NM1 - 9

GENERAL CORRESPONDENCE

YEAR(S):

1992-1989

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

IN THE MATTER OF THE HEARING
CALLED BY THE OIL CONSERVATION
DIVISION FOR THE PURPOSE OF
CONSIDERING:

CASE NO. 9955 De Novo

APPLICATION OF SUNCO TRUCKING WATER
DISPOSAL COMPANY FOR A PERMIT TO CONSTRUCT
AND OPERATE A COMMERCIAL WASTEWATER
EVAPORATION POND, SAN JUAN COUNTY, NEW MEXICO

PRE-HEARING STATEMENT

This pre-hearing statement is submitted by Sunco Trucking Water Disposal Company as required by the Oil Conservation Division.

APPEARANCES OF PARTIES

PARTY	ATTORNEY
Sunco Trucking Water Disposal Company 708 South Tucker Avenue Farmington, NM 87401 (505)327-0416 Attention:	John A. Dean, Jr. P.O. Drawer 1259 Farmington, NM 87499 (505) 327-6031
OTHER PARTIES	ATTORNEY
Harold and Doris Horner	Gary L Horner P.O. Box 2497 Farmington, NM 87499 (505) 326-2378

STATEMENT OF SUNCO TRUCKING WATER DISPOSAL COMPANY'S POSITION

Sunco Trucking Water Disposal Company's position in regard to the above referenced matter is that the Order of the Division, No. R-9-485, entered April 2, 1991, should be adopted by the Commission. This Order was entered after more than three days of testimony and reflects Sunco's position in this case. Sunco proposes to present its case by adoption of a large part of the record compiled in this case, beginning on June 13, 1990 at 8:15 a.m., and continuing thereafter. Sunco may also have available the witnesses as listed below, subject to its right to call

other witnesses. At the original hearing in this matter, the protestors had no witnesses testify and had only limited numbers of exhibits, which were the Judgment and other related pleadings from the Basin Disposal case and other federal and New Mexico statutes. If protestors intend to present any additional evidence by exhibit or witnesses, then applicant reserves the right to call other witnesses such as are necessary to rebut that testimony.

SUNCO TRUCKING WATER DISPOSAL COMPANY'S PROPOSED EVIDENCE, WITNESSES AND EXHIBITS

WITNESS	EST. TIME	EXHIBITS
Richard P. Cheney, P.E., P.L.S., Brewer & Associates P.O. Box 2079 Farmington, NM 87499	1 hour	Applicant's Exhibit 11 introduced at the Examiner Hearing held in this matter
Chuck Badsgard Sunco Trucking 708 S. Tucker Farmington, NM 87401	15 minutes	Applicant's Exhibit 10 introduced at the Examiner Hearing held in this matter
Robert C. Frank Geologist P.O. Box 308 Farmington, NM 87499	1 hour	Applicant's Exhibit 1 introduced at the Examiner Hearing held in this matter Applicant's Exhibits 2A and 2B introduced at the Examiner Hearing held in this matter Applicant's Exhibit 3 introduced at the Examiner Hearing held in this matter Applicant's Exhibit 4 introduced at the Examiner Hearing held in this matter Applicant's Exhibit 5 introduced at the Examiner Hearing held in this matter Applicant's Exhibit 6 introduced at the Examiner Hearing held in this matter

		Applicant's Exhibit 7 introduced at the Examiner Hearing held in this matter
		Applicant's Exhibit 8 introduced at the Examiner Hearing held in this matter
		Applicant's Exhibit 9 introduced at the Examiner Hearing held in this matter
Dave Boyer Environmental Bureau Chief Oil Conservation Division	15 minutes	Oil Conservation Division's Exhibit 2 introduced at the Examiner Hearing held in this matter
		Oil Conservation Division's Exhibit 3 introduced at the Examiner Hearing held in this matter
		Oil Conservation Division's Exhibit 4 introduced at the Examiner Hearing held in this matter
Roger C. Anderson Environmental Engineer Oil Conservation Division	45 minutes	
William Olson Hydrogeologist Oil Conservation Division		
		Sunco, at the De Novo hearing, intends to offer the testimony presented by it at the Examiner Hearing held in this matter in June, 1990, a transcript of which is in the possession of the Oil Conservation Division. Sunco proposes to submit as evidence all of the testimony presented by the witnesses listed herein. The testimony of each witness will be substantially the same as at the Examiner Hearing held in this matter.

PROCEDURAL MATTERS

- None -

PRE-HEARING CONFERENCE

At the request of the legal counsel for the Oil Conservation Division, Sunco will be available for pre-hearing conference anytime June 5, June 6 or June 7, with June 7 being the most desirable date. Sunco prefers the pre-hearing conference to be held telephonically.

Respectfully Submitted,

JOHN A. DEAN, JR.
Attorney for Sunco Trucking
Water Disposal Company
P.O. Drawer 1259
Farmington, NM 87499
(505) 327-6031

CERTIFICATE OF MAILING

I hereby certify that a true and correct copy of the foregoing pleading was mailed this 31st day of May, 1991, to:

Gary L. Horner
Attorney at Law
P.O. Box 2497
Farmington, NM 87499

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

IN THE MATTER OF THE HEARING
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APPLICATION OF SUNCO TRUCKING WATER
DISPOSAL COMPANY FOR A PERMIT TO CONSTRUCT
AND OPERATE A COMMERCIAL WASTEWATER
EVAPORATION POND, SAN JUAN COUNTY, NEW MEXICO

PROTESTORS PRE-HEARING STATEMENT

COMES NOW Protestors, HAROLD HORNER and DORIS HORNER, in response to a request by the Oil Conservation Division (OCD) for a pre-hearing statement prior to the De Novo hearing currently scheduled before the Commission on June 12, 1991.

Protestors' position is best setforth in their closing argument submitted on July 12, 1990 with respect to the hearings on the subject matter held before the OCD hearing Michael E. Stogner on June 13, 15 and 22, 1990. Said Closing Argument is incorporated herein by reference.

Protestors understand that on June 12, 1991 the OCD will hold a hearing before the Commission with regard to the subject matter. Protestors also understand that rather than a hearing de novo on June 12, 1991, the OCD intends to use the framework of the April 2, 1991 Proposed Division Order for the basis of evaluating testimony and record in the case. If that is to be the format of the June 12, 1991 hearing, Protestors would request and expect that the entire record, exhibits, and documents administratively noticed from the June, 1990 hearing on the present matter be admitted as evidence at the June 12, 1991 hearing.

Protestors have certain problems with the Proposed Division Order of April 2, 1991. The following is a partial list of Protestors' concerns with said Proposed Order:

1. The subject Permit should be denied
2. Finding #5 indicates that Applicant intends to "dispose of produced salt water and drilling fluids which have been tested and treated for hydrogen sulfide." Said finding minimizes the hazardous nature of the produced waters to be disposed of by Applicant by characterizing such water as "salt water." Further said finding minimizes the hazardous nature of such produced water at the subject facility by seemingly indicating that all water received at the facility will have been tested and treated for hydrogen sulfide before being accepted at the subject facility. In fact, testimony at the June 1990 hearings clearly indicated that no limitations were intended to be put on the produced waters received at the subject facility and that all testing and treating would occur at the subject facility as part

of the operation of the facility.

3. Finding #7 indicates that "Protester... did not present any direct evidence to support their position that the facility could not be permitted without... presenting a danger to human health and the environment." In fact, Protestors presented ample findings from the Basin Case where a similar facility within five miles of the subject facility had caused injuries so severe to surrounding residents that a judgment of nearly $1,000,000 was entered against the operators of the Basin facility.

4. Finding #28 indicates "Protestor did not offer into evidence any of the relevant facts of that [Basin] case to support its argument. In fact, Protestor offered into evidence at the June 1990 hearing the 34 page "Court's Amended Findings of Fact" from the Basin Case which were filed therein on June 6, 1989. Such document was administratively noticed during the June 1990 hearings herein and marked as Petitioner's Exhibit #1.

5. The Order proposed by the Division would permit the subject facility before essential engineering drawings are received, reviewed and approved by OCD, even though considerable testimony at the June hearings indicated that the Applicant's plans were woefully inadequate with regard to the control of hydrogen sulfide emissions.

6. The OCD continues to refuse to hold Applicant responsible for Complying with hazardous emission standards promulgated by the New Mexico Environmental Improvement Board.

7. The subject proposed order seems to have no interest in insuring that Applicant will have an adequate closure, contingency or solid waste disposal plans.

8. The general tenor of the subject order, coupled with the results of previous negotiations between the OCD and the Applicant, indicate that those conditions and restrictions placed on Applicant will likely not be aggressively enforced.

9. In sum, it appears that the subject proposed order is designed to insure that the subject facility will be allowed to operate regardless of its adverse effects on human health and the environment.

Protestors propose to call the following witnesses at the June 12, 1991 hearing:

1. OCD staff member - Roger Anderson, we believe; and
2. Possibly someone from the EID.

Protestors believe that they will not need to introduce any exhibits into evidence any additional exhibits, unless there exists a discrepancy between what exhibits Protestors and OCD believe has already been admitted or administratively noticed.

Counsel for Protestors will be available for a pre-hearing conference on June 6 or 7, 1991. It appears that all parties will be available on June 7, 1991. Protestors have no objection to such conference being conducted by telephone.

Respectfully Submitted,

Gary L. Horner, Esquire
Attorney for Protestors, HAROLD HORNER and DORIS HORNER
Post Office Box 2497
Farmington, New Mexico 87499
(505) 326-2378

CERTIFICATE OF MAILING

I hereby certify that a true copy of the foregoing PROTESTORS" PRE-HEARING STATEMENT was mailed by first class postage, or delivered to, the following individuals this _____ day of June, 1991:

JOHN A. DEAN JR., Esquire
Attorney for Applicant
Post Office Drawer 1259
Farmington, New Mexico 87499

_____
Gary L. Horner, Esquire
Attorney for Protestors

STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

BRUCE KING
GOVERNOR

May 23, 1991

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

John A. Dean, Jr.
P. O. Box 1259
Farmington, New Mexico 87499

and

Gary L. Horner
P. O. Box 2497
Farmington, New Mexico 87499

Re: Sunco Trucking and Disposal Company
Surface Disposal Application
Case 9955 De Novo

Gentlemen:

Upon application of Harold Horner filed in response to the Division Order issuing the surface disposal permit to Sunco Trucking, the De Novo hearing in the above case has been docketed for Commission Hearing on June 12, 1991. As I am sure you will remember, the examiner hearing took over three days to present the evidence. The Commission will not permit the case to go on in the same manner. The Commission will use the framework of the Division order for the basis in evaluating the testimony and record in the case and that should be the basis for your presentation.

In order to exercise some control over the process, I am requesting that counsel for each party submit to the Division not later than May 31, 1991, a pre-hearing statement setting forth the nature of evidence the party intends to present, and identification of the witnesses the party intends to call and a list of the exhibits which the party proposes to submit in support of its position. The Commission does approve of incorporating all or portions of the record from examiner hearings into its record in order to take advantage of that of which has already been done and build upon it.

After reviewing the pre-hearing statements, I may determine that it is necessary and appropriate to hold a pre-hearing conference prior to the actual Commission hearing. You should plan on being available for such a conference sometime between the 5th and 7th of June. With your pre-hearing statement you may advise me which day is preferred, and if you can agree upon and date and time please let me know and I will make that time available. The afternoon

of Thursday, the 6th, will not be a good time because the Division's district supervisors will be in town and using the conference room, but any other time within that period is acceptable to me.

Sincerely,

Robert G. Stovall

ROBERT G. STOVALL,
General Counsel

RGS/dr

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

IN THE MATTER OF THE HEARING
CALLED BY THE OIL CONSERVATION
DIVISION FOR THE PURPOSE OF
CONSIDERING:

CASE NO. 9955
ORDER NO. R-9485

APPLICATION OF SUNCO TRUCKING WATER
DISPOSAL COMPANY FOR A PERMIT TO CONSTRUCT
AND OPERATE A COMMERCIAL WASTEWATER
EVAPORATION POND, SAN JUAN COUNTY, NEW MEXICO

ORDER OF THE DIVISION

BY THE DIVISION:

This cause came on for hearing at 8:15 a.m. on June 13, 1990, at Santa Fe, New Mexico, before Examiner Michael E. Stogner.

NOW, on this 2nd day of April, 1991, the Division Director, having considered the testimony, the record and the recommendations of the Examiner, and being fully advised in the premises,

FINDS THAT:

(1) Due public notice having been given as required by law, the Division has jurisdiction of this cause and the subject matter thereof.

(2) Sunco Trucking Water Disposal Company ("Applicant") has applied to the Division for a permit pursuant to Rule 711 of the Division's Rules and Regulations to construct a commercial surface disposal facility to dispose of nonhazardous wastewater resulting from oil and gas drilling and production operations.

(3) Said facility is to be located in the SW/4 NW/4 (Unit E) of Section 2, Township 29 North, Range 12 West, NMPM, San Juan County, New Mexico.

(4) Harold and Doris Horner ("Protester") are owners of land near the proposed facility and protested the granting of the permit and requested this hearing on the application.

(5) Applicant proposes to build a synthetically double-lined evaporation pond with leak detection, aeration systems and evaporation enhancing spray systems to dispose of produced salt water and drilling fluids which have been tested and treated for hydrogen sulfide.

(6) Applicant appeared at the hearing and presented testimony about the design and operational standards and established a prima facie showing that the facility could be designed and operated so as to protect fresh water supplies and not constitute an unreasonable harm to human health and the environment if standards for such operation are met and followed.

(7) Protester appeared at the hearing through Counsel and cross-examined Applicant's witnesses but did not present any direct evidence to support their position that the facility could not be permitted without creating an unreasonable risk of contaminating fresh water supplies or presenting a danger to human health and the environment.

(8) There is a need for additional disposal facilities in the San Juan Basin to provide for environmentally safe and cost effective means of disposing of water produced in connection with oil and gas operations, and approval of a properly designed facility will help to prevent illegal dumping of water in a manner which would endanger the environment.

(9) The proposed facility is located on a mesa and not in a watercourse, lakebed, sinkhole or other depression. The location is safely above the high water level of the Animas River and any other watercourse in the vicinity.

(10) Evidence presented by the applicant shows that the design of the evaporation pits is adequate to contain all fluids with sufficient surface area.

(11) The design of the proposed ponds has been approved by the State Engineer.

(12) The geology of the proposed site and the distance to any fresh water is such that even if there were a catastrophic

failure if the liner and the full pond were to empty, there is virtually no probability that any fresh water would be contaminated.

(13) If the facility is constructed with a double synthetic lining and adequate leak detection on properly constructed base, and if a proper leak response program which will require prompt detection and repair is maintained, it is highly unlikely that fluids will contact the soil with no danger of contacting fresh water sources.

(14) The applicant proposed that the leak detection system be constructed with two inch collector and 1 inch lateral pipes, but that is not large enough to prevent blockage with accumulated sands and other solids, and the system should use four inch collectors and two inch main pipes.

(15) Intervenor objected to the location of the proposed facility because it is an area which may be used for residential purposes. The Division has no authority to disapprove a facility because the land use is incompatible with surrounding uses, but those uses may be a factor in establishing design and operational requirements to protect human health and the environment.

(16) Intervenor questioned applicant's witnesses and argued that the risk of hydrogen sulfide build-up and potential danger to nearby residents was a significant hazard for which the permit should be denied.

(17) Applicant presented an engineering witness who testified that H_2S build-up could be avoided by preventing anaerobic conditions from developing in the pond by supplying sufficient oxygen to the pond through the aeration system to maintain a residual oxygen level of at least 5 parts per million (ppm).

(18) The size of the aeration system necessary to maintain the necessary residual oxygen level is dependent upon the total oxygen demand of the pond, which can be reduced by insuring that no H_2S water is introduced into the pond and by chemically treating the water if the oxygen demand increases or H_2S is detected. A chemical engineer with the Division's Environmental Bureau confirmed that testimony.

(19) The applicant testified that wastewater delivered to the facility can be tested and treated in a closed system if H_2S is found to be present to prevent its introduction into the pond.

(20) The oxygen level of the pond can be measured regularly and additional aeration and chemical treatment with bleach can be used to eliminate anaerobic conditions before dangerous H_2S build-up occurs.

(21) The operator should be required to keep 1000 gallons of fresh bleach on location at all times in case of need, and stored bleach which has reached the manufacturer's shelf life should be disposed of in the pond.

(22) Air quality monitoring around the berm of the pond can detect the presence of H_2S gas at levels above 0.1 ppm, and remedial measures can be undertaken to eliminate the source before higher concentrations occur.

(23) The applicant should be required to have an emergency notification and contingency plan to be implemented in the unlikely event of H_2S levels reaching a level of 10 ppm at the fence line.

(24) The applicant's operational personnel should be fully trained at all times in the use of H_2S monitoring equipment and in the proper methods for reducing H_2S levels in the pond.

(25) The applicant proposes using a sprayer system to enhance evaporation from the pond.

(26) An enhanced sprayer is a reasonable method to enhance evaporation, but the design for such system should be approved by the Division before installation. It should have an anemometer with automatic shutdown system(s) to prevent spray drift from being blown beyond the confines of the ponds, and it should not be operated without an attendant on duty.

(27) Protester offered the judgment of the District Court of San Juan County in the case of Payne v. Basin Disposal, CV-87-569-1102 in support of their position that the permit should not be approved. The Division takes administrative notice of that decision.

(28) The judgment identified in finding (27) is limited to the facts of that case, and Protester did not offer into evidence any of the relevant facts of that case to support its argument.

(29) The applicant must post the reclamation bond as required by Division Rules and Regulations before beginning construction on the facility.

IT IS THEREFORE ORDERED THAT:

(1) The applicant, Sunco Trucking Water Disposal Company, is hereby authorized to construct and operate a commercial surface wastewater disposal facility at a site in the SW/4 NW/4 (Unit E), Section 2, Township 29 North, Range 12 West, NMPM, San Juan County, New Mexico, for the purpose of collection, disposal, evaporation or storage of produced water, completion fluids and other non-hazardous oilfield related waste. subject to the permit conditions.

PROVIDED HOWEVER THAT, the proposed disposal facility shall be constructed and operated in accordance with the permit conditions attached hereto as Exhibit "A" which are incorporated herein and made a part of this order, and in accordance with such additional conditions and requirements as may be directed by the Division Director from time to time, and shall be operated and maintained in such a manner as to preclude spills and fires, and to protect surface waters, ground waters, human health, livestock and the environment.

(2) Prior to constructing said facility, the applicant shall submit, to the Santa Fe office of the Division, a surety or cash bond in the amount of $25,000 in a form approved by the Division.

(3) Engineering designs for aeration systems shall be submitted to the Director for approval prior to construction.

(4) Engineering designs for the enhanced evaporation spray systems shall be submitted to the Director for approval prior to construction.

(5) The Aztec office of the Oil Conservation Division shall be notified at least 48 hours prior to the installation of

the primary liner to afford the opportunity for the Division to inspect the leak detection system.

(6) As-built drawings, certified by a registered professional engineer, shall be submitted to the OCD prior to initiating operations.

(7) The Director of the Division shall be authorized to administratively grant approval for the expansion or modification of the proposed disposal facility.

(8) Authority for operation of the treating plant and disposal facility shall be transferrable only upon written application and approval by the Division Director.

(9) Authority for operation of the treating plant and disposal facility shall be suspended or rescinded whenever such suspension or rescission should appear necessary to protect human health or property, to protect fresh water supplies from contamination, to prevent waste, or for non-compliance with the terms and conditions of this order or Division Rules and Regulations.

(10) The leak-detection system between the primary and secondary liner shall be constructed with two (2)-inch laterals and four (4)-inch collector pipes.

(11) The aeration systems shall be designed to provide sufficient oxygen to the pond to maintain a residual oxygen concentration of 0.5 ppm (parts per million).

(12) The aeration systems shall be designed such that the oxygen requirements and residuals are provided without the use of the spray system.

(13) The aeration systems shall be designed to allow for expansion if the actual oxygen demand exceeds the oxygen demand uses in the design calculations.

(14) The permit granted by this order shall become effective only upon acceptance and certification by the applicant.

(15) The Division shall have the authority to administratively change any condition of this permit to protect fresh water, human health and the environment. Applicant may request a hearing upon any change which material affects the

operation of the facility.

(16) Jurisdiction of this cause is retained for the entry of such further orders as the Division may deem necessary.

DONE at Santa Fe, New Mexico, on the day and year hereinabove designated.

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

WILLIAM J. LEMAY
Director

NEW MEXICO OIL CONSERVATION DIVISION

CASE 9955, ORDER R-9485
Exhibit A

SURFACE DISPOSAL FACILITY PERMIT
INITIAL CONDITIONS FOR APPROVAL
SUNCO TRUCKING WATER DISPOSAL COMPANY

I. Type of Operation

The major purpose of the facility shall be to dispose of salt water produced in connection with the production of oil and gas by evaporating such water in open pits using enhanced evaporation techniques as necessary and under those conditions which make such use safe.

Water shall be tested for hydrogen sulfide (H_2S) and treated, if necessary, in a closed system prior to introduction into a pond. Ponds shall be properly aerated to maintain oxygen levels as required by this permit. Contingency plans have been developed for H_2S buildup and for leaks as set forth herein.

II. Operator

The owner of the facility is:

Sunco Trucking Water Disposal Company
708 South Tucker Ave.
Farmington, NM 87401

III. Location of Disposal Pit

The facility shall be located at a site in the SW/4 NW/4 (Unit E), Section 2, Township 29 North, Range 12 West, NMPM, San Juan County, New Mexico. Said facility shall be constructed in accordance with the site plan submitted to the Division at hearing subject to any modifications directed or approved by the Division.

IV. Expansion Request

This is an application for a new facility to be constructed upon issuance of this permit.

V. Land Ownership

The land upon which the facility is to be constructed is owned in fee by Sunco Trucking Water Disposal Company.

VI. Storage/Disposal Facilities Description

A. The facility shall accept for disposal produced water, completion fluids and non-hazardous oilfield related waste for disposal

B. Fluids shall be received in an open skim tank, subject to the requirements for treatment set forth herein. Oil and other hydrocarbons shall be skimmed off and placed in closed storage tanks until sold. Treated and skimmed water shall be placed in open, synthetically double lined ponds with approved leak detection system for evaporation. The skim tank, oil storage tanks and ponds are to be located as shown on the site plan submitted at the hearing, subject to any modifications or changes required or approved by the Division.

VII. Engineering Design

A. The subject facility shall be constructed in accordance with the engineering designs presented at the hearing as applicant's exhibits no. 1, 2A, 2B, 3, 4 & 6 and in accordance with the following conditions and requirements set forth herein.

B. General Construction Requirements

1. Location

This approval is for the specific site and location identified. The location of any pit or pond shall not be changed from the submitted site plan without specific authorization from the Division.

2. Design and Construction

a. The ponds shall have a minimum freeboard of eighteen (18) inches. If overtopping occurs at any time, the freeboard shall be lowered to prevent a reoccurrence.

Liner markings or some other device shall be installed to accurately measure freeboard.

b. The pond shall be constructed so that the inside grade of the levee is no steeper than 2:1. Levees shall have an outside grade no steeper than 3:1.

c. The top of the levees shall be level and shall be at least eighteen inches (18") wide.

d. An aeration system shall be constructed to prevent anaerobic conditions from forming in a pond. Such system shall be able to provide sufficient oxygen in the pond to maintain a residual oxygen concentration of 0.5 parts per million (ppm) without the use of any spray system. The system shall be designed to permit expansion if actual oxygen demand exceeds the oxygen demand used in design calculations. Such plans and specifications, certified by a registered professional engineer, must be submitted to the Division for approval prior to actual construction.

e. Upon completion of construction "as-built" completion diagrams of the ponds and aeration systems certified by a registered professional engineer shall be submitted.

3. Synthetically Lined Evaporation Ponds

a. Materials -- Synthetic materials used for lining the evaporation ponds shall be impermeable flexible HDPE membrane as submitted in applicant's hearing exhibit no. 1, and no substitution of different material shall be made without prior approval of the Division.

b. Leak Detection System

(1) A leak detection system of an approved design shall be installed between the primary and secondary liner. The Aztec district office of the Division shall be notified at least 48 hours in advance of the scheduled installation of the primary liner to afford the opportunity for a Division representative to inspect the leak detection system.

(2) A network of slotted or perforated drainage pipes shall be installed between the primary and secondary liners. The main collector pipes shall be not less than four (4) inch diameter and the laterals shall be not less than two (2) inch diameter pipe. The network shall be of sufficient density so that no point in the pond bed is more than twenty feet (20') from such drainage pipe or lateral thereof. The material placed between the pipes and laterals shall be sufficiently permeable to allow transport of the fluids to the drainage pipe. The slope for all drainage lines and laterals shall be at least six inches (6") per fifty feet (50'). The slope of the pond bed shall also conform to these values to assure fluid flow towards the leak detection system. The drainage pipe shall convey any fluids to a corrosion-proof sump located outside the perimeter of the pond.

c. Preparation of Pond Bed for Installation of Liners

(1) The bed of the pond and inside grade of the levee shall be smooth and compacted, free of holes, rocks, stumps, clods, or any other debris which may rupture the liner. If necessary to prevent rocks from damaging the liner, the pond bed shall be covered with a compacted layer of sand or other suitable materials.

(2) A trench shall be excavated on the top of the levee the entire perimeter of the pond for the purpose of anchoring flexible liners. This trench shall be located a minimum of nine inches (9") from the slope break and shall be a minimum of twelve inches (12") deep.

(3) The liner shall rest smoothly on the pond bed and the inner face of the levees, and shall be of sufficient size to extend down to the bottom of the anchor trench and come back out a minimum of two inches (2") from the trench on the side furthest from the pond. Wrinkles or folds shall be placed at each corner of the pond in accordance with manufacturer's specifications to allow for contraction and expansion of the membrane due to temperature variations.

(4) The liners shall be properly vented in accordance with the design submitted as Applicant's Exhibit 2B.

(5) An anchor of used pipe or other similar material shall be placed over the liner in the anchor trench and the trench back-filled. The anchor trench shall extend the entire perimeter of the pond.

(6) The sand, gravel or geotextile membranae layers placed on top of the secondary liner shall be done in such a manner that the risk of tearing the liner is minimized.

(7) At any point of discharge into the pond(s), no fluid force shall be directed toward the liner.

4. Spray Evaporation Systems

a. Sprayer systems shall be included to enhance natural evaporation.

b. Engineering designs for the sprayer system must be submitted for approval prior to installation. An anemometer with automatic shutdown systems shall be installed which will automatically deactivate the spray systems when wind-born spray drift can be carried outside the confines of the ponds.

c. Spray systems shall be operated such that all spray remains within the confines of the lined portion of the ponds. The spray system shall be operated only when an attendant is on duty at the facility.

5. Skimmer Tanks

a. Required Use
Skimmer tanks shall be used to separate any oil from the water prior to allowing the water to discharge into the evaporation pond.

b. Design Criteria

The skimmer tank shall be designed to allow for oil/water separation only; oil shall be removed in a timely manner and stored in tanks. Per Division General Rule 310, oil shall not be stored or retained in earthen reservoirs or in open receptacles.

(1) The material of construction and/or design shall provide for corrosion resistance.

(2) Siphons or other suitable means shall be employed to draw water from oil/water interface for transfer to the evaporation pond. The siphon shall be located as far as possible from the inlet to the skimmer tank.

(3) The skimmer tank shall at all times be kept free of appreciable oil buildup to prevent oil flow into the evaporation pond.

6. Fences, Signs and Netting

a. A fence shall be constructed and maintained in good condition around the facility perimeter. Adequate space will be provided between the fence and levees for passage of maintenance vehicles. The fence shall be constructed so as to prevent livestock and people from entering the facility area. Fences shall not be constructed on levees.

b. A sign not less than 12" x 24" with lettering of not less than two inches (2") shall be posted in a conspicuous place on the fence surrounding the facility. The sign shall be maintained in legible condition and shall identify the operator of the disposal system, the location of the facility by quarter-quarter section, township, and range; and emergency telephone numbers.

c. To protect migratory birds, all tanks exceeding 16 feet in diameter, and exposed pits and ponds shall be screened, netted or covered. Upon written application by the operator, an exception to screening, netting or covering of a facility may be granted by the district supervisor upon a showing that an alternative method will protect migratory birds or that the facility is not hazardous to migratory birds.

VIII. Spill/Leak Prevention and Reporting Procedures (Contingency Plan)

A. Leak detection system sumps shall be inspected daily, and records of such inspections shall be made and retained and kept on file at the facility for OCD inspection at any time. If fluids are found in the sump the following steps will be immediately undertaken:

1. The operator shall notify the Division Aztec District Office within twenty-four (24) hours;

2. the fluids will be sampled and analyzed to determine the source; and

3. the fluids will be immediately and continuously removed from the sump. Such fluids may be returned to the pond.

B. If a leak is determined to exist in the primary liner, the operator will immediately undertake the following contingency measures:

1. Introduction of fluids into the pond will cease.

2. Enhanced evaporation will commence, provided atmosphere conditions are such that the spray systems can be operated in accordance with the provisions of this permit.

3. 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.

4. The liner will be repaired and tested and the leak detection system will be completely drained before resuming introduction of fluids into the pond.

IX. Operation and Maintenance

A. **Requirements for receipt of fluid.**

1. Disposal at this facility shall occur only when an attendant is on duty. The facility shall be secured when no attendant is present.

2. No produced water shall be received at the facility unless the transporter has a valid Form C-133 (Authorization to Move Produced Water) on file with the Division.

3. Only liquids that are non-hazardous by U.S. Environmental Protection Agency under Resource Conservation Recovery Act (RCRA) Subtitle C exemption or by characteristic testing will be accepted at the facility. Liquids and solids from operations not currently exempt under RCRA Subtitle C will be tested for appropriate hazardous constituents prior to disposal.

4. All liquids accepted for disposal shall be tested for hydrogen sulfide concentrations. All liquids with measurable hydrogen sulfide concentrations shall be treated in a closed system prior to introduction of liquids to any open tank or pond. The treatment reaction shall be driven to completion to eliminate all measurable hydrogen sulfide.

5. The operator shall keep and make available for inspection records for each calendar month on the source, location, volume and type of waste (produced water, spent acids, completion fluids, drilling mud, etc.), analysis for hazardous constituents (if required), date of disposal, and hauling company that disposes of fluids or material in the facility. Records of H_2S measurements and treatment volumes shall be maintained in the same manner. Such records shall be maintained for a period of two (2) years from the date of disposal.

6. The operator shall file forms C-117-A, C-118, and C-120-A as required by OCD rules.

7. Fluids shall not be accepted if introduction of the fluid will cause the pond freeboard to be less than that approved herein.

B. **Pond Maintenance.**

1. Outside walls of all levees shall be maintained in such a manner to prevent erosion. Inspections of the outside walls of the levees shall be made weekly and after any rainfall of consequence.

2. No oil shall be allowed in the pond(s).

C. **General Operational Requirements.**

1. Operating personnel shall be trained in the operation, calibration, maintenance and safety requirements of all test equipment used at the facility.

2. At least 1000 gallons of a treatment chemical shall be stored on-site and shall not be retained for a period in excess of the manufacturer's stated shelf life. Expired chemicals may be disposed of in the pond.

3. Prior to disposal, any accumulated sludge generated in the disposal facility shall be analyzed for composition and disposal pursuant to requirements determined by the OCD.

4. If any of the required systems become inoperative, the Aztec district office of the Division will be notified immediately.

X. Closure Plan

A. When the facility is to be closed, the operator shall provide for removal of all fluids and/or wastes, back-filling, grading and mounding of pits, cleanup of any contaminated soils. Wastes shall be disposed of in accordance with statutes, rules and regulations in effect at the time of closure.

B. OCD shall be notified when operation of the facility is discontinued for a period in excess of six months or when the facility is to be dismantled.

XI. Flood Protection

A. The facility will be constructed such that there will be no storm water runoff from the boundaries of the facility.

B. The operator will immediately notify the Aztec district office of the Division of any flooding or washouts.

XII. H_2S Prevention and Contingency Plan

A. In order to prevent development of harmful concentrations of hydrogen sulfide, the following procedures shall be followed:

1. Daily tests shall be conducted and records made and maintained of the pH in each pond, and if the pH falls below 7.0, remedial steps shall be taken immediately to raise the pH.

2. Weekly tests shall be conducted and records made and retained at the facility of the dissolved sulfide concentrations in the ponds.

3. Tests shall be conducted, and records made and retained at the facility of such tests, to determine the dissolved oxygen levels in each pond:

a. Tests shall be conducted at the beginning and end of each day, or at least twice per 24-hour period.

b. The sample for each test shall be taken one foot from the bottom of the pond.

c. The location of each test shall vary around the pond.

d. If any test shows a dissolved residual oxygen level of less than 0.5 ppm, immediate steps shall be undertaken to raise the oxygen level to at least 0.5 ppm, which measures may include adding bleach or increased aeration.

B. In order to prevent any harm by hydrogen sulfide gas, Tests of ambient H_2S levels shall be conducted, and records made and retained. Such tests shall be made at varying locations around the berm of the pond and shall be conducted twice per day. The wind speed and direction shall be recorded in conjunction with each test.

1. If an H_2S reading of 0.1 ppm or greater is obtained:

a. A second reading shall be taken on the downwind berm within one hour;

b. The dissolved oxygen and dissolved sulfide levels of the pond shall be tested immediately and the need for immediate treatment determined;

c. Tests for H_2S levels shall be made at the fence line, downwind from the problem pond.

2. If two consecutive H_2S readings of 0.1 ppm or greater are obtained:

   a. The operator shall notify the Aztec office of the OCD immediately;

   b. The operator shall commence hourly monitoring on a 24-hour basis;

   c. The operator will obtain daily analysis of dissolved sulfides in the pond.

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

   a. The operator will immediately notify the OCD and the following public safety agencies:

      State Police
      County Sheriff
      County Fire Marshall;

   b. The operator will initiate notification of all persons residing within one-half ($\frac{1}{2}$) mile of the fence line and assist public safety officials with evacuation as requested.

XIII. Additional Information

The operator shall notify the Division of any additional information change in conditions which may be relevant to this permit.

XIV. Certification

Sunco Trucking Water Disposal Company, by the officer whose signature appears below, accepts this permit and agrees to comply with all terms and conditions contained herein. Sunco Trucking Water Disposal Company further acknowledges that this permit shall not become effective until Bond satisfactory to the Division is posted and that these conditions and requirements of this permit may be changed administratively by the Division for good cause shown as necessary to protect fresh water, human health and the environment.

Accepted:

SUNCO TRUCKING WATER DISPOSAL COMPANY

by_____
Title

State of New Mexico

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

Oil Conservation Division

RE: Sunco Trucking Water Disposal Permit Application For Administrative Approval for a Commercial Evaporation Facility

OCD Case No.: 9955

CLOSING ARGUMENT

Applicant, Sunco Trucking, Inc., doing business as Sunco Trucking Water Disposal, has made application to receive a permit to construct and operate a commercial surface waste water disposal facility. These facilities are authorized under Rule 711 of the Rules of the Oil Conservation Division. The necessity for these types of facilities was brought about by the adoption of Rule 707 by the Oil Conservation Division. This Rule states that any water or fluid hauled from a oil and gas well location shall be disposed of only in a licensed facility.

The Oil Conservation Division's authority is found at NMSA 70-2-12, 1989 Supp. That rule reads in pertinent part at part 15: "to regulate the disposition of water produced or used in connection with the drilling for or producing of oil or gas or both and to direct surface and subsurface disposal of the water in a manner that will afford reasonable protection against contamination

of fresh water supplies designated by the state engineer". The interest of the Oil Conservation Division in this type of facility is for the protection of fresh water.

The Oil Conservation Division has enacted Rule 711 and a document entitled Guidelines For Construction Of Commercial Waste Water Disposal Facilities. Sunco Trucking, doing business as Sunco Trucking Water Disposal, has used these two sources in formulating its application for its permit. (Applicant's Exhibit 1.) As is the case in all facilities of this type, this application is first treated as an administrative approvable permit. Consequently, several letters were exchanged between OCD and Applicant. (Applicant's Exhibits 3, 4, 5, 6, 7 and 8.) The application, Applicant's Exhibit 1, and the letters exchanged between OCD and Applicant basically constitute their proposal to construct and operate a commercial waste water disposal facility. Some other modifications are necessitated as a result of the hearing, which was held in this cause of action. These changes will be illustrated elsewhere in this Closing Argument and are included in the Application which Sunco Trucking has submitted herewith. The purpose of the attached Application is to succinctly state Sunco's proposal for the permitting, construction and operation of this commercial waste water disposal facility. (Applicant has attempted to include all changes agreed to at the hearing.)

Harold W. and Doris J. Horner filed a letter of protest with the OCD on or about August 21, 1989. This letter of protest had the effect of invoking the provisions of Oil Conservation Division

Rule 711, Subpart B. It is important to note at the beginning of the discussion of the protest, that neither of the protesters, nor any witnesses on their behalf, testified at the hearing of this matter. All land owners were notified as required by Rule 711, Subpart B (Applicant's Exhibit 10 and OCD Exhibit 2 and 3). No other parties appeared at any portion of the hearing other than Harold W. Horner, who appeared during the first day of the hearing. No other land owners or interested parties appeared. Protesters attempts to participate in the hearing were limited to cross examination of Applicant's witnesses and of those witnesses called by OCD and the introduction of several exhibits, mostly consisting of New Mexico Environmental Improvement Division Regulations. It is important to note that, even though this permit process was shifted from an administrative approval to one requiring a public hearing, this change has no effect on the basic jurisdiction of OCD (Rule 711). Applicant believes that the total lack of evidence presented by Protesters overwhelmingly demands that this application be approved in the manner presented by Applicant in its application and in the exchange of letters between OCD and Applicant, along with those changes made at the hearing. Nothing that Protesters have presented changes any of the proposed design for construction or operation of the facility by Applicant. It seems as though Protesters main thrust is that EID standards should be used by the OCD in approving or disapproving or determining the rules by which this proposed facility should be operated.

The authority of the Environmental Improvement Division is

found in numerous statutory acts. The Water Quality Act, NMSA 74-6-1, 1978 Comp., et seq. and Air Quality Control Act, 74-2-1, 1978 Comp., are relevant hereto. It is asserted by Applicant that EID standards do not apply to the facility being considered at this hearing. Applicant asserts that EID's interest in protecting the air and water applies only to those known sources of contaminants upon which it regulates. Protesters introduced Air Quality Control Regulation 707 (Protesters Exhibit 17). Examining the applicability part of that rule shows the weakness of Protesters argument. AQC Rule 707.A. reads "Any person constructing any new major stationary source or major modification as defined in this regulation, that emits or will emit regulated pollutants in an attainment or unclassified area shall obtain a permit from the department in accordance with the requirements of this regulation prior to the construction or modification." No testimony was presented that the proposed facility emits or will emit regulated pollutants. It is a given that H2S is a contaminant that is regulated by EID. However, this pond is not constructed in a manner that makes it a known pollutant to the extent that a license under EID authority is necessary (NMSA 74-2-7, 1978 Comp.).

Protesters exhibits were Air Quality Control regulations adopted by the Environmental Improvement Board, particularly 201, 626, 702, 705 and 707. Careful reading of these regulations would immediately suggest that they are not applicable to the present or the proposed facility by Applicant. It was testified to by Applicant's witness, Bob Frank, who is the operator of a similar

facility, that no EID permit has been received by him. OCD witnesses testified that they were not aware that any EID permit was required. (See testimony of Roger Anderson). In addition, Applicant's witness Richard Cheney testified that he was not aware that water sewage treatment plants, which he testified were much more prone to admitting H2S, required an EID permit. It is though Protesters are clutching at straws to come up with additional methods to delay the application of Sunco's facility. It is clear that Protesters do not want the facility near the land that they own. However, they have done nothing by way of evidence, either in person or exhibits, expert or nonexpert, to give the OCD examiner any authority to rely on to deny the permit of Applicant. As stated above, the sole thrust of their protest, properly presented, was that an EID permit should be required or that EID ambient air standards should be applied (Protesters Exhibits 3, 4, 5, 6 and 7).

Applicant presented much competent evidence in support of the granting of a permit.

Applicant presented the testimony of Bob Frank, a geologist and owner/operator of a disposal pond permitted similarly to that requested by Applicant. He testified as to the construction, design and operation of the proposed facility. Protesters presented no evidence in these areas. Applicant presented the testimony of Chuck Badsgard, the person in charge of operations of Sunco Trucking, who would be the ultimate supervisor of Sunco Disposal ponds. He testified as to the safety record, financial

soundness and verified all of the information presented by Bob Frank and Applicant's exhibits 1, 2, 3, 4, 5 and 6. Protesters presented no evidence in these areas. Applicant presented the testimony of Richard Cheney, a registered engineer and land surveyor and an expert in the design of waste water treatment plants. He testified that the design of the pond proposed by Applicant would sufficiently address his two main concerns in the prevention of H2S smells. His first concern is the ability to keep the pond aerobic, that is, oxygen based. Mr. Cheney testified that, given the design and proposed operation of the ponds, with sufficient horse power on the motors running the aeration systems, that there would be sufficient ability to keep the pond aerobic. Mr. Cheney's second concern would be the ability of the operator to mix the oxygen sufficiently in the liquid in the pond or to mix whatever chemicals were necessary to treat the pond. Mr. Cheney testified that the proposed design of the pond was sufficient to mix the pond in a manner so as to keep it aerobic and to treat it with chemicals if that became necessary. Protesters presented no evidence in these areas. The OCD called Roger Anderson, the environmental engineer for the Division, who testified that the application as presented in Applicant's exhibits 1, 2, 3, 4, 5 and 6 was complete and, subject to small alterations, could be administratively approved. He also testified that notice had been given as required by State statute by the OCD both of the application and of the public hearing. He stated that his concerns as to the protection of the fresh water supplies of the State of

New Mexico had been adequately addressed and he believed, with minor alterations, all of which have been incorporated or would be incorporated into Applicant's design and proposed operation of this facility, that the facility proposed, and if operated as proposed, would be safe to protect the fresh water in the State of New Mexico. Protesters presented no evidence in the areas testified to by Mr. Anderson. The OCD called William Olson, a hydrologist with the OCD. Mr. Olson testified that, even if there was a leak in the primary and secondary liners of the pond and a continuous head was on the water, that is some force on the water, that it would take approximately 21 years for it to reach any known fresh water sources. Protesters presented no evidence on those areas covered by Mr. Olson.

In short, Protesters have presented no evidence of any nature that would influence the outcome of this hearing. It is obvious to Applicant that the Protesters sole purpose was to delay the application presented by Sunco Trucking, Inc. and that they had no legitimate evidence or concerns to place before the hearing examiner, nor did they have any legitimate concerns that were properly under the jurisdiction of OCD. The one point that Protesters could possibly argue was that of a catastrophic situation where the primary and secondary liners failed and that, at that time, there would be no other pond to drain the leaking pond into. This assumed there would be no other facility to deposit the water from the leaking pond into. Their assertion was that this might somehow threaten fresh water supplies. Both Mr.

Cheney and Mr. Olson put these fears to rest when they testified as to the length of time that it would take for the pond water to reach fresh water sources under these catastrophic conditions. That is 21 years according to Mr. Olson and 8 according to Mr. Cheney.

Mr. Roger Anderson and other witnesses also testified that there might be circumstances whereby OCD would need to make decisions and changes in the operation and design of the pond that would be in the best interest of the OCD mission. Applicant would suggest that any order entered in this cause give OCD the administrative ability to make changes without the necessity of a public hearing in the operation, construction or maintenance of this facility.

In short, Applicant has met its burden under existing statutes, regulations and guidelines. It has demonstrated that it will be able to operate the pond as proposed in a manner that would be in the best interest of the OCD mission and not threatening any fresh water supplies. It has already been determined, and is unchallenged, that these facilities are necessary and that there is a great demand for facilities of this kind. It was testified to by Mr. Frank that the facility partially owned and operated by him is full, that he believed the other facilities in San Juan County were full, and that there was sufficient demand to support the necessity of the proposed facility. Applicant has met all statutory guidelines in its application and will submit any other or meet any other reasonable requirements that the examiner may

place on this permit. Applicant is aware that it has to post a surety bond in the amount of $25,000 before construction and will do so. Applicant would ask that an order be entered allowing the construction and operation of its facility as proposed in its application and under reasonable guidelines this body might deem necessary. In the order that OCD be granted the administrative ability to make construction, design, operation or maintenance requirement changes without the necessity of public approval as they are needed to protect the best interest of the OCD mission.

Respectfully Submitted,

JOHN A. DEAN, JR.
Attorney for Applicant
P.O. Drawer 1259
Farmington, N.M. 87499
(505) 327-6031

To: New Mexico Oil Conservation Division
310 Old Santa Fe Trail, Room 206
Santa Fe, New Mexico 87503

Sunco Trucking Water Disposal Application
for Waste Storage/Disposal Pit Permit

Submitted By: Sunco Trucking, Inc. d/b/a
Sunco Trucking Water Disposal
708 South Tucker Avenue
Farmington, New Mexico 87401

EXHIBITS

For puroses of brevity, all Exhibits previously submitted with Original Application on May 19, 1989, are hereby incorporated into this Application, along with all of Applicant's Exhibits. Applicant has not signed this application as it is submitted to help us present our view on what an order approving the application should contain.

I. GENERAL INFORMATION

A. Owner: Sunco Trucking, Inc., d/b/a Sunco Trucking Water Disposal

B. Contact Person: Robert C. Frank or Chuck Badsgard
708 South Tucker Avenue
Farmington, New Mexico 87401
(505) 325-8729

C. Location: SW 1/4, NW 1/4 Sec. 2-T29N-R12W

D. Type of Operation: The major purpose of the facility is the disposal, by evaporation of produced water from the San Juan Basin. The water will be trucked into location and unloaded into above ground tanks with the oil collected and stored for future treating and sale. The second pond will be constructed commensurate with the first pond; however, the second pond will not be lined until market conditions dictate. The third pond will be constructed and lined once the market conditions further warrant its construction. The weathered surface of pond two will be ripped and recompacted to the original density requirements prior to being lined. Each pond will be equipped with an aeration system and a spray system. The aeration system will be operable from start up and the sprayers will be utilized as market conditions dictate.

E. Copies: Three copies of the application have been provided.

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

_____ _____

Signature Date

_____ _____

Printed Name of Person Signing Title

II. GENERAL DESCRIPTION

A. Proposed Operations.

1. Storage/Disposal Facilities Description:

The facility will be built pursuant to the attached diagram. The facility will be equipped with one unloading tank, two storage tanks, and three large evaporation ponds. Ponds number two and three will be built as market conditions dictate. The only fluids to be accepted are produced water from oil and gas operations.

2. Technical Information:

a. Surface Impoundments: Produced water will be the only effluent stored. Below please find a tabulation of the pond specifications.

	Area (ft. 2)	Volume *(bbls)	Depth (ft.)	Slope (Inside & Outside)
Pond 1	1,963	2,300	11'	3:1
Pond 2	90,000	195,000	15'	3:1
Pond 3	90,000	195,000	15'	3:1
TOTAL:	181,963	392,300		

The subsurface consists of a sandy loam 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 secondary liner will be made of 30 mil or greater PVC. The primary liner will be made of 30 mil or greater CPER or equivalent. The specification sheet for both liners is attached. The primary line is resistant to sunlight, hydrocarbons, fungus, algae, bacteria and salt water. The secondary liner is resistant to hydrocarbons, fungus, algae, bacteria and salt water. Each liner will be laid in the ponds by rolls and then seamed together.

The leak detection system will consist of 1" perforated laterals 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 ponds will be self contained and the drainage diverted away from the ponds. The ponds are on a gentle slope with no major drainage problems.

b. Drying beds or other pits: There are no drying beds anticipated at this time. If the need arises, the OCD will be notified and their approval obtained prior to any such work being implemented.

c. Other on-site disposal: None anticipated.

3. Ancillary Equipment:

The ponds will be equipped with a commercial aeration system consisting of three rock diffusers and an air compressor. The second system will be a network of perforated PVC pipe laid in the bottom of the pond. The second system will be able to circulate either a liquid or gaseous medium. The specification sheet for the diffusers and air blower are attached. The data for each is indicated by a check mark. There will be a total of 18 diffusers with a capacity of 0.10 cfm or 1.8 cfm. The blower will have a capacity of 3.6 cfm at a hydrostatic pressure of 5.0 psi. The hydrostatic pressure of 13.5' of water will be approximately 5.75 psi. The efficiency of the blower will be reduced by altitude 20%; however, the rate will still be 2.88 cfm. The 2.8 cfm will be more than adequate to supply air to the diffusers.

This system will consist of 2" PVC trunk line and 1" lateral. The laterals will be perforated in gangs on 20' centers with 8, 1/32" holes per gang. (See attached.) The PVC pipe will be anchored to the pond 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 air will be supplied by a Masport pump (130 cfm at 6 psi hydrostatic backpressure).

There will be a total of 288 holes. Each hole will allow 0.42 cfm to pass under 15 psi. The Masport pump delivers 20 psi continuous. If necessary, the Masport pump can be replaced by a compressor. Attached is certification from Engineer Richard Cheney as to the ability to keep the pond odor free. (Also Applicant's Exhibit 11.) Applicant will meet the horsepower requirements of 96 for the pumps on these systems.

The ponds will be equipped with sprayers. The sprayers will be located on a floating island. The island will be anchored to the sides of the pond. The island will consist of at least four nozzles and eight jets. The exact configuration is not known at this time. The sprayers will be supplied by a centrifugal pump with a capacity of at least 14 BWPM. The power supply for the pump will be either a natural gas or electric motor. This system will only be operated during those periods when an attendant is on duty. During periods of high wind or gusts, the system will be turned off. During periods of slight to moderate winds, the pump will be slowed so as to maintain the salt or spray inside the pond.

At this time, no other ancillary equipment is anticipated.

B. Spill/Leak Prevention and Procedures.

1. In as much as the ponds will be double lined, and with the ponds sloped to a sump, there will be no other containment or clean up apparatus necessary.

   If fluids are found in the leak detection sump, receiving fluids for disposal in the affected pond will cease immediately and artificial evaporation and the transportation of fluids to other facilities will begin immediately. The OCD, both locally and in Santa Fe, will be notified within 24 hours of the detection of fluids in the sump. At that time the remedial actions, as outlined above, will be implemented. A sample of the fluid in the sump will be tested for conductivity to determine if its source is the pond. Subject to availability, the water will be disposed of at any one or all three of the following commercial disposal facilities:

   Basin Disposal: Sec. 3-T29N-R11W
   Hicks Disposal: Sec. 15-T28N-R13W
   Southwest Water Disposal: Sec. 32-T30N-R9W

   The leak detection sump will be continually pumped and recycled into the affected pond until such time as the sump dries out. This will indicate the level in the pond at which the leak is located.

   The location and cause of the leak will be determined and repaired. The liner will be tested for multiple leaks upon fill up. If a second or additional leaks are found, the pond will be evaporated below the level and repaired as above. The subsequent repaires will be completed within 30 days of detection, if possible.

   The fluids in the leak detection system will be removed and placed back in the pond to be evaporated.

2. The leak detection system will be the only means in which leaks are to be detected. The sumps will be inspected daily.

C. Closure Plan.

At that point in time, when the facility is to be closed the ponds will be evaporated and left to dry for one year. During the drying period, the leak detection sump will be monitored weekly and the pond will remain locked (closed) to any further dumping. If vandalism becomes a problem, the Sheriff's Department will be notified of the vandalism, breaking and entering of the facility. The pond will be monitored weekly for H2S emissions.

After the drying period, the salts will be marketed if an economical market exists or they will be buried on site, in the original plastic. The pond will then be covered with a PVC liner or clay to prevent any vertical leaching of salts by rain water. An analysis of the precipitated salts will be performed to ascertain if the salts may be buried onsite under the regulations existing at that time. If there are any concentrations of chemical compounds which are not permitted to be buried onsite, they will be extracted at that time. The extraction method will be determined at the time when the compounds are known.

The sludges/salts that cannot be buried at the time of abandonment will be analyzed to determine if they will be acceptable at the onsite facility or the County Landfill. If the waste is not acceptable at the onsite facility or County Landfill, those unacceptable portions of the sludge/salt will be disposed of at the nearest hazardous waste disposal facility.

The ponds berms will be backfilled in to cover the pond and the area recontoured as near as practical to the original contours. The area will then be reseeded.

III. SITE CHARACTERISTICS

A. Hydrologic Features.

1. The nearest running water is the Animas River, which is approximately 1-1/2 miles North. The State Engineers Office in Albuquerque, N.M. was consulted as to the location of the nearest water well. There is a well reported in the SE4, SE4 of Section 34-T30N-R12W. The well encountered water at 25'. The total depth of the well is 107'. A copy of the well record is attached. The well is used for household and livestock watering purposes. A field inspection of the reported quarter section revealed that the well is either abandoned or mis-located in the records.

2. This information is not available as there is no ground water reported within 1 mile of the facility.

3. The flow direction of ground water most likey to be affected by any leak is Northwesterly based upon topography.

4. A water sample cannot be obtained as mentioned above, therfore no analysis is available.

B. Geologic Description of Pit Site.

1. The pit site rests on a paleoerosional surface as evidenced by the attached drillers log. Nine test holes were drilled to determine the soil mechanics. The soil type ranges from a clay/sand mixture to silt/sand mixture and cobbles/boulders.

2. The name and depth of the most shallow aquifer is unknown.

3. Not available.

4. Not available.

C. Flood Protection.

1. The flooding potential at the pit site with respect to major precipitation and/or run off is minimal at best as the pond will be maintained with at least a 1-1/2' freeboard. The facility is located on top of a broad ridge, well out of any established water

courses. In any event, drainage away from the ponds will be accomplished by diversion ditches cut on the uphill side of the facility.

2. The pond is well out of the 100 year flood plan.

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

IV. ADDITIONAL INFORMATION

In as much as these ponds are to be synthetically lined, no further information is necessary at this time.

V. General Construction Requirements.

A. Location.

1. The ponds are out of any water courses.

B. Design and Construction.

1. The natural evaporative capacity for each pond is approximately 175 BWPD. This is based on a net evaporation rate of 48"/year and 90,000 ft(2) surface area. As mentioned earlier, sprayers will be installed as market conditions warrant. The anticipated enhanced evaporation rate is 1050 BWPD per pond. The holding capacity of each pond is approximately 195,000 barrels of water. Being that this is a commercial operation with a relatively infinite market the pond cannot be sized to known produced water volumes. As mentioned earlier, market conditions will dictate the operations of this facility.

2. Wave calculations for a pond with this small of a fetch is difficult. Interpolation of a graph supplied by the U.S. Army Corp. of Engineers indicates that a unidirectional 40 mph sustained wind along the maximum fetch of 424' 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 are remote at best. The wave run up is estimated at 3". The total wave action on the dike is 9". The average yearly rainfall for this area is 12". With the rainfall occuring over the entire year, we feel that an 18" freeboard is adequate.

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

4. The traveling surface of the level top will be twelve feet.

5. See II.3 above.

C. Synthetically Lined Evaporation Pits.

1. Materials:
   a. The synthetic materials used to line the evaporation pits will be flexible. The

specification sheets for the liners are attached.

b. Not applicable.

c. The liners will be at least 30 mils thick.

d. Both the primary liner and secondary liner will be resistant to hydrocarbons, salts, acidic and alkaline solutions, fungus, bacteria and rot. In addition the primary liner will be resistant to ultraviolet light. Washed sand and "pea" gravel will be used between the primary and secondary liner.

2. Leak Detection System:

a. A leak detection system as discussed in II.a.2 will be installed between the primary and secondary liner. The OCD office in Aztec, New Mexico will be notified at least 24 hours in advance of the scheduled installation of the primary liner.

b. A drainage and sump leak detection system will be used. (See II.a.2 above.)

c. Not applicable.

d. The leak detection system will consist of 1" perforated PVC laterals draining at a 2% grade to a perforated 2" PVC main line. The 2" PVC main line 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.

3. Preparation of Pit Bed for Installation of Liners:

a. The bed of the pit and the inside and outside grades 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 onsite characteristics should allow for the liners to be placed directly on the finished berm.

b. An anchor break will be excavated 6" wide, 12" deep and set back a minimum of 9" from the slope break.

4. Installation of Flexible Membrane Liners:

a. The OCD office in Aztec, New Mexico, will be notified at least 24 hours prior to secondary liner installation.

b. The liner will be installed and the joints sealed pursuant to the manufacturers specifications.

c. The liner will rest smoothly on the pit bed and inner face of the levey 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.

d. Two gas vents will be installed on each side of each pond. The liner will be resting on a sandy loam material which should be adequate for venting purposes. A sieve test will be run on the material to be certain no more than 5% of the material will pass through a 200 sieve. The vents will be located approximately 9" down from the berm, break.

e. Used casing or equivalent will be used to anchor the liner in the liner trench.

f. Not applicable.

g. All sand or gravel placement will be completed so as to not jeopardize the liner on which it is placed.

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

D. Clay Lined Pits.

1. Not applicable.
2. Not applicable.
3. Not applicable.

E. Skimmer Ponds/Tanks.

1. Not applicable.

F. Fences and Signs.

1. A fence will be constructed around the entire facility as indicated on the attached drawings. The fence will be of sufficent strength to keep livestock out of the facility. The fence will be closed and locked at all times when the pond is not manned.
2. A sign at least 12' x 24' with 2" lettering will be placed at the facility entrance and will identify the owner/operator, location and emergency phone numbers.

G. Maintenance.

1. The leak detection sumps will be checked for leaks weekly.

2. The outside of the berms will be maintained so as to prevent erosion. After each rain the pond perimeters will be walked to inspect for wash outs.

H. Contingency Plan.

1. As mentioned earlier, if a leak is detected, the OCD will be notified within 24 hours and the spill/leak prevention and procedures set out in II.B. will be initiated immediately.

   Each load will be tested for H2S. If H2S is detected, that load will be treated by the procedure set out by Engineer Richard Cheney at the hearing.

   The ponds will be maintained in an aerobic state. H2S should not be a problem as each pond has three systems in which to keep the pond aerobic.

TABLE A
DYNALOY® POND LINER SPECIFICATIONS

PROPERTY	TEST METHOD	MINIMUM MATERIAL PROPERTIES TEST VALUE	TEST VALUE	TEST VALUE
Gauge (Nominal)		36 mils	40 mils	45 mils
Scrim (reinforcing fabric)		Polyester 9×9-1000 denier	Polyester 9×9-1000 denier	Polyester 9×9-1000 denier
Thickness, mils minimum	ASTM D751			
1. Overall		34 mils	37 mils	41 mils
2. Over Scrim	Optical Method	11 mils	11 mils	11 mils
Breaking Strength (pounds, minimum)	ASTM D751 (grab method)	200 lbs	220 lbs	250 lbs
Tear Strength (pounds minimum)	ASTM D751 (as modified by NSF)			
1. Initial		35 lbs	35 lbs	35 lbs
2. After Aging	Oven aging @ 212 °F 30 days	25 lbs	25 lbs	25 lbs
Low Temperature	ASTM D2136 1/8 in. Mandril 4 hrs., Pass	−40 °F	−40 °F	−40 °F
Dimensional Stability (each direction, percent change maximum)	ASTM D1204 212 °F, 1 hr	2%	2%	2%
Volatile Loss (percent loss maximum)	ASTM D1203 MTD A 30-mil sheet	0.7%	0.7%	0.7%
Hydrostatic Resistance (pounds/sq in minimum)	ASTM D751 Method A, Proc. 1	250 psi	250 psi	250 psi
Ply Adhesion (each direction pounds/in width minimum)	ASTM D413 Machine MTD, Type A, (as modified by NSF)	7 lbs/in width or Film Tearing Bond	7 lbs/in width or Film Tearing Bond	7 lbs/in width or Film Tearing Bond
Resistance to Soil Burial (percent change maximum in original value)	ASTM D3083 30-mil sheet (as modified by NSF)			
Unsupported Sheet				
1. Breaking Strength		5%	5%	5%
2. Elongation at Break		20%	20%	20%
3. Modulus 100% Elongation		20%	20%	20%
Oil Resistance (percent weight change maximum)	ASTM D471 30-mil sheet 7 days @ 158 °F, ASTM oil #2	5%	5%	5%
MINIMUM FACTORY SEAM REQUIREMENTS				
Factory Seaming Method		———— Dielectric Fusion Weld ————		
Bonded Seam Strength (factory seam breaking strength, lbs min)	ASTM D751 (as modified by NSF)	160 lbs	176 lbs	200 lbs
Peel Adhesion (lb/in minimum)	ASTM D413 (as modified by NSF)	——— Ply separation in plane of scrim or 10 lbs/in. ———		
Resistance to Soil Burial (percent change maximum in original value)	ASTM D3083 (as modified by NSF)			
Bonded Seam Strength		−20%	−20%	−20%
Peel Adhesion		−20%	−20%	−20%

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TABLE A
PVC POND LINER SPECIFICATIONS

MINIMUM MATERIAL PROPERTIES

PROPERTY	TEST METHOD	TEST VALUE	TEST VALUE	TEST VALUE	TEST VALUE
Gauge (nominal)		20 mils	30 mils	40 mils	50 mils
Thickness, minimum	ASTM D792 Par. 9.1.3	19 mils	28.5 mils	38 mils	47.5 mils
Specific Gravity	ASTM D792 MTD A-1	1.24 to 1.30	1.24 to 1.30	1.24 to 1.30	1.2 to 1.3
Minimum Tensile Properties (each direction)	ASTM D882				
1. Breaking Factor (lbs/inch width)	MTD A or B one inch wide	46 lbs/in width (2300 psi)	69 lbs/in width (2300 psi)	92 lbs/in width (2300)	120 lbs/in width (2400 psi)
2 Elongation at Break (percent)	MTD A or B	300%	300%	300%	350%
3 Modulus (Force) @ 100% Elongation (lbs/inch width)	MTD A or B	18 lbs/in width (900 psi)	27 lbs/in width (900 psi)	36 lbs/in width (900 psi)	55 lbs/in width (1,100 psi)
Tear Resistance (minimum average pounds)	ASTM D1004 Die C	6 lbs (300 lbs/in)	8 lbs (267 lbs/in)	10 lbs (250 lbs/in)	14 lbs (280 lbs/in)
Low Temperature Impact (50% pass)	ASTM D1790	−15 °F	−15 °F	−20 °F	−30 °F
Dimensional Stability (each direction, percent change maximum)	ASTM D1204 212 °F 15 Min.	±5%	±5%	±5%	±5%
Water Extraction (max % wt loss)	ASTM D3083 (as modified by NSF)	0.35%	0.35%	0.35%	0.35%
Volatile Loss (max % wt loss)	ASTM D1203 MTD A	0.9%	0.7%	0.5%	0.6%
Resistance to Soil Burial (percent change maximum in original value)	ASTM D3083 (as modified by NSF)				
1. Breaking Factor		5%	5%	5%	5%
2 Elongation at Break		20%	20%	20%	20%
3. Modulus @ 100% Elongation		20%	20%	20%	20%
Hydrostatic Resistance (pounds/sq in minimum)	ASTM D751 MTD A	60 psi	82 psi	89 psi	110 psi

FACTORY SEAM REQUIREMENTS

Factory Seaming Method		——————— Dielectric Fusion Weld ———————			
Bonded Seam Strength (factory seam breaking factor pp w. str.)	ASTM D3083 (as modified by NSF)	36.8 lbs/in width	55.2 lbs/in width	73.6 lbs/in width	96 lbs/in width
Peel Adhesion (pounds/inch minimum)	ASTM D413 (as modified by NSF)	——————10 lbs/in Width or Film Tearing Bond——————			
Resistance to Soil Burial (percent change maximum in original value)	ASTM D3083 (as modified by NSF)				
Bonded Seam Strength		−20%	−20%	−20%	−20%
Peel Adhesion		−20%	−20%	−20%	−20%

FIELD SEAM REQUIREMENTS

Field Seaming Method		——————— Bodied Solvent Weld ———————			
Bonded Seam Strength (Seam Breaking Factor)	ASTM D3083 (as modified by NSF)	36.8 lbs/in Width	55.2 lbs/in Width	73.6 lbs/in Width	96 lbs/in Width

Michael E. Stogner, Hearing Examiner
New Mexico Oil Conservation Division
State Land Office Building
Post Office Box 2088
Santa Fe, New Mexico 87504-2088

OCD Case No. 9955

IN THE MATTER OF:
Sunco Trucking Water Disposal
Permit Application for Approval for
Commercial Evaporation Ponds

PROTESTORS' CLOSING ARGUMENT

COMES NOW Harold W. Horner and Doris J. Horner (referred to as "Protestors" herein), by and through their attorney, Gary L. Horner, subsequent to permit hearings held on June 13, 15 and 22, 1990, regarding the subject Sunco Trucking and Waste Disposal (STWD) application for a permit for proposed commercial evaporation ponds (hereinafter "disposal pits" or "ponds"), and hereby makes the following closing argument in writing as ordered by the hearing examiner herein:

SUMMARY

I. The subject STWD application should be denied by OCD for the following reasons:

a) Existing OCD regulations are inadequate to protect surrounding residents, landowners, the environment and the public in general;

b) The closure plan submitted by STWD is inadequate; and

c) The contingency plan submitted by STWD is inadequate.

II. The following recommendations of the OCD staff regarding the imposition of additional requirements on STWD before the subject permit is granted should be adopted and STWD should be required to comply with such additional requirements:

a) Two inch laterals and four inch collectors should be used in the leak detection system as shown in the original drawings;

b) The sumps should be inspected daily;

c) If fluids are found in a sump:

i) The OCD should be notified within 24 hours;

ii) Such water should be sampled to determine if it is rainwater or pond water;

iii) Such sump should be emptied immediately;

iv) Fluids may be returned to the pond; and

v) Fluids must be treated as produced water and disposed of accordingly;

d) If a leak is detected, and until such time as the fluid level of the pond can be lowered below the level of the leak, and the leak repaired:

i) No additional fluids may be introduced into the pond;

ii) Enhanced evaporation should begin;

iii) The contents of the pond should be removed and transported to other facilities; and

iv) Such other restrictions and requirements as may be required by OCD at the time based upon the then existing conditions;

g) A registered professional engineer certify that the system required to be installed by these proceedings is the system that is actually built;

h) Subject ponds must be maintained in aerobic condition;

i) No hydrogen sulfide may be introduced into the ponds;

j) Any incoming water with measurable hydrogen sulfide levels should be treated in a closed vessel, such that all such measurable hydrogen sulfide is eliminated, prior to introduction in any open pond or tank;

k) The treatment of incoming hydrogen sulfide laden fluids must be conducted in a closed system, preferably within the closed tank of the truck that delivers such fluids to the site;

l) No hydrogen sulfide laden fluid may be discharged into a separation tank;

m) Tests shall be conducted, and records made and retained before and after such tests, to insure that the appropriate standards are met;

n) OCD shall retain the authority to insure that the proposed standard of no measurable hydrogen sulfide in open ponds or tanks is met;

o) There shall be no upper limit as to the amount or quantity of produced water received at the subject facility; but cannot exceed freeboard

p) There shall be no upper limit as to the measurable amount of hydrogen sulfide accepted into the facility in incoming loads, prior to treatment as described herein;

q) Tests shall be conducted, and records made and retained of such tests, to determine the dissolved oxygen levels in each pond;

i) Such tests shall be conducted at the beginning and end of each day, or at least twice per 24 hour period;

ii) The sample for each test shall be taken close to the bottom of the pond;

iii) The location of each test should vary around the pond; and

iv) Such sampling will require a method such as a sealable thief or an electronic probe on a cable;

r) A residual oxygen level of .5 ppm shall be maintained in each pond;

s) A registered professional engineer shall certify that entire system has been designed to conform to the standards and requirements imposed herein and elsewhere by OCD;

t) OCD shall maintain a continuing oversight of the operation of the subject facility;

u) Tests shall be conducted, and records made and retained,

of ambient hydrogen sulfide levels;

i) Such tests shall be made at varying locations around the berm of the pond;

ii) Such tests shall be conducted twice per day;

iii) The wind speed and direction shall be recorded in conjunction with each such test;

iv) If a hydrogen sulfide reading of .1 ppm or greater is obtained, an additional reading shall be made within one hour;

v) If a hydrogen sulfide reading of .1 ppm or greater is obtained, the dissolved oxygen level of the pond shall be tested immediately and the need for immediate treatment determined;

vi) If a hydrogen sulfide reading of .1 ppm or greater is obtained, tests for hydrogen sulfide levels shall be made at the fenceline of the subject direct, downwind from the problem pond; and

vii) If two consecutive hydrogen sulfide readings of .1 ppm or greater are obtained, OCD shall be notified immediately;

t) A level of zero hydrogen sulfide shall be maintained in the ponds;

u) The pond fluids shall be tested weekly for hydrogen sulfide or immediately if any measurable hydrogen sulfide is detected in the atmosphere;

v) Tests shall be conducted daily, and records made and retained, of ph levels in the ponds;

w) Ph levels in the pond shall be maintained at 7.0 or above;

x) If no problems regarding sludge are encountered, the bottom of the pond shall be scraped after one year to determine what is down there;

y) If sludge is found to exist a different form of agitation system shall be employed or such sludge shall be cleaned out of the pond and disposed of in accordance with the directives of the OCD;

z) These standards, restrictions, conditions or requirements may be changed in the future based upon experience;

aa) The New Mexico Environmental Improvement Division shall also be notified any time the standards, restrictions, conditions or requirements setforth herein or elsewhere are exceeded or otherwise abrogated or violated;

ab) No oil shall be allowed in the pond;

ac) Any detectable oil in the ponds shall be removed immediately;

ad) If any oil is experienced in the ponds, such ponds shall be netted in accordance with OCD or other New Mexico regulations;

ae) Skimmer tanks shall be netted in accordance with OCD regulations;

af) The spray system shall only be operated when manned;

ag) The spray system shall only be operated when the sprays and mists created thereby are maintained within the pond,

allowing sprays and mists even on the berm of such ponds is unacceptable;

~~ak)~~ The aeration and spray systems here shall be designed to allow for the expansion of such systems if oxygen demand levels experienced exceed 1 ppm;

~~al)~~ The aeration systems be designed to provide sufficient oxygen to the pond to maintain a residual oxygen level of .5 ppm ~~and considering an additional 1 ppm oxygen demand in such pond~~;

~~am)~~ The aeration systems shall be designed such that required oxygen levels and requirements may be maintained without the use of the spray system;

~~ak)~~ 5,000 gallons of bleach shall be maintained on site;

~~al)~~ On site bleach shall be dumped into the ponds periodically such that new bleach may be stored; depending on shelf life

~~am)~~ Operating personnel shall be trained on the instruments to be used and safety requirements; and

~~an)~~ All records of any tests made at the subject facility shall be retained ~~for a period of time as determined by the OCD~~.

III. Over and above the previously mentioned requirements recommended by the OCD staff, certain additional requirements must be imposed on STWD if the proposed commercial evaporation pits (hereinafter disposal pits) are to be operated without creating adverse impacts upon the surrounding residents, landowners, environment and public in general.

~~a)~~ No algae shall be allowed in the ponds;

~~b)~~ If leak is detected in primary liner, in excess of four inch capacity of leak detection system, the level of the subject pond shall be lowered below the level of the leak within one week, and the level of such pond shall remain below the level of such leak until such leak has been repaired;

~~c)~~ If hydrogen sulfide is detected in the pond or in the atmosphere, such hydrogen sulfide shall be eliminated within 24 hours;

~~d)~~ The subject ponds shall be netted;

~~e)~~ As incoming loads are treated, the hydrogen sulfide-chlorine reaction shall be driven to completion before such fluids ma be introduced into the ponds to prevent the introduction of hydrogen sulfide or free sulfur to such ponds;

~~f)~~ The ponds shall be tested for sludge accumulations weekly, if sludge is detected, such sludge shall be removed immediately;

~~g)~~ If sludge is removed from the pond, such sludge shall be tested for its composition and then disposed of at the direction of OCD ~~and EID~~;

h) Tests shall be conducted daily, and records made and retained, of hydrogen sulfide levels at the fenceline in a downwind direction;

i) If hydrogen sulfide levels of .01 ppm or greater are detected in the atmosphere at the fenceline, the OCD and EID shall be notified immediately;

j) If hydrogen sulfide levels of 10 ppm or greater are

detected at the fenceline the residents within a radius of 1.5 miles should be evacuated and traffic on County Road 3500 shall be halted:

k) A registered professional engineer shall estimate the decreased efficiency over time of the aeration and spray systems to be expected in this environment;

l) The aeration and spray systems shall be increased in size, and a regular maintenance program of such systems shall be designed and implemented, to insure that such systems function adequately over time, taking into consideration anticipated system decreases in efficiency due to the subject operating environment;

m) For purposes of use at the subject facility, no bleach shall be stored for periods in excess of ~~one month~~ of shelf life;

n) Operators shall be trained in the chemical relationships and reactions which may be encountered during the course of the operation of the proposed facility;

o) If any of the aeration systems or spray systems become inoperative, notify the OCD ~~and EID~~ immediately;

p) The aeration shall be designed to provide the oxygen required without relying on the transfer of oxygen to the pond at the surface of the pond;

q) The maximum depth of water in the evaporation ponds shall be three (3) feet; and

r) Stiff operating and financial penalties must be imposed upon STWD, if conditions are in fact experienced which adversely impact surrounding property owners, residents and the public in general.

IV. The subject STWD application should be denied even if the above mentioned requirements are adopted for the following reasons:

a) No designs have yet been submitted to, and/or approved by, OCD regarding the fine bubble diffuser system;

b) No designs have yet been submitted to, and/or approved by, OCD regarding the proposed coarse bubble diffuser system;

c) No designs have yet been submitted to, and/or approved by, OCD for the proposed spray system;

d) No adequate plan has yet been submitted and/or approved regarding the disposal of solid wastes or sludges collected, generated, produced, or recovered at the subject facility;

e) No adequate plan has yet been submitted and/or approved regarding the closure of the subject site;

f) No adequate contingency plan has yet been submitted and/or approved regarding the methods and time limits for lowering the level of the pond below the level of a leak and repairing such leak when a significant leak in the primary liner is detected;

g) No adequate contingency plan has yet been submitted and/or approved regarding the time limits for the elimination of hydrogen sulfide emissions from the proposed facility if such hydrogen sulfide emission conditions are in fact encountered;

and

h) The proposed location for the STWD facility is entirely inappropriate.

DISCUSSION

Evaporation ponds such as those proposed here by STWD have a potential for creating disastrous conditions. To understand the magnitude of the problems that may be created, one need only look at the history of the Basin Disposal facility.

The Basin Disposal facility is located within five miles of the proposed STWD facility. The Basin facility was created for the purpose of evaporating produced water, as will be the present STWD facility. The Basin facility opened for business on or about October 1, 1985 after receiving a permit from the OCD. STWD seeks a similar permit in the present proceeding.

However, the situation quickly deteriorated at the Basin facility. By (date of petition), 1987 the residents surrounding the Basin facility had become so annoyed and injured by such facility that they filed a Complaint in District Court (Eleventh Judicial District Court, County of San Juan, State of New Mexico in the matter of State of New Mexico; Timothy Payne, et al., Plaintiffs, v. Basin Disposal Inc., et al., Defendants, Cause Number CV-87-569-1102 (herein referred to as the "Basin case")).

In the Basin case, the Honorable Samuel Z. Montoya entered a Final Judgment (dated June 6, 1989) (such document was administratively noticed herein and marked for identification as Petitioner's Exhibit No. 2) against defendants for the sum of $966,247.90 primarily due to personal injuries suffered by plaintiffs as a result of hydrogen sulfide emissions from Basin Disposal, Inc.'s produced water disposal site.

STWD argues here that there is little similarity between the Basin facility and the proposed STWD facility. But an examination of the STWD application shows that there is very little difference between the Basin facility and the proposed STWD facility. In fact, the proposed STWD facility is so similar to the Basin facility that problems encountered at Basin can be expected at STWD. The two facilities are so similar that they must be compared.

The best analysis of the design and operation of the Basin facility is found in the Court's Amended Findings of Fact in the Basin Case (No. CV-87-569-1102) (herein referred to as "Basin Facts). (Such document was administratively noticed herein and marked for identification as Petitioner's Exhibit No. 1). Since the STWD facility has not yet been constructed, we must rely on the application for permit submitted by STWD and the related supporting documents.

The Basin facility was primarily used as a waste repository for produced water, as will be the STWD facility. The Basin disposal pond consisted of a double lined design, as will the STWD pond. The Basin facility has an evaporation pond capable of holding four million gallons of fluid. The STWD facility will

have three evaporation ponds capable of holding approximately twenty million gallons each. Therefore, the potential problem at the STWD site may be 15 times greater than that at the Basin site.

In the Court's Amended Findings of Fact in the Basin case (filed June 6, 1989) (hereinafter Basin Facts) the Court found that:

"8. The Basin facility is subject to and regulated by the New Mexico Oil Conservation Division ("OCD")....

"10. The location, design, construction, and operation of the facility were approved by the OCD and were in compliance with all applicable permits, rules, regulations and criteria of the OCD." (Basin Facts, page 3.)

The Basin Court also found that:

"7. ...The primary operation of Basin is to serve as a repository for produced water.... Basin's facility is located two and one-half (2.5) miles north of Bloomfield, New Mexico.... The facility presently includes a large evaporation pond capable of holding some four million gallons of fluid, twelve (12) lined mud pits, and numerous storage tanks in various facets of the operation. The facility opened for business on or about October 1, 1985." (Basin Facts, pages 3 and 4.)

The Basin Court also found that:

"13. Basin started to emit hydrogen sulfide gas at least as early as the spring of 1987." (Basin Facts, page 3.)

"14. The levels of hydrogen sulfide gas emitted from Basin have been measured in a range between 0.1 and 300 parts per million (ppm)." However, the Basin Court further found that "[t]*he Gas-Tech monitor used by Basin operators to measure* ambient air emissions of hydrogen sulfide was unreliable. The monitor readings taken from that monitor were and are unreliable and have been systematically measuring the ambient air hydrogen sulfide levels below what the levels were in fact. Defendant's own expert... found in the fall of 1988 that Basin's monitor was incapable of calibration and that it had been underrecording hydrogen sulfide levels." (Basin Facts, page 4).

"15. The emissions of hydrogen sulfide from Basin have continued up to the time of trial, in varying degrees.

"16. The emissions of hydrogen sulfide from Basin carry over to the homes of the plaintiffs in sufficient concentrations to cause adverse physical and psychological effects and to create intolerably obnoxious odors.

"17. The Emissions of hydrogen sulfide from Basin carry over to highway 44 and throughout the surrounding area for a distance of approximately .5 to 1.0 mile north and 1.0 to 1.5 miles south. The odors are obnoxious and offensive to members of the public.

"18. The spray system operated by Basin caused mist from Basin to carry over to the homes and property of [plaintiffs].... The mist left a powdery particulate residue as if a salty substance had been sprinkled on their motor vehicles which was hard to remove and damaged the paint and roof of the vehicles.

"19. During the summer of 1987, a rain storm flushed materials which Basin had allowed to seep into the arroyo immediately south of the facility down the arroyo and onto the property of [plaintiffs].... The 'green foam' which was carried onto these plaintiffs' properties left a scummy residue.

"20. The emissions of hydrogen sulfide from Basin were caused by the activity of bacteria which existed in the anaerobic environment created in the evaporation pond.

"21. The hydrogen sulfide emissions were caused by the design and operation of the waste disposal facility including the following acts and omissions by Basin and individual defendants.

"a. the depth of the pond in excess of eleven feet;

"b. the acceptance of volumes of produced water two to three times in excess of the design capacity;

"c. the increase in maximum water level of the pond;

"d. the operation of the spray system;

"e. the failure to monitor incoming loads of produced water from[sic] hydrogen sulfide prior to the summer of 1987;

"f. the failure to permit loads of produced water to settle prior to being placed in the main evaporation pond;

"g. the failure to increase the number of settling tanks to accommodate the increased volume of produced water;

"h. the ongoing presence of free-floating oil on the surface of the main evaporation system;

"i. the failure to remove sediments and sludge from the main evaporation pond;

"j. the policy of the defendants to take every load of produced water brought to the facility regardless of its source or content;

"k. the failure to exercise due caution with regard to loads of materials which may have contained high concentrations of bacteria, sulfides, or sulfates;

"l. the decision to accept loads of produced water containing high concentrations of hydrogen sulfide and to store those loads in tanks with vents exposing the contents to the atmosphere." Basin Facts, page 4 to 6.

The Basin Court further found that:

"28. The emissions of hydrogen sulfide from Basin caused the plaintiffs to experience adverse health effects. The emissions of hydrogen sulfide caused the following physical effects either by direct exposure or as an indirect effect resulting from the stress of living in a noxious environment: eye irritation, nose irritation, throat irritation, lung irritation, headaches, nausea, vomiting.[sic] bloody noses, insomnia, irritability, and diminished concentration.

"29. The emissions of hydrogen sulfide from Basin also caused the plaintiffs to suffer adverse psychological effects. The emissions of hydrogen sulfide from Basin caused the plaintiffs to experience anxiety, depression, anger, and frustration. The emissions of hydrogen sulfide also caused [plaintiffs]... to develop post-traumatic stress disorder."

"30. There is a need in San Juan County for disposal

facilities for produced water. Basin, however, has accepted produced water regardless of whether the source was San Juan County or even New Mexico. In fact, within weeks of opening October 1, 1985, Basin's volume of intake was 1500 to 2000 bbls per day. The design capacity of the evaporation pond was 750 bbls. per day. A substantial or significant portion of this produced water did not come from the vulnerable areas in the San Juan Basin, but rather was trucked in from the Amoco fields in southern Colorado." Basin Facts, pages 7 to 8.

The Basin Court further found that:

"42. The emissions of hydrogen sulfide affect a substantial number of persons, both plaintiffs and non-plaintiffs, who live and work in the vicinity of Basin.

"43. The emissions of hydrogen sulfide from Basin disperse throughout the area and cause offensive and obnoxious odors affecting persons driving on highway 44 and those individuals who live and work in the vicinity of Basin. These emissions of hydrogen sulfide have caused adverse health effects to some persons who have traveled the public roads and highway near Basin or who work in the vicinity....

"45. The emissions of hydrogen sulfide are injurious to the public health and welfare.

"46. The emissions of hydrogen sulfide interfere with the exercise and enjoyment of public rights and the right to use the public thoroughfares in the residential areas around Basin and on the highway.

"47. The emissions of hydrogen sulfide from Basin have diminished the property value of the land surrounding the facility.

"48. The emissions of hydrogen sulfide from Basin constitute an unreasonable interference with rights common to the public....

"53. The defendant's conduct... was not reasonable and it was reasonably foreseeable that the hydrogen sulfide, which defendants knew was a material with dangerous properties present in produced water, would be emitted from the evaporation pond...." Basin Facts, Pages 12 to 13.

The STWD disposal pits, like the Basin facility, is designed to dispose of produced water. Hopefully, if the STWD facility is ever constructed, the location design, construction and operation of such facility will be approved by and in compliance with all applicable permits, rules, regulations and criteria of the OCD, as was the Basin facility.

Conditions found at the Basin facility indicate that produced water brought to the STWD disposal pits can be expected to contain hazardous levels of hydrogen sulfide gas.

Conditions found at the Basin facility indicate that conditions at the STWD disposal pits can be expected to generate hazardous levels of hydrogen sulfide gas.

Conditions found at the Basin facility indicate that the spray system to be utilized by STWD will increase the level of airborne hydrogen sulfide emissions from the STWD disposal pits.

Conditions found at the Basin facility indicate that the proposed STWD disposal pits will represent an unreasonable risk to the health, safety and welfare of those members of the public utilizing the new County Road No. 3500.

The Guidelines for Permit Application, Design and Construction of Waste/Storage Disposal Pits, published by the OCD, with respect to which the STWD application was prepared, is substantially the same as the regulations in effect at the time Basin Disposal applied for a permit for its facility. The public should not be led to expect that their health, safety and/or welfare will in any manner be protected, or assured from harm, from hazardous conditions that may be associated with the STWD disposal pits, simply because STWD may have complied with all applicable permits, rules, regulations and/or guidelines promulgated by OCD with respect to the location, design, construction or operation of the proposed STWD disposal pits.

With respect to regulation of hydrogen sulfide emissions, there appears to be only two applicable rules promulgated by the OCD. The first such rule is OCD Rule 118. OCD Rule 118 states that "the intent of this rule is to provide for the protection of the public's safety in areas where hydrogen sulfide ... gas in concentrations greater than 100 parts per million (PPM) may be encountered." Such rule is in fact woefully inadequate to protect the public in light of the hazards presented by hydrogen sulfide.

The National Safety Council has established that hydrogen sulfide can cause hemorrhaging and death at exposure levels of 100-150 parts per million over an 8-48 hour period. The National Safety Council has further established that hydrogen sulfide can cause coughing, collapse and unconsciousness at exposure levels of 500-600 parts per million over a 0-2 minute period and that exposure levels in excess of 600 parts per million can cause death within 0-2 minutes.

The Basin Court found that the applicable emission standard for hydrogen sulfide should be EIB Air Quality Control Regulation 201 (such document was administratively noticed herein and marked for identification as Petitioner's Exhibit No. 3) which limits such emissions to 0.010 parts per million. Therefore, OCD Rule 118 would allow hydrogen sulfide emission levels 10,000 times greater than allowed by the EIB AQCR 201 or by the Basin Court.

The inadequacy of OCD Rule 118 is made more apparent when compared to the Environmental Improvement Board Air Quality Control Regulation 627 (such document was administratively noticed herein and marked for identification as Petitioner's Exhibit No. 4). EIB AQCR 627 limits hydrogen sulfide levels inside the stacks ("undiluted effluent gas stream") of petroleum processing facilities to 10 ppm by volume unless such effluent gas stream is passed through a device capable of oxidizing the hydrogen sulfide to sulfur dioxide. Therefore, OCD Rule 118 would allow the public to be exposed to hydrogen sulfide levels 10 times greater than the EIB would allow inside smokestacks.

The second rule, promulgated by OCD which may be applicable

to the subject STWD application with regard to the emission of hydrogen sulfide, is the Contingency Plan expressed in the OCD Pit Guidelines which states that: "[a] contingency plan in the event of... a release of [hydrogen sulfide]... shall be submitted for approval along with the details for pit construction. The contingency plan will outline a procedure for... aeration and treating pit fluids for [hydrogen sulfide]... generation, [hydrogen sulfide]... monitoring and notification of appropriate authorities." (OCD Pit Guidelines, V.H.1., page 10.)

With respect to proposed methods for the mitigation of hydrogen sulfide emissions from the STWD disposal pits, the STWD application provides only that "[t]he ponds will be equipped with a commercial aeration system. The aeration systems will be placed in the bottom of the ponds and will consist of three rock diffusers. The location of the diffusers will be equidistant (as close as practical) from each other. They will be anchored to the pond bottom by bricks and or sand tubes. A second aeration system will be placed in the pond bottom as well. This system will consist of a network of perforated 1" and 2" PVC pipe. The system will be able to circulate either a liquid or a gaseous medium. Further details will be forwarded as it becomes available." (Emphasis added.) (STWD application II.A.3.A.) The STWD application further provides that "[e]ach load will be tested for [hydrogen sulfide].... If [hydrogen sulfide]... is detected that load will be isolated and the operator will determine if the water is to be removed or if STWD will treat the load. If STWD treats the load sufficient chlorine will be added so that residual chlorine is present prior to the water being drained into the skimmer pond."

"The ponds will be maintained in an aerobic state. [Hydrogen sulfide]... should not be a problem as each pond has three systems in which to keep the pond aerobic." (STWD application V.I.)

The STWD aeration systems have not been properly sized, detailed drawings and calculations of such aeration systems have not been offered to demonstrate sufficiency of the proposed aeration systems. STWD did offer a description of the aeration system they intended to use in their August 18, 1989 letter to OCD (such letter was admitted into evidence and marked as Exhibit No. 3). It should be noted that, at that time, STWD appeared to be contemplating a single aeration system. In the same letter, STWD enclosed a specification sheet on the compressor to be employed in the subject aeration system. Said STWD information indicated that the subject compressor would have a 1/3 horsepower motor.

In a letter dated November 3, 1989 from OCD to STWD, OCD required STWD to "[s]ubmit the design criteria and calculations used to determine if the aeration systems are properly designed and sized to maintain the pond(s) ia an aerobic state and preclude the emissions of [hydrogen sulfide] gas. A Registered Professional Engineer that specializes in waste water storage and treatment is required to certify the adequacy of the design and

construction of the system."

STWD replied by letter dated April 17, 1990. (Such letter was admitted into evidence and marked as Exhibit No. 4.) Attached to said letter, was a document prepared by Richard Cheney, a Registered Professional Engineer, wherein Mr. Cheney attempted to size the pump on the subject aeration system. Mr. Cheney determined that a 32 horsepower blower motor would be required on the aeration system given the assumption that a .5 milligram per liter residual of dissolved oxygen would be sufficient to maintain the ponds in an aerobic condition. Mr. Cheney further qualified his position when he stated "we believe that the recirculation/spray evaporation system will be critical to the successful operation of the facility." However, no details on such recirculation/spray evaporation system have yet been provided.

The 32 horsepower blower motor recommended by the professional engineer was 100 times greater than the 1/3 horsepower motor initially recommended by STWD. Mr. Cheney explained during cross examination on June 15, 1990 that even the 32 hp system could not be relied upon by itself to provide adequate aeration of the pond. By this time STWD was talking about two aeration systems: a fine bubble diffuser system and a coarse bubble diffuser system. The 32 hp blower motor discussed would be installed on the coarse bubble aeration system. Mr. Cheney indicated that a like sized blower motor would be required on the fine bubble aeration system. Mr. Cheney also recommended that all such systems should be designed together and certified by a registered professional engineer.

By June 22, 1990, Mr. Cheney had decided that the original assumption of .5 milligrams per liter (ppm) was inadequate to do the job properly, and had decided that an additional 1.0 ppm oxygen demand requirement should be proved for. Therefore, by June 22, 1990, Mr. Cheney was recommending that a 96 horsepower blower motor be used on the coarse bubble aeration systems of each pond. Still no designs had been submitted and no information whatsoever had been provided regarding the fine bubble aeration system or the recirculation/spray evaporation system. Mr. Cheney indicated that such recirculation/spray evaporation system may still be required to provide adequate oxygen levels in the pond.

STWD has provided no explanation with respect to how well such aeration systems will perform as sludge builds up in the pits. In fact STWD refuses to acknowledge that there will be any sludge build up in the pits. STWD ignores the Basin finding that sludge build up created a concentrated environment for anaerobic bacteria and that such sludge build up was a significant cause of the generation of hydrogen sulfide in the pond. STWD's position, refusing to acknowledge the possibility of sludge build up, is entirely untenable when considering that the same substances will be placed in the STWD ponds as was placed in the Basin pond. However, STWD does acknowledge that there will be several feet of something left over, after the pond has fulfilled its

purposes, that will need to be buried on site forever.

No explanations have been provided with respect to how sludge is to be removed from such pits without damaging such aeration systems. Therefore, Protestors, surrounding residents and the public in general should not be misled with respect to the sufficiency of such systems or the ability of STWD to adequately control hydrogen sulfide emissions from the STWD disposal pits.

The Basin Court ordered "that the defendants may operate their produced water disposal facility only under the following conditions:

"1. that the defendants maintain the disposal pit in an aerobic condition;

"2. keep the level of water in the disposal pit at a depth of no more than three (3) feet;...

"5. continue the present chemical treatment of the settling tanks and the disposal pit;...

"8. continue monitoring the emissions of hydrogen sulfide and limit such emissions to 0.010 parts per million, in compliance with the ambient air quality standards as promulgated by the environmental Improvement Board of the State of New Mexico under its Air Quality Control Regulation 201 dated June 15, 1981;

"9. monitor the build-up of sludge in the bottom of the disposal pit and remove same, if anaerobic conditions begin to develop in the disposal pit." (Basin Case, Final Judgment, entered June 6, 1989, page 3.)

STWD plans to operate its disposal pit at depths up to 13.5 feet (STWD application II.A.2.A.), rather than limiting such depths to three (3) feet as ordered upon Basin by the Basin Court. The maximum depth of water in the STWD disposal pits should be limited to three (3) feet as ordered in the Basin case.

STWD has not stated that it intends to limit hydrogen sulfide emissions to 0.010 parts per million, as ordered in the Basin Case. In fact STWD has stated that their minimum threshold measurements for hydrogen sulfide will be 0.1 ppm. Therefore, the minimum measuring threshold STWD intends to employ is 10 times greater than the allowable ambient air quality standard for hydrogen sulfide as promulgated by the New Mexico EIB in AQCR 201.

It does not appear that either STWD or OCD intend to involve the New Mexico Environmental Improvement Division (hereinafter EID) in the permitting or approval process of the STWD application for disposal pits, although it is the EID who apparently has been charged with the responsibility for regulating air quality control.

The New Mexico Environmental Improvement Board Air Quality Control Regulation 702 A. (administratively noticed herein and marked for identification as Petitioner's Exhibit No. 5) provides that "Any person constructing or modifying any new source of an air contaminant, which source, if it were uncontrolled,... would result in the emission of a hazardous air

pollutant, must obtain a permit from the department prior to the construction or modification." Therefore, EIB AQCR 702 A. clearly requires a permit of STWD for the proposed facility since such facility, if uncontrolled, would clearly result in the emission of the hazardous air pollutant hydrogen sulfide.

However, problems arise in that the Air Quality Bureau of the New Mexico Environmental Improvement Division, who have been charged with enforcing such EIB air quality control regulations, appear to have no resources, time or interest in requiring STWD or others to apply for such permits, or to enforce such EIB regulations against such facilities as contemplated here. In fact, the Air Quality Bureau does not require permits or enforce such regulations regarding waste water treatment facilities, which also if uncontrolled, would produce hazardous levels of hydrogen sulfide.

Unfortunately, it currently appears that neither this STWD application nor any other STWD application, will be reviewed by the New Mexico Environmental Improvement Division with respect to potential compliance with respect to such EID regulations. Therefore, it currently appears that if surrounding property owners, residents and the public in general are to be protected from the potential hydrogen sulfide hazards here, the OCD must be prepared to assume the role of protector.

For the source of its jurisdiction regarding the regulation of hydrogen sulfide emissions from sources regulated by the OCD, OCD may look to OCD Rule 118 (discussed herein). The OCD may also look to Sections 72-2-12 (15), (21) and (22) NMSA 1978 (1989 Repl.). Said subsection (15) provides that the OCD is authorized to make rules, regulations and orders for the purpose of regulating "the disposition of water produced or used in connection with the drilling for or producing of oil or gas or both and to direct surface... disposal of the water...." Said Subsection (21) provides that the OCD is authorized to make rules, regulations and orders for the purpose of regulating "the disposition of nondomestic wastes resulting from the exploration, development, production or storage of crude oil or natural gas to protect the public health and environment." (emphasis added). Said subsection (22) also provides that the OCD is authorized to make rules, regulations and orders for the purpose of regulating "the disposition of nondomestic wastes resulting from the oil field service industry, the transportation of crude oil or natural gas, the treatment of natural gas or the refinement of crude oil to protect the public health and environment...." (emphasis added).

Therefore, OCD has clearly been charged with the responsibility of protecting the public health and environment in connection with such produced water disposal facilities as presently being considered. An absolutely essential element of protecting the public health and environment here is the regulation and prevention of hydrogen sulfide emissions from such facility. It has been clearly established that such hydrogen sulfide emissions are extremely dangerous to the public

health and environment.

If STWD is allowed to construct said disposal pits as proposed, the value of Protestors property as potential residential property will be greatly diminished. Such residential development of Protestors property may be precluded altogether.

STWD apparently argues that the operation of the STWD facility will be different from the operation of the Basin facility, such that problems encountered at Basin may not reasonably be expected at STWD. However, the factors causing the hydrogen sulfide emissions at the Basin facility should be compared to the anticipated conditions at the STWD facility.

The Basin Court found that:

"40. Among the unreasonable actions or omissions of defendants in failing to reasonably or adequately cure the known conditions causing the hydrogen sulfide emissions are the following:

"a. the failure to drain the pond and clean out the sludge which was a major source of the hydrogen sulfide emissions because the sludge was a concentrated anaerobic environment;

"b. the failure to install, in a timely manner, an adequate aeration system;

"c. installing an inadequate and underpowered aeration system, when defendants belatedly installed one in August of 1988;

"d. the continued use of the spray system after it was known or reasonably should have been known to defendants that the operation of the spray system would 'strip' the water of hydrogen sulfide and thereby cause increased offensive and unhealthy hydrogen sulfide emissions;

"e. continuing to accept produced water and other drilling fluids at rates in excess of the facility's design capacity and thereby continuing conditions which would maintain an anaerobic environment;

"f. continuing to take produced water with unreasonably high levels of hydrogen sulfide, sulfides, and sulfates;

"g. selection of the Biogenesis material as the primary mechanism of chemical remediation, without adequate investigation and under circumstances in which defendant knew or reasonably should have known that the Biogenesis material would not effect an adequate remedy to the conditions causing hydrogen sulfide emissions;

"h. the treatment of the pond with concentrations of chemicals which defendants knew to be insufficient to effect a solution to the hydrogen sulfide problem;

"i. the storage of produced water containing high concentrations of dissolved hydrogen sulfide in storage tanks which were not completely closed, thereby allowing hydrogen sulfide emissions into the atmosphere." Basin facts pp. 10-12.

In comparison to the Basin problems, STWD refuses to

acknowledge the possibility of sludge build up, and thus, refuses to agree to a plan of cleaning out such sludge. As previously stated, the Basin Court found that the build up of sludge in the pond was a major factor in the production of hydrogen sulfide. It is quite apparent that the same types of fluids will be going into the STWD ponds as went into the Basin pond. Therefore, if sludge was a problem at the Basin facility, sludge may properly be expected to be a problem at the STWD facility.

Once STWD comes to terms with the necessity of sludge removal, it must be determined what to do with such sludge. Therefore, how such sludge is to be disposed of, must be a part of the plans submitted by STWD and approved by OCD.

The needed sludge disposal plan also has a significant bearing on the STWD closure plan. Once a method of disposing of such sludge is determined, there will be no need for on site burial of the sludge at the end of the useful life of the ponds.

In comparison to the Basin problems, the aeration system initially proposed by STWD was entirely inadequate. In the Basin case, the initial lack of aeration system, and then the installation of an inadequate and underpowered aeration system, was a significant factor in the generation of hydrogen sulfide at the Basin facility.

If the latest STWD plan is to install 2-96 hp aeration systems, the current plan (after seeking the advise of an engineer) is 600 times larger than the initially proposed 1/3 hp system. Even if the STWD plan is currently to install 2-96 hp aeration systems, no detail drawings of such systems have been submitted by STWD for OCD review. In fact, it is not apparent what the STWD aeration system plan is at this point. STWD has not yet submitted such plans or otherwise committed to any type, or size of aeration system. Likewise, such STWD aeration systems have not been approved by OCD.

In comparison to the Basin problems, STWD may still be relying upon the spray system, in addition to the aeration systems, to provide adequate oxygen levels in the ponds. As found at Basin, when hydrogen sulfide is present, the use of the spray system "strips" the hydrogen sulfide from the water and increases the damage to the surrounding environment. Therefore, during hydrogen sulfide conditions, STWD should not use the spray system, although STWD may be relying on the use of the spray system at such times to increase oxygen levels in the ponds. The spray system should also not be used during windy conditions to avoid damage to surrounding property, residents and the public in general. Therefore, several factors may prevent the use of the spray system at any particular point in time. If the pond is in such a state that additional oxygen must be added to the pond at such time, the systems should be designed such that the aeration systems standing alone, without the spray systems, are capable of adding the entire oxygen requirement to the pond.

In comparison to the Basin problems, it appears that the OCD may be anticipating putting no restrictions on the amount of incoming fluids at the STWD facility. In the Basin case it was

determined that the acceptance of produced water at rates in excess of the facility's design capacity was a significant factor in Basin's inability to control the pond environment. Here, the system design should be finalized and the maximum intake rate should then be determined based upon the systems to be installed. Reasonable incoming load rate limits should then be imposed upon the operation of the STWD facility.

In comparison to the Basin problems, it appears that OCD may be anticipating placing no restrictions on the level of hydrogen sulfide, sulfides, and/or sulfates accepted into the STWD facility. In the Basin case it was determined that acceptance of loads with no restrictions on hydrogen sulfide, sulfides and sulfate levels was a significant factor causing hydrogen sulfide emissions at such facility. The in-truck pretreatment scheme proposed by STWD as an after thought at the subject hearing should be properly designed and tested to determine realistic levels of hydrogen sulfide that may be accepted at the STWD facility. Also, no where has anyone considered the danger of hydrogen sulfides and sulfates in incoming loads. Also, no testing procedures, acceptance limits or treatment schemes have been offered, analyzed, considered, or approved for such hydrogen sulfides and/or sulfates. Testing schemes, acceptance limits and treatment plans should be submitted and approved before the present STWD facility is permitted.

In comparison to the Basin problems, STWD had initially envisioned transferring incoming loads into large open tanks for the separation of oils prior to transferring the water to the main evaporation ponds. Then STWD proposed to treat such waters for hydrogen sulfide in such open separation tanks. The Basin case found that the storage of incoming loads containing hydrogen sulfide in tanks with merely open vents was a significant factor in the release of hydrogen sulfide emissions from the facility. Thus, the dumping of incoming loads into open tanks or ponds should never be allowed until such loads have been tested, and treated if necessary, to insure that no hydrogen sulfide, sulfides or sulfates are present in such load.

STWD has proposed that said disposal pits be located in the northwest quarter of Section 2, Township 29 North, Range 12 West, San Juan County, New Mexico. Protestors own the parcel of land directly west of the proposed location of the proposed disposal pits. Protestors property being approximately described as the east 866 feet of Section 3, Township 29 North, Range 12 West, San Juan County, New Mexico. Protestors property being situated within one-half mile of the proposed location of said disposal pits.

Protestors intend, and have intended for some time, to subdivide the aforementioned property for residential purposes when market conditions allow. In order to facilitate such future residential uses of said property, Protestors have caused to be installed: a 500,000 gallon water tank located in the southwest quarter of Section 1, Township 29 North, Range 12 West, San Juan

County, New Mexico; as well as, a portion of a water line to be used to serve Protestors property from said water tank.

Crouch Mesa, where both the subject disposal pits are to be located and where Protestors property is located, is relatively flat, lying relatively equidistant between Farmington, Aztec and Bloomfield. Therefore, Crouch Mesa currently has significant potential for future residential development. The proposed STWD facility could eliminate the possible future development of surrounding properties.

County Road 3500, which provides access between Flora Vista and highway 64 (between Farmington and Bloomfield), crosses applicants property (quarter section) and, therefore, passes within one-quarter mile of the proposed STWD disposal pits. The proposed STWD facility then represents a potential health hazard to the general public traveling County Road 3500. In the Basin case, the Basin facility was found to create health hazards for those individuals travelling Highway 44.

Thousands of acres exist within San Juan County that have no development potential in the foreseeable future. Many potential sites are available for such facilities where surrounding property owners would not be excessively burdened by such facilities. The currently proposed site for such STWD facility should not be considered further, simply due to its location.

The design proposed by STWD is inadequate with respect to the contamination of surrounding soils and ground water, in that STWD proposes:

a) to initially construct a single large evaporation pond (see STWD letter dated May 19, 1989 requesting administrative approval for disposal pits - hereinafter STWD application-II.A.1.);

b) in the event of a leak in the single pond, STWD proposes to artificially evaporate said pond until the water depth is below the leak (see STWD application II.A.3.B.1.);

c) in the event of a leak in the single pond, the leak detection system will be recycled to the main pond until market conditions warrant a second pond and the leak can be repaired in the first pond (see STWD application II.A.3.B.1.).

The primary liner will be tested for leaks by monitoring the leak detection system and associated sump. The secondary liner will never be tested for leaks. If a leak develops in the primary liner, the secondary liner will become the primary barrier between the pond and surrounding soils. If the secondary liner has become the primary barrier, but the secondary liner has never been tested for leaks and the use of such evaporation pond is continued without interruption for undetermined, possibly extended periods of time, leaks may be experienced to the surrounding soils for extended periods of time with no provisions being made for the detection or correction of such leaks in the secondary liner. Therefore, the design of such system is inadequate to protect surrounding soils when a single evaporation pond is utilized.

Further, STWD has stated that if a leak is experienced in

the primary liner, it may take as long as nine months before the level of the pond is brought below the level of the leak. Exposing surrounding soils to such conditions for such extended periods of time is simply unacceptable.

Further, STWD proposes that "[i]f a leak is detected, the leak detection system will be pumped into one of the other ponds and the pond that is leaking will be lowered until such depth as the water is below the leak" (see STWD application II.A.3.B.1.). If the second evaporation pond is not built until market conditions allow, such pond will only be built when the capacity to be utilized exceeds the capacity of a single evaporation pond. At such time, when the capacity required exceeds the capacity of a single pond, it will not be possible to completely drain one pond by removing the products from that pond and placing such products in the second pond. Therefore, the system as proposed by STWD will never be sufficient to provide for the draining of such ponds in order to repair leaks.

The closure plan proposed by STWD is not adequate in that the sludge, remaining after the life of the disposal pits, will simply be buried in the ground on site (see STWD application II.A.3.C.1.). OCD apparently believes that such products constitute a risk to surrounding soils and ground water such that double lined evaporation ponds are required to prevent the contamination of surrounding soils and ground water. To simply allow such products to be buried, wrapped in plastic, for all eternity appears to constitute significant risks to the surrounding environment.

The STWD application does not address the use of injection wells on the site. Pursuant to such application, it would appear that injection wells are not anticipated on the subject site. It would appear that evaporation ponds and injection wells are both viable alternatives for the disposal of produced water. It would appear that the choice between evaporation ponds and injection wells would be based largely upon economics. Protestors understand that such injection wells are not covered by the subject disposal pit application process. It appears that nothing in the STWD application precludes the installation and use of such injection wells in the future. Therefore, it appears that STWD may elect to utilize injection wells at the subject site in the future if market conditions warrant. Such injection wells could create significant contamination of local soils and ground water supplies. If the disposal pits currently being sought are approved, the existence of such disposal pits in the future would probably weigh heavily in favor of allowing STWD to utilize injection wells on the same site.

The Notice Of Publication provided by OCD with respect to the STWD application states that "[t]he ground water most likely to be affected by any accidental discharges is at a depth in excess of 80 feet with a total dissolved solids content estimated at 2000 mg/l." It is unclear to Protestors how the ground water most likely to be affected by accidental discharges can be at a depth in excess of 80 feet unless someone is

intending to inject products into the ground at depths in excess of 80 feet. Again, if STWD or someone else is intending to use injection wells on the subject site, Protestors have not been notified of such intent and would certainly protest such injection wells if proposed.

Protestors adamantly protest the design, construction and location of the STWD disposal pits as proposed. However, Protestors do not perceive the subject STWD application for disposal pits standing alone. Rather, Protestors perceive such application as additionally opening the door to a house of horrors that may yet include additional evaporation ponds, injection wells, unlined mud pits, uncontrolled expansion, accidental discharges, emissions of hydrogen sulfide and other airborne noxious gases, contamination of ground water supplies and contamination of ground surfaces and surface waters.

CONCLUSION

Protestors respectfully:

1. State that the disposal pits proposed by STWD would pose intolerable and totally unacceptable harm with respect to the value of their property, the health, safety and welfare of future residents of such area and would unreasonably restrict their own use and enjoyment of their property;

2. Request that the STWD application be denied as proposed;

3. Request that the subject STWD application be denied even if the above mentioned requirements are adopted for the following reasons:

a) No designs have yet been submitted to, and/or approved by, OCD regarding the fine bubble diffuser system;

b) No designs have yet been submitted to, and/or approved by, OCD regarding the proposed coarse bubble diffuser system;

c) No designs have yet been submitted to, and/or approved by, OCD for the proposed spray system;

d) No adequate plan has yet been submitted and/or approved regarding the disposal of solid wastes or sludges collected, generated, produced, or recovered at the subject facility;

e) No adequate plan has yet been submitted and/or approved regarding the closure of the subject site;

f) No adequate contingency plan has yet been submitted and/or approved regarding the methods and time limits for lowering the level of the pond below the level of a leak and repairing such leak when a significant leak in the primary liner is detected;

g) No adequate contingency plan has yet been submitted and/or approved regarding the time limits for the elimination of hydrogen sulfide emissions from the proposed facility if such hydrogen sulfide emission conditions are in fact encountered; and

h) The proposed location for the STWD facility is entirely inappropriate.

4. Request that the STWD application be denied as such

application may possibly be amended with respect to the proposed location.

Respectfully submitted by:

July 12, 1990

GARY L. HORNER, Esquire
Date
Attorney for Protestors, HAROLD and DORIS HORNER
P.O. Box 2497
Farmington, New Mexico 87499
(505) 326-2378

CERTIFICATE OF SERVICE

I hereby certify that a true copy of the foregoing PROTESTOR'S CLOSING ARGUMENT was mailed by first-class postage, or delivered, to the following individuals this 12th day of July, 1990:

JOHN A. DEAN, JR., Esquire
Attorney for Applicant, SUNCO TRUCKING and WASTE DISPOSAL
506 West Arrington
Farmington, New Mexico 87401

GARY L. HORNER, Esquire

STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

EXAMINER HEARING

IN THE MATTER OF:

Application of Sunco Trucking Water Disposal for a permit to construct and operate a commercial wastewater evaporation pond, San Juan County, New Mexico

Case 9955

TRANSCRIPT OF PROCEEDINGS

BEFORE: MICHAEL E. STOGNER, EXAMINER

STATE LAND OFFICE BUILDING

SANTA FE, NEW MEXICO

June 13, 1990

STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

EXAMINER HEARING

IN THE MATTER OF:

Application of Sunco Trucking Water Disposal for a permit to construct and operate a commercial wastewater evaporation pond, San Juan County, New Mexico — Case 9955

TRANSCRIPT OF PROCEEDINGS

BEFORE: MICHAEL E. STOGNER, EXAMINER

STATE LAND OFFICE BUILDING

SANTA FE, NEW MEXICO

June 15, 1990

ORIGINAL

CUMBRE COURT REPORTING
(505) 984-2244

STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

CASE 9955

EXAMINER HEARING

IN THE MATTER OF:

Application of Sunco Trucking Water Disposal for a Permit to Construct and Operate a Commercial Wastewater Evaporation Pond, San Juan County, New Mexico.

TRANSCRIPT OF PROCEEDINGS (Volume III)

BEFORE: MICHAEL E. STOGNER, EXAMINER

STATE LAND OFFICE BUILDING

SANTA FE, NEW MEXICO

June 22, 1990

SUNCO TRUCKING COMPANY
WATER AND OILFIELD HEAVY HAULING P.O. BOX 443, FARMINGTON, NM 87499 (505) 327-0416

New Mexico Oil Conservation Division
PO Box 2088
Santa Fe, NM 87504-2088

April 17, 1990

ATTN: Roger Anderson

SUBJECT: Commercial Disposal Facility
NW/4 Section 2-T29N-R12W
San Juan County, New Mexico

Dear Mr. Anderson:

Pursuant to your letter of ~~July~~ 20, 1989, I would like to address each item separately.

1) The manufacturer's specifications sheet for chemical resistance are attached.

2) Please see attached certification dated March 26, 1990 being performed by Brewer Associates,INC., Farmington, NM.

3) Please be advised that the second pond will be constructed commensurate with the first pond however the second pond will not be lined until market conditions dictate. The third pond will constructed and lined once the market conditions further warrant its construction. The weathered surface of pond two will be ripped and recompacted to the original density requirements prior to being lined.

4) I would like to make a few comments regarding the contingency plan the NMOCD has placed upon determination of a leak in the primary liner.

First: If the affected pond happens to be at free board capacity, 20 acre feet of water, (155,160 bbl's) and none of the other ponds are operational and or full there are some physical constraints regarding the emptying of this pond. To comply with your request to empty the pond within seven (7) days would require the disposal and transportation of 1939.5 (80 bbl) loads in a period of seven (7) days, or the equivalent of 277+ loads per day. There is not currently any one or any combination of existing commercial facilities that can handle such a volume. We believe this to be an unrealistic and physically impossible request.

Secondly: If the purpose of the secondary liner is only for short term containment, why is the liner required to be a minimum of 30 mills thick?

Thirdly: Even if the secondary liner were punctured there will be some inherent impermeability due to the compaction of the subgrade and the general nature of the subsoil. Once the liner(s) were repaired the water would be bound by capillary action to the subsoil.

We would like to offer the following contingency plan as a compromise to the original plan and your recent request.

A. Immediately cease receiving fluids for disposal in the affected pond.

B. Drain the affected pond into the unaffected ponds if available. If none of the ponds are available, commence evaporation and evaporate the pond for a period not to exceed 100 days. If during that period the pond has not been lowered below the source of the leak the water will be hauled away until the water level is below the source of the leak. The water will be disposed of at any one or all three of the following commercial disposal facilities:

    Basin Disposal: Sec 3-T29N-R11W
    Hicks Disposal: Sec 15-T28N-R13W
    Southwest Water Disposal: Sec 32-T30N-R9W

    The leak detection sump will be continually pumped and recycled into the affected pond until such time as the sump dries out. This will indicate the level in the pond at which the leak is located.

C. The location and cause of the leak will be determined and repaired. The liner will be tested for multiple leaks upon fill up. If a second or additional leaks are found the pond will be evaporated below the level and repaired as above. The subsequent repairs will be completed within 30 days of detection.

D. The fluids in the leak detection system will be

removed and placed back in the pond, to be evaporated. The OCD will be notified within 24 hours of the detection of fluids in the sump. At that time the remedial actions, as outlined above will be implemented

5) The holding capacity of each pond, as mentioned previously, is approximately 155,160 bbl's or 871,196 cuft. Salt generation calculations based upon Stanley Zygmunts work with the New Mexico Energy Research Development Institute indicates that the salt generated by passive evaporation will be 7304 cuft per year per pond. The calculations were based on Sodium Chloride (NaCl) as the principle precipitate and an average TDS of 15000 ppm. At that rate it will take 119 years for each pond to fill with salt. With the spray system in operation we expert up to a 10 fold increase in evaporation. That will decrease the life expectancy of the pond to 11.9 years which is consistent with the project life of each pond. . With this in mind we do not intend to monitor the sludge/salt build up. Therefore we are not concerned about liner inteqrity, aeration systems or circulation systems as the sludge/salt build up will be left intact upon drying and abandonment.

It is our intention to sell or bury the precipitated salts onsite in the plastic liner as per our initial application of May 19, 1989. The pond will then be covered with a PVC liner or clay to prevent any vertical leaching of salts by rain water. An analysis of the precipitated salts will be performed to ascertain if the salts may be buried onsite under the regulations existing at that time. If there are any concentrations of chemical compounds which are not permitted to be buried onsite they will be extracted at that time. The extraction method will be determined at that time when the compounds are known.

Through a conversation with Roger Kolv with Waste Management of Four Corners, operator of the San Juan County Landfill the current regulations would allow the sludge/salt to be disposed of at the County Landfill if the sludge/salt had less than 30% liquid content and fell within the parameters of their permit.

The sludges/salts will be analyzed at the time of abandonment to determine if they will be acceptable at the onsite facility or the County Landfill. If the waste is not acceptable at the onsite facility or County Landfill those unacceptable portions of the sludge/salt will be disposed of at the nearest hazardous waste disposal facility.

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 onsite facility or the County Landfill. These are "solid wastes" going in and they will be solid wastes as they exit. The repeated evaporation of water may give concentrations of certain heavy metals that may have to be extracted however they can not be qualified nor quantified at this time. Only at the time of abandonment will they become evident. At that time a determination will be made as to their final

disposal.

During the drying period the leak detection sump will be monitored weekly and the pond will remain locked (closed) to any further dumping. If vandalism becomes a problem the Sheriffs' Department will be notified of the vandalism, breaking and entering of the facility. H2S emissions are very unlikely as the pond will be open to the atmosphere, completely in an aerobic state. However the pond will be monitored weekly for H2S emissions.

7) a. Dissolved sulfides in the pond(s) will be analysed monthly and the results will be kept at the office.

b. 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(s). The prevailing winds are Southwesterly therefore the sampling points will be located on the Northeast sides of the pond(s) and tanks. The H2S concentrations and ph will be measured in the morning and afternoon.

a. 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.

The ponds will be treated on a regular basis with bleach (chlorine). The amount of bleach to be added is anticipated at 1000 gals per month. The bleach is 12-16% active. There is no schedule at this time as the amounts may vary as conditions as yet undetermined warrant. As mentioned previously the pond will be maintained in an aerobic state by the two aeration systems and the sprayer system. The bleach will be added as a matter of prudence.

STWD will maintain a bleach tank on location with a minimum holding capacity of 1000 gallons. Bleach is unstable at these concentrations and therefore has a short shelf life. With the short shelf life (approximately 30 days) we can not store any more chlorine than we intend to use in that period. Material Safety Data Sheets (MSDS) will be located on the tanks containing the bleach, the employees will be properly trained in handling the bleach and proper safety equipment such as rubber gloves and safety goggles will be located near the tanks when handling the bleach

Chemical Distributors, INC. (CDI), Farmington, NM will be the supplier of the bleach. CDI maintains 500 gals. of bleach at their local yard. In addition CDI is currently constructing a bleach plant in El Paso, Texas. The plant is scheduled to be on line April 15, 1990. The plant will have the capacity of 25,000 gallons of 16% bleach per day.

They've indicated that they will maintain their own transportation equipment. They would be able to deliver 5000 gals. of 12-16% active bleach daily to the facility if necessary. They would require 24 hour notice.

If for some reason there should be H2S in the water the active chlorine will react with the H2S as follows:

$$H2S + 4Cl2 + 4\ H2O > H2SO4 + 8\ HCl$$

The net effect is that the bleach will combine with the H2S and water to produce H2SO4 (sulfuric acid) and HCl (hydrochloric acid). This will in turn lower th ph of the pond which further prohibits the growth of bacteria.

In as much as the pond is equipped with three aeration systems we do not believe there will not be an H2S problem. Furthermore each load will be tested for H2S and treated prior to entering the pond. Once the water enters the pond the H2S producing bacteria will be unable to survive in the aerobic pond.

TREATMENT PLAN

1. Determine chlorine demand for sulfides, H2S and organics.
2. Initiate treatment with 12-16% active bleach on hand and at CDI yard.
3. Deliver and treat pond(s) with sufficient bleach to reduce dissolved sulfides and prohibit the emission of H2S. The rate of treatment will be a maximum of 5000 gallons of 12-16% active bleach daily.

b. If air concentrations of H2S reach 10 ppm at the fence line STWD will notify the County Fire Marshal, County Sheriffs Department, New Mexico State Police and OCD. The actions to be taken by STWD will be as follows:

TREATMENT PLAN

1. Notify the parties as shown above.
2. Evacuate those persons residing within 1/4 mile of the fence line. Provide temporary housing at the Motel 6, Farmington, NM or at another motel as approved by STWD. Each person requiring temporary housing will be provided a per diem for meals not to exceed $20.00. Temporary housing and the meal per diem to be provided as long as the H2S levels remain above 10 ppm at the fence line.

3. Implement treatment plan as outlined in "a" above.

Any other actions or requirements imposed by the the OCD after review of H2S emissions will be implemented after review of all alternatives and acceptance by STWD. STWD believes that protection of the general public is paramount and will take prudent actions to ensure the safety of the general public.

8) The skimmer pit will be completely enclosed with screening to prevent migratory birds from reaching the pit.

I believe that this answers all of your concerns. If I may be of any further assistance, please advise.

Very truly yours,

Robert C. Frank

Robert C. Frank
Agent

PALCO LININGS INC.

DYNALOY CHEMICAL EXPOSURE DATA

This chart reflects the results of field application experience and limited testing of Dynaloy with chemicals and solutions. Unless otherwise specified, concentrations are 100%. These results may not be applicable for use at elevated temperatures.

RATING SYSTEM

A. Effluent has little or no affect on the liner. Probably good for long term containment.

B. Effluent has a minor detrimental affect on the liner. Questionable for continuous long term containment (>5 years), probably good for short term containment.

C. Effluent has a detrimental affect on the liner. Successful long term service improbable. Good for temporary or emergency containment only.

X. Effluent quickly attacks the liner. Not to be used even for short term containment.

?. Following one of the above classifications indicates that the rating is based upon limited information.

Ammonium Nitrate (40%)	A
Benzene	X
Brine	A
Calcium Hydroxide (10%)	A
Cyanide solution (100 ppm, pH=11)	A
Detergents (2%)	A
Diesel Fuel	B
Gasoline	C
Glycols	A?
Hydrochloric Acid (10%)	A
Kerosine	B
Methyl Ethyl Ketone	X
Mineral Oil	A
Motor Oil (SAE 30)	A?
Nitric Acid (10%)	B
Olive Oil	A?
Phosphoric Acid (50%)	A?
Sodium Carbonate (2%)	A
Sodium Hydroxide (10%)	A?
Sodium Hypochlorite (5%)	C
Sulfuric Acid (30%)	A?
Trichlorocthylene	X
Transformer oil	B?
Transmission Fluid	B

These chemical exposure data are general in nature. It is recommended that the specific effluent be tested with the liner intended to be used for it's containment.

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PALCO LININGS, INC.

RESEARCH and DEVELOPMENT
LABORATORY REPORT

Title: Immersion Study, Dynaloy®in Petroleum	
Report No. PL-145-85	Submitted SH 1-14-85
Study No.	Approved DMK 1/14/85

Test Method

30 mil Dynaloy® was totally immersed in three types of crude oil at room temperature according to ASTM D471. Weight changes and physical appearance were periodically recorded during the 4-1/4 years exposure.

Days	Iranian Lite	Sahara	North Slope
62	+15.3%	+11.4%	+10.6%
312	+17.2%	+13.2%	+12.3%
734	+18.3%	+14.9%	+13.0%
1549	+17.6%	+16.2%	+14.3%

After over four years of immersion in the petroleum, the Dynaloy® appeared in good shape, was still very flexible, and did not appear to be losing strength. The petroleum was changed after the last measurement and the exposure is continuing.

Spencer Hampton
Laboratory Technician
Palco Linings, Inc.

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PALCO LININGS, INC.

RESEARCH and DEVELOPMENT
LABORATORY REPORT

Title: Immersion Study, Dynaloy® in Diesel Fuel #2	
Report No. PL-161-85	Submitted: SH 9-6-85
Study No. 224	Approved: RSHK 9/6/85

Test Method

Weighed tensile strips of 30 mil unreinforced Dynaloy® were exposed to diesel fuel #2 in accordance with ASTM D471. After the completion of an immersion period, a set of tensile strips were removed from the fuel, quickly wiped clean, weighed and tensile properties run according to ASTM D882. The percent weight and tensile property changes for 1, 3 and 9 days exposure are reported below.

Test Results

		1 day	3 days	9 days
Tensile Strength	MD	-8.1%	-6.2%	-5.9%
	TD	-8.3%	-10.0%	-10.5%
Elongation at Break	MD	-16.8%	-12.1%	-7.8%
	TD	-4.0%	-8.9%	-4.6%
Stress @ 100% Elongation	MD	-5.1%	-4.2%	-6.8%
	TD	-10.7%	-11.8%	-11.0%
Weight Change		+2.6%	+2.3%	+4.0%

Spencer Hampton
Laboratory Technician
PALCO LININGS, INC.

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PALCO LININGS, INC.

RESEARCH and DEVELOPMENT
LABORATORY REPORT

Title: Immersion Study, Dynaloy in Naphtha.	
Report No. PL-150-85	Submitted J.S. 9.26.85
Study No. 211	Approved JMK 4/26/85

Test Method

Unreinforced 30 mil Dynaloy was immersed in Fuel Grade Naphtha at room temperature according to ASTM D471. Weight and physical appearance changes were periodically recorded during the study.

Test Results

Days	Weight Change
11	+2.4%
48	+0.7%
82	+0.4%
218	+0.4%
374	+0.7%

Throughout the immersion, the Dynaloy did not appear to swell, change shape or deteriorate. The Naphtha was replaced with fresh fuel after 218 days exposure and the study is continuing.

PALCO LININGS, INC.

J. Stein

John Stein
Laboratory Technician

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PALCO LININGS, INC.

RESEARCH and DEVELOPMENT
LABORATORY REPORT

Title: Immersion Study, Dynaloy in Sulfuric Acid	
Report No. PL-149-85A	Submitted: SH 3-25-85
Study No. 215	Approved: GTMK 3/25/85

INTRODUCTION

Laminated 30 mil unreinforced Dynaloy was immersed in 1% and 10% sulfuric acid according to ASTM D543. The immersion was conducted at 73°F, 122°F and 158°F for a period of five weeks with testing after one and five weeks. After an exposure period was complete, the specimens to be tested were removed from the exposure container, briefly rinsed with tap water, quickly dried, weighed and tested. Tensile properties were determined in accordance with ASTM D882.

Results

The percent weight changes, the average tensile property values and the percent change in tensile properties are listed on table one. Breaking factor and modulus at 100% elongation are in units of lbs/ in width. Elongation at break is expressed in percent. The weight changes are accurate to within 0.1% and the tensile properties to within 5%.

PALCO LININGS, INC.

Spencer Hampton

Spencer Hampton
Laboratory Technician

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TABLE 1, DYNALOY IN SULFURIC ACID

Temp. (°F)	Time (days)	Weight	Breaking Factor	Elongation at Break	Modulus at 100%
1% H_2SO_4					
73°	7	+1.6%	-1.4% 57.5	-2.4% 290	-7.3% 38.4
	35	+3.2%	-0.3% 58.1	3.0% 306	-5.8% 39.0
122°	7	+5.6%	-1.8% 57.3	-0.3% 296	-9.1% 37.6
	35	+10.2%	+1.6% 59.3	-3.6% 286	-4.3% 39.6
158°	7	+10.1%	-4.2% 55.9	-7.0% 276	-6.4% 38.8
	35	+18.6%	-3.7% 56.1	-13.3% 258	+1.4% 42.0
10% H_2SO_4					
73°	7	+0.8%	-2.2% 57.0	-2.8% 289	-8.5% 37.9
	35	+1.1%	-1.6% 57.4	-1.0% 295	-6.7% 38.6
122°	7	+1.0%	-4.6% 55.6	-7.0% 276	-5.8% 39.0
	35	+0.7%	-2.0% 57.1	-4.0% 285	+1.1% 41.9
158°	7	+0.7%	-5.4% 55.1	-4.0% 285	-5.5% 39.1
	35	-0.5%	+7.2% 62.5	-10.8% 265	+11.7% 46.3

PALCO LININGS, INC.

RESEARCH and DEVELOPMENT
LABORATORY REPORT

Title: LINER WEIGHT CHANGES IN AQUEOUS SOLUTIONS, THE EFFECT OF DISSOLVED SOLIDS CONTENT ON DYNALOY AND PVC

Report No. PL-167-85 Submitted: R.O. 12/11/85

Study No. 232 Approved: GMK 12/11/85

INTRODUCTION

Samples of 30 mil Dynaloy, 20 mil PVC and 30 mil PVC were immersed in aqueous solutions having various dissolved solid contents in order to determine the effect on the water absorption of the liners. The three solutions used in this study were distilled water, tap water and a 5% sodium chloride solution. The immersion was conducted at 50°C for a period of 16 weeks. The weight changes were measured after 2, 4, 8 and 16 weeks.

TEST RESULTS

20 Mil PVC

	2 Weeks	4 Weeks	8 Weeks	16 Weeks
Distilled Water	+1.49%	+1.63%	+1.67%	+2.24%
Tap Water	+1.56%	+1.74%	+1.63%	+2.16%
5% Salt Water	+0.05%	+0.04%	+0.04%	-0.08%

30 Mil PVC

	2 Weeks	4 Weeks	8 Weeks	16 Weeks
Distilled Water	+1.76%	+1.94%	+2.01%	+2.59%
Tap Water	+1.66%	+1.89%	+1.96%	+2.55%
5% Salt Water	-0.07%	-0.03%	-0.03%	-0.10%

30 Mil Dynaloy

	2 Weeks	4 Weeks	8 Weeks	16 Weeks
Distilled Water	+2.12%	+2.17%	+2.11%	+2.44%
Tap Water	+1.80%	+1.74%	+1.56%	+1.78%
5% Salt Water	+0.06%	-0.03%	-0.05%	-0.50%

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PALCO LININGS, INC.

RESEARCH and DEVELOPMENT
LABORATORY REPORT

Title:	Effects of Cyanide Solution and Distilled Water on Palco 30 mil PVC Liner.
Report No. PL-129-83-C	Submitted: R.O. 10/22/86
Study No. 180	Approved: GMK 10/22/86

INTRODUCTION

This study evaluated the affect of a cyanide leach solution on Palco 30 mil Polyvinyl Chloride (PVC) liner at room temperature and 158°F. The US EPA stated in the October 1, 1984 Federal Register that exposure of a liner to a leachate at a temperature 72°F higher than the service temperature would accelerate chemical reactions by a factor of 75. A 28 day immersion study at 158°F would then be equivalent to 2100 days (5.75 years) of service in the field at 86°F. Distilled water was used as a standard for comparison. Tensile properties, tear resistance and weight were checked after 0, 7, 15 and 28 days immersion.

TEST PROCEDURES

A 20 ppm sodium cyanide solution was prepared by adding sodium cyanide to a dilute sodium hydroxide solution. The resulting solution had a pH of ~11.

One inch wide tensile specimens and die "C" tear specimens were cut from a sample of 30 mil PVC after the PVC had acclimated to standard laboratory temperature and humidity for not less than 40 hours. The machine direction tensile specimens were weighed prior to immersion. The specimens for each test period were immersed in separate containers.

At the conclusion of an exposure period, the samples were lightly rinsed with distilled water, gently dried with paper towels and allowed to acclimate to standard laboratory conditions for at least four days. The specimens were then weighed and tested. Tensile properties were tested according to ASTM D882. Tear resistance was tested according to ASTM D1004.

TEST RESULTS

The percent changes in the physical properties are reported on table 1, attached.

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TABLE 1
PL-129-83-C

73°F	DAYS	DISTILLED WATER MD	DISTILLED WATER TD	SODIUM CYANIDE MD	SODIUM CYANIDE TD
Tear Resistance	7	+1%	+3%	+2%	-2%
	15	+5%	+7%	+6%	+9%
	28	+4%	+5%	+6%	+2%
Stress at 100% Elongation	7	-2%	-1%	-3%	-1%
	15	+1%	-2%	+2%	±0%
	28	+6%	+2%	+1%	+1%
Stress at Break	7	-1%	+2%	-2%	±0%
	15	-2%	+2%	-2%	+3%
	28	+6%	+2%	+1%	+1%
Strain at Break	7	-2%	-1%	+4%	-4%
	15	-1%	+1%	-3%	-4%
	28	-2%	±0%	-1%	-2%
Weight	7	±0.0%		-0.1%	
	15	-0.1%		-0.1%	
	28	-0.1%		±0.0%	

158°F	DAYS	DISTILLED WATER MD	DISTILLED WATER TD	SODIUM CYANIDE MD	SODIUM CYANIDE TD
Tear Resistance	7	+2%	+6%	+1%	+13%
	15	+2%	+9%	+1%	+3%
	28	+2%	+10%	+4%	+11%
Stress at 100% Elongation	7	+4%	+4%	+6%	+9%
	15	+5%	+9%	+7%	+8%
	28	+10%	+8%	+7%	+8%
Stress at Break	7	+1%	+2%	±0%	+3%
	15	-4%	+3%	-1%	±0%
	28	+3%	-1%	-2%	+5%
Strain at Break	7	+4%	+4%	+4%	±0%
	15	+2%	-3%	+4%	-5%
	28	-2%	-1%	+3%	-1%
Weight	7	-0.2%		-0.3%	
	15	-0.4%		-0.3%	
	28	-0.4%		-0.3%	

BREWER
ASSOCIATES, INC.

ENGINEERS • SURVEYORS

P. O. BOX 2079 • FARMINGTON, NM 87499 • (505) 327-3303
CLOVIS, NM • (505) 763-4255

March 26, 1990

Mr. George Coleman
Sunco Trucking & Water Disposal
708 S. Tucker Ave
Farmington, New Mexico 87401

Re: Commercial Disposal Facility Northwest Quarter of Section 1 T29N, R12W, San Juan County New Mexico

Transmitted herewith are our calculations regarding Item No. 2 on the letter received by your company from the Energy Minerals and Natural Resources Department, dated November 3, 1989. As we have discussed, actual oxygen requirements for a facility such as yours are difficult to calculate due to the lack of data on the waste stream being received. We have based our calculations on the assumption that a 0.5 milligram per liter residual of dissolved oxygen would be sufficient to maintain the ponds in an aerobic condition. Complete oxygen dispersion will be extremely important. For this reason, we believe that the recirculation/spray evaporation system will be critical to the successful operation of the facility. If actual oxygen demand proves to be greater than anticipated, the recirculation/spray evaporation system will have the capability of adding oxygen to the system, as well as assuring the complete dispersion of available oxygen.

If we can be of further assistance please feel free to contact us at you convenience.

Sincerely yours,

BREWER ASSOCIATES, INC.

Richard P. Cheney, P.E., P.L.S.
President

RPC:jc 90005/L1189

SUNCO TRUCKING AND WATER DISPOSAL
OXYGEN AND MIXING CALCULATIONS

Most criteria developed for oxygen uptake, relates to the treatment of municipal and domestic waste waters. These types of waste have been evaluated for many years and estimates of oxygen demand can be made for design purposes. The same theories and formulas should apply to the treatment of water produced from coal seams. However, very little is known about the oxygen demand of such waters. Generally, the power required to supply oxygen to a system is much less than the power required to provide adequate mixing. For many years waste water treatment design was based on maintaining a dissolved oxygen level of 2.0 mgl within the treatment basin. It was assumed at this level of dissolved oxygen, the oxygen demand would be supplied and there would be sufficient energy available to the waters to maintain adequate mixing. For purposes of this design and calculation we have assumed that the actual oxygen demand will be substantially less than that required in a domestic or municipal waste water treatment facility. The following calculations compute the Hp required to maintain a dissolved oxygen content of 0.5 mgl:

ASSUME THAT DISSOLVED O_2 RESIDUAL SHOULD EQUAL = 0.5 MGL

@ 6.5 mg Requires 27# O_2/Day

#O_2/Feet^3 Air = 0.0175

% Eff per foot of Immersion Depth = 1.0 for Coarse Bubble Diffusers. Use Immersion Depth of 12 feet.

S.O.R. = 1.12 # O_2/hour

$$\text{Air Q required} = \frac{1.12}{(0.0175 \times 0.01 \times 12)}/60 = 533 \text{ cfm}$$

Corrections for Inlet Conditions

Elevation = 6,000 Feet P = 14.696 psia

P_1 = Inlet Pressure Due to Altitude

14.696 - (6,000/2116.2) = 11.86 psia

T = Air Temperature @ Standard Conditions in Degrees R

= 68 + 460 = 528° R

T_1 = Blower Inlet Air Temperature in Degrees R

= 90+ 460 = 550° R

Calculate Flow Rate From PQ = MRT

M = PQ/RT

Where R = Specific Gas Constant = 53.3 x °R for Air

$$M = \frac{14.696 \times 533 \times 144}{53.3 \times 528} = 40 \text{ lb. m/ min.}$$

$$Q_2 = MRT_1 / P_1$$

$$Q = \frac{40 \times 53.3 \times 550}{11.86 \times 144} = 687 \text{ I.C.F.M.}$$

Blower Brake Hp @ Average Inlet Conditions

$$BHP = \frac{0.227 \times Q_2 \times [(P_2/P_1)^{0.283} - 1]}{\text{Blower Efficiency}}$$

Use 2 Psi for Line Losses

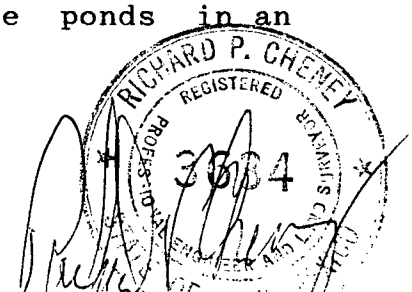
$P_2 = 11.86 + (.4335 \times 12) + 2 = 19.06$

Assume Blower Efficiency of 0.7

$$BHP = \frac{0.227 \times 687 \times [(\frac{19.06}{11.86})^{0.283} - 1]}{0.7} = 32 \text{ hp}$$

It is our opinion that incoming waters will have a very small oxygen demand. Therefor, mixing to assure complete dispersion of available oxygen, will be critical to the successful operation of the facility.

The operator proposes to enhance evaporation by installing a high pressure spray system. This system will have two intake points at approximate third points in the pond, and will discharge back to the pond through high pressure spray nozzles attached to an island in the center of the pond. The proposal is to provide a pump with the capability of circulating 50,000 barrels per day during a 10 to 12 hour operating period. Based on a 12 hour operating period this would be equivalent to approximately 3,000 gallons per minute. At this rate the operator would have the capability of moving the complete pond in approximately 36 hours. This turnover would also be enhanced by the operation of the air system. In addition, the spray/evaporation system will also add oxygen to the pond. Based on this set of operating conditions, it is our opinion that the operator will be able to maintain the pond in an aerobic condition or will be able to return it to an aerobic condition if so required. These calculations are based upon the assumption that incoming waters will have very little oxygen demand. It is my understanding that the operator will also have chemical injection capabilities and that the operator will maintain close control over the quality of incoming waters. With aeration, recirculation, and chemical injection capabilities, the operator should have sufficient redundancy to maintain the ponds in an odor free condition.



New Mexico Health and Environment Department

MARALYN BUDKE
Acting Secretary

CARLA L. MUTH
Deputy Secretary

MICHAEL J. BURKHART
Deputy Secretary

RICHARD MITZELFELT
Director

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

June 2, 1989

Roy Flack
Road Superintendent
San Juan County
112 S. Mesa Verde
Aztec, NM 87410

RE: Discharge Plan (DP-614) for San Juan Septage Disposal Site.

Dear Mr. Flack:

The discharge plan (DP-614) for the septage disposal facility located adjacent to the Crouch Mesa landfill about 3 miles southwest of Aztec, San Juan County is hereby approved.

The approved discharge plan consists of the discharge plan dated April 17, 1989; all attachments to the discharge plan; the site plan dated January 24, 1989; and the Western Technologies, Inc. study report (WTI No. 31290031) dated April 28, 1989. Pursuant to this approval, San Juan County may continue utilizing the pond identified as No. 1 in the site plan until July 15, 1989. Pond No. 2 shall be lined in accordance with one of the three alternatives given on Page 1 of the April 28, 1989 Western Technologies, Inc. study report before being brought into service on or before July 15, 1989. Pond No. 1 then shall be allowed to dry. Any sludge in Pond No. 1 shall be removed and may be deposited in the area identified as "future sludge disposal area" in the site plan or an alternative location approved in writing by the Environmental Improvement Division (EID) of the Health and Environment Department. There shall be no subsequent discharge into Pond No. 1 or any discharge to the proposed Pond No. 3 and Pond No. 4 until they have been lined in accordance with one of the alternatives given on Page 1 of the April 20, 1989 Western Technologies Inc. study report.

The operation of the site shall continue to meet all provisions defined in EID's letter to San Juan County on January 27, 1989 which granted temporary permission for discharge to the site. Additionally, each pond shall be tested, as recommended on Page 2 of the April 28, 1989 Western Technologies, Inc. study report, to assure that bentonite has been added and incorporated in accordance with specifications. Please provide the test results to the Program Manager of the EID Ground Water Section.

Approval of this ground-water discharge plan does not relieve you of your responsibility to comply with any other applicable local laws and regulations, such as zoning requirements and nuisance ordinances.

— ENVIRONMENTAL IMPROVEMENT DIVISION —
Harold Runnels Building
1190 St. Francis Dr.
Santa Fe, New Mexico 87503

The discharge plan application was submitted pursuant to Section 3-106 of the New Mexico Water Quality Control Commission Regulations. It is approved pursuant to Section 3-109. Please note Subsections 3-109.E. and 3-109.F., which provide for possible future modification of the plan. Please be advised that the approval of this plan does not relieve you of liability should your operation result in actual pollution of surface or ground waters which may be actionable under other laws and/or regulations.

Monitor Wells #1 and #2 as identified in the Western Technologies Inc. Study Report (WTI No. 3189 0002) dated April 7, 1989 shall be sampled and tested for heavy metals and purgeable organics on an annual basis, starting July 1, 1989. The same monitor wells shall be sampled and tested for nitrates and TKN quarterly, i.e. July 1, October 1, January 1, and April 1 of each year. The sample results shall be submitted to the EID generally within 30 days after sampling i.e. July 30, October 30, January 30 and April 30 of each year.

Regarding septage haulers who discharge at the septage disposal site, San Juan County shall maintain a log on-site that includes the name of the hauler, the license plate of the vehicle, origin of load, amount in gallons, and time and date. The log shall be available for inspection by the EID at all times that the disposal site is in operation. Additionally, San Juan County shall secure a sample from each vehicle. One out of ten vehicles shall be sampled for nitrates and TKN. One out of one hundred vehicles shall be sampled for heavy metals and purgeable organics. The results from the sampling of haulers shall be submitted to the EID quarterly on about July 30, October 30, January 30, and April 30 of each year.

Please note that Section 3-104 of the regulations requires that "When a plan has been approved, discharges must be consistent with the terms and conditions of the plan."

Please be aware that in this discharge plan you have made commitments which are legally enforceable under the New Mexico Water Quality Act (74-6-1 to 74-6-4, 74-6-6 to 74-6-13 NMSA 1978). These include constructing all aspects of your installation as designed, properly installing and maintaining any required monitor wells in the prescribed locations and completely fulfilling any required monitoring commitments on schedule. You are susceptible to fines should you not fulfill these obligations.

Pursuant to subsection 3-109.6.4., this plan approval is for a period of five years. This approval will expire June 2, 1994 and you should submit an application for new approval in ample time before that date.

On behalf of the staff of the Ground Water Section, I wish to thank you, David Songer, and Western Technologies, Inc. for your cooperation during the discharge plan review.

Sincerely,

Stuart P. Castle

Stuart P. Castle
Bureau Chief
Ground Water Bureau

SPC:ECR:mlg

Enclosures

Geotechnical Services For:

Crouch Mesa

Liquid Waste Disposal Pits

WESTERN TECHNOLOGIES INC.
The Quality People

ARIZONA

Phoenix
3737 East Broadway Road
P.O. Box 21387
Phoenix, Arizona 85036
(602) 437-3737

Mesa
952 East Baseline Road, No. 104
Mesa, Arizona 85204
(602) 926-2113

Sun City
17200 North Dysart Road, No. 13
P.O. Box 2431
Sun City, Arizona 85372
(602) 975-2154

Flagstaff
2400 East Huntington Drive
Flagstaff, Arizona 86001
(602) 774-8708

Lakeside
Route 1, Box 1030
Lakeside, Arizona 85929
(602) 368-5568

Tucson
3480 South Dodge Boulevard
Tucson, Arizona 85713
(602) 748-2262

Sierra Vista
1227 South Paseo San Luis
Sierra Vista, Arizona 85635
(602) 458-0364

Laughlin / Bullhead City
1610 Riverview Drive, No. 5
Bullhead City, Arizona 86442
(602) 758-8378

NEW MEXICO

Albuquerque
8305 Washington Place, N.E.
Albuquerque, New Mexico 87113
(505) 823-4488

Farmington
400 South Lorena Avenue
Farmington, New Mexico 87401
(505) 327-4966

NEVADA

Las Vegas
3611 West Tompkins Avenue
Las Vegas, Nevada 89103
(702) 798-8050

Submitted to:

San Juan County
112 South Mesa Verde
Aztec, New Mexico 87410

Attention: Mr. David Songer

April 7, 1989
WTI No. 31890002

WESTERN TECHNOLOGIES INC.
400 South Lorena Avenue
Farmington, New Mexico 87401
(505) 327-4966

San Juan County
112 South Mesa Verde
Aztec, New Mexico 87410

April 7, 1989

Attention: Mr. David Songer

Project: Crouch Mesa
Liquid Waste Disposal Pits

WT No. 31890002

As you requested, we have completed installation of two groundwater monitoring wells at the above referenced project. The work was performed in accordance with our proposal of March 22, 1989.

The borings logs, well schematics, site plan and results of laboratory analyses of water samples are attached.

We appreciate working with you on this project. If you have any questions or comments, we will be most happy to discuss them with you.

Sincerely,
WESTERN TECHNOLOGIES INC.

George A. Madrid

George A. Madrid, P. E.

Attachments

Distribution: Client (3)

/cb

DEFINITION OF TERMINOLOGY

ALLOWABLE SOIL BEARING CAPACITY ALLOWABLE FOUNDATION PRESSURE	The recommended maximum contact stress developed at the interface of the foundation element and the supporting material.
BACKFILL	A specified material placed and compacted in a confined area.
BASE COURSE	A layer of specified material placed on a subgrade or subbase.
BASE COURSE GRADE	Top of base course.
BENCH	A horizontal surface in a sloped deposit.
CAISSON	A concrete foundation element cast in a circular excavation which may have an enlarged base. Sometimes referred to as a cast-in-place pier.
CONCRETE SLABS-ON-GRADE	A concrete surface layer cast directly upon a base, subbase or subgrade.
CRUSHED ROCK BASE COURSE	A base course composed of crushed rock of a specified gradation.
DIFFERENTIAL SETTLEMENT	Unequal settlement between or within foundation elements of a structure.
ENGINEERED FILL	Specified material placed and compacted to specified density and/or moisture conditions under observation of a representative of a soil engineer.
EXISTING FILL	Materials deposited through the action of man prior to exploration of the site.
EXISTING GRADE	The ground surface at the time of field exploration.
EXPANSIVE POTENTIAL	The potential of a soil to expand (increase in volume) due to the absorption of moisture.
FILL	Materials deposited by the action of man.
FINISHED GRADE	The final grade created as a part of the project.
GRAVEL BASE COURSE	A base course composed of naturally occurring gravel with a specified gradation.
HEAVE	Upward movement.
NATIVE GRADE	The naturally occurring ground surface.
NATIVE SOIL	Naturally occurring on-site soil.
ROCK	A natural aggregate of mineral grains connected by strong and permanent cohesive forces. Usually requires drilling, wedging, blasting or other methods of extraordinary force for excavation.
SAND AND GRAVEL BASE	A base course of sand and gravel of a specified gradation.
SAND BASE COURSE	A base course composed primarily of sand of a specified gradation.
SCARIFY	To mechanically loosen soil or break down existing soil structure.
SETTLEMENT	Downward movement.
SOIL	Any unconsolidated material composed of discrete solid particles, derived from the physical and/or chemical disintegration of vegetable or mineral matter, which can be separated by gentle mechanical means such as agitation in water.
STRIP	To remove from present location.
SUBBASE	A layer of specified material placed to form a layer between the subgrade and base course.
SUBBASE GRADE	Top of subbase.
SUBGRADE	Prepared native soil surface.

METHOD OF SOIL CLASSIFICATION
(ASTM D 2487)

COARSE-GRAINED SOILS

LESS THAN 50% FINES*

GROUP SYMBOLS	DESCRIPTION	MAJOR DIVISIONS
GW	WELL-GRADED GRAVELS OR GRAVEL-SAND MIXTURES, LESS THAN 5% FINES	GRAVELS More than half of coarse fraction is larger than No. 4 sieve size
GP	POORLY-GRADED GRAVELS OR GRAVEL-SAND MIXTURES, LESS THAN 5% FINES	
GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES, MORE THAN 12% FINES	
GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES, MORE THAN 12% FINES	
SW	WELL-GRADED SANDS OR GRAVELLY SANDS, LESS THAN 5% FINES	SANDS More than half of coarse fraction is smaller than No. 4 sieve size
SP	POORLY-GRADED SANDS OR GRAVELLY SANDS, LESS THAN 5% FINES	
SM	SILTY SANDS, SAND-SILT MIXTURES, MORE THAN 12% FINES	
SC	CLAYEY SANDS, SAND-CLAY MIXTURES, MORE THAN 12% FINES	

NOTE:
Coarse-grained soils receive dual symbols if they contain 5 to 12% fines (e.g. SW-SM, GP-GC, etc.)

FINE-GRAINED SOILS

MORE THAN 50% FINES*

GROUP SYMBOLS	DESCRIPTION	MAJOR DIVISIONS
ML	INORGANIC SILTS, VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS	SILTS AND CLAYS Liquid limit less than 50
CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS	
OL	ORGANIC SILTS OR ORGANIC SILTY-CLAYS OF LOW PLASTICITY	
MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDS OR SILTS, ELASTIC SILTS	SILTS AND CLAYS Liquid limit more than 50
CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS	
OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY	
PT	PEAT, MUCK, AND OTHER HIGHLY ORGANIC SOILS	HIGHLY ORGANIC SOILS

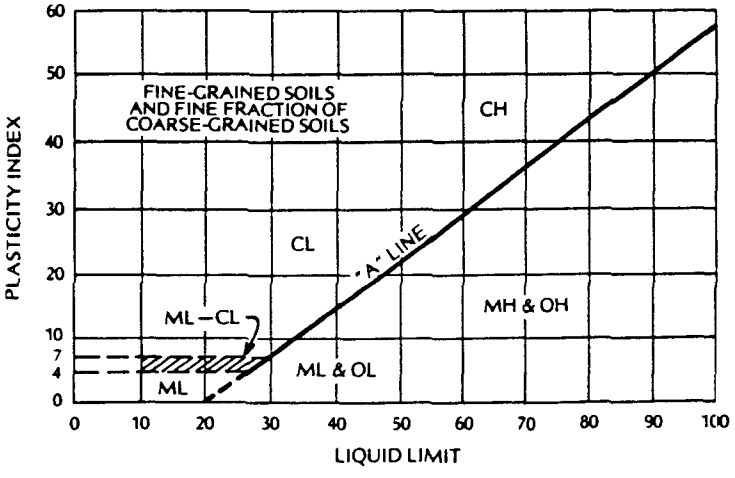
NOTE:
Fine-grained soils receive dual symbols if their limits plot in the hatched zone on the Plasticity Chart (ML-CL)

SOIL SIZES

COMPONENT	SIZE RANGE
BOULDERS	ABOVE 12 in.
COBBLES	3 in. to 12 in.
GRAVEL	No. 4 to 3 in.
Coarse	¾ in. to 3 in.
Fine	No. 4 to ¾ in.
SAND	No. 200 to No 4
Coarse	No. 10 to No. 4
Medium	No. 40 to No. 10
Fine	No. 200 to No. 40
*FINES (Silt or Clay)	BELOW No. 200

NOTE:
Only sizes smaller than three inches are used to classify soils.

PLASTICITY CHART



LOG OF BORING NO. 1

Project Crouch Mesa - Liquid Waste Disposal Pits Job No. 31890002

Elevation Not Determined Datum

Type/Size Boring 5 5/8" Rotary Rig Type Mayhew 1500

Groundwater Conditions Groundwater encountered at 55' on 03/30/89 Date 03/30/89

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
5					DAMP SLT. DAMP	SC	CLAYEY SAND; brown, some silt.
10					SLT. DAMP	SP	SAND; brown, medium to fine grained sand.
15							
20					SL	CL	SANDY CLAY; brown, some soluble salts. Gravel six inches thick 20.5 to 21 feet. Moist.
25					DAMP SLT. DAMP		SANDSTONE; brown to gray.
30							

LOG OF BORING NO. 1 CONTINUED

Project Crouch Mesa - Liquid Waste Disposal Pits Job No. 31890002

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
31					SLT. DAMP		SANDSTONE; brown to gray.
35							
					SLT. DAMP		SANDSTONE; white to gray, medium hard. Medium to coarse grained sand.
40							
45							
					PL		SHALE; gray. Encountered water at 55 feet.
50							
55					SAT.		▽
60							

LOG OF BORING NO. 1 CONTINUED

Project Crouch Mesa - Liquid Waste Disposal Pits Job No. 31890002

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
61							SHALE; gray.
65							
70							
75							
							Stopped at 75 feet.
							Set casing 0 to 75 feet (2" PVC) (Sch 40). Threaded.
							Screen set 50 to 75 feet (0.020 slot).
							Sand pac 10-20 Colorado silica sand.

LOG OF BORING NO. 2

Project Crouch Mesa - Liquid Waste Disposal Pits Job No. 31890002

Elevation Not Determined Datum

Type/Size Boring 5 5/8" Rotary Rig Type Mayhew 1500

Groundwater Conditions Groundwater encountered at 75' on 03/30/89 Date 03/30/89

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
5					DAMP SLT. DAMP	SP	SILTY SAND; brown to tan, medium to coarse grained sand.
15							
20					SLT. DAMP		SANDSTONE; brown to tan, fine to medium grained sand.
25							
					SL		SHALE; gray.
30					SLT. DAMP		SANDSTONE; tan to brown.

LOG OF BORING NO. 2 CONTINUED

Project Crouch Mesa - Liquid Waste Disposal Pits Job No. 31890002

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
31							SANDSTONE; tan to brown.
35					SL		SHALE; gray to brown.
					DAMP		SANDSTONE; brown.
40					SL		SHALE; gray to brown.
50					SLT. DAMP		SANDSTONE; gray, fine to medium grained sand.
55							
					SL		SHALE; gray.
60					SLT. DAMP		SANDSTONE; gray.

LOG OF BORING NO. 2 CONTINUED

Project Crouch Mesa - Liquid Waste Disposal Pits Job No. 31890002

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
61					SL		SHALE; gray.
65					SLT. DAMP		SANDSTONE; white to gray, coarse grained sand. Moist at 75 feet.
70							
					DAMP		
					MOIST		
80							
85							
					SL-PL		SHALE; brown to gray.
90					SLT. DAMP		SANDSTONE; gray to white.

LOG OF BORING NO. 2 CONTINU

Project Crouch Mesa - Liquid Waste Disposal Pits Job No. 31890002

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
91					SLT. DAMP		SANDSTONE; gray to white.
95							
00					SL		SHALE; gray.
5							
					SLT. DAMP		SANDSTONE; gray.
110					SL		SHALE; gray to black. Some sand.
115							
120					SLT. DAMP		SANDSTONE; tan to white.

LOG OF BORING NO. 2 CONTINUED

Project Crouch Mesa - Liquid Waste Disposal Pits Job No. 31890002

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
121					SLT. DAMP		SANDSTONE; tan to white.
125							
130							
135							
140							
145							
150							

LOG OF BORING NO. 2 CONTINUED

Project Crouch Mesa - Liquid Waste Disposal Pits Job No. 31890002

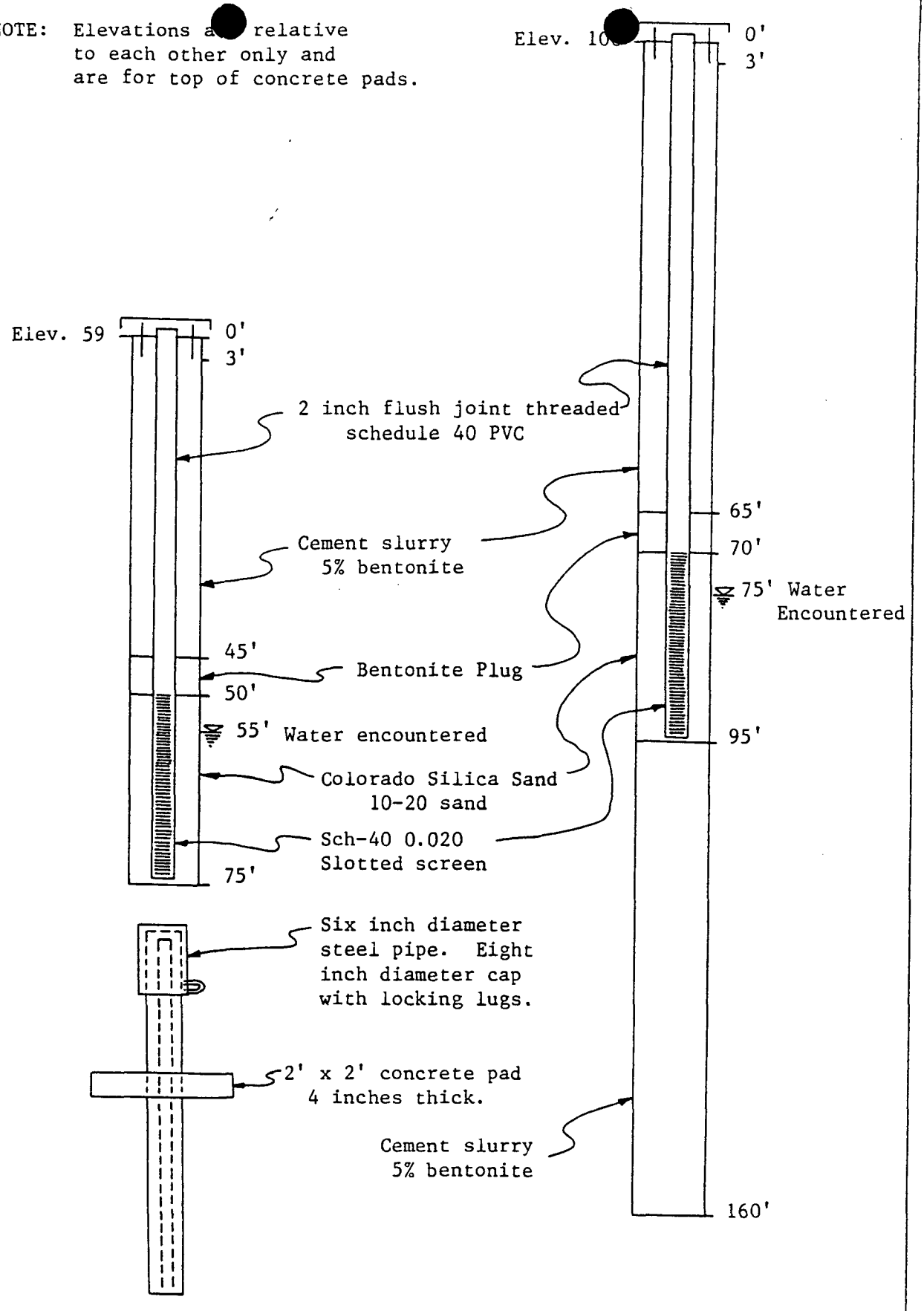
Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Moisture Content, %	Unified Classification	Description
151					SLT. DAMP		SANDSTONE; tan to white, fine to medium grained sand.
155							
0							Stopped at 160 feet. Cement well back to 95 feet, 5% bentonite. Set casing 0 to 95 feet (2" PVC) (sch 40). Threaded. Screen set 70 to 95 feet (0.020 slot). Sand pac 10-20 Colorado silica sand.

Prepared By L. E. C. Date 04/06/89

Checked By G. A. M. Date 04/07/89

Client San Juan County Job No. 31890002

NOTE: Elevations are relative to each other only and are for top of concrete pads.

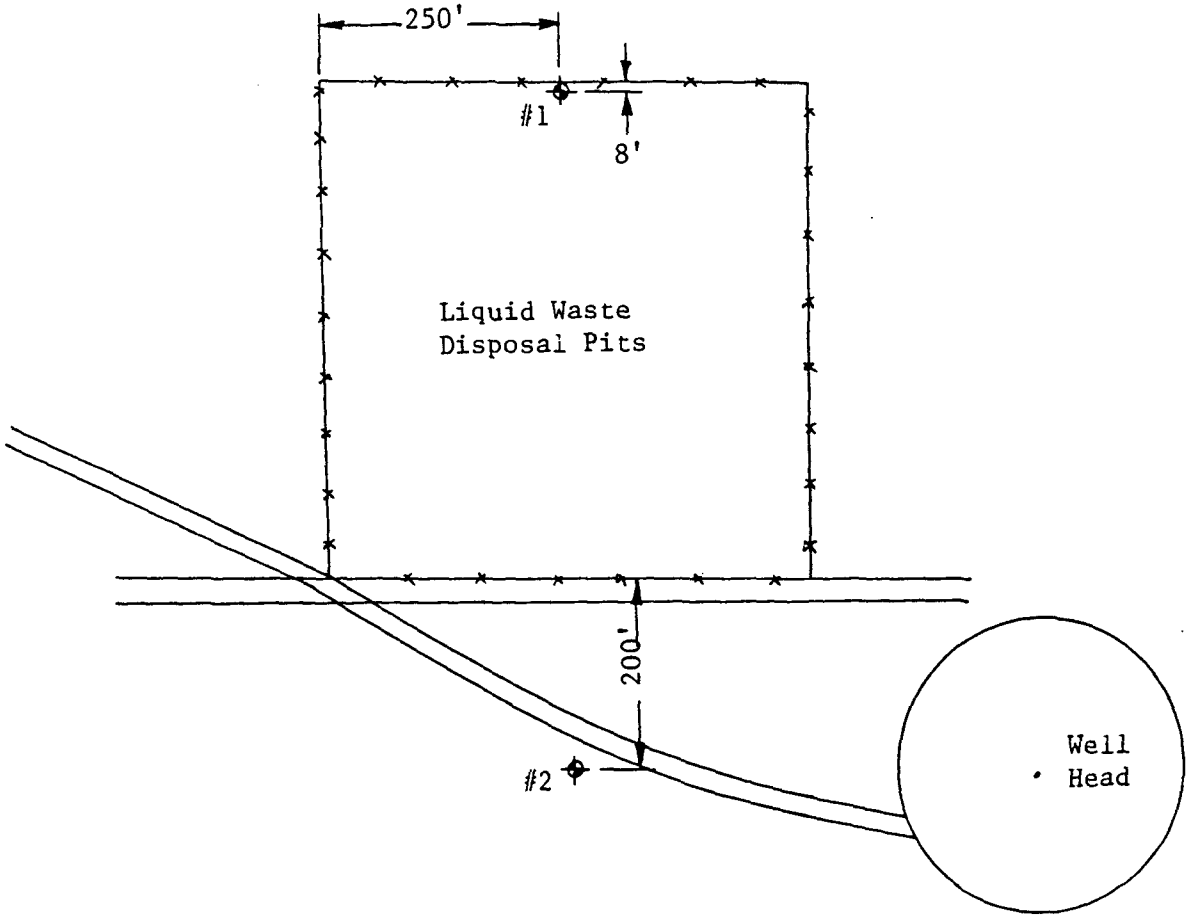


Typical well cap

MONITORING WELLS

Prepared By L. E. C. Date 04/06/89 Job No. 31890002

Checked By G. A. M. Date 04/07/89 Client San Juan County



MONITORING WELL

Inter·Mountain
Laboratories, Inc.

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

Western Technologies, Inc.
400 South Lorena
Farmington, NM 87401

April 5, 1989

Sample Identification:	Well #1	Date Sampled:	4-3-1989
Laboratory Number:	1245	Date Received:	4-3-1989

Total Dissolved Solids..... 7798 mg/l

April V. Gil
Sr. Geologist

imi
Inter-Mountain
Laboratories, Inc.

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

Western Technologies, Inc.
400 South Lorena
Farmington, NM 87401

April 5, 1989

Sample Identification: Well #2
Laboratory Number: 1246

Date Sampled: 4-3-1989
Date Received: 4-3-1989

Total Dissolved Solids..... 6576 mg/l

April V. Gil
Sr. Geologist

WESTERN TECHNOLOGIES INC.

400 South Lorena Avenue
Farmington, New Mexico 87401
(505) 327-4966

San Juan County
112 South Mesa Verde
Aztec, New Mexico 87410

April 28, 1989

Attention: Mr. David Songer

Regarding: Crouch Mesa
Septic Waste Ponds
San Juan County, N. M.

WT No. 31290031

As you requested, we have completed sampling and laboratory analyses of soil from the above referenced project. The purpose of the work was to make recommendations relative to addition of bentonite to the existing soil to decrease its permeability.

Soil samples were obtained from the four corners of the bottom in the north pond. The samples were analyzed for gradation and plasticity along with permeability with varying percentages of bentonite. The results of these laboratory analyses are presented on the attached laboratory report forms.

The bentonite used was Swell Clay-Swell Gel produced by the Redmond Clay and Salt Company located in Redmond, Utah. The bentonite was obtained locally at Weskem, Inc. According to the producer the unit weight of the bentonite is approximately 65 pounds per cubic foot.

Based on the test results the following alternatives are presented.

Alternate	Percent Bentonite, per weight of Soil	Minimum Depth of Bentonite, ft.	Calculated Seepage, cu. ft./year	Bentonite Required per 100 S.F. Surface Area, lbs.
No. 1	10	2	1,360	1,972
No. 2	12	1.5	1,350	1,775
No. 3	14	1	1,460	1,380

Crouch Mesa
Septic Waste Ponds
San Juan County, N. M.
WT No. 31290031

The above recommendations are based on the uniform soil-bentonite mixture being compacted to at least 90 percent of standard (ASTM D698) proctor. The seepage calculations are based on an average pond bottom surface area of 7,500 square feet and water depth of three feet.

Full-time observation and testing should be provided during the addition of bentonite to assure the recommended bentonite quantities are blended uniformly throughout the recommended depth. Particularly, if Alternate No. 3 is selected, since the recommended soil-bentonite depth is only one foot. After compaction of the soil-bentonite mixture tests should be performed at random locations to assure the recommended compaction requirements have been accomplished.

We appreciate working with you on this project. If you have any questions or comments, we will be most happy to discuss them with you.

Sincerely,
WESTERN TECHNOLOGIES INC.

George A. Madrid, P. E.

Copies: Client (3)

/cb

WESTERN TECHNOLOGIES INC.
400 South Lorena Avenue
Farmington, New Mexico 87401
(505) 327-4966

LABORATORY REPORT

Client: San Juan County 30070
Attn: Mr. David Songer
112 South Mesa Verde
Aztec, New Mexico 87410

Job No.
Lab./Invoice No. 31290031
Date of Report 04/26/89
Reviewed By S a mcdaid

Project: Crouch Mesa Septic Waste Ponds
Location: San Juan County, NM

Material/Specimen: Clayey Sand-Bentonite Mixture — Sampled By: S. Wood/WT — Date: 04/13/89
Source: Native - Redmond Clay & Salt Company — Submitted By: S. Wood/WT — Date: 04/13/89
Test Procedure: Constant Head Permeability — Authorized By: D. Songer/Client — Date: 04/12/89

RESULTS

% BENTONITE	COEFFICIENT OF PERMEABILITY, cm/sec
6	3.5×10^{-6}
8	1.3×10^{-6}
10	9.6×10^{-8}
14	5.4×10^{-8}

NOTE: Specimens molded at 90% compaction and optimum moisture content of ASTM D698 A Proctor (109.5 pcf Max. Dry Density at 9.0% Optimum Moisture Content).

Copies to: Client (3)
/cb

WESTERN TECHNOLOGIES INC.

400 South Lorena Avenue
Farmington, New Mexico 87401
(505) 327-4966

LABORATORY REPORT

PHYSICAL PROPERTIES OF AGGREGATES

Client: San Juan County 30070
Attn: Mr. David Songer
112 South Mesa Verde
Aztec, New Mexico 87410

Job No. _____
Lab/Invoice No. 31290031
Date of Report 04/27/89
Reviewed By S.A. Madrid

Project: Crouch Mesa Septic Waste Pits

Location: San Juan County, NM — Sampled By: S. Wood/WT — Date: 04/15/89

Type of Aggregate: SC-Clayey Sand — Submitted By: S. Wood/WT — Date: 04/15/89

Source of Aggregate: Native - N. Pond — Authorized By: D. Songer/Client — Date: 04/12/89

Sieve Analysis, ASTM C136-

Sieve Size	% Passing Accumulative	Specification
4"		
3"		
2"		
1½"		
1⅛"		
1"		
¾"		
½"		
⅜"		
¼"		
No. 4		
8		
10		
16		
30		
40		
50		
100		
Finer than 200 ASTM C117-		

Test Standards are ASTM unless otherwise noted.

Test		Result	Specification	Test STD
Fineness Modulus				C125-
Dry Rodded Unit Weight, pcf				C29-
Lightweight Pieces, %				C123-
Clay Lumps and Friable Particles				C142-
Organic Impurities				C40-
Sand Equivalent Value				C2419-
Resistance to Abrasion	% Wear, rev.			C131-
	% Wear, 500 rev.			Grading
	% Wear, rev.			C535-
	% Wear, 1000 rev.			Grading
Scratch Hardness, % by: Weight | Count		|	|	C235-
Fractured Faces, % by: Weight | Count		|	|	
Liquid Limit | Plasticity Index		|	|	D4318-
Cleanness Value				Calif. 227-
Moisture Density Relations	Max. Dry Density, pcf	109.5	☒ D698- A ☐ D1557- ☐ AASHTO T99- ☐ AASHTO T180-	
	Optimum Moisture, %	9.0		
	Method	A		
Specific Gravity	Absorption, %		☐ C127- ☐ C128-	
	Bulk (Dry)			
	Bulk (SSD)			
	Apparent			

Copies to: Client (3)
/cb

WESTERN TECHNOLOGIES INC.

400 South Lorena Avenue
Farmington, New Mexico 87401
(505) 327-4966

LABORATORY REPORT

PHYSICAL PROPERTIES OF AGGREGATES

Client: San Juan County 30070
Attn: Mr. David Songer
112 South Mesa Verde
Aztec, New Mexico 87410

Job No. _____
Lab/Invoice No. 31290031
Date of Report 04/27/89
Reviewed By S.A. Madrid

Project: Crouch Mesa Septic Waste Pits

Location: San Juan County, NM — Sampled By: S. Wood/WT — Date: 04/13/89

Type of Aggregate: Blend of 4 Samples w/10%* — Submitted By: S. Wood/WT — Date: 04/13/89

Source of Aggregate: Native & Redmond Clay & Salt Co. — Authorized By: D. Songer/Client — Date: 04/12/89

Sieve Analysis, ASTM C136- Test Standards are ASTM unless otherwise noted.

Sieve Size	% Passing Accumulative	Specification
4"		
3"		
2"		
1½"		
1⅛"		
1"		
¾"		
½"		
⅜"		
¼"		
No. 4		
8		
10		
16		
30		
40		
50		
100		
Finer than 200 ASTM C117-		

Test		Result	Specification	Test STD
Fineness Modulus				C125-
Dry Rodded Unit Weight, pcf				C29-
Lightweight Pieces, %				C123-
Clay Lumps and Friable Particles				C142-
Organic Impurities				C40-
Sand Equivalent Value				C2419-
Resistance to Abrasion	% Wear, rev.			C131-
	% Wear, 500 rev.			Grading
	% Wear, rev.			C535-
	% Wear, 1000 rev.			Grading
Scratch Hardness, % by: Weight | Count		|	|	C235-
Fractured Faces, % by: Weight | Count		|	|	
Liquid Limit | Plasticity Index		|	|	D4318-
Cleanness Value				Calif. 227-
Moisture Density Relations	Max. Dry Density, pcf	113.0	☒ D698- A ☐ D1557- ☐ AASHTO T99- ☐ AASHTO T180-	
	Optimum Moisture, %	13.1		
	Method	A		
Specific Gravity	Absorption, %		☐ C127- ☐ C128-	
	Bulk (Dry)			
	Bulk (SSD)			
	Apparent			

*Bentonite

Copies to: Client (3)
/cb

WESTERN TECHNOLOGIES INC.
400 South Lorena Avenue
Farmington, New Mexico 87401
(505) 327-4966

LABORATORY REPORT

PHYSICAL PROPERTIES OF AGGREGATES

Client: San Juan County 30070
Attn: Mr. David Songer
112 South Mesa Verde
Aztec, New Mexico 87410

Job No.
Lab/Invoice No. 31290031
Date of Report 04/26/89
Reviewed By S. a. Mudrich

Project: Crouch Mesa Septic Waste Ponds

Location: San Juan County, NM — Sampled By: S. Wood/WT — Date: 04/13/89

Type of Aggregate: SC-Clayey Sand — Submitted By: S. Wood/WT — Date: 04/13/89

Source of Aggregate: N. Pond, N.E. Corner — Authorized By: D. Songer/Client — Date: 04/12/89

Sieve Analysis, ASTM C136- (0-2')

Test Standards are ASTM unless otherwise noted.

Sieve Size	% Passing Accumulative	Specification
4"		
3"		
2"		
1½"		
1⅛"		
1"		
¾"		
½"		
⅜"		
¼"		
No. 4	100	
8	99	
10	99	
16	98	
30	77	
40	56	
50	42	
100	30	
200	20	
Finer than 200 ASTM C117-		

Test		Result	Specification	Test STD
Fineness Modulus				C125-
Dry Rodded Unit Weight, pcf				C29-
Lightweight Pieces, %				C123-
Clay Lumps and Friable Particles				C142-
Organic Impurities				C40-
Sand Equivalent Value				C2419-
Resistance to Abrasion	% Wear, rev.			C131-
	% Wear, 500 rev.			Grading
	% Wear, rev.			C535-
	% Wear, 1000 rev.			Grading
Scratch Hardness, % by: Weight | Count		|	|	C235-
Fractured Faces, % by: Weight | Count		|	|	
Liquid Limit | Plasticity Index		35 | 16	|	D4318-
Cleanness Value				Calif. 227-
Moisture Density Relations	Max. Dry Density, pcf		☐ D698- ☐ D1557- ☐ AASHTO T99- ☐ AASHTO T180-	
	Optimum Moisture, %			
	Method			
Specific Gravity	Absorption, %		☐ C127- ☐ C128-	
	Bulk (Dry)			
	Bulk (SSD)			
	Apparent			

Copies to: Client (3)
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WESTERN TECHNOLOGIES INC.
400 South Lorena Avenue
Farmington, New Mexico 87401
(505) 327-4966

LABORATORY REPORT

PHYSICAL PROPERTIES OF AGGREGATES

Client: San Juan County 30070
Attn: Mr. David Songer
112 South Mesa Verde
Aztec, New Mexico 87410

Job No.
Lab/Invoice No. 31290031
Date of Report 04/26/89
Reviewed By Sa. Madrid

Project: Crouch Mesa Septic Waste Pits

Location: San Juan County, NM — Sampled By: S. Wood/WT — Date: 04/13/89

Type of Aggregate: SC-Clayey Sand — Submitted By: S. Wood/WT — Date: 04/13/89

Source of Aggregate: N. Pond, N.W. Corner — Authorized By: D. Songer/Client — Date: 04/12/89

Sieve Analysis, ASTM C136- (0-2')

Test Standards are ASTM unless otherwise noted.

Sieve Size	% Passing Accumulative	Specification
4"		
3"		
2"		
1½"		
1⅛"		
1"		
¾"		
½"		
⅜"		
¼"		
No. 4	100	
8	99	
10	99	
16	98	
30	77	
40	59	
50	46	
100	34	
200	22	
Finer than 200 ASTM C117-		

Test		Result	Specification	Test STD
Fineness Modulus				C125-
Dry Rodded Unit Weight, pcf				C29-
Lightweight Pieces, %				C123-
Clay Lumps and Friable Particles				C142-
Organic Impurities				C40-
Sand Equivalent Value				C2419-
Resistance to Abrasion	% Wear, rev.			C131- Grading
	% Wear, 500 rev.			
	% Wear, rev.			C535- Grading
	% Wear, 1000 rev.			
Scratch Hardness, % by: Weight | Count		|	|	C235-
Fractured Faces, % by: Weight | Count		|	|	
Liquid Limit | Plasticity Index		30 | 13	|	D4318-
Cleanness Value				Calif. 227-
Moisture Density Relations	Max. Dry Density, pcf		☐ D698- ☐ D1557- ☐ AASHTO T99- ☐ AASHTO T180-	
	Optimum Moisture, %			
	Method			
Specific Gravity	Absorption, %		☐ C127- ☐ C128-	
	Bulk (Dry)			
	Bulk (SSD)			
	Apparent			

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Farmington, New Mexico 87401
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LABORATORY REPORT

PHYSICAL PROPERTIES OF AGGREGATES

Client: San Juan County 30070
Attn: Mr. David Songer
112 South Mesa Verde
Aztec, New Mexico 87410

Job No.
Lab/Invoice No. 31290031
Date of Report 04/26/89
Reviewed By S.A. Mackie

Project: Crouch Mesa Septic Waste Pits

Location: San Juan County, NM — Sampled By: S. Wood/WT — Date: 04/13/89

Type of Aggregate: SC-Clayey Sand — Submitted By: S. Wood/WT — Date: 04/13/89

Source of Aggregate: N. Pond, S.E. Corner (0-2') — Authorized By: D. Songer/Client — Date: 04/12/89

Sieve Analysis, ASTM C136-

Test Standards are ASTM unless otherwise noted.

Sieve Size	% Passing Accumulative	Specification
4"		
3"		
2"		
1½"		
1⅛"		
[illegible]"		
[illegible]"		
[illegible]"		
[illegible]"		
[illegible]"	100	
[illegible]4	99	
[illegible]	99	
[illegible]0	99	
[illegible]6	98	
30	77	
40	57	
50	42	
100	29	
200	18	
Finer than 200 ASTM C117-		

Test		Result	Specification	Test STD
Fineness Modulus				C125-
Dry Rodded Unit Weight, pcf				C29-
Lightweight Pieces, %				C123-
Clay Lumps and Friable Particles				C142-
Organic Impurities				C40-
Sand Equivalent Value				C2419-
Resistance to Abrasion	% Wear, rev.			C131-
	% Wear, 500 rev.			Grading
	% Wear, rev.			C535-
	% Wear, 1000 rev.			Grading
Scratch Hardness, % by: Weight | Count		|	|	C235-
Fractured Faces, % by: Weight | Count		|	|	
Liquid Limit | Plasticity Index		32 | 14	|	D4318-
Cleanness Value				Calif. 227-
Moisture Density Relations	Max. Dry Density, pcf		☐ D698- ☐ D1557- ☐ AASHTO T99- ☐ AASHTO T180-	
	Optimum Moisture, %			
	Method			
Specific Gravity	Absorption, %		☐ C127- ☐ C128-	
	Bulk (Dry)			
	Bulk (SSD)			
	Apparent			

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LABORATORY REPORT

PHYSICAL PROPERTIES OF AGGREGATES

Client: San Juan County 30070
Attn: Mr. David Songer
112 South Mesa Verde
Aztec, New Mexico 87410

Job No.
Lab/Invoice No. 31290031
Date of Report 04/26/89
Reviewed By S.a. madrid

Project: Crouch Mesa Septic Waste Pits

Location: San Juan County, NM — Sampled By: S. Wood/WT — Date: 04/13/89

Type of Aggregate: SC-Clayey Sand — Submitted By: S. Wood/WT — Date: 04/13/89

Source of Aggregate: N. Pond, S.W. Corner (0-2') — Authorized By: D. Songer/Client — Date: 04/12/89

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Sieve Size	% Passing Accumulative	Specification
4"		
3"		
2"		
1½"		
1⅛"		
1"		
¾"	100	
½"	99	
⅜"	--	
¼"	99	
No. 4	99	
8	99	
10	99	
16	98	
30	73	
40	70	
50	32	
100	20	
200	13	
Finer than 200 ASTM C117-		

Test Standards are ASTM unless otherwise noted.

Test		Result	Specification	Test STD
Fineness Modulus				C125-
Dry Rodded Unit Weight, pcf				C29-
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	% Wear, rev.			C535-
	% Wear, 1000 rev.			Grading
Scratch Hardness, % by: Weight | Count		|	|	C235-
Fractured Faces, % by: Weight | Count		|	|	
Liquid Limit | Plasticity Index		32 | 12	|	D4318-
Cleanness Value				Calif. 227-
Moisture Density Relations	Max. Dry Density, pcf		☐ D698- ☐ D1557- ☐ AASHTO T99- ☐ AASHTO T180-	
	Optimum Moisture, %			
	Method			
Specific Gravity	Absorption, %		☐ C127- ☐ C128-	
	Bulk (Dry)			
	Bulk (SSD)			
	Apparent			

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