NM2 - 8

GENERAL CORRESPONDENCE YEAR(S):

2004-1993

Kieling, Martyne

To: Brad Walls
Cc: Foust, Denny
Subject: RE:

Brad,

Regarding our conversation and your company's concern about mosquitoes in the Peoples evaporation ponds located in San Juan County. The New Mexico Oil Conservation Division has reviewed the MSDS for the Zoecon Altosid Briquets that you propose to use. The product does not appear to be a hazardous waste (Item 15. Regulatory Information), and does degrade over time (Item #12 Environmental Fate). The OCD must be informed if Peoples chooses to discontinue use of Zoecon Altosid Briquets or if Peoples wishes to use a different product to control the mosquito larva/adults. This is so the OCD may evaluate how this could affect the integrity of the pond and its permitted use.

Sincerely

Martyne Kieling

CC: File NM-02-001 and NM-02-008

-----Original Message-----
From: Brad Walls [mailto:bwwalls@resourceproduction.com]
Sent: Wednesday, June 02, 2004 7:44 AM
To: Martyne Kieling
Subject:

Brad Walls, President
Resource Production Co.
P.O. Box 3076
Farmington, NM 87499
(505) 325-7927
bwwalls@resourceproduction.com

Date Issued: May, 2001
Supersedes: March, 2001

MATERIAL SAFETY DATA SHEET
ZOECON ALTOSID® BRIQUETS

Manufacturer: Wellmark International

Address: 1100 East Woodfield Road, Suite 500 Schaumburg, IL 60173

Emergency Phone: 1-800-248-7763

Transportation Emergency Phone: CHEMTREC: 1-800-424-9300

1. CHEMICAL PRODUCT INFORMATION

Product Name: Zoecon Altosid® Briquets

Chemical Name/Synonym: S)-Methoprene: Isopropyl (2E,4E,7S)-11-methoxy-3,7,11-trimethyl-2,4-dodecadienoate

Chemical Family: Terpenoid

Formula: C19 H34 O3

EPA Registration No.: 2724-375-

RF Number: 433A

2. COMPOSITION / INFORMATION ON INGREDIENTS

Component (chemical, common name)	CAS Number	Weight	Tolerance
(S)-Methoprene: Isopropyl (2E,4E,7S)-11-methoxy-3,7,11-trimethyl-2,4-dodecadienoate	65733-16-6	8.62%	Not established
Inert ingredients (non-hazardous and/or trade secret):		91.38%	

3. HAZARD INFORMATION

PRECAUTIONARY STATEMENT

Caution: Keep out of the reach of children..

SIGNS AND SYMPTOMS OF OVEREXPOSURE

No adverse reactions have resulted from normal human exposure during research and testing. Adverse animal reactions to this product have not been shown.

PRIMARY ROUTE OF ENTRY **Dermal/Eye:** Yes **Oral:** Yes **Inhalation:** Yes

ACUTE TOXICITY

Oral: LD50 (rat): > 34,600 mg/kg bw (highest dose level tested) (Based on S-Methoprene)

Dermal: LD50 (rabbit) >5,000 mg/kg bw) (Based on S-Methoprene)

Inhalation: LC50 (rat): >210 mg/L (4 hour) (HDT) (Based on RS-Methoprene)

OTHER TOXICOLOGICAL INFORMATION

Skin Irritation: Non-irritating (rabbit) (Based on S-Methoprene)

Eye Irritation: Practically non-irritating (rabbit) (Based on S-Methoprene)

Sensitizer: Not a sensitizer(guinea pig) (Based on RS-Methoprene)

4. FIRST AID MEASURES

Eye: Immediately flush with plenty of water.. See a physician if irritation persists.

Skin: Wash material off with soap and water. Remove contaminated clothing and footwear. See a physician if symptoms persist.

Ingestion: Drink 1-2 glasses of water and try to induce vomiting. Seek medical attention. Never give anything by mouth to an unconscious person.

Inhalation: Remove victim to fresh air. See a physician if cough or other respiratory symptoms develop

Note to Physician: Treat symptomatically

5. FIRE FIGHTING MEASURES

NFPA Rating: **Health: 0** **Fire: 0** **Reactivity: 0**

Flammability Class: N/A

Flash Point: Does not flash

Explosive Limits (% of Volume): N/A

Extinguishing Media: Water, foam, dry chemical

Special Protective Equipment: Firefighters should wear protective clothing, eye protection, and self contained breathing apparatus.

Fire Fighting Procedures: Normal procedures. Do not allow run-off to enter waterways inhabited by aquatic organisms

Combustion Products: Carbon dioxide, carbon monoxide

Unusual Fire/Explosion Hazards: None

6. ACCIDENTAL RELEASE MEASURES

Steps to be taken: Sweep up material and place in a container for disposal. Do not allow spill to enter waterways inhabited by aquatic organisms

Absorbents: None necessary due to product form

Incompatibles: None

7. HANDLING AND STORAGE

Handling: Avoid contact with eyes or clothing. Avoid breathing dust. Wash thoroughly with soap and water after handling.

Storage: Store in a cool, dry place. Do not contaminate food or feed by storage or disposal. Keep away from children.

8. EXPOSURE CONTROL / PERSONAL MEASURES

Exposure Limits: Not applicable

Ventilation: Use with adequate ventilation.

Personal Protective Equipment: Under ordinary use conditions, no special protection is required. If prolonged exposure is expected, it is recommended to wear a MSHA/NIOSH approved organic vapor/pesticide respirator, impervious gloves, chemical goggles or safety glasses with side shields.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance and Odor: Grey to black solid with slight hydrocarbon odor.

Boiling Point: N/A

Melting Point: N/A

Vapor Pressure (mm Hg): N/A

Vapor Density (Air = 1): N/A

Specific Gravity: 1.4 g/cc

Bulk Density: N/A

Solubility: 1 ppm

Evaporation Rate: N/A

pH: N/A

10. STABILITY AND REACTIVITY

Stability: Stable

Reactivity: Non-reactive

Incompatibility w/ Other Materials: None

Decomposition Products: None

Hazardous Polymerization: Will not occur

11. TOXICOLOGICAL INFORMATION

CHRONIC TOXICITY [Based on (RS)-Methoprene Technical]
Methoprene is not considered as a carcinogen. The NOEL for non-carcinogen effects in an 18-month mouse study was 250ppm..

DEVELOPMENTAL/REPRODUCTIVE TOXICITY [Based on (RS)-Methoprene Technical]
Methoprene is not a teratogen. The NOEL for maternal and embryo toxicity in rabbits was 200/mg/kg/day. The NOEL for reproductive effects in rats was 500 ppm..

MUTAGENICITY [Based on (RS)-Methoprene Technical]
Methoprene is not a mutagen.

12. ECOLOGICAL INFORMATION

ENVIRONMENTAL FATE [Based on (RS)-Methoprene Technical]

Hydrolysis: T1/2 > 4 weeks

Photolysis: T1/2 < 10 hours

Soil half life: ~ 10 days

< 2 ppm

Water solubility:

ECOTOXICITY [Based on (S)-Methoprene Technical]

Acute Toxicity: fish:LC50 (trout): 760 ppb, (bluegill): > 370 ppb ((S)-Methoprene); **aquatic invertebrates:**LC50 (Daphnia): 360 ppb ((S)-Methoprene.)

13. DISPOSAL CONSIDERATIONS

Wastes resulting from the use of this product may be disposed of on site or at an approved waste management facility. Triple rinse (or equivalent). Do not contaminate water when disposing of rinsate or equipment wash waters. Then offer for recycling or reconditioning or puncture and dispose of in a sanitary landfill or incineration, or if allowed by state and local authorities, by burning. If burned, stay out of smoke.

14. TRANSPORT INFORMATION

DOT49CFR Description: Not regulated as hazardous by D.O.T.

Freight Classification: Insecticides, NOI other than poison in boxes or drums. NMFC 102120

15. REGULATORY INFORMATION

CERCLA (Superfund): Not regulated

RCRA: Not regulated as hazardous

SARA 311/312 HAZARD CATEGORIES

Immediate Health: Yes (irritation)

Delayed Health: No

Fire: No

Sudden Pressure: No

Reactivity: No

The information presented herein, while not guaranteed, was prepared by technically knowledgeable personnel and to the best of our knowledge is true and accurate. It is not intended to be all inclusive and the manner and conditions of use and handling may involve other or additional considerations.

Kieling, Martyne

From: Foust, Denny
Sent: Friday, March 26, 2004 9:28 AM
To: Anderson, Roger; Chavez, Frank; Kieling, Martyne; Perrin, Charlie
Subject: FW: Blancett Complaint of Water release at People Pond II

During my onsite conversation with Mike Roark agent for Peoples we reviewed dike maintenance in the revegatated area, and placement of straw bales or dike repair to limit runoff from the fenced facility. The main berm of the pond will also need back dragging to prevent erosion due to precipitation. A new facility sign has been ordered.

-----Original Message-----
From: Anderson, Roger
Sent: Friday, March 26, 2004 8:54 AM
To: Foust, Denny
Cc: Prukop, Joanna; Leach, Carol
Subject: FW: Blancett Complaint of Water release at People Pond II

It appears that the berm needs maintenance. Please let me know by Monday what requirements you give them.

-----Original Message-----
From: Foust, Denny
Sent: Friday, March 26, 2004 8:47 AM
To: Anderson, Roger; Chavez, Frank; Kieling, Martyne; Perrin, Charlie; Bill Liess (E-mail)
Subject: Blancett Complaint of Water release at People Pond II






Peoples24_304.jpg Peoples26_304.jpg Peoples27_304.jpg Peoples28_304.jpg Peoples30_304.jpg Peoples31_304.jpg

I visited the site on March 25, 2004 and found no evidence of a produced water release. Their has been some run off from the fenced pond area but this appears to be precipitation. Revegatation on the overspray impacted area is going fairly well.

03/26/02

FACILITY INSPECTION
KOCH EVAPORATION POND #1
C-31-32N-08W

Pond looks good throughout. Koch recently discovered a floor grate in the pump house which drains out the storm water drain They will modify the system to catch material coming through the floor grate. Leak detection level 22", Koch will take comparison TDS tests for leak detection and the pond. No more vegetation affected than during the early months. New well off sets pond to the south.

KOCH EVAPORATION POND #2
F-26-32N-09W

Tweeti Blancett holder of a BLM grazing permit on section 26 has inferred this pond is affecting a stock water tank about 660 feet south of the pond. Pond has more salt build up than Pond #1 but still looks very reasonable, there are some dead and impacted trees along the south and east edges of the pond but it does not seem to have changed in the last five years. The leak detection has 17" of water. Pond overall looks good. Koch will take comparative TDS samples from the pond, leak detection, stock tank, Pipeline Spring and Pinto Pond.

Koch Exploration Company, LLC
Inspection by Denny Foust of the OCD
03-26-02

Photo 1

Photo 2

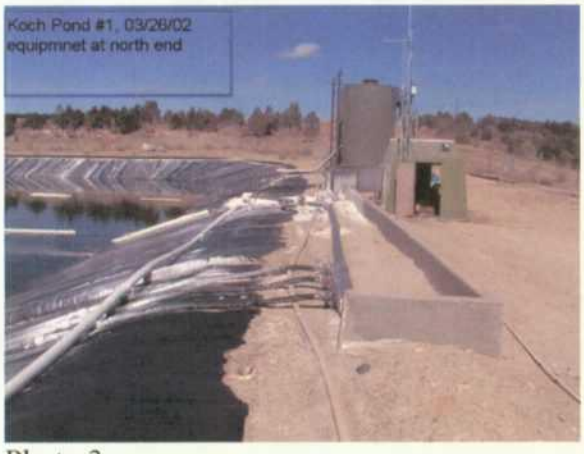


Photo 3

KOCH

KOCH EXPLORATION COMPANY

September 22, 2000

Ms Martyne J. Kieling
Environmental Geologist
New Mexico Oil Conversation Division
2040 S. Pacheco Street
Santa Fe, NM 87505

RE: OCD Rule 711 Permit Approval NM-02-0001 and NM-02-0008
Koch Exploration Company
Centralized Evaporation Pond #1 and #2
NE/4 NW/4 Sections 31, T32N-R8W (Pond 2)
SE/4 NW/4 Section 26, T32N-R9W (Pond 1)

Dear Ms Kieling:

Enclosed please find executed copies of the referenced permits. While Koch Exploration has executed the permits and agrees with the conditions, we are concerned with the condition to test the O_2 content of the pond water weekly, the initial permit required monthly testing. Since the ponds were placed in service Koch has taken monthly O_2 measurements and tested weekly for H_2S. During this time we have observed that the O_2 is within acceptable levels and have not detected any H_2S. With your permission we would like to ask for a waiver on weekly O^2 testing and to continue the current monthly O_2 testing as required in the initial permit.

We appreciate your attention to this request and look forward to your reply.

Sincerely,

G. S. Bennett
Chief Engineer

20 East Greenway Plaza • Houston, Texas 77046-2002 • 800/890-0205 • FAX 713/544-6161

NEW MEXICO ENERGY, MINERALS and NATURAL RESOURCES DEPARTMENT

GARY E. JOHNSON
Governor
Jennifer A. Salisbury
Cabinet Secretary

Lori Wrotenbery
Director
Oil Conservation Division

October 11, 2000

Mr. Stan Bennett
Koch Exploration Company
P.O. Box 1478
Houston, TX 77251-9970

RE: OCD Rule 711 Permit Approval NM-02-0008 and NM-02-0001
Koch Exploration Company
Centralized Evaporation Pond # 1 and #2

Dear Mr. Bennett:

The New Mexico Oil Conservation Division received the permits with the Directors original signature by mistake. I am returning the original signature permits to you with a copy of your signature page. I am keeping your orignial signature page for our records.

If you have any questions please do not hesitate to contact me at (505) 827-7153.

Sincerely,

Martyne Kieling
Environmental Geologist

KOCH

KOCH EXPLORATION COMPANY

September 22, 2000

Ms Martyne J. Kieling
Environmental Geologist
New Mexico Oil Conversation Division
2040 S. Pacheco Street
Santa Fe, NM 87505

RE: OCD Rule 711 Permit Approval NM-02-0001 and NM-02-0008
Koch Exploration Company
Centralized Evaporation Pond #1 and #2
NE/4 NW/4 Sections 31, T32N-R8W (Pond 2)
SE/4 NW/4 Section 26, T32N-R9W (Pond 1)

Dear Ms Kieling:

Enclosed please find executed copies of the referenced permits. While Koch Exploration has executed the permits and agrees with the conditions, we are concerned with the condition to test the O_2 content of the pond water weekly, the initial permit required monthly testing. Since the ponds were placed in service Koch has taken monthly O_2 measurements and tested weekly for H_2S. During this time we have observed that the O_2 is within acceptable levels and have not detected any H_2S. With your permission we would like to ask for a waiver on weekly O^2 testing and to continue the current monthly O_2 testing as required in the initial permit.

We appreciate your attention to this request and look forward to your reply.

Sincerely,

G. S. Bennett
Chief Engineer

20 East Greenway Plaza ▪ Houston, Texas 77046-2002 ▪ 800/890-0205 ▪ FAX 713/544-6161

NEW MEXICO ENERGY, MINERALS and NATURAL RESOURCES DEPARTMENT

GARY E. JOHNSON
Governor
Jennifer A. Salisbury
Cabinet Secretary

Lori Wrotenbery
Director
Oil Conservation Division

September 15, 2000

CERTIFIED MAIL
RETURN RECEIPT NO. 7099-3220-0000-5051-1088

Mr. Stan Bennett
Koch Exploration Company
P.O. Box 1478
Houston, TX 77251-9970

RE: OCD Rule 711 Permit Approval NM-02-0008
Koch Exploration Company,
Centralized Evaporation Pond # 1
NE/4 NW/4 Section 31, Township 32 North, Range 8 West, NMPM,
San Juan County, New Mexico.

Dear Mr. Bennett:

The permit application for the Koch Exploration Company (Koch) centralized surface waste management facility located in NE/4 NW/4 Section 31, Township 32 North, Range 8 West, NMPM, San Juan County, New Mexico **is hereby approved** in accordance with New Mexico Oil Conservation Division (OCD) Rule 711 under the conditions contained in the enclosed attachment. A $50,000 blanket bond, Surety Bond No. 400JZ6303, has been submitted by Koch and approved by the Director. The application consists of the permit application Form C-137 dated July 27, 1998, inspection report response letter dated July 23, 1998, and materials already on file with the OCD.

The operation, monitoring and reporting shall be as specified in the enclosed attachment. All modifications and alternatives to the approved evaporation methods must receive prior OCD approval. Koch is required to notify the Director of any facility expansion or process modification and to file the appropriate materials with the Division.

Please be advised approval of this facility permit does not relieve Koch of liability should your operation result in actual pollution of surface water, ground water, or the environment. In addition, OCD approval does not relieve Koch of responsibility for compliance with other federal, state or local laws and/or regulations.

Please be advised that all tanks exceeding 16 feet in diameter and exposed pits, ponds or lagoons must be screened, netted or otherwise rendered non-hazardous to migratory birds. In addition, OCD Rule 310 prohibits oil from being stored or retained in earthen reservoirs or open receptacles.

The facility is subject to periodic inspections by the OCD. The conditions of this permit will be reviewed by the OCD no later than five (5) years from the date of this approval and the facility will be inspected at least once a year.

Enclosed are two copies of the conditions of approval. **Please sign and return one copy to the OCD Santa Fe Office within five working days of receipt of this letter.**

If you have any questions please do not hesitate to contact Martyne J. Kieling at (505) 827-7153.

Sincerely,

Lori Wrotenbery

Lori Wrotenbery
Director

LW/mjk

xc with attachments:
Aztec OCD Office
Donald Johnson, Koch Exploration Company

ATTACHMENT TO OCD PERMIT APPROVAL
Permit NM-02-0008
KOCH EXPLORATION COMPANY
CENTRALIZED WASTE MANAGEMENT FACILITY
NE/4 NW/4 Section 31, Township 32 North, Range 8 West, NMPM,
San Juan County, New Mexico.
(September 15, 2000)

EVAPORATION POND OPERATION

1. The facility must be fenced and have a sign at the entrance. The sign must be legible from at least fifty (50) feet and contain the following information: a) name of the facility; b) location by section, township and range; and c) emergency phone number.

2. The pond must have a minimum freeboard of two feet (2'). A liner marking or other device must be installed in the pond to accurately measure freeboard.

3. Pond inspection and maintenance must be conducted on a weekly basis or immediately following a consequential rainstorm or windstorm. If any defect is noted repairs must be made as soon as possible. If the defect will jeopardize the integrity of the pond additional wastes may not be placed into the pond until repairs have been completed. Records of such inspections must be made available to the OCD upon request.

4. The outside walls of all levees must be maintained in such a manner to prevent erosion. Inspection of the outside walls of the levees must be made weekly.

5. The spray evaporation system will be operated such that all spray remains within the confines of the lined portion of the pond. An anemometer with automatic shutdown must be installed and utilized such that the spray system will not operate when winds, sustained or in gusts, cause windborn drift to leave the confines of the pond.

6. The pond leak detection system sumps must be inspected weekly. Results must be recorded and maintained at the facility for OCD review. If fluids are found in the sump, the following steps must be undertaken:

    a. the operator must notify the Aztec office within 24 hours;

    b. the fluids must be sampled and analyzed and a comparison made to the fluids in the pond to determine the source; and

    c. the fluids must be immediately and continuously removed from the sump. Such fluids may be returned to the pond.

7. If a leak is determined to exist in the primary liner, the operator will immediately undertake the following measures under the direction of the OCD:

   a. introduction of fluids into the pond must cease;

   b. enhanced evaporation must commence, provided atmospheric conditions are such that the spray system can be operated in accordance with the provisions of this permit;

   c. fluids must be removed from the pond using evaporation, injection or transportation to another authorized facility until the fluid level is below the location of the leak in the liner; and

   d. the liner must be repaired and tested and the leak detection system must be completely drained before introduction of fluids into the pond resumes.

8. Sludge thickness in the base of the pond must be measured annually. Any sludge build-up in the bottom of the pond in excess of twelve inches (12") must be removed and disposed of at an OCD-approved waste management facility.

9. All new or replacement above ground tanks located at the facility and containing materials other than fresh water must be placed on an impermeable pad and be bermed so that the containment area will hold one and one-third the volume of the largest tank or all interconnected tanks whichever is greater. All existing tanks must be labeled as to contents and hazards and must be bermed to contain one and one-third the volume of the largest tank or all interconnected tanks whichever is greater.

10. Below grade sumps must be cleaned and visually inspected annually. Results must be recorded and maintained for OCD review. If sump integrity has failed the OCD must be notified within 48 hours of discovery and the sump and contaminated soils must be removed and disposed of at an OCD-approved waste management facility. Soil remediation must follow OCD surface impoundment closure guidelines. Koch must submit a report to the OCD Santa Fe and Aztec District offices that describes the investigation and remedial actions taken.

11. The produced water receiving and treatment area must be inspected weekly for tank, piping and berm integrity.

12. To protect migratory birds, all tanks exceeding 16 feet in diameter and exposed pits, ponds or lagoons must be screened, netted, covered or otherwise rendered nonhazardous to migratory birds.

13. Liquid reduction technologies that may be used to eliminate pond waters include evaporation, enhanced evaporation and injection.

14. Tests to determine dissolved oxygen levels in the pond must be conducted on a weekly basis. Test results must be recorded and retained. The sample for each test must be taken one foot from the bottom of the pond and the location of each test must vary around the pond. The OCD Aztec Office will be notified immediately if any test shows a dissolved residual oxygen level of less than 0.5 ppm.

15. Tests of ambient H_2S levels must be conducted on a weekly basis. Test results must be recorded and retained. The tests must be conducted at four (4) locations around the pond at the top of the berm. The wind speed and direction must be recorded in conjunction with each test.

    a. If an H_2S reading of 1.0 ppm or greater is obtained:

        i. a second reading must be taken on the downwind berm within one hour;

        ii. the dissolved oxygen and dissolved sulfide levels of the pond must be tested immediately and the need for immediate treatment determined; and

        iii. tests for H_2S levels must be made at the fence line down wind from the problem pond.

    b. If two (2) consecutive H_2S readings of 1.0 ppm or greater are obtained:

        i. the operator must notify the Aztec office of the OCD immediately;

        ii. the operator must commence hourly monitoring on a 24-hour basis; and

        iii. the operator must obtain a daily analysis of dissolved sulfides in the pond.

    c. If an H_2S reading of 10.0 ppm or greater at the facility fence line is obtained:

        i. the operator must immediately notify the Aztec office of the OCD and the following public safety agencies:

            New Mexico State Police
            San Juan County Sheriff
            San Juan County Fire Marshall; and

        ii. the operator must initiate notification of all persons residing within one-half

(½) mile of the fence line and assist public safety officials with evacuation as requested.

WASTE ACCEPTANCE CRITERIA

1. The facility is authorized to accept only produced waters that are generated in the State of New Mexico by Koch Exploration Company.

2. The facility is authorized to accept only produced waters that are exempt from RCRA Subtitle C regulations and that do not contain Naturally Occurring Radioactive Material (NORM) regulated pursuant to 20 NMAC 3.1 Subpart 1403.

3. At no time may any OCD-permitted surface waste management facility accept wastes that are determined to be RCRA Subtitle C hazardous wastes by either listing or characteristic testing.

4. The transporter of any wastes to the facility must supply a certification that wastes delivered are those wastes received from the generator and that no additional materials have been added.

5. No produced water may be received at the facility from motor vehicles unless the transporter has a valid Form C-133, "Authorization to Move Produced Water," on file with the Division.

6. Comprehensive records of all material disposed of at the surface waste management facility must be maintained by the permit holder.

REPORTING AND RECORD KEEPING

1. Results of weekly inspections of the pond and its leak detection system and the produced water receiving and treatment area must be recorded and maintained for OCD review

2. Results of testing of the evaporation pond for H_2S, dissolved sulfides and dissolved oxygen must be recorded and maintained for OCD review.

3. Results of annual maintenance on below grade sumps and annual measurements of sludge thickness in the pond must be recorded and maintained for OCD review.

4. The applicant must notify the **OCD Aztec office within 24 hours** of any fire, break, leak, spill, blow out, or any other circumstance that could constitute a hazard or contamination in accordance with OCD Rule 116.

5. The applicant must file forms C-117, C-118, and C-120 with the appropriate OCD office.

6. All records of testing and monitoring must be retained for a period of five (5) years.
7. The OCD must be notified prior to the installation of any pipelines or wells or other structures within the boundaries of the facility.

FINANCIAL ASSURANCE

1. Pursuant to OCD Rule 711.B.3.a., financial assurance in a form approved by the Director is required from Koch Exploration Company in the amount of **$25,000** for this facility or **$50,000** for statewide financial assurance.

2. Financial assurance must be submitted within thirty (30) days of this permit approval or on **October 15, 2000**.

3. The facility is subject to periodic inspections by the OCD. The conditions of this permit and the facility may be reviewed by the OCD no later than five (5) years from the date of this approval.

CLOSURE

1. The OCD Santa Fe and Aztec offices must be notified when operation of the facility is to be discontinued for a period in excess of six (6) months or when the facility is to be dismantled. Within six (6) months after discontinuing use or within 30 days of deciding to dismantle the facility, a closure plan must be submitted to the OCD Santa Fe office for approval. The operator must complete cleanup of constructed facilities and restoration of the facility site within six (6) months of receiving the closure plan approval, unless an extension of time is granted by the Director.

2. The closure plan to be submitted must include the following procedures:

   a. When the facility is to be closed no new material will be accepted.

   b The soils beneath the evaporation pond and liquids receiving and treatment area will be characterized as to total petroleum hydrocarbons (TPH) and volatile aromatic organics (BTEX) content to determine potential migration of contamination.

   c. Contaminated soils exceeding OCD closure standards for the site will be removed or remediated.

d. The area will be contoured, seeded with native grasses and allowed to return to its natural state. If the landowner desires to keep existing structures, berms, and fences for future alternative uses the structures may be left in place.

e. Closure will be pursuant to all OCD requirements in effect at the time of closure, and any other applicable local, state and/or federal regulations.

CERTIFICATION

Koch Exploration Company, by the officer whose signature appears below, accepts this permit and agrees to comply with all terms and conditions contained herein. Koch Exploration Company further acknowledges that these conditions and requirements of this permit may be changed administratively by the Division for good cause shown as necessary to protect ground water, surface water, human health and the environment.

Accepted:

KOCH EXPLORATION COMPANY

Signature _____ Title _____ Date _____

STATE OF NEW MEXICO
ENERGY MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION

MEMORANDUM OF MEETING OR CONVERSATION

X Telephone ____ Personal Time 8:50 Date 8-29-00

Originating Party: MARTYNE KIELING

Other Parties: Don Johnson

Subject: Koch Pond #1 & #2

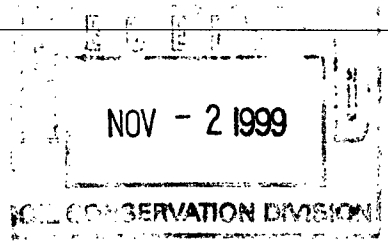
Discussion: Contact Person is Stan Bennett
P.O. Box 1478
Houston, TX 77251-9970
713-544-4562

Conclusions or Agreements

Distribution: Koch #1
Koch #2

Signed: Martyne J. Kieling

KOCH INDUSTRIES INC



October 29, 1999

Ms. Martyne Kieling
New Mexico Energy, Minerals, and Natural Resources Department
Oil Conservation Division
2040 S. Pacheco St.
Santa Fe, NM 87505

Re: Permit Renewal
OCD Rule 711 Permit
Koch Exploration Company
Centralized Koch Pond No. 1
San Juan County, NM

Dear Ms. Kieling:

I recently conducted an internal records review for Koch Exploration Company. The above referenced permit indicates an expiration date of October 6, 1998. Through discussions with the area manager and notes in the file, it appears as if this permit is still in effect. In April of 1998, a call was made to the OCD regarding permit renewal forms. At that time, OCD responded and indicated that the office was significantly behind in work load and that the permit would still be valid after the expiration date. As per our discussion this morning, you indicated that this permit is still valid and that a draft permit renewal would be sent to the facility in the Spring of 2000. Please feel free to contact me at (316) 828-6960 with any questions or concerns.

Respectfully,

Dana Mourning
Compliance Manager
Koch Exploration Company

cc: Don Johnson, Koch Exploration Company

KOCH
INDUSTRIES INC
P.O. Box 489
Aztec, NM 87410

NOV 25 1998

November 12, 1998

Oil Consersvation Division
1000 Rio Brazos RD
Aztec, NM 87410

ATTN: Mr. Denny Foust

RE: 1998 Yearly Pond Inspection & Water Analysis

Dear Mr. Foust:

Enclosed you will find water analysis from Pond #1 and Pond #2 for the year of 1998 that is required from us on a yearly basis. During our weekly inspections through out the year on both ponds we have not encountered any sick or dead birds or wildlife. If you would like to inspect our reports for each week on either or both of the ponds, they will be available upon request at the Koch Exploration Company's Aztec Office locatated at 610 South Main in Aztec.

If you have any questions or comments concerning these water analysis, please feel free to contact me at (505)-334-9111 or in my mobile phone at (505)-320-0819.

Sincerely,

Don Johnson
Operations Manager
Koch Exploration Company

cc: Roger Anderson
Oil Conservation Division
PO Box 2088
Santa Fe, NM 87504

Inter-Mountain Laboratories, Inc.

2506 W. Main Street
Farmington, New Mexico 87401

CASE NARRATIVE

Date: Nov. 5, 1998

Client: Koch Exploration Co.

Lab ID: 0398W06013-14 No. of Samples: 2

Project: Pond 1 + Pond 2

Dear Client:

The samples were received for analysis at Inter-Mountain Laboratories (IML), Farmington, New Mexico. Enclosed are the results of these analyses.

Comment:

For the sample identified as Pond 2, the anion/cation balance exceeded the recommended maximum of 5%. Method specified reruns were made in order to check the results. The rerun results did not change significantly from the original analysis. The samples have high carbonate concentrations which make the recommended balance percentage difficult to achieve.

Analytical results were obtained by approved methods. Sample analyses were obtained within the method specified holding time. Practical Quantitation limits (PQL) were determined for each parameter for various matrices, and preparation dilutions. Quantitative results are reported on an "as received " basis for all matrices unless otherwise specified.

If you have any question, please call me at 1 (505) 326-4737.

Wes Harvey
Laboratory Director
IML-Farmington, NM

Inter-Mountain Laboratories, Inc.

2506 W. Main Street
Farmington, New Mexico 87401

WATER QUALITY REPORT

Client: Koch Exploration Co.
Project: Pond 1 + Pond 2
Sample ID: Koch Pond #1
Lab ID: 0398W06013
Matrix: Water
Condition: Cool/Intact

Report Date: 11/05/98
Receipt Date: 10/13/98
Sample Date: 10/13/98

Parameter	Concentration		PQL	Method
GENERAL PARAMETERS				
pH	9.3 s.u.		0.1 s.u.	EPA 150.1
Electrical Conductivity	27000 µmhos/cm		10 µmhos/cm	EPA 120.1
Solids - Total Dissolved	22750 mg/L		10 mg/L	EPA 160.1
Alkalinity	16716 mg/L		1 mg/L	EPA 310.1
Hardness	154 mg/L		1 mg/L	EPA 130.2
MAJOR ANIONS				
Bicarbonate (HCO3)	11700 mg/L	191 meq/L	1 mg/L	EPA 310.1
Carbonate (CO3)	4290 mg/L	142.86 meq/L	1 mg/L	EPA 310.1
Hydroxide (OH)	<1 mg/L	0.00 meq/L	1 mg/L	EPA 310.1
Chloride	1600 mg/L	45.1 meq/L	1 mg/L	EPA 300.0
Sulfate	112.0 mg/L	2.33 meq/L	5 mg/L	EPA 300.0
MAJOR CATIONS				
Calcium	11.5 mg/L	0.57 meq/L	0.2 mg/L	EPA 200.7
Magnesium	30.4 mg/L	2.50 meq/L	0.2 mg/L	EPA 200.7
Potassium	27.5 mg/L	0.70 meq/L	0.2 mg/L	EPA 200.7
Sodium	7710 mg/L	335 meq/L	0.2 mg/L	EPA 200.7
CATION / ANION BALANCE QC INFORMATION				
Anion Sum	382 meq/L	382 meq/L	0.1 meq/L	Calculation
Cation Sum	339.1 meq/L	339 meq/L	0.1 meq/L	Calculation
Cation/Anion Balance	5.92 %	5.92 %	0.1 %	Calculation

Reference: EPA - "Methods for Chemical Analysis of Water and Wastes (MCAWW)" - EPA/600/4-79-020 - March, 1983.
EPA - "Methods for the Determination of Metals in Environmental Samples" - Supplement I - 600/R-94-111 - May, 1994.

Reviewed By: _____

Inter-Mountain Laboratories, Inc.

2506 W. Main Street
Farmington, New Mexico 87401

WATER QUALITY REPORT

Client: Koch Exploration Co.
Project: Pond 1 + Pond 2
Sample ID: Koch Pond #2
Lab ID: 0398W06014
Matrix: Water
Condition: Cool/Intact

Report Date: 11/06/98
Receipt Date: 10/13/98
Sample Date: 10/13/98

Parameter	Concentration	PQL	Method
GENERAL PARAMETERS			
pH	9.3 s.u.	0.1 s.u.	EPA 150.1
Electrical Conductivity	28700 µmhos/cm	10 µmhos/cm	EPA 120.1
Solids - Total Dissolved	24742 mg/L	10 mg/L	EPA 160.1
Alkalinity	19723 mg/L	1 mg/L	EPA 310.1
Hardness	149 mg/L	1 mg/L	EPA 130.2

MAJOR ANIONS				
Bicarbonate (HCO3)	13600 mg/L	224 meq/L	1 mg/L	EPA 310.1
Carbonate (CO3)	5120 mg/L	170.77 meq/L	1 mg/L	EPA 310.1
Hydroxide (OH)	<1 mg/L	0.00 meq/L	1 mg/L	EPA 310.1
Chloride	1750 mg/L	49.3 meq/L	1 mg/L	EPA 300.0
Sulfate	7.0 mg/L	0.15 meq/L	5 mg/L	EPA 300.0

MAJOR CATIONS				
Calcium	5.6 mg/L	0.28 meq/L	0.2 mg/L	EPA 200.7
Magnesium	32.6 mg/L	2.69 meq/L	0.2 mg/L	EPA 200.7
Potassium	29.1 mg/L	0.74 meq/L	0.2 mg/L	EPA 200.7
Sodium	7960 mg/L	346 meq/L	0.2 mg/L	EPA 200.7

CATION / ANION BALANCE QC INFORMATION				
Anion Sum	445 meq/L	445 meq/L	0.1 meq/L	Calculation
Cation Sum	350.0 meq/L	350 meq/L	0.1 meq/L	Calculation
Cation/Anion Balance	11.95	11.95 %	N/A	N/A

Reference: EPA - "Methods for Chemical Analysis of Water and Wastes (MCAWW)" - EPA/600/4-79-020 - March, 1983.
EPA - "Methods for the Determination of Metals in Environmental Samples" - Supplement I - 600/R-94-111 - May, 1994.

Reviewed By: _____

Inter-Mountain Laboratories, Inc.

2506 W. Main Street
Farmington, New Mexico 87401

TOTAL PETROLEUM HYDROCARBONS
EPA METHOD 418.1

Client:	**Koch Exploration**	Date Reported:	10/23/98
Project:	Koch Pond #1 & #2	Date Sampled:	10/13/98
Matrix:	Water	Date Received:	10/13/98
Condition:	Intact/Cool	Date Extracted:	10/22/98
		Date Analyzed:	10/23/98

Sample ID	Lab ID	Result mg/L	Detection Limit mg/L
Pond #1	0398G06013	**ND**	1.0
Pond #2	0398G06014	**ND**	1.0

ND - Analyte not detected at stated detection level.

Method 418.1:

Petroleum Hydrocarbons, Total Recoverable, USEPA Chemical Analysis of Water and Waste, 1978.

Method 3510:

Separatory Funnel Liquid - Liquid Extraction, USEPA SW-846, Test Methods for Evaluating Solid Waste, Rev. 1, July 1992.

Analyst: _____

Reviewed: _____

Inter-Mountain Laboratories, Inc.

2506 W. Main Street
Farmington, New Mexico 87401

Quality Assurance / Quality Control

Total Petroleum Hydrocarbons

Client:	**Koch Exploration**	Date Reported:	10/23/98
Project:	Koch Pond #1 & #2	Date Sampled:	10/13/98
Matrix:	Water	Date Received:	10/13/98
Condition:	Intact/Cool	Date Extracted:	10/22/98
		Date Analyzed:	10/23/98

Method Blank Analysis

Lab ID	Result	Units	Detection Limit
Method Blank	ND	mg/L	20.0

Spike Analysis

Lab ID	Found Conc. mg/L	Sample Conc. mg/L	Spike Amount mg/L	Percent Recovery	Acceptance Limits
MB	46	ND	52.5	87%	70-130%

Known Analysis

Lab ID	Found Conc. mg/L	Known Conc. mg/L	Percent Recovery	Acceptance Limits
QC	18.8	26.0	72%	70-130%

Method 418.1: Petroleum Hydrocarbons, Total Recoverable, USEPA Chemical Analysis of Water and Waste, 1978.

Method 3550: Ultrasonic Extraction of Non-Volatile and Semi-Volatile Organic Compounds from Solids, USEPA SW -846, rev.1, July 1992.

Reported By: _____ Reveiwed By: _____

KOCH INDUSTRIES INC
Koch Exploration Company
P.O. Box 489
Aztec, New Mexico 87410
Phone: (505) 334-9111

RECEIVED
JUL 28 1998
Environmental Bureau
Oil Conservation Division

July 23, 1998

Martyne J. Kieling
Environmental Geologist
New Mexico Energy, Minerals & Natural Resources Department
Oil Conservation Division
2050 South Pacheco Street
Santa Fe, New Mexico 87505

RE: 711 Centralized Waste Management Facility Inspection Response
Koch Exploration Company, Koch #1 Evaporation Pond
NE/4 Nw/4 of Section 31, Township 32 North, Range 8 West, NMPM
San Juan County, New Mexico

Dear Ms. Kieling:

In response to your inspection of the Koch Exploration Company (Koch #1) waste management facility evaporation pond #1 on June 12, 1997. Attachment 1 is in response to the permit deficiencies found at Koch #1 during the inspection and the new Rule 711 requirements that are not on file. Attachment 2 contains photographs taken upon completion of required work

Pursuant to Order R-10411-B the OCD General Rule 711 revision, we have included the new financial assurance forms, and a permit application, Form C-137 are also attached.

All necessary forms and responses to deficiencies found at Koch #1 during the facility inspection are attached, to meet re-permitting requirements under the new Rule 711.

If you have questions or need additional information for re-permitting this facility, please feel free to contact me at (505) 334-9111.

Sincerely,

Don Johnson
Operations Manager
Koch Exploration Company

Attachments
cc: Oil Conservation Division
1000 Rio Brazos RD
Aztec, NM 87410

ATTACHMENT 1
INSPECTION REPORT RESPONSE
KOCH EXPLORATION COMPANY, KOCH #1
(NE/4 NW/4 of Section 31, Township 32 North, Range 8 West, NMPM)
SAN JUAN COUNTY, NEW MEXICO

1. Pond Freeboard: Liner markings or some other device shall be installed to accurately measure freeboard. Pond freeboard shall be a minimum one and a half (1 ½) feet below the top of the lowest point on the levee. The pond must be maintained below freeboard level at all times.

   Freeboard markers accurately measure the two foot (2') freeboard height (see picture # 2). Freeboard is now marked with 4" lettering.

2. Pond Levee: The top of the levee shall be level, ponding of water should not occur, and the outside grade of the levee should be maintained to minimize erosion and maintain proper levee width.

   The levee will be monitored after precipitation events, and maintained as needed.

3. Leak Detection System: The top of the leak detection monitor well must be above the top of the levee. The monitor well should be covered. In addition, the leak detection monitor well shall be inspected weekly.

   The evaporation pond leak detection system shall be inspected weekly, and maintained in good working order.

4. Sludge Build-up: Any sludge build-up in the bottom of the pond in excess of twelve inches (12") will be removed and disposed of at an OCD approved disposal facility.

   Sludge thickness was measured in six (6) randomly selected areas. Using a thief off bottom of pond, we experienced no sign of sediment in any of the samples. We will continue to monitor sludge build-up periodically.
   The pond does have an extensive algae bloom which we have decided not to treat for at this time. We believe any treatment would increase the risk of future H2S problems or excessive sludge build-up.

5. Security: The facility shall be secured when no attendant is present, to present any unauthorized dumping. Securing the facility may include locks on tank valves, a perimeter fence and locked gate or other similar security measures.

   Facility has a perimeter fence and locking gate, no action necessary at this time.

6. Signs: The facility shall have a sign in a conspicuous place at the facility. The sign shall be maintained in legible condition and shall be legible from at least fifty (50) feet and contain the following information: a) name of facility, b) location by quarter-quarter section, township and range, and c) emergency phone number.

   The facility has clearly labeled sign posted within view. This sign will be monitored and

maintained as needed.

7. Drum Storage: All drums containing materials other than fresh water must be stored on an impermeable pad with curbing. All empty drums should be stored on their sides with the bungs in and lined up on a horizontal plane. Chemicals in other containers such as sacks or buckets should also be stored on an impermeable pad and curb type containment.

   There are no drums or containers stored on site.

8. Process Area: All process and maintenance areas which show evidence that leaks and spills are reaching the ground surface must be either paved and curbed or have some type of spill collection device incorporated into the design.

   Overall yard maintenance practices at the facility were good, no action necessary at this time.

9. Above Ground Tanks: All above ground tanks which contain fluids other than fresh water must be bermed to contain a volume of one-third more than the total volume of the largest tank or of all interconnected tanks. All new facilities or modifications to existing facilities must place the tank on an impermeable type pad within the berm so that leaks can be identified.

   The berms around the above ground tanks have been repaired to establish any overflow of tanks directly into the pond (see pictures 1, 3, and 5). The emergency containment is directed into the evaporation pond (see picture 5).

10. Open Top Tanks and Pits: To protect migratory birds, all tanks exceeding 16 feet in diameter, and exposed pits and ponds shall be screened, netted, covered or otherwise rendered nonhazardous to migratory birds. In addition, OCD Rule 310 prohibits oil from being stored or retained in earthen reservoir, or in open receptacles.

    The evaporation pond did not contain any oil at time of inspection, and has not in the past. Netting is not required on the evaporation pond as long as it is kept oil free. Koch will continue to regularly monitor the evaporation pond for any oil or hazardous materials.

11. Above Ground Saddle Tanks: Above ground saddle tanks must have impermeable pad and curb type containment unless they contain fresh water or fluids that are gases at atmospheric temperature and pressure.

    There are no saddle tanks at this facility.

12. Tank Labeling: All tanks, drums and containers should be clearly labeled to identify their contents and other emergency information necessary if the tank were to rupture, spill or ignite.

    Hazard placards have been placed on all above ground tanks (see pictures 1, 3, 4, and 5). Labeling, taken from MSDS sheet is as follows:

Produced Water	
Health	**0**
Reactivity	**0**
Flammability	**0**
Personal Protective Equipment	**B**

13. Below Grade Tanks/Sumps: All below grade tanks, sumps, and pits must be approved by the OCD prior to installation or upon modification and must incorporate secondary containment and leak-detection into the design. All pre-existing sumps and below grade tanks must demonstrate integrity on an annual basis. Integrity tests include pressure testing and/or visual inspection of cleaned out tanks or sumps, or other OCD approved methods.

    There are no below grade tanks, pits or sumps at any tank valves. All valve catchment barrels are above ground.

14. Underground Process/Wastewater Lines: All underground process/wastewater pipelines must be tested to demonstrate their mechanical integrity at present and then every 5 years thereafter. Companies may propose various methods for testing such as pressure testing or other OCD approved methods.

    There are no underground/process wastewater lines at this facility. The only underground line is for pump suction, which is above pond freeboard. Should the integrity of this line fail, the pond pump will shut it's self off.

15. Housekeeping: All systems designed for spill collection/prevention should be inspected frequently to ensure proper operation and to prevent overtopping or system failure.

    The facility tanks were clean with no overtopping stains. Overall yard maintenance and spill prevention/cleanup was good. No action necessary at this time.

16. Trash and Potentially Hazardous Materials: All trash and potentially hazardous materials should be properly disposed of.

    There is no trash at the facility. The facility will continue to be maintained in a trash and potentially hazardous materials free area.

17. Spill Reporting: All spills/releases shall be reported pursuant to OCD Rule 116 and WQCC 1203 to the appropriate OCD District Office.

    There were no spills evident at this facility. Should a spill occur it will be reported under the guidelines of OCD Rule 116 and WQCC 1203 to the appropriate OCD District Office.

18. Naturally Occurring Radioactive Material (NORM): All generators submitting waste to a New Mexico Oil Conservation Division Permitted Commercial or Centralized 711 Waste Management Facility must include a Naturally Occurring Radioactive Material status declaration. The generator must declare that the waste was tested for Naturally Occurring Radioactive Material (NORM) and does not contain NORM at regulated levels pursuant to 20 NMAC 3.1 Subpart 1403.C and D.

    NORM declaration is attached to OCD form C-137, Application For Waste Management Facility.

    Pursuant to 20 NMAC 3.1 Subpart 1403.E, "Produced water is exempt from the requirements of these regulations if it is ...stored or disposed in a double, synthetically lined surface impoundment permitted by the Division".

19. Produced Water Well Locations: Produced water from all well production locations that supply

A listing by name and legal location is attached to OCD for C-137, Application For Waste Management Facility.

20. Application Requirements for Permit Under the New Rule 711: An application, Form C-137, for a permit renewal shall be filed in DUPLICATE with the Santa Fe Office of the Division and ONE COPY with the appropriate OCD district office. The application shall comply with Division guidelines and shall include:

(a) The names and addresses of the applicant and all principal officers of the business if different from the applicant;

See enclosed C-137 application.

(b) A plat and topographic map showing the location of the facility in relation to governmental surveys (¼ ¼ section, township, and range), highways or roads giving access to the facility site, watercourses, water sources, and dwellings within one (1) mile of the site;

This is already on file with the OCD.

(c) The names and addresses of the surface owners of the real property on which the management facility is sited and surface owners of the real property of record within one mile of the site;

This is already on file with the OCD.

(d) A description of the facility with a diagram indicating location of fences and cattle guards, and detailed construction/installation diagrams of any pits, liner, dikes, piping, sprayers, and tanks on the facility;

This is already on file with the OCD.

(e) A plan for management of approved wastes;

This is already on file with the OCD.

(f) A contingency plan for reporting a cleanup of spills or releases;

This is attached to form C-137, Application For Waste Management Facility.

(g) A routine inspection and maintenance plan to ensure permit compliance;

This is attached to form C-137, Application For Waste Management Facility.

(h) A Hydrogen Sulfide (H2S) Prevention and Contingency Plan to protect public health;

This is already on file with the OCD.

(i) A closure plan including a cost estimate sufficient to close the facility to protect public health and the environment; said estimate to be based upon the use of equipment normally available to a third party contractor;

This is attached to form C-137, Application For Waste Management Facility.

(j) Geological/hydrological evidence, including depth to and quality of groundwater beneath the site, demonstrating that disposal of oil field wastes will not adversely impact fresh water.

This is already on file with the OCD.

(k) Certification by an authorized representative of the applicant that information submitted in the application is true, accurate and complete to the best of the applicant's knowledge.

See form C-137, Application For Waste Management Facility.

District I - (505) 393-6161
P. O. Box 1980
Hobbs, NM 88241-1980
District II - (505) 748-1283
811 S. First
Artesia, NM 88210
District III - (505) 334-6178
1000 Rio Brazos Road
Aztec, NM 87410
District IV - (505) 827-7131

New Mexico
Energy Minerals and Natural Resources Department
Oil Conservation Division
2040 South Pacheco Street
Santa Fe, New Mexico 87505
(505) 827-7131

RECEIVED
JUL 28 1998
Environmental Bureau
Oil Conservation Division

Form C-137
Originated 8/8/95

Submit Original
Plus 1 Copy
to Santa Fe
1 Copy to appropriate
District Office

APPLICATION FOR WASTE MANAGEMENT FACILITY

(Refer to the OCD Guidelines for assistance in completing the application)

☐ Commercial ☒ Centralized

1. Type: ☒ Evaporation ☐ Injection ☐ Other
   ☐ Solids/Landfarm ☐ Treating Plant
2. Operator: Koch Exploration Co.
   Address: 610 S. Main St / P.O. Box 489 Aztec, NM 87410
   Contact Person: Don Johnson Phone: (505) 334-9111
3. Location: NE /4 NW /4 Section 31 Township 32 North Range 8 West
   Submit large scale topographic map showing exact location
4. Is this a modification of an existing facility? ☐ Yes ☒ No
5. Attach the name and address of the landowner of the facility site and landowners of record within one mile of the site.
   already on file
6. Attach description of the facility with a diagram indicating location of fences, pits, dikes, and tanks on the facility.
   already on file
7. Attach designs prepared in accordance with Division guidelines for the construction/installation of the following: pits or ponds, leak-detection systems, aerations systems, enhanced evaporation (spray) systems, waste treating systems, security systems, and landfarm facilities.
   already on file
8. Attach a contingency plan for reporting and clean-up for spills or releases.
9. Attach a routine inspection and maintenance plan to ensure permit compliance.
10. Attach a closure plan.
11. Attach geological/hydrological evidence demonstrating that disposal of oil field wastes will not adversely impact groundwater. Depth to and quality of ground water must be included.
    already on file
12. Attach proof that the notice requirements of OCD Rule 711 have been met.
    already on file
13. Attach a contingency plan in the event of a release of H_2S.
    already on file
14. Attach such other information as necessary to demonstrate compliance with any other OCD rules, regulations and orders.
15. CERTIFICATION

I hereby certify that the information submitted with this application is true and correct to the best of my knowledge and belief.

Name: Don Johnson Title: Operations Manager

Signature: Don Johnson Date: 7/27/98

KOCH INDUSTRIES INC
Koch Exploration Company
P.O. Box 489
Aztec, New Mexico 87410
Phone: (505) 334-9111

FACILITIES THAT DISPOSE OF WATER INTO POND #1

Gardner C-2	Unit G Sec. 31, T-32-N, R-8-W
Gardner C-3	Unit M Sec. 31, T-32-N, R-8-W
Gardner C-4	Unit K Sec. 25, T-32-N, R-9-W
Gardner C-6	Unit B Sec. 25, T-32-N, R-9-W

Water Spill Contingency Plan

for

KOCH INDUSTRIES INC

Koch Exploration Company
P.O. Box 489
Aztec, New Mexico 87410
Phone: (505) 334-9111

There are 2 Evaporation Ponds in San Juan County, New Mexico that are operated by Koch Exploration Company. The following Names and Numbers should be used in case of a Spill, which Names and Numbers will depend on the circumstances. Koch Exploration does not operate or own any equipment of our own that could be utilized in the event of a spill.

Governmental Agencies:

1. New Mexico Oil Conservation Commission: (505)-334-6178
2. Bureau of Land Management (BLM): (505)-599-8900

Clean up Equipment and Personnel:

1. Vacuum Trucks:
    a. Triple S Trucking: (505)-331-6193
    b. Sunco Trucking: (505)-327-0416
    c. Dawn Trucking: (505)-327-6314
2. Roustabout Services:
    a. Sunland Construction (505) 334-4350
    b. Foutz & Bursum: (505) 325-3712
    c. Flint Engineering: (505)-325-5081
    d. Cimmarron Oilfield Service: (505) -327-5049
3. Dirt Moving Equipment:
    a. Bill Moss Excavation: (505)-334-9093
    b. Sunland Construction (505) 334-4350
    c. Rosenbaum Construction: (505)-325-6367
    d. Adobe Construction: (505)-632-1486
    e. Aztec Excavation (505) 334-4020

Koch Exploration Company Employees: Aztec Office: (505)-334-9111

Employee Name	Home Phone	Mobile Phone	Pager
1. Don Johnson (Operations Manager)	(505)-334-3252	(505)-320-0819	(505)-324-2788
2. John Clark (Pumper)	(505)-334-6235	(505)-320-7799	
3. Ken Cagle (Pumper)	(505)-632-1505	(505)-320-1018	
4. Glen Hise (Contract Pumper)	(505)-334-9856	(505)-599-8074	

5. Stan Bennett (Main Office Wichita,KS) (316)-828-5242 or (Houston Office) (713) 544-4562

Routine Inspection and Maintenance Plan

for

KOCH INDUSTRIES INC

Koch Exploration Company
Evaporation Pond #1
P.O. Box 489
Aztec, New Mexico 87410
Phone: (505) 334-9111

Koch will:

1. Weekly monitor leak detection. Records for such inspections will be made and kept on file for two (2) years from the date of record. If fluids are found in the sump the following steps will be immediately undertaken.
    a. Koch will notify the OCD Aztec Office within twenty-four (24) hours of discovery.
    b. The fluids will be sampled and analyzed to determine the source.
    c. The fluids will be immediately and continuously removed from the sump. Such fluids may be returned to the pond.

    If a leak is determined to exist in the primary liner, Koch will immediately undertake the following:
    a. Introduction of fluids in the pond will cease.
    b. Enhanced evaporation will commence, provided atmosphere conditions are such that the spray systems can be operated in accordance with the provisions of this permit.
    c. Fluids will be removed from the pond utilizing evaporation and transportation to another authorized facility, until the fluid level is below the location of the leak in the liner.
    d. The liner will be repaired and tested and the leak detection system will be completely drained before resuming introduction of fluids into the pond.

2. Conduct weekly tests for ambient H_2S levels. Tests will be made at varying locations around the pond levee. The wind speed and direction will be recorded in conjunction with each test.

    If an H_2S reading of 0.1 ppm or greater is obtained:
    a. A second reading will be taken on the down wind berm within one hour.
    b. The dissolved oxygen and dissolved sulfide levels of the pond will be tested immediately and the need for immediate treatment determined
    c. Tests for H_2S levels will be made at the fence line, downwind from the pond.

    If 2 consecutive H_2S readings of 0.1 ppm or greater are obtained:
    a. Koch will notify the OCD Aztec Office immediately.
    b. Koch will commence hourly monitoring on a 24-hour basis.

c. Koch will obtain daily analysis of dissolved sulfides in the pond.
d. Koch will implement the approved treatment plan so as to reduce dissolved sulfides in the pond and eliminate H2S emissions.

If an H2S reading of 10.0 ppm or greater at the facility fence line is obtained:

a. Koch will immediately notify the OCD Aztec and Santa Fe Offices and the following public safety agencies:

New Mexico State Police	(505) 325-7547
San Juan County Sheriff Dept.	(505) 334-6622
Fire Marshall	(505) 334-4500

b. Koch will initiate notification of all persons residing within one-half (1/2) mile of the fence line and assist public safety officials with evacuation as requested,

3. Conduct monthly tests to determine the dissolved oxygen levels. The sample for each test will be taken one foot from the bottom of the pond and the location of each test will vary around the pond. The OCD Aztec Office will be notified immediately if any test shows a dissolved residual oxygen level of less than 0.5 ppm. Test records will be available in the Koch Exploration Aztec Office for review.

4. Monitor pond levee after precipitation events, to maintain level, prevent ponding of water, to minimize erosion, and maintain proper width.

5. Periodically measure any sludge build-up in the bottom of the pond. Any build-up in excess of twelve (12) inches will be removed and disposed of at an OCD approved disposal facility.

6. Routinely inspect, and maintain berms around the above ground tanks.

7. Regularly inspect the tank separation system to ensure it is working properly, and no contaminants are entering the pond.

KOCH INDUSTRIES INC
Koch Exploration Company
P.O. Box 489
Aztec, New Mexico 87410
Phone: (505) 334-9111

Naturally Occurring Radioactive Material (NORM) Status Declaration For Evaporation Pond #1

Koch Exploration had the following sites tested for NORM in October, 1997. Each of these sites discharge produced water into the Koch Evaporation Pond #1, and do not contain NORM at regulated levels pursuant to 20 NMAC 3.1 Subpart 1403.C and D. The Evaporation Pond was not tested, as produced water stored or disposed in a double, synthetically lined surface impoundment permitted by the OCD, is exempt from NORM regulations.

Well Name	Background NORM	Highest NORM	Above Background
Gardner C-2	14 μR/Hr	14 μR/Hr	0 μR/Hr
Gardner C-3	11 μR/Hr	15 μR/Hr	4 μR/Hr
Gardner C-4	14 μR/Hr	14 μR/Hr	0 μR/Hr
Gardner C-6	14 μR/Hr	14 μR/Hr	0 μR/Hr

X _____

Don Johnson, Operations Manager
Koch Exploration Company
Aztec, New Mexico

Closure Plan

for

KOCH INDUSTRIES INC

Koch Exploration Company

Evaporation Pond #1

P.O. Box 489

Aztec, New Mexico 87410

Phone: (505) 334-9111

Upon Koch's decision to close it's Evaporation Pond # 1, notice will be given to OCD. Closure and waste disposal will then be completed in accordance with the statues rules and regulations in effect at the time of closure.

Koch will:

1. Cease discharge of waters into the site, and begin removal of all fluids and/or wastes.

   Assuming Pond is at maximum level (freeboard), based on the Koch Evaporation Pond #1's last 12 months experience and anticipated rainfall, it will take approximately 3 years to evaporate the pond's capacity. This **does not** include trucking any water from the Pond.

2. Remove, the plastic liner, all operating equipment, and structures from the site.

3. Clean up any contaminated soils and/or waters pursuant to OCD approval, fill the pond, and level the site.

4. Re-seeded the area with natural grasses and allow it to return to it's natural state.

The approximate cost for dirt remediation of this facility is $18,000.00.

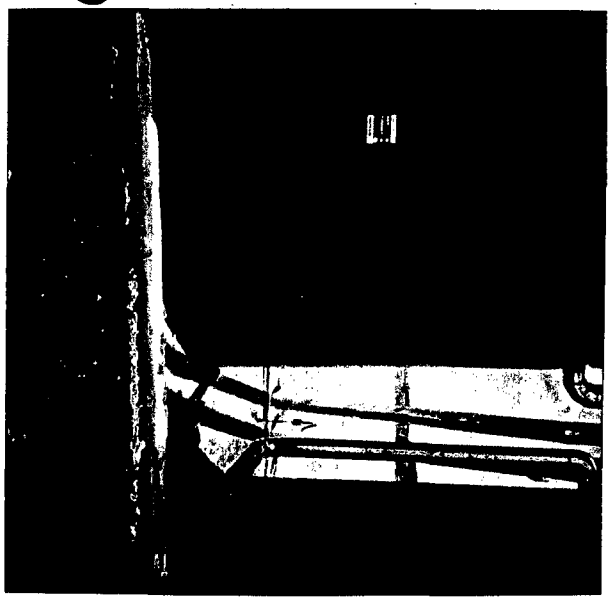
ATTACHMENT 2

KOCH #1 711 APPLICATION

(PHOTOS BY KOCH)

Pond #1

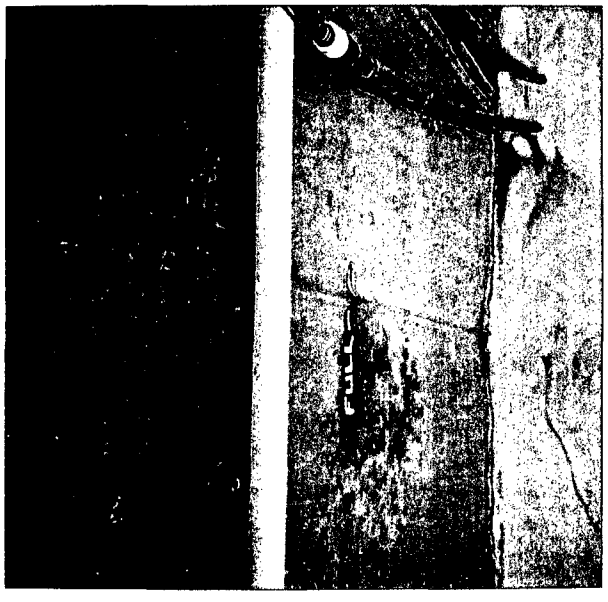
(1)



Pond #1

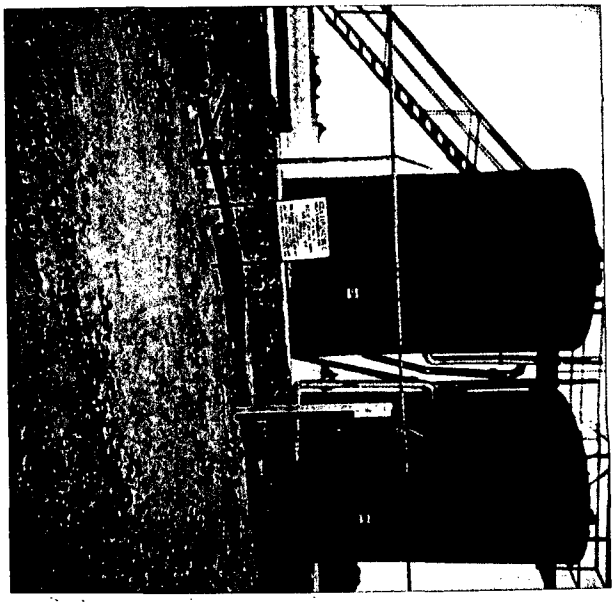
4" lettering

(2)



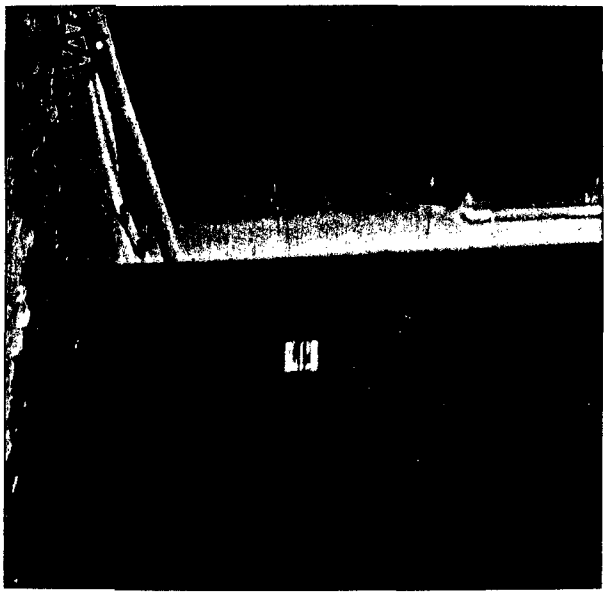
Pond #1

(3)



Pond #1

(4)



Pond #1

(5)

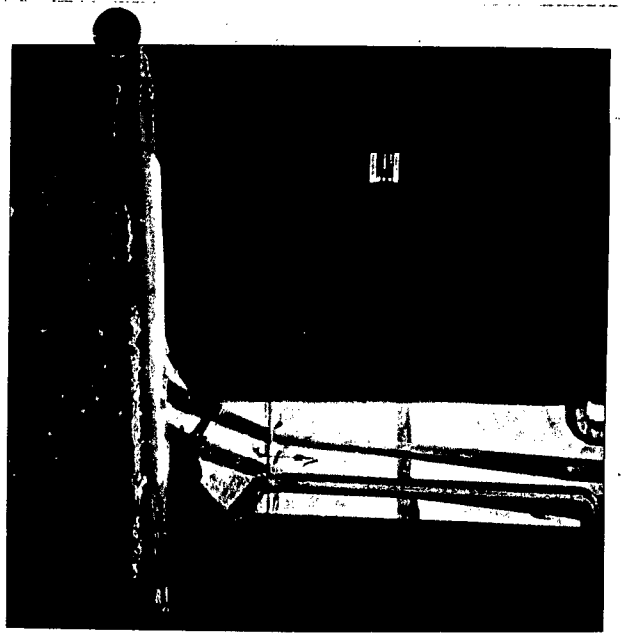
ATTACHMENT 2

KOCH #1 711 APPLICATION

(PHOTOS BY KOCH)

Pond #1

(1)



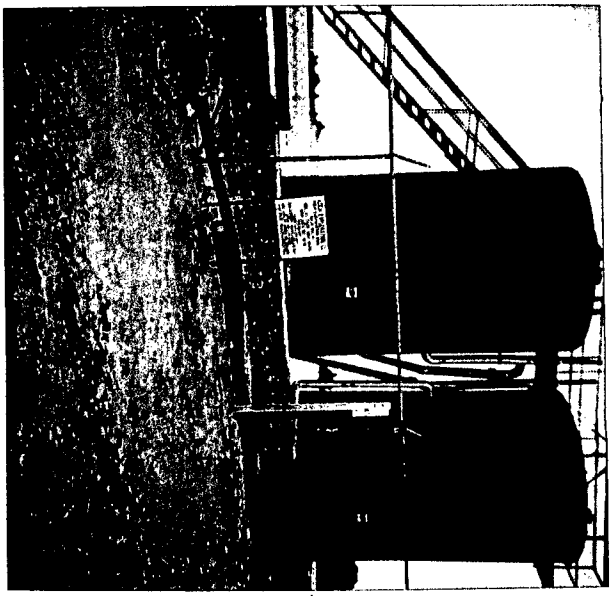
Pond #1

4" lettering

(2)

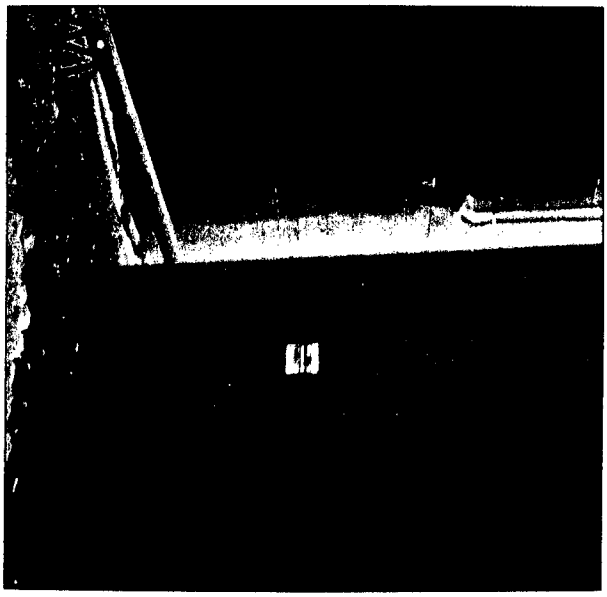
Pond #1

(3)



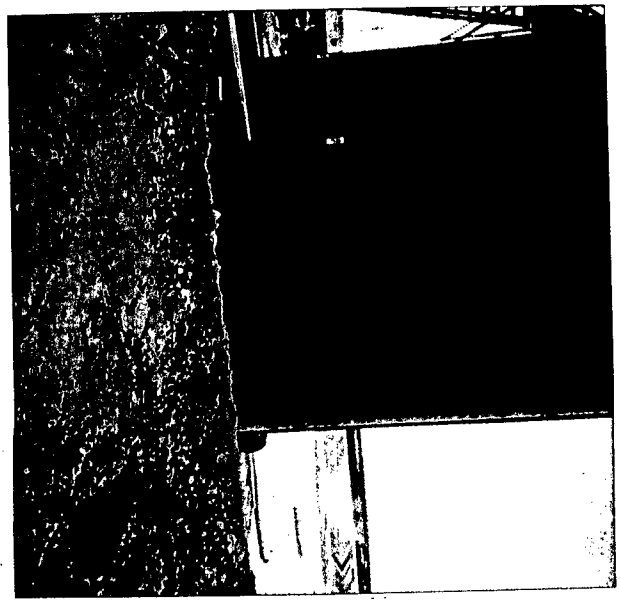
Pond #1

(4)



Pond #1

(5)



KOCH
INDUSTRIES INC
P.O. Box 489
Aztec, New Mexico 87410

Date: September 15, 1997

To: Roger Anderson (NMOCD)
2040 S. Pacheco
Sante Fe, New Mexico 87505

From: Don Johnson (Koch Exploration Company)

Subj: * "Correction to prior Notice" for Koch Evaporation Pond #1 Liner Repair

Roger,
I am writing this notice to inform you of the leak we experienced at the Koch Evaporation Pond #1 during the last month. The first indication of a leak was on July 31, 1997, when leak detection monitor went from 12" to 14". At that time we were not concerned due to recent rain fall. Leak detection continued to increase by approximately 2" per day. On August 10, 1997 we pumped 10 gallons out of leak detection system, which changed level from 21" to 16". This is a leak of approximately 1 gallon per day. Leak detection continued to increase slightly. During our regular inspection of pond we found a 2" rip in liner above free board, but it was below the enhanced evaporation piping and water was running over hole and seeping in leak detection. We put a temporary patch on enhanced evaporation system to curtail the water running over ripped liner area. On August 24, 1997 we again pumped 14 gallons from leak detection system. Level went from 30" back to 17" . We had Lang Containment out of Cortez, Colorado to repair XR5 liner with a patch and tested it on August 6, 1997. Once again we pumped 15 gals out of leak detection system on September 8, 1997. Since that time the leak detection system has had no increase in level. We will continue to monitor regularly, but leak seems to be contained.

* This is to inform you of the mistake I had made on the repair date of August 6, 1997. This date should have been September 6, 1997. The reason for delay was the liner repair company was on a job out of town and could not get to repair until September 6, 1997.

Sincerely,

Don Johnson
Operations Manager (Koch Exploration Company)

cc: Bill Liese (BLM)
Denny Foust (NMOCD)
Mike Scates (Koch Exploration Company)

Martyne Kieling

From: Denny Foust
Sent: Monday, August 25, 1997 12:09 PM
To: Martyne Kieling; Roger Anderson
Subject: KOCH EVAPORATION POND I

AUGUST 25, 1997

DON JOHNSON CALLED THIS MORNING TO INDICATE THEY HAVE AN INCH OF WATER IN THE LEAK DETECTION, WATER HAULERS HAD MADE A SLIGHT TEAR IN THE LINER ABOVE THE WATER LINE. KOCH IS IN THE PROCESS OF REPAIRING THE LINER. WATER ENTERED THE LEAK DETECTION THROUGH TEAR AS IT WAS CIRCULATED OVER THE LINER FOR EVAPORATION.

Call Denny.

~~Has water tested / compared to water in Pond 2~~

Is Repair completed?

Did Koch shut of Circulator System to Prevent Further infiltration?

NEW MEXICO ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION
2040 S. Pacheco
Santa Fe, New Mexico 87505

August 23, 1995

CERTIFIED MAIL
RETURN RECEIPT NO.P-176-012-176

Mr. Don Johnson
Koch Exploration Company
PO Box 489
Farmington, New Mexico 87410

RE: Koch Exploration Co. Evaporation Ponds #1 and #2
San Juan County, New Mexico

Dear Mr. Johnson:

The New Mexico Oil Conservation Division (OCD) has received Koch Exploration Company's (Koch) request, dated August 7, 1995, to modify the referenced facilities by installing drip lines six inches below the top of the lined berms for enhanced evaporation at the facilities.

The request is hereby approved with the following conditions:

1. The original permitted free-board (2') will remain the same.

2. The design of the enhanced evaporation system will not allow liquids to leave the confines of the ponds.

Please be advised this approval does not relieve Koch of liability should their operation result in pollution of ground water, surface water or the environment. In addition, OCD approval does not relieve Koch of responsibility for compliance with other federal, state and/or local regulations.

If you have any questions don't hesitate to call me at (505) 827-7153.

Sincerely,

Chris Eustice
Geologist

cc: OCD Aztec Office, Denny Foust

Koch Exploration Company
P.O. Box 489
Aztec, NM 87410
505-334-9111

July 2, 1995

Mr. Chris Eustice
NMOCD
2040 S. Pacheco
Sante Fe, NM 87505

Re: Proposed Expansion of
Centralized Koch Evaporation Ponds #1 and #2
San Juan County, New Mexico

Dear Mr. Eustice,

As Foreman for Koch Exploration Company, I respectfully request the approval of an enhanced evaporation system at both the Centralized Koch Ponds #1 and #2, so as to utilize the heat generated from the black XR5 liner material for evaporation purposes. (SEE ATTACHED DRAWING)

There are two (2) reasons for installing this drip enhanced evaporation system. 1.) To utilize the heat from the black liner material for evaporation purposes. 2.) To circulate water at the dead end of the ponds to help stimulate the oxygen level and keeping water from becoming stagnant.

The PVC line will be pre-drilled at 6" centers with the 4" PVC (schedule 40)on the end with pump having 1/8" holes and the 3" PVC (schedule 40) lines on both sides having 1/4" holes. Both ends of the 3" PVC will be open ended so as to keep and pressure from building in pipe and to help circulate the far end of pond. We plan on installing the pipe 6" from top of dike to utilize the greatest potential of liner possible.

The drip system will only be utilized when the first three (3) automated valves are open due to wind speed, which open most frequently, with the remaining 6 bypass valves discharging back into ponds. We don't want to hook up any more bypass valves due to volumes when all 9 valves are open at one time.

Your prompt reply to my request will be greatly appreciated. Construction will begin when approval is received. Please direct any correspondence to Koch Exploration Company , P.O. Box 489, Aztec, NM 87410, ATTN: Don Johnson, or feel free to call me with any questions at 505-334-9111.

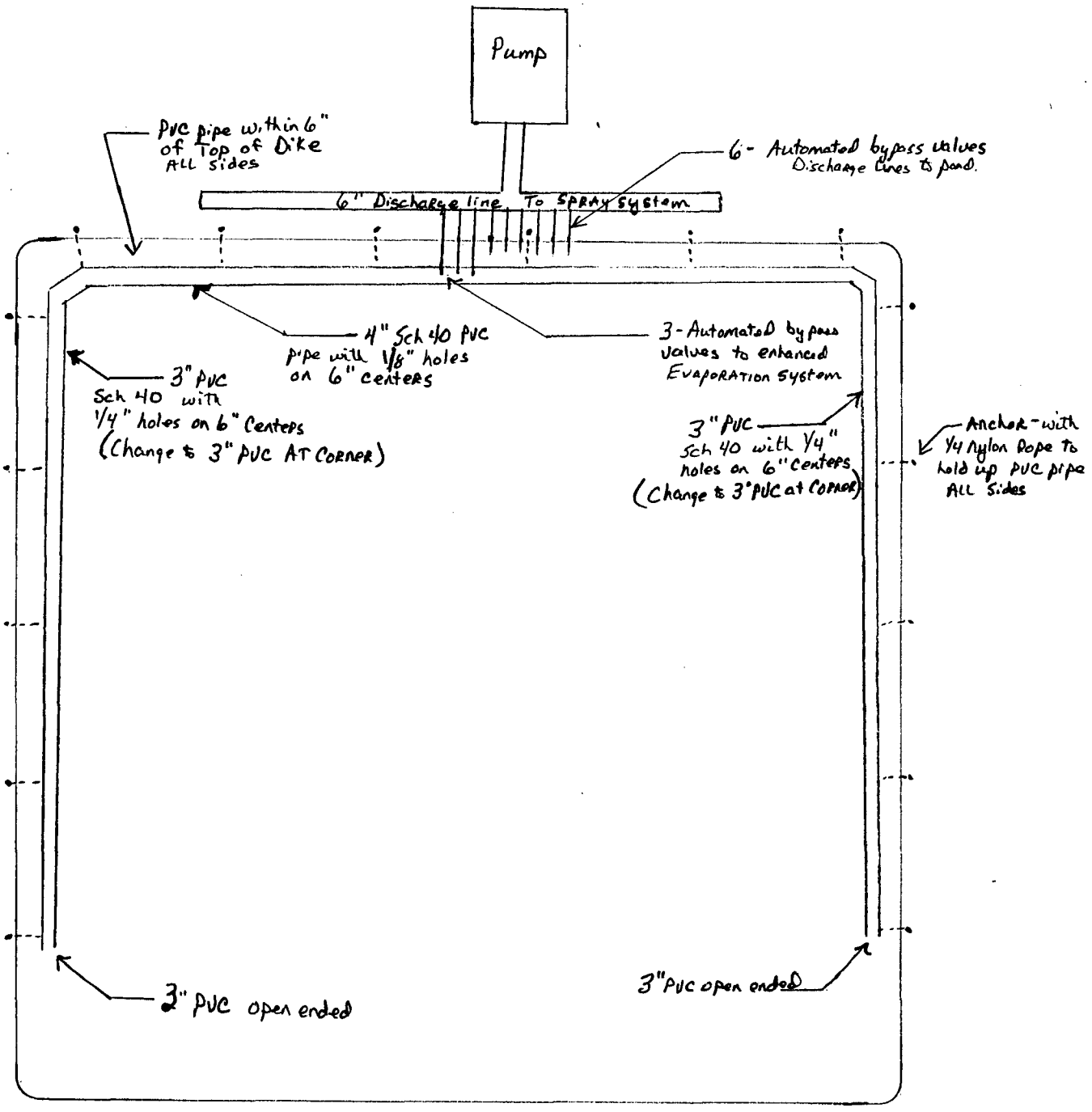
Thank You.

Sincerely,

Don Johnson
Foreman
Koch Exploration Company

cc: Mike Scates, Koch Exploration Company
Denny Fousts, NMOCD Aztec
Don Elsworth, BLM Farmington

Koch Evaporation Ponds #1 and #2
Enhanced Evaporation (Drip) System



NOTE: NOT TO SCALE

STATE OF NEW MEXICO

ENERGY, MINERALS and NATURAL RESOURCES DIVISION

OIL CONSERVATION DIVISION

AZTEC DISTRICT OFFICE

OIL CONSERVATION DIVISION

'94 JUL 20 AM 8 50

New Mexico DRUG FREE It's a State of Mind!

BRUCE KING
GOVERNOR

ANITA LOCKWOOD
CABINET SECRETARY

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

July 19, 1994

Koch Exploration Company
Attn. Don Johnson
POB 489
Aztec, NM 87410

RE: Chemical treatment Koch Evaporation Pond on Bureau of Land Management Surface.

Dear Mr. Johnson:

Ecosystem Control has requested approval to treat Koch Exploration's evaporation pond with algicide brand named Cutrine. The New Mexico Oil Conservation Division has no objection to Koch Exploration treating their evaporation pond located in C-31-32N-08W, San Juan County, New Mexico with an algicide. The NMOCD rules are so structured that there is no approval process for treatments. NMOCD is concerned that the results of such treatments will keep Koch's evaporation pond in compliance with NMOCD rules and permit conditions.

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

Yours truly,

Denny G. Foust

Denny G. Foust
Environmental Geologist

XC: Environmental File
Environmental Bureau-Santa Fe
DGF File
Bill Falvey-Farmington BLM

Ecosystem Control

* Vegetation * Soil * Water * Wildlife
• Ecological Investigation
• Environmental Assessment

418 Curtis Lane
Bloomfield, NM 87413
Office (505) 632-3641
Mobile Phone (505) 860-7342

July 4, 1994

N.M. Oil Conservation Div.
Attn. Mr Denny Foust
1000 Rio Brazos Road
Aztec, New Mexico 87410

Dear Mr. Foust:

We have been asked by Koch Exploration Co. to treat their #1 evaporation pond in order to reduce algae buildup in the water to insignificant levels. A high algae population would diminish the effectiveness of the designed evaporation process and probably cause maintenance difficulties with the pumps and piping.

We plan to use an Algicide named Cutrine (Q train) manufactured by Applied Biochemists Inc. The EPA Reg. No. is 8959-12-AA. It is recommended for use in potable water systems, lakes & reservoirs and is harmless to animal life as well. (It is used in Zoos)

If you have no objections to the use of this chemical, (active ingredients: Copper ethanolamine complexes) please indicate by signing below.

Thank you.

Sincerely,

John B. Curtis Jr.

John B. Curtis Jr. Field Ecologist

To the best of my knowledge, there is no reason the algicide described above should not be used in the Koch Evap. Pond # 1.

Mr. Denny Foust, NM OCD, Aztec, NM Date

cc: Mr. Don Johnson, Koch Expl.
Mr. Bill Falvey, BLM

Denny Foust
OCD

Attn: John Curtis
FAX: 505-334-168

MATERIAL SAFETY DATA SHEET

Storage Information and Precautionary Handling Procedures

MANUFACTURER'S NAME: Applied Biochemists EMERGENCY NO.: 414/242-5870

ADDRESS: 5300 West Countyline Road Mequon, Wisconsin 53092

PRODUCT NAME: Cutrine Plus Granular CHEMICAL NAME: Copper Alkanolamine Complex

CHEMICAL FORMULA: CHEMICAL FAMILY: Copper & Nitrogen Compounds

I. PHYSICAL DATA

BOILING POINT: Not Applicable SPECIFIC GRAVITY: Not Applicable

PERCENT VOLATILES BY VOLUME: Nil

APPEARANCE AND ODOR: Slight odor. Blue-green granules

SOLUBILITY IN WATER: Granules are insoluble. Chemical on granules completely soluble

II. HAZARDOUS INGREDIENTS

MATERIAL: Not Applicable

III. FIRE AND EXPLOSION HAZARD DATA

FLASH POINT: Not Applicable

EXTINGUISHING MEDIA: Water, carbon dioxide, dry chemical or foam

SPECIAL FIRE FIGHTING PROCEDURES: None

UNUSUAL FIRE AND EXPLOSION HAZARDS: Decomposition of wet chemical may cause autoignition above 150°F.

IV. HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE: Not Available

EFFECTS OF OVEREXPOSURE: Contact with eyes or skin may be irritating. Inhaled dust may be irritating to mucous membranes.

EMERGENCY AND FIRST AID PROCEDURES: If swallowed, call physician. Flush contact with skin and eyes thoroughly with water. Call a physician for eyes.

V. REACTIVITY DATA

STABILITY:	STABLE	Yes	CONDITIONS TO AVOID: Temperatures above 150°F especially if material is damp.
	UNSTABLE		

INCOMPATIBILITY: Strong Acids

HAZARDOUS DECOMPOSITION PRODUCTS: Thermal decomposition may produce oxides of nitrogen, carbon and ammonia

HAZARDOUS POLYMERIZATION:	MAY OCCUR		CONDITIONS TO AVOID: Contamination with acids
	WON'T OCCUR	XX	

VI. SPILL OR LEAK PROCEDURES

IN CASE MATERIAL IS RELEASED OR SPILLED: Sweep up

WASTE DISPOSAL METHOD: Incinerate in a furnace or sanitary landfill. Contact local authorities for local regulation.

VII. SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION: Should be available in dusty conditions

VENTILATION: LOCAL EXHAUST SPECIAL

MECHANICAL Acceptable OTHER

PROTECTIVE GLOVES: EYE PROTECTION: Yes

OTHER PROTECTIVE EQUIPMENT: Eye Wash

VIII. SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING: Keep out of the reach of children. Avoid getting on skin or in eyes. Do not stack wet material. Store in a cool dry place.

OTHER PRECAUTIONS:

FEBRUARY 2, 1987
REVISION DATE

B; 11 Olson

CONSERVATION DIVISION
RECEIVED
95 APR 11 PM 8 52

Form 3160-5
(June 1990)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

93 FEB 10 AM 10:07

FORM APPROVED
Budget Bureau No. 1004-0135
Expires: March 31, 1993

SUNDRY NOTICES AND REPORTS ON WELLS

Do not use this form for proposals to drill or to deepen or reentry to a different reservoir.
Use "APPLICATION FOR PERMIT—" for such proposals

SUBMIT IN TRIPLICATE

RECEIVED
MAR - 9 1995
OIL CON. DIV.
DIST. 3

5. Lease Designation and Serial No.
NM-013642

6. If Indian, Allottee or Tribe Name
N/A

7. If Unit or CA, Agreement Designation
N/A

1. Type of Well
☐ Oil Well ☐ Gas Well ☒ Other Evaporation Pond

8. Well Name and No.
Koch Evaporation Pond

2. Name of Operator
Koch Exploration Company

9. API Well No.
1

3. Address and Telephone No.
PO Box 489, Aztec, NM 87410 505-334-9111

10. Field and Pool, or Exploratory Area
N/A

4. Location of Well (Footage, Sec., T., R., M., or Survey Description)
NE/4, NW/4, Section 31-T32N-R8W

11. County or Parish, State
San Juan County, NM

12. CHECK APPROPRIATE BOX(s) TO INDICATE NATURE OF NOTICE, REPORT, OR OTHER DATA

TYPE OF SUBMISSION	TYPE OF ACTION	
☐ Notice of Intent	☐ Abandonment	☐ Change of Plans
☒ Subsequent Report	☐ Recompletion	☐ New Construction
☐ Final Abandonment Notice	☐ Plugging Back	☐ Non-Routine Fracturing
	☐ Casing Repair	☐ Water Shut-Off
	☐ Altering Casing	☐ Conversion to Injection
	☒ Other Test Interval	☐ Dispose Water

(Note: Report results of multiple completion on Well Completion or Recompletion Report and Log form.)

13. Describe Proposed or Completed Operations (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.)*

Reference conditions for approval to Sundry Notice dated 12/16/93 for Koch Evaporation Pond #1 netting exemption:

Koch requests approval to cease hiring a BLM approved third party to inspect Koch's Evaporation Pond #1 four times a year for dead migratory birds. Condition #1 required this inspection for a period of one year. These inspections were conducted as required and no sign of sick, injured or dead migratory birds existed. Koch personnel will continue to perform these inspections weekly.

Koch requests approval to submit water quality reports including test for hydrocarbons annually to BLM. This test would be taken in the fall. Past water samples have shown that there is no threat or potential hazard to wildlife or waterfowl. Condition #3 required copies from NMOCD water quality reports be submitted quarterly to coincide with the bird check for one year. The water quality reports required by the NMOCD do not require hydrocarbon testing but call for weekly testing for ambient H_2S levels and monthly testing to determine the dissolved oxygen levels. These tests will continue to be performed on site as required and the results are available for BLM review upon request.

14. I hereby certify that the foregoing is true and correct

Signed Michael Scates Title Administrative Manager Date 3/2/95

Michael Scates

(This space for Federal or State office use)

Approved by _____ Title _____ Date MAR 07 1995

Conditions of approval, if any:

DISTRICT MANAGER

Title 18 U.S.C. Section 1001, makes it a crime for any person knowingly and willfully to make to any department or agency of the United States any false, fictitious or fraudulent statements or representations as to any matter within its jurisdiction.

NMOCD

KOCH EXPLORATION COMPANY

P.O. BOX 489 AZTEC, NEW MEXICO 87410 (505)-334-9111

Mr. Chris Eustice
New Mexico Oil Conservation Division
P. O. Box 2008
Sante Fe, New Mexico 87504-2088

Re: Design Changes in Suction Line at Koch Evaporation Pond #1

Dear Chris,

Attached you will find the changes that we made at our Koch Evaporation Pond #1. We were having trouble with the pump cavitating due to lack of positive suction head. We lowered the pump as far as possible to avoid this cavitation of pump. We stayed above the freeboard level with the suction line so as not to have a potential leak. We installed a boot where the suction line came out of liner, repacked the soil beneath the liner material, and put the anchor trench back in original place.

If you need any additional information concerning this change please feel free to call me at your convenience at 505-334-9111.

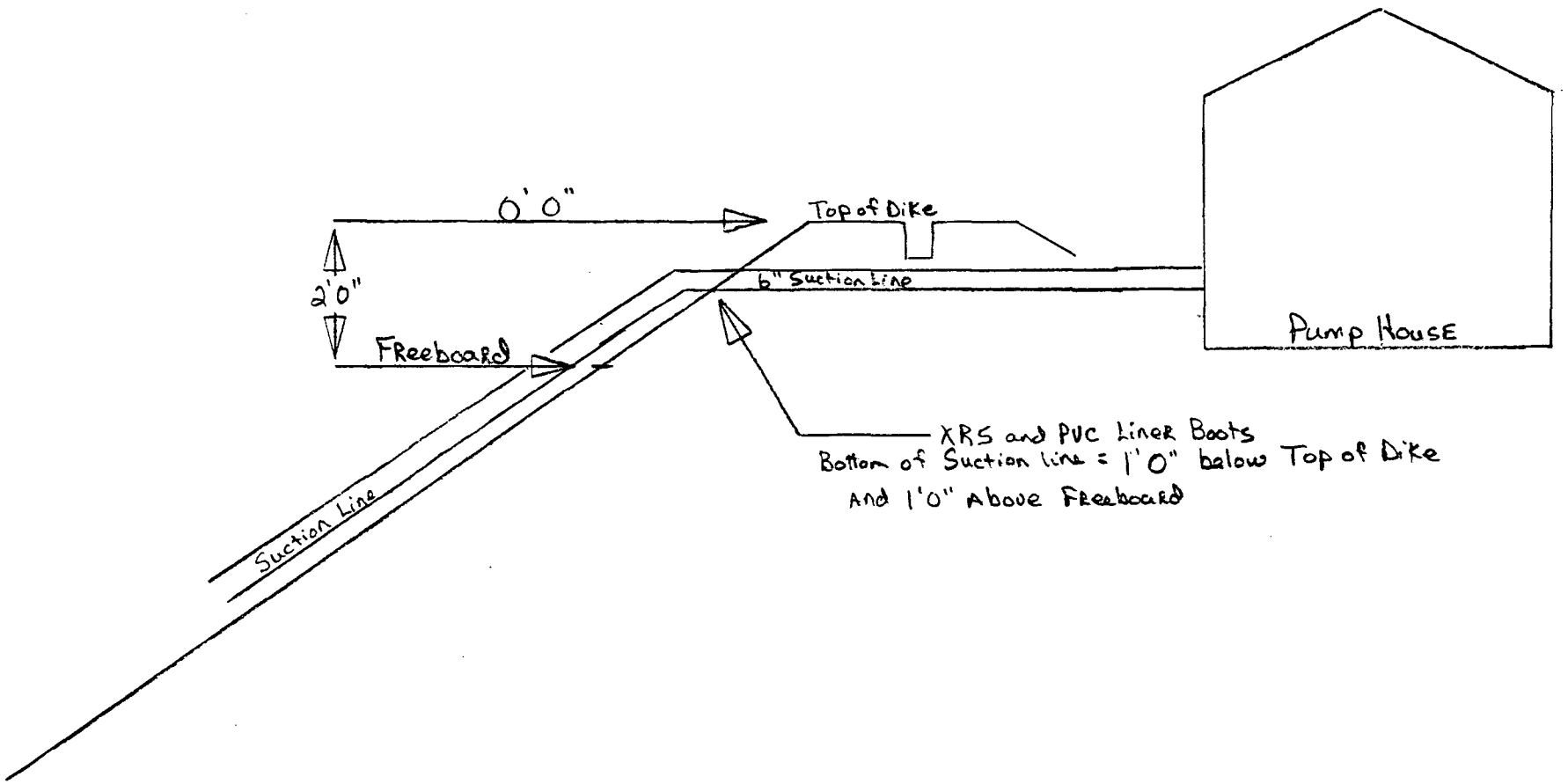
cc: Denny Fousts
Oil Conservation Division
1000 Rio Brazos Road
Aztec, New Mexico 87410

Sincerely,

Don Johnson
Foreman
Koch Exploration Company

KOCH

EXPLORATION COMPANY



KOCH EVAPORATION POND #1
DESIGN CHANGES TO SUCTION LINE

STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

DRUG FREE

BRUCE KING
GOVERNOR

ANITA LOCKWOOD
CABINET SECRETARY

August 31, 1994

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

CERTIFIED MAIL
RETURN RECEIPT NO. P-176-012-248

Mr. Donald L. Johnson
Koch Exploration Company
P.O. Box 489
Aztec, New Mexico 87410

Re: Modification Request
Koch Evaporation Pond #1

Dear Mr. Johnson:

The Oil Conservation Division (OCD) has received your request, dated July 25, 1994, for authorization to receive and dispose of produced water from the following wells:

Blancett Com C-1	Unit A Sec. 27, T-32-N, R-9-W
Gardner C-1	Unit M Sec. 35, T-32-N, R-9-W
Gardner C-5	Unit L Sec. 26, T-32-N, R-9-W
Gardner C-7	Unit G Sec. 26, T-32-N, R-9-W

Based on the information supplied in the July 25, 1994 request the OCD hereby approves the addition of the above mentioned wells.

Please be advised that approval of this modification does not relieve you of liability should your operation result in actual pollution of surface water, ground water, or the environment actionable under other laws and/or regulations.

If you have any questions, please feel free to call me at (505) 827-5824.

Sincerely,

Chris Eustice
Environmental Geologist

cx: Denny Foust, OCD Aztec Office

RECORD OF PHONE CONVERSATION (W/CHRIS EUSTICE)

Date: 8-5-94 Time: 1020 AM

RE: Centralized pond getting H20 from 4 additional wells

Name: Don Johnson

Company: KOCH EXPLORATION CO

Koch is requesting to take produced water from 4 additional wells to their Evaporation pond #1, section 31, T32N, R8W

They sent OCD letter of request that arrived 8-1-94. Letter dated 7-25-94 RCA said OK to give verbal

Comments/Followup: Gave verbal approval to be followed up w/ a letter.

KOCH EXPLORATION COMPANY
P.O. Box 489
Aztec, New Mexico 87410
(505)-334-9111

July 25, 1994

Chris Eustice
New Mexico Oil Conservation Division
P. O. Box 2008
Sante Fe, NM 87504-2088

Subject: Truck and Dispose produced water from 4 Koch owned and operated wells to Koch Evaporation Pond 1, Sec. 31-T32N-R8W.

Dear Chris,

Koch Exploration is requesting approval to truck and dispose produced water from the following wells, to the Koch Evaporation Pond #1.

Well Name	Lease No.	Location
Blancett Com C-1	NM-013642	NE/4, S27-T32N-R9W (A)
Gardner C-1	SF-079048-A	SW/4, S35-T32N-R9W (M)
Gardner C-5	NM-013642	SW/4, S26-T32N-R9W (L)
Gardner C-7	NM-013642	NE/4, S26-T32N-R9W (G)

This facility now services the Gardner C-2, C-3, C-4, and C-6 wells already approved.

We plan to truck produced water from these wells listed above on a year round basis or as long as capacity allows. Each of these wells listed above are from the same formation (Basin Fruitland Coal) and water from each well is comparable to the wells already approved. We plan to begin trucking on approval from NMOCD and BLM. All facility guidelines well be unchanged.

If you need any further information concerning this request or I may be of any further assistance, please feel free to contact me at your convenience.

Sincerely,

Donald L. Johnson
Foreman

cc: Denny Foust NMOCD, Aztec, NM
Don Elsworth BLM, Farmington, NM
Mike Scates Koch, Wichita, KS

Kathy Brown

KOCH EXPLORATION COMPANY
P.O. BOX 489
AZTEC, NEW MEXICO 87410
505-334-9111

March 2, 1994

Mr. Denny Fousts
OCD
1000 Rio Brazos Road
Aztec, NM 87410

Ref: Liner Leak Report for Koch Evaporative Pond #1

Dear Mr. Fousts:

Included you will find a Chronological Report for leak(s) in Koch Exploration's Pond #1 and our daily leak detection records. This is to inform you what steps were taken to determine and repair leaks in our evaporation pond liner.

If you need any additional information concerning this matter please feel free to call me at 505-334-9111.

Sincerely,

Donald L. Johnson

Donald L. Johnson
Koch Exploration Company
Foreman

KOCH EXPLORATION COMPANY
CHRONOLOGICAL ORDER REPORT
for
KOCH EVAPORATION POND #1
(LEAK IN POND TOP LINER)

JAN 23- Had 2'8" in leak detection system prior to any discharge in pond (rain/snow between liners during construction). Began discharge into pond today.

JAN 31- Leak detection was at 2'9" changing 1/4" or less daily from the first day (23rd). We have no electric power at pond at this time, but used a generator to pump out leak detection today. Conductivity was at 2,400. Pond water at this time was 10,600. We thought that the slight changes in leak detection was due to the rising level of produced water squeezing out the geotextile between liners. Took sample from sump to Inter-Mountain labs to be tested.

FEB 3- Had 2'9" in leak detection and pumped water out again today (down to nothing). Conductivity at 9,100. At this time we did some testing on geotextile pad to see if it would change conductivity of water, and it did but only slightly.

FEB 4- Had 1'6 1/2" in leak detection. Conductivity was at 9,100, unchanged since yesterday. Pond water is at 10,800. Will continue monitoring daily to see if it changes. Pumped 49 gals (down to nothing).

FEB 5- Had 1'6" in leak detection. Conductivity at 9,000 and pumped out to nothing with 41 gals removed.

FEB 6- Had 1'4" in leak detection. Conductivity at 9,200 and pumped out to nothing with 35 1/2 gals removed. Leak detection is dropping daily and not sure we have a leak at this time.

FEB 7- Reported to OCD that we are unsure if we have a leak at this time or not. Denny Fousts recommended that we test for an additional week to determine leak for sure. Sump had 1'5" and pumped out to nothing, removing 36 1/2 gals. Conductivity was at 10,300 today. Took sample to Inter-Mountain labs for testing.

FEB 8- Had 1'5" in leak detection and pumped 35 gals with conductivity at 10,100.

FEB 9- Had 1'3 1/2" in leak detection and pumped 29 1/2 gals with conductivity at 10,100. Still continues to drop slightly.

FEB 10- Had 1'5 1/2" in leak detection and pumped 36 1/2 gals with conductivity increasing to 10,700. At this time we decided we had a small leak in top liner and ceased discharge into pond today.

FEB 11- Reported to OCD (Denny Fousts) and BLM (Bill Liese) that we ceased discharge into pond yesterday afternoon due to a leak determined to exist in top liner. Will continue to monitor leak detection daily. Frank Liner Fabrication (FLF) and I will try to determine best method to use to determine leak in pond and removal of water to find leak. Sent registered letters to Environmental Liners and J.P. Stevens Corp. of determination of leak in liner, due to liner warranty requirements. We decided that we will remove water from pond as quickly as possible to find leak. As we remove water, which will take an estimated 3 or 4 days, we will monitor leak detection to see if it changes any to help find area where leak could be. Lined up trucks and pump to remove water from bottom of pond, because trucks will not pull water from that depth.

FEB 12- Began hauling water to disposal wells. There is 11,473 BBL's of produced water (plus rain/snow melt off) to be hauled to the Pritchard and Basin Disposal. Production water in pond is from the following wells: Gardner 2-C (3,586 BBL's), Gardner 3-C (1,252 BBL's), Gardner 4-C (2,440 BBL's), and Gardner 6-C (4,195 BBL's).

FEB 13- Continued hauling pond water to disposal. Leak detection had 1'6" and pumped out 41 gals.

FEB 14- Leak detection at 1'2" and pumped out 25 1/2 gals.

FEB 15- Leak detection at 11 1/2" and pumped out 15 gals.

FEB 16- Completed removal of produced water to disposal. Hauled a total of 13,040 bbl's of water to disposal. FLF began testing liner for leaks today. Leak detection at 4 3/8" and pumped out 15 gals.

FEB 17- Continue testing liner for leaks, we will test 100% of seams and patches and look for any body leaks. We are finding spots, mostly in patches, that fail vacuum box test. We have found a few spots that were definitely leaks. Completed approximately 1/2 the testing of liner where water will be at 14,000 bbl's. Leak detection is at 0 and has not changed since yesterday, even though some snow has melted to the lowest part of pond.

FEB 18- Called Denny Fousts (OCD) and Bill Liese (BLM) to inform them we could begin discharge into pond today if tested up high enough in bottom of pond. When I got to pond today leak detection was at 1'3" from rain and snow melt off. We pumped out 16 gals, down to nothing and conductivity is lower today (7,500). Continue testing of liner and found 2 holes and 6 spots that failed vacuum box test. We will not begin discharge today until we determine leak is above water level or in water level. At 6:00 pm leak detection was at 6 3/4" and snow run off continues from South end.

FEB 19- Leak detection is at 8 3/4", which gained 2" overnight, not much change. Pumped out 8 gals today and conductivity at 7,400. We don't think leak is in very bottom of pond where water

level is, but to determine for sure we have decided to remove snow from South end into water. This is to prevent any false readings we are getting in leak detection system. Leak detection seems to change only when temperatures are warm enough for run off. Began discharge into pond again and will monitor leak detection closely. We are tested above where water will be in a few days with production water going into pond.

FEB 20- Leak detection at 1'3 1/2" and pumped out 22 gals. Conductivity is at 6,400. We are not sure if leak is from snow run off or within water level. Still think it is outside water level, but want to be sure before continuing discharge. Began pushing snow into water today. We will continue testing liner when all snow is removed from liner in South end. We removed 1/2 of the snow today. We used warm produced water to help us break up snow, which was frozen.

FEB 21- Leak detection at 1'1 3/4" and pumped 15 gals. Conductivity is 6,300. Completed removing snow today into water level, using more produced water to help melt snow. Will continue to monitor leak detection closely. Pumped leak detection to nothing at 5:00 pm. We will again begin testing liner tomorrow.

FEB 22- Skiff of snow this morning, but leak detection is only 2" today. We think this is from drainage from South end where snow was. Began testing liner again and finding a lot of places that fail vacuum box test. We found at least 25 places in liner that failed testing.

FEB 23- Leak detection at 3 1/2", which is the same as last night at 5:00 pm. No change when it freezes. Only time leak detection changes is afternoon hours when it thaws out on South end. Completed all testing of seams and patches marking all bad spots that failed testing. We did not complete all patching today, but will continue tomorrow. Total possible leaks found by retesting 100% of bottom seams and patches was 75 vacuum box failures and approximately 8-10 definite holes. Who ever did initial testing either did not know what they were looking for or was not paying close enough attention to what they were doing.

FEB 24- Leak detection at 4 1/2", which is unchanged overnight. Completed all patching and testing of patches in bottom and up slopes a few feet. Bob Frank will retest 100% of slopes later, but before water level is at any point that has not been tested.

FEB 25- Leak detection at 5 1/2" and pumped out 3 1/2 gals. Conductivity is 5,300. Checked pond water which is at 6,500, which indicates that there is no leak in present water level. There will be some slight changes in leak detection as water level rises and squeezes out trapped water in geotextile. We will monitor closely each day and continue checking conductivity when leak detection needs pumped out. Began discharging into pond again.

FEB 26- Leak detection at 5 3/4" and we did not pump out today. All of the increase is in the afternoon hours when geotextile thaws out and runs into leak detection sump.

FEB 27- leak detection at 7 1/2" today and pumped out 6 1/2 gals. Conductivity is at 4,900. Pumped down to 1 3/4".

FEB 28- Leak detection at 2 1/4" and only changed 3/4" since yesterday. Did not pump out sump today.

MARCH 1- Leak detection had no change today. Leak is fixed. We will continue testing leak detection on a daily basis, along with conductivity when pumped out. Hopefully we will not find any further leaks in liner.

KOCH EXPLORATION COMPANY
KOCH EVAPORATIVE POND #1

LEAK DETECTION RECORDS
(DAILY UNTIL FILL-UP)

MONTH Jan YEAR 94

DAY	GUAGE	INCREASE DECREASE	PUMPED OUT	GUAGE AFTER PUMPED OUT	REMARKS
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					
16.					
17.					
18.					
19.					
20.					
21.					
22.	PRIOR to	Any discharge in Pond		Leak detection at 2'8"	Rain/Snow wate
23.	2'8"	-0-			
24.	2'8	-0-			
25.	2'8 1/4	1/4"			Hydrostatic Pressure
26.	2'8 1/2	1/4"			" "
27.	2'8 3/4	1/4"			" "
28.	2'8 3/4	-0-			
29.	2'9	1/4"			" "
30.	2'9	-0-			
31.	2'9 1/4	1/4"	✓	6"	" "

Sent water sample to be tested

KOCH EXPLORATION COMPANY
KOCH EVAPORATIVE POND #1

LEAK DETECTION RECORDS
(DAILY UNTIL FILL-UP)

MONTH Feb YEAR 94

DAY	GUAGE	INCREASE DECREASE	PUMPED OUT	GUAGE AFTER PUMPED OUT	REMARKS	Mud Conductivity meter	Pumped out gals
1.	2'7	2'1"	yesterday	1¼"	Water TRAPPED in footprints almost back to original level		
2.	2'8¼	1¼"	NO	1¼"	Hydrostatic pressure		
12:00pm 3.	2-9 to 3" (-2-6)	+¾"	yes	1¼"	Pumped down to nothing	9100	
11:00 Am 4.	1'6½ to 3"	+ 1'3½	yes	1¼"	Pumped to Nothing	9100	(49)
12:00 pm 5.	1'6	+ 1'3	yes	1"	Pumped to Nothing	9200	(41)
11:30 Am 6.	1'4	+ 1'1	yes	1"	pumped to Nothing	9200	(35½)
12:00 PM 7.	1'5	+ 1'2"	yes	1"	pumped to Nothing	19,300	(36½)
12:00 8.	1'5	+ 1'2	yes	½"	pumped to Nothing	10,300	(55)
1:00pm 9.	1'3½	1'0½	yes	½	pumped to nothing	10,100	39½ gals
1:00 10.	1'5½	1'2½	yes	½	pumped to nothing	10,700	36½ gal
12:00 11.	1'7½	1'4½	yes	½	pumped to nothing	10,900	43½ gals
12:00 12.	1'6½	1'3½	yes	½	pumped to nothing	11,000	41½ gals
1:00 13.	1'6	1'3	yes	½	pumped to Nothing	—	41 gals
1:00 14.	1'2	11"	yes	½	pumped to nothing	—	25½ gals
1:00 15.	11½"	+ 8½"	yes	½	pumped to nothing	—	15 gals
1:00 16.	4 3/8"	+ 3 7/8"	yes	¼"	pumped to nothing	—	3 gals
1:00 17.	-0-	-¼"	NO	—	—	—	0
11:00 18.	1'3	+ 1'3"	yes	¼"	Rain/Snow into Leak detection (INSPECTED)	7,500	16 gals
10:00am 19.	8¾	+ 8½"	yes	¼"	Rain/Snow (No Leak in Bottom?)	7,400	8 gals
Rain/Snow 9:30 20.	1'3½	+ 1'3¼	yes	¼"	Rain/Snow ?	6,400	22 gals
Mix Of Snow 8:30 21.	1'1¾	+ 1'½	yes	¼"	Snow Melt (Removed all Snow Seen)	6,300	15 gals
8:40 22.	2"	1¾"	NO	—	increased slightly Today (drifting)		—
10:30 23.	3½"	1½"	NO	—	All increased in Afternoon only	—	—
12:00 24.	4½"	1"	NO	—	" " " "	—	—
9:00am 25.	5½"	1"	yes	-0-	" " " "	5300	3½ gals
10:00am 26.	5¾	5¾"	NO	-0-	Very warm day (Melt)	—	—
2:00pm 27.	7½	1¾"	yes	1½"	No change over night 6:00 pm Sunday	4,500	6½ gals
9:00am 28.	2¼	¾"	NO	—	—	—	—
29.							
30.							
31.							

NOTE: 2-10-94 Ceased discharge into Pond
2-12-94 Began removing water from Pond to Disposal
2-16-94 Completed removal of Produced water to Disposal & Began Testing Lines for Leaks (FLF)
2-19-94 Began discharge again (performed up to date 100% inspection on Seams & patches) will Completed the rest when snow is melted. (Ice Bottom 4/3)
2-20-94 - STop discharge into pond (until we determine leak do in water level of above)

STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

BRUCE KING
GOVERNOR

ANITA LOCKWOOD
CABINET SECRETARY

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

January 26, 1994

CERTIFIED MAIL
RETURN RECEIPT NO. P-111-334-063

Mr. Michael Scates
Koch Exploration Company
P.O. Box 2256
Wichita, Kansas 67201-2256

RE: **APPROVAL FOR ANCHOR DESIGN MODIFICATION**
SAN JUAN COUNTY, NEW MEXICO

Dear Mr. Scates:

The New Mexico Oil Conservation Division (OCD) has received the January 6, 1994 request submitted by Frank Liner Fabrications, Inc. on behalf of Koch Exploration Company. The request is to modify the new anchor trench system for the new liner which was installed over the original defective liner. The Centralized Disposal Facility is located in the NE/4 NW/4, Section 31, Township 32 North, Range 8 West, NMPM, San Juan County, New Mexico.

Based on the information supplied in the January 6, 1994 request, the OCD hereby approves the modification of the anchor trench system.

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

If you have any questions, please feel free to contact me at (505) 827-5884.

Sincerely,

Kathy M. Brown
Geologist

xc: Denny Foust, OCD Aztec Office

FLF
Pond Lining
& Roofing

FRANK LINER FABRICATIONS, INC.

P.O. Box 308 • Farmington NM 87499 • (505) 327-7660

January 6, 1994

Kathy Brown
New Mexico Oil Conservation Division
P. O. Box 2008
Santa Fe, Nm 87504-2088

Subject: Koch Exploration Co.
Evaporation Pond I
Section 31-T32N-R8W

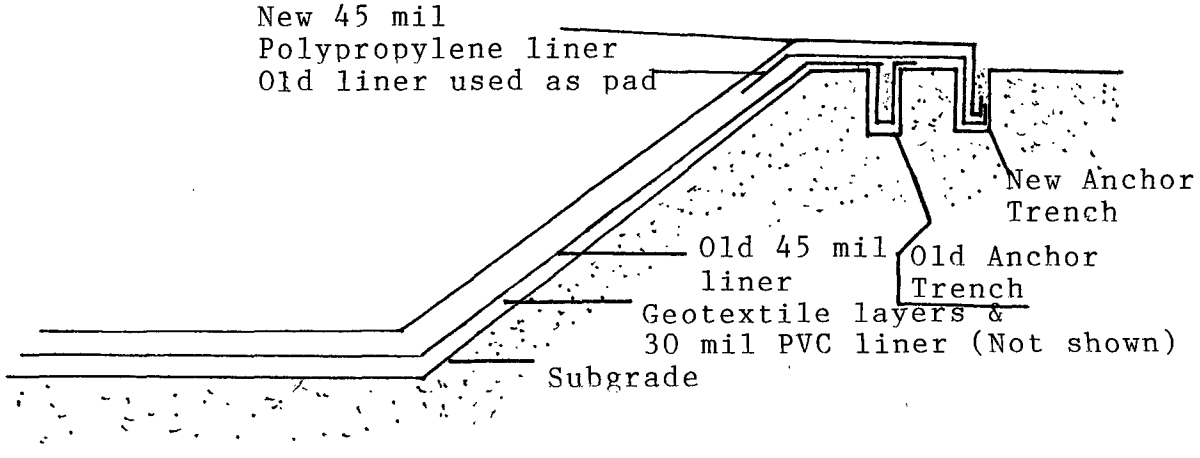
Dear Kathy,

On behalf of Koch Exploration Co. I wish to advise that the new 45 mil reinforced liner referenced in my letter of December 16, 1993 is defective as well.

The manufacturer is shipping a new liner, for the entire pond, which is made from a different batch of raw material. The new liner is to be delivered on or about January 10, 1994. Installation will commence immediately upon delivery.

The new liner will be installed over the previous liners. In order to do so, we must dig a new anchor trench. The new liner will be installed over the old liner into the new anchor trench pursuant to the sketch below.

ANCHOR DETAIL



FLF

This letter is provided as a recap of our conversation on January 6, 1994. If written approval from the NMCOD is required, in addition to your verbal approval, please issue a letter stating the same.

I feel confident that the correct decision, on behalf of the manufacturer, has been made. If I may be of any further assistance, please contact me at your convenience.

Very truly yours,

Robert C. Frank

Robert C. Frank
President

cc: D. Foust NMOCD, Aztec
M. Scates Koch, Wichita
D. Johnson Koch, Aztec

FLF
Pond Lining
& Roofing

FRANK LINER FABRICATIONS, INC.

P.O. Box 308 • Farmington NM 87499 • (505) 327-7660

OIL CONSERVATION DIVISION
RECEIVED
'93 DEC 20 AM 9 05

December 16, 1993

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

Subject: Koch Exploration Co.
Evaporation Pond 1
Section 31-T32N-R8W

Dear Kathy,

On behalf of Koch Exploration Co. (Koch) I wish to advise that the un-reinforced polypropylene liner did not pass mechanical , nondestructive testing procedures.

Samples of the liner and field seams were sent back to the manufacturer and it was determined that the failures were due to a manufacturers defect. The manufacturer recommends and I am requesting approval to solve the problem by installing a new 45 mil reinforced polypropylene over the existing un-reinforced liner.

The new liner will be seamed to the existing 45 mil reinforced liner (slopes) and a cap strip will be welded over the new seam.

The old un-reinforced liner may be watertight, however it is structurally unsound. The recommended solution to this problem will in no way change the operation of this pond.

This letter is provided as a recap of our conversation on December 16, 1993. If written approval from the NMOCD is required in addition to your verbal approval, please issue a letter stating the same.

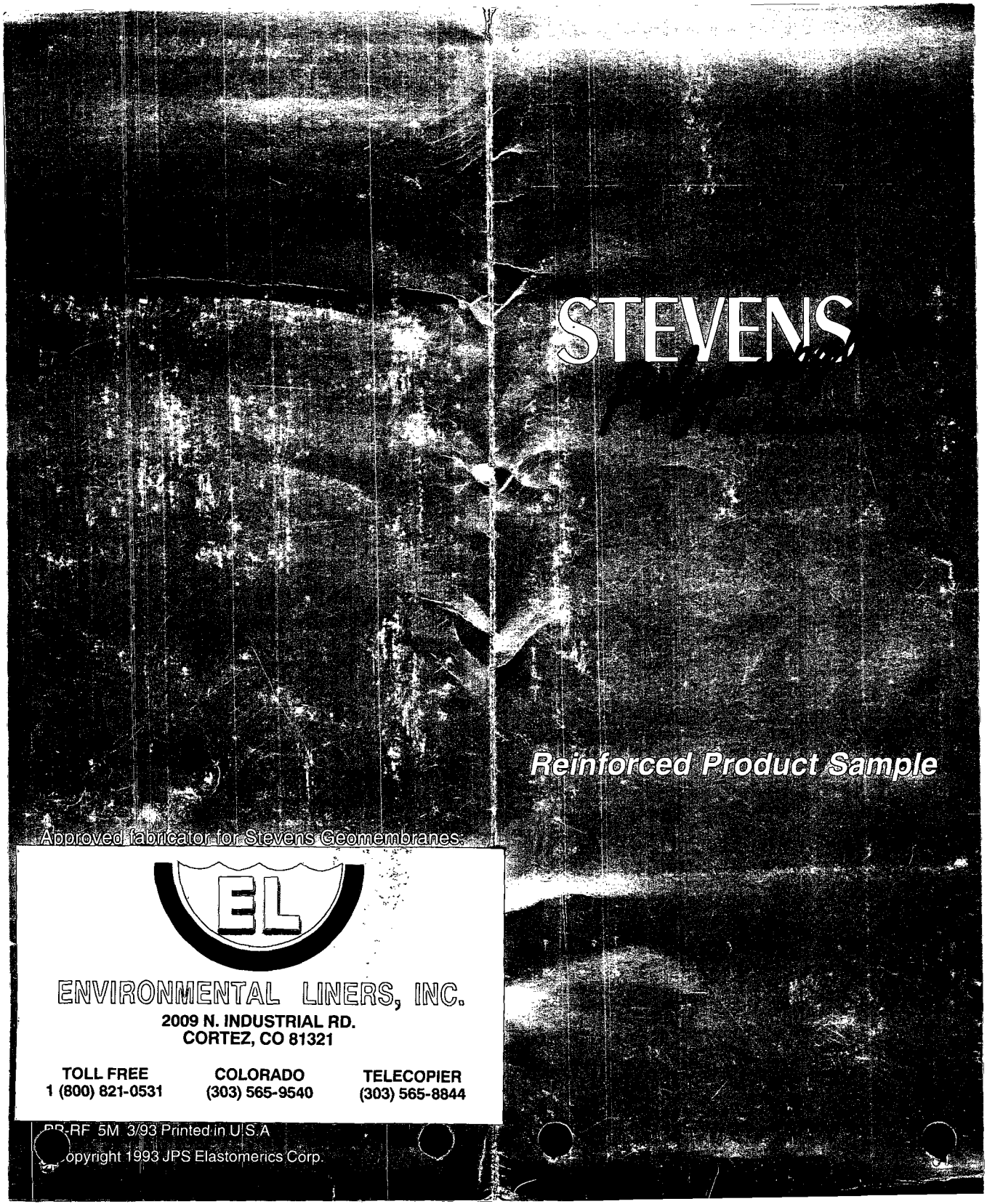
FLF

The new liner installation should start on or about December 27, 1993. If I may be of any further assistance, please contact me at your convenience.

Very truly yours,

Robert C. Frank
President

cc: D. Foust NMOCD, Aztec
M. Scates Koch, Wichita
D. Johnson Koch, Aztec



Approved fabricator for Stevens Geomembranes:

ENVIRONMENTAL LINERS, INC.
2009 N. INDUSTRIAL RD.
CORTEZ, CO 81321

TOLL FREE	COLORADO	TELECOPIER
1 (800) 821-0531	(303) 565-9540	(303) 565-8844

RR-RF 5M 3/93 Printed in U.S.A

FLF
FRANK LINER FABRICATIONS, INC.
Lic. No. 33474

Secondary Containment Liners • Underground Tanks
Evaporation Ponds • Production Pits • Tarps
Reserve Pits • Roofing Materials

BOB FRANK
(505) 327-7660

P.O. Box 308
Farmington, NM 87499

Stevens Polypropylene Geomembranes provide secure containment in a highly flexible, thermoplastic sheet.

Stevens reinforced* Polypropylene Geomembranes:

- Will not stress crack
- Wide seaming window provides installation freedom
- Durable thermal welded seams show outstanding peel & shear strength
- 10x10 1000 denier polyester scrim reinforcement gives high puncture, tear & tensile strengths
- Strong resistance to UV, weathering, and chemicals
- Low coefficient of expansion & contraction & excellent layflat
- High conformance characteristics
- Excellent thermal and dimensional stability
- Available in large prefabricated panels

Hundred of millions of square feet of Stevens Geomembranes are installed as liners, floating covers and caps in critical containment applications throughout North America

*Unreinforced & geocomposite designs available

STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

BRUCE KING
GOVERNOR

ANITA LOCKWOOD
CABINET SECRETARY

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

November 9, 1993

CERTIFIED MAIL
RETURN RECEIPT NO. P-667-241-145

Mr. Michael Scates
Koch Exploration Company
P.O. Box 2256
Wichita, Kansas 67201-2256

RE: **CENTRALIZED EVAPORATION POND NO. I**
APPROVAL FOR LINER SUBSTITUTION
SAN JUAN COUNTY, NEW MEXICO

Dear Mr. Scates:

The New Mexico Oil Conservation Division (OCD) has received the October 18, 1993 request submitted by Frank Liner Fabrications, Inc. on behalf of Koch Exploration Company. The request is to substitute a composite polypropylene liner for the XR-5 liner at Koch's double-lined pond approved by the Division Director on October 6, 1993 in accordance with OCD Rule 711. The Centralized Disposal Facility is located in the NE/4 NW/4, Section 31, Township 32 North, Range 8 West, NMPM, San Juan County, New Mexico.

The polypropylene liner is resistant to ultraviolet rays, salt water, fungus, bacteria, and algae, but it does not exhibit long term oil resistance.

Based on the information supplied in the October 18, 1993 request, the OCD hereby approves the substitution of a composite polypropylene liner for the XR-5 liner under the following conditions:

1. No oil will be allowed in the pond. All water entering the pond will first pass through a skimmer system.

2. Only water produced from coal wells (pursuant to original approval) will be disposed of into the pond.

Please be advised that approval of this operation does not relieve you of liability should your operation result in actual pollution of surface or ground waters or the environment actionable under other laws and/or regulations. In addition, the OCD approval does not relieve you of liability for compliance with any other laws and/or regulations.

If you have any questions, please feel free to contact me at (505) 827-5884.

Sincerely,

Kathy Brown

Kathy M. Brown
Geologist

xc: Denny Foust, OCD Aztec Office
Don Ellsworth, BLM Farmington

FLF
Pond Lining
& Roofing

FRANK LINER FABRICATIONS, INC.

P.O. Box 308 • Farmington NM 87499 • (505) 327-7660

October 18, 1993

Ms. Kathy Brown
New Mexico Oil Conservation Division
P. O. Box 2088
Santa Fe, NM 87504-2088

Subject: Koch Exploration Co.
Evaporation Pond I
Sec. 31-T32N-R8W
San Juan County, NM

Dear Kathy,

On behalf of Koch Exploration Co., I respectfully request permission to substitute a composite polypropylene liner for the XR-5 liner approved in our permit. The polypropylene liner will consist of 40 mil non-reinforced liner on the bottom and 45 mil reinforced liner on the sides. The polypropylene liner exhibits many of the same characteristics as XR-5; however, it does not exhibit long term oil resistance.

The basis for our request is that the water entering the pond will be from only coal wells and does not contain any hydrocarbons. Additionally, the water will only enter the pond after first passing through a skimmer tank. The need for the more expensive XR-5 liner is eliminated by limiting water received at the pond to water produced only from coal wells.

The polypropylene liner is resistant to ultraviolet rays, salt water, fungus, bacteria and algae. The liner is flexible like XR-5 and is easily installed in prefabricated blankets. The polypropylene will provide the same environmental protection as the XR-5 since there will be no hydrocarbons entering the pond.

If I may be of any further assistance, please contact me at your convenience.

Very truly yours,

Robert C. Frank

Robert C. Frank
Permit Agent
Koch Exploration Co.

STEVENS Polypropylene GEOMEMBRANES

General Information

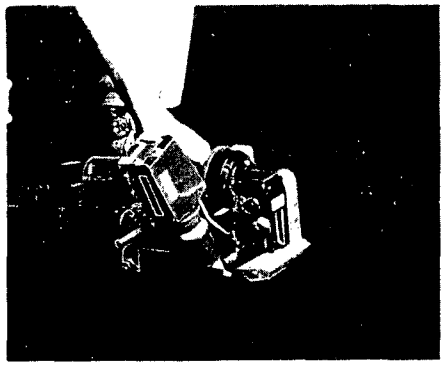
The Stevens Polypropylene geomembrane was developed to meet the rigorous and varied design and installation needs of the environmental containment industry.

Stevens Polypropylene (PP) is a member of the polyolefin family, but unlike high density polyethylene, polypropylene is low in crystallinity and is not susceptible to stress cracking. It is a very flexible thermoplastic membrane.

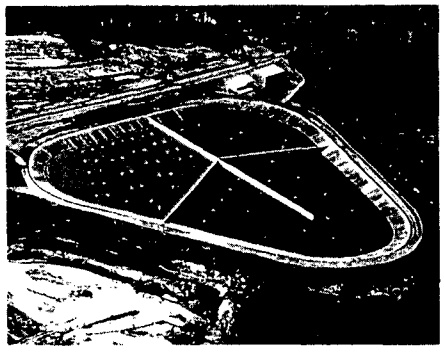
Polypropylene is a highly stable, inert polymer. Starting with its basic molecular structure, it is designed to survive under harsh site conditions.

Stevens Polypropylene geomembranes contain no plasticizers. They will remain flexible even after exposure to weathering and UV, enabling the material to easily conform to the subgrade, even after aging.

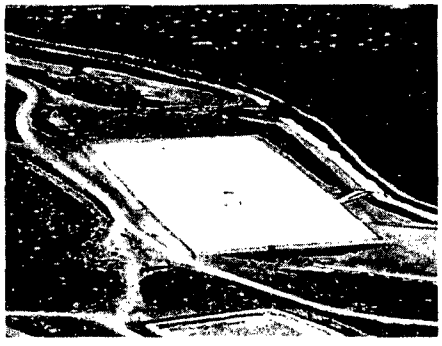
Stevens Polypropylene geomembranes are calendered into 300 yard rolls that are factory-fabricated into panels up to 20,000 square feet in size, ready for deployment in the field. They are installed with either an automated hot-air or wedge welder forming a homogeneous bond with consistent peel and shear strength. The material's wide seaming window contributes to installation freedom. It can be installed year round, under a variety of ambient and site conditions.



Stevens Polypropylene Geomembranes use heat welding to create strong, reliable seams.



Stevens Polypropylene's outstanding weathering and UV resistance provides longterm, durable containment in a wastewater retention basin at a Somerset (PA) Prison.



Chemical resistance & high flexibility of Stevens Polypropylene Geomembrane was critical to the success of a floating cover over a heap-leach pond in a Nevada mining operation.

In field installations and laboratory testing Stevens Polypropylene exhibits outstanding performance. The material's uniaxial tensile, multiaxial and hydrostatic test results illustrate the system's ability to withstand typical stresses caused by subsidence and loading conditions, while maintaining membrane integrity.

Excellent thermal and dimensional stability, good chemical and UV resistance and strong heat-welded seams also contribute to the membrane's durability.

From landfill liners to caps for hazardous or industrial waste piles, to floating covers on cyanide heap leach operations, Stevens Polypropylene geomembranes provide security.

This brochure contains a summary of index and performance tests completed by JPS and independent laboratories including Advanced Terra Testing, Matrecon, Precision Labs and GeoSyntec Consultants.

Flexibility (ASTM D-882-D638*)

Stevens Polypropylene geomembranes have a low flexural modulus making them easy to fabricate and install. The fabricated panels are accordion folded in boxes for ease of deployment in the field. Stevens Polypropylene will conform well to uneven substrate, distributing stress concentrations evenly on the sheet.

Linear Thermal Expansion & Dimensional Stability

(ASTM D-696*)

Stevens Polypropylene geomembranes are extremely stable materials. They exhibit low rates of linear thermal expansion and contraction. These properties enable the membrane to layflat with minimum undulations or wrinkles to the sheet. Minor changes in ambient temperature and in the surface temperature of the sheet will not affect its outstanding dimensional characteristics (note chart A).

In laboratory testing when exposed to a 90°F change in the surface temperature of the sheet, unreinforced polypropylene expanded only 5.4 inches per 100 feet, half the rate of expansion of highly crystalline materials. Reinforced PP expanded a mere .78 inches.

Stevens Polypropylene's low level of linear displacement is an asset during field seaming when material movement increases the difficulty of achieving a quality weld.

Seamability

Stevens Polypropylene has a wide seaming window--one of the widest seaming temperature ranges in the industry (note Chart B). Reliable, high quality welds can be made with either a hot-air or wedge welder. A homogenous bond can be made without having to grind the surface of the sheet. Detail seaming around penetrations is easy with the use of a hot air gun.

Even with sheet surface temperature changes of up to 100°F, a good seam can be made that achieves specified peel and shear values with minimal adjustments to the speed and temperature of the welder.

Tensile

(ASTM D-4885*)

Stevens Polypropylene geomembrane lining system combine the strengths of reinforced and unreinforced membrane in a single containment application.

The scrim-reinforced sheet provides high strength for exposed applications such as floating cover and interim cap installations. The unreinforced sheet provides the high elongation and low tensile characteristics that are necessary to survive under subsidence conditions.

Chart C illustrates the tensile values for Stevens reinforced and unreinforced polypropylene.

Multiaxial Stability

(GRI GM4*)

Load or pressure in a containment facility exerts stresses on a geomembrane in many directions of the sheet. For this reason, polypropylene was tested for confomrance characteristics under multiaxial loading.

Chart D shows the high yield strength of the scrim-reinforced Polypropylene and the ability of the unreinforced sheet to conform to the contours or movement of the subgrade under low pressure.

Unreinforced PP's elongation characteristics allows for distribution of stress over the surface of the membrane, rather than localized stress concentration.

High Puncture Resistance

(GRI GM3*)

Stevens Polypropylene shows outstanding resistance to puncture that could result from rocks, debris and other hard objects within a subgrade. Such materials could cause failure in a flexible membrane liner system that's in tension. Chart E shows that Stevens PP will elongate over such objects, even when subjected to point loading stress.

Chemical Resistance**

Stevens Polypropylene is highly resistant to a broad range of chemicals, leachates and other aqueous solutions making it well suited for applications ranging from landfills to anaerobic floating covers, to cyanide solution ponds, to black-liquor ponds.

After prolonged immersion in black liquor solution while under stress, PP showed no significant change in physical properties. No evidence of surface environmental stress

**JPS recommends that you reveiw the ASTM standards referenced herein to determine the suitability and relevance of the performance test data for your particular application.*

*** Chemical resistance -- You should test polypropylene geomembranes under actual or simulated exposure site conditions before installation. A geomembrane's ability to withstand exposure to a chemical is influenced by a number of factors including: dilution of the chemical, temperature, aeration, velocity of flow, duration of exposure, stability of the fluid, possible chemical reactions with other compounds under containment, size of the membrane under attack, geometry of the test sample, etc.*

Chart A Comparison of Typical Expansion & Contraction Rates per 90 deg. Temperature Change

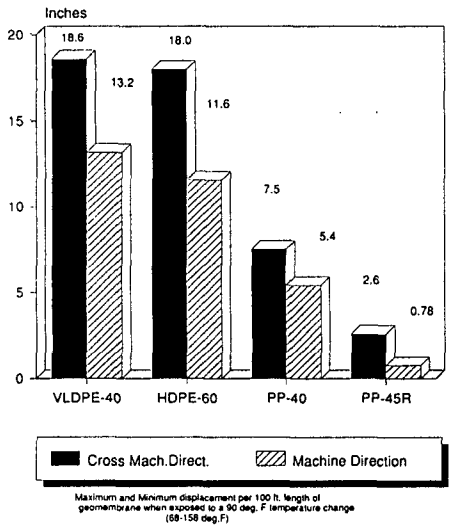


Chart B Seaming Temperature Window (Wedge Welder)

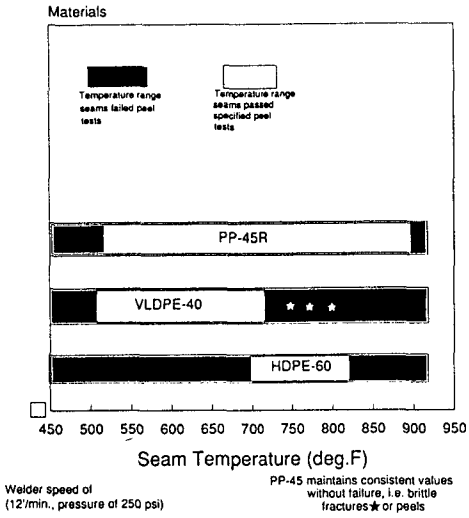


Chart C Tensile Strength at Yield Polypropylene ASTM D-4885

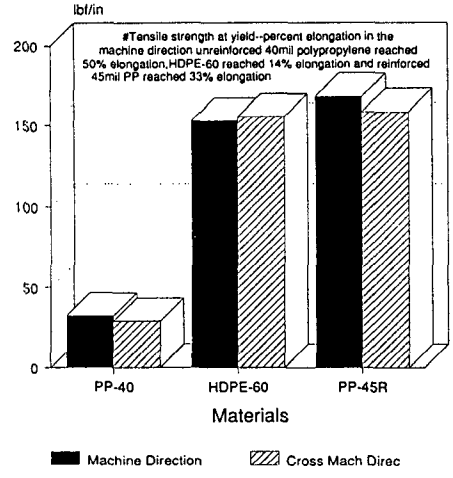


Chart E Large Scale Hydrostatic Puncture Test GRI/GM3

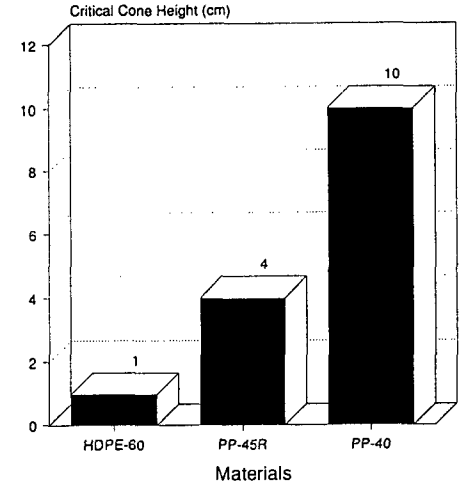
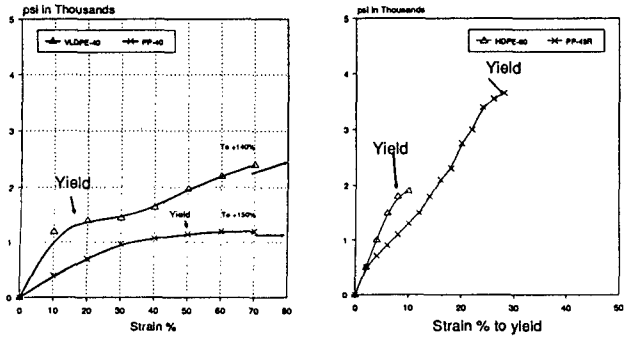


Chart D Large Scale Multiaxial Stress-Strain GRI/GM4



cracking was discovered.

In addition, after prolonged immersion testing in a variety of chemicals and waste water streams, Stevens Polypropylene was not adversely effected.

Water Vapor Transmission Barrier

Stevens Polypropylene geomembranes form a highly impermeable barrier, inhibiting moisture and gas transmission through the membrane. Water vapor transmission rates for unreinforced Stevens PP are less than .08g/M^2 day.

Wide Temperature Tolerance

Stevens Polypropylene geomembranes withstand wide temperature variations making them well suited for a variety of climates and terrains. The system can withstand above waterline temperatures of 200°F (93.3°C) and will remain flexible below -40°F (-40°C). It can survive in containment applications where intermittent operating temperatures can spike by as much as 100°F.

Weathering

Stevens PP has demonstrated resistance to ultraviolet radiation and ozone in exposed applications and in accelerated weathering and aging tests such as Emmaqua^R and Xenon arc.

High Strength

Stevens 10x10 1000 denier polyester-scrim-reinforced PP geomembranes provide high strength, dimensional stability, tear and puncture resistance. Stevens PP also shows excellent resistance to abrasion and wear conditions.

Widest PP Product Line

JPS is the only manufacturer to offer a complete line of polypropylene geomembrane products. Marketed under the Stevens tradename, they are available with a 10x10 1000 denier reinforcing scrim, unreinforced or laminated with a geotextile to form a geocomposite.

Product line diversity gives engineers greater design freedom in the selection of the right high performance geomembranes for their application.

Over A Century of Experience

JPS Elastomerics Corp., manufacturers calendered and extruded elastomeric products from natural and synthetic rubber, as well as other high performance elastomeric polymers. These products are marketed into the environmental, commercial roofing, apparel, disposable diaper and general industrial markets in over 34 countries worldwide.

The Environmental Products Division of JPS Elastomerics Corp. is a leading supplier of high performance, flexible geomembranes for the environmental containment industry.

Hundreds of millions of square feet of Stevens Geomembranes can be found in demanding installations world wide.

JPS is under the corporate umbrella of JPS Textile Group, Inc., a company with annual sales in excess of $850 million. Dating back to 1863, JPS Elastomerics is now headquartered in Northampton, Massachusetts. The company operates manufacturing plants in Easthampton, Massachusetts, Westfield, North Carolina and Stuart, Virginia.

For additional information on any of Stevens Geomembranes, phone the Environmental Products Division.

ENGINEERING SPECIFICATIONS

Stevens Polypropylene
10 X 10 1000 denier polyester scrim reinforced

Property	Test Method	Type .045
Gauge, nominal (mils)	—	45
Plies, reinforcing 10 x 10 1000d polyester scrim	—	1
Thickness, minimum (mils)	ASTM D751	
1. Overall	Optical Method	41
2. Over scrim		11
Breaking strength - fabric, minimum (lbs)	ASTM D751, Method A	250
Elongation at break - percentage		22
Low temperature flexibility (°F)	ASTM D2136, 1/8 in. mandrel, 4 hrs - Pass	-40
Puncture resistance (lbs)	FTMS 101C Method 2031	210
Tear strength minimum (lbs.)	ASTM D751, Method B Tongue Tear	55
Dimensional Stability (percent change, maximum)	ASTM D1204 180°F/1 hour	1.0
Resistance to soil burial (maximum % change from original values)		
a. 40-mil unsupported sheet	ASTM D3083 (per ASTM paragraph 9.5)	5
1. Breaking strength		15
2. Elongation at break		15
3. Modulus at 100% elongation		
b. scrim fabric breaking strength	ASTM D751, Method A	15
Hydrostatic Resistance, minimum (lbs.)	ASTM D751, Method A, Procedure 1	250
Ply adhesion, minimum (lbs./in.)	ASTM D413, Machine Method	20
Water Absorption (maximum, % weight change)	ASTM D471 70°F	<1%
UV Resistance	a) Florida exposure	pass-1 yr. exposure
	b) ASTM G26 Xenon arc method 63°C	pass-3000 hrs.
Stress Cracking Resistance (min. hours with no failure)	ASTM D1693	Pass-3000 hrs.
SEAM PROPERTIES:		
Bonded Seam Strength (lbs./width)	ASTM D751, as modified in Appendix A, NSF54	200
Peel Adhesion, minimum (lbs./inch)	ASTM D413, as modified in Appendix A, NSF54	30

2009 N. INDUSTRIAL RD.
CORTEZ, CO 81321

TOLL FREE 1 (800) 821-0531
COLORADO (303) 565-9540
TELECOPIER (303) 565-8844

PP - 1A 1.

ENVIRONMENTAL LINERS, INC.

COMPARATIVE TEST VALUES FOR STEVENS POLYPROPYLENE

PROPERTY	TEST METHOD	JPS PP* .045"	HDPE .060"	HDPE .080"	HDPE .100"	HYP. .036"	HYP. .045"
Thickness nominal (mils)	ASTM D751	.045	.054	.072	.900	.036	.045
Density, g/cm3	ASTM D792	.900	.940	.940	.940	1.3	1.3
Minimum Tensile Properties							
Tensile @ Yield (lb/in width)	ASTM D638	200	128	168	210	200	200
Tensile @ Break (psi)	ASTM D638	5000	2100	2100	2100	3500	3500
Elongation @ Yield (percent)	ASTM D638	30	12	12	12	20	20
Elongation @ Break (percent)	ASTM D638	800	560	560	560	30	30
Dimensional Stability (percent)	ASTM D1204	1	2	2	2	2	2
Environmental Stress Crack (min.hrs. with no failure)	ASTM D1693	3000	1500	1500	1500	n/a	n/a
Puncture Resistance (lbs)	FTMS 101C Method 2031	210	72	96	120	200	200
Coefficient of Thermal Expansion (cm/cm/c 10 to -5) (40-80 C range		13	30	30	30	11	11
Crystallinity Values (percent)		11	40-60	40-60	40-60	n/a	n/a
Fusion Window for seaming (°F)		550-1000F		(750 F to 950 F) may vary with compound		n/a	n/a

FLF
Pond Lining
& Roofing

FRANK LINER FABRICATIONS, INC.

P.O. Box 308 • Farmington NM 87499 • (505) 327-7660

October 7, 1993

Ms. Kathy Brown
N. M. Oil Conservation Division
P. O. Box 2088
Santa Fe, NM 87504-2088

Subject: Centralized Koch Pond No 1
Sec 31-T32N-R8W
San Juan County, NM

Dear Kathy,

On behalf of Koch Exploration Co. (Koch), as their consultant, I respectfully request permission to utilize produced water for constructing the dikes on the subject pond.

The water to be utilized will be from Koch's own coal wells in the immediate area. The water will be from those wells that this pond will service. Water analyses from these four wells were submitted with the original application dated August 19, 1993.

If necessary to supplement the water supply, produced water from Koch's other coal wells will be utilized. Those other wells are the Blancett Com 1-C, Gardner 1-C, Gardner 5-C and Gardner 7-C. Attached please find water analyses for these four wells. The water analyses for these supplemental wells is very similar to the the primary wells.

I request permission to utilize produced water for several reasons:

1) Sufficient quantities of local fresh water are not readily available to this site. Fresh water would have to be trucked in at considerable expense.

2) The pH of the produced water is mildly alkaline, as is the soil from which the pond will be constructed.

3) The water used to compact the soil will only be utilized in sufficient quantities, so as to obtain optimum moisture content. Once the in-situ clay material is wetted with the produced water, that water will be bound in place by chemical and capillary actions. There will be no migration of produced water.

FLF

4) Positive drainage will provided around the outside perimeter of the pond. With positive drainage around the pond, the pond dikes will not be subjected to any leaching, other than that rain or snow which falls directly on the dikes. In this semi-arid climate there will be little or no leaching.

It is my opinion that there will be no threat to fresh water supplies, human health or the environment by allowing Koch to utilize this produced water in construction of the pond.

Your prompt reply to my request will be greatly appreciated. Please direct any correspondence to Koch Exploration Co., with a copy to Don Ellsworth, Farmington B.L.M., and myself.

Thank you.

Very truly yours,

Robert C. Frank

Robert C. Frank
Geologist

cc: M. Scates, Koch Exploration Co.

WATER ANALYSIS TESTING ENVIRONMENTAL REPORTS

1115 Farmington Avenue - Farmington , NM 87401
(505) 325-1085

Lab Sample No.: W93-275

Standard A.P.I. Water Analysis Report

Collected By: Don Johnson

Company: Koch Exploration Co. Collection Date: 7-Aug-93

Well Name: Gardner 7C Collection Time: 4:00 PM

Formation: Basin Fruitland Coal County: San Juan State: NM

Location: Sec. 26-T32N-R9W Analyst: K. Lambdin & S. Spencer

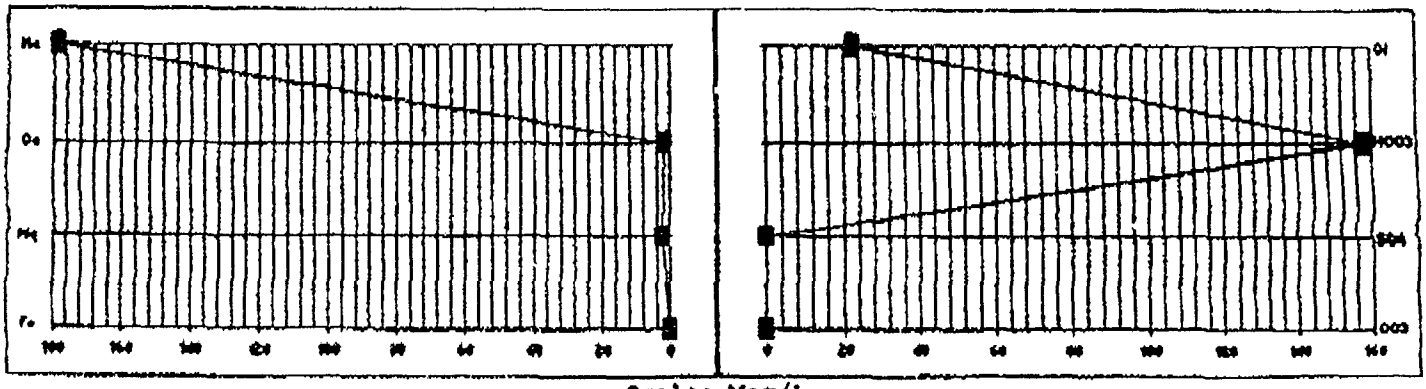
Remarks: None. Analysis Date: 8/9/93

PARAMETER	mg/l (ppm)	Comment	PARAMETER	mg/l (ppm)	Comment
Sodium , Na	4,100 mg/l		Chloride , Cl	800 mg/l	
Potassium, K	18 mg/l				
Calcium , Ca	35 mg/l		Sulfate, SO4	0 mg/l	<5
			Hydroxide, OH	0 mg/l	
Magnesium , Mg	30 mg/l		Carbonate, CO3	0 mg/l	
			Bicarbonate, HCO3	9,600 mg/l	
Iron, Fe (Total)	0.0 mg/l	NR			
			Specific Gravity (@ 60 Degrees F)	1.010 Units	
TDS	11,860 mg/l				

Remarks: None.

NR = Test Not Run Anion/Cation: 98.3%

Stiff Diagram



Scale: Meq/L

WATER ANALYSIS TESTING ENVIRONMENTAL REPORTS

1115 Farmington Avenue - Farmington , NM 87401
(505) 325-1085

Lab Sample No.: W93-38

Standard A.P.I. Water Analysis Report

Collected By: Don Johnson

Company: Koch Exploration Co.

Collection Date: 2-Feb-93

Location: SW 1/4 Sec.26-T32-R9

Collection Time: Unknown

Formation: Fruitland Coal

County: San Juan State: NM

Well Name: Gardner 5-C

Analyst: K. Lambdin Karen C Lambdin

Remarks: none

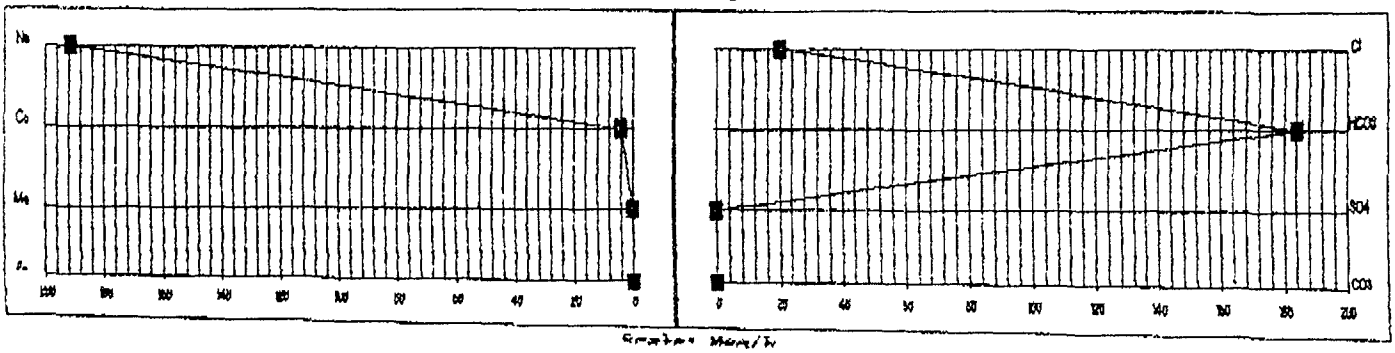
PARAMETER	as ION		Comment	PARAMETER	as ION		Comment
Sodium , Na	4,400	mg/l		Chloride , Cl	709	mg/l	
Potassium, K	0	mg/l	NR				
Calcium , Ca	79	mg/l	TH as Ca	Sulfate, SO4	0	mg/l	<10
				Hydroxide, OH	0	mg/l	
Magnesium , Mg	0	mg/l	NR	Carbonate, CO3	0	mg/l	
Iron , Fe(Diss.)	0.0	mg/l	NR	Bicarbonate,HCO3	11,224	mg/l	
Hydrogen Sulfide	0	mg/l	NR	Resistivity (@25 Degrees C)	0.654	ohm-m	
pH	7.70	Units		Conductivity	15,300	uS	
				Specific Gravity (@ 60 Degrees F)	1.022	Units	
TDS	11,720	mg/l					

Remarks: Ca and Mg reported as Total Hardness as Ca.
This determination required a 30 minute acid digestion.
Not enough sample to run Fe and H2S.

NR = Test Not Run

Anion/Cation: 104.5%

Stiff Diagram



API WATER ANALYSIS REPORT FORM

TECH, Inc.
333 East Main
Farmington
New Mexico
87401
505/327-3311

Laboratory No. 25-910311-28

Company	Sample No.	Date Sampled
Koch Exploration Co.		

Field	Legal Description	County or Parish	State
	SW¼ S35 T32 R9		

Lease or Unit	Well	Depth	Formation	Water, B/D
Gardner	C-1		Fruitland Coal	

Type of Water (Produced, Supply, etc.)	Sampling Point	Sampled By

DISSOLVED SOLIDS

CATIONS	mg/l	me/l
Sodium, Na (calc.)	2773.8	120.6
Calcium, Ca	49.7	2.5
Magnesium, Mg	23.3	1.9
Barium, Ba		

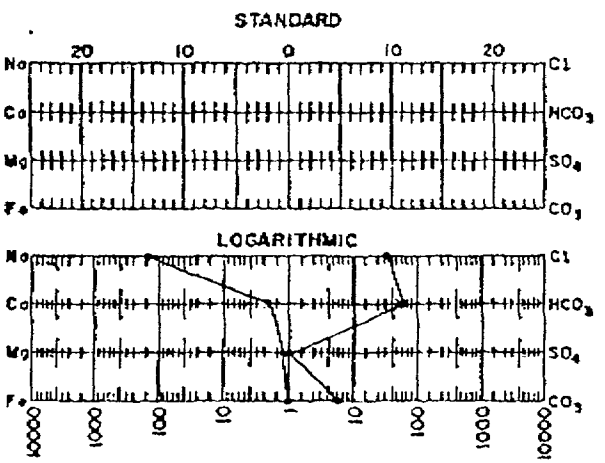
ANIONS	mg/l	me/l
Chloride, Cl	1772.5	50
Sulfate, So_4	N/D	N/D
Carbonate, CO_3	216	7.2
Bicarbonate, HCO_3	4135.8	67.8

Total Dissolved Solids (calc.)	8971.1
Iron, Fe (total)	
Sulfide, as H_2S	

OTHER PROPERTIES

pH	8.2
Specific Gravity, 60/60 F.	1.0051
Resistivity (ohm-meters) 72° F.	0.74

WATER PATTERNS — me/l



REMARKS & RECOMMENDATIONS:

Date Received	Preserved	Date Analyzed	Analyzed By
3-11-91		3-11-91	H.A.

WATER ANALYSIS TESTING ENVIRONMENTAL REPORTS

1115 Farmington Avenue - Farmington , NM 87401
(505) 325-1085

Lab Sample No.: W93-236

Standard A.P.I. Water Analysis Report

Collected By: Don Johnson

Company: Koch Exploration Company
Collection Date: 21-Jul-93

Well Name: Blancett Com 1C
Collection Time: 11:00 AM

Formation: Basin Fruitland Coal
County: San Juan State: NM

Location: Sec.27 T32N R9W NE 1/4.
Analyst: K. Lambdin Karen C Lambdin

Remarks: None.
Analysis Date: 7/25/93

PARAMETER	as ION		Comment
Sodium , Na	4,300	mg/l	
Potassium, K	15	mg/l	
Calcium , Ca	26	mg/l	
Magnesium , Mg	22	mg/l	
Iron, Fe (Total)	0.0	mg/l	NR
Hydrogen Sulfide	0	mg/l	NR
pH	7.89	Units	
TDS	11,490	mg/l	

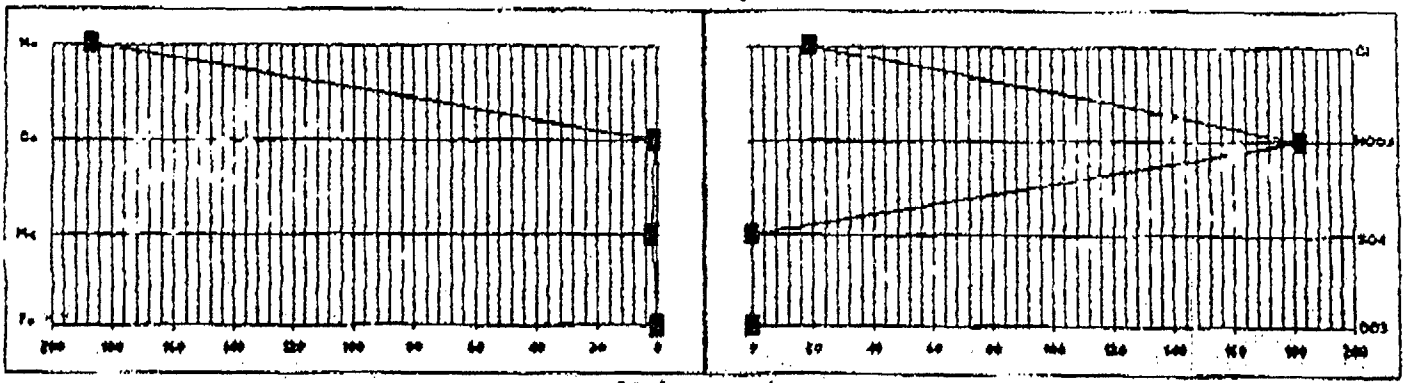
PARAMETER	as ION		Comment
Chloride , Cl	686	mg/l	
Sulfate, SO4	0	mg/l	<5
Hydroxide, OH	0	mg/l	
Carbonate, CO3	0	mg/l	
Bicarbonate, HCO3	11,124	mg/l	
Resistivity (@25 Degrees C)	0.679	ohm-m	
Conductivity	14,730	uS	
Specific Gravity (@ 60 Degrees F)	1.016	Units	

Remarks: None.
Not enough sample to run H2S.

NR = Test Not Run

Anion/Cation: 105.9%

Stiff Diagram



Scale: Meq/L

FLF
Pond Lining
& Roofing

FRANK LINER FABRICATIONS, INC.

P.O. Box 308 • Farmington NM 87499 • (505) 327-7660

October 7, 1993

Mr. Frank Chavez
N. M. Oil Conservation Division
1000 Rio Brazos
Aztec, NM 87410

Subject: Centralized Koch Pond No 1
Sec 31-T32N-R8W
San Juan County, NM

Dear Frank,

On behalf of Koch Exploration Co. (Koch), as their consultant, I respectfully request permission to utilize produced water for constructing the dikes on the subject pond.

The water to be utilized will be from Koch's own coal wells in the immediate area. The water will be from those wells that this pond will service. Water analyses from these four wells were submitted with the original application dated August 19, 1993.

If necessary to supplement the water supply, produced water from Koch's other coal wells will be utilized. Those other wells are the Blancett Com 1-C, Gardner 1-C, Gardner 5-C and Gardner 7-C. Attached please find water analyses for these four wells. The water analyses for these supplemental wells is very similar to the the primary wells.

I request permission to utilize produced water for several reasons:

1) Sufficient quantities of local fresh water are not readily available to this site. Fresh water would have to be trucked in at considerable expense.

2) The pH of the produced water is mildly alkaline, as is the soil from which the pond will be constructed.

3) The water used to compact the soil will only be utilized in sufficient quantities, so as to obtain optimum moisture content. Once the in-situ clay material is wetted with the produced water, that water will be bound in place by chemical and capillary actions. There will be no migration of produced water.

FLF

4) The water utilized for compaction will be applied in such a manner as to prevent ponding and run-off.

5) Positive drainage will provided around the outside perimeter of the pond. With positive drainage around the pond, the pond dikes will not be subjected to any leaching, other than that rain or snow which falls directly on the dikes. In this semi-arid climate there will be little or no leaching.

It is my opinion that there will be no threat to fresh water supplies, human health or the environment by allowing Koch to utilize this produced water in construction of the pond.

Your prompt reply to my request will be greatly appreciated. Please direct any correspondence to Koch Exploration Co., with a copy to Don Ellsworth, Farmington B.L.M., and myself.

Thank you.

Very truly yours,

Robert C. Frank
Geologist

Accepted and Agreed to this 8 day of Oct, 1993

New Mexico Oil Conservation Division

By _____

Title DEPUTY OIL & GAS INSPECTOR, DIST. #3

cc: M. Scates, Koch Exploration Co.

WATER ANALYSIS TESTING ENVIRONMENTAL REPORTS

1115 Farmington Avenue - Farmington, NM 87401
(505) 325-1085

Lab Sample No.: W93-236

Standard A.P.I. Water Analysis Report

Collected By: Don Johnson

Company: Koch Exploration Company

Collection Date: 21-Jul-93

Well Name: Blancett Com 1C

Collection Time: 11:00 AM

Formation: Basin Fruitland Coal

County: San Juan State: NM

Location: Sec.27 T32N R9W NE 1/4.

Analyst: K. Lambdin Karen C Lambdin

Remarks: None.

Analysis Date: 7/25/93

PARAMETER	as ION		Comment
Sodium, Na	4,300	mg/l	
Potassium, K	15	mg/l	
Calcium, Ca	26	mg/l	
Magnesium, Mg	22	mg/l	
Iron, Fe (Total)	0.0	mg/l	NR
Hydrogen Sulfide	0	mg/l	NR
pH	7.89	Units	
TDS	11,490	mg/l	

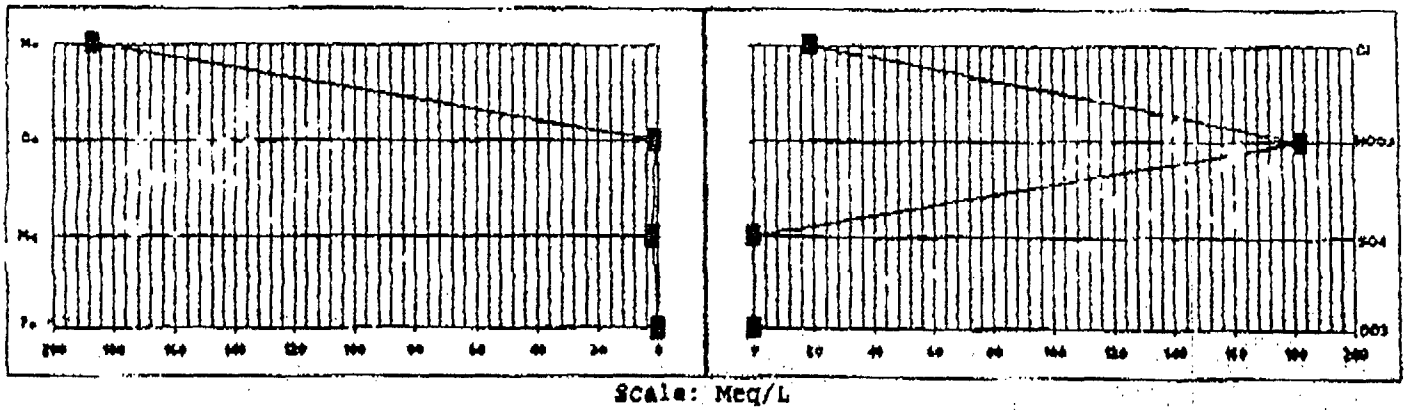
PARAMETER	as ION		Comment
Chloride, Cl	686	mg/l	
Sulfate, SO4	0	mg/l	<5
Hydroxide, OH	0	mg/l	
Carbonate, CO3	0	mg/l	
Bicarbonate, HCO3	11,124	mg/l	
Resistivity (@25 Degrees C)	0.679	ohm-m	
Conductivity	14,730	uS	
Specific Gravity (@ 60 Degrees F)	1.016	Units	

Remarks: None.
Not enough sample to run H2S.

NR = Test Not Run

Anion/Cation: 105.98

Stiff Diagram



Scale: Meq/L

P.10/11

P.8/11

API WATER ANALYSIS REPORT FORM

Laboratory No. 25-910311-28

Company: Koch Exploration Co.		Sample No.	Date Sampled
Field	Legal Description: SW¼ 535 T32 R9	County or Parish	State
Lease or Unit: Gardner	Well: C-1	Depth	Formation: Fruitland Coal / Water, B/D
Type of Water (Produced, Supply, etc.)	Sampling Point		Sampled By

DISSOLVED SOLIDS

CATIONS	*mg/l*	*me/l*
Sodium, Na (calc.)	2773.8	120.6
Calcium, Ca	49.7	2.5
Magnesium, Mg	23.3	1.9
Barium, Ba		

ANIONS	*mg/l*	*me/l*
Chloride, Cl	1772.5	50
Sulfate, So_4	n/d	n/d
Carbonate, CO_3	216	7.2
Bicarbonate, HCO_3	4135.8	67.8

Total Dissolved Solids (calc.) 8971.1

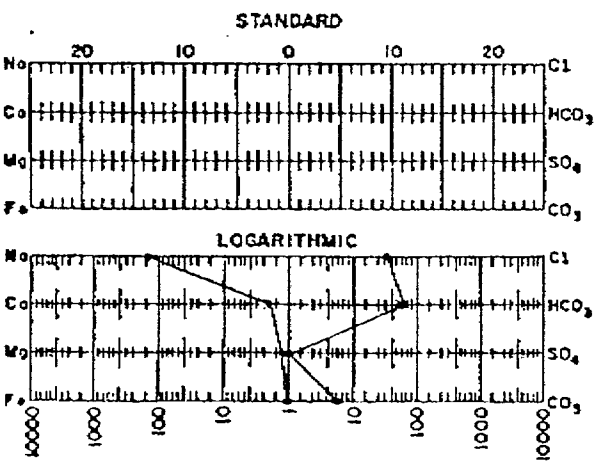
Iron, Fe (total)

Sulfide, as H_2S

OTHER PROPERTIES

pH	8.2
Specific Gravity, 60/60 F.	1.0051
Resistivity (ohm-meters) 72° F.	0.74

WATER PATTERNS — *me/l*



REMARKS & RECOMMENDATIONS:

Date Received	Preserved	Date Analyzed	Analyzed By
3-11-91		3-11-91	H.A.

TECH, Inc.
333 East Main
Farmington
New Mexico
87401
505/327-3311

WATER ANALYSIS TESTING ENVIRONMENTAL REPORTS

1115 Farmington Avenue - Farmington , NM 87401
(505) 325-1085

Lab Sample No.: W93-38

Standard A.P.I. Water Analysis Report

Collected By: Don Johnson

Company: Koch Exploration Co. Collection Date: 2-Feb-93

Location: SW 1/4 Sec.26-T32-R9 Collection Time: Unknown

Formation: Fruitland Coal County: San Juan State: NM

Well Name: Gardner 5-C Analyst: K. Lambdin Karen C Lambdin

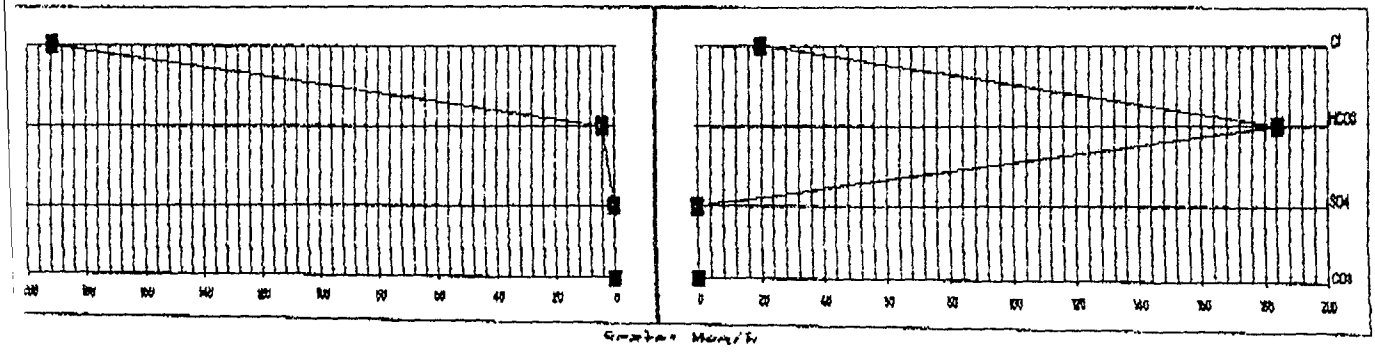
Remarks: none

PARAMETER	as ION		Comment	PARAMETER	as ION		Comment
odium , Na	4,400	mg/l		Chloride , Cl	709	mg/l	
otassium, K	0	mg/l	NR				
alcium , Ca	79	mg/l	TH as Ca	Sulfate, SO4	0	mg/l	<10
				Hydroxide, OH	0	mg/l	
agnesium , Mg	0	mg/l	NR	Carbonate, CO3	0	mg/l	
on , Fe(Diss.)	0.0	mg/l	NR	Bicarbonate,HCO3	11,224	mg/l	
ydrogen Sulfide	0	mg/l	NR	Resistivity (@25 Degrees C)	0.654	ohm-m	
	7.70	Units		Conductivity	15,300	uS	
				Specific Gravity (@ 60 Degrees F)	1.022	Units	
DS	11,720	mg/l					

Remarks: Ca and Mg reported as Total Hardness as Ca.
This determination required a 30 minute acid digestion.
Not enough sample to run Fe and H2S.

= Test Not Run Anion/Cation: 104.5%

Stiff Diagram



WATER ANALYSIS TESTING ENVIRONMENTAL REPORTS

1115 Farmington Avenue - Farmington , NM 87401
(505) 325-1085

Lab Sample No.: W93-275

Standard A.P.I. Water Analysis Report

Collected By: Don Johnson

Company: Koch Exploration Co. Collection Date: 7-Aug-93

Well Name: Gardner 7C Collection Time: 4:00 PM

Formation: Basin Fruitland Coal County: San Juan State: NM

Location: Sec. 26-T32N-R9W Analyst: K. Lambdin & S. Spencer

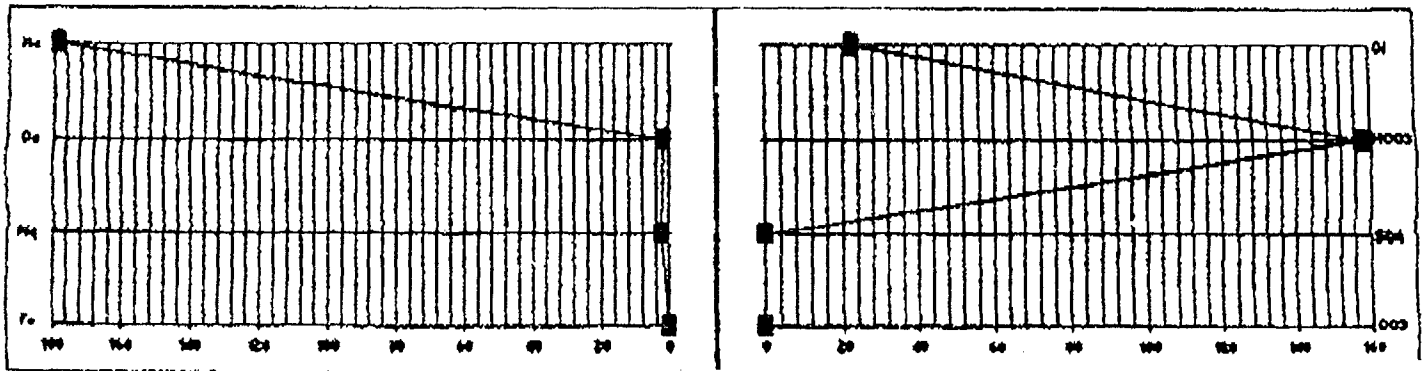
Remarks: None. Analysis Date: 8/9/93

PARAMETER	mg/l	Comments	PARAMETER	mg/l	Comments
Sodium , Na	4,100		Chloride , Cl	800	
Potassium, K	18				
Calcium , Ca	35		Sulfate, SO4	0	<5
			Hydroxide, OH	0	
Magnesium , Mg	30		Carbonate, CO3	0	
Iron, Fe (Total)	0.0	NR	Bicarbonate, HCO3	9,600	
			Specific Gravity (@ 60 Degrees F)	1.010	Units
TDS	11,860				

Remarks: None.

NR = Test Not Run Anion/Cation: 98.3%

Stiff Diagram



STATE OF NEW MEXICO

OIL CONSERVATION DIVISION

MEMORANDUM OF MEETING OR CONVERSATION

☒ Telephone ☐ Personal	Time	Date
	3:45 P.M.	10/4/93

Originating Party	Other Parties
Bob Frank	K.M. Brown
Frank Liners	OCD

Subject

Koch Pond No. 1 – Freeboard & lateral size

Discussion

Mike Stogner asked Bob to call us & discuss the freeboard & lateral (leakdetection) sizes. Bob said that a 2 foot freeboard would be OK since pond was designed with a fudge factor and ½ foot more freeboard is OK. Also, the size of the laterals being 2" + 1" is for ease of installation of the liner and will not effect the performance of the leak detection system. Still waiting on BLM to issue a permit.

Conclusions or Agreements

Distribution

Signed Kathy Brown

STATE OF NEW MEXICO

OIL CONSERVATION DIVISION

MEMORANDUM OF MEETING OR CONVERSATION

☒ Telephone ☐ Personal	Time	Date
	9:00 A.M	Oct. 4, 1993 (Mon.)

Originating Party	Other Parties
K.M. Brown - OCD	Mike Scates - Koch
	316-832-5237

Subject KOCH EXPLORATION - Centralized Ponds
OCD Questions on application

Discussion (1) Are you still requesting both ponds?
(2) Do you plan to use the areation system or only have it available ~~for~~ if there is an H_2S or smell problem?
(3) How do you propose to detect H_2S to activate your ~~prop~~ proposed contingency plan (ie. monitoring, smell, ?)
(4) How often will someone be frequenting the site
(5) Are you open to signing the facility? weekly H_2S monitoring? Increasing freeboard to 2'?
(6) Need name for the 2 ponds to distinguish them

Conclusions or Agreements (1) - Only pond in Section 31
(2) Only use if H_2S problem
(3) Need to talk to Bob Frank. Mike would accept a condition requiring H_2S monitoring a minimum of once a week.
(4) Probably daily (5) Signing in application;
(6) Pond in Section 31 to be permitted - call it Pond 1

Distribution xc: file

Signed Kathy Brown

STATE OF NEW MEXICO

OIL CONSERVATION DIVISION

MEMORANDUM OF MEETING OR CONVERSATION

☒ Telephone ☐ Personal

Time: 9:00 A.M.

Date: Sept. 10, 1993

Originating Party	Other Parties
Dale	Kathy Brown
Koch Exploration	OCD

Subject: Koch Evaporation Ponds
San Juan County

Discussion: Koch has decided to go with Bob Frank's double-lined evaporation ponds and not Tweety's proposal based on Koch's concern over environmental liability & the costs. Will only need to permit the pond on the east side of the canyon which will be on BLM land. Want to hold off on the pond on the west side since the water has not increased as predicted. Will install a centralized tank battery for the west side wells (4) and see what happens with water production next year. Tank battery will also be on BLM land.

Conclusions or Agreements

Need centralized 711 permit for pond on east side canyon. Letter from Koch stating intentions of centralized tank battery for west side of canyon will be suffic - no permit required.

Distribution: file: Koch
Tweety.

Signed: Kathy Brown

STATE OF NEW MEXICO

OIL CONSERVATION DIVISION

MEMORANDUM OF MEETING OR CONVERSATION

☒ Telephone ☐ Personal | Time 8:00 AM. | Date Sept. 7, 1993

Originating Party	Other Parties
Michael Scates - Koch	K. Brown OCD

Subject: Koch Exploration - Evaporation Pits

Discussion: KB - What pond do you want permitted.
Scates - skeptical about Tweety's project.
Is going to meet with Tweety on Thurs.
Also, Tweety's pond hasn't been reviewed by State Engineer
East & West side of canyon - pond applications submitted
by Koch. Tweety's is the alternative for the east pond.
~~East & West sides of canyon~~
Mike has environmental concerns about Tweety's operation -
high salts, run off into arroyo (NPDES), State Engineers approval.

Conclusions or Agreements

Will hear from Mike on Kochs decision on Thursday
Will go ahead & review west canyon pond.

Distribution: files: Tweety
Koch

Signed Kathy Brown

KOCH

KOCH EXPLORATION COMPANY

August 20, 1993

Mr. Roger Anderson
New Mexico Oil Conservation Division
P.O. Box 2088
Santa Fe, NM 87504-2088

Re: Administrative Approval to
Construct Surface Waste Disposal Facility
NE/4, NW/4 Section 31-T32N-R8W
San Juan County, NM

Dear Mr. Anderson:

Koch Exploration Company requests administrative approval to construct and operate a centralized spray evaporation pond at the above referenced location.

Enclosed is our "Application for Surface Waste Disposal Facility" and supporting data. An "Application for Permit to Construct a Flood Control Dam" has been forwarded to the State Engineer's office. If I may be of any further assistance, please contact me or our consultant, Robert C. Frank (305-327-7660) at your convenience.

We will forward the "Surface Owner Right of Way Agreement" as available.

Sincerely,

Michael Scates

Michael Scates
Administrative Manager

P.O. Box 2256 ▪ Wichita, Kansas 67201-2256 ▪ 4111 East 37th Street North ▪ Wichita, Kansas 67220
316/832-5237 ▪ FAX 316/832-5390

IMPORTANT - READ INSTRUCTIONS ON BACK BEFORE FILLING OUT THIS FORM

APPLICATION FOR PERMIT TO CONSTRUCT A FLOOD CONTROL DAM

File No._____ Date of receipt_____

1. Name of applicant Koch Exploration Company
   Address P.O. Box 2256, 4111 E. 37th St. NE
   City and State Wichita, KS Zip code 67220

2. Dam hazard classification (SCS criteria) Class "A"

3. Dam is to be located on: (a) Name of stream or watercourse NA, Ponds are out of any watercourse
   (b) Which is a tributary of _____

4. Location of the intake structure of the principal spillway conduit from detention storage: San Juan County. (a) SW ¼ NE ¼ NW ¼ of Section 31, Township 32N, Range 8W, N.M.P.M. or (b) within _____ feet of X = _____ feet, Y = _____ feet, N.M.C.S., _____ zone, within _____ Grant.

5. Drainage area characteristics: (a) drainage area NA acres; (b) 100-year, 6 hour precipitation _____ inches; (c) probable maximum precipitation (PMP), 6 hour storm _____ inches; (d) volume of run-off from the 100-year, 6 hour storm _____ acre-feet. (e) volume of run-off from the PMP, 6 hour storm _____ acre-feet.

6. Properties of detention dam: (a) maximum height above foundation at downstream toe 20 feet; (b) length of crest 320 ft each side feet; (c) width of crest 12 feet; (d) maximum width at base 117 feet; (e) slope of upstream face 3:1; (f) slope of downstream face 3:1; (g) elevation at crest of dam 6,666 feet; (h) elevation of emergency spillway crest NA feet; (i) elevation of flow line of the intake structure of the principal spillway conduit NA feet; (j) characteristics of emergency spillway, (1) location NA, (2) width NA feet, (3) maximum capacity NA cubic feet per second, (4) freeboard above maximum high water line 1.5 feet, (5) cross-sectional area at maximum flow NA square feet; (k) characteristics of principal spillway conduit, (1) size, type and numer of gates NA (2) dimension NA feet, (3) length NA feet, (4) slope NA, (5) Manning coefficient NA, (6) maximum discharge capacity _____ cubic feet per second, time to empty the detention reservoir NA hours, (96 hours maximum unless prior approval has been obtained); (l) construction material, etc. _____

(m) approximate volume of material in dam 18,000 cubic yards, (n) type of construction Earth, Double-lined with plastic and leak detection system

7.

Height Above Flow Line of Intake Structure	Area of Water Surface, Acres	Storage Capacity, Acre Feet	Remarks and Critical Points
0			Flow line of intake structure
	2.22	24.8	

8. Additional data or explanations The pond will be constructed at 95% or better of Standard Proctor. The construction will be monitored by a third party engineering firm. This is an evaporation pond. The water will be piped in. There will be no run-off, or run-on.

9. Estimated costs: Detention dam and appurtenances ... $ 70,000
   Other constructed works ..... $ 60,000
   Total cost 130,000 $ 130,000

10. Estimated date to begin construction September 15, 1993
    Estimated date to complete construction October 15, 1993

11. Dam will be constructed under supervision of GEOMAT

12. Signature of Applicant Michael Scates
    Michael Scates
    Administrative Manager

ACTION OF STATE ENGINEER

This application to construct a flood control dam is approved provided it is not exercised to the detriment of any others having prior, valid and existing rights to the use of waters of this stream system and further provided that

Witness my hand and seal this_____day of_____, A.D., 19_____.

S.E. Reynolds, State Engineer

By:_____

Instructions

typed and in triplicate w/ each having an original signature

This form shall be filed in triplicate and accompanied by maps, plans, specifications, etc.

Section 1 - Fill in all blanks

Section 2 - Class (a). — Dams located in rural or agricultural areas where failure may damage farm buildings, agricultural land, or township and country roads.

Class (b).— Dams located in predominantly rural or agricultural areas were failure may damage isolated homes, main highways or minor railroads or cause interruption of use or service of relatively important public utilities.

Class (c). — Dams located where failure may cause loss of life, serious damage to homes, industrial and commercial buildings, important public utilities, main highways, or railroads.

Section 3 - Fill in all blanks

Section 4 - Fill in either part a or b

Sections 5, 6, 7 - Fill in all blanks

Section 8 - Fill in if necessary

Section 9, 10 - Fill in all blanks

Section 11 - Construction must be under supervision of registered engineer, consulting engineer firm or government agency.

Section 12 - Signature

FILING FEE - $10.00 + $2/$1000 of estimated construction costs

Revised 5/93

State of New Mexico
Energy, Minerals and Natural Resources Department
OIL CONSERVATION DIVISION
P.O. Box 2088
Santa Fe, NM 87501

APPLICATION FOR SURFACE WASTE DISPOSAL FACILITY

(Refer to OCD Guidelines for assistance in completing the application)

☐ Commercial ☒ Centralized

I. Type: ☒ Produced Water ☐ Drilling Muds ☐ Other _____
☐ Solids/Landfarm ☐ Treating Fluids

II. OPERATOR: Koch Exploration Company

ADDRESS: P.O. Box 2256, Wichita, Kansas 67201

CONTACT PERSON: Michael Scates PHONE: (316) 832-5595

III. LOCATION: NE /4 NW /4 Section 31 Township 32N Range 8W
Submit large scale topographic map showing exact location.

IV. IS THIS AN EXPANSION OF AN EXISTING FACILITY? ☐ Yes ☒ No

V. Attach the name and address of the landowner of the disposal facility site and landowners of record within one-half mile o the site.

VI. Attach discription of the facility with a diagram indicating location of fences, pits, dikes, and tanks on the facility.

VII. Attach detailed engineering designs with diagrams prepared in accordance with Division guidelines for the construction/installation of the following: pits or ponds, leak-detection systems, aerations sytems, enhanced evaporation (spray) systems, waste treating systems, security systems, and landfarm facilities.

VIII. Attach a contingency plan for reporting and clean-up of spills or releases.

IX. Attach a routine inspection and maintenance plan to ensure permit compliance.

X. Attach a closure plan.

XI. Attach geological/hydrological evidence demonstrating that disposal of oil field wastes will not adversely impact fresh water. Depth to and quality of ground water must be included.

XII. Attach proof that the notice requirements of OCD Rule 711 have been met (Commercial facilities only).

XIII. Attach a contingency plan in the event of a release of H_2S.

XIV. Attach such other information as necessary to demonstrate compliance with any other OCD rules, regulations and/or orders.

XV. CERTIFICATION

I hereby certify that the information submitted with this application is true and correct to the best of my knowledge and belief.

Name: Michael Scates Title: Administrative Manager

Signature: Michael Scates Date: 8/19/93

DISTRIBUTION: Original and one copy to Santa Fe with one copy to appropriate Division District Office.

KOCH EXPLORATION COMPANY

Supporting Data
Addendum to Application for
Surface Waste Disposal Facility

Spray Evaporation Pond I
NE/4, NW/4 Section 31-T32N-R8W
San Juan County, NM

V. Land Owner of Disposal Facility Site:

United States of America
Bureau of Land Management
1235 LaPlata Hwy
Farmington, NM 87401

Landowner of record within one-half mile.

United States of America
Bureau of Land Management
1235 LaPlata Hwy
Farmington, NM 87401

State of New Mexico
New Mexico State Land Office
P.O. Box 1148
Santa Fe, NM 87504-1148

VI. Attached is a site plan.

The pond will service the following wells:

Well Name	Location
Gardner 2C	NE/4 Sec 31-T32N-R8W
Gardner 3C	SW/4 Sec 31-T32N-R8W
Gardner 4C	SW/4 Sec 25-T32N-R9W
Gardner 6C	NW/4 Sec 25-T32N-R9W

Water analyses for the wells referenced above are attached. Water from each of these wells will be piped to the evaporation pond. The water will enter a skimmer tank prior to entering the pond.

VII.

Attached are engineering design specifications and diagrams for the evaporation pond, including the leak detection system. In addition please find diagrams of the aeration and spray system. There will be no waste treating or land farm facilities. There will be no security system other than a 6" chain link fence with three strand barb wire.

The subsurface consists of a sandy loam, clay and weathered sandstone material. The subgrade will be prepared, placed in 6" to 9" lifts and compacted to 95% of proctor and +4% of optimum moisture. The actual values will be determined by an independent laboratory testing firm.

The liner company to be used is Frank Liner Fabrication, Inc. The secondary liner will be made of 30 mil PVC. The primary liner will be made of 30 mil XR-5. The primary liner is resistant to sunlight, hydrocarbons, fungus, algae, bacteria and salt water. The secondary liner is resistant to hydrocarbons, fungus, algae, bacteria and salt water. Please see attached liner specifications and chemical compatibility data sheets. Each liner will be laid in the pond by rolls and then seamed together. The seams will be air lance and vacuum box tested. The leak detection system will consist of 1" perforated lateral draining to a central 2" line, which will drain to a sump outside of the berm.

The freeboard will be 1.5', leaving the pond a maximum height of 13.5' of water. There will be no runoff or runon as the pond will be self-contained and the drainage diverted away from the pond. The pond is on a gentle slope with no major drainage problem.

An aeration system will be placed in the pond bottom as well. This system will consist of a network of perforated 1" and 2" PVC or HDPE pipe. The system will be able to circulate either a liquid or gaseous medium.

The system will consist of 2" PVC trunk line and 1" laterals. The laterals will be perforated with 2/32" and 3/32" holes on 10' centers (please see attached). The pipe will be anchored to the bottom with sand tubes. This system will be capable of pumping gaseous and/or liquid mediums. The liquid will be pumped by splitting the sprayer pump and introducing the liquid through a Venturi type hopper.

The aeration system is being installed as a matter of prudence. The facility will be accepting only Fruitland Coal, produced water. The water will be piped into the facility so as to create a "closed system". The water being disposed of does not contain any sulfides or sulfates. With the absence of sulfur, there cannot be an H2S generation problem.

The piping will be placed during the initial construction. If needed, power and air for the system will be supplied by a portable diesel powered air compressor.

We do not anticipate using this pond for conventional produced water. If, at some time, the decision is made to use the pond for disposal of conventional produced water, Koch Exploration Company will submit plans to ensure that H2S will not be generated by the change of water.

The pond will be equipped with sprayers. The sprayers will be located on floating islands. Please see attached diagram. The islands will be tethered to the sides of the pond. The islands will consist of hollow cone nozzle. The sprayers will be supplied by a centrifugal pump with a capacity of at least 800 gpm at 80 psi. The power supply for the pump will be natural gas. The pond is sized to evaporate 500 bwpd with the sprayer system operational for 8 - 9 months per year. The pond is deep enough to handle the volume of water produced, plus rainfall / snow melt during the winter months. The holding capacity has a built safety factor of 20% for the same time period.

The spray system will be controlled by an anemometer. The anemometer will open 3" bypasses at three different wind speeds. The speeds will be seasonally adjusted to ensure that the spray stays within the confines of the dike.

VIII. Contingency Plan for Reporting and Clean Up of Spills or Releases.

In as much as the pond will be double lined, and with the pond sloped to a sump, there will be no other containment or cleanup apparatus necessary. If a leak is detected, the leak detection system will be pumped into the pond and incoming water will be diverted and trucked to Koch's other evaporation pond and/or to a commercial disposal facility. The evaporation system and trucking will be used to lower the pond until the water is below the leak. The liner will re repaired and the pond placed back into operation.

The commercial facilities to be used will be one or both of the following:

Name	Location
Amoco Pritchard SWD #1	S34-T31N-R8W
Southwest Water Disposal	S32-T30N-R9W

The OCD will be notified within one working day of any leaks.

The leak detection system will be the only means in which leaks are to be detected. The sumps will be inspected at least weekly after fill up and daily during fill up. If leaks are detected, the procedure outlined above will be followed. A leak will be qualified by laboratory testing and comparison of sump and pond water analyses. In addition a leak will be further qualified by the sump water heigh approaching the pond water height when measured from a common datum.

IX. Inspection/Maintenance Plan.

The leak detection sump will be monitored daily during fill up and weekly thereafter. The results of the monitoring will be maintained in a log at Koch's Aztec office. Inspection of the dike for erosion will be noted monthly. Records of the dike inspection will be maintained in the Aztec, office.

Dissolved oxygen readings will be taken at a maximum 10' of depth below water surface monthly. Sulfides and sulfates are not present in this water so there will be no provisions to take these measurements.

X. Closure Plan.

Salt generation calculations, based upon Stanley Zygmunts work with the New Mexico Energy Research Development Institute, indicate that at the designed evaporative rate of 500 BWPD , 592 cubic yards of salt will be generated annually. The pond has a holding capacity of 40,010 cubic yards. At the design evaporative rate it will take 67.5 years to fill the pond with salt. The project life is estimated at 20 years. At the time of abandonment the salt generated will represent 30 % of the pond capacity.

It is our intention to sell or bury the precipitated salts on site in the plastic liner. The pond will then be covered with a PVC liner and mounded over with soil and or clay to prevent any vertical leaching of salts by rain water.

We do not anticipate, under the current regulations, that there will be any sludges/salts or chemical compounds evolve that will prohibit the disposal of these wastes at the on site facility. Koch Exploration Co. will submit forms C-117 A, C-118 and C-120 A as necessary for this operation.

XI. The nearest known water source is Pump Canyon Arroyo. The arroyo runs intermittently and the salinity is estimated at 700 TDS. The arroyo is 490' lower than the pond elevation and over one half mile east. Mr. Charles Wohlenberg with, the New Mexico State Engineers Office, Albuquerque, NM researched the files and found there are no recorded water wells within 3 miles of this facility.

The flow of ground water most likely to be affected by any leaks is easterly, based upon topography. The nearest spring is approximately 1 1/2 miles south of the facility and approximately 500' lower in elevation.

The pit site rests on a paleoerosional surface as evidenced by recent drilling. The geology indicates layered strata of alternating clay and sandstone. The pit will be located in a clay lense immediately above a sandstone ledge.

The sandstone is visible on the east margins of the pond. The ponds will be double lined with leak detection. The native material, when compacted to 95% of proctor, will also have an unknown permeability, however, it will be less than uncompacted native soil. The likelihood of ground water contamination is remote at best.

Flood Protection.

The flooding potential at the pit site, with respect to major precipitation and/or runoff, is minimal at best as the pond will be maintained with a 1-1/2 ' freeboard. The facility is located on the east side of gentle ridge. Drainage off of the ridge will be routed to the South. In any event, drainage away from the pond will be accomplished by diversion ditches cut on the uphill side of the facility.

The pond is well out of the 100 year flood plain.

The outside of the site will be checked after each major rainfall. The OCD will be notified of any significant erosion.

XII. The following entities have been notified of our proposed operation (please see location map). These are the owners of land within 1/2 mile of the proposed operation.

1) United States of America
c/o Bureau of Land Management
1235 LaPlata Hwy
Farmington, NM 87401

2) State of New Mexico
New Mexico State Land Office
P.O. Box 1148
Santa Fe, NM 87504-1148

XIII. As mentioned earlier the chance of H2S being generated at this facility is remote. There are no sulfides or sulfates in the source water. In addition a spray system will be installed to enhance evaporation. The spraying action will add oxygen to the water. The pump is designed to move 800 gpm or 27,400 bwpd. The maximum holding capacity of the pond is 192,398 bbls. The pump will circulate the volume of the pond every 7.02 days.

If the pond begins to emit H2S, air concentrations of H2S will be measured in tenths of a part per million and the ph will be measured twice daily around the perimeter of the pond. The prevailing winds are southwesterly; therefore, the sampling points will be located on the northeast sides of the pond. The H2S concentrations and ph will be measured in the morning and afternoon.

If air concentrations of H2S reaches 1 ppm at the fence line for two consecutive monitor readings, or if dissolved sulfides in the pit water reaches 15 ppm, the OCD will be notified immediately; hourly H2S monitoring (24 hours per day, 7 days per week) will commence at the designated locations; pond water will be analysed for dissolved sulfides daily; and the below referenced treatment plan will be implemented so as to reduce dissolved sulfides in the pond and eliminate H2S emissions.

Treatment Plan

1. Determine chlorine/oxygen demand for sulfides, H2S and organics.

2. Initiate treatment with 65% active granular bleach. Introduce liquid bleach or potassium permanganate.

3. Deliver and treat pond with sufficient bleach or potassium permanganate to reduce dissolved sulfides and prohibit the emission of H2S. The rate or treatment will be a maximum of 5000 gallons of 12-16% active bleach, or 5, 110# drums of potassium permanganate daily.

If air concentrations of H2S reach 10 ppm at the fence line, Koch Exploration Co. will notify the County Fire Marshal, County Sheriff's Department, New Mexico State Police, and the OCD. The site is remote so no other action will be required. There are no residences or county roads for over two miles. With the remote site, no evacuation plans are necessary.

XIV. Wave calculations for a pond with this small of a fetch is difficult. Interpolation of a graph supplied by the US Army Corp. of Engineers indicates that an unidirectional 40 mph sustained wind along the maximum fetch of 452' will generate a 6" wave. Sustained winds of this magnitude in this area are not common. The likelihood of a sustained wind along the maximum fetch is remote at best. The wave run-up is estimated at 3". The total wave action on the dike is 9". The waves would be a non-breaking type. The average yearly rainfall for this area is 12". With the rainfall occurring over the entire year, we feel that an 18" freeboard is adequate.

Both the inside and outside slopes of the pond will be 3:1.

The traveling surface of the levee top will be twelve feet.

The OCD office in Aztec will be notified at least 24 hours in advance of the primary and secondary liner installation.

A drainage and sump leak detection system will be used. The leak detection system will consist of 1" perforated PVC laterals draining at a 2% grade to a 2" PVC mainline. The 2" PVC mainline will drain at 1% to a corrosion proof sump which will be located outside of the berm. No point in the pond bottom will be greater than 20' from a detection line.

The bed of the pit and the inside grade of the levee will be smooth, compacted to 95% of proctor, free of holes, rocks, stumps, clods, or other debris which could rupture the liner. The subgrade will be covered with geotextile prior to installing liners.

An anchor trench will be excavated 6" wide, 12" deep, and set back from the slope break by 9". Sand tubes will be used to anchor the liner down.

The liner will be installed and the joints sealed pursuant to the manufacturer's specifications.

The liner will rest smoothly on the pit bed and inner face of the levee and shall be of sufficient size to extend to the bottom of the anchor trench and back out a minimum of two inches from the trench on the side furthest from the pond. Folds in the liner will be located in the pit corners to compensate for temperature fluctuations.

Three gas vents will be installed on each side of the pond. The liner will be resting on geotextile which will be adequate for venting any migrating gases from beneath the liners. The vents will be located approximately 9" down from the berm break.

All siphons and discharge lines will be directed away from the liner.

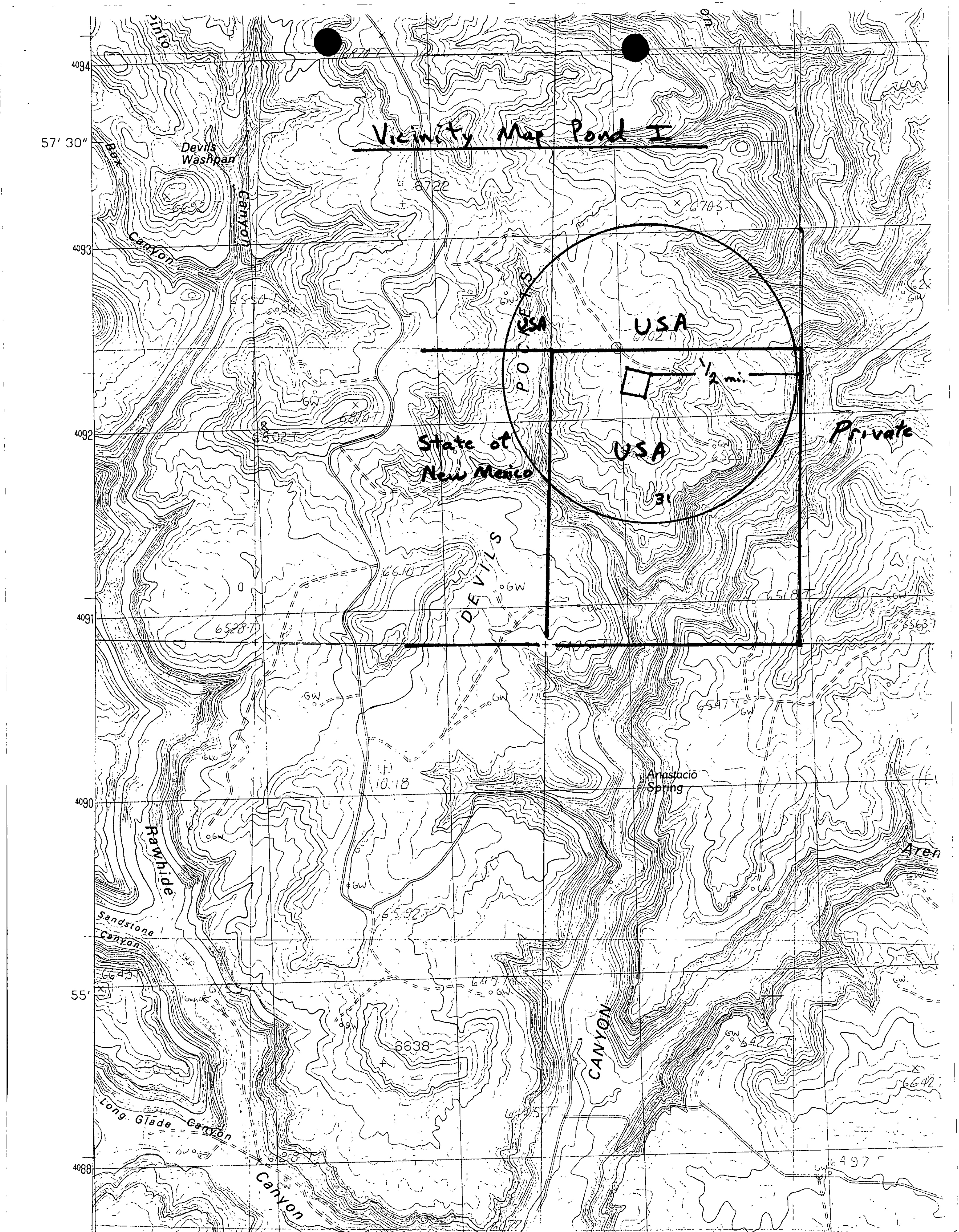
Steel skimmer tanks will be used. Water will be drained from the bottom of the tanks into the pond. The wells feeding this pond do not currently produce any hydrocarbons. The tanks will be automatically controlled by a tank level indicator. If any hydrocarbons should accumulate they will be collected and transported by truck to one of the local refineries (Bloomfield Refinery, Thriftway Refinery, or Giant Refinery) for treatment and sale.

A fence will be constructed around the entire facility. The fence will be of sufficient strength to keep livestock out of the facility. The fence will be closed and locked at all times when the pond is not manned.

A sign at least 12" by 24" with 2" lettering will be placed at the facility entrance and will identify the owner/operator, location and emergency phone numbers.

A written application will be made of the district supervisor for exception to screening or netting this pit.

If there are any further questions please contact Koch Exploration Co. or Robert C. Frank


Vicinity Map Pond I
4094
57′ 30″
Devils Washpan
Box
Canyon
Canyon
6722
6703
4093
POCKETS
USA
USA
6702
1/2 mi.
4092
State of New Mexico
USA
Private
31
DEVILS
6610
GW
4091
6528
6518
6547
Anastacio Spring
10.18
4090
Rawhide
Aren
Sandstone Canyon
6592
6645
55′
6638
CANYON
6422
6642
Long Glade Canyon
4088
Canyon
6497

WATER ANALYSIS TESTING ENVIRONMENTAL REPORTS

1115 Farmington Avenue - Farmington , NM 87401
(505) 325-1085

Lab Sample No.: W93-35

Standard A.P.I. Water Analysis Report

Collected By: Don Johnson

Company: Koch Exploration Co. Collection Date: 2-Feb-93

Location: NE 1/4; Sec.31-T32-R8 Collection Time: Unknown

Formation: Fruitland Coal County: San Juan State: NM

Well Name: Gardner 2-C Analyst: K. Lambdin

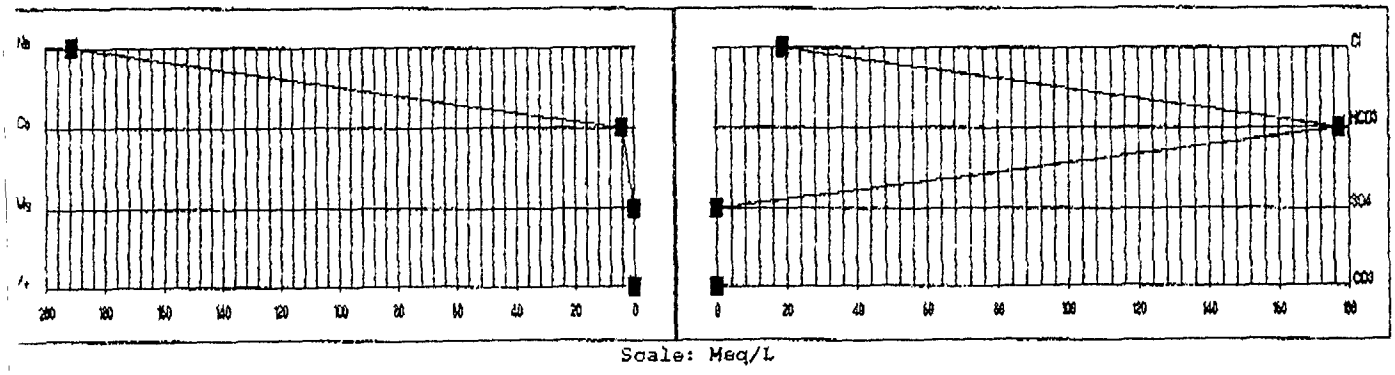
Remarks: none

PARAMETER	as ION		Comment	PARAMETER	as ION		Comment
Sodium , Na	4,400	mg/l		Chloride , Cl	675	mg/l	
Potassium, K	0	mg/l	NR				
Calcium , Ca	80	mg/l	TH as Ca	Sulfate, SO4	0	mg/l	<10
				Hydroxide, OH	0	mg/l	
Magnesium , Mg	0	mg/l	NR	Carbonate, CO3	0	mg/l	
Iron , Fe(Diss.)	0.0	mg/l	NR	Bicarbonate,HCO3	10,821	mg/l	
Hydrogen Sulfide	0	mg/l	NR	Resistivity (@25 Degrees C)	0.678	ohm-m	
pH	7.85	Units		Conductivity	14,760	uS	
TDS	11,680	mg/l		Specific Gravity (@ 60 Degrees F)	1.018	Units	

Remarks: Ca and Mg reported as Total Hardness as Ca.
This determination required a 30 minute acid digestion.
Not enough sample to run Fe and H2S .

NR = Test Not Run Anion/Cation: 100.6%

Stiff Diagram



Scale: Meq/L

WATER ANALYSIS TESTING ENVIRONMENTAL REPORTS

1115 Farmington Avenue - Farmington , NM 87401
(505) 325-1085

Lab Sample No.: W93-36

Standard A.P.I. Water Analysis Report

Collected By: Don Johnson

Company: Koch Exploration Co. Collection Date: 2-Feb-93

Location: SW 1/4 Sec.31-T32-R8 Collection Time: Unknown

Formation: Fruitland Coal County: San Juan State: NM

Well Name: Gardner 3-C Analyst: K. Lambdin Karen C Lambdin

Remarks: none

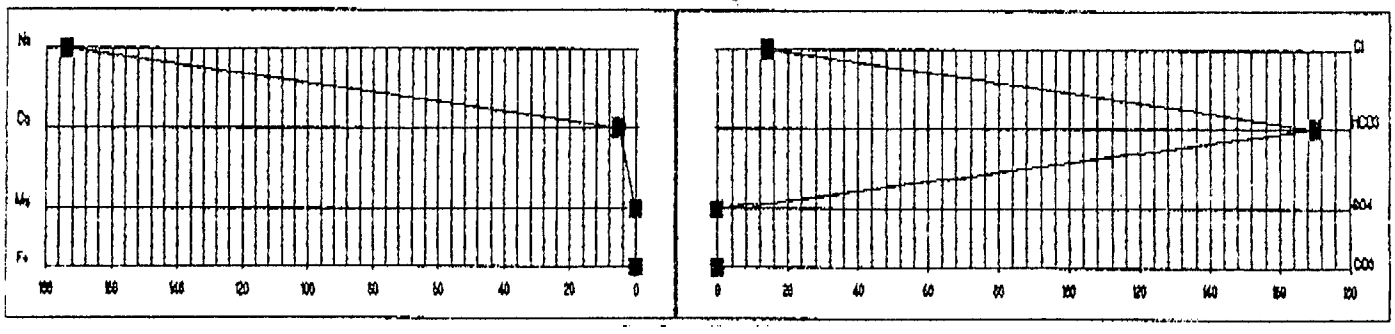
PARAMETER	as ION		Comment	PARAMETER	as ION		Comment
Sodium , Na	4,000	mg/l		Chloride , Cl	497	mg/l	
Potassium, K	0	mg/l	NR				
Calcium , Ca	105	mg/l	TH as Ca	Sulfate, SO4	0	mg/l	<10
				Hydroxide, OH	0	mg/l	
Magnesium , Mg	0	mg/l	NR	Carbonate, CO3	0	mg/l	
Iron , Fe(Diss.)	0.0	mg/l	NR	Bicarbonate,HCO3	10,370	mg/l	
Hydrogen Sulfide	0	mg/l	NR	Resistivity (@25 Degrees C)	0.716	ohm-m	
pH	7.95	Units		Conductivity	13,960	uS	
				Specific Gravity (@ 60 Degrees F)	1.019	Units	
TDS	10,880	mg/l					

Remarks: Ca and Mg reported as Total Hardness as Ca.
This determination required a 30 minute acid digestion.
Not enough sample to run Fe and H2S .

NR = Test Not Run

Anion/Cation: 102.7%

Stiff Diagram



WATER ANALYSIS TESTING ENVIRONMENTAL REPORTS

1115 Farmington Avenue - Farmington , NM 87401
(505) 325-1085

Lab Sample No.: W93-37

Standard A.P.I. Water Analysis Report

Company: Koch Exploration Co. Collection Date: 2-Feb-93

Location: SW 1/4 Sec.25-T32-R9 Collection Time: Unknown

Formation: Fruitland Coal County: San Juan State: NM

Well Name: Gardner 4-C Analyst: K. Lambdin Karen C Lambdin

Remarks: none

PARAMETER	as ION		Comment
odium , Na	4,400	mg/l	
otassium, K	0	mg/l	NR
alcium , Ca	79	mg/l	TH as Ca
agnesium , Mg	0	mg/l	NR
con , Fe(Diss.)	0.0	mg/l	NR
/drogen Sulfide	0	mg/l	NR
d	7.70	Units	
DS	11,720	mg/l	

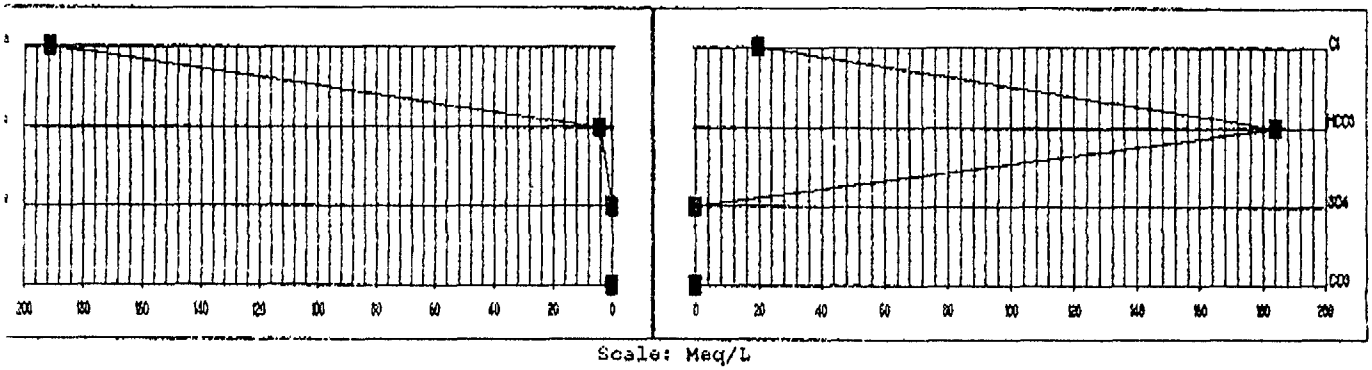
PARAMETER	as ION		Comment
Chloride , Cl	709	mg/l	
Sulfate, SO4	0	mg/l	<10
Hydroxide, OH	0	mg/l	
Carbonate, CO3	0	mg/l	
Bicarbonate,HCO3	11,224	mg/l	
Resistivity (@25 Degrees C)	0.654	ohm-m	
Conductivity	15,300	uS	
Specific Gravity (@ 60 Degrees F)	1.022	Units	

Remarks: Ca and Mg reported as Total Hardness as Ca.
This determination required a 30 minute acid digestion.
Not enough sample to run Fe and H2S.

\ = Test Not Run

Anion/Cation: 104.5%

Stiff Diagram



Scale: Meq/L

WATER ANALYSIS TESTING ENVIRONMENTAL REPORTS

1115 Farmington Avenue - Farmington , NM 87401
(505) 325-1085

Lab Sample No.: W93-39

Standard A.P.I. Water Analysis Report

Collected By: Don Johnson

Company: Koch Exploration Co. Collection Date: 2-Feb-93

Location: NE1/4 Sec.25-T32-R9 Collection Time: Unknown

Formation: Fruitland Coal County: San Juan State: NM

Well Name: Gardner 6-C Analyst: K. Lambdin Karen C Lambdin

Remarks: none

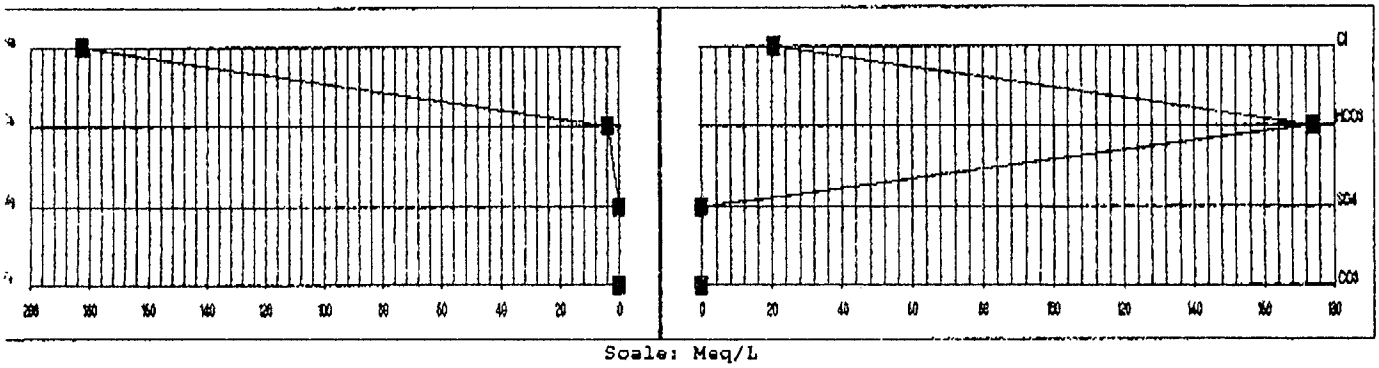
PARAMETER	as ION		Comment
odium , Na	4,200	mg/l	
otassium, K	0	mg/l	NR
alcium , Ca	76	mg/l	TH as Ca
agnesium , Mg	0	mg/l	NR
ron , Fe(Diss.)	0.0	mg/l	<1
ydrogen Sulfide	0	mg/l	NR
H	7.52	Units	
DS	11,520	mg/l	

PARAMETER	as ION		Comment
Chloride , Cl	726	mg/l	
Sulfate, SO4	0	mg/l	<10
Hydroxide, OH	0	mg/l	
Carbonate, CO3	0	mg/l	
Bicarbonate,HCO3	10,590	mg/l	
Resistivity (@25 Degrees C)	0.679	ohm-m	
Conductivity	14,730	uS	
Specific Gravity (@ 60 Degrees F)	1.012	Units	

Remarks: Ca and Mg reported as Total Hardness as Ca.
This determination required a 30 minute acid digestion.
Not enough sample to run H2S .

R = Test Not Run Anion/Cation: 104.1%

Stiff Diagram



Scale: Meq/L

KOCH

KOCH EXPLORATION COMPANY

August 20, 1993

United States of America
c/o Bureau of Land Management
1235 LaPlata Highway
Farmington, NM 87401

Re: Evaporation Pond I
NE/4, NW/4 Section 31-T32N-R8W
San Juan County, NM

Gentlemen:

Pursuant to New Mexico Oil Conservation Division (NMOCD) Rule 711, please be advised that Koch Exploration Company intends to construct and operate a central disposal facility.

As a landowner within a half-mile radius of this facility, we are required to notify you of our plans. Our plans have been filed with the NMOCD in Santa Fe, NM. If you have any questions or concerns, please contact the NMOCD in Santa Fe, NM. Their address and phone number follows:

New Mexico Oil Conservation Division
P. O. Box 2088
Santa Fe, NM 87504
505-827-5800

Sincerely,

Michael Scates
Administrative Manager

Certified Mail: P 468 905 931

P.O. Box 2256 • Wichita, Kansas 67201-2256 • 4111 East 37th Street North • Wichita, Kansas 67220
316/832-5237 • FAX 316/832-5390

KOCH

KOCH EXPLORATION COMPANY

August 20, 1993

State of New Mexico
c/o New Mexico State Land Office
P. O. Box 1148
Santa Fe, NM 87504-1148

Re: Evaporation Pond I
NE/4, NW/4 Section 31-T32N-R8W
San Juan County, NM

Gentlemen:

Pursuant to New Mexico Oil Conservation Division (NMOCD) Rule 711, please be advised that Koch Exploration Company intends to construct and operate a central disposal facility.

As a landowner within a half-mile radius of this facility, we are required to notify you of our plans. Our plans have been filed with the NMOCD in Santa Fe, NM. If you have any questions or concerns, please contact the NMOCD in Santa Fe, NM. Their address and phone number follows:

New Mexico Oil Conservation Division
P. O. Box 2088
Santa Fe, NM 87504
505-827-5800

Sincerely,

Michael Scates

Michael Scates
Administrative Manager

Certified Mail: P 468 905 930

P.O. Box 2256 • Wichita, Kansas 67201-2256 • 4111 East 37th Street North • Wichita, Kansas 67220
316/832-5237 • FAX 316/832-5390

GEOTECHNICAL EVALUATION FOR KOCH EXPLORATION EVAPORATION POND, NORTH ½ SECTION 31, TOWNSHIP 32 NORTH, RANGE 8 WEST, SAN JUAN COUNTY, NEW MEXICO

PREPARED FOR:

FRANK LINER FABRICATIONS, INC.
1507 SCHOFIELD LANE
FARMINGTON, NEW MEXICO 87401

AUGUST 20, 1993
GEOMAT NO. 93013-01

GEOMAT Inc. 909 ½ West Apache ♦ Farmington, New Mexico 87401 ♦ 505-327-7928

Frank Liner Fabrications, Inc.
1507 Schofield Lane
Farmington, New Mexico 87401

August 20, 1993

Attention: Mr. Bob Frank

Regarding: Koch Exploration Evaporation Pond
North ½ Section 31, Township 32 North,
Range 8 West, San Juan County, New Mexico

GEOMAT No. 93013-01

Gentlemen:

This report presents the results of our geotechnical evaluation for the proposed Koch Exploration Evaporation Pond to be constructed in the North ½ Section 31, Township 32 North, Range 8 West, in San Juan County, New Mexico. Our study indicated that the materials underlying the proposed evaporation pond site generally consisted of native silty sand soils overlying sandstone, which was encountered at shallow depths. The sandstone contained varying amounts of clay, and auger refusal was encountered at relatively shallow depths. Clayey, moderately to highly weathered sandstone was encountered in our borings B-7 and B-8, on the northern end of the site. Deeper cuts will occur during construction.

Due to the auger refusal encountered in the borings we anticipate that excavation of this site will be difficult and heavy duty ripping equipment will be required for construction of the pond. Groundwater was not encountered on this site. Based on our findings and knowledge of the area, and our understanding of the proposed facility to be constructed at this site, it is our opinion that the proposed evaporation pond dikes may be constructed on competent sandstone material by placing engineered fill, comprised of the on-site material, in properly compacted and tested lifts, to a maximum height of 15 feet. We understand that the pond will be fully lined and the inside and outside slopes of the dikes will be a

maximum of 3:1 (horizontal to vertical). The pond will be fully lined with alternating layers of geo-textile and impermeable PVC pond liners placed to the top of the proposed dikes. We understand that the pond will also have a leak detection system built-in, so that potential leakage of the contained water into the dike soils or the underlying soils and rock will be continually monitored.

The results of our slope stability analyses for the proposed lined pond dikes is presented as a part of this report and our study indicated a gross factor of safety greater than 2 for the static stability of the dikes. The slope stability analysis was performed assuming dry conditions underlying the pond liner system and assuming that the pond liner system had developed leaks and saturated the underlying soils. Due to the low seismic risk designation of the northwestern portion of New Mexico, dynamic (pseudo-static) analyses were not performed.

We appreciate the opportunity to have provided geotechnical engineering services for this project. We are available for further geotechnical and materials engineering consultation during the design and construction of the project. In order to provide professional continuity to the project, we recommend that *GEOMAT* Inc. be retained to perform construction observation and materials testing services. If you have any questions about this report, or require additional consultation or services, please contact us.

Respectfully submitted,
GEOMAT Inc.

KIM M. PRESTON
NEW MEXICO
11871
REGISTERED PROFESSIONAL ENGINEER

8/20/93

Kim M. Preston, P.E.
Project Engineer

George A. Madrid, P.E.
Principal Engineer

Distribution: (8) Addressee

TABLE OF CONTENTS

GEOTECHNICAL EVALUATION FOR KOCH EXPLORATION EVAPORATION POND NORTH ½ SECTION 31, TOWNSHIP 32 NORTH, RANGE 8 WEST, SAN JUAN COUNTY, NEW MEXICO

INTRODUCTION

The proposed Koch Exploration Evaporation Pond will be constructed in the North ½ Section 31, Township 32 North, Range 8 West, in San Juan County, New Mexico. We understand that the evaporation pond will be used to evaporate the production water resulting from development of four natural gas wells in the area near the site of the evaporation pond.

Our services were performed to provide recommendations for use in design of the proposed dike structures to be constructed around the perimeter of the pond, and recommendations for use in preparing drainage and earthwork guidelines for the project. Results of the field subsurface exploration, laboratory testing, and our conclusions and recommendations are presented in this report.

SITE DESCRIPTION AND EXISTING CONSTRUCTION

The existing site has been chained to remove a majority of the large vegetation and the resulting material was burned. Sparse small brush and other natural vegetation was observed growing on the site. The site slopes downward to the southeast with about 19½ feet of elevation differential across the site. The site was surveyed by others and it was also approved for development by an archeological team, provided by the client, prior to beginning our subsurface exploration. There is a natural gas pipeline on the site adjacent to the existing roadway on the northeast side of the property.

PROPOSED CONSTRUCTION

We understand that the proposed evaporation pond will have plan dimensions of 320 feet by 320 feet to top inside of the finished dikes and will be 15 feet deep from top of finished dike elevation. The inside and outside slopes of the proposed dikes will 3:1 (horizontal to

vertical), with a minimum crest width of 12 feet, in accordance with the guidelines provided by the New Mexico State Engineer Office. The plan dimension of the bottom of the pond, from toe of dike slope to toe of dike slope, will be 230 feet by 230 feet.

The pond will be fully lined with alternating layers of geo-textile and impermeable PVC pond liners placed to the top of the proposed dikes. We understand that the pond will also have a leak detection system built-in, so that potential leakage of the contained water into the dike soils or the underlying soils and rock will be continually monitored.

SUBSURFACE EXPLORATION

Our field subsurface exploration consisted of the excavation and sampling of nine small-diameter borings spaced across the site. The spacing of the boring locations was intended to provide a profile of the site subsurface conditions and to provide the geotechnical information necessary to perform a static slope stability study of the proposed dikes. The field exploration was performed using a truck-mounted, CME-55 drill rig utilizing small-diameter, hollow-stem, flight augers. The borings were advanced to depths ranging from about 5 feet to about 13½ feet. Auger refusal was encountered at all of our test boring locations on this site. The approximate locations of the borings are shown on the attached site plan, and detailed descriptions of conditions encountered underlying the site, at our boring locations, are presented on the boring logs in the Appendix of this report. Bulk samples were obtained at selected depths and transported to our laboratory.

Laboratory testing of representative samples was performed to evaluate grain size distribution (sieve analysis) and plasticity index of the soils encountered. The results of the laboratory testing are presented in the Appendix.

The soils were classified in general accordance with the Unified Soil Classification System. The soil classification symbols appear on the boring logs and are briefly described in the Appendix.

SUBSURFACE CONDITIONS

The material underlying the evaporation pond site generally consisted of native silty sand soils overlying sandstone which was encountered at shallow depths. The sandstone contained varying amounts of clay and auger refusal was encountered at relatively shallow depths. Medium plastic, clayey, moderately to highly weathered sandstone was encountered in our borings B-7 and B-8, on the northern end of the site. This area will be cut during construction for the final pond configuration. Auger refusal was encountered in both of these borings also, and we anticipate that excavation of this entire site will be difficult and heavy duty ripping equipment will be required for construction of the pond. Groundwater was not encountered on this site. Visual moisture contents were in the range of slightly damp to damp, as observed in the soil in the auger cuttings. The boring logs, presented in the Appendix to this report, provide more detailed descriptions of the subsurface conditions encountered.

Our services were performed in order to provide geotechnical engineering recommendations for the proposed project as described in this report. Our scope of services did not include any environmental assessment for the presence or absence of hazardous or toxic materials in the soil, rock, groundwater or air, on, above, or below the surface of this site. Identification of such substances requires alternative exploration techniques and analyses which were beyond the scope of this study.

SLOPE STABILITY OF CONSTRUCTED DIKES

As part of our evaluation of the feasibility of the proposed construction, a computerized static slope stability analysis was performed for the dikes to be constructed at the site. This computer analysis was performed using a range of variables for anticipated conditions, resulting from construction of the dikes as recommended in this report.

Critical failure surfaces were computer generated utilizing the PCSTABL5M computer program using "RANDOM" searching algorithms. Intensive iterations using this subroutine yielded what we considered to be the most critical failure surface. Our analysis indicated that the minimum static factor of safety for this surface is greater than 2. Due to the low seismic risk designation of the northwestern portion of New Mexico, dynamic (pseudo-static)

analyses were not performed. These slope stability analyses were performed assuming non-saturated and saturated conditions. We assume that saturated conditions will only occur as a result of the failure of the liner system, and we have also assumed that a failure of this system will be detected and the leak repaired before subsurface soils actually become saturated.

Due to the granular, erodible nature of the materials encountered at this site, the exposed outside slopes of the dikes may need to be graded smooth and bank protection may need to be installed on the slopes on the site. The expected life of the bank protection should be consistent with the expected life of the project. The chosen bank protection system should prevent erosion of the slopes for the life of the project. Recommendations for bank protection systems can be provided, upon request, when the final site development plans are determined.

CONCLUSIONS

Based on the results of our subsurface exploration, laboratory testing, and engineering evaluation, it is our opinion that the geotechnical conditions at the site are suitable for the proposed construction, provided that the recommendations presented in this report are included in the project design and good engineering design and construction practices are applied to the project. The provisions included in this report regarding excavation and construction of the evaporation pond dikes and providing proper drainage around the pond area, should be included as an integral part of the design of this project.

RECOMMENDATIONS

GENERAL

Our recommendations are based on the assumption that the subsurface conditions across the site are similar to those disclosed by the borings excavated for this project. If variations are noted during construction or if changes are made in location of the pond, or the size or structure, we should be notified so that we can supplement our recommendations, as applicable. This report does not encompass the effects, if any, of underlying geology, or regional groundwater withdrawal, and expresses no opinion regarding their effects on surface movement.

PRELIMINARY SITE PREPARATION

The guidelines presented in the Earthwork section of this report should be used in the site preparation for this project. Further, we recommend that the proposed containment dikes be constructed in accordance with the recommendations contained in this report.

Strip and remove any existing fill, soft, loose, or wet soils, vegetation, and debris for a distance of 5 feet beyond the proposed construction limits. All exposed ground surfaces should be level, and free of mounds and depressions which could inhibit uniform engineered fill placement and compaction. The guidelines presented in the Earthwork section of this report should be used in the site preparation for this project.

EXCAVATION

Generally, the native surface silty sand soils should be stripped from the site of the proposed evaporation pond and stockpiled for use in construction of the dikes. This material should be blended with the underlying sandstone material to provide as much a homogeneous fill material as possible for use in construction of the dikes. Based on the results of our field subsurface exploration and the fact that auger refusal was encountered at all nine of our boring locations, we anticipate that excavation of the on-site sandstone materials will be difficult and the use of heavy duty ripping equipment will be required for excavation of the materials at this site.

We recommend that the geotechnical engineer or his representative observe dike configurations in cut areas prior to placement of the liner system and the dike bearing soils prior to placement of the engineered fill for the dike construction. The purpose of this observation will be to evaluate if the disturbed materials resulting from the excavation have been removed and that the exposed bearing conditions are similar to those anticipated for support of the dikes. Any soft, loose or unacceptable materials should be removed and replaced in accordance with the recommendations contained in this report.

EARTH DIKE BEARING SURFACE

Containment dikes should be constructed to bear on competent sandstone material and the dike base should be level for the length and width of the dike. We have assumed that in

the cut areas of the site the dike configuration will be directly cut into the existing materials. The transition between the cut and fill areas should be a series of level benches to accommodate fill placement.

PLACEMENT OF EARTH DIKES

The engineered fill for construction of the dikes should be placed on a level, competent sandstone surface. The engineered fill should be placed and compacted in accordance with the recommendations in this report. The material excavated from the site should be blended, if possible, such that the dikes are constructed using a homogeneous fill soil material. The slopes for the dike should be over-built and cut-back at the slope angle recommended in this report such that the surface of the dike slopes meet the compaction requirements contained herein.

SURFACE DRAINAGE

Positive drainage should be provided such that infiltration of water into the site subsurface soils and rock, below the evaporation pond and associated dikes, is prevented during construction and for the life of the facility. Saturation of the soils and rock underlying the proposed evaporation pond could affect the slope stability of the containment dikes.

EARTHWORK

GENERAL

The recommendations provided in this report are based upon general conformance with the appropriate earthwork procedures as presented in this section.

SITE CLEARING

Strip and remove any existing fill, soft, loose, or wet soils, vegetation, and debris from the proposed construction area. All exposed ground surfaces should be level, and free of mounds and depressions which could inhibit uniform engineered fill placement and compaction.

EXCAVATION

Based on the results of our field subsurface exploration and the fact that auger refusal was encountered at all nine of our boring locations, we anticipate that excavation of the on-site sandstone materials will be difficult and the use of heavy duty ripping equipment will be required for excavation of the materials at this site. The correct equipment for site conditions should be selected by the contractor to perform the earthwork at the site.

For safety of workmen, temporary excavations deeper than 4 feet, to be entered by workers, should be rigidly braced or laid back at a slope ratio no steeper than 1:1 (horizontal to vertical). Equipment and spoil piles should be allowed no closer than 15 feet from the edge of the excavation or slopes.

FILL PLACEMENT AND COMPACTION

All areas to receive engineered fill should be stripped of existing fill, vegetation, debris and other deleterious materials, as well as loose, wet or soft soil. Fill soils should be placed on level, competent native subgrade material. The presence of competent native subgrade materials should be observed and evaluated by the geotechnical engineer during construction. The exposed subgrade soils should be scarified and moisture conditioned to a depth of at least 8 inches and compacted in accordance with the recommendations contained herein. The maximum lift thickness for fill soils will be dependent on the type of compaction equipment utilized, but fill should generally be placed in uniform lifts not exceeding 8 inches in loose thickness. Placement and compaction of fills should be performed in accordance with the recommendations in this report and good construction practices. Engineered fill should be placed and compacted in horizontal lifts using equipment and procedures that will produce recommended water contents and densities throughout the lift. Sloping areas steeper than 5:1 (horizontal:vertical) should be benched to reduce the potential for slippage between existing slopes and fills. Benches should be level and wide enough to accommodate compaction and earth moving equipment.

Materials should be compacted at the following recommended dry density as evaluated by ASTM D698-91:

Material	Minimum Percent Compaction (ASTM D698-91)
On-site native subgrade material and dike engineered fill	95

On-site, dike construction, engineered fill soils should be compacted within three percent of optimum moisture content as evaluated by ASTM D698-91.

MATERIALS

The on-site, native silty sand and underlying sandstone materials are recommended for use as engineered fill in construction of the dikes for the evaporation pond at this location. Soils may be generally suitable for engineered fill provided they are free of organic material, clay lumps, debris, and rocks larger than 6 inches in diameter. The sandstone material excavated at the site should be processed to a well graded material with a maximum 6-inch particle size prior to placement as engineered fill. Import soils should be evaluated for suitability by the project geotechnical engineer at the borrow site. Frozen soils should not be used as engineered fill or backfill.

LIMITATIONS

The field evaluation, laboratory testing, and geotechnical analyses presented in this report have been conducted in general accordance with current engineering practice and standard of care exercised by reputable geotechnical consultants performing similar tasks in the area. No other warranty, expressed or implied, is made regarding the conclusions, recommendations, and professional opinions presented in this report. Variations may exist and conditions not observed or described in this report may be encountered during construction. Our conclusions and recommendations are based on an analysis of the observed conditions and apply to the specific project discussed in this report; therefore, any changes in structure loads, structure locations, or site grades should be provided to us so we may review our conclusions and recommendations and make any necessary modifications. If conditions

different from those described in this report are encountered, our office should be notified and additional recommendations, if required, will be provided upon request. In the event of any changes in the nature, design, or locations of the proposed improvements, the conclusions and recommendations presented herein may not be valid unless the changes are evaluated and the conclusions of this report are modified in writing. Further, our scope of services did not include any environmental assessment or evaluation for the presence or absence of hazardous or toxic materials in the soil, rock, groundwater or air, on, above, or below the surface of this site. Identification of such substances requires alternative exploration techniques and analyses which were beyond the scope of this exploration.

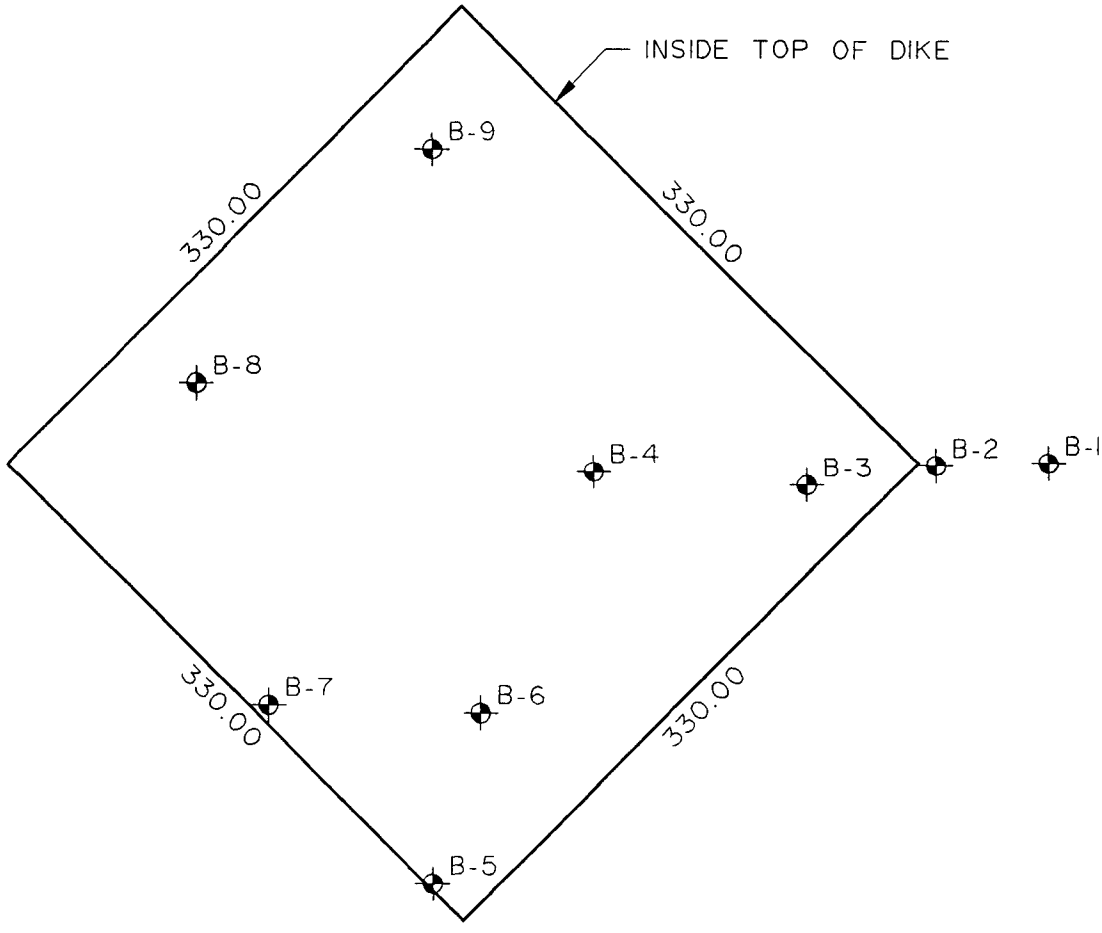
We prepared the report as an aid in design of the proposed project. This report is not a bidding document. Contractors reviewing this report must draw their own conclusions regarding site conditions and specific construction techniques to be used.

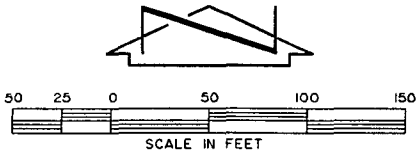
Our conclusions and recommendations are based on observation and testing of the earthwork and foundation preparations by a qualified and reputable geotechnical engineer. It would be logical for *GEOMAT* Inc. to provide these services since we have prepared this report and are familiar with the project and the field conditions at the site.

Deviations from our recommendations by the plans, written specifications, or field applications shall relieve us of responsibility unless our written concurrence with such deviations has been obtained.

APPENDIX

SITE PLAN
KOCH EXPLORATION EVAPORATION POND
NORTH 1/2 SECTION 31, TOWNSHIP 32 NORTH, RANGE 8 WEST, SAN JUAN COUNTY, NEW MEXICO





⊕ = BORING NUMBER AND APPROX. LOCATION

REFERENCE: UNTITLED, UNDATED TOPOGRAPHIC SURVEY PROVIDED BY CLIENT

GEOMAT PROJECT No. 93013-01 DATE: 8/93

PROJECT NAME AND SITE LOCATION KOCH EXPLORATION EVAPORATION POND
NORTH ½ SECTION 31, TOWNSHIP 32 NORTH, RANGE 8 WEST, SAN JUAN COUNTY, NEW MEXICO

PROJECT NO.	RIG TYPE	DATE	SHEET	BORING NO.
93013-01	CME 55	7/30/93	1 OF 1	B-1

BLOWS/FOOT	SAMPLE SYMBOL	DRY DENSITY (PCF)	MOISTURE CONTENT %	UNIFIED CLASSIFICATION	DEPTH IN FEET	DESCRIPTION
				SM		Native: Light Brown, Slightly Damp, Loose, Silty SAND With Few Gravel
50/2"	CS					Formation: Light Brown, Slightly Damp, Moderately Weathered SANDSTONE With Clay
50/5"	SS				5	Brown to Yellow Brown, Damp, Slightly to Moderately Weathered SANDSTONE
50/1"	SS				10	Weathering Decreases With Depth
					15	Auger Refusal at 13½ Feet No Groundwater Encountered Backfilled With Cuttings

SUBSURFACE EVALUATION LOG

GEOMAT Inc.
909 ½ West Apache
Farmington, New Mexico 87401

SAMPLE SYMBOLS: SS = SPLIT SPOON / ST = SHELBY TUBE, 3" O.D. / CS = CALIFORNIA RING SAMPLER, 3" O.D.
MCS = MODIFIED CALIFORNIA RING SAMPLER, 2 3/8" O.D./ AU = AUGER SAMPLE.

PROJECT NAME AND SITE LOCATION KOCH EXPLORATION EVAPORATION POND
NORTH ½ SECTION 31, TOWNSHIP 32 NORTH, RANGE 8 WEST, SAN JUAN COUNTY, NEW MEXICO

PROJECT NO.	RIG TYPE	DATE	SHEET	BORING NO.
93013-01	CME 55	7/30/93	1 OF 1	B-2

BLOWS/FOOT	SAMPLE SYMBOL	DRY DENSITY (PCF)	MOISTURE CONTENT %	UNIFIED CLASSIFICATION	DEPTH IN FEET	DESCRIPTION
	AU			SM		Native: Light Brown, Slightly Damp, Loose, Silty SAND With Few Gravel
50/3"	SS					Formation: Light Brown, Slightly Damp, Moderately Weathered SANDSTONE With Clay
					5	
50/5"	SS					Orange Brown, Damp, Slightly to Moderately Weathered SANDSTONE
						Light Brown, Damp, Slightly Weathered, Clayey SANDSTONE
					10	Auger Refusal at 8½ Feet No Groundwater Encountered Backfilled With Cuttings

SUBSURFACE EVALUATION LOG

GEOMAT Inc.
909 ½ West Apache
Farmington, New Mexico 87401

SAMPLE SYMBOLS: SS = SPLIT SPOON / ST = SHELBY TUBE, 3"O.D. / CS = CALIFORNIA RING SAMPLER, 3"O.D. MCS = MODIFIED CALIFORNIA RING SAMPLER, 2 3/8"O.D./ AU = AUGER SAMPLE.

PROJECT NAME AND SITE LOCATION KOCH EXPLORATION EVAPORATION POND
NORTH ½ SECTION 31, TOWNSHIP 32 NORTH, RANGE 8 WEST, SAN JUAN COUNTY, NEW MEXICO

PROJECT NO.	RIG TYPE	DATE	SHEET	BORING NO.
93013-01	CME 55	7/30/93	1 OF 1	B-3

BLOWS/FOOT	SAMPLE SYMBOL	DRY DENSITY (PCF)	MOISTURE CONTENT %	UNIFIED CLASSIFICATION	DEPTH IN FEET	DESCRIPTION
				SM		Native: Light Brown, Slightly Damp, Loose, Silty SAND With Few Gravel
					5	Formation: Brown to Yellow Brown, Damp, Slightly To Moderately Weathered SANDSTONE Light Brown, Slightly Damp, Moderately Weathered SANDSTONE With Clay Brown To Yellow Brown, Damp, Slightly To Moderately Weathered SANDSTONE Light Brown, Damp, Slightly Weathered, Clayey SANDSTONE Auger Refusal At 6 Feet No Groundwater Encountered Backfilled With Cuttings

SUBSURFACE EVALUATION LOG

GEOMAT Inc.
909 ½ West Apache
Farmington, New Mexico 87401

SAMPLE SYMBOLS: SS = SPLIT SPOON / ST = SHELBY TUBE, 3"O.D. / CS = CALIFORNIA RING SAMPLER, 3"O.D. MCS = MODIFIED CALIFORNIA RING SAMPLER, 2 3/8"O.D./ AU = AUGER SAMPLE.

PROJECT NAME AND SITE LOCATION KOCH EXPLORATION EVAPORATION POND
NORTH ½ SECTION 31, TOWNSHIP 32 NORTH, RANGE 8 WEST, SAN JUAN COUNTY, NEW MEXICO

PROJECT NO.	RIG TYPE	DATE	SHEET	BORING NO.
93013-01	CME-55	07/30/93	1 OF 1	B-4

BLOWS/FOOT	SAMPLE SYMBOL	DRY DENSITY (PCF)	MOISTURE CONTENT %	UNIFIED CLASSIFICATION	DEPTH IN FEET	DESCRIPTION
	AU			SM		Native: Light Brown, Slightly Damp, Loose, Silty SAND With Few Gravel
					5	Formation: Light Brown, Slightly Damp, Moderately Weathered SANDSTONE With Clay
						Brown to Yellow Brown, Damp, Slightly to Moderately Weathered SANDSTONE
					10	Light Brown, Damp, Slightly Weathered, Clayey SANDSTONE
						Auger refusal at 5½ Feet No Groundwater Encountered Backfilled With Cuttings

SUBSURFACE EVALUATION LOG

GEOMAT Inc
909 ½ West Apache
Farmington, New Mexico 87401

SAMPLE SYMBOLS: SS = SPLIT SPOON / ST = SHELBY TUBE, 3"O.D. / CS = CALIFORNIA RING SAMPLER, 3"O.D. MCS = MODIFIED CALIFORNIA RING SAMPLER, 2 3/8"O.D./ AU = AUGER SAMPLE.

PROJECT NAME AND SITE LOCATION KOCH EXPLORATION EVAPORATION POND
NORTH ½ SECTION 31, TOWNSHIP 32 NORTH, RANGE 8 WEST, SAN JAUN COUNTY, NEW MEXICO

PROJECT NO.	RIG TYPE	DATE	SHEET	BORING NO.
93013-01	CME-55	07/30/93	1 OF 1	B-5

BLOWS/FOOT	SAMPLE SYMBOL	DRY DENSITY (PCF)	MOISTURE CONTENT %	UNIFIED CLASSIFICATION	DEPTH IN FEET	DESCRIPTION
				SM		Native: Light Brown, Slightly Damp, Loose, Silty SAND With Few Gravel
					5	Formation: Light Brown, Slightly Damp, Moderately Weathered SANDSTONE With Clay
						Auger Refusal at 5 Feet No Groundwater Encountered Backfilled With Cuttings

SUBSURFACE EVALUATION LOG

GEOMAT Inc
909 ½ West Apache
Farmington, New Mexico 87401

SAMPLE SYMBOLS: SS = SPLIT SPOON / ST = SHELBY TUBE, 3"O.D. / CS = CALIFORNIA RING SAMPLER, 3"O.D. MCS = MODIFIED CALIFORNIA RING SAMPLER, 2 3/8"O.D./ AU = AUGER SAMPLE.

PROJECT NAME AND SITE LOCATION KOCH EXPLORATION EVAPORATION POND
NORTH ½ SECTION 31, TOWNSHIP 32 NORTH, RANGE 8 WEST, SAN JUAN COUNTY, NEW MEXICO

PROJECT NO.	RIG TYPE	DATE	SHEET	BORING NO.
93013-01	CME 55	07/30/93	1 OF 1	B-6

BLOWS/FOOT	SAMPLE SYMBOL	DRY DENSITY (PCF)	MOISTURE CONTENT %	UNIFIED CLASSIFICATION	DEPTH IN FEET	DESCRIPTION
				SM		Native: Light Brown, Slightly Damp, Loose, Silty SAND With Few Gravel
95/9"	CS				5	Formation: Light Brown, Slightly Damp, Moderately Weathered SANDSTONE with Clay
						Light Brown, Damp, Slightly Weathered, Clayey SANDSTONE
					10	Brown to Yellow Brown, Damp, Slightly to Moderately Weathered SANDSTONE

Auger Refusal at 7 Feet
No Groundwater Encountered
Backfilled With Cuttings

SUBSURFACE EVALUATION LOG

GEOMAT Inc.
909 ½ West Apache
Farmington, New Mexico 87401

SAMPLE SYMBOLS: SS = SPLIT SPOON / ST = SHELBY TUBE, 3"O.D. / CS = CALIFORNIA RING SAMPLER, 3"O.D. MCS = MODIFIED CALIFORNIA RING SAMPLER, 2 3/8"O.D./ AU = AUGER SAMPLE.

PROJECT NAME AND SITE LOCATION KOCH EXPLORATION EVAPORATION POND
NORTH ½ SECTION 31, TOWNSHIP 32 NORTH, RANGE 8 WEST, SAN JUAN COUNTY, NEW MEXICO

PROJECT NO.	RIG TYPE	DATE	SHEET	BORING NO.
93013-01	CME 55	07/30/93	1 OF 1	B-7

BLOWS/FOOT	SAMPLE SYMBOL	DRY DENSITY (PCF)	MOISTURE CONTENT %	UNIFIED CLASSIFICATION	DEPTH IN FEET	DESCRIPTION
						Formation:
						Light Brown, Slightly Damp, Moderately Weathered SANDSTONE With Clay
						Brown to Yellow Brown, Damp, Slightly to Moderately Weathered SANDSTONE
					5	Light Brown, Damp, Slightly Weathered, Clayey SANDSTONE
						Auger Refusal at 6 Feet
						No Groundwater Encountered
						Backfilled With Cuttings

SUBSURFACE EVALUATION LOG

GEOMAT Inc.
909 ½ West Apache
Farmington, New Mexico 87401

SAMPLE SYMBOLS: SS = SPLIT SPOON / ST = SHELBY TUBE, 3"O.D. / CS = CALIFORNIA RING SAMPLER, 3"O.D. MCS = MODIFIED CALIFORNIA RING SAMPLER, 2 3/8"O.D./ AU = AUGER SAMPLE.

PROJECT NAME AND SITE LOCATION KOCH EXPLORATION EVAPORATION POND
NORTH ½ SECTION 31, TOWNSHIP 32 NORTH, RANGE 8 WEST, SAN JUAN COUNTY, NEW MEXICO

PROJECT NO.	RIG TYPE	DATE	SHEET	BORING NO.
93013-01	CME 55	07/30/93	1 OF 1	B-8

BLOWS/FOOT	SAMPLE SYMBOL	DRY DENSITY (PCF)	MOISTURE CONTENT %	UNIFIED CLASSIFICATION	DEPTH IN FEET	DESCRIPTION
				SM		Native: Light Brown, Slightly Damp, Loose, Silty SAND With Few Gravel
				CL	5	Light Brown to Grey, Slightly Damp, Hard, Sandy CLAY
					10	Formation: Brown to Yellow Brown, Damp, Slightly to Moderately Weathered SANDSTONE
						Auger Refusal at 10½ Feet No Groundwater Encountered Backfilled With Cuttings

SUBSURFACE EVALUATION LOG

GEOMAT Inc.
909 ½ West Apache
Farmington, New Mexico 87401

SAMPLE SYMBOLS: SS = SPLIT SPOON / ST = SHELBY TUBE, 3"O.D. / CS = CALIFORNIA RING SAMPLER, 3"O.D. MCS = MODIFIED CALIFORNIA RING SAMPLER, 2 3/8"O.D./ AU = AUGER SAMPLE.

PROJECT NAME AND SITE LOCATION KOCH EXPLORATION EVAPORATION POND
NORTH ½ SECTION 31, TOWNSHIP 32 NORTH, RANGE 8 WEST, SAN JUAN COUNTY, NEW MEXICO

PROJECT NO.	RIG TYPE	DATE	SHEET	BORING NO.
93013-01	CME 55	07/30/93	1 OF 1	B-9

BLOWS/FOOT	SAMPLE SYMBOL	DRY DENSITY (PCF)	MOISTURE CONTENT %	UNIFIED CLASSIFICATION	DEPTH IN FEET	DESCRIPTION
					5	Native: Light Brown to Grey, Slightly Damp, Hard Sandy CLAY
						Auger Refusal at 5½ Feet No Groundwater Encountered Backfilled With Cuttings

SUBSURFACE EVALUATION LOG

GEOMAT Inc.
909 ½ West Apache
Farmington, New Mexico 87401

SAMPLE SYMBOLS: SS = SPLIT SPOON / ST = SHELBY TUBE, 3" O.D. / CS = CALIFORNIA RING SAMPLER, 3" O.D. MCS = MODIFIED CALIFORNIA RING SAMPLER, 2 3/8" O.D./ AU = AUGER SAMPLE.

DESCRIPTION OF MATERIAL CLASSIFICATIONS
(ASTM D2487)

GW	Well-graded gravels and gravel-sand mixtures, little or no fines. 50% or more of coarse fraction retained on No. 4 sieve. More than 95% retained on No. 200 sieve. Clean.
GP	Poorly graded gravels and gravel-sand mixtures, little or no fines. 50% or more of coarse fraction retained on No. 4 sieve. More than 95% retained on No. 200 sieve. Clean.
SW	Well-graded sands and gravelly sands, little or no fines. More than 50% of coarse fraction passes No. 4 sieve. More than 95% retained on No. 200 sieve. Clean.
SP	Poorly graded sands and gravelly sands, little or no fines. More than 50% of coarse fraction passes No.4 sieve. More than 95% retained on No. 200 sieve. Clean.
GM	Silty gravels, gravel-sand-silt mixtures. 50% or more of coarse fraction retained on No. 4 sieve. More than 50% retained on No. 200 sieve.
GC	Clayey gravels, gravel-sand-clay mixtures. 50% or more of coarse fraction retained on No. 4 sieve. More than 50% retained on No. 200 sieve.
SM	Silty and, sand-silt mixtures. More than 50% of coarse fraction passes No. 4 sieve. More than 50% retained on No. 200 sieve.
SC	Clayey sands, sand-clay mixtures. More than 50% of coarse faction passes No. 4 sieve. More than 50% retained on No. 200 sieve.
ML	Inorganic silts, very fine sands, rock flour, silty or clayey fine sands. Liquid limit less than 50%. More than 50% passes No. 200 sieve.
CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays. Liquid limit less than 50%. 50% or more passes No. 200 sieve.
MH	Inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts. Liquid limit greater than or equal to 50%. 50% or more passes No. 200 sieve.
CH	Inorganic clays of high plasticity, fat clays. Liquid limit greater than 50%. 50% or more passes No. 200 sieve.
OL	Organic silts and organic silty clays of low plasticity. Liquid limit less than 50%. 50% or more passes No. 200 sieve.
OH	Organic clays of medium to high plasticity. Liquid limit greater than or equal to 50%. 50% or more passes No. 200 sieve.
PT	Peat, muck and other highly organic soils.

SIEVE ANALYSIS
& PLASTICITY INDEX
Boring B-2 @ 0-2 Feet

Sieve Size	Accumulative % Passing
3/8"	100
No. 4	94
No. 8	91
No. 10	91
No. 16	89
No. 30	84
No. 40	73
No. 50	57
No. 100	37
No. 200	25

Liquid Limit = 26

Plasticity Index = 10

SIEVE ANALYSIS & PLASTICITY INDEX Boring B-8 @ 4-7 Feet	
Sieve Size	Accumulative % Passing
3/8"	100
No. 4	99+
No. 8	99
No. 10	99
No. 16	99
No. 30	99
No. 40	98
No. 50	97
No. 100	93
No. 200	89
	Liquid Limit = 42
	Plasticity Index = 23

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer's Method of Slices

Run Date: 8/20/93
Time of Run: 08:30
Run By: kmp
Input Data Filename: 93013-01.a
Output Filename: 93013-01.z

PROBLEM DESCRIPTION 93013-01 N½SEC31,T32N,R8W,IMPERVIOUS

BOUNDARY COORDINATES

10 Top Boundaries
14 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	.00	99.00	10.00	93.00	2
2	10.00	93.00	19.00	96.00	2
3	19.00	96.00	30.90	96.00	2
4	30.90	96.00	31.00	96.00	1
5	31.00	96.00	74.00	81.00	1
6	74.00	81.00	304.00	81.00	1
7	304.00	81.00	351.00	96.00	1
8	351.00	96.00	351.10	96.00	1
9	351.10	96.00	363.00	96.00	2
10	363.00	96.00	422.00	76.00	2
11	30.90	96.00	73.90	79.90	3
12	73.90	79.90	304.10	79.90	3
13	304.10	79.90	351.10	96.00	2
14	304.10	79.90	422.00	76.00	3

ISOTROPIC SOIL PARAMETERS

3 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	150.0	151.0	900.0	45.0	.00	.0	1
2	120.0	125.0	100.0	30.0	.00	.0	1
3	130.0	135.0	300.0	40.0	.00	.0	1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40

Piezometric Surface No. 1 Specified by 2 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	40.00	93.00
2	341.00	93.00

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Irregular Surfaces, Has Been Specified.

100 Trial Surfaces Have Been Generated.

10 Surfaces Initiate From Each Of 10 Points Equally Spaced Along The Ground Surface Between X = 300.00 ft.
and X = 351.00 ft.

Each Surface Terminates Between X = 352.00 ft.
and X = 422.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation At Which A Surface Extends Is Y = 50.00 ft.

20.00 ft. Line Segments Define Each Trial Failure Surface.

Following Is Displayed The Most Critical Of The Trial Failure Surfaces Examined.

* * Safety Factors Are Calculated By The Modified Janbu Method * *

Failure Surface Specified By 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	317.00	85.15
2	336.79	82.25
3	355.37	89.64
4	366.25	94.90

*** 3.638 ***

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer's Method of Slices

Run Date: 8/20/93
Time of Run: 08:45
Run By: kmp
Input Data Filename: 93013-01.a
Output Filename: 93013-01.y

PROBLEM DESCRIPTION 93013-01 N1/2SEC31,T32N,R8W,LEAK IN LINER SYSTEM

BOUNDARY COORDINATES

10 Top Boundaries
14 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	.00	99.00	10.00	93.00	2
2	10.00	93.00	19.00	96.00	2
3	19.00	96.00	30.90	96.00	2
4	30.90	96.00	31.00	96.00	1
5	31.00	96.00	74.00	81.00	1
6	74.00	81.00	304.00	81.00	1
7	304.00	81.00	351.00	96.00	1
8	351.00	96.00	351.10	96.00	1
9	351.10	96.00	363.00	96.00	2
10	363.00	96.00	422.00	76.00	2
11	30.90	96.00	73.90	79.90	3
12	73.90	79.90	304.10	79.90	3
13	304.10	79.90	351.10	96.00	2
14	304.10	79.90	422.00	76.00	3

ISOTROPIC SOIL PARAMETERS

3 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	150.0	151.0	900.0	45.0	.00	.0	1
2	120.0	125.0	100.0	30.0	.00	.0	1
3	130.0	135.0	300.0	40.0	.00	.0	1

2 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40

Piezometric Surface No. 1 Specified by 2 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	40.00	93.00
2	341.00	93.00

Piezometric Surface No. 2 Specified by 4 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	40.00	93.00
2	73.90	79.90
3	304.10	79.90
4	422.00	76.00

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Irregular Surfaces, Has Been Specified.

100 Trial Surfaces Have Been Generated.

10 Surfaces Initiate From Each Of 10 Points Equally Spaced
Along The Ground Surface Between X = 300.00 ft.
and X = 351.00 ft.

Each Surface Terminates Between X = 352.00 ft.
and X = 422.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 50.00 ft.

20.00 ft. Line Segments Define Each Trial Failure Surface.

Following Is Displayed The Most Critical Of The Trial
Failure Surfaces Examined.

* * Safety Factors Are Calculated By The Modified Janbu Method * *

Failure Surface Specified By 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	317.00	85.15
2	336.79	82.25
3	355.37	89.64
4	366.25	94.90

*** 3.638 ***