NM2 - 7

GENERAL CORRESPONDENCE YEAR(S):

1977-1992

STATE OF NEW MEXICO
ENERGY, MINERALS and NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION
AZTEC DISTRICT OFFICE

'92 MAR 13 AM 8 26

BRUCE KING
GOVERNOR

ANITA LOCKWOOD
CABINET SECRETARY

1000 RIO BRAZOS ROAD
AZTEC, NEW MEXICO 87410
(505) 334-6178

March 11,1992

Amoco Production Company
Attn: B. D. Shaw
200 Amoco Court
Farmington, NM 87410

RE: Cahn Evaporation Pond Repair Approval Located E-33-T32N-R10W

Dear Mr. Shaw:

The Oil Conservation Division does approve Amoco's request to repair the Cahn Evaporation Pond by overlaying existing liners with a new 30 mil minimum plastic liner. The existing leak detection system is to be dry during repairs. Leak detection sumps are to be monitored regularly as specified in your permit once operations resume. The Oil Conservation Division approved the design proposed in your 12/18/91 letter and approves your design alterations in your 3/10/92 letter which eliminate the use of a clay liner.

If you have questions please feel free to contact this office.

Yours truly,

Denny G. Foust
Environmental Geologist

DGF/sh

XC: OCD-Environmental Bureau

Roger

AMOCO

Southern Rockies Business Unit

San Juan Operations Center

March 10, 1992

New Mexico Oil Conservation Division
1000 Rio Brazos Rd.
Aztec, NM 87410

Attn: Denny Foust

File: BDS-4-986

Cahn Evaporation Pond

Please reference our letter of December 18, 1991, File: BDS-45-986. Amoco Production Company is requesting approval to repair the subject pond for evaporation of drilling water and drying of drilling materials. The repair will consist of overlaying existing liners with a new plastic liner.

Our request is necessary due to converting drilling operations to closed systems which eliminates evaporation of fluids on site. We will continue to control overspray and monitor leak detection sumps. Thank you for your consideration.

B D Shaw

B. D. Shaw
Environmental Coordinator

BDS/slb

Southern Rockies Business Unit

San Juan Operations Center

December 18, 1991

New Mexico Oil Conservation Division
P. O. Box 2088
Santa Fe, NM 87504

Attn: William J. LeMay

File: BDS-45-986

Cahn Evaporation Pond

Amoco Production Company is requesting approval to repair the subject pond for evaporation of drilling water and drying of drilling materials. The repair will consist of overlaying existing liners with a bentonite layer. Information on this material is enclosed.

Our request is necessary due to converting drilling operations to closed systems which eliminates evaporation of fluids on site. We will continue to control overspray and monitor leak detection sumps. Thank you for your consideration.

B. D. Shaw
Environmental Coordinator

BDS/slb

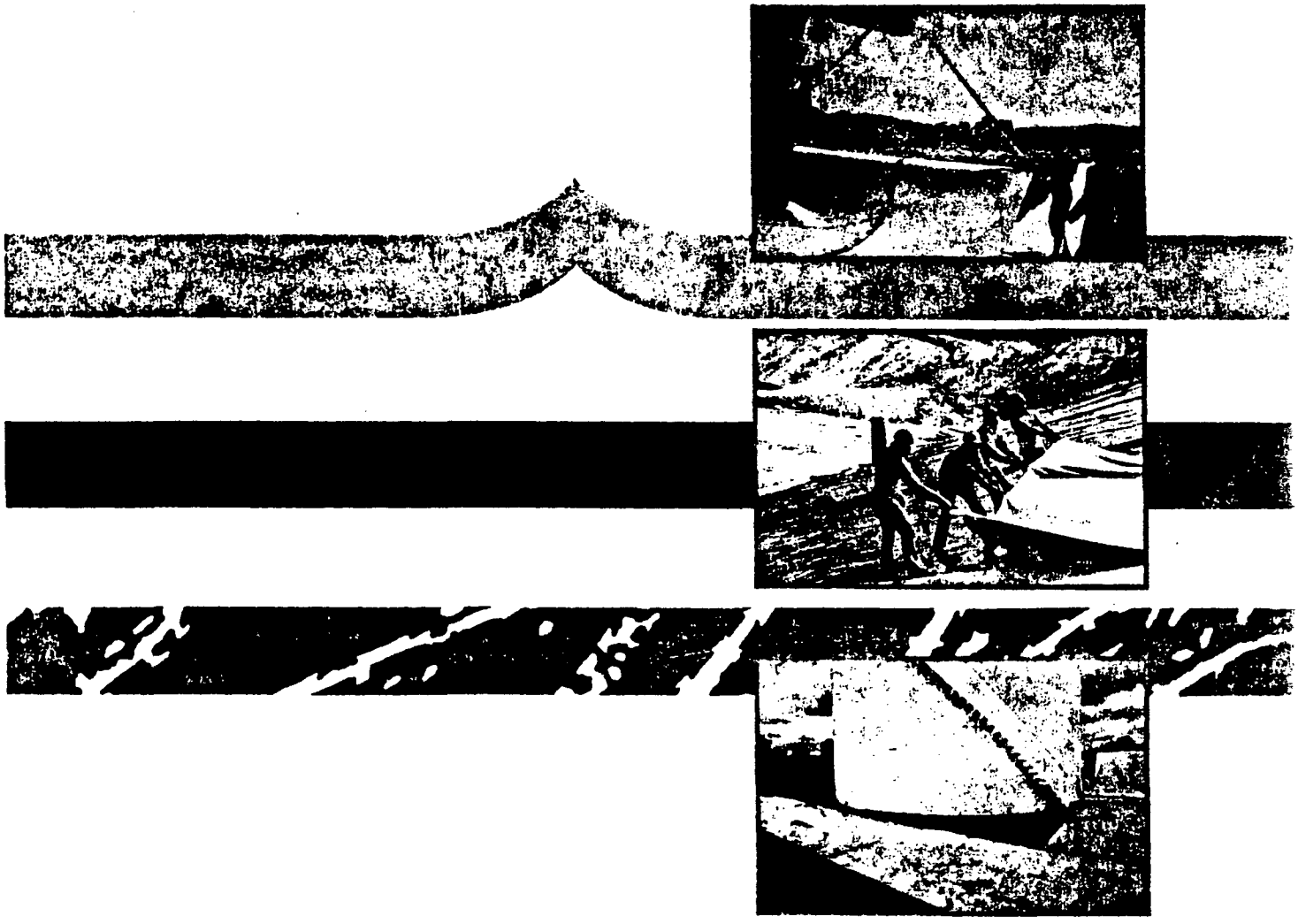
Enclosure

cc: OCD - Aztec

To Denny approved 1/16/91

O.R.E. SYSTEMS
P.O. Box 3677
Farmington, NM 87499
(505) 327-2161

CLAYMAX®



CLAYMAX® IS THE STATE-OF-THE-ART GEOCOMPOSITE LINER FOR THE WATER AND WASTE CONTAINMENT INDUSTRY. CLAYMAX® . . . THE IMPERMEABLE BARRIER OF BENTONITE CLAY IN CARPET FORM.

CLAYMAX® liner is the optimum impermeable liner for the water and waste containment industry.

CLAYMAX® PRODUCT SPECIFICATION

Sodium Bentonite Content	1.0 lbs. per square foot
Thickness	¼ inch
Liner Dimensions	13.5 feet x 82 feet
Effective Area Covered	1059.5 square feet (assume 6" overlap along one side and one end)
Roll Weight/Unit	1130 lbs. (minimum)
Permeability Coefficient	2×10^{-10} cm per second @ 35' head pressure.

LABORATORY TEST DATA

Procedure — Six inches of silica sand covering CLAYMAX liner in a triaxial cell under thirty-five feet of water head pressure.

GROUP	PERMEANT	PERMEABILITY
Water	De-Aired Water	2×10^{-10} cm/sec.
Salt	Seawater	2×10^{-10} cm/sec.
Acid	Acetic Acid	2×10^{-10} cm/sec.
	Phosphoric Acid	2×10^{-9} cm/sec.
Calcium	Calcium Chloride	2×10^{-9} cm/sec.
Alcohol	Ethyl Alcohol	2×10^{-9} cm/sec.
Organics	Methylene Chloride	3×10^{-10} cm/sec.
Leachate	Sewage BOD-38,000	8×10^{-10} cm/sec.
	Paper Pulp Sludge	2×10^{-10} cm/sec.
Hydrocarbons	Jet Fuel	8×10^{-10} cm/sec.
	Diesel Fuel	8×10^{-10} cm/sec.
	Unleaded Gasoline	2×10^{-10} cm/sec.
Pressure	150 foot Water Head	1×10^{-9} cm/sec.

Additional tests are available upon request.

The above test performance data were produced under laboratory conditions. The actual performance characteristics may vary. No performance warranty is express or implied.

PACKAGING AND SHIPPING

Roll Content	1107.0 square feet
Roll Weight	1135 lbs. (approx.) wrapped
Roll Size	14.5 feet long (PVC wrapped) x 18" diameter (approx.)

APPLICATIONS: Fresh water ponds, waste lagoons, municipal landfills/caps, tank farm containments, irrigation canals and earthen dams.

CLAYMAX® liner is a flexible polypropylene bentonite sandwich providing a uniform layer of clay in carpet form creating a cost-effective solution for any liquid containment sealing problem.

E.P.A. regulations for waste containment specify that lagoon/landfill liners be composed of a heavy plastic membrane layer (HDPE) on top of a thick layer of **compacted clay (3 feet minimum).** Because a single sheet of **CLAYMAX liner exceeds this requirement,** it has been specified and installed as "the clay layer" in several landfills in the United States and Europe.

CLAYMAX® liner is the state-of-the-art geocomposite liner that ingeniously combines the durability of woven polypropylene fabric with the impermeability of a pound-per-square-foot of an inert mineral, sodium bentonite (montmorillonite).

Sodium bentonite, the mineral component in CLAYMAX liner, is a high-swelling clay that swells to form a monolithic seal when hydrated with fresh water. The CLAYMAX liner has **self-sealing seams** and an overall **self-healing** ability if ripped or punctured. In its hydrated (swollen) state, the clay will swell up to 15 times its dry volume providing tremendous impermeability and a great resistance to all chemicals. In a typical installation, the ¼-inch CLAYMAX liner sheet will swell ½-to-1 inch resulting in the **equivalent permeability of 30 feet of compacted clay.**

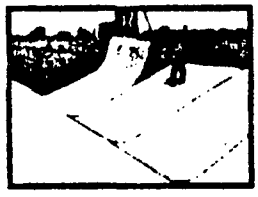
EQUIPMENT REQUIRED: The CLAYMAX liner must be installed with the **stenciled polypropylene side up (facing the operator).** The polypropylene protects and supports the system on installation. The liner can either be pulled from a roll suspended at the top of a slope, or the free end may first be secured in a locking trench and the suspended roll can be backed down the slope and across the excavation by the supporting vehicle.

Suspending and unrolling CLAYMAX liner is facilitated by inserting a heavy-duty 3-inch diameter steel pipe through the 3½-inch roll core on which CLAYMAX liner is shipped. This pipe should be 16-18 feet long to accommodate the hoisting chains from the lifting vehicle (any type of vehicle with a fork or front-end bucket). A spreader bar is required to ensure roll clearance and to prevent damage to roll edges.

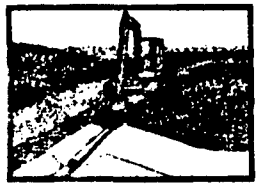
Quality control of CLAYMAX liner seams requires an on-site inspection of a uniform 6-inch overlap and supervision of backfilling to prevent aggregate from opening seams.

SITE PREPARATION: The pond, lagoon, tank farm enclosure or canal excavation depth should be determined to allow for a final addition of a minimum 6-8 inches of soil or aggregate cover material. The excavation should be well contoured with slopes that are at a maximum of three-to-one. Protrusions and rocks larger than 2 inches in diameter should be removed and the entire excavation should be compacted sufficiently to prevent ruts from installation vehicles. Compaction can be accomplished using either conventional rolling equipment or wheeled vehicles. Use of sheepsfoot rolling equipment is not recommended. A liner **locking trench (min. 18 inches deep)** must be provided at the top of all slopes.

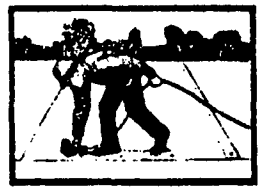
ORIENTATION: When installing CLAYMAX liner, **all seams on slopes must be perpendicular to the excavation bottom.** This method prevents seam displacement during the backfill procedure. It is also important that the first CLAYMAX liner roll and all succeeding rolls be pulled tight to smooth out creases.



ANCHORING: All CLAYMAX liner sheets should be anchored to pressure-treated wooden 2 x 4's (or equivalent) and locked into trenches at the top of all slopes, covered with fill and compacted to prevent slippage during installation. This trench should be at least 12 inches above the final contained liquid level and should be approximately **18 inches deep** and **18 inches back from the finished waterline.**



SEAMING: CLAYMAX liner seams are non-critical and self-seaming. CLAYMAX liner seams require a **simple 6-inch overlap** with long pins or nails every yard to allow for movement of CLAYMAX liner during ground subsidence. No adhesive or thermal welding is required. The hydrated bentonite will push through the woven polypropylene forming a monolithic seal with a permeability of no greater than 1×10^{-9} cm/sec.



REPAIRING: Irregular shapes, cuts or tears are **easily repaired** by covering the area with CLAYMAX liner to provide a 6-inch overlap on all sides. These repair pieces should be stapled or nailed in position until cover material has been placed.

COVERING: Cover material (minimum 6-8 inches of aggregate or backfill) should be applied as CLAYMAX liner sheets are placed to afford maximum protection. **Correctly installed, CLAYMAX liner is capable of supporting installation personnel and equipment.** Because it is not recommended for vehicles to operate directly on CLAYMAX liner without the support of a backfill, **cover material should always be pushed forward.** Cover material (other than aggregate) should be compacted after placement.

CLAYMAX® liner, the state-of-the-art geocomposite, can be used as a primary or secondary liner.

MATERIAL SPECIFICATIONS

Primary Backing (Typical Properties) — Polypropylene is nonbiodegradable and inert to most chemicals, acids and alkalis.

Color	Natural white
Filler Fiber	Nylon
Substrate	24 x 10 Delustered woven polypropylene, non-toxic, water permeable
Weight	4 oz. per square yard
Tensile Strength	78 lbs. per inch (minimum)
Grab Strength (ASTM D-1682)	Warp 95 lbs., Fill 70 lbs.
Mullen Burst Strength (ASTM D774)	250.25 lbs. per square inch
Puncture Strength (¾" mandril ASTM D3787 MOD.)	249 lbs.
Melting Point	329° F
Elongation (ASTM D-1682)	Warp 15%, Fill 18%
Shrinkage—Hot Water	Nil
Shrinkage—Dry (20 min. @ 270°F)	2%

Cover Fabric	100% spunlace polyester; open weave allows for expansion of bentonite
Weight	1 oz. per square yard
Grab Strength	Warp 30 lbs., Fill 13.6 lbs.
Burst Strength	35 lbs. per square inch

Bentonite Sizing (Sodium Montmorillonite)	Specially graded, 6 mesh and 30 mesh granules
Mineralogical Composition	90% Montmorillonite (min.)

Adhesive	Water soluble, non-toxic
Storage	On dry ground, under roof or other protective covering

The manufacturer reserves the right to change product specifications and instructions/limitations without notice. Information contained herein supersedes previously printed material prior to 7/89.

O.R.E. SYSTEMS
P.O. Box 3677
Farmington, NM 87499
(505) 327-2161

CLAYMAX® LIQUID CONTAINMENT LINER

ADVANTAGES

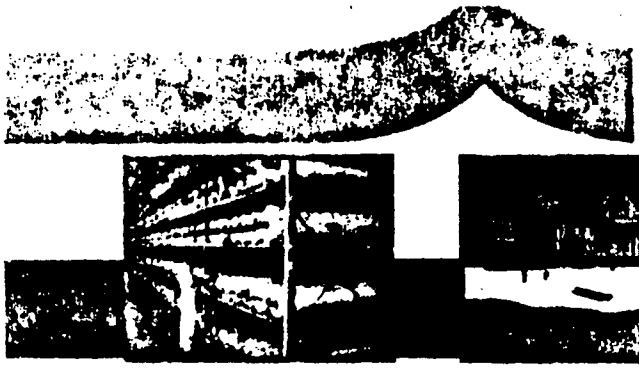
- Economical and easy to install
- Minimal labor required
- All seams are simple overlap seams
- Liner can be cut and trimmed with a utility knife

GENERAL CHARACTERISTICS

- Self-healing/Self-sealing
- Natural sealant actuated by water
- Porous protection layers allowing quicker hydration
- Water-soluble adhesive
- Factory-uniform continuous bentonite layer
- Minimum 1 lb. bentonite per sq. ft.
- Totally flexible
- Compatible for use with plastic liners and other multiple liner systems
- Rolled goods for convenient storage
- Standard sheet sizes: 13½' x 82' and custom lengths available
- Relatively resistant to environmental and biological attack

INSTALLATION ADVANTAGES

- Uncomplicated installation requiring:
  - **No seam welding or sewing**
  - **No special equipment or cutting tools**
  - **No geotextile or other special protection**
- May be staked or nailed
- Simple overlap seams
- Accommodates complex configurations
- No bentonite loss when cut or trimmed
- Virtually no waste material



CLAYMAX Liner Inventory

Decorative Pond

Leachate Collection Pond
(Secondary Liner)

CAUTIONARY INSTRUCTIONS: CLAYMAX liner may be damaged by exposure to water turbulence or hazardous or toxic substances, hazardous or solid wastes, salt or other contaminants in water and should not be used for containment of these constituents without prior evaluation. CLAYMAX liner must be inspected for damage if exposed to any of those substances or conditions and, if damaged, must be repaired or replaced immediately. CLAYMAX liner must be installed in accordance with plan and specification requirements, prepared by a professional engineer.

All drawings are intended solely as a guide and for general information only.

All test performance data were produced under laboratory conditions and are not intended as a substitute for tests of the specific liquid or leachate that may come in contact with CLAYMAX liner. All test performance data are subject to James Clem Corporation's limitation of warranties. James Clem Corporation recommends that the purchaser perform site-specific tests of CLAYMAX liner.

LIMITATION OF WARRANTIES: James Clem Corporation warrants that CLAYMAX liner meets James Clem Corporation's specifications. James Clem Corporation disclaims any other warranties, express or implied, as to CLAYMAX liner, including all warranties of merchantibility and fitness for any particular purpose. James Clem Corporation is not liable for any incidental or consequential damages of any kind. James Clem Corporation assumes no liability for CLAYMAX liner's performance or for injuries resulting from the use of CLAYMAX liner, including any liability resulting from the purchaser's engineering, design, construction and installation.

GENERAL INSTALLATION INFORMATION: CLAYMAX liner should never be installed in standing water.

Exposure to turbulent water may also cause damage.

If exposed to any of these substances or conditions, CLAYMAX liner must be inspected and, where necessary, immediately repaired or replaced.

If rainfall commences during installation or while under construction, cover with plastic sheeting to provide interim protection.

To insure its integrity, CLAYMAX liner must be protected by and remain buried under a minimum of 6" to 8" of backfill or aggregate. Backfill must be compacted with rubber-tired or conventional rolling equipment to an 85% Modified Proctor.

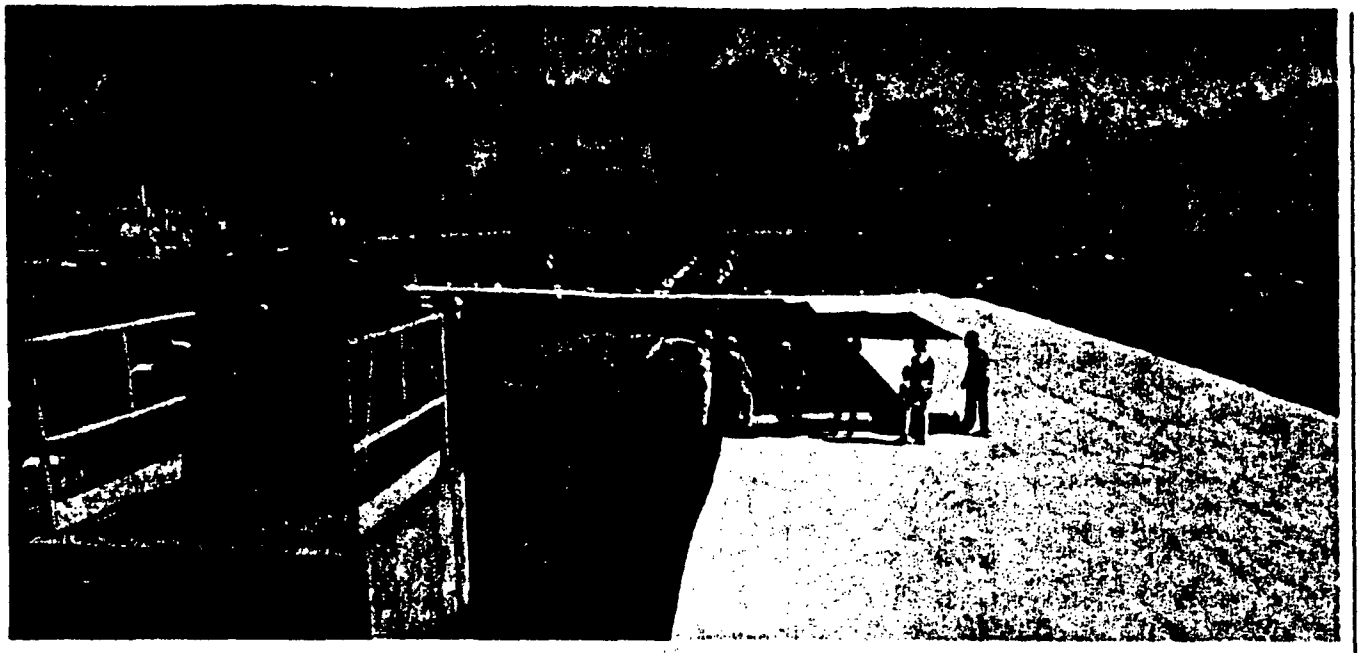
All illustrations are intended solely as a guide and are for general information only. Contact James Clem Corporation for:

- Containment installation instructions on slopes greater than 3 to 1.
- Installations where CLAYMAX liner must resist extreme hydrostatic pressure that may require a double layer of CLAYMAX liner.
- Temporary containment applications.
- Suitability for secondary containment applications.

Any unusual CLAYMAX liner application procedures not covered in this brochure must be approved in writing by James Clem Corporation prior to the installation.

The information contained in this brochure supercedes all information printed prior to 7/89.

Printed in the USA 8 89



Bentonite/Geotextile Liner Used In Ash Leachate Collection Lagoon

By Lisa Hawkins

A utility company located in upstate New York used a state-of-the-art bentonite/geotextile liner as part of a geocomposite liner system at a remediation pond in upper New York. The site is a 60,000-square-foot ash leachate collection lagoon that is adjacent to the Weber Ash Landfill in Fenton, New York.

Problems with the lagoon's existing lining system forced engineers to design a new system that could withstand the rigors of an annual cleaning process. Leachate and surface run-off are extracted from the Weber Landfill and drained into the collection lagoon. Solids within the fly ash leachate settle on the bottom of the pond. The pond is drained and cleaned once or twice a year to remove this hardened sediment. The existing geomembrane was unable to withstand this cleaning procedure.

The new design involved three of the latest innovations in liner components: (1) a bentonite composite liner; (2) an effective drainage system; and, (3) roller compacted concrete.

Bentonite clay liners are used as an effective long-term means of waterproofing and liquid containment. The longevity of sodium bentonite makes it an ideal choice for liquid containment, because in its hydrated state, this inert mineral will swell up to 15 times its dry volume, and when confined, forms a dense, impermeable layer that has a great resistance to chemicals. In this specific design, a sodium bentonite mat was used in conjunction with a synthetic geomembrane to form an impermeable, composite liner. Together, the clay layer and the geomembrane provide protection against groundwater contamination.

The clay liner selected for this ash leachate lagoon was the CLAYMAX liquid containment liner. CLAYMAX is a flexible, geotextile/bentonite composite that provides a continuous layer of clay in carpet form. It is made with the world's highest quality sodium bentonite adhered to a durable, woven polypropylene fabric and protected by an open-weave, non-biodegradable polyester scrim. The bentonite liner was supplied by LA Salomon, Inc., of Montville, New Jersey; it is manufactured by Clem Environmental Corp., in Fairmount, Georgia. CLAYMAX was installed by Vacri Construction, Inc., of Binghamton, New York.

Seals Defects

One of the primary reasons officials from the utility company selected the unique bentonite mat was its extremely low hydraulic conductivity and its ability to seal defects in the adjacent synthetic liner. The 1/4-inch thick liner was used in lieu of the two-foot soil clay layer usually required by the New York State Department of Environmental Conservation (DEC). By replacing the compacted clay layer with the bentonite mat, the engineers gave themselves additional usable volume in the lagoon. CLAYMAX provided a continuous layer of clay protection which eliminated the difficult and labor intensive process of compacting natural clay. It also alleviated the complicated quality control problems normally associated with bentonite-amended soil or admixtures. Available in large rolls, this impermeable geocomposite provides a pound of sodium bentonite per square foot of material.

After receiving approval from the New York State DEC, reconstruc-

tion of the ash leachate collection lagoon began in July. The first step included the removal of the old lining system and regrading the subgrade. All protrusions and rocks larger than two inches in diameter were removed, and the slopes were prepared at 3:1. Upon completion of the ground preparation, the lining system installation began.

The components of the new design were as follows: subgrade; 16-oz. non-woven geotextile; 5-mil PVC geomembrane; geonet; 16-oz. non-woven geotextile; CLAYMAX; 50-mil PVC geomembrane; 16-oz. non-woven geotextile; 6 inches of roller compacted concrete (RCC).

Backfill Cover

As each successive layer of the system was rolled out, they were locked into a V-shaped trench at the top of the slope and covered with backfill. The 16-oz. non-woven geotextile was laid out first on top of compacted silty sand; this was followed by the 50-mil PVC. The geonet layer and the 16-oz. non-woven geotextile were then placed consecutively. The clay layer was installed in the form of the CLAYMAX liquid containment liner. A second layer of 50-mil PVC was placed on top of the bentonite layer, completing the composite liner. To protect the top PVC layer, an additional 16-oz. non-woven geotextile was installed. However, this geotextile layer was not placed in the trench, because there was concern with pull-out when the RCC installation equipment began operating on the slopes. Finally, six inches of RCC were placed, providing a rigid cover for the lagoon.

The procedure for placing the bentonite membrane was simple and uncomplicated. Each 13-and-1/2 by 82-ft. CLAYMAX roll was suspended at the top of the slope and pulled down the slope of the collection pond. Each sheet covers 1,060 square feet and weighs approximately 1,200 pounds. The seams between successive rolls of CLAYMAX required a simple 6-inch overlap, and unlike synthetic liners, no adhesive was required with the bentonite mat. As the sodium bentonite hydrates, it swells and extrudes through the weave in the supporting geotextiles, forming a monolithic seal at each overlap. In a typical installation, the 1/4-inch thick sheet will swell 1/2 to one inch.

The self-healing, self-sealing CLAYMAX liner offered a simple solution for the engineers of this upstate New York utility company. The innovative design of the flexible liner alleviated many of the problems and complications they may have encountered with other liners. A coal pile run-off project is underway near Buffalo, New York, although the design has been altered slightly. This lagoon is a single layer design with HDPE replacing the PVC of top of the CLAYMAX liner.

The CLAYMAX liner was developed in 1980 as a pond liner, but it has found a strong market in landfills and landfill caps, tank farm basins, and waste lagoons. It is internationally patented and dedicates itself to the preservation of environmental resources worldwide.

About the Author

Lisa Hawkins serves as public relations manager for the James Clem Corp. in Chicago, IL.■

Geocomposite Liner Meets Secondary Containment Needs

The New York State Bulk Storage Regulations call for all new and existing petroleum bulk storage tanks to be equipped with a secondary containment system. The companies that these regulations affect have until December 27, 1990 to either comply, or face significant penalties.

Mobil Oil Corp.is one such company affected by these regulations. At Port Mobil, a 70 acre site in Staten Island, NY, there are 37 tanks, which comprise a total capacity of over one billion gallons. These sites are designed in a "cup and saucer" fashion, with the tank serving as the cup and the bermed containment area the saucer. The containment area must be at least 110% capacity of the tank and must be lined. Mobil had the task of choosing the best alternative for the job.

A plastic liner was one method considered by Mobil engineers. However, the many pipe protrusions involved created a difficult and time consuming installation. They decided that this alternative was not feasible. Another consideration was compacted clay, but the length and steepness of the slopes made it difficult to compact the clay in these situations. Again, this labor intensive installation procedure sent them looking for a better alternative. The liner chosen for this site was a bentonite mat manufactured by the James Clem Corp.

This geocomposite is made with a high swelling sodium bentonite clay. One pound per square foot of bentonite is sandwiched between two geotextiles providing a uniform layer of clay in carpet form. The rolls are 13.5' wide, 82' long and weigh approximately 1,250 pounds.

The geocomposite liner is installed in much the same way as plastic liners. An anchor trench is used at the top of the slope to hold the material in place. The material is then rolled down the slope and spread across the base in shingled fashion. Due to the swelling capabilities of the bentonite, the seams are simply overlapped six inches. Upon hydration, the bentonite will swell, the seams will seal themselves and a monolithic seal will be formed across the entire containment area. The same holds true if the liner is punctured or ripped. The bentonite will seal the area. This was an important factor for the design engineers because of the many pipe protrusions on site.

The design called for approximately 2,600 rolls of the liner. The subgrade was compacted to 85% modified proctor, the liner was installed and 6" of stone was placed on top. Due to extremely long and steep slopes, the engineers considered two techniques to stabilize these areas: A geogrid was used in some areas because it provided an optimal surface for the cover material and supplemented the tensile strength of the liner. Another technique called "benching" was also considered; benching is simply adding intermediate locking trenches along the length of the slope. This technique effectively reduces the required tensile strength of the liner by the number of benches.

For additional information, contact James Clem Corp., 444 N. Michigan Ave., Suite 1610, Chicago, IL 60611, 312/321-6255, FAX: 312/321-6258

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Pollution Equipment News
HAZARDOUS WASTE • AIR • WATER • WASTEWATER • OCEAN

O.R.E. SYSTEMS
P.O. Box 3677
Farmington, NM 87499
(505) 327-2161

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 26, 1989

CERTIFIED MAIL
RETURN RECEIPT NO. P-106-675-034

Mr. R. J. Broussard
District Manager
AMOCO PRODUCTION COMPANY
2325 E. 30th Street
Farmington, New Mexico 87401

RE: Cahn Evaporation Pit

Dear Mr. Broussard:

In your June 8, 1989, letter to the Oil Conservation Division, you requested an additional 60-days to repair or abandonment of the pond. We concur with your request and will require that Amoco provide a response no later than August 14, 1989. If your decision is to repair the pond, at that time provide details on the repairs proposed, the methods to be used to control spray drift, and the completion timetable. During this 60-day period, no produced water is to be placed in the pond.

The remaining requirements in our May 31st letter pertaining to the recordkeeping and control of spray drift at the Schneider pit continue in effect.

If you have any questions, please contact David Englert at (505) 827-5885.

Sincerely,

for William J. LeMay
Director

WJL/DGB/sl

cc: OCD Aztec Office

Amoco Production Company
2325 East 30th Street
Farmington, NM 87401
(505) 325-8841

August 17, 1989

New Mexico Oil Conservation Division
P. O. Box 2088
Santa Fe, NM 87504

Attn: William LeMay

File: BDS-5-986

Cahn and Schneider Evaporation Ponds

Please reference your letter of May 31, 1989 concerning the above subject ponds. Amoco offers the following in response to your letter's three requirements.

1. Repairs to the Cahn pond have been completed. The OCD's Aztec office was notified of the repairs. The installation construction company representative repaired the liner as necessary with patches. We are currently monitoring the sumps for reoccurring shows of water to pull until the gravel pack is dry again.

2. Amoco will develop and keep records for three years on monitoring of the pit sumps. The OCD will be notified immediately should a leak be detected. Records will be made available upon OCD request. They will be kept at our main office in Farmington.

3. Amoco proposes to control spray drift to the best of our ability. However, some overspray will occur occasionally. We propose to wash the affected area as necessary. The maximum length of time between washings will be 30 days. Amoco does not see any vegetation damage or plant death and consequently does not see a problem with spray drift. Visual impacts are important and cleaning of the area each month should be sufficient to mitigate public concern.

Please contact me at 325-8841 or write to the address shown above if you have questions or other concerns. Thank you for your cooperation.

B. D. Shaw
Environmental Coordinator

BDS/slb

cc: NMOCD- Aztec

Amoco Production Company
2325 East 30th Street
Farmington, New Mexico 87401
505-325-8841

R. J. Broussard
District Manager

June 8, 1989

New Mexico Oil Conservation Division
P. O. Box 2088
Santa Fe, New Mexico 87504

Attention: William J. LeMay

File: CBD-205-986

Cahn Evaporation Pit

Please reference your letter of May 31, 1989 concerning the above subject evaporation pit in San Juan County. Amoco Production Company is requesting the construction contractor to review and comment on the steps to repair this pit liner. We are also considering abandonment of the pit. Amoco requests an additional 60 days to complete our analysis of this situation as the pond is currently dry and not being used. Thank you for your consideration.

R. J. Broussard BDS

BDS/slb

CBD

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

May 31, 1989

CERTIFIED MAIL
RETURN RECEIPT NO. P-106-675-168

Mr. R. J. Broussard
District Manager
AMOCO PRODUCTION COMPANY
2325 E. 30th Street
Farmington, New Mexico 87401

Dear Mr. Broussard:

Based on a phone conversation on May 26, 1989, between Mike Kutas (Amoco) and David Boyer of the Oil Conservation Division (OCD), we understand that produced water is being pumped out of the leaking "Cahn" evaporation pit into the "Schneider" evaporation pit. After removal of part of the water it was noted that seams of the pit lining were parting, providing a leak source to the leak detection system. Also, we understand that Amoco has since contacted the contractors that had installed the liner, and repairs are being scheduled.

Notification requirements of detected leaks, as required by our letter of June 15, 1988 (copy enclosed) approving repair of the "Cahn" evaporation pit, were not observed. The leak detection system was to be inspected monthly and if fluids were observed in the sump OCD was to be notified immediately. OCD discovered the failure during field work activity at Cedar Hill on April 6, 1989. Because of Amoco's failure to notify OCD and because salt spray has left the fenced area of the pit (as documented below), OCD is modifying previous approvals for the Cahn and Schneider evaporation ponds as follows:

1) Within ten days of receipt of this letter, provide OCD with written notification of steps taken to repair the Cahn liner and a timetable for completion of repairs. Amoco must notify OCD upon completion of repairs and before reuse.

2) OCD will require documentation of monitoring efforts. The name of the inspector, dates and observations made at both evaporation pit leak detection systems (Cahn & Schneider) shall be recorded and kept for a period of three (3) years. Inspections will be made monthly and if evidence of leaks occur, OCD will be notified immediately. Evidence of leaks are recurrence of fluids within sumps after initial observation followed by removal of fluids to below the pipe outlet.

3) Salt incrustation on vegetation and on the ground around the pits has been noted by OCD personnel and reported in complaints by private citizens. The incrustation is the result of spray drift from the aeration system. Spray drift beyond the fenced perimeter of the evaporation pits must be prevented. Submit a plan within 60 days describing proposed methods to control spray drift from both evaporation pits.

We will appreciate your cooperation in efforts to resolve these problems. If you have any questions, please contact David Englert at (505) 827-5885.

Sincerely,

William J. LeMay
Director

WJL/DE/sl

Enclosure

cc: OCD Aztec Office

STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

GARREY CARRUTHERS
GOVERNOR

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87504
(505) 827-5800

June 15, 1988

Mr. R. J. Broussard
District Manager
AMOCO PRODUCTION COMPANY
2325 East 30th Street
Farmington, New Mexico 87401

RE: Cahn Evaporation Pond Repair

Dear Mr. Broussard:

The Oil Conservation Division (OCD) has reviewed your request, dated June 3, 1988, for approval to install a new 36 mil hypalon liner over the existing liner at the Cahn evaporation pond located in the SW/4 NE/4 NW/4 Section 33, Township 32 North, Range 10 West, NMPM, San Juan County, New Mexico.

The application was submitted pursuant to OCD rule R-7940 A and is hereby approved pursuant to that rule with the following conditions:

1. All fluid will be removed from the leak detection system prior to discharging any fluids into the repaired pond.

2. The leak detection system will be inspected monthly. If fluids are observed in the sump, the OCD will be notified immediately. A sample of the fluids will be analyzed to determine their origin. The analysis will be supplied to the OCD.

Please be advised that the approval of this application does not relieve you of liability should your operation result in actual pollution of surface or ground waters which may be actionable under other laws and/or regulations.

If there are any questions, please call Roger Anderson at (505) 827-5885.

Sincerely,

William J. LeMay
Director

WJL:RA:sl

cc: OCD - Aztec

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

MEMORANDUM OF MEETING OR CONVERSATION

☒ Telephone ☐ Personal	Time 9 AM	Date 5/26/89
Originating Party		Other Parties
Mike Rutas - Amoco 326-9233		David Boyer - OCD

Subject: Leak at Cahn Evaporation Pond

Discussion: Today began draining Cahn pond by pumping via new line to Schneider Pond. Have already found tension rips at seams. Company from Houston to be on site next week. Discussed need to avoid spray drift beyond fence line by redirecting sprayers, manual control or wind sensor.

Also, TCE in Schneider pond likely from cleaning prior to repair. Will send copy of repair order showing cost of materials including solvent purchase.

Conclusions or Agreements: Will send letter to Broussard addressing these issues. He will send copy of earlier material repair order showing TCE use if can get permission.

(Note: Future ENV. person is Buddy Shaw 326-9219)

Distribution: Amoco file

Signed: David (F Boyer)

Memo

From
DAVID G. BOYER 5/4/89
Hydrogeologist

To Greg Nelson -

Attached are copies of our results from the April sampling of your ponds. The Schneider pond has low levels of the solvent trichloroethene (TCE). Continued presence of it could subject Amoco to the RCRA Hazardous Waste rules under E/S. We will resample this, to confirm its presence, sometime in the next 60-days.

Dave Boyer

Oil Conservation Division
P.O. Box 2088 Santa Fe, N.M. 87501

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

MEMORANDUM OF MEETING OR CONVERSATION

☑ Telephone ☐ Personal	Time 0946	Date May 3, 89

Originating Party	Other Parties
Dave Englert OCD	Ed Alizadeh Amoco, Farmington

Subject: Leaking "Cahn" Evaporation Pit

Discussion:

- In process of draining Cahn pit to Schneides pit
- They are in contact with "Wright Construction" from Houston, Tx the corp. that installed liners. Wright will inspect, R or R liners, methods of inspection similar to geophysical methods or electrical surveys commonly used in lines leak detections - also look for soft spots below liners associated w/ leaks.
- Liner appx 1 yr old, $75,000 installation
- In future contact ~~Fred Wright~~, Production Engineer Fred White

Conclusions or Agreements:

Pit liner is being repaired or replaced

Distribution

Signed David Englert

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

MEMORANDUM OF MEETING OR CONVERSATION

☑ Telephone ☐ Personal	Time A.M.	Date 4/10/89
Originating Party	**Other Parties**	
Dave Englert OCD	Greg Nelson (Drilling Foreman)	

Subject Waters in Cabin sumps & leak detection information (from Amoco double lined evap pits)

Discussion

1. Refessed product information on leak detection of lined pits (mailed information 4/11/89)
2. amount of water pumped from sumps.

Discovered 4/6/89 ??

120 barrels	4/6/89	
120 barrels	4/7/89	
20 barrels	4/7/89	during OCD inspection Englert / Boyer
8 barrels	4/8/89	
not pumped	4/9/89	

Conclusions or Agreements

Greg will keep us advised of pump rates from sumps

Distribution

Signed David Englert

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

MEMORANDUM OF MEETING OR CONVERSATION

☑ Telephone ☐ Personal	Time	Date
	0930	4/14/89

Originating Party	Other Parties
Greg Nelson	– message –

Subject: Waters in Cahn sumps (from double lined evap pit)

Discussion:
– message indicated that they were still pumping water from sumps at a rate of 3.5 barrels/day
– have started pulling sumps ?

Conclusions or Agreements: I out of office but call 0800 Monday morning for update 327-0217

Distribution

Signed
Dave Englert

Lab No. TML 72-521,07-124

ORGANIC ANALYSIS REQUEST FORM F-891230

REPORT TO: DAVID BOYER
N.M. OIL CONSERVATION DIVISION
P.O. Box 2088
Santa Fe, NM 87504-2088

Sample No. _____
DATE REC. _____
PRIORITY _____
PHONE(S): 827-5812

COLLECTION CITY: Cedar Hill ; COUNTY: San Juan

COLLECTION DATE/TIME CODE: (Year-Month-Day-Hour-Minute) 8 9 1 0 4 0 6 1 1 3 5 5

LOCATION CODE: (Township-Range-Section-Tracts) 3 2 N + 1 0 W + 3 3 + 1 2 1 – (10N06E24342)

SUBMITTER: David Boyer

SAMPLE TYPE: WATER ☒, 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.
- ☒ P-Ice Sample stored in an ice bath (Not Frozen).
- ☐ P-AA Sample Preserved with Ascorbic Acid to remove chlorine residual.
- ☒ 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)
- ☒ (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: _____

FIELD DATA:

pH= – ; Conductivity= 11,500 umho/cm at 17 °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.)

Amoco Cahn Evap pond - from tap at circulation pump (except VOC dipped)

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: 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: 5/4/89 Phone or (Letter)? Initials VK

Inter·Mountain
Laboratories, Inc.

2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

Report Date: 04/18/89

Client: New Mexico OCD

Sample ID:	8904061355	Date Sampled:	04/06/89
Laboratory Number:	F891230	Date Received:	04/07/89
Analysis Requested:	Purgeable Aromatic	Date Extracted:	NA
Sample Matrix:	Water	Date Analyzed:	04/14/89

Parameter	Concentration	Units
BENZENE	ND (0.2)	ug/l
TOLUENE	0.28 (0.2)	ug/l
ETHYLBENZENE	ND (0.2)	ug/l
m,p-XYLENE	0.33 (0.2)	ug/l
o-XYLENE	ND (0.2)	ug/l

Method: 8020 Aromatic Volatile Organics, SW-846, USEPA (1982)
602 Purgable Aromatics, 40 CFR Part 136, USEPA (1984)

(Detection limit in parenthesis.)
ND - Parameter not detected at the stated detection limit.

Jack M. Morgan
Senior Organic Chemist

Inter·Mountain
Laboratories, Inc.

2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

Report Date: 4/18/89

Client: New Mexico OCD
Sample ID: 8904061355
IML Sample No: F891230
Analysis Requested: Purgeable Halocarbons
Sample Matrix: Water

Date Sampled: 04/06/89
Date Received: 04/07/89
Date Extracted: N/A
Date Analyzed: 04/18/89

Parameter	Concentration		Units
CHLOROMETHANE	ND	(1.0)	ug/l
BROMOMETHANE	ND	(1.0)	ug/l
DICHLORODIFLUOROMETHANE	ND	(1.0)	ug/l
VINYL CHLORIDE	ND	(1.0)	ug/l
CHLOROETHANE	ND	(1.0)	ug/l
METHYLENE CHLORIDE	ND	(0.1)	ug/l
TRICHLOROFLUOROMETHANE	ND	(0.1)	ug/l
1,1-DICHLOROETHENE	ND	(0.1)	ug/l
1,1-DICHLOROETHANE	ND	(0.05)	ug/l
TRANS-1,2-DICHLOROETHENE	ND	(0.1)	ug/l
CHLOROFORM	ND	(0.1)	ug/l
1,2-DICHLOROETHANE	ND	(0.03)	ug/l
1,1,1-TRICHLOROETHANE	ND	(0.03)	ug/l
CARBON TETRACHLORIDE	ND	(0.1)	ug/l
BROMODICHLOROMETHANE	ND	(0.1)	ug/l
1,2-DICHLOROPROPANE	ND	(0.1)	ug/l
CIS-1,3-DICHLOROPROPENE	ND	(0.1)	ug/l
TRICHLOROETHENE	ND	(0.1)	ug/l
DIBROMOCHLOROMETHANE	ND	(0.1)	ug/l
1,1,2-TRICHLOROETHANE	ND	(0.02)	ug/l
TRANS-1,3-DICHLOROPROPENE	ND	(0.1)	ug/l
2-CHLOROETHYLVINYL ETHER	ND	(0.1)	ug/l
BROMOFORM	ND	(0.2)	ug/l
1,1,2,2-TETRACHLOROETHANE	ND	(0.03)	ug/l
TETRACHLOROETHENE	ND	(0.03)	ug/l
CHLOROBENZENE	ND	(0.1)	ug/l
1,2-DICHLOROBENZENE	ND	(0.1)	ug/l
1,3-DICHLOROBENZENE	ND	(0.1)	ug/l
1,4-DICHLOROBENZENE	ND	(0.1)	ug/l

Method: 601 Purgeable Halocarbons, 40 CFR Part 136, USEPA (1984).

(Detection limit in parenthesis.)
ND - Parameter not detected at the stated detection limit.

Jack M. Morgan
Senior Organic Chemist

Inter·Mountain
Laboratories, Inc.

2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

** Quality Assurance Report
Spike Analysis

Report Date: 4/18/89

Client: New Mexico OCD
Sample ID: 8904061355
IML Sample No: F891230
Analysis Requested: Purgeable Halocarbons
Sample Matrix: Water

Date Sampled: 04/06/89
Date Received: 04/07/89
Date Extracted: N/A
Date Analyzed: 04/18/89

Parameter	Spike Added (ug/l)	Concentration (ug/l)	Recovery (%)
1,2-DICHLOROETHANE	20	19.07 (0.03)	95.3

Method: 601 Purgeable Halocarbons, 40 CFR Part 136, USEPA (1984).

(Detection limit in parenthesis.)
ND - Parameter not detected at the stated detection limit.

Jack M. Morgan
Senior Organic Chemist

Contract Lab IMC
Contract No. 77-521.07-124

GENERAL WATER CHEMISTRY and NITROGEN ANALYSIS

DATE RECEIVED		LAB NO.	Sample No.
Collection DATE 89 | 04 | 06		SITE INFORM-ATION ►	Sample location: Amoco Cahn Evaporation Pond
Collection TIME 1355			Collection site description: from tap at circulation pump (except VOC – dipped)
Collected by – Person/Agency: Englert / Boyer / OCD			

SEND FINAL REPORT TO ►
ENVIRONMENTAL BUREAU
NM OIL CONSERVATION DIVISION
State Land Office Bldg, PO Box 2088
Santa Fe, NM 87504-2088

Attn: David Boyer

Phone: 827-5812

F1267

Station/well code: ~~Amo~~

Owner: Amoco

SAMPLING CONDITIONS

☐ Bailed ☒ Dipped ☐ Pump ☒ Tap	Water level	Discharge	Sample type: Grab
pH (00400) ___	Conductivity (Uncorrected) 11500 µmho	Water Temp. (00010) 17 °C	Conductivity at 25°C (00094) µmho

Field comments

SAMPLE FIELD TREATMENT — *Check proper boxes*

No. of samples submitted: 1

☒ NF: Whole sample (Non-filtered) ☐ F: Filtered in field with 0.45 µ membrane filter ☐ A: 2 ml H_2SO_4/L added

☒ NA: No acid added ☐ Other-specify: ☐ A: 5ml conc. HNO_3 added ☐ A: 4ml fuming HNO_3 added

ANALYTICAL RESULTS from SAMPLES

NA	Units	Date analyzed
☒ Conductivity (Corrected) 25°C (00095)	µmho	
☐ Total non-filterable residue (suspended) (00530)	mg/l	
☒ Other: Lab pH		
☐ Other:		
☐ Other:		

A-H_2SO_4		
☐ Nitrate-N + , Nitrate-N total (00630)	mg/l	
☐ Ammonia-N total (00610)	mg/l	
☐ Total Kjeldahl-N ( )	mg/l	
☐ Chemical oxygen demand (00340)	mg/l	
☐ Total organic carbon ( )	mg/l	
☐ Other:		
☐ Other:		

From NF, NA Sample:

		Date Analyzed
☒ Calcium	mg/l	
☒ Potassium	mg/l	
☒ Magnesium	mg/l	
☒ Sodium	mg/l	
☒ Bicarbonate	mg/l	
☒ Chloride	mg/l	
☒ Sulfate	mg/l	
☒ Total Solids	mg/l	
☒ CO_3		
☒ Br		
☒ Cation/Anion Balance		

Analyst	Date Reported	Reviewed by

Laboratory remarks

FOR OCD USE -- Date Owner Notified 3/1/89 Phone or (Letter?) Initials AYB

CLIENT: Oil Conservation Division

Sample Id: Cahn Evap Pond
Lab Id: F1267
Date Collected: 04/04/89
Date Received: 04/07/89
Date Reported: 04/21/89

		Date Analyzed
Lab pH	9.4	4/10
Lab Conductivity, umhos/cm @ 25C	18560	4/10
Total Solids (103), mg/l	15640	4/10
Total Dissolved Solids (calc), mg/l	16129	
Bromide, mg/l	0.14	4/20
Sodium Adsorption Ratio	303.37	
Total Alkalinity as CaCO3, mg/l	12423	4/10
Total Hardness as CaCO3, mg/l	94	4/10

	mg/l	meq/l	
Acidity as CaCo3	<1	<0.01	4/10
Bicarbonate as HCO3	9386	153.86	4/10
Carbonate as CO3	2838	94.59	4/10
Chloride	1603	45.22	4/10
Sulfate	90	1.89	4/11
Calcium	23	1.16	4/11
Magnesium	9	0.73	4/11
Potassium	187	4.78	4/14
Sodium	6780	294.91	4/14

Major Cations	301.58	
Major Anions	295.56	
Cation/Anion Difference	1.01	%

Contract Lab IML

Contract No. 77-521.07-124

HEAVY METAL ANALYSIS FORM

Date Received		Lab No.		Sample No.

COLLECTION DATE & TIME: yy 89 | mm 04 | dd 06 | hh 13 | mm 55

COLLECTED BY: Englert / Boyer

COLLECTION SITE DESCRIPTION: Amoco Cohn Evaporation Pond

OWNER: Amoco

TO: F1260

ENVIRONMENTAL BUREAU
NM OIL CONSERVATION DIVISION
State Land Office Bldg., PO Box 2088
SANTA FE, NM 87504-2088

ATTN: D Boyer
TELEPHONE: 827-5812

SITE LOCATION:
County: San Juan

Township, Range, Section, Tract: (10N06E24342)

STATION/ WELL CODE:

LATITUDE, LONGITUDE: -

SAMPLING CONDITIONS:

☐ Bailed ☐ Pump ☒ Dipped ☒ Tap | Water Level: | Discharge: | Sample Type:

pH(00400)	Conductivity(Uncorr.)	Water Temp.(00010)	Conductivity at 25°C (00094)
—	11,500 µmho	17 °C	µmho

FIELD COMMENTS: from tap at circulation pump, except VOC's — dipped

SAMPLE FIELD TREATMENT Check proper boxes:		LAB ANALYSIS REQUESTED:
☒ WPN: Water Preserved w/HNO_3 Non-Filtered	☐ WPF: Water Preserved w/HNO_3 Filtered	☐ ICAP Scan Mark box next to metal if AA is required.

ANALYTICAL RESULTS (MG/L)

ELEMENT	ICAP VALUE	AA VALUE	ELEMENT	ICAP VALUE	AA VALUE
Aluminum	☒	☐	Silicon	☐	☐
Barium	☒	☐	Silver	☐	☐
Beryllium	☐	☐	Strontium	☐	☐
Boron	☒	☐	Tin	☐	☐
Cadmium	☒	☐	Vanadium	☐	☐
Calcium	☐	☐	Zinc	☐	☐
Chromium	☒	☐	Arsenic		☒
Cobalt	☐	☐	Selenium		☒
Copper	☐	☐	Mercury		☒
Iron	☒	☐		☐	☐
Lead	☒	☐		☐	☐
Magnesium	☐	☐		☐	☐
Manganese	☒	☐		☐	☐
Molybdenum	☐	☐		☐	☐
Nickel	☐	☐		☐	☐

LAB COMMENTS:

For OCD Use:
Date Owner Notified: 5/4/89
Phone or Letter?
Initials: AFB

ICAP Analyst _____ Reviewer _____

Date Analyzed _____ Date Reveived _____

Inter·Mountain
Laboratories, Inc.

2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

NEW MEXICO OIL CONSERVATION DIVISION
Attn: David Boyer
P.O. Box 2088
Santa Fe, N.M. 87504-2088

01 May, 1989

RE: Total Metal Analysis

Sample ID: 8904061355
Lab ID: F1260
Date Sampled: 04/06/89
Date Received: 04/06/89

Parameter	Result (mg/l)	Date Analyzed	Method
Aluminum	0.22	04/17/89	200.7
Arsenic	<0.005	04/17/89	206.3
Barium	5.4	04/17/89	200.7
Boron	16.21	04/17/89	200.7
Cadmium	<0.002	04/24/89	213.1
Chromium	<0.02	04/17/89	200.7
Iron	3.88	04/17/89	200.7
Lead	0.02	04/19/89	239.1
Manganese	0.09	04/17/89	200.7
Mercury	<0.001	04/19/89	245.1
Selenium	<0.005	04/24/89	270.3

Method Reference: EPA Methods for Chemical Analysis of Wastes and Water, 1983.

Jack M. Morgan
Senior Organic Chemist

Albuquerque, NM 87106 841-2570

ENVIRONMENT

87-1622-C

REPORT TO: David Boyer
N.M. Oil Conservation Division
P. O. Box 2088
Santa Fe, N.M. 87504-2088

S.L.D. No. OR- 1622
DATE REC. 10-9-87
PRIORITY 3

PHONE(S): 327-5812
USER CODE: 8 2 2 3 5
SUBMITTER: David Boyer
CODE: 2 6 0

SAMPLE COLLECTION CODE: (YYMMDDHHMMIII) 8 7 1 0 0 8 1 0 1 4 5 W C 0

SAMPLE TYPE: WATER ☒, SOIL ☐, FOOD ☐, OTHER: _____ CODE: _____

COUNTY: San Juan ; CITY: Cedar Hill CODE: _____

LOCATION CODE: (Township-Range-Section-Tracts) 3 2 N + 1 0 W + 3 3 + 1 2 - (10N06E24342)

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 Purgeables (1-3 Carbons)
- ☒ (754) Aromatic & Halogenated Purgeables
- ☐ (765) Mass Spectrometer Purgeables
- ☐ (766) Trihalomethanes

Other Specific Compounds or Classes

- ☐ _____
- ☐ _____
- ☐ _____
- ☐ _____
- ☐ _____

EXTRACTABLE SCREENS

- ☐ (751) Aliphatic Hydrocarbons
- ☐ (760) Organochlorine Pesticides
- ☐ (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: _____

FIELD DATA:

pH= 9 ; Conductivity= 19200 umho/cm at 17 °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.)

Amoco Cedar Hill Old Pond Leak Detection Sump (CHHN Pond (#3))

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: hand

This form accompanies 2 Septum Vials, _____ Glass Jugs, and/or _____ _____

Samples were preserved as follows:

- ☐ NP: No Preservation; Sample stored at room temperature.
- ☒ P-Ice Sample stored in an ice bath (Not Frozen).
- ☐ P-$Na_2S_2O_3$ Sample Preserved with Sodium Thiosulfate to remove chlorine residual.

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 ☐ Seals Intact: Yes ☐ No ☐

Signatures _____ _____

For OCD Use: Date Owner Notified _____ Phone or Letter? _____ Initials _____

ANALYSES PERFORMED LAB. No.: OR- 1622

THIS PAGE FOR LABORATORY RESULTS ONLY

This sample was tested using the analytical screening method(s) checked below:

PURGEABLE SCREENS

- ☐ (753) Aliphatic Purgeables (1-3 Carbons)
- ☒ (754) Aromatic & Halogenated Purgeables
- ☐ (765) Mass Spectrometer Purgeables
- ☐ (766) Trihalomethanes

Other Specific Compounds or Classes

- ☐ _____
- ☐ _____
- ☐ _____
- ☐ _____
- ☐ _____

EXTRACTABLE SCREENS

- ☐ (751) Aliphatic Hydrocarbons
- ☐ (760) Organochlorine Pesticides
- ☐ (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

ANALYTICAL RESULTS

COMPOUND(S) DETECTED	CONC. [PPB]	COMPOUND(S) DETECTED	CONC. [PPB]
aromatics purgeables	N.D.		
halogenated purgeables	N.D.		
	-		
* DETECTION LIMIT * ✳	25 PPB	+ DETECTION LIMIT + +	

ABBREVIATIONS USED:

N D = NONE DETECTED AT OR ABOVE THE STATED DETECTION LIMIT

T R = DETECTED AT A LEVEL BELOW THE STATED DETECTION LIMIT (NOT CONFIRMED)

[RESULTS IN BRACKETS] ARE UNCONFIRMED AND/OR WITH APPROXIMATE QUANTITATION

LABORATORY REMARKS: _____

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes ☐ No ☑ Seal(s) broken by: not sealed date: _____

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 10/15/87. Analyst's signature: Mary C. Elen

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block.

Reviewers signature: K Meyerhein

New Mexico Health and Environment Department
SCIENTIFIC LABORATORY DIVISION
700 Camino de Salud NE
Albuquerque, NM 87106 — (505) 841-2555

859 WNW

GENERAL WATER CHEMISTRY and NITROGEN ANALYSIS

DATE RECEIVED 10 9 87 | LAB NO. 4682 | USER CODE ☐ 59300 ☐ 59600 ☒ OTHER: 82235

Collection DATE 10 8 87

Collection TIME 1045

SITE INFORMATION ►

Sample location 32N 10W Sec 33

Collection site description @ Leak Detection Sump

Collected by — Person/Agency Olson, Anderson / OCD

SEND FINAL REPORT TO ►

ENVIRONMENTAL BUREAU
NM OIL CONSERVATION DIVISION
State Land Office Bldg, PO Box 2088
Santa Fe, NM 87504-2088

Attn: David Boyer

Phone: 827-5812

Station/well code: Old Lined Pond

Owner: Amoco

SAMPLING CONDITIONS

☐ Bailed ☒ Dipped ☐ Pump ☐ Tap	Water level	Discharge	Sample type: Grab
pH (00400): 9	Conductivity (Uncorrected): 19200 µmho	Water Temp. (00010): 17 °C	Conductivity at 25°C (00094): µmho

Field comments

SAMPLE FIELD TREATMENT — *Check proper boxes*

No. of samples submitted: 1

☒ NF: Whole sample (Non-filtered) ☐ F: Filtered in field with 0.45 µmembrane filter ☐ A: 2 ml H_2SO_4/L added

☒ NA: No acid added ☐ Other-specify: ☐ A: 5ml conc. HNO_3 added ☐ A: 4ml fuming HNO_3 added

ANALYTICAL RESULTS from SAMPLES

NA		Units	Date analyzed
☒ Conductivity (Corrected) 25°C (00095)	23,071	µmho	12/5
☐ Total non-filterable residue (suspended) (00530)		mg/l	
☐ Other:			
☐ Other:			
☐ Other:			

A-H_2SO_4			
☐ Nitrate-N + , Nitrate-N total (00630)		mg/l	
☐ Ammonia-N total (00610)		mg/l	
☐ Total Kjeldahl-N ( )		mg/l	
☐ Chemical oxygen demand (00340)		mg/l	
☐ Total organic carbon ( )		mg/l	
☐ Other:			
☐ Other:			

From NF, NA Sample:

			Date Analyzed
☒ Calcium	< 1.0	mg/l	11/23
☒ Potassium	101	mg/l	11/16
☒ Magnesium	24.4	mg/l	11/23
☒ Sodium	9430	mg/l	11/16
☒ Bicarbonate	14420	mg/l	11/23
☒ Chloride	1750	mg/l	12/2
☒ Sulfate	280	mg/l	12/2
☒ Total Solids	↑18328	mg/l	12/2
☐			
☐			
☒ Cation/Anion Balance			

Analyst | Date Reported: 12 15 87 | Reviewed by

Laboratory remarks: pH = 8.88, (CO_3^{-2}) = 1279 mg/l

FOR OCD USE -- Date Owner Notified _____ Phone or Letter? _____ Initals _____

CATIONS				ANIONS			
ANALYTE	MEQ.	PPM	DET. LIMIT	ANALYTE	MEQ.	PPM	DET. LIMIT
Ca	0.05	1.00	<3.0	HC03	236.32	14420.00	<1.0
Mg	2.00	24.40	<0.3	SO4	5.83	280.00	<10.0
Na	410.18	9430.00	<10.0	CL	49.37	1750.00	<5.0
K	2.58	101.00	<0.3				
Mn	0.00	0.00		NO3	0.00	0.00	< 0.
Fe	0.00	0.00		C03	21.32	1279.00	< 1.
				NH3	0.00	0.00	< 0.
				PO4	0.00	0.00	< 0.
SUMS	414.82	9556.40			312.83	17729.00	

Total Dissolved Solids= 18320

Ion Balance = 132.60%

WC No. = 8704682

Date out/By CJ 12/15

Lab No. INL 11-521.07-124 ORGANIC ANALYSIS REQUEST FO F-891240

REPORT TO: DAVID BOYER
N.M. OIL CONSERVATION DIVISION
P.O. Box 2088
Santa Fe, NM 87504-2088

Sample No. _____
DATE REC. _____
PRIORITY _____
PHONE(S): 827-5812

COLLECTION CITY: Cedar Hill ; COUNTY: San Juan

COLLECTION DATE/TIME CODE: (Year-Month-Day-Hour-Minute) 8 9 0 4 2 6 1 4 5 0

LOCATION CODE: (Township-Range-Section-Tracts) 3 2 N + 1 0 W + 2 8 + 3 3 1 ~ (10N06E24342)

SUBMITTER: David Boyer

SAMPLE TYPE: WATER ☒, 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.
- ☒ P-Ice Sample stored in an ice bath (Not Frozen).
- ☐ P-AA Sample Preserved with Ascorbic Acid to remove chlorine residual.
- ☒ 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)
- ☒ (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: _____

FIELD DATA:

pH= _____; Conductivity= 14,000 umho/cm at 14 °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.)

Amoco Schneider Evap Pit - dipped from SW corner at gate

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: 5/4/89 Phone or (Letter) Initials DJB

Inter·Mountain
Laboratories, Inc.

2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

Report Date: 04/18/89

Client: New Mexico OCD

Sample ID:	8904061450	Date Sampled:	04/06/89
Laboratory Number:	F891240	Date Received:	04/07/89
Analysis Requested:	Purgeable Aromatic	Date Extracted:	NA
Sample Matrix:	Water	Date Analyzed:	04/14/89

Parameter	Concentration	Units
BENZENE	0.40 (0.2)	ug/l
TOLUENE	1.89 (0.2)	ug/l
ETHYLBENZENE	0.20 (0.2)	ug/l
m,p-XYLENE	0.35 (0.2)	ug/l
o-XYLENE	0.26 (0.2)	ug/l

Method: 8020 Aromatic Volatile Organics, SW-846, USEPA (1982)
602 Purgable Aromatics, 40 CFR Part 136, USEPA (1984)

(Detection limit in parenthesis.)
ND - Parameter not detected at the stated detection limit.

Jack M. Morgan
Senior Organic Chemist

Inter·Mountain
Laboratories, Inc.

2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

** Quality Assurance Report
Spike Analysis

Report Date: 04/18/89

Client: New Mexico OCD

Sample ID:	8904061450	Date Sampled:	04/06/89
Laboratory Number:	F891240	Date Received:	04/07/89
Analysis Requested:	Purgeable Aromatic	Date Extracted:	NA
Sample Matrix:	Water	Date Analyzed:	04/14/89

Parameter	Spike Added(ug/l)	Recovered (ug/l)	Percent Recovery
BENZENE	10	10.24	98.4
TOLUENE	10	11.66	97.7
ETHYLBENZENE	10	10.27	100.7
m,p-XYLENE	10	10.37	100.2
o-XYLENE	10	10.20	99.4

Method: 8020 Aromatic Volatile Organics, SW-846, USEPA (1982)
602 Purgable Aromatics, 40 CFR Part 136, USEPA (1984)

(Detection limit in parenthesis.)
ND - Parameter not detected at the stated detection limit.

Jack M. Morgan
Senior Organic Chemist

Inter-Mountain Laboratories, Inc.

2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

Report Date: 4/18/89

Client: New Mexico OCD
Sample ID: 8904051450
IML Sample No: F891240
Analysis Requested: Purgeable Halocarbons
Sample Matrix: Water

Date Sampled: 04/05/89
Date Received: 04/07/89
Date Extracted: N/A
Date Analyzed: 04/18/89

Parameter	Concentration		Units
CHLOROMETHANE	ND	(1.0)	ug/l
BROMOMETHANE	ND	(1.0)	ug/l
DICHLORODIFLUOROMETHANE	ND	(1.0)	ug/l
VINYL CHLORIDE	ND	(1.0)	ug/l
CHLOROETHANE	ND	(1.0)	ug/l
METHYLENE CHLORIDE	0.33	(0.1)	ug/l
TRICHLOROFLUOROMETHANE	ND	(0.1)	ug/l
1,1-DICHLOROETHENE	ND	(0.1)	ug/l
1,1-DICHLOROETHANE	ND	(0.05)	ug/l
TRANS-1,2-DICHLOROETHENE	ND	(0.1)	ug/l
CHLOROFORM	ND	(0.1)	ug/l
1,2-DICHLOROETHANE	ND	(0.03)	ug/l
1,1,1-TRICHLOROETHANE	ND	(0.03)	ug/l
CARBON TETRACHLORIDE	ND	(0.1)	ug/l
BROMODICHLOROMETHANE	ND	(0.1)	ug/l
1,2-DICHLOROPROPANE	ND	(0.1)	ug/l
CIS-1,3-DICHLOROPROPENE	ND	(0.1)	ug/l
TRICHLOROETHENE	2.4	(0.1)	ug/l
DIBROMOCHLOROMETHANE	ND	(0.1)	ug/l
1,1,2-TRICHLOROETHANE	ND	(0.02)	ug/l
TRANS-1,3-DICHLOROPROPENE	ND	(0.1)	ug/l
2-CHLOROETHYLVINYL ETHER	ND	(0.1)	ug/l
BROMOFORM	ND	(0.2)	ug/l
1,1,2,2-TETRACHLOROETHANE	ND	(0.03)	ug/l
TETRACHLOROETHENE	ND	(0.03)	ug/l
CHLOROBENZENE	ND	(0.1)	ug/l
1,2-DICHLOROBENZENE	ND	(0.1)	ug/l
1,3-DICHLOROBENZENE	ND	(0.1)	ug/l
1,4-DICHLOROBENZENE	ND	(0.1)	ug/l

Method: 601 Purgeable Halocarbons, 40 CFR Part 136, USEPA (1984).

(Detection limit in parenthesis.)
ND - Parameter not detected at the stated detection limit.

Jack M. Morgan
Senior Organic Chemist

Contract Lab IM
Contract No. 77-521.07-124

GENERAL WATER CHEMISTRY and NITROGEN ANALYSIS

DATE RECEIVED | | | LAB NO.

Collection DATE 89/04/06
Collection TIME 1450
Collected by — Person/Agency Boyer/Engler/OCD

SITE INFORMATION ▶

Sample No.

Sample location: Amoco Schneider Evaporation Pit

Collection site description: Dipped from SW corner at gate

SEND FINAL REPORT TO ▶

ENVIRONMENTAL BUREAU
NM OIL CONSERVATION DIVISION
State Land Office Bldg, PO Box 2088
Santa Fe, NM 87504-2088

Attn: David Boyer

Phone: 827-5812

F1268

Station/well code — San Juan Cty
Owner: Amoco

SAMPLING CONDITIONS

☐ Bailed ☒ Dipped ☐ Pump ☐ Tap	Water level	Discharge	Sample type: Grab
pH (00400) —	Conductivity (Uncorrected) 19,000 µmho	Water Temp. (00010) 14 °C	Conductivity at 25°C (00094) µmho

Field comments

SAMPLE FIELD TREATMENT — *Check proper boxes*

No. of samples submitted: 1

☒ NF: Whole sample (Non-filtered) ☐ F: Filtered in field with 0.45 µ membrane filter ☐ A: 2 ml H_2SO_4/L added

☒ NA: No acid added ☐ Other-*specify:* ☐ A: 5ml conc. HNO_3 added ☐ A: 4ml fuming HNO_3 added

ANALYTICAL RESULTS from SAMPLES

NA	Units	Date analyzed
☒ Conductivity (Corrected) 25°C (00095)	µmho	
☐ Total non-filterable residue (suspended) (00530)	mg/l	
☒ Other: Lab pH		
☐ Other:		
☐ Other:		

A-H_2SO_4		
☐ Nitrate-N + Nitrate-N total (00630)	mg/l	
☐ Ammonia-N total (00610)	mg/l	
☐ Total Kjeldahl-N ( )	mg/l	
☐ Chemical oxygen demand (00340)	mg/l	
☐ Total organic carbon ( )	mg/l	
☐ Other:		
☐ Other:		

From NE, NA Sample:

		Date Analyzed
☒ Calcium	mg/l	
☒ Potassium	mg/l	
☒ Magnesium	mg/l	
☒ Sodium	mg/l	
☒ Bicarbonate	mg/l	
☒ Chloride	mg/l	
☒ Sulfate	mg/l	
☒ Total Solids	mg/l	
☒ CO_3		
☒ Br		
☒ Cation/Anion Balance		

Analyst	Date Reported	Reviewed by

Laboratory remarks

FOR OCD USE -- Date Owner Notified 5/4/89 Phone or (Letter) Inital DJB

CLIENT: Oil Conservation Division

Sample Id: Schneider Evap Pond
Lab Id: F1268
Date Collected: 04/04/89
Date Received: 04/07/89
Date Reported: 04/21/89

		Date Analyzed
Lab pH	9.4	4/10
Lab Conductivity, umhos/cm @ 25C	35600	4/10
Total Solids (103), mg/l	34712	4/10
Total Dissolved Solids (calc), mg/l	35728	
Bromide, mg/l	0.16	4/20
Sodium Adsorption Ratio	419.74	
Total Alkalinity as CaCO3, mg/l	26857	4/10
Total Hardness as CaCO3, mg/l	233	4/10

	mg/l	meq/l	
Acidity as CaCo3	<1	<0.01	4/10
Bicarbonate as HCO3	18067	296.18	4/10
Carbonate as CO3	7229	240.96	4/10
Chloride	3834	108.14	4/10
Sulfate	690	14.40	4/11
Calcium	52	2.61	4/11
Magnesium	25	2.05	4/11
Potassium	314	8.03	4/14
Sodium	14730	640.71	4/14

Major Cations	653.40	
Major Anions	659.68	
Cation/Anion Difference	0.48	%

CLIENT: Oil Conservation Division

Sample Id: Schneider Evap Pond
Lab Id: F1268A
Date Collected: 04/04/89
Date Received: 04/07/89
Date Reported: 04/21/89

		Date Analyzed
Lab pH	9.4	4/10
Lab Conductivity, umhos/cm @ 25C	35900	4/10
Total Solids (103), mg/l	34816	4/10
Total Dissolved Solids (calc), mg/l	35880	
Bromide, mg/l	0.15	4/20
Sodium Adsorption Ratio	421.17	
Total Alkalinity as CaCO3, mg/l	26729	4/10
Total Hardness as CaCO3, mg/l	233	4/10

	mg/l	meq/l	
Acidity as CaCo3	<1	<0.01	4/10
Bicarbonate as HCO3	17832	292.32	4/10
Carbonate as CO3	7267	242.25	4/10
Chloride	3936	111.02	4/10
Sulfate	760	15.86	4/11
Calcium	49	2.43	4/11
Magnesium	27	2.23	4/11
Potassium	322	8.23	4/14
Sodium	14780	642.89	4/14

Major Cations	655.78	
Major Anions	661.45	
Cation/Anion Difference	0.43	%

HEAVY METAL ANALYSIS FORM

Contract Lab IML
Contract No. DE-AM 77-521.02-124

Date Received	Lab No.	Sample No.

COLLECTION DATE & TIME: yy 89 mm 04 dd 06 hh 14 mm 50

COLLECTED BY: Englert / Boyer

COLLECTION SITE DESCRIPTION: Amoco Sneider Evap Pond

OWNER: Amoco

TO: (?) F12761

ENVIRONMENTAL BUREAU
NM OIL CONSERVATION DIVISION
State Land Office Bldg., PO Box 2088
SANTA FE, NM 87504-2088

ATTN: D. Boyer
TELEPHONE: 827-5812

SITE LOCATION:
County: San Juan

Township, Range, Section, Tract: (10N06E24342)

STATION/ WELL CODE:

LATITUDE, LONGITUDE:

SAMPLING CONDITIONS:

☐ Bailed ☐ Pump ☒ Dipped ☐ Tap	Water Level:	Discharge:	Sample Type:

pH(00400)	Conductivity(Uncorr.)	Water Temp.(00010)	Conductivity at 25°C (00094)
—	19,000. µmho	14 °C	µmho

FIELD COMMENTS: dipped from S.W. corner of gate

SAMPLE FIELD TREATMENT Check proper boxes:		LAB ANALYSIS REQUESTED:
☒ WPN: Water Preserved w/HNO_3 Non-Filtered	☐ WPF: Water Preserved w/HNO_3 Filtered	☐ ICAP Scan Mark box next to metal if AA is required.

ANALYTICAL RESULTS (MG/L)

ELEMENT	ICAP VALUE	AA VALUE	ELEMENT	ICAP VALUE	AA VALUE
Aluminum	☒	☐	Silicon	☐	☐
Barium	☒	☐	Silver	☐	☐
Beryllium	☐	☐	Strontium	☐	☐
Boron	☒	☐	Tin	☐	☐
Cadmium	☒	☐	Vanadium	☐	☐
Calcium	☐	☐	Zinc	☐	☐
Chromium	☒	☐	Arsenic		☒
Cobalt	☐	☐	Selenium		☒
Copper	☐	☐	Mercury		☒
Iron	☒	☐		☐	☐
Lead	☒	☐		☐	☐
Magnesium	☐	☐		☐	☐
Manganese	☒	☐		☐	☐
Molybdenum	☐	☐		☐	☐
Nickel	☐	☐		☐	☐

LAB COMMENTS: Bottle has following info: SWWD Mon Well #9
8904051920 UNF/HNO3 on Lid: NF HNO3

For OCD Use:
Date Owner Notified: 5/4/89
Phone or Letter?
Initials: DB

ICAP Analyst _____ Reviewer _____
Date Analyzed _____ Date Reveived _____

Inter·Mountain
Laboratories, Inc.

2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

NEW MEXICO OIL CONSERVATION DIVISION
Attn: David Boyer
P.O. Box 2088
Santa Fe, N.M. 87504-2088

01 May, 1989

RE: Total Metal Analysis

Sample ID: 8904061450
Lab ID: F1261
Date Sampled: 04/06/89
Date Received: 04/06/89

Parameter	Result (mg/l)	Date Analyzed	Method
Aluminum	323.6	04/17/89	200.7
Arsenic	<0.005	04/17/89	206.3
Barium	1.3	04/17/89	200.7
Boron	<0.01	04/17/89	200.7
Cadmium	0.006	04/24/89	213.1
Chromium	0.15	04/17/89	200.7
Iron	213.9	04/17/89	200.7
Lead	<0.02	04/19/89	239.1
Manganese	2.65	04/17/89	200.7
Mercury	<0.001	04/19/89	245.1
Selenium	0.044	04/24/89	270.3

Method Reference: EPA Methods for Chemical Analysis of Wastes and Water, 1983.

Jack M. Morgan
Senior Organic Chemist

Albuquerque, NM 87106 841-2570

ENVIRONMENT

REPORT TO: David Boyer

N.M. Oil Conservation Division

P. O. Box 2088

Santa Fe, N.M. 87504-2088

PHONE(S): 327-5812

SUBMITTER: David Boyer

S.L.D. No. OR- 1621

DATE REC. 10-9-87

87-1621-C

PRIORITY 3

USER CODE: 3 2 2 3 5

CODE: 2 6 0

SAMPLE COLLECTION CODE: (YYMMDDHHMMIII) 8 7 1 0 0 8 1 0 2 0 W C 0

SAMPLE TYPE: WATER ☑, SOIL ☐, FOOD ☐, OTHER: _____ CODE: _____

COUNTY: San Juan; CITY: Cedar Hill CODE: _____

LOCATION CODE: (Township-Range-Section-Tracts) 3 2 N + 1 0 W + 2 B + 3 3 - (10N06E24342)

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 Purgeables (1-3 Carbons)
- ☒ (754) Aromatic & Halogenated Purgeables
- ☐ (765) Mass Spectrometer Purgeables
- ☐ (766) Trihalomethanes

Other Specific Compounds or Classes

- ☐ _____
- ☐ _____
- ☐ _____
- ☐ _____
- ☐ _____

EXTRACTABLE SCREENS

- ☐ (751) Aliphatic Hydrocarbons
- ☐ (760) Organochlorine Pesticides
- ☐ (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: _____

FIELD DATA:

pH= _____; Conductivity= 13500 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.)

Amoco Cedar Hill New Pond Leak Detection Sump

(Schneider Pond - BTB)

I certify that the results in this block accurately reflect the results of my field analyses, observations and activities.(signature collector): Willie Olson Method of Shipment to the Lab: hand

This form accompanies 2 Septum Vials, _____ Glass Jugs, and/or _____

Samples were preserved as follows:

- ☐ NP: No Preservation; Sample stored at room temperature.
- ☒ P-Ice Sample stored in an ice bath (Not Frozen).
- ☐ P-$Na_2S_2O_3$ Sample Preserved with Sodium Thiosulfate to remove chlorine residual.

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 ☐ Seals Intact: Yes ☐ No ☐

Signatures _____ _____

For OCD Use: Date Owner Notified _____ Phone or Letter? _____ Initials _____

ANALYSES PERFORMED LAB. No.: OR- 1621

THIS PAGE FOR LABORATORY RESULTS ONLY

This sample was tested using the analytical screening method(s) checked below:

PURGEABLE SCREENS

- ☐ (753) Aliphatic Purgeables (1-3 Carbons)
- ☒ (754) Aromatic & Halogenated Purgeables
- ☐ (765) Mass Spectrometer Purgeables
- ☐ (766) Trihalomethanes

Other Specific Compounds or Classes

- ☐ _____
- ☐ _____
- ☐ _____
- ☐ _____
- ☐ _____

EXTRACTABLE SCREENS

- ☐ (751) Aliphatic Hydrocarbons
- ☐ (760) Organochlorine Pesticides
- ☐ (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

ANALYTICAL RESULTS

COMPOUND(S) DETECTED	CONC. [PPB]	COMPOUND(S) DETECTED	CONC. [PPB]
aromatic purgeables	see remarks		
halogenated purgeables	N.D.		
Trichloroethene	150		
[Tetrachloroethene]	T.R.		
	-		
* DETECTION LIMIT *	10-ug/L	+ DETECTION LIMIT +	

ABBREVIATIONS USED:

N D = NONE DETECTED AT OR ABOVE THE STATED DETECTION LIMIT

T R = DETECTED AT A LEVEL BELOW THE STATED DETECTION LIMIT (NOT CONFIRMED)

[RESULTS IN BRACKETS] ARE UNCONFIRMED AND/OR WITH APPROXIMATE QUANTITATION

LABORATORY REMARKS: One early eluting unsaturated compound at approx 10 ppb detected by the photoionization detector but not identified.

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes ☐ No ☑ Seal(s) broken by: not sealed date: _____

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 10/15/87 Analyst's signature: Mary C. Allen

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block.

Reviewers signature: K Meyerhen

New Mexico Health and Environment Department
SCIENTIFIC LABORATORY DIVISION
700 Camino de Salud NE
Albuquerque, NM 87106 — (505) 841-2555

859 WNW

GENERAL WATER CHEMISTRY and NITROGEN ANALYSIS

DATE RECEIVED 10 | 9 | 87	LAB NO. WC 4681	USER CODE ☐ 59300 ☐ 59600 ☒ OTHER: 82235	
Collection DATE 10 | 8 | 87	SITE INFORM-ATION	Sample location 32N 10W Sec 33	
Collection TIME 1020		Collection site description Leak Detection Sump	
Collected by — Person/Agency Olson, Anderson / OCD			

SEND FINAL REPORT TO ►

ENVIRONMENTAL BUREAU
NM OIL CONSERVATION DIVISION
State Land Office Bldg, PO Box 2088
Santa Fe, NM 87504-2088

Attn: David Boyer

Phone: 827-5812

Lined

Station/well code: Newa Pond

Owner: Amoco

SAMPLING CONDITIONS

☐ Bailed ☐ Pump ☒ Dipped ☐ Tap	Water level	Discharge	Sample type: Grab
pH (00400)	Conductivity (Uncorrected) 13500 µmho	Water Temp. (00010) 18 °C	Conductivity at 25°C (00094) µmho

Field comments

SAMPLE FIELD TREATMENT — *Check proper boxes*

No. of samples submitted: 1

☒ NF: Whole sample (Non-filtered) ☐ F: Filtered in field with 0.45 µmembrane filter ☐ A: 2 ml H_2SO_4/L added

☒ NA: No acid added ☐ Other-*specify:* ☐ A: 5ml conc. HNO_3 added ☐ A: 4ml fuming HNO_3 added

ANALYTICAL RESULTS from SAMPLES

NA	Units	Date analyzed
☒ Conductivity (Corrected) 25°C (00095)	µmho	
☐ Total non-filterable residue (suspended) (00530)	mg/l	
☐ Other:		
☐ Other:		
☐ Other:		

A-H_2SO_4		
☐ Nitrate-N +, Nitrate-N total (00630)	mg/l	
☐ Ammonia-N total (00610)	mg/l	
☐ Total Kjeldahl-N ( )	mg/l	
☐ Chemical oxygen demand (00340)	mg/l	
☐ Total organic carbon ( )	mg/l	
☐ Other:		
☐ Other:		

From NE, NA Sample:

			Date Analyzed
☒ Calcium	4.8	mg/l	11/23
☒ Potassium	61.2	mg/l	11/16
☒ Magnesium	11.7	mg/l	11/23
☒ Sodium	3956	mg/l	11/16
☒ Bicarbonate	7174	mg/l	11/23
☒ Chloride	1520	mg/l	11/18
☒ Sulfate	<5	mg/l	12/2
☒ Total Solids	11340	mg/l	12/2
☐			
☐			
☒ Cation/Anion Balance			

Analyst	Date Reported	Reviewed by
	12/3/87	CO

Laboratory remarks

pH = 9.30 (CO_3^{-2}) = 1226 mg/l

Sorry we missed conductivity, possible massive interferences.

FOR OCD USE -- Date Owner Notified _____ Phone or Letter? _____ Initals _____

CATIONS				ANIONS			
ANALYTE	MEQ.	PPM	DET. LIMIT	ANALYTE	MEQ.	PPM	DET. LIMIT
Ca	0.24	4.80	<3.0	HC03	117.57	7174.00	<1.0
Mg	0.96	11.70	<0.3	SO4	0.10	5.00	<10.0
Na	172.07	3956.00	<10.0	CL	42.88	1520.00	<5.0
K	1.57	61.20	<0.3				
Mn	0.00	0.00		NO3	0.00	0.00	< 0.
Fe	0.00	0.00		C03	20.43	1226.00	< 1.
				NH3	0.00	0.00	< 0.
				PO4	0.00	0.00	< 0.
SUMS	174.84	4033.70			180.98	9925.00	

Total Dissolved Solids= 11340
Ion Balance = 96.61%

WC No. = 8704681
Date out/By 12/3/87

REPORT TO:

David G. Boyer
New Mexico Oil Conservation Division
P. O. Box 2088
Santa Fe, NM 87501

85-0192-C

LABORATORY

LAB NUMBER ORG-192-A,B
3/1/85

Users Code No. 82235

ALL CONTAINERS WHICH THIS FORM ACCOMPANIES ARE COLLECTIVELY REFERRED TO AS "SAMPLE".

CERTIFICATE OF FIELD PERSONNEL

Sample Type: Water ☒ Soil ☐ Other

Water Supply and/or Code No. Amoco West Evaporation Pond

City & County Cedar Hill, San Juan Cty

Collected (date & time) 850228 1025 By (name) Boyer/Baca OCD

pH= — ; Conductivity= 10,250 umho/cm at 45-50°F; Chlorine Residual= —

Dissolved Oxygen= — mg/l; Alkalinity= — ; Flow Rate= —

Sampling Location, Methods & Remarks (i.e. odors etc.)

Sample of produced water from evap. pond, Mostly Fruitland Form, (Schneider Pond) SW/4, SW/4, Sec 28, T32N, R10W

I certify that the statements in this block accurately reflect the results of my field analyses, observations and activities. Signed David G Boyer

I certify that I witnessed these field analyses, observations and activities and concur with the statements in this block. Signed _____

Method of Shipment to Laboratory Hand carried.

THIS FORM ACCOMPANIES 2 septum vials with teflon-lined discs identified as:
specimen X ; duplicate X ; triplicate _____ ; blank(s) _____,
and _____ amber glass jug(s) with teflon-lined cap(s) identified as _____,
and _____ other container(s) (describe) _____ identified as _____.

Containers are marked as follows to indicate preservation (circle):

~~NP~~: No preservation; sample stored at room temperature (~20°C).
P-ICE: Sample stored in an ice bath.
P-$Na_2O_3S_2$: Sample preserved with 3 mg $Na_2O_3S_2$/40 ml and stored at room temperature.

CERTIFICATE(S) OF SAMPLE RECEIPT

I (we) certify that this sample was transferred from _____ to _____ at (location) _____ on (date & time) _____ and that the statements in this block are correct.

Disposition of Sample _____. Seal(s) Intact: Yes ☐ No ☐ .

Signature(s) _____ _____

I (we) certify that this sample was transferred from _____ to _____ at (location) _____ on (date & time) _____ and that the statements in this block are correct.

Disposition of Sample _____. Seal(s) Intact: Yes ☐ No ☐ .

Signature(s) _____ _____

Please report no later than 3/25/85

ANALYSES REQUESTED

LAB. No.: ORG- 192

PLEASE CHECK THE APPROPRIATE BOXES BELOW TO INDICATE THE TYPE OF ANALYTICAL SCREENS REQUIRED. WHENEVER POSSIBLE LIST SPECIFIC COMPOUNDS SUSPECTED OR REQUIRED.

QUALITATIVE	QUANTITATIVE	PURGEABLE SCREENS	QUALITATIVE	QUANTITATIVE	EXTRACTABLE SCREENS
		ALIPHATIC HYDROCARBON SCREEN			ALIPHATIC HYDROCARBONS
X	X	AROMATIC HYDROCARBON SCREEN			CHLORINATED HYDROCARBON PESTICIDES
		HALOGENATED HYDROCARBON SCREEN			CHLOROPHENOXY ACID HERBICIDES
		GAS CHROMATOGRAPH/MASS SPECTROMETER			HYDROCARBON FUEL SCREEN
					ORGANOPHOSPHATE PESTICIDES
					POLYCHLORINATED BIPHENYLS (PCB's)
					POLYNUCLEAR AROMATIC HYDROCARBONS
					TRIAZINE HERBICIDES
		SPECIFIC COMPOUNDS			SPECIFIC COMPOUNDS

REMARKS:

ANALYTICAL RESULTS

COMPOUND	[PPB]	COMPOUND	[PPB]
halogenated purgeables	none detected		
benzene	none detected		
toluene	1 ppb		
ethyl-benzene	trace		
para-xylene	trace		
meta-xylene	trace		
ortho-xylene	1 ppb		
		* DETECTION LIMIT	1 ugm/l

REMARKS: Three other peaks were also detected but not identified. The sample was foamy.

CERTIFICATE OF ANALYTICAL PERSONNEL

Seal(s) Intact: Yes ___ NO X. Seal(s) broken by: _____ date: _____

I certify that I followed standard laboratory procedures on handling and analysis of this sample unless otherwise noted and that the statements in this block and the analytical data on this page accurately reflect the analytical results for this sample.

Date(s) of analysis: 4/11.85. Analyst's signature: JL Tinney

I certify that I have reviewed and concur with the analytical results for this sample and with the statements in this block. Reviewers signature: K Meyerhen

New Mexico Health and Environment Department
SCIENTIFIC LABORATORY DIVISION
700 Camino de Salud NE
Albuquerque, NM 87106 — (505) 841-2555

GENERAL WATER CHEMISTRY and NITROGEN ANALYSIS

DATE RECEIVED: 3 / 1 / 85 LAB NO. WC 886
USER CODE ☐ 59300 ☐ 59600 ☒ OTHER: 82235
Collection DATE: 85 02 28
Collection TIME: 1025
SITE INFORMATION ►
Sample location: Amoco West Evaporation Pond
Collection site description: West Evap pond at Cedar Hill Sample from North end by gate
Collected by — Person/Agency: Boyer/Race OCD
Please report no later than 3/25/85

SEND FINAL REPORT TO ►
ENVIRONMENTAL BUREAU
NM OIL CONSERVATION DIVISION
State Land Office Bldg, PO Box 2088
Santa Fe, NM 87501
Attn: David Boyer

Fruitland Form.

Station/well code: ~~U-16~~, SW/4, Sec 28
Owner: T 32N, R10W

SAMPLING CONDITIONS

☐ Bailed ☒ Dipped ☐ Pump ☐ Tap	Water level: —	Discharge: —	Sample type: Grab
pH (00400): —	Conductivity (Uncorrected): 10,250 µmho	Water Temp. (00010): ~45-50° F ☒	Conductivity at 25°C (00094): — µmho

Field comments: Pond has only small floating globules of oil sludge
Leak detection sumps full and leaking (Schneider Pond)

SAMPLE FIELD TREATMENT — *Check proper boxes*

No. of samples submitted: 1
☒ NF: Whole sample (Non-filtered) ☐ F: Filtered in field with 0.45 µmembrane filter ☐ A: 2 ml H_2SO_4/L added
☒ NA: No acid added ☐ Other-*specify:*

ANALYTICAL RESULTS from SAMPLES

NF, NA		Units	Date analyzed
☒ Conductivity (Corrected) 25°C (00095)	18185	µmho	3/28
☐ Total non-filterable residue (suspended) (00530)		mg/l	
☒ Other: pH	9.27		3/25
☐ Other:			
☐ Other:			

NA NF		Units	Date analyzed
☒ Calcium (00915)	*	mg/l	3/5
☒ Magnesium (00925)	*	mg/l	3/5
☒ Sodium (00930)	5980	mg/l	3/13
☒ Potassium (00935)	99.1	mg/l	3/13
☒ Bicarbonate (00440)	4778.6	mg/l	3/25
☒ Chloride (00940)	1528.8	mg/l	3/21
☒ Sulfate (00945)	146.6	mg/l	3/14
☒ Total filterable residue (dissolved) (70300)	14,315	mg/l	3/22
☒ Other: CO_3	4230.0		3/25
☒ ~~F~~	2.33	mg/L	3/25

NF, A-H_2SO_4			
☐ Nitrate-N +, Nitrate-N total (00630)		mg/l	
☐ Ammonia-N total (00610)		mg/l	
☐ Total Kjeldahl-N ( )		mg/l	
☐ Chemical oxygen demand (00340)		mg/l	
☐ Total organic carbon ( )		mg/l	
☐ Other:			
☐ Other:			

F, A-H_2SO_4			
☐ Nitrate-N +, Nitrate-N dissolved (00631)		mg/l	
☐ Ammonia-N dissolved (00608)		mg/l	
☐ Total Kjeldahl-N ( )		mg/l	
☐ Other:			

Analyst | Date Reported: 4 / 4 / 85 | Reviewed by

Laboratory remarks: * interferences likely caused by NaOH on both technician and titrations methods (matrix interference)

New Mexico Health and Environment Department
SCIENTIFIC LABORATORY DIVISION
700 Camino de Salud NE
Albuquerque, NM 87106 — (505) 841-2555

GENERAL WATER CHEMISTRY and NITROGEN ANALYSIS

DATE RECEIVED: 3 / 1 / 85 | LAB NO. WC 895 | USER CODE ☐ 59300 ☐ 59600 ☒ OTHER: 82235

Collection DATE: 85 02 28
Collection TIME: 1025
Collected by — Person/Agency: Boyer/Race OCD

SITE INFORMATION ►

Sample location: Amoco West Evaporation Pond
Collection site description: West Evap pond at Cedar Hill Sample from North end by gate

Please report no later than 3/25/85

SEND FINAL REPORT TO ►

ENVIRONMENTAL BUREAU
NM OIL CONSERVATION DIVISION
State Land Office Bldg, PO Box 2088
Santa Fe, NM 87501

Attn: David Boyer

Station/well code: ~~NW/4~~, SW/4, Sec 28 T 32N, R10W
Owner:

SAMPLING CONDITIONS

☐ Bailed ☐ Pump ☒ Dipped ☐ Tap	Water level: —	Discharge: —	Sample type: Grab
pH (00400): —	Conductivity (Uncorrected): 10,250 µmho	Water Temp. (00010): ~45-50°F	Conductivity at 25°C (00094): — µmho

Field comments: Pond has only small floating globules of oil sludge Leak detection sump full and leaking (Schneider Pond)

SAMPLE FIELD TREATMENT — *Check proper boxes*

No. of samples submitted: 1

☒ NF: Whole sample (Non-filtered) ☐ F: Filtered in field with 0.45 µmembrane filter ☒ A: 2 ml H_2SO_4/L added

☐ NA: No acid added ☐ Other-*specify:*

ANALYTICAL RESULTS from SAMPLES

NF, NA		Units	Date analyzed
☐ Conductivity (Corrected) 25°C (00095)		µmho	
☐ Total non-filterable residue (suspended) (00530)		mg/l	
☐ Other:			
☐ Other:			
☐ Other:			

F, NA		Units	Date analyzed
☐ Calcium (00915)		mg/l	
☐ Magnesium (00925)		mg/l	
☐ Sodium (00930)		mg/l	
☐ Potassium (00935)		mg/l	
☐ Bicarbonate (00440)		mg/l	
☐ Chloride (00940)		mg/l	
☐ Sulfate (00945)		mg/l	
☐ Total filterable residue (dissolved) (70300)		mg/l	
☐ Other:			

NF, A-H_2SO_4			
☒ Nitrate-N +, Nitrate-N total (00630)	0.08	mg/l	3/7
☒ Ammonia-N total (00610)	0.70	mg/l	3/29
☒ Total Kjeldahl-N ( )	2.22	mg/l	4/12
☐ Chemical oxygen demand (00340)		mg/l	
☐ Total organic carbon ( )		mg/l	
☐ Other:			
☐ Other:			

F, A-H_2SO_4			
☐ Nitrate-N +, Nitrate-N dissolved (00631)		mg/l	
☐ Ammonia-N dissolved (00608)		mg/l	
☐ Total Kjeldahl-N ( )		mg/l	
☐ Other:			

Analyst: | Date Reported: 4 / 15 / 85 | Reviewed by: Dean

Laboratory remarks:

SLD 726 (12/84) *DISTRIBUTION:* WHITE — EID, GW&HW Bureau CANARY — WS System PINK — EID Local Office GOLDENROD — SLD

New Mexico Health and Environment Department
SCIENTIFIC LABORATORY DIVISION
700 Camino de Salud NE
Albuquerque, NM 87106 — (505) 841-2555

Heavy Metal
~~GENERAL WATER CHEMISTRY and NITROGEN~~ ANALYSIS

DATE RECEIVED 3/1/85	LAB NO. HM381	USER CODE ☐ 59300 ☐ 59600 ☒ OTHER: 82235	
Collection DATE 02 28 85	SITE INFORMATION ►	Sample location Amoco West Evaporation Pond	
Collection TIME 1025		Collection site description West Evap pond at Cedar Hill Sample from North end by gate	
Collected by — Person/Agency Boyer/Bacca OCD		Please report no later than 3/25/85	
SEND FINAL REPORT TO ► ENVIRONMENTAL BUREAU NM OIL CONSERVATION DIVISION State Land Office Bldg, PO Box 2088 Santa Fe, NM 87501 Attn: David Boyer		Station/ well code ~~NW~~ SW/4, Sec 28 T32N, R10W Owner	

SAMPLING CONDITIONS

☐ Bailed ☒ Dipped ☐ Pump ☐ Tap	Water level —	Discharge —	Sample type Grab
pH (00400) —	Conductivity (Uncorrected) 10,250 µmho	Water Temp. (00010) ~ 45-50°F	Conductivity at 25°C (00094) — µmho
Field comments Pond has only small floating globules of oil sludge Leak detection sumps full and leaking (Schneider Pond)			

SAMPLE FIELD TREATMENT — *Check proper boxes*

No. of samples submitted 1	☒ NF: Whole sample (Non-filtered)	☐ F: Filtered in field with 0.45 µmembrane filter	☒ A: ~~2 ml H_2SO_4/L added~~ 5ml HNO_3
☐ NA: No acid added ☐ Other-*specify:*			

ANALYTICAL RESULTS from SAMPLES

NF, NA ~~A~~ HNO_3	Units	Date analyzed	F, NA	Units	Date analyzed
☐ Conductivity (Corrected) 25°C (00095)	µmho		☐ Calcium (00915)	mg/l	
☐ Total non-filterable residue (suspended) (00530)	mg/l		☐ Magnesium (00925)	mg/l	
☒ Other: ICAP SCAN			☐ Sodium (00930)	mg/l	
☒ Other: As			☐ Potassium (00935)	mg/l	
☒ Other: Se			☐ Bicarbonate (00440)	mg/l	
			☐ Chloride (00940)	mg/l	
			☐ Sulfate (00945)	mg/l	
			☐ Total filterable residue (dissolved) (70300)	mg/l	
			☐ Other:		
NF, A-H_2SO_4			**F, A-H_2SO_4**		
☐ Nitrate-N +, Nitrate-N total (00630)	mg/l		☐ Nitrate-N +, Nitrate-N dissolved (00631)	mg/l	
☐ Ammonia-N total (00610)	mg/l		☐ Ammonia-N dissolved (00608)	mg/l	
☐ Total Kjeldahl-N ( )	mg/l		☐ Total Kjeldahl-N ( )	mg/l	
☐ Chemical oxygen demand (00340)	mg/l		☐ Other:		
☐ Total organic carbon ( )	mg/l				
☐ Other:					
☐ Other:					

Analyst YB | Date Reported 03 25 85 | Reviewed by MJ

Laboratory remarks

SLD 726 (12/84) *DISTRIBUTION:* WHITE — EID, GW&HW Bureau CANARY — WS System PINK — EID Local Office GOLDENROD — SLD

ICAP SCREEN

Lab Number: NM 381

Sample Code: AMOCO WEST EVAP POND

Date Submitted: 3/1/85

Date Reported: 3/25/85

By: BOYER / BACA

By: MJ

Determination	Concentration (µg/ml)
Aluminum	<0.10
Barium	6.9
Beryllium	<0.10
Boron	6.6
Cadmium	<0.10
Calcium	8.8
Chromium	<0.10
Cobalt	<0.10
Copper	<0.10
Iron	1.4
Lead	<0.10
Magnesium	20.
Manganese	<0.05
Molybdenum	<0.10
Nickel	<0.10
Silicon	11.
Silver	<0.10
Strontium	5.0
Tin	<0.10
Vanadium	<0.10
Yttrium	<0.10
Zinc	<0.10

STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

GARREY CARRUTHERS
GOVERNOR

April 11, 1989

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87504
(505) 827-5800

G. C. Nelson
Drilling Foreman
AMOCO PRODUCTION COMPANY
3400 Browning Parkway
Farmington, New Mexico 87401

Dear Mr. Nelson:

Enclosed is the product information on detecting leak locations in lined ponds. We visited about utilization of systems similar to this during our inspection of the Cahn evaporation pond Friday, April 7, 1989. Our office does not necessarily endorse "Leak Sensors, Inc." but it is the only information about the subject we have at this office. I hope the information can be of help to you.

I enjoyed meeting you Friday. We should be in the area in two weeks and I look forward to meeting you again.

Sincerely,

David Englert

David Englert
Geologist

DE/sl

Enclosure

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 15, 1988

Mr. R. J. Broussard
District Manager
AMOCO PRODUCTION COMPANY
2325 East 30th Street
Farmington, New Mexico 87401

RE: Cahn Evaporation Pond Repair

Dear Mr. Broussard:

The Oil Conservation Division (OCD) has reviewed your request, dated June 3, 1988, for approval to install a new 36 mil hypalon liner over the existing liner at the Cahn evaporation pond located in the SW/4 NE/4 NW/4 Section 33, Township 32 North, Range 10 West, NMPM, San Juan County, New Mexico.

The application was submitted pursuant to OCD rule R-7940 A and is hereby approved pursuant to that rule with the following conditions:

1. All fluid will be removed from the leak detection system prior to discharging any fluids into the repaired pond.

2. The leak detection system will be inspected monthly. If fluids are observed in the sump, the OCD will be notified immediately. A sample of the fluids will be analyzed to determine their origin. The analysis will be supplied to the OCD.

Please be advised that the approval of this application does not relieve you of liability should your operation result in actual pollution of surface or ground waters which may be actionable under other laws and/or regulations.

If there are any questions, please call Roger Anderson at (505) 827-5885.

Sincerely,

William J. LeMay
Director

WJL:RA:sl

cc: OCD - Aztec

Amoco Production Company
2325 East 30th Street
Farmington, New Mexico 87401
505-325-8841

R. J. Broussard
District Manager

June 3, 1988

New Mexico Oil Conservation Division
Attn: Roger Anderson
State Land Office Building
Santa Fe, NM 87501-2088

File: FEW-133-501.61

Dear Mr. Anderson:

Application to Permit Repair of the Cahn Evaporation Pond
SW/4 NE/4 NW/4 Sec. 33, T32N, R10W
San Juan County, New Mexico

Per your conversation with Brooke Bell on May 25, 1988, this letter requests your approval to permit repair of the Cahn evaporation pond. Once repaired, the pond will handle water from area Fruitland coal wells in our Cedar Hill Field and water from three Colorado coal degas wells located just across the state line. Water from the Colorado wells will be trucked to the pond during July through October. Production from these wells will then be evaluated to determine the economic feasibility of drilling a disposal well in 1989.

The Cahn evaporation pond currently stands empty. The pond will be cleaned of all debris. Any void areas and sluffing sideslopes will be filled in and compacted. The existing fill line in the pond bottom will be removed and the area repaired with cement. A new liner system consisting of a 36 mil reinforced industrial grade hypalon membrane liner will be installed over the existing liner. This method and material was used in repairing the larger Schneider pond two years ago. Wright & Kohli Construction Company will be handling the liner material and installation. Again, this is the same contracting firm responsible for repairing the Schneider pond. Attached is a copy of the repair proposal submitted to Amoco by Wright & Kohli.

Your earliest attention to this matter is greatly appreciated. Materials have been ordered, and repair work should begin by late June. Should you have any questions, please contact Brooke Bell at (505) 325-8841, extension 225.

Sincerely,
R. J. Broussard FEW

BSB/ct
Attachment

W2

WRIGHT & KOHLI CONSTRUCTION CO., INC.

MAY 27, 1988

BROOKE BELLE
AMOCO PRODUCTION COMPANY
2325 EAST 30th ST.
FARMINGTON, NM 87401

RE: MEMBRANE LINER REPLACEMENT, CAHN LEASE EVAPORATION POND

DEAR BROOKE,

I AM PLEASED TO CONFIRM MY PHONE QUOTATION OF YESTERDAY FOR THE SUBJECT JOB.

WE OFFER TO SUPPLY ALL MATERIALS, FREIGHT, SUPERVISION, LABOR, AND INSURANCE FOR INSTALLTION OF A 36 MIL 10 X 10 1000 D. POLYESTER REINFORCED INDUSTRIAL GRADE HYPALON MEMBRANE LINER FOR THE CAHN LEASE EVAPORATION POND AS FOLLOWS:

ALL MATERIALS, ADHESIVES, VENTS, AND ACCESSORIES..$41,470.00

LABOR, SUPERVISON, INSURANCE, AND TRAVEL.....$10,725.00

MATERIALS ARE F.O.B. JOBSITE FOR CUSTOMER UNLOADING AND SPOTTING. ANY SALES AND/OR USE TAXES ARE TO THE BUYER'S ACCOUNT. DELIVERY IS ESTIMATED AT 2-3 WEEKS DEPENDING ON RECEIPT OF ORDER. TERMS ARE NET 30 DAYS. OUR FIELD SUPERINTENDENT, PHIL PRIOLO, WILL BE MADE AVAILABLE, IF REQUESTED.

WE PROPOSE THAT THE NEW LINER SYSTEM BE PLACED OVER THE EXISTING CPE/CPER COMBINATION LINER WITH THE ANCHOR TRENCH BEING PLACED JUST OUTSIDE THE EXISTING ONE. ALL DIRTWORK TO BE DONE BY OTHERS INCLUDING THE EXCAVATION OF THE NEW TRENCH. THE POND SHOULD BE CLEANED OF ALL DEBRIS INCLUDING ANYTHING THAT COULD CAUSE PUNCTURE. IT WOULD BE ADVISABLE TO FILL IN AND COMPACT ANY VOIDS, INCLUDING THE TIRE RUTS, ANY SOFT SPOTS, AND ANY AREAS WHICH HAVE SLUFFING OF THE SIDESLOPE. IT WOULD BE ADVISABLE UPON COMPLETION TO GRADE THE TOP BERM AWAY FROM THE POND.

WE ASSUME THAT THE EXISTING FILL LINE IN THE POND BOTTOM WILL BE REMOVED. WE WILL SUPPLY AND INSTALL NEW AIR/GAS VENTS AND RECOMMEND THAT THE EXISTING SAND TUBES BE SALVAGED AND REPLACED DURING THE NEW LINER INSTALLATION.

P.O. Box 7280, The Woodlands, Tx. 77380 (713) 367-1941

I TRUST THAT WE MAY BE OF SERVICE AND THANK YOU AGAIN FOR YOUR CONTINUED INTEREST IN WRIGHT & KOHLI CONSTRUCTION COMPANY, INC. IF YOU HAVE ANY QUESTIONS, OR DESIRE FURTHER INFORMATION, PLEASE DO NOT HESITATE TO CONTACT ME.

SINCERELY,

WRIGHT & KOHLI
CONSTRUCTION COMPANY

JOHN A. KOHLI
VICE PRESIDENT

JAK:SJW
ENCL: AS NOTED

Amoco Production Company
2325 East 30th
Farmington, New Mexico 87401
505-325-8841

R. J. Broussard
District Manager

January 19, 1987

New Mexico Oil Conservation Division
State Land Office Building
Santa Fe, NM 87501-2088

Attn: Mr. David Boyer

File: DBB-8-501.61

Dear Mr. Boyer:

Registration of Evaporation Ponds
Cedar Hill Area, New Mexico

Per Jami Bailey's letter of January 12, 1987, attached are revised forms of registration for our Cahn and Schneider evaporation ponds.

Sincerely,

R. J. Broussard

BWE/ct

Attachments

W1

State of New Mexico
Energy and Minerals Department

OIL CONSERVATION DIVISION
P. O. Box 2088
Santa Fe, New Mexico 87501
(505) 827-5800

CENTRALIZED DISPOSAL OR COLLECTION
PIT REGISTRATION FORM

Owner/Operator: Amoco Production Company
(List information only for pits operated by you at a lease or at other locations)

Address: 2325 East 30th Street, Farmington, NM 87401

Well and Lease, or Facility Name: Schneider Evaporation Pond

Location: E/2 SW/4 SW/4 28, T32N, R10W

	(A) Pit Fluid Sources	(B) Pit Fluid Type: 1. Produced Water 2. Completion Fluids 3. Drilling Fluids 4. Drill Cuttings	(C) Maximum Daily Discharge to each Pit	(D) Pit Type: 1. Unlined 2. Lined 3. Tank
List all Wells & Locations that Contribute Fluid to Pit				
Amoco Ealum GC C #1	G33,32N,10W	PW	19E.	L
Amoco Keys GC G#1	K27,32N,10W	PW	5E	L
Amoco Leeper GC D#1Y	L34,32N,10W	PW	22E	L
Amoco Sammons GC I #1	B6,31N,10W	PW	5E	L
Amoco Schneider GC B #1S	M28,32N,10W	PW	32E	L
Amoco State GC BW #1	B32,32N,10W	PW	5E	L
Amoco State GC BX #1	K32,32N,10W	PW	5E	L
Amoco Wood GC A #1	B4,31N,10W	PW	5E	L

Note: All wells produce from the Fruitland Coal.

Is this facility located in or within 100 horizontal feet of a watercourse? Yes _____ No X
Watercourse: Any lake-bed or gully, draw, stream bed, wash, arroyo, or natural or man-made channel through which water flows or has flowed.

Is ground water at the site at 10 feet or less from the base of the pit? Yes _____ No X

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

D B Blevins for RJB
(Signature)

01198 7
(Date)

R. J. Broussard
(Printed Name of Person Signing)

District Manager
(Title)

State of New Mexico
Energy and Minerals Department

OIL CONSERVATION DIVISION
P. O. Box 2088
Santa Fe, New Mexico 87501
(505) 827-5800

CENTRALIZED DISPOSAL OR COLLECTION
PIT REGISTRATION FORM

Owner/Operator: Amoco Production Company
(List information only for pits operated by you at a lease or at other locations)

Address: 2325 East 30th Street, Farmington, NM 87401

Well and Lease, or Facility Name: Cahn Evaporation Pond

Location: SW/4 NE/4 NW/4 33,T32N,R10W

List all Wells & Locations that Contribute Fluid to Pit	(A) Pit Fluid Sources	(B) Pit Fluid Type: 1. Produced Water 2. Completion Fluids 3. Drilling Fluids 4. Drill Cuttings	(C) Maximum Daily Discharge to each Pit	(D) Pit Type: 1. Unlined 2. Lined 3. Tank
Amoco Cahn GC #1	C33,32N,10W	PW	5E	L

Note: This well produces from the Fruitland Coal.

Is this facility located in or within 100 horizontal feet of a watercourse? Yes ____ No X
Watercourse: Any lake-bed or gully, draw, stream bed, wash, arroyo, or natural or man-made channel through which water flows or has flowed.

Is ground water at the site at 10 feet or less from the base of the pit? Yes ____ No X

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

[signature] for RJB (Signature) — 011987 (Date)

R. J. Broussard (Printed Name of Person Signing) — District Manager (Title)

STATE OF NEW MEXICO

ENERGY AND MINERALS DEPARTMENT

OIL CONSERVATION DIVISION

January 12, 1987

GARREY CARRUTHERS
GOVERNOR

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE NEW MEXICO 87501
(505) 827-5800

Mr. R. J. Broussard
Amoco Production Company
2325 E. 30th Street
Farmington, N. M. 87401

RE: CENTRALIZED PIT REGISTRATION FORMS

Dear Mr. Broussard:

The enclosed centralized disposal pit registration forms were submitted to the OCD in accordance with Rule 5 of Order No. R-7940-A. The form requires listing of all wells and their locations that contribute fluid to the pit. You are requested to revise these forms to include source well locations and your signature, and to submit them by February 1, 1987. Blank forms are included for your convenience.

Thank you for your cooperation.

Sincerely,

JAMI BAILEY
Field Representative

JB:dp

Enc.

State of New Mexico
Energy and Minerals Department

OIL CONSERVATION DIVISION
P. O. Box 2088
Santa Fe, New Mexico 87501
(505) 827-5800

CENTRALIZED DISPOSAL OR COLLECTION
PIT REGISTRATION FORM

Owner/Operator: Amoco Production Company
(List information only for pits operated by you at a lease or at other locations)

Address: 2325 E. 30th Street, Farmington, NM 87401

Well and Lease, or Facility Name: Schneider Evaporation Pond

Location: E/2 SW/4 SW/4 28, T32N, R10W

(A) Pit Fluid Sources	(B) Pit Fluid Type: 1. Produced Water 2. Completion Fluids 3. Drilling Fluids 4. Drill Cuttings	(C) Maximum Daily Discharge to each Pit	(D) Pit Type: 1. Unlined 2. Lined 3. Tank
List all Wells & Locations that Contribute Fluid to Pit			
Schneider B #1S	Produced Water	32 BPD	Lined
Other various wells as pit capacity allows	Produced Water	168 BPD	Lined

Is this facility located in or within 100 horizontal feet of a watercourse? Yes_____ No X
Watercourse: Any lake-bed or gully, draw, stream bed, wash, arroyo, or natural or man-made channel through which water flows or has flowed.

Is ground water at the site at 10 feet or less from the base of the pit? Yes_____ No X

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

(Signature) (Date)

R. J. BROUSSARD (Printed Name of Person Signing)

DISTRICT MANAGER (Title)

State of New Mexico
Energy and Minerals Department

OIL CONSERVATION DIVISION
P. O. Box 2088
Santa Fe, New Mexico 87501
(505) 827-5800

CENTRALIZED DISPOSAL OR COLLECTION
PIT REGISTRATION FORM

Owner/Operator: Amoco Production Company
(List information only for pits operated by you at a lease or at other locations)

Address: 2325 E. 30th Street, Farmington, NM 87401

Well and Lease, or Facility Name: Cahn Evaporation Pond

Location: SW/4 NE/4 NW/4 33, T32N, R10W

(A) Pit Fluid Sources	(B) Pit Fluid Type: 1. Produced Water 2. Completion Fluids 3. Drilling Fluids 4. Drill Cuttings	(C) Maximum Daily Discharge to each Pit	(D) Pit Type: 1. Unlined 2. Lined 3. Tank
List all Wells & Locations that Contribute Fluid to Pit			
Cahn #1	Produced Water	5 BPD	Lined
Ealum C #1	Produced Water	19 BPD	Lined
Keys G #1	Produced Water	5 BPD	Lined
Leeper D #1Y	Produced Water	22 BPD	Lined
Sammons I #1	Produced Water	5 BPD	Lined
State BW #1	Produced Water	5 BPD	Lined
State BX #1	Produced Water	5 BPD	Lined
Woods A #1	Produced Water	5 BPD	Lined
Other various wells as pit capacity allows	Produced Water	29 BPD	Lined

Is this facility located in or within 100 horizontal feet of a watercourse? Yes _____ No X

Watercourse: Any lake-bed or gully, draw, stream bed, wash, arroyo, or natural or man-made channel through which water flows or has flowed.

Is ground water at the site at 10 feet or less from the base of the pit? Yes _____ No X

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

(Signature) _____ (Date) _____

R. J. BROUSSARD (Printed Name of Person Signing)

DISTRICT MANAGER (Title)

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

MEMORANDUM OF MEETING OR CONVERSATION

☒ Telephone ☐ Personal | Time 9 AM | Date 9/4/86

Originating Party: Bruce Elder - Amoco 326-9231

Other Parties: D. G. Boyer - OCD

Subject: Pits at Amoco Facility - Cedar Hill

Discussion: Elder called to say that the people replacing the top liners said the underliner along the pond sides was so badly damaged to repair (it is PVC). Amoco is considering costs of replacing it and will make decision in several weeks. If replaced, they will shut down other pit and transfer spray operation. New top liners would be Hypalon

Conclusions or Agreements

Elder will call & update next week or when he know more about plans.

Distribution: Amoco file

Signed: David G Boyer

Amoco Production Company
2325 East 30th
Farmington, New Mexico 87401
505-325-8841

R. J. Broussard
District Manager

August 28, 1986

New Mexico Oil Conservation Division
State Land Office Building
Santa Fe, NM 87501-2088

Attn: Mr. David Boyer

File: DBB-252-501.61

Dear Mr. Boyer:

Registration of Evaporation Ponds
Cedar Hill Area, New Mexico

Per our conversation on August 6, 1986, attached are registration forms per Rule 5 of OCD Order No. R-7940-A, on both our Cahn and Schneider evaporation ponds.

In response to Jami Bailey's letter of August 1, 1986:

(1) The Schneider pit liner is scheduled to be fixed starting today. The pit has not been in operation for well over a year. The underliner will be patched with a solvent adhesive by bonding together the sections of the hypalon lines. Then, the new overliner will be installed. The leak detection system will be kept in place.

(2) We will inspect and repair the underliner in the area of the riser making sure the liner is sealed against the riser tube.

(3) As identified on the pit registration forms, produced water from other Amoco operated wells may be disposed into the pits if capacity allows. To prevent unauthorized use, the pits are fenced with chain-link, only one water hauling firm is used, and our operators check the pits daily. We also have several pumpers and operators that drive along New Mexico Highway 550 every day and who could easily see if unauthorized dumping was occuring. The truck-in water connection will be locked with only authorized users having keys.

If you have any questions or comments, please call Bruce Elder at (505) 325-8841.

Sincerely,

R. J. Brossard

BWE/ct

Attachments

P1

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

TONEY ANAYA
GOVERNOR

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87501-2088
(505) 827-5800

August 8, 1986

Mr. Bruce Elder
Amoco Production Company
Farmington District
2325 E. 30th
Farmington, N.M. 87401

Dear Mr. Elder:

Here is the extent of the Amoco file for the Cedar Hill ponds. Please note my comments after talking to Dale. Please include answers to those questions in your response. Jami Bailey will be reviewing the registration form and Roger Anderson the engineering specs.

On file here is a review of a spray evaporation system for Basin Disposal. Phil Baca, our previous engineer, did a lot of calculations applicable to other San Juan Basin locations. If they would be applicable to your situation, let us know.

I hope our conversation on August 6, and the information enclosed will clear up a lot of the confusion regarding the ponds. If I can be of further assistance, please call.

Sincerely,

David G. Boyer

DAVID G. BOYER
Hydrogeologist/Environmental Bureau Chief

DGB:dp

Enc.

cc: Frank Chavez, OCD - Aztec

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

MEMORANDUM OF MEETING OR CONVERSATION

☒ Telephone ☐ Personal	Time	Date 8/5/86

Originating Party	Other Parties
Bruce Elder - Amoco engineer	Jami Bailey

Subject Repairs of Cedar Hills disposal pit

Discussion

1. Amoco asked if there was an approval on file for the pits. I told him we had only an application, but no approval letter. If they had one, I'd like to see a copy.
2. Elder asked why they would not qualify as an exemption to R-7940-A as being regulated by WQCC. I explained why not.
3. He asked about my position + authority with the Bureau, the OCD organization + its relationship with EMD.
4. He stated there were "probably" no written plans or specs for repair of the pits, altho a contractor may be engaged for the repairs this month. I requested a specific plan, date of repair for witnessing.

Conclusions or Agreements

Amoco will submit Pit Registration Forms for the Cedar Hills pits, pursuant to R-7940-A. They appear to be very uncooperative concerning repairs or releasing any other info.

Distribution

File
OB

Signed Jami Bailey

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

TONEY ANAYA
GOVERNOR

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87501-2088
(505) 827-5800

August 1, 1986

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Amoco Production Company
501 Airport Drive
Farmington, New Mexico 87401
ATTN: MR. R. J. BROUSSARD

RE: LINED EVAPORATION PONDS, CEDAR HILL AREA, SAN JUAN COUNTY

Dear Mr. Broussard:

After review of the file on the permitted Cahn and Schneider lined evaporation ponds which are located in Unit K, Section 25, Township 31 North, Range 12 West, and in Unit B, Section 32, Township 32 North, Range 10 West, I have the following questions and comments:

(1) What is the current status of the integrity of the primary and secondary liners of the ponds? Relining of the ponds was due to be undertaken during Summer, 1985; however, no plans, specifications, or notification of completion were submitted to this office. This information is required for our files.

(2) The leak detection system was found to be faulty in that fluid seepage was found in the area of the riser. Please indicate how this system has been or will be corrected.

(3) Are these pits receiving produced water from any other wells or operators? What precautions are taken to prevent unauthorized use?

I would like to remind you that pursuant to Rule 5 of OCD Order No. R-7940-A, "the owner/operator of any existing centralized surface disposal or collection facility seeking the continued use thereof for disposal or collection purposes, must file a Pit Registration Form with the Division by September 1, 1986." A copy of Order No. R-7940-A and the required form are

enclosed for your convenience. If you have any questions concerning this matter, please contact me in Santa Fe at 827-5882.

Sincerely,

JAMI BAILEY
Field Representative

JB:dp

Enc.

cc: OCD, Aztec District Office

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

MEMORANDUM OF MEETING OR CONVERSATION

☒ Telephone ☐ Personal	Time 3:30	Date 5/15/86

Originating Party	Other Parties
Charlie Gholson	Jami Bailey

Subject

Report of oil on Amoco's Cedar Hill pit
(NOTE - not sure if this is Disposal Pond or Production pit - JRB)

Discussion

Report of excessive oil on pit is overblown. Charlie inspected pit & found 1 bbl. of oil, maximum, floating on the surface.

Charlie was vague as to source of report, mentioned EPA.

Conclusions or Agreements

Distribution

Signed Jami Bailey

Amoco Production Company (USA)
Petroleum Center Building
501 Airport Drive
Farmington, New Mexico 87401
505-325-8841

R. W. Schroeder
District Superintendent

August 6, 1982

New Mexico Oil Conservation Division
Attn: Frank Chavez
1000 Rio Brazos Road
Aztec, NM 87410

File: DHS-355-501.61

Liner Solar Evaporation Pond Reply

In response to your letter concerning construction of lined solar evaporation ponds in the Cedar Hill area, we are forwarding the requested information. First, with regards to the liner vents, we will not install liner vents on this application. Vents are used primarily in marshy environments and in areas where gas could seep to the surface and become trapped under the liner. Since the Cedar Hill area does not fit either category, we will not require liner vents.

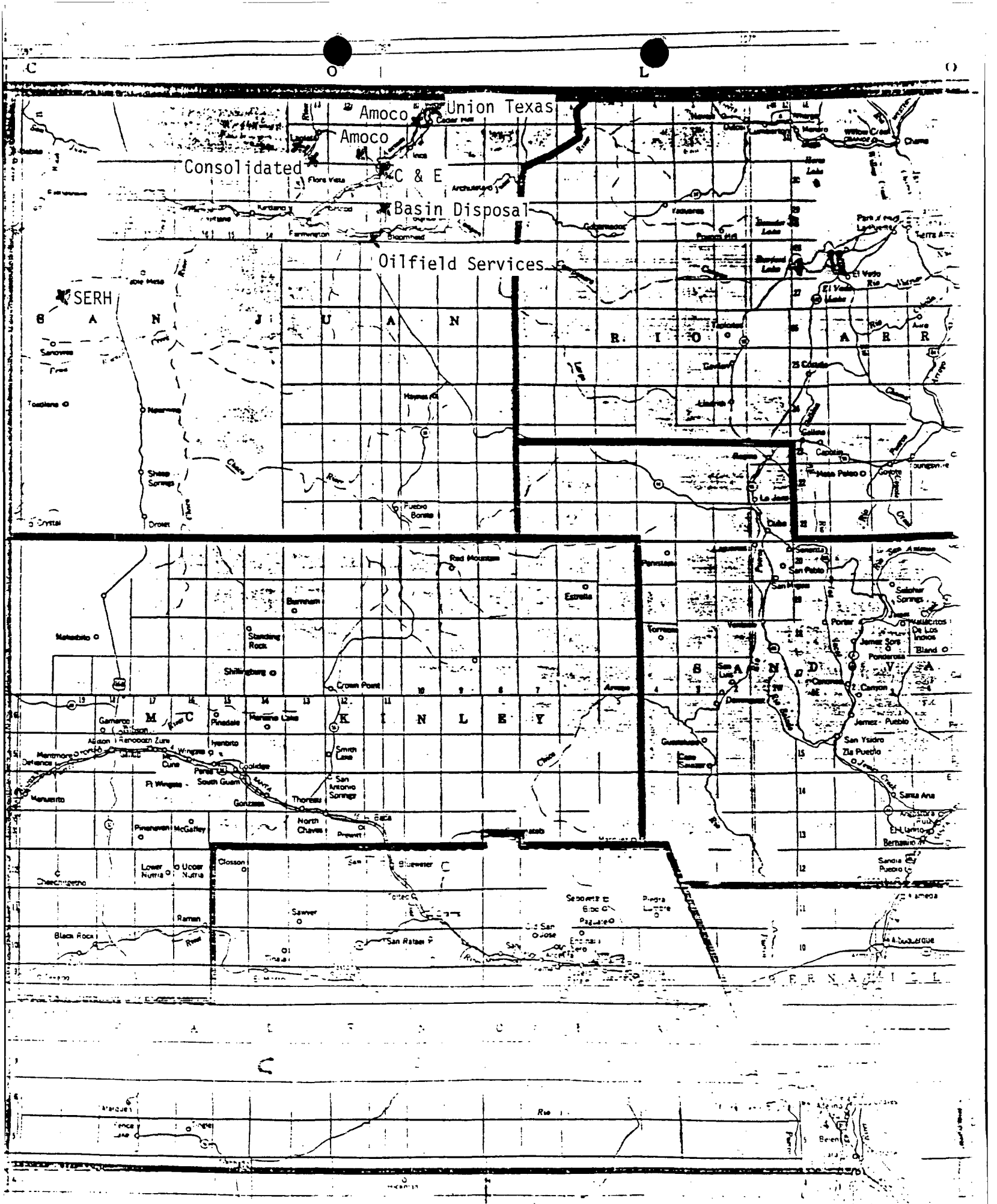
In response to your question regarding the working fluid level, the referenced drawings show a pond depth of 37 inches; and the text states the maximum pond level will be 22.2 inches. The 37 inches represents the fluid level for a year's input of water with no evaporation losses and was included mainly to show the pond's storage capacity. The 22.2 inches is the maximum working fluid level taking evaporation into consideration. The 22.2 inch maximum working fluid level will be 21.5 inches below ground level.

If you have any questions or require additional information regarding the pits, please contact Tim Clawson at our Farmington District office, (505) 325-8841, ext. 246.

Yours very truly,

R. W. Schroeder

TDC/de



OCD APPROVED EVAPORATION PITS: NORTHWESTERN NEW MEXICO

OCD APPROVED PRDOUCED WATER EVAPRORATION PITS - NORTHWEST, NM

Operator	Location	Status 10/25/85
Amoco	K 25-31N-12W B32-32N-10W	Approved in 1982; relined in 1985
Basin Disposal	E3-29N-11W	Began Operation 10/3/85
C & E	C5-30N-11W	Waiting on Advertisement
Consolidated Oil & Gas	C30-31N-13W P34-31N-13W	Approved by BLM in 1982
Oilfield Services (Finney)	33-29N-11N	120 day Temporary Pit Permit
SERH	0-20-27N-19W	Application Approved 10/18/85
Union Texas	20-32N-10W	Construction to begin 11/1/85

Amoco Production Company (USA)

Petroleum Center Building
501 Airport Drive
Farmington, New Mexico 87401
505-325-8841

R. W. Schroeder
District Superintendent

July 20, 1982

New Mexico Oil Conservation Division
Attn: Mr. Joe D. Ramey
Box 2088
Santa Fe, NM 87501

New Mexico Oil Conservation Division
Attn: Mr. Frank Chavez
1000 Rio Brazos Road
Aztec, NM 87410

File: DHS-298-501.61

Request for Approval of Lined Solar Evaporation Ponds,
Cedar Hill Area, San Juan County, New Mexico

Amoco Production Company requests permission to construct two lined solar evaporation ponds to dispose of water produced with natural gas from three wells. The two ponds will be used to dispose of 100 BWPD from the Cahn Gas Com No. 1 (Unit K, Section 25, T31N, R12W) and 200 BWPD combined from the Schneider Gas Com No. 1 (Unit B, Section 32, T32N, R10W) and State Gas Com "BW" No. 1 (Unit M, Section 28, T32N, R10W). The ponds will be located near the Cahn No. 1 and Schneider No. 1 well sites (see Attachment No. 1). Produced water from the State BW No. 1 will be pipelined to the 200 BWPD Schneider No. 1 disposal pond (see Attachment No. 2).

Each of the subject wells produces 100 BWPD from the Mount Nebo Fruitland formation. The water contains 20,000+ ppm total dissolved solids and therefore cannot be discharged onto the surface (see Attachments No. 3, 4, and 5). Since the water contains no oil or grease, solar evaporation is an economical and efficient means to dispose of the produced water. We are currently hauling the produced water to our Hogback injection disposal facility. This disposal technique is far less economical than solar evaporation.

Both ponds have been designed to evaporate a year's supply of water during a five month period from May through September. According to climatological data, this area has an evaporation rate of 49 inches during the May - September period and no evaporation for the remainder of the year (see Attachment 6). However, 12 inches of precipitation can be expected during the remaining (October - April) seven months, so that the net May - September evaporation rate was reduced to 37 inches. Using the value of 37 inches of net evaporation, the ponds were designed to have a sufficient surface area to evaporate a year's supply of water during the May -

September period. The maximum fluid level in the ponds will be 22.2 inches and will occur from October through April (see Attachment No. 7 and 8). By the end of September each year, the ponds should evaporate completely dry.

The ponds will evaporate the water to dryness, leaving a sodium bicarbonate precipitate on the liner. The amount of salt deposited each year will be approximately 243,100 pounds or 0.91 percent of the pond volume (see Attachment 9). Precipitate fill-up is insignificant over the projected pond life of 20 years. We will monitor yearly deposition to insure that solids precipitation does not significantly affect the ponds' storage capabilities.

The liner of the 100 BPD pond offsetting the Cahn will be constructed of 50 mil (1.25 mm) Chevron Industrial Membrane. The liner of the 200 BPD pond offsetting the Schneider will be 30 mil (0.76 mm) reinforced chlorinated polyethylene. Both liners will be underlain with sand to prevent punctures and installed according to the liner company's specifications (see Attachments No. 10 and 11). A leak detection system will be installed (see Attachment No. 9). Should a leak develop, the ponds will be drained (see Attachment 13). The water will be stored in one of six, 300-barrel tanks on the subject leases. After the leak is repaired, the water will be returned to the pond.

If the ponds are approved, the produced water will pass through a heated, two phase separator, allowed to stand in a 300 barrel storage tank, mechanically filtered, then discharged into the respective ponds (see Attachments No. 14 and 15). For the State "BW", the water will be pumped to the Schneider pond following filtration.

The land where the ponds will be located is covered with sagebrush. Since the land is presently used as a pasture area, the ponds will be enclosed with a six foot high fence (11.5 gauge) with three strands of barbed wire on top.

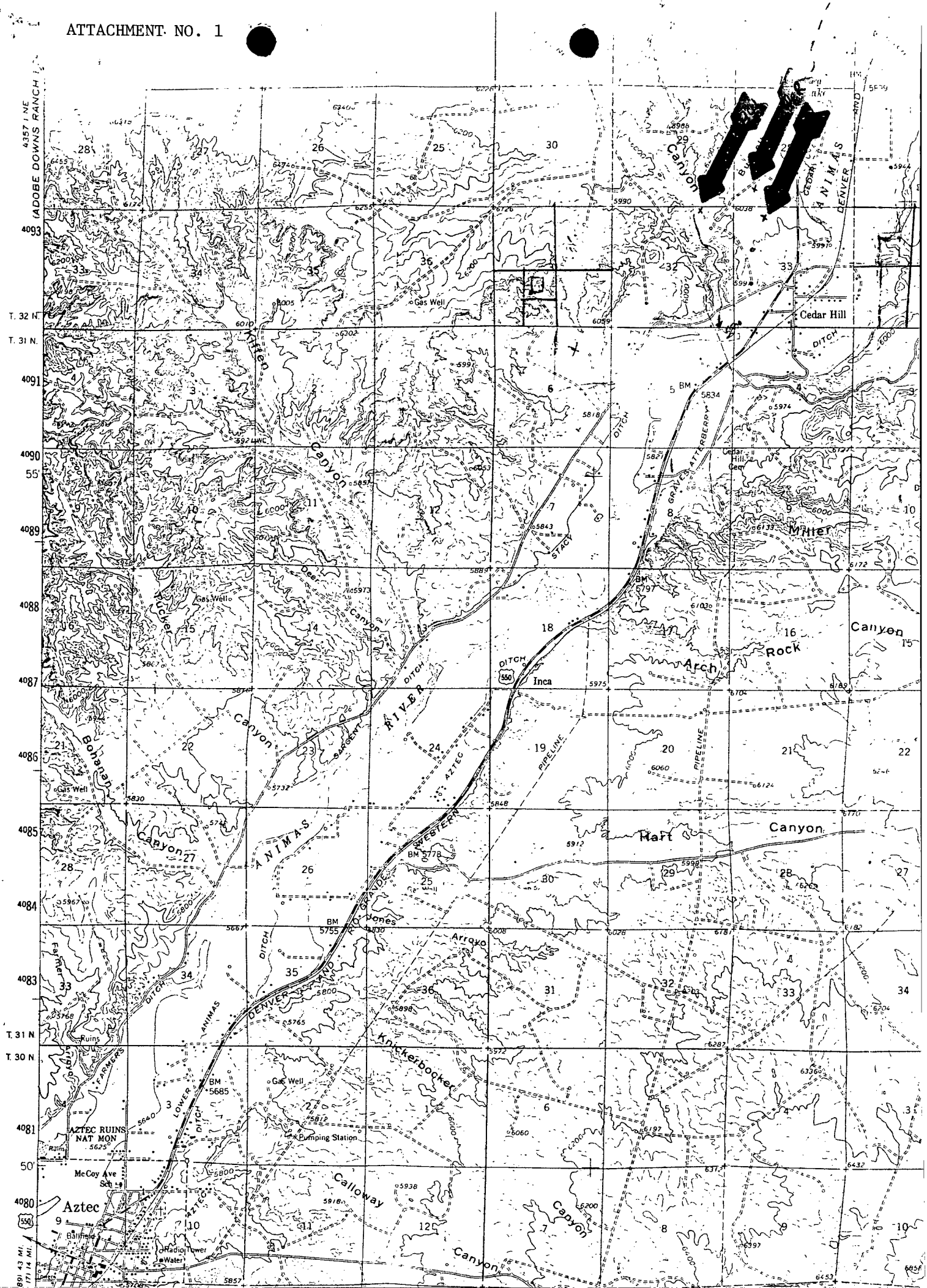
We have already negotiated damage fees with the land owners and are proceeding to obtain pipeline rights-of-way. As previously mentioned, we plan to pipe the water from the State "BW" to the pond on the Schneider. The pipeline will be located alongside the lease road from the State to the Schneider.

If you have any questions, or require additional information regarding this request, please contact Tim Clawson at our Farmington District office, (505) 325-8841, Ext. 246.

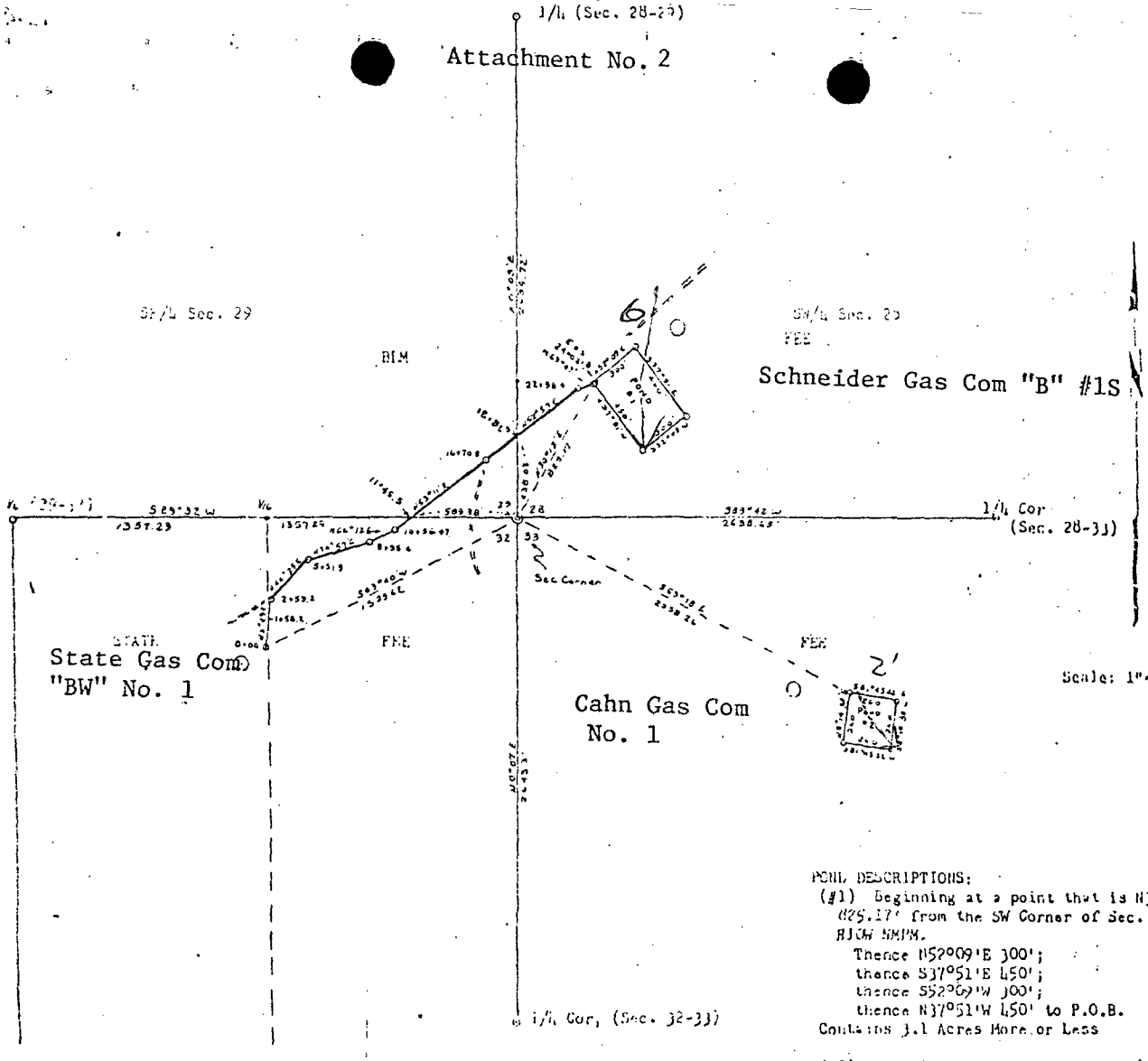
R. W. Schroeder

TDC/tk
Attachments

ATTACHMENT NO. 1



Attachment No. 2



POND DESCRIPTIONS:

(#1) Beginning at a point that is N30°12'E 825.17' from the SW Corner of Sec. 28, T32N, R10W NMPM.
Thence N52°09'E 300';
thence S37°51'E 450';
thence S52°09'W 300';
thence N37°51'W 450' to P.O.B.
Contains 3.1 Acres More or Less

(#2) Beginning at a point that is S63°18'E, 2655.2o' from the NW Corner of Sec. 33, T32N, R10W NMPM;
Thence S37°51'22"E 260';
thence S52°08'38"W 260';
thence N37°51'22"W 260';
thence N52°08'38"E 260' to the P.O.B.
Contains 1.55 Acres More or Less

PIPELINE CENTERLINE DESCRIPTION:

Beginning at a point that is S63°40'W, 1529.62' from the NE Corner of 32-T32N-R10W NMPM County of San Juan, State of New Mexico:
Thence N05°49'E, 259.2' to Station 2+59.2;
thence N11°25'E, 292.7' to Station 5+51.9;
thence N70°57'E, 343.7' to Station 9+95.6;
thence N66°12'E, 160.87' to Station 10+56.47;
thence N53°11'E, 618.33' to Station 16+70.8;
thence N52°53'E, 627.6' to Station 22+98.4;
thence N67°47'E, 105.78' to Station 24+04.18 and End of Survey at the edge of a disposal pond.

LENGTH OF PIPELINE:
State: 158.2'
Fee: 987.3' (Section 32)
BLM: 737.4' (Section 29)
Fee: 521.28' (Section 28)
TOTAL: 2,404.18'

APPLICANT'S CERTIFICATE:

This is to certify that Fred B. Kerr Jr. who subscribed the statement hereon, is the person employed by the undersigned applicant to prepare this map, which has been adopted by the applicant as the approximate final location of the works thereby shown, and that this map is filed as a part of the complete application, and in order that the applicant may obtain the benefits of the Act of February 25, 1920(30 USC 185) as amended; and I further certify that the right of way shown hereon is desired for the transportation of Saltwater through a 2⅜ inch buried fiberglass pipeline.
LENGTH OF PIPELINE: 737.4' Width of ROW: 20' Acreage: 0.34 Acres More or Less

_____

Title: _____

For: AMOCO PRODUCTION COMPANY

This is to certify that this plat was prepared from field notes of actual surveys made by me, and that the same are true and correct to the best of my knowledge and belief.

Fred B. Kerr Jr.

Saltwater Disposal Pipeline and Ponds
for
AMOCO PRODUCTION COMPANY
Located in Sections 28, 29, 32, and 33 of T32N, R10W N.M.P.M., County of San Juan, State of New Mexico.

June 11, 1982

DIVISION LABORATORY

FARMINGTON, NEW MEXICO

Attachment No. 3

LABORATORY WATER ANALYSIS

Report No: _____

D: Amoco Production, Inc.

Date: 5-14-82

501 Airport Dr.

Farmington, NM 87401

Attn: Tim Clawson

ubmitted By: Tim Clawson Date Received: May 13, 1982

ell No: Schneider Gas Com "B" Depth: Unknown Formation: Mt. Nebo Fruitland

ocation: #1-S NE/4, Sec 32, T 32 N, R10W Sampled by Tim Clawson-5/12/82

Resistivity	0.59	ohms/m^2/m at 70° F
Temperature	76° F	
Specific Gravity(Sp.Gr.)	1.010	
pH	8.1	
Total Dissolved Solids	19,699	parts per million*
Calcium (Ca^{++})	42	parts per million
Magnesium (Mg^{++})	3	parts per million
Chlorides (Cl^{-})	760	parts per million
Carbonates (CO_3^{--})	0	parts per million
Bicarbonates (HCO_3^{-})	13,392	parts per million
Sulfates (SO_4^{--})	< 10	parts per million
Iron (Fe^{+++})	present	parts per million
Potassium (K^{+})	nil	parts per million
Sodium (Na^{+})(Difference)	5,492	parts per million
Stability Index (SI)	Not required	

EMARKS:

* indicates parts per million by weight; uncorrected for Specific Gravity

ABORATORY ANALYST:

Clarion Cochran

Respectfully submitted,
National Cementers Corporation

By: Clarion A. Cochran

Attachment No. 4

FARMINGTON, NEW MEXICO

LABORATORY WATER ANALYSIS

Report No:

o: Amoco Production Co.

501 Airport Dr.

Farmington, NM 87401

Attn: Tim Clawson

Date: 5/14/82

ubmitted By: Tim Clawson Date Received: May 13, 1982

ell No: State Gas com "BW" #1 Depth: Unknown Formation: Mt. Nebo Fruitlan

ocation: SW4, Sec 28, T32N, R10W Sampled by T. Clawson 5/12/82

Resistivity	0.54	ohms/m^2/m at 70° F
Temperature	77°F	
Specific Gravity(Sp.Gr.)	1.013	
pH	8.1	
Total Dissolved Solids	22,207	parts per million*
Calcium (Ca^{++})	79	parts per million
Magnesium (Mg^{++})	4	parts per million
Chlorides (Cl^{-})	993	parts per million
Carbonates (CO_3^{--})	Trace	parts per million
Bicarbonates (HCO_3^{-})	14,880	parts per million
Sulfates (SO_4^{--})	less than 10	parts per million
Iron (Fe^{+++})	present	parts per million
Potassium (K^{+})	nil	parts per million
Sodium (Na^{+})(Difference)	6,251	parts per million
Stability Index (SI)	not required	

EMARKS:

* indicates parts per million by weight; uncorrected for Specific Gravity

ABORATORY ANALYST:

Clarion Cochran

Respectfully submitted,
National Cementers Corporation

By: Clarion A Cochran

Attachment No. 5

DIVISION LABORATORY

FARMINGTON, NEW MEXICO

LABORATORY WATER ANALYSIS

Report No:

Date: 3/1/82

To: Amoco Production Co.
501 Airport Dr.
Farmington, NM 87401
Attn: Tim Clawson

Submitted By: Tim Clawson Date Received: 2/16/82

Well No: Cahn GC #1 Depth: Unknown Formation: Fruitland

Location: 32N, 10W, Sec 33

Resistivity	0.46	ohms/m^2/m
Temperature	75°F	
Specific Gravity(Sp.Gr.)	1.012	
pH	8.3	
Total Dissolved Solids	21,026	parts per million*
Calcium (Ca^{++})	66	parts per million
Magnesium (Mg^{++})	5	parts per million
Chlorides (Cl^{-})	896	parts per million
Carbonates (CO_3^{--})	903	parts per million
Bicarbonates (HCO_3^{-})	13,045	parts per million
Sulfates (SO_4^{--})	<10	parts per million
Iron (Fe^{+++})	nil	parts per million
Potassium (K^{+})	nil	parts per million
Sodium (Na^{+})(Difference)	6,111	parts per million
Stability Index (SI)	not required	

REMARKS:

* indicates parts per million by weight; uncorrected for Specific Gravity

LABORATORY ANALYST:

Clarion Cochran

Respectfully submitted,
National Cementers Corporation

By: Clarion A Cochran

A relatively small mountainous area, locally known as the Chuska Mountains, is located in the southwestern part of the county. The topography of this area varies extremely, ranging from nearly level to gently sloping and undulating on the mountain top or plateau to the very steep dissected mountain slopes. The soils in this part of the county are generally developing in materials of sandstone origin.

The central and remaining parts of the county are characterized by broad, gently sloping to rolling plains and valleys with locally prominent outcrops of sandstone and shale, mesas, buttes, and hogback ridges. Many of the plains and upland areas to the east of the Chaco River have a cover of alluvial and eolian materials.

Nearly level to gently sloping valley bottoms border many of the principal drainages of the county. These occur in the entrenched valleys of the San Juan, Animas, and La Plata rivers as well as in a number of the smaller ephemeral stream systems.

The area is drained by the San Juan River which originates in Colorado and re-enters that state after making a loop through the northern part of San Juan County. In addition to the San Juan River, including the Animas, La Plata, and Los Pinos tributaries, this county contains numerous intermittent drainageways. The Chaco River, the largest of these intermittent streams, generally flows northwesterly from the southeastern part of the county to its confluence with the San Juan River just east of Shiprock. Many of the intermittent streams are bordered by highly erodible soils and barren or nearly barren shale hills. During periods of flash floods, these streams contribute considerable sediment to the drainage system.

Shiprock, in the northwest part of the county, has an elevation of 4,945 feet. From this point, the general land level increases to the north, east, and south to a maximum of slightly over 9,300 feet in the Chuska Mountains in the southwestern part of the county. Elevations of 6,800 feet to slightly more than 7,100 feet are common near the east county boundary and in the northeastern part near the Colorado-New Mexico state line.

Climate[4]

Distant high mountains shield San Juan County from much precipitation that would otherwise be supplied from shallow intrusions of extremely cold air in winter. Aridity is maintained because the air from the Gulf of Mexico loses most of its moisture before it reaches northwestern New Mexico, and much of the moisture in air from over the Pacific is removed by the high western mountains over which it flows.

Average annual precipitation totals from 5 to 8 inches along the valley, generally increasing with increasing elevation to nearly 12 inches along the Colorado border and to more than 15 inches in the mountains of the southwest corner. Annual amounts may vary greatly, as shown by totals ranging from 3 inches to as much as 24 inches at Aztec Ruins National Monument area. Monthly precipitation is greatest in late summer and early fall when thunderstorms, occasionally accompanied by hail, are most active. Winter precipitation is heavier than fall or spring precipitation.

The snowfall season is November through April with annual totals averaging from 9 inches in the valley to more than 20 inches along the Colorado border and at high elevations. Snowfall in the Colorado Mountains is the primary source of summer irrigation water along the San Juan River. Temperatures rarely reach 100 degrees Fahrenheit, and only a few days a year have temperatures of zero or below. Average annual temperature is in the low fifties. The average daily range of temperature is nearly 33 degrees, so frequent freezing and thawing of the surface take place in December through March when night-time temperatures average below freezing. Extremes of temperature in the county have been 110 degrees at Fruitland and -35 degrees at Bloomfield.

The period between the last freezing or lower temperature in the spring and the first in the fall ranges from 139 days at Chaco Canyon National Monument to 170 days at the Farmington airport. The monthly pattern of temperature and precipitation in the county is illustrated in table 2 with data from Aztec Ruins National Monument. This pattern is generally applicable to other localities within the county, for which selected annual averages are listed in table 3.

Evaporation for May through October, as measured by a Class A pan, averages 49 inches at Farmington, but may be as much as 25 percent greater at higher plateau locations where there is greater wind movement.

Sunshine occurs about 70 percent of the possible number of hours. Average relative humidity is nearly 50 percent, ranging from 70 percent in early morning hours to 30 percent in the afternoons. In late spring and early summer, afternoon relative humidities are more nearly 15 to 20 percent.

[4]This section was prepared by Frank E. Houghton, ESSA, Weather Bureau State Climatologist.

Table 2. Monthly temperatures and precipitation, Aztec Ruins National Monument, San Juan County, New Mexico 1931 to 1960, elevation 5640 feet

Item	Jan	Feb	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov	Dec
Temperature °F.												
Average daily maximum	43	49	55	68	77	86	91	88	82	70	55	45
Average daily minimum	15	20	25	32	41	48	57	55	48	37	23	17
Daily mean	29	34	41	50	59	67	74	72	65	54	39	31
Extreme maximum	66	78	80	89	95	103	104	105	96	87	80	67
Extreme minimum	-22	-27	1	10	21	31	43	41	29	13	-7	-16
Precipitation												
Average (inches)	.74	.76	.79	.60	.67	.44	.94	1.32	1.12	1.09	.49	.86
Average days 0.10 inch or more (no.)	3	3	3	2	2	1	3	4	3	3	2	3
Average snowfall (inches)	6.7	4.8	2.0	0.5	T	T	0	0	T	0.1	1.8	5.7

T - Trace, amount too small to measure.

Table 3. Annual averages of selected climatological data, San Juan County, New Mexico, for period of record through 1960

Station	Elevation	Temperatures: Mean maximum	Temperatures: Mean minimum	Temperatures: Yrs. of record	Precipitation: Mean annual	Precipitation: Yrs. of record	Last 32° F or Lower in Spring	First 32° F or Lower in Fall	Time Between Dates
	feet	°F	°F	number	inches	number	average date		days
Aztec Ruins National Monument	5640	68	35	30	9.33	59	May 12	Oct. 9	150
Bloomfield 3SE[1]	5794	68	35	51	8.46	60	May 8	Oct. 9	154
Chaco Canyon National Monument	6175	68	34	25	8.67	28	May 22	Oct. 8	139
Farmington 4NE[1]	5395	68	35	20	8.22	46	May 14	Oct. 7	146
Farmington Airport	5495	67	37	19	8.12	20	May 4	Oct. 21	170
Fruitland	5165	69	36	47	6.96	55	May 11	Oct. 7	149
Newcomb	5565	70	35	11	5.35	13	May 10	Oct. 12	155
Shiprock 1E[1]	4974	70	37	29	7.04	32	May 1	Oct. 15	167
Whiskey Creek	7450				14.97	17			

[1] Figures and letters following the station name, such as 3SE, indicate distance in miles and direction from the postoffice.

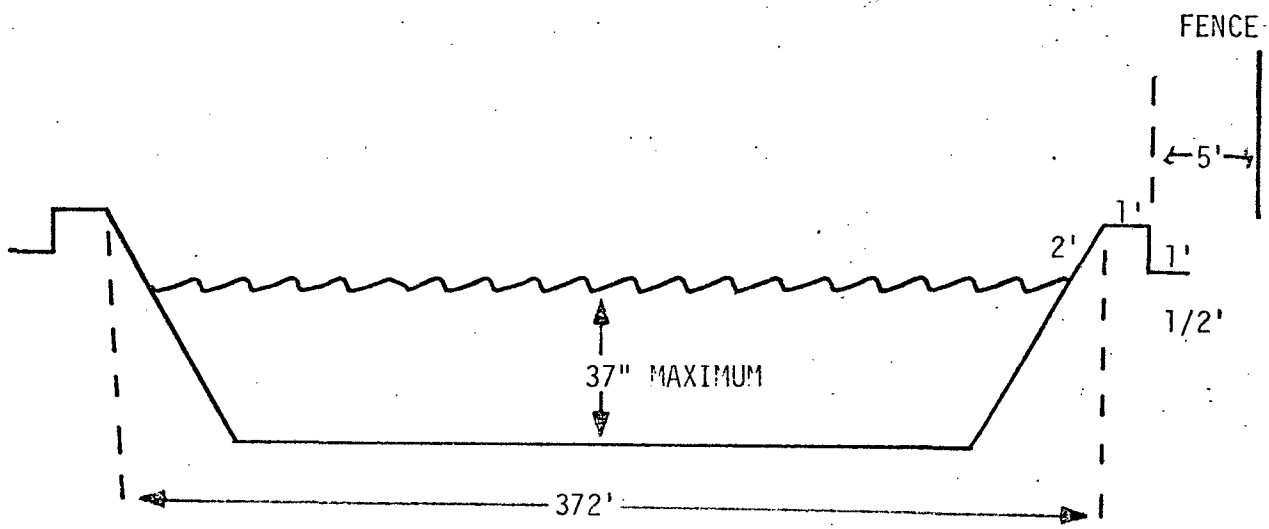
The two predominant directions of winds in the valley are from the east and west, influenced by orientation of the valley. Strong winds are most common from the west. Spring is the windiest season with an average of 10 miles per hour. Winds of 25 miles per hour or greater occur only 1 percent of the time, but they occasionally cause blowing dust when the soil is dry.

LAND USE

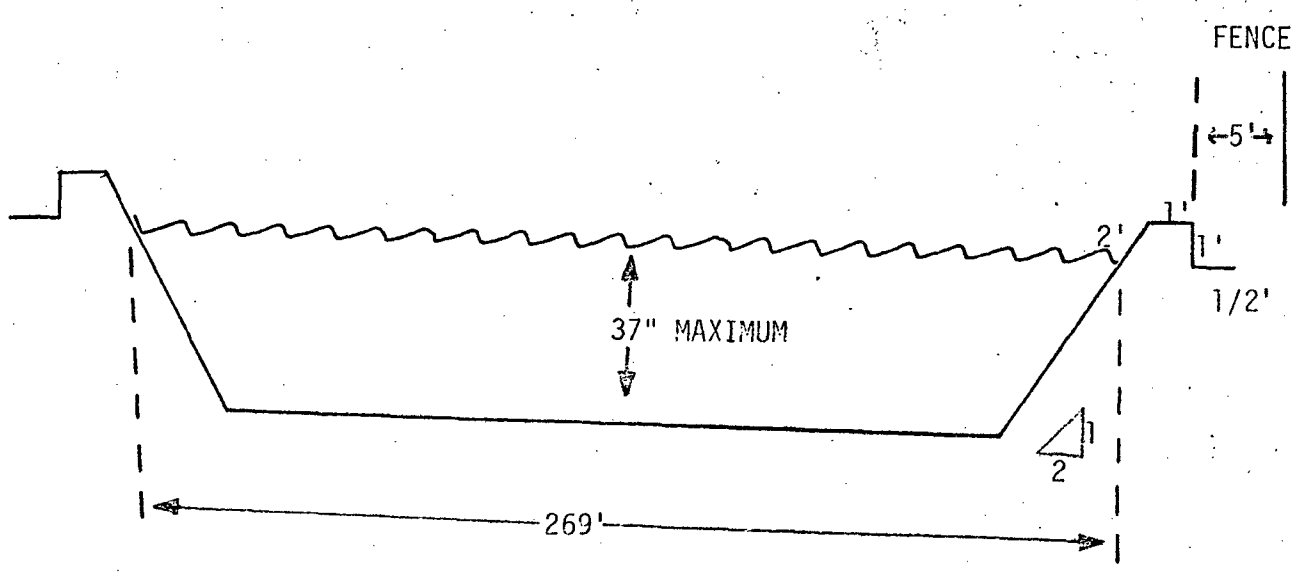
Although only a small percentage of the land area in San Juan County is farmed under irrigation, this agricultural enterprise contributes much to the county's economy. The present irrigation farming is largely confined to the valleys of the San Juan, Animas, and La Plata rivers. It was estimated by the State Conservation Needs Committee that approximately 49,000[5] acres of land were irrigated in 1966. Urban and industrial expansion during recent years has withdrawn some of the prime agricultural land. New lands have been brought under irrigation to replace that withdrawn for other uses; hence, there has been little or no change in total irrigated land in recent years. Alfalfa and corn are the most extensively grown crops; lesser acreages of tree fruits, small grains, beans, vegetables, and potatoes are grown, but any one of them may be the main cash crop in a particular area.

The Navajo Irrigation Project, a project authorized for construction by the Bureau of Reclamation, will provide irrigation water for

[5] New Mexico Soil and Water Conservation Needs Inventory, Statistical Report, Soil Conservation Service and other federal and state agencies, 1970.



Amoco Production Company	SCALE: none
Schneider Evaporation Pond	DRG. NO. 7



Amoco Production Company	SCALE: none
Cahn Evaporation Pond	DRG. NO. 8

SOLIDS PRECIPITATION DETERMINATION

TDS is assumed to be sodium bicarbonate = 19,000 ppm = 19 gm/l

Solids Precipitated:

$$19 \text{ gm/l} \times 0.062427 \frac{\text{lb/ft}^3}{\text{gm/l}} \times 100 \text{ BWPD} \times 365 \text{ days/yr} \times 5.615 \text{ ft}^3\text{/bbl}$$

$$= 243{,}100 \text{ lbs } NaHCO_3\text{/yr}$$

Specific gravity of $NaHCO_3$ is 2.2

Volume of Solids Precipitated:

$$243{,}100 \text{ lbs/yr} \times \frac{1 \ H_2O}{2.2 \ NaHCO_3} \times \frac{1 \text{ ft}^3 \ H_2O}{62.4 \text{ lbs m}} = 1770 \text{ ft}^3\text{/yr}$$

Pond Volume = 195,600 ft^3 for 100 BWPD with 37" fluid level

Pond Volume Fill Up Per Year:

$$1770 \frac{\text{ft}^3}{\text{yr}} / 195{,}600 \frac{\text{ft}^3}{\text{yr}} = 0.0091 = 0.91\%$$

ENGINEERING SPECIFICATION

036 INDUSTRIAL GRADE HYPALON®

SUPPORTED WITH 10x10 1000D SCRIM

1. SCOPE

1.1 The scope covered by these specifications covers the furnishings and installation of a fabric-reinforced Hypalon lining. All work shall be done in strict accordance with the engineers drawings and specifications.

2. CONTRACTOR'S EXPERIENCE

2.1 Any contractor proposing to perform the work hereunder shall have demonstrated his ability to do the work by having successfully installed at least two million square feet of reinforced membrane lining.

3. LINING MATERIAL

3.1 The membrane used for lining material shall be fabric-reinforced Hypalon of new, first-quality products designed and manufactured specifically for the purpose of this work, and shall have been satisfactorily demonstrated by prior use to be suitable and durable for such purposes. The manufacturer shall have produced, and have in service in similar applications for a period of not less than one (1) year, at least ten (10) million square feet of fabric-reinforced Hypalon material utilizing the same scrim specified for use under these specifications.

3.2 Hypalon utilized for encapsulation of the scrim shall be manufactured from a composition of high quality ingredients, suitably compounded, of which Hypalon 45 synthetic rubber resin is the sole elastomer. Zinc compounds of any kind, including zinc oxide, zinc stearate and zinc dusting agents, are prohibited. Dusting agents of any kind are prohibited on the finished product.

Property	Test Method	Specification
Tensile Strength	ASTM D-412	1500 psi min.
Elongation @ Break	ASTM D-412	300% min.
Water Absorption	ASTM D-471 (7 days @ 70°F)	2% (wt) max.
Cold Bend (36 mil specimen, reinforced)	ASTM D-2136 (⅛" mandrel)	−45°F, no cracks
Brittleness Temp. (30 mil specimen, unreinforced)	ASTM D-746 Procedure B	−45°F, no failures
Ozone Resistance	ASTM D-1149 (3 ppm @ 30% strain @ 104°F — 72 hours)	No effect
Heat Aging	ASTM D-412 (14 days @ 212°F)	
Tensile Strength		1500 psi min.
Elongation @ Break		150% min.

All test values are based on .030" specimens.

3.3 Scrim used in the membrane shall be 10 × 10 1000D polyester of an open type weave that permits strike-through of the Hypalon through the fabric to facilitate adhesion between the plies of Hypalon. The fill yarn must have 2.5 turns per inch maximum and 2.0 turns per inch minimum. All selvage edges must be trimmed prior to applying the Hypalon coating.

3.4 The composite membrane material shall consist of a thoroughly bonded, fabric-reinforced Hypalon rubber sheeting. It shall be manufactured by the calendering process and shall be uniform in color, thickness, size, and surface texture. The fabric shall be totally encapsulated between plies of Hypalon and shall not extend closer than ⅛ inch to the edge of the Hypalon coating either side of the fabric. Exposed fabric along longitudinal edges of roll stock and indications of delamination will not be permitted. The composite material shall be a flexible, durable, watertight product free of pinholes, blisters, holes, and contaminants and shall not delaminate in a water environment.

The composite membrane material shall be fabric-reinforced Hypalon consisting of one ply of scrim and two plies of Hypalon as manufactured by Stevens Elastomeric And Plastic Products Inc., Easthampton, Massachusetts, or approved equal.

Property	Test Method	Specification
Thickness.	ASTM D-751	.036 and not less than .033
Strength:		
Warp	ASTM D-751	200 Lbs.
Fill	Grab Method	200 Lbs.
Tear:		
Warp	ASTM D-751	80 Lbs.
Fill	Tongue Method	80 Lbs.
Puncture Resistance	FTM-101 B -2031	180 Lbs.

3.5 The fabricator shall be an experienced firm customarily engaged in factory-fabricating individual widths of fabric-reinforced Hypalon roll stock into large sheets. Factory seams shall have a minimum of 1-½" scrim to scrim overlap when made by the solvent seaming method, and ⅝ inch scrim to scrim overlap when made by the heat welded method.

Each factory-fabricated sheet shall be given prominent, unique indelible identifying markings indicating proper direction of unrolling and/or unfolding to facilitate layout and positioning in the field. Each factory-fabricated sheet shall be individually packaged in a heavy cardboard or wooden crate fully enclosed and protected to prevent damage to it during shipment, prominently identified in the same fashion as the sheet within and showing the date of shipment. Until installed, factory-fabricated sheets shall be stored in their original unopened crates; if outdoors, they shall be stored on pallet and shall be protected from the direct rays of the sun under a light-colored heat-reflective opaque cover in a manner that provides a free-flowing air space between the crate and cover.

4. OTHER MATERIALS

4.1 Solvent for cleaning contact surfaces of field joints and for other required uses shall be as recommended by the manufacturer or approved fabricator of the fabric-reinforced Hypalon.

4.2 All seaming, sealing and high-solids adhesives shall be of a type or types recommended by the manufacturer or approved fabricator of the fabric-reinforced Hypalon and shall be delivered in original sealed containers each with an indelible label bearing the brand name and complete directions as to proper storage, use and application of the adhesive.

5. INSTALLATION

5.1 Prior to ordering fabric-reinforced Hypalon material, the contractor shall submit, for the engineer's approval, shop drawings showing lining sheet layout with proposed size, number, position, of all factory-fabricated sheets and indicating the location of all field joints. Shop drawings shall also show complete details and/or methods for anchoring the lining at top of slope, making field joints, seals at structures, etc.

5.2 Lap joints shall be used to seal factory-fabricated sheets of fabric-reinforced Hypalon together in the field. All field joints between sheets of fabric-reinforced Hypalon shall be made on a supporting smooth surface and, unless the weather is sufficiently warm, heat guns shall be used to make the sealing temperature at least 90°F. The lap joints shall be formed by lapping the edges of sheets a minimum of 3" scrim-to-scrim. The contact surfaces of the sheets shall be wiped clean to remove all dirt, dust, moisture, or other foreign materials, then wiped with 111 Trichloroethane. Sufficient Hypalon-to-Hypalon bonding adhesive shall be applied to both contact surfaces in the joint area and the two surfaces pressed together while wet and immediately rolled. Any wrinkles shall be smoothed out and any cut edges of the fabric-reinforced Hypalon shall be sealed with high solids Hypalon adhesive to prevent wicking.

5.3 Any necessary repairs to the Hypalon membrane shall be patched with a piece of the membrane material itself and Hypalon-to-Hypalon adhesive. The adhesive shall be applied to the contact surfaces of both the patch and lining to be repaired, the two surfaces pressed together immediately and rolled, and any wrinkles smoothed out, all in accordance with Paragraph 5.2 hereof.

5.4 All joints, on completion of the work, shall be tightly bonded. Any membrane surface showing injury due to scuffing, penetration by foreign objects, or distress from other causes shall, as directed by the engineer, be replaced or repaired with an additional piece of fabric-reinforced Hypalon membrane of the proper size.

5.5 On completion of installation, the contractor shall dispose of all trash, waste, material and equipment used in connection with the work hereunder, and shall leave the premises in a neat and acceptable condition.

6. SEAM STRENGTH

6.1 All factory and field seams (joints) shall, after 12 days, have a seam strength of 170 pounds when tested in accordance with ASTM D-751, Grab Method (using 4" wide specimens having a length of 10" plus the seam width). The distance between the jaws of the testing apparatus at the start of the test must be 8" plus the seam width and shall have sufficient strength in peel that they fail by delamination from the scrim rather than in the plane of the seam.

WATERSAVER COMPANY, INC.
POST OFFICE BOX 16465 ♦ DENVER, COLORADO 80216 ♦ (303) - 623-4111
Plant and Office – 3560 Wynkoop Street

POND AND RESERVOIR MEMBRANE LINERS

GENERAL INSTRUCTIONS FOR JOBSITE PREPARATION

1. The earth upon which the liner will be placed must be smooth and free from sharp rocks, roots, vegetation, and other foreign material. A compacted substrate is advisable to prevent settling. Compaction around pipes and structures is especially important.

2. Check measurements and grades prior to start of liner installation. Surveyor control stakes should be left in place to assist in placing the lining panels.

3. Dig the anchor trench as shown on the shop drawing or the engineering drawings. A typical cross section is found on TLD-74, where a minimum 12" setback is shown. ALWAYS THROW EARTH FROM TRENCH AWAY FROM SIDE SLOPE.

4. Crew size will depend on the project size. A minimum of 6 men is required, most projects need at least 10 men to spread panels.

5. Old tires or sand bags will be needed to keep the material in position during windy conditions. Normally 10 tires per panel up to 50 tires are required.

6. Tools and equipment not supplied by Watersaver include; wiping rags, paint brushes for adhesive, rakes and shovels. Liner panels may weigh as much as 4000#. A large front end loader or forklift will be required to assist in the spreading of the lining material. Palleted cartons are about 84" x 36" x 36".

7. Cements and adhesives shall be kept from extreme heat and cold.

8. A Technical Services Representative is available from the Watersaver Co. for a small fee when made part of the purchase agreement.

9. All PVC (Vinyl) liners must be covered with earth if an extended life is expected. A minimum of 12" of earth should be placed on the bottom and slopes. Side slopes of 3:1 or less are normally required to hold the earth cover. Windy conditions may require special rip rap considerations.

10. Driving on the liner is permitted only when the liner is first covered with 12" of earth. If an area is to have sustained traffic 24" of cover is advised. Damage to the liner must be repaired as it is discovered!

11. Structures including, pipes, splash pads, inlets, outlets, and headwalls should be finished prior to placement of the liner. Prefabricated corners and pipe seals are available for flashing the liner to structures.

This sheet is furnished to aid in planning liner installations. Watersaver Co., Inc. as a supplier of materials only, does not assume responsibility for errors in design, engineering, quantities, or dimensions.

JPS-76
Supersedes JPS-74

POST OFFICE BOX 16465 ◆ DENVER, COLORADO 80216 ◆ (303)-623-4111
Plant and Office — 3560 Wynkoop Street

STANDARD SPECIFICATIONS

POLYVINYL CHLORIDE (PVC) PLASTIC LININGS

01 - GENERAL REQUIREMENTS

The work covered by these specifications consists of installing a polyvinyl chloride (PVC) plastic lining in the (lagoon, reservoir, canal, etc.) where shown on the drawings or directed by the Engineer. All work shall be done in strict accordance with the drawings and these specifications and subject to the terms and conditions of the contract.

02 - PVC MATERIALS

A. General. The materials supplied under these specifications shall be first quality products designed and manufactured specifically for the purposes of this work, and which have been satisfactorily demonstrated by prior use to be suitable and durable for such purposes. The manufacturer of the calendered rolls shall show where a minimum of 500,000 sq.ft. (46,000 sq.m.) of its 76" (193 cm) wide material has been installed for lining hydraulic structures.

B. Description of PVC Materials. PVC (polyvinyl chloride) plastic lining shall consist of 76" (193 cm) widths of calendered polyvinyl chloride sheeting fabricated into large sections by means of special factory-bonded seams into a single panel, or into the minimum number of large panels required to fit the jobsite as supplied by WATERSAVER CO., INC., 3560 Wynkoop St., Denver, Colorado (303-623-4111).

1. Physical Characteristics - The PVC materials shall have the following physical characteristics.

PROPERTY	10 Mil	20 Mil	30 Mil	Test Method
Thickness	± 7%	± 5%	± 5%	ASTM D-1593
Specific Gravity	1.23	1.23	1.23	ASTM D-792-A
Tensile Strength, lbs./in. width	24	52	66	ASTM D-882, Method B
Modulus @ 100% Elongation, lbs/in.	9	20	30	ASTM D-882, Method B
Ultimate Elongation, %	250	300	325	ASTM D-882, Method B
Oven Aging (Wt.loss, % max.)	0.7	0.5	0.4	2" x 4" sample 16 hrs. in a forced air circulating oven @212°F.
Tear Resistant:				
A. Elmendorf, grams	1500	4000	6000	ASTM D-1922
B. Graves Tear, lbs.min.	3.25	6	8.25	ASTM D-1004
Low Temperature Impact, °F	0	-15	-20	ASTM D-1790
Water Extraction (% loss max.104°F for 24 hrs.)	1.0	.3	.15	ASTM D-1239
Volatility % loss max.	1.5	1.0	.75	ASTM D-1203, Method A
Dimensional Stability (@212°F, 15 Min.) % max.change	6	5	5	ASTM D-1204
Resistant to Soil Burial:				
Tensile Strength Loss (% Max.)	5.0	5.0	5.0	Par. 4c. (1) per Bureau of Reclamation procedure.
Elongation Loss (% Max.)	20.0	20.0	20.0	

2. PVC materials shall be manufactured from domestic virgin polyvinyl chloride resin and specifically compounded for the use in hydraulic facilities. Reprocessed material shall not be used. It shall be neutral gray to black in color and produced in a standard minimum width of at least 76" (193 cm). Thickness shall be as shown on the drawings. Certification test results showing that the sheeting meets the specifications shall be supplied on request.

03 - FACTORY FABRICATION

Individual calender widths of PVC shall be factory fabricated into large panels. The manufacturer of the calendered rolls shall show where a minimum of 500,000 sq.ft. (46,000 sq.m.) of its 76" (193 cm) wide material has been installed for lining hydraulic structures. Lap joints with a minimum joint width of 1/2 inch (13 mm) shall be used. Factory made splices shall have a strength of 80% of the specified sheet strength. After fabrication, the lining shall be accordion folded in both directions and packaged for minimum handling in the field. Shipping boxes shall be substantial enough to prevent damage to contents.

04 - PLACING OF PVC LINING

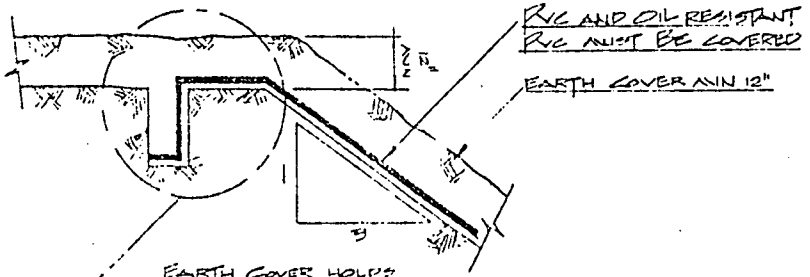
A. General - Installation shall be performed by a contractor that has previously installed a minimum of 500,000 sq.ft. (46,000 sq.m.) of this material or by a contractor that has a fabricator field representative in attendance. The surface (substrate) to receive the liner shall be smooth, and free of sharp objects that could puncture the lining. All vegetation must be removed. A soil sterilant may be required at the discretion of the Engineer. The PVC lining shall be placed over the prepared surfaces to be lined in such a manner as to assure minimum handling. It shall be sealed to all concrete structures and other openings through the lining in accordance with details shown on the drawings submitted by the contractor and approved by the Engineer. The lining shall be closely fitted and sealed around inlets, outlets and other projections through the lining. Any portion of lining damaged during installation shall be removed or repaired by using an additional piece of lining as specified hereinafter.

1. Field Joints - Lap joints will be used to seal factory fabricated panels of PVC together in the field. Lap joints shall be formed by lapping the edges of panels a minimum of 2 inches (50 mm). The contact surfaces of the panels shall be wiped clean to remove all dirt, dust or other foreign materials. Sufficient cold-applied vinyl to vinyl bonding adhesive shall be applied to the contact surfaces in the joint area, and the two surfaces pressed together immediately. Any wrinkles shall be smoothed out. Field made splices shall have a strength of 80% of the specified sheet strength.

2. Joints to Structures - All curing compounds and coatings shall be completely removed from the joint area. Joining of PVC to concrete shall be made with vinyl to concrete adhesive and mechanically fastened. Unless otherwise shown on the drawings, the minimum width of concrete to PVC joint shall be 8 inches (20 cm).

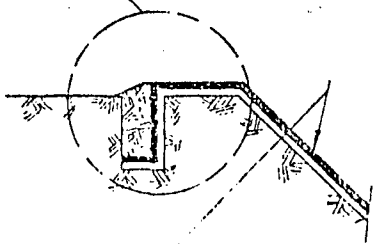
3. Repairs to PVC - Any necessary repairs to the PVC shall be patched with the lining material itself and cold applied vinyl to vinyl splicing adhesive. The splicing adhesive shall be applied to the contact surfaces of both the patch and lining to be repaired, and the two surfaces pressed together immediately. Any wrinkles shall be smoothed out.

4. Quality of Workmanship - All joints, on completion of the work, shall be tightly bonded. Any lining surface showing injury due to scuffing, penetration by foreign objects or distress from rough subgrade shall, as directed by the Engineer, be replaced or covered and sealed with an additional layer of PVC of the proper size. A Technical Service Representative will be made available to the contractor if the contractor desires. The contractor will bear the expense of this Technical Service Representative. The Technical Service Representative is not directly responsible for the quality of the work involved; such responsibility will be solely that of the contractor.



A/1

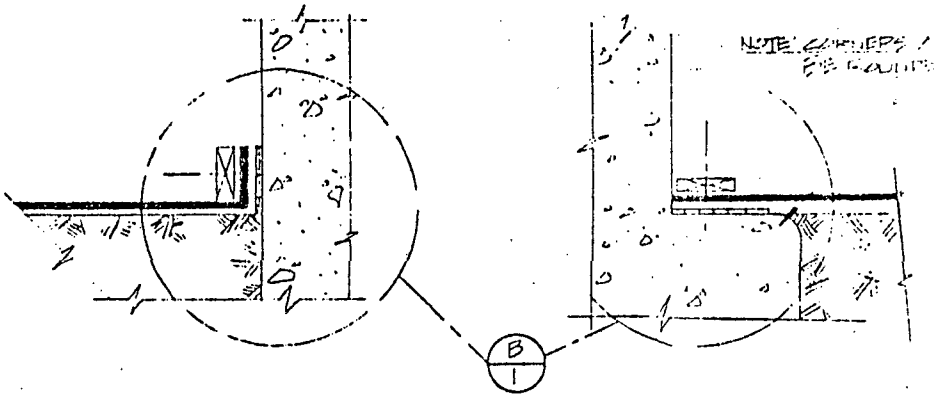
COVERED LINER
NO SCALE

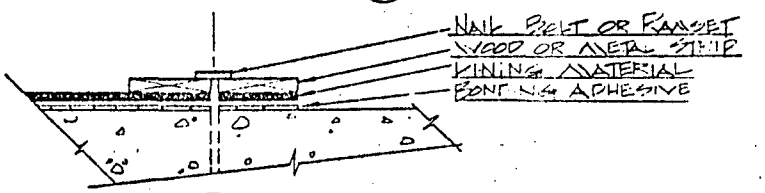


REINFORCED LINING MATERIALS SHOULD BE USED IF THE SLOPE IS 2:1 OR STEEPER

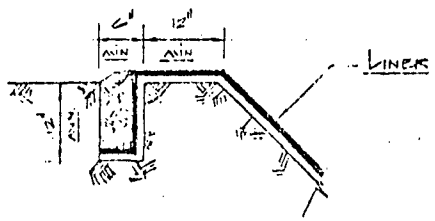
EXPOSED LINERS ARE AVAILABLE IN
CPE
HYPALON
EPDM
NEOPRENE
URETHANE

EXPOSED LINER
NO SCALE



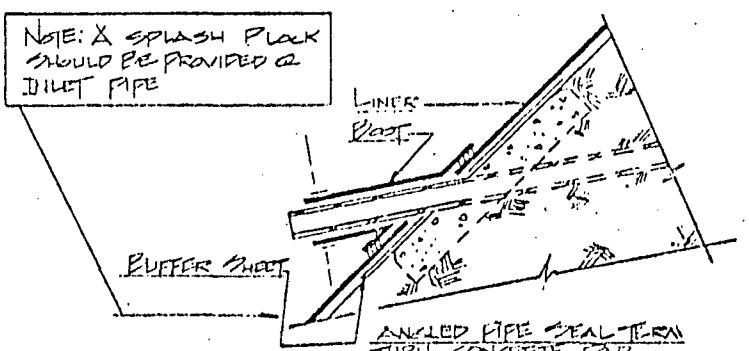


B/1 TYPICAL VERTICAL & HORIZONTAL MECHANICAL TERMINATION
NO SCALE

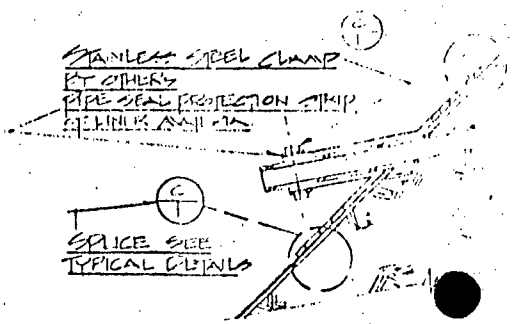


A/1 TYPICAL BURIAL TRENCH
NO SCALE

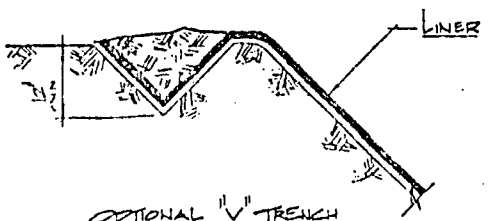
NOTE: A SPLASH PLACK SHOULD BE PROVIDED @ INLET PIPE



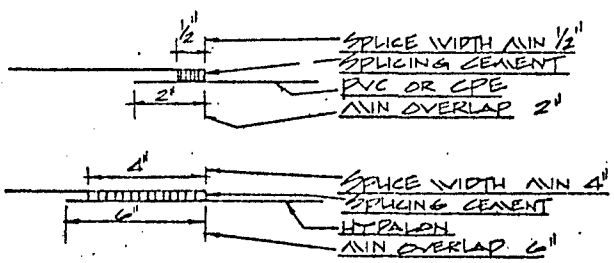
ANGLED PIPE SEAL THRU CONCRETE PAD
NO SCALE



C/1 ANGLED PIPE SEAL
NO SCALE



OPTIONAL "V" TRENCH
NO SCALE



C/1 TYPICAL FIELD SPLICE
NO SCALE
NOTE: FOR FIELD SPLICING EPDM, NEOPRENE AND URETHANE, CONTACT WATERSAVER CO. FOR MFGRS RECOMMENDATIONS

WATERSAVER CO. INC.
BOX 15468 DENVER, COLO 80215
PHONE: 303-623-4111
OFFICES IN NEW JERSEY, TEXAS, CALIFORNIA, OKLAHOMA

TYPICAL LINING DETAILS

DRAWN BY	SCALE:	WFR
T. Koss 3-21-11	NONE	WSC-PCB

TD-7

Chevron

Construction Guide CG-64P
Chevron Industrial Membrane (CIM) for Earthen Reservoirs

1.0 DESCRIPTION

This specification covers the installation of Chevron's Industrial Membrane System (CIM) in reservoirs, ponds, pits or lagoons designed to hold water, chemical and/or sanitary waste and to prevent seepage into the surrounding soil.

2.0 MATERIALS

2.1 Chevron Premix CIM

2.2 Chevron Activator CIM

2.3 Chevron Bonding Agent

2.4 Fabric Mat (See Table I)

3.0 SAFE PRACTICES

Construction should be done with due regard to use of equipment and procedures designed to minimize danger to personnel and materials. Chevron U.S.A. Inc./Asphalt Division provides Safety Practice Recommendations for considerations when installing the CIM System. (Refer to Appendix 1, CIM Manual.)

4.0 CONSTRUCTION OF THE BASIN

4.1 Construction

The basin may be excavated by any convenient means. Excavated soil is graded into a compacted embankment. The surfaces of the basin shall be tightly compacted, smooth, and free of holes, rocks, stumps, debris or sharp protrusions of any sort. Liner is anchored by backfill in a trench excavated around the perimeter of the embankment. Any weed growth in the basin should be removed.

(See paragraph 5.6 concerning herbicides if they are required for treatment of subgrade soils.)

The slope of the sides shall be determined according to good engineering practice after due consideration of the type of soil, the intended use of the pit, the risk of danger in case of collapse, etc.; but the slope of a non-reinforced earthen wall should never be steeper than 2 (horizontal) to 1 (vertical), and preferably not steeper than 3 to 1.

TABLE I

FABRIC SCRIM AND MINIMUM APPLICATION RATE OF CIM

FABRIC SCRIM	WEIGHT Oz/Yd²	SUPPLIER	MINIMUM APPLICATION RATE OF CIM Gal/Yd²	WET MILS	LINER MINIMUM MIL THICKNESS
CEREX	2.0	MONSANTO TEXTILES CO.	0.232	40	35
BAMILEX XP-113	4.1	BAY MILLS LTD. (CANADA)	0.232	40	35
SCRIM	3.1	CHEVRON U.S.A. INC. ASPHALT DIV.	0.336	60	50
PETROMAT	4.4	PHILLIPS FIBERS CORP.	0.464	80	70

4.2 Venting

Continuous flexible membrane pond linings can be damaged to failure by gas pressure created beneath them. Gas formation is common in some oil and gas producing areas, or can occur if organic materials are present in the soil beneath the reservoir membrane. Certain bacteria may attack the organic matter and create gassing.

In Gulf Coast locations and other areas where marsh lands and oil deposits are found, gas producing mechanisms tend to be active. Hence, these areas should be carefully surveyed to determine whether this situation exists before the pit is built. If continuous gas evolution is detected, the reservoir should be built with a bottom slope of about (3%) three percent. Sloped underdrains (French drains, perforated pipe) should be constructed at intervals of about 50 feet. These are to vent any generated gas to the higher elevations of the embankment berm where the vent pipes or flaps can be easily installed.

For large installations, in gas producing locations, the design of the gas venting system may require special engineering, especially if the bottom of the reservoir is not a sloped single one-plane area. Refer to Figure II.
Other approved vents may be used.

5.0 INSTALLATION OF THE MEMBRANE

5.1 Chevron Bonding Agent

Before laying any fabric for the membrane, Chevron Bonding Agent shall be applied over any areas of *concrete, metal, or stone* which are to be covered with CIM.

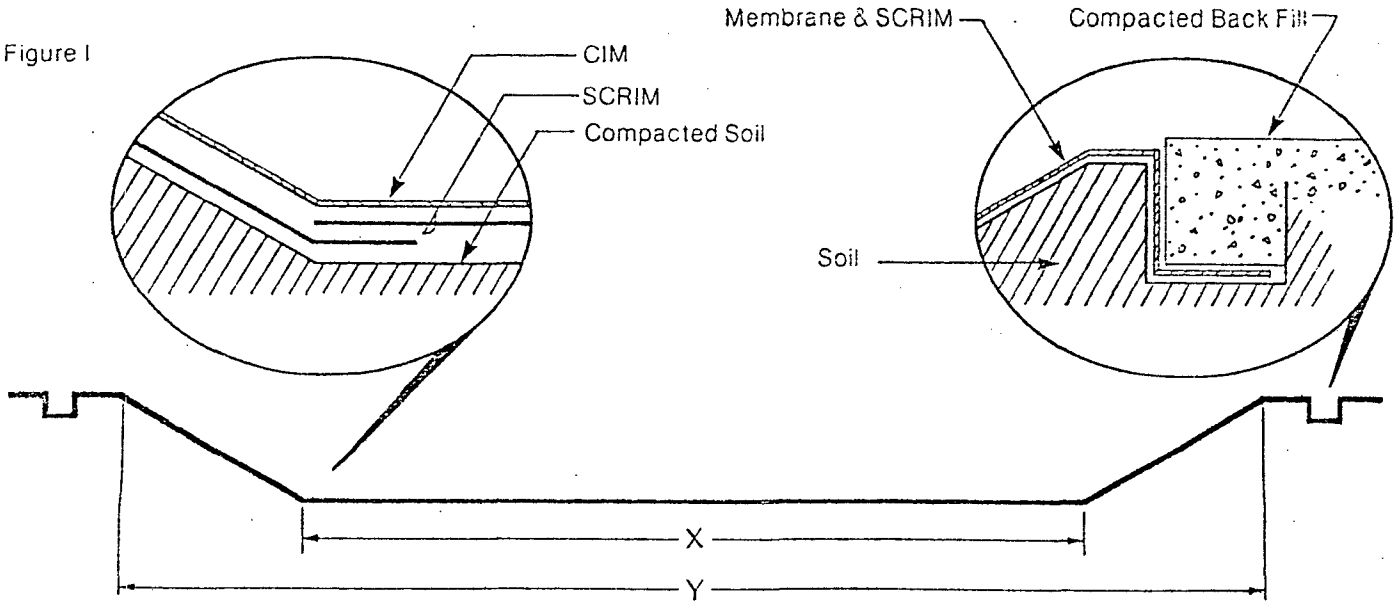
5.2 Placement of Fabric SCRIM

Selection of the SCRIM for the membrane depends on the end use of the pond or reservoir. For light duty such as shallow fish ponds (up to 10 feet deep) or decorative landscaping ponds, two ounce Cerex is suitable. For medium duty, such as ponds or reservoirs from 10 to 25 feet deep, or where occasional foot traffic will occur, use 3 ounce CIM SCRIM, or Bamilex XP-113. For heavier duty, ponds or reservoirs over 25 feet deep, or where hooved animals may walk on the membrane to drink, use 4.4 ounce Petromat or Bamilex XP-113 and cover the finished membrane with a layer of sand, soil, or gravel for a depth of (30 Cm) 1 foot. See Table I for mat description and recommended coverage.

SCRIM shall be placed over the entire surface of the pit using a 6-inch overlap on longitudinal and transverse joints. Refer to overlap detail. (Figure III)

The liner architect should pay particular attention to geographical conditions including climate and prevailing wind directions. Placement of the SCRIM shall include provisions for overlap not to oppose prevailing winds. Fasteners and/or weights (sandbags, used tires, containers, etc.) may be required to contain SCRIM during construction and until ready for service.

Figure I



The SCRIM shall extend over the outside edge of the pit, into, and across the bottom of a ditch excavated to a minimum depth of one foot (see Figure I). After construction of the membrane system is completed, the ditch shall be backfilled and compacted thoroughly.

In corners, the SCRIM shall be cut to fit so that no area shall have more than three layers. There shall be no air pockets under the fabric nor any bulky areas caused by too many layers.

5.3 Installation of Chevron Industrial Membrane (CIM)

CIM shall be spray applied over the SCRIM at a rate of not less than specified in Table I for the particular type of SCRIM. The SCRIM will absorb most of this amount, creating a completely waterproof system. Extra membrane shall be used at joints to ensure complete coverage.

If work cannot be completed in one day, about two feet of fabric shall be left uncoated to form a joint for the next day's work.

Any areas where fabric is not completely coated after the membrane has cured shall be oversprayed until all fabric is covered.

SCRIM extending outside the basin into trenches or ditches shall be thoroughly coated with membrane.

For potable water service and/or extreme sunlight exposure (such as Middle Eastern desert conditions) all areas of the pond, lagoon or reservoir shall receive a thin layer of clean dry aggregate, assuring complete coverage, directly into the CIM within 30 minutes of CIM application to the SCRIM. Aggregates may be 20/30 mesh sand or larger. This is not necessary below constant fluid level design or where protective cover (soil) is specified for the complete system.

5.4 Backfilling

After the membrane has cured, all trenches or ditches into which the membrane-coated SCRIM extends shall be backfilled and compacted.

5.5 Cover Material

All areas of the pond or reservoir which will be subject to animal or rubber-tired wheel traffic shall be covered with a minimum of 15 cm (6") of sand or soil containing no sharp aggregate. If gravel is used a minimum of 15 cm (*6 inches*) of sand or soil shall be placed before the gravel is applied.

If the pond, pit or reservoir is to be dredged or "harvested" using mechanical equipment, a minimum of 60 cm (*2 feet*) of cover shall be placed. The cover material should consist of two layers of distinctly different characteristics (size, color, or texture) so the operator of the harvesting equipment will realize how close to the membrane he is operating so no damage will be done.

5.6 Soil Applied Herbicides

Where there is danger of weed seeds being germinated in the soil below the proposed membrane, it may be advisable to treat the compacted subgrade with a herbicide. Where the membrane has been covered with sand or gravel to prevent puncture by animal hooves, the cover material may require treatment with herbicides.

An appropriate herbicide should be used to preclude damage to the CIM by any plant growth. Follow manufacturer's instructions on the handling and safety of any herbicide used.

6.0 GENERAL LIMITATIONS

No phase of this construction shall take place if:

1. Material temperature at time of application is below 60°F.
2. Surface temperature is below 50°F.
3. Rain is imminent.
4. Surface temperature drops below dew point.
5. Other conditions are obviously unsuitable.

7.0 DISCLAIMER OF WARRANTIES

CHEVRON INDUSTRIAL MEMBRANE LIMITED WARRANTY

Chevron U.S.A. Inc., Asphalt Division (Company) warrants that for a period of five (5) years following date of shipment to the purchaser, Chevron Industrial Membrane (CIM), when applied in the approved manner, according to good construction procedure and subjected to normal uses and service for which it is designed: (a) will not become brittle or crack due to normal exposure or normal construction, (b) will provide a water barrier, and (c) will not fail cohesively in a properly applied membrane where movement does not exceed normal design basis.

The Company shall, at its option, either refund the purchase price of, or provide replacement for, that portion of the CIM materials which fail within said five (5) year period to perform in accordance with this Warranty, and such refund or replacement shall constitute the full limit of the Company's liability and obligation for any such failure.

Normal use and service excludes, among others, the exposure of the CIM to harmful chemicals, abuse by any machinery, equipment or people, or excessive pressures or stresses from any source whatsoever. This Warranty shall not apply if the membrane is ruptured by any cause other than failure of the CIM and/or is subject to misuse or abnormal use or conditions during said five (5) year Warranty. The Company makes no warranty with respect to appearance, color or adhesion of any protective coatings.

This Warranty shall further not apply to the application of the Membrane to Portland cement concrete intended for constant submersion The Company makes no Warranty with respect to this unrecommended usage and buyer and user of CIM accept complete risks of failure should it be so employed.

THE ABOVE WARRANTY IS IN LIEU OF ANY AND ALL OTHER WARRANTIES AND THE COMPANY MAKES NO OTHER WARRANTIES, EXPRESSED OR IMPLIED IN FACT OR BY LAW, INCLUDING, BUT NOT LIMITED TO, ANY WARRANTY OR MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR ANY IMPLIED WARRANTY ARISING FROM COURSE OF DEALING OR USAGE OF ANY TRADE IN RESPECT OF THE COMPANY MATERIALS, EXCEPT AS PROVIDED HEREIN. THE COMPANY SHALL NOT BE LIABLE OR OBLIGATED FOR ANY LOSS OF PROFITS OR CONSEQUENTIAL OR OTHER DAMAGE, ARISING, DIRECTLY OR INDIRECTLY, IN RESPECT OF THE COMPANY MATERIALS OR THE USE OR FAILURE THEREOF, RESULTING FROM A BREACH OF WARRANTY OR NEGLIGENCE. Buyer and user of CIM recognize that it is used in connection with engineering designs and circumstances beyond the Company's control and accept risks of failure beyond the limits of this Warranty.

CHEVRON INDUSTRIAL MEMBRANE
LINER SYSTEMS

Typical Material Properties — Supported Extended Polyurethane

Property	Test Method	Supported Finished Material[2] Type 1	Type 2	Type 3	Type 4
Thickness 1. Overall (mils, minimum)	ASTM D751	25	45	30	70
Minimum Tensile Properties	ASTM D751				
1. Breaking Strength — fabric TD (pounds minimum) MD		50 70	70 120	110 120	100 140
Breaking Strength — composite MD TD		90 75	160 160	130 130	220 160
Tear Strength (pounds, (minimum) composite	ASTM D751 Tongue Method 8x8 in. sample				
1. Initial		2.5	4.5	35	4.5
2. After Heat Aging	212°F, 30 days	2.5	4.5	35	4.5
Low Temperature Composite	ASTM D2136 1/8 in. mandrel, 4 hrs., Pass	−40°F	−40°F	−40°F	−40°F
Unsupported sheet, 100 mils			below −60°F		
Dimensional Stability (each direction percentage change maximum)	ASTM D1204 212°F, 1 hr.	−0.8	−0.5	−1.3	−0.7
Resistance to Soil Burial[1] (pecent change maximum in original values)	ASTM D3083 365 day soil burial 30 mil sheet (as modified in Appendix A)				
a. Unsupported sheet	ASTM D882				
1. Breaking Factor				+15	
2. Elongation at Break				−15	
3. Initial Modulus				+30	
b. Membrane Fabric Breaking Factor	ASTM D751	TBD	TBD	TBD	TBD
Bonded Seam Strength (pounds, minimum)	ASTM D751 (As modified in Appendix A, 12 in./min.)		greater than single layer		
Hydrostatic Resistance (pounds/sq. in. minimum)	ASTM D751 Method A, Procedure I	80	210	250	280
Ozone Resistance	ASTM D1149 (As modified in 7 days, 100 pphm 104°F, 1/8 in. bent loop			NA	
Ply Adhesion (each direction, pounds/in. width minimum	ASTM D413 Machine Method Type A			NA	
Volatile Loss, % (Unsupported)	ASTM D1203 Method A 30 mil. sheet			0.4	
(Puncture Resistance, lbs.)	FTMS 101B Method 2065	25	50	45	70

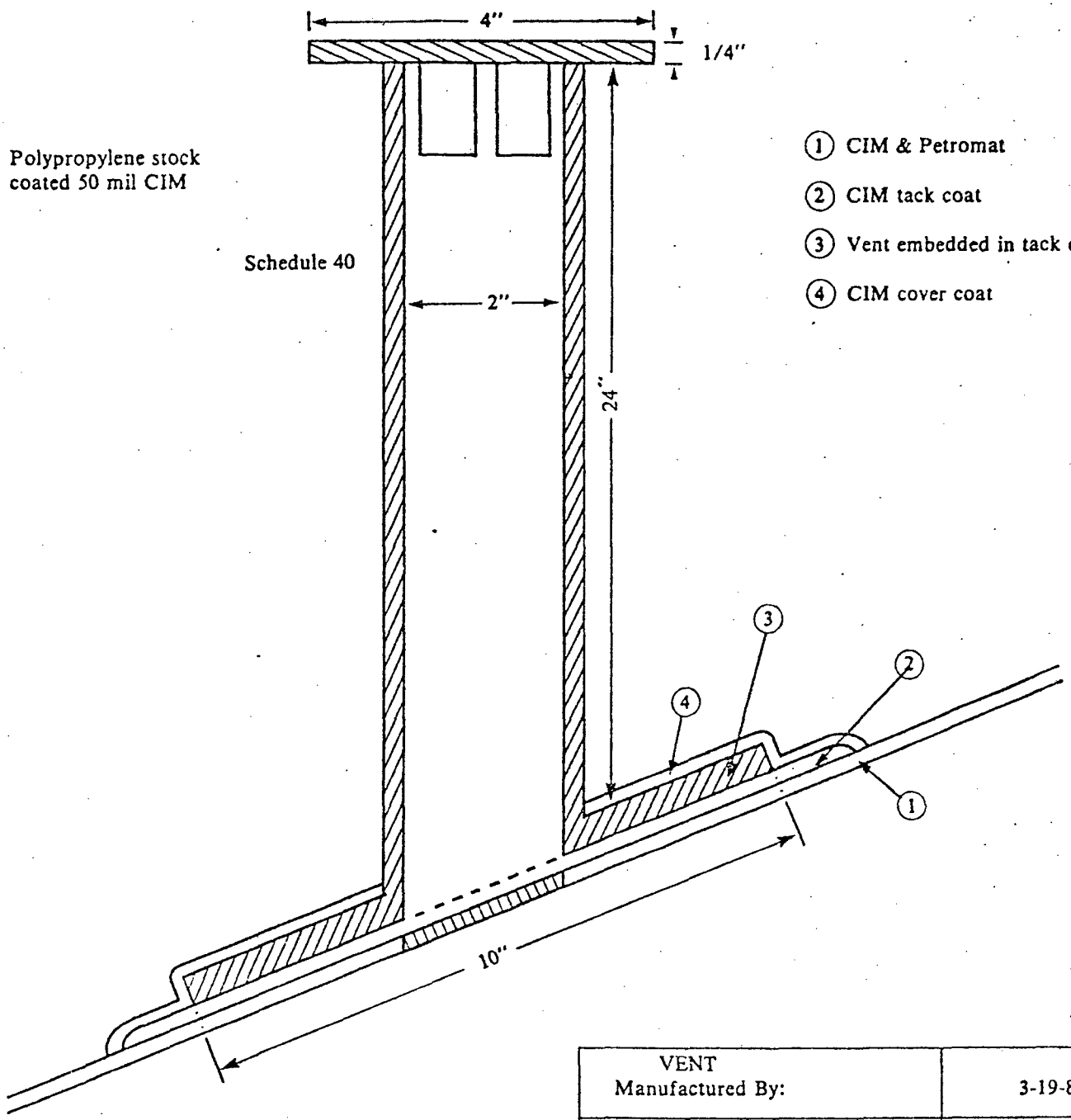
[1] Test value of "after exposure" sample is based on precut sample dimension. 120 day test is required for initial certification.

[2] Supporting Fabrics:

Type 1: Nylon 6.6 2.0 oz/yd^2
Type 2: Polypropylene 3.1 oz/yd^2
Type 3: Composite of 2 layers 0.5 oz/yd^2 nylon 6.6 plus 5x5 1000d polyester scrim (4.1 oz/yd^2 total)
Type 4: Polypropylene 4.4 oz/yd^2

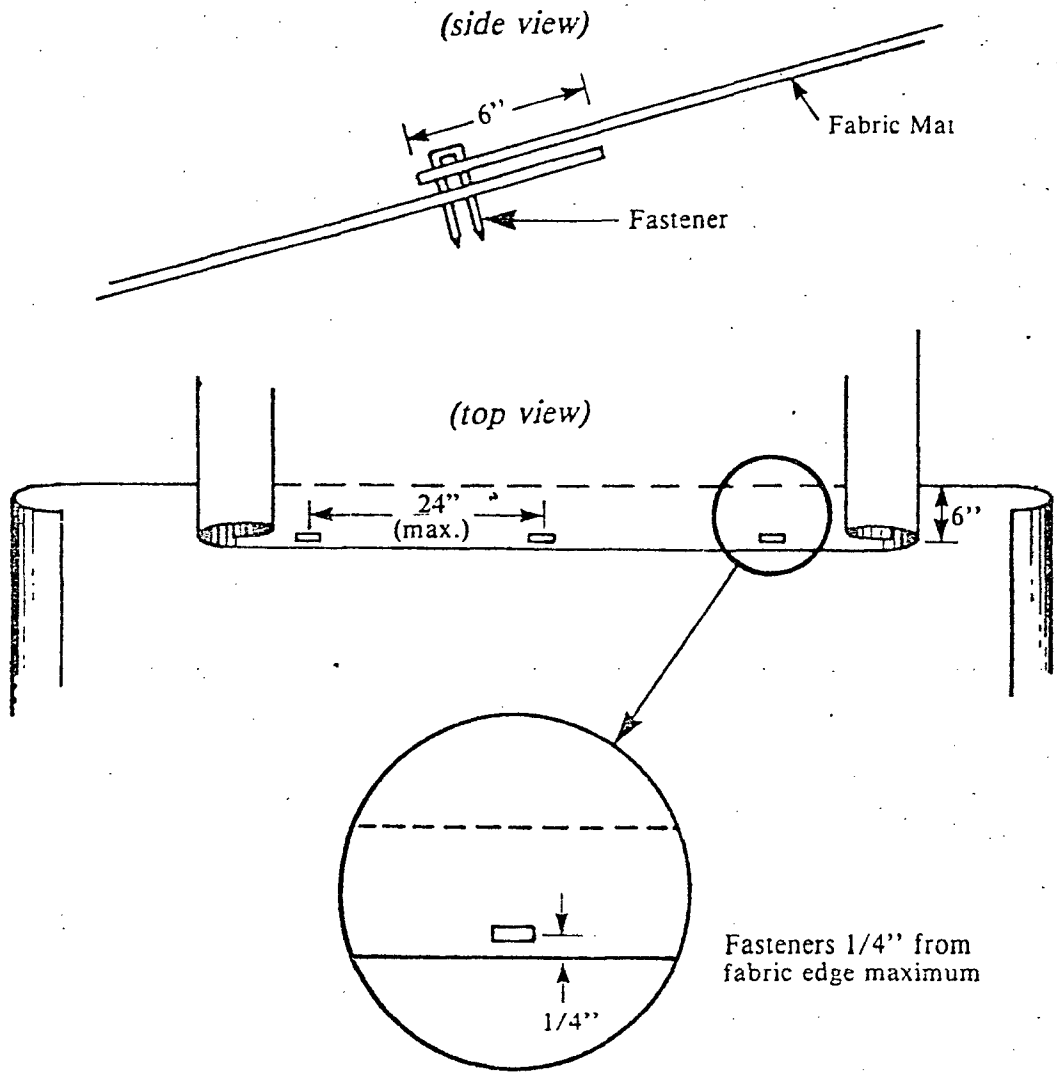
CG-64P (CD-11-81)
(Supersedes 5-80)

VENT DETAIL



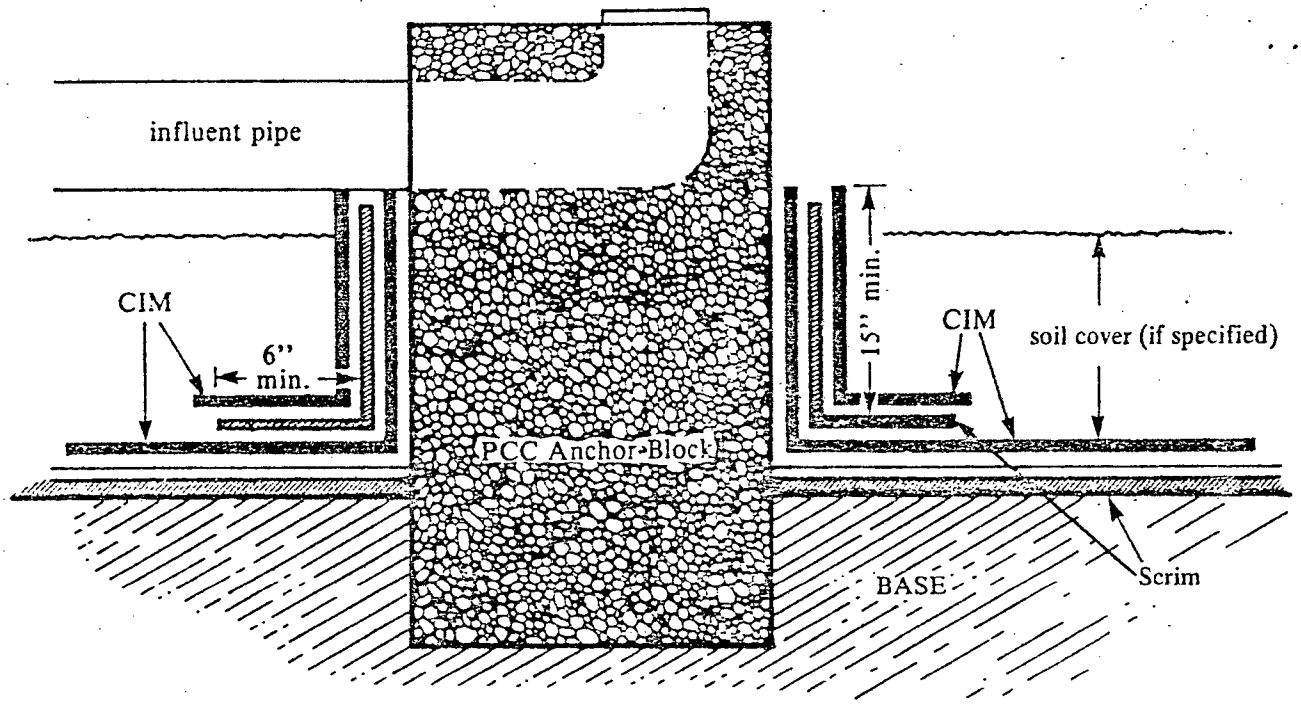
VENT Manufactured By:	3-19-80
K. D. Coleman Co. P. O. Box 414 Santa Clara, California 95052	J.E.H.

Detail of Fabric Overlap



Detail of Anchor Block

(Typical)



1. Butt scrim to base of anchor block.
2. Spray apply CIM over scrim and to height of influent pipe underside.
3. Place scrim overlapping initial layer 6" min. and up anchor block 15" min. to base of influent pipe.
4. Allow CIM & scrim to cure 15 min. minimum but no longer than 2 hours.
5. Spray apply CIM over scrim reinforcement. All 4 sides.

DAMAGE REPAIR PROCEDURE FOR CIM LINER SYSTEM

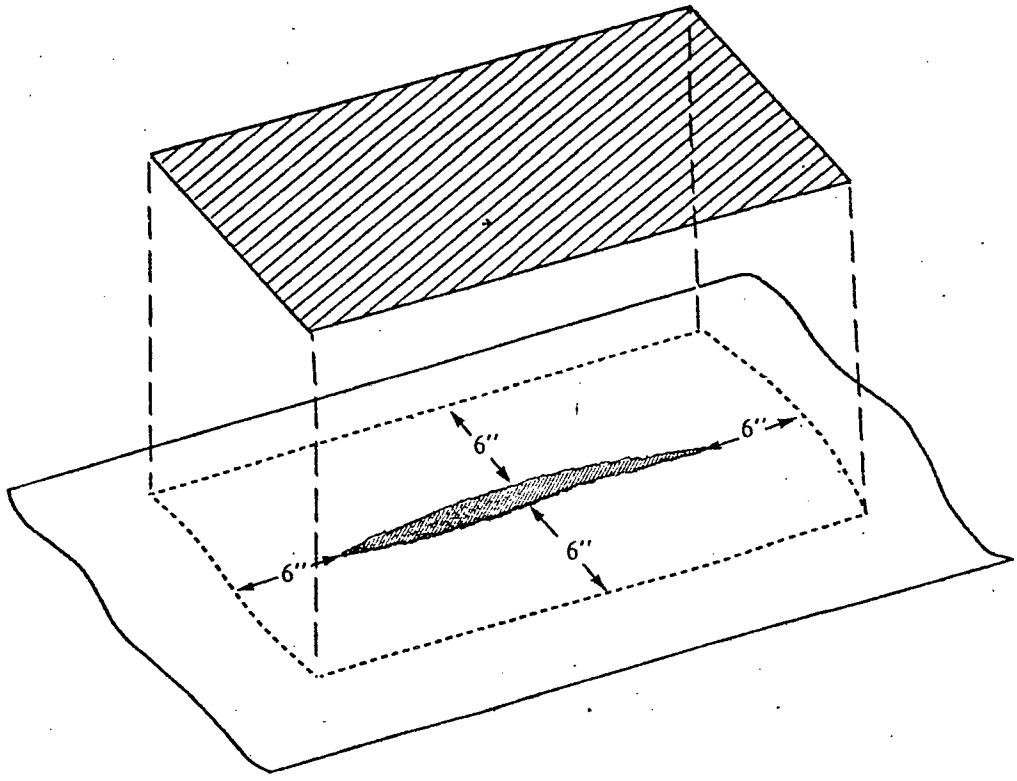
If Membrane should be damaged due to accidental mechanical action and it is necessary to patch, the following steps are necessary:

Step No. 1
Remove all dirt or contaminants surrounding the damaged area.

Step No. 2
By use of a wire brush, or other mechanical means, severely abrade the membrane surface and base surface allowing for a minimum 6" overlap of scrim patch.

Step No. 3
Inspect for absolute cleanliness and apply Chevron Bonding Agent to abraded area at the rate of 0.015 gallons per square yard.

Scrim Patch



Step No. 4
Cut additional piece of scrim to cover abraded area.

Step No. 5
Apply CIM over the entire abraded area. Apply scrim patch over the freshly applied CIM and press patch into place. Apply CIM by spray or spatula over the scrim patch at two (2) times the rate specified for CIM application.

Step No. 6
Allow to cure a minimum of 4 hours before returning to service.

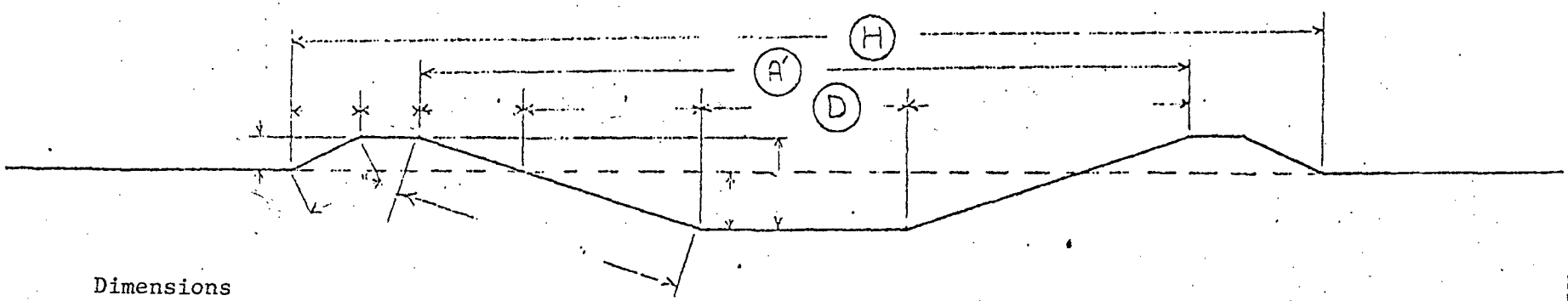
CG-64P (CD-11-81)
(Supersedes 5-80)

Amoco Production Company

SCALE:

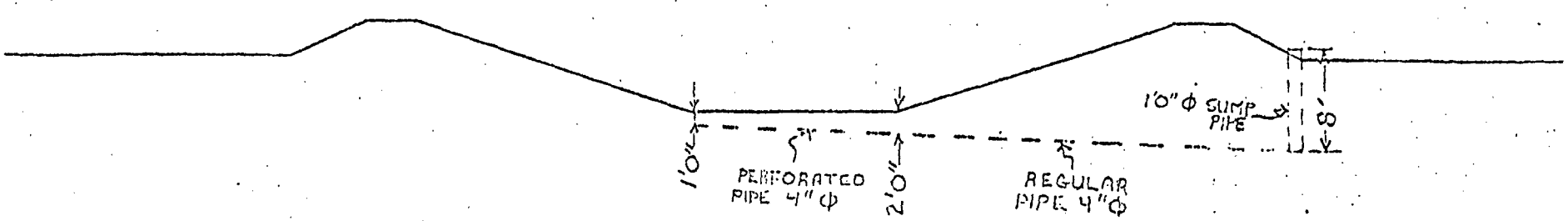
Attachment No. 12

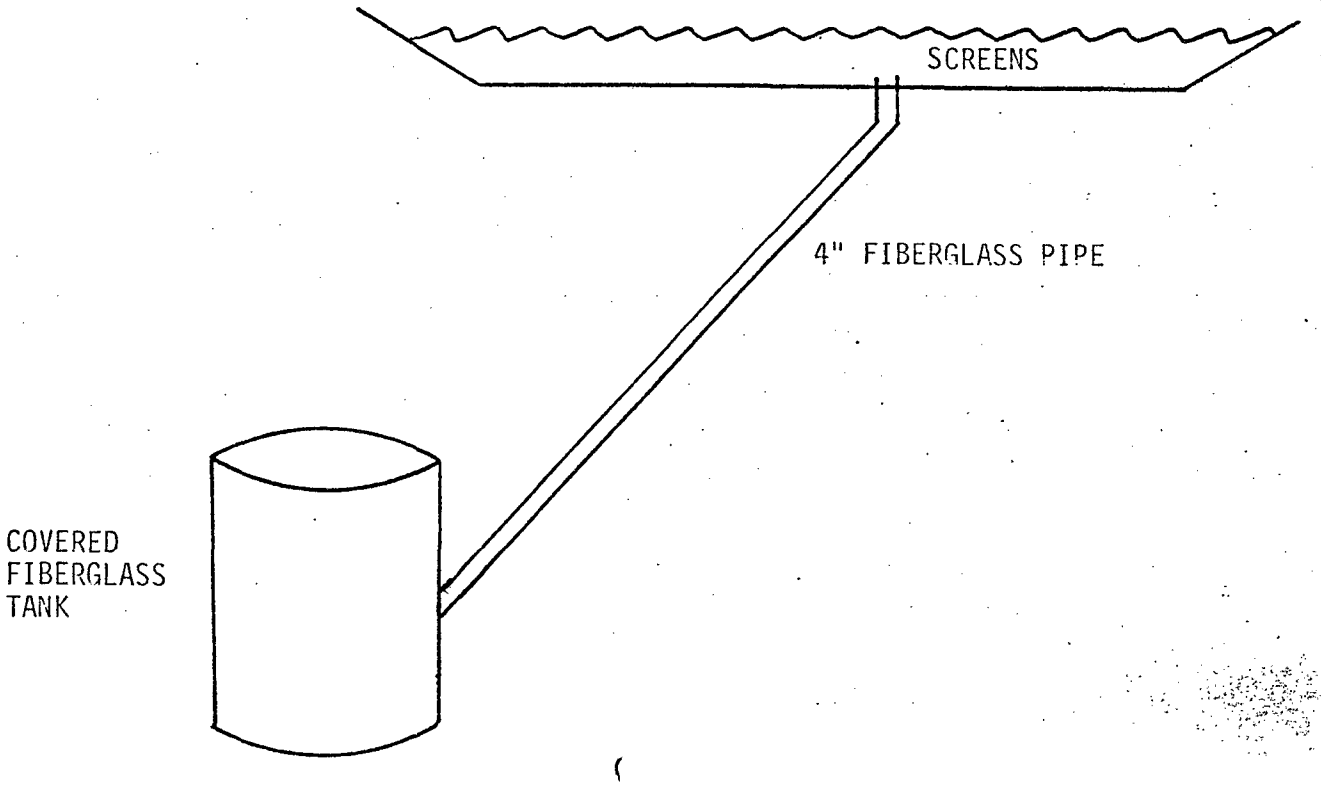
SIDE VIEW OF PIT



Dimensions
shown on
Attachment 7 and 8.

SIDE VIEW SHOWING LOCATION OF LEAK DETECTOR

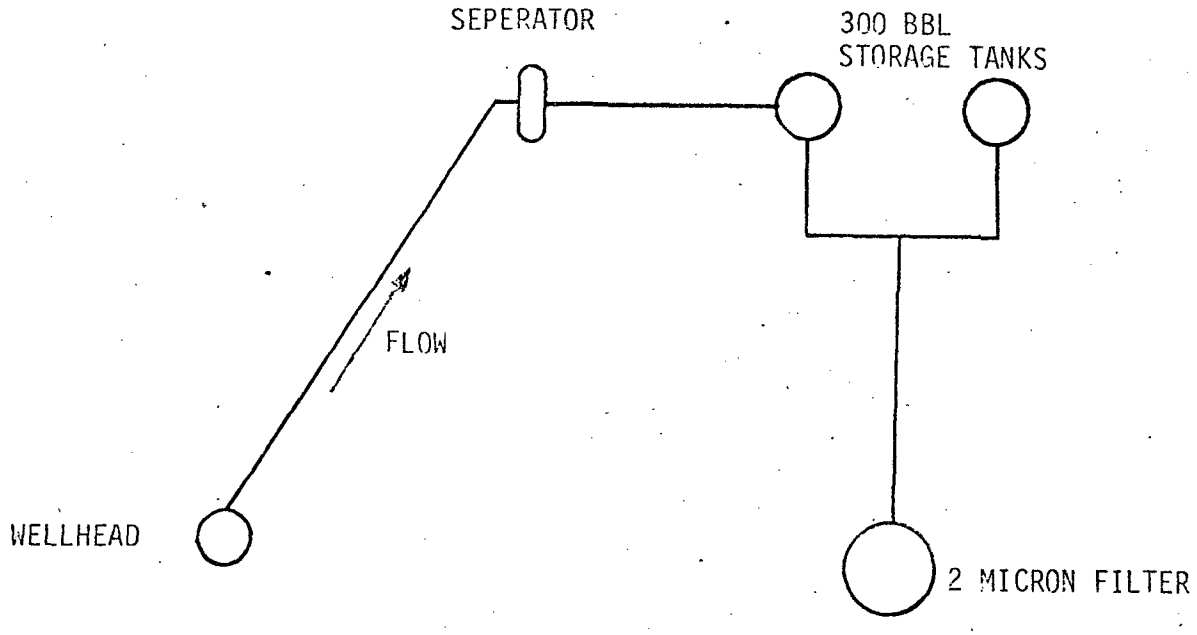




NOTE: Portion of tank will be below ground level so that tank level is same as pond level.

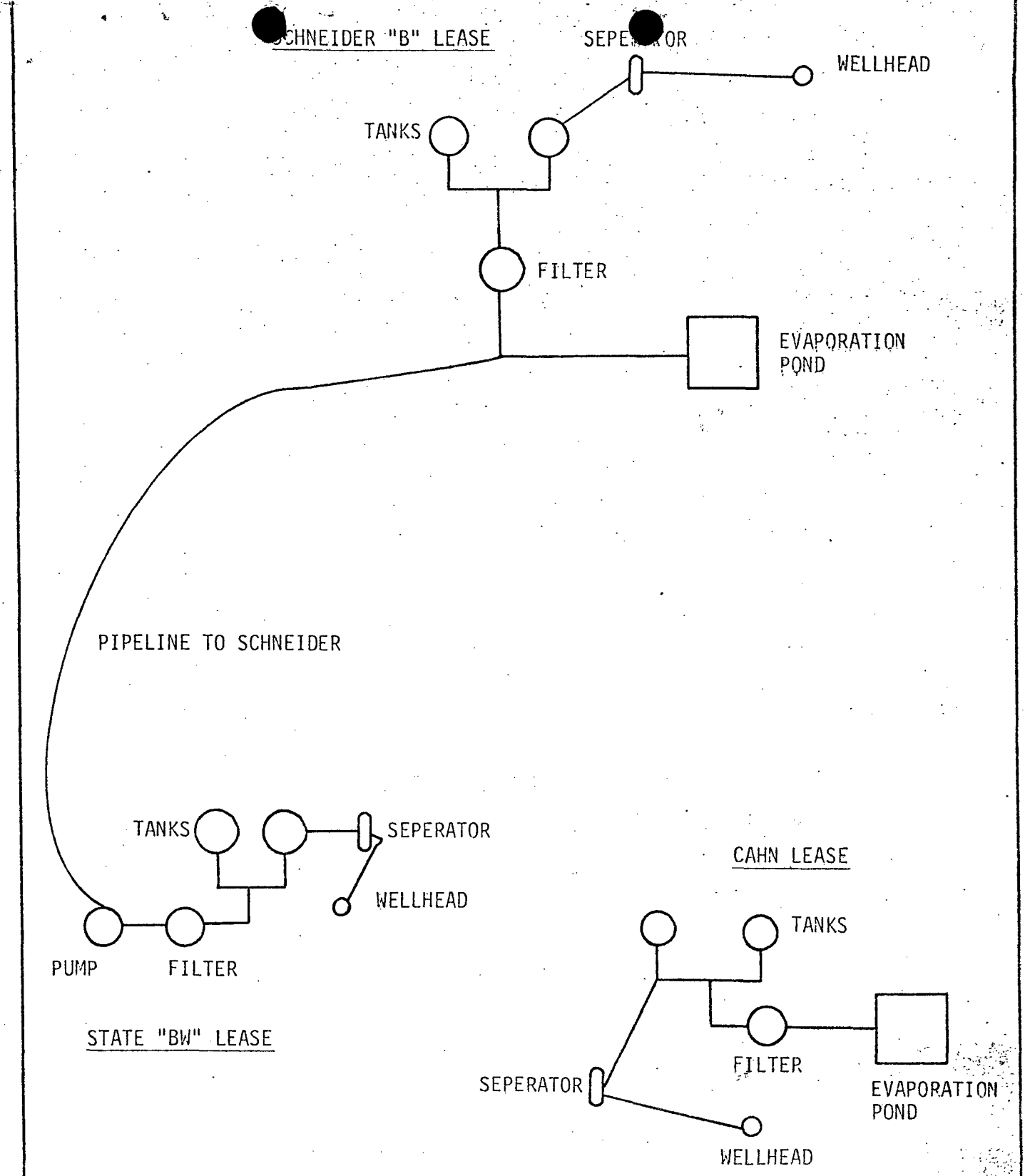
Amoco Production Company	SCALE: none
Pond Drainage	DRG. NO. 13

FORM 432 2-71



Amoco Production Company	SCALE: none
Surface Production Equipment	DRG. NO. 14

ATTACHMENT NO.



Amoco Production Company	SCALE: none
Schematic layout for Evaporation Facilities	DRG. NO. 15

FORM 432 2-71

Case 6238

Amoco Production Company
Security Life Building
Denver, Colorado 80202

April 21, 1978

Joe D. Ramey (3)
Secretary-Director
New Mexico Oil Conservation Commission
P. O. Box 2088
Santa Fe, NM 87501

File: RAS-410-986.511

Application for Water Disposal, Mt Nebo
Fruitland Field Extension
San Juan County, New Mexico

Pursuant to my telephone conversation with Dick Stamets, we ask that our captioned application filed with you by letter dated October 12, 1977 and supplemented by information contained in our letter dated February 15, 1978 be set for examiner hearing on Wednesday, May 17, 1978. The facts and statements in those two letters are correct except for one minor change. We can no longer use the Leeper Gas Com "B" Fruitland No. 1 well in NW/4 of Section 34, T32N-R10W as a Fruitland gas producing well because of damage to the formation. We have temporarily abandoned the well. We plan to drill a replacement Fruitland gas producing well as a twin to Leeper Gas Com "B" Fruitland No. 1 in the NW/4 of Section 34.

RBG/ls
cc:
A. R. Kendrick, Supervisor
District No. 3
New Mexico Oil Conservation Commission
1000 Rio Brazos Road
Aztec, NM 87410

P. T. McGrath
United States Geological Surv.,
Box 959
Farmington, NM 87401

Amoco Production Company
Security Life Building
Denver, Colorado 80202

February 15, 1978

Joe D. Ramey (3)
Secretary-Director
New Mexico Oil Conservation Commission
P. O. Box 2088
Santa Fe, NM 87501

SANTA FE

File: RAS-247-986.511

Application for Water Disposal, Mt. Nebo
Fruitland Field Extension
San Juan County, New Mexico

On October 12, 1977, we filed the captioned application with you, complete with numerous exhibits, requesting your administrative approval without a hearing. Subsequent telephone conversations by Carl Ulvog with Amoco personnel in Denver indicated approval could not be granted until information was furnished as to the chemistry of the Ojo Alamo water in this particular area.

At its Leeper Gas Com "B" Fruitland No. 1 well in NW/4 of Section 34-32N-10W, Amoco perforated the Ojo Alamo and acidized the formation with 50 gallons of 15% HCl. After swabbing for one hour, a sample was taken followed by another sample one-half hour later. These water analyses are attached. Total solids content of the Ojo Alamo water is approximately 17,650 ppm, clearly non-usable water.

A water flow was encountered on a newly drilled Cedar Hill well, the Usselman Gas Com No. 1A, at a depth of 1190'. The analysis of this water, also attached, shows similar water of poor quality.

In a geological sense, aquifers generally are recharged where their outcrops are the highest, and they discharge water where their outcrops are the lowest. Recharge water derived from direct infiltration at the outcrop is of low salinity when it begins to move underground, but the salinity increases progressively with movement through the formation to places of discharge. The recharge of the Ojo Alamo sandstone occurs in the eastern and southern portion of

the basin, at altitudes of 7,000-8,000' (please see the enclosed exhibit). The water then moves northwestward and westward, becoming progressively more saline, from the recharge area across the basin to discharge points along the Animas and San Juan Rivers at an altitude of 5,500'. The Ojo Alamo sandstone at the disposal wells which we propose is far removed from areas of recharge, consequently has very poor water quality, and produces no oil or gas anywhere in the San Juan Basin. As a result, Amoco believes the Ojo Alamo offers the only prudent and plausible option for subsurface water disposal.

Amoco respectfully requests your administrative approval without a hearing, if you have no objection and the owners herein notified offer no objection, of its application to dispose of Fruitland water that is produced with the gas from its Cahn No. 1 and Leeper Gas Com "B" Fruitland No. 1 wells in Sections 33 and 34, T32N, R10W, by injection into the Ojo Alamo formation. Upon your approval, Amoco would drill a water disposal well, its Cahn No. 3 in NW/4 Section 33, T32N-R10W and would re-enter and complete as a water disposal well its abandoned 100% WI Keys Gas Com "F" No. 1 in SW/4 of Section 27, T32N, R10W. This would provide disposal wells at the Ojo Alamo level on both sides of the Animas River to handle the volumes of water that are produced from the Fruitland on each side of the river.

Please consider the attachments to our earlier application dated October 12, 1977 a part of this application.

The attached Verification and Affidavit demonstrates that a copy of this application was sent by certified mail to all offset owners, other than Amoco, and the surface owner of the land upon which each of the two disposal candidates is located.

R. B. Giles

RBG/fet
Encls.

cc:
A. R. Kendrick, Supervisor
District No. 3
New Mexico Oil Conservation Commission
1000 Rio Brazos Road
Aztec, NM 87410

P. T. McGrath
United States Geological Survey
Box 959
Farmington, NM 87401

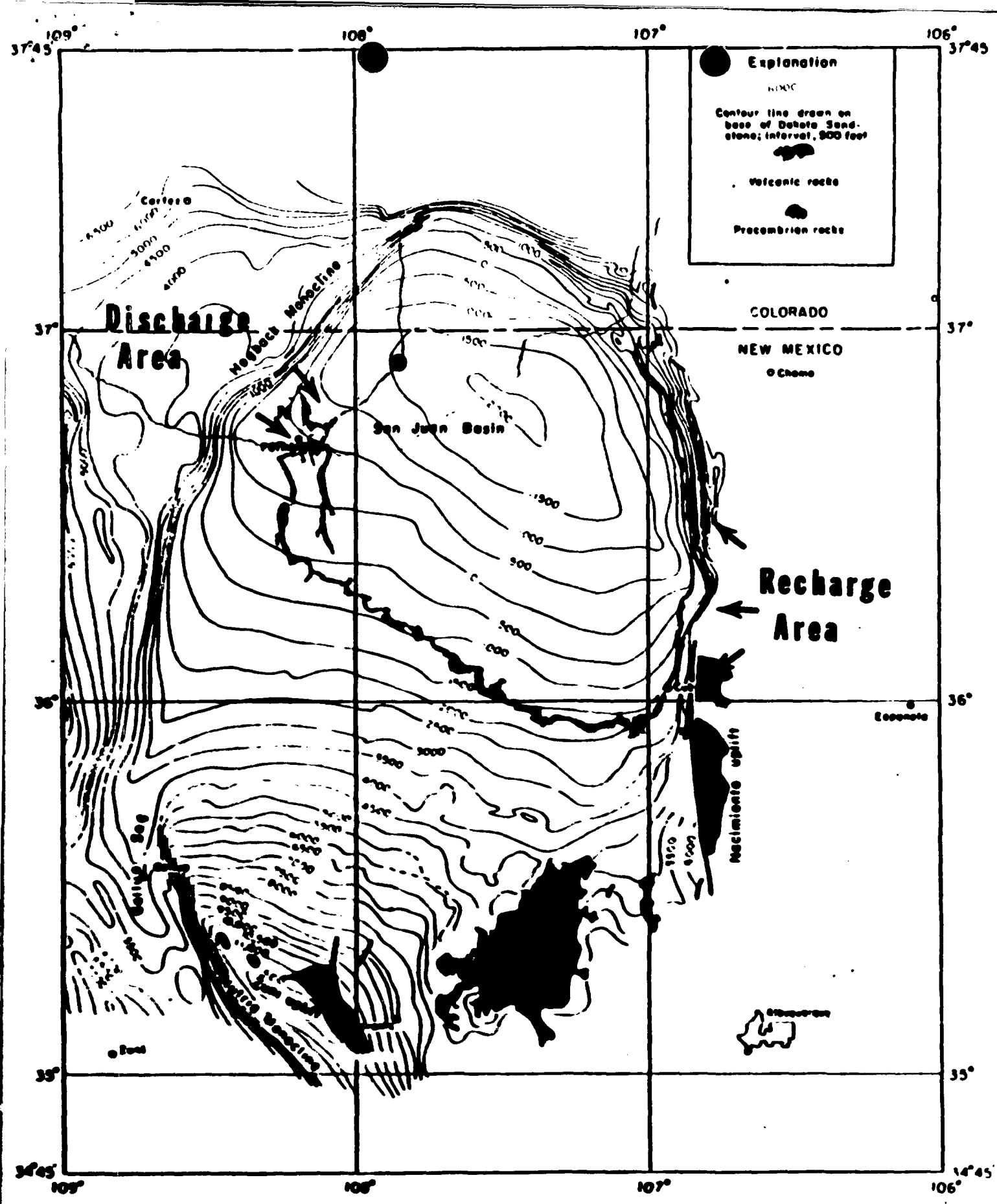
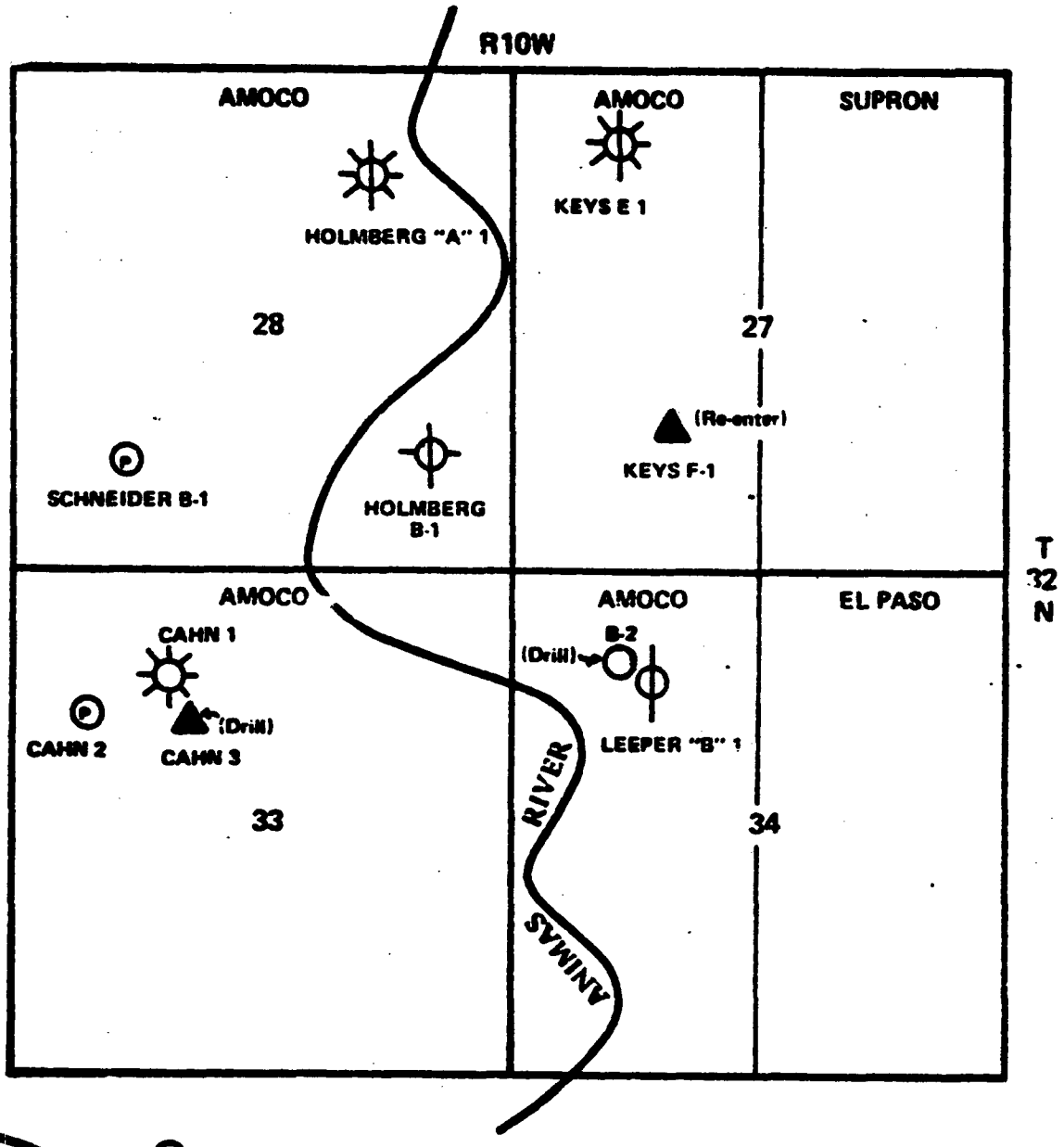


Figure 1.
Map showing structure of San Juan Basin. Modified from Silver (1950)

~ Ojo Alamo Outcrop
● Disposal Location

Gary C. Harrison

FRUITLAND GAS PLAY
CEDAR HILL AREA
SAN JUAN COUNTY, NEW MEXICO



○ PROPOSED FRUITLAND GAS WELL (TWIN TO LEEPER "B" 1 TEMPORARILY ABANDONED WELL)

EXISTING FRUITLAND GAS WELL

Ⓟ FRUITLAND PRESSURE OBSERVATION WELL

▲ PROPOSED WELL FOR DISPOSAL OF PRODUCED FRUITLAND WATER INTO OJO ALAMO FORMATION

BEFORE EXAMINER STAMETS
OIL CONSERVATION COMMISSION
EXHIBIT NO. 1
CASE NO. 6233
Submitted by Amoco
Hearing Date 5/

san juan testing-laboratory, inc.

909 WEST APACHE • P.O. BOX 2070 • FARMINGTON, NEW MEXICO

PHONE: 327-9944

Date January 10, 1978

Report to AMOCO Production Company

Requested by Amoco Personnel Sampled by Amoco Personnel

Project Leeper B #1 Gas Well Location Cedar Hill Area

Source of Material Water Sample # 4 - Possibly from Ojo Alamo Formation 800' depth
1/9/78 1:00 p.m.

Lab No. 26906 Water Analysis for Petroleum Engineering

JAN 13 1978

TEST RESULTS

WATER ANALYSIS FOR PETROLEUM ENGINEERING

Constitutents	Test Results
Total Solids	17,664 mg/L
pH	6.95
Specific Gravity	1.012 at 64°F
Resistivity	0.362 ohms/meter @ 70°F
Conductivity	27,600 micromhos / cm @ 70°F

Comments

Essentially a 1.77% salt solution

Constitutents		
Cations	Meg/L	mg/L
Sodium	190.9	4,389
Calcium	103.0	2,060
Magnesium	2.0	24
Iron	Iron Sulfide as black prec.	
Barium	0	0
Anions		
Chloride	253.5	8,975
Bicarbonate	0.6	37
Carbonate	0	0
Hydroxide	0	0
Sulfate	41.7	2,000

Copies to AMOCO Production Company (3) ✓

Certified by

LAWRENCE A. BREWER REGISTERED PROFESSIONAL ENGINEER AND LAND SURVEYOR 3122 STATE OF NEW MEXICO

A-33

san juan testing laboratory, inc.

909 WEST APACHE • P.O. BOX 2079 • FARMINGTON, NEW MEXICO

PHONE: 327-9944

Date January 10, 1978

RECEIVED JAN 13 1978 FARMINGTON AREA

Report to AMOCO Production Company

Requested by Amoco Personnel Sampled by Amoco Personnel

Project Leeper B #1 Gas Well Location Cedar Hill Area

Source of Material Water Sample #5 - Possibly from Ojo Alamo Formation 800' depth 1/9/78 shortly after 1:00 p.m.

Lab No. 26907 Water Analysis For Petroleum Engineering

TEST RESULTS

WATER ANALYSIS FOR PETROLEUM ENGINEERING

File

Constitutents	Test Results
Total Solids	17,634 mg/L
pH	7.0
Specific Gravity	1.013 @ 64°F
Resistivity	0.365 ohms/meter @ 70°F
Conductivity	27,400 micromhos/cm @ 70°F

Comments

Essentially a 1.76% salt solution

Constitutents		
Cations	**Meq/L**	**mg/L**
Sodium	190.7	4,385
Calcium	101.5	2,030
Magnesium	3.2	39
Iron	Iron sulfate as black preci	
Barium	0	0
Anions		
Chloride	254.2	9,000
Bicarbonate	0.5	29
Carbonate	0	0
Hydroxide	0	0
Sulfate	40.6	1,950

Copies to AMOCO Production Company(3) ✓

Certified by:

LAWRENCE A. BREWER REGISTERED PROFESSIONAL ENGINEER AND LAND SURVEYOR 3122 STATE OF NEW MEXICO

24485

New Mexico Bureau of Mines & Mineral Resources
Socorro, NM 87801

A DIVISION OF
NEW MEXICO INSTITUTE OF MINING & TECHNOLOGY

Information 505/835-5420
Publications 505/835-5410
After hours 505/835-5011

NOV 13 1977

November 16, 1977

Mr. Carl G. Ulvog
Oil Conservation Commission
Land Office Building
Santa Fe, NM

Dear Carl:

Am finally able to finish this response to your Nov. 10 call concerning disposal of Fruitland water in the Ojo Alamo in northeastern San Juan County! Although we have made no pumping tests in conjunction with our study, some hydrologic characteristics of the Ojo Alamo Sandstone are available in the literature. Please find attached a summary of these.

Specific capacities and transmissivities for the Ojo Alamo are generally low as shown on the attached table. The Ojo Alamo is artesian in all the cases extracted from Brimhall's article. The magnitude of S values for artesian aquifers normally ranges from 0.00001 to 0.001. The S values reported for the Ojo Alamo are thus moderate to high, falling in the middle or upper part of this range.

As regards quality of water, the main control of quality seems to be merely distance from outcrop. However, our preliminary compilation of data suggests that the total dissolved solids content of ground water from Tertiary aquifers as a group is generally greater than 1,000 mg/l in the area roughly north of T28N, regardless of distance from outcrop. This deviation from the rule may be explained in two ways.

First, the distance-from-outcrop control applies best to aquifers that are exposed only in a narrow band owing to basinward dips beneath overlying strata. Most of the Tertiary section crops out not in a single narrow band but rather over a broad area because of badlands topography that has evolved through dissection of these nearly horizontal and soft deposits. As dissection has rarely penetrated as deep as the Ojo Alamo, its water quality may be controlled by the distance-from-outcrop rule. We just don't have enough information at present to say for sure and I would be cautious in applying the greater-than-1,000 mg/l-north-of-T28N generalization until further data are compiled.

The second possible explanation for the apparent concentration of poor quality water north of T28N is that the Tertiary deposits seem to constitute a shallow ground water flow system that discharges more

Amoco Production Company
Security Life Building
Denver, Colorado 80202

October 12, 1977

Joe D. Ramey (3)
Secretary-Director
New Mexico Oil Conservation Commission
P.O. Box 2088
Santa Fe, New Mexico 87501

File: VDP-1382-986.511

Application for Water Disposal, Mt. Nebo Fruitland Field Extension,
San Juan County, New Mexico

Amoco respectfully requests your administrative approval without a hearing, if you have no objection and the owners herein notified offer no objection, of its application to dispose of Fruitland water, that is produced with the gas from its Cahn No. 1 and Leeper Gas Com "B" Fruitland No. 1 wells in Sections 33 and 34, T32N-R10W, by injection into the Ojo Alamo formation. Upon your approval, Amoco would drill a water disposal well, its Cahn No. 3 in NW/4 Section 33, T32N-R10W and would re-enter and complete as a water disposal well its abandoned 100% WI Keys Gas Com "F" No. 1 in SW/4 Section 27, T32N-R10W. This would provide disposal wells at the Ojo Alamo level on both sides of the Animas River to handle the volumes of water that are produced from the Fruitland on each side of the river.

There is precedence for such a water disposal plan. El Paso obtained your administrative approval without a hearing to dispose of produced water into the Ojo Alamo at the Atlantic State No. 6 well in Section 16, T30N-R10W, approximately 10 miles to the south of the area involved with this application.

While the Ojo Alamo, where it's shallow, is used by the Indians as a potable water supply, the nearest Indian lands are more than 30 miles away. The Ojo Alamo under the lands involved with this application lies at a depth in excess of 1,000 feet and consequently is not used as a water supply by the fee owners. Also, there is no oil or gas production from the Ojo Alamo anywhere in the San Juan Basin. Therefore, the requirement of Rule 701 for Applicant to include a plat showing all leases and wells within a two-mile radius of the disposal wells would be inappropriate and needlessly burdensome.

Amoco encloses the following to support its water disposal application:

Attachment 1, a plat showing all wells and lessees in the vicinity of Amoco's two proposed water disposal candidates, Cahn No. 3 and Keys Gas Com "F" No. 1.

Completed Form C-108's for each of the two disposal well candidates.

Attachment 3 is a tabular summary of all wells, within one-half mile of the disposal wells, which penetrate the injection zone showing all casing strings, setting depths, sacks of cement used, cement tops, total depth, producing interval, well identification, and location.

Attachment 4, a downhole schematic of the Holmberg Gas Com "B" No. 1 in Section 28, which is the only plugged and abandoned well within one-half mile of either disposal candidate.

Attachments 5 and 6 are log sections of the Ojo Alamo zone in the Keys "F" No. 1 and the Schneider Gas Com "B" No. 1 which is located in the SW/4 Section 28, T32N-R10W, a direct north offset to the Cahn No. 3.

Attachments 7 a-c are water analyses of bradenhead samples taken from producing Mesaverde gas wells in the area of the two water disposal candidates.

Attachment 8 is an analysis of Cahn No. 1 produced water.

Both the Cahn Gas Com No. 1 and the Leeper Gas Com "B" No. 1 are awaiting a gas sales line connection. However, in our view, it would not be possible to produce these Fruitland wells without our recommended water disposal system. The Ojo Alamo offers the only plausible option available to us for subsurface water disposal. As for surface options available, there are none. There are no water disposal possibilities nearby, thus, trucking the produced water out of the area has to be eliminated from consideration.

If approval is granted for this water disposal system, Amoco, pursuant to Memo No. 3-77 from your office dated August 24, 1977, will not inject water into either disposal well using a surface injection pressure greater than 0.2 psi per foot of depth to the top of the Ojo Alamo, unless we find the Ojo Alamo has a fracture gradient which would support a higher pressure.

The attached Verification and Affidavit, a part of this application, demonstrates that a copy of this application was sent by certified mail to all offset owners, other than Amoco, and the surface owner of the land upon which each of the two disposal candidates is located.

RB Giles

RBG:ks
Attachments

SUBJECT CEDAR HILL AREA

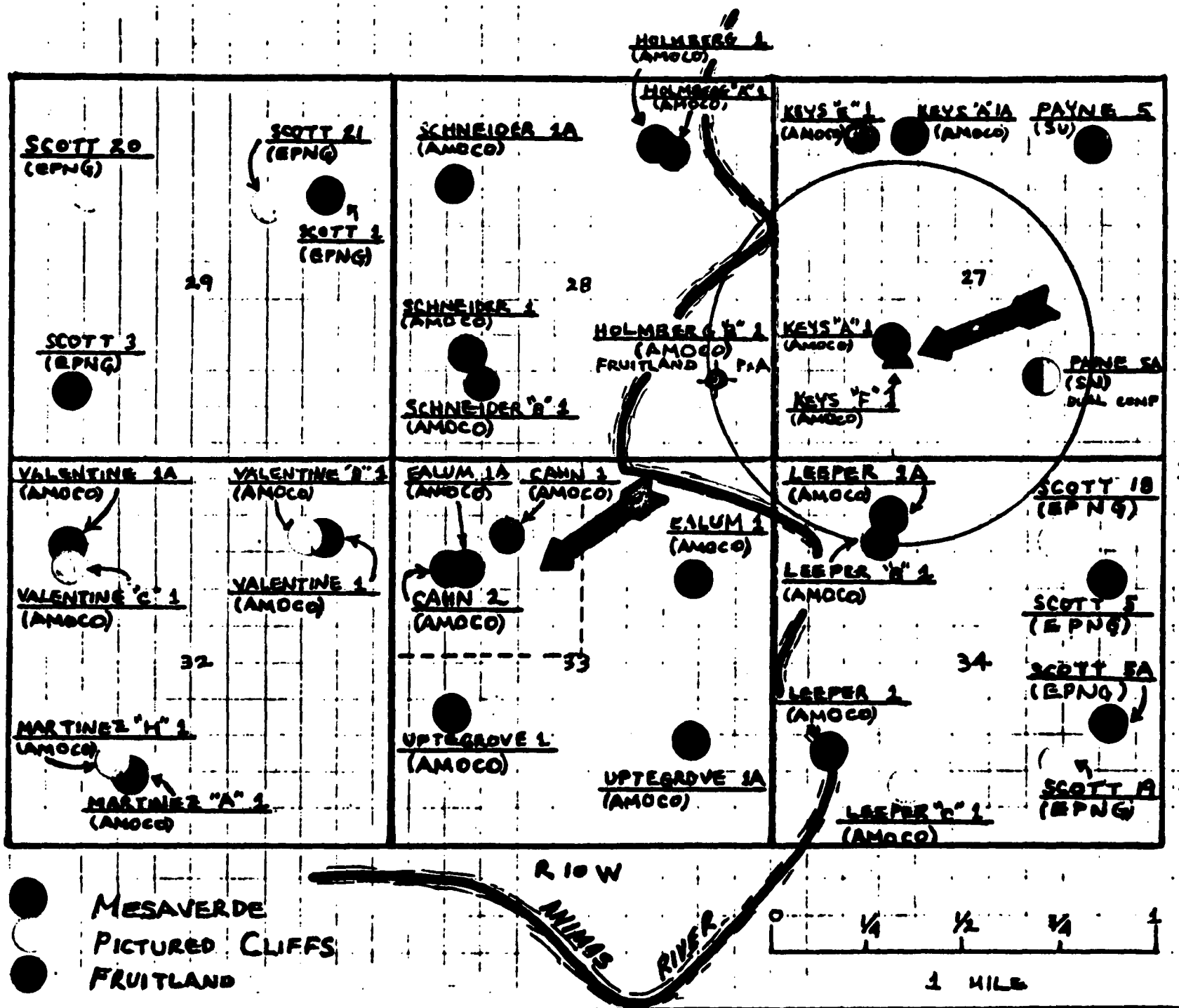
SAN JUAN COUNTY, NEW MEXICO

ENGINEERING CHART

APPN

DATE 9-12-77

BY WRC



SUBJECT CEDAR HILL AREA

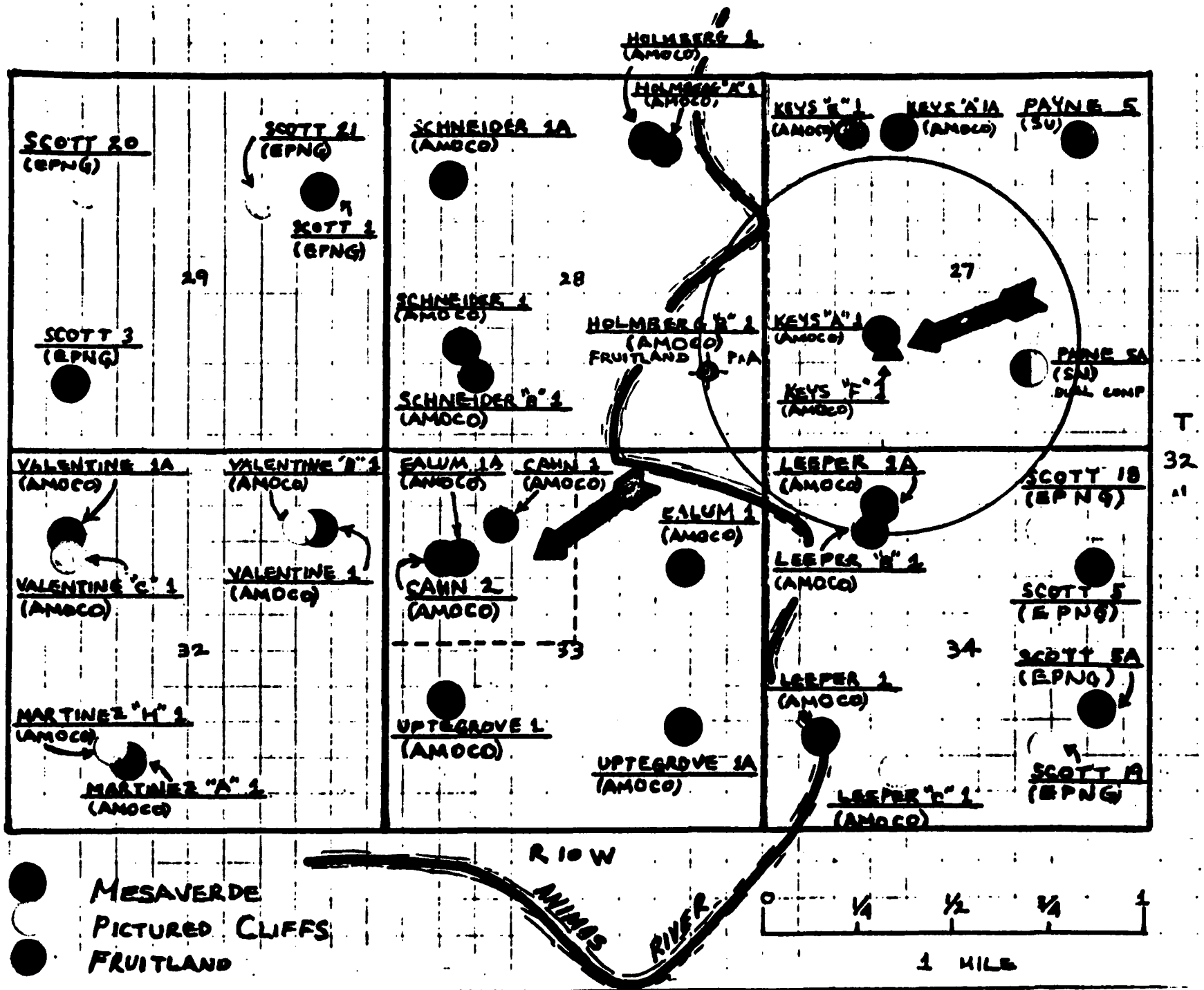
SAN JUAN COUNTY, NEW MEXICO

ENGINEERING CHART

APPN

DATE 9-12-77

BY WRC



CEDAR HILL WELLS WITHIN 1/2 MILE OF POTENTIAL WATER DISPOSAL WELLS

WELL NAME OPERATOR	WELL LOCATION	HOLE SIZE	CASING SIZE AND WT.	SETTING DEPTH (FT)	CEMENT	CEMENT TOPS	TD	PROD INTE
ayne No. 5A Southern Union	1140' FSL x 1725' FEL Sec. 27, T-32-N, R-10-W	13-3/4" 8-3/4" 6-1/4"	10-3/4" 30# 7" 23# 4-1/2" 10.5#	546' 3443' 3323-5690'	350 sx 230 sx 11.5 310 sx	CIRC 2400' 4600'	5770'	Picture Mesaver
hn Gas Com No. 1 Amoco	1030' FNL x 1600' FWL Sec. 33, T-32-N, R-10-W	12-1/4" 8-3/4"	9-5/8" 32.3# 7" 20#	253' 2795'	250 sx 600 sx *	CIRC. 100-200'	2812'	Fruitla 1000 ft w/ 2.41 fill
hn Gas Com No. 2 Amoco	1510' FNL x 800' FWL Sec. 33, T-32-N, R-10-W	12-1/4" 7-7/8"	8-5/8" 24# 4-1/2" 11#	276' 2957'	250 sx 680 sx *	CIRC 100-200'	2946'	Fr lan
lum Gas Com No. 1 Amoco	1650' FNL x 1140' FEL Sec. 33, T-32-N, R-10-W	12-1/4" 8-3/4" 6-1/4"	9-5/8" 32.3# 7" 20# x 23# 5" 15# 5-1/2" 14#	256' 4642' 4346-5320'	200 sx 438ft^3 2.41 190 sx *	CIRC 3585' 4300'	5320'	Mesaverd
lum Gas Com No. 1A Amoco	1450' FNL x 1030' FWL Sec. 33, T-32-N, R-10-W	12-1/4" 8-3/4" 6-1/4"	9-5/8" 32.3# 7" 23# 4-1/2" 10.5#	259' 3200' 3018-5400'	280 sx 775 sx 4.1 375 sx	CIRC CIRC CIRC	5400'	Mesaverd
nneider Gas Com No. 1 Amoco	1450' FSL x 990' FWL Sec. 28, T-32-N, R-10-W	12-1/4" 8-3/4" 6-1/4"	9-5/8" 32.3# 7" 20# x 23# 5-1/2" 14#	255' 4646' 4570-5144'	275 sx 428ft^3 1.46 122 sx	CIRC 4020' 4700'	5410'	Mesaverd
nneider Gas Com No. 1A Amoco	1460' FNL x 810' FWL Sec. 28, T-32-N, R-10-W	12-1/4" 8-3/4" 6-1/4"	9-5/8" 36# 7" 23# 4-1/2" 10.5#	270' 3349' 3159-5514'	280 sx 685 sx 4.8 280 sx	CIRC CIRC 4796'	5525'	Mesaverd
nneider Gas Com "B" No. 1 Amoco	1110' FSL x 1185' FWL Sec. 28, T-32-N, R-10-W	12-1/4" 7-7/8"	8-5/8" 24# 4-1/2" 10.5#	258' 3050'	200 sx 930 sx 3.3	CIRC CIRC	3050'	Fruitlan
tegrove Gas Com No. 1 Amoco	1850' FSL x 790' FWL Sec. 33, T-32-N, R-10-W	12-1/4" 8-3/4" 6-1/4"	9-5/8" 32.3# 7" 20# 5" 15#	279' 4579' 4445-5261'	190 sx 438ft^3 285 sx	CIRC 3210' CIRC	5270'	Mesaverd
tegrove Gas Com No. 1A Amoco	1470' FSL x 1190' FEL Sec. 33, T-32-N, R-10-W	12-1/4" 8-3/4" 6-1/4"	9-5/8" 36# 7" 23# 4-1/2" 10 <#	267' 3075' 2868-5250'	280 sx 635 sx 4.8 280 sx	CIRC CIRC CIRC	5250'	Mesaverd

*CALCULATED CEMENT TOPS

WELL NAME OPERATOR	WELL LOCATION	HOLE SIZE	CASING SIZE AND WT.	SETTING DEPTH (FT)	CEMENT	CEMENT TOPS	TD	PRODUCING INTERVAL
per Gas Com No. 1A moco	800' FNL x 1590' FWL Sec. 34, T-32-N, R-10-W	12-1/4" 8-3/4" 6-1/4"	9-5/8" 32.3# 7" 23# 4-1/2" 10.5#	254' 3149' 2962-5305'	280 sx 775 sx 375 sx	CIRC *100-200' CIRC	5305'	Mesaverd
per Gas Com "B" No. 1 moco	1110' FNL x 1450' FWL Sec. 34, T-32-N, R-10-W	12-1/4" 7-7/8"	8-5/8" 24# 4-1/2" 10.5# x 11#	258' 2851'	200 sx 870 sx	CIRC CIRC	2851'	Fruitlan
entine Gas Com No. 1 moco	990' FNL x 990' FEL Sec. 32, T-32-N, R-10-W	12-1/4" 8-3/4" 4-3/4"	9-5/8" 32.3# 7" 20# 4" 11.34#	261' 4570' 4196-5289'	250 sx 800 sx 225 sx	CIRC CIRC CIRC	5289'	Mesaverd
entine Gas Com "B" No.1 moco	1140' FNL x 1140' FEL Sec. 32, T-32-N, R-10-W	12-1/4" 7-7/8"	8-5/8" 24# 4-1/2" 10.5# x 11#	261' 2960'	275 sx 640 sx	CIRC *100-200'	2960'	Pictured
n Gas Com "A" No. 1 moco	1650' FSL x 1650' FWL Sec. 27, T-32-N, R-10-W	12-1/4" 8-3/4" 6-1/4"	9-5/8" 32.3# 7" 20# x 23# 5" 15#	250' 4551' 4405-5243'	225 sx 438ft^3 100 sx	CIRC 2490' *CIRC	5243'	Mesaverd

alculated cement tops

CHEM LAB NOV 5 197

WATER ANALYSIS EXCHANGE REPORT
ATTACHMENT 7a

MEMBER Amoco Production Company
OPERATOR Amoco Production Company
WELL NO. Ealum Gas Com. No. 1
FIELD Blanco-Mesaverde
COUNTY San Juan
STATE New Mexico

LAB NO. 21618-5
LOCATION
FORMATION Mesaverde
INTERVAL
SAMPLE FROM Bradenhead (10-20-76)
DATE November 2, 1976

REMARKS & CONCLUSIONS:

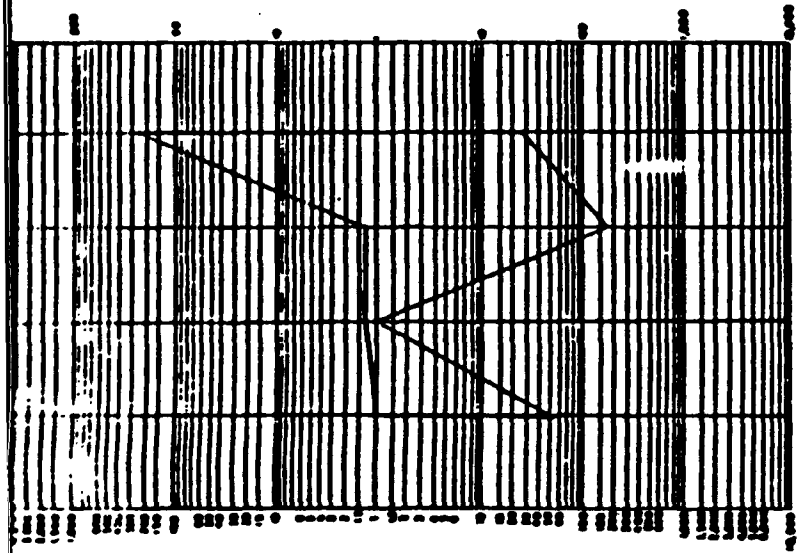
Cations	mg/l	meq/l	Anions	mg/l	meq/l
Sodium	5812	252.84	Sulfate	7	0.15
Potassium	41	1.05	Chloride	1010	28.48
Lithium			Carbonate	1680	55.94
Calcium	27	1.35	Bicarbonate	10492	172.07
Magnesium	17	1.40	Hydroxide		
Iron	-		Hydrogen sulfide	-	
Total Cations		256.64	Total Anions		256.64

Total dissolved solids, mg/l 13761
NaCl equivalent, mg/l 11876
Observed pH 9.0

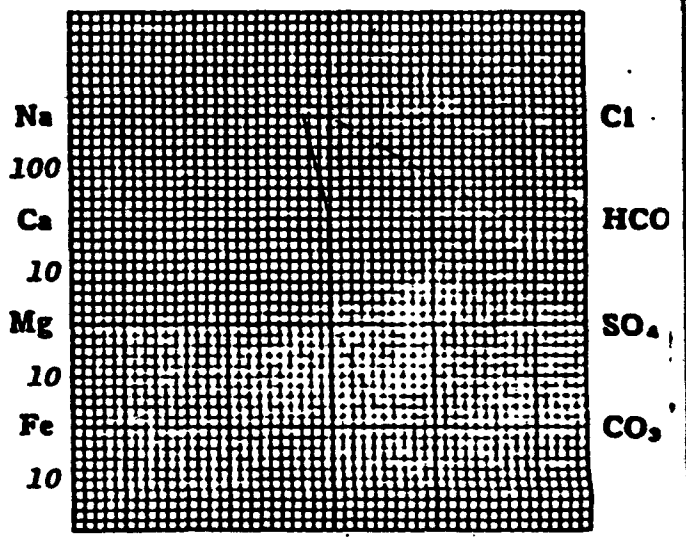
Specific resistance @ 68° F.:
Observed 0.60 ohm-meters
Calculated 0.56 ohm-meters

WATER ANALYSIS PATTERNS
MEQ per unit

LOGARITHMIC



STANDARD



(Na value in above graphs includes Na, K, and Li)
NOTE: Mg/l = Milligrams per liter. Meq/l = Milligram equivalents per liter

WATER ANALYSIS EXCHANGE REPORT

ATTACHMENT 7b

AREA	
1	AS
	AMS
2	NE
	M
3	
4	

MEMBER Amoco Production Company
OPERATOR Amoco Production Company
WELL NO. Keys Gas Com. No. 1
FIELD Blanco-Mesaverde
COUNTY San Juan
STATE New Mexico

LAB NO. 21618-1 REPORT NO.
LOCATION
FORMATION Mesaverde
INTERVAL
SAMPLE FROM Bradenhead (10-18-76)
DATE November 2, 1976

REMARKS & CONCLUSIONS:

Cations	mg/l	meq/l	Anions	mg/l	meq/l
Sodium	5251	228.40	Sulfate	5	0.10
Potassium	31	0.79	Chloride	820	23.12
Lithium			Carbonate	576	19.18
Calcium	64	3.19	Bicarbonate	11614	190.47
Magnesium	6	0.49	Hydroxide		
Iron	-		Hydrogen sulfide	-	
Total Cations		232.87	Total Anions		232.87

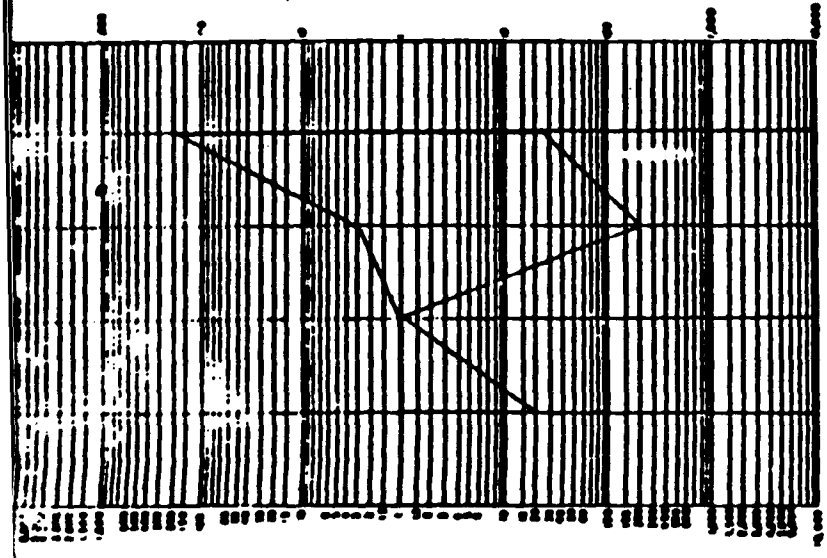
Total dissolved solids, mg/l 12473
NaCl equivalent, mg/l 10039
Observed pH 8.5

Specific resistance @ 68° F.:
Observed 0.72 ohm-meters
Calculated 0.66 ohm-meters

WATER ANALYSIS PATTERNS

MEQ per unit

LOGARITHMIC



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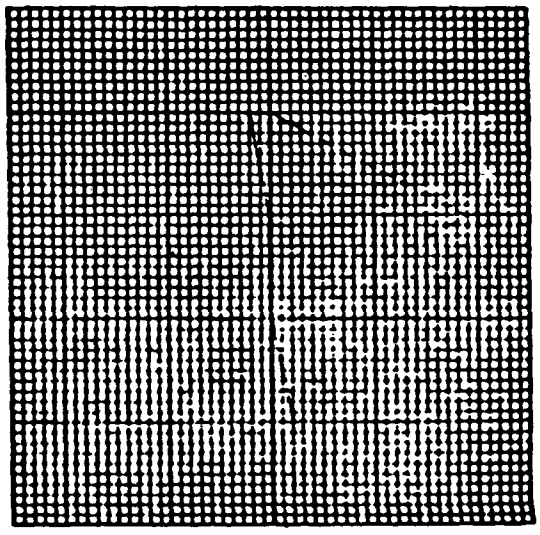


(Na value in above graphs includes Na, K, and Li)
NOTE: Mg/l = Milligrams per liter. Meq/l = Milligram equivalents per liter
Sodium chloride equivalent = by Dunlap & Hawthorne calculation from components

CHEM LABOV 5 1976

WATER ANALYSIS EXCHANGE REPORT

ATTACHMENT 7c

MEMBER Amoco Production Company	LAB NO. 21618-3 REPORT NO.
OPERATOR Amoco Production Company	LOCATION
WELL NO. Schneider Gas Com. No. 1	FORMATION Mesaverde
FIELD Blanco-Mesaverde	INTERVAL
COUNTY San Juan	SAMPLE FROM Bradenhead (10-20-76)
STATE New Mexico	DATE November 2, 1976

REMARKS & CONCLUSIONS:

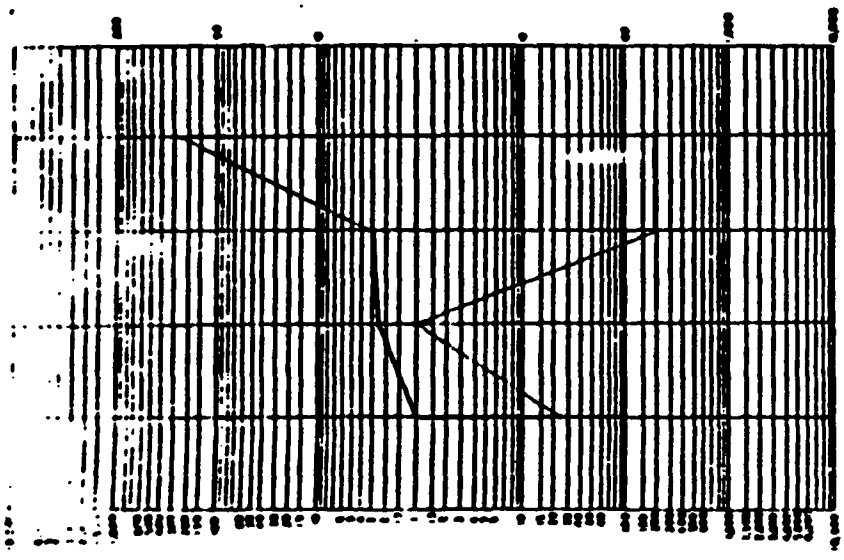
Cations	mg/l	meq/l	Anions	mg/l	meq/l
Sodium	5903	256.79	Sulfate	2	0.04
Potassium	40	1.02	Chloride	840	23.69
Lithium			Carbonate	720	23.98
Calcium	69	3.44	Bicarbonate	13176	216.09
Magnesium	31	2.55	Hydroxide		
Iron	-		Hydrogen sulfide	-	
Total Cations		263.80	Total Anions		263.80

Total dissolved solids, mg/l	14094	Specific resistance @ 68° F.:	
NaCl equivalent, mg/l	11376	Observed	0.64 ohm-meters
Observed pH	8.6	Calculated	0.58 ohm-meters

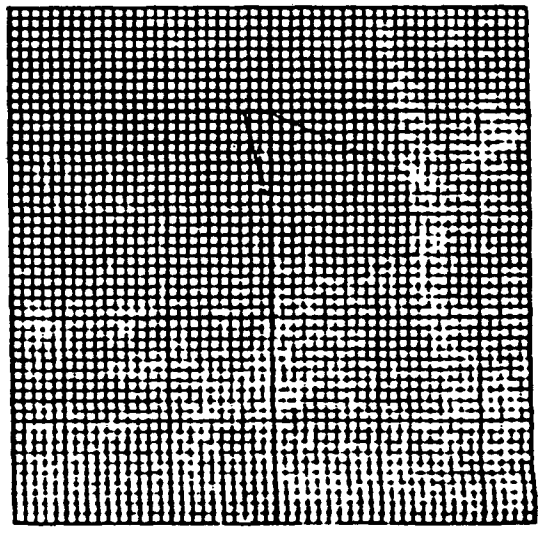
WATER ANALYSIS PATTERNS

MEQ per unit

LOGARITHMIC



STANDARD



(No value in above graphs includes Na, K, and Li)

NOTE: Mg/l = Milligrams per liter. Meq/l = Milligram equivalents per liter

Sodium chloride equivalent = by Dunlap & Hawthorne calculation from components

ATTACHMENT 8

Amoco Production Company
RESEARCH CENTER
WATER ANALYSIS

TS or File No. _____
Lab. No. T-23,207
Field No. _____
API Well No. _____

CATION SAMPLED: Division Denver | District South | Area Farmington
perator (Plant) Amoco | Well No. 1 | Lease Cahn Gas Com.
ate (Province) New Mexico | County (Parish) San Juan
wp. _____ Rng. _____ Sec. _____ | Quarter (Lsd.) _____ | Other (Meridian) _____
Wildcat ( ) Field Well ( ) Field name _____
mple collected from Wellhead | Date 3/25/77 | Sample collected by Inskeep
nterval sampled _____ to _____ | Interval name _____
ecovery _____

rm 97 transmitted by H.Montgomery | Date 3/25/77 | Authorized by _____

ORGANIC CONSTITUENTS in mg/l

	BOTTOM	MIDDLE	TOP	MUD	
ne					
luene					
Gases					

DESCRIPTION OF SAMPLE

mple used for detailed analyses _____
ate received _____
ndition as received _____
lor _____
lor _____
spended solids _____
ttom sediment _____
il or fluorescence _____

QUALITY OF SAMPLE

	BOTTOM	MIDDLE	TOP
hloride n mg/l:			

COMMENTS:

BEFORE EXAMINER STAMETS
OIL CONSERVATION COMMISSION
EXHIBIT NO. 2
CASE NO. 6233
Submitted by Amoco
Hearing Date 5/17/78

CONVENTIONAL MAJOR ION ANALYSIS

			Major Ions mg/l	% of Total Major Ions	Reaction Value meq/l	% of Total Reaction Value
CATIONS	Sodium	Na^+	5,791	27.97	251.91	49.37
	Calcium	Ca^{++}	40	.19	2.00	.39
	Magnesium	Mg^{++}	15	.07	1.23	.24
	Potassium	K^+				
ANIONS	Chloride	Cl^-	964	4.65	27.18	5.33
	Bicarbonate	HCO_3^-	13,900	67.12	227.96	44.67
	Sulfate	SO_4^{--}	0	0	0	0
	Carbonate	CO_3^{--}	0	0	0	0
	TOTAL		20,710			

Total solids by evaporation 13,350 mg/l
NaCl resistivity equivalent (Dunlap) 10,576 mg/l
Resistivity .539 ohm-meters at 77 °F
pH 8.1 Specific gravity 1.015 at 72 °F
Ryznar stability index (2pHs-pH) _____ at _____ °F

OTHER IONS AND DISSOLVED SOLIDS

CATIONS	mg/l	ANIONS	mg/l	OTHERS	mg/l

REMARKS AND CONCLUSIONS:

MAY 2 1977
FARMINGTON AREA

1	AS	
	AAS	
2	AE	
	AA	
3		
4		
5		

wren 535.11

cc: Bob Reed
G. W. Schmidt

Ronnie Ramon

Amoco Cahn Evap Pit # 1
NW of Cedar Hill

aeration system & ponding within pit - note salt encrustation in dry areas

June 14, 89

Anaconda Calm Evap Pit #1
NW of Cedar Hill

note salt encrustation
along E side of pond extending
(guesstimation) 150'

June 14, 89

CHANNE 11 550