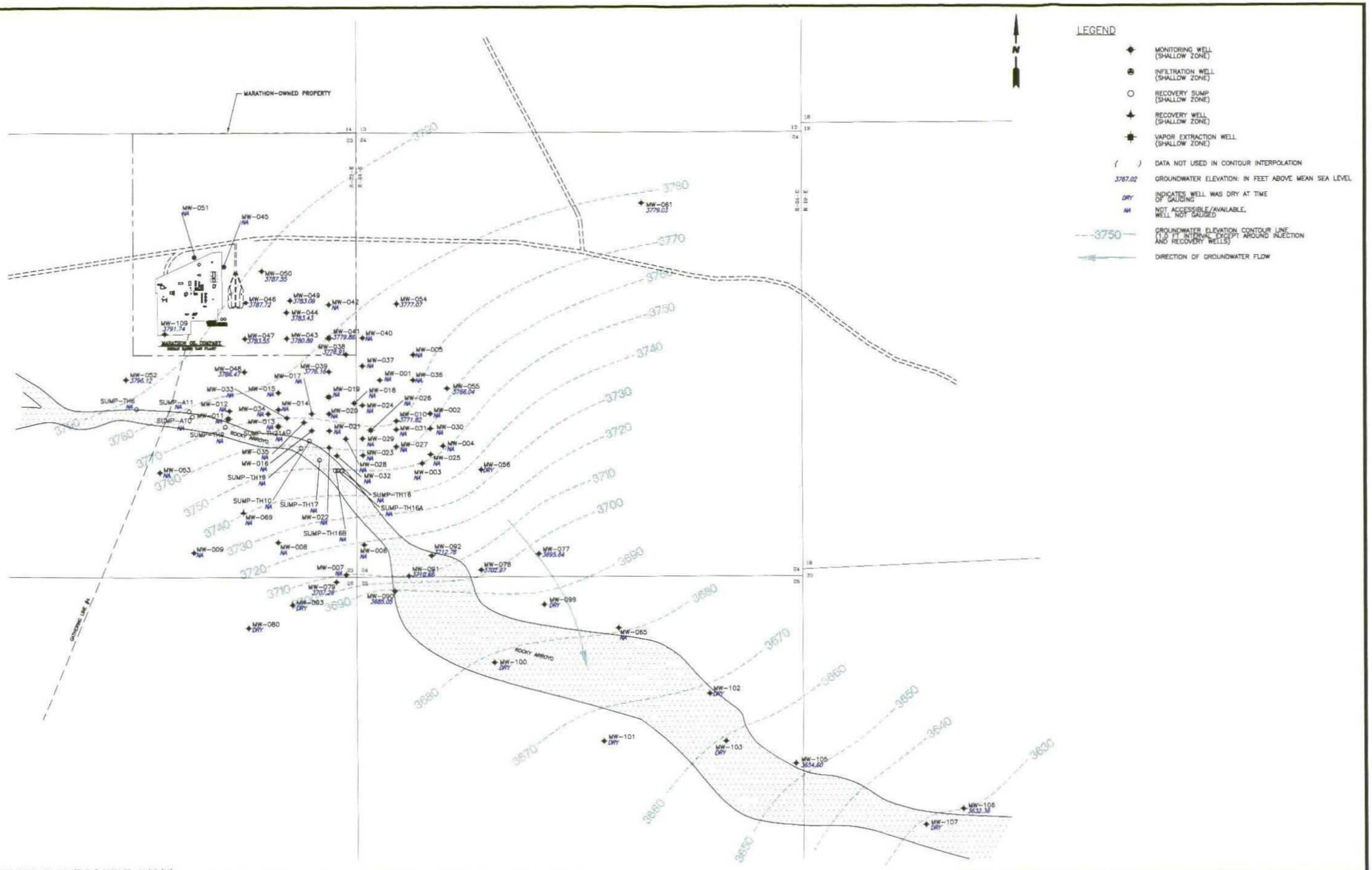
MARATHON OIL COMPANY
INDIAN BASIN REMEDIATION PROJECT
EDDY COUNTY, NEW MEXICO

GROUNDWATER ELEVATION CONTOURS, SHALLOW ZONE AQUIFER
JUNE 1998

DRAWN	DATE	PROJECT MANAGER	DEPARTMENT MANAGER
M. WASILEWSKI	2/3/99	M. HANSEN	D. SOUSA
		LEAD DESIGN PROF.	CHECKED
			M. HANSEN
		PROJECT NUMBER	DRAWING NUMBER
		NP000443.0001	5



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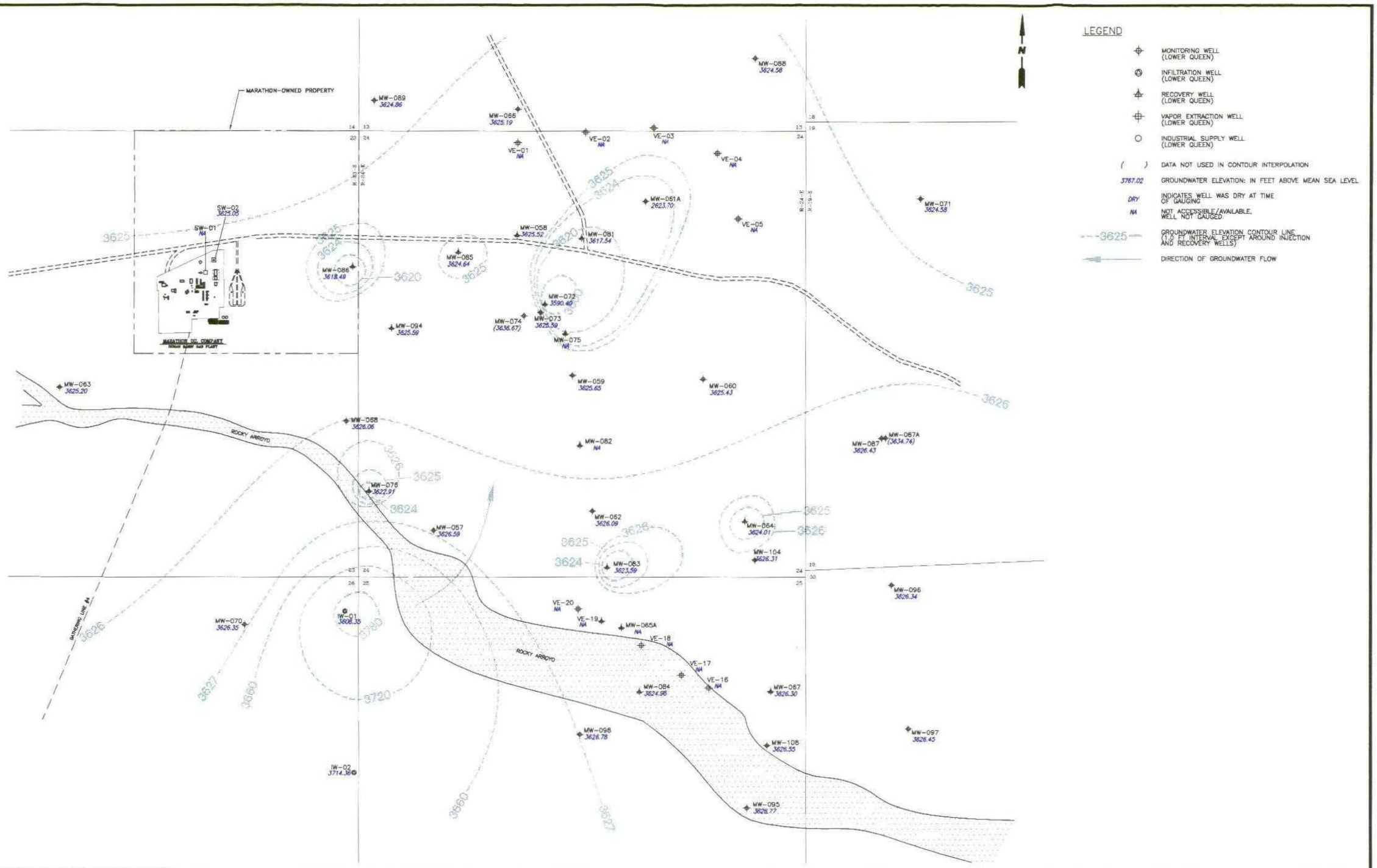
MARATHON OIL COMPANY
INDIAN BASIN REMEDIATION PROJECT
EDDY COUNTY, NEW MEXICO

GROUNDWATER ELEVATION CONTOURS, SHALLOW ZONE AQUIFER
OCTOBER 1998

DRAWN	DATE	PROJECT MANAGER	DEPARTMENT MANAGER
M. WASILEWSKI	2/3/98	M. HANSEN	D. SOUSA
		LEAD DESIGN PROF.	CHECKED
			M. HANSEN
		PROJECT NUMBER	DRAWING NUMBER
		NP000443.0001	6



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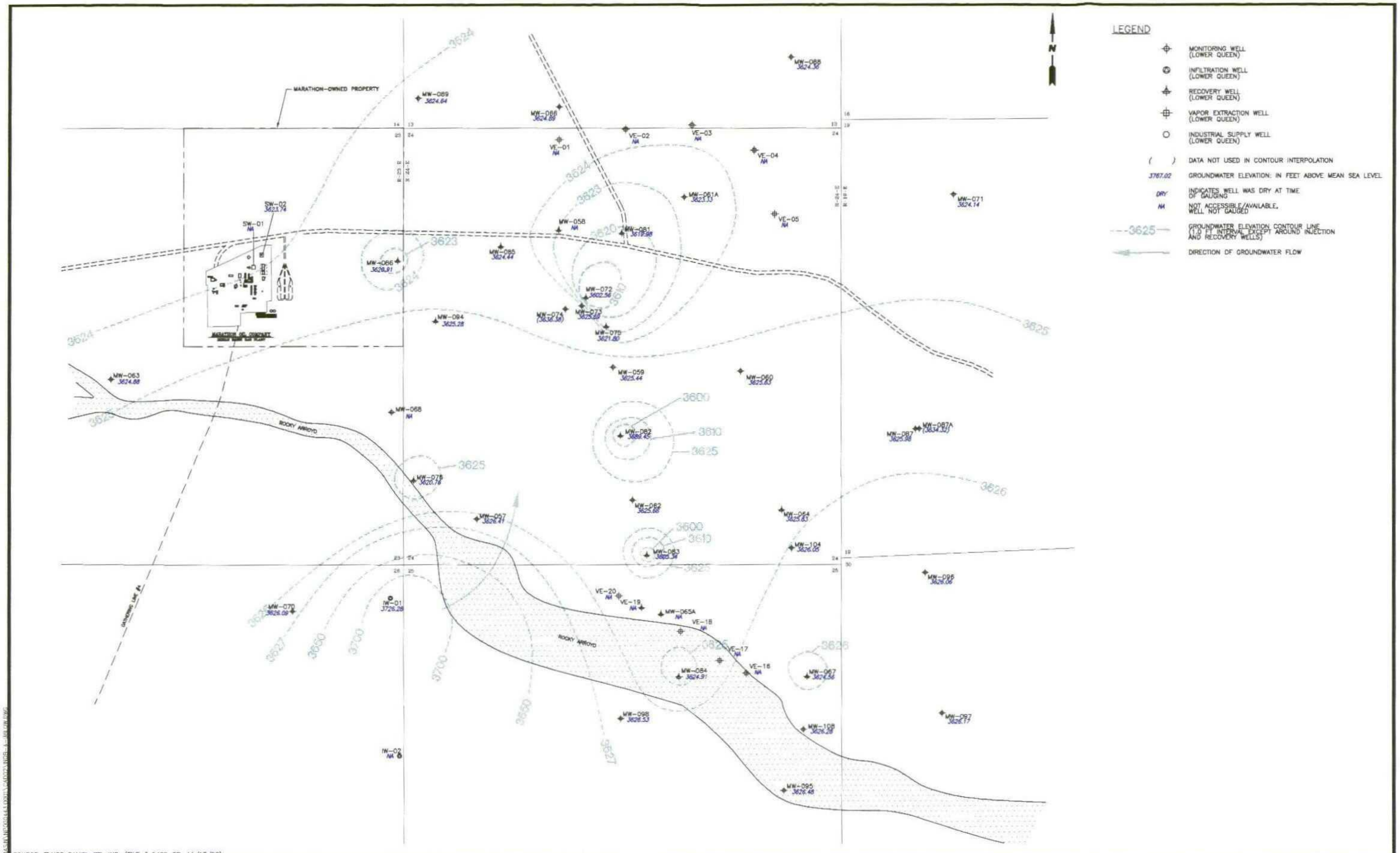
MARATHON OIL COMPANY
INDIAN BASIN REMEDIATION PROJECT
EDDY COUNTY, NEW MEXICO

GROUNDWATER ELEVATION CONTOURS, LOWER QUEEN AUIFER
JANUARY 1998

DRAWN	DATE	PROJECT MANAGER	DEPARTMENT MANAGER
M. WASILEWSKI	2/3/98	M. HANSEN	D. SOUSA
		LEAD DESIGN PROF.	CHECKED
			M. HANSEN
		PROJECT NUMBER	DRAWING NUMBER
		NP000443.0001	7



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MARATHON OIL COMPANY
INDIAN BASIN REMEDIATION PROJECT
EDDY COUNTY, NEW MEXICO

GROUNDWATER ELEVATION CONTOURS, LOWER QUEEN AQUIFER
APRIL 1998

DRAWN	DATE	PROJECT MANAGER	DEPARTMENT MANAGER
M. WASILEWSKI	2/3/99	M. HANSEN	D. SOUSA
		LEAD DESIGN PROF.	CHECKED: M. HANSEN
		PROJECT NUMBER: NP000443.0001	DRAWING NUMBER: 8

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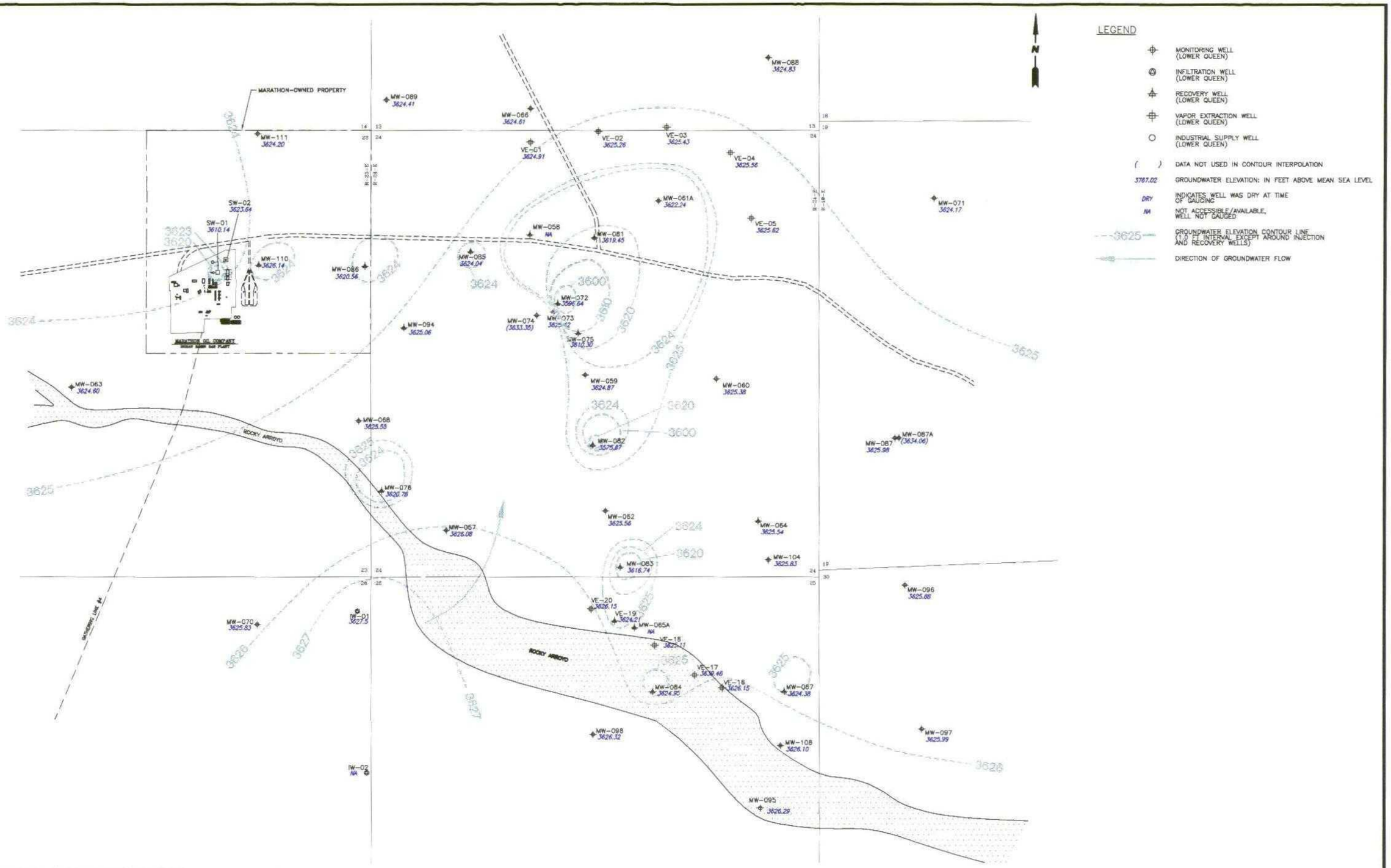

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MARATHON OIL COMPANY
INDIAN BASIN REMEDIATION PROJECT
EDDY COUNTY, NEW MEXICO

GROUNDWATER ELEVATION CONTOURS, LOWER QUEEN AQUIFER, JUNE 1998

DRAWN	DATE	PROJECT MANAGER	DEPARTMENT MANAGER
M. WASILEWSKI	2/3/98	M. HANSEN	D. SOUSA
		LEAD DESIGN PROF.	CHECKED
			M. HANSEN
		PROJECT NUMBER	DRAWING NUMBER
		NP000443.0001	9

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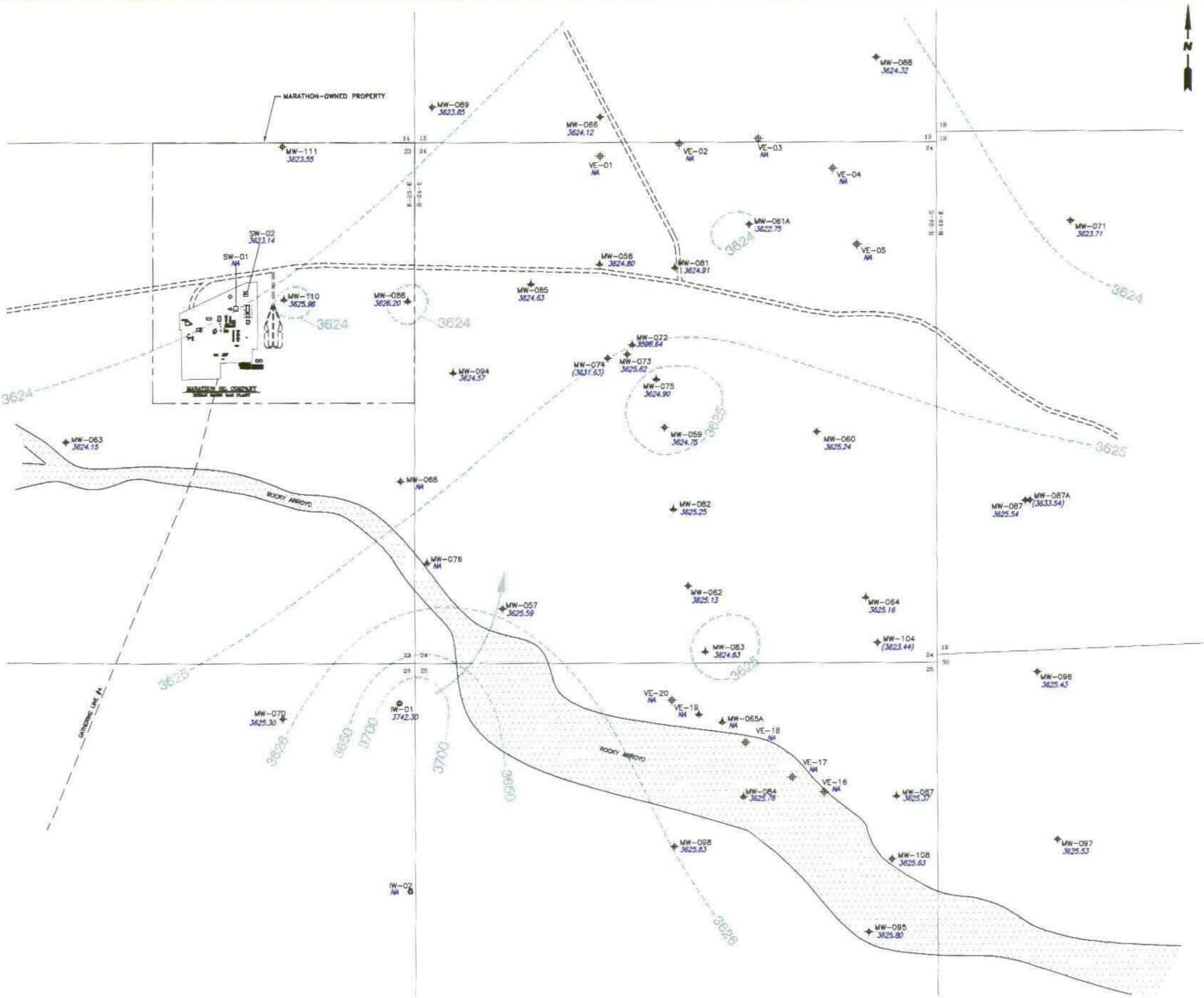

LEGEND

- MONITORING WELL (LOWER QUEEN)
- INFILTRATION WELL (LOWER QUEEN)
- RECOVERY WELL (LOWER QUEEN)
- VAPOR EXTRACTION WELL (LOWER QUEEN)
- INDUSTRIAL SUPPLY WELL (LOWER QUEEN)
- ( ) DATA NOT USED IN CONTOUR INTERPOLATION
- 3767.02 GROUNDWATER ELEVATION: IN FEET ABOVE MEAN SEA LEVEL
- DRY INDICATES WELL WAS DRY AT TIME OF GAUGING
- NA NOT ACCESSIBLE/AVAILABLE, WELL NOT GAUGED
- --3625-- GROUNDWATER ELEVATION CONTOUR LINE (10 FT. INTERVAL EXCEPT AROUND INJECTION AND RECOVERY WELLS)
- DIRECTION OF GROUNDWATER FLOW

NOTE:
RECOVERY WELLS WERE NOT PUMPING AT TIME OF GAUGING.

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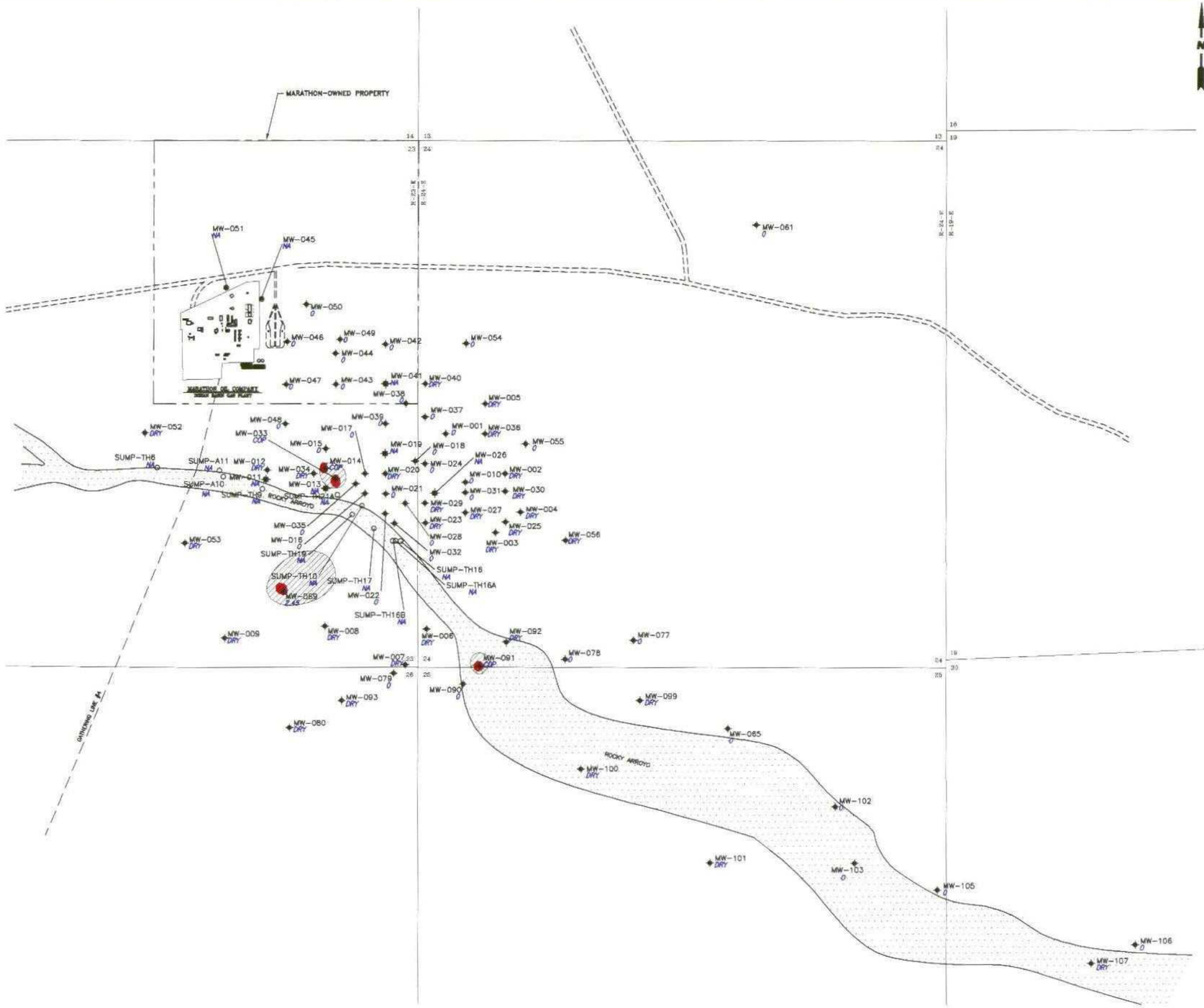
Suite 3004, Langhorne, Pa 19047
Tel: 215/752-6840 Fax: 215/752-6879

MARATHON OIL COMPANY
INDIAN BASIN REMEDIATION PROJECT
EDDY COUNTY, NEW MEXICO

GROUNDWATER ELEVATION CONTOURS, LOWER QUEEN AQUIFER, OCTOBER 1998

DRAWN	DATE	PROJECT MANAGER	DEPARTMENT MANAGER
M. WASILEWSKI	2/3/98	M. HANSEN	D. SOUSA
		LEAD DESIGN PROF.	CHECKED
			M. HANSEN
		PROJECT NUMBER	DRAWING NUMBER
		NP000443.0001	10



LEGEND

- MONITORING WELL (SHALLOW ZONE)
- INFILTRATION WELL (SHALLOW ZONE)
- RECOVERY SUMP (SHALLOW ZONE)
- RECOVERY WELL (SHALLOW ZONE)
- VAPOR EXTRACTION WELL (SHALLOW ZONE)
- COP — CONDENSATE ON PROBE AT TIME OF GAUGING
- 2.45 — THICKNESS OF SEPARATE-PHASE CONDENSATE IN FEET
- DRY — INDICATES WELL WAS DRY AT TIME OF GAUGING
- NA — NOT ACCESSIBLE/AVAILABLE, WELL NOT GAUGED
- INFERRED BOUNDARY OF CONDENSATE PLUME

MW-55	
Benzene	110
Toluene	12
Ethylbenzene	31
Total Xylenes	<0.5

- WELL ID
- COLOR INDICATES BTEX CONSTITUENTS PRESENT AT CONCENTRATIONS ABOVE REGULATORY THRESHOLD.
- CONCENTRATION (MICROGRAMS PER LITER)
- INDICATES CONSTITUENT NOT DETECTED ABOVE NOTED LABORATORY DETECTION LIMIT.
- CONSTITUENT

NOTES:

NO SHALLOW ZONE WELLS WERE SAMPLED FOR LABORATORY ANALYSIS DURING THE JANUARY 1998 SAMPLING EVENT.

SOURCE: FLUOR DANIEL GTI, INC. (FILE # 5469-SP, 11/17/98)

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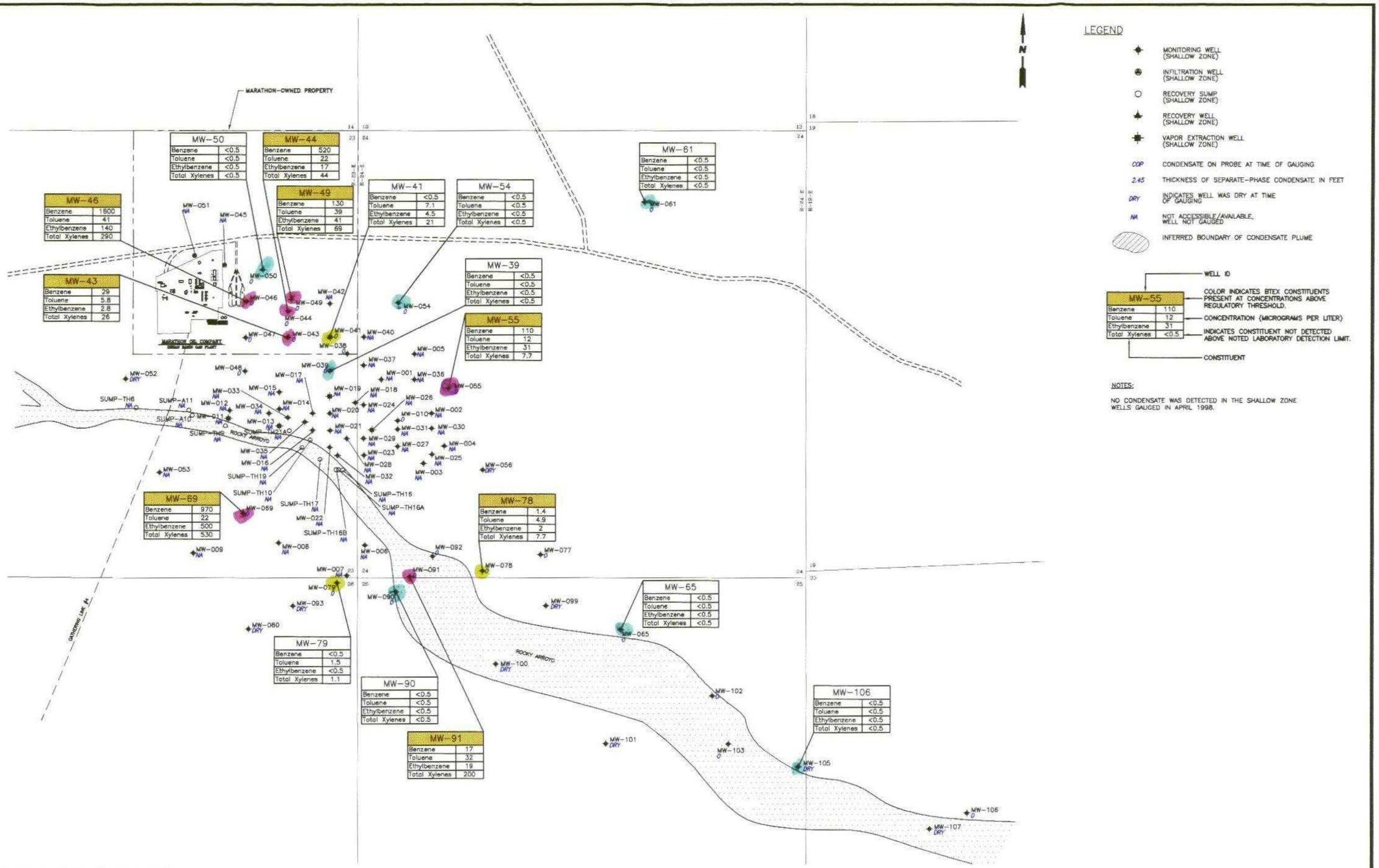
3000 Cabot Blvd West
Suite 3004, Langhorne, Pa 19047
Tel: 215/752-6840 Fax: 215/752-6879

MARATHON OIL COMPANY
INDIAN BASIN REMEDIATION PROJECT
EDDY COUNTY, NEW MEXICO

BTEX AND CONDENSATE DISTRIBUTION, SHALLOW ZONE AQUIFER, JANUARY 1998

DRAWN	DATE	PROJECT MANAGER	DEPARTMENT MANAGER
M. WASILEWSKI	2/19/99	M. HANSEN	D. SOUSA
		LEAD DESIGN PROF.	CHECKED
			M. HANSEN
		PROJECT NUMBER	DRAWING NUMBER
		NP000443.0001	11



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3000 Cabot Blvd West
Suite 3004, Langhorne, Pa 19047
Tel: 215/752-6840 Fax: 215/752-6879

MARATHON OIL COMPANY
INDIAN BASIN REMEDIATION PROJECT
EDDY COUNTY, NEW MEXICO

BTEX AND SEPARATE-PHASE CONDENSATE DISTRIBUTION, SHALLOW ZONE AQUIFER, APRIL 1998

DRAWN	DATE	PROJECT MANAGER	DEPARTMENT MANAGER
M. WASILEWSKI	2/19/99	M. HANSEN	D. SOUSA
		LEAD DESIGN PROF.	CHECKED
			M. HANSEN
		PROJECT NUMBER	DRAWING NUMBER
		NP000443.0001	12

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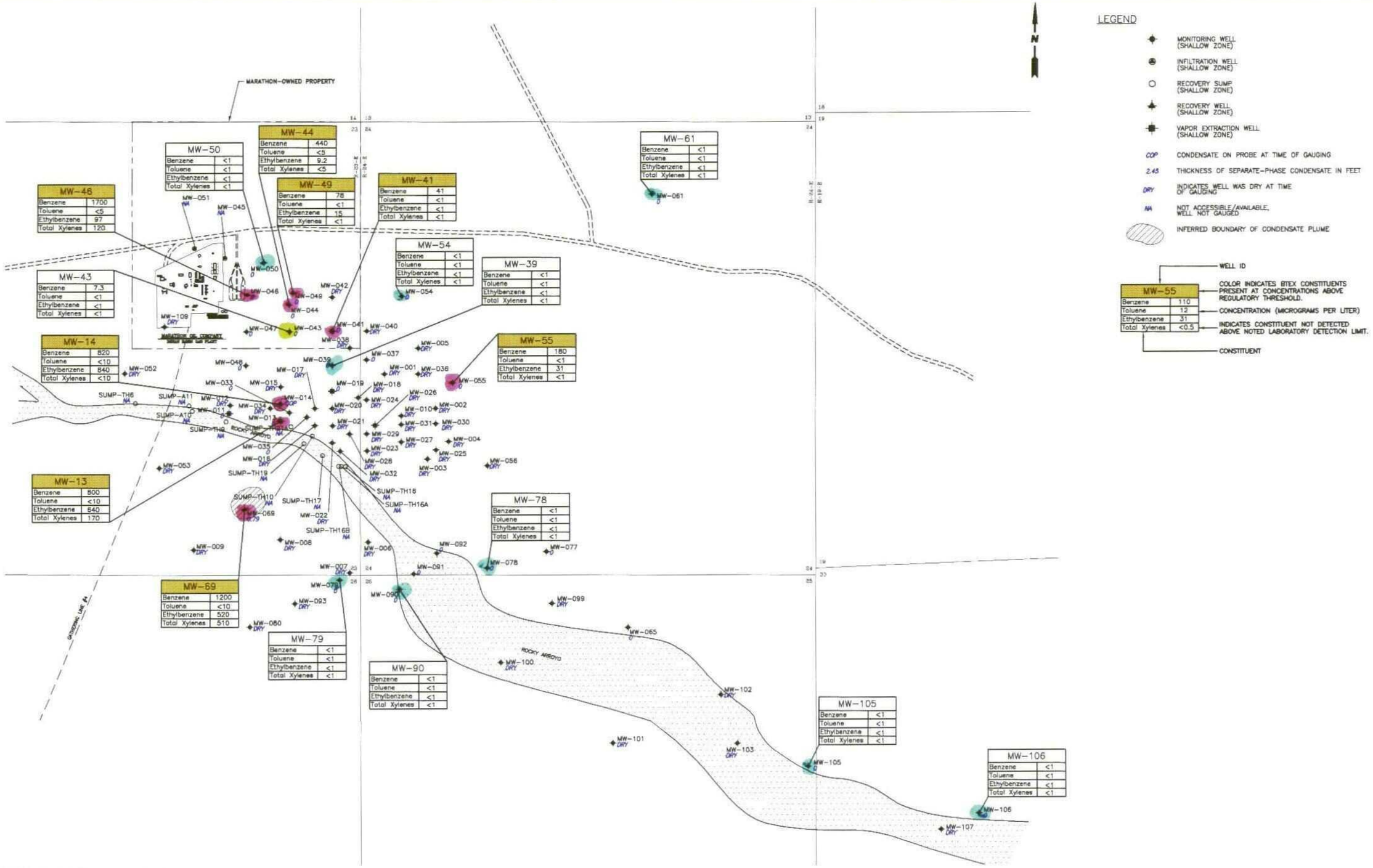

LEGEND

- MONITORING WELL (SHALLOW ZONE)
- INFILTRATION WELL (SHALLOW ZONE)
- RECOVERY SUMP (SHALLOW ZONE)
- RECOVERY WELL (SHALLOW ZONE)
- VAPOR EXTRACTION WELL (SHALLOW ZONE)
- COP — CONDENSATE ON PROBE AT TIME OF GAUGING
- 2.45 — THICKNESS OF SEPARATE-PHASE CONDENSATE IN FEET
- DRY — INDICATES WELL WAS DRY AT TIME OF GAUGING
- NA — NOT ACCESSIBLE/AVAILABLE, WELL NOT GAUGED
- INFERRED BOUNDARY OF CONDENSATE PLUME

MW-55 (WELL ID)	
Benzene	110
Toluene	12
Ethylbenzene	31
Total Xylenes	<0.5

COLOR INDICATES BTEX CONSTITUENTS PRESENT AT CONCENTRATIONS ABOVE REGULATORY THRESHOLD.
CONCENTRATION (MICROGRAMS PER LITER)
INDICATES CONSTITUENT NOT DETECTED ABOVE NOTED LABORATORY DETECTION LIMIT.
CONSTITUENT

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NO.	DATE	REVISION DESCRIPTION	BY
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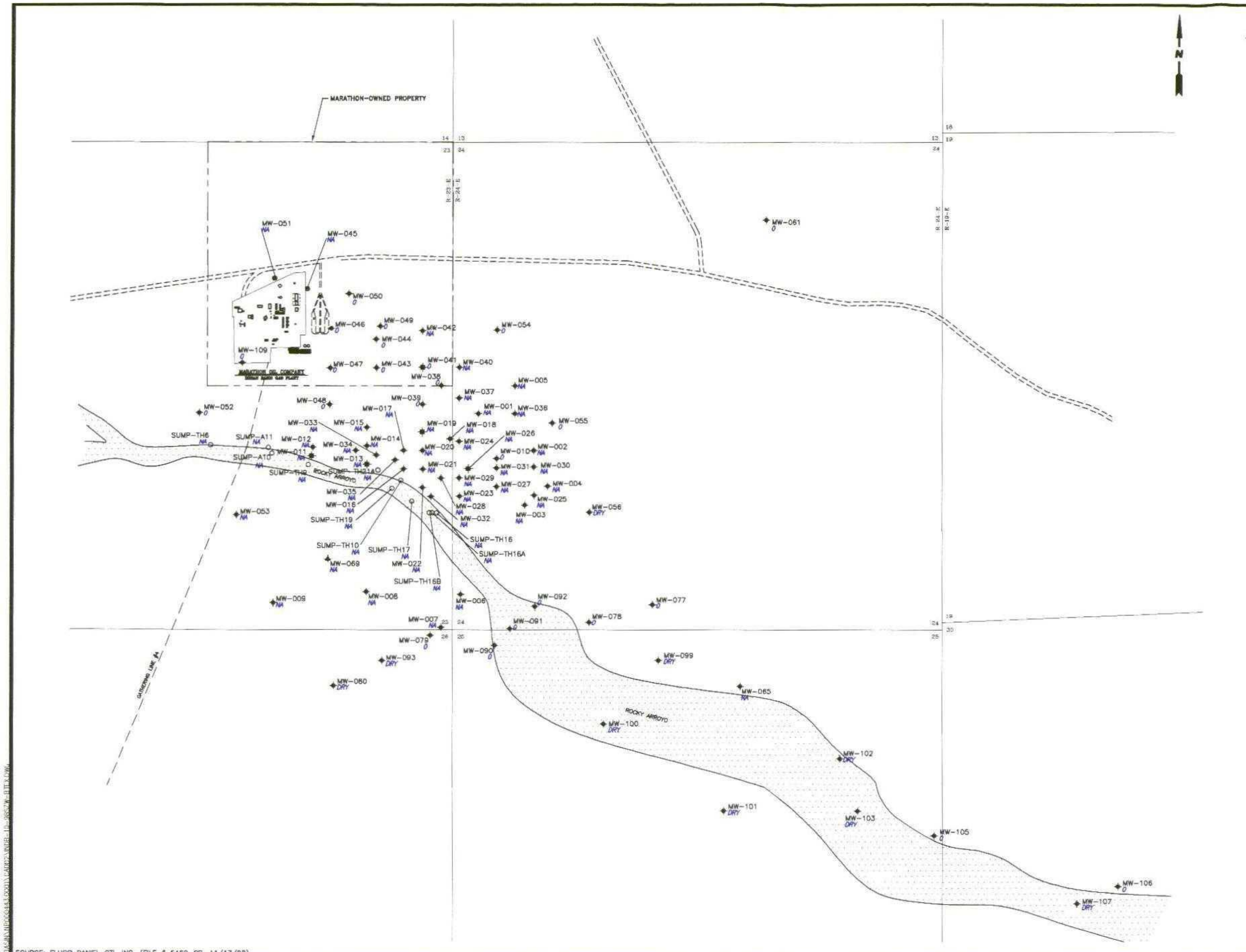
3000 Cabot Blvd West
Suite 3004, Langhorne, Pa 19047
Tel: 215/752-6840 Fax: 215/752-6879

MARATHON OIL COMPANY
INDIAN BASIN REMEDIATION PROJECT
EDDY COUNTY, NEW MEXICO

BTEX AND CONDENSATE DISTRIBUTION, SHALLOW ZONE AQUIFER, JUNE 1998

DRAWN	DATE	PROJECT MANAGER	DEPARTMENT MANAGER
M. WASILEWSKI	2/18/99	M. HANSEN	D. SOUSA
		LEAD DESIGN PROF.	CHECKED
			M. HANSEN
		PROJECT NUMBER	DRAWING NUMBER
		NP000443.0001	13



LEGEND

- MONITORING WELL (SHALLOW ZONE)
- INFILTRATION WELL (SHALLOW ZONE)
- RECOVERY SUMP (SHALLOW ZONE)
- RECOVERY WELL (SHALLOW ZONE)
- VAPOR EXTRACTION WELL (SHALLOW ZONE)
- COP — CONDENSATE ON PROBE AT TIME OF GAUGING
- 2.45 — THICKNESS OF SEPARATE-PHASE CONDENSATE IN FEET
- DRY — INDICATES WELL WAS DRY AT TIME OF GAUGING
- NA — NOT ACCESSIBLE/AVAILABLE, WELL NOT GAUGED
- INFERRED BOUNDARY OF CONDENSATE PLUME

MW-55	
Benzene	110
Toluene	12
Ethylbenzene	31
Total Xylenes	<0.5

- WELL ID
- COLOR INDICATES BTEX CONSTITUENTS PRESENT AT CONCENTRATIONS ABOVE REGULATORY THRESHOLD.
- CONCENTRATION (MICROGRAMS PER LITER)
- INDICATES CONSTITUENT NOT DETECTED ABOVE NOTED LABORATORY DETECTION LIMIT.
- CONSTITUENT

NOTES:

1. NO SHALLOW ZONE WELLS WERE SAMPLED FOR LABORATORY ANALYSIS DURING THE OCTOBER 1998 SAMPLING EVENT.
2. NO CONDENSATE WAS DETECTED IN THE SHALLOW ZONE WELLS GAUGED IN OCTOBER 1998.

SOURCE: FLUOR DANIEL GTI, INC. (FILE # 5469-SP, 11/17/98)

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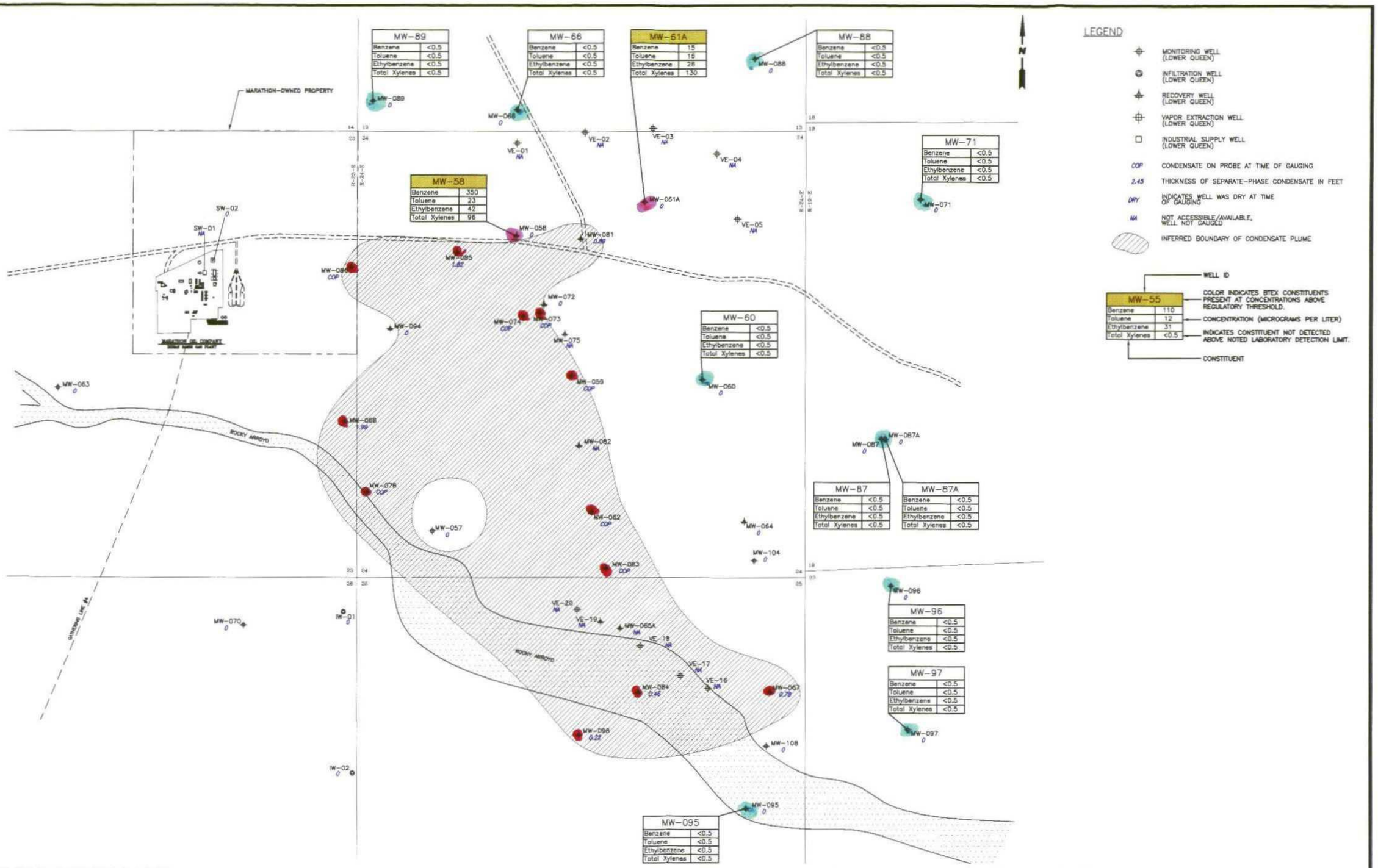
**MARATHON OIL COMPANY
INDIAN BASIN REMEDIATION PROJECT
EDDY COUNTY, NEW MEXICO**

BTEX AND CONDENSATE DISTRIBUTION, SHALLOW ZONE AQUIFER, OCTOBER 1998

DRAWN: M. WASILEWSKI	DATE: 2/19/99	PROJECT MANAGER: M. HANSEN	DEPARTMENT MANAGER: D. SOUSA
		LEAD DESIGN PROF.:	CHECKED: M. HANSEN
		PROJECT NUMBER: NP000443.0001	DRAWING NUMBER: 14



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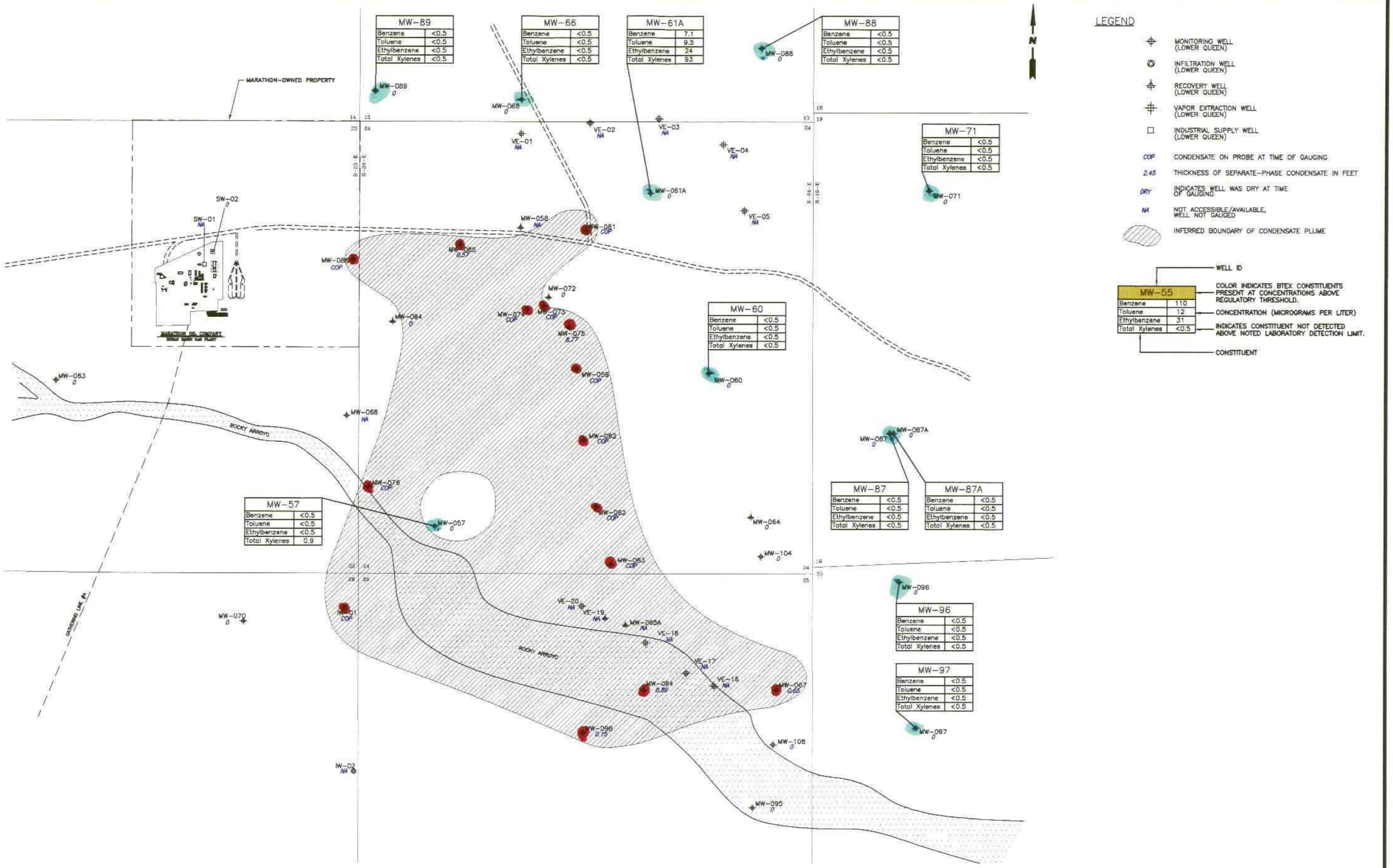
MARATHON OIL COMPANY
INDIAN BASIN REMEDIATION PROJECT
EDDY COUNTY, NEW MEXICO

BTEX AND CONDENSATE DISTRIBUTION, LOWER QUEEN AQUIFER, JANUARY 1998

DRAWN	DATE	PROJECT MANAGER	DEPARTMENT MANAGER
M. WASILEWSKI	2/18/99	M. HANSEN	D. SOUSA
		LEAD DESIGN PROF.	CHECKED
			M. HANSEN
		PROJECT NUMBER	DRAWING NUMBER
		NP000443.0001	15

P:\COMMON\MHANSEN\INDIAN_BASIN\NP000443.0001\CAD\MW8-1_99.DW, BTEX.DWG



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NO.	DATE	REVISION DESCRIPTION	BY / CKD

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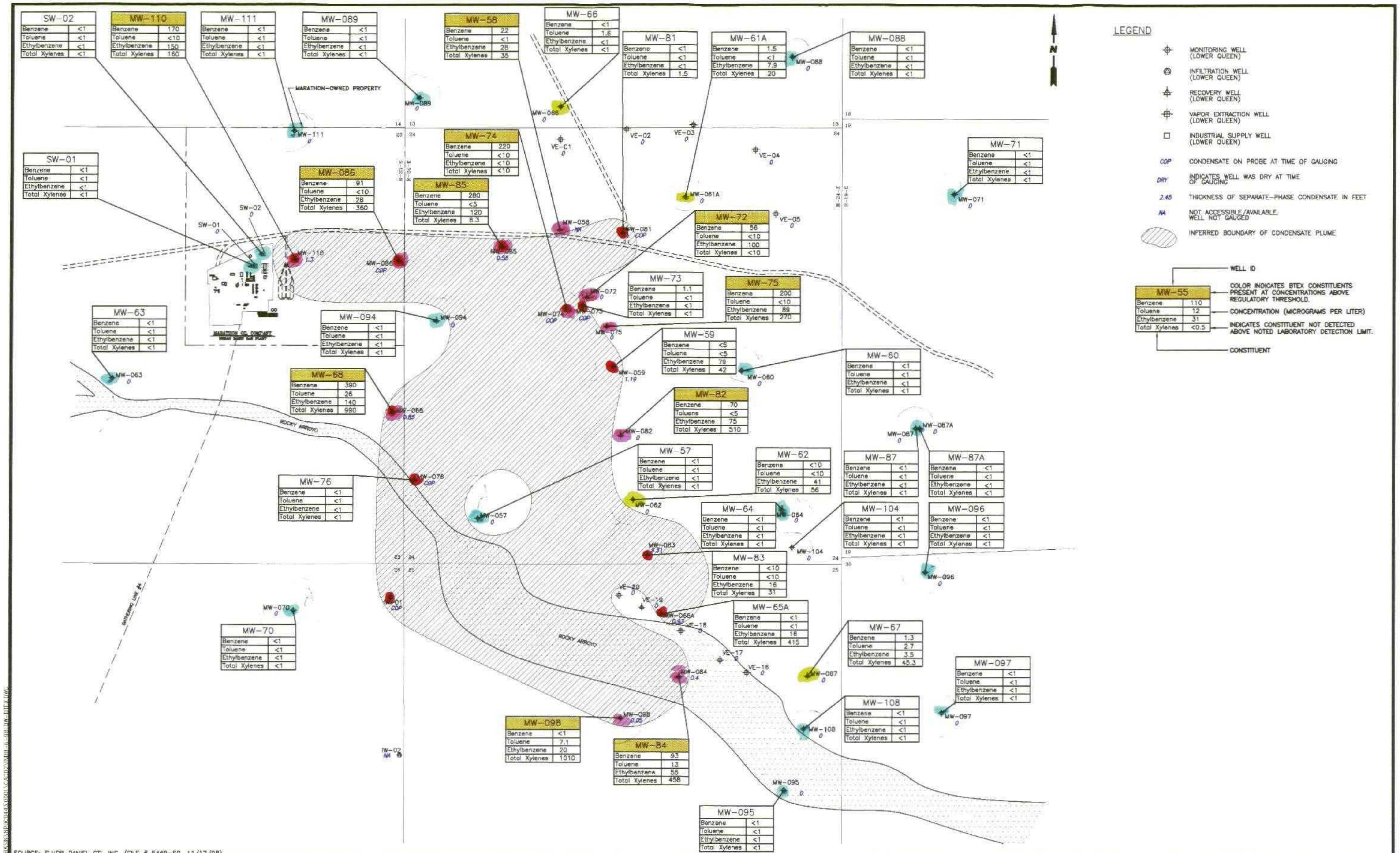
MARATHON OIL COMPANY
INDIAN BASIN REMEDIATION PROJECT
EDDY COUNTY, NEW MEXICO

BTEX AND CONDENSATE DISTRIBUTION, LOWER QUEEN AQUIFER, APRIL 1998

DRAWN	DATE
M. WASILEWSKI	2/18/99
PROJECT MANAGER	DEPARTMENT MANAGER
M. HANSEN	D. SOUSA
LEAD DESIGN PROF.	CHECKED
	M. HANSEN
PROJECT NUMBER	DRAWING NUMBER
NP000443.0001	16



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NO.	DATE	REVISION DESCRIPTION	BY / CKD

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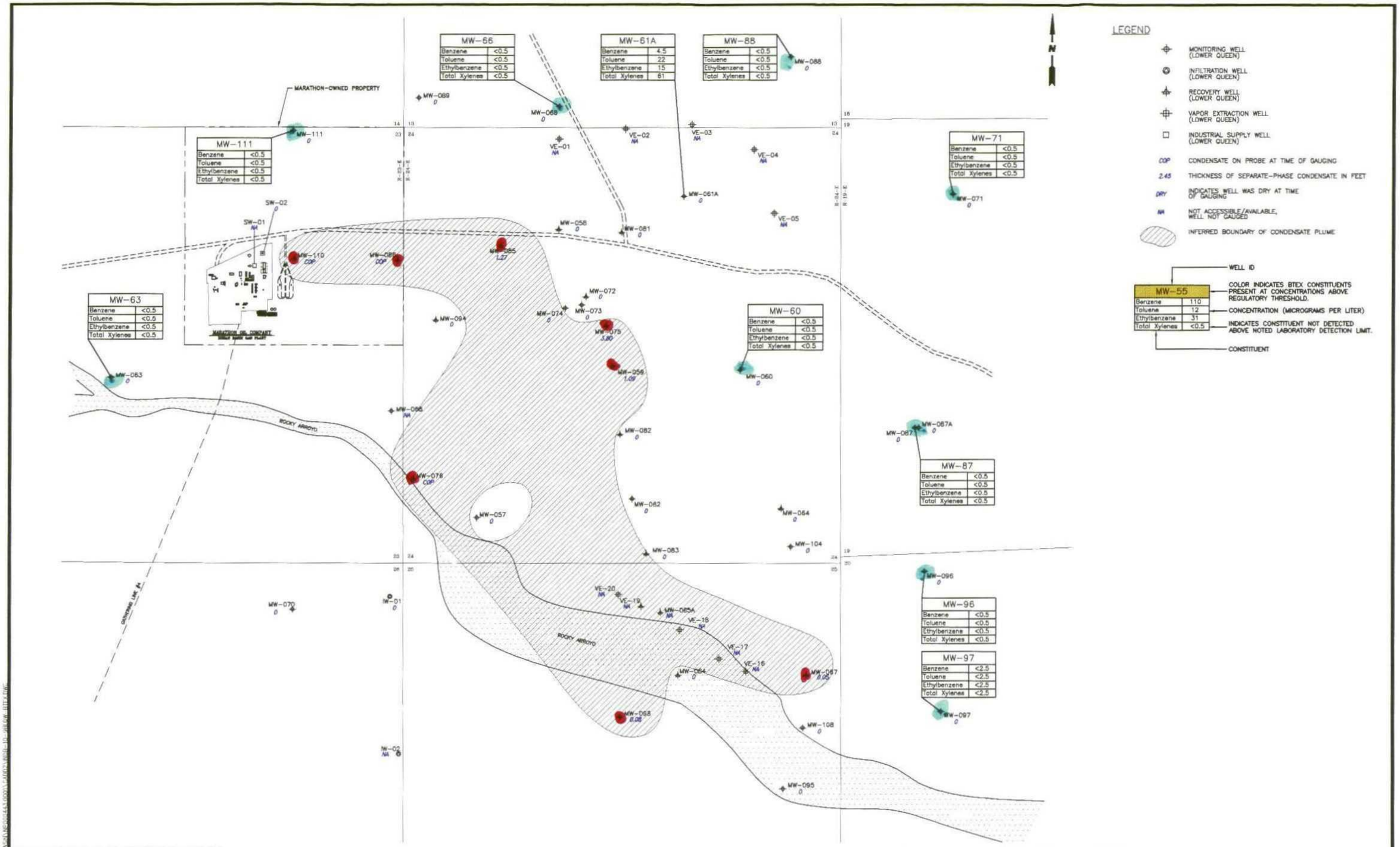
MARATHON OIL COMPANY
INDIAN BASIN REMEDIATION PROJECT
EDDY COUNTY, NEW MEXICO

BTEX AND CONDENSATE DISTRIBUTION, LOWER QUEEN AQUIFER, JUNE 1998

DRAWN: M. WASILEWSKI	DATE: 2/18/99	PROJECT MANAGER: M. HANSEN	DEPARTMENT MANAGER: D. SOUSA
		LEAD DESIGN PROF.	CHECKED: M. HANSEN
		PROJECT NUMBER: NP000443.0001	DRAWING NUMBER: 17



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Suite 3004, Langhorne, Pa 19047
Tel: 215/752-8540 Fax: 215/752-6879

MARATHON OIL COMPANY
INDIAN BASIN REMEDIATION PROJECT
EDDY COUNTY, NEW MEXICO

BTEX AND CONDENSATE DISTRIBUTION
LOWER QUEEN AQUIFER,
OCTOBER 1998

DRAWN	DATE	PROJECT MANAGER	DEPARTMENT MANAGER
M. WASILEWSKI	2/19/99	M. HANSEN	D. SOUSA
		LEAD DESIGN PROF.	CHECKED
			M. HANSEN
		PROJECT NUMBER	DRAWING NUMBER
		NP000443.0001	18

Appendix A

Historic Fluid Level Data,
May 1991 - October 1998

Appendix A

Historic Fluid Level Data, May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

Well ID	Date	Measuring Point Elevation (feet amsl)	Depth to Water (feet bmp)	Condensate Thickness (feet)	Corrected Water-Level Elevation (feet amsl)
IW-1	07/16/96	3808.55	185.32	2.91	3625.35
IW-1	10/13/96	3808.55	181.83	2.81	3628.77
IW-1	02/03/97	3808.55	185.60	5.38	3626.87
IW-1	04/28/97	3808.55	183.12	1.53	3626.54
IW-1	07/14/97	3808.55	182.27	0.38	3626.55
IW-1	10/13/97	3808.55	181.80	0.16	3626.86
IW-1	11/04/97	3808.55	52.65	0	3755.90
IW-1	11/12/97	3808.55	55.85	0	3752.70
IW-1	11/19/97	3808.55	41.80	0	3766.75
IW-1	11/24/97	3808.55	70.90	0	3737.65
IW-1	12/10/97	3808.55	4.00	0	3804.55
IW-1	04/27/98	3808.55	82.27	0	3726.28
IW-1	05/28/98	3808.55	11.26	0	3797.29
IW-1	06/15/98	3808.55	181.05	0	3627.50
IW-1	10/09/98	3808.55	61.46	0	3747.09
IW-2	08/01/96	3835.86	207.22	0	3628.64
IW-2	10/13/96	3835.86	205.52	0	3630.34
IW-2	02/03/97	3835.86	52.92	0	3782.94
IW-2	04/28/97	3835.86	28.89	0	3806.97
IW-2	07/14/97	3835.86	133.89	0	3701.97
IW-2	10/13/97	3835.86	29.61	0	3806.25
IW-2	11/04/97	3835.86	208.50	0	3627.36
IW-2	11/12/97	3835.86	208.70	0	3627.16
IW-2	11/19/97	3835.86	208.78	0	3627.08
IW-2	11/24/97	3835.86	208.95	0	3626.91
IW-2	12/10/97	3835.86	175.58	0	3660.28
IW-2	01/27/98	3835.86	121.00	0	3714.86
IW-2	02/25/98	3835.86	24.64	0	3811.22
MW-1	12/01/91	3792.50	9.68	0	3782.82
MW-1	04/01/96	3792.50	D	--	--
MW-1	01/27/98	3792.50	14.90	0	3777.60
MW-1	06/16/98	3792.50	D	--	--
MW-2	01/28/98	3788.72	D	--	--
MW-2	06/16/98	3788.72	D	--	--
MW-3	01/16/96	3787.50	D	--	--
MW-3	04/19/96	3787.50	D	--	--
MW-3	07/16/96	3787.50	D	--	--
MW-3	10/13/96	3787.50	D	--	--
MW-3	01/28/98	3787.50	D	--	--
MW-3	06/16/98	3787.50	D	--	--
MW-4	04/15/92	3785.88	18.58	0	3767.30
MW-4	07/01/92	3785.88	17.74	0	3768.14
MW-4	10/01/92	3785.88	18.54	0	3767.34
MW-4	01/01/93	3785.88	18.57	0	3767.31
MW-4	04/01/93	3785.88	18.57	0	3767.31
MW-4	01/28/98	3785.88	D	--	--
MW-4	06/16/98	3785.88	D	--	--
MW-5	01/16/96	3801.69	D	--	--
MW-5	04/19/96	3801.69	D	--	--

Notes:

Water level elevations corrected for condensate using a specific gravity of 0.73

feet amsl Feet above mean sea level

feet bmp Feet below measuring point

D Well was dry at time of gauging

-- No data obtained

Appendix A

Historic Fluid Level Data, May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

Well ID	Date	Measuring Point Elevation (feet amsl)	Depth to Water (feet bmp)	Condensate Thickness (feet)	Corrected Water-Level Elevation (feet amsl)
MW-5	07/15/96	3801.69	D	--	--
MW-5	10/13/96	3801.69	D	--	--
MW-5	01/27/98	3801.69	D	--	--
MW-5	06/16/98	3801.69	D	--	--
MW-6	01/16/96	3785.17	D	--	--
MW-6	01/27/98	3785.17	D	--	--
MW-6	06/15/98	3785.17	D	--	--
MW-7	01/16/96	3784.46	D	--	--
MW-7	04/17/96	3784.46	D	--	--
MW-7	07/15/96	3784.46	D	--	--
MW-7	10/13/96	3784.46	D	--	--
MW-7	01/27/98	3784.46	D	--	--
MW-7	06/15/98	3784.46	D	--	--
MW-8	01/16/96	3795.04	D	--	--
MW-8	04/17/96	3795.04	D	--	--
MW-8	10/13/96	3795.04	D	--	--
MW-8	01/27/98	3795.04	D	--	--
MW-8	06/15/98	3795.04	D	--	--
MW-9	01/16/96	3807.85	D	--	--
MW-9	04/17/96	3807.85	D	--	--
MW-9	07/15/96	3807.85	D	--	--
MW-9	10/13/96	3807.85	D	--	--
MW-9	01/27/98	3807.85	D	--	--
MW-9	06/15/98	3807.85	D	--	--
MW-10	12/01/91	3790.78	16.68	0	3774.10
MW-10	04/15/92	3790.78	16.70	0	3774.08
MW-10	07/01/92	3790.78	16.02	0	3774.76
MW-10	10/01/92	3790.78	16.97	0	3773.81
MW-10	01/01/93	3790.78	17.74	0	3773.04
MW-10	04/01/93	3790.78	18.31	0	3772.47
MW-10	01/01/94	3790.78	18.21	0	3772.57
MW-10	01/16/96	3790.78	D	--	--
MW-10	04/17/96	3790.78	D	--	--
MW-10	07/16/96	3790.78	D	--	--
MW-10	10/13/96	3790.78	17.00	0	3773.78
MW-10	02/04/97	3790.78	17.99	0	3772.79
MW-10	03/18/97	3790.78	17.88	0	3772.90
MW-10	04/29/97	3790.78	18.21	0	3772.57
MW-10	07/15/97	3790.78	18.20	0	3772.58
MW-10	10/14/97	3790.78	18.45	0	3772.33
MW-10	01/28/98	3790.78	18.20	0	3772.58
MW-10	04/27/98	3790.78	18.19	0	3772.59
MW-10	06/16/98	3790.78	D	--	--
MW-10	10/10/98	3790.78	18.96	0	3771.82
MW-11	12/01/91	3806.96	22.08	0	3784.88
MW-11	04/15/92	3806.96	22.73	0	3784.23
MW-11	07/01/92	3806.96	18.00	0	3788.96
MW-11	10/01/92	3806.96	22.47	0	3784.49
MW-11	01/01/93	3806.96	24.03	0	3782.93

Notes:

Water level elevations corrected for condensate using a specific gravity of 0.73

feet amsl Feet above mean sea level

feet bmp Feet below measuring point

D Well was dry at time of gauging

-- No data obtained

Appendix A

Historic Fluid Level Data, May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

Well ID	Date	Measuring Point Elevation (feet amsl)	Depth to Water (feet bmp)	Condensate Thickness (feet)	Corrected Water-Level Elevation (feet amsl)
MW-11	04/01/93	3806.96	24.38	0	3782.58
MW-11	10/01/93	3806.96	24.43	0	3782.53
MW-11	01/01/94	3806.96	24.30	0	3782.66
MW-11	04/01/94	3806.96	24.38	0	3782.58
MW-11	07/01/94	3806.96	24.34	0	3782.62
MW-11	10/01/94	3806.96	22.23	0	3784.73
MW-11	04/01/95	3806.96	24.23	0	3782.73
MW-11	07/01/95	3806.96	23.80	0	3783.16
MW-11	10/01/95	3806.96	22.01	0	3784.95
MW-11	01/16/96	3806.96	23.91	0	3783.05
MW-11	04/19/96	3806.96	23.97	0	3782.99
MW-11	07/15/96	3806.96	20.05	0	3786.91
MW-11	10/13/96	3806.96	20.46	0	3786.50
MW-11	02/04/97	3806.96	23.22	0	3783.74
MW-11	04/28/97	3806.96	23.40	0	3783.56
MW-11	06/17/98	3806.96	24.20	0	3782.76
MW-12	01/27/98	3809.96	D	--	--
MW-12	06/16/98	3809.96	D	--	--
MW-13	12/01/91	3801.58	18.14	0	3783.44
MW-13	04/15/92	3801.58	18.92	0	3782.66
MW-13	01/01/95	3801.58	19.76	0	3781.82
MW-13	04/01/95	3801.58	20.34	0	3781.24
MW-13	07/01/95	3801.58	20.36	0	3781.22
MW-13	10/01/95	3801.58	18.41	0	3783.17
MW-13	01/16/96	3801.58	19.83	0.08	3781.80
MW-13	04/19/96	3801.58	19.89	0.09	3781.75
MW-13	07/15/96	3801.58	17.15	0.08	3784.48
MW-13	10/13/96	3801.58	17.39	0	3784.19
MW-13	02/04/97	3801.58	19.15	0	3782.43
MW-13	03/18/97	3801.58	19.31	0	3782.27
MW-13	04/28/97	3801.58	19.34	0	3782.24
MW-13	06/17/98	3801.58	20.74	0	3780.84
MW-14	12/01/91	3803.61	9.68	0	3793.93
MW-14	10/01/93	3803.61	22.55	0	3781.06
MW-14	01/01/94	3803.61	22.78	0	3780.83
MW-14	01/27/98	3803.61	22.36	0	3781.25
MW-14	06/16/98	3803.61	22.88	0	3780.73
MW-15	12/01/91	3803.59	9.68	0	3793.91
MW-15	01/27/98	3803.59	19.28	0	3784.31
MW-15	06/16/98	3803.59	D	--	--
MW-16	12/01/91	3801.04	9.68	0	3791.36
MW-16	04/01/93	3801.04	22.32	0	3778.72
MW-16	07/01/93	3801.04	22.25	0	3778.79
MW-16	01/27/98	3801.04	22.37	0	3778.67
MW-16	06/16/98	3801.04	D	--	--
MW-17	12/01/91	3799.55	9.68	0	3789.87
MW-17	04/01/93	3799.55	18.68	0	3780.87
MW-17	07/01/93	3799.55	19.13	0	3780.42
MW-17	10/01/93	3799.55	19.11	0	3780.44

Notes:

Water level elevations corrected for condensate using a specific gravity of 0.73

feet amsl Feet above mean sea level

feet bmp Feet below measuring point

D Well was dry at time of gauging

-- No data obtained

Appendix A

Historic Fluid Level Data, May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

Well ID	Date	Measuring Point Elevation (feet amsl)	Depth to Water (feet bmp)	Condensate Thickness (feet)	Corrected Water-Level Elevation (feet amsl)
MW-17	01/01/94	3799.55	19.27	0	3780.28
MW-17	01/27/98	3799.55	19.20	0	3780.35
MW-17	06/17/98	3799.55	D	--	--
MW-18	12/01/91	3795.82	9.68	0	3786.14
MW-18	04/15/92	3795.82	15.25	0	3780.57
MW-18	07/01/92	3795.82	11.08	0	3784.74
MW-18	10/01/92	3795.82	15.89	0	3779.93
MW-18	01/01/93	3795.82	17.05	0	3778.77
MW-18	04/01/93	3795.82	17.13	0	3778.69
MW-18	01/27/98	3795.82	17.30	0	3778.52
MW-18	06/16/98	3795.82	D	--	--
MW-19	04/15/92	3797.21	16.50	0	3780.71
MW-19	07/01/92	3797.21	12.15	0	3785.06
MW-19	10/01/92	3797.21	17.16	0	3780.05
MW-19	01/01/93	3797.21	18.85	0	3778.36
MW-19	04/01/93	3797.21	18.93	0	3778.28
MW-19	01/16/96	3797.21	19.04	0	3778.17
MW-19	04/19/96	3797.21	19.06	0	3778.15
MW-19	07/16/96	3797.21	19.04	0	3778.17
MW-19	10/13/96	3797.21	16.09	0	3781.12
MW-19	02/04/97	3797.21	18.34	0	3778.87
MW-19	03/18/97	3797.21	18.50	0	3778.71
MW-19	04/28/97	3797.21	18.84	0	3778.37
MW-19	06/17/98	3797.21	18.88	0	3778.33
MW-20	12/01/91	3797.59	9.68	0	3787.91
MW-20	01/27/98	3797.59	D	--	--
MW-20	06/17/98	3797.59	D	--	--
MW-21	12/01/91	3798.21	9.68	0	3788.53
MW-21	04/01/93	3798.21	22.63	0	3775.58
MW-21	07/01/93	3798.21	22.88	0	3775.33
MW-21	10/01/93	3798.21	23.13	0	3775.08
MW-21	01/27/98	3798.21	23.03	0	3775.18
MW-21	06/16/98	3798.21	D	--	--
MW-22	12/01/91	3799.20	9.68	0	3789.52
MW-22	04/15/92	3799.20	17.16	0	3782.04
MW-22	07/01/92	3799.20	17.07	0	3782.13
MW-22	10/01/92	3799.20	17.29	0	3781.91
MW-22	01/01/93	3799.20	17.29	0	3781.91
MW-22	04/01/93	3799.20	17.29	0	3781.91
MW-22	01/27/98	3799.20	17.20	0	3782.00
MW-22	06/16/98	3799.20	D	--	--
MW-23	01/28/98	3794.48	D	--	--
MW-23	06/16/98	3794.48	D	--	--
MW-24	12/01/91	3794.09	9.68	0	3784.41
MW-24	04/15/92	3794.09	12.90	0	3781.19
MW-24	07/01/92	3794.09	14.09	0	3780.00
MW-24	10/01/92	3794.09	12.92	0	3781.17
MW-24	01/16/96	3794.09	D	--	--
MW-24	04/19/96	3794.09	D	--	--

Notes:

Water level elevations corrected for condensate using a specific gravity of 0.73

feet amsl Feet above mean sea level

feet bmp Feet below measuring point

D Well was dry at time of gauging

-- No data obtained

Appendix A

Historic Fluid Level Data, May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

Well ID	Date	Measuring Point Elevation (feet amsl)	Depth to Water (feet bmp)	Condensate Thickness (feet)	Corrected Water-Level Elevation (feet amsl)
MW-24	07/16/96	3794.09	D	--	--
MW-24	10/13/96	3794.09	D	--	--
MW-24	01/27/98	3794.09	12.92	0	3781.17
MW-24	06/16/98	3794.09	D	--	--
MW-25	01/28/98	3786.97	D	--	--
MW-25	06/16/98	3786.97	D	--	--
MW-26	12/01/91	3793.01	9.68	0	3783.33
MW-26	07/01/92	3793.01	16.37	0	3776.64
MW-26	10/01/92	3793.01	19.66	0	3773.35
MW-26	01/01/93	3793.01	20.41	0	3772.60
MW-26	04/01/93	3793.01	20.72	0	3772.29
MW-26	07/01/93	3793.01	20.77	0	3772.24
MW-26	10/01/93	3793.01	20.78	0	3772.23
MW-26	01/01/94	3793.01	20.77	0	3772.24
MW-26	06/17/98	3793.01	D	--	--
MW-27	01/28/98	3790.93	D	--	--
MW-27	06/16/98	3790.93	D	--	--
MW-28	12/01/91	3797.03	19.23	0	3777.80
MW-28	01/27/98	3797.03	18.48	0	3778.55
MW-28	06/16/98	3797.03	D	--	--
MW-29	01/16/96	3794.06	D	--	--
MW-29	04/19/96	3794.06	D	--	--
MW-29	07/16/96	3794.06	D	--	--
MW-29	10/13/96	3794.06	D	--	--
MW-29	01/28/98	3794.06	D	--	--
MW-29	06/16/98	3794.06	D	--	--
MW-30	12/01/91	3788.30	14.75	0	3773.55
MW-30	01/28/98	3788.30	D	--	--
MW-30	06/16/98	3788.30	D	--	--
MW-31	12/01/91	3791.15	18.85	0	3772.30
MW-31	04/15/92	3791.15	19.00	0	3772.15
MW-31	07/01/92	3791.15	18.50	0	3772.65
MW-31	10/01/92	3791.15	19.00	0	3772.15
MW-31	01/01/93	3791.15	19.44	0	3771.71
MW-31	04/01/93	3791.15	19.64	0	3771.51
MW-31	01/28/98	3791.15	19.03	0	3772.12
MW-31	06/16/98	3791.15	D	--	--
MW-32	07/01/92	3797.47	15.35	0	3782.12
MW-32	01/16/96	3797.47	D	--	--
MW-32	04/19/96	3797.47	D	--	--
MW-32	07/15/96	3797.47	D	--	--
MW-32	10/13/96	3797.47	D	--	--
MW-32	01/27/98	3797.47	15.70	0	3781.77
MW-32	06/16/98	3797.47	D	--	--
MW-33	12/01/91	3802.48	19.02	0	3783.46
MW-33	01/01/93	3802.48	19.91	0	3782.57
MW-33	07/01/93	3802.48	19.91	0	3782.57
MW-33	01/27/98	3802.48	19.91	0	3782.57
MW-33	06/16/98	3802.48	19.97	0	3782.51

Notes:

Water level elevations corrected for condensate using a specific gravity of 0.73

feet amsl Feet above mean sea level

feet bmp Feet below measuring point

D Well was dry at time of gauging

-- No data obtained

Appendix A

Historic Fluid Level Data, May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

Well ID	Date	Measuring Point Elevation (feet amsl)	Depth to Water (feet bmp)	Condensate Thickness (feet)	Corrected Water-Level Elevation (feet amsl)
MW-34	12/01/91	3806.00	19.72	0	3786.28
MW-34	01/27/98	3806.00	D	--	--
MW-34	06/16/98	3806.00	D	--	--
MW-35	12/01/91	3800.81	18.24	0	3782.57
MW-35	07/01/93	3800.81	19.77	0	3781.04
MW-35	10/01/93	3800.81	19.81	0	3781.00
MW-35	01/01/94	3800.81	20.09	0	3780.72
MW-35	01/27/98	3800.81	20.10	0	3780.71
MW-35	06/16/98	3800.81	20.57	0	3780.24
MW-36	01/27/98	3792.94	D	--	--
MW-36	06/16/98	3792.94	D	--	--
MW-37	12/01/91	3795.03	11.72	0	3783.31
MW-37	04/01/93	3795.03	19.96	0	3775.07
MW-37	07/01/93	3795.03	20.11	0	3774.92
MW-37	10/01/93	3795.03	20.19	0	3774.84
MW-37	01/01/94	3795.03	20.21	0	3774.82
MW-37	01/27/98	3795.03	19.37	0	3775.66
MW-37	06/16/98	3795.03	19.82	0	3775.21
MW-38	12/01/91	3797.32	13.48	0	3783.84
MW-38	04/15/92	3797.32	16.54	0	3780.78
MW-38	07/01/92	3797.32	12.42	0	3784.90
MW-38	10/01/92	3797.32	17.66	0	3779.66
MW-38	01/01/93	3797.32	20.24	0	3777.08
MW-38	04/01/93	3797.32	20.42	0	3776.90
MW-38	07/01/93	3797.32	20.23	0	3777.09
MW-38	10/01/93	3797.32	20.30	0	3777.02
MW-38	01/16/96	3797.32	D	--	--
MW-38	04/19/96	3797.32	D	--	--
MW-38	07/15/96	3797.32	D	--	--
MW-38	10/13/96	3797.32	16.54	0	3780.78
MW-38	02/03/97	3797.32	19.96	0	3777.36
MW-38	04/28/97	3797.32	20.30	0	3777.02
MW-38	07/15/97	3797.32	20.38	0	3776.94
MW-38	10/13/97	3797.32	20.22	0	3777.10
MW-38	01/27/98	3797.32	20.18	0	3777.14
MW-38	04/27/98	3797.32	20.32	0	3777.00
MW-38	06/16/98	3797.32	D	--	--
MW-38	10/09/98	3797.32	20.41	0	3776.91
MW-39	12/01/91	3796.20	13.05	0	3783.15
MW-39	01/01/93	3796.20	17.15	0	3779.05
MW-39	04/01/93	3796.20	22.32	0	3773.88
MW-39	07/01/93	3796.20	17.78	0	3778.42
MW-39	10/01/93	3796.20	18.10	0	3778.10
MW-39	01/01/94	3796.20	18.72	0	3777.48
MW-39	04/01/94	3796.20	19.07	0	3777.13
MW-39	07/01/94	3796.20	19.29	0	3776.91
MW-39	10/01/94	3796.20	19.23	0	3776.97
MW-39	01/01/95	3796.20	19.57	0	3776.63
MW-39	04/01/95	3796.20	19.84	0	3776.36

Notes:

Water level elevations corrected for condensate using a specific gravity of 0.73

feet amsl Feet above mean sea level

feet bmp Feet below measuring point

D Well was dry at time of gauging

-- No data obtained

Appendix A

Historic Fluid Level Data, May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

Well ID	Date	Measuring Point Elevation (feet amsl)	Depth to Water (feet bmp)	Condensate Thickness (feet)	Corrected Water-Level Elevation (feet amsl)
MW-39	07/01/95	3796.20	19.84	0	3776.36
MW-39	10/01/95	3796.20	20.03	0	3776.17
MW-39	01/16/96	3796.20	20.29	0	3775.91
MW-39	04/19/96	3796.20	20.32	0	3775.88
MW-39	07/15/96	3796.20	20.30	0	3775.90
MW-39	10/13/96	3796.20	15.70	0	3780.50
MW-39	02/03/97	3796.20	17.11	0	3779.09
MW-39	04/28/97	3796.20	17.44	0	3778.76
MW-39	07/14/97	3796.20	17.41	0	3778.79
MW-39	10/13/97	3796.20	18.60	0	3777.60
MW-39	01/27/98	3796.20	19.20	0	3777.00
MW-39	04/27/98	3796.20	19.25	0	3776.95
MW-39	06/16/98	3796.20	19.41	0	3776.79
MW-39	10/09/98	3796.20	20.04	0	3776.16
MW-40	04/01/93	3803.12	18.68	0	3784.44
MW-40	01/27/98	3803.12	D	--	--
MW-40	06/16/98	3803.12	D	--	--
MW-41	12/01/91	3799.04	14.61	0	3784.43
MW-41	01/01/93	3799.04	19.18	0	3779.86
MW-41	07/01/93	3799.04	19.28	0	3779.76
MW-41	10/01/93	3799.04	19.74	0	3779.30
MW-41	01/01/94	3799.04	19.82	0	3779.22
MW-41	04/01/94	3799.04	21.19	0	3777.85
MW-41	07/01/94	3799.04	20.52	0	3778.52
MW-41	10/01/94	3799.04	19.60	0	3779.44
MW-41	01/01/95	3799.04	19.87	0	3779.17
MW-41	04/01/95	3799.04	19.82	0	3779.22
MW-41	07/01/95	3799.04	19.82	0	3779.22
MW-41	10/01/95	3799.04	20.58	0	3778.46
MW-41	01/16/96	3799.04	20.06	0	3778.98
MW-41	04/19/96	3799.04	20.10	0	3778.94
MW-41	07/15/96	3799.04	20.06	0	3778.98
MW-41	10/13/96	3799.04	19.02	0	3780.02
MW-41	02/03/97	3799.04	18.98	0	3780.06
MW-41	03/18/97	3799.04	19.09	0	3779.95
MW-41	04/28/97	3799.04	18.98	0	3780.06
MW-41	07/14/97	3799.04	18.85	0	3780.19
MW-41	04/27/98	3799.04	19.26	0	3779.78
MW-41	06/17/98	3799.04	19.37	0	3779.67
MW-41	10/09/98	3799.04	19.18	0	3779.86
MW-42	12/01/91	3804.73	19.98	0	3784.75
MW-42	07/01/93	3804.73	22.63	0	3782.10
MW-42	10/01/93	3804.73	22.89	0	3781.84
MW-42	01/01/94	3804.73	23.13	0	3781.60
MW-42	01/27/98	3804.73	21.94	0	3782.79
MW-42	06/16/98	3804.73	D	--	--
MW-43	12/01/91	3802.05	17.38	0	3784.67
MW-43	07/01/93	3802.05	21.33	0	3780.72
MW-43	10/01/93	3802.05	21.18	0	3780.87

Notes:

Water level elevations corrected for condensate using a specific gravity of 0.73

feet amsl Feet above mean sea level

feet bmp Feet below measuring point

D Well was dry at time of gauging

-- No data obtained

Appendix A

Historic Fluid Level Data, May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

Well ID	Date	Measuring Point Elevation (feet amsl)	Depth to Water (feet bmp)	Condensate Thickness (feet)	Corrected Water-Level Elevation (feet amsl)
MW-43	01/01/94	3802.05	21.27	0	3780.78
MW-43	04/01/94	3802.05	22.38	0	3779.67
MW-43	07/01/94	3802.05	21.41	0	3780.64
MW-43	10/01/94	3802.05	21.41	0	3780.64
MW-43	01/01/95	3802.05	21.44	0	3780.61
MW-43	04/01/95	3802.05	21.53	0	3780.52
MW-43	07/01/95	3802.05	21.53	0	3780.52
MW-43	10/01/95	3802.05	21.80	0	3780.25
MW-43	01/16/96	3802.05	21.75	0	3780.30
MW-43	04/19/96	3802.05	21.70	0	3780.35
MW-43	07/15/96	3802.05	21.44	0	3780.61
MW-43	10/13/96	3802.05	20.13	0	3781.92
MW-43	02/03/97	3802.05	20.71	0	3781.34
MW-43	04/28/97	3802.05	20.49	0	3781.56
MW-43	07/14/97	3802.05	20.39	0	3781.66
MW-43	10/13/97	3802.05	20.78	0	3781.27
MW-43	01/27/98	3802.05	20.55	0	3781.50
MW-43	04/27/98	3802.05	20.72	0	3781.33
MW-43	06/16/98	3802.05	20.89	0	3781.16
MW-43	10/09/98	3802.05	21.16	0	3780.89
MW-44	12/01/91	3804.14	17.85	0	3786.29
MW-44	04/15/92	3804.14	19.40	0	3784.74
MW-44	07/01/92	3804.14	17.27	0	3786.87
MW-44	10/01/92	3804.14	20.28	0	3783.86
MW-44	01/01/93	3804.14	21.20	0	3782.94
MW-44	04/01/93	3804.14	21.48	0	3782.66
MW-44	07/01/93	3804.14	21.63	0	3782.51
MW-44	10/01/93	3804.14	21.58	0	3782.56
MW-44	01/01/94	3804.14	21.68	0	3782.46
MW-44	04/01/94	3804.14	22.02	0	3782.12
MW-44	07/01/94	3804.14	22.13	0	3782.01
MW-44	10/01/94	3804.14	21.58	0	3782.56
MW-44	01/01/95	3804.14	21.88	0	3782.26
MW-44	04/01/95	3804.14	22.26	0	3781.88
MW-44	07/01/95	3804.14	22.26	0	3781.88
MW-44	10/01/95	3804.14	21.84	0	3782.30
MW-44	01/16/96	3804.14	21.86	0	3782.28
MW-44	04/19/96	3804.14	21.88	0	3782.26
MW-44	07/15/96	3804.14	21.75	0	3782.39
MW-44	10/13/96	3804.14	19.32	0	3784.82
MW-44	02/03/97	3804.14	20.79	0	3783.35
MW-44	04/28/97	3804.14	20.43	0	3783.71
MW-44	07/14/97	3804.14	20.31	0	3783.83
MW-44	10/13/97	3804.14	20.73	0	3783.41
MW-44	01/27/98	3804.14	20.66	0	3783.48
MW-44	04/27/98	3804.14	20.84	0	3783.30
MW-44	06/16/98	3804.14	21.04	0	3783.10
MW-44	10/09/98	3804.14	20.71	0	3783.43
MW-45	12/01/91	3808.68	13.91	0	3794.77

Notes:

Water level elevations corrected for condensate using a specific gravity of 0.73

feet amsl Feet above mean sea level

feet bmp Feet below measuring point

D Well was dry at time of gauging

-- No data obtained

Appendix A

Historic Fluid Level Data, May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

Well ID	Date	Measuring Point Elevation (feet amsl)	Depth to Water (feet bmp)	Condensate Thickness (feet)	Corrected Water-Level Elevation (feet amsl)
MW-45	07/01/93	3808.68	21.49	0	3787.19
MW-45	10/01/93	3808.68	21.47	0	3787.21
MW-45	01/01/94	3808.68	21.54	0	3787.14
MW-45	04/01/94	3808.68	22.64	0	3786.04
MW-45	07/01/94	3808.68	21.85	0	3786.83
MW-45	10/01/94	3808.68	21.52	0	3787.16
MW-45	01/01/95	3808.68	21.78	0	3786.90
MW-45	04/01/95	3808.68	22.13	0	3786.55
MW-45	07/01/95	3808.68	22.13	0	3786.55
MW-46	10/01/93	3805.54	19.87	0	3785.67
MW-46	01/01/94	3805.54	19.42	0	3786.12
MW-46	04/01/94	3805.54	19.59	0	3785.95
MW-46	10/01/94	3805.54	19.20	0	3786.34
MW-46	04/01/95	3805.54	19.55	0	3785.99
MW-46	07/01/95	3805.54	19.55	0	3785.99
MW-46	01/16/96	3805.54	19.48	0	3786.06
MW-46	04/19/96	3805.54	19.52	0	3786.02
MW-46	07/15/96	3805.54	19.41	0	3786.13
MW-46	10/13/96	3805.54	15.73	0	3789.81
MW-46	02/04/97	3805.54	18.22	0	3787.32
MW-46	04/28/97	3805.54	16.93	0	3788.61
MW-46	07/14/97	3805.54	17.15	0	3788.39
MW-46	10/13/97	3805.54	18.01	0	3787.53
MW-46	01/27/98	3805.54	17.54	0	3788.00
MW-46	04/27/98	3805.54	18.34	0	3787.20
MW-46	06/16/98	3805.54	18.69	0	3786.85
MW-46	10/10/98	3805.54	17.82	0	3787.72
MW-47	12/01/91	3805.09	18.49	0	3786.60
MW-47	07/01/93	3805.09	21.37	0	3783.72
MW-47	01/16/96	3805.09	D	--	--
MW-47	04/19/96	3805.09	D	--	--
MW-47	07/15/96	3805.09	D	--	--
MW-47	10/13/96	3805.09	19.66	0	3785.43
MW-47	02/04/97	3805.09	21.51	0	3783.58
MW-47	04/28/97	3805.09	21.46	0	3783.63
MW-47	07/14/97	3805.09	21.54	0	3783.55
MW-47	10/13/97	3805.09	21.48	0	3783.61
MW-47	01/27/98	3805.09	21.80	0	3783.29
MW-47	04/27/98	3805.09	21.50	0	3783.59
MW-47	06/16/98	3805.09	21.62	0	3783.47
MW-47	10/10/98	3805.09	21.54	0	3783.55
MW-48	12/01/91	3806.18	18.05	0	3788.13
MW-48	04/15/92	3806.18	19.44	0	3786.74
MW-48	07/01/92	3806.18	17.25	0	3788.93
MW-48	10/01/92	3806.18	18.87	0	3787.31
MW-48	01/01/93	3806.18	19.58	0	3786.60
MW-48	01/16/96	3806.18	D	--	--
MW-48	04/19/96	3806.18	D	--	--
MW-48	07/15/96	3806.18	D	--	--

Notes:

Water level elevations corrected for condensate using a specific gravity of 0.73

feet amsl Feet above mean sea level

feet bmp Feet below measuring point

D Well was dry at time of gauging

-- No data obtained

Appendix A

Historic Fluid Level Data, May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

Well ID	Date	Measuring Point Elevation (feet amsl)	Depth to Water (feet bmp)	Condensate Thickness (feet)	Corrected Water-Level Elevation (feet amsl)
MW-48	10/13/96	3806.18	17.88	0	3788.30
MW-48	02/04/97	3806.18	19.60	0	3786.58
MW-48	04/28/97	3806.18	19.66	0	3786.52
MW-48	07/14/97	3806.18	19.66	0	3786.52
MW-48	10/13/97	3806.18	19.68	0	3786.50
MW-48	01/27/98	3806.18	19.71	0	3786.47
MW-48	04/27/98	3806.18	19.72	0	3786.46
MW-48	06/16/98	3806.18	19.75	0	3786.43
MW-48	10/09/98	3806.18	19.71	0	3786.47
MW-49	12/01/91	3805.61	16.60	0	3789.01
MW-49	07/01/93	3805.61	21.98	0	3783.63
MW-49	10/01/93	3805.61	21.93	0	3783.68
MW-49	01/01/94	3805.61	22.27	0	3783.34
MW-49	04/01/94	3805.61	22.64	0	3782.97
MW-49	07/01/94	3805.61	22.73	0	3782.88
MW-49	10/01/94	3805.61	22.30	0	3783.31
MW-49	01/01/95	3805.61	22.56	0	3783.05
MW-49	04/01/95	3805.61	22.94	0	3782.67
MW-49	07/01/95	3805.61	22.94	0	3782.67
MW-49	10/01/95	3805.61	22.68	0	3782.93
MW-49	01/16/96	3805.61	22.55	0	3783.06
MW-49	04/19/96	3805.61	22.59	0	3783.02
MW-49	07/15/96	3805.61	22.76	0	3782.85
MW-49	10/13/96	3805.61	19.54	0	3786.07
MW-49	02/03/97	3805.61	20.66	0	3784.95
MW-49	03/18/97	3805.61	20.99	0	3784.62
MW-49	04/28/97	3805.61	20.70	0	3784.91
MW-49	07/14/97	3805.61	20.31	0	3785.30
MW-49	10/13/97	3805.61	21.01	0	3784.60
MW-49	01/27/98	3805.61	21.08	0	3784.53
MW-49	04/27/98	3805.61	21.34	0	3784.27
MW-49	06/16/98	3805.61	21.35	0	3784.26
MW-49	10/09/98	3805.61	22.52	0	3783.09
MW-50	12/01/91	3813.35	20.74	0	3792.61
MW-50	04/15/92	3813.35	22.83	0	3790.52
MW-50	07/01/92	3813.35	15.91	0	3797.44
MW-50	10/01/92	3813.35	23.77	0	3789.58
MW-50	01/01/93	3813.35	25.52	0	3787.83
MW-50	04/01/93	3813.35	26.16	0	3787.19
MW-50	07/01/93	3813.35	26.43	0	3786.92
MW-50	10/01/93	3813.35	26.43	0	3786.92
MW-50	01/01/94	3813.35	26.83	0	3786.52
MW-50	04/01/94	3813.35	27.04	0	3786.31
MW-50	07/01/94	3813.35	27.16	0	3786.19
MW-50	10/01/94	3813.35	26.87	0	3786.48
MW-50	01/01/95	3813.35	27.03	0	3786.32
MW-50	04/01/95	3813.35	27.37	0	3785.98
MW-50	07/01/95	3813.35	27.37	0	3785.98
MW-50	10/01/95	3813.35	26.85	0	3786.50

Notes:

Water level elevations corrected for condensate using a specific gravity of 0.73

feet amsl Feet above mean sea level

feet bmp Feet below measuring point

D Well was dry at time of gauging

-- No data obtained

Appendix A

Historic Fluid Level Data, May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

Well ID	Date	Measuring Point Elevation (feet amsl)	Depth to Water (feet bmp)	Condensate Thickness (feet)	Corrected Water-Level Elevation (feet amsl)
MW-50	01/16/96	3813.35	27.20	0	3786.15
MW-50	04/19/96	3813.35	27.22	0	3786.13
MW-50	07/15/96	3813.35	27.04	0	3786.31
MW-50	10/13/96	3813.35	25.89	0	3787.46
MW-50	02/03/97	3813.35	25.15	0	3788.20
MW-50	03/18/97	3813.35	25.18	0	3788.17
MW-50	04/28/97	3813.35	24.81	0	3788.54
MW-50	07/14/97	3813.35	24.56	0	3788.79
MW-50	10/13/97	3813.35	25.45	0	3787.90
MW-50	01/27/98	3813.35	25.39	0	3787.96
MW-50	04/27/98	3813.35	25.84	0	3787.51
MW-50	06/16/98	3813.35	26.05	0	3787.30
MW-50	10/09/98	3813.35	25.80	0	3787.55
MW-51	12/01/91	3810.86	17.77	0	3793.09
MW-52	07/01/92	3817.49	19.00	0	3798.49
MW-52	01/16/96	3817.49	D	--	--
MW-52	04/19/96	3817.49	D	--	--
MW-52	07/15/96	3817.49	D	--	--
MW-52	10/13/96	3817.49	20.97	0	3796.52
MW-52	02/04/97	3817.49	21.31	0	3796.18
MW-52	04/28/97	3817.49	D	--	--
MW-52	07/14/97	3817.49	D	--	--
MW-52	10/13/97	3817.49	D	--	--
MW-52	01/27/98	3817.49	D	--	--
MW-52	04/27/98	3817.49	D	--	--
MW-52	06/16/98	3817.49	D	--	--
MW-52	10/09/98	3817.49	21.37	0	3796.12
MW-53	01/16/96	3809.92	D	--	--
MW-53	04/19/96	3809.92	D	--	--
MW-53	07/15/96	3809.92	D	--	--
MW-53	10/13/96	3809.92	D	--	--
MW-53	01/27/98	3809.92	D	--	--
MW-53	06/16/98	3809.92	D	--	--
MW-54	12/01/91	3823.86	43.80	0	3780.06
MW-54	04/15/92	3823.86	44.77	0	3779.09
MW-54	07/01/92	3823.86	44.16	0	3779.70
MW-54	10/01/92	3823.86	44.66	0	3779.20
MW-54	01/01/93	3823.86	45.54	0	3778.32
MW-54	04/01/93	3823.86	46.11	0	3777.75
MW-54	07/01/93	3823.86	46.61	0	3777.25
MW-54	10/01/93	3823.86	46.73	0	3777.13
MW-54	01/01/94	3823.86	46.34	0	3777.52
MW-54	04/01/94	3823.86	47.45	0	3776.41
MW-54	07/01/94	3823.86	47.12	0	3776.74
MW-54	10/01/94	3823.86	46.65	0	3777.21
MW-54	01/01/95	3823.86	46.59	0	3777.27
MW-54	04/01/95	3823.86	46.96	0	3776.90
MW-54	07/01/95	3823.86	46.96	0	3776.90
MW-54	10/01/95	3823.86	47.40	0	3776.46

Notes:

Water level elevations corrected for condensate using a specific gravity of 0.73

feet amsl Feet above mean sea level

feet bmp Feet below measuring point

D Well was dry at time of gauging

-- No data obtained

Appendix A

Historic Fluid Level Data, May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

Well ID	Date	Measuring Point Elevation (feet amsl)	Depth to Water (feet bmp)	Condensate Thickness (feet)	Corrected Water-Level Elevation (feet amsl)
MW-54	01/16/96	3823.86	46.79	0	3777.07
MW-54	04/17/96	3823.86	48.97	0	3774.89
MW-54	07/15/96	3823.86	48.74	0	3775.12
MW-54	10/13/96	3823.86	46.14	0	3777.72
MW-54	02/04/97	3823.86	46.06	0	3777.80
MW-54	04/28/97	3823.86	46.27	0	3777.59
MW-54	07/14/97	3823.86	46.42	0	3777.44
MW-54	10/14/97	3823.86	47.16	0	3776.70
MW-54	01/27/98	3823.86	47.27	0	3776.59
MW-54	04/27/98	3823.86	46.86	0	3777.00
MW-54	06/16/98	3823.86	47.31	0	3776.55
MW-54	10/10/98	3823.86	46.79	0	3777.07
MW-55	12/01/91	3794.40	24.43	0	3769.97
MW-55	04/15/92	3794.40	24.77	0	3769.63
MW-55	07/01/92	3794.40	21.89	0	3772.51
MW-55	10/01/92	3794.40	24.47	0	3769.93
MW-55	01/01/93	3794.40	26.57	0	3767.83
MW-55	04/01/93	3794.40	28.70	0	3765.70
MW-55	07/01/93	3794.40	30.02	0	3764.38
MW-55	10/01/93	3794.40	30.76	0	3763.64
MW-55	01/01/94	3794.40	31.15	0	3763.25
MW-55	04/01/94	3794.40	32.30	0	3762.10
MW-55	07/01/94	3794.40	31.90	0	3762.50
MW-55	10/01/94	3794.40	28.61	0	3765.79
MW-55	01/01/95	3794.40	29.50	0	3764.90
MW-55	04/01/95	3794.40	30.65	0	3763.75
MW-55	07/01/95	3794.40	30.65	0	3763.75
MW-55	10/01/95	3794.40	32.20	0	3762.20
MW-55	01/16/96	3794.40	30.74	0	3763.66
MW-55	04/17/96	3794.40	33.03	0	3761.37
MW-55	07/16/96	3794.40	28.85	0	3765.55
MW-55	10/13/96	3794.40	28.02	0	3766.38
MW-55	02/04/97	3794.40	26.43	0	3767.97
MW-55	04/29/97	3794.40	26.91	0	3767.49
MW-55	07/15/97	3794.40	26.81	0	3767.59
MW-55	10/14/97	3794.40	27.21	0	3767.19
MW-55	01/28/98	3794.40	27.38	0	3767.02
MW-55	04/27/98	3794.40	27.57	0	3766.83
MW-55	06/16/98	3794.40	28.00	0	3766.40
MW-55	10/10/98	3794.40	28.36	0	3766.04
MW-56	12/01/91	3782.45	32.58	0	3749.87
MW-56	04/15/92	3782.45	9.26	0	3773.19
MW-56	07/01/92	3782.45	31.37	0	3751.08
MW-56	10/01/92	3782.45	34.68	0	3747.77
MW-56	01/01/93	3782.45	40.40	0	3742.05
MW-56	01/16/96	3782.45	D	--	--
MW-56	04/19/96	3782.45	D	--	--
MW-56	07/16/96	3782.45	D	--	--
MW-56	10/14/96	3782.45	34.34	0	3748.11

Notes:

Water level elevations corrected for condensate using a specific gravity of 0.73

feet amsl Feet above mean sea level

feet bmp Feet below measuring point

D Well was dry at time of gauging

-- No data obtained

Appendix A

Historic Fluid Level Data, May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

Well ID	Date	Measuring Point Elevation (feet amsl)	Depth to Water (feet bmp)	Condensate Thickness (feet)	Corrected Water-Level Elevation (feet amsl)
MW-56	02/04/97	3782.45	37.47	0	3744.98
MW-56	03/18/97	3782.45	40.26	0	3742.19
MW-56	04/29/97	3782.45	42.34	0	3740.11
MW-56	07/15/97	3782.45	43.73	0	3738.72
MW-56	10/14/97	3782.45	D	--	--
MW-56	01/28/98	3782.45	D	--	--
MW-56	04/27/98	3782.45	D	--	--
MW-56	06/16/98	3782.45	D	--	--
MW-56	10/10/98	3782.45	D	--	--
MW-57	05/28/91	3787.70	160.25	0	3627.45
MW-57	06/01/91	3787.70	160.25	0	3627.45
MW-57	07/16/91	3787.70	160.29	0	3627.41
MW-57	08/21/91	3787.70	155.50	0	3632.20
MW-57	09/18/91	3787.70	154.29	0	3633.41
MW-57	10/22/91	3787.70	157.11	0	3630.59
MW-57	11/15/91	3787.70	157.50	0	3630.20
MW-57	03/01/92	3787.70	157.92	0	3629.78
MW-57	04/01/92	3787.70	157.59	0	3630.11
MW-57	05/01/92	3787.70	148.00	0	3639.70
MW-57	06/01/92	3787.70	151.21	0	3636.49
MW-57	07/01/92	3787.70	154.07	0	3633.63
MW-57	08/01/92	3787.70	155.24	0	3632.46
MW-57	09/01/92	3787.70	155.67	0	3632.03
MW-57	10/01/92	3787.70	156.01	0	3631.69
MW-57	11/01/92	3787.70	156.31	0	3631.39
MW-57	12/01/92	3787.70	156.55	0	3631.15
MW-57	01/01/93	3787.70	156.68	0	3631.02
MW-57	02/01/93	3787.70	156.79	0	3630.91
MW-57	03/01/93	3787.70	157.00	0	3630.70
MW-57	04/01/93	3787.70	156.95	0	3630.75
MW-57	05/01/93	3787.70	157.23	0	3630.47
MW-57	06/01/93	3787.70	157.13	0	3630.57
MW-57	07/01/93	3787.70	157.42	0	3630.28
MW-57	08/01/93	3787.70	157.28	0	3630.42
MW-57	09/01/93	3787.70	157.57	0	3630.13
MW-57	10/01/93	3787.70	157.65	0	3630.05
MW-57	11/01/93	3787.70	157.89	0	3629.81
MW-57	12/01/93	3787.70	157.96	0	3629.74
MW-57	01/01/94	3787.70	157.91	0	3629.79
MW-57	02/01/94	3787.70	158.78	0	3628.92
MW-57	03/01/94	3787.70	158.92	0	3628.78
MW-57	04/01/94	3787.70	158.96	0	3628.74
MW-57	05/01/94	3787.70	158.74	0	3628.96
MW-57	07/01/94	3787.70	158.49	0	3629.21
MW-57	08/01/94	3787.70	158.16	0	3629.54
MW-57	09/01/94	3787.70	158.14	0	3629.56
MW-57	10/01/94	3787.70	158.31	0	3629.39
MW-57	12/01/94	3787.70	159.51	0	3628.19
MW-57	01/01/95	3787.70	158.77	0	3628.93

Notes:

Water level elevations corrected for condensate using a specific gravity of 0.73

feet amsl Feet above mean sea level

feet bmp Feet below measuring point

D Well was dry at time of gauging

-- No data obtained

Appendix A

Historic Fluid Level Data, May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

Well ID	Date	Measuring Point Elevation (feet amsl)	Depth to Water (feet bmp)	Condensate Thickness (feet)	Corrected Water-Level Elevation (feet amsl)
MW-57	04/01/95	3787.70	158.96	0	3628.74
MW-57	07/01/95	3787.70	158.06	0	3629.64
MW-57	10/01/95	3787.70	159.23	0	3628.47
MW-57	01/16/96	3787.70	159.67	0	3628.03
MW-57	04/17/96	3787.70	161.95	0	3625.75
MW-57	07/16/96	3787.70	162.02	0	3625.68
MW-57	10/14/96	3787.70	158.83	0	3628.87
MW-57	02/04/97	3787.70	159.89	0	3627.81
MW-57	04/29/97	3787.70	160.23	0	3627.47
MW-57	07/15/97	3787.70	160.29	0	3627.41
MW-57	09/30/97	3787.70	161.30	0	3626.40
MW-57	10/09/97	3787.70	161.33	0	3626.37
MW-57	10/14/97	3787.70	161.13	0	3626.57
MW-57	10/29/97	3787.70	161.04	0.01	3626.66
MW-57	11/04/97	3787.70	161.23	0.01	3626.47
MW-57	11/12/97	3787.70	161.26	0.01	3626.44
MW-57	11/19/97	3787.70	161.34	0.01	3626.36
MW-57	11/24/97	3787.70	161.33	0	3626.37
MW-57	12/10/97	3787.70	161.30	0	3626.40
MW-57	01/28/98	3787.70	161.11	0	3626.59
MW-57	02/25/98	3787.70	161.44	0	3626.26
MW-57	04/27/98	3787.70	161.29	0	3626.41
MW-57	05/28/98	3787.70	161.67	0	3626.03
MW-57	06/16/98	3787.70	161.62	0	3626.08
MW-57	10/10/98	3787.70	162.11	0	3625.59
MW-58	07/16/91	3824.07	197.91	0	3626.16
MW-58	08/21/91	3824.07	193.76	0	3630.31
MW-58	09/18/91	3824.07	193.26	0	3630.81
MW-58	10/22/91	3824.07	194.45	0	3629.62
MW-58	11/15/91	3824.07	194.77	0	3629.30
MW-58	01/16/96	3824.07	D	--	--
MW-58	07/16/96	3824.07	D	--	--
MW-58	10/14/96	3824.07	196.01	0.01	3628.06
MW-58	02/04/97	3824.07	203.00	0	3621.07
MW-58	04/28/97	3824.07	204.14	0	3619.93
MW-58	07/15/97	3824.07	197.66	0	3626.41
MW-58	10/01/97	3824.07	199.20	0.3	3625.08
MW-58	10/09/97	3824.07	199.52	0.67	3625.03
MW-58	10/14/97	3824.07	196.10	0	3627.97
MW-58	01/28/98	3824.07	198.55	0	3625.52
MW-58	05/28/98	3824.07	205.14	0	3618.93
MW-58	10/11/98	3824.07	200.48	0	3623.59
MW-59	07/16/91	3819.59	193.98	0	3625.61
MW-59	08/21/91	3819.59	189.84	0	3629.75
MW-59	09/18/91	3819.59	189.38	0	3630.21
MW-59	10/22/91	3819.59	190.65	0	3628.94
MW-59	11/15/91	3819.59	190.00	0	3629.59
MW-59	01/16/96	3819.59	192.56	0.07	3627.08
MW-59	04/17/96	3819.59	193.37	1.37	3627.22

Notes:

Water level elevations corrected for condensate using a specific gravity of 0.73

feet amsl Feet above mean sea level

feet bmp Feet below measuring point

D Well was dry at time of gauging

-- No data obtained

Appendix A

Historic Fluid Level Data, May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

Well ID	Date	Measuring Point Elevation (feet amsl)	Depth to Water (feet bmp)	Condensate Thickness (feet)	Corrected Water-Level Elevation (feet amsl)
MW-59	07/16/96	3819.59	193.40	1.42	3627.22
MW-59	10/14/96	3819.59	192.43	1.22	3628.05
MW-59	02/04/97	3819.59	193.70	1.28	3626.82
MW-59	04/29/97	3819.59	194.09	1.14	3626.33
MW-59	07/15/97	3819.59	194.11	1.17	3626.33
MW-59	09/30/97	3819.59	195.30	1.2	3625.16
MW-59	10/09/97	3819.59	194.05	0	3625.54
MW-59	10/14/97	3819.59	195.81	1.99	3625.23
MW-59	01/28/98	3819.59	193.94	0	3625.65
MW-59	04/27/98	3819.59	194.15	0	3625.44
MW-59	05/28/98	3819.59	195.72	1.16	3624.71
MW-59	06/16/98	3819.59	195.59	1.19	3624.86
MW-59	10/10/98	3819.59	194.84	1.09	3625.54
MW-60	07/16/91	3815.28	188.22	0	3627.06
MW-60	08/21/91	3815.28	184.81	0	3630.47
MW-60	09/18/91	3815.28	184.32	0	3630.96
MW-60	10/22/91	3815.28	185.50	0	3629.78
MW-60	11/15/91	3815.28	185.43	0	3629.85
MW-60	03/01/92	3815.28	186.00	0	3629.28
MW-60	04/01/92	3815.28	185.79	0	3629.49
MW-60	05/01/92	3815.28	180.10	0	3635.18
MW-60	06/01/92	3815.28	181.67	0	3633.61
MW-60	07/01/92	3815.28	183.21	0	3632.07
MW-60	08/01/92	3815.28	183.61	0	3631.67
MW-60	09/01/92	3815.28	183.94	0	3631.34
MW-60	10/01/92	3815.28	184.18	0	3631.10
MW-60	11/01/92	3815.28	184.44	0	3630.84
MW-60	12/01/92	3815.28	184.67	0	3630.61
MW-60	01/01/93	3815.28	184.75	0	3630.53
MW-60	02/01/93	3815.28	184.86	0	3630.42
MW-60	03/01/93	3815.28	185.08	0	3630.20
MW-60	04/01/93	3815.28	185.02	0	3630.26
MW-60	05/01/93	3815.28	185.29	0	3629.99
MW-60	06/01/93	3815.28	185.23	0	3630.05
MW-60	07/01/93	3815.28	185.47	0	3629.81
MW-60	08/01/93	3815.28	185.41	0	3629.87
MW-60	09/01/93	3815.28	185.66	0	3629.62
MW-60	10/01/93	3815.28	185.70	0	3629.58
MW-60	11/01/93	3815.28	185.96	0	3629.32
MW-60	12/01/93	3815.28	185.98	0	3629.30
MW-60	01/01/94	3815.28	185.93	0	3629.35
MW-60	02/01/94	3815.28	186.79	0	3628.49
MW-60	03/01/94	3815.28	184.91	0	3630.37
MW-60	04/01/94	3815.28	186.91	0	3628.37
MW-60	05/01/94	3815.28	186.71	0	3628.57
MW-60	07/01/94	3815.28	186.54	0	3628.74
MW-60	08/01/94	3815.28	185.34	0	3629.94
MW-60	09/01/94	3815.28	186.24	0	3629.04
MW-60	10/01/94	3815.28	186.44	0	3628.84

Notes:

Water level elevations corrected for condensate using a specific gravity of 0.73

feet amsl Feet above mean sea level

feet bmp Feet below measuring point

D Well was dry at time of gauging

-- No data obtained

Appendix A

Historic Fluid Level Data, May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

Well ID	Date	Measuring Point Elevation (feet amsl)	Depth to Water (feet bmp)	Condensate Thickness (feet)	Corrected Water-Level Elevation (feet amsl)
MW-60	12/01/94	3815.28	187.54	0	3627.74
MW-60	01/01/95	3815.28	186.81	0	3628.47
MW-60	04/01/95	3815.28	187.01	0	3628.27
MW-60	07/01/95	3815.28	187.09	0	3628.19
MW-60	10/01/95	3815.28	187.29	0	3627.99
MW-60	01/19/96	3815.28	187.76	0	3627.52
MW-60	04/17/96	3815.28	187.83	0	3627.45
MW-60	07/16/96	3815.28	188.04	0	3627.24
MW-60	10/13/96	3815.28	187.89	0	3627.39
MW-60	02/04/97	3815.28	188.19	0	3627.09
MW-60	03/18/97	3815.28	188.40	0	3626.88
MW-60	04/28/97	3815.28	188.48	0	3626.80
MW-60	07/14/97	3815.28	188.74	0	3626.54
MW-60	10/01/97	3815.28	189.70	0	3625.58
MW-60	10/09/97	3815.28	189.65	0	3625.63
MW-60	10/13/97	3815.28	189.97	0	3625.31
MW-60	01/27/98	3815.28	189.37	0	3625.91
MW-60	04/27/98	3815.28	189.65	0	3625.63
MW-60	05/28/98	3815.28	190.32	0	3624.96
MW-60	06/15/98	3815.28	189.90	0	3625.38
MW-60	10/10/98	3815.28	190.04	0	3625.24
MW-61A	07/16/91	3815.97	189.06	0	3626.91
MW-61A	08/21/91	3815.97	186.85	0	3629.12
MW-61A	09/18/91	3815.97	186.92	0	3629.05
MW-61A	10/22/91	3815.97	187.99	0	3627.98
MW-61A	11/15/91	3815.97	187.00	0	3628.97
MW-61A	10/01/94	3815.97	187.26	0	3628.71
MW-61A	12/01/94	3815.97	188.24	0	3627.73
MW-61A	01/01/95	3815.97	187.57	0	3628.40
MW-61A	02/04/97	3815.97	187.98	0	3627.99
MW-61A	04/28/97	3815.97	188.14	0	3627.83
MW-61A	07/14/97	3815.97	191.60	0	3624.37
MW-61A	09/30/97	3815.97	191.10	0	3624.87
MW-61A	10/09/97	3815.97	192.16	0.01	3623.81
MW-61A	10/13/97	3815.97	190.78	0	3625.19
MW-61A	01/27/98	3815.97	192.27	0	3623.70
MW-61A	04/27/98	3815.97	192.64	0	3623.33
MW-61A	05/28/98	3815.97	192.00	0	3623.97
MW-61A	06/15/98	3815.97	193.73	0	3622.24
MW-61A	10/10/98	3815.97	193.22	0	3622.75
MW-62	08/21/91	3819.90	189.51	0	3630.39
MW-62	09/18/91	3819.90	189.11	0	3630.79
MW-62	10/22/91	3819.90	190.80	0	3629.10
MW-62	11/15/91	3819.90	189.60	0	3630.30
MW-62	01/16/96	3819.90	192.04	0.01	3627.86
MW-62	04/17/96	3819.90	192.39	0.01	3627.51
MW-62	07/16/96	3819.90	192.34	0	3627.56
MW-62	10/14/96	3819.90	191.45	0.01	3628.45
MW-62	02/04/97	3819.90	192.57	0	3627.33

Notes:

Water level elevations corrected for condensate using a specific gravity of 0.73

feet amsl Feet above mean sea level

feet bmp Feet below measuring point

D Well was dry at time of gauging

-- No data obtained

Appendix A

Historic Fluid Level Data, May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

Well ID	Date	Measuring Point Elevation (feet amsl)	Depth to Water (feet bmp)	Condensate Thickness (feet)	Corrected Water-Level Elevation (feet amsl)
MW-62	04/28/97	3819.90	192.89	0	3627.01
MW-62	07/15/97	3819.90	193.26	0	3626.64
MW-62	09/30/97	3819.90	194.20	0	3625.70
MW-62	10/09/97	3819.90	194.20	0	3625.70
MW-62	10/14/97	3819.90	193.80	0	3626.10
MW-62	10/29/97	3819.90	194.22	0.01	3625.68
MW-62	11/04/97	3819.90	194.18	0	3625.72
MW-62	11/12/97	3819.90	194.14	0.02	3625.77
MW-62	11/19/97	3819.90	194.30	0.01	3625.60
MW-62	11/24/97	3819.90	194.24	0.01	3625.66
MW-62	12/10/97	3819.90	194.33	0	3625.57
MW-62	01/28/98	3819.90	193.81	0	3626.09
MW-62	02/25/98	3819.90	194.32	0	3625.58
MW-62	04/27/98	3819.90	194.22	0	3625.68
MW-62	05/28/98	3819.90	194.76	0	3625.14
MW-62	06/16/98	3819.90	194.34	0	3625.56
MW-62	10/10/98	3819.90	194.77	0	3625.13
MW-63	08/21/91	3826.16	193.73	0	3632.43
MW-63	09/18/91	3826.16	190.65	0	3635.51
MW-63	10/22/91	3826.16	194.29	0	3631.87
MW-63	11/15/91	3826.16	195.34	0	3630.82
MW-63	03/01/92	3826.16	196.82	0	3629.34
MW-63	04/01/92	3826.16	197.02	0	3629.14
MW-63	05/01/92	3826.16	183.25	0	3642.91
MW-63	06/01/92	3826.16	187.21	0	3638.95
MW-63	07/01/92	3826.16	189.00	0	3637.16
MW-63	08/01/92	3826.16	192.73	0	3633.43
MW-63	09/01/92	3826.16	193.65	0	3632.51
MW-63	10/01/92	3826.16	194.24	0	3631.92
MW-63	11/01/92	3826.16	194.90	0	3631.26
MW-63	12/01/92	3826.16	195.32	0	3630.84
MW-63	01/01/93	3826.16	195.55	0	3630.61
MW-63	02/01/93	3826.16	195.84	0	3630.32
MW-63	03/01/93	3826.16	196.14	0	3630.02
MW-63	04/01/93	3826.16	195.99	0	3630.17
MW-63	05/01/93	3826.16	196.34	0	3629.82
MW-63	06/01/93	3826.16	196.43	0	3629.73
MW-63	07/01/93	3826.16	196.62	0	3629.54
MW-63	08/01/93	3826.16	196.69	0	3629.47
MW-63	09/01/93	3826.16	196.93	0	3629.23
MW-63	10/01/93	3826.16	196.89	0	3629.27
MW-63	11/01/93	3826.16	197.32	0	3628.84
MW-63	12/01/93	3826.16	197.43	0	3628.73
MW-63	01/01/94	3826.16	197.33	0	3628.83
MW-63	02/01/94	3826.16	198.42	0	3627.74
MW-63	03/01/94	3826.16	198.37	0	3627.79
MW-63	04/01/94	3826.16	197.47	0	3628.69
MW-63	05/01/94	3826.16	198.28	0	3627.88
MW-63	07/01/94	3826.16	197.98	0	3628.18

Notes:

Water level elevations corrected for condensate using a specific gravity of 0.73

feet amsl Feet above mean sea level

feet bmp Feet below measuring point

D Well was dry at time of gauging

-- No data obtained

Appendix A

Historic Fluid Level Data, May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

Well ID	Date	Measuring Point Elevation (feet amsl)	Depth to Water (feet bmp)	Condensate Thickness (feet)	Corrected Water-Level Elevation (feet amsl)
MW-63	08/01/94	3826.16	197.12	0	3629.04
MW-63	09/01/94	3826.16	197.33	0	3628.83
MW-63	10/01/94	3826.16	197.74	0	3628.42
MW-63	12/01/94	3826.16	199.00	0	3627.16
MW-63	01/01/95	3826.16	198.20	0	3627.96
MW-63	04/01/95	3826.16	198.46	0	3627.70
MW-63	07/01/95	3826.16	198.49	0	3627.67
MW-63	10/01/95	3826.16	198.57	0	3627.59
MW-63	01/16/96	3826.16	198.90	0	3627.26
MW-63	04/17/96	3826.16	199.23	0	3626.93
MW-63	07/16/96	3826.16	198.91	0	3627.25
MW-63	10/13/96	3826.16	194.89	0	3631.27
MW-63	02/04/97	3826.16	199.01	0	3627.15
MW-63	04/28/97	3826.16	199.46	0	3626.70
MW-63	07/14/97	3826.16	200.01	0	3626.15
MW-63	10/01/97	3826.16	200.80	0	3625.36
MW-63	10/09/97	3826.16	209.05	0	3617.11
MW-63	10/13/97	3826.16	200.88	0	3625.28
MW-63	01/27/98	3826.16	200.96	0	3625.20
MW-63	04/27/98	3826.16	201.28	0	3624.88
MW-63	05/28/98	3826.16	200.72	0	3625.44
MW-63	06/16/98	3826.16	201.56	0	3624.60
MW-63	10/09/98	3826.16	202.01	0	3624.15
MW-64	08/21/91	3798.57	167.43	0	3631.14
MW-64	09/18/91	3798.57	167.21	0	3631.36
MW-64	10/22/91	3798.57	168.66	0	3629.91
MW-64	11/15/91	3798.57	168.90	0	3629.67
MW-64	03/01/92	3798.57	169.20	0	3629.37
MW-64	04/01/92	3798.57	169.00	0	3629.57
MW-64	05/01/92	3798.57	161.58	0	3636.99
MW-64	06/01/92	3798.57	164.25	0	3634.32
MW-64	07/01/92	3798.57	166.36	0	3632.21
MW-64	08/01/92	3798.57	166.82	0	3631.75
MW-64	09/01/92	3798.57	167.17	0	3631.40
MW-64	10/01/92	3798.57	167.45	0	3631.12
MW-64	11/01/92	3798.57	167.63	0	3630.94
MW-64	12/01/92	3798.57	167.85	0	3630.72
MW-64	01/01/93	3798.57	167.99	0	3630.58
MW-64	02/01/93	3798.57	168.08	0	3630.49
MW-64	03/01/93	3798.57	168.26	0	3630.31
MW-64	04/01/93	3798.57	168.22	0	3630.35
MW-64	05/01/93	3798.57	168.52	0	3630.05
MW-64	06/01/93	3798.57	168.46	0	3630.11
MW-64	07/01/93	3798.57	168.70	0	3629.87
MW-64	08/01/93	3798.57	168.59	0	3629.98
MW-64	09/01/93	3798.57	168.83	0	3629.74
MW-64	10/01/93	3798.57	168.88	0	3629.69
MW-64	11/01/93	3798.57	169.09	0	3629.48
MW-64	12/01/93	3798.57	169.13	0	3629.44

Notes:

Water level elevations corrected for condensate using a specific gravity of 0.73

feet amsl Feet above mean sea level

feet bmp Feet below measuring point

D Well was dry at time of gauging

-- No data obtained

Appendix A

Historic Fluid Level Data, May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

Well ID	Date	Measuring Point Elevation (feet amsl)	Depth to Water (feet bmp)	Condensate Thickness (feet)	Corrected Water-Level Elevation (feet amsl)
MW-64	01/01/94	3798.57	169.12	0	3629.45
MW-64	02/01/94	3798.57	169.92	0	3628.65
MW-64	03/01/94	3798.57	170.05	0	3628.52
MW-64	04/01/94	3798.57	170.03	0	3628.54
MW-64	05/01/94	3798.57	169.89	0	3628.68
MW-64	07/01/94	3798.57	169.65	0	3628.92
MW-64	08/01/94	3798.57	168.39	0	3630.18
MW-64	09/01/94	3798.57	169.32	0	3629.25
MW-64	10/01/94	3798.57	169.56	0	3629.01
MW-64	12/01/94	3798.57	170.71	0	3627.86
MW-64	01/01/95	3798.57	169.94	0	3628.63
MW-64	04/01/95	3798.57	170.13	0	3628.44
MW-64	07/01/95	3798.57	170.24	0	3628.33
MW-64	10/01/95	3798.57	170.33	0	3628.24
MW-64	01/19/96	3798.57	170.87	0	3627.70
MW-64	04/17/96	3798.57	170.98	0	3627.59
MW-64	07/16/96	3798.57	171.27	0.33	3627.54
MW-64	10/13/96	3798.57	170.69	0.29	3628.09
MW-64	02/04/97	3798.57	171.53	0.38	3627.31
MW-64	03/18/97	3798.57	171.95	0.55	3627.02
MW-64	04/28/97	3798.57	171.93	0.55	3627.04
MW-64	07/15/97	3798.57	171.41	0.53	3627.54
MW-64	10/01/97	3798.57	173.70	1.4	3625.89
MW-64	10/09/97	3798.57	173.58	1.28	3625.92
MW-64	10/13/97	3798.57	173.33	1.29	3626.18
MW-64	10/21/97	3798.57	173.34	1.17	3626.08
MW-64	11/12/97	3798.57	176.15	0	3622.42
MW-64	11/19/97	3798.57	173.02	0	3625.55
MW-64	11/24/97	3798.57	174.56	0	3624.01
MW-64	12/10/97	3798.57	174.50	0	3624.07
MW-64	01/06/98	3798.57	174.50	0	3624.07
MW-64	01/15/98	3798.57	174.40	0	3624.17
MW-64	01/20/98	3798.57	174.56	0	3624.01
MW-64	01/28/98	3798.57	174.56	0	3624.01
MW-64	02/03/98	3798.57	173.16	0	3625.41
MW-64	02/25/98	3798.57	172.77	0	3625.80
MW-64	04/27/98	3798.57	172.74	0	3625.83
MW-64	05/28/98	3798.57	173.84	0	3624.73
MW-64	06/15/98	3798.57	173.03	0	3625.54
MW-64	10/10/98	3798.57	173.41	0	3625.16
MW-65	12/01/91	3763.31	55.90	0	3707.41
MW-65	07/01/93	3763.31	56.34	0	3706.97
MW-65	10/01/93	3763.31	56.81	0	3706.50
MW-65	01/01/94	3763.31	56.67	0	3706.64
MW-65	07/01/94	3763.31	56.70	0	3706.61
MW-65	10/01/94	3763.31	56.20	0	3707.11
MW-65	01/01/95	3763.31	56.58	0	3706.73
MW-65	04/01/95	3763.31	57.14	0	3706.17
MW-65	07/01/95	3763.31	57.14	0	3706.17

Notes:

Water level elevations corrected for condensate using a specific gravity of 0.73

feet amsl Feet above mean sea level

feet bmp Feet below measuring point

D Well was dry at time of gauging

-- No data obtained

Appendix A

Historic Fluid Level Data, May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

Well ID	Date	Measuring Point Elevation (feet amsl)	Depth to Water (feet bmp)	Condensate Thickness (feet)	Corrected Water-Level Elevation (feet amsl)
MW-65	10/01/95	3763.31	57.07	0	3706.24
MW-65	01/16/96	3763.31	57.25	0	3706.06
MW-65	04/17/96	3763.31	57.35	0	3705.96
MW-65	07/16/96	3763.31	56.01	0	3707.30
MW-65	10/14/96	3763.31	56.92	0	3706.39
MW-65	02/04/97	3763.31	56.12	0	3707.19
MW-65	04/28/97	3763.31	56.18	0	3707.13
MW-65	07/15/97	3763.31	56.44	0	3706.87
MW-65	10/14/97	3763.31	56.22	0	3707.09
MW-65	01/28/98	3763.31	56.29	0	3707.02
MW-65	04/27/98	3763.31	56.39	0	3706.92
MW-65	06/15/98	3763.31	57.22	0	3706.09
MW-65A	08/21/91	3763.26	131.36	0	3631.90
MW-65A	09/18/91	3763.26	130.91	0	3632.35
MW-65A	10/22/91	3763.26	133.09	0	3630.17
MW-65A	11/15/91	3763.26	133.70	0	3629.56
MW-65A	01/16/96	3763.26	136.11	1.3	3628.09
MW-65A	06/15/98	3763.26	137.96	0.93	3625.97
MW-66	08/21/91	3828.98	196.77	0	3632.21
MW-66	09/18/91	3828.98	198.73	0	3630.25
MW-66	10/22/91	3828.98	199.70	0	3629.28
MW-66	11/15/91	3828.98	199.88	0	3629.10
MW-66	03/01/92	3828.98	200.37	0	3628.61
MW-66	04/01/92	3828.98	200.25	0	3628.73
MW-66	05/01/92	3828.98	195.25	0	3633.73
MW-66	06/01/92	3828.98	196.08	0	3632.90
MW-66	07/01/92	3828.98	197.35	0	3631.63
MW-66	08/01/92	3828.98	197.77	0	3631.21
MW-66	09/01/92	3828.98	198.17	0	3630.81
MW-66	10/01/92	3828.98	198.40	0	3630.58
MW-66	11/01/92	3828.98	198.76	0	3630.22
MW-66	12/01/92	3828.98	198.98	0	3630.00
MW-66	01/01/93	3828.98	199.10	0	3629.88
MW-66	02/01/93	3828.98	199.23	0	3629.75
MW-66	03/01/93	3828.98	199.49	0	3629.49
MW-66	04/01/93	3828.98	199.38	0	3629.60
MW-66	05/01/93	3828.98	199.63	0	3629.35
MW-66	06/01/93	3828.98	199.59	0	3629.39
MW-66	07/01/93	3828.98	199.82	0	3629.16
MW-66	08/01/93	3828.98	199.78	0	3629.20
MW-66	09/01/93	3828.98	200.01	0	3628.97
MW-66	10/01/93	3828.98	200.09	0	3628.89
MW-66	11/01/93	3828.98	200.35	0	3628.63
MW-66	12/01/93	3828.98	200.42	0	3628.56
MW-66	01/01/94	3828.98	200.33	0	3628.65
MW-66	02/01/94	3828.98	201.39	0	3627.59
MW-66	03/01/94	3828.98	201.44	0	3627.54
MW-66	04/01/94	3828.98	201.36	0	3627.62
MW-66	05/01/94	3828.98	201.26	0	3627.72

Notes:

Water level elevations corrected for condensate using a specific gravity of 0.73

feet amsl Feet above mean sea level

feet bmp Feet below measuring point

D Well was dry at time of gauging

-- No data obtained

Appendix A

Historic Fluid Level Data, May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

Well ID	Date	Measuring Point Elevation (feet amsl)	Depth to Water (feet bmp)	Condensate Thickness (feet)	Corrected Water-Level Elevation (feet amsl)
MW-66	07/01/94	3828.98	200.91	0	3628.07
MW-66	08/01/94	3828.98	199.86	0	3629.12
MW-66	09/01/94	3828.98	200.66	0	3628.32
MW-66	10/01/94	3828.98	200.83	0	3628.15
MW-66	12/01/94	3828.98	201.96	0	3627.02
MW-66	01/01/95	3828.98	201.04	0	3627.94
MW-66	04/01/95	3828.98	202.26	0	3626.72
MW-66	07/01/95	3828.98	201.59	0	3627.39
MW-66	10/01/95	3828.98	201.62	0	3627.36
MW-66	01/16/96	3828.98	200.89	0	3628.09
MW-66	04/17/96	3828.98	202.29	0	3626.69
MW-66	07/16/96	3828.98	202.45	0	3626.53
MW-66	10/13/96	3828.98	200.80	0	3628.18
MW-66	02/04/97	3828.98	202.60	0	3626.38
MW-66	04/28/97	3828.98	202.84	0	3626.14
MW-66	07/14/97	3828.98	202.72	0	3626.26
MW-66	09/30/97	3828.98	204.00	0	3624.98
MW-66	10/09/97	3828.98	204.20	0	3624.78
MW-66	10/13/97	3828.98	203.77	0	3625.21
MW-66	01/27/98	3828.98	203.79	0	3625.19
MW-66	04/27/98	3828.98	204.09	0	3624.89
MW-66	05/28/98	3828.98	204.18	0	3624.80
MW-66	06/15/98	3828.98	204.37	0	3624.61
MW-66	10/10/98	3828.98	204.86	0	3624.12
MW-67	09/18/91	3765.87	133.99	0	3631.88
MW-67	10/22/91	3765.87	135.74	0	3630.13
MW-67	11/15/91	3765.87	136.00	0	3629.87
MW-67	03/01/92	3765.87	136.35	0	3629.52
MW-67	04/01/92	3765.87	136.25	0	3629.62
MW-67	05/01/92	3765.87	127.66	0	3638.21
MW-67	06/01/92	3765.87	131.08	0	3634.79
MW-67	07/01/92	3765.87	133.24	0	3632.63
MW-67	08/01/92	3765.87	133.89	0	3631.98
MW-67	09/01/92	3765.87	134.24	0	3631.63
MW-67	10/01/92	3765.87	134.33	0	3631.54
MW-67	11/01/92	3765.87	134.76	0	3631.11
MW-67	12/01/92	3765.87	135.00	0	3630.87
MW-67	01/01/93	3765.87	135.10	0	3630.77
MW-67	02/01/93	3765.87	135.19	0	3630.68
MW-67	03/01/93	3765.87	135.39	0	3630.48
MW-67	04/01/93	3765.87	135.37	0	3630.50
MW-67	05/01/93	3765.87	135.63	0	3630.24
MW-67	06/01/93	3765.87	135.58	0	3630.29
MW-67	07/01/93	3765.87	135.81	0	3630.06
MW-67	08/01/93	3765.87	135.69	0	3630.18
MW-67	09/01/93	3765.87	135.99	0	3629.88
MW-67	10/01/93	3765.87	136.04	0	3629.83
MW-67	11/01/93	3765.87	136.26	0	3629.61
MW-67	12/01/93	3765.87	136.31	0	3629.56

Notes:

Water level elevations corrected for condensate using a specific gravity of 0.73

feet amsl Feet above mean sea level

feet bmp Feet below measuring point

D Well was dry at time of gauging

-- No data obtained

Appendix A

Historic Fluid Level Data, May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

Well ID	Date	Measuring Point Elevation (feet amsl)	Depth to Water (feet bmp)	Condensate Thickness (feet)	Corrected Water-Level Elevation (feet amsl)
MW-67	01/01/94	3765.87	136.25	0	3629.62
MW-67	02/01/94	3765.87	137.16	0	3628.71
MW-67	03/01/94	3765.87	137.22	0	3628.65
MW-67	04/01/94	3765.87	137.31	0	3628.56
MW-67	05/01/94	3765.87	137.14	0	3628.73
MW-67	07/01/94	3765.87	136.82	0	3629.05
MW-67	08/01/94	3765.87	135.55	0	3630.32
MW-67	09/01/94	3765.87	136.58	0	3629.29
MW-67	10/01/94	3765.87	136.71	0	3629.16
MW-67	12/01/94	3765.87	137.89	0	3627.98
MW-67	01/01/95	3765.87	137.09	0	3628.78
MW-67	04/01/95	3765.87	137.29	0	3628.58
MW-67	07/01/95	3765.87	137.40	0	3628.47
MW-67	10/01/95	3765.87	137.54	0	3628.33
MW-67	01/19/96	3765.87	138.02	0	3627.85
MW-67	04/17/96	3765.87	138.13	0	3627.74
MW-67	07/16/96	3765.87	138.14	0	3627.73
MW-67	10/14/96	3765.87	137.53	0	3628.34
MW-67	02/04/97	3765.87	138.37	0	3627.50
MW-67	04/28/97	3765.87	138.64	0	3627.23
MW-67	07/15/97	3765.87	138.95	0	3626.92
MW-67	10/01/97	3765.87	140.50	0.8	3625.95
MW-67	10/09/97	3765.87	144.05	4.35	3624.99
MW-67	10/13/97	3765.87	139.98	0.67	3626.37
MW-67	10/21/97	3765.87	140.55	0.75	3625.86
MW-67	10/29/97	3765.87	140.54	0.83	3625.93
MW-67	11/04/97	3765.87	140.43	0.75	3625.98
MW-67	11/12/97	3765.87	140.52	0.87	3625.98
MW-67	11/19/97	3765.87	140.55	0.77	3625.88
MW-67	11/24/97	3765.87	140.70	0.95	3625.86
MW-67	12/10/97	3765.87	140.57	0.85	3625.92
MW-67	01/06/98	3765.87	139.76	0	3626.11
MW-67	01/15/98	3765.87	139.75	0	3626.12
MW-67	01/20/98	3765.87	141.43	0.9	3625.09
MW-67	01/28/98	3765.87	140.14	0.77	3626.29
MW-67	02/03/98	3765.87	141.33	0.73	3625.07
MW-67	02/10/98	3765.87	141.32	0	3624.55
MW-67	02/17/98	3765.87	141.81	0.44	3624.38
MW-67	02/25/98	3765.87	141.12	0	3624.75
MW-67	04/27/98	3765.87	141.13	0.65	3625.21
MW-67	05/28/98	3765.87	141.43	0	3624.44
MW-67	06/15/98	3765.87	141.49	0	3624.38
MW-67	10/10/98	3765.87	140.50	0.05	3625.40
MW-68	09/18/91	3797.83	166.68	0	3631.15
MW-68	10/22/91	3797.83	169.37	0	3628.46
MW-68	11/15/91	3797.83	167.30	0	3630.53
MW-68	10/14/97	3797.83	171.76	0	3626.07
MW-68	01/27/98	3797.83	173.22	1.99	3626.06
MW-68	06/17/98	3797.83	172.90	0.85	3625.55

Notes:

Water level elevations corrected for condensate using a specific gravity of 0.73

feet amsl Feet above mean sea level

feet bmp Feet below measuring point

D Well was dry at time of gauging

-- No data obtained

Appendix A

Historic Fluid Level Data, May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

Well ID	Date	Measuring Point Elevation (feet amsl)	Depth to Water (feet bmp)	Condensate Thickness (feet)	Corrected Water-Level Elevation (feet amsl)
MW-69	12/01/91	3805.11	29.38	0	3775.73
MW-69	04/15/92	3805.11	31.63	0	3773.48
MW-69	07/01/92	3805.11	24.71	0	3780.40
MW-69	10/01/92	3805.11	31.37	0	3773.74
MW-69	01/01/93	3805.11	33.61	0	3771.50
MW-69	04/01/93	3805.11	39.58	0	3765.53
MW-69	07/01/93	3805.11	41.96	0	3763.15
MW-69	10/01/93	3805.11	41.26	0	3763.85
MW-69	10/01/95	3805.11	32.51	0	3772.60
MW-69	01/20/96	3805.11	37.54	4.19	3770.62
MW-69	04/17/96	3805.11	36.60	0.26	3768.69
MW-69	07/15/96	3805.11	31.26	0.36	3774.11
MW-69	02/03/97	3805.11	34.33	3.24	3773.14
MW-69	04/28/97	3805.11	32.74	0.02	3772.38
MW-69	07/14/97	3805.11	34.34	0.02	3770.78
MW-69	10/13/97	3805.11	35.55	0	3769.56
MW-69	01/27/98	3805.11	39.44	2.45	3767.45
MW-69	04/27/98	3805.11	39.08	0	3766.03
MW-69	06/15/98	3805.11	40.77	0.79	3764.91
MW-70	09/18/91	3822.57	191.59	0	3630.98
MW-70	10/22/91	3822.57	191.68	0	3630.89
MW-70	11/15/91	3822.57	192.20	0	3630.37
MW-70	03/01/92	3822.57	192.74	0	3629.83
MW-70	04/01/92	3822.57	192.62	0	3629.95
MW-70	05/01/92	3822.57	189.97	0	3632.60
MW-70	06/01/92	3822.57	188.42	0	3634.15
MW-70	07/01/92	3822.57	188.87	0	3633.70
MW-70	08/01/92	3822.57	189.54	0	3633.03
MW-70	09/01/92	3822.57	190.02	0	3632.55
MW-70	10/01/92	3822.57	190.48	0	3632.09
MW-70	11/01/92	3822.57	190.86	0	3631.71
MW-70	12/01/92	3822.57	191.17	0	3631.40
MW-70	01/01/93	3822.57	191.39	0	3631.18
MW-70	02/01/93	3822.57	191.54	0	3631.03
MW-70	03/01/93	3822.57	191.77	0	3630.80
MW-70	04/01/93	3822.57	191.80	0	3630.77
MW-70	05/01/93	3822.57	192.09	0	3630.48
MW-70	06/01/93	3822.57	192.18	0	3630.39
MW-70	07/01/93	3822.57	192.32	0	3630.25
MW-70	08/01/93	3822.57	192.30	0	3630.27
MW-70	09/01/93	3822.57	192.53	0	3630.04
MW-70	10/01/93	3822.57	192.65	0	3629.92
MW-70	11/01/93	3822.57	192.91	0	3629.66
MW-70	12/01/93	3822.57	192.96	0	3629.61
MW-70	01/01/94	3822.57	192.99	0	3629.58
MW-70	02/01/94	3822.57	194.02	0	3628.55
MW-70	03/01/94	3822.57	194.00	0	3628.57
MW-70	04/01/94	3822.57	193.19	0	3629.38
MW-70	05/01/94	3822.57	193.86	0	3628.71

Notes:

Water level elevations corrected for condensate using a specific gravity of 0.73

feet amsl Feet above mean sea level

feet bmp Feet below measuring point

D Well was dry at time of gauging

-- No data obtained

Appendix A

Historic Fluid Level Data, May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

Well ID	Date	Measuring Point Elevation (feet amsl)	Depth to Water (feet bmp)	Condensate Thickness (feet)	Corrected Water-Level Elevation (feet amsl)
MW-70	07/01/94	3822.57	193.59	0	3628.98
MW-70	08/01/94	3822.57	193.09	0	3629.48
MW-70	09/01/94	3822.57	193.17	0	3629.40
MW-70	10/01/94	3822.57	193.38	0	3629.19
MW-70	12/01/94	3822.57	194.58	0	3627.99
MW-70	01/01/95	3822.57	192.83	0	3629.74
MW-70	04/01/95	3822.57	194.11	0	3628.46
MW-70	07/01/95	3822.57	194.19	0	3628.38
MW-70	10/01/95	3822.57	194.19	0	3628.38
MW-70	01/16/96	3822.57	194.68	0	3627.89
MW-70	04/17/96	3822.57	194.94	0	3627.63
MW-70	07/15/96	3822.57	194.70	0	3627.87
MW-70	10/13/96	3822.57	193.98	0	3628.59
MW-70	02/03/97	3822.57	194.47	0	3628.10
MW-70	04/28/97	3822.57	195.01	0	3627.56
MW-70	07/14/97	3822.57	195.44	0	3627.13
MW-70	10/01/97	3822.57	196.20	0	3626.37
MW-70	10/13/97	3822.57	196.05	0	3626.52
MW-70	10/29/97	3822.57	196.24	0.01	3626.33
MW-70	11/04/97	3822.57	196.35	0	3626.22
MW-70	11/12/97	3822.57	196.34	0	3626.23
MW-70	11/19/97	3822.57	196.36	0.01	3626.21
MW-70	11/24/97	3822.57	196.36	0	3626.21
MW-70	12/10/97	3822.57	196.47	0	3626.10
MW-70	01/27/98	3822.57	196.22	0	3626.35
MW-70	02/25/98	3822.57	196.45	0	3626.12
MW-70	04/27/98	3822.57	196.48	0	3626.09
MW-70	05/28/98	3822.57	196.91	0	3625.66
MW-70	06/15/98	3822.57	196.74	0	3625.83
MW-70	10/09/98	3822.57	197.27	0	3625.30
MW-71	10/01/93	3778.05	149.68	0	3628.37
MW-71	11/01/93	3778.05	149.90	0	3628.15
MW-71	12/01/93	3778.05	149.93	0	3628.12
MW-71	01/01/94	3778.05	149.92	0	3628.13
MW-71	02/01/94	3778.05	150.94	0	3627.11
MW-71	03/01/94	3778.05	150.90	0	3627.15
MW-71	04/01/94	3778.05	149.98	0	3628.07
MW-71	05/01/94	3778.05	150.64	0	3627.41
MW-71	07/01/94	3778.05	150.37	0	3627.68
MW-71	08/01/94	3778.05	149.35	0	3628.70
MW-71	09/01/94	3778.05	150.19	0	3627.86
MW-71	10/01/94	3778.05	150.41	0	3627.64
MW-71	12/01/94	3778.05	151.41	0	3626.64
MW-71	01/01/95	3778.05	150.65	0	3627.40
MW-71	04/01/95	3778.05	150.88	0	3627.17
MW-71	07/01/95	3778.05	150.84	0	3627.21
MW-71	10/01/95	3778.05	151.15	0	3626.90
MW-71	01/16/96	3778.05	151.36	0	3626.69
MW-71	04/17/96	3778.05	151.74	0	3626.31

Notes:

Water level elevations corrected for condensate using a specific gravity of 0.73

feet amsl Feet above mean sea level

feet bmp Feet below measuring point

D Well was dry at time of gauging

-- No data obtained

Appendix A

Historic Fluid Level Data, May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

Well ID	Date	Measuring Point Elevation (feet amsl)	Depth to Water (feet bmp)	Condensate Thickness (feet)	Corrected Water-Level Elevation (feet amsl)
MW-71	07/16/96	3778.05	151.69	0	3626.36
MW-71	10/13/96	3778.05	149.72	0	3628.33
MW-71	02/04/97	3778.05	152.39	0	3625.66
MW-71	04/28/97	3778.05	152.52	0	3625.53
MW-71	07/14/97	3778.05	152.86	0	3625.19
MW-71	10/01/97	3778.05	153.40	0	3624.65
MW-71	10/09/97	3778.05	153.41	0.01	3624.64
MW-71	10/13/97	3778.05	153.39	0	3624.66
MW-71	01/28/98	3778.05	153.47	0	3624.58
MW-71	04/27/98	3778.05	153.91	0	3624.14
MW-71	05/28/98	3778.05	153.86	0	3624.19
MW-71	06/15/98	3778.05	153.88	0	3624.17
MW-71	10/10/98	3778.05	154.34	0	3623.71
MW-72	10/01/93	3819.32	190.55	0.5	3629.14
MW-72	11/01/93	3819.32	189.91	0	3629.41
MW-72	12/01/93	3819.32	196.73	3.72	3625.30
MW-72	01/16/96	3819.32	216.76	16.5	3614.60
MW-72	04/17/96	3819.32	214.60	16.35	3616.65
MW-72	07/16/96	3819.32	201.95	11.85	3626.02
MW-72	10/14/96	3819.32	211.05	5.84	3612.53
MW-72	02/04/97	3819.32	213.65	1.22	3606.56
MW-72	04/29/97	3819.32	197.65	2.72	3623.65
MW-72	07/15/97	3819.32	212.06	6.71	3612.15
MW-72	10/09/97	3819.32	228.35	0	3590.97
MW-72	10/14/97	3819.32	229.54	0	3589.78
MW-72	10/29/97	3819.32	229.55	0	3589.77
MW-72	11/04/97	3819.32	227.75	0	3591.57
MW-72	11/12/97	3819.32	227.83	0	3591.49
MW-72	11/19/97	3819.32	206.30	0.26	3613.20
MW-72	11/24/97	3819.32	227.73	0	3591.59
MW-72	12/10/97	3819.32	228.74	0	3590.58
MW-72	01/06/98	3819.32	228.54	0.02	3590.79
MW-72	01/15/98	3819.32	228.50	0	3590.82
MW-72	01/20/98	3819.32	228.92	0	3590.40
MW-72	02/03/98	3819.32	220.23	0	3599.09
MW-72	02/10/98	3819.32	224.93	0	3594.39
MW-72	02/17/98	3819.32	224.27	0	3595.05
MW-72	02/25/98	3819.32	224.67	0	3594.65
MW-72	04/27/98	3819.32	216.73	0	3602.59
MW-72	05/28/98	3819.32	229.14	0	3590.18
MW-72	06/16/98	3819.32	222.68	0	3596.64
MW-72	10/11/98	3819.32	196.22	0	3623.10
MW-73	12/01/94	3820.09	202.90	6.12	3621.65
MW-73	01/01/95	3820.09	195.75	1.68	3625.57
MW-73	04/01/95	3820.09	207.07	8.52	3619.23
MW-73	07/01/95	3820.09	204.48	6.72	3620.51
MW-73	10/01/95	3820.09	192.35	0	3627.74
MW-73	01/16/96	3820.09	192.66	0	3627.43
MW-73	04/17/96	3820.09	204.10	1.86	3617.34

Notes:

Water level elevations corrected for condensate using a specific gravity of 0.73

feet amsl Feet above mean sea level

feet bmp Feet below measuring point

D Well was dry at time of gauging

-- No data obtained

Appendix A

Historic Fluid Level Data, May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

Well ID	Date	Measuring Point Elevation (feet amsl)	Depth to Water (feet bmp)	Condensate Thickness (feet)	Corrected Water-Level Elevation (feet amsl)
MW-73	07/16/96	3820.09	193.91	1.61	3627.35
MW-73	10/14/96	3820.09	191.42	0.01	3628.67
MW-73	02/04/97	3820.09	193.00	0	3627.09
MW-73	04/29/97	3820.09	194.09	0.68	3626.49
MW-73	07/15/97	3820.09	193.70	0	3626.39
MW-73	09/30/97	3820.09	195.00	0.9	3625.74
MW-73	10/09/97	3820.09	194.92	0.72	3625.69
MW-73	10/14/97	3820.09	195.15	0	3624.94
MW-73	01/28/98	3820.09	194.50	0	3625.59
MW-73	04/27/98	3820.09	194.40	0	3625.69
MW-73	05/28/98	3820.09	194.66	0	3625.43
MW-73	06/16/98	3820.09	194.67	0	3625.42
MW-73	10/10/98	3820.09	194.47	0	3625.62
MW-74	**12/01/94**	**3820.82**	**192.31**	**0**	**3628.51**
MW-74	01/01/95	3820.82	193.88	1.44	3627.99
MW-74	04/01/95	3820.82	189.31	0.48	3631.86
MW-74	07/01/95	3820.82	188.07	0	3632.75
MW-74	01/16/96	3820.82	188.65	0	3632.17
MW-74	04/17/96	3820.82	187.30	0	3633.52
MW-74	07/16/96	3820.82	186.52	0	3634.30
MW-74	10/14/96	3820.82	178.77	0	3642.05
MW-74	02/04/97	3820.82	182.50	0	3638.32
MW-74	04/29/97	3820.82	183.92	0	3636.90
MW-74	07/15/97	3820.82	183.74	0	3637.08
MW-74	09/30/97	3820.82	185.30	0	3635.52
MW-74	10/09/97	3820.82	185.25	0	3635.57
MW-74	10/14/97	3820.82	185.77	0	3635.05
MW-74	01/28/98	3820.82	184.15	0	3636.67
MW-74	04/27/98	3820.82	184.44	0	3636.38
MW-74	05/28/98	3820.82	134.12	0	3686.70
MW-74	06/16/98	3820.82	187.47	0	3633.35
MW-74	10/10/98	3820.82	189.19	0	3631.63
MW-75	**12/01/94**	**3816.12**	**228.96**	**23.04**	**3603.98**
MW-75	01/01/95	3816.12	209.93	12.72	3615.47
MW-75	04/01/95	3816.12	251.13	35.4	3590.83
MW-75	07/01/95	3816.12	295.32	59.52	3564.24
MW-75	01/18/96	3816.12	197.10	3.1	3621.28
MW-75	04/17/96	3816.12	189.17	0.04	3626.97
MW-75	07/16/96	3816.12	190.40	1.76	3627.00
MW-75	10/14/96	3816.12	190.01	1.79	3627.41
MW-75	02/04/97	3816.12	193.45	0	3622.67
MW-75	04/29/97	3816.12	200.64	3.34	3617.91
MW-75	07/15/97	3816.12	200.95	6.17	3619.67
MW-75	10/09/97	3816.12	200.87	4.59	3618.60
MW-75	10/14/97	3816.12	200.86	2.76	3617.27
MW-75	10/29/97	3816.12	200.62	0.54	3615.89
MW-75	11/04/97	3816.12	200.76	3.52	3617.92
MW-75	11/12/97	3816.12	196.10	0	3620.02
MW-75	11/19/97	3816.12	199.10	2.75	3619.02

Notes:

Water level elevations corrected for condensate using a specific gravity of 0.73

feet amsl Feet above mean sea level

feet bmp Feet below measuring point

D Well was dry at time of gauging

-- No data obtained

Appendix A

Historic Fluid Level Data, May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

Well ID	Date	Measuring Point Elevation (feet amsl)	Depth to Water (feet bmp)	Condensate Thickness (feet)	Corrected Water-Level Elevation (feet amsl)
MW-75	11/24/97	3816.12	200.42	5.57	3619.76
MW-75	12/10/97	3816.12	195.43	0	3620.69
MW-75	01/06/98	3816.12	214.82	0	3601.30
MW-75	01/15/98	3816.12	214.80	0	3601.32
MW-75	01/20/98	3816.12	200.95	0	3615.17
MW-75	02/03/98	3816.12	201.20	1.9	3616.30
MW-75	02/10/98	3816.12	205.10	4.5	3614.30
MW-75	02/17/98	3816.12	200.77	0.95	3616.04
MW-75	02/25/98	3816.12	203.15	2.15	3614.53
MW-75	04/27/98	3816.12	200.72	8.77	3621.80
MW-75	05/28/98	3816.12	201.72	2.7	3616.37
MW-75	06/16/98	3816.12	205.82	0	3610.30
MW-75	10/11/98	3816.12	192.53	3.8	3626.36
MW-76	12/01/94	3796.01	167.36	0	3628.65
MW-76	01/01/95	3796.01	169.05	2.04	3628.45
MW-76	07/01/95	3796.01	180.14	6.84	3620.86
MW-76	10/01/95	3796.01	168.22	0.41	3628.09
MW-76	01/16/96	3796.01	168.85	0.95	3627.85
MW-76	04/17/96	3796.01	169.59	0.99	3627.14
MW-76	07/16/96	3796.01	167.04	0	3628.97
MW-76	10/14/96	3796.01	171.86	0	3624.15
MW-76	02/04/97	3796.01	169.32	0	3626.69
MW-76	04/29/97	3796.01	174.30	0	3621.71
MW-76	07/15/97	3796.01	175.10	0	3620.91
MW-76	09/30/97	3796.01	176.20	0	3619.81
MW-76	10/14/97	3796.01	173.57	0	3622.44
MW-76	01/28/98	3796.01	173.10	0	3622.91
MW-76	04/27/98	3796.01	175.25	0	3620.76
MW-76	05/28/98	3796.01	173.68	0	3622.33
MW-76	06/16/98	3796.01	175.25	0	3620.76
MW-77	01/01/95	3775.48	80.03	0	3695.45
MW-77	04/01/95	3775.48	80.04	0	3695.44
MW-77	07/01/95	3775.48	80.04	0	3695.44
MW-77	10/01/95	3775.48	79.70	0	3695.78
MW-77	01/16/96	3775.48	79.84	0	3695.64
MW-77	04/17/96	3775.48	78.95	0	3696.53
MW-77	07/16/96	3775.48	79.42	0	3696.06
MW-77	10/14/96	3775.48	80.02	0	3695.46
MW-77	02/04/97	3775.48	D	--	--
MW-77	04/29/97	3775.48	80.35	0	3695.13
MW-77	07/15/97	3775.48	80.31	0	3695.17
MW-77	10/14/97	3775.48	78.92	0	3696.56
MW-77	01/28/98	3775.48	77.00	0	3698.48
MW-77	04/27/98	3775.48	78.48	0	3697.00
MW-77	06/16/98	3775.48	75.30	0	3700.18
MW-77	10/10/98	3775.48	79.84	0	3695.64
MW-78	01/01/95	3785.82	86.51	0	3699.31
MW-78	04/01/95	3785.82	86.32	0	3699.50
MW-78	07/01/95	3785.82	86.32	0	3699.50

Notes:

Water level elevations corrected for condensate using a specific gravity of 0.73

feet amsl Feet above mean sea level

feet bmp Feet below measuring point

D Well was dry at time of gauging

-- No data obtained

Appendix A

Historic Fluid Level Data, May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

Well ID	Date	Measuring Point Elevation (feet amsl)	Depth to Water (feet bmp)	Condensate Thickness (feet)	Corrected Water-Level Elevation (feet amsl)
MW-78	10/01/95	3785.82	86.19	0	3699.63
MW-78	01/16/96	3785.82	86.22	0	3699.60
MW-78	04/17/96	3785.82	86.29	0	3699.53
MW-78	07/16/96	3785.82	86.41	0	3699.41
MW-78	10/14/96	3785.82	59.39	0	3726.43
MW-78	02/04/97	3785.82	75.78	0	3710.04
MW-78	04/29/97	3785.82	74.53	0	3711.29
MW-78	07/15/97	3785.82	74.47	0	3711.35
MW-78	10/14/97	3785.82	82.08	0	3703.74
MW-78	01/28/98	3785.82	81.61	0	3704.21
MW-78	04/27/98	3785.82	82.33	0	3703.49
MW-78	06/16/98	3785.82	82.27	0	3703.55
MW-78	10/10/98	3785.82	82.85	0	3702.97
MW-79	01/01/95	3788.39	76.29	0	3712.10
MW-79	04/01/95	3788.39	77.32	0	3711.07
MW-79	07/01/95	3788.39	77.32	0	3711.07
MW-79	10/01/95	3788.39	79.57	0	3708.82
MW-79	01/16/96	3788.39	78.31	0	3710.08
MW-79	04/17/96	3788.39	78.36	0	3710.03
MW-79	07/15/96	3788.39	81.09	0	3707.30
MW-79	10/13/96	3788.39	80.08	0	3708.31
MW-79	02/03/97	3788.39	80.44	0	3707.95
MW-79	04/28/97	3788.39	75.65	0	3712.74
MW-79	07/14/97	3788.39	75.46	0	3712.93
MW-79	10/13/97	3788.39	78.70	0	3709.69
MW-79	01/27/98	3788.39	80.52	0	3707.87
MW-79	04/27/98	3788.39	81.14	0	3707.25
MW-79	06/15/98	3788.39	80.84	0	3707.55
MW-79	10/09/98	3788.39	81.13	0	3707.26
MW-80	01/16/96	3821.64	D	--	--
MW-80	04/19/96	3821.64	D	--	--
MW-80	07/15/96	3821.64	D	--	--
MW-80	10/13/96	3821.64	D	--	--
MW-80	02/03/97	3821.64	D	--	--
MW-80	04/28/97	3821.64	D	--	--
MW-80	07/14/97	3821.64	D	--	--
MW-80	10/13/97	3821.64	D	--	--
MW-80	01/27/98	3821.64	D	--	--
MW-80	04/27/98	3821.64	D	--	--
MW-80	06/15/98	3821.64	D	--	--
MW-80	10/09/98	3821.64	D	--	--
MW-81	10/01/95	3817.03	195.77	2.74	3623.26
MW-81	01/16/96	3817.03	199.04	4.29	3621.12
MW-81	04/17/96	3817.03	204.35	9.95	3619.94
MW-81	07/16/96	3817.03	204.26	9.37	3619.61
MW-81	10/13/96	3817.03	202.11	8.49	3621.11
MW-81	02/04/97	3817.03	197.25	2.11	3621.32
MW-81	04/28/97	3817.03	204.40	9.15	3619.30
MW-81	07/14/97	3817.03	196.19	1.45	3621.89

Notes:

Water level elevations corrected for condensate using a specific gravity of 0.73

feet amsl Feet above mean sea level

feet bmp Feet below measuring point

D Well was dry at time of gauging

-- No data obtained

Appendix A

Historic Fluid Level Data, May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

Well ID	Date	Measuring Point Elevation (feet amsl)	Depth to Water (feet bmp)	Condensate Thickness (feet)	Corrected Water-Level Elevation (feet amsl)
MW-81	10/09/97	3817.03	200.02	0.02	3617.02
MW-81	10/14/97	3817.03	200.96	0.06	3616.11
MW-81	10/29/97	3817.03	202.44	1.44	3615.64
MW-81	11/04/97	3817.03	200.92	0	3616.11
MW-81	11/12/97	3817.03	200.95	0.25	3616.26
MW-81	11/19/97	3817.03	200.94	0.01	3616.09
MW-81	11/24/97	3817.03	200.81	0	3616.22
MW-81	12/10/97	3817.03	200.85	0	3616.18
MW-81	01/06/98	3817.03	199.35	0	3617.68
MW-81	01/15/98	3817.03	199.30	0	3617.73
MW-81	01/20/98	3817.03	200.89	0.79	3616.71
MW-81	01/27/98	3817.03	200.14	0.89	3617.53
MW-81	02/03/98	3817.03	200.88	0.58	3616.57
MW-81	02/10/98	3817.03	206.74	1.64	3611.48
MW-81	02/17/98	3817.03	218.70	12.08	3607.14
MW-81	02/25/98	3817.03	217.41	11.41	3607.94
MW-81	04/27/98	3817.03	197.05	0	3619.98
MW-81	05/28/98	3817.03	192.28	0	3624.75
MW-81	06/15/98	3817.03	197.58	0	3619.45
MW-81	10/11/98	3817.03	193.23	0	3623.80
MW-82	10/01/95	3825.07	196.65	0	3628.42
MW-82	01/18/96	3825.07	209.62	0	3615.45
MW-82	04/17/96	3825.07	209.12	0	3615.95
MW-82	07/16/96	3825.07	222.80	0	3602.27
MW-82	10/14/96	3825.07	196.33	0.02	3628.75
MW-82	02/04/97	3825.07	223.66	0	3601.41
MW-82	04/28/97	3825.07	249.21	0	3575.86
MW-82	07/15/97	3825.07	248.90	0	3576.17
MW-82	09/30/97	3825.07	249.20	0	3575.87
MW-82	10/09/97	3825.07	197.07	0	3628.00
MW-82	10/14/97	3825.07	229.01	0	3596.06
MW-82	10/29/97	3825.07	200.15	0	3624.92
MW-82	11/04/97	3825.07	209.26	0	3615.81
MW-82	11/12/97	3825.07	211.36	2.62	3615.62
MW-82	11/19/97	3825.07	213.86	5.28	3615.06
MW-82	11/24/97	3825.07	213.96	0	3611.11
MW-82	12/10/97	3825.07	212.95	0	3612.12
MW-82	02/25/98	3825.07	245.20	0	3579.87
MW-82	04/27/98	3825.07	235.62	0	3589.45
MW-82	05/28/98	3825.07	210.13	0	3614.94
MW-82	06/16/98	3825.07	249.20	0	3575.87
MW-82	10/11/98	3825.07	199.81	0	3625.26
MW-83	10/01/95	3794.12	169.47	1.67	3625.87
MW-83	01/18/96	3794.12	189.30	16.8	3617.08
MW-83	04/17/96	3794.12	179.40	0.2	3614.86
MW-83	07/16/96	3794.12	176.36	0.56	3618.16
MW-83	10/14/96	3794.12	176.25	0.18	3618.00
MW-83	02/04/97	3794.12	178.77	0	3615.35
MW-83	04/28/97	3794.12	179.41	0	3614.71

Notes:

Water level elevations corrected for condensate using a specific gravity of 0.73

feet amsl Feet above mean sea level

feet bmp Feet below measuring point

D Well was dry at time of gauging

-- No data obtained

Appendix A

Historic Fluid Level Data, May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

Well ID	Date	Measuring Point Elevation (feet amsl)	Depth to Water (feet bmp)	Condensate Thickness (feet)	Corrected Water-Level Elevation (feet amsl)
MW-83	07/15/97	3794.12	168.18	1.62	3627.12
MW-83	09/30/97	3794.12	202.70	0	3591.42
MW-83	10/09/97	3794.12	202.70	0	3591.42
MW-83	10/14/97	3794.12	200.25	0	3593.87
MW-83	10/21/97	3794.12	202.55	0	3591.57
MW-83	10/29/97	3794.12	200.20	0	3593.92
MW-83	11/04/97	3794.12	200.17	0	3593.95
MW-83	11/12/97	3794.12	200.20	0	3593.92
MW-83	11/19/97	3794.12	194.44	0.58	3600.10
MW-83	11/24/97	3794.12	193.52	0	3600.60
MW-83	12/10/97	3794.12	187.51	0	3606.61
MW-83	01/28/98	3794.12	170.53	0	3623.59
MW-83	02/25/98	3794.12	182.22	4.87	3615.45
MW-83	04/27/98	3794.12	188.78	0	3605.34
MW-83	05/28/98	3794.12	170.14	0	3623.98
MW-83	06/16/98	3794.12	184.32	9.51	3616.74
MW-83	10/11/98	3794.12	169.96	0	3624.16
MW-84	**07/16/96**	**3759.60**	**131.50**	**0.39**	**3628.38**
MW-84	10/14/96	3759.60	131.79	1.05	3628.57
MW-84	02/04/97	3759.60	132.84	1.29	3627.70
MW-84	04/29/97	3759.60	133.64	1.79	3627.26
MW-84	07/15/97	3759.60	133.89	1.9	3627.09
MW-84	09/30/97	3759.60	134.90	2.3	3626.37
MW-84	10/14/97	3759.60	136.64	3.94	3625.83
MW-84	10/21/97	3759.60	137.06	4.32	3625.69
MW-84	10/29/97	3759.60	133.35	0.72	3626.77
MW-84	11/04/97	3759.60	133.72	0	3625.88
MW-84	11/12/97	3759.60	132.70	0.05	3626.93
MW-84	11/19/97	3759.60	136.38	3.66	3625.89
MW-84	11/24/97	3759.60	136.00	3.23	3625.95
MW-84	12/10/97	3759.60	134.60	1.65	3626.20
MW-84	01/06/98	3759.60	133.48	0.08	3626.17
MW-84	01/15/98	3759.60	133.30	0	3626.30
MW-84	01/20/98	3759.60	147.14	6.91	3617.50
MW-84	01/28/98	3759.60	133.96	0.46	3625.97
MW-84	02/03/98	3759.60	133.89	0.13	3625.80
MW-84	02/10/98	3759.60	133.70	0.01	3625.90
MW-84	02/17/98	3759.60	139.13	2.86	3622.55
MW-84	02/25/98	3759.60	134.69	0.23	3625.07
MW-84	04/27/98	3759.60	135.34	0.89	3624.90
MW-84	05/28/98	3759.60	134.40	0	3625.20
MW-84	06/16/98	3759.60	134.94	0.4	3624.95
MW-84	10/11/98	3759.60	134.10	0	3625.50
MW-85	**07/16/96**	**3824.93**	**200.62**	**3.64**	**3626.96**
MW-85	10/13/96	3824.93	201.10	4.86	3627.37
MW-85	02/04/97	3824.93	200.85	3.34	3626.51
MW-85	04/29/97	3824.93	199.89	1.19	3625.90
MW-85	07/14/97	3824.93	199.39	0	3625.54
MW-85	10/09/97	3824.93	200.15	0.15	3624.88

Notes:

Water level elevations corrected for condensate using a specific gravity of 0.73

feet amsl Feet above mean sea level

feet bmp Feet below measuring point

D Well was dry at time of gauging

-- No data obtained

Appendix A

Historic Fluid Level Data, May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

Well ID	Date	Measuring Point Elevation (feet amsl)	Depth to Water (feet bmp)	Condensate Thickness (feet)	Corrected Water-Level Elevation (feet amsl)
MW-85	10/14/97	3824.93	200.35	0	3624.58
MW-85	10/29/97	3824.93	199.31	0	3625.62
MW-85	11/04/97	3824.93	200.16	0.1	3624.84
MW-85	11/12/97	3824.93	200.00	0	3624.93
MW-85	11/19/97	3824.93	199.28	0.01	3625.65
MW-85	11/24/97	3824.93	200.07	0	3624.86
MW-85	12/10/97	3824.93	200.12	0	3624.81
MW-85	01/06/98	3824.93	201.37	0.6	3623.99
MW-85	01/15/98	3824.93	201.30	0.55	3624.03
MW-85	01/20/98	3824.93	207.80	4.23	3620.21
MW-85	01/27/98	3824.93	201.62	1.82	3624.63
MW-85	02/03/98	3824.93	201.68	0.79	3623.82
MW-85	02/10/98	3824.93	201.36	0.42	3623.87
MW-85	02/17/98	3824.93	201.78	0.73	3623.68
MW-85	02/25/98	3824.93	200.95	0.2	3624.12
MW-85	04/27/98	3824.93	200.91	0.57	3624.43
MW-85	05/28/98	3824.93	203.78	1.02	3621.89
MW-85	06/16/98	3824.93	201.29	0.55	3624.04
MW-85	10/11/98	3824.93	201.32	1.27	3624.53
MW-86	10/14/96	3823.99	193.32	0	3630.67
MW-86	02/04/97	3823.99	190.99	0	3633.00
MW-86	04/28/97	3823.99	197.37	0	3626.62
MW-86	07/14/97	3823.99	199.78	0	3624.21
MW-86	09/30/97	3823.99	188.10	0	3635.89
MW-86	10/09/97	3823.99	198.76	0	3625.23
MW-86	10/14/97	3823.99	196.27	0	3627.72
MW-86	01/27/98	3823.99	205.50	0	3618.49
MW-86	04/27/98	3823.99	203.08	0	3620.91
MW-86	05/28/98	3823.99	199.71	0	3624.28
MW-86	06/16/98	3823.99	203.43	0	3620.56
MW-86	10/11/98	3823.99	198.11	0	3625.88
MW-87	08/01/96	3740.50	113.11	0	3627.39
MW-87	10/14/96	3740.50	112.19	0	3628.31
MW-87	02/04/97	3740.50	112.94	0	3627.56
MW-87	04/28/97	3740.50	113.21	0	3627.29
MW-87	07/14/97	3740.50	113.83	0	3626.67
MW-87	10/09/97	3740.50	114.20	0	3626.30
MW-87	10/13/97	3740.50	114.43	0	3626.07
MW-87	10/29/97	3740.50	113.95	0	3626.55
MW-87	11/04/97	3740.50	114.30	0	3626.20
MW-87	11/12/97	3740.50	114.22	0	3626.28
MW-87	11/19/97	3740.50	114.35	0	3626.15
MW-87	11/24/97	3740.50	114.25	0	3626.25
MW-87	12/10/97	3740.50	114.32	0	3626.18
MW-87	01/28/98	3740.50	114.07	0	3626.43
MW-87	02/25/98	3740.50	114.35	0	3626.15
MW-87	04/27/98	3740.50	114.52	0	3625.98
MW-87	05/28/98	3740.50	105.30	0	3635.20
MW-87	06/15/98	3740.50	114.52	0	3625.98

Notes:

Water level elevations corrected for condensate using a specific gravity of 0.73

feet amsl Feet above mean sea level

feet bmp Feet below measuring point

D Well was dry at time of gauging

-- No data obtained

Appendix A

Historic Fluid Level Data, May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

Well ID	Date	Measuring Point Elevation (feet amsl)	Depth to Water (feet bmp)	Condensate Thickness (feet)	Corrected Water-Level Elevation (feet amsl)
MW-87	10/10/98	3740.50	114.96	0	3625.54
MW-87A	08/01/96	3739.53	124.91	0	3614.62
MW-87A	10/14/96	3739.53	104.75	0	3634.78
MW-87A	02/04/97	3739.53	103.69	0	3635.84
MW-87A	04/28/97	3739.53	104.43	0	3635.10
MW-87A	07/14/97	3739.53	104.92	0	3634.61
MW-87A	10/13/97	3739.53	104.44	0	3635.09
MW-87A	01/28/98	3739.53	104.79	0	3634.74
MW-87A	04/27/98	3739.53	105.21	0	3634.32
MW-87A	05/28/98	3739.53	114.02	0	3625.51
MW-87A	06/15/98	3739.53	105.47	0	3634.06
MW-87A	10/10/98	3739.53	105.99	0	3633.54
MW-88	08/01/96	3789.70	163.59	0	3626.11
MW-88	10/13/96	3789.70	162.22	0	3627.48
MW-88	02/04/97	3789.70	163.38	0	3626.32
MW-88	04/28/97	3789.70	163.54	0	3626.16
MW-88	07/14/97	3789.70	163.84	0	3625.86
MW-88	10/01/97	3789.70	164.40	0	3625.30
MW-88	10/09/97	3789.70	164.38	0	3625.32
MW-88	10/13/97	3789.70	164.34	0	3625.36
MW-88	01/27/98	3789.70	164.41	0	3625.29
MW-88	04/27/98	3789.70	164.84	0	3624.86
MW-88	05/28/98	3789.70	164.00	0	3625.70
MW-88	06/15/98	3789.70	164.87	0	3624.83
MW-88	10/10/98	3789.70	165.38	0	3624.32
MW-89	08/01/96	3827.68	201.41	0	3626.27
MW-89	10/14/96	3827.68	199.95	0	3627.73
MW-89	02/04/97	3827.68	201.39	0	3626.29
MW-89	04/28/97	3827.68	201.67	0	3626.01
MW-89	07/14/97	3827.68	201.94	0	3625.74
MW-89	10/01/97	3827.68	202.80	0	3624.88
MW-89	10/09/97	3827.68	202.70	0	3624.98
MW-89	10/13/97	3827.68	202.70	0	3624.98
MW-89	01/27/98	3827.68	202.82	0	3624.86
MW-89	04/27/98	3827.68	203.04	0	3624.64
MW-89	05/28/98	3827.68	203.19	0	3624.49
MW-89	06/15/98	3827.68	203.27	0	3624.41
MW-89	10/10/98	3827.68	203.83	0	3623.85
MW-90	02/04/97	3781.73	43.24	0	3738.49
MW-90	04/28/97	3781.73	43.54	0	3738.19
MW-90	07/14/97	3781.73	43.42	0	3738.31
MW-90	10/13/97	3781.73	44.78	0	3736.95
MW-90	01/27/98	3781.73	43.26	0	3738.47
MW-90	04/27/98	3781.73	43.68	0	3738.05
MW-90	06/15/98	3781.73	44.26	0	3737.47
MW-90	10/09/98	3781.73	96.68	0	3685.05
MW-91	02/04/97	3783.07	64.90	0	3718.17
MW-91	04/29/97	3783.07	64.96	0.01	3718.11
MW-91	07/15/97	3783.07	64.96	0.02	3718.12

Notes:

Water level elevations corrected for condensate using a specific gravity of 0.73

feet amsl Feet above mean sea level

feet bmp Feet below measuring point

D Well was dry at time of gauging

-- No data obtained

Appendix A

Historic Fluid Level Data, May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

Well ID	Date	Measuring Point Elevation (feet amsl)	Depth to Water (feet bmp)	Condensate Thickness (feet)	Corrected Water-Level Elevation (feet amsl)
MW-91	10/14/97	3783.07	68.75	0	3714.32
MW-91	01/28/98	3783.07	70.57	0	3712.50
MW-91	04/27/98	3783.07	69.38	0	3713.69
MW-91	06/16/98	3783.07	72.26	0	3710.81
MW-91	10/10/98	3783.07	72.41	0	3710.66
MW-92	02/04/97	3785.29	D	--	--
MW-92	04/29/97	3785.29	D	--	--
MW-92	07/15/97	3785.29	D	--	--
MW-92	10/14/97	3785.29	D	--	--
MW-92	01/28/98	3785.29	D	--	--
MW-92	04/27/98	3785.29	72.52	0	3712.77
MW-92	06/16/98	3785.29	72.45	0	3712.84
MW-92	10/10/98	3785.29	72.51	0	3712.78
MW-93	02/03/97	3817.50	D	--	--
MW-93	04/29/97	3817.50	D	--	--
MW-93	07/14/97	3817.50	D	--	--
MW-93	10/13/97	3817.50	D	--	--
MW-93	01/27/98	3817.50	D	--	--
MW-93	04/27/98	3817.50	D	--	--
MW-93	06/15/98	3817.50	D	--	--
MW-93	10/09/98	3817.50	D	--	--
MW-94	07/15/96	3821.48	194.15	0	3627.33
MW-94	10/13/96	3821.48	196.21	0	3625.27
MW-94	02/04/97	3821.48	197.60	0	3623.88
MW-94	07/14/97	3821.48	198.65	0	3622.83
MW-94	09/30/97	3821.48	199.70	0	3621.78
MW-94	10/09/97	3821.48	196.04	0	3625.44
MW-94	10/14/97	3821.48	195.95	0	3625.53
MW-94	01/27/98	3821.48	195.89	0	3625.59
MW-94	04/27/98	3821.48	196.20	0	3625.28
MW-94	05/28/98	3821.48	196.35	0	3625.13
MW-94	06/16/98	3821.48	196.42	0	3625.06
MW-94	10/10/98	3821.48	196.91	0	3624.57
MW-95	04/29/97	3746.26	118.48	0	3627.78
MW-95	07/15/97	3746.26	118.59	0	3627.67
MW-95	10/14/97	3746.26	119.30	0	3626.96
MW-95	10/29/97	3746.26	119.31	0	3626.95
MW-95	11/04/97	3746.26	119.35	0	3626.91
MW-95	11/12/97	3746.26	119.30	0	3626.96
MW-95	11/19/97	3746.26	119.41	0	3626.85
MW-95	11/24/97	3746.26	119.45	0	3626.81
MW-95	12/10/97	3746.26	119.42	0	3626.84
MW-95	01/28/98	3746.26	119.49	0	3626.77
MW-95	02/25/98	3746.26	119.62	0	3626.64
MW-95	04/27/98	3746.26	119.78	0	3626.48
MW-95	05/28/98	3746.26	119.90	0	3626.36
MW-95	06/16/98	3746.26	119.97	0	3626.29
MW-95	10/10/98	3746.26	120.46	0	3625.80
MW-96	04/29/97	3739.80	112.60	0	3627.20

Notes:

Water level elevations corrected for condensate using a specific gravity of 0.73

feet amsl Feet above mean sea level

feet bmp Feet below measuring point

D Well was dry at time of gauging

-- No data obtained

Appendix A

Historic Fluid Level Data, May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

Well ID	Date	Measuring Point Elevation (feet amsl)	Depth to Water (feet bmp)	Condensate Thickness (feet)	Corrected Water-Level Elevation (feet amsl)
MW-96	07/15/97	3739.80	112.57	0	3627.23
MW-96	10/01/97	3739.80	113.40	0	3626.40
MW-96	10/09/97	3739.80	113.34	0	3626.46
MW-96	10/13/97	3739.80	113.38	0	3626.42
MW-96	10/29/97	3739.80	113.38	0	3626.42
MW-96	11/04/97	3739.80	113.35	0	3626.45
MW-96	11/12/97	3739.80	113.31	0	3626.49
MW-96	11/19/97	3739.80	113.45	0	3626.35
MW-96	11/24/97	3739.80	113.58	0	3626.22
MW-96	12/10/97	3739.80	113.47	0	3626.33
MW-96	01/28/98	3739.80	113.46	0	3626.34
MW-96	02/25/98	3739.80	113.48	0	3626.32
MW-96	04/27/98	3739.80	113.74	0	3626.06
MW-96	05/28/98	3739.80	113.88	0	3625.92
MW-96	06/15/98	3739.80	113.92	0	3625.88
MW-96	10/10/98	3739.80	114.37	0	3625.43
MW-97	04/29/97	3750.16	122.82	0	3627.34
MW-97	07/15/97	3750.16	122.91	0	3627.25
MW-97	10/01/97	3750.16	123.80	0	3626.36
MW-97	10/09/97	3750.16	123.75	0	3626.41
MW-97	10/13/97	3750.16	123.61	0	3626.55
MW-97	10/29/97	3750.16	123.62	0	3626.54
MW-97	11/04/97	3750.16	123.74	0	3626.42
MW-97	11/12/97	3750.16	123.70	0	3626.46
MW-97	11/19/97	3750.16	123.85	0	3626.31
MW-97	11/24/97	3750.16	123.80	0	3626.36
MW-97	12/10/97	3750.16	123.90	0	3626.26
MW-97	01/28/98	3750.16	123.71	0	3626.45
MW-97	02/25/98	3750.16	123.89	0	3626.27
MW-97	04/27/98	3750.16	123.99	0	3626.17
MW-97	05/28/98	3750.16	124.12	0	3626.04
MW-97	06/15/98	3750.16	124.17	0	3625.99
MW-97	10/10/98	3750.16	124.63	0	3625.53
MW-98	04/29/97	3770.15	142.42	0	3627.73
MW-98	07/15/97	3770.15	142.51	0	3627.64
MW-98	10/14/97	3770.15	143.55	0.29	3626.81
MW-98	10/29/97	3770.15	143.43	0.23	3626.88
MW-98	11/04/97	3770.15	143.50	0.25	3626.83
MW-98	11/12/97	3770.15	143.35	0.17	3626.92
MW-98	11/19/97	3770.15	143.48	0.22	3626.83
MW-98	11/24/97	3770.15	143.54	0.26	3626.79
MW-98	12/10/97	3770.15	143.52	0.12	3626.71
MW-98	01/28/98	3770.15	143.53	0.22	3626.78
MW-98	02/25/98	3770.15	143.77	0.19	3626.51
MW-98	04/27/98	3770.15	143.73	0.15	3626.52
MW-98	05/28/98	3770.15	143.80	0	3626.35
MW-98	06/16/98	3770.15	143.87	0.05	3626.31
MW-98	10/10/98	3770.15	144.32	0.08	3625.88
MW-99	02/04/97	3770.05	D	--	--

Notes:

Water level elevations corrected for condensate using a specific gravity of 0.73

feet amsl Feet above mean sea level

feet bmp Feet below measuring point

D Well was dry at time of gauging

-- No data obtained

Appendix A

Historic Fluid Level Data, May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

Well ID	Date	Measuring Point Elevation (feet amsl)	Depth to Water (feet bmp)	Condensate Thickness (feet)	Corrected Water-Level Elevation (feet amsl)
MW-99	04/29/97	3770.05	D	--	--
MW-99	07/15/97	3770.05	D	--	--
MW-99	10/14/97	3770.05	D	--	--
MW-99	01/28/98	3770.05	D	--	--
MW-99	04/27/98	3770.05	D	--	--
MW-99	06/16/98	3770.05	D	--	--
MW-99	10/10/98	3770.05	D	--	--
MW-100	04/29/97	3773.31	D	--	--
MW-100	07/15/97	3773.31	D	--	--
MW-100	10/14/97	3773.31	D	--	--
MW-100	01/28/98	3773.31	D	--	--
MW-100	04/27/98	3773.31	D	--	--
MW-100	06/16/98	3773.31	D	--	--
MW-100	10/10/98	3773.31	D	--	--
MW-101	02/04/97	3762.71	D	--	--
MW-101	04/29/97	3762.71	D	--	--
MW-101	07/15/97	3762.71	D	--	--
MW-101	10/14/97	3762.71	D	--	--
MW-101	01/28/98	3762.71	D	--	--
MW-101	04/27/98	3762.71	D	--	--
MW-101	06/16/98	3762.71	D	--	--
MW-101	10/10/98	3762.71	D	--	--
MW-102	02/04/97	3753.69	D	--	--
MW-102	04/28/97	3753.69	D	--	--
MW-102	07/15/97	3753.69	D	--	--
MW-102	10/13/97	3753.69	D	--	--
MW-102	01/28/98	3753.69	82.60	0	3671.09
MW-102	04/27/98	3753.69	82.60	0	3671.09
MW-102	06/15/98	3753.69	D	--	--
MW-102	10/10/98	3753.69	D	--	--
MW-103	02/04/97	3743.14	D	--	--
MW-103	04/29/97	3743.14	D	--	--
MW-103	07/15/97	3743.14	D	--	--
MW-103	10/14/97	3743.14	72.30	0	3670.84
MW-103	01/28/98	3743.14	72.70	0	3670.44
MW-103	04/27/98	3743.14	72.78	0	3670.36
MW-103	06/16/98	3743.14	D	--	--
MW-103	10/10/98	3743.14	D	--	--
MW-104	07/15/97	3793.64	168.72	0	3624.92
MW-104	10/13/97	3793.64	167.22	0	3626.42
MW-104	10/29/97	3793.64	167.25	0	3626.39
MW-104	11/04/97	3793.64	167.30	0	3626.34
MW-104	11/12/97	3793.64	167.20	0	3626.44
MW-104	11/19/97	3793.64	167.30	0	3626.34
MW-104	11/24/97	3793.64	167.30	0	3626.34
MW-104	12/10/97	3793.64	167.28	0	3626.36
MW-104	01/28/98	3793.64	167.33	0	3626.31
MW-104	02/25/98	3793.64	167.34	0	3626.30
MW-104	04/27/98	3793.64	167.59	0	3626.05

Notes:

Water level elevations corrected for condensate using a specific gravity of 0.73

feet amsl Feet above mean sea level

feet bmp Feet below measuring point

D Well was dry at time of gauging

-- No data obtained

Appendix A

Historic Fluid Level Data, May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

Well ID	Date	Measuring Point Elevation (feet amsl)	Depth to Water (feet bmp)	Condensate Thickness (feet)	Corrected Water-Level Elevation (feet amsl)
MW-104	05/28/98	3793.64	167.75	0	3625.89
MW-104	06/15/98	3793.64	167.81	0	3625.83
MW-104	10/10/98	3793.64	168.27	0	3625.37
MW-105	02/04/97	3736.93	D	--	--
MW-105	04/28/97	3736.93	D	--	--
MW-105	07/15/97	3736.93	D	--	--
MW-105	10/13/97	3736.93	D	--	--
MW-105	01/28/98	3736.93	82.93	0	3654.00
MW-105	04/27/98	3736.93	D	--	--
MW-105	06/15/98	3736.93	82.84	0	3654.09
MW-105	10/10/98	3736.93	82.33	0	3654.60
MW-106	02/04/97	3721.97	87.97	0	3634.00
MW-106	04/28/97	3721.97	87.59	0	3634.38
MW-106	07/15/97	3721.97	87.63	0	3634.34
MW-106	10/13/97	3721.97	88.75	0	3633.22
MW-106	01/28/98	3721.97	88.97	0	3633.00
MW-106	04/27/98	3721.97	89.36	0	3632.61
MW-106	06/15/98	3721.97	89.63	0	3632.34
MW-106	10/10/98	3721.97	89.61	0	3632.36
MW-107	02/04/97	3726.27	D	--	--
MW-107	04/29/97	3726.27	D	--	--
MW-107	07/15/97	3726.27	D	--	--
MW-107	10/13/97	3726.27	D	--	--
MW-107	01/28/98	3726.27	D	--	--
MW-107	04/27/98	3726.27	D	--	--
MW-107	06/15/98	3726.27	D	--	--
MW-107	10/10/98	3726.27	D	--	--
MW-108	07/15/97	3747.13	119.97	0	3627.16
MW-108	10/13/97	3747.13	120.47	0	3626.66
MW-108	10/29/97	3747.13	120.45	0	3626.68
MW-108	11/04/97	3747.13	120.42	0	3626.71
MW-108	11/12/97	3747.13	124.40	0	3622.73
MW-108	11/19/97	3747.13	120.55	0	3626.58
MW-108	11/24/97	3747.13	120.54	0	3626.59
MW-108	12/10/97	3747.13	120.55	0	3626.58
MW-108	01/28/98	3747.13	120.58	0	3626.55
MW-108	02/25/98	3747.13	120.57	0	3626.56
MW-108	04/27/98	3747.13	120.85	0	3626.28
MW-108	05/28/98	3747.13	120.72	0	3626.41
MW-108	06/15/98	3747.13	121.03	0	3626.10
MW-108	10/10/98	3747.13	121.50	0	3625.63
MW-109	06/17/98	3809.53	D	--	--
MW-109	10/10/98	3809.53	17.79	0	3791.74
MW-110	06/17/98	3812.61	187.42	1.3	3626.13
MW-110	10/09/98	3812.61	188.34	0	3624.27
MW-111	06/19/98	3824.44	200.24	0	3624.20
MW-111	10/10/98	3824.44	200.89	0	3623.55
STOCK_WELL	01/01/94	3779.76	19.61	0	3760.15
SUMP-16A	12/01/91	3785.14	11.65	0	3773.49

Notes:

Water level elevations corrected for condensate using a specific gravity of 0.73

feet amsl Feet above mean sea level

feet bmp Feet below measuring point

D Well was dry at time of gauging

-- No data obtained

Appendix A

Historic Fluid Level Data, May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

Well ID	Date	Measuring Point Elevation (feet amsl)	Depth to Water (feet bmp)	Condensate Thickness (feet)	Corrected Water-Level Elevation (feet amsl)
SUMP-16A	04/15/92	3785.14	12.02	0	3773.12
SUMP-16A	07/01/92	3785.14	4.87	0	3780.27
SUMP-16A	10/01/92	3785.14	12.00	0	3773.14
SUMP-16A	01/01/93	3785.14	13.00	0	3772.14
SUMP-16A	04/01/93	3785.14	14.15	0	3770.99
SUMP-16A	10/01/94	3785.14	11.25	0	3773.89
SUMP-16A	01/01/95	3785.14	16.34	0	3768.80
SUMP-16A	04/01/95	3785.14	17.32	0	3767.82
SUMP-16A	07/01/95	3785.14	17.32	0	3767.82
SUMP-16A	10/01/95	3785.14	14.60	0	3770.54
SUMP-16A	01/16/96	3785.14	16.30	0	3768.84
SUMP-16A	04/19/96	3785.14	17.45	0	3767.69
SUMP-16A	07/15/96	3785.14	16.85	0	3768.29
SUMP-16A	10/13/96	3785.14	15.99	0	3769.15
SUMP-A10	01/16/96	3800.99	D	--	--
SUMP-A10	04/19/96	3800.99	D	--	--
SUMP-A10	07/15/96	3800.99	D	--	--
SUMP-A10	10/13/96	3800.99	11.62	0	3789.37
SW-01	02/04/97	3808.19	D	--	--
SW-01	05/28/98	3808.19	198.00	0	3610.19
SW-01	06/17/98	3808.19	198.05	0	3610.14
SW-02	08/21/91	3808.79	180.53	0	3628.26
SW-02	09/18/91	3808.79	180.53	0	3628.26
SW-02	10/22/91	3808.79	179.74	0	3629.05
SW-02	11/15/91	3808.79	179.44	0	3629.35
SW-02	03/01/92	3808.79	180.12	0	3628.67
SW-02	04/01/92	3808.79	180.00	0	3628.79
SW-02	05/01/92	3808.79	176.52	0	3632.27
SW-02	06/01/92	3808.79	176.06	0	3632.73
SW-02	07/01/92	3808.79	176.06	0	3632.73
SW-02	08/01/92	3808.79	176.99	0	3631.80
SW-02	09/01/92	3808.79	177.57	0	3631.22
SW-02	10/01/92	3808.79	178.02	0	3630.77
SW-02	11/01/92	3808.79	178.31	0	3630.48
SW-02	12/01/92	3808.79	179.06	0	3629.73
SW-02	01/01/93	3808.79	178.88	0	3629.91
SW-02	02/01/93	3808.79	179.08	0	3629.71
SW-02	03/01/93	3808.79	179.31	0	3629.48
SW-02	04/01/93	3808.79	179.04	0	3629.75
SW-02	05/01/93	3808.79	179.22	0	3629.57
SW-02	06/01/93	3808.79	179.39	0	3629.40
SW-02	07/01/93	3808.79	179.76	0	3629.03
SW-02	08/01/93	3808.79	179.76	0	3629.03
SW-02	09/01/93	3808.79	179.86	0	3628.93
SW-02	10/01/93	3808.79	179.63	0	3629.16
SW-02	11/01/93	3808.79	180.39	0	3628.40
SW-02	12/01/93	3808.79	179.62	0	3629.17
SW-02	01/01/94	3808.79	180.41	0	3628.38
SW-02	02/01/94	3808.79	181.55	0	3627.24

Notes:

Water level elevations corrected for condensate using a specific gravity of 0.73

feet amsl Feet above mean sea level

feet bmp Feet below measuring point

D Well was dry at time of gauging

-- No data obtained

Appendix A

Historic Fluid Level Data, May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

Well ID	Date	Measuring Point Elevation (feet amsl)	Depth to Water (feet bmp)	Condensate Thickness (feet)	Corrected Water-Level Elevation (feet amsl)
SW-02	03/01/94	3808.79	180.10	0	3628.69
SW-02	04/01/94	3808.79	180.58	0	3628.21
SW-02	05/01/94	3808.79	181.13	0	3627.66
SW-02	07/01/94	3808.79	181.00	0	3627.79
SW-02	08/01/94	3808.79	180.61	0	3628.18
SW-02	09/01/94	3808.79	180.52	0	3628.27
SW-02	10/01/94	3808.79	181.56	0	3627.23
SW-02	12/01/94	3808.79	184.89	0	3623.90
SW-02	01/01/95	3808.79	181.26	0	3627.53
SW-02	04/01/95	3808.79	181.50	0	3627.29
SW-02	07/01/95	3808.79	181.62	0	3627.17
SW-02	10/01/95	3808.79	181.70	0	3627.09
SW-02	01/16/96	3808.79	182.21	0	3626.58
SW-02	04/17/96	3808.79	182.25	0	3626.54
SW-02	07/15/96	3808.79	182.24	0	3626.55
SW-02	10/01/96	3808.79	180.89	0	3627.90
SW-02	01/01/97	3808.79	182.21	0	3626.58
SW-02	02/04/97	3808.79	182.31	0	3626.48
SW-02	04/28/97	3808.79	182.80	0	3625.99
SW-02	07/15/97	3808.79	183.04	0	3625.75
SW-02	10/14/97	3808.79	183.89	0	3624.90
SW-02	01/27/98	3808.79	183.74	0	3625.05
SW-02	04/27/98	3808.79	185.05	0	3623.74
SW-02	05/28/98	3808.79	185.13	0	3623.66
SW-02	06/17/98	3808.79	185.15	0	3623.64
SW-02	10/09/98	3808.79	185.65	0	3623.14
SW-03	07/15/96	3842.29	215.52	0	3626.77
SW-03	10/01/96	3842.29	213.51	0	3628.78
SW-03	02/03/97	3842.29	215.63	0	3626.66
SW-03	04/28/97	3842.29	216.14	0	3626.15
SW-03	07/14/97	3842.29	216.74	0	3625.55
SW-03	10/14/97	3842.29	217.51	0	3624.78
SW-03	01/27/98	3842.29	217.54	0	3624.75
SW-03	04/27/98	3842.29	217.80	0	3624.49
SW-03	05/28/98	3842.29	217.98	0	3624.31
SW-03	06/15/98	3842.29	218.50	0	3623.79
SW-03	10/09/98	3842.29	218.58	0	3623.71
VE-01	06/15/98	--	204.78	0	--
VE-02	06/15/98	--	200.67	0	--
VE-03	06/15/98	--	191.32	0	--
VE-04	06/15/98	--	179.89	0	--
VE-05	06/15/98	--	164.48	0	--
VE-16	10/29/97	3750.96	124.27	0	3626.69
VE-16	11/04/97	3750.96	124.35	0	3626.61
VE-16	11/12/97	3750.96	124.22	0	3626.74
VE-16	11/19/97	3750.96	124.33	0	3626.63
VE-16	11/24/97	3750.96	124.33	0	3626.63
VE-16	12/10/97	3750.96	124.30	0	3626.66
VE-16	02/25/98	3750.96	124.38	0	3626.58

Notes:

Water level elevations corrected for condensate using a specific gravity of 0.73

feet amsl Feet above mean sea level

feet bmp Feet below measuring point

D Well was dry at time of gauging

-- No data obtained

Appendix A

Historic Fluid Level Data, May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

Well ID	Date	Measuring Point Elevation (feet amsl)	Depth to Water (feet bmp)	Condensate Thickness (feet)	Corrected Water-Level Elevation (feet amsl)
VE-16	06/15/98	3750.96	124.81	0	3626.15
VE-17	10/29/97	3756.73	118.48	0	3638.25
VE-17	11/04/97	3756.73	117.00	0	3639.73
VE-17	11/12/97	3756.73	117.93	0	3638.80
VE-17	11/19/97	3756.73	118.13	0	3638.60
VE-17	11/24/97	3756.73	118.32	0	3638.41
VE-17	12/10/97	3756.73	118.24	0	3638.49
VE-17	02/25/98	3756.73	119.27	0	3637.46
VE-17	06/15/98	3756.73	117.27	0	3639.46
VE-18	06/15/98	3756.82	131.71	0	3625.11
VE-19	10/29/97	3761.18	136.05	2.05	3626.62
VE-19	11/04/97	3761.18	136.41	2.45	3626.55
VE-19	11/19/97	3761.18	140.88	2.88	3622.40
VE-19	11/24/97	3761.18	140.33	1.39	3621.86
VE-19	12/10/97	3761.18	138.56	0	3622.62
VE-19	01/06/98	3761.18	139.67	2.56	3623.37
VE-19	01/15/98	3761.18	140.90	3.4	3622.76
VE-19	01/20/98	3761.18	140.16	0.48	3621.37
VE-19	02/03/98	3761.18	136.63	0.01	3624.55
VE-19	02/10/98	3761.18	138.66	1.11	3623.33
VE-19	02/17/98	3761.18	139.83	1.89	3622.72
VE-19	02/25/98	3761.18	139.80	1.95	3622.80
VE-19	05/28/98	3761.18	133.78	0	3627.40
VE-19	06/16/98	3761.18	136.97	0	3624.21
VE-20	06/16/98	3768.41	142.26	0	3626.15

Notes:

Water level elevations corrected for condensate using a specific gravity of 0.73

feet amsl Feet above mean sea level

feet bmp Feet below measuring point

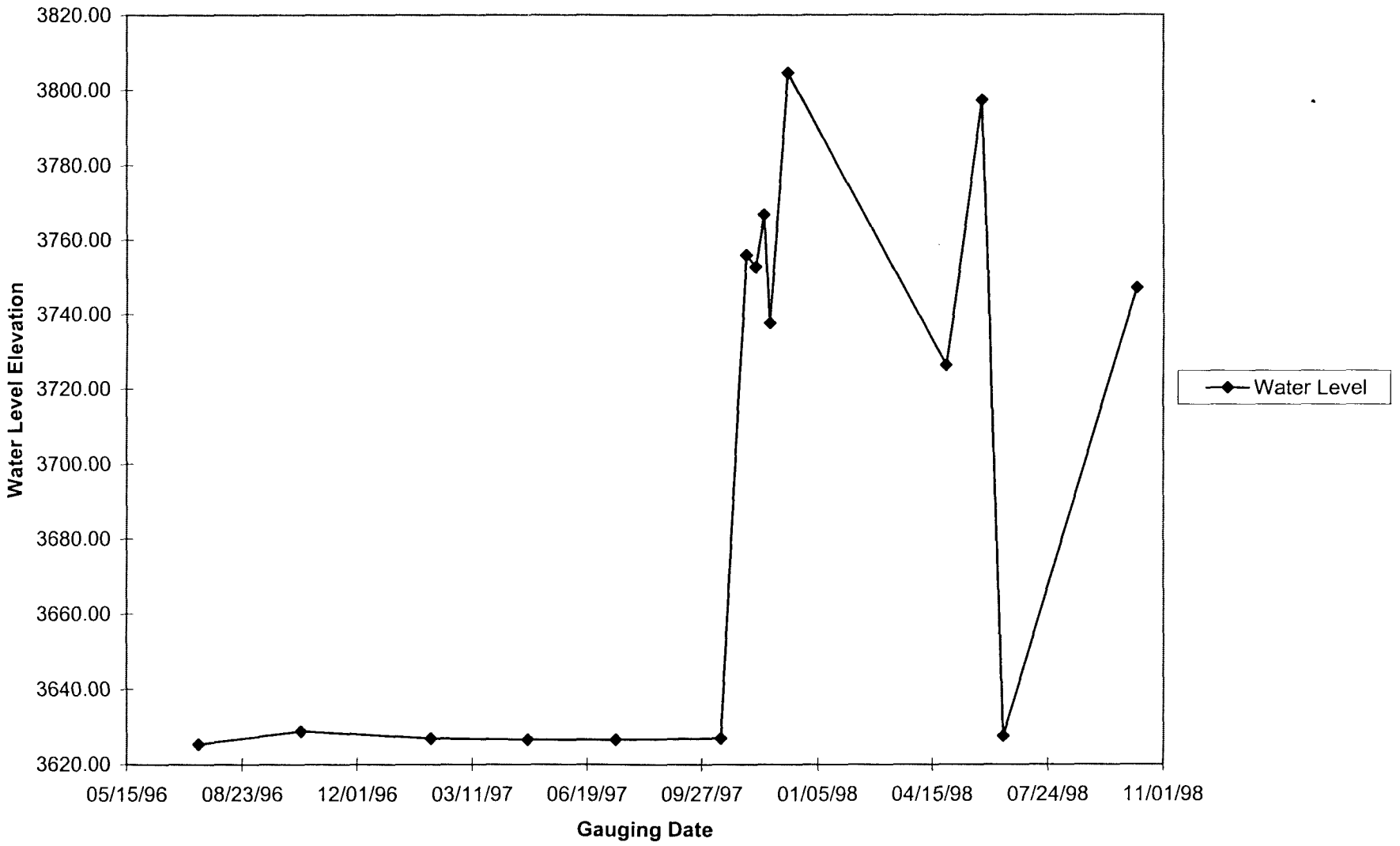
D Well was dry at time of gauging

-- No data obtained

Appendix B

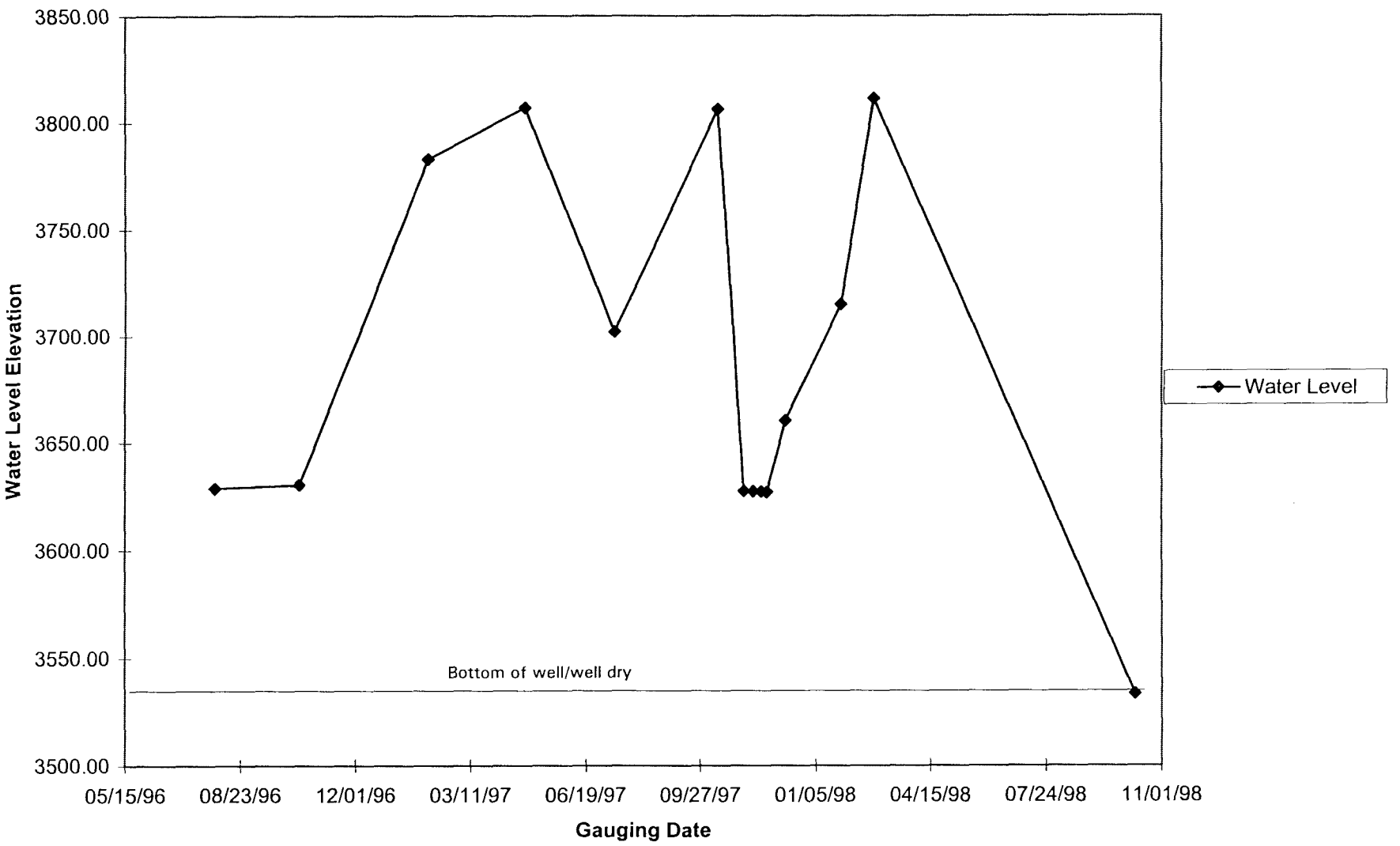
Monitoring Well Hydrographs

IW-1



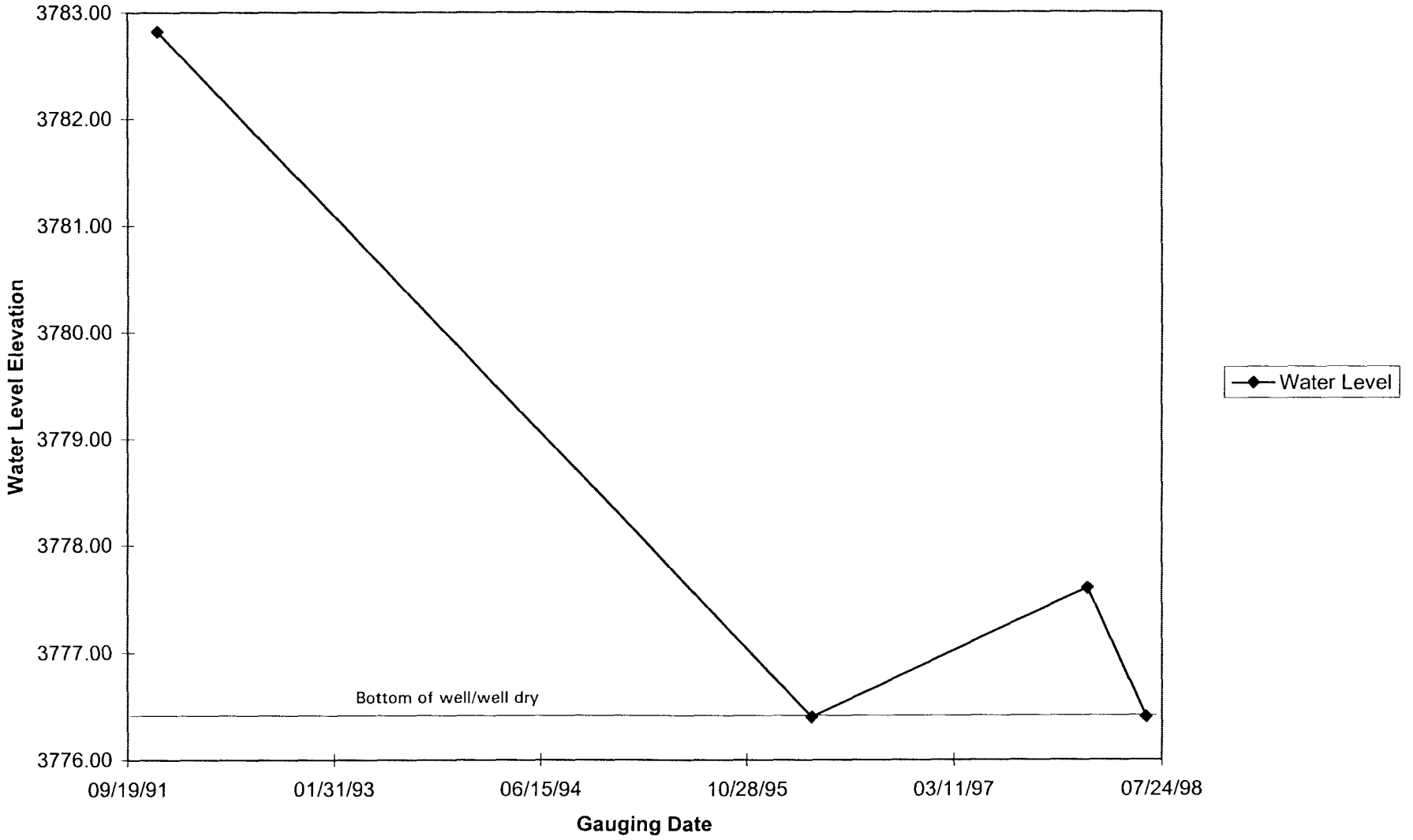
* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

IW-2



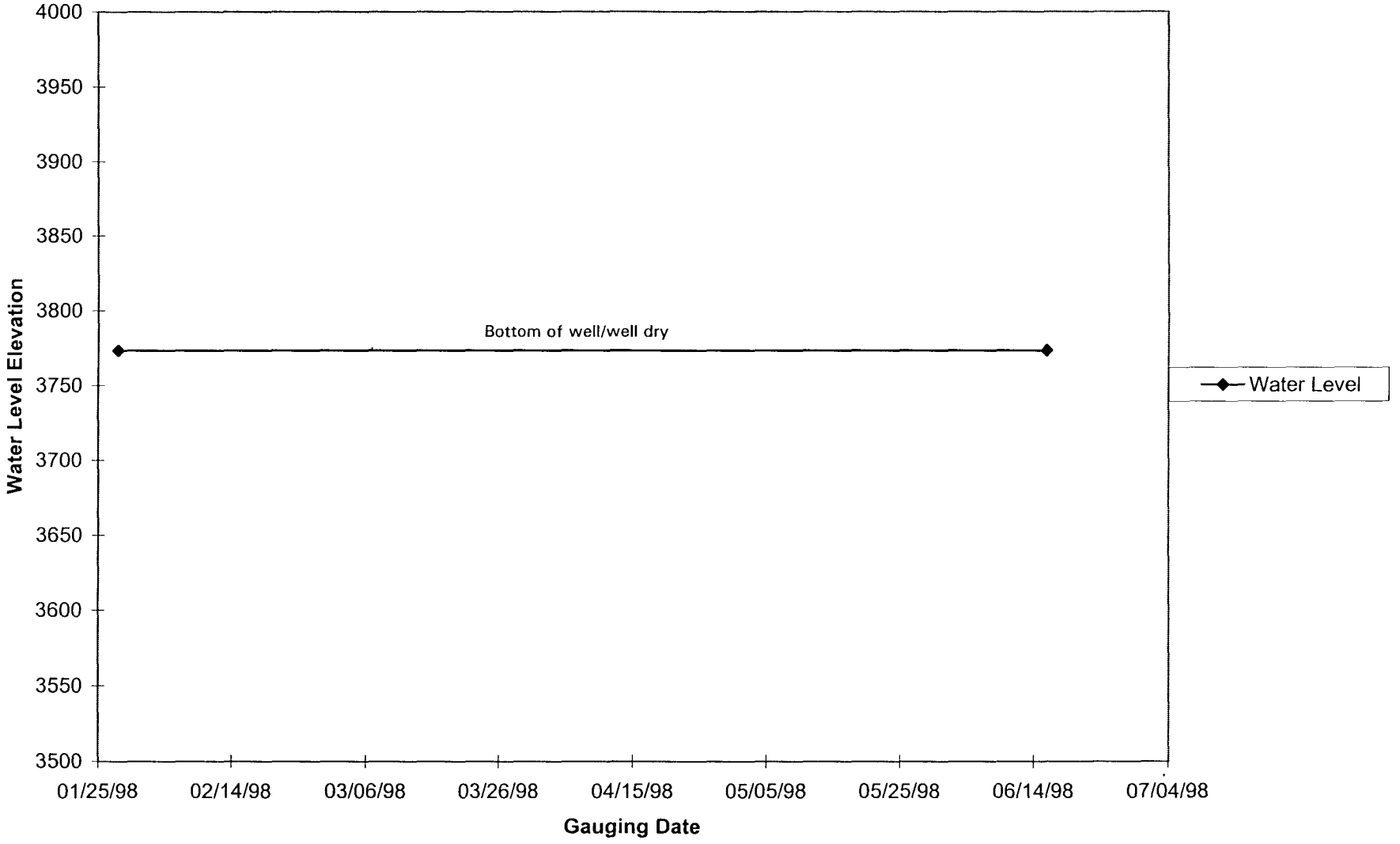
* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-1



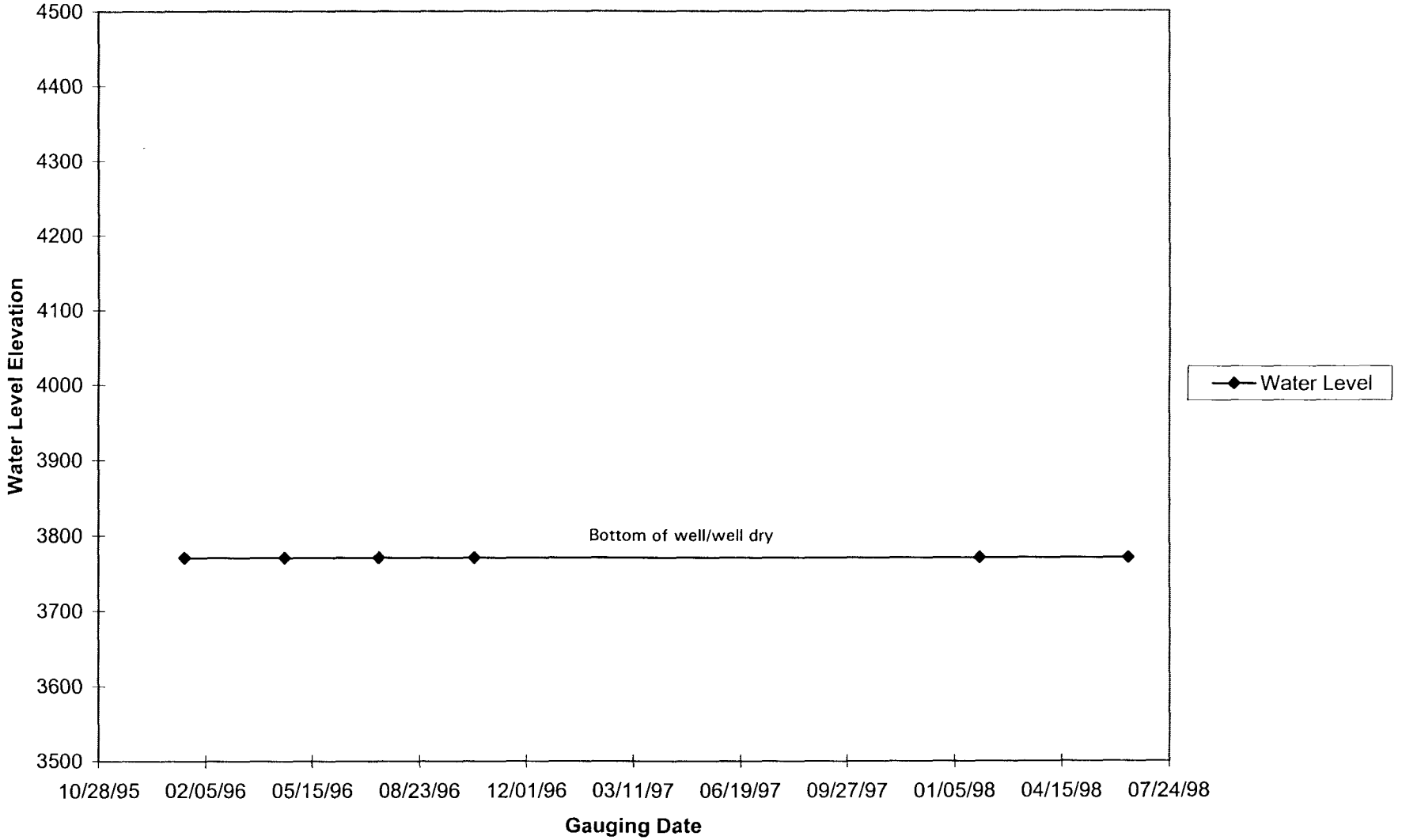
* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-2



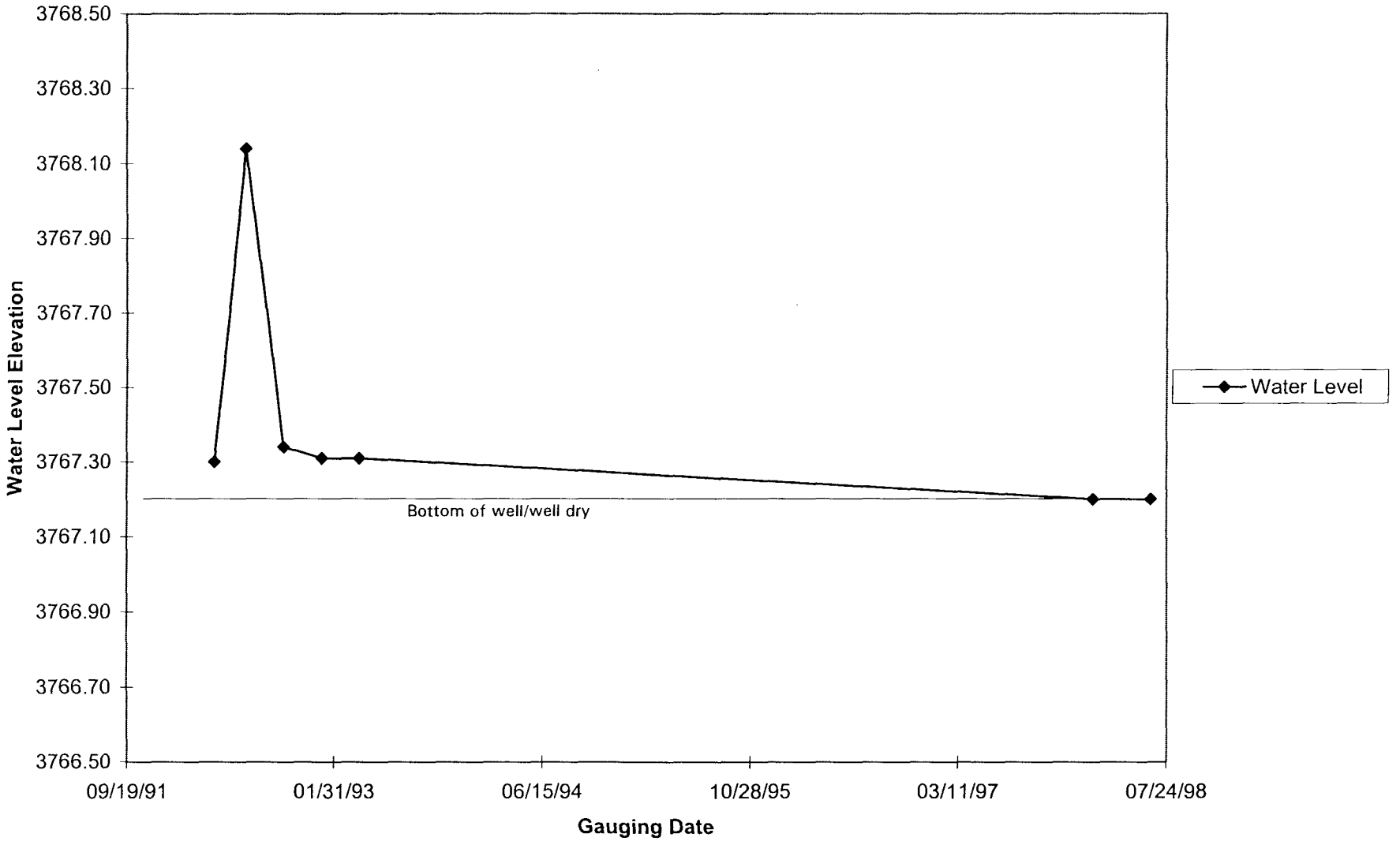
* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-3



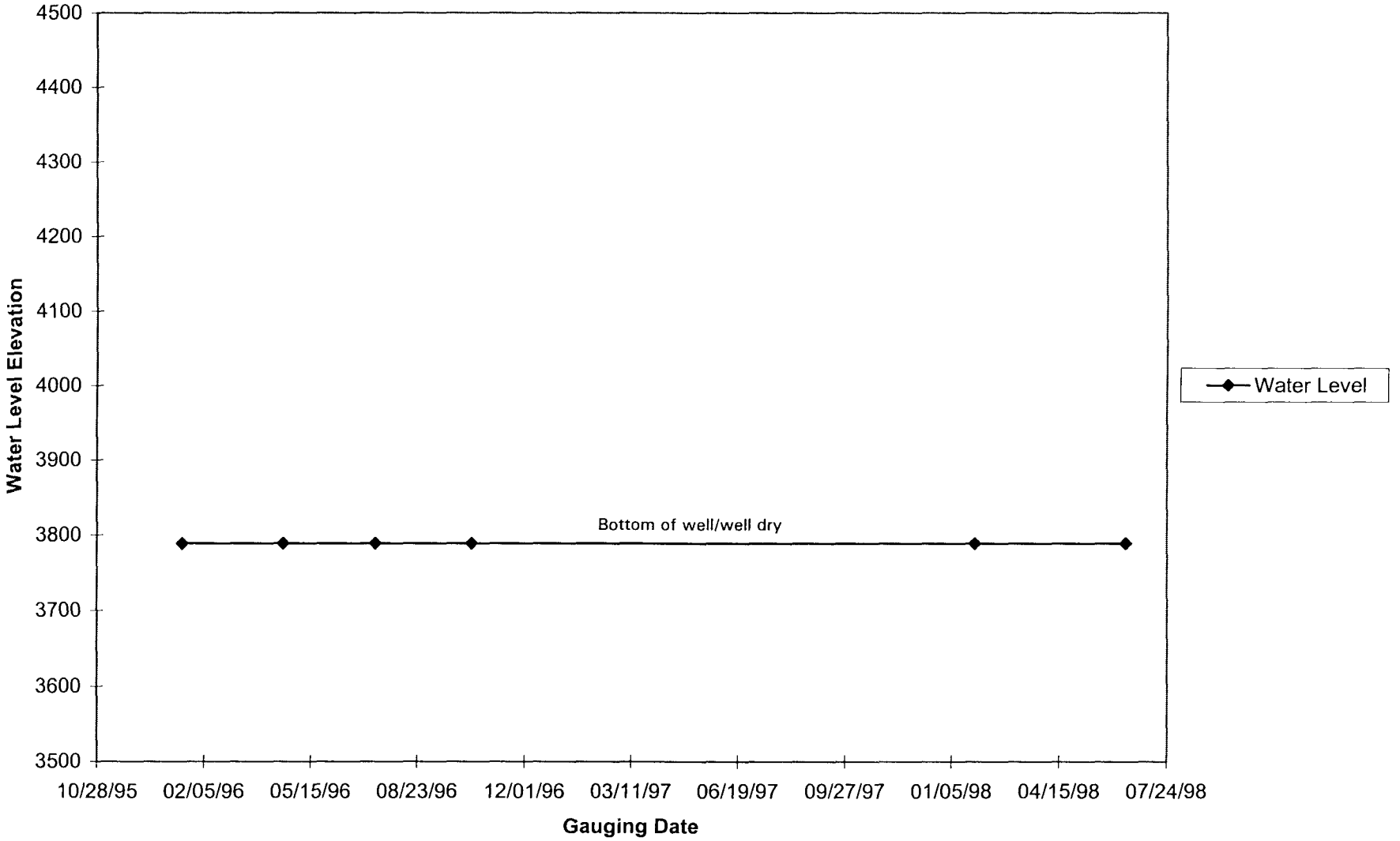
* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-4



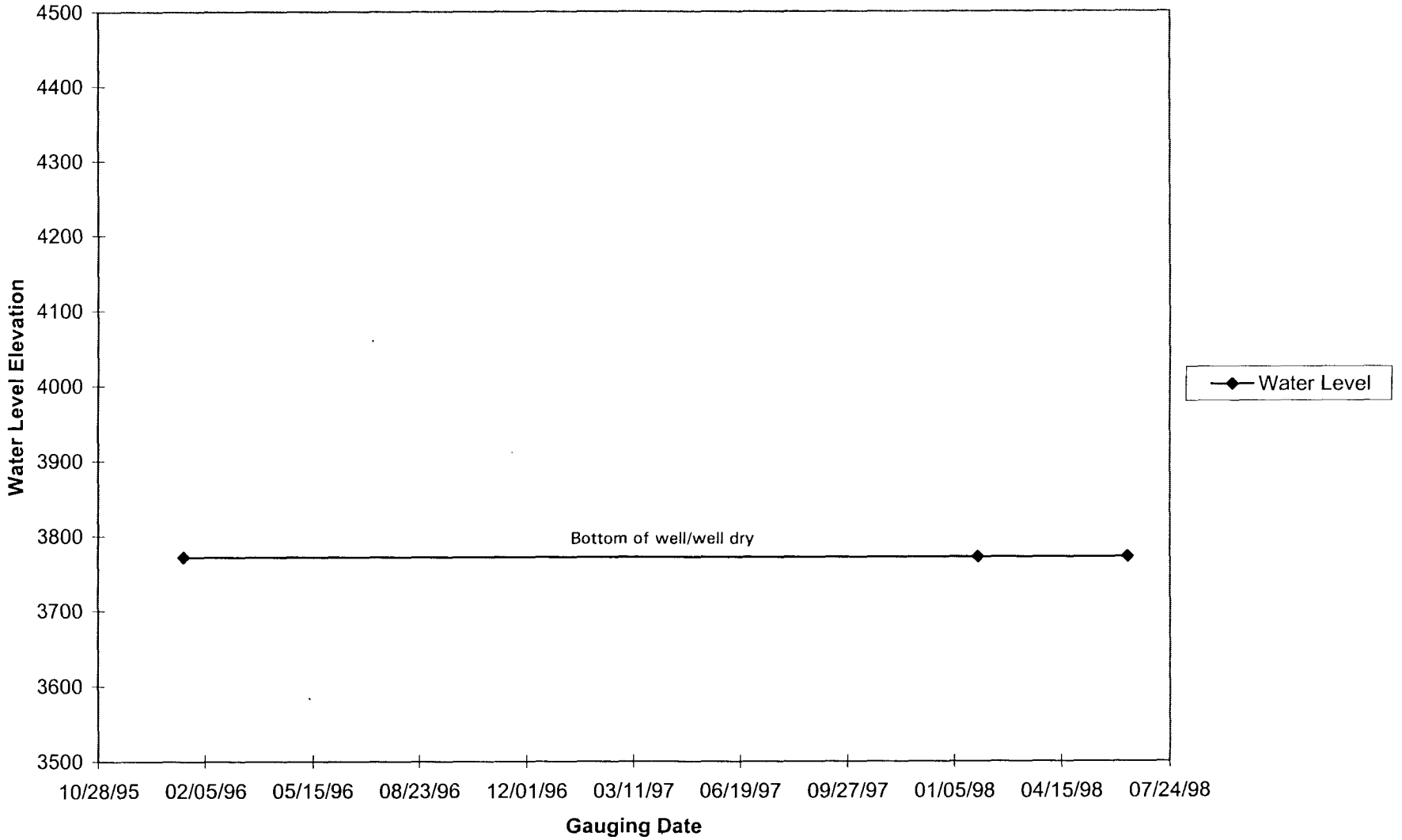
* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-5



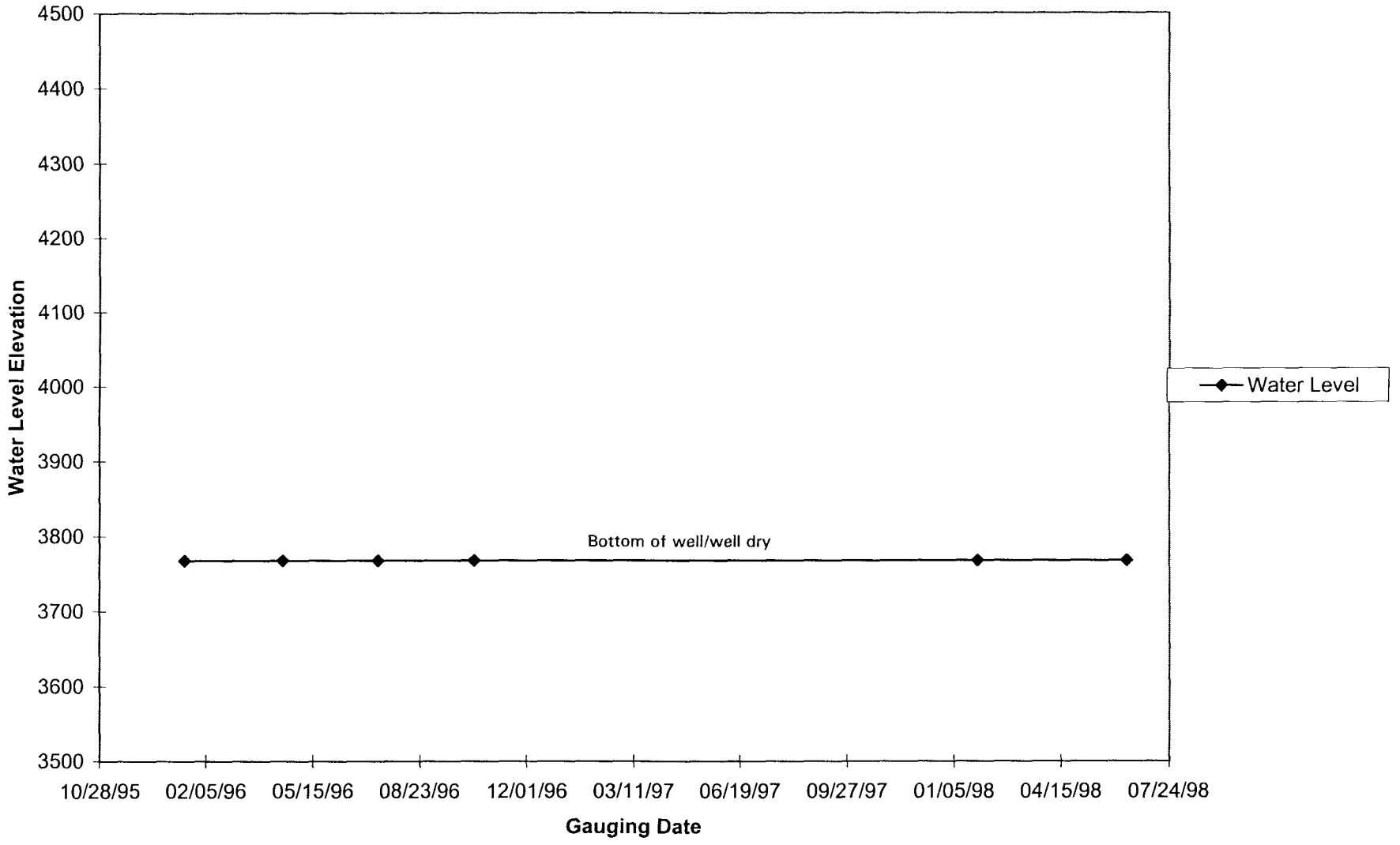
* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-6



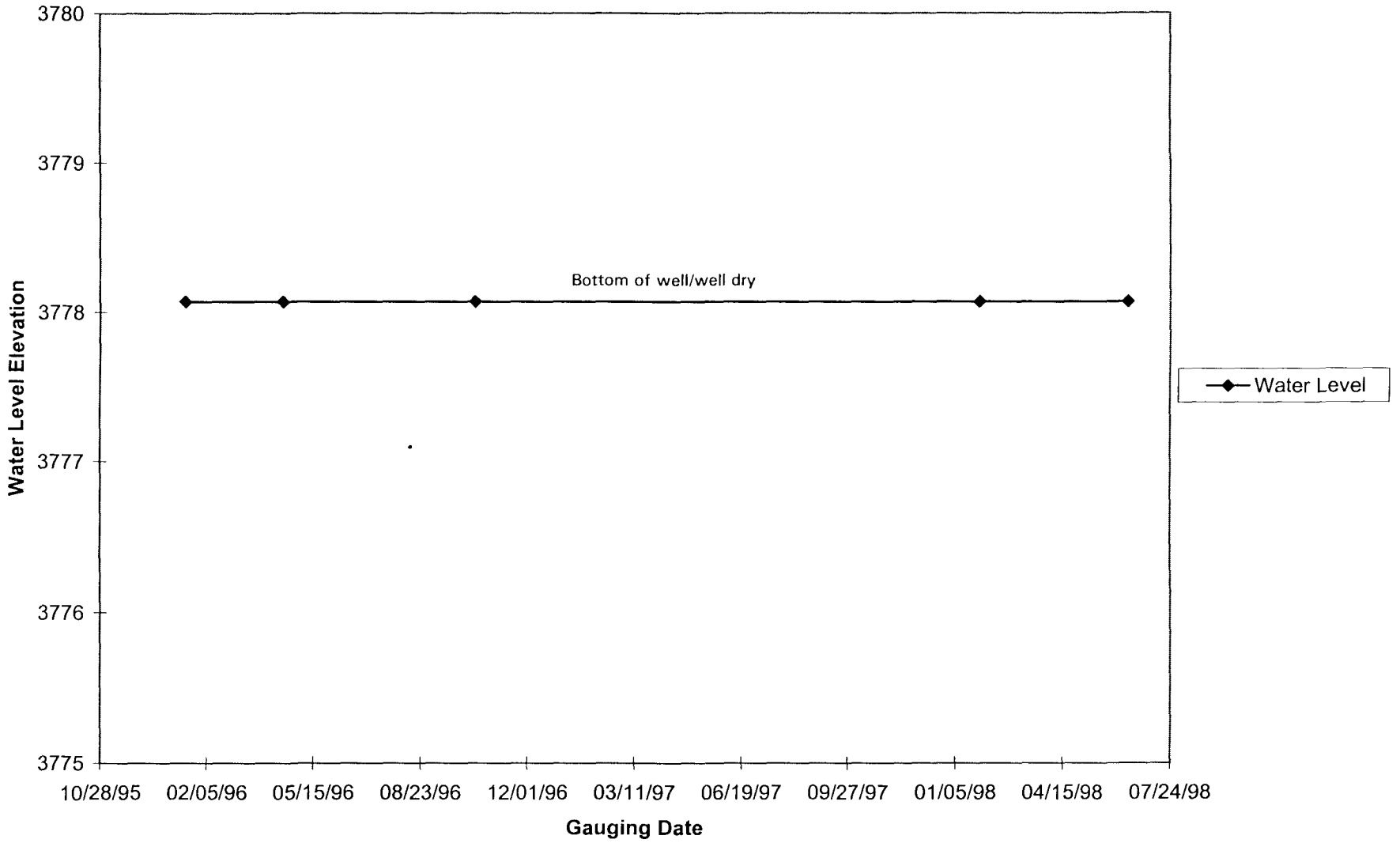
* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-7



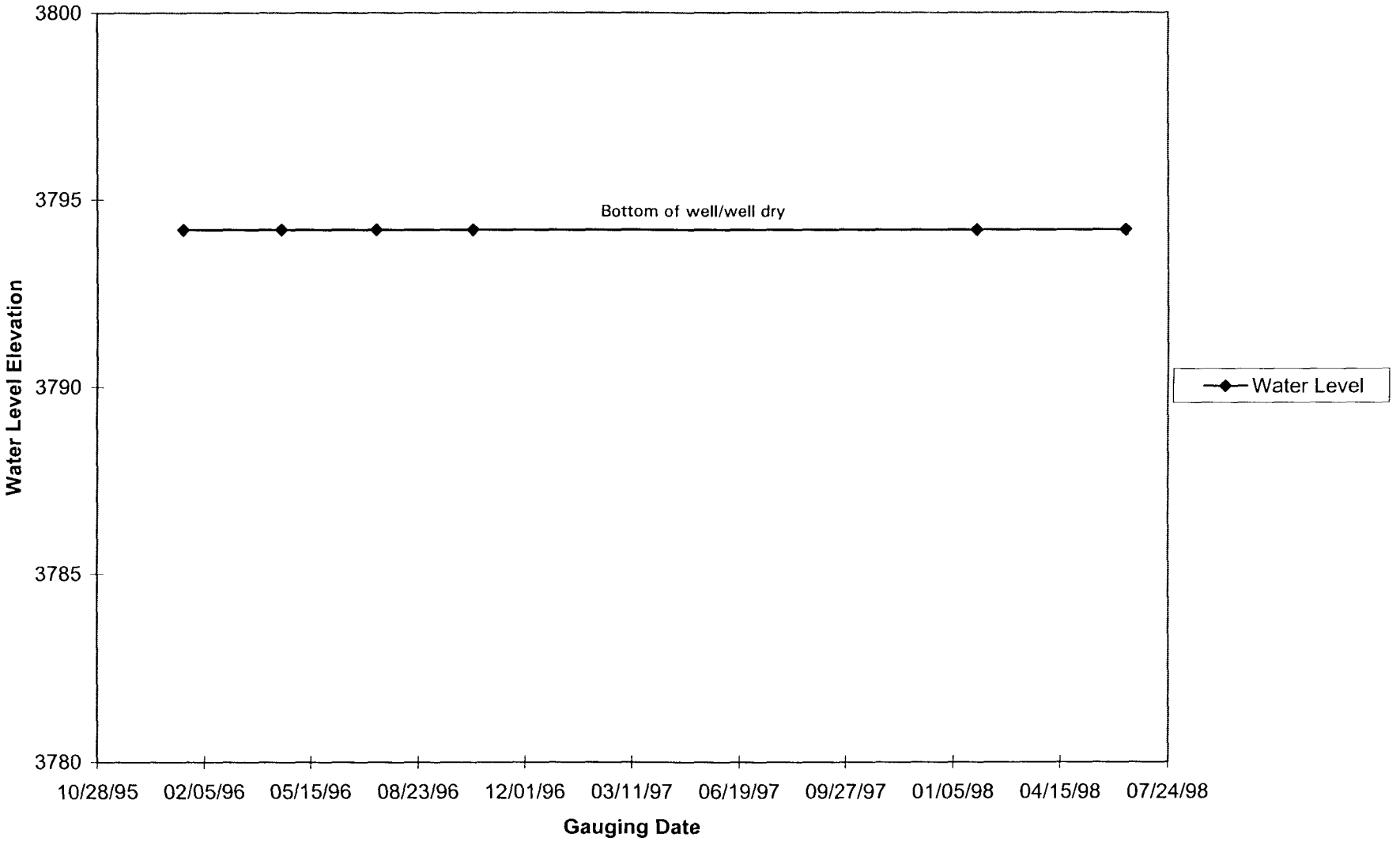
* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-9



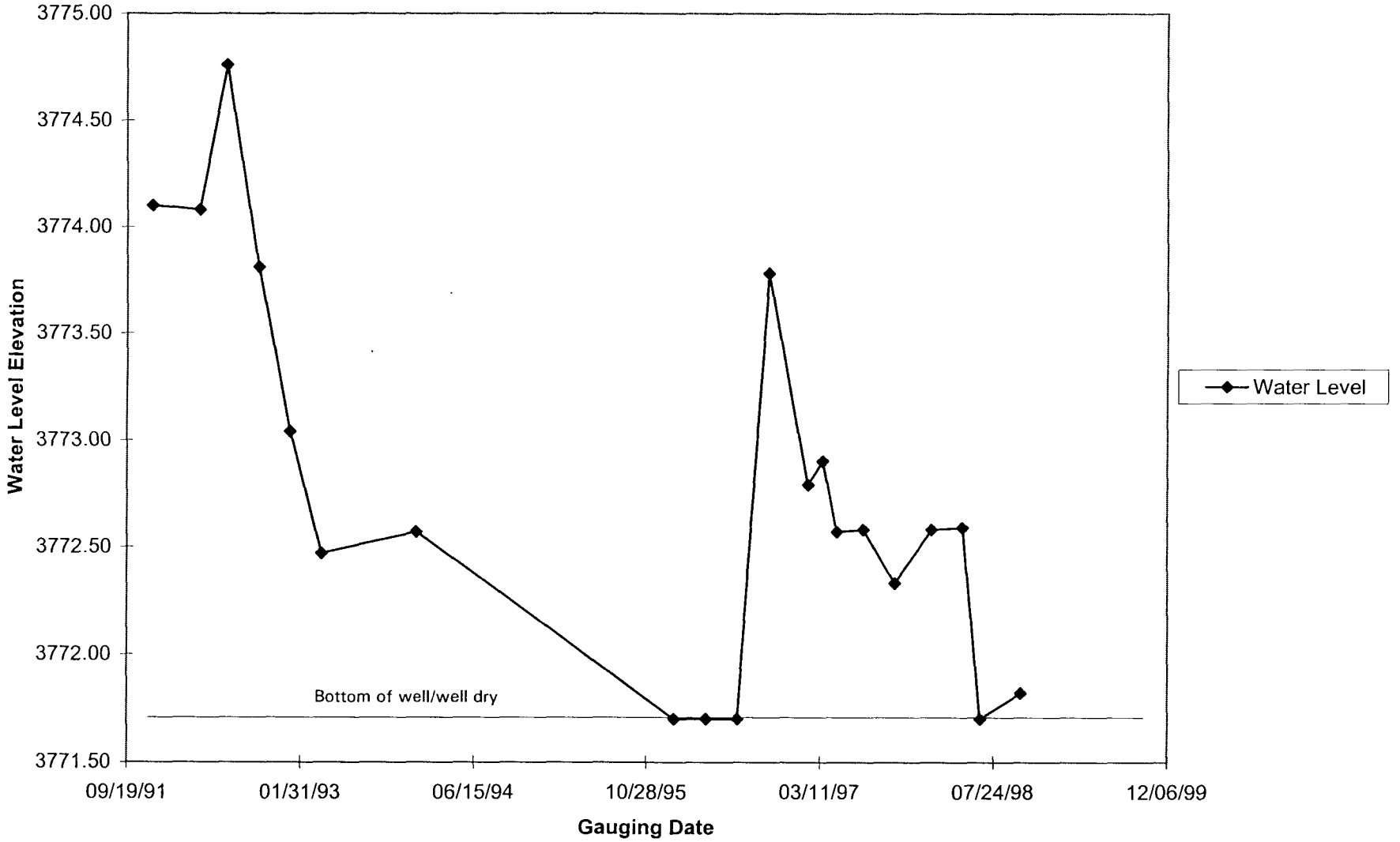
* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-9



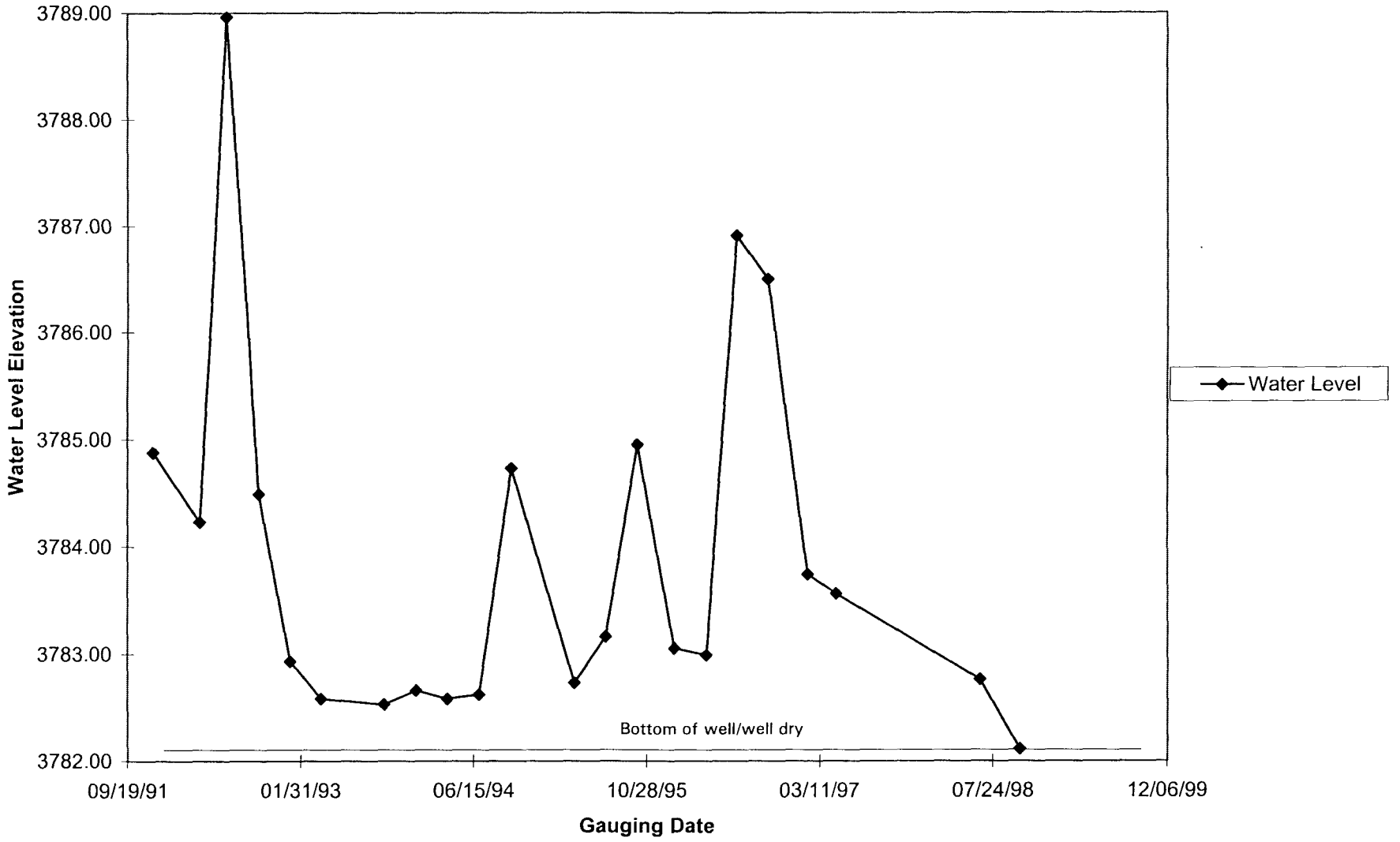
* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-10



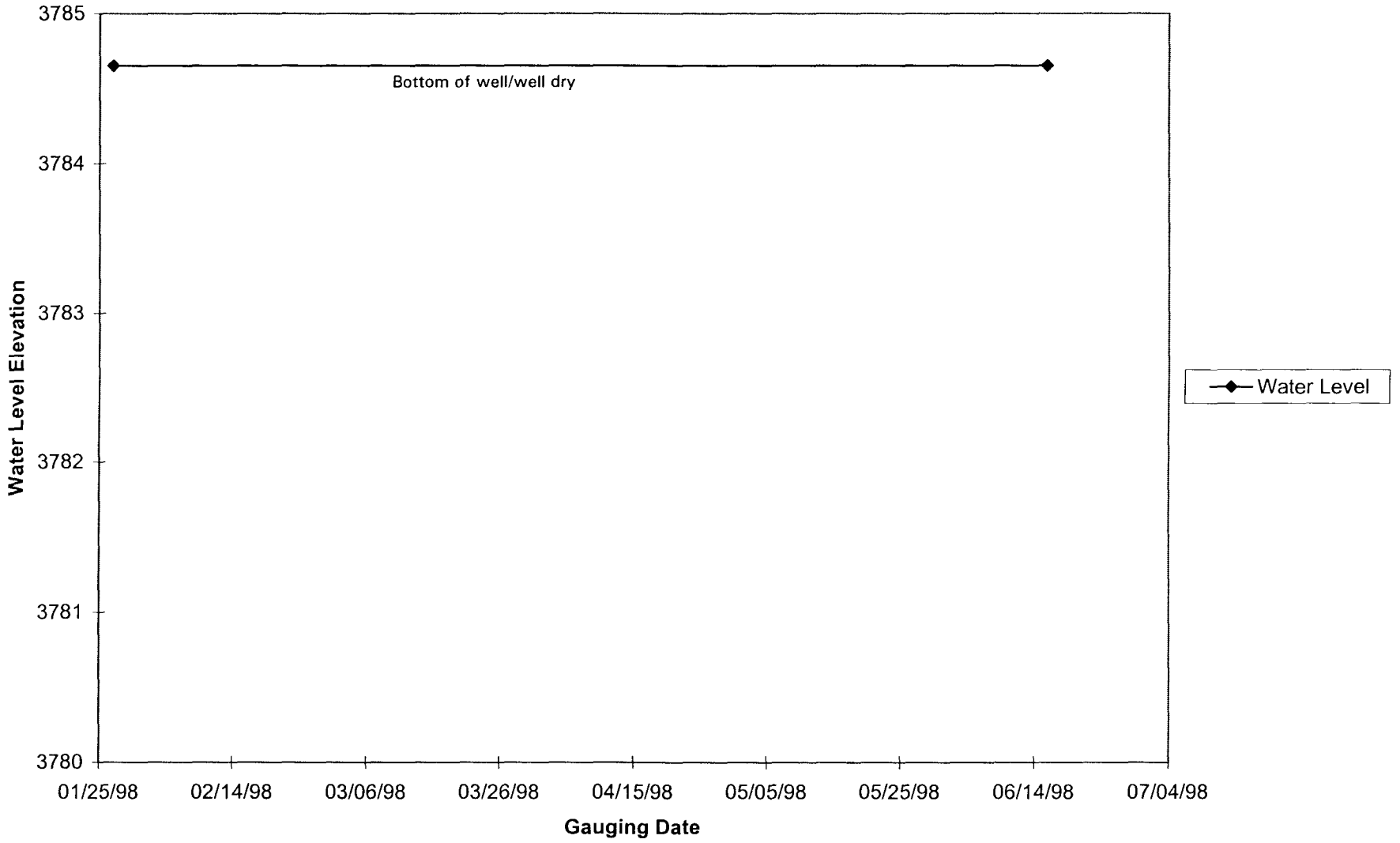
* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-11



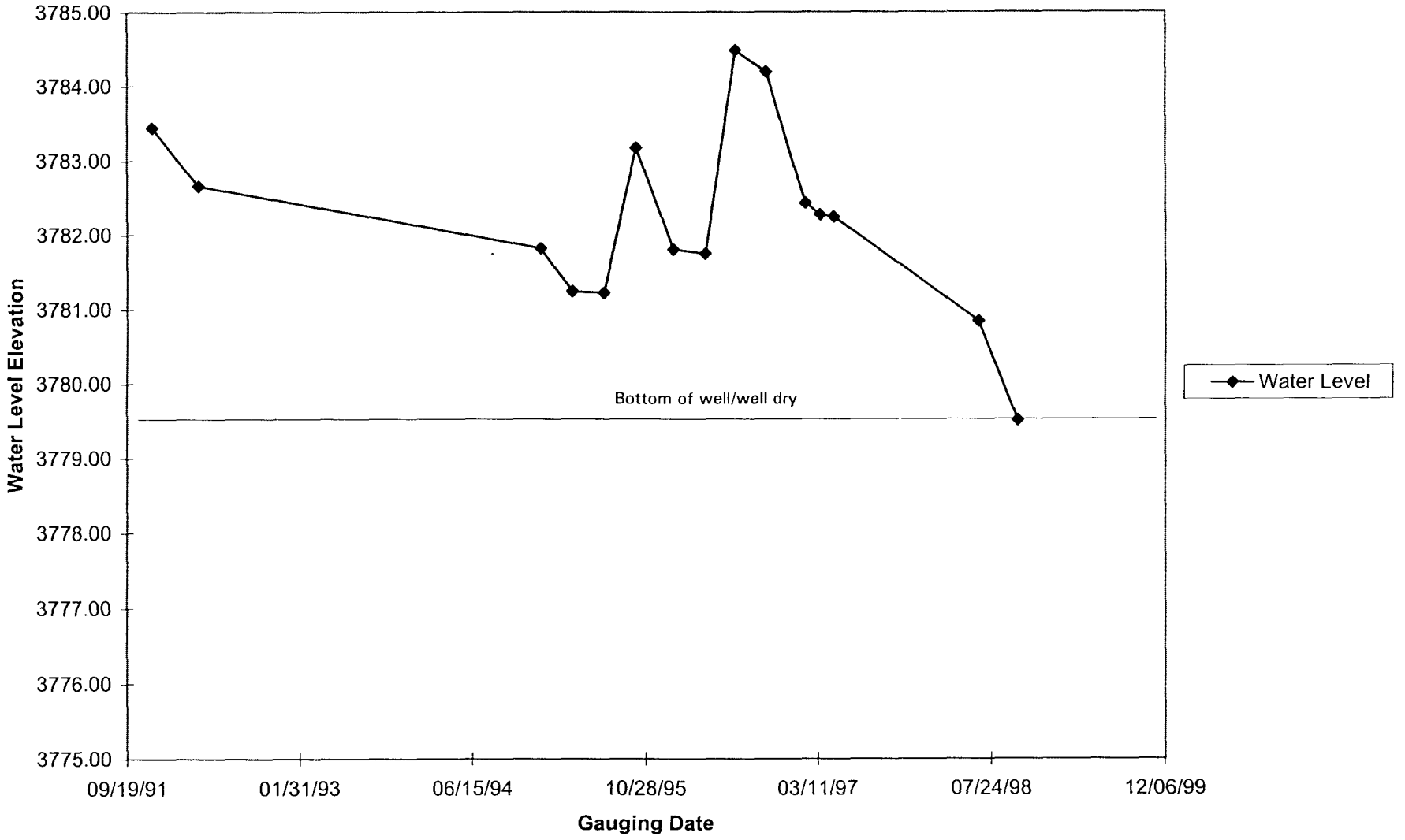
* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-12



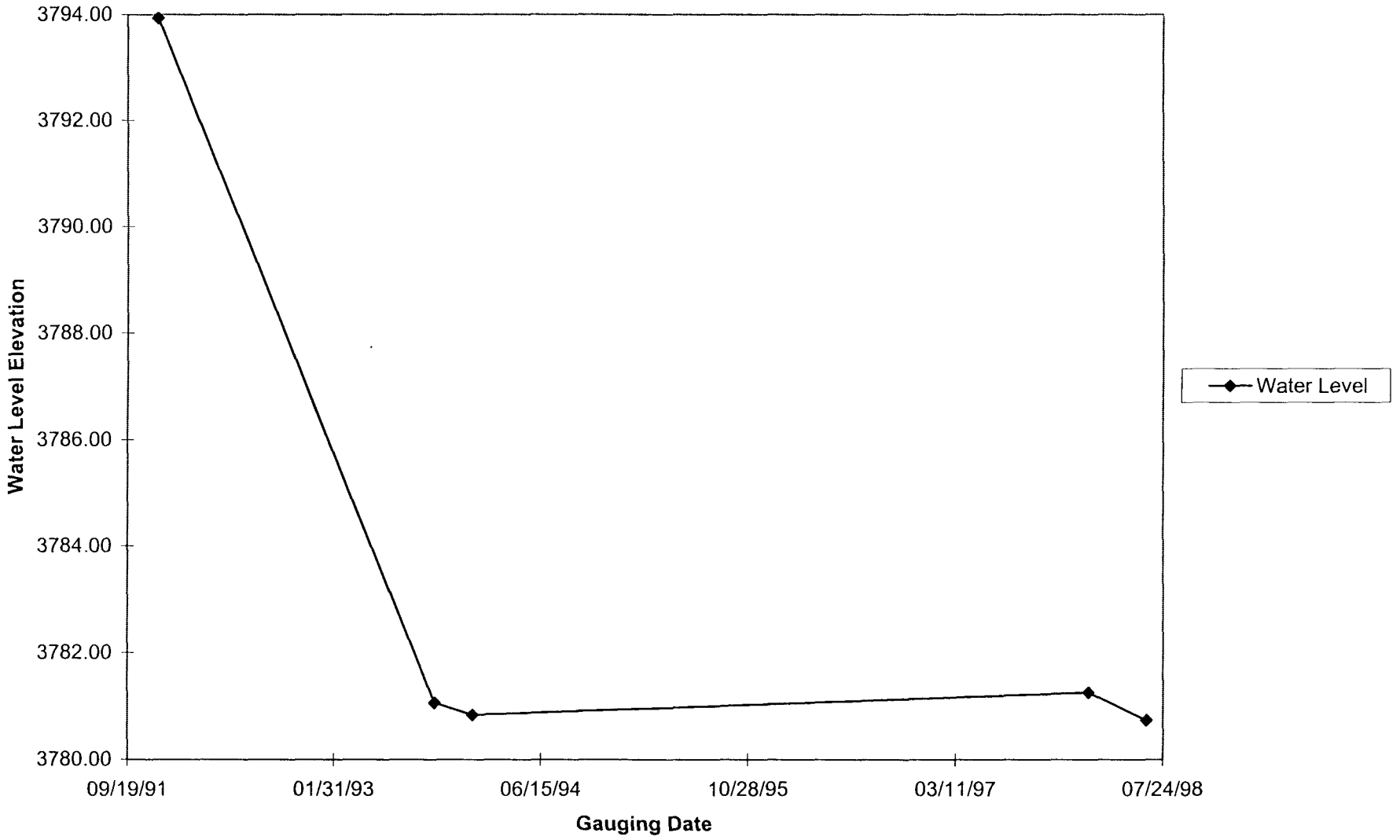
* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-13



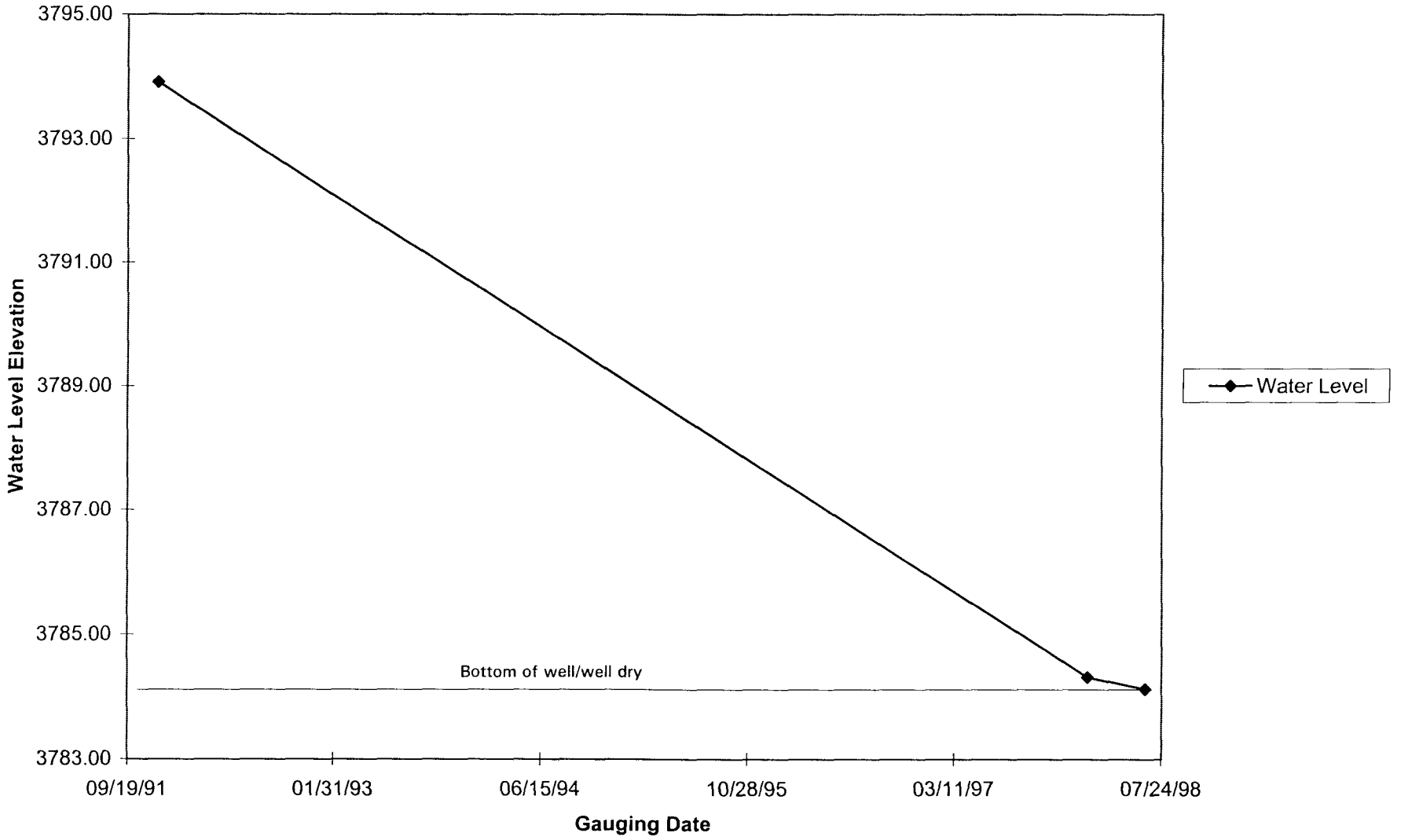
* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-14



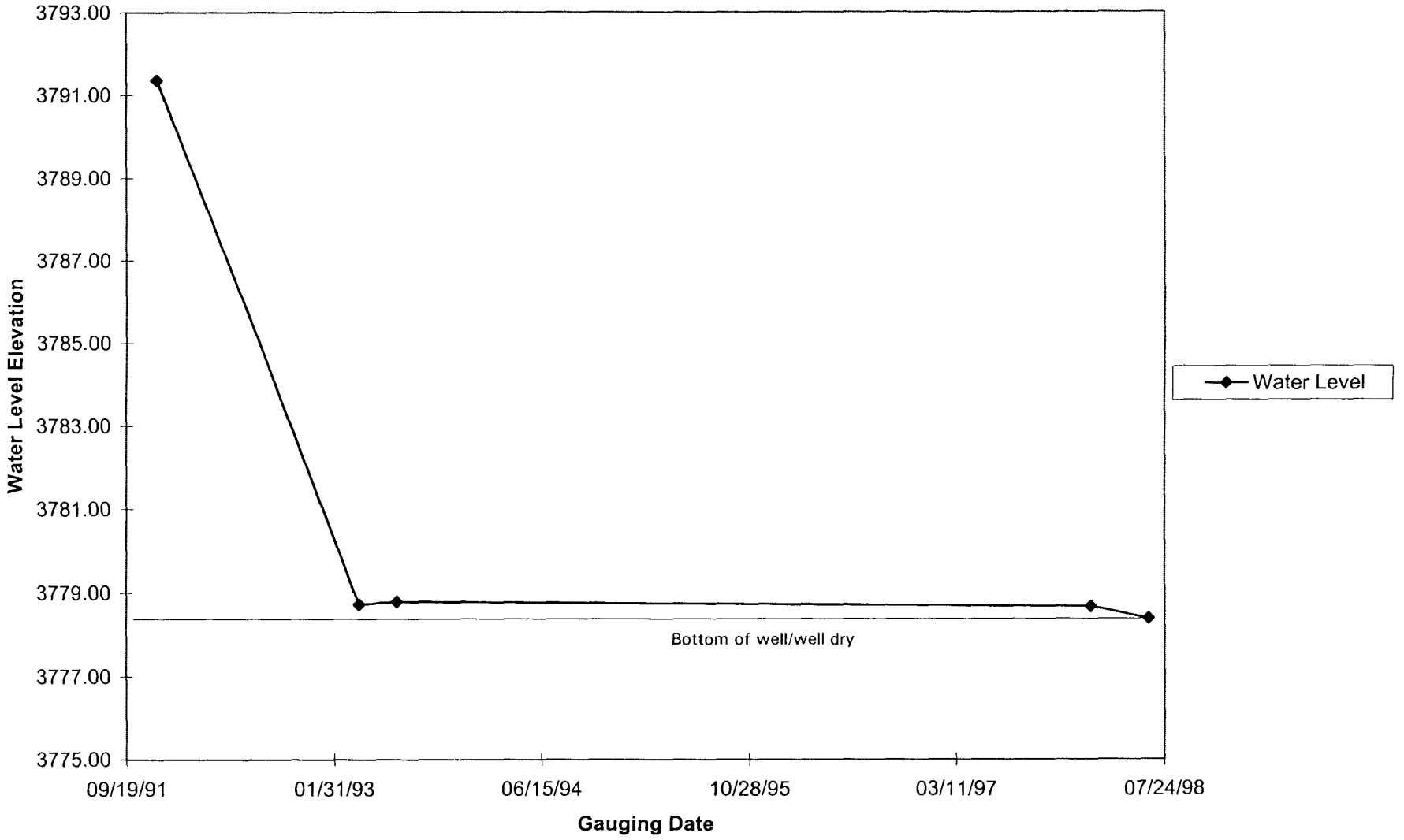
* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-15



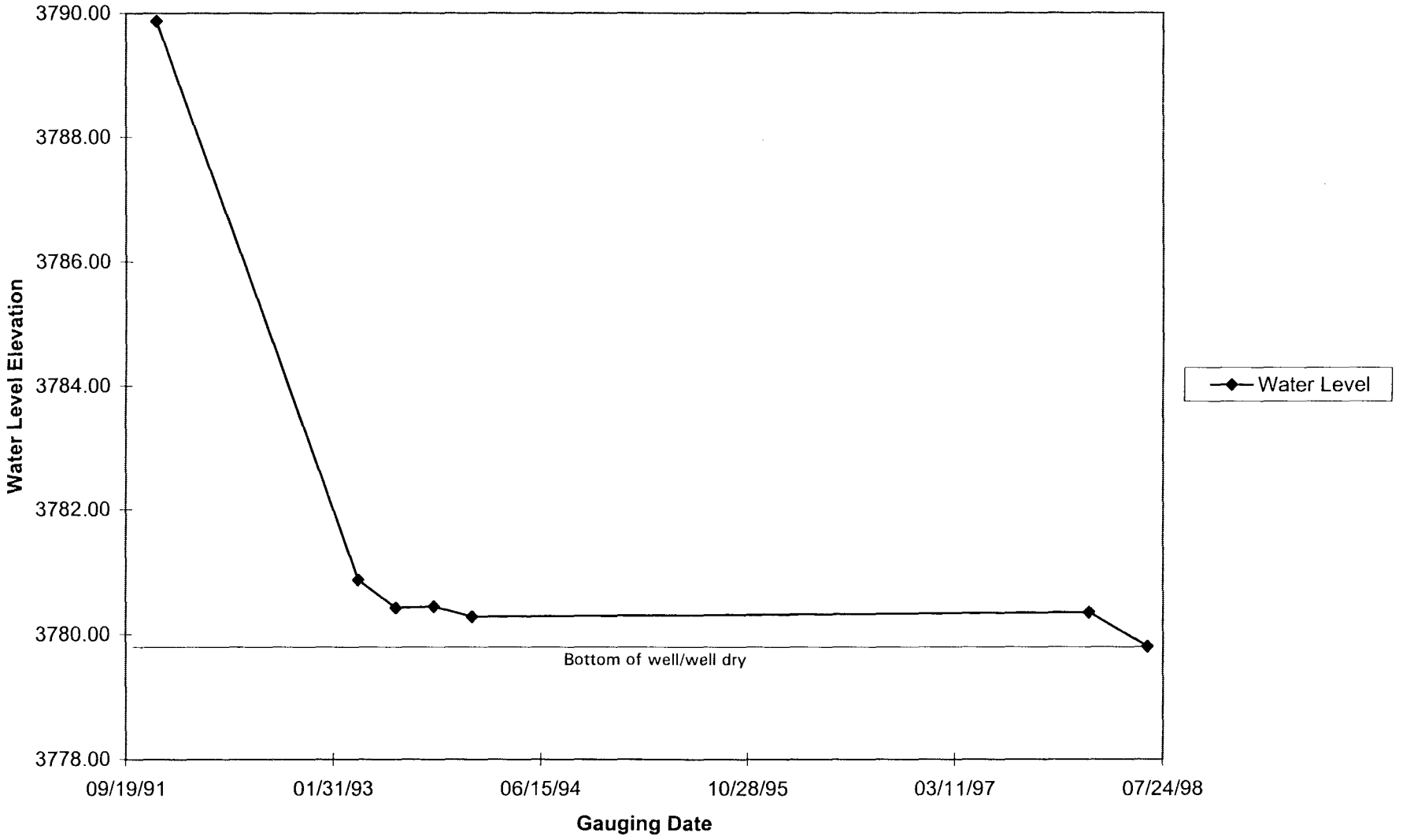
* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-16



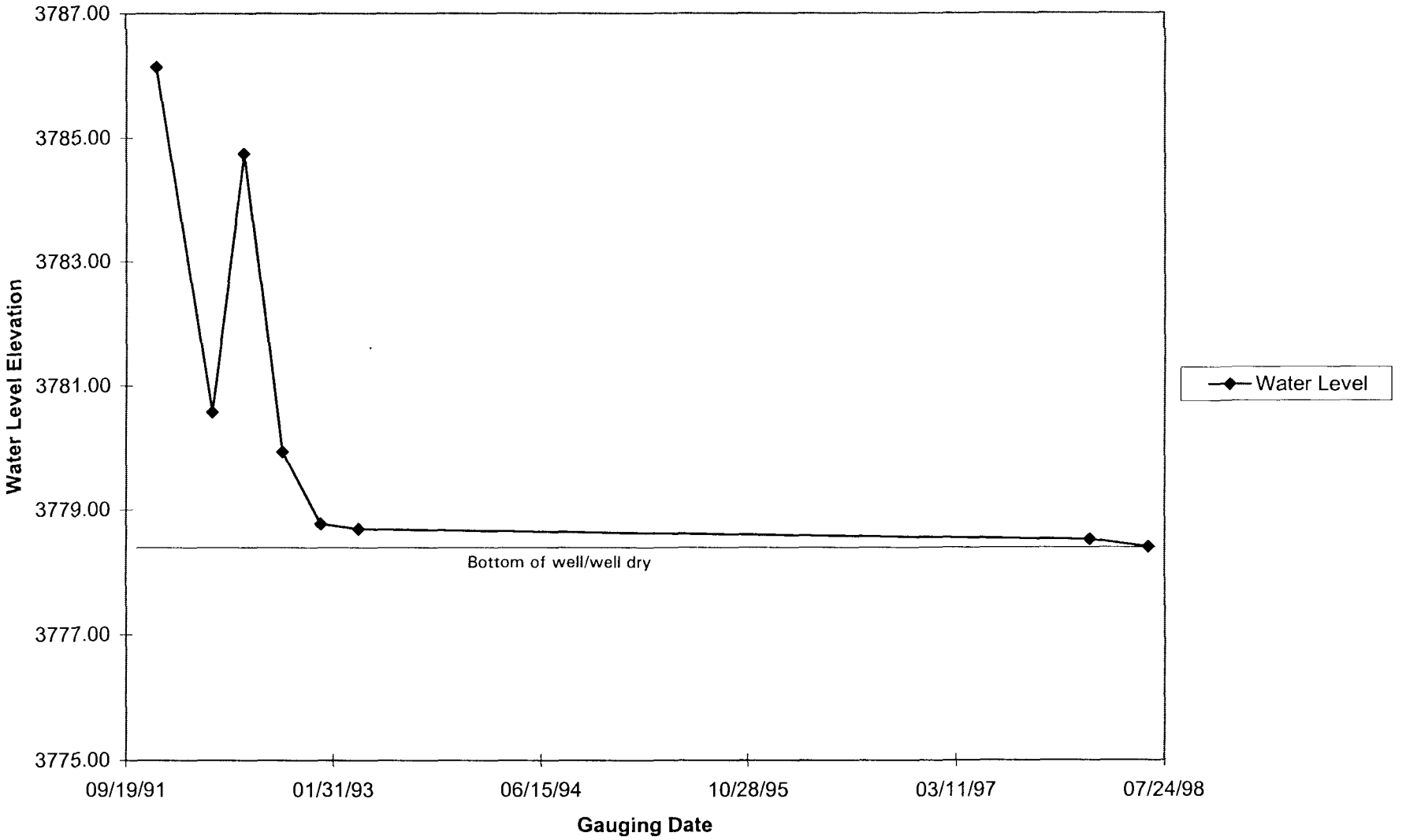
* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-17



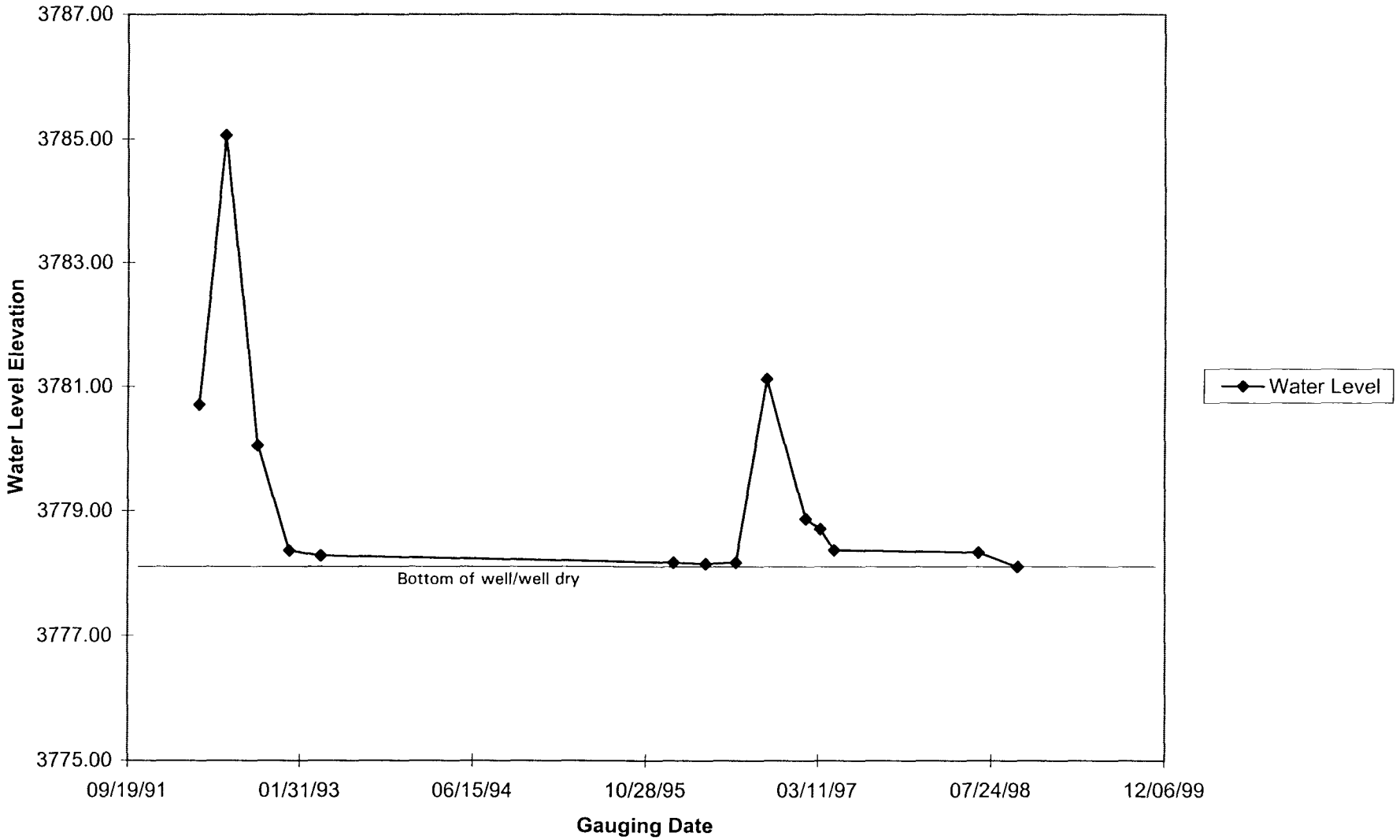
* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-18



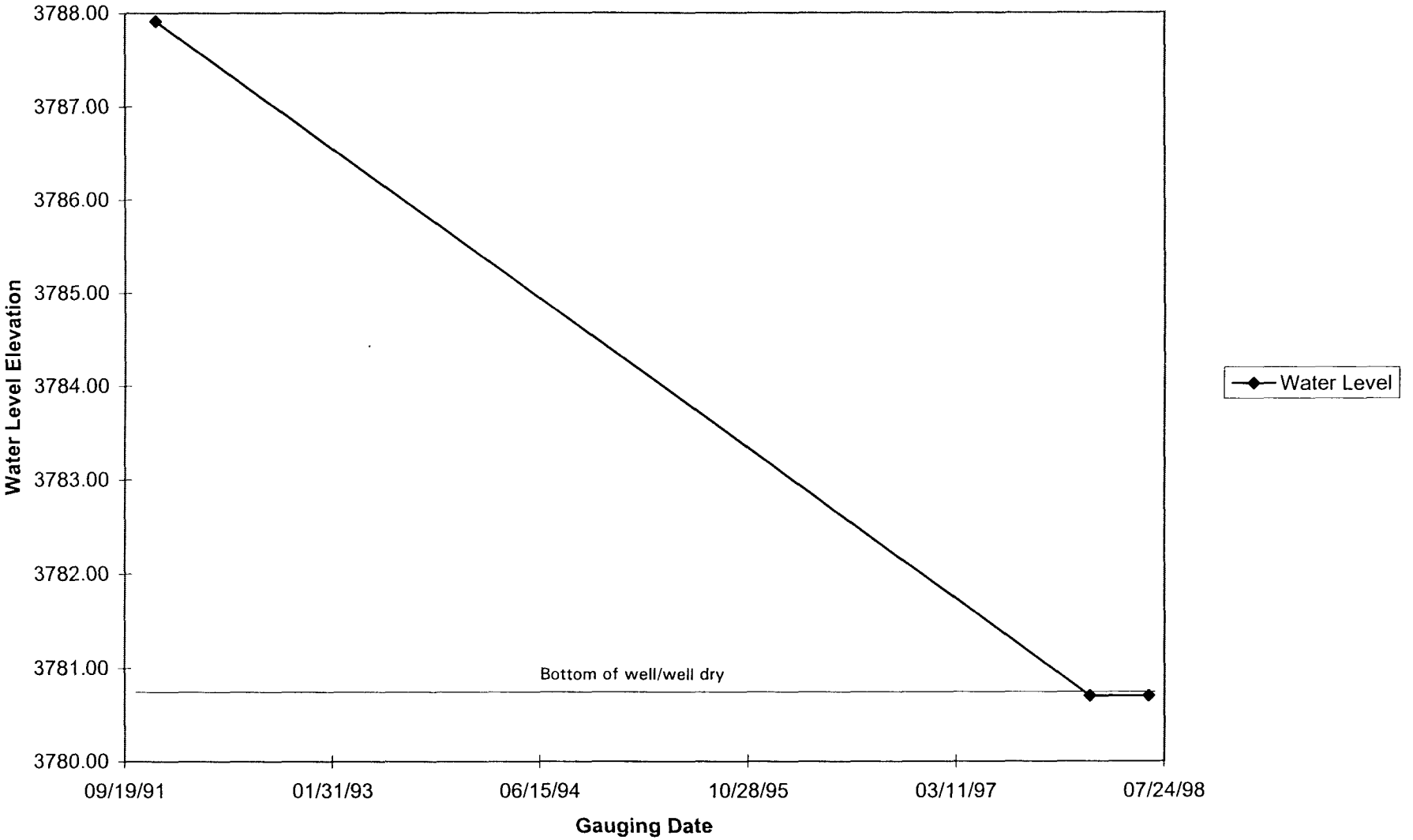
* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-19



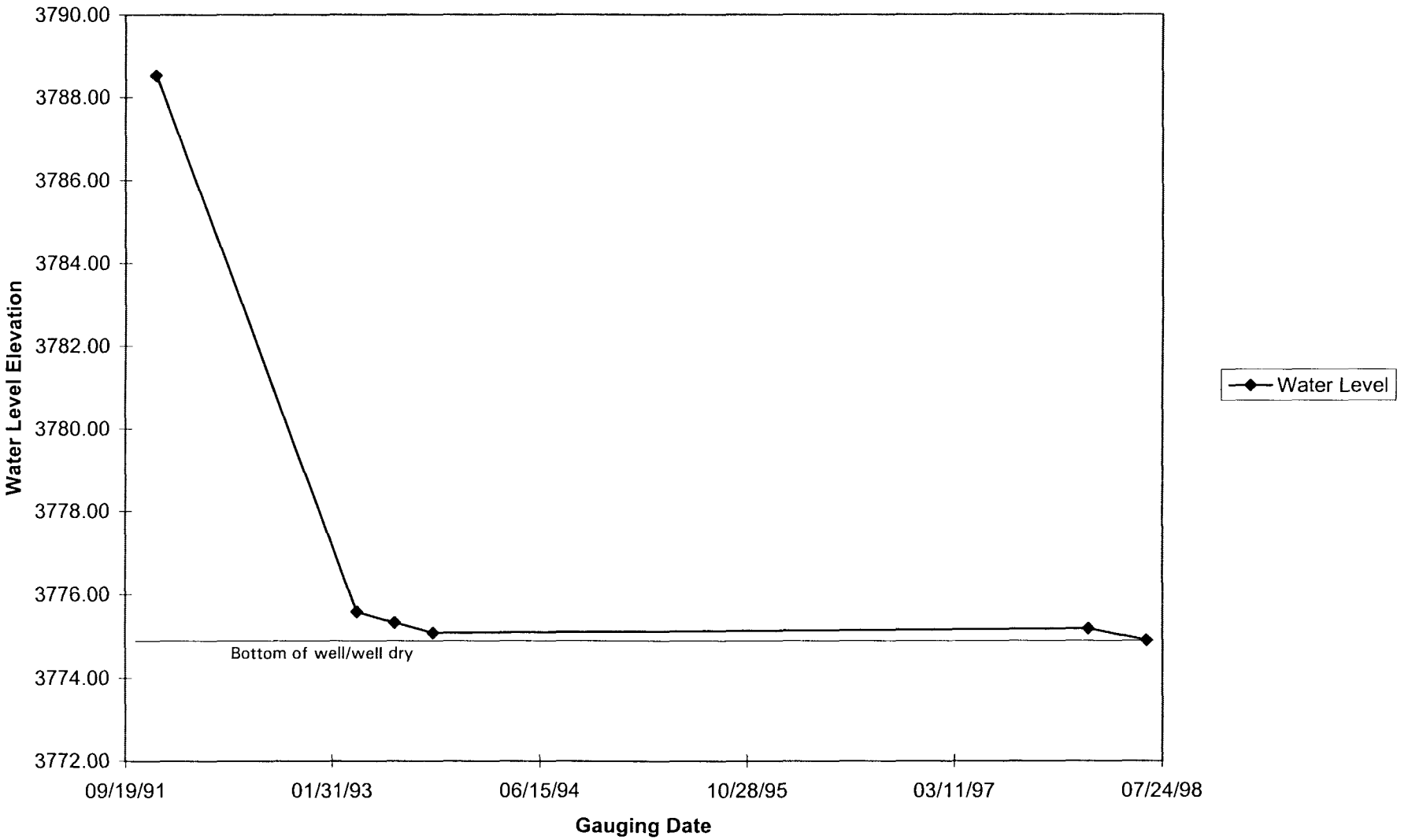
* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-20



* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-21



* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

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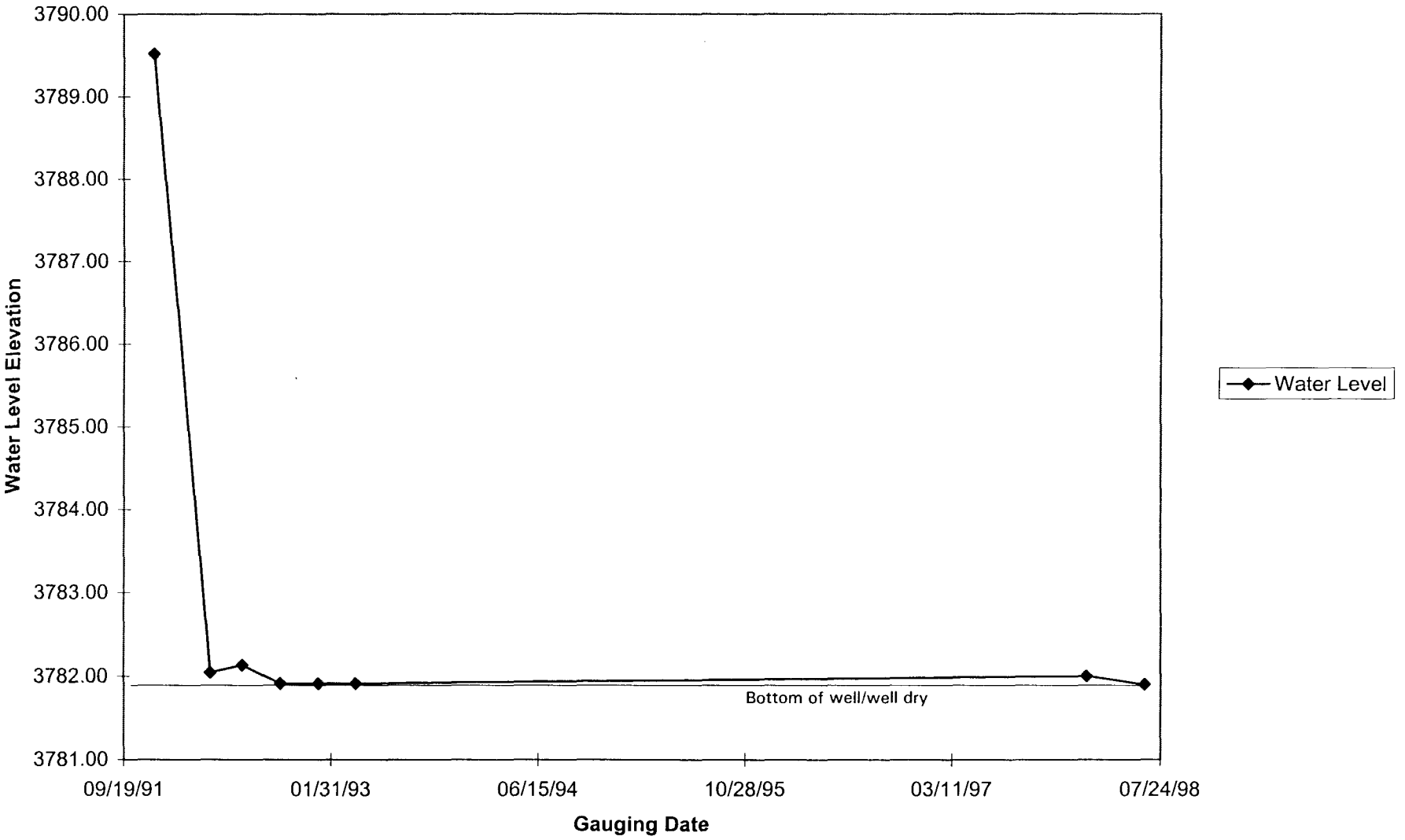

* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

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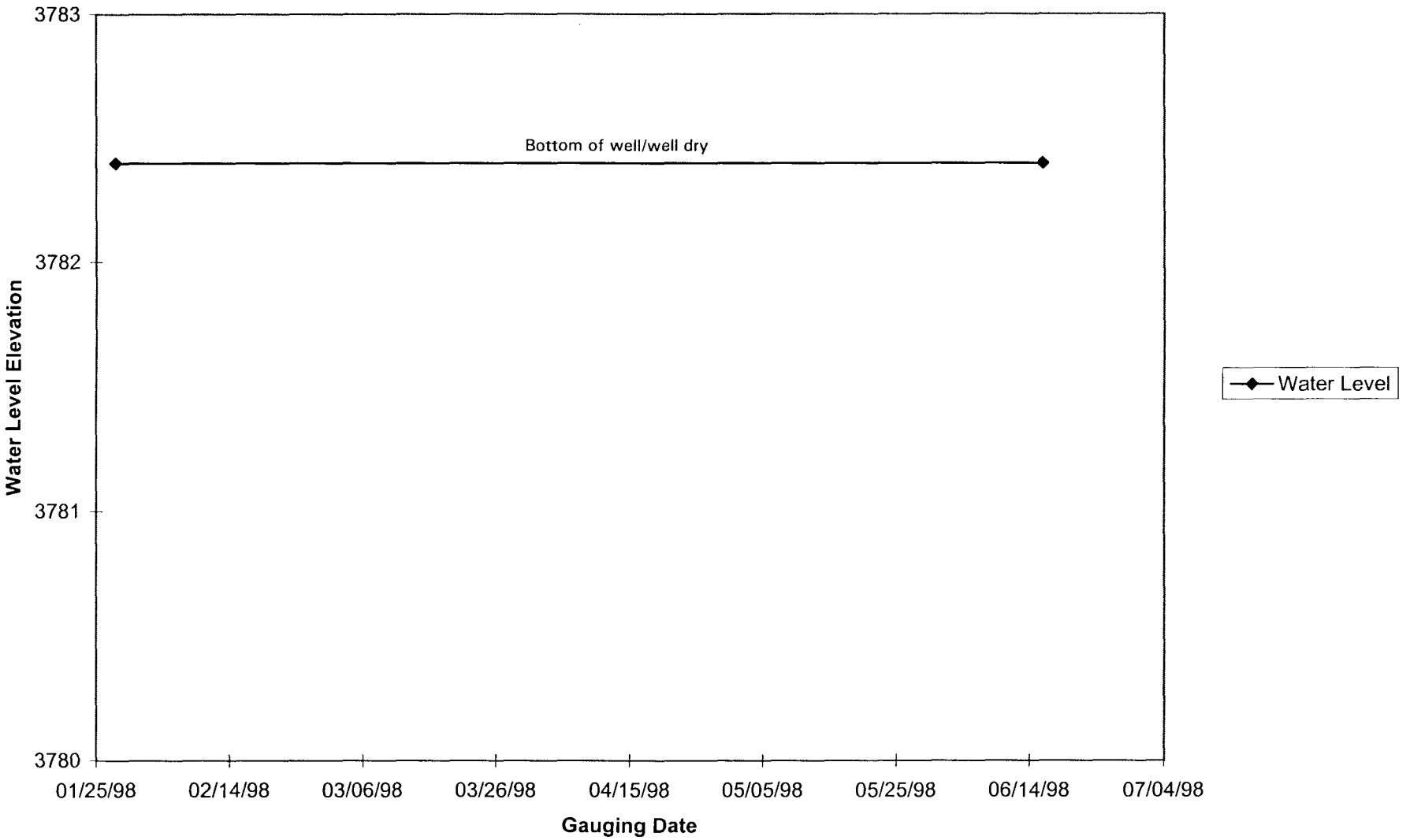
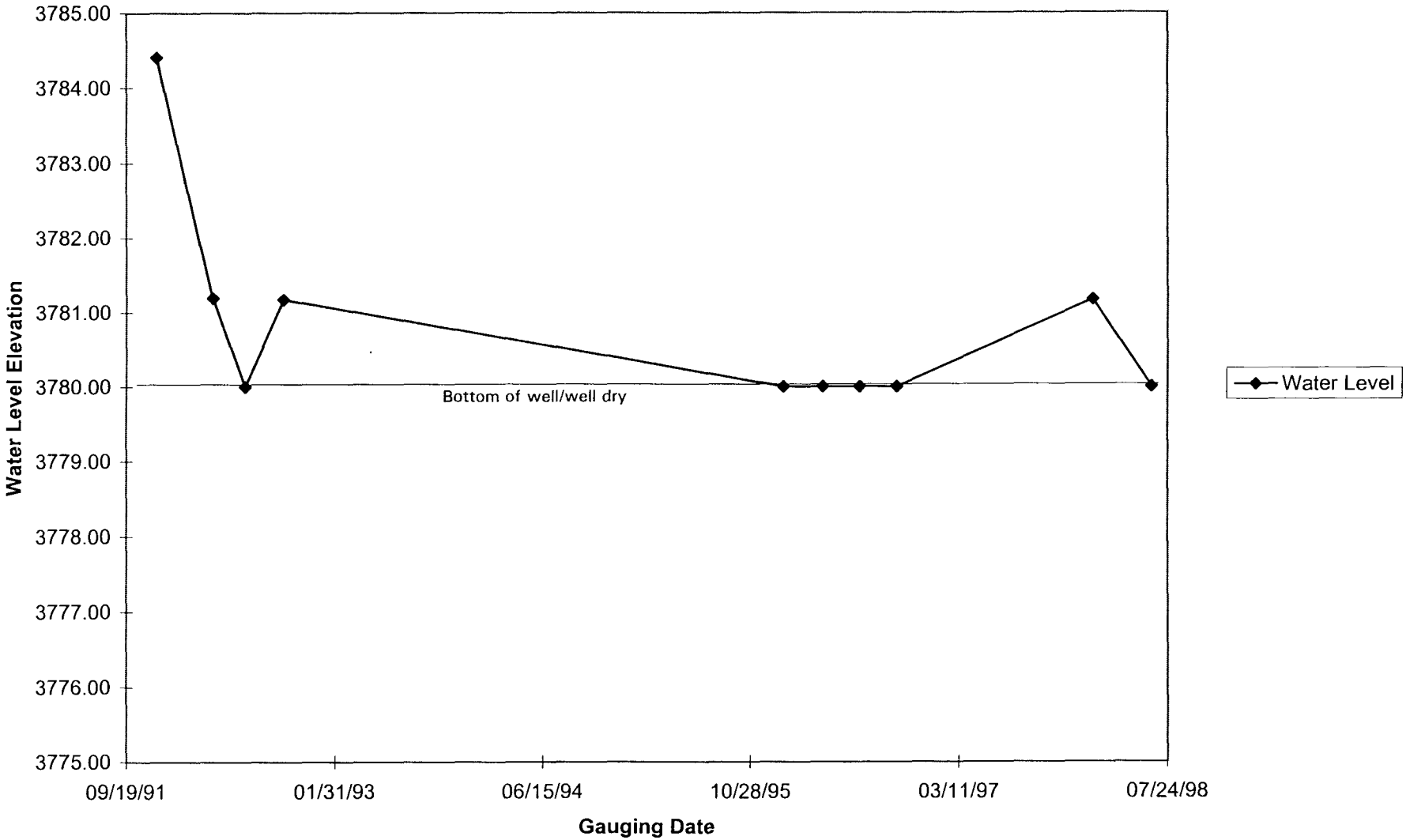


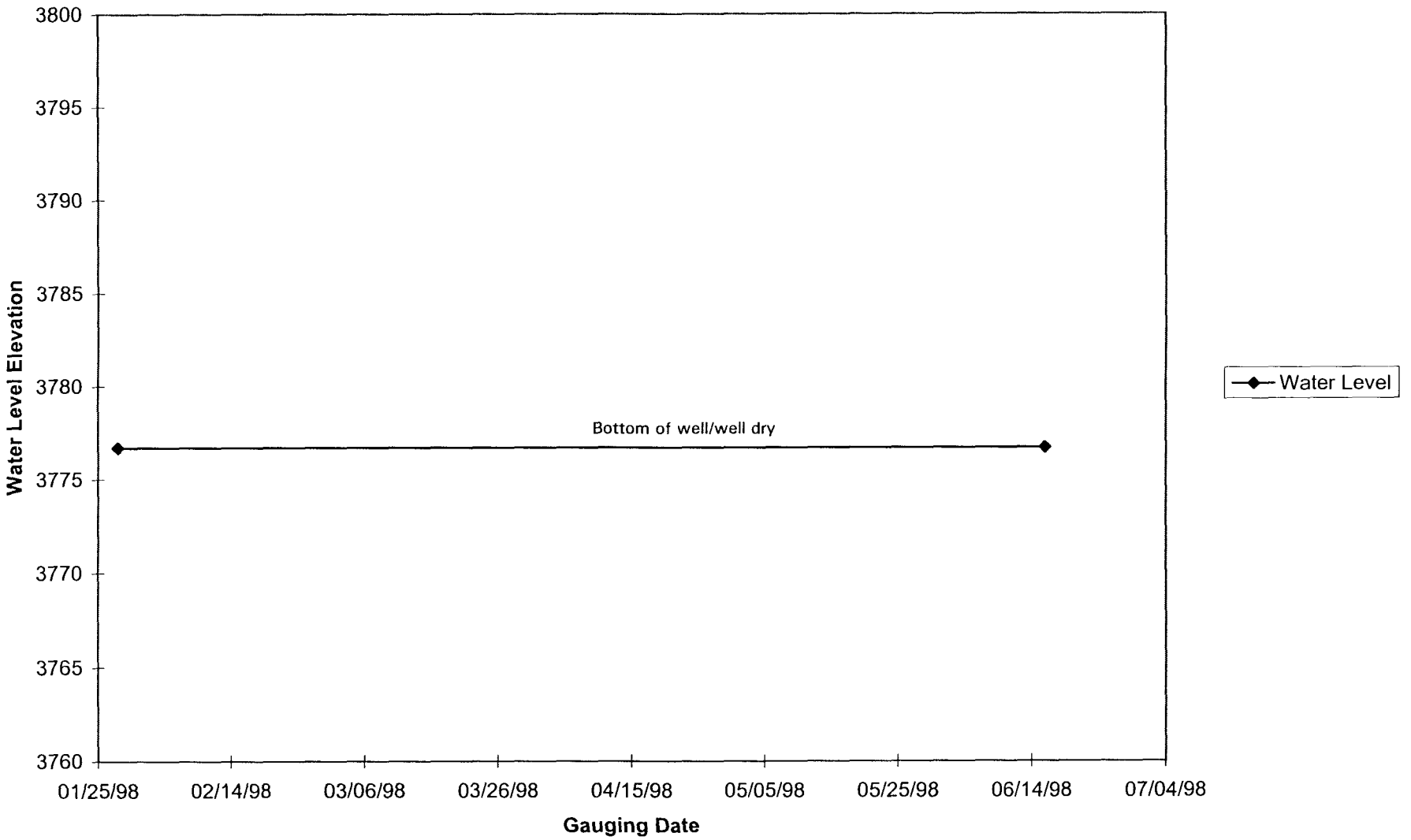
* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-24



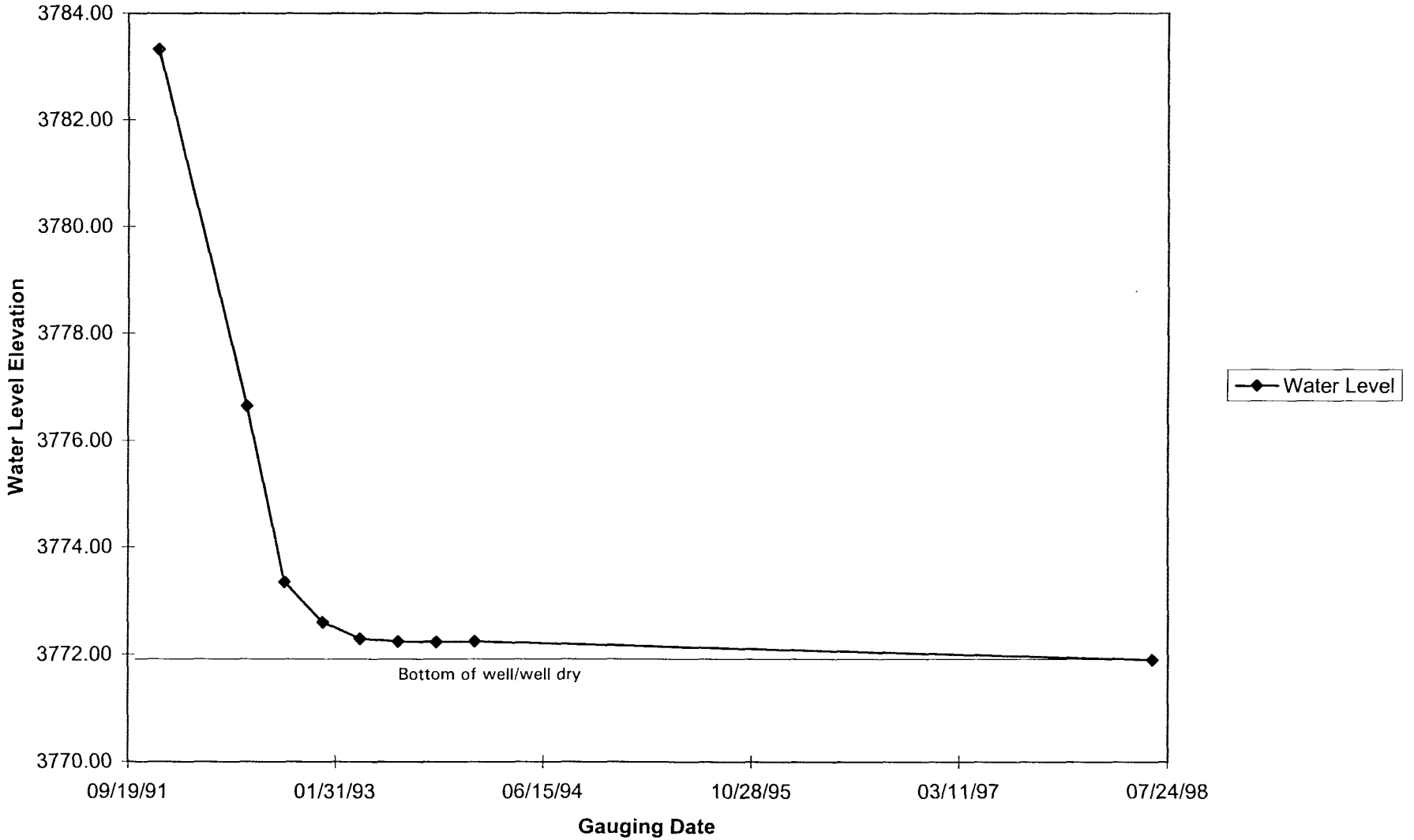
* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-25



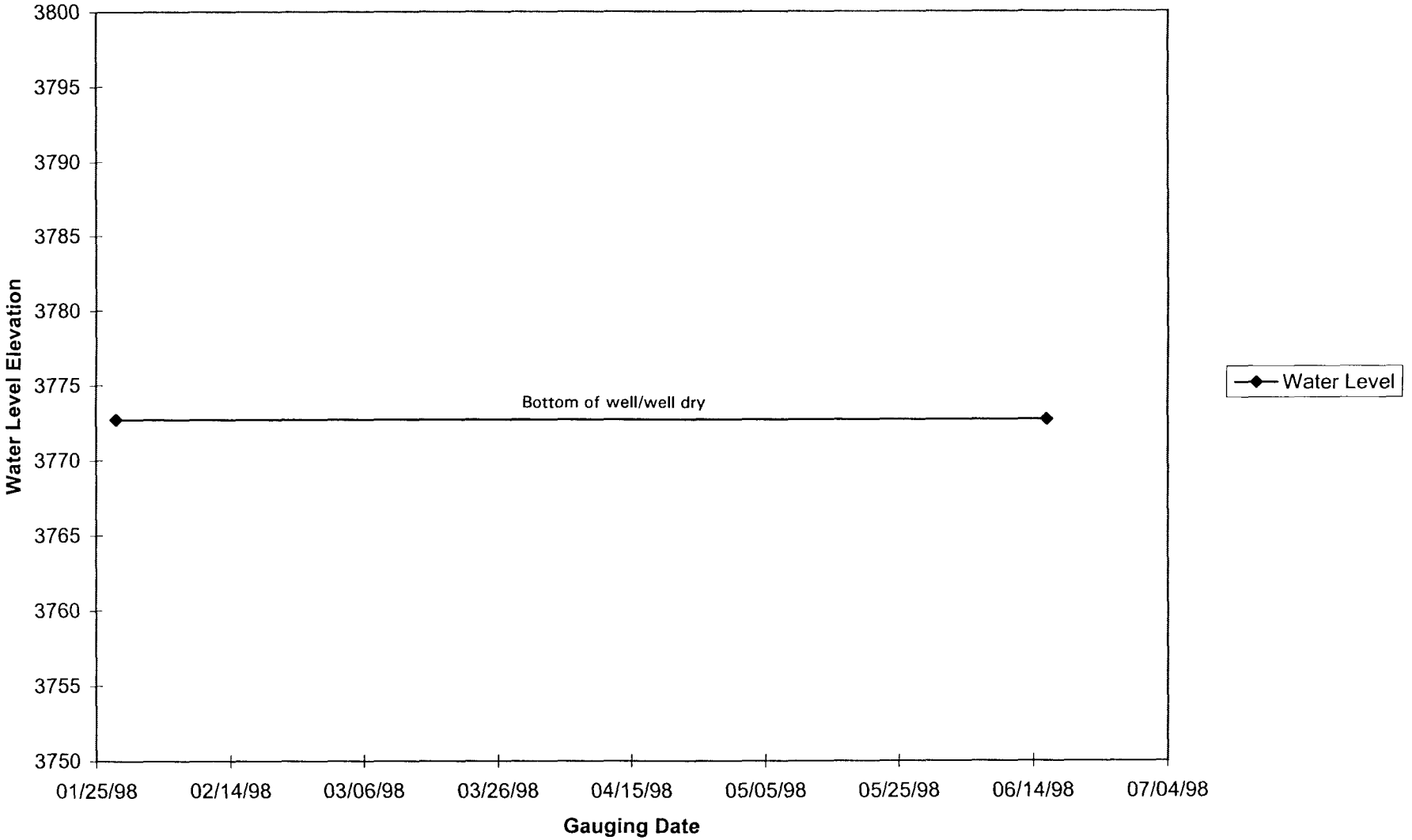
* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-26



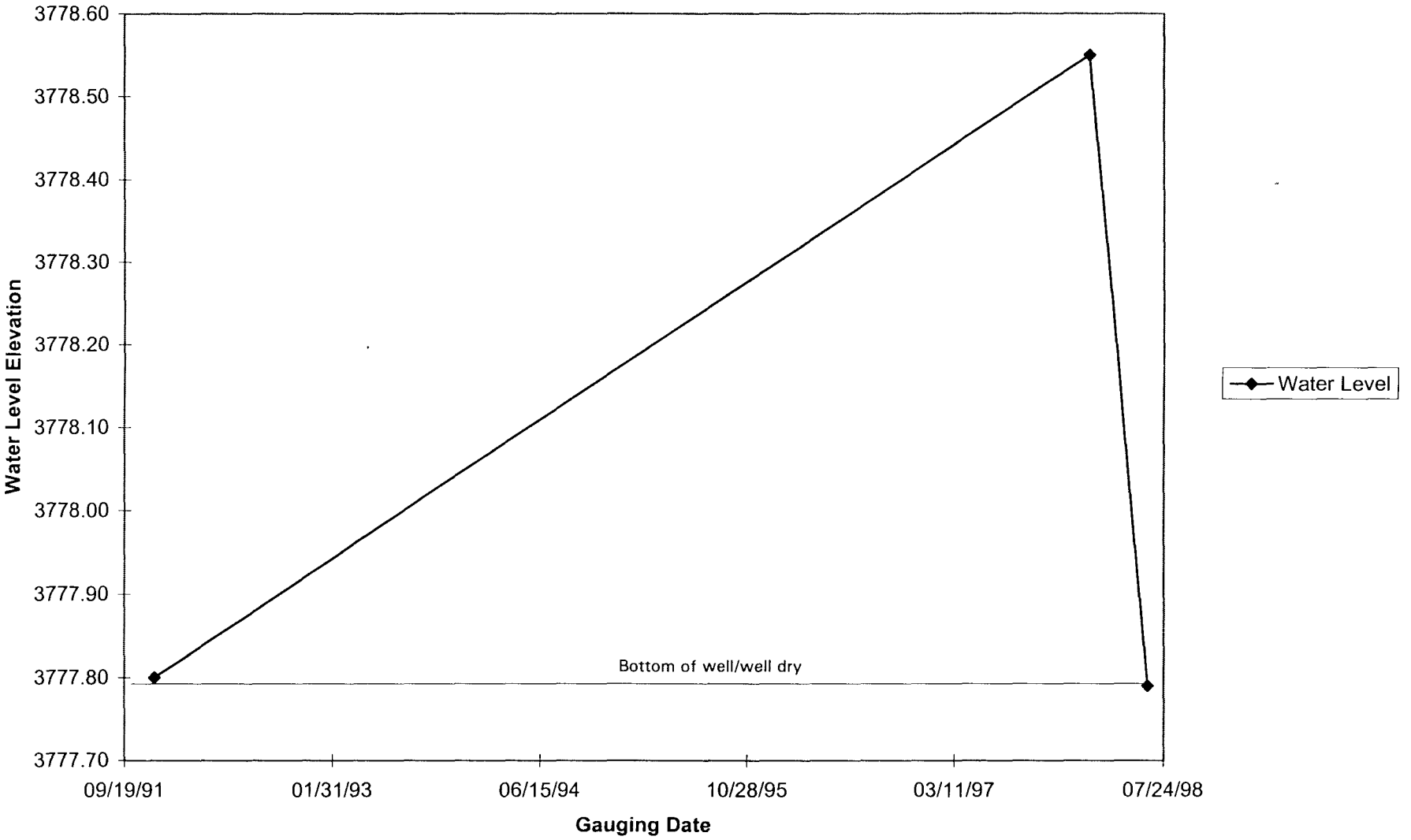
* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-27



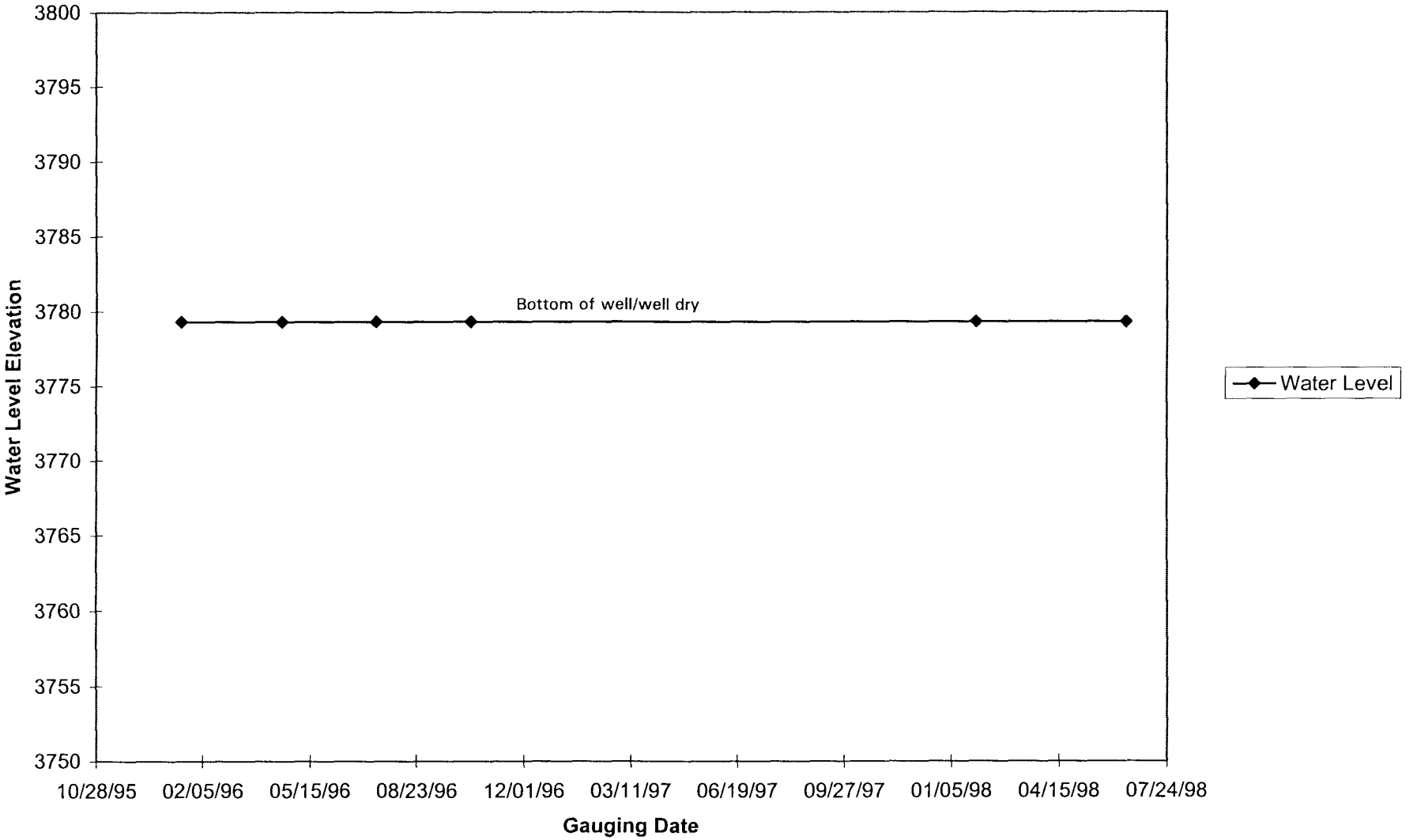
* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-28



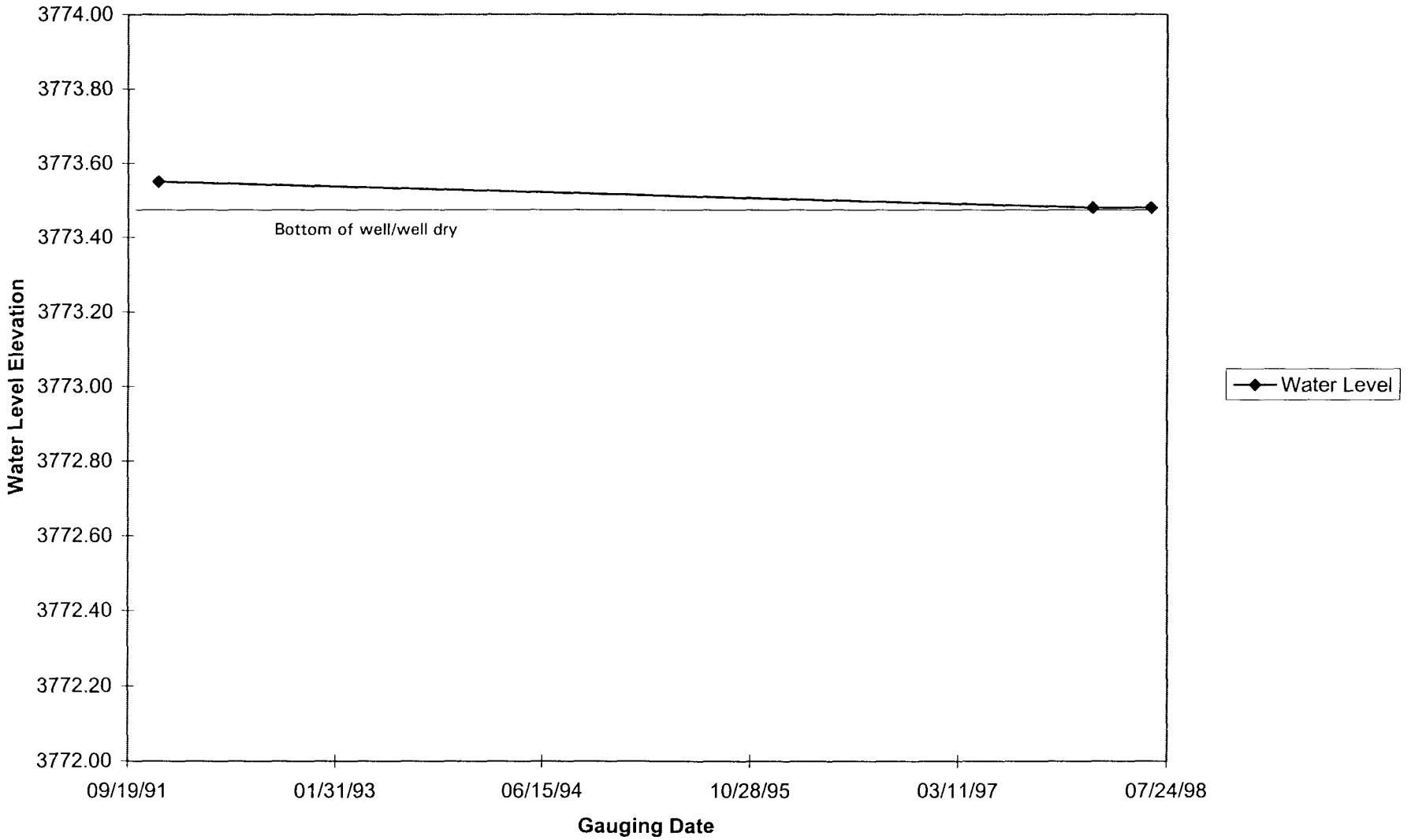
* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-29



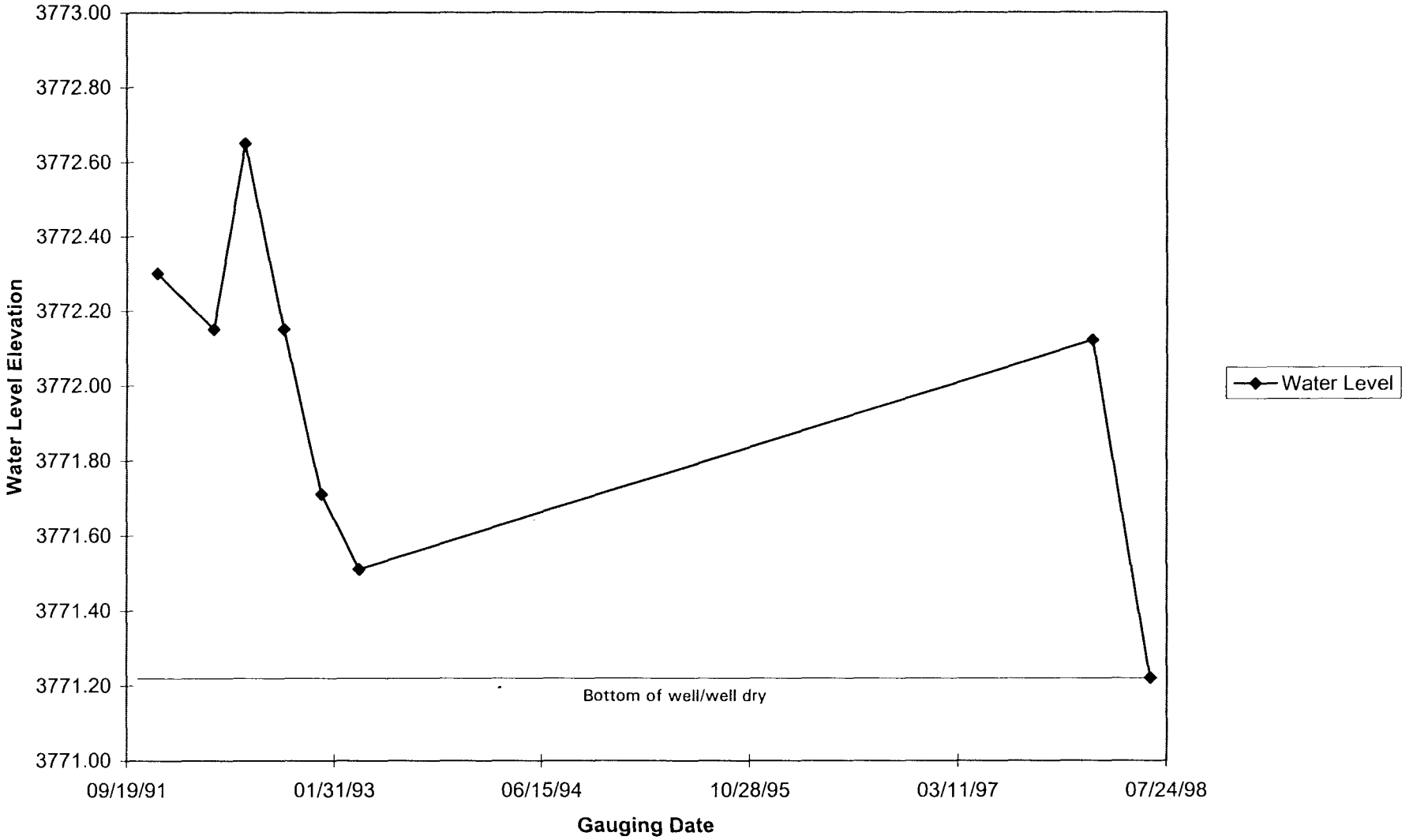
* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-30



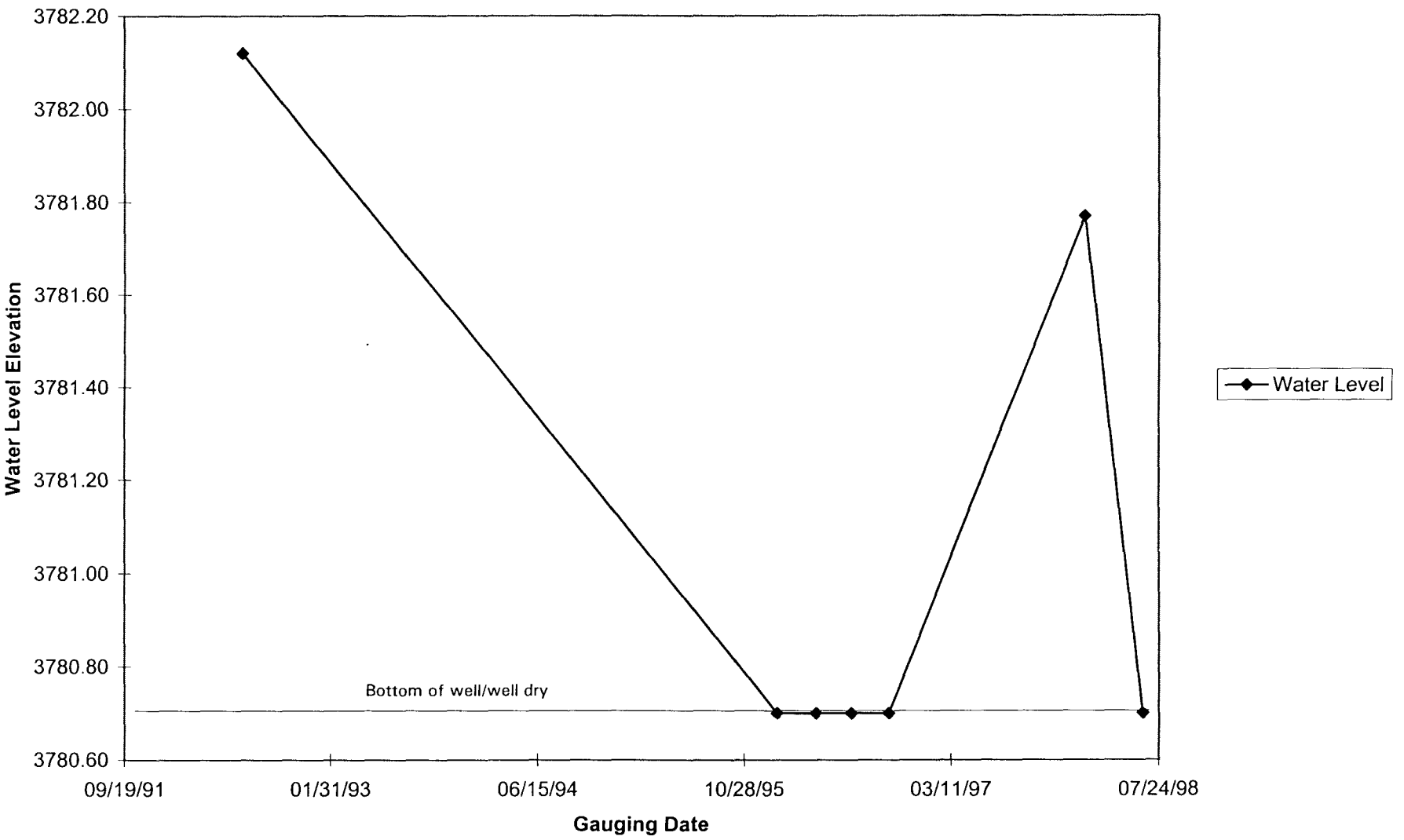
* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-31



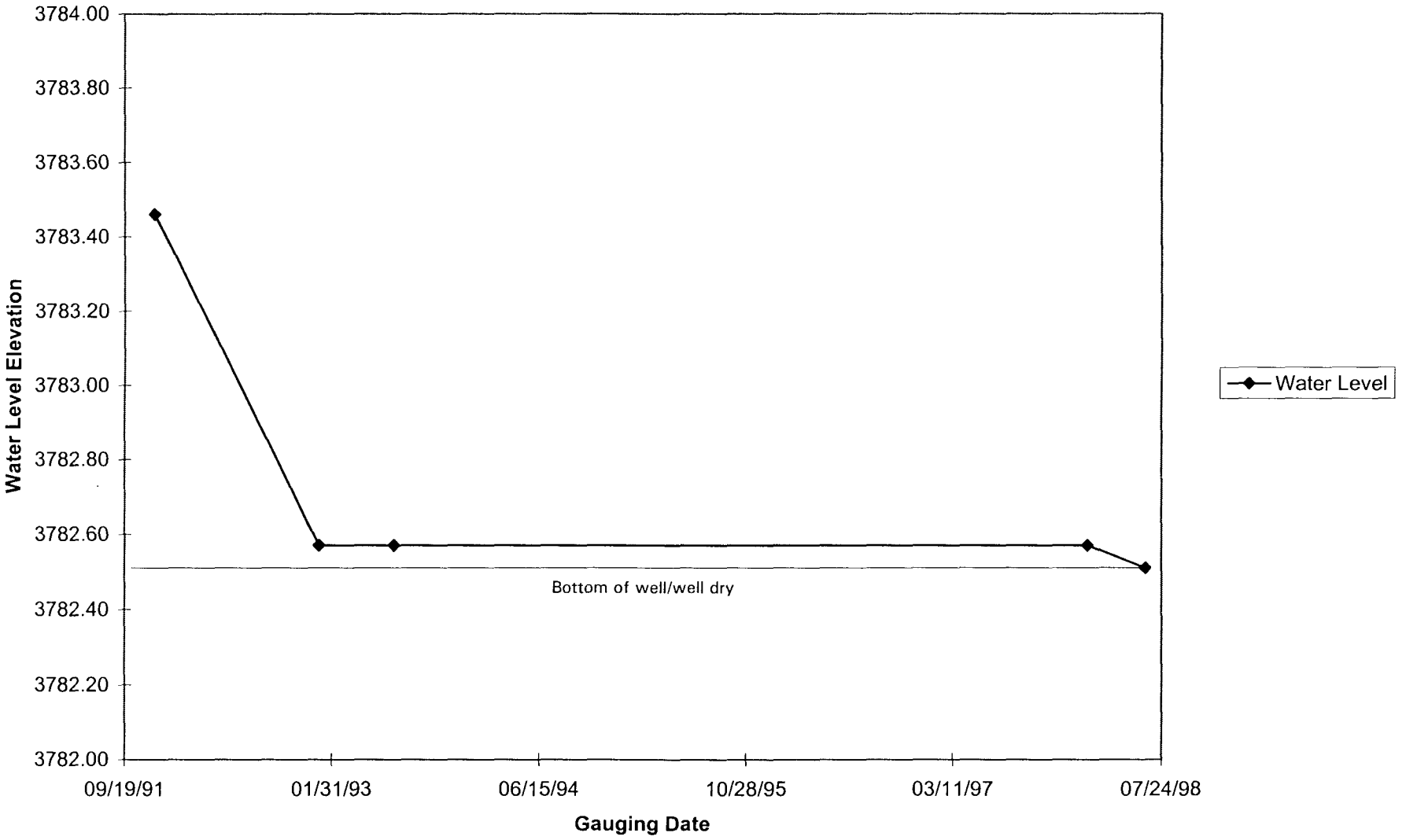
* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-32



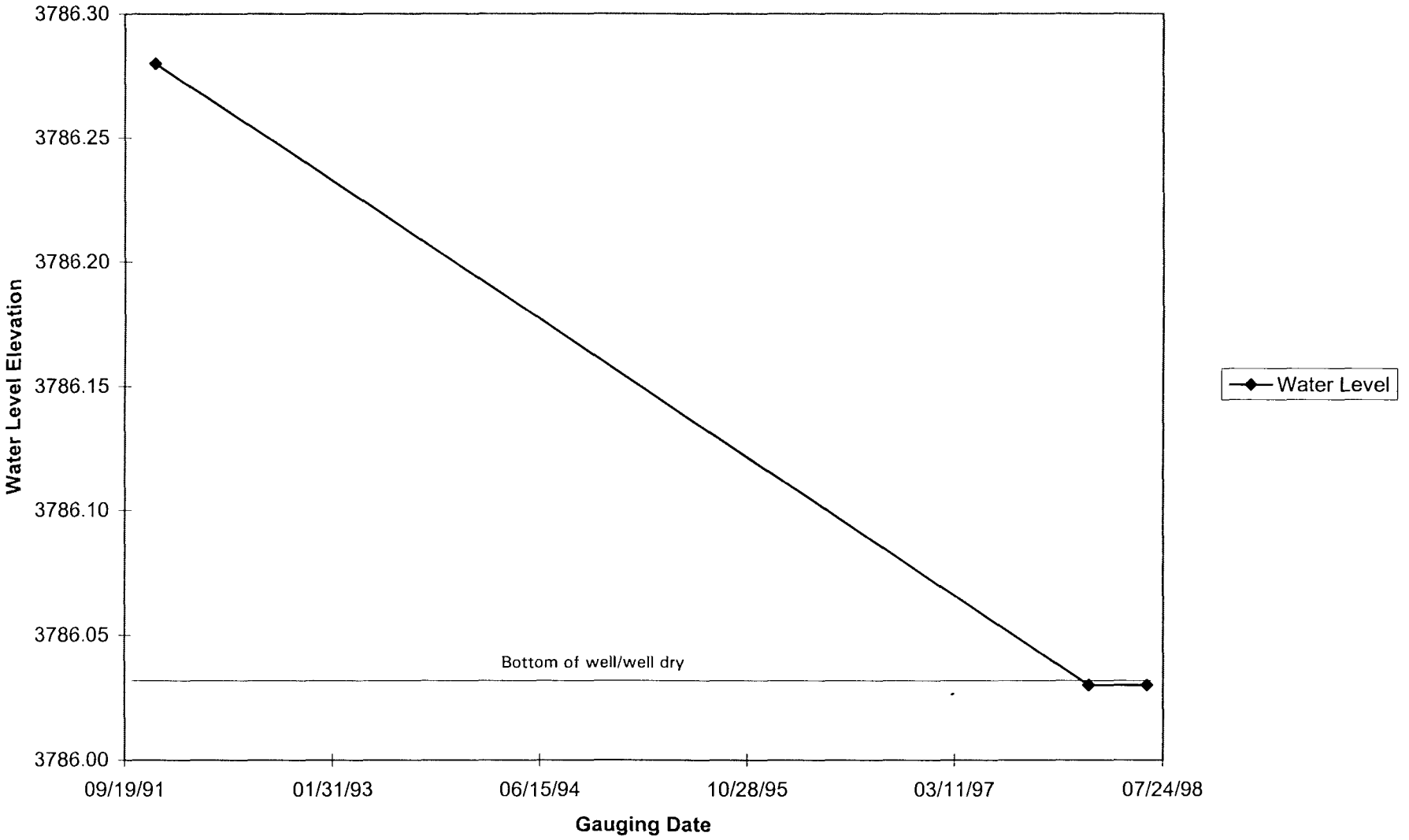
* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-33



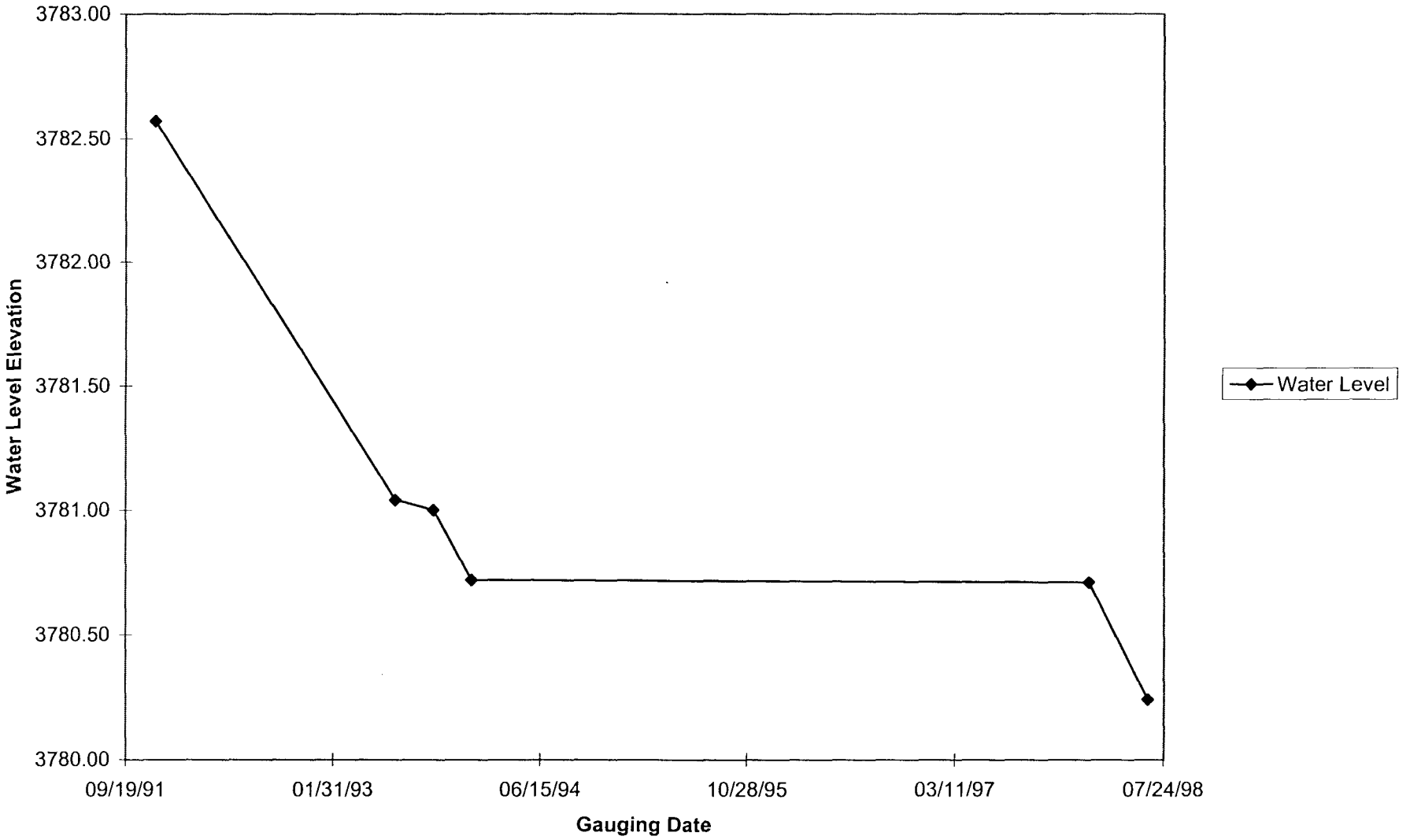
* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-34



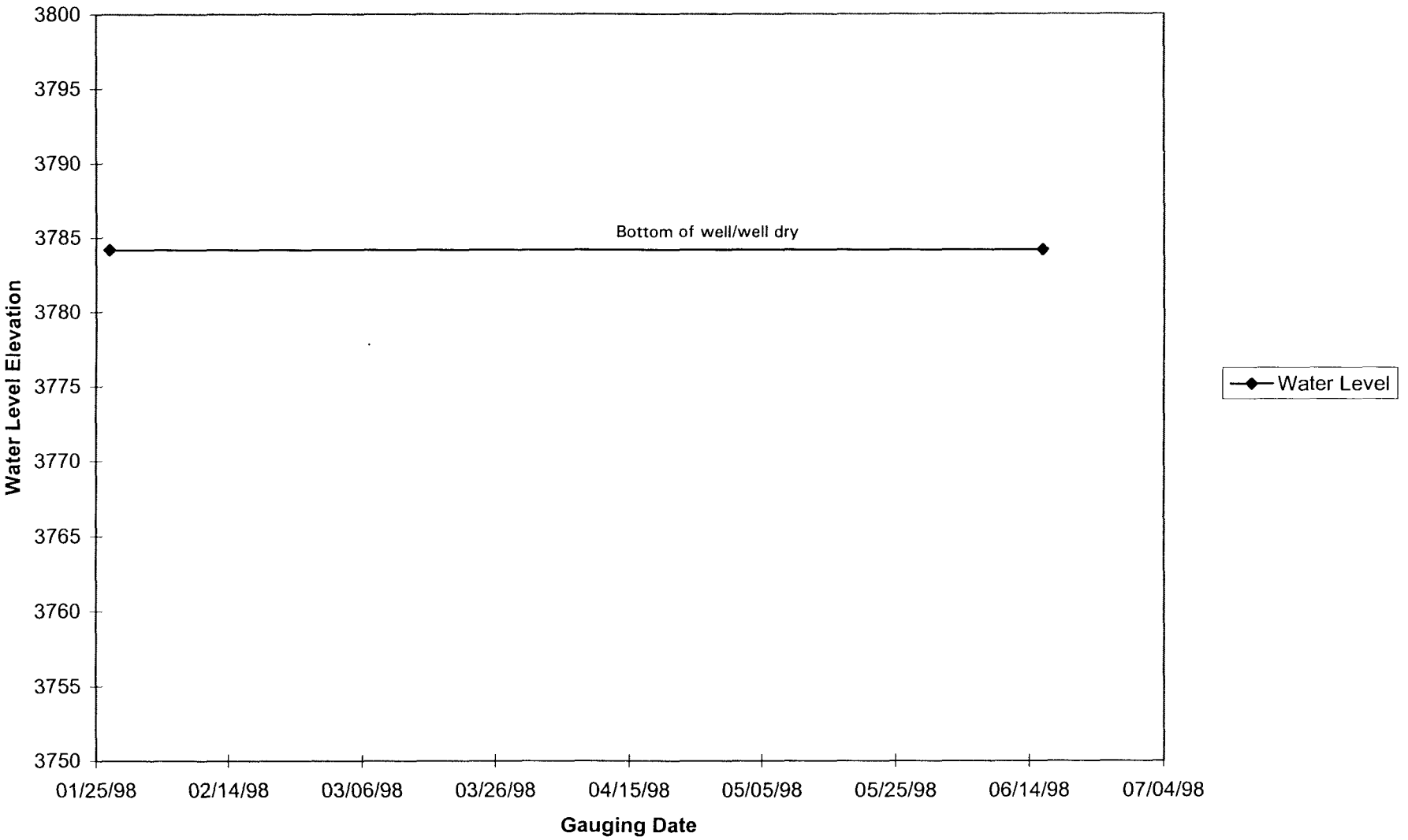
* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-35



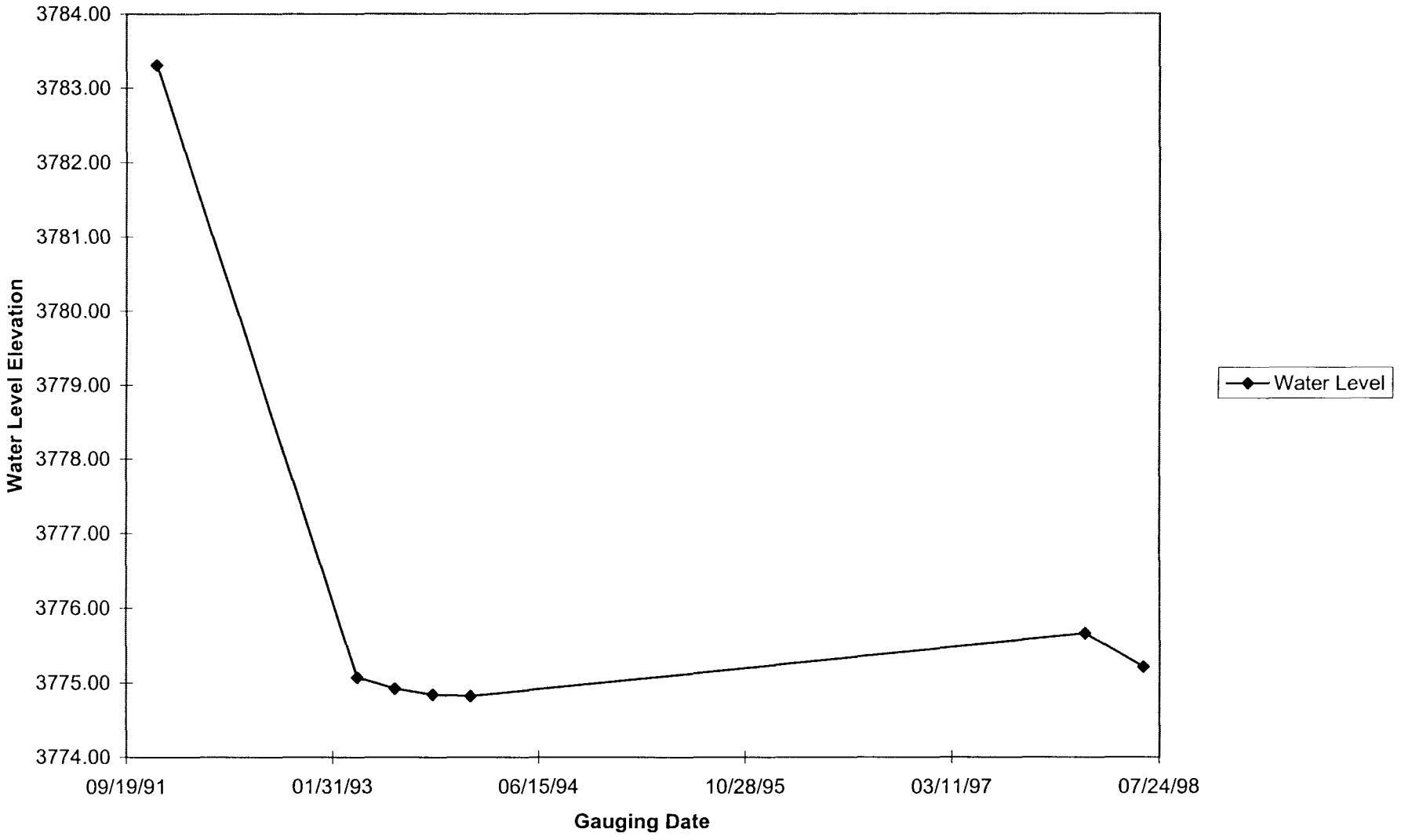
* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-36



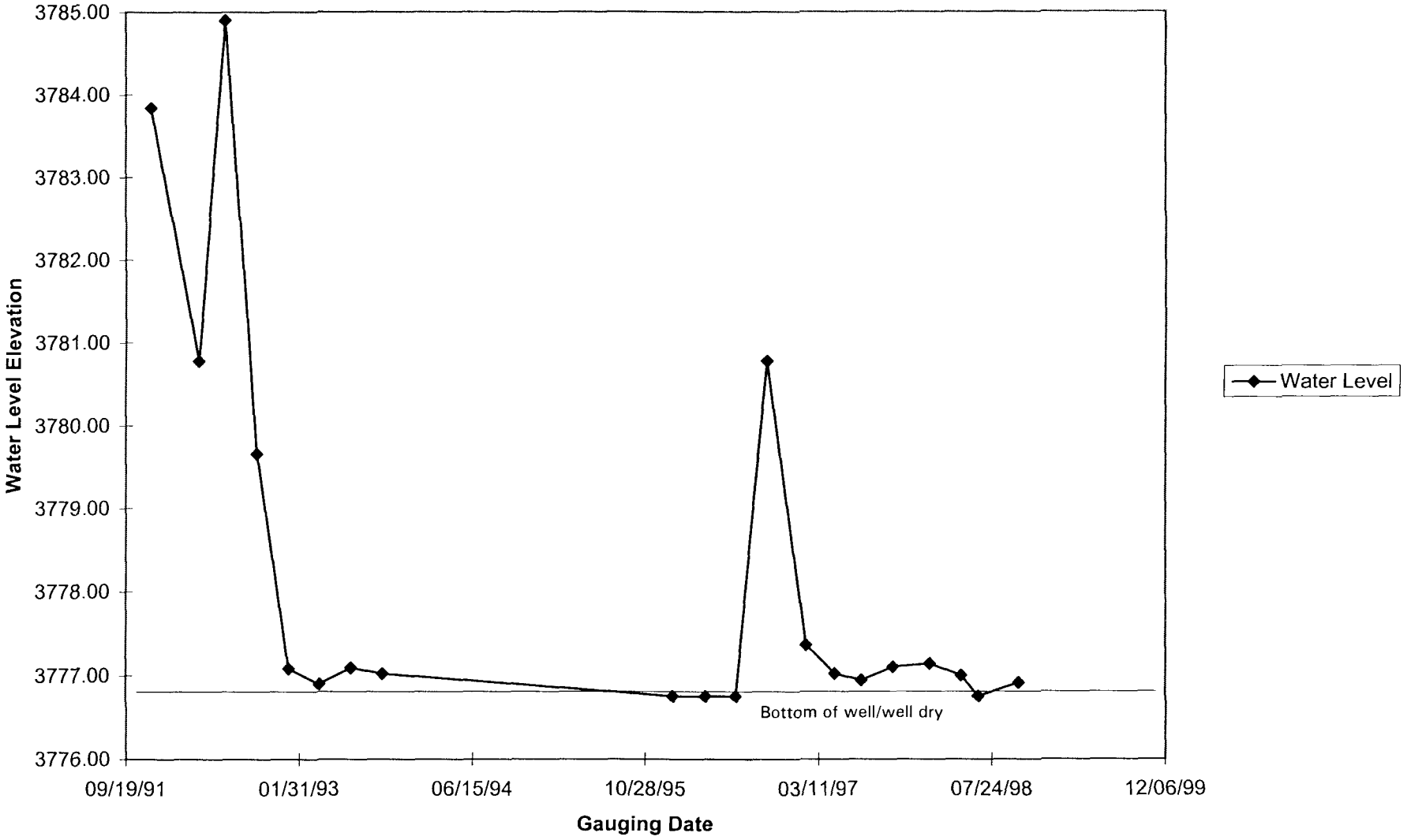
* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-37



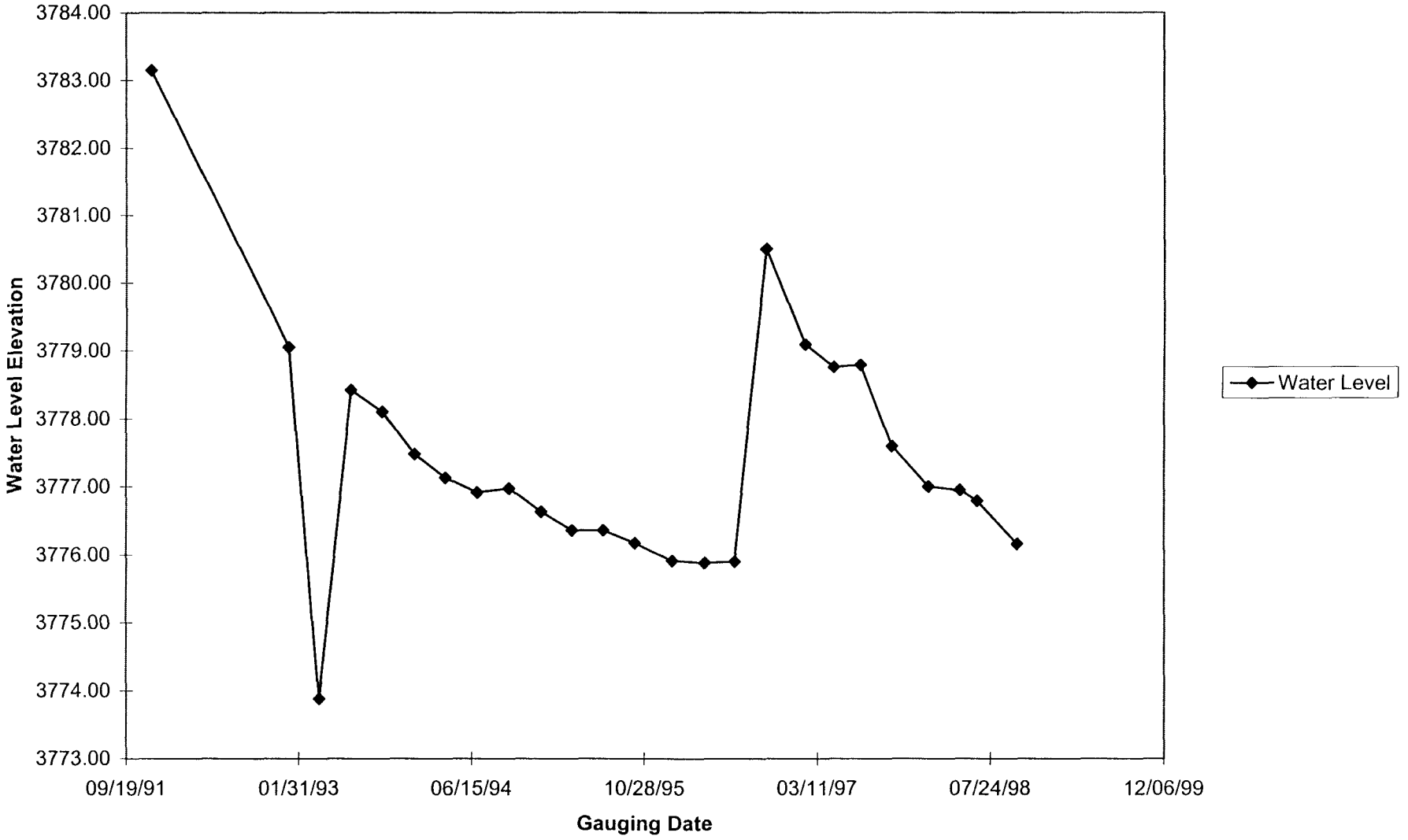
* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-38



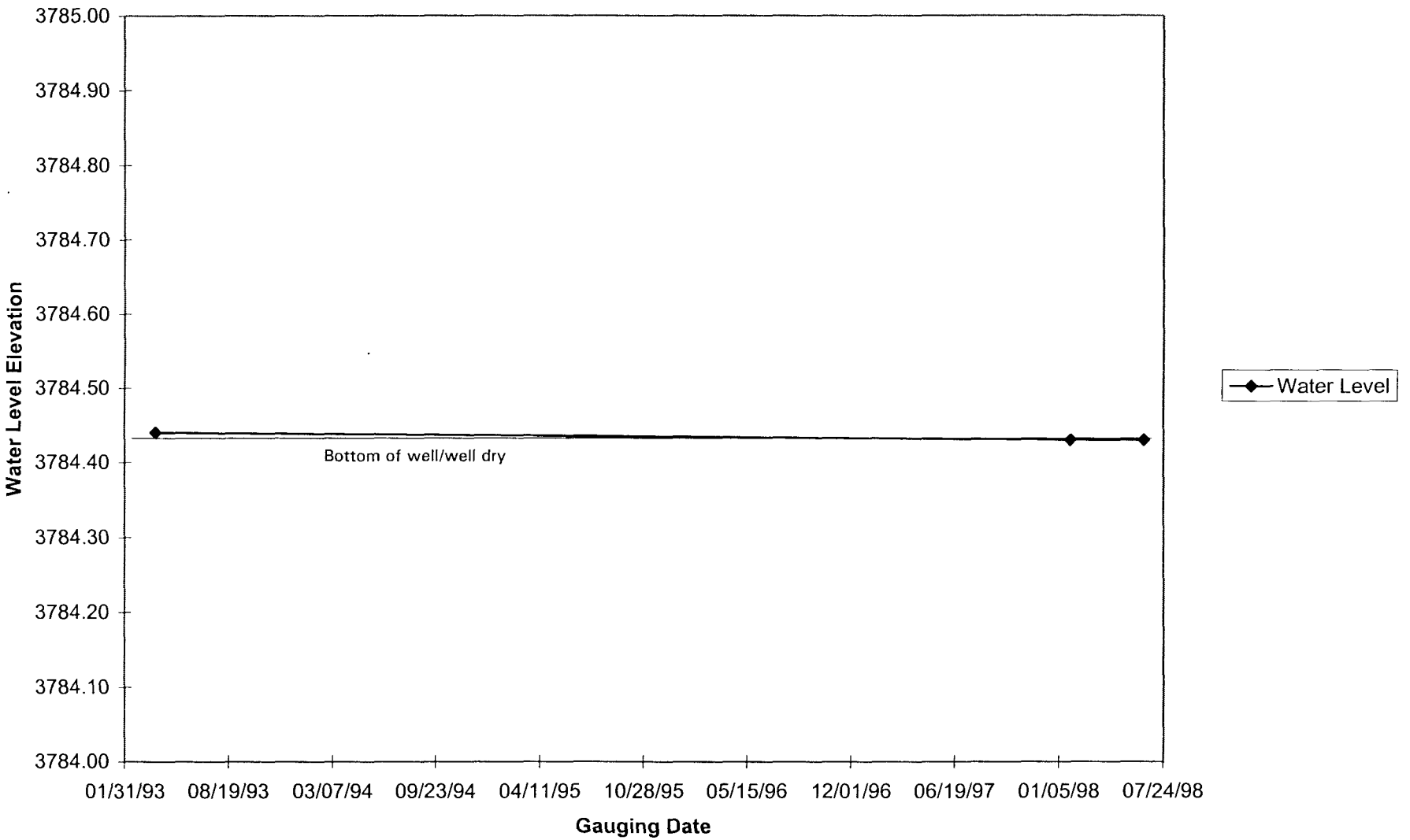
* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-39



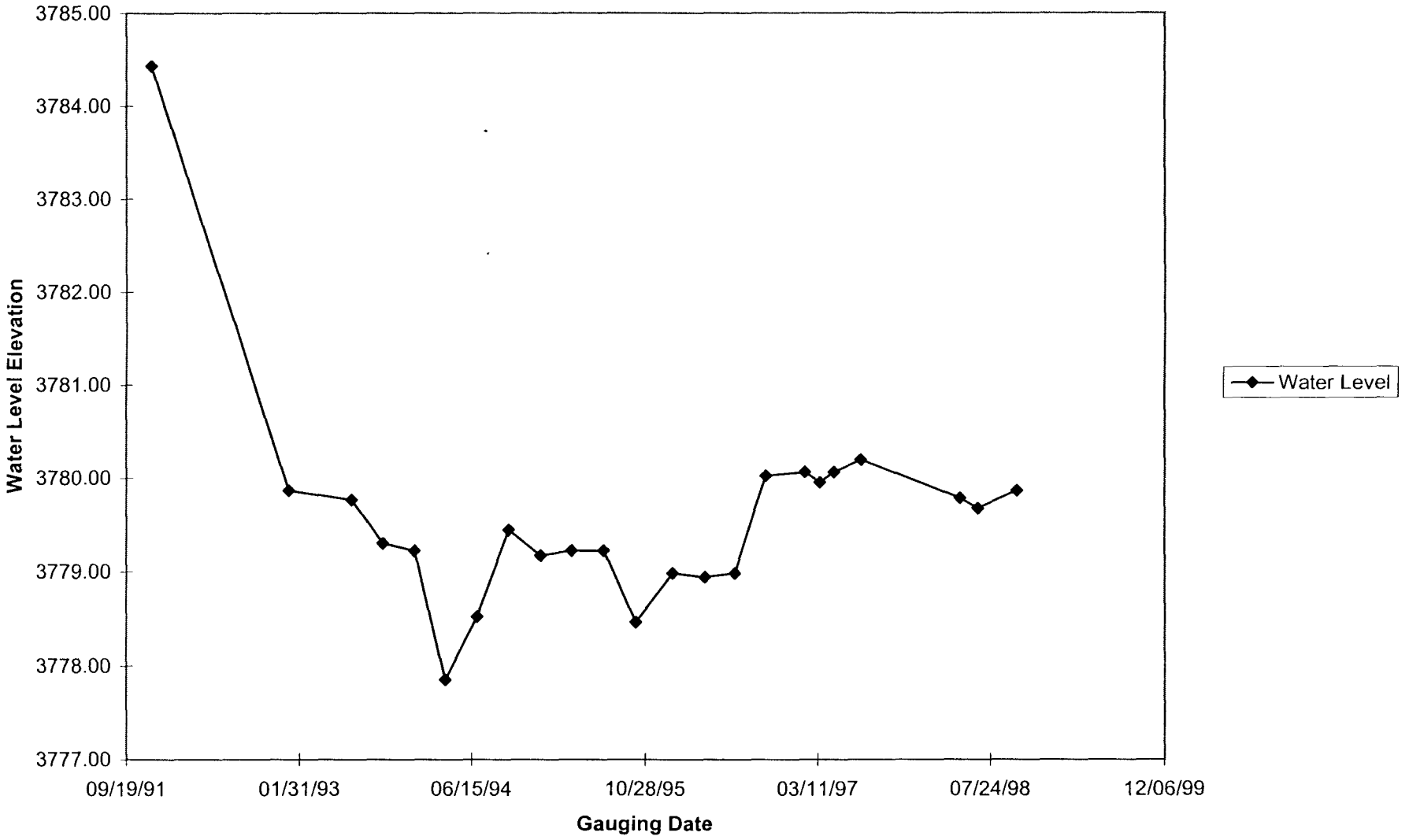
* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-40



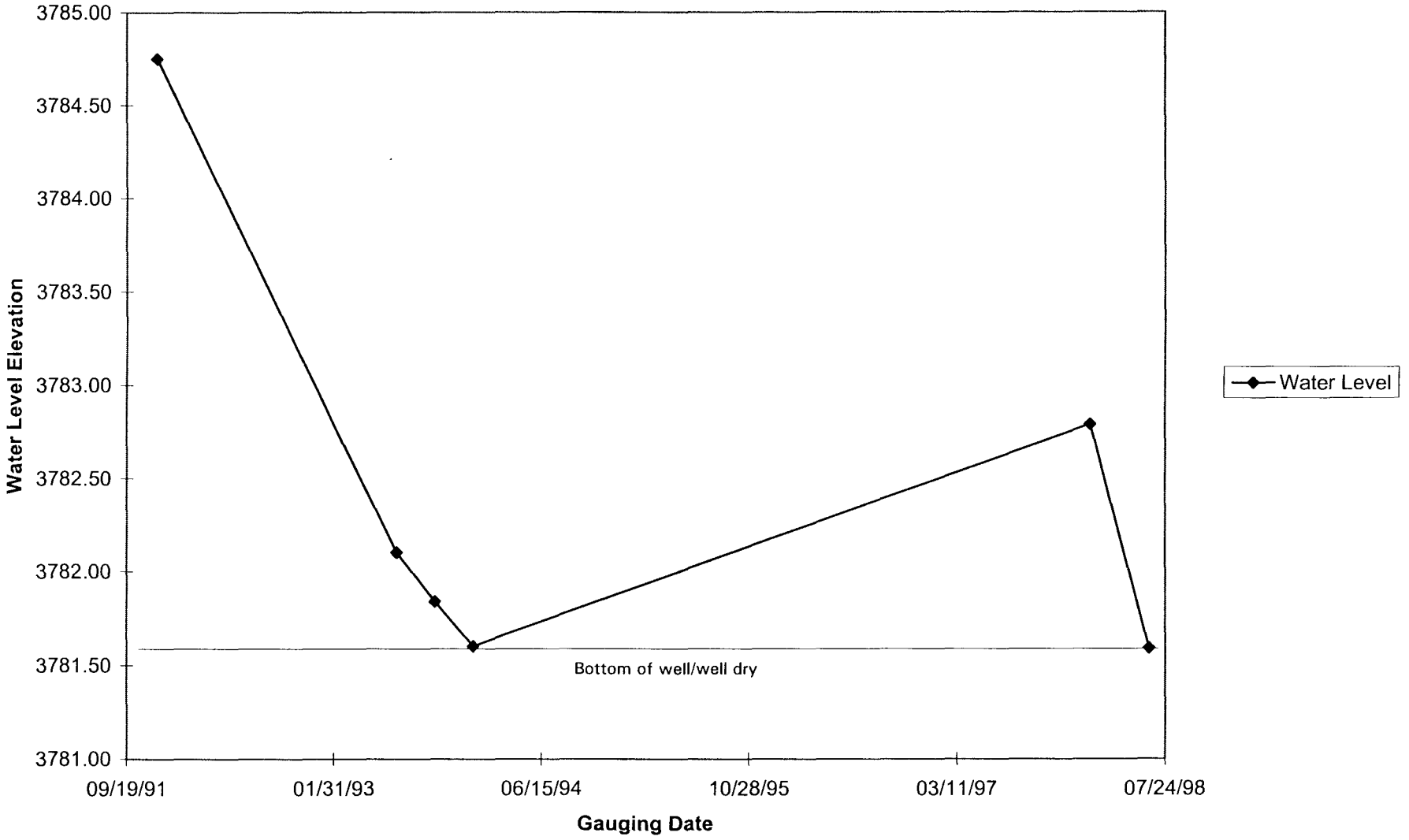
* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-41



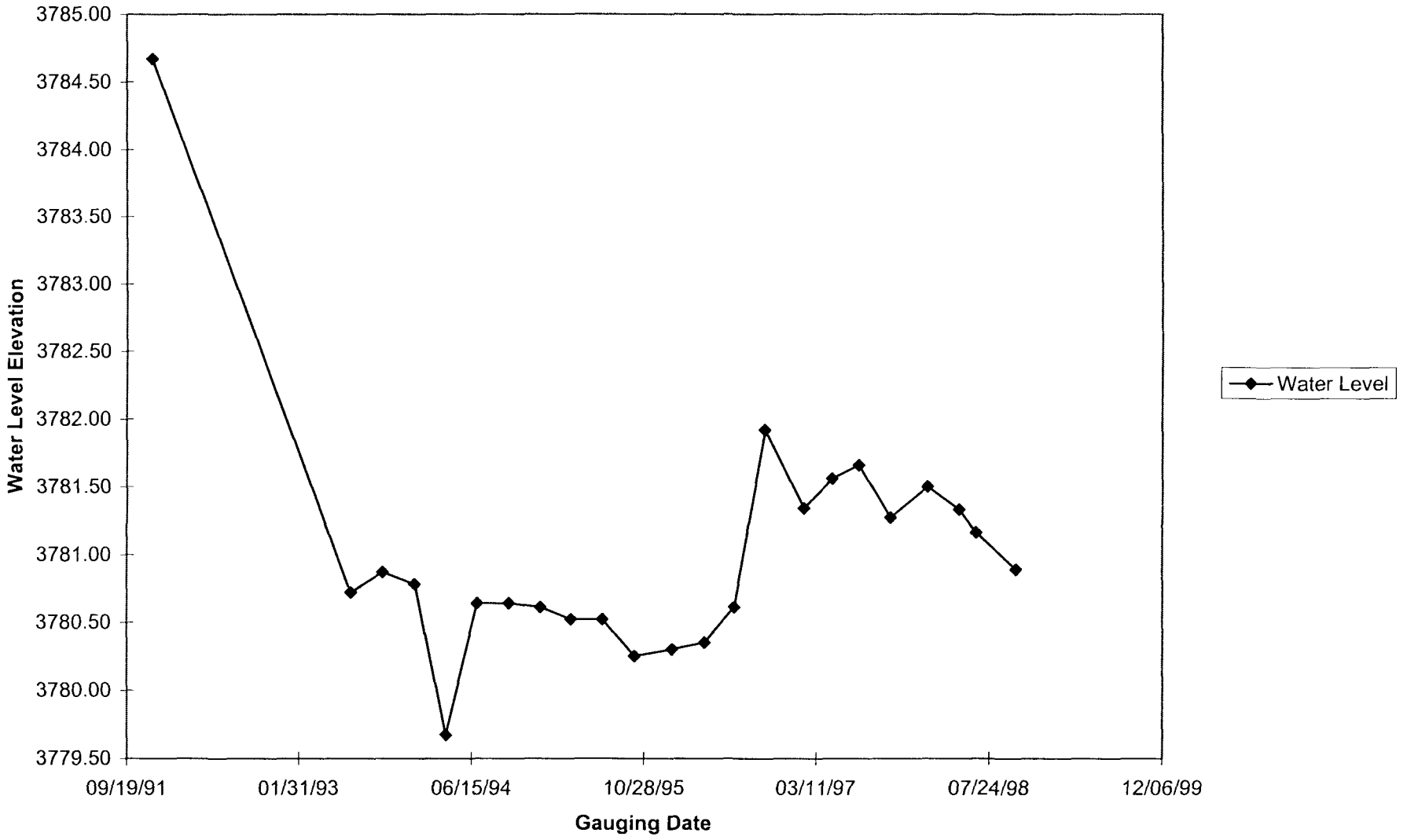
* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-42



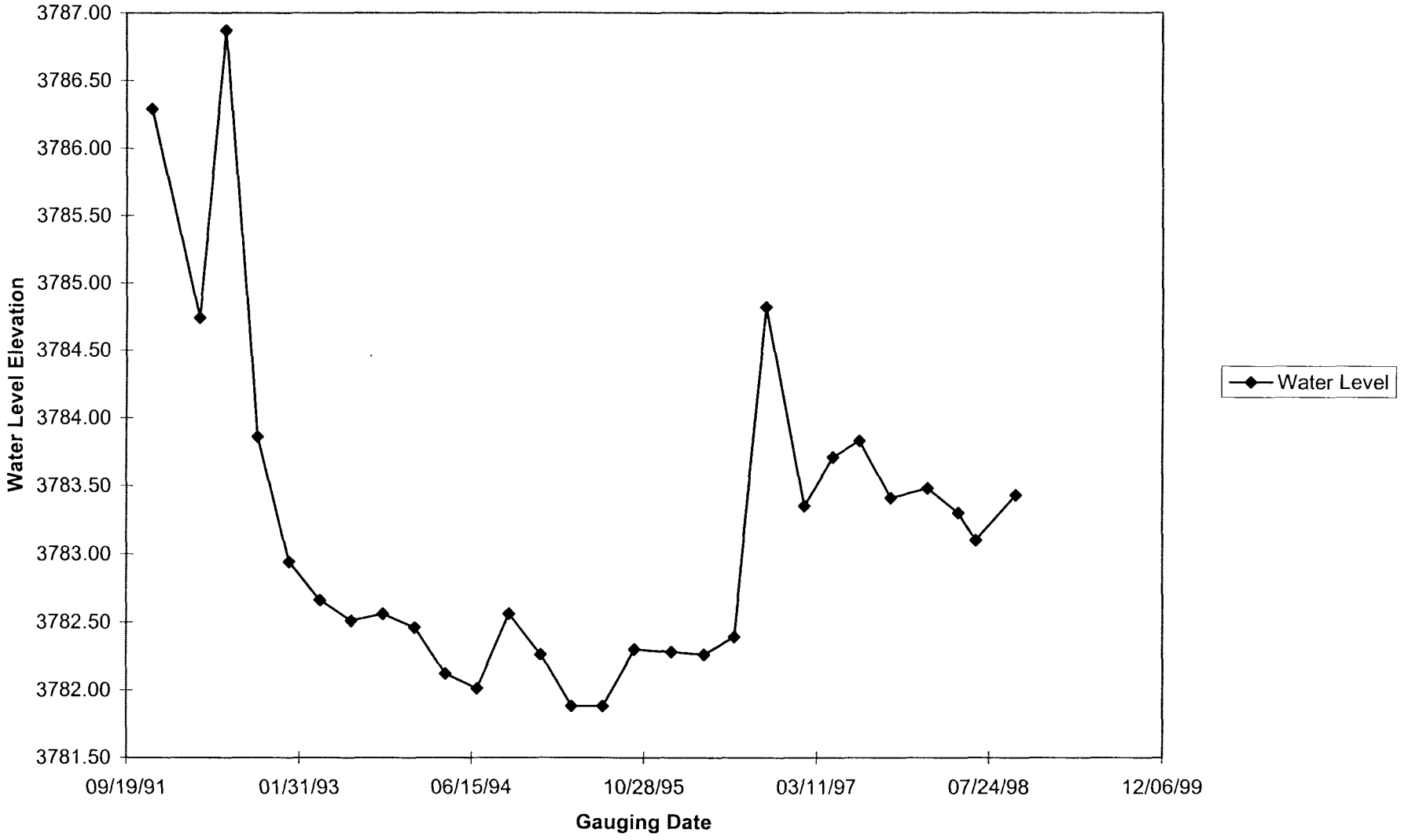
* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-43



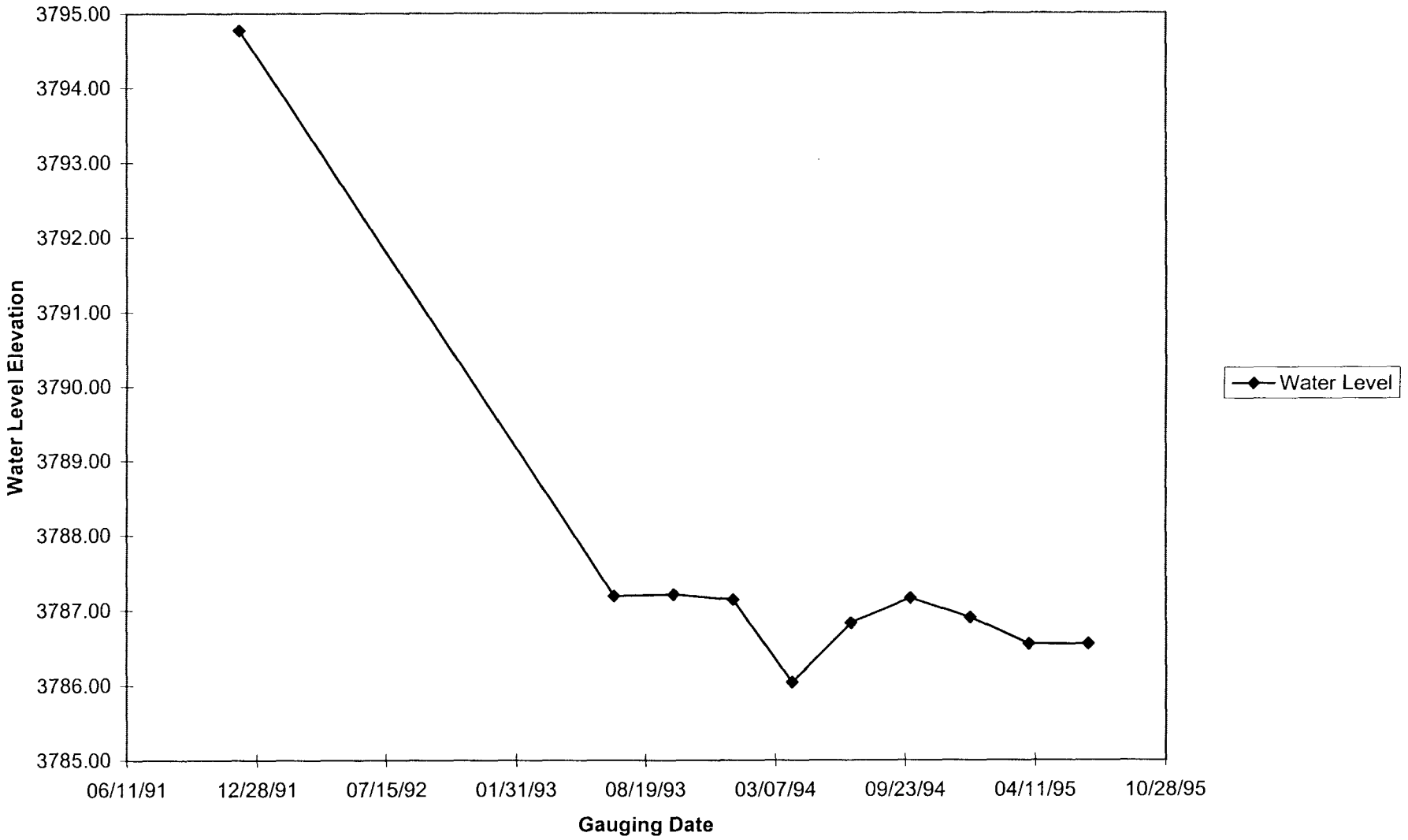
* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-44



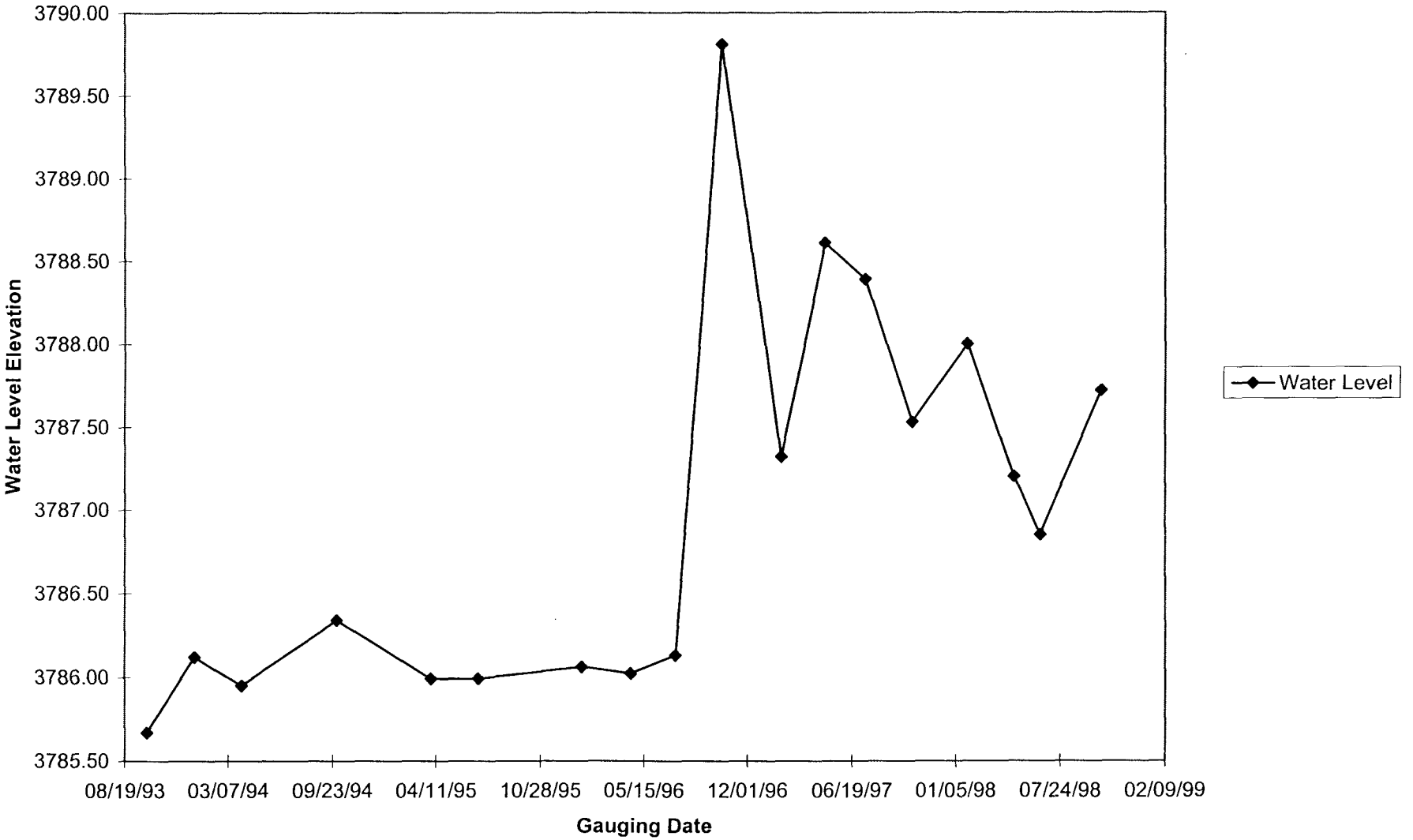
* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-45



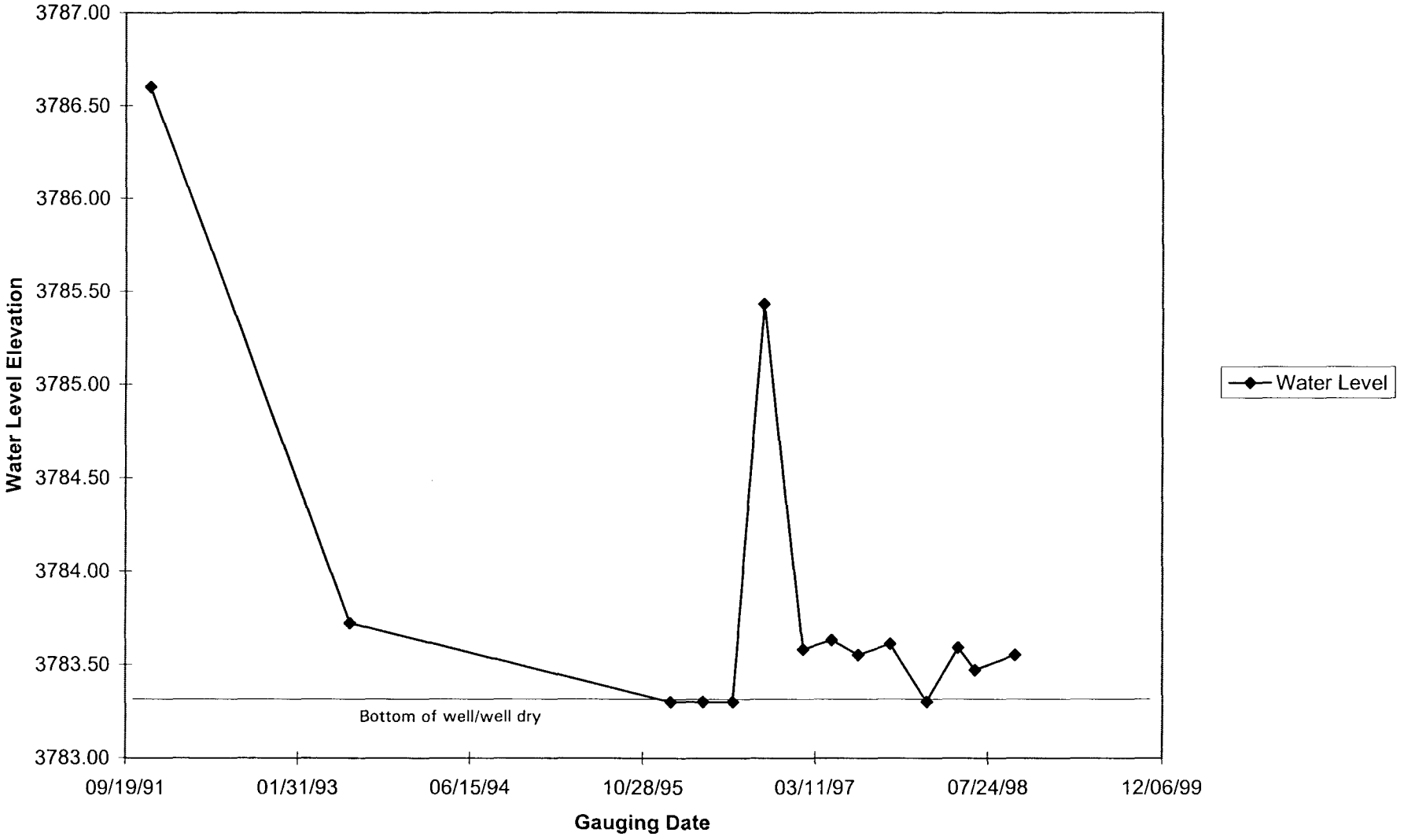
* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-46



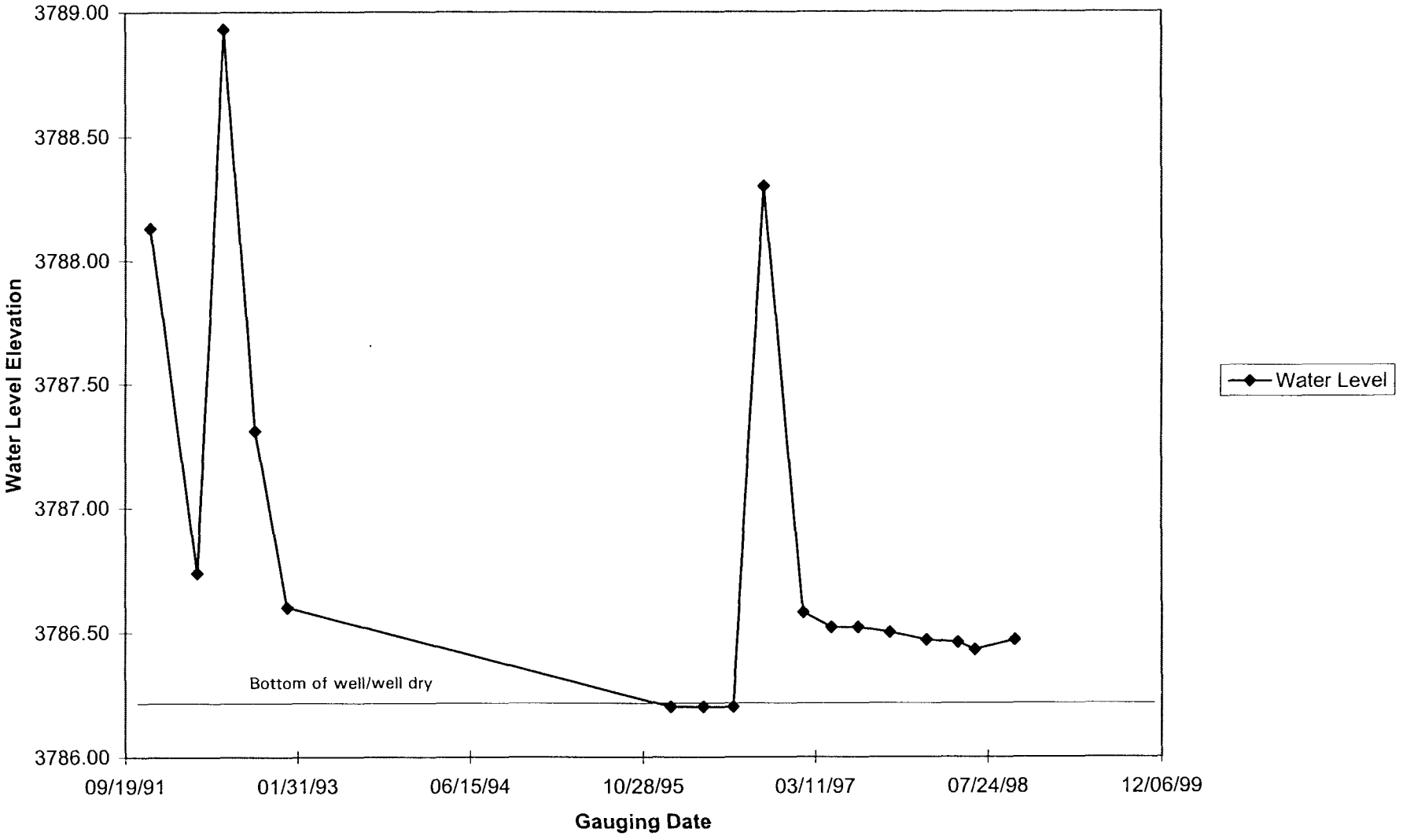
* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-47



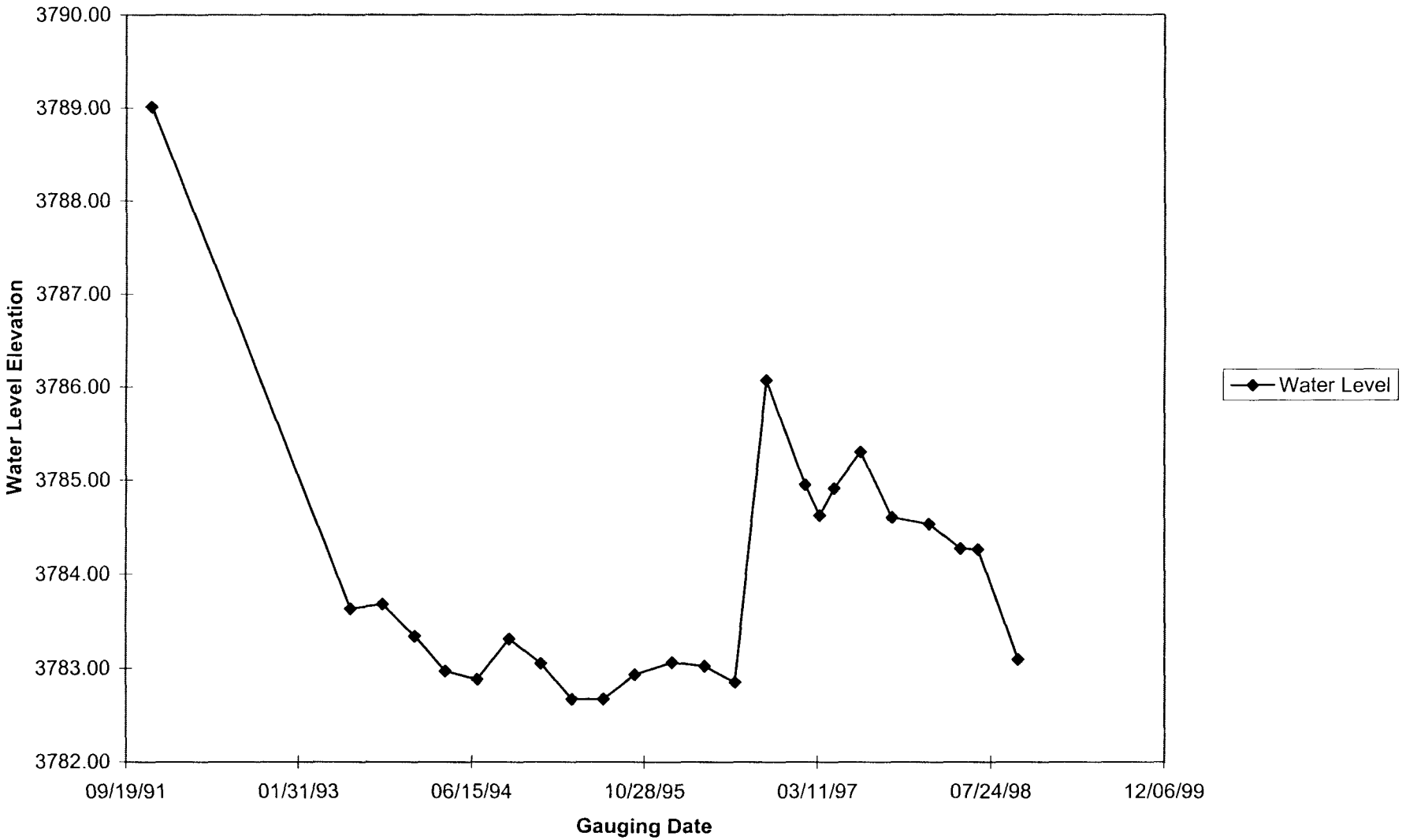
* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-48



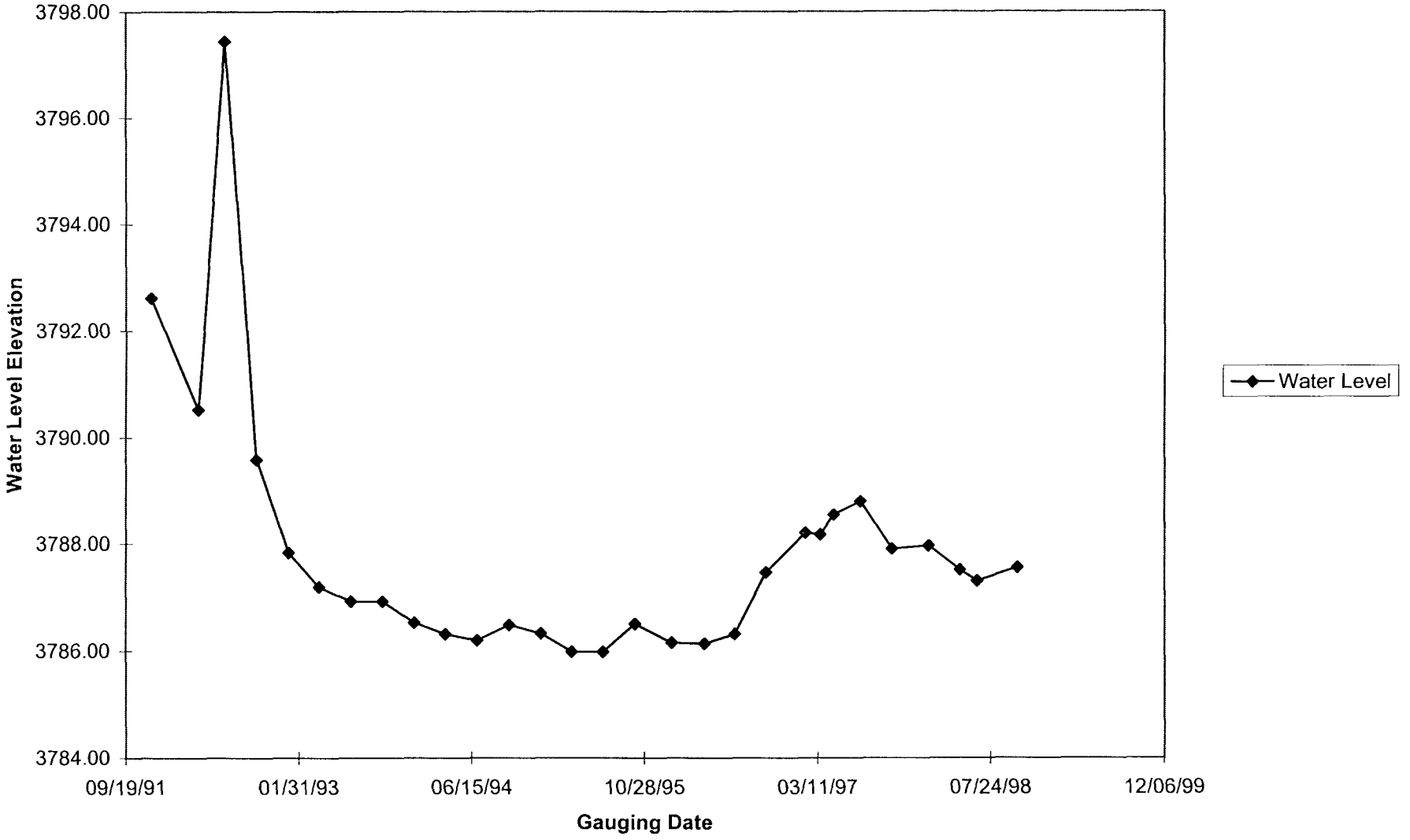
* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-49



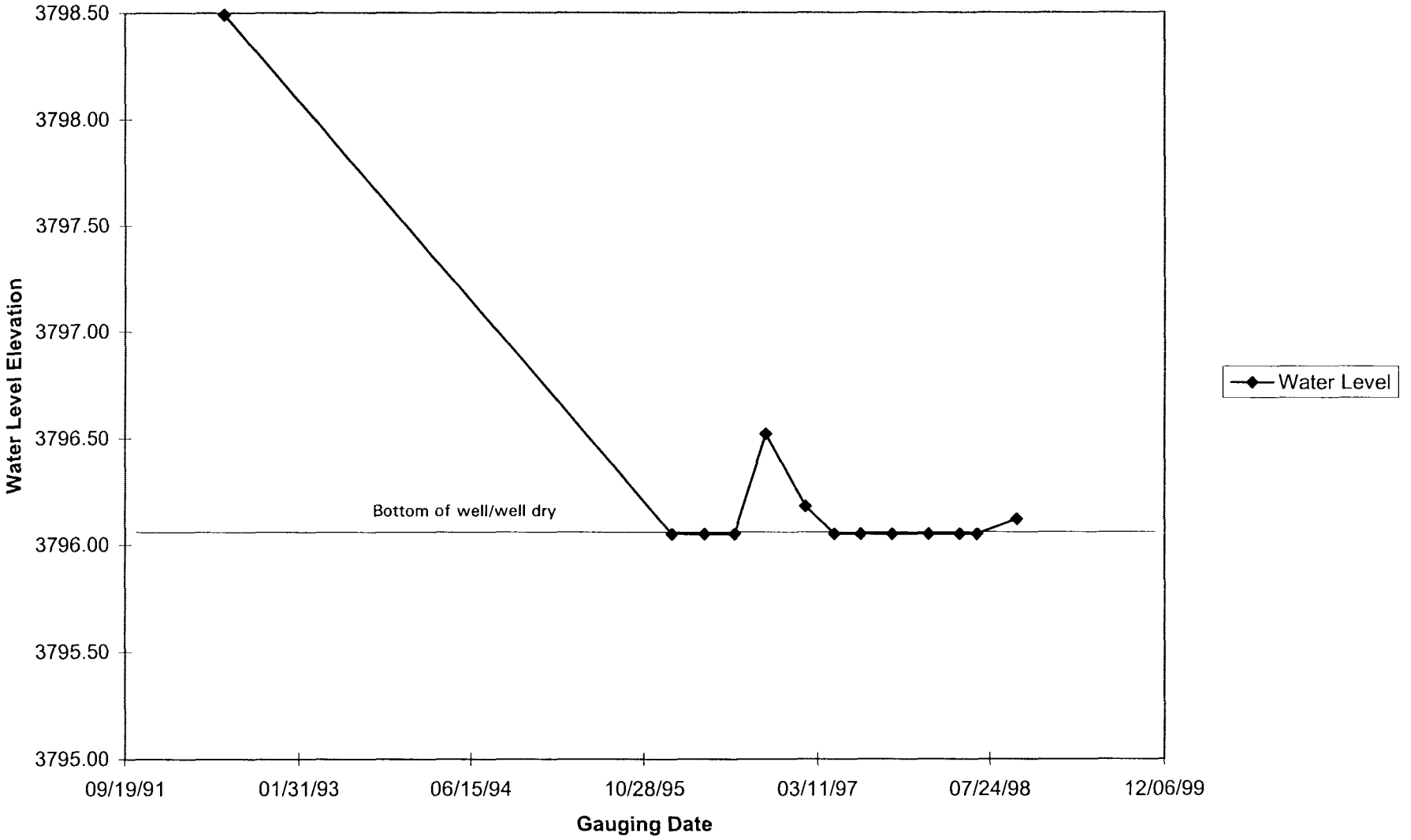
* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-50



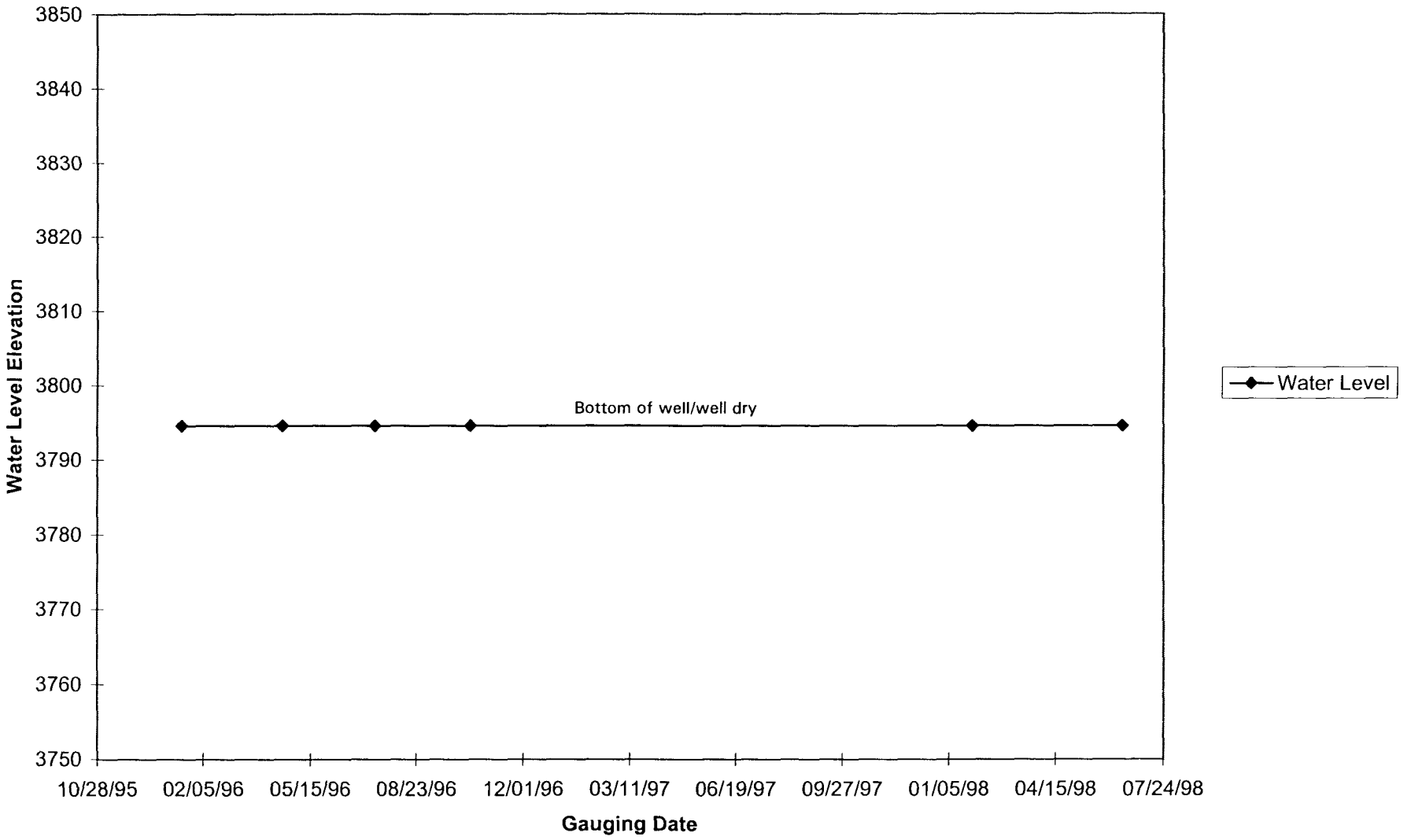
* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-52



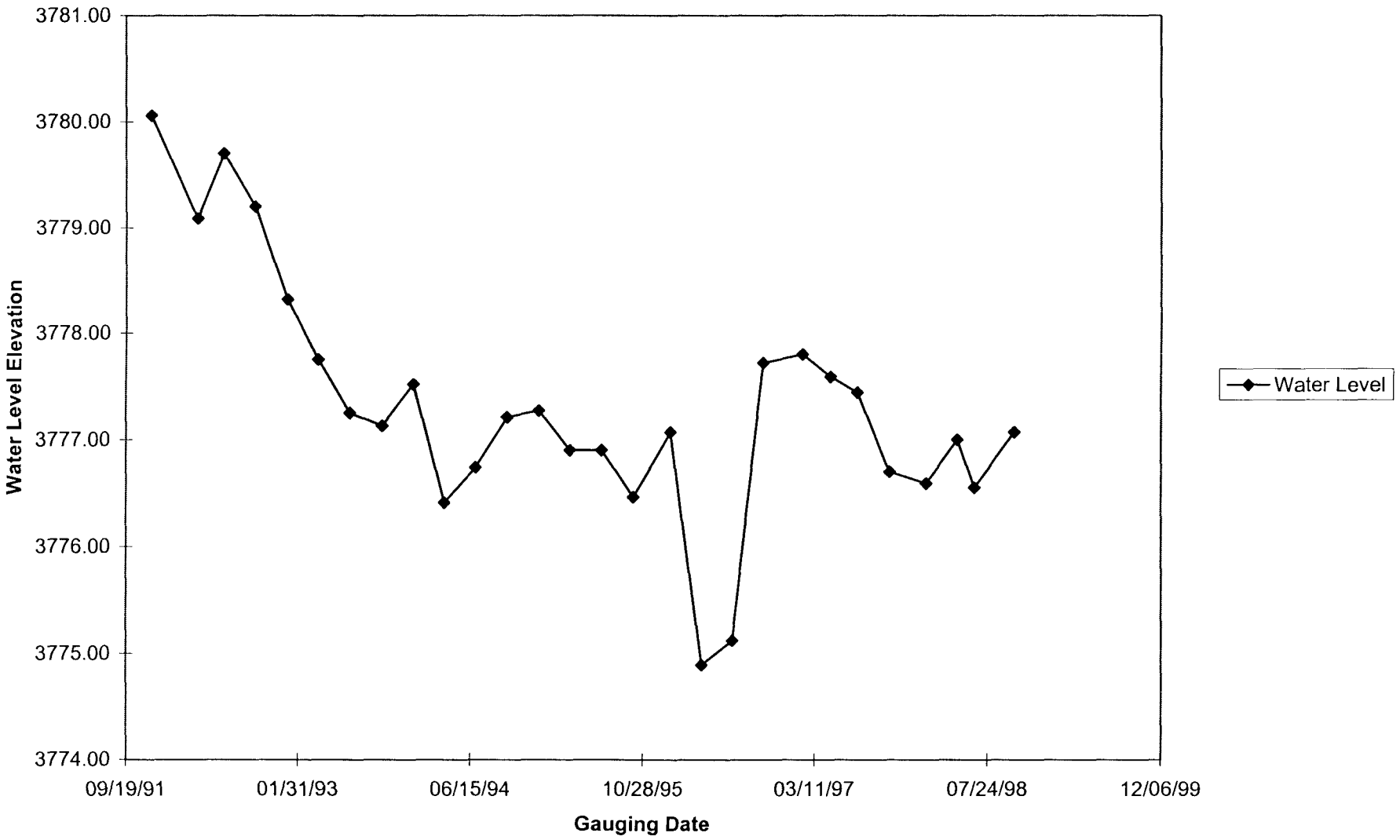
* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-53



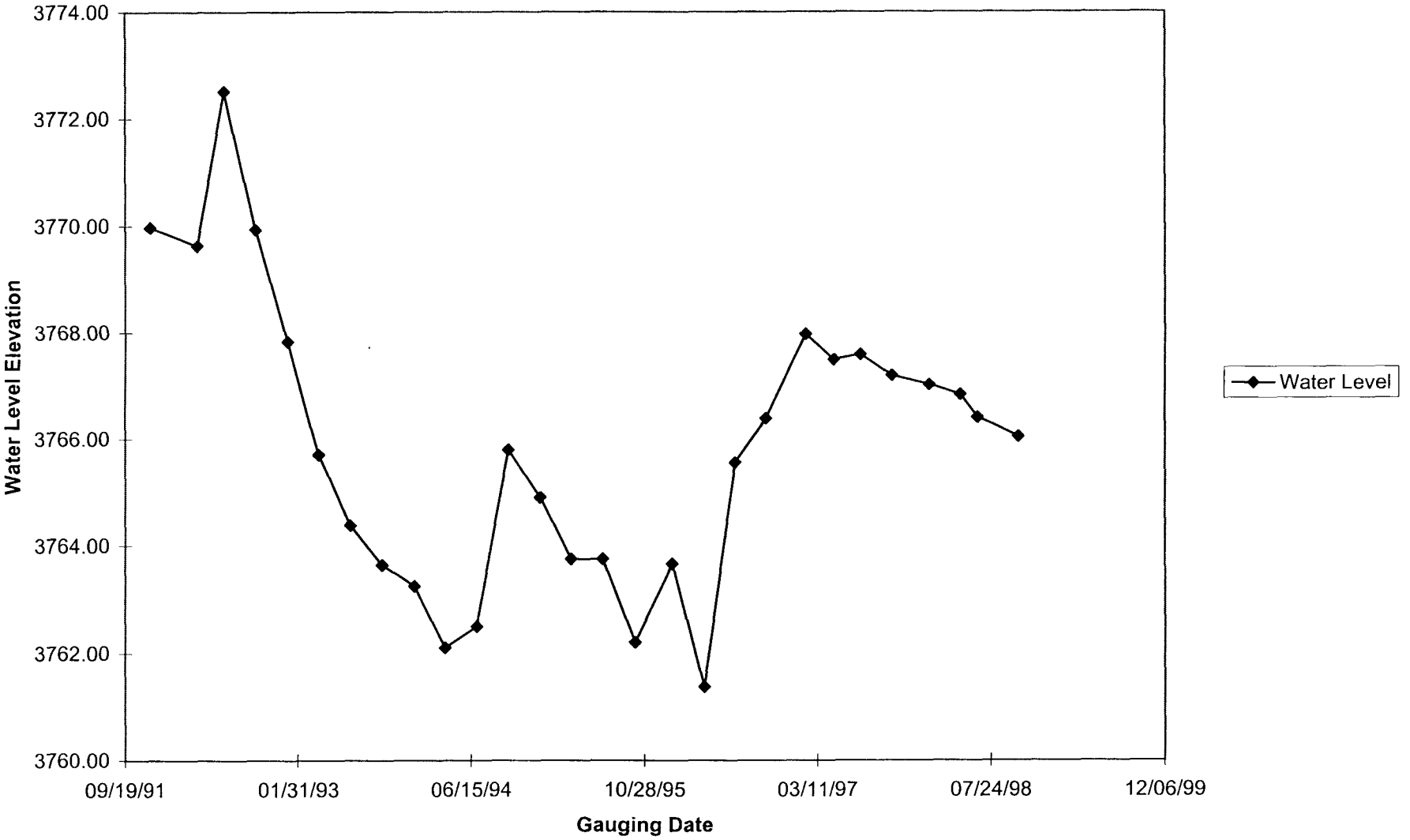
* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-54



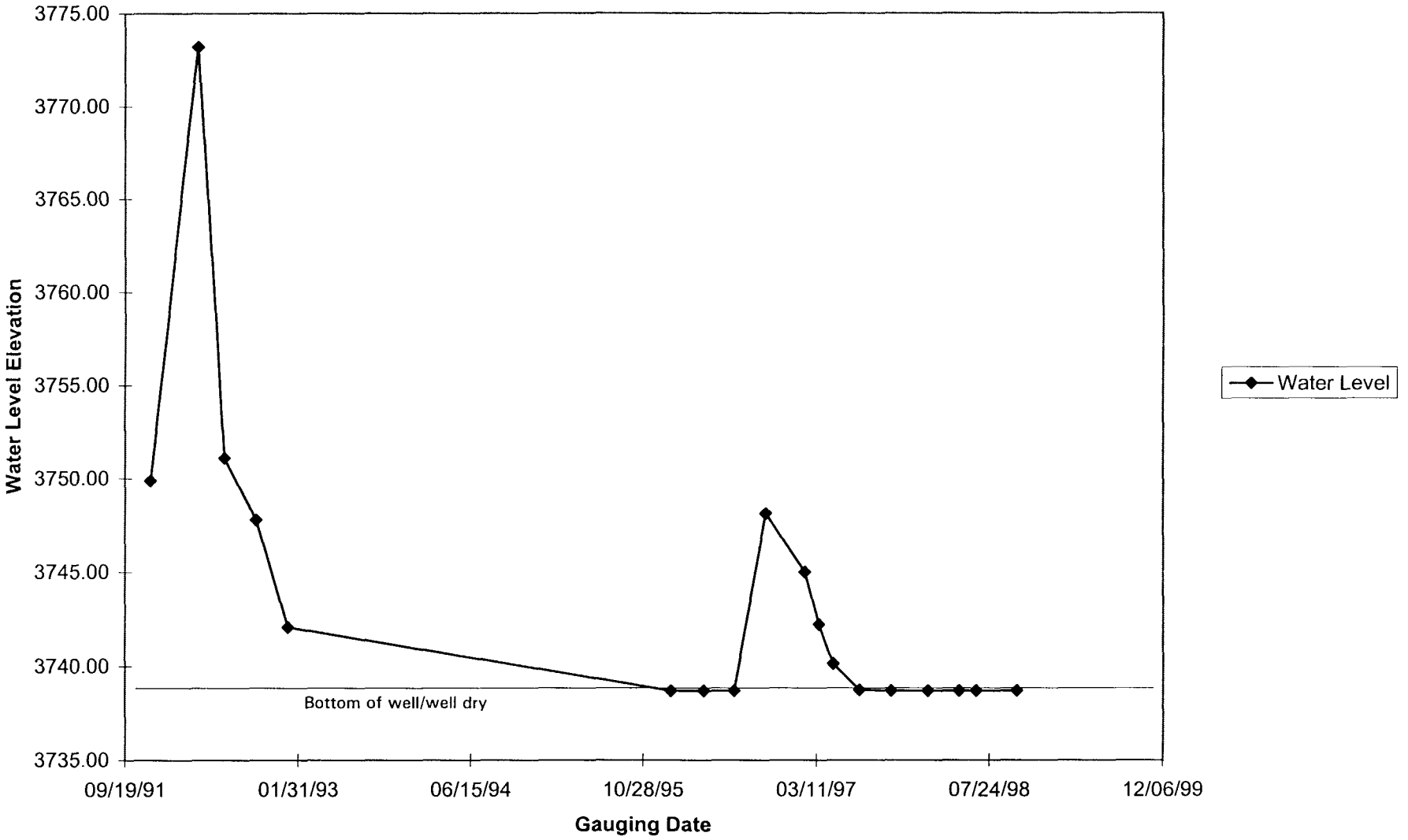
* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-55



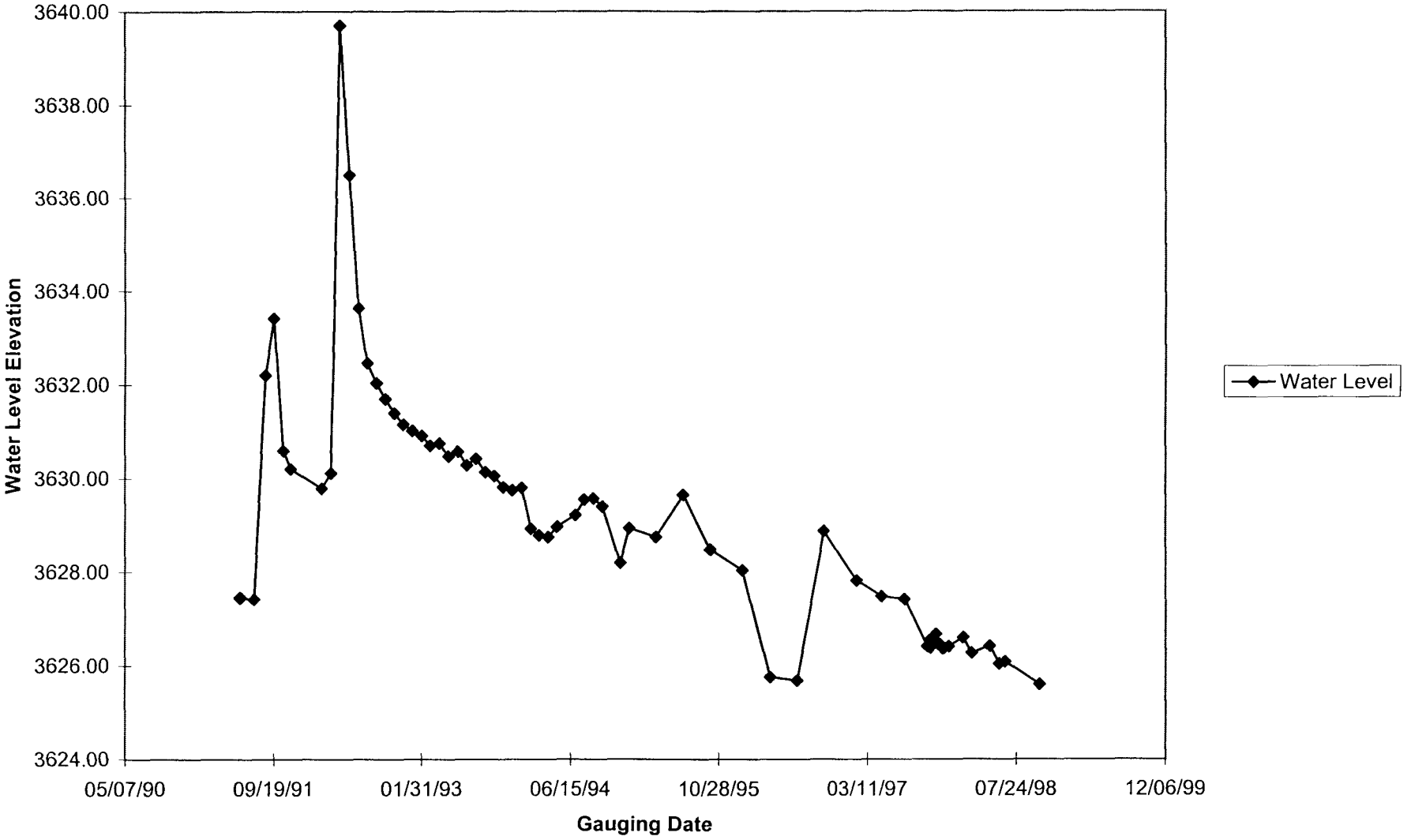
* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-56



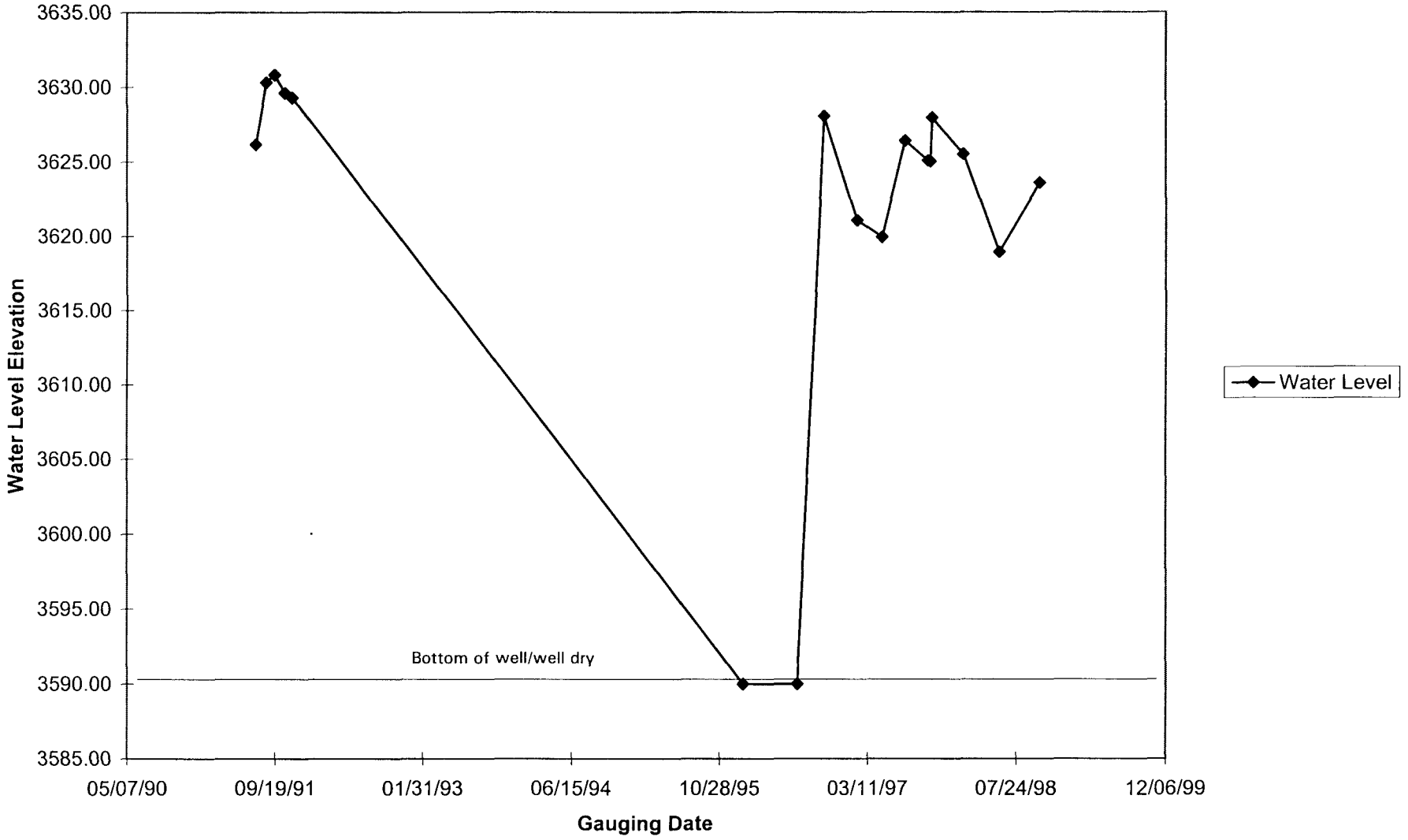
* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-57



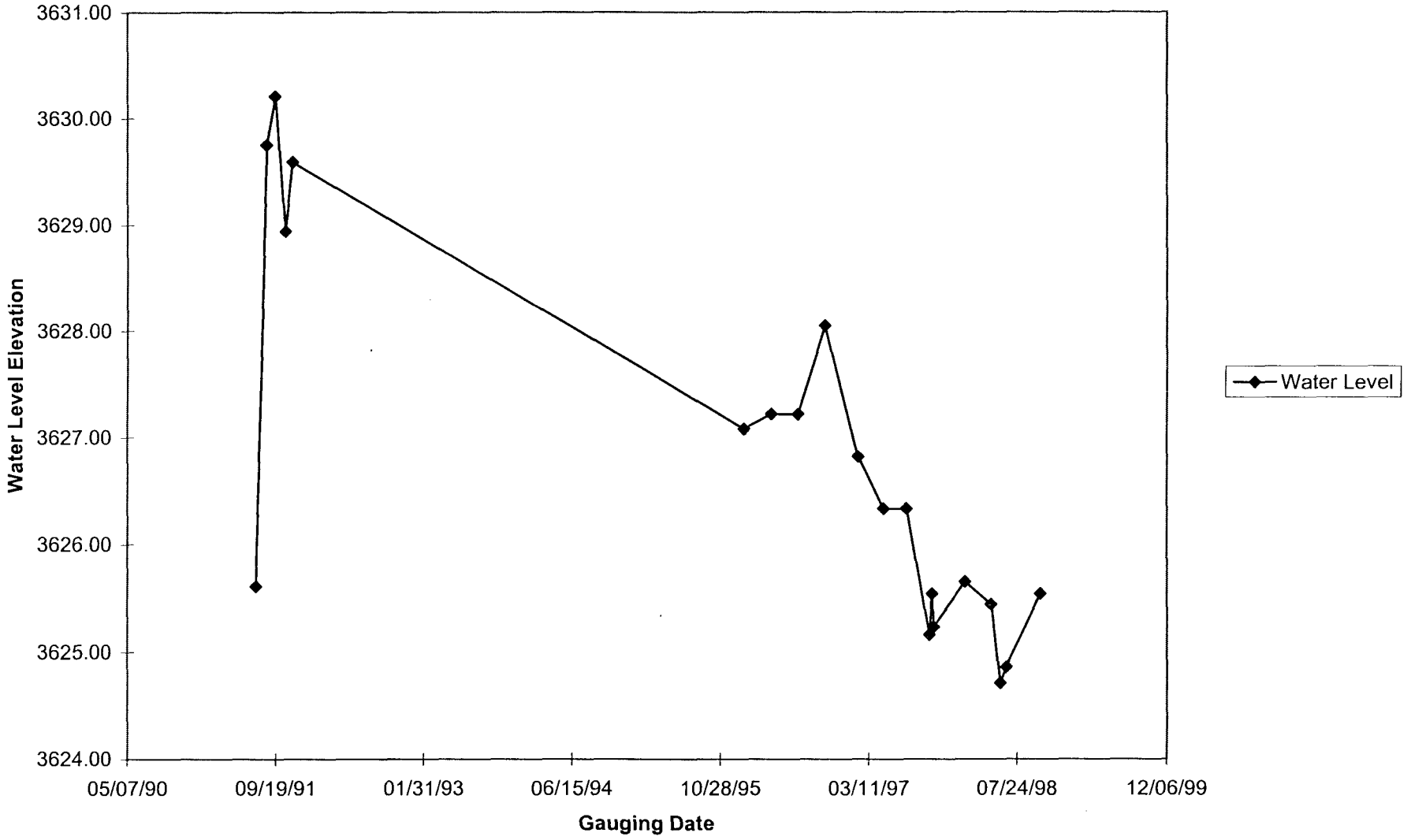
* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-58



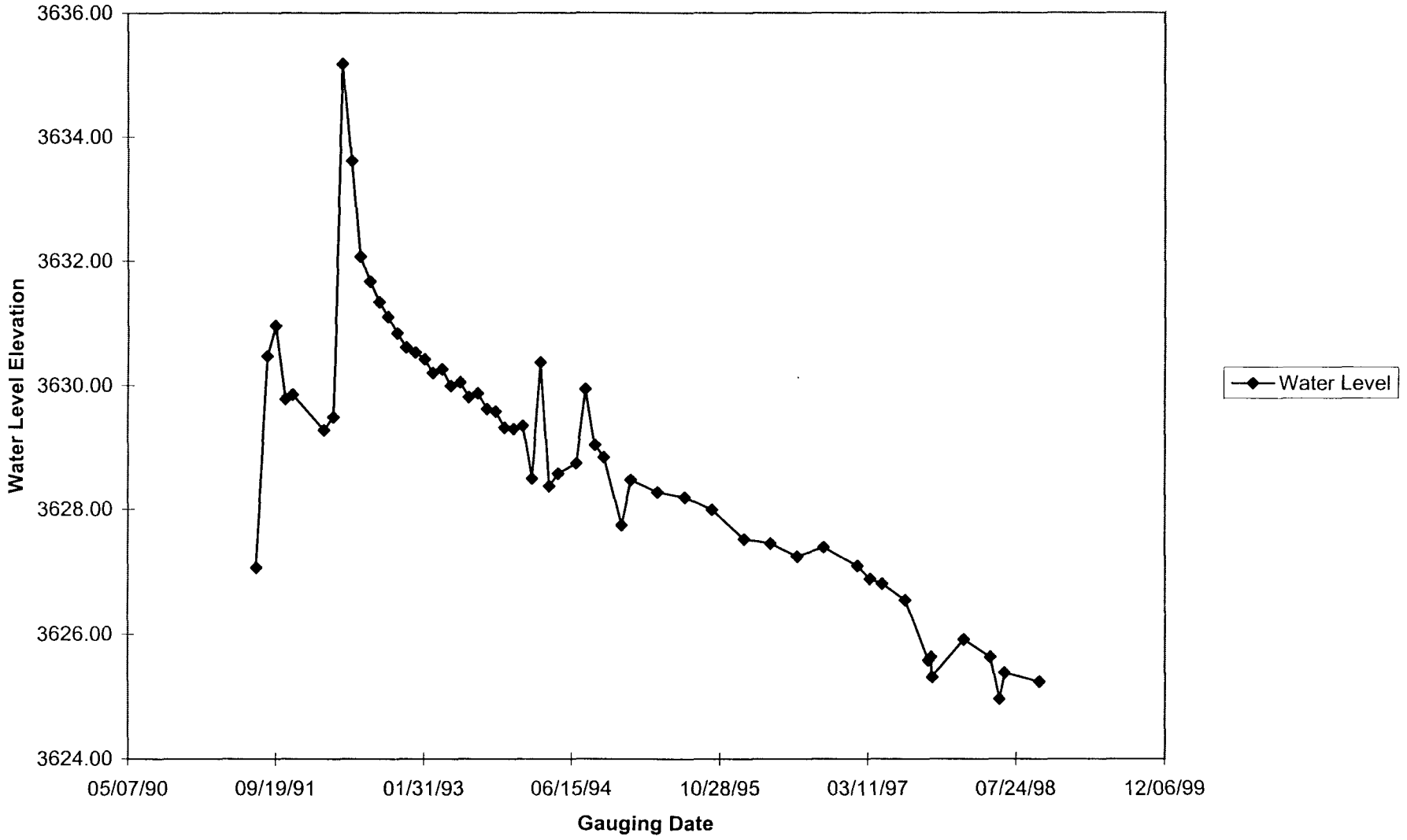
* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-59



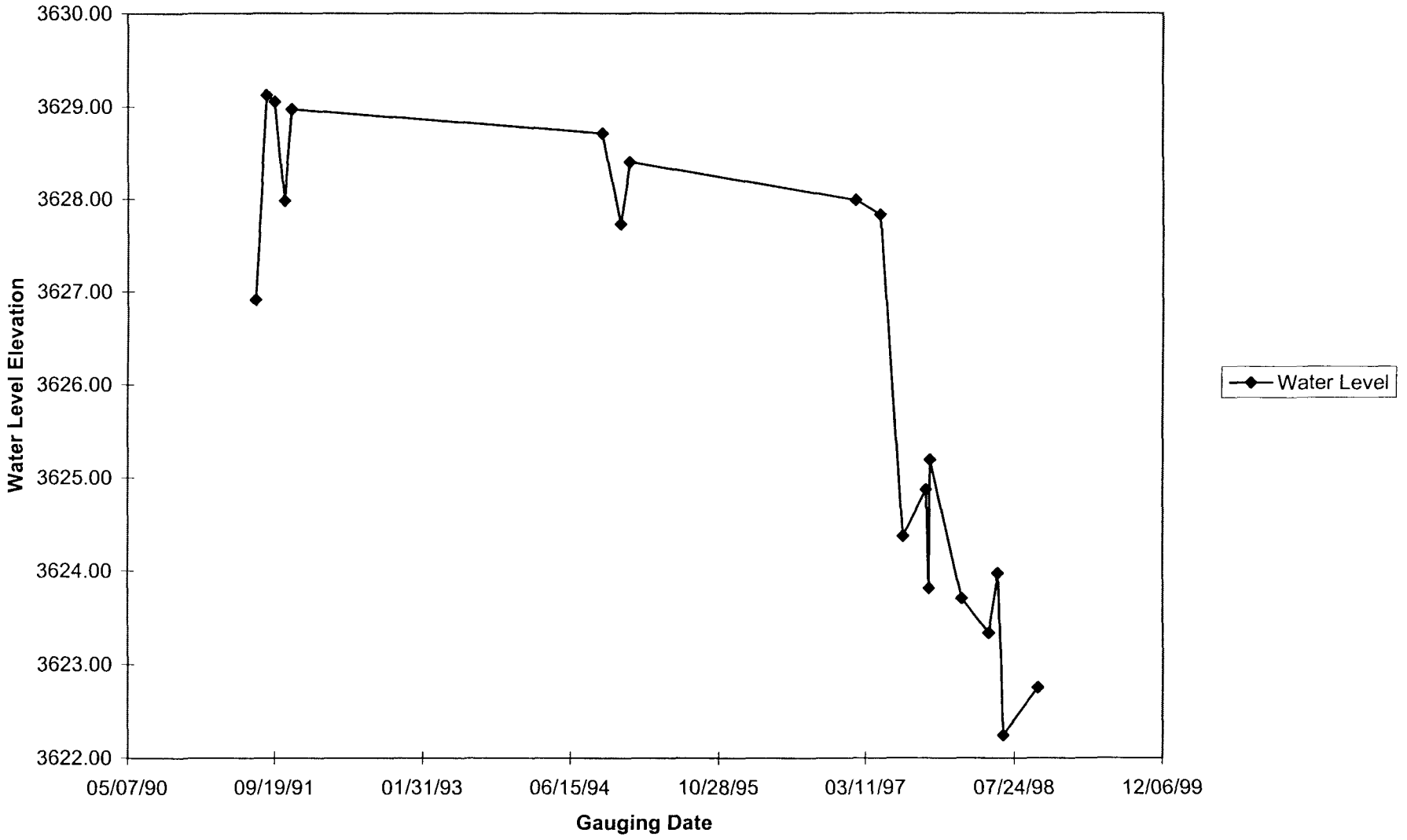
* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-60



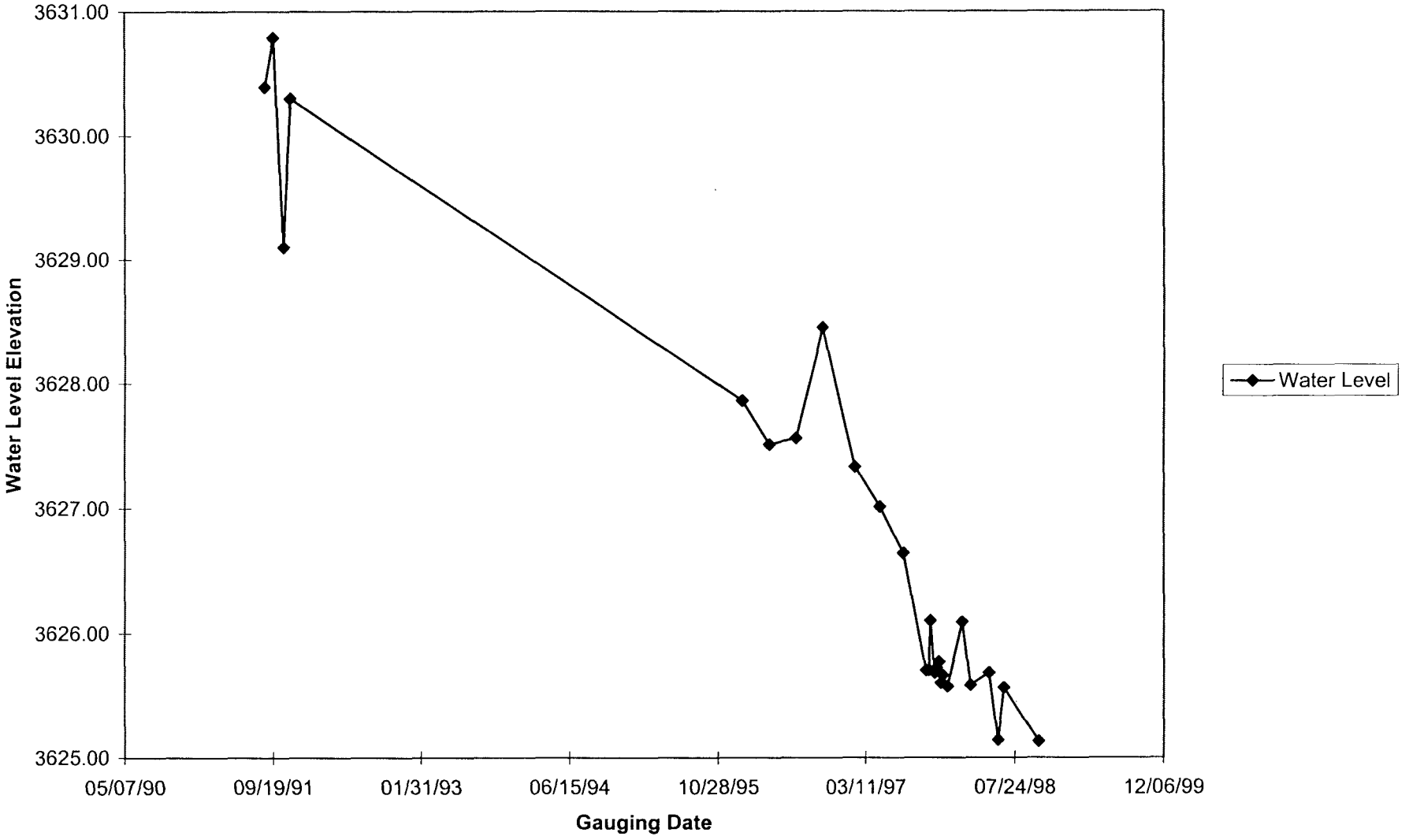
* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-61A



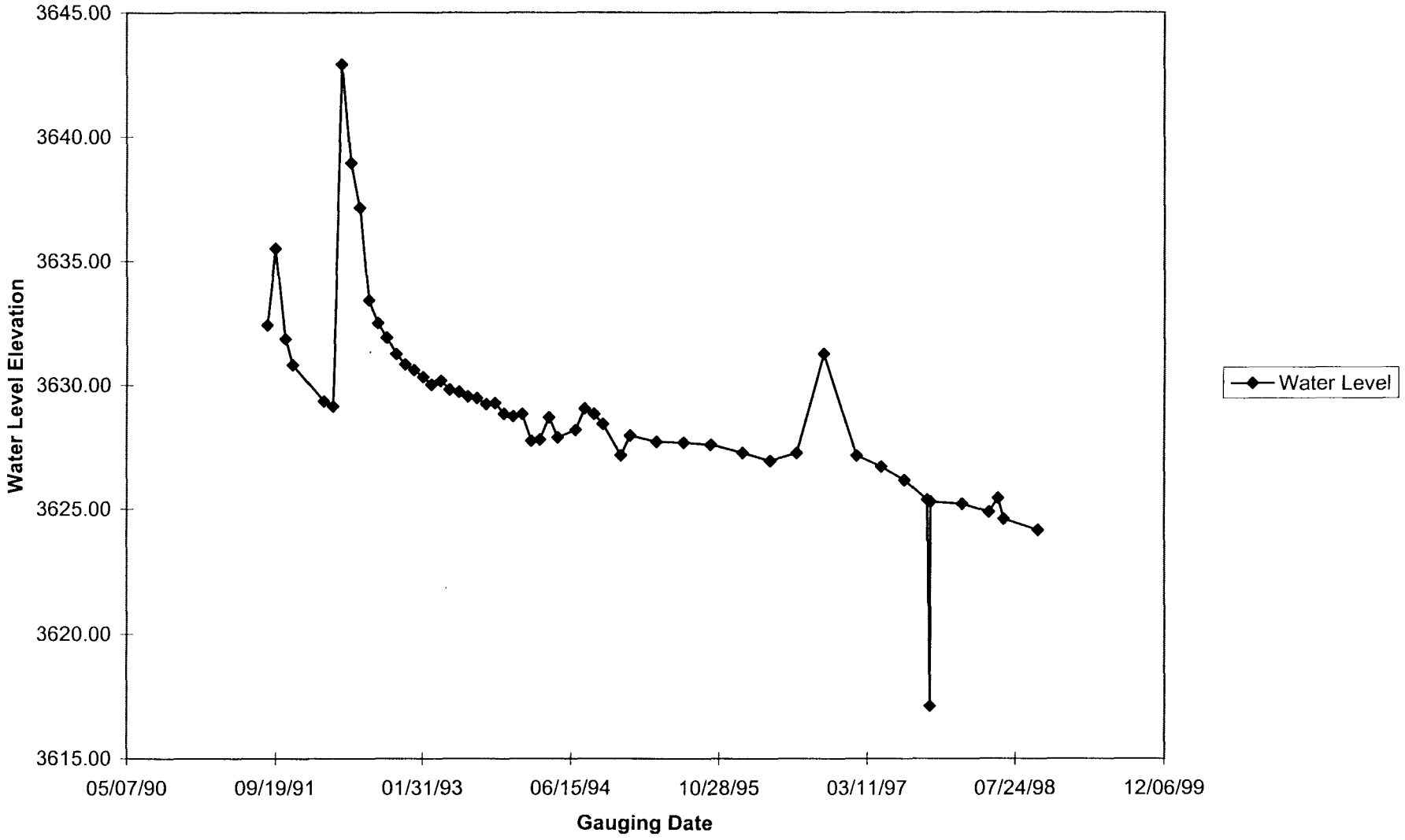
* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-62



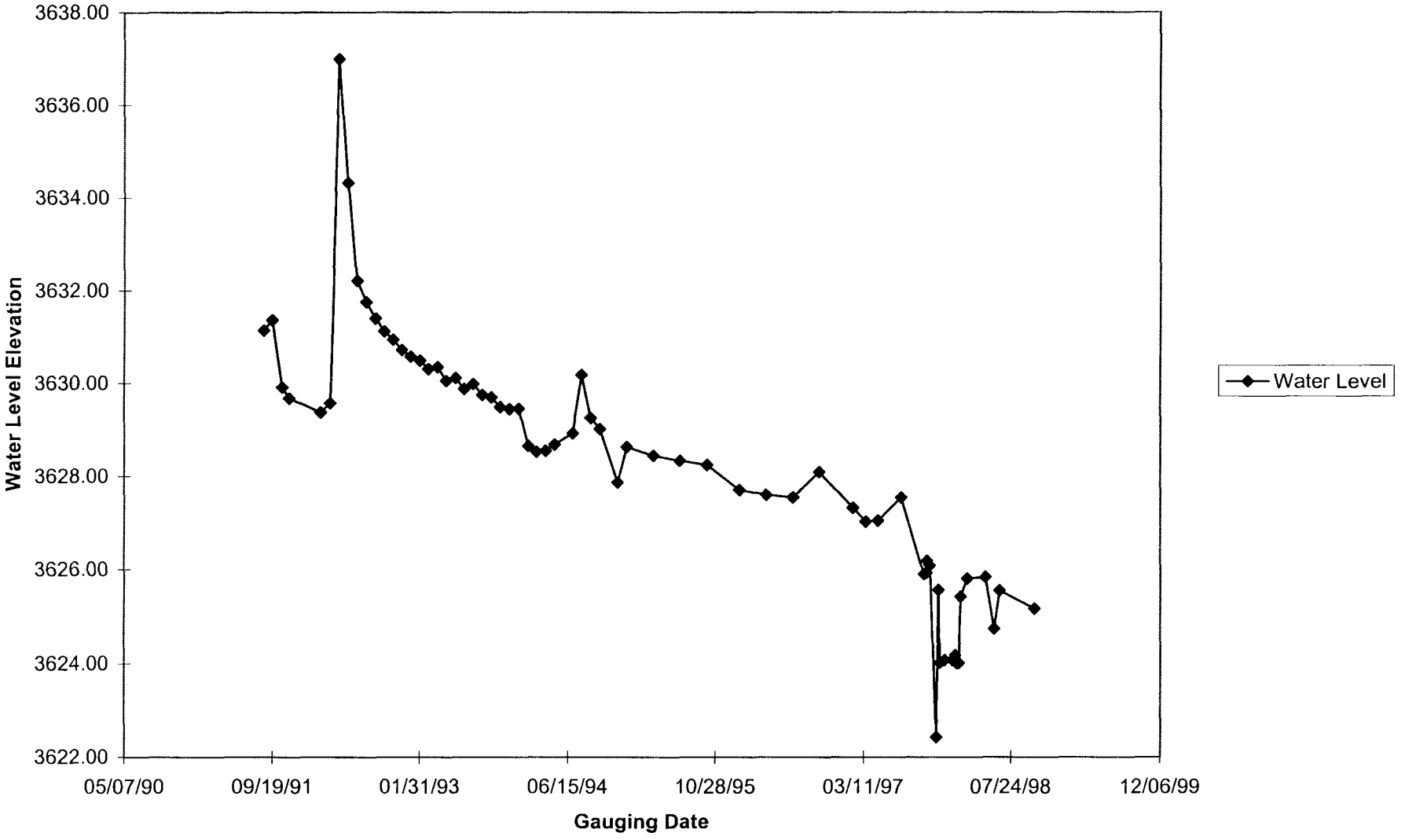
* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-63



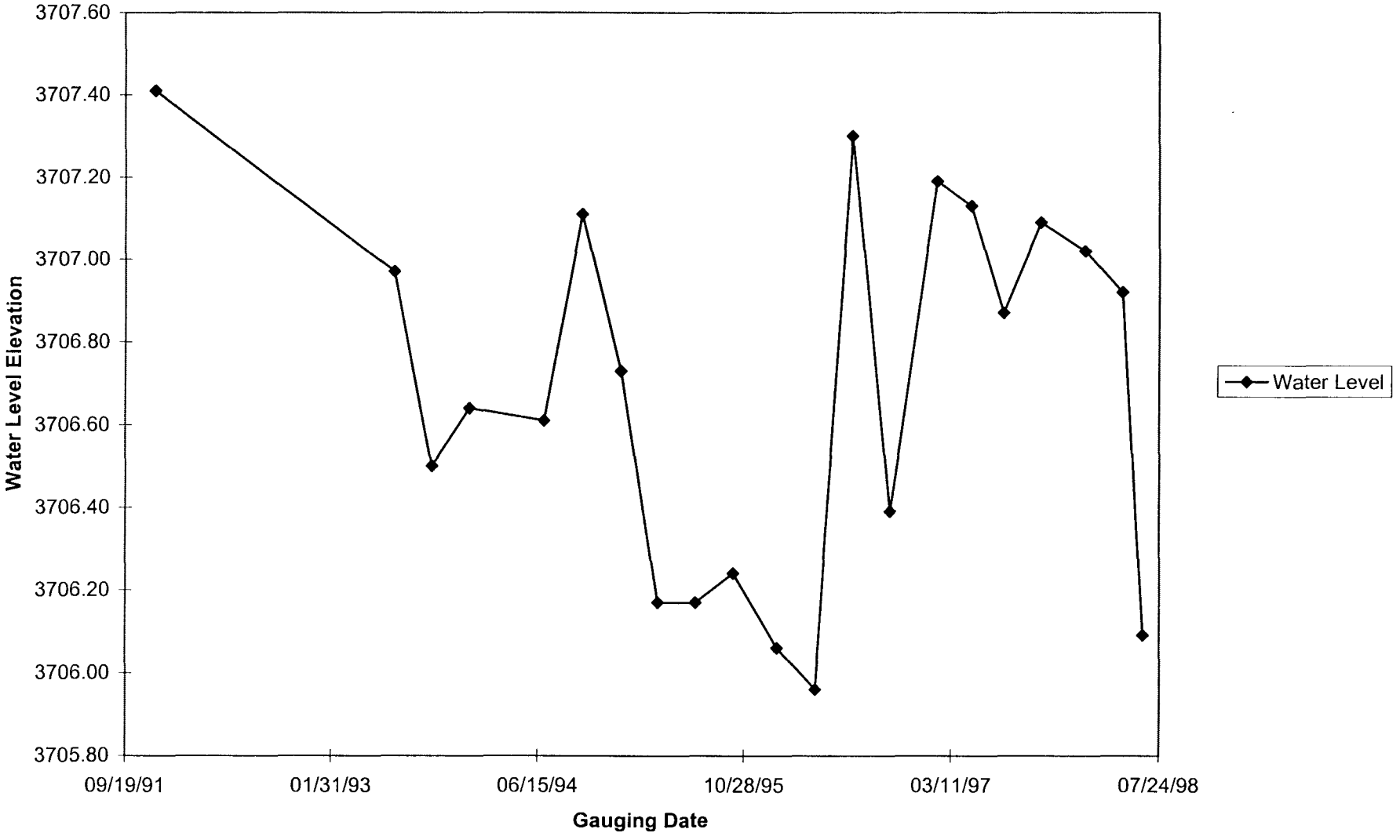
* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-64



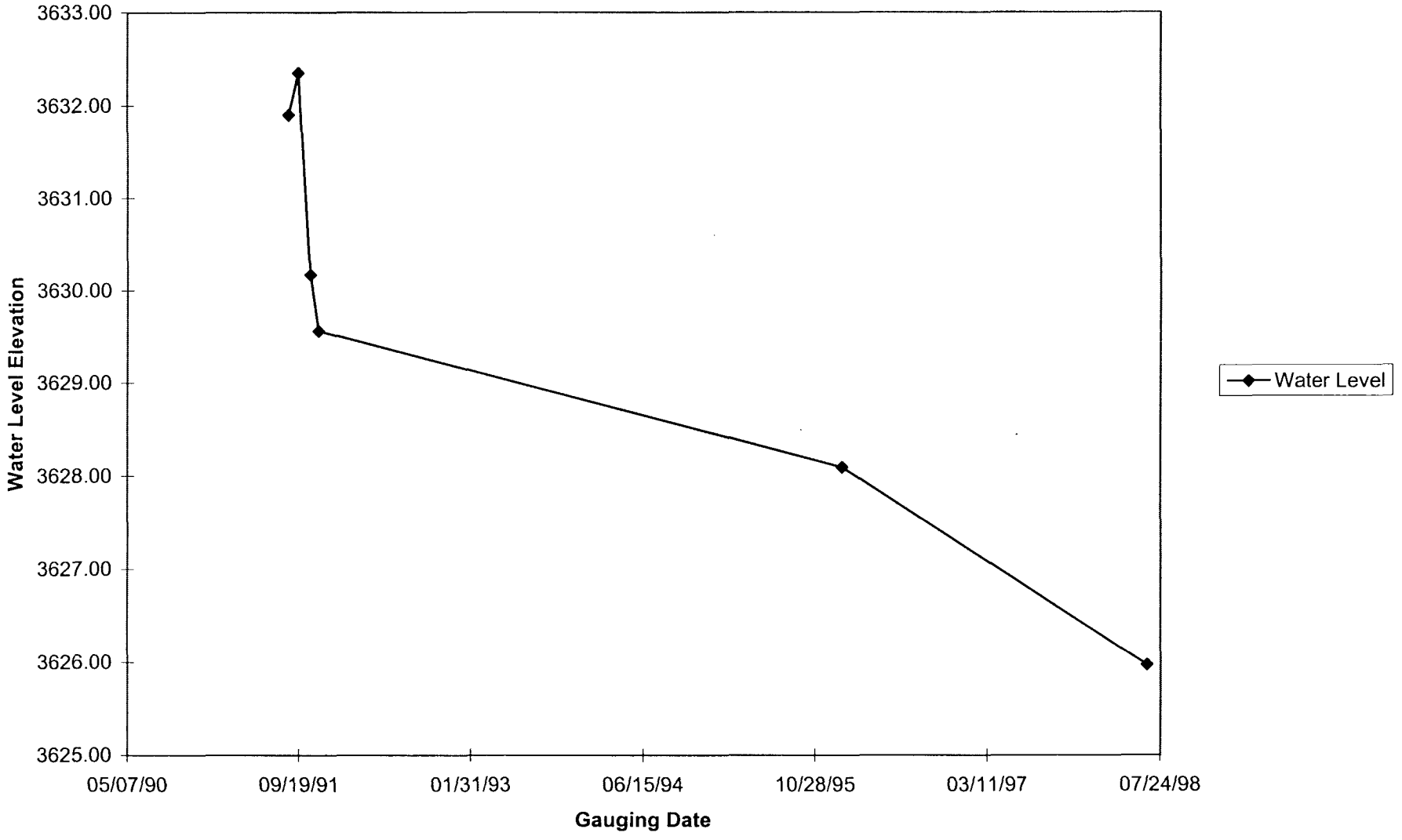
* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-65



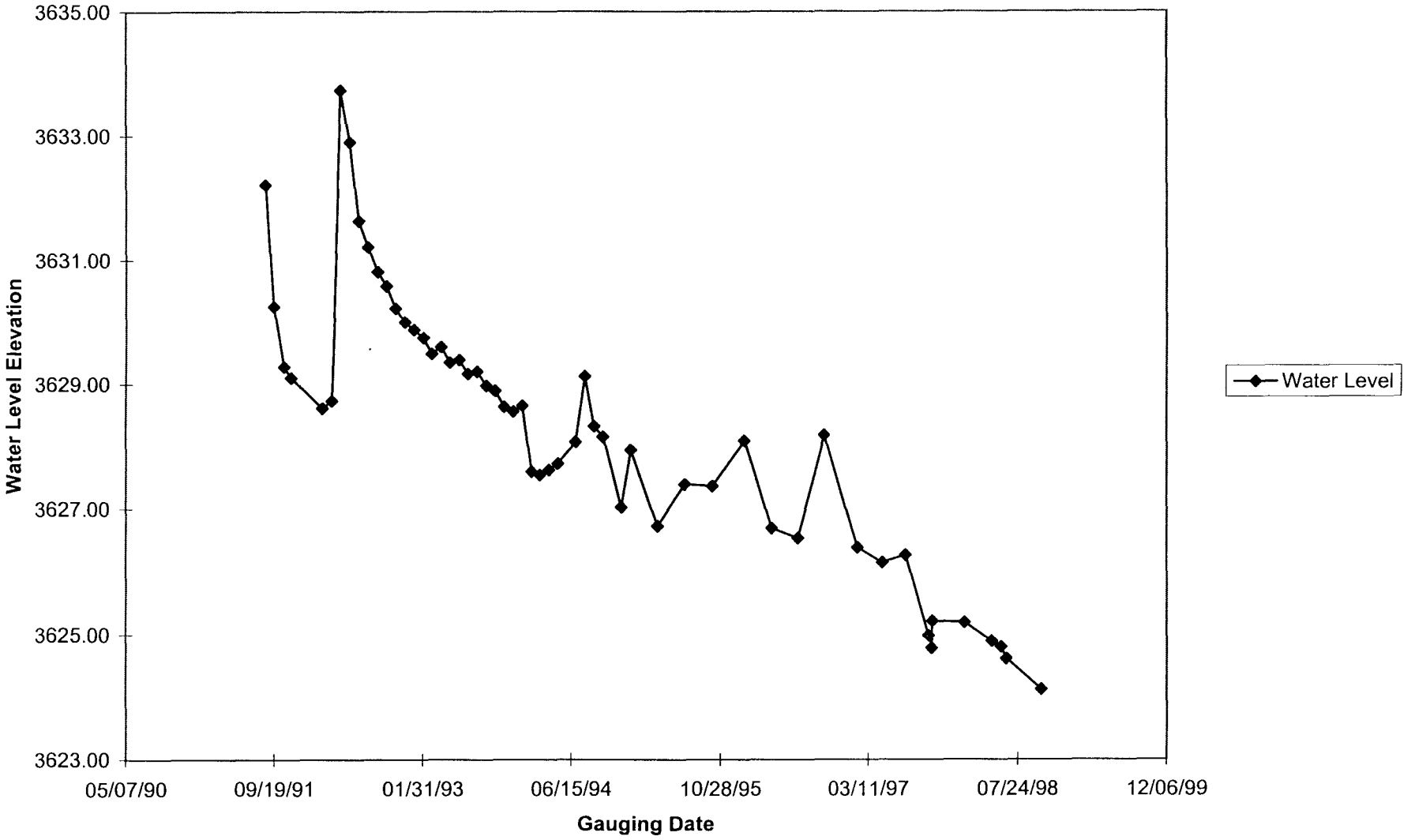
* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-65A



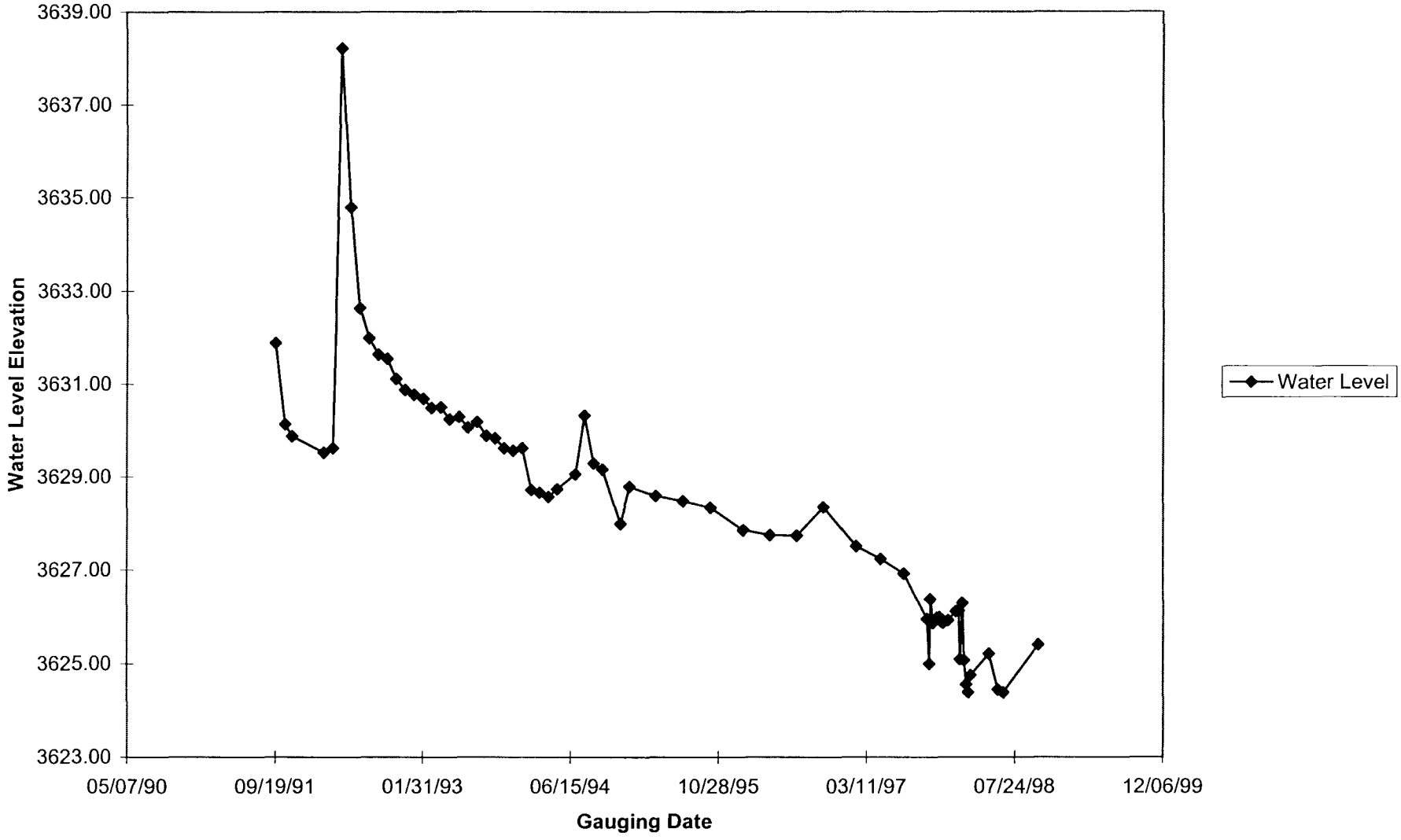
* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-66



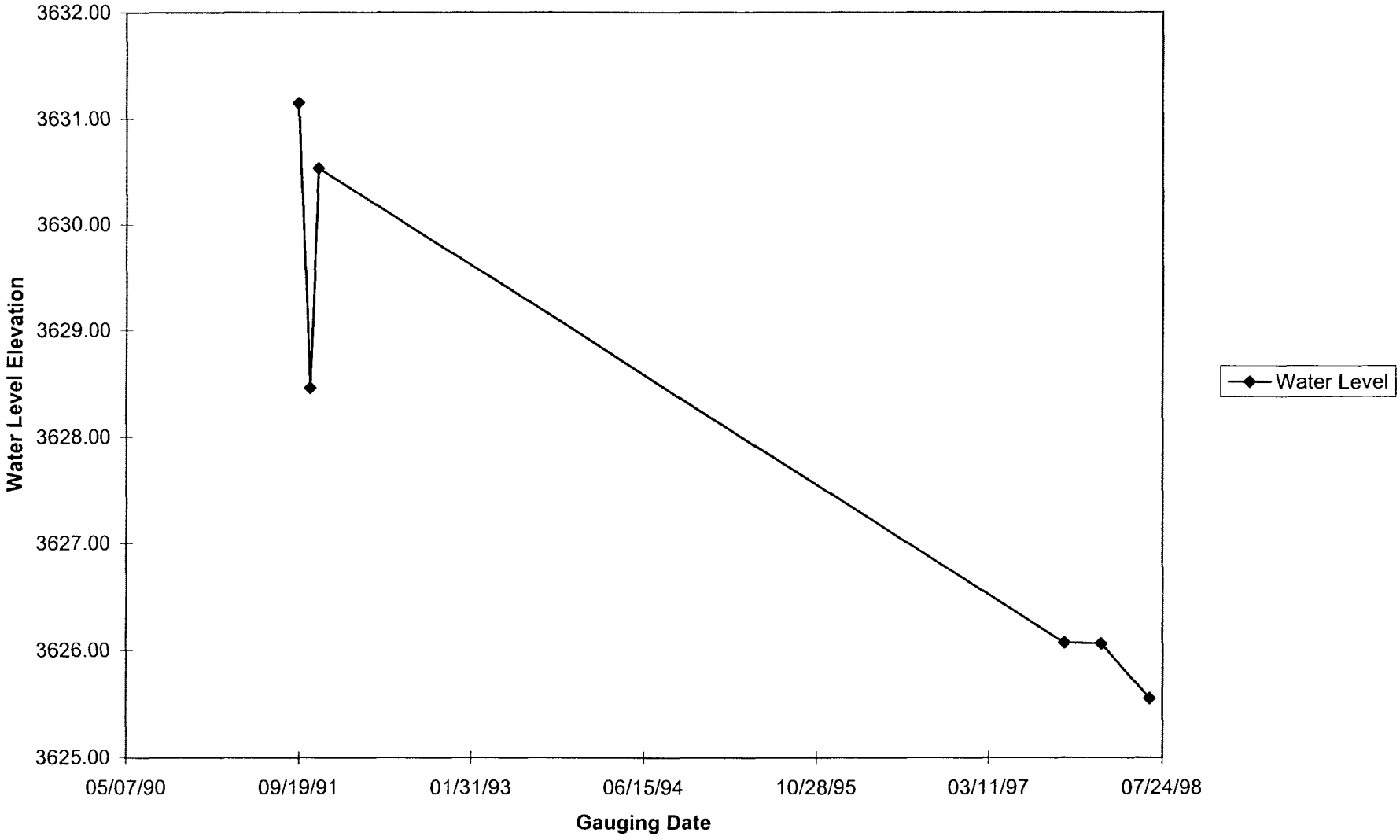
* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-67



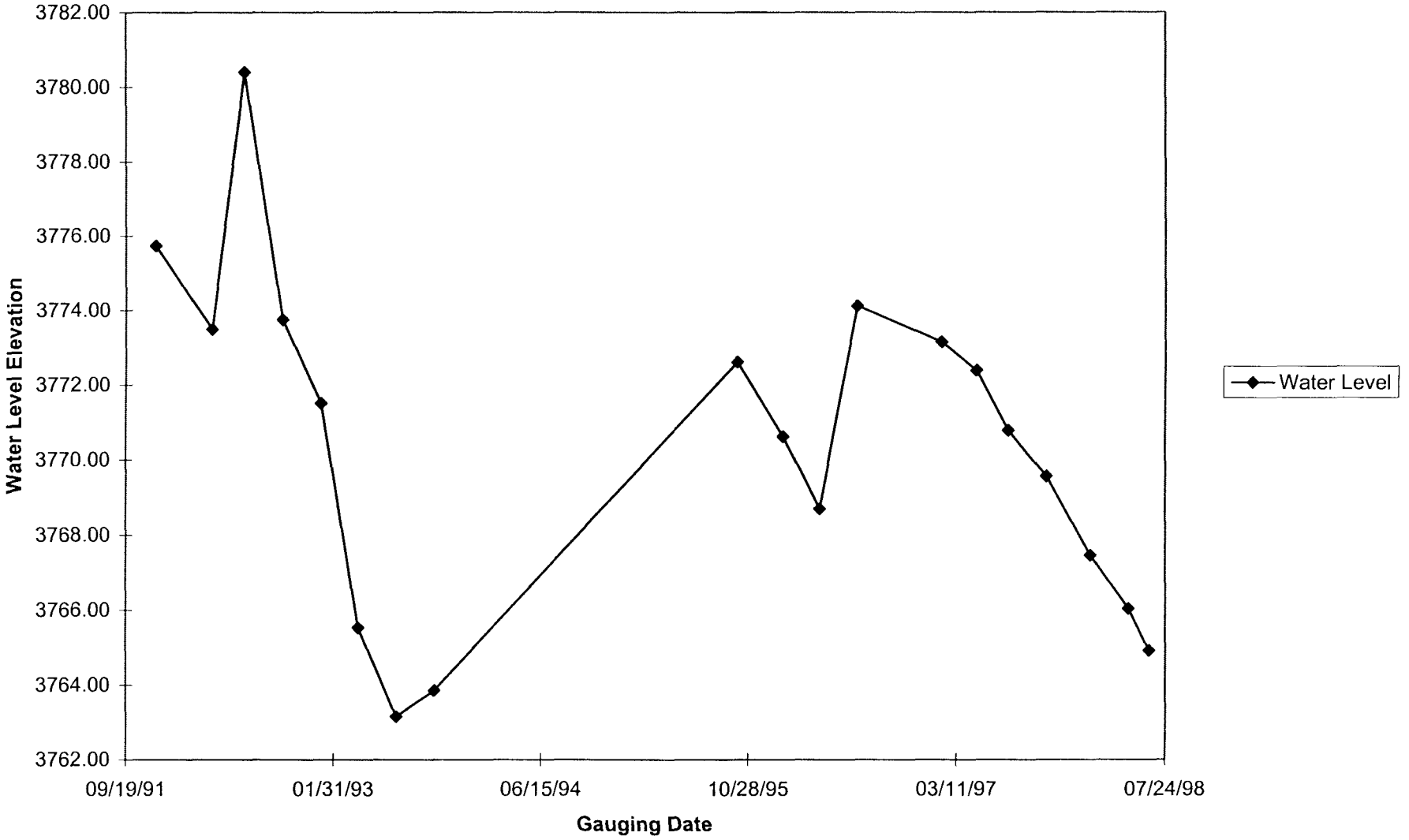
* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-68



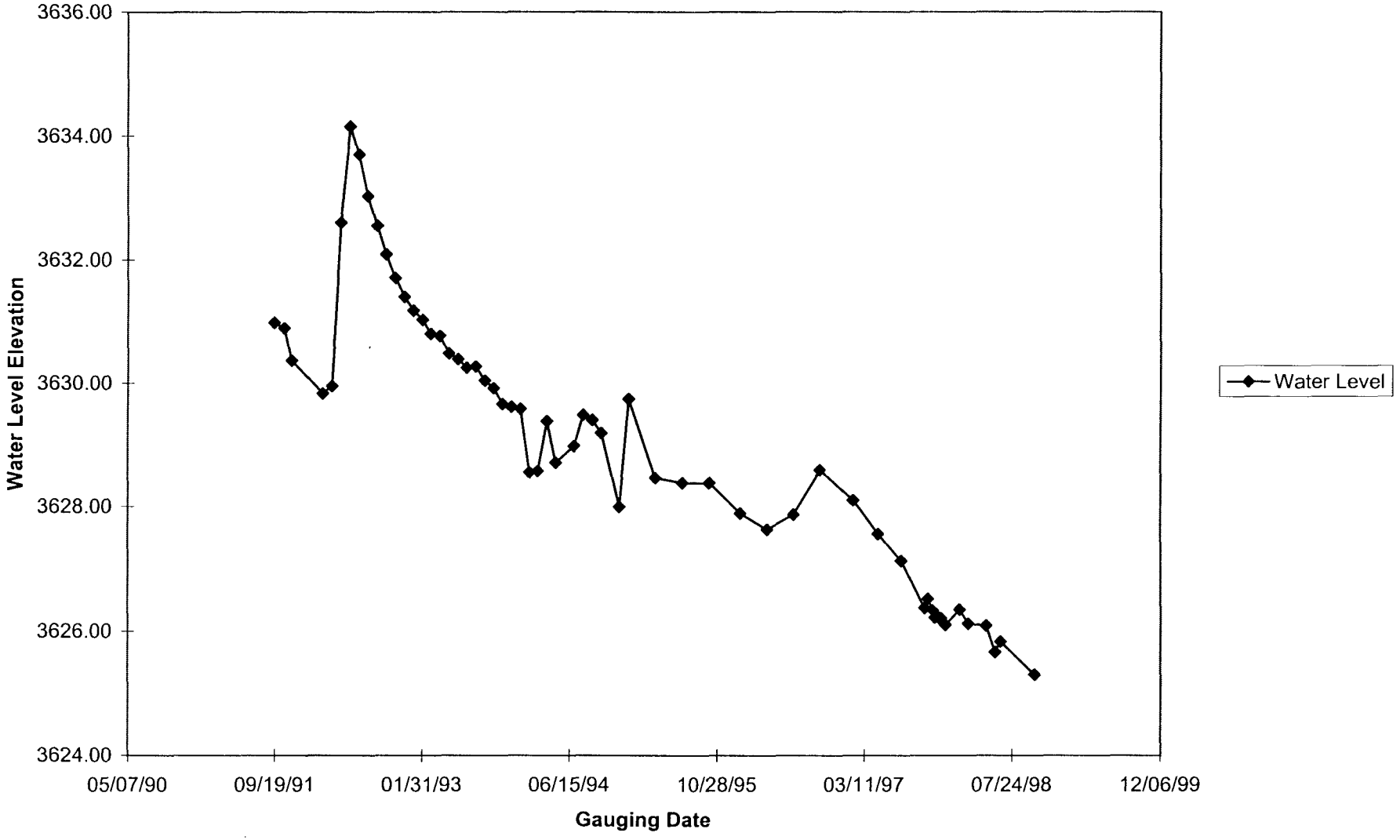
* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-69



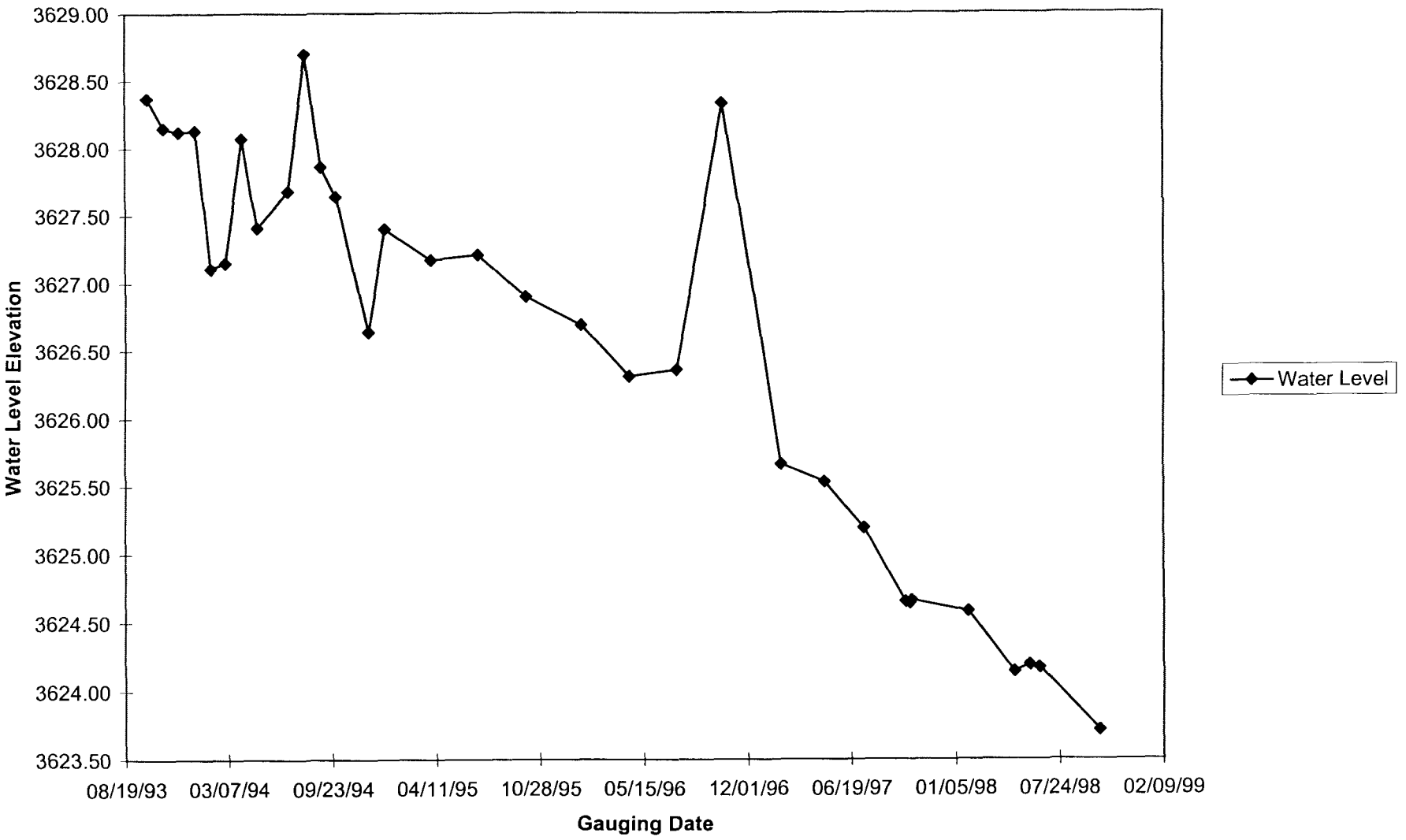
* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-70



* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-71



* Water level elevations in feet above mean sea level, based on survey data provided by Marathon