NM1 - 9

GENERAL CORRESPONDENCE

YEAR(S):

1992-

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

December 28, 1992

ATTN: Ms. Kathy M. Brown
State Of New Mexico
Energy & Minerals and Natural
Resources Department
Oil Conservation Commission
P.O. Box 2088
Santa Fe, NM 87504

Ref: #P-667-241-924

Dear Ms. Brown:

In reference to your request concerning our Double Shale Shaker at our OCD Rule 711 permitted disposal facility, I submit the following:

1. PIT DESIGN: As we discussed I have enclosed photos for your file.
2. DISPOSITION OF SOLIDS: These dried solids will be taken to Tierra Land Farm for disposal.
3. SOLIDS ANALYSIS: As we discussed in our meeting, we shall annually sample the area beneath the burmed pits where the solids are to be dried.

If you have any further questions, please contact me at (505) 327-0416.

Sincerely,

Michael J. Leonard

Michael J. Leonard
Sunco Disposal

XC: Denny Foust, OCD Aztec Office

State of New Mexico

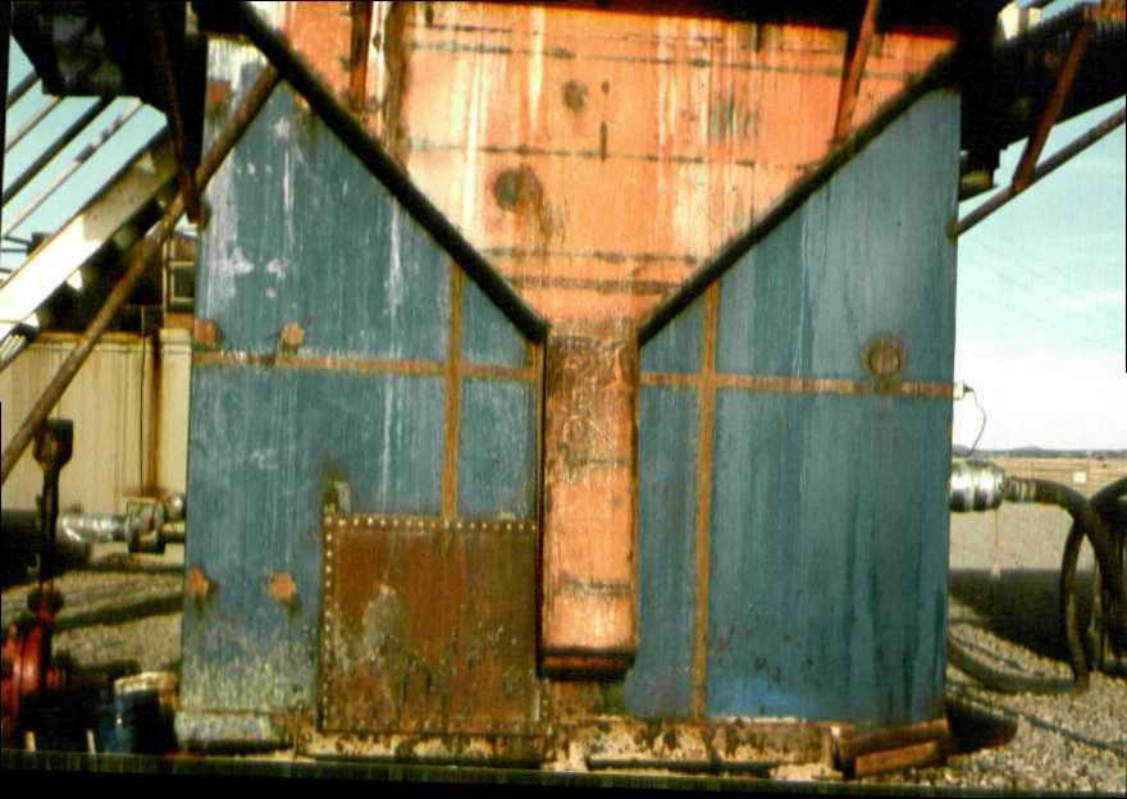
ENERGY, MINERALS and NATURAL RESOURCES DEPARTMENT

2040 South Pacheco
P.O. Box 6429
Santa Fe, New Mexico 87505-5472

Sunco Water Disposal
Solid Shaker
Proposed To Add
November 3, 1992

Sunco 711

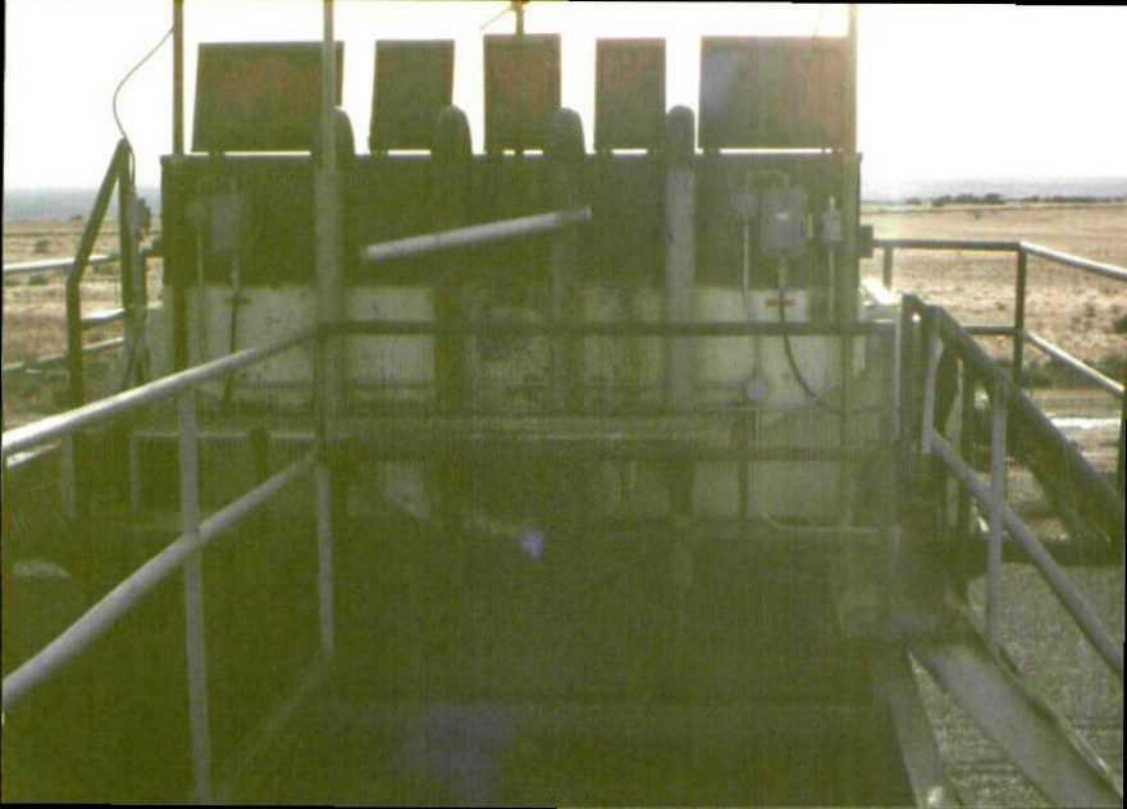
Sunco 711



Sunco 7.11

Sonco 711

Sonco 711



Sunco 711

Sunco 711

Solids Shaker

November 3 1992

STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

BRUCE KING
GOVERNOR

ANITA LOCKWOOD
CABINET SECRETARY

December 4, 1992

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

CERTIFIED MAIL
RETURN RECEIPT NO. P-667-241-923

Mr. George E. Coleman
President
Sunco Trucking Company
P.O. Box 443
Farmington, New Mexico 87499

RE: **Modification of OCD Rule 711 Permit**
Sunco Water Disposal Facility
San Juan County, New Mexico

Dear Mr. Coleman:

The New Mexico Oil Conservation Division (OCD) has determined that the use of the Form C-118 "Pipeline Quality Oil Recovered by Treating Plants" is not appropriate for an OCD 711 commercial surface disposal facility. Form C-112 "Transporter's and Storer's Monthly Report" is the appropriate form to submit for the Sunco Water Disposal Facility.

Effective upon receipt of this letter the OCD requests that you cease use of Form C-118 and institute use of Form C-112 which will be submitted to both the OCD Santa Fe and Aztec Offices.

If you have any questions, please contact Kathy Brown at (505) 827-5884.

Sincerely,

William J. LeMay
Director

xc: Denny Foust, OCD Aztec Office

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

BRUCE KING
GOVERNOR

ANITA LOCKWOOD
CABINET SECRETARY

December 4, 1992

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

CERTIFIED MAIL
RETURN RECEIPT NO. P-667-241-924

Mr. Ron Mahan
Contracts Manager
Sunco Trucking Company
P.O. Box 443
Farmington, New Mexico 87499

RE: **Disposal of Shale Shaker Solids**
Sunco Water Disposal Facility
San Juan County, New Mexico

Dear Mr. Malan:

The New Mexico Oil Conservation Division (OCD) has received your request, dated November 3, 1992, to install a Double/Double Shale Shaker to remove solids from the water received at your OCD Rule 711 permitted disposal facility. The request proposes to collect the solids, isolate them in a bermed area until dry and then spread them 4"-6" deep in an isolated area on your property.

The OCD requires additional information to evaluate your proposal. Please submit the following materials so that the review process can continue:

1. Pit Design: Submit construction plans and engineering diagrams for the proposed pit in which the shale shaker will be located. Include detailed plans of any berming, lining, or spill collection devices which will be incorporated into the pit. In addition, include a diagram indicating the flow pattern and media that the incoming/outgoing fluids will travel through.

2. Disposition of Solids : Submit construction plans and engineering diagrams for the area where the solids will be isolated to dry out. Include any berming, lining or monitoring devices which will incorporated into the design. In addition, submit a map showing the exact location at which you intend to spread the dry solids.

3. Solids Analysis: Submit an analysis for a representative sample of solids that would collect in the proposed shale shaker. The sample will be collected and analyzed prior to drying out (ie. fresh). The sample will be analyzed for total petroleum hydrocarbons (TPH) using modified EPA method 8015, heavy metals using the ICAP scan, and total volatile organics using EPA methods 8010/8020.

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

Sincerely,

Kathy M. Brown

Kathy M. Brown
Geologist

xc: Denny Foust, OCD Aztec Office

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

OIL CONSERVATION DIVISION
RECEIVED
92 NOV 4 AM 9 06

November 3, 1992

State of New Mexico
Energy, Minerals and Natural
Resources Department
Oil Conservation Commission
P. O. Box 2088
Santa Fe, NM 87504

Ref: Order #R-9485-A

Gentlemen:

We propose to set a 8' X 10' X 35' additional pit with a Double/Double Shale Shaker to our system to remove solids from the water we are receiving. The solids accumulate at a rate of 50 - 100 cubic yards per month. We propose to isolate these solids in a bermed area until dry and then spread them 4"-6" deep in an isolated area of our property.

We appreciate your consideration in this matter.

Sincerely,

Ron Mahan
Contracts Manager

GARY L. HORNER
ATTORNEY AT LAW

TELEPHONE
(505) 326-2378

P.O. BOX 2497
FARMINGTON, NM 87499

August 13, 1992

William J. LeMay, Director
Oil Conservation Division
State Land Office Building
Post Office Box 2088
Santa Fe, New Mexico 87504-2088

Re: Sunco Trucking and Water Disposal (STWD), Case No. 9955; Report entitled "Oxygen Demand Requirements for Sunco Produced Water Facility", dated July 14, 1992: Request that construction at the subject facility be halted

Dear Mr. LeMay :

We have received a document entitled "Oxygen Demand Requirements for Sunco Produced Water Facility" dated July 14, 1992 (hereinafter referred to as the "Oxygen Report") which was prepared by Brewer Associates, Inc. The subject Oxygen Report was signed by Richard P. Cheney. We have several problems with said document.

I. **The subject Oxygen Report is not an engineering design for an aeration system.**

The Oil Conservation Division (hereinafter referred to as the "OCD") entered an Order of the Division, Order No. R-9485, in the present matter, on April 2, 1991 (hereinafter "Division Order"). The Oil Conservation Commission (hereinafter referred to as the "Commission") entered an Order of the Commission, Order No. R-9485-A, in the present matter, on July 19, 1991 (hereinafter "Commission Order"). Said Commission Order affirmed and adopted the Division Order with certain exceptions as indicated. Decretory Paragraph No. (3) of Commission Order states that "[e]ngineering designs for aeration systems shall be certified by a registered professional engineer and submitted to and approved by the Director prior to construction." (Emphasis in original.)

The subject Oxygen Report should not be considered an engineering design for an aeration system. Although the subject Oxygen Report does provide a simple schematic representation of a distribution system, no pump, blower or compressor designs are calculated or otherwise specified. Likewise, no installation or construction details or drawings have been provided.

II. **The subject Oxygen Report makes no provisions for the expandability of the subject coarse bubble diffuser aeration system.**

The Commission Order Decretory Paragraph (8) provides the "[e]ach

aeration system shall be designed to allow for expansion if the actual oxygen demand exceeds the oxygen demand used in the design calculations."

Mr. Cheney testified repeatedly that little was known about the oxygen demand of the waters anticipated in the subject facility. Said Oxygen Report does not calculate the oxygen demand of the subject facility, but rather makes certain assumptions about such oxygen demand and then calculates the air requirements required to meet such assumed oxygen demand. The subject Oxygen Report makes no attempt to design the subject system. Therefore, to date no showing has been made as to how the subject system will be installed such that it can be expanded as necessary, as required by the Commission Order.

III. **The subject Oxygen Report does not address the critical concern of mixing within pond waters to move accumulated sludges that create an environment for the growth of anaerobic bacteria.**

Mr. Cheney testified on June 15, 1990 at the examiner hearing in this matter (June 15, 1990 Transcript, page 255, lines 12 - 15) that mixing of the pond waters was a concern equally as important as the oxygen levels in the pond. Mr. Cheney also testified that to maintain adequate mixing in the pond, waters in the pond must maintain a certain velocity (June 15, 1990 Transcript, page 255, lines 10 - 11). Mr. Cheney testified that in order to prevent an accumulation of sludge on the bottom of the pond to prevent the growth of anaerobic bacteria in the sludge, the sludge must be mixed, by suspending it in the pond at least daily (June 15, 1990 Transcript, page 260, line 6 through page 261, line 25).

The subject Oxygen Report indicates that the distribution system laterals will be approximately 50 feet apart. Groups of eight holes along each lateral will apparently be located approximately 20 feet apart along each lateral. The subject Oxygen Report contemplates a total of 320 holes across the 44,100 square foot pond bottom (1 - 3/16 inch diameter hole per 138 square feet) (90,000 square foot surface area; 1 - 3/16 inch diameter hole per 281 square feet). It is very difficult to comprehend that even minimum water velocities can be maintained in the vast majority of the 20,000,000 gallon pond.

Neither the subject Oxygen Report, nor any other report or testimony associated with these proceedings, attempt to establish any criteria regarding this important water velocity issue. Likewise, their have been no design calculations presented, or other showing, that sufficient water velocities will be maintained across the bottom of the pond to keep the sludge moving that will otherwise accumulate on the bottom of the pond.

Mr. Cheney did testify that mixing conditions would be sufficient to keep the sludge moving on the bottom of the pond (June 15, 1990 Transcript, page 260 lines 6 - 24), but such statements were totally without foundation. At the time of such testimony, Mr. Cheney was discussing a course bubble diffuser system (June 15, 1990 Transcript, page 243 line 7 through page 244, line 18). The report being discussed at the June 15, 1990 Examiner's Hearing was signed by Richard P. Cheney and dated March 26, 1990 (hereinafter referred to as the March 1990

Report). Said March 1990 Report may be found within a document marked for identification (at the June 1990 Examiner's Hearings) as Applicant's Exhibit Number 4.

The March 1990 Report actually did not discuss a coarse bubble diffuser system, but rather discussed the oxygen requirements, and the horsepower rating of a blower, to maintain a .5 milligram per liter (mgl) oxygen residual within the subject pond. The March 1990 Report determined that in order to maintain the .5 mgl oxygen residual level within the pond it would necessary to utilize a blower capable of delivering 687 cubic feet per minute (cfm). Said March 1990 Report further determined that said blower would need to have a rating of at least 32 horsepower (hp).

Said March 1990 report stated that "mixing to assure complete dispersion of available oxygen, will be critical to the successful operation of the facility." Therefore, it is clear that the March 1990 Report considered mixing critical to disperse available oxygen throughout the pond, and that providing sufficient water velocities to keep sludge moving on the bottom of the pond was not considered. Mr. Cheney's testified further that "we feel like that mixing is a crucial part of providing oxygen, maybe . . . mixing is more important even than the amount of oxygen that's supplied to make sure that all portions of the pond come in contact with an oxygen supply." (June 15, 1990 Transcript, page 245, lines 1 - 5.)

Mr. Cheney's June 15, 1990 testimony regarding mixing conditions being sufficient to keep sludge moving were made without any previous consideration or inquiry into the matter whatsoever. (See also June 15, 1990 Transcript, page 270 line 15 through page 273, line 17.) To date, no studies or calculations have yet been made to determine, or establish, that conditions within the pond will be such that sludge will not settle on the bottom of the pond.

It is clear from the Basin Case that such sludge deposits on the bottom of the pond were a major factor in the creation of an environment for anaerobic bacteria, and thus, for the generation of hydrogen sulfide. (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 (hereinafter referred to as the "Basin case")). 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) filed June 6, 1989 (hereinafter referred to as "Basin Facts). (Such document was administratively noticed during the Examiner Hearing in this matter and marked for identification as Petitioner's Exhibit No. 1).

Mr. Frank testified that sludge could be expected to accumulate to depths of five to six feet. (June 15, 1990 Transcript, page 184, lines 8 - 20.) Mr. Frank testified that accumulating sludges within the pond will remain in the pond until closure of the site. At that time such sludges will probably simply be covered over by the pond liner. (June 13, 1992 Transcript, page 43, line 24 through page 45, line 11.)

Mr. Cheney testified that the solids in the pond would probably have to be

cleaned out periodically. (June 12, 1991 Transcript, page 190, line 3 through page 191, line 19.) However, STWD has made no indication that they ever intend to remove sludges or solids from the subject ponds.

Thus, it is critical that a showing be made that the sludges on the bottom of the pond will either be removed periodically, or that some means exists to stir up such sludges on a daily basis to prevent an environment for the growth of anaerobic bacteria. To date such showing has not been made.

IV. **The subject Oxygen Report does not address, or provide for, the decreased efficiency of the coarse bubble diffuser system over time caused by hole plugging.**

Mr. Cheney testified that bubblers in the aeration system would become clogged over time resulting in a significant decrease in efficiency. (June 15, 1990 Transcript, page 268, line 22 through page 269, line 24 and June 12, 1991 Transcript, page 188, line 24 through page 189, line 24.) In fact, a quantification of the problem can be seen from the subject Oxygen Report. Said Oxygen Report states that at a pressure of approximately 100 pounds per square inch (psi), the subject coarse bubble diffuser system could provide 600 cfm using orifices of 3/16 inch diameter. However, if such orifice size were reduced to 1/8 inch, the air flow would be reduced to 275 cfm, and if such orifice size were reduced to 1/32 inch, the air flow at 100 psi would be reduced to 17.25 cfm.

Therefore, the plugging of the orifices in the aeration system over time caused by the increasing salinity of the waters, is a major concern that requires consideration in the design of such aeration systems. An aeration system design that considers the decreased efficiency of such system over time, caused by the plugging of such holes, has yet to be offered.

V. **The subject Oxygen Report apparently assumes incoming waters will be introduced into the ponds containing high levels of hydrogen sulfide.**

The 150 ppm oxygen demand in incoming waters assumed by Mr. Cheney in the Oxygen Report is very disturbing. Said Oxygen Report used such 150 ppm oxygen demand to calculate the size of the aeration system in the pond. Mr. Cheney testified that his assumptions in the March Report, that there would be very little oxygen demand in incoming waters, was based upon his understanding that any hydrogen sulfide present in incoming waters would be eliminated before such waters were introduced into the pond by treating such waters with chlorine. (June 15, 1990 Transcript, page 257, line 22 through page 259, line 1; and page 282, line 18 through page 283, line 15.)

Mr. Frank testified that the highest levels of hydrogen sulfide in incoming waters that he had accepted into his disposal facilities was on the order of 22 ppm, and the maximum levels of hydrogen sulfide that he would recommend accepting into the subject facility would be 50 ppm. Mr. Frank further testified that incoming loads with such levels of hydrogen sulfide would require treatment with chlorine before allowing such waters into the pond. (June 15, 1990 Transcript,

page 180 line 17 through page 183, line 14.)

Mr. Cheney testified that 8.4 ppm chlorine would be required to treat 1 ppm of hydrogen sulfide in incoming loads and that such treatment should take place in a closed system within the trucks as they arrive at the facility and before such trucks are unloaded at the subject facility. (June 22, 1990 Transcript, page 319, line 7 through page 321, line 17.) Mr. Cheney testified that no upper limit should be imposed on hydrogen sulfide levels accepted in incoming loads at the subject facility and that any load should be treated in the truck if hydrogen sulfide levels exceeded .5 ppm. (June 22, 1990 Transcript, page 326, line 21 through page 327, line 21.)

Therefore, an aeration system design within the pond that provides for an oxygen demand of 150 ppm in incoming loads represents a radical departure from the parameters, designs and criteria previously discussed. Mr. Cheney testified that hydrogen sulfide could easily be, and should be, treated with chlorine within incoming trucks. Even OCD's own environmental engineer, Roger Anderson testified that any measurable amount of hydrogen sulfide in incoming waters should be treated such that such hydrogen sulfide be eliminated before introduction into the ponds. (June 22, 1990 Transcript page 464, line 8, through page 470, line 15.)

In fact, STWD's own expert, Mr. Cheney stated in a letter to Mr. George Coleman, dated June 21, 1990 and introduced at the Examiner's Hearing as Applicant's Exhibit # 11, that "[a]eration alone generally is not sufficient for the removal of hydrogen sulfide." (page 2) Mr. Cheney went on to state in said June 21, 1990 letter that "[i]n summary the facility should have adequate redundancy regarding the treatment of hydrogen sulfide. The treatment capabilities are as follows:

> "1. Injection of chlorine and recirculation of delivered loads.
>
> "2. The capability of the coarse bubble diffusion system to maintain a dissolved oxygen residual in the pond.
>
> "3. The capability of the recirculation system to provide aeration and mixing of the pond.
>
> "4. The capability of the fine bubble diffusers to provide additional oxygen and to enhance the mixing capabilities of the other aeration systems.
>
> "Also, combined with these four treatment procedures, the facility will also have the capability of injecting chlorine directly into the pond through both the course bubble and fine bubble diffusing systems." (Applicant's Exhibit # 11, page 3)

The Commission Order adopted the Division Order which states in Exhibit A Paragraph IX. A. 4. (page 8) that "[a]ll 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."

Thus, a system design that provides for an oxygen demand of 150 ppm in incoming loads represents; not only a radical departure from the parameters,

designs and criteria previously discussed; but also, the anticipated violation of the Commission Order.

VI. **The calculations within the subject Oxygen Report reflect considerable discrepancies from previous reports.**

Said March 1990 Report stated that "the calculations are based upon the assumption that incoming waters will have very little oxygen demand." The aeration system considered in the March 1990 Report calculated a 32 hp blower to provide 687 cfm to maintain a dissolved oxygen content of 0.5 mgl, "based upon the assumption that incoming waters will have very little oxygen demand . . . . and that the operator will maintain close control over the quality of incoming waters." (March 1990 Report)

Mr. Cheney later testified that the aeration system should provide for a 1 ppm oxygen demand within the pond, in addition to the .5 mgl oxygen residual requirement. Mr. Cheney then calculated that the motor to provide such oxygen to the pond through such aeration system would be sized on the order of 96 hp. (June 22, 1990 Transcript, page 321, line 18 through page 322, line 15.)

However, the Oxygen Report, using a similar aeration system, calculated 100 - 450 cfm requirement assuming a 1 ppm (mgl) residual oxygen requirement and a 150 ppm oxygen demand in incoming waters. (Oxygen Report, page 1) The Oxygen Report goes on to calculate that the aeration system must supply 14 pounds of oxygen per hour (# O_2/hr), compared to a calculation of 1.12 # O_2/hr in the March Report.

Therefore, the Oxygen Report calculates that 85% less air will need to be supplied to the pond, compared to the March Report; although the Oxygen Report calculates that 1250% more oxygen must be supplied to the pond, compared to the March Report.

Mr. Cheney did not calculate a motor size in the Oxygen Report. However, Mr. Cheney was able to use simple ratios to determine that the motor size would increase from 32 hp to 96 hp if the oxygen requirement in the pond went from .5 mgl to 1.5 mgl. If we compare the 99 cfm air flow requirements of the Oxygen Report to the 687 cfm air flow requirements of the March Report, we find that the Oxygen Report would require a motor size of 4.6 hp compared to the 32 hp requirement of the March Report. If the 150 ppm oxygen requirement for incoming waters is factored out of the Oxygen Report, we find that the air flow requirement of the Oxygen Report would be reduced by one-half. Therefore, if the 150 ppm oxygen requirement for incoming waters is eliminated from the Oxygen Report, the Oxygen Report would be talking about a motor size of 2.3 hp compared to the 96 hp requirement specified by Mr. Cheney on June 22, 1990 and again on June 12, 1991. (June 12, 1991 Transcript, page 154, line 8 - 15.)

These numbers do not compute!! Something is very wrong somewhere, although both reports were prepared by Mr. Cheney.

VII. **Designs for other critical systems have not been submitted, such as a**

second aeration system, recirculation/spray system and chemical injection systems, that are critical to the successful operation of the facility.

Commission Order Decretory Paragraph (3) states that "[e]ngineering designs for aeration systems shall be certified by a registered professional engineer and submitted to and approved by the Director prior to construction." (Emphasis in original). Commission Order Decretory Paragraph (4) states that "[e]ngineering designs for the enhanced evaporation spray systems shall be certified by a registered professional engineer and submitted to and approved by the Director prior to construction." (Emphasis in original.) Commission Order Decretory Paragraph (7) states that "[e]ach aeration system shall be designed such that the oxygen requirements and residuals can be provided without the use of any additional system." (Emphasis in original.)

The March 1990 Report stated that "[w]ith aeration, recirculation, and chemical injection capabilities, the operator should have sufficient redundancy to maintain the ponds in an odor free condition." While discussing the subject aeration system, Mr. Cheney testified that "I think that the recirculation and spray system that Mr. Frank has designed for this is an integral part of the system. . . . [S]o I think that the availability of the oxygen to the pond with all of the systems operating, I think that there would be a sufficient amount." (June 15, 1990 Transcript, page 245, lines 5 - 22.)

The STWD request for administrative approval from the OCD for the subject commercial evaporation ponds submitted July 2, 1989 (Marked for Identification at the Examiner's Hearing as Applicant's Exhibit No. 1.) provided 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.)

STWD did offer a description of an aeration system they intended to use in their August 18, 1989 letter to OCD (such letter was admitted into evidence at the Examiner's Hearing and marked as Exhibit No. 3). 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) in 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. (June 15, 1990 Transcript, page 267, line 22 through page 268 line 13.) Mr. Cheney also recommended that all such systems should be designed together and certified by a registered professional engineer.

Mr. Frank testified regarding the nature of the two separate and distinct aeration systems. (June 13, 1990 Transcript, page 33, line 2 through page 35, line 15.) Mr. Frank also testified about the nature of the sprayer systems. (June 13, 1990 Transcript page 31, line 13 through page 32, line 24 and page 37, line 10 through page 38, line 23.

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 provided 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. (June 22, 1990 Transcript, page 321, line 18 through page 322, line 15.) Still no designs had been submitted and no information had been provided regarding the fine bubble diffuser 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.

Therefore, it is clear that Mr. Cheney believed that an aeration system, a recirculating system, a spray system and chemical injection capabilities were necessary in order to assure that the pond had sufficient oxygen. Mr. Cheney testified that the 32 hp aeration system was not sufficient in and of itself to maintain the required oxygen levels in the pond. (See June 15, 1990 Transcript,

page 311, lines 18 - 21.) Adequate control of the pond can only be considered in the context of all of the subject systems. No designs, calculations, drawings have yet been submitted to, or considered by, the Commission regarding a fine bubbler system (or other second aeration system), recirculating system, spray system or chemical injection system. Therefore, the aeration system being discussed should not be considered sufficient standing alone to provide the necessary oxygen to the pond.

VIII. **STWD has violated the Commission Order by constructing the subject facility before system designs have been submitted and approved.**

Protestors have recently driven by the subject facility. Such visit revealed that two ponds have been constructed. Liners are visible in one pond. Several tanks are on site. Fences, gates and signs are in place. It appears that the subject facility is nearly ready to accept fluids. Protestors did not actually enter the subject facility, and therefore, could not determine what systems had been constructed, such as aeration, recirculation/spray or leak detection systems. From Protestor's vantage point it could not be determined whether the subject STWD facility had actually accepted fluids to date.

Commission Order Decretory Paragraph (3) provides that "[e]ngineering designs for aeration systems shall be certified by a registered professional engineer and submitted to and approved by the Director prior to construction." Commission Order Decretory Paragraph (4) provides that ""[e]ngineering designs for enhanced evaporation spray systems shall be certified by a registered professional engineer and submitted to and approved by the Director prior to construction." Commission Order Decretory Paragraph (2) provides that "Protestor is afforded the opportunity to review and comment on all engineering designs for the aeration, circulation and enhanced evaporation spray systems."

Since the only thing Protestor has received to date is the subject Oxygen Report, Protestor must assume that the subject system designs have not yet been submitted. If such system designs have not yet been submitted and approved by the Director, STWD is in violation of the Commission Order by having constructed the subject facilities.

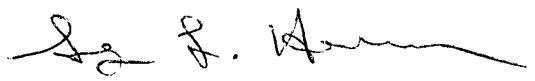
IX. **Protestors request that all construction at the subject facility be halted until system designs are submitted and approved.**

Clearly, designs for the subject aeration systems have not yet been submitted or approved. Clearly the subject Oxygen Report can not be considered a design for the subject aeration system. Clearly massive discrepancies exist between past reports and the current Oxygen Report. Clearly the subject facility has a very significant potential for causing harm to surrounding residents and the environment. Clearly, STWD was to provide designs of the subject systems for approval prior to construction.

Therefore, construction at the subject facility should be halted until such designs are submitted and it is shown that such facility will not be the

environmental hazard that it clearly has the potential to be.

Respectfully Submitted,



GARY L. HORNER, Esquire
Attorney for Protestors, HAROLD and DORIS HORNER

xc: Mr. Ron Mahan
Contract Representative
Big A Well Service
Post Office Box 1496
Farmington, New Mexico 87499
Harold and Doris Horner
John Dean, Jr., Esquire
Attorney for Applicant, STWD

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

August 11, 1992

State of New Mexico
Energy, Minerals, and Natural Resources Dept.
Oil Conservation Commission
P. O. Box 2088
Santa Fe, NM 87504

Sunco Disposal Systems
Ref: Order #R-9485-A

Gentlemen:

As per permit guidelines, enclosed are a Mylor Sepia and copy of as built drawings of our water disposal facility. Also enclosed are an Engineers Report and copies of Engineers Daily Test and Observation Reports.

Please review and advise if you need additional information before issuing final approval.

Sincerely,

George E Coleman

George E. Coleman
Chairman

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

SUNCO Trucking Water Disposal Company
P. O. Box 3337
Farmington, NM 87499-3337

August 10, 1992

Attention: Ron Mahan

Regarding: Crouch Mesa Wastewater Evaporation Ponds
San Juan County, NM

GEOMAT No. 1429

As you requested, we have reviewed the enclosed as-built drawing for the above referenced project. The purpose of the review was to determine conformance of the as-built dike cross-sections with those shown on the construction drawing. The as-built dike cross-sections show the crest widths, slopes, and maximum pond depths to be the same as those shown on the construction drawing.

Based on the full-time observation and testing we performed during earthwork construction of the ponds, subgrade preparation, fill placement and compaction was performed in reasonable compliance with the specifications on the construction and as-built drawings. We understand you will submit copies of our daily observation and testing reports with this letter to the State Engineer office.

Since our scope of work was limited to the earthwork construction, *GEOMAT* makes no warranties either expressed or implied relative to the leak detection system, liners nor any other appurtenances or work which were part of project.

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 at your convenience.

Sincerely yours,
GEOMAT, Inc.

GEORGE A. MADRID NEW MEXICO 9110 REGISTERED PROFESSIONAL ENGINEER

George A. Madrid, P.E.

Distribution: Addressee (3)

GAM/mn

EQMAT Inc. 909 ½ West Apache ◊ Farmington, New Mexico 87401 ◊ 505-327-7928

REVIEW OF EARTHWORK CONSTRUCTION

Client: SUNCO Trucking Water Disposal Company Invoice No: 1292
Project: Crouch Mesa Ponds Report By: R. Johnston Date: 04-22-92
Earthwork Contractor: B & E Construction Superintendent: D. Dennison
Subject: Over Excavation & Backfill of Old Reserve Pit

Arrived on site at 1:00 PM as requested. Upon arrival, overexcavation of old reserve pit, southeast of injection well, had been performed by B & E Construction. Material from east side of site was placed in excavated area in approximately 1 foot lifts and compactive effort applied. One speedy moisture test was performed on existing backfill materials (0-1.0 foot in depth) and was within specified moisture requirements. Three Field Density Tests were performed on backfill of old reserve pit as requested by Earl/Sunco, with all tests meeting project requirements.

One soil sample of material removed from reserve pit was returned to lab for D698A proctor as requested by Earl/Sunco.

4.0 Hours Technician Time On-Site

Report Reviewed By: S.A. Machuld

Distribution: Client (2)
Billing (1)

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

SOIL/AGGREGATE FIELD DENSITY TESTS

Client: Sunco Trucking Water Disposal Co.
Attn: Mr. Ron Mahan
P.O. Box 3337
Farmington, NM 87499-3337

Client P. O. No.:
Job No.:
Invoice No.: 1292
Date of Report: 04-23-92

Project: Crouch Mesa Wastewater Evaporation Ponds
Location: San Juan County, New Mexico
Authorized By: Earl Ramdelman/Client
Test Locations Designated By: R. Johnston/GEOMAT
Material Description: Redish Silty Sand
Field Density Test Method: ASTM D2922,D3017

Date: 04-22-92
Tested By: R. Johnston/GEOMAT
Material Source: 1.5' Depth West Side*
Reviewed By: S.A. Madrid
* Pond #2

Test No.	In-Place Moisture (%)	In-Place Dry Density (PCF)	Compaction (%)	Optimum Moisture (%)	Maximum Dry Density (PCF)	Tested Per ASTM	Required Compaction (%)	Required Moisture (%)	Within Specs?
1	17.4	108.8	95	13.6	114.5	D698A	95	13.6 - 17.6	Yes
2	17.6	109.0	95	13.6	114.5	D698A	95	13.6 - 17.6	Yes
3	17.5	109.4	96	13.6	114.5	D698A	95	13.6 - 17.6	Yes

Test No.	Test Date	Test Location	Material Tested	Elevation Datum*
1	04-22-92	Over Excavation of Old Reserve Pit, Northwest Side Pit #2	Subgrade Backfill	96'
2	04-22-92	Over Excavation of Old Reserve Pit, Northwest Side Pit #2	Subgrade Backfill	98'
3	04-22-92	Over Excavation of Old Reserve Pit, Northwest Side Pit #2	Subgrade Backfill	100'

Distribution: Client (2), Billing (1)

*Datum: 100' = Top of Existing Grade

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

LABORATORY REPORT

Client: Sunco Trucking Water Disposal Company
Attn: Mr. Ron Mahan
P.O. Box 3337
Farmington, NM 87499-3337

Invoice No. 1292
Date of Report 04-24-92

Project: Crouch Mesa Wastewater Evaporation Ponds
Location: San Juan County, New Mexico
Type of Material: Clayey Sand
Source of Material: Old Reserve Pit
Requested By: E. Randelman Date: 04-22-92
Sampled By: R. Johnston/GEOMAT Date: 04-22-92
Submitted By: R. Johnston Date: 04-22-92
Reviewed By: D.a. Madrid

Sieve Analysis, ASTM

Sieve Size	Accumulative % Passing	Specification
3"		
2½"		
2"		
1½"		
1"		
¾"		
½"		
⅜"		
¼"		
No. 4		
8		
10		
16		
30		
40		
50		
100		
200		

Moisture Density Relationship, Test Method: ASTM D698A
Maximum Dry Density, PCF: 117.1 Optimum Moisture, %: 13.0

Plasticity Index, ASTM D4318

	Results	Specs.
LL:		
PL:		
PI:		

Other

Distribution: Client (2), Billing (1)

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

REVIEW OF EARTHWORK CONSTRUCTION

Client: SUNCO Trucking Water Disposal company Invoice No: 1292
Project: Crouch Mesa Ponds Report By: R. Johnston Date: 04-23-92
Earthwork Contractor: B & E Construction Superintendent: D. Dennison
Subject: North Dike Pond #2

Arrived on site at 8:00 A.M. as requested. Earthwork construction began at 10:00 A.M., with placement of fill material on North Dike, Pond #2. Material was placed in approximately 1 foot lifts and compactive effort applied. Moisture content of fill material was monitored with speedy moisture gage to assure adequate moisture before compactive effort was applied. Five Field Density Tests were performed on fill, on North Dike, Pond #2. All the tests met project requirements. Approximately two foot of fill was placed the entire length of North Dike, Pond #2. Approximately two foot of soil was removed from proposed South Dike, Pond #2, and interior slope is being cut into undisturbed native material. Change in soil type exists approximately two feet below existing subgrade, going from Reddish Silty Sand to Whitish Silty Sand.

6.5 Hours Technician Time On-Site.

Report Reviewed By: S. A. Madrid

Distribution: Client (2)
Billing (1)

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

SOIL/AGGREGATE FIELD DENSITY TESTS

Client: Sunco Trucking Water Disposal Co.
Attn: Mr. Ron Mahan
P.O. Box 3337
Farmington, NM 87499-3337

Client P. O. No.:
Job No.:
Invoice No.: 1292
Date of Report: 04-24-92

Project: Crouch Mesa Wastewater Evaporation Ponds
Location: San Juan County, New Mexico
Authorized By: E. Randelman/SUNCO
Test Locations Designated By: R. Johnston/GEOMAT
Material Description: Reddish Silty Sand
Field Density Test Method: ASTM D2922, D3017

Date: 04-23-92
Tested By: R. Johnston/GEOMAT
Material Source: 1.5' Depth W. Side*
Reviewed By: S.A. Madrid

*Pond #2

Test No.	In-Place Moisture (%)	In-Place Dry Density (PCF)	Compaction (%)	Optimum Moisture (%)	Maximum Dry Density (PCF)	Tested Per ASTM	Required Compaction (%)	Required Moisture (%)	Within Specs?
1	14.0	110.7	97	13.6	114.5	D698A	95	13.6 - 17.6	Yes
2	13.9	109.6	96	13.6	114.5	D698A	95	13.6 - 17.6	Yes
3	14.4	111.3	97	13.6	114.5	D698A	95	13.6 - 17.6	Yes
4	13.9	109.0	95	13.6	114.5	D698A	95	13.6 - 17.6	Yes
5	14.2	110.8	97	13.6	114.5	D698A	95	13.6 - 17.6	Yes

Test No.	Test Date	Test Location	Material Tested	Elevation Datum*
1	04-23-92	Center Line North Dike Pond #2, 200'East of North-west Corner of Dike	Backfill	85.0
2	04-23-92	25' South of Toe of Dike Pond #2, 300'East of North-west Corner of Dike	Backfill	84.0
3	04-23-92	50' South of Toe of Dike Pond #2, 100'East of North-west Corner of Dike	Backfill	86.0
4	04-23-92	50' South of Toe of Dike Pond #2, 400' East of North-west Corner of Dike	Backfill	85.0
5	04-23-92	10' South of Toe of Dike Pond #2, 150' East of North-west Corner of Dike	Backfill	87.0

Distribution: Client (2), Billing (1)

*Datum: 100' - Top of Pond #2, North Dik

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

REVIEW OF EARTHWORK CONSTRUCTUCTION

Client: SUNCO Trucking Water Disposal Company Invoice No: 1292
Project: Crouch Mesa Ponds Report By: R. Johnston Date: 04-24-92
Earthwork Contractor: B & E Construction Superintendent: D. Dennison
Subject: Pond #2

Arrived on site at 8:00 A.M. as requested. Fill placement on North and East Dikes continued today by B & E Construction. Inside slopes were cut into undisturbed native material on West Dike on Pond #2.

Approximately two feet of fill was placed the entire length on North and East Dikes today. A total of six Field Density Tests were performed today on fill areas, with two failing areas due to low moisture content. These areas were wetted, and reworked. Two retests were performed on failing area. These areas now meet project requirements.

6.5 Hours Technician Time On-Site

Report Reviewed By: S. A. Madrid

Distribution: Client (2)
Billing (1)

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

SOIL/AGGREGATE FIELD DENSITY TESTS

Client: Sunco Trucking Water Disposal Co.
Attn: Mr. Ron Mahan
P.O. Box 3337
Farmington, NM 87499-3337

Client P. O. No.:
Job No.:
Invoice No.: 1292
Date of Report: 04-27-92

Project: Crouch Mesa Wastewater Evaporation Ponds
Location: San Juan County, New Mexico
Authorized By: E. Randelman/Client
Date: 04-24-92
Test Locations Designated By: R. Johnston/GEOMAT
Tested By: R. Johnston/GEOMAT
Material Description: Silty Sand, Reddish/Silty Sand*
Material Source: W. Side Pond 2/N. Side*
Field Density Test Method: ASTM D2922, D3017
Reviewed By: S. A. Madrid
*Whitish
*Pond 2

Test No.	In-Place Moisture (%)	In-Place Dry Density (PCF)	Compaction (%)	Optimum Moisture (%)	Maximum Dry Density (PCF)	Tested Per ASTM	Required Compaction (%)	Required Moisture (%)	Within Specs?
1	16.4	108.9	95	13.6	114.5	D698A	95	13.6 - 17.6	Yes
2	10.9	107.4	93	13.6	116.0	D698A	95	13.6 - 17.6	No
3R	13.7	110.2	95	13.6	116.0	D698A	95	13.6 - 17.6	Yes
4	16.0	113.4	98	13.6	116.0	D698A	95	13.6 - 17.6	Yes
5	10.1	113.0	97	13.6	116.0	D698A	95	13.6 - 17.6	No
6R	15.6	110.0	95	13.6	116.0	D698A	95	13.6 - 17.6	Yes

Test No.	Test Date	Test Location	Material Tested	Elevation Datum*
1	04-24-92	30' South of Toe of North Dike, Pond #2, 350' East of Northwest Corner of Dike	Fill	85'
2	04-24-92	50' South of Toe of North Dike, Pond #2, 200' East of Northwest Corner of Dike	Fill	87'
3R	04-24-92	Retest #2 from 04-24-92	Fill	87'
4	04-24-92	50' West of Toe of East Dike, Pond #2, 50' South of Northeast Corner of Dike	Fill	88'
5	04-24-92	25' West of Toe of North Dike, Pond #2, 150' East of Northwest Corner of Dike	Fill	89'
6R	04-24-92	Retest #5 from 04-24-92.	Fill	89'

Distribution: Client (2), Billing (1)

*Datum: 100' = Top of Dike

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

REVIEW OF EARTHWORK CONSTRUCTION

Client: SUNCO Trucking Water Disposal Company Invoice No: 1306
Project: Crouch Mesa Ponds Report By: R. Johnston Date: 04-27-92
Earthwork Contractor: B & E Construction Superintendent: D. Dennison
Subject: Pond #2

Arrived on site at 8:00 AM as requested. Fill placement continued on north and east dikes by B & E Construction. Aprroximately 3 feet of fill was placed on north dike and 2 feet on east dikes, both the entire length of dike. Trench was excavated on west dike to install PVC pipe for leak detector system. PVC pipe was not placed in trench today. Several speedy moisture tests were performed on loose lifts in fill areas to assist contractor with moisture control of material before compactive effort was applied. Ten Field Density Tests (Nuclear Method) were performed on north and east dikes today with all testing meeting moisture and density requirements. All material which was excavated out of old reserve pit was used today for fill.

8.0 Hours Technician Time On-Site

Report Reviewed By: S.A. Madrid

Distribution: Client (2)
Billing (1)

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

SOIL/AGGREGATE FIELD DENSITY TESTS

Client: Sunco Trucking Water Disposal Co.
Attn: Mr. Ron Mahan
P.O. Box 3337
Farmington, NM 87499-3337

Client P. O. No.:
Job No.:
Invoice No.: 1306
Date of Report: 04-29-92

Project: Crouch Mesa Wastewater Evaporation Ponds
Location: San Juan County, New Mexico
Authorized By: E. Randelman/Client
Test Locations Designated By: R. Johnston/GEOMAT
Material Description: Silty Sand, Reddish/Clayey Sand
Field Density Test Method: ASTM D2922, D3017

Date: 04-27-92
Tested By: R. Johnston/GEOMAT
Material Source: West Side of Pond #2/*
Reviewed By: S. a. madrid
*Old Reserve Pit

Test No.	In-Place Moisture (%)	In-Place Dry Density (PCF)	Compaction (%)	Optimum Moisture (%)	Maximum Dry Density (PCF)	Tested Per ASTM	Required Compaction (%)	Required Moisture (%)	Within Specs?
1	13.6	110.1	96	13.6	114.5	D698A	95	13.6 - 17.6	Yes
2	15.0	110.2	96	13.6	114.5	D698A	95	13.6 - 17.6	Yes
3	14.0	109.7	96	13.6	114.5	D698A	95	13.6 - 17.6	Yes
4	16.0	110.9	97	13.6	114.5	D698A	95	13.6 - 17.6	Yes
5	17.3	109.2	95	13.6	114.5	D698A	95	13.6 - 17.6	Yes
6	13.7	111.3	97	13.6	114.5	D698A	95	13.6 - 17.6	Yes

Test No.	Test Date	Test Location	Material Tested	Elevation Datum*
1	04-27-92	Center Line North Dike, Pond #2, 100' East of Northwest Corner of Dike	Engineered Fill	88'6"
2	04-27-92	Center Line North Dike, Pond #2, 300' East of Northwest Corner of Dike	Engineered Fill	88'6"
3	04-27-92	Center Line North Dike, Pond #2, 200' East of Northwest Corner of Dike	Engineered Fill	89'0"
4	04-27-92	Center Line North Dike, Pond #2, 400' East of Northwest Corner of Dike	Engineered Fill	90'0"
5	04-27-92	East Dike, Pond #2, 10' West of Toe, 150 South of Northeast Corner of Dike	Engineered Fill	90'0"
6	04-27-92	East Dike, Pond #2, 30' South of Northeast Corner of Dike	Engineered Fill	92'0"

Distribution: Client (2), Billing (1)

*Datum: 100' = Top of Dike

SOIL/AGGREGATE FIELD DENSITY TESTS

Client: Sunco Trucking Water Disposal Co.
Attn: Mr. Ron Mahan
P.O. Box 3337
Farmington, NM 87499-3337

Client P. O. No.
Job No.
Invoice No. 1306
Date of Report 04-29-92

Project: Crouch Mesa Wastewater Evaporation Ponds
Location: San Juan County, New Mexico
Authorized By: E. Randelman/Client
Test Locations Designated By: R. Johnston/GEOMAT
Material Description: Silty Sand, Reddish/Clayey Sand
Field Density Test Method: ASTM D2922, D3017

Date: 04-27-92
Tested By: R. Johnston/GEOMAT
Material Source: West Side of Pond #2/*
Reviewed By: S. A. Madrid
*Old Reserve Pit

Test No.	In-Place Moisture (%)	In-Place Dry Density (PCF)	Compaction (%)	Optimum Moisture (%)	Maximum Dry Density (PCF)	Tested Per ASTM	Required Compaction (%)	Required Moisture (%)	Within Specs?
7	13.1	111.6	95	13.0	117.1	D698A	95	13.0 - 17.0	Yes
8	16.2	109.2	95	13.6	114.5	D698A	95	13.6 - 17.6	Yes
9	15.3	109.8	96	13.6	114.5	D698A	95	13.6 - 17.6	Yes
10	17.1	112.0	98	13.6	114.5	D698A	95	13.6 - 17.6	Yes

Test No.	Test Date	Test Location	Material Tested	Elevation Datum*
7	04-27-92	North Dike, Pond #2, 15' South of Toe, 150 East of Northwest Corner of Dike	Engineered Fill	90'0"
8	04-27-92	East Dike, Pond #2, 75' West of Toe, 100' South of Northeast Corner of Dike	Engineered Fill	91'0"
9	04-27-92	North Dike, Pond #2, 50' South of Toe, 50' East of Northwest Corner of Dike	Engineered Fill	90'0"
10	04-27-92	East Dike, Pond #2, 15' West of Toe, 350' South of Northeast Corner of Dike	Engineered	92'0"

Distribution: Client (2), Billing (1)

*Datum: 100' = Top of Dike

GEOMAT

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

REVIEW OF EARTHWORK CONSTRUCTION

Client: SUNCO Trucking Water Disposal Company Invoice No: 1306
Project: Crouch Mesa Ponds Report by: R. Johnston Date: 04-28-92
Earthwork Contractor: B & E Construction Superintendent: D. Dennison
Subject: Pond #2

Arrived on site at 8:00 AM as requested. Fill placement continued on north and east dikes by B & E Construction. Fill material is being excavated from interior of Pond #1. Approximately 3 feet of fill was placed the entire length of north and west dikes. Trench was excavated on west dike of proposed Pond #1 to install PVC pipe for leak detector system. PVC pipe was not placed in trench today. Fifteen Field Density Tests were performed in fill sections on north and east dikes today with all tests meeting density and moisture requirements.

8 Hours Techician On-Site

Report Reviewed By: S. A. Madrid

Distribution: Client (2), Billing (1)

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

SOIL/AGGREGATE FIELD DENSITY TESTS

Client: Sunco Trucking Water Disposal Co.
Attn: Mr. Ron Mahan
P.O. Box 3337
Farmington, NM 87499-3337

Client P. O. No.
Job No.
Invoice No. 1306
Date of Report 04-29-92

Project: Crouch Mesa Wastewater Evaporation
Location: San Juan County, New Mexico
Authorized By: E. Randelman/Client
Test Locations Designated By: R. Johnston/GEOMAT
Material Description: Silty Sand, Reddish
Field Density Test Method: ASTM D2922, D3017

Date: 04-28-92
Tested By: R. Johnston/GEOMAT
Material Source: 1.5' Depth, West Side*
Reviewed By: S.a. macdonald

*Pond #2

Test No.	In-Place Moisture (%)	In-Place Dry Density (PCF)	Compaction (%)	Optimum Moisture (%)	Maximum Dry Density (PCF)	Tested Per ASTM	Required Compaction (%)	Required Moisture (%)	Within Specs?
1	15.8	108.6	95	13.6	114.5	D698A	95	13.6 - 17.6	Yes
2	13.8	109.2	95	13.6	114.5	D698A	95	13.6 - 17.6	Yes
3	14.0	111.3	97	13.6	114.5	D698A	95	13.6 - 17.6	Yes
4	14.9	110.7	97	13.6	114.5	D698A	95	13.6 - 17.6	Yes
5	14.2	108.9	95	13.6	114.5	D698A	95	13.6 - 17.6	Yes

Test No.	Test Date	Test Location	Material Tested	Elevation Datum*
1	04-28-92	North Dike Pond #2, 25' South of Toe, 100' East of Northwest Corner of Dike	Engineered Fill	90.6'
2	04-28-92	North Dike Pond #2, 70' South of Toe, 350' East of Northwest Corner of Dike	Engineered Fill	91.0'
3	04-28-92	East Dike Pond #2, 50' West of Toe, 100' South of Northeast Corner of Dike	Engineered Fill	91.0'
4	04-28-92	East Dike Pond #2, 50' West of Toe, 100' South of Northeast Corner of Dike	Engineered Fill	92.0'
5	04-28-92	North Dike Pond #2, 25' South of Toe, 350' East of Northwest Corner of Dike	Engineered Fill	91.0'

Distribution: Client (2), Billing (1)

*Datum: 100' = Top of Dike

SOIL/AGGREGATE FIELD DENSITY TESTS

Client: Sunco Trucking Water Disposal Co.
Attn: Mr. Ron Mahan
P.O. box 3337
Farmington, NM 87499-3337

Client P. O. No.
Job No.
Invoice No. 1306
Date of Report 04-29-92

Project: Crouch Mesa Wastewater Evaporation
Location: San Juan County, New Mexico
Authorized By: E. Randelman/Client
Test Locations Designated By: R. Johnston/GEOMAT
Material Description: Silty Sand, Reddish
Field Density Test Method: ASTM D2922, D3017

Date: 04-28-92
Tested By: R. Johnston/GEOMAT
Material Source: 1.5' Depth, West Side*
Reviewed By: S.A. Mead
*Pond #2

Test No.	In-Place Moisture (%)	In-Place Dry Density (PCF)	Compaction (%)	Optimum Moisture (%)	Maximum Dry Density (PCF)	Tested Per ASTM	Required Compaction (%)	Required Moisture (%)	Within Specs?
6	14.4	112.1	98	13.6	114.5	D698A	95	13.6 - 17.6	Yes
7	16.1	113.1	99	13.6	114.5	D698A	95	13.6 - 17.6	Yes
8	14.6	110.6	97	13.6	114.5	D698A	95	13.6 - 17.6	Yes
9	17.5	108.8	95	13.6	114.5	D698A	95	13.6 - 17.6	Yes
10	17.1	110.7	97	13.6	114.5	D698A	95	13.6 - 17.6	Yes

Test No.	Test Date	Test Location	Material Tested	Elevation Datum*
6	04-28-92	East Dike Pond #2, 10' West of Toe, 125' South of Northeast Corner of Dike	Engineered Fill	91.0'
7	04-28-92	East Dike Pond #2, 50' West of Toe, 300' South of Northeast Corner of Dike	Engineered Fill	94.0'
8	04-28-92	North Pike Pond #2, 25' South of Toe, 75' East of Northwest Corner of Dike	Engineered Fill	91.0'
9	04-28-92	North Pike Pond #2, 50' South of Toe, 350' East of Northwest Corner of Dike	Engineered Fill	91.0'
10	04-28-92	East Dike Pond #2, 25' West of Toe, 300' South of Northeast Corner of Dike	Engineered Fill	93.0'

Distribution: Client (2), Billing (1)

*Datum: 100' = Top of Dike

SOIL/AGGREGATE FIELD DENSITY TESTS

Client: Sunco Trucking Water Disposal Co.
Attn: Mr. Ron Mahan
P.O. Box 3337
Farmington, NM 87499-3337

Client P. O. No.
Job No.
Invoice No. 1306
Date of Report 04-29-92

Project: Crouch Mesa Wastewater Evaporation
Location: San Juan County, New Mexico
Authorized By: E. Randelman/Client
Test Locations Designated By: R. Johnston/GEOMAT
Material Description: Silty Sand, Reddish
Field Density Test Method: ASTM D2922, D3017

Date: 04-28-92
Tested By: R. Johnston/GEOMAT
Material Source: 1.5' Depth, West Side*
Reviewed By: S.O. Madrid

*Pond #2

Test No.	In-Place Moisture (%)	In-Place Dry Density (PCF)	Compaction (%)	Optimum Moisture (%)	Maximum Dry Density (PCF)	Tested Per ASTM	Required Compaction (%)	Required Moisture (%)	Within Specs?
11	15.1	110.9	97	13.6	114.5	D698A	95	13.6 - 17.6	Yes
12	14.5	108.9	95	13.6	114.5	D698A	95	13.6 - 17.6	Yes
13	16.4	109.6	96	13.6	114.5	D698A	95	13.6 - 17.6	Yes
14	15.3	109.0	95	13.6	114.5	D698A	95	13.6 - 17.6	Yes
15	15.4	108.9	95	13.6	114.5	D698A	95	13.6 - 17.6	Yes

Test No.	Test Date	Test Location	Material Tested	Elevation Datum*
11	04-28-92	East Dike Pond #2, 50' West of Toe, 150' South of Northeast Corner of Dike	Engineered Fill	92.0'
12	04-28-92	North Dike Pond #2, 15' South of Toe, 250' East of Northwest Corner of Dike	Engineered Fill	92.6'
13	04-28-92	North Dike Pond #2, 50' South of Toe, 250' East of Northwest Corner of Dike	Engineered Fill	92.6'
14	04-28-92	East Dike Pond #2, 75' West of Toe, 200' South of Northeast Corner of Dike	Engineered Fill	92.6'
15	04-28-92	East Dike Pond #2, 15' West of Toe, 200' South of Northeast Corner of Dike	Engineered Fill	92.6'

Distribution: Client (2), Billing (1)

*Datum: 100' = Top of Dike

GEOMAT

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

REVIEW OF EARTHWORK CONSTRUCTION

Client: SUNCO Trucking Water Disposal Company Invoice No: 1306
Project: Crouch Mesa Ponds Report By: R. Johnston Date: 04-29-92
Earthwork Contractor: B & E Construction Superintendent: D. Dennison
Subject: Pond #2

Arrived on site at 8:00 A.M. as requested. Fill placement continued today on north, east and south dikes of Pond #2 by B & E Construction. Fill production was slow this morning due to equipment breakdowns. Approximately 1 foot of fill was placed the entire length of north and east dikes and approximately 2 feet at southeast end of south dike. Nine Field Density Tests were performed in fill sections today, with all testing meeting moisture and density requirements.

A concern was brought up this afternoon over the proposed method of backfill placement, in excavated trench for leak detection system, on west side of proposed Pond #1. The trench was approximately 24" wide and 12 feet in depth. The intentions were to use a vibratory compactor in trench, which is a safety hazard due to the depth and width of trench with vibratory equipment inside. The trench was then backfilled with loose material to approximately 6 feet below top of trench. Differential settlement could occur using this method, which could cause structural damage to dikes and protective liner inside pond. Work in this area was stopped by Earl Randelman (SUNCO) after conversation with Mr. George Madrid (GEOMAT). After inspection of trench, Earl Randelman notified me that a decision will be made in the morning on what to do in this area.

8 Hours Technician On-Site.

Report Reviewed By: G. A. Madrid

Distribution: Client (2), Billing (1)

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

SOIL/AGGREGATE FIELD DENSITY TESTS

Client: Sunco Trucking Water Disposal Co.
Attn: Mr. Ron Mahan
P.O. Box 3337
Farmington, NM 87499-3337

Client P. O. No.
Job No.
Invoice No. 1306
Date of Report 04-30-92

Project: Crouch Mesa Wastewater Evaporation
Location: San Juan County, New Mexico
Authorized By: E. Randelman/Client
Test Locations Designated By: R. Johnston/GEOMAT
Material Description: Silty Sand, Whitish/Silty Sand,*
Field Density Test Method: ASTM D2922, D3017
*Reddish

Date: 04-29-92
Tested By: R. Johnston/GEOMAT
Material Source: West Side of Pond #2/*
Reviewed By: S.a. Madrid
*North Edge Pond #2

Test No.	In-Place Moisture (%)	In-Place Dry Density (PCF)	Compaction (%)	Optimum Moisture (%)	Maximum Dry Density (PCF)	Tested Per ASTM	Required Compaction (%)	Required Moisture (%)	Within Specs?
1	15.4	113.2	98	13.6	116.0	D698A	95	13.6 - 17.6	Yes
2	15.1	113.2	98	13.6	116.0	D698A	95	13.6 - 17.6	Yes
3	14.2	110.2	96	13.6	114.5	D698A	95	13.6 - 17.6	Yes
4	14.2	110.8	97	13.6	114.5	D698A	95	13.6 - 17.6	Yes
5	14.6	110.0	96	13.6	114.5	D698A	95	13.6 - 17.6	Yes

Test No.	Test Date	Test Location	Material Tested	Elevation Datum*
1	04-29-92	South Dike Pond #2, Center Line of Dike, 75' West of Southeast Corner of Dike	Engineered Fill	93.0'
2	04-29-92	South Dike Pond #2, Center Line of Dike, 100' West of Southeast Corner of Dike	Engineered Fill	94.0'
3	04-29-92	North Dike Pond #2, 15' South of Toe, 175' East of Northwest Corner of Dike	Engineered Fill	92.0'
4	04-29-92	East Dike Pond #2, 25' West of Toe, 300' South of Northeast Corner of Dike	Engineered Fill	94.0'
5	04-29-92	North Dike Pond #2, 50' South of Toe, 350' East of	Engineered Fill	92'6"

Distribution: Client (2), Billing (1)

*Datum: 100' = Top of Dike

SOIL/AGGREGATE FIELD DENSITY TESTS

Client: Sunco Trucking Water Disposal Co.
Attn: Mr. Ron Mahan
P.O. Box 3337
Farmington, NM 87499-3337

Client P. O. No.
Job No.
Invoice No. 1306
Date of Report 04-30-92

Project: Crouch Mesa Wastewater Evaporation
Location: San Juan County, New Mexico
Authorized By: E. Randelman/Client
Date: 04-29-92
Test Locations Designated By: R. Johnston/GEOMAT
Tested By: R. Johnston/GEOMAT
Material Description: Silty Sand, Whitish/Silty Sand,*
Material Source: West Side of Pond #2/*
Field Density Test Method: ASTM D2922, D3017
Reviewed By: S.A. Madrid
*Reddish
*North Edge Pond #2

Test No.	In-Place Moisture (%)	In-Place Dry Density (PCF)	Compaction (%)	Optimum Moisture (%)	Maximum Dry Density (PCF)	Tested Per ASTM	Required Compaction (%)	Required Moisture (%)	Within Specs?
6	13.8	109.1	95	13.6	114.5	D698A	95	13.6 - 17.6	Yes
7	15.4	108.4	95	13.6	114.5	D698A	95	13.6 - 17.6	Yes
8	13.8	111.8	96	13.6	116.0	D698A	95	13.6 - 17.6	Yes
9	16.7	112.3	97	13.6	116.0	D698A	95	13.6 - 17.6	Yes

Test No.	Test Date	Test Location	Material Tested	Elevation Datum*
6	04-29-92	North Dike Pond #2, 75' South of Toe, 150' East of Northwest Corner of Dike	Engineered Fill	92.6'
7	04-29-92	South Dike Pond #2, 15' North of Toe, 100' West of Southeast Corner of Dike	Engineered Fill	94.6'
8	04-29-92	North Dike Pond #2, 25' South & 25' East of Northwest Corner of Dike	Engineered Fill	93.0'
9	04-29-92	North Dike Pond #2, 25' South of Toe, 350' East of Northwest Corner of Dike	Engineered Fill	93.0'

Distribution: Client (2), Billing (1)

*Datum: 100' = Top of Dike

GEOMAT

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

REVIEW OF EARTHWORK CONSTRUCTION

Client: SUNCO Trucking Water Disposal Company Invoice No: 1306
Project: Crouch Mesa Ponds Report By: R. Johnston Date: 04-30-92
Earthwork Contractor: B & E Construction Superintendent: D. Dennison
Subject: Pond #2

Placement of fill on dikes of Pond #2 continued today by B & E Construction. Approximately 2 feet of fill was placed on north, south, east and north end of west dike today. Material being excavated on inside of pond is now a very dry whitish silty sand and is very difficult to process. Approximately 40 gallons of water is now needed to process 1 cubic yard of material at optimum moisture. Nine Field Density Tests were performed in fill sections with all tests meeting moisture and density requirements.

Forty-four yards of flowable fill, supplied by Arco Materials, was placed today in excavated trenches for leak detection out-flow pipes in west embankments of Ponds #1 and #2. Trenches are now shallow enough to eliminate a safety hazard when compacting backfill material inside trench. These trenches are to be backfilled to existing grade tomorrow with processed on-site material.

8 Hours Technician On-Site

Reviewed By: A.A. Madrid

Distribution: Client (2)
Billing (1)

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

SOIL/AGGREGATE FIELD DENSITY TESTS

Client: Sunco Trucking Water Disposal Co.
Attn: Mr. Ron Mahan
P.O. Box 3337
Farmington, NM 87499-3337

Client P. O. No.
Job No.
Invoice No. 1306
Date of Report 05-01-92

Project: Crouch Mesa Wastewater Evaporation Ponds
Location: San Juan County, New Mexico
Authorized By: E. Randelman/Client
Date: 04-30-92
Test Locations Designated By: R. Johnston/GEOMAT
Tested By: R. Johnston/GEOMAT
Material Description: Silty Sand, Reddish
Material Source: North End Pond #2
Field Density Test Method: ASTM D2922, D3017
Reviewed By: D. A. Macha

Test No.	In-Place Moisture (%)	In-Place Dry Density (PCF)	Compaction (%)	Optimum Moisture (%)	Maximum Dry Density (PCF)	Tested Per ASTM	Required Compaction (%)	Required Moisture (%)	Within Specs?
1	17.4	110.8	96	13.6	116.0	D698A	95	13.6 - 17.6	Yes
2	16.3	111.3	96	13.6	116.0	D698A	95	13.6 - 17.6	Yes
3	15.9	109.8	95	13.6	116.0	D698A	95	13.6 - 17.6	Yes
4	15.7	110.3	95	13.6	116.0	D698A	95	13.6 - 17.6	Yes
5	14.9	113.2	98	13.6	116.0	D698A	95	13.6 - 17.6	Yes

Test No.	Test Date	Test Location	Material Tested	Elevation Datum*
1	04-30-92	North Dike Pond #2, 50' South of Toe, 50' East of Northwest Corner of Dike	Engineered Fill	92.6'
2	04-30-92	North Dike Pond #2, 40' South of Toe, 300' East of Northwest Corner of Dike	Engineered Fill	92.6'
3	04-30-92	East Dike Pond #2, 50' West of Toe, 125' South of Northeast Corner of Dike	Engineered Fill	93.6'
4	04-30-92	East Dike Pond #2,15' West of Toe, 275' South of Northeast Corner of Dike	Engineered Fill	94.6'
5	04-30-92	North Dike Pond #2, 25' South of Toe, 150' East of Northwest Corner of Dike	Engineered Fill	93.0'

Distribution: Client (2), Billing (1)

*Datum: 100' = Top of Dike

SOIL/AGGREGATE FIELD DENSITY TESTS

Client: Sunco Trucking Water Disposal Co.
Attn: Mr. Ron Mahan
P.O. Box 3337
Farmington, NM 87499-3337

Client P. O. No.
Job No.
Invoice No. 1306
Date of Report 05-01-92

Project: Crouch Mesa Wastewater Evaporation Ponds
Location: San Juan County, New Mexico
Authorized By: E. Randelman/Client
Test Locations Designated By: R. Johnston/GEOMAT
Material Description: Silty Sand, Reddish
Field Density Test Method: ASTM D2922, D3017

Date: 04-30-92
Tested By: R. Johnston/GEOMAT
Material Source: North End Pond #2
Reviewed By: S. A. Madrid

Test No.	In-Place Moisture (%)	In-Place Dry Density (PCF)	Compaction (%)	Optimum Moisture (%)	Maximum Dry Density (PCF)	Tested Per ASTM	Required Compaction (%)	Required Moisture (%)	Within Specs?
6	15.7	113.4	98	13.6	116.0	D698A	95	13.6 - 17.6	Yes
7	15.2	114.1	98	13.6	116.0	D698A	95	13.6 - 17.6	Yes
8	15.8	114.8	99	13.6	116.0	D698A	95	13.6 - 17.6	Yes
9	15.2	114.7	99	13.6	116.0	D698A	95	13.6 - 17.6	Yes

Test No.	Test Date	Test Location	Material Tested	Elevation Datum*
6	04-30-92	North Dike Pond #2, 60' South of Toe, 350' East of Northwest Corner of Dike	Engineered Fill	93.0'
7	04-30-92	South Dike Pond #2, 25' North of Toe, 75' West of Southeast Corner of Dike	Engineered Fill	94.6'
8	04-30-92	East Dike Pond #2, Center Line of Dike, 300' South of Northeast Corner of Dike	Engineered Fill	94.6'
9	04-30-92	East Dike Pond #2, Center Line of Dike, 100' South of Northeast Corner of Dike	Engineered Fill	94.0'

Distribution: Client (2), Billing (1)

*Datum: 100' = Top of Dike

GEOMAT

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

REVIEW OF EARTHWORK CONSTRUCTION

Client: SUNCO Trucking Water Disposal Company Invoice No: 1306
Project: Crouch Mesa Ponds Report By: R. Johnston Date: 05-01-92
Earthwork Contractor: B & E Construction Superintendent: D. Dennison
Subject: Pond #2, Backfill Over Leak detection System Trench

Fill placement continued today on north, south and east dikes of Pond #2 by B & E Construction. Approximately 2 feet compacted fill was placed today on north, south and east dikes. Backfill of trench started today on top of flowable fill which was placed yesterday over PVC pipe for leak detection system. Trench was backfilled to existing subgrade. Twelve Field Density Tests were performed in fill sections on dikes and backfill in trench over PVC pipe. All testing today met moisure and density requirements.

6.5 Hours Technician On-Site

Report Reviewed By: D. A. Madrid

Distribution: Client (2)
Billing (1)

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

SOIL/AGGREGATE FIELD DENSITY TESTS

Client: Sunco Trucking Water Disposal Co.
Attn: Mr. Ron Mahan
P.O. Box 3337
Farmington, NM 87499-3337

Client P. O. No.
Job No.
Invoice No. 1306
Date of Report 05-04-92

Project: Crouch Mesa Wastewater Evaporation Ponds
Location: San Juan County, New Mexico
Authorized By: E. Randelman/Client
Test Locations Designated By: R. Johnston/GEOMAT
Material Description: Silty Sand, Whitish
Field Density Test Method: ASTM D2922, D3017

Date: 05-01-92
Tested By: R. Johnston/GEOMAT
Material Source: 5' In Depth North Edge*
Reviewed By: A.O. Madrid
* Pond #2

Test No.	In-Place Moisture (%)	In-Place Dry Density (PCF)	Compaction (%)	Optimum Moisture (%)	Maximum Dry Density (PCF)	Tested Per ASTM	Required Compaction (%)	Required Moisture (%)	Within Specs?
1	15.7	111.4	96	13.6	116.0	D698A	95	13.6 - 17.6	Yes
2	13.8	111.8	96	13.6	116.0	D698A	95	13.6 - 17.6	Yes
3	13.7	110.3	95	13.6	116.0	D698A	95	13.6 - 17.6	Yes
4	14.3	113.4	98	13.6	116.0	D698A	95	13.6 - 17.6	Yes
5	14.1	112.7	97	13.6	116.0	D698A	95	13.6 - 17.6	Yes

Test No.	Test Date	Test Location	Material Tested	Elevation Datum*
1	05-01-92	Center Line North Dike Pond #2, 150' East of Northwest Corner of Dike	Engineered Fill	94.0'
2	05-01-92	Center Line West Dike Pond #2, 100' South of Northwest Corner of Dike	Engineered Fill	93.0'
3	05-01-92	Center Line South Dike Pond #2, 200' West of Southeast Corner of Dike	Engineered Fill	97.0'
4	05-01-92	Center Line West Dike Pond #2 Over PVC Pipe for Leak Detection System	Trench Backfill	97.0'*
5	05-01-92	Center Line West Dike Pond #2 Over PVC Pipe for Leak Detection System	Trench Back-	98.0'*

Distribution: Client (2), Billing (1)

*Datum: 100' = Top of Dike
*100' = Top of Trench

SOIL/AGGREGATE FIELD DENSITY TESTS

Client: Sunco Trucking Water Disposal Co.
Attn: Mr. Ron Mahan
P.O. Box 3337
Farmington, NM 87499-3337

Client P. O. No.
Job No.
Invoice No. 1306
Date of Report 05-04-92

Project: Crouch Mesa Wastewater Evaporation Ponds
Location: San Juan County, New Mexico
Authorized By: E. Randelman/Client
Test Locations Designated By: R. Johnston/GEOMAT
Material Description: Silty Sand, Whitish
Field Density Test Method: ASTM D2922, D3017

Date: 05-01-92
Tested By: R. Johnston/GEOMAT
Material Source: 5' In depth North Edge*
Reviewed By: J. A. Madrid
*Pond #2

Test No.	Moisture (%)	In-Place Dry Density (PCF)	Compaction (%)	Optimum Moisture (%)	Maximum Dry Density (PCF)	Tested Per ASTM	Required Compaction (%)	Required Moisture (%)	Within Specs?
6	13.9	112.7	97	13.6	116.0	D698A	95	13.6 - 17.6	Yes
7	14.0	112.4	97	13.6	116.0	D698A	95	13.6 - 17.6	Yes
8	14.2	111.8	96	13.6	116.0	D698A	95	13.6 - 17.6	Yes
9	13.9	112.4	97	13.6	116.0	D698A	95	13.6 - 17.6	Yes
10	14.7	113.4	98	13.6	116.0	D698A	95	13.6 - 17.6	Yes

Test No.	Test Date	Test Location	Material Tested	Elevation Datum*
6	05-01-92	North Dike Pond #2, 50' South of Toe, 75' East of Northwest Corner of Dike	Engineered Fill	94.6'
7	05-01-92	East Dike Pond #2, 40' West of Toe, 150' South of Northeast Corner of Dike	Engineered Fill	94.6'
8	05-01-92	East Dike Pond #2, 75' West of Toe, 300' South of Northeast Corner of Dike	Engineered Fill	96.0'
9	05-01-92	West Dike Pond #2, 30' East of Toe, Over PVC Pipe for Leak Detection System	Trench Back-Fill	99.0'*
10	05-01-92	North Dike Pond #2, Center Line of Dike, 200' East of Northwest Corner of Dike	Engineered Fill	94.0'

Distribution: Client (2), Billing (1)

*Datum: 100' = Top of Dike
*100' = Top of Trench

GEOMAT

SOIL/AGGREGATE FIELD DENSITY TESTS

Client: Sunco Trucking water Disposal Co.
Attn: Mr. Ron Mahan
P.O. Box 3337
Farmington, NM 87499-3337

Client P. O. No.
Job No.
Invoice No. 1306
Date of Report 05-04-92

Project: Crouch Mesa Wastewater Evaporation Ponds
Location: San Juan County, New Mexico
Authorized By: E. Randelman/Client
Test Locations Designated By: R. Johnston/GEOMAT
Material Description: Silty Sand, Whitish
Field Density Test Method: ASTM D2922, D3017

Date: 05-01-92
Tested By: R. Johnston/GEOMAT
Material Source: 5' In Depth North Edge*
Reviewed By: D. A. Madrid
*Pond #2

Test No.	In-Place Moisture (%)	In-Place Dry Density (PCF)	Compaction (%)	Optimum Moisture (%)	Maximum Dry Density (PCF)	Tested Per ASTM	Required Compaction (%)	Required Moisture (%)	Within Specs?
11	15.1	112.1	97	13.6	116.0	D698A	95	13.6 - 17.6	Yes
12	14.3	113.4	98	13.6	116.0	D698A	95	13.6 - 17.6	Yes

Test No.	Test Date	Test Location	Material Tested	Elevation Datum*
11	05-01-92	West Dike Pond #2, Center Line of Dike Over PVC Pipe for Leak Detection System	Trench Back-fill	100'*
12	05-01-92	West Dike Pond #2, Center Line of Dike, 100' South of Northwest Corner of Dike	Engineered Fill	93.6'

Distribution: Client (2), Billing (1)

*Datum: 100' = Top of Dike
*100' = Top of Trench

GEOMAT

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

REVIEW OF EARTHWORK CONSTRUCTION

Client: SUNCO Trucking Water Disposal Company Invoice No: 1306
Project: Crouch Mesa Ponds Report By: R. Johnston Date: 05-04-92
Earthwork Contractor: B & E Construction Superintendent: D. Dennison
Subject: Ponds #1 and #2

Placement of fill continued today on dikes for Pond #2 and north dike of Pond #1. Approximately 1-1/2' of fill was placed in fill areas. Backfill of trench, over PVC pipe for leak detection system, started today on west dike of Pond #1. Trench was backfilled to existing grade. Thirteen Field Density Tests were performed on fill material for dikes and backfill of trench on west dike of Pond #1. All tests performed today met moisture and density requirements.

8 Hours Technician On-Site.

Report Reviewed By: S.a. Madrid

Distribution: Client (2)
Billing (1)

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

SOIL/AGGREGATE FIELD DENSITY TESTS

Client: Sunco Trucking Water Disposal Co.
Attn: Mr. Ron Mahan
P.O. Box 3337
Farmington, NM 87499-3337

Client P. O. No.
Job No.
Invoice No. 1306
Date of Report 05-05-92

Project: Crouch Mesa Wastewater Evaporation Ponds
Location: San Juan County, New Mexico
Authorized By: E. Randelman/Client
Test Locations Designated By: R. Johnston/GEOMAT
Material Description: Silty Sand
Field Density Test Method: ASTM D2922, D3017

Date: 05-04-92
Tested By: R. Johnston/GEOMAT
Material Source: 5' in Depth West*
Reviewed By: S.O. Madrid

*Side, Pond #2

Test No.	In-Place Moisture (%)	In-Place Dry Density (PCF)	Compaction (%)	Optimum Moisture (%)	Maximum Dry Density (PCF)	Tested Per ASTM	Required Compaction (%)	Required Moisture (%)	Within Specs?
1	13.9	108.7	95	13.6	114.5	D698A	95	13.6 - 17.6	Yes
2	14.1	109.3	95	13.6	114.5	D698A	95	13.6 - 17.6	Yes
3	13.8	113.1	99	13.6	114.5	D698A	95	13.6 - 17.6	Yes
4	14.0	110.3	96	13.6	114.5	D698A	95	13.6 - 17.6	Yes
5	13.6	111.3	97	13.6	114.5	D698A	95	13.6 - 17.6	Yes

Test No.	Test Date	Test Location	Material Tested	Elevation Datum*
1	05-04-92	East Dike Pond #2, 50' West of Toe, 250' South of Northeast Corner of dike	Engineered Fill	95.0'
2	05-04-92	North Dike Pond #2, 50' South of Toe, 200' East of Northwest Corner of Dike	Engineered Fill	94.0'
3	05-04-92	South Dike Pond #2, 60' North of Toe, 250' West of Southeast Corner of Dike	Engineered Fill	97.0'
4	05-04-92	North Dike Pond #1, 75' South of Toe, 150' East of Northwest Corner of Dike	Engineered Fill	87.0'
5	05-04-92	West Dike Pond #2, 25' East of Toe, 200' South of Northwest Corner of Dike	Engineered	93.0'

Distribution: Client (2), Billing (1)

*Datum: 100' = Top of Dike

SOIL/AGGREGATE FIELD DENSITY TESTS

Client: Sunco Trucking Water Disposal Co.
Attn: Mr. Ron Mahan
P.O. Box 3337
Farmington, NM 87499-3337

Client P. O. No.:
Job No.:
Invoice No.: 1306
Date of Report: 05-05-92

Project: Crouch Mesa Wastewater Evaporation Ponds
Location: San Juan County, New Mexico
Authorized By: E. Randelman/Client
Test Locations Designated By: R. Johnston/GEOMAT
Material Description: Silty Sand
Field Density Test Method: ASTM D2922, D3017

Date: 05-04-92
Tested By: R. Johnston/GEOMAT
Material Source: 5' in Depth West*
Reviewed By: J.a. madrid
*Side, Pond #2

Test No.	In-Place Moisture (%)	In-Place Dry Density (PCF)	Compaction (%)	Optimum Moisture (%)	Maximum Dry Density (PCF)	Tested Per ASTM	Required Compaction (%)	Required Moisture (%)	Within Specs?
6	14.0	114.1	100	13.6	114.5	D698A	95	13.6 - 17.6	Yes
7	15.1	111.1	97	13.6	114.5	D698A	95	13.6 - 17.6	Yes
8	14.7	110.5	97	13.6	114.5	D698A	95	13.6 - 17.6	Yes
9	15.1	109.2	95	13.6	114.5	D698A	95	13.6 - 17.6	Yes
10	14.5	113.4	99	13.6	114.5	D698A	95	13.6 - 17.6	Yes

Test No.	Test Date	Test Location	Material Tested	Elevation Datum*
6	05-04-92	Center Line West Dike Pond #1 Over PVC Pipe for Leak Detection System	Backfill	96.0'*
7	05-04-92	Center Line West Dike Pond #1 Over PVC Pipe for Leak Detection System	Backfill	97.0'*
8	05-04-92	East Dike Pond #2, 25' West of Toe, 150' South of Northeast Corner of Dike	Engineered Fill	96.0'
9	05-04-92	North Dike Pond #2, Center Line of Dike, 300' East of Northwest Corner of Dike	Engineered Fill	94.6'
10	05-04-92	West Dike Pond #2, 25' East of Toe, 200' South of Northwest Corner of Dike	Engineered	93.6'

Distribution: Client (2), Billing (1)

*Datum: 100' = Top of Dike
*100' = Top of Trench

GEOMAT

SOIL/AGGREGATE FIELD DENSITY TESTS

Client: Sunco Trucking Water Disposal Co.
Attn: Mr. Ron Mahan
P.O. Box 3337
Farmington, NM 87499-3337

Client P. O. No.
Job No.
Invoice No. 1306
Date of Report 05-05-92

Project: Crouch Mesa Wastewater Evaporation Ponds
Location: San Juan County, New Mexico
Authorized By: E. Randelman/Client
Test Locations Designated By: R. Johnston/GEOMAT
Material Description: Silty Sand
Field Density Test Method: ASTM D2922, D3017

Date: 05-04-92
Tested By: R. Johnston/GEOMAT
Material Source: 5' in Depth West*
Reviewed By: S.A. Madrid
*Side, Pond #2

Test No.	In-Place Moisture (%)	In-Place Dry Density (PCF)	Compaction (%)	Optimum Moisture (%)	Maximum Dry Density (PCF)	Tested Per ASTM	Required Compaction (%)	Required Moisture (%)	Within Specs?
11	14.0	114.1	100	13.6	114.5	D698A	95	13.6 - 17.6	Yes
12	13.9	113.8	99	13.6	114.5	D698A	95	13.6 - 17.6	Yes
13	15.3	112.4	98	13.6	114.5	D698A	95	13.6 - 17.6	Yes

Test No.	Test Date	Test Location	Material Tested	Elevation Datum*
11	05-04-92	West Dike Pond #1 Over PVC Pipe for Leak Detection, 25' East of Toe of Dike	Backfill	98.0'*
12	05-04-92	West Dike Pond #1 Over PVC Pipe for Leak Detection, Center of Dike	Backfill	99.0'*
13	05-04-92	Center Line West Dike Pond #1 Over PVC Pipe for Leak Detection System	Backfill	100'

Distribution: Client (2), Billing (1)

*Datum: 100' = Top of Dike
*100' = Top of Trench

GEOMAT

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

REVIEW OF EARTHWORK CONSTRUCTION

Client: SUNCO Trucking Water Disposal Company Invoice No: 1306
Project: Crouch Mesa Ponds Report By: R. Johnston Date: 05-05-92
Earthwork Contractor: B & E Construction Superintendent: D. Dennison
Subject: Pond # 1 and #2

Fill placement continued on dikes for Pond #2 and north dike for Pond #1 today by B & E Construction. Approximately 1 foot of fill was placed in all fill areas. Low production today was caused by equipment breakdowns. Problems, also, occured when scrapers were excavating material from two different areas. One scraper was excavating dry material from Pond #2 and the other one wet material from Pond #1 and placing material on same dike. This made processing of dry material difficult without getting wet material too wet. These areas were disced and blended together to meet project requirements. Nine Field Density Tests were performed today with all tests meeting moisture and density requirements.

8 Hours Technician and Nuclear Densometer On-Site.

Report Reviewed By: R. A. Madrid

Distribution: Client (2)
Billing (1)

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

SOIL/AGGREGATE FIELD DENSITY TESTS

Client: Sunco Trucking Water Disposal Co.
Attn: Mr. Ron Mahan
P.O. Box 3337
Farmington, NM 87499-3337

Client P. O. No.:
Job No.:
Invoice No.: 1306
Date of Report: 05-06-92

Project: Crouch Mesa Wastewater Evaporation Ponds
Location: San Juan County, New Mexico
Authorized By: E. Randelman/Client
Test Locations Designated By: R. Johnston/GEOMAT
Material Description: Silty Sand
Field Density Test Method: ASTM D2922, D3017

Date: 05-05-92
Tested By: R. Johnston/GEOMAT
Material Source: 1.5' In Depth East*
Reviewed By: S.A. Madrid

*Side Pond #2

Test No.	In-Place Moisture (%)	In-Place Dry Density (PCF)	Compaction (%)	Optimum Moisture (%)	Maximum Dry Density (PCF)	Tested Per ASTM	Required Compaction (%)	Required Moisture (%)	Within Specs?
1	14.4	109.6	96	13.6	114.5	D698A	95	13.6 - 17.6	Yes
2	13.9	114.4	100	13.6	114.5	D698A	95	13.6 - 17.6	Yes
3	14.1	112.6	98	13.6	114.5	D698A	95	13.6 - 17.6	Yes
4	14.2	110.0	96	13.6	114.5	D698A	95	13.6 - 17.6	Yes
5	13.9	114.8	100+	13.6	114.5	D698A	95	13.6 - 17.6	Yes

Test No.	Test Date	Test Location	Material Tested	Elevation Datum*
1	05-05-92	South Dike Pond #2, Center Line of Dike, 100' West of Southeast Corner of Dike	Engineered Fill	97.6'
2	05-05-92	East Dike Pond #2, Center Line of Dike, 300' South of Northeast Corner of Dike	Engineered Fill	97.0'
3	05-05-92	North Dike Pond #2, 40' South of Toe, 150' West of Northeast Corner of Dike	Engineered Fill	94.0'
4	05-05-92	West Dike Pond #2, 10' East of Toe, 300' South of Northwest Corner of Dike	Engineered Fill	94.0'
5	05-05-92	East Dike Pond #2, Center Line of Dike, 100' South of Northeast Corner of Dike	Engineered	94.6'

Distribution: Client (2), Billing (1)

*Datum: 100' = Top of Dike

SOIL/AGGREGATE FIELD DENSITY TESTS

Client: Sunco Trucking Water Disposal Co.
Attn: Mr. Ron Mahan
P.O. Box 3337
Farmington, NM 87499-3337

Client P. O. No.
Job No.
Invoice No. 1306
Date of Report 05-06-92

Project: Crouch Mesa Wastewater Evaporation Ponds
Location: San Juan County, New Mexico
Authorized By: E. Randelman/Client
Test Locations Designated By: R. Johnston/GEOMAT
Material Description: Silty Sand
Field Density Test Method: ASTM D2922, D3017

Date: 05-05-92
Tested By: R. Johnston/GEOMAT
Material Source: 1.5' In Depth East*
Reviewed By: S.a. Madrid
*Side Pond #2

Test No.	In-Place Moisture (%)	In-Place Dry Density (PCF)	Compaction (%)	Optimum Moisture (%)	Maximum Dry Density (PCF)	Tested Per ASTM	Required Compaction (%)	Required Moisture (%)	Within Specs?
6	14.4	111.8	98	13.6	114.5	D698A	95	13.6 - 17.6	Yes
7	14.0	113.6	99	13.6	114.5	D698A	95	13.6 - 17.6	Yes
8	14.8	110.4	96	13.6	114.5	D698A	95	13.6 - 17.6	Yes
9	14.5	112.7	98	13.6	114.5	D698A	95	13.6 - 17.6	Yes

Test No.	Test Date	Test Location	Material Tested	Elevation Datum*
6	05-05-92	North Dike Pond #2, 50' South of Toe, 100' East of Northwest Corner of Dike	Engineered Fill	94.0'
7	05-05-92	North Dike Pond #1, 25' South of Toe, 150' East of Northwest Corner of Dike	Engineered Fill	89.0'
8	05-05-92	East Dike Pond #2, Center Line of Dike, 250' South of Northeast Corner of Dike	Engineered Fill	95.0'
9	05-05-92	North Dike Pond #2, Center Line of Dike, 250' East of Northwest Corner of Dike	Engineered Fill	94.6'

Distribution: Client (2), Billing (1)

*Datum: 100' = Top of Dike

GEOMAT

CEMAT Inc. 909 ½ West Apache ◇ Farmington, New Mexico 87401 ◇ 505-327-7928

REVIEW OF EARTHWORK CONSTRUCTION

Client: SUNCO Trucking Water Disposal Company Invoice No: 1306
Project: Crouch Mesa Ponds Report By: R. Johnston Date: 05-06-92
Earthwork Contractor: B & E Construction Superintendent: D. Dennison
Subject: Ponds #1 & #2

Fill placement continued today on dikes for Pond #2 and north dike of Pond #1 by B & E Construction. Approximately 6 inches of fill was placed in these locations before water wagon broke down. Construction was stopped at 1:30 p.m. due to no water to process dry material. Six Field Density Tests were performed on processed and compacted material before breakdown. All tests performed met moisture and density requirements. Dry material was placed in all fill areas. This material will be processed and compactive effort applied before further fill placement.

4 Hours Technician Time.

Report Reviewed By: S.A. Madrid

Distribution: Client (2)
Billing (1)

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

SOIL/AGGREGATE FIELD DENSITY TESTS

Client: Sunco Trucking Water Disposal Co.
Attn: Mr. Ron Mahan
P.O. Box 3337
Farmington, NM 87499-3337

Client P. O. No.
Job No.
Invoice No. 1306
Date of Report 05-06-92

Project: Crouch Mesa Wastewater Evaporation Ponds
Location: San Juan County, New Mexico
Authorized By: E. Randelman/Client
Test Locations Designated By: R. Johnston/GEOMAT
Material Description: Silty Sand
Field Density Test Method: ASTM D2922, D3017

Date: 05-06-92
Tested By: R. Johnston/GEOMAT
Material Source: 1.5' in Depth West Side*
Reviewed By: S.a. madrid
*Pond #2

Test No.	In-Place Moisture (%)	In-Place Dry Density (PCF)	Compaction (%)	Optimum Moisture (%)	Maximum Dry Density (PCF)	Tested Per ASTM	Required Compaction (%)	Required Moisture (%)	Within Specs?
1	16.0	110.6	97	13.6	114.5	D698A	95	13.6 - 17.6	Yes
2	17.1	109.9	96	13.6	114.5	D698A	95	13.6 - 17.6	Yes
3	14.5	114.4	100	13.6	114.5	D698A	95	13.6 - 17.6	Yes

Test No.	Test Date	Test Location	Material Tested	Elevation Datum*
1	05-06-92	West Dike Pond #2, Center Line of Dike, 150' South of Northwest Corner of Dike	Engineered Fill	95.0'
2	05-06-92	North Dike Pond #1, 50' South of Toe, 200' East of Northwest Corner of Dike	Engineered Fill	88.6'
3	05-06-92	East Dike Pond #2, Center Line of Dike, 250' South of Northeast Corner of Dike	Engineered Fill	96.0'

Distribution: Client (2), Billing (1)

*Datum: 100' = Top of Dike

SOIL/AGGREGATE FIELD DENSITY TESTS

Client: Sunco Trucking Water Disposal Co.
Attn: Mr. Ron Mahan
P.O. Box 3337
Farmington, NM 87499-3337

Client P. O. No.
Job No.
Invoice No. 1306
Date of Report 05-06-92

Project: Crouch Mesa Wastewater Evaporation Ponds
Location: San Juan County, New Mexico
Authorized By: E. Randelman/Client
Date: 05-06-92
Test Locations Designated By: R. Johnston/GEOMAT
Tested By: R. Johnston/GEOMAT
Material Description: Silty Sand
Material Source: 1.5' in Depth West Side*
Field Density Test Method: ASTM D2922, D3017
Reviewed By: D.a. madrid
*Pond #2

Test No.	In-Place Moisture (%)	In-Place Dry Density (PCF)	Compaction (%)	Optimum Moisture (%)	Maximum Dry Density (PCF)	Tested Per ASTM	Required Compaction (%)	Required Moisture (%)	Within Specs?
4	16.0	109.8	96	13.6	114.5	D698A	95	13.6 - 17.6	Yes
5	16.8	109.3	96	13.6	114.5	D698A	95	13.6 - 17.6	Yes
6	16.0	108.9	95	13.6	114.5	D698A	95	13.6 - 17.6	Yes

Test No.	Test Date	Test Location	Material Tested	Elevation Datum*
4	05-06-92	North Dike Pond #2, Center Line of Dike, 200' West of Northeast Corner of Dike	Engineered Fill	95.0'
5	05-06-92	West Dike Pond #2, Center Line of Dike, 75' South of Northwest Corner of Dike	Engineered Fill	95.6'
6	05-06-92	North Dike Pond #1, 25' South of toe, 250' East of Northwest Corner of Dike	Engineered	89.0'

Distribution: Client (2), Billing (1)

*Datum: 100' = Top of Dike

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

REVIEW OF EARTHWORK CONSTRUCTION

Client: SUNCO Trucking Water Disposal Company Invoice No. 1306
Project: Crouch Mesa Ponds Report By: R. Johnston Date: 05-07-82
Earthwork Contractor: B&E Construction Superintendent: D. Dennison
Subject: Ponds #1 & #2

Arrived on jobsite at 10:00 A.M. as requested by Earl Randelman. There was no water to process material until 12:30 P.M. due to breakdown of pump to fill water wagon. It took several hours to process material which was placed yesterday, very dry on grade. Approximately 6" of compacted fill was placed today on dikes for Pond #2 and north dike for Pond #1. Five field density tests were performed on fill areas today with all tests meeting moisture and density requirements. Material which was placed towards end of day still lacks required moisture and compactive effort

6 Hours Technician Time

Report Reviewed By: D. A. Macleod

Distribution: Client (2)
Billing (1)

geo

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

SOIL/AGGREGATE FIELD DENSITY TESTS

Client: SUNCO Trucking Water Disposal Co.
Attn: Mr. Ron Mahan
P.O. Box 3337
Farmington, NM 87499-3337

Client P. O. No.
Job No.
Invoice No. 1306
Date of Report 05-07-92

Project: Crouch Mesa Wastewater Evaporation Ponds
Location: San Juan County, New Mexico
Authorized By: E. Randelman/Client
Test Locations Designated By: R. Johnston/GEOMAT
Material Description: Silty Sand/Whitish
Field Density Test Method: ASTM D2922, D3017

Date: 05-06-92
Tested By: R. Johnston/GEOMAT
Material Source: 5' Depth, North*
Reviewed By: S.A. Macleod
*Edge of Pond 2

Test No.	In-Place Moisture (%)	In-Place Dry Density (PCF)	Compaction (%)	Optimum Moisture (%)	Maximum Dry Density (PCF)	Tested Per ASTM	Required Compaction (%)	Required Moisture (%)	Within Specs?
1	15.0	110.3	95	13.6	116.0	D698A	95	13.6 - 17.6%	Yes
2	14.5	113.4	98	13.6	116.0	D698A	95	13.6 - 17.6%	Yes
3	15.4	113.4	98	13.6	116.0	D698A	95	13.6 - 17.6%	Yes
4	14.8	111.3	96	13.6	116.0	D698A	95	13.6 - 17.6%	Yes
5	15.2	112.4	97	13.6	116.0	D698A	95	13.6 - 17.6%	Yes

Test No.	Test Date	Test Location	Material Tested	Elevation Datum*
1	05-07-92	West Dike of Pond #2, Center Line of Dike, 250' South of N.W. Corner of Dike	Engineered Fill	95.6'
2	05-07-92	North Dike of Pond #2, Center Line of Dike, 300' East of N.W. Corner of Dike	Engineered Fill	95.6'
3	05-07-92	East Dike of Pond #2, Center Line of Dike, 200' South of N.E. Corner of Dike	Engineered Fill	97.6'
4	05-07-92	South Dike of Pond #2, Center Line of Dike, 200' West of S.E. Corner of Dike	Engineered Fill	97.6'
5	05-07-92	North Dike of Pond #1, Center Line of Dike, 150' East of N.W. Corner of Dike	Engineered Fill	90.0'

Distribution: Client (2), Billing (1)

*Datum: 100' = Top of Dike

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

REVIEW OF EARTHWORK CONSTRUCTION

Client: SUNCO Trucking Water Disposal Company Invoice No: 1306
Project: Crouch Mesa Ponds Report By: R. Johnston Date: 05-08-92
Earthwork Contractor: B & E Construction Superintendent: D. Dennison
Subject: Pond #2

Low production occurred today due to no watering equipment on site. Material which was wetted overnight with sprinklers was used for fill on north and east dikes of Pond #2. All material which had adequate moisture was used for fill in these areas. Three Field Density Tests were performed on fill today with all tests meeting project requirements. At 12:30 P.M. Earl Randelman informed me that there will be no watering equipment on site today, to return at 8:00 A.M. Monday 05-11-92.

1.5 Hours Technician On-Site.

Report Reviewed By: S. a. Madrid

Distribution: Client (2)
Billing (1)

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

SOIL/AGGREGATE FIELD DENSITY TESTS

Client: Sunco Trucking Water Disposal Co.
Attn: Mr. Ron Mahan
P.O. Box 3337
Farmington, NM 87499-3337

Client P. O. No.
Job No.
Invoice No. 1306
Date of Report 05-11-92

Project: Crouch Mesa Wastewater Evaporation
Location: San Juan County, New Mexico
Authorized By: E. Randelman/Client
Test Locations Designated By: R. Johnston/GEOMAT
Material Description: Redish Silty Sand
Field Density Test Method: ASTM D1556,D4944

Date: 05-08-92
Tested By: R. Johnston/GEOMAT
Material Source: 115' Depth West Side*
Reviewed By: S.a. Madrid

*Pond #1

Test No.	In-Place Moisture (%)	In-Place Dry Density (PCF)	Compaction (%)	Optimum Moisture (%)	Maximum Dry Density (PCF)	Tested Per ASTM	Required Compaction (%)	Required Moisture (%)	Within Specs?
1	15.1	130.3	99	13.6	114.5	D698A	95	13.6 - 17.6	Yes
2	17.0	128.9	96	13.6	114.5	D698A	95	13.6 - 17.6	Yes
3	15.6	126.2	95	13.6	114.5	D698A	95	13.6 - 17.6	Yes

Test No.	Test Date	Test Location	Material Tested	Elevation Datum*
1	05-08-92	East Dike Pond #2, Center Line of Dike, 100' South of Northeast Corner of Dike		97.6'
2	05-08-92	East Dike Pond #2, Center Line of Dike, 300' South of Northeast Corner of Dike		97.6'
3	05-08-92	North Dike Pond #2, Center Line of Dike, 150' West of Northeast Corner of Dike		97.6'

Distribution: Client (2), Billing (1)

*Datum: 100' = Top of Dike

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

LABORATORY REPORT

Client: SUNCO Trucking Water Disposal Co.
Attn: Mr. Ron Mahan
P.O. Box 3337
Farmington, NM 87499-3337

Invoice No. 1306
Date of Report 05-12-92

Project: Crouch Mesa Wastewater Evaporation Ponds
Location: San Juan County, New Mexico
Type of Material: Silty Sand & Decomposed Sand* Source of Material: 10' Depth South Edge Pond #1
Requested By: E. Randelman Date: 05-11-92 Sampled By: R. Johnston/GEOMAT Date: 05-11-92
Submitted By: R. Johnston Date: 05-11-92 Reviewed By: D.A. Madrid

*Stone

Sleve Analysis, ASTM

Sleve Size	Accumulative % Passing	Specification
3"		
2½"		
2"		
1½"		
1"		
¾"		
½"		
⅜"		
¼"		
No. 4		
8		
10		
16		
30		
40		
50		
100		
200		

Moisture Density Relationship, Test Method: ASTM D698A
Maximum Dry Density, PCF: 113.8 Optimum Moisture, %: 15.0

Plasticity Index, ASTM D4318

	Results	Specs.
LL:		
PL:		
PI:		

Other

Distribution: Client (2), Billing (1)

san juan repro Form 551-3

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

REVIEW OF EARTHWORK CONSTRUCTION

Client: SUNCO Trucking Water Disposal Company Invoice No: 1306
Project: Crouch Mesa Ponds Report By: R. Johnston Date: 05-11-92
Earthwork Contractor: B & E Construction Superintendent: D. Dennison
Subject: Pond #1

Arrived on site at 8:00 A.M. as requested. Rain over weekend saturated surface of material that was placed and compacted last Friday. Dry material was placed in thin lift and diced into wet material until soil met moisture requirements. Abrupt material change occurred during excavation of inside Pond #1. Approximately 10 feet in depth a brown silty sand with sandstone pieces was encountered. One sample was obtained and returned to Farmington Lab for D698 Proctor. Ten Field Density Tests were performed on fill sections with all tests meeting project requirements. Approximately 1 foot of compacted fill was placed today on all sides of Pond #1.

6.5 Hours Technician and Nuclear Demsometer On-Site.

Report Reviewed By: D.A. Madrid

Distribution: Client (2)
Billing (1)

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

SOIL/AGGREGATE FIELD DENSITY TESTS

Client: SUNCO Trucking Water Disposal Co.
Attn: Mr. Ron Mahan
P.O. Box 3337
Farmington, NM 87499-3337

Client P. O. No.
Job No.
Invoice No. 1306
Date of Report 05-12-92

Project: Crouch Mesa Wastewater Evaporation Ponds
Location: San Juan County, New Mexico
Authorized By: E. Randelman/Client
Date: 05-11-92
Test Locations Designated By: R. Johnston/GEOMAT
Tested By: R. Johnston/GEOMAT
Material Description: Silty Sand
Material Source: 1.5' in Depth West*
Field Density Test Method: ASTM D2922, D3017
Reviewed By: D. A. Madsen
*Side Pond #2

Test No.	In-Place Moisture (%)	In-Place Dry Density (PCF)	Compaction (%)	Optimum Moisture (%)	Maximum Dry Density (PCF)	Tested Per ASTM	Required Compaction (%)	Required Moisture (%)	Within Specs?
1	16.2	112.0	98	13.6	114.5	D698A	95	13.6 - 17.6	Yes
2	14.4	108.9	95	13.6	114.5	D698A	95	13.6 - 17.6	Yes
3	13.9	110.2	96	13.6	114.5	D698A	95	13.6 - 17.6	Yes
4	14.7	109.8	96	13.6	114.5	D698A	95	13.6 - 17.6	Yes
5	14.1	112.6	98	13.6	114.5	D698A	95	13.6 - 17.6	Yes

Test No.	Test Date	Test Location	Material Tested	Elevation Datum*
1	05-11-92	West Dike Pond #1, 50' East of Toe, 150' South of Northwest Corner of Dike	Engineered Fill	91.0'
2	05-11-92	North Dike Pond #1, 25' South of toe, 150' East of Northwest Corner of Dike	Engineered Fill	89.6'
3	05-11-92	West Dike Pond #1, Center Line of Dike, 200' South of Northwest Corner of Dike	Engineered Fill	90.0'
4	05-11-92	West Dike Pond #1, Center Line of Dike, 300' South of Northwest Corner of Dike	Engineered Fill	90.0'
5	05-11-92	North Dike Pond #1, Center Line of Dike, 250' East of Northwest Corner of Dike	Engineered Fill	90.6'

Distribution: Client (2), Billing (1)

*Datum: 100' = Top of Dike

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

SOIL/AGGREGATE FIELD DENSITY TESTS

Client: SUNCO Trucking Water Disposal Co.
Attn: Mr. Ron Mahan
P.O. Box 3337
Farmington, NM 87499-3337

Client P. O. No.
Job No.
Invoice No. 1306
Date of Report 05-12-92

Project: Crouch Mesa Wastewater Evaporation
Location: San Juan County, New Mexico
Authorized By: E. Randelman/Client
Date: 05-11-92
Test Locations Designated By: R. Johnston/GEOMAT
Tested By: R. Johnston/GEOMAT
Material Description: Silty Sand
Material Source: 1.5' in Depth West*
Field Density Test Method: ASTM D2922, D3017
Reviewed By: D. a. Madrid
*Side Pond #2

Test No.	In-Place Moisture (%)	In-Place Dry Density (PCF)	Compaction (%)	Optimum Moisture (%)	Maximum Dry Density (PCF)	Tested Per ASTM	Required Compaction (%)	Required Moisture (%)	Within Specs?
6	14.3	109.3	95	13.6	114.5	D698A	95	13.6 - 17.6	Yes
7	15.1	108.6	95	13.6	114.5	D698A	95	13.6 - 17.6	Yes
8	13.9	110.3	96	13.6	114.5	D698A	95	13.6 - 17.6	Yes
9	14.1	109.2	95	13.6	114.5	D698A	95	13.6 - 17.6	Yes
10	14.8	111.4	97	13.6	114.5	D698A	95	13.6 - 17.6	Yes

Test No.	Test Date	Test Location	Material Tested	Elevation Datum*
6	05-11-92	South Dike Pond #1, 15' North of Toe, 125' East of Southwest Corner of Dike	Engineered Fill	95.0'
7	05-11-92	West Dike Pond #1, Center Line of Dike, 300' South of Northwest Corner of Dike	Engineered Fill	90.0'
8	05-11-92	North Dike Pond #1, 25' South of Toe, 125' East of Northwest Corner of Dike	Engineered Fill	91.0'
9	05-11-92	West Dike Pond #1, 45' East of Toe, 100' North of Southwest Corner of Dike	Engineered Fill	92.0'
10	05-11-92	East Dike Pond #1, Center Line of Dike, 300' South of Northeast Corner of Dike	Engineered Fill	91.0'

Distribution: Client (2), Billing (1)

*Datum: 100' = Top of Dike

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

REVIEW OF EARTHWORK CONSTRUCTION

Client: SUNCO Trucking Water Disposal Company Invoice No: 1306
Project: Crouch Mesa Ponds Report By: R. Johnston Date: 05-12-92
Earthwork Contractor: B & E Construction Superintendent: D. Dennison
Subject: Pond #1 and Scimmer Pond

Fill placement continued today on dikes for Pond #1 by B & E Construction. Approximately 1 foot of compacted fill was placed today on all dikes for Pond #1. Approximately 2-1/2 feet of material was excavated on inside of proposed scimmer pond. Material was placed in fill sections on east, south and west sides of pond. Thirteen Field Density Tests were performed in fill sections for dikes for Pond #1 and scimmer pond, with all tests meeting project requirements.

8 Hours Technician and Nuclear Densometer On-Site.

Report Reviewed By: S.A. Madrid

Distribution: Client (2)
Billing (1)

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

SOIL/AGGREGATE FIELD DENSITY TESTS

Client: SUNCO Trucking Water Disposal Co.
Attn: Mr. Ron Mahan
P.O. Box 3337
Farmington, NM 87499-3337

Client P. O. No.
Job No.
Invoice No. 1306
Date of Report 05-13-92

Project: Crouch Mesa Wastewater Evaporation
Location: San Juan County, New Mexico
Authorized By: E. Randelman/Client
Date: 05-12-92
Test Locations Designated By: R. Johnston/GEOMAT
Tested By: R. Johnston/GEOMAT
Material Description: Reddish Silty Sand, Silty Sand*
Material Source: 1.5' in Depth, West**
Field Density Test Method: ASTM D2922, D3017
Reviewed By: S. A. Madrid

*W/Decomposed Sandstone
**side, Pond #2, 10' in Depth South Side Pond #1

Test No.	In-Place Moisture (%)	In-Place Dry Density (PCF)	Compaction (%)	Optimum Moisture (%)	Maximum Dry Density (PCF)	Tested Per ASTM	Required Compaction (%)	Required Moisture (%)	Within Specs?
1	15.8	114.2	100+	15.0	113.8	D698A	95	15.0 - 19.0	Yes
2	15.1	112.3	99	15.0	113.8	D698A	95	15.0 - 19.0	Yes
3	17.4	108.9	95	13.6	114.5	D698A	95	13.6 - 17.6	Yes
4	14.8	112.3	98	13.6	114.5	D698A	95	13.6 - 17.6	Yes
5	15.0	112.0	98	13.6	114.5	D698A	95	13.6 - 17.6	Yes

Test No.	Test Date	Test Location	Material Tested	Elevation Datum*
1	05-12-92	North Dike Pond #1, 25' South of Toe, 50' East of Northwest Corner of Dike	Engineered Fill	90.6'
2	05-12-92	West Dike Pond #1, 25' East of Toe, 100' North of Southwest Corner of Dike	Engineered Fill	92.0'
3	05-12-92	West Dike of Scimmer Pond, Center Line of Dike, 25' North of Southwest Corner of Dike	Engineered Fill	97.0'
4	05-12-92	East Dike Pond #1, Center Line of Dike, 100' South of Northeast Corner of Dike	Engineered Fill	97.0'
5	05-12-92	South Dike Pond #1, Center Line of Dike, 250' East of Southwest Corner of Dike	Engineered Fill	97.6'

Distribution: Client (2), Billing (1)

*Datum: 100' = Top of Dike

SOIL/AGGREGATE FIELD DENSITY TESTS

Client: SUNCO Trucking Water Disposal Co.
Attn: Mr. Ron Mahan
P.O. Box 3337
Farmington, NM 87499-3337

Client P. O. No.
Job No.
Invoice No. 1306
Date of Report 05-13-92

Project: Crouch Mesa Wastewater Evaporation
Location: San Juan County, New Mexico
Authorized By: E. Randelman/Client
Test Locations Designated By: R. Johnston/GEOMAT
Material Description: Reddish Silty Sand, Silty Sand*
Field Density Test Method: ASTM D2922, D3017

Date: 05-12-92
Tested By: R. Johnston/GEOMAT
Material Source: 1.5' in Depth, West**
Reviewed By: S.a. Madrid

*W/Decomposed Sandstone **side, Pond #2, 10' in Depth South Side Pond #1

Test No.	In-Place Moisture (%)	In-Place Dry Density (PCF)	Compaction (%)	Optimum Moisture (%)	Maximum Dry Density (PCF)	Tested Per ASTM	Required Compaction (%)	Required Moisture (%)	Within Specs?
6	17.1	108.7	96	15.0	113.8	D698A	95	15.0 - 19.0	Yes
7	18.3	108.0	95	15.0	113.8	D698A	95	15.0 - 19.0	Yes
8	15.0	108.8	96	15.0	113.8	D698A	95	15.0 - 19.0	Yes
9	15.1	113.2	99	15.0	113.8	D698A	95	15.0 - 19.0	Yes
10	15.3	112.7	99	15.0	113.8	D698A	95	15.0 - 19.0	Yes

Test No.	Test Date	Test Location	Material Tested	Elevation Datum*
6	05-12-92	North Dike Pond #1, Center Line of Dike, 125' West of Northeast Corner of Dike	Engineered Fill	91.0'
7	05-12-92	South Dike Pond #1, 10' North of Toe, 100' East of Southwest Corner of Dike	Engineered Fill	97.0'
8	05-12-92	West Dike Pond #1, 45' East of Toe, 100' North of of Southwest Corner of Dike	Engineered Fill	97.6'
9	05-12-92	East Dike Pond #1, Center Line of Dike, 200' North of Northeast Corner of Dike	Engineered Fill	97.6'
10	05-12-92	North Dike Pond #1, Center Line of Dike, 200' West of Northeast Corner of Dike	Engineered	95.0'

Distribution: Client (2), Billing (1)

*Datum: 100' = Top of Dike

GEOMAT

SOIL/AGGREGATE FIELD DENSITY TESTS

Client: SUNCO Trucking Water Disposal Co.
Attn: Mr. Ron Mahan
P.O. Box 3337
Farmington, NM 87499-3337

Client P. O. No.
Job No.
Invoice No. 1306
Date of Report 05-13-92

Project: Crouch Mesa Wastewater Evaporation
Location: San Juan County, New Mexico
Authorized By: E. Randelman/Client
Date: 05-12-92
Test Locations Designated By: R. Johnston/GEOMAT
Tested By: R. Johnston/GEOMAT
Material Description: Reddish Silty Sand, Silty Sand*
Material Source: 1.5' in Depth, West**
Field Density Test Method: ASTM D2922, D3017
Reviewed By: S. a. Madrid

*W/Decomposed Sandstone
**side, Pond #2, 10' in Depth South Side Pond #1

Test No.	In-Place Moisture (%)	In-Place Dry Density (PCF)	Compaction (%)	Optimum Moisture (%)	Maximum Dry Density (PCF)	Tested Per ASTM	Required Compaction (%)	Required Moisture (%)	Within Specs?
11	15.7	109.8	96	15.0	113.8	D698A	95	15.0 - 19.0	Yes
12	17.1	114.1	100+	15.0	113.8	D698A	95	15.0 - 19.0	Yes
13	15.8	111.1	98	15.0	113.8	D698A	95	15.0 - 19.0	Yes

Test No.	Test Date	Test Location	Material Tested	Elevation Datum*
11	05-12-92	West Dike Pond #1, Center Line of Dike, 275' South of Northwest Corner of Dike	Engineered Fill	95.0'
12	05-12-92	South Dike Pond #1, Center Line of Dike, 200' East of Southwest Corner of Dike	Engineered Fill	98.0'
13	05-12-92	North Dike Pond #1, Center Line of Dike, 150' East of Northwest Corner of Dike	Engineered Fill	92.0'

Distribution: Client (2), Billing (1)

*Datum: 100' = Top of Dike

GEOMAT

EDMAT Inc. 909 ½ West Apache ◇ Farmington, New Mexico 87401 ◇ 505-327-7928

REVIEW OF EARTHWORK CONSTRUCTION

Client: SUNCO Trucking Water Disposal Company Invoice No: 1306
Project: Crouch Mesa Ponds Report By: R. Johnston Date: 05-13-92
Earthwork Contractor: B & E Construction Superintendent: D. Dennison
Subject: Pond #1

Fill placement continued today on dikes for Pond #1 by B & E Construction. Silty Sand with Decomposed Sandstone is being excavated from interior of Pond #1 and placed on dikes. Material is taking water and achieving required compaction and moisture content very easily. Approximately 1 foot of compacted fill was placed today on four dikes for Pond #1. Ten Field Density Tests were performed on fill sections with all tests meeting moisture and density requirements.

6.5 Hours Technician On-Site

Report Reviewed By: S.D. Madrid

Distribution: Client (2)
Billing (1)

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

SOIL/AGGREGATE FIELD DENSITY TESTS

Client: Sunco Trucking Water Disposal Co.
Attn: Mr. Ron Mahan
P.O. Box 3337
Farmington, NM 87499-3337

Client P. O. No.
Job No.
Invoice No. 1306
Date of Report 05-14-92

Project: Crouch Mesa Wastewater Evaporation
Location: San Juan County, New Mexico
Authorized By: E. Randelman/Client
Date: 05-13-92
Test Locations Designated By: R. Johnston/GEOMAT
Tested By: R. Johnston/GEOMAT
Material Description: Silty Sand & Decomposed Sand*
Material Source: 10' Depth South Edge Pond #
Field Density Test Method: ASTM D2922, D3017
Reviewed By: D. A. Madrid
*Stone

Test No.	In-Place Moisture (%)	In-Place Dry Density (PCF)	Compaction (%)	Optimum Moisture (%)	Maximum Dry Density (PCF)	Tested Per ASTM	Required Compaction (%)	Required Moisture (%)	Within Specs?
1	15.1	112.1	99	15.0	113.8	D698A	95	15.0 - 19.0	Yes
2	17.2	108.3	95	15.0	113.8	D698A	95	15.0 - 19.0	Yes
3	16.8	110.2	97	15.0	113.8	D698A	95	15.0 - 19.0	Yes
4	16.1	110.9	97	15.0	113.8	D698A	95	15.0 - 19.0	Yes
5	15.3	113.1	99	15.0	113.8	D698A	95	15.0 - 19.0	Yes

Test No.	Test Date	Test Location	Material Tested	Elevation Datum*
1	05-13-92	North Dike Pond #1, Center Line of Dike, 150' East of Northwest Corner of Dike	Engineered Fill	93.0'
2	05-13-92	West Dike Pond #1, Center Line of Dike, 200' South of Northwest Corner of Dike	Engineered Fill	94.6'
3	05-13-92	South Dike Pond #1, Center Line of Dike, 150' West of Southwest Corner of Dike	Engineered Fill	98.0'
4	05-13-92	East Dike Pond #1, Center Line of Dike, 100' North of Southeast Corner of Dike	Engineered Fill	96.0'
5	05-13-92	South Dike Pond #1, 5' North of Toe, 200' West of Southeast Corner of Dike	Engineered Fill	98.6'

Distribution: Client (2), Billing (1)

*Datum: 100' = Top of Dike

SOIL/AGGREGATE FIELD DENSITY TESTS

Client: Sunco Trucking Water Disposal Co.
Attn: Mr. Ron Mahan
P.O. box 3337
Farmington, NM 87499-3337

Client P. O. No.
Job No.
Invoice No. 1306
Date of Report 05-14-92

Project: Crouch Mesa Wastewater Evaporation
Location: San Juan County, New Mexico
Authorized By: E. Randelman/Client
Test Locations Designated By: R. Johnston/GEOMAT
Material Description: Silty Sand & Decomposed Sand*
Field Density Test Method: ASTM D2922, D3017
*Stone

Date: 05-13-92
Tested By: R. Johnston/GEOMAT
Material Source: 10' Depth South Edge Pond #
Reviewed By: J.B. Macdonald

Test No.	In-Place Moisture (%)	In-Place Dry Density (PCF)	Compaction (%)	Optimum Moisture (%)	Maximum Dry Density (PCF)	Tested Per ASTM	Required Compaction (%)	Required Moisture (%)	Within Specs?
6	16.8	110.6	97	15.0	113.8	D698A	95	15.0 - 19.0	Yes
7	15.1	108.9	96	15.0	113.8	D698A	95	15.0 - 19.0	Yes
8	15.0	113.6	100	15.0	113.8	D698A	95	15.0 - 19.0	Yes
9	16.3	110.2	97	15.0	113.8	D698A	95	15.0 - 19.0	Yes
10	15.7	112.1	99	15.0	113.8	D698A	95	15.0 - 19.0	Yes

Test No.	Test Date	Test Location	Material Tested	Elevation Datum*
6	05-13-92	North Dike Pond #1, Center Line of Dike, 250' East of Northwest Corner of Dike	Engineered Fill	93.6'
7	05-13-92	West Dike Pond #1, Center Line of Dike, 150' South of Northwest Corner of Dike	Engineered Fill	95.0'
8	05-13-92	East Dike Pond #1, 150' West of Toe, 100' South of Northeast Corner of Dike	Engineered Fill	95.0'
9	05-13-92	North Dike Pond #1, Center Line of Dike, 250' East of Northwest Corner of Dike	Engineered Fill	94.0'
10	05-13-92	West Dike Pond #1, Center Line of Dike, 150' South of Northwest Corner of Dike	Engineered Fill	95.6'

Distribution: Client (2), Billing (1)

*Datum: 100' = Top of Dike

GEOMAT

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

REVIEW OF EARTHWORK CONSTRUCTION

Client: SUNCO Trucking Water Disposal Company Invoice No: 1306
Project: Crouch Mesa Ponds Report By: R. Johnston Date: 05-14-92
Earthwork Contractor: B & E Construction Superintendent: D. Dennison
Subject: Pond #1

Fill placement continued today on east, west and north dikes for Pond #1 by B & E Construction. Approximately 1-1/2 feet of compacted fill was placed on east, west and north dikes today. Well cemented medium grained sandstone was encountered during excavation of Pond #1. Material which cannot be broken up in required 6- inch minus material is being dumped on east side of Pond #1 and will be disposed of at later date. Fourteen Field Density Tests were performed, including two retests. Both areas which tests did not meet specified density and moisture content were reprocessed and reworked to specified requirements. One sample was obtained near finish grade at bottom of southwest corner of Pond #1 and returned to lab for sieve analysis. This material must have less than 5% passing #200 to eliminate fabric on finish subgrade. This sample location was chosen by Bob Frank.

8 Hours Technician On-Site.

Report Reviewed By: S. A. Madrid

Distribution: Client (2)
Billing (1)

CONMAT Inc. 909 ½ West Apache ◊ Farmington, New Mexico 87401 ◊ 505-327-7928

REVIEW OF EARTHWORK CONSTRUCTION

Client: SUNCO Trucking Water Disposal Company Invoice No. 1306
Project: Crouch Mesa Ponds Report By: R. Johnston Date: 05-15-92
Earthwork Contractor: B & E Construction Superintendent: D.Dennison
Subject: Ponds #1 and #2

Fill placement continued today on dikes for Ponds #1 and #2. Two six inch lifts were placed on Pond #2 and three six inch lifts were placed on Pond #1. South dikes on both Ponds #1 and #2 are near finish grade. Borrow material is now being hauled from area west of Pond #2 designated by Mr. George Coleman. Twelve field density tests were performed on fill sections of dikes of Ponds #1 and #2 with all tests meeting density and moisture requirements.

6 Hours Technician Time On-Site.

Report Reviewed By: J. A. Madrid

Distribution: Client (2)
Billing (1)

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

SOIL/AGGREGATE FIELD DENSITY TESTS

Client: SUNCO Trucking Water Disposal Co.
Attn: Mr. Ron Mahan
P.O. Box 3337
Farmington, NM 87499-3337

Client P. O. No.
Job No.
Invoice No. 1306
Date of Report 05-18-92

Project: Crouch Mesa Wastewater Evaporation Ponds
Location: San Juan County, New Mexico
Authorized By: E. Randelman/Client
Date: 05-14-92
Test Locations Designated By: R. Johnston/GEOMAT
Tested By: R. Johnston/GEOMAT
Material Description: Silty Sand W/Decomposed Sandstone
Material Source: 10' Depth, South *
Field Density Test Method: ASTM D2922, D3017
Reviewed By: A.a.madrid
*Edge of Pond #1

Test No.	In-Place Moisture (%)	In-Place Dry Density (PCF)	Compaction (%)	Optimum Moisture (%)	Maximum Dry Density (PCF)	Tested Per ASTM	Required Compaction (%)	Required Moisture (%)	Within Specs?
1	17.0	108.4	95	15.0	113.8	D698A	95	15.0 - 19.0	Yes
2	17.2	109.3	96	15.0	113.8	D698A	95	15.0 - 19.0	Yes
3	16.3	110.4	97	15.0	113.8	D698A	95	15.0 - 19.0	Yes
4	16.4	108.9	96	15.0	113.8	D698A	95	15.0 - 19.0	Yes
5	15.8	109.4	96	15.0	113.8	D698A	95	15.0 - 19.0	Yes

Test No.	Test Date	Test Location	Material Tested	Elevation Datum*
1	05-15-92	N. Dike Pond #1, Center Line of Dike, 250' West of N.E. Corner of Dike	Engineered Fill	96'
2	05-15-92	West Dike Pond #1, Center Line of Dike, 150' South of N.W. Corner of Dike	Engineered Fill	97'
3	05-15-92	South Dike Pond #1, Center Line of Dike, 200' East of S.W. Corner of Dike	Engineered Fill	99'
4	05-15-92	East Dike Pond #1, Center Line of Dike, 100' North of S.E. Corner of Dike	Engineered Fill	97.6'
5	05-15-92	West Dike Pond #2, Center Line of Dike, 200' South of N.W. Corner of Dike	Engineered Fill	96'

Distribution: Client (2), Billing (1)

*Datum: 100' = Top of Dike

SOIL/AGGREGATE FIELD DENSITY TESTS

Client: SUNCO Trucking Water Disposal Co.
Attn: Mr. Ron Mahan
P.O. Box 3337
Farmington, NM 87499-3337

Client P. O. No.
Job No.
Invoice No. 1306
Date of Report 05-18-92

Project: Crouch Mesa Wastewater Evaporation Ponds
Location: San Juan County, New Mexico
Authorized By: E. Randelman/Client
Date: 05-14-92
Test Locations Designated By: R. Johnston/GEOMAT
Tested By: R. Johnston/GEOMAT
Material Description: Silty Sand W/Decomposed Sandstone
Material Source: 10' Depth, South *
Field Density Test Method: ASTM D2922, D3017
Reviewed By: S.A. Macdiel

*Edge of Pond #1

Test No.	In-Place Moisture (%)	In-Place Dry Density (PCF)	Compaction (%)	Optimum Moisture (%)	Maximum Dry Density (PCF)	Tested Per ASTM	Required Compaction (%)	Required Moisture (%)	Within Specs?
6	16.1	112.3	99	15.0	113.8	D698A	95	15.0 - 19.0	Yes
7	16.6	111.6	98	15.0	113.8	D698A	95	15.0 - 19.0	Yes
8	15.9	110.2	97	15.0	113.8	D698A	95	15.0 - 19.0	Yes
9	16.0	110.0	97	15.0	113.8	D698A	95	15.0 - 19.0	Yes
10	16.1	109.3	96	15.0	113.8	D698A	95	15.0 - 19.0	Yes

Test No.	Test Date	Test Location	Material Tested	Elevation Datum*
6	05-15-92	North Dike Pond #2, Center Line of Dike, 150' East of N.W. Corner of Dike	Engineered Fill	95'
7	05-15-92	East Dike Pond #2, Center Line of Dike, 100' South of N.E. Corner of Dike	Engineered Fill	96'
8	05-15-92	South Dike Pond #2, Center Line of Dike, 125' West of S.E. Corner of Dike	Engineered Fill	99'
9	05-15-92	South Dike Pond #1, Center Line of Dike, 150' West of S.W. Corner of Dike	Engineered Fill	99.6'
10	05-15-92	West Dike Pone #1, Center Line of Dike, 150' North of S.W. Corner of Dike	Engineered Fill	97.6'

Distribution: Client (2), Billing (1)

*Datum: 100' = Top of Dike

GEOMAT

SOIL/AGGREGATE FIELD DENSITY TESTS

Client: SUNCO Trucking Water Disposal Co.
Attn: Mr. Ron Mahan
P.O. Box 3337
Farmington, NM 87499-3337

Client P. O. No.
Job No.
Invoice No. 1306
Date of Report 05-18-92

Project: Crouch Mesa Wastewater Evaporation Ponds
Location: San Juan County, New Mexico
Authorized By: E. Randelman/Client
Test Locations Designated By: R. Johnston/GEOMAT
Material Description: Silty Sand W/Decomposed Sandstone
Field Density Test Method: ASTM D2922, D3017

Date: 05-14-92
Tested By: R. Johnston/GEOMAT
Material Source: 10' Depth, South *
Reviewed By: S.a. madrid

* Edge of Pond #1

Test No.	In-Place Moisture (%)	In-Place Dry Density (PCF)	Compaction (%)	Optimum Moisture (%)	Maximum Dry Density (PCF)	Tested Per ASTM	Required Compaction (%)	Required Moisture (%)	Within Specs?
11	16.2	110.4	97	15.0	113.8	D698A	95	15.0 - 19.0	Yes
12	16.8	109.8	96	15.0	113.8	D698A	95	15.0 - 19.0	Yes

Test No.	Test Date	Test Location	Material Tested	Elevation Datum*
11	05-15-92	North Dike Pond #1, Center Line of Dike, 200' East of N.W. Corner of Dike	Engineered Fill	96.6'
12	05-15-92	East Dike Pond #1, Center Line of Dike, 75' North of S.E. Corner of Dike	Engineered Fill	98'

Distribution: Client (2), Billing (1)

*Datum: 100' = Top of Dike

GEOMAT

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

LABORATORY REPORT

Client: SUNCO Trucking Water Disposal Co.
Attn: Mr. Ron Mahan
P.O. Box 3337
Farmington, NM 87499-3337

Invoice No. 1306
Date of Report 05-18-92

Project: Crouch Mesa Wastewater Evaporation Ponds
Location: San Juan County, New Mexico
Type of Material: Silty Sand
Source of Material: Southwest Edges (Bottom) Pond #1
Requested By: B. Frank Date: 05-14-92
Sampled By: R. Johnston Date: 05-14-92
Submitted By: R. Johnston Date: 05-14-92
Reviewed By: D.A. Madrid

Sieve Analysis, ASTM

Sieve Size	Accumulative % Passing	Specification
3"		
2½"		
2"		
1½"		
1"		
¾"		
½"	100	
⅜"	99	
¼"	-	
No. 4	98	
8	97	
10	96	
16	92	
30	48	
40	39	
50	29	
100	19	
200	15	5% Maximum

Moisture Density Relationship, Test Method: _____
Maximum Dry Density, PCF: _____ Optimum Moisture, %: _____

Plasticity Index, ASTM D4318

	Results	Specs.
LL:		
PL:		
PI:		

Other

Distribution: Client (2), Billing (1)

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

REVIEW OF EARTHWORK CONSTRUCTION

Client: SUNCO Trucking Water Disposal Company Invoice No: 1306
Project: Crouch Mesa Ponds Report By: R. Johnston Date: 05-18-92
Earthwork Contractor: B & E Construction Superintendent: D. Dennison
Subject: Ponds #1 and #2

Fill placement continued today on North, East, and West Dikes of Ponds #1 and #2 by B & E Construction. Approximately 1' to 1-1/2' of compacted fill was placed on dikes for Ponds #1 and #2. Trench was excavated on North Dike of Pond #1 for placement of PVC suction pipe. Trench was backfilled and compactive effort applied to top of trench. Eighteen field density tests were performed on engineered fill on dikes and backfill of trench for suction pipe. All testing today met moisture and density requirements. Sieve sample from Thursday, 05-14-92 which was returned to lab did not meet the required 5% maximum passing #200 sieve to eliminate fabric on subgrade.

7 Hours Technician Time On-Site.

Reviewed By: S. a. Madrid

Distribution: Client (2)
Billing (1)

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

SOIL/AGGREGATE FIELD DENSITY TESTS

Client: SUNCO Trucking Water Disposal Co.
Attn: Mr. Ron Mahan
P.O. Box 3337
Farmington, NM 87499-3337

Client P. O. No.
Job No.
Invoice No. 1306
Date of Report 05-19-92

Project: Crouch Mesa Wastewater Evaporation Ponds
Location: San Juan County, New Mexico
Authorized By: E. Randelman/Client
Date: 05-15-92
Test Locations Designated By: R. Johnston/GEOMAT
Tested By: R. Johnston/GEOMAT
Material Description: Reddish Silty Sand
Material Source: 1.5 Ft. Depth, West*
Field Density Test Method: ASTM D2922, D3017
Reviewed By: S. A. Machuld
*Side of Pond #2

Test No.	In-Place Moisture (%)	In-Place Dry Density (PCF)	Compaction (%)	Optimum Moisture (%)	Maximum Dry Density (PCF)	Tested Per ASTM	Required Compaction (%)	Required Moisture (%)	Within Specs?
1	16.0	109.8	96	13.6	114.5	D698A	95	13.6-17.6	Yes
2	14.0	110.3	96	13.6	114.5	D698A	95	13.6-17.6	Yes
3	14.7	111.3	97	13.6	114.5	D698A	95	13.6-17.6	Yes
4	17.0	109.1	95	13.6	114.5	D698A	95	13.6-17.6	Yes
5	15.1	113.4	99	13.6	114.5	D698A	95	13.6-17.6	Yes

Test No.	Test Date	Test Location	Material Tested	Elevation Datum*
1	05-18-92	East Dike Pond #1, Center Line of Dike, 125' North of S.E. Corner of Dike	Engineered Fill	98'
2	05-18-92	North Dike Pond #1, 75' South of Toe, 250' East of N.W. Corner of Dike	Engineered Fill	95'6"
3	05-18-92	West Dike Pond #1, 50' East of Toe, 225' South of N.W. Corner of Dike	Engineered Fill	95'6"
4	05-18-92	East Dike Pond #2, Center Line of Dike, 275' South of N.E. Corner of Dike	Engineered Fill	98'
5	05-18-92	North Dike Pond #2, 60' South of Toe, 125' East of N.W. Corner of Dike	Engineered Fill	95'

Distribution: Client (2), Billing (1)

*Datum: 100' = Top of Dike

SOIL/AGGREGATE FIELD DENSITY TESTS

Client: SUNCO Trucking Water Disposal Co.
Attn: Mr. Ron Mahan
P.O. Box 3337
Farmington, NM 87499-3337

Client P. O. No.
Job No.
Invoice No. 1306
Date of Report 05-19-92

Project: Crouch Mesa Wastewater Evaporation Ponds
Location: San Juan County, New Mexico
Authorized By: E. Randelman/Client
Test Locations Designated By: R. Johnston/GEOMAT
Material Description: Reddish Silty Sand
Field Density Test Method: ASTM D2922, D3017

Date: 05-15-92
Tested By: R. Johnston/GEOMAT
Material Source: 1.5 Ft. Depth, West*
Reviewed By: D. a. madrid

*Side of Pond #2

Test No.	In-Place Moisture (%)	In-Place Dry Density (PCF)	Compaction (%)	Optimum Moisture (%)	Maximum Dry Density (PCF)	Tested Per ASTM	Required Compaction (%)	Required Moisture (%)	Within Specs?
6	16.1	108.9	95	13.6	114.5	D698A	95	13.6 - 17.6	Yes
7	14.3	109.4	96	13.6	114.5	D698A	95	13.6 - 17.6	Yes
8	16.0	110.2	96	13.6	114.5	D698A	95	13.6 - 17.6	Yes
9	15.7	111.3	97	13.6	114.5	D698A	95	13.6 - 17.6	Yes
10	14.9	110.8	97	13.6	114.5	D698A	95	13.6 - 17.6	Yes

Test No.	Test Date	Test Location	Material Tested	Elevation Datum*
6	05-18-92	West Dike Pond #1, Center Line of Dike, 200' North of S.W. Corner of Dike	Engineered Fill	96'
7	05-18-92	West Dike Pond #2, Center Line of Dike, 75' North of S.W. Corner of Dike	Engineered Fill	96'
8	05-18-92	East Dike Pond #2, Center Line of Dike, 100' South of N.E. Corner of Dike	Engineered Fill	98'4"
9	05-18-92	North Dike Pond #2, Center Line of Dike, 200' East of N.W. Corner of Dike	Engineered Fill	95'6"
10	05-18-92	North Dike Pond #1, Over PVC Suction Pipe, Center Line of Dike	Engineered Fill	98' **

Distribution: Client (2), Billing (1)

*Datum: 100' = Top of Dike
**Datum: 100' = Top of Trench

GEOMAT

SOIL/AGGREGATE FIELD DENSITY TESTS

Client: SUNCO Trucking Water Disposal Co.
Attn: Mr. Ron Mahan
P.O. Box 3337
Farmington, NM 87499-3337

Client P. O. No.
Job No.
Invoice No. 1306
Date of Report 05-19-92

Project: Crouch Mesa Wastewater Evaporation Ponds
Location: San Juan County, New Mexico
Authorized By: E. Randelman/Client
Test Locations Designated By: R. Johnston/GEOMAT
Material Description: Reddish Silty Sand
Field Density Test Method: ASTM D2922, D3017

Date: 05-15-92
Tested By: R. Johnston/GEOMAT
Material Source: 1.5 Ft. Depth, West*
Reviewed By: S.A. Madrid

*Side of Pond #2

Test No.	In-Place Moisture (%)	In-Place Dry Density (PCF)	Compaction (%)	Optimum Moisture (%)	Maximum Dry Density (PCF)	Tested Per ASTM	Required Compaction (%)	Required Moisture (%)	Within Specs?
11	15.4	112.3	98	13.6	114.5	D698A	95	13.6 - 17.6	Yes
12	17.0	113.1	99	13.6	114.5	D698A	95	13.6 - 17.6	Yes
13	16.3	109.2	95	13.6	114.5	D698A	95	13.6 - 17.6	Yes
14	17.0	109.0	95	13.6	114.5	D698A	95	13.6 - 17.6	Yes
15	14.2	113.3	98	13.6	114.5	D698A	95	13.6 - 17.6	Yes

Test No.	Test Date	Test Location	Material Tested	Elevation Datum*
11	05-18-92	West Dike Pond #1, Center Line of Dike, 50' North of S.W. Corner of Dike	Engineered Fill	98'
12	05-18-92	North Dike Pond #1, Over PVC Suction Pipe, Center Line of Dike	Engineered Fill	100'**
13	05-18-92	East Dike Pond #1, Center Line of Dike, 150' South of N.E. Corner of Dike	Engineered Fill	98'
14	05-18-92	North Dike Pond #1, Center Line of Dike, 200' West of N.E. Corner of Dike	Engineered Fill	96'6"
15	05-18-92	West Dike Pond #1, Center Line of Dike, 150' South of N.W. Corner of Dike	Engineered Fill	97'

Distribution: Client (2), Billing (1)

*Datum: 100' = Top of Dike
**Datum: 100' = Top of Trench

GEOMAT

SOIL/AGGREGATE FIELD DENSITY TESTS

Client: SUNCO Trucking Water Disposal Co.
Attn: Mr. Ron Mahan
P.O. Box 3337
Farmignton, NM 87499-3337

Client P. O. No.
Job No.
Invoice No. 1306
Date of Report 05-19-92

Project: Crouch Mesa Wastewater Evaporation Ponds
Location: San Juan County, New Mexico
Authorized By: E. Randelman/Client
Date: 05-15-92
Test Locations Designated By: R. Johnston/GEOMAT
Tested By: R. Johnston/GEOMAT
Material Description: Reddish Silty Sand
Material Source: 1.5 Ft. Depth, West*
Field Density Test Method: ASTM D2922, D3017
Reviewed By: S.A. Macaul
*Side of Pond #2

Test No.	In-Place Moisture (%)	In-Place Dry Density (PCF)	Compaction (%)	Optimum Moisture (%)	Maximum Dry Density (PCF)	Tested Per ASTM	Required Compaction (%)	Required Moisture (%)	Within Specs?
16	14.8	112.3	98	13.6	114.5	D698A	95	13.6 - 17.6	Yes
17	14.9	110.9	97	13.6	114.5	D698A	95	13.6 - 17.6	Yes
18	15.2	111.7	98	13.6	114.5	D698A	95	13.6 - 17.6	Yes

Test No.	Test Date	Test Location	Material Tested	Elevation Datum*
16	05-18-92	East Dike Pond #2, Center of Dike, 150' South of N.E. Corner of Dike	Engineered Fill	98'6"
17	05-18-92	North Dike Pond #2, Center of dike, 200' West of N.E. Corner of Dike	Engineered Fill	96'
18	05-18-92	West Dike Pond #2, Center of Dike, 150' South of N.W. Corner of Dike	Engineered Fill	96'6"

Distribution: Client (2), Billing (1)

*Datum: 100' = Top of Dike

GEOMAT

EDMAT Inc. 909 ½ West Apache ◇ Farmington, New Mexico 87401 ◇ 505-327-7928

REVIEW OF EARTHWORK CONSTRUCTION

Client: SUNCO Trucking Water Disposal Company Invoice No: 1306
Project: Crouch Mesa Ponds Report By: R. Johnston Date: 05-19-92
Earthwork Contractor: B & E Construction Superintendent: D. Dennison
Subject: Ponds #1 & #2

Fill placement continued today on west, north and east dikes of Ponds #1 and #2 by B & E Construction. One foot to two feet of engineered fill was placed on these dikes today to bring all compacted fill dikes within one foot of finish grade for Ponds #1 and #2. Twelve field density tests were performed with nuclear densometer today with all tests meeting moisture and density requirements.

8 Hours Technician Time On-Site.

Reviewed By: S. A. Madrid

Distribution: Client (2)
Billing (1)

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

SOIL/AGGREGATE FIELD DENSITY TESTS

Client: SUNCO Trucking Water Disposal Co.
Attn: Mr. Ron Mahan
P.O. Box 3337
Farmington, NM 87499-3337

Client P. O. No.
Job No.
Invoice No. 1306
Date of Report 05-20-92

Project: Crouch Mesa Wastewater Evaporation Ponds
Location: San Juan County, New Mexico
Authorized By: E. Randelman/Client
Test Locations Designated By: R. Johnston/GEOMAT
Material Description: Reddish Silty Sand
Field Density Test Method: ASTM D2922, D3017

Date: 05-18-92
Tested By: R. Johnston/GEOMAT
Material Source: 1.5 Ft. Depth, West*
Reviewed By: S. A. Madrid
*Side of Pond #2

Test No.	In-Place Moisture (%)	In-Place Dry Density (PCF)	Compaction (%)	Optimum Moisture (%)	Maximum Dry Density (PCF)	Tested Per ASTM	Required Compaction (%)	Required Moisture (%)	Within Specs?
1	15.2	111.8	98	13.6	114.5	D698A	95	13.6 - 17.6	Yes
2	15.4	110.9	97	13.6	114.5	D698A	95	13.6 - 17.6	Yes
3	14.6	112.0	98	13.6	114.5	D698A	95	13.6 - 17.6	Yes
4	16.2	112.4	98	13.6	114.5	D698A	95	13.6 - 17.6	Yes
5	13.9	109.4	96	13.6	114.5	D698A	95	13.6 - 17.6	Yes

Test No.	Test Date	Test Location	Material Tested	Elevation Datum*
1	05-19-92	West Dike Pond #2, Center Line of Dike, 250' South Of N.W. Corner of Dike	Engineered Fill	98'
2	05-19-92	North Dike Pond #2, Center Line of Dike, 200' East of N.W. Corner of Dike	Engineered Fill	97'6"
3	05-19-92	East Dike Pond #2, Center Line of Dike, 150' South of N.E. Corner of Dike	Engineered Fill	98'
4	05-19-92	East Dike Pond #1, Center Line of Dike, 150' South of N.E. Corner of Dike	Engineered Fill	99'
5	05-19-92	North Dike Pond #1, Center Line of Dike, 100' East of N.W. Corner of Dike	Engineered Fill	98'6"

Distribution: Client (2), Billing (1)

*Datum: 100' = Top of Dike

SOIL/AGGREGATE FIELD DENSITY TESTS

Client: SUNCO Trucking Water Disposal Co.
Attn: Mr. Ron Mahan
P.O. Box 3337
Farmington, NM 87499-3337

Client P. O. No.
Job No.
Invoice No. 1306
Date of Report 05-20-92

Project: Crouch Mesa Wastewater Evaporation Ponds
Location: San Juan County, New Mexico
Authorized By: E. Randelman/Client
Date: 05-18-92
Test Locations Designated By: R. Johnston/GEOMAT
Tested By: R. Johnston/GEOMAT
Material Description: Reddish Silty Sand
Material Source: 1.5 Ft. Depth, West *
Field Density Test Method: ASTM D2922, D3017
Reviewed By: D.A. Madrid
*Side of Pond #2

Test No.	In-Place Moisture (%)	In-Place Dry Density (PCF)	Compaction (%)	Optimum Moisture (%)	Maximum Dry Density (PCF)	Tested Per ASTM	Required Compaction (%)	Required Moisture (%)	Within Specs?
6	14.2	110.3	96	13.6	114.5	D698A	95	13.6 - 17.6	Yes
7	15.6	111.4	97	13.6	114.5	D698A	95	13.6 - 17.6	Yes
8	13.6	109.3	95	13.6	114.5	D968A	95	13.6 - 17.6	Yes
9	14.7	110.4	97	13.6	114.5	D698A	95	13.6 - 17.6	Yes
10	14.6	109.8	96	13.6	114.5	D698A	95	13.6 - 17.6	Yes

Test No.	Test Date	Test Location	Material Tested	Elevation Datum*
6	05-19-92	West Dike Pond #1, Center Line of Dike, 100' North of S.E. Corner of Dike	Engineered Fill	98'6"
7	05-19-92	West Dike Pond #2, Center Line of Dike, 200' South of N.W. Corner of Dike	Engineered Fill	97'6"
8	05-19-92	North Dike Pond #2, Center Line of Dike, 150' East of N.W. Corner of Dike	Engineered Fill	99'
9	05-19-92	West Dike Pond #2, Center Line of Dike, 200' South of N.E. Corner of Dike	Engineered Fill	99'
10	05-19-92	West Dike Pond #1, Center Line of Dike, 75' South of N.W. Corner of Dike	Engineered Fill	99'

Distribution: Client (2), Billing (1)

*Datum: 100' = Top of Dike

SOIL/AGGREGATE FIELD DENSITY TESTS

Client: SUNCO Trucking Water Disposal Co.
Attn: Mr. Ron Mahan
P.O. Box 3337
Farmington, NM 87499-3337

Client P. O. No.
Job No.
Invoice No. 1306
Date of Report 05-20-92

Project: Crouch Mesa Wastewater Evaporation Ponds
Location: San Juan County, New Mexico
Authorized By: E. Randelman/Client
Date: 05-18-92
Test Locations Designated By: R. Johnston/GEOMAT
Tested By: R. Johnston/GEOMAT
Material Description: Reddish Silty Sand
Material Source: 1.5 Ft. Depth, West*
Field Density Test Method: ASTM D2922, D3017
Reviewed By: S. A. Madrid
*Side of Pond #2

Test No.	In-Place Moisture (%)	In-Place Dry Density (PCF)	Compaction (%)	Optimum Moisture (%)	Maximum Dry Density (PCF)	Tested Per ASTM	Required Compaction (%)	Required Moisture (%)	Within Specs?
11	15.0	112.0	98	13.6	114.5	D698A	95	13.6-17.6	Yes
12	15.7	110.9	97	13.6	114.5	D698A	95	13.6-17.6	Yes

Test No.	Test Date	Test Location	Material Tested	Elevation Datum*
11	05-19-92	North Dike Pond #1, Center Line of Dike, 250' East of N.W. Corner of Dike	Engineered Fill	99'
12	05-19-92	East Dike Pond #1, Center Line of Dike, 200' South of N.E. Corner of Dike	Engineered Fill	99'6"

Distribution: Client (2), Billing (1)

*Datum: 100' = Top of Dike

GEOMAT

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

REVIEW OF EARTHWORK CONSTRUCTION

Client: SUNCO Trucking Water Disposal Company Invoice No: 1306
Project: Crouch Mesa Ponds Report By: R. Johnston Date: 05-20-92
Earthwork Contractor: B & E Construction Superintendent: D. Dennison
Subject: Ponds #1 and #2

Fill placement continued today on West, North, and East dikes of Ponds #1 and #2 by B & E Construction. All dikes are now near finish grade. No compactive effort was applied near finish grade. Construction was stopped at 3:30 P.M. due to rain. Three field density tests were performed within 6" of finish grade on West, North, and East dikes of Pond #1. Slopes and radius at corners are being bladed and finished by B & E Construction. All testing today met project requirements.

7 Hours Technician Time On-Site.

Reviewed By: S. A. Madrid

Distribution: Client (2)
Billing (1)

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

SOIL/AGGREGATE FIELD DENSITY TESTS

Client: SUNCO Trucking Water Disposal Co.
Attn: Mr. Ron Mahan
P.O. Box 3337
Farmington, NM 87499-3337

Client P. O. No.:
Job No.:
Invoice No.: 1306
Date of Report: 05-21-92

Project: Crouch Mesa Wastewater Evaporation Ponds
Location: San Juan County, New Mexico
Authorized By: E. Randelman/Client
Test Locations Designated By: R. Johnston/GEOMAT
Material Description: Reddish Silty Sand
Field Density Test Method: ASTM D2922, D3017

Date: 05-19-92
Tested By: R. Johnston/GEOMAT
Material Source: 1.5 Ft. Depth, West *
Reviewed By: S. A. Mac...

*Side of Pond #2

Test No.	In-Place Moisture (%)	In-Place Dry Density (PCF)	Compaction (%)	Optimum Moisture (%)	Maximum Dry Density (PCF)	Tested Per ASTM	Required Compaction (%)	Required Moisture (%)	Within Specs?
1	17.0	109.2	95	13.6	114.5	D698A	95	13.6 - 17.6	Yes
2	17.1	110.2	96	13.6	114.5	D698A	95	13.6 - 17.6	Yes
3	16.9	109.8	96	13.6	114.5	D698A	95	13.6 - 17.6	Yes

Test No.	Test Date	Test Location	Material Tested	Elevation Datum*
1	05-20-92	West Dike Pond #1, Center Line of Dike, 100' South of N.W. Corner of Dike	Engineered Fill	99'6"
2	05-20-92	North Dike Pond #1, Center Line of Dike, 200' East of N.W. Corner of Dike	Engineered Fill	99'6"
3	05-20-92	East Dike Pond #1, Center Line of Dike, 150' South of N.E. Corner of Dike	Engineered Fill	99'6"

Distribution: Client (2), Billing (1)

*Datum: 100' = Top of Dike

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

REVIEW OF EARTHWORK CONSTRUCTION

Client: SUNCO Trucking Water Disposal Company Invoice No: 1306
Project: Crouch Mesa Ponds Report By: R. Johnston Date: 05-21-92
Earthwork Contractor: B & E Construction Superintendent: D. Dennison
Subject: Ponds #1 & #2

No earthwork was in progress upon arrival on site. Rain overnight created slippery conditions on dikes for Pond #1 and #2. Both dikes are near finish grade and Don Dennison/B & E Construction did not want to damage slopes and radius at corners with equipment on dikes in wet conditions. Earl Randelman/SUNCO stated that no testing will be needed until Friday.

One Hour Technician Time On-Site

Reviewed By: D. a. madrid

Distribution: Client (2)
Billing (1)

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

REVIEW OF EARTHWORK CONSTRUCTION

Client: SUNCO Trucking Water Disposal Company Invoice No. 1306
Project: Crouch Mesa Ponds Report By: R. Johnston Date: 05-22-92
Earthwork Contractor: B & E Construction Superintendent: D. Dennison
Subject: Ponds #1 and #2

Top of dikes for Ponds #1 and #2 are near finish grade. Cecil Tullis/Hi Country Surveying blue topped dikes for Pond #2 today and low sections were filled with material to grade. These filled sections had not been processed and compacted by end of day today. Dikes on Pond #1 had not been blue topped by 4:30 today. Eight field density tests were performed on dikes of Ponds #1 and #2 near finish grade. Fill areas for blue topped dikes for Pond #1 have not tested. All testing today met moisture and density requirements.

7 Hours Technician Time On-Site

Reviewed By: A.A. Madrid

Distribution: Client (2)
Billing (1)

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

SOIL/AGGREGATE FIELD DENSITY TESTS

Client: SUNCO Trucking Water Disposal Co.
Attn: Mr. Ron Mahan
P.O. Box 3337
Farmington, NM 87499-3337

Client P. O. No.
Job No. 1306
Invoice No.
Date of Report 05-26-92

Project: Crouch Mesa Wastewater Evaporation Ponds
Location: San Juan County, New Mexico
Authorized By: Earl Randelmon/Client
Test Locations Designated By: R. Johnston/GEOMAT
Material Description: Reddish, Silty Sand
Field Density Test Method: ASTM D2922

Date: 05-22-92
Tested By: R. Johnston (GEOMAT)
Material Source: 1.5' Depth, Westside
Reviewed By: A.A. Madrid

* Pond #2

Test No.	In-Place Moisture (%)	In-Place Dry Density (PCF)	Compaction (%)	Optimum Moisture (%)	Maximum Dry Density (PCF)	Tested Per ASTM	Required Compaction (%)	Required Moisture (%)	Within Specs?
1	15.1	110.1	96	13.6	114.5	D698A	95	13.6-17.6	Yes
2	16.3	111.5	97	13.6	114.5	D698A	95	13.6-17.6	Yes
3	16.2	113.2	99	13.6	114.5	D698A	95	13.6-17.6	Yes
4	13.9	109.8	96	13.6	114.5	D698A	95	13.6-17.6	Yes
5	14.8	112.2	98	13.6	114.5	D698A	95	13.6-17.6	Yes

Test No.	Test Date	Test Location	Material Tested	Elevation Datum*
1	05-22-92	South Dike Pond #2, Center Line 150' West of South East Corner of Dike	Engineered Fill	100'
2	05-22-92	East Dike Pond #2, Center Line 150' North of South East Corner of Dike	Engineered Fill	100'
3	05-22-92	North Dike Pond #2, Center Line 100' East of North West Corner of Dike	Engineered Fill	100'
4	05-22-92	West Dike Pond #2, Center Line 200' South of North West Corner of Dike	Engineered Fill	100'
5	05-22-92	West Dike Pond #1, Center Line 200' South of North West Corner of Dike	Engineered Fill	100'

Distribution: Client (2), Billing (1)

*Datum: 100' Top of Dike

SOIL/AGGREGATE FIELD DENSITY TESTS

Client: SUNCO Trucking Water Disposal Co.
Attn: Mr. Ron Mahan
P.O. Box 3337
Farmington, NM 87401

Client P. O. No.
Job No. 1306
Invoice No.
Date of Report 05-26-92

Project: Crouch Mesa Wastewater Evaporation Ponds
Location: San Juan County, New Mexico
Authorized By: Earl Randelmon/Client
Date: 05-22-92
Test Locations Designated By: R. Johnston/GEOMAT
Tested By: R. Johnston/GEOMAT
Material Description: Reddish, Silty Sand
Material Source: 1.5' Depth, Westside
Field Density Test Method: ASTM D2922
Reviewed By: S.A. Madrid

* Pond #2

Test No.	In-Place Moisture (%)	In-Place Dry Density (PCF)	Compaction (%)	Optimum Moisture (%)	Maximum Dry Density (PCF)	Tested Per ASTM	Required Compaction (%)	Required Moisture (%)	Within Specs?
6	14.9	111.3	97	13.6	114.5	D698A	95	13.6-17.6	Yes
7	15.1	110.1	96	13.6	114.5	D698A	95	13.6-17.6	Yes
8	15.4	111.4	97	13.6	114.5	D698A	95	13.6-17.6	Yes

Test No.	Test Date	Test Location	Material Tested	Elevation Datum*
6	05-22-92	North Dike Pond #1, Center Line of Dike 150', West of North East Corner of Dike	Engineered Fill	100'
7	05-22-92	East Dike Pond #1, Center Line of Dike 200', South of North East Corner of Dike	Engineered Fill	100'
8	05-22-92	South Dike Pond #1, Center Line of Dike 150', West of South East Corner of Dike	Engineered Fill	100'

Distribution: Client (2), Billing (1)

*Datum: 100' Top of Dike

GEOMAT

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

REVIEW OF EARTHWORK CONSTRUCTION

Client: SUNCO Trucking Water Disposal Company Invoice No: 1306
Project: Crouch Mesa Ponds Report By: R. Johnston Date: 05-26-92
Earthwork Contractor: B & E Construction Superintendent: D. Dennison
Subject: PONDS #1 and #2

Field Density Tests were performed on blue topped dikes for Pond #2. Cecil Tullis/High Country Surveys blue topped finish grade on dikes for Pond #1 and Scimmer Pond today. Field density tests were performed on finish grade on dikes for Pond #1 and Scimmer Pond. B & E Construction is fine grading dikes and slopes today. All field density tests performed met project requirements. This completes testing on dikes. Earl Randelman stated he will notify us when backfill of drain lines starts, for moisture and density testing of backfill.

5 Hours Technician Time On-Site

Reviewed By: A. a. madrid

Distribution: Client (2)
Billing (1)

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

SOIL/AGGREGATE FIELD DENSITY TESTS

Client: Sunco Trucking Water Disposal Co.
Attn: Mr. Ron Mahan
P.O. Box 3337
Farmington, NM 87499-3337

Client P. O. No.
Job No. 1306
Invoice No.
Date of Report 05-27-92

Project: Crouch Mesa Wastewater Evaporation Ponds
Location: San Juan County, New Mexico
Authorized By: E. Ramdelman/Client — Date: 05-26-92
Test Locations Designated By: R. Johnston/GEOMAT — Tested By: R. Johnston/GEOMAT
Material Description: Reddish, Silty Sand — Material Source: 1.5' Depth West Side *Pond #2
Field Density Test Method: ASTM D2922, D3017 — Reviewed By: J.O. Madrid

Test No.	In-Place Moisture (%)	In-Place Dry Density (PCF)	Compaction (%)	Optimum Moisture (%)	Maximum Dry Density (PCF)	Tested Per ASTM	Required Compaction (%)	Required Moisture (%)	Within Specs?
1	14.0	110.2	96	13.6	114.5	D698A	95	13.6-17.6	Yes
2	13.8	111.3	97	13.6	114.5	D698A	95	13.6-17.6	Yes
3	14.1	109.7	96	13.6	114.5	D698A	95	13.6-17.6	Yes
4	13.9	110.0	96	13.6	114.5	D698A	95	13.6-17.6	Yes
5	13.7	109.4	96	13.6	114.5	D698A	95	13.6-17.6	Yes

Test No.	Test Date	Test Location	Material Tested	Elevation Datum*
1	05-26-92	West Dike Pond #2, Center Line of Dike 150' South of North West Corner of Dike	Engineered Fill	Yes
2	05-26-92	North Dike Pond #2, Center Line of Dike 150' East of North West Corner of Dike	Engineered Fill	Yes
3	05-26-92	East Dike Pond #2, Center Line of Dike 150' North of South East Corner of Dike	Engineered Fill	Yes
4	05-26-92	South Dike Pond #2, Center Line of Dike 150' West of South East Corner of Dike	Engineered Fill	Yes
5	05-26-92	South Dike Slimmer Pond, Center Line of Dike, South East Corner of Dike	Engineered Fill	Yes

Distribution: Client (2), Billing (1)

*Datum: 100'= Top of Dike

SOIL/AGGREGATE FIELD DENSITY TESTS

Client: SUNCO Trucking Water Disposal Co.
Attn: Mr. Ron Mahan
P.O. Box 3337
Farmington, NM 87499-3337

Client P. O. No.
Job No. 1306
Invoice No.
Date of Report 05-27-92

Project: Crouch Mesa Wastewater Evaporation Ponds
Location: San Juan County, New Mexico
Authorized By: E. Ramdelman/Client
Test Locations Designated By: R. Johnston/GEOMAT
Material Description: Reddish, Silty Sand
Field Density Test Method: ASTM D2922, D3017

Date: 05-26-92
Tested By: R. Johnston/GEOMAT
Material Source: 1.5' Depth West Side
Reviewed By: J.A. Madrid
*Pond #2

Test No.	In-Place Moisture (%)	In-Place Dry Density (PCF)	Compaction (%)	Optimum Moisture (%)	Maximum Dry Density (PCF)	Tested Per ASTM	Required Compaction (%)	Required Moisture (%)	Within Specs?
6	13.7	110.3	96	13.6	114.5	D698A	95	13.6-17.6	Yes
7	13.9	109.4	96	13.6	114.5	D698A	95	13.6-17.6	Yes
8	14.1	110.2	96	13.6	114.5	D698A	95	13.6-17.6	Yes
9	13.9	111.3	97	13.6	114.5	D698A	95	13.6-17.6	Yes

Test No.	Test Date	Test Location	Material Tested	Elevation Datum*
6	05-26-92	South Dike Pond #1, Center Line of Dike 150', East of South West Corner of Dike	Engineered Fill	Yes
7	05-26-92	West Dike Pond #1, Center Line of Dike 150', North of South West Corner of Dike	Engineered Fill	Yes
8	05-26-92	North Dike Pond #1, Center Line of Dike 150', West of North East Corner of Dike	Engineered Fill	Yes
9	05-26-92	East Dike Pond #1, Center Line of Dike 150', South of North East Corner of Dike	Engineered Fill	Yes

Distribution: Client (2), Billing (1)

*Datum: 100'= Top of Dike

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

REVIEW OF EARTHWORK CONSTRUCTION

Client: SUNCO Trucking Water Disposal Company Invoice No. 1361

Project: Crouch Mesa Ponds Report By: J. Sanchez

Date: 06-08-92 Earthwork Contractor: Frank Liner Fabrications

Superintendent: B. Frank Subject: Trench Backfill Areas

Arrived on-site at 10:00 A.M. as requested. Contractor had placed a lift in the north dike wall overflow trench on Pond #1. A compaction test was taken. The soil met compaction requirements but failed on moisture. Informed Bob Frank/Frank Liner Fabrications of this result. He then blended stockpiled materials to meet moisture requirements. Technician was released for the day with a will call for 06-09-92 to continue compaction testing.

1.5 Hours Technician Time On-Site

Reviewed By: A.C. Madrid

Distribution: Client (2)

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

SOIL/AGGREGATE FIELD DENSITY TESTS

Client: SUNCO Trucking Water Disposal Co.
Attn: Mr. Ron Mahan
P.O. Box 3337
Farmington, NM 87499-3337

Client P. O. No.
Job No. 1361
Invoice No.
Date of Report 06-09-92

Project: Crouch Mesa Wastewater Evaporation
Location: San Juan County, New Mexico
Authorized By: Bob Frank
Test Locations Designated By: J. Sanchez/GEOMAT
Material Description: Silty Sandy Reddish
Field Density Test Method: ASTM D2922, D3017

Date: 06-08-92
Tested By: J. Sanchez/GEOMAT
Material Source: 1.5' Depth, Western Side*
Reviewed By: S.a. macdonald
*Pond #2

Test No.	In-Place Moisture (%)	In-Place Dry Density (PCF)	Compaction (%)	Optimum Moisture (%)	Maximum Dry Density (PCF)	Tested Per ASTM	Required Compaction (%)	Required Moisture (%)	Within Specs?
1	12.5	110.6	97	13.6	114.5	D698A	95	13.6-17.6	No

Test No.	Test Date	Test Location	Material Tested	Elevation Datum*
1	06-08-92	Pond #1, North Dike Wall, N.E. Corner of Dike At Over Flow Trench	Trench/ Backfill	95.5'

Distribution: Client (2), Billing (1)

*Datum: 100'= Top of Trench in Dike

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

REVIEW OF EARTHWORK CONSTRUCTION

Client: SUNCO Trucking Water Disposal Company Invoice No. 1361

Project: Crouch Mesa Ponds Report By: J. Sanchez

Date: 06-10-92 Earthwork Contractor: Frank Liner Fabrications

Superintendent: B. Frank Subject: Trench Backfill Areas

Arrived on-site at 8:00 A.M. as requested. A concern was brought up over the proposed method of backfill placement for the vent trench on the east dike of the scimmer pond and the vent riser excavation on the outside slope of the west dike of the pond one. The scimmer pond trench is approximately 30" wide and 11 feet deep. The vent riser excavation is approximately 15' deep. The contractor's intention was to use a vibratory walk-behind compactor for backfill compaction. This is a safety hazard due to the depths and widths of the excavations. The excavation walls could shear-ff and collapse on a man in the trench. The contractor was informed of this hazard. Rod/Frank Liner informed me that Bob Frank directed him to cut benches into the scimmer pond trench walls to minimize the hazard. It was not clear what they intended to do regarding the pond one vent riser excavation. I was directed to leave the site until further notice. Left site at 8:30 a.m.

After informing George Madrid, P.E., GEOMAT, he met with Bob Frank on-site to observe and discuss the pond one vent riser excavation. It was decided to backfill the excavation to native ground level with flowable fill and slope the remaining excavation wall to at least a 3/4:1 (horizontal:vertical) slope prior to backfilling the remainder with native materials.

Returned to site at 2:30 p.m. to monitor placement of flowable fill and perform compaction testing. Performed three tests on backfill of vent riser trench inside west dike of pond one. The backfill tested today meets the specified requirements.

3 Hours Technician On-Site

Reviewed By: G.A. Madrid

Distribution: Client (2)

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

SOIL/AGGREGATE FIELD DENSITY TESTS

Client: SUNCO Trucking Water Disposal Co.
Attn: Mr. Ron Mahan
P.O. Box 3337
Farmington, NM 87499-3337

Client P. O. No.
Job No.
Invoice No. 1361
Date of Report 06-11-92

Project: Crouch Mesa Wastewater Evaporation
Location: San Juan County, New Mexico
Authorized By: Bob Franks
Test Locations Designated By: J. Sanchez/GEOMAT
Material Description: Silty Sand
Field Density Test Method: ASTM D2922, D3017

Date: J. Sanchez/GEOMAT
Tested By: J. Sanchez/GEOMAT
Material Source: Backfill
Reviewed By: S.a. madrid

Test No.	In-Place Moisture (%)	In-Place Dry Density (PCF)	Compaction (%)	Optimum Moisture (%)	Maximum Dry Density (PCF)	Tested Per ASTM	Required Compaction (%)	Required Moisture (%)	Within Specs?
1	12.0	104.2	91	13.6	114.5	D698A	95	13.6-17.6	No
2R	13.4	109.1	95	13.6	114.5	D698A	95	13.6-17.6	No
3R	13.7	108.8	95	13.6	114.5	D698A	95	13.6-17.6	Yes

Test No.	Test Date	Test Location	Material Tested	Elevation Datum*
1	06-10-92	West Dike Wall Pond #1, Interior Trench Backfill	Backfill	100'
2R	06-10-92	West Dike Wall, Retest #1, on 06-10-92, Backfill	Backfill	100'
3R	06-10-92	West Dike Wall, Retest #2R, on 06-10-92, Backfill	Backfill	100'

Distribution: Client (2), Billing (1)

*Datum: 100'=Top of Trench

ENVIRONMENTAL MATERIALS TESTING Inc. 909 ½ West Apache ◆ Farmington, New Mexico 87401 ◆ 505-327-7928

REVIEW OF EARTHWORK CONSTRUCTION

Client: SUNCO Trucking Water Disposal Company Invoice No. 1361

Project: Crouch Mesa Ponds Report By: J. Sanchez

Date: 06-11-92 Earthwork Contractor: Frank Liner Fabrications

Superintendent: B. Frank Subject: Trench Backfill Areas

Arrived on-site at 11:00 A.M. as requested. Contractor had processed material to be backfilled and had stockpiled this material. Contractor is working at the east dike trench of the scimmer pond. Ten field density tests were performed today. Backfill tested today meets the specified requirements for compaction and moisture.

7.5 Hours Technician Time On-Site

Reviewed By: S. A. Macdil

Distribution: Client (2)

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

SOIL/AGGREGATE FIELD DENSITY TESTS

Client: SUNCO Trucking Water Disposal Co.
Attn: Mr. Ron Mahan
P.O. Box 3337
Farmington, NM 87499-3337

Client P. O. No.:
Job No.:
Invoice No.: 1361
Date of Report: 06-12-92

Project: Crouch Mesa Wastewater Evaporation
Location: San Juan County, New Mexico
Authorized By: Rodney Mullins/Frank Liners
Test Locations Designated By: J. Sanchez/GEOMAT
Material Description: Silty Sand, Reddish
Field Density Test Method: ASTM D2922, D3017

Date: 06-11-92
Tested By: J. Sanchez/GEOMAT
Material Source: Trench Backfill
Reviewed By: S.A. Madrid

Test No.	In-Place Moisture (%)	In-Place Dry Density (PCF)	Compaction (%)	Optimum Moisture (%)	Maximum Dry Density (PCF)	Tested Per ASTM	Required Compaction (%)	Required Moisture (%)	Within Specs?
1	15.6	104.0	91	13.6	114.5	D698A	95	13.6-17.6	No
2R	13.7	108.8	95	13.6	114.5	D698A	95	13.6-17.6	Yes
3	13.8	106.0	93	13.6	114.5	D698A	95	13.6-17.6	No
4R	14.1	110.9	97	13.6	114.5	D698A	95	13.6-17.6	Yes
5	13.6	108.3	95	13.6	114.5	D698A	95	13.6-17.6	Yes
6	14.6	110.5	97	13.6	114.5	D698A	95	13.6-17.6	Yes
7	13.7	110.1	96	13.6	114.5	D698A	95	13.6-17.6	Yes
8	15.1	108.7	95	13.6	114.5	D698A	95	13.6-17.6	Yes
9	13.8	104.8	92	13.6	114.5	D698A	95	13.6-17.6	No
10R	14.4	108.8	95	13.6	114.5	D698A	95	13.6-17.6	Yes

Test No.	Test Date	Test Location	Material Tested	Elevation Datum*
1	06-11-92	Center of Dike, East Wall of Scimmer Pond	Backfill	90'
2R	06-11-92	Retest #1, on 06-11-92	Backfill	90'
3	06-11-92	5' West of Center of Dike, E. Wall of Scimmer Pond	Backfill	91'
4R	06-11-92	Retest #3, on 06-11-92	Backfill	91'
5	06-11-92	5' East of Center of Dike, E. Wall of Scimmer Pond	Backfill	92'
6	06-11-92	Center of Dike, East Wall of Scimmer Pond	Backfill	93'
7	06-11-92	Center of Dike, East Wall of Scimmer Pond	Backfill	94
8	06-11-92	Center of Dike, East Wall of Scimmer Pond	Backfill	95'
9	06-11-92	Center of Dike, East Wall of Scimmer Pond	Backfill	96'
10R	06-11-92	Retest #9, on 06-11-92	Backfill	96'

Distribution: Client (2), Billing (1)

*Datum: 100'= Top of Trench

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

REVIEW OF EARTHWORK CONSTRUCTION

Client: SUNCO Trucking Water Disposal Company Invoice No. 1361

Project: Crouch Mesa Ponds Report By: J. Sanchez

Date: 06-12-92 Earthwork Contractor: Frank Liner Fabrications

Superintendent: B. Frank Subject: Trench Backfill Areas

Arrived on-site at 8:30 A.M. as requested. Contractor has completed backfill operations at the trench on the east dike of the scimmer pond. Contractor is backfilling the interior trench at the north dike of Pond #1 at the overflow trench. Contractor is backfilling at the west dike of Pond #1 at the riser. Eleven Field Density tests were performed today. Backfill tested today meets the specified requirements for compaction and moisture.

8.5 Hours Technician Time On-Site.

Reviewed By: S. A. Madrid

Distribution: Client (2)

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

SOIL/AGGREGATE FIELD DENSITY TESTS

Client: SUNCO Trucking Water Disposal Co.
Attn: Mr. Ron Mahan
P.O. Box 3337
Farmington, NM 87499-3337

Client P. O. No.
Job No.
Invoice No. 1361
Date of Report 06-16-92

Project: Crouch Mesa Wastewater Evaporation
Location: San Juan County, New Mexico
Authorized By: Bob Frank
Date: 06-12-92
Test Locations Designated By: J. Sanchez/GEOMAT
Tested By: J. Sanchez/GEOMAT
Material Description: Silty Sand; Reddish
Material Source: Backfill
Field Density Test Method: ASTM D2922, D3017
Reviewed By: Raymond J. Johnston

Test No.	In-Place Moisture (%)	In-Place Dry Density (PCF)	Compaction (%)	Optimum Moisture (%)	Maximum Dry Density (PCF)	Tested Per ASTM	Required Compaction (%)	Required Moisture (%)	Within Specs?
1	14.3	108.6	95	13.6	114.5	D698A	95	13.6-17.6	Yes
2	13.8	108.4	95	13.6	114.5	D698A	95	13.6-17.6	Yes
3	14.6	111.3	97	13.6	114.5	D698A	95	13.6-17.6	Yes
4	15.2	111.7	97	13.6	114.5	D698A	95	13.6-17.6	Yes
5	14.2	111.1	97	13.6	114.5	D698A	95	13.6-17.6	Yes

Test No.	Test Date	Test Location	Material Tested	Elevation Datum*
1	06-12-92	Center of Dike, In Trench, E. Dike Wall Scimmer Pond	Backfill	96.5'
2	06-12-92	Center of Dike, In Trench, E. Dike Wall Scimmer Pond	Backfill	97'
3	06-12-92	Center of Dike, In Trench, E. Dike Wall Scimmer Pond	Backfill	97.5'
4	06-12-92	Center of Dike, In Trench, E. Dike Wall Scimmer Pond	Backfill	98.5'
5	06-12-92	Center of Dike, In Trench, E. Dike Wall Scimmer Pond	Backfill	99'

Distribution: Client (2), Billing (1)

*Datum: 100'=Top of Trench in Dike Wall

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

SOIL/AGGREGATE FIELD DENSITY TESTS

Client: SUNCO Trucking Water Disposal Co.
Attn: Mr. Ron Mahan
P.O. Box 3337
Farmington, NM 87499-3337

Client P. O. No.
Job No.
Invoice No. 1361
Date of Report 06-16-92

Project: Crouch Mesa Wastewater Evaporation
Location: San Juan County, New Mexico
Authorized By: Bob Frank
Date: 06-12-92
Test Locations Designated By: J. Sanchez/GEOMAT
Tested By: J. Sanchez/GEOMAT
Material Description: Silty Sand; Reddish
Material Source: Backfill
Field Density Test Method: ASTM D2922, D3017
Reviewed By: Raymond J. Johnston

Test No.	Moisture (%)	In-Place Dry Density (PCF)	Compaction (%)	Optimum Moisture (%)	Maximum Dry Density (PCF)	Tested Per ASTM	Required Compaction (%)	Required Moisture (%)	Within Specs?
6	13.7	112.7	98	13.6	114.5	D698A	95	13.6-17.6	Yes
7	16.6	109.9	96	13.6	114.5	D698A	95	13.6-17.6	Yes
8	15.3	110.8	97	13.6	114.5	D698A	95	13.6-17.6	Yes
9	14.6	108.8	95	13.6	114.5	D698A	95	13.6-17.6	Yes
10	15.4	108.9	95	13.6	114.5	D698A	95	13.6-17.6	Yes
11	14.7	109.4	96	13.6	114.5	D698A	95	13.6-17.6	Yes

Test No.	Test Date	Test Location	Material Tested	Elevation Datum*
6	06-12-92	Center of Dike, In Trench, E. Dike Wall of Scimmer Pond	Backfill	100'
7	06-12-92	At Overflow Trench, N. Dike Wall, Inside or S. Side of N. Dike	Backfill	96'
8	06-12-92	At Overflow Trench, N. Dike Wall, Inside or S. Side of N. Dike	Backfill	97'
9	06-12-92	W. Dike Wall of Pond #1, At Riser	Backfill	94'
10	06-12-92	At Overflow Trench, N. Dike Wall, Inside or S. Side of N. Dike	Backfill	98'
11	06-12-92	W. Dike Wall of Pond #1, At Riser	Backfill	95'

Distribution: Client (2), Billing (1)

*Datum: 100'=Top of Trench in Dike Wall

CENMAT Inc. 909 ½ West Apache ◊ Farmington, New Mexico 87401 ◊ 505-327-7928

REVIEW OF EARTHWORK CONSTRUCTION

Client: SUNCO Trucking Water Disposal Company Invoice No. 1361

Project: Crouch Mesa Ponds Report By: J. Sanchez

Date: 06-13-92 Earthwork Contractor: Frank Liner Fabrications

Superintendent: B. Frank Subject: Trench Backfill Areas

Arrived on-site at 8:30 A.M. as requested. Contractor completed trench backfill operations on the west dike of Pond #1 at the riser. Contractor has completed trench backfill operations on the north dike of Pond #1 at the interior or south side of the fluid transfer and overflow pipes located at the northeast corner, north dike of Pond #1. Seven field density tests were performed today. Backfill tested today meets the specified requirements for compaction and moisture.

4.5 Hours Technician Time On-Site

Reviewed By: S.A. Madrid

Client (2)

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

SOIL/AGGREGATE FIELD DENSITY TESTS

Client: SUNCO Trucking Water Disposal Co.
Attn: Mr. Ron Mahan
P.O. Box 3337
Farmington, NM 87499-3337

Client P. O. No.
Job No.
Invoice No. 1361
Date of Report 06-15-92

Project: Crouch Mesa Wastewater Evaporation
Location: San Juan County, New Mexico
Authorized By: Bob Frank
Date: 06-13-92
Test Locations Designated By: J. Sanchez/GEOMAT
Tested By: J. Sanchez/GEOMAT
Material Description: Silty Sand/reddish
Material Source: Backfill
Field Density Test Method: ASTM D2922, D3017
Reviewed By: Raymond T. Johnston

Test No.	In-Place Moisture (%)	In-Place Dry Density (PCF)	Compaction (%)	Optimum Moisture (%)	Maximum Dry Density (PCF)	Tested Per ASTM	Required Compaction (%)	Required Moisture (%)	Within Specs?
1	13.7	108.3	95	13.6	114.5	D698A	95	13.6-17.6	Yes
2	14.1	111.5	97	13.6	114.5	D698A	95	13.6-17.6	Yes
3	14.5	114.2	100	13.6	114.5	D698A	95	13.6-17.6	Yes
4	13.9	112.6	98	13.6	114.5	D698A	95	13.6-17.6	Yes
5	14.4	108.3	95	13.6	114.5	D698A	95	13.6-17.6	Yes
6	16.2	109.2	95	13.6	114.5	D698A	95	13.6-17.6	Yes
7	14.7	109.8	96	13.6	114.5	D698A	95	13.6-17.6	Yes

Test No.	Test Date	Test Location	Material Tested	Elevation Datum*
1	06-13-92	W. Dike Wall of Pond #1 At Riser	Backfill	96'
2	06-13-92	At Overflow Trench, N. Dike Wall Inside or S. Side of N. Dike, Pond #1	Backfill	99'
3	06-13-92	W. Dike Wall of Pond #1, At Riser	Backfill	97'
4	06-13-92	At Overflow Trench, N. Dike Wall Inside or S. Side of N. Dike, Pond #1	Backfill	100'
5	06-13-92	W. Dike Wall of Pond #1, At Riser	Backfill	98'
6	06-13-92	W. Dike Wall of Pond #1, At Riser	Backfill	99'
7	06-13-92	W. Dike Wall of Pond #1, At Riser	Backfill	100'

Distribution: Client (2), Billing (1)

*Datum: 100'= Top of Trench

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

OIL CONSERVATION DIVISION
RECEIVED
'92 JUL 16 AM 9 09

July 14, 1992

State of New Mexico Energy,
Minerals, and Natural Resources Dept.
Oil Conservation Commission
P. O. Box 2088
Santa Fe, NM 87504

Attn: William J. LeMay

Case: 9955 (De Novo)
Order #R-9485-A

Gentlemen:

Sunco Water Disposal Company submits for your approval our plans for aerating our disposal ponds.

We appreciate your consideration in this matter.

See separately bound submittal

Sincerely,

Ron Mahan
Contracts Manager

CC: Aztec OCD
1000 Rio Brazos Road
Aztec, NM 87410

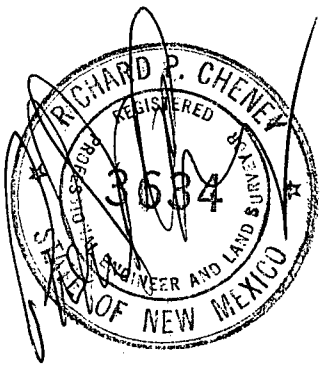
OXYGEN DEMAND REQUIRMENTS
FOR
SUNCO PRODUCED WATER FACILITY

FARMINGTON, NEW MEXICO

July 14, 1992

Prepared By

Brewer Associates, Inc.
909 West Apache
Farmington, New Mexico 87401



CHENEY — WALTERS — ECHOLS
BREWER
ASSOCIATES, INC.
ENGINEERS • SURVEYORS
P. O. BOX 2079 • FARMINGTON, NM 87499 • (505) 327-3303

July 14, 1992

Mr. Ron Mahan
Contract Representative
Big A Well Service
P.O. Box 1496
Farmington, New Mexico 87499

RE: SUNCO PRODUCED WATER DISPOSAL FACILITY

Dear Mr. Mahan:

Transmitted herewith are our calculations regarding the aeration system that has been proposed for the above referenced project. Our calculations indicate that sufficient oxygen may be supplied to the system with a 2-inch supply line and 1-inch distribution lines if the orifice is drilled a minimum of 3/16-inch in diameter. The reasoning and calculations utilized to arrive at the amount of air required are as submitted in the attached report.

Very truly yours,

BREWER ASSOCIATES, INC.

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

RPC:yf RPT-92

Attachments

REPORT

1. Produced water oxygen demand - To our knowledge no studies have been completed regarding the oxygen demand from produced oilfield waters. For purposes of this report, we have estimated the oxygen demand to be 150 parts per million. This would be the equivalent of a weak of domestic sewage. Each part per million of oxygen demand obviously requires one part per million of oxygen at 100 percent efficiency. In addition, to meeting the oxygen demand of incoming waters, the OCD has placed a requirement on the facility to maintain a 0.5 part per million residual in the basin at all times. The demand of the incoming waters plus the required residual will determine the amount of oxygen required for the system in any given 24 hour period. The actual OCD requirement for residual is that the pond have a 0.5 part per million residual at one foot above the bottom of the pond. In order to assure that this 0.5 part per million residual occurs, we have used a requirement of 1 part per million residual average for the entire pond. The amount of air required to maintain the residual will vary with the depth of the pond. The maximum amount of air required to maintain the residual would occur when the pond is full; however, since transfer efficiency increases with depth, the amount of air required in terms of CFM is actually less than a deeper pond. The following calculations demonstrate total oxygen requirements.

   Assume incoming waters have an oxygen demand of 150 ppm

   Permit requires that 0.5 ppm residual be maintained at 1' above bottom of pond.

   Due to varying efficiencies of oxygen transfer at various depths calculate oxygen requirement for 1 ppm residual.

   Incoming water oxygen requirement:

   Assume 40 trucks per day @ 80 barrels each

   $$\frac{(40 \times 80 \times 42 \times 8.33)}{1{,}000{,}000} (150) = 168 \text{lbs}/O_2$$

   O_2 residual requirement @ pond depth 13.5 ft.

   Pond volume =20,000,000 Gal $\pm$

   $$\frac{20{,}000{,}000\ (8.3)}{1{,}000{,}000} (1) = 167 \text{ lbs}/O_2$$

   Total O_2 requirement = 168 + 167 = 335 lbs O_2/Day

   $$\text{S.O.R.} = \frac{335}{24} = 14 \text{ lbs. } O_2/\text{Hr}$$

   Assume oxygen transfer efficiency at 1% per foot of immersion depth

   Efficiency @ 3' depth = 3% @ 13.5' depth = 13.5%

   Use 0.0175 lbs oxygen per Ft^3 air

$$Q_{air} \text{ for 3' depth} = \left(\frac{14}{(0.0175 \times 0.01 \times 3)}\right) \div 60 = 444 \text{ cfm}$$

$$Q_{air} \text{ for 13.5' depth} = \left(\frac{14}{(0.0175 \times 0.01 \times 13.5)}\right) \div 60 = 99 \text{ cfm}$$

Oxygen requirements vary substantially with the depth of the pond and water temperature.

The following calculations show the amount of air that can be moved through the bubbler system as constructed.

TABLE 1

Size Orifice	CFM	Required Pressure
1/4	600	37 psi
3/16	600	97 psi
1/8	275	100 psi
1/32	17.25	100 psi

2. Pipe flow calculations - The following solutions to the pipe flow calculations were arrived at by using very general, basic empirical fluid flow formulae. These were selected because we were using two very different fluids, one liquid and noncompressible and one a gas and compressible. The basic hole through pipe formula was chosen because most orifice formulae are based on ratio of jet velocity to whole velocity. This is not the case with the formula we used; therefore, it should adapt more to discharging air in the water.

It will be noted from pressure drop calculations that the orifice is the most crucial part of the project. We have assumed a friction factor for the pipe but as can be noted the pipe has a relatively small influence on the total pressure required. Included are the following calculations: orifice, lateral and main calculations using an orifice size of 1/32-inch for air only, 3/16-inch for air and one with 3/16-inch for water.

A brief summary of other calculations can be found at the bottom of the second page of the 3/16-inch orifice calculations that show the air capacities (maximum density in 15 feet of water). The following table shows orifice cfm and required pressure.

We have also shown the amount of water that can be purged from the system under the given conditions. It is our opinion that a 3/16-inch orifice will provide the best solution for this particular application. Air compressors for aeration should be able to deliver a total of 450 cfm at approximately 100 psi.

GIVEN:

* 210 ft. sq. pond and eight 1 inch pvc pipes fed by one 2 inch pipe.
* Each 1 inch pipe has 40 drill holes in the top @ 2 in. c-c.
* Each drill hole is drilled squarely with the center of the pipe.
* Water depth varies with the seasons from 3 ft. to 15 ft.
* " temp. " " " " 40 to 70 degrees F.

ASSUME: (2 inch nominal & 2.067 ID pvc and 1 inch OD & .87 inch ID pvc)

* Input flow rate 500 to 600 cfm. 8.333333 cfs to 10 cfs.
* U = average flow velocity over the pipe section in fps.
* Air density @ 40 d F = .00247 slug/cf.
* " " " 70 d F = .002325 slug/cf.
* Water density @ 40 & 70 d F = 1.94 slug/cf.
* Kinematic Viscosity of 40 d air = .000146 ft^2/sec.
* Kinematic Viscosity of 70 d air = .000152 ft^2/sec.
* Kinematic Viscosity of 40 d water = .000016 ft^2/sec.
* Kinematic Viscosity of 40 d water = .0000102 ft^2/sec.
* P = static pressure (psia)
* Atmospheric pressure = 11.8 psia

FIND:

* Pressure drop across an orifice assuming a variety of diameters. The worst case scenerio was assumed to exist on the end of the one inch pipe furthest from the supply. The pressure drop across this orifice is the determining pressure for the entire system. (Hole through pipe formula Applied Fluid Mechanics/Robert Blevins)
* Pressure drop across an orifice while purging the water from the system and supplying a continuous amount of air.
* Pressure drop in the supply system. [Supply pressure required]

A. ASSUME 1/32 ORIFICE SIZE-FIND QUANTITY OF AIR CAN BE MIXED WITH WATER IN ONE HOUR WITH A SINGLE SOURCE PRESSURE OF 100 PSIG.

PRESSURE DROP CALCULATIONS: 0.87 =d; A= 0.004128 ; Ao=0.000766

LATERALS	Q (cfs)	(f)	V (fps)	L (ft)	density (pcf)	DELTA P
1	0.000898	0.05	0.217631	0.166666	0.00247	0.000000
2	0.001796	0.05	0.435262	0.166666	0.00247	0.000000
3	0.002695	0.05	0.652893	0.166666	0.00247	0.000000
4	0.003593	0.05	0.870524	0.166666	0.00247	0.000000
5	0.004492	0.05	1.088155	0.166666	0.00247	0.000000
6	0.005390	0.05	1.305786	0.166666	0.00247	0.000000
7	0.006289	0.05	1.523417	0.166666	0.00247	0.000000
8	0.007187	0.05	1.741048	0.166666	0.00247	0.000000
9	0.008085	0.05	1.958679	19.68	0.00247	0.000042
10	0.008984	0.05	2.176311	0.166666	0.00247	0.000000
11	0.009882	0.05	2.393942	0.166666	0.00247	0.000000
12	0.010781	0.05	2.611573	0.166666	0.00247	0.000000
13	0.011679	0.05	2.829204	0.166666	0.00247	0.000000
14	0.012578	0.05	3.046835	0.166666	0.00247	0.000000
15	0.013476	0.05	3.264466	0.166666	0.00247	0.000000
16	0.014375	0.05	3.482097	0.166666	0.00247	0.000001
17	0.015273	0.05	3.699728	0.166666	0.00247	0.000001
18	0.016171	0.05	3.917359	19.68	0.00247	0.000168
19	0.017070	0.05	4.134990	0.166666	0.00247	0.000001
20	0.017968	0.05	4.352622	0.166666	0.00247	0.000001
21	0.018867	0.05	4.570253	0.166666	0.00247	0.000001
22	0.019765	0.05	4.787884	0.166666	0.00247	0.000002
23	0.020664	0.05	5.005515	0.166666	0.00247	0.000002
24	0.021562	0.05	5.223146	0.166666	0.00247	0.000002
25	0.022460	0.05	5.440777	0.166666	0.00247	0.000002
26	0.023359	0.05	5.658408	0.166666	0.00247	0.000002
27	0.024257	0.05	5.876039	19.68	0.00247	0.000378
28	0.025156	0.05	6.093670	0.166666	0.00247	0.000003
29	0.026054	0.05	6.311301	0.166666	0.00247	0.000003
30	0.026953	0.05	6.528933	0.166666	0.00247	0.000003
31	0.027851	0.05	6.746564	0.166666	0.00247	0.000004
32	0.02875	0.05	6.964195	0.166666	0.00247	0.000004
33	0.029648	0.05	7.181826	0.166666	0.00247	0.000004
34	0.030546	0.05	7.399457	0.166666	0.00247	0.000005
35	0.031445	0.05	7.617088	0.166666	0.00247	0.000005
36	0.032343	0.05	7.834719	19.68	0.00247	0.000672
37	0.033242	0.05	8.052350	0.166666	0.00247	0.000006
38	0.034140	0.05	8.269981	0.166666	0.00247	0.000006
39	0.035039	0.05	8.487612	0.166666	0.00247	0.000006
40	0.035937	0.05	8.705244	0.166666	0.00247	0.000007
41	0.036835	0.05	8.922875	0.166666	0.00247	0.000007
42	0.037734	0.05	9.140506	0.166666	0.00247	0.000007
43	0.038632	0.05	9.358137	0.166666	0.00247	0.000008
44	0.039531	0.05	9.575768	0.166666	0.00247	0.000008
45	0.040429	0.05	9.793399	19.61333	0.00247	0.001047
	TOTAL DROP IN LATERALS			---------->		0.002426

MAIN FEEDER LINE A = 0.023302

NODE	Q (cfs)	(f)	V (fps)	L (ft)	density (pcf)	DELTA P
1	0.071875	0.05	3.084384	52.5	0.00247	0.000660
2	0.14375	0.05	6.168768	52.5	0.00247	0.002642
3	0.215625	0.05	9.253153	52.5	0.00247	0.005945
4	0.2875	0.05	12.33753	26.25	0.00247	0.005284
	TOTAL DROP IN FEEDER MAIN: ==========>					0.014533

ORIFICE: Q =0.0008984 cfs per orifice

500cfm LOCATION	DIAMETER INCH	AREA [ft^2]	AIR DENSITY @ 40 D F	H2O psi @ 7 FT.	"U" fps	Vo fps	Delta P psi
1/32	0.03125	0.0000053	0.00247	6.5	0.149752	168.6783	93.51143

TOTAL DROP:	93.53	TOTAL CFM	17.25
PSI FROM 15' WATER	6.5	ORIFICE	0.000898 cfs
REQUIRED PSIG	100.03		
ELEVATION 6000'	11.8		
REQUIRED PSIA	111.83		

A. ASSUME 3/16 ORIFICE SIZE-FIND QUANTITY OF AIR CAN BE MIXED WITH WATER IN ONE HOUR WITH A SINGLE SOURCE PRESSURE OF 100 PSIG.

PRESSURE DROP CALCULATIONS: 0.87 =d; A= 0.004128 ; Ao=0.027611

LATERALS	Q (cfs)	(f)	V (fps)	L (ft)	density (pcf)	DELTA P
1	0.03125	0.05	7.569777	0.166666	0.00247	0.000005
2	0.032148	0.05	7.787408	0.166666	0.00247	0.000005
3	0.033046	0.05	8.005039	0.166666	0.00247	0.000005
4	0.033945	0.05	8.222670	0.166666	0.00247	0.000006
5	0.034843	0.05	8.440301	0.166666	0.00247	0.000006
6	0.035742	0.05	8.657932	0.166666	0.00247	0.000006
7	0.036640	0.05	8.875564	0.166666	0.00247	0.000007
8	0.037539	0.05	9.093195	0.166666	0.00247	0.000007
9	0.038437	0.05	9.310826	19.68	0.00247	0.000949
10	0.039335	0.05	9.528457	0.166666	0.00247	0.000008
11	0.040234	0.05	9.746088	0.166666	0.00247	0.000008
12	0.041132	0.05	9.963719	0.166666	0.00247	0.000009
13	0.042031	0.05	10.18135	0.166666	0.00247	0.000009
14	0.042929	0.05	10.39898	0.166666	0.00247	0.000010
15	0.043828	0.05	10.61661	0.166666	0.00247	0.000010
16	0.044726	0.05	10.83424	0.166666	0.00247	0.000010
17	0.045625	0.05	11.05187	0.166666	0.00247	0.000011
18	0.046523	0.05	11.26950	19.68	0.00247	0.001391
19	0.047421	0.05	11.48713	0.166666	0.00247	0.000012
20	0.048320	0.05	11.70476	0.166666	0.00247	0.000012
21	0.049218	0.05	11.92239	0.166666	0.00247	0.000013
22	0.050117	0.05	12.14003	0.166666	0.00247	0.000013
23	0.051015	0.05	12.35766	0.166666	0.00247	0.000014
24	0.051914	0.05	12.57529	0.166666	0.00247	0.000014
25	0.052812	0.05	12.79292	0.166666	0.00247	0.000015
26	0.053710	0.05	13.01055	0.166666	0.00247	0.000015
27	0.054609	0.05	13.22818	19.68	0.00247	0.001917
28	0.055507	0.05	13.44581	0.166666	0.00247	0.000016
29	0.056406	0.05	13.66344	0.166666	0.00247	0.000017
30	0.057304	0.05	13.88107	0.166666	0.00247	0.000017
31	0.058203	0.05	14.09871	0.166666	0.00247	0.000018
32	0.059101	0.05	14.31634	0.166666	0.00247	0.000019
33	0.06	0.05	14.53397	0.166666	0.00247	0.000019
34	0.060898	0.05	14.75160	0.166666	0.00247	0.000020
35	0.061796	0.05	14.96923	0.166666	0.00247	0.000020
36	0.062695	0.05	15.18686	19.68	0.00247	0.002526
37	0.063593	0.05	15.40449	0.166666	0.00247	0.000022
38	0.064492	0.05	15.62212	0.166666	0.00247	0.000022
39	0.065390	0.05	15.83975	0.166666	0.00247	0.000023
40	0.066289	0.05	16.05739	0.166666	0.00247	0.000023
41	0.067187	0.05	16.27502	0.166666	0.00247	0.000024
42	0.068085	0.05	16.49265	0.166666	0.00247	0.000025
43	0.068984	0.05	16.71028	0.166666	0.00247	0.000025
44	0.069882	0.05	16.92791	0.166666	0.00247	0.000026
45	0.070781	0.05	17.14554	19.61333	0.00247	0.003209
	TOTAL DROP IN LATERALS			---------->		0.010581

MAIN FEEDER LINE A = 0.023302

NODE	Q (cfs)	(f)	V (fps)	L (ft)	density (pcf)	DELTA P
1	2.5	0.05	107.2829	52.5	0.00247	0.799228
2	2.571875	0.05	110.3673	52.5	0.00247	0.845844
3	2.64375	0.05	113.4517	52.5	0.00247	0.893781
4	2.715625	0.05	116.5360	26.25	0.00247	0.471520
	TOTAL DROP IN FEEDER MAIN: ==========>					3.010374

ORIFICE: Q = 0.03125 cfs per orifice

LOCATION	DIAMETER INCH	AREA [ft^2]	AIR DENSITY @ 40 D F	H2O psi @ 7 FT.	"U" fps	Vo fps	Delta P psia
3/16	0.1875	0.0001917	0.00247	6.5	5.208782	162.9742	87.26044

TOTAL DROP:	90.28	TOTAL CFM	600
PSI FROM 15' WATER	6.5	ORIFICE	0.03125 cfs
REQUIRED PSIG	96.78		
ELEVATION 6000'	11.8		
REQUIRED PSIA	108.58		

1/4 INCH ORIFICE WILL DELIVER 600 CFM WITH AN IN PUT OF 37psia
3/16 INCH ORIFICE WILL DELIVER 600 CFM WITH AN IN PUT OF 97psig
1/8 INCH ORIFICE WILL DELIVER 275 CFM WITH AN IN PUT OF 100 psig.
1/32 INCH ORIFICE WILL DELIVER 17.25 CFM WITH AN IN PUT OF 100 psig.

A. ASSUME 3/16 ORIFICE SIZE-FIND QUANTITY OF WATER THAT CAN BE PURGED FROM THE SYSTEM WITH 100 PSIG.

PRESSURE DROP CALCULATIONS: 0.87 =d; A= 0.004128 ; Ao=0.027611

LATERALS	Q (cfs)	(f)	V (fps)	L (ft)	density (pcf)	DELTA P
1	0.001041	0.05	0.252325	0.166666	1.94	0.000004
2	0.002083	0.05	0.504651	0.166666	1.94	0.000018
3	0.003125	0.05	0.756977	0.166666	1.94	0.000041
4	0.004166	0.05	1.009303	0.166666	1.94	0.000074
5	0.005208	0.05	1.261629	0.166666	1.94	0.000115
6	0.00625	0.05	1.513955	0.166666	1.94	0.000167
7	0.007291	0.05	1.766281	0.166666	1.94	0.000227
8	0.008333	0.05	2.018607	0.166666	1.94	0.000296
9	0.009375	0.05	2.270933	19.68	1.94	0.044377
10	0.010416	0.05	2.523259	0.166666	1.94	0.000463
11	0.011458	0.05	2.775585	0.166666	1.94	0.000561
12	0.0125	0.05	3.027910	0.166666	1.94	0.000668
13	0.013541	0.05	3.280236	0.166666	1.94	0.000784
14	0.014583	0.05	3.532562	0.166666	1.94	0.000909
15	0.015625	0.05	3.784888	0.166666	1.94	0.001043
16	0.016666	0.05	4.037214	0.166666	1.94	0.001187
17	0.017708	0.05	4.289540	0.166666	1.94	0.001340
18	0.01875	0.05	4.541866	19.68	1.94	0.177511
19	0.019791	0.05	4.794192	0.166666	1.94	0.001674
20	0.020833	0.05	5.046518	0.166666	1.94	0.001855
21	0.021875	0.05	5.298844	0.166666	1.94	0.002046
22	0.022916	0.05	5.551170	0.166666	1.94	0.002245
23	0.023958	0.05	5.803496	0.166666	1.94	0.002454
24	0.025	0.05	6.055821	0.166666	1.94	0.002672
25	0.026041	0.05	6.308147	0.166666	1.94	0.002899
26	0.027083	0.05	6.560473	0.166666	1.94	0.003136
27	0.028125	0.05	6.812799	19.68	1.94	0.399401
28	0.029166	0.05	7.065125	0.166666	1.94	0.003637
29	0.030208	0.05	7.317451	0.166666	1.94	0.003902
30	0.03125	0.05	7.569777	0.166666	1.94	0.004175
31	0.032291	0.05	7.822103	0.166666	1.94	0.004458
32	0.033333	0.05	8.074429	0.166666	1.94	0.004751
33	0.034375	0.05	8.326755	0.166666	1.94	0.005052
34	0.035416	0.05	8.579081	0.166666	1.94	0.005363
35	0.036458	0.05	8.831407	0.166666	1.94	0.005683
36	0.0375	0.05	9.083732	19.68	1.94	0.710047
37	0.038541	0.05	9.336058	0.166666	1.94	0.006351
38	0.039583	0.05	9.588384	0.166666	1.94	0.006699
39	0.040625	0.05	9.840710	0.166666	1.94	0.007057
40	0.041666	0.05	10.09303	0.166666	1.94	0.007423
41	0.042708	0.05	10.34536	0.166666	1.94	0.007799
42	0.04375	0.05	10.59768	0.166666	1.94	0.008184
43	0.044791	0.05	10.85001	0.166666	1.94	0.008579
44	0.045833	0.05	11.10234	0.166666	1.94	0.008982
45	0.046875	0.05	11.35466	19.61333	1.94	1.105691
TOTAL DROP IN LATERALS					---------->	2.562028

LENGTH 105 FT

VOLUME 0.433467 FT^3

MAIN FEEDER LINE A = 0.023302

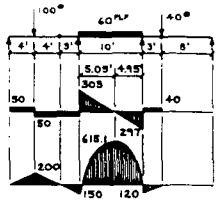
NODE	Q (cfs)	(f)	V (fps)	L (ft)	density (pcf)	DELTA P	VOLUME
1	0.083333	0.05	3.576097	52.5	1.94	0.697481	
2	0.166666	0.05	7.152195	52.5	1.94	2.789927	
3	0.25	0.05	10.72829	52.5	1.94	6.277337	
4	0.333333	0.05	14.30439	26.25	1.94	5.579855	
	TOTAL DROP IN FEEDER MAIN: ==========>					15.34460	4.281901

ORIFICE: Q =0.001041 cfs per orifice

LOCATION	DIAMETER INCH	AREA [ft^2]	AIR DENSITY @ 40 D F	H2O psi @ 7 FT.	"U" fps	Vo fps	Delta P psi
3/16	0.1875	0.000191	1.94	6.5	0.173626	5.432476	76.15171

TOTAL DROP:	94.06	TOTAL CFM	20
PSI FROM 15' WATER	6.5	ORIFICE	0.001041 cfs
REQUIRED PSIG	100.56		
ELEVATION 6000'	11.8		
REQUIRED PSIA	112.36		

TOTAL VOLUME OF PIPE = 7.75 FT^3
TIME TO PURGE @ 100 PSI= 0.39 MINUTES



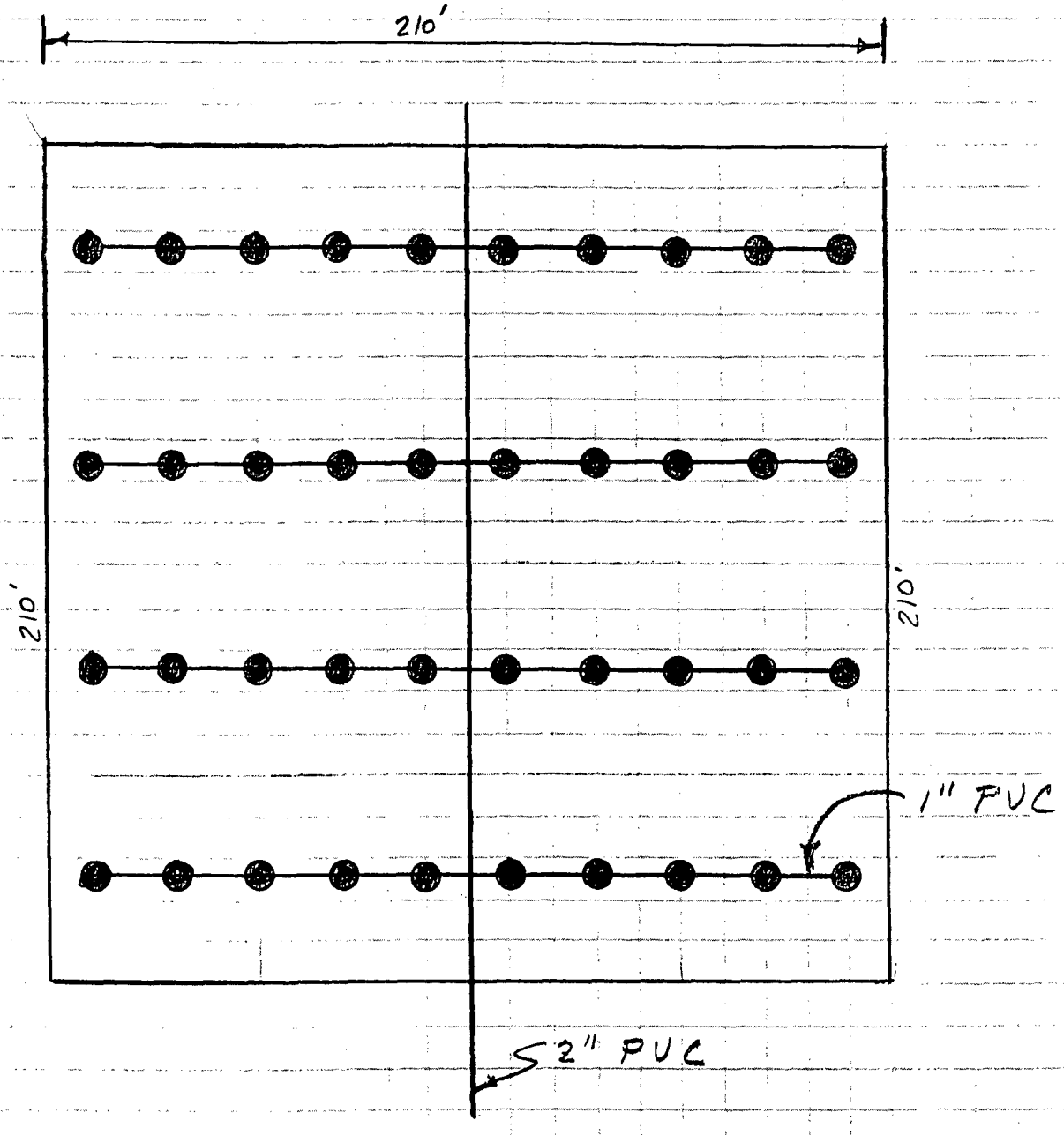
BREWER ASSOC.

NO.

DATE

SHEET ____ OF ____

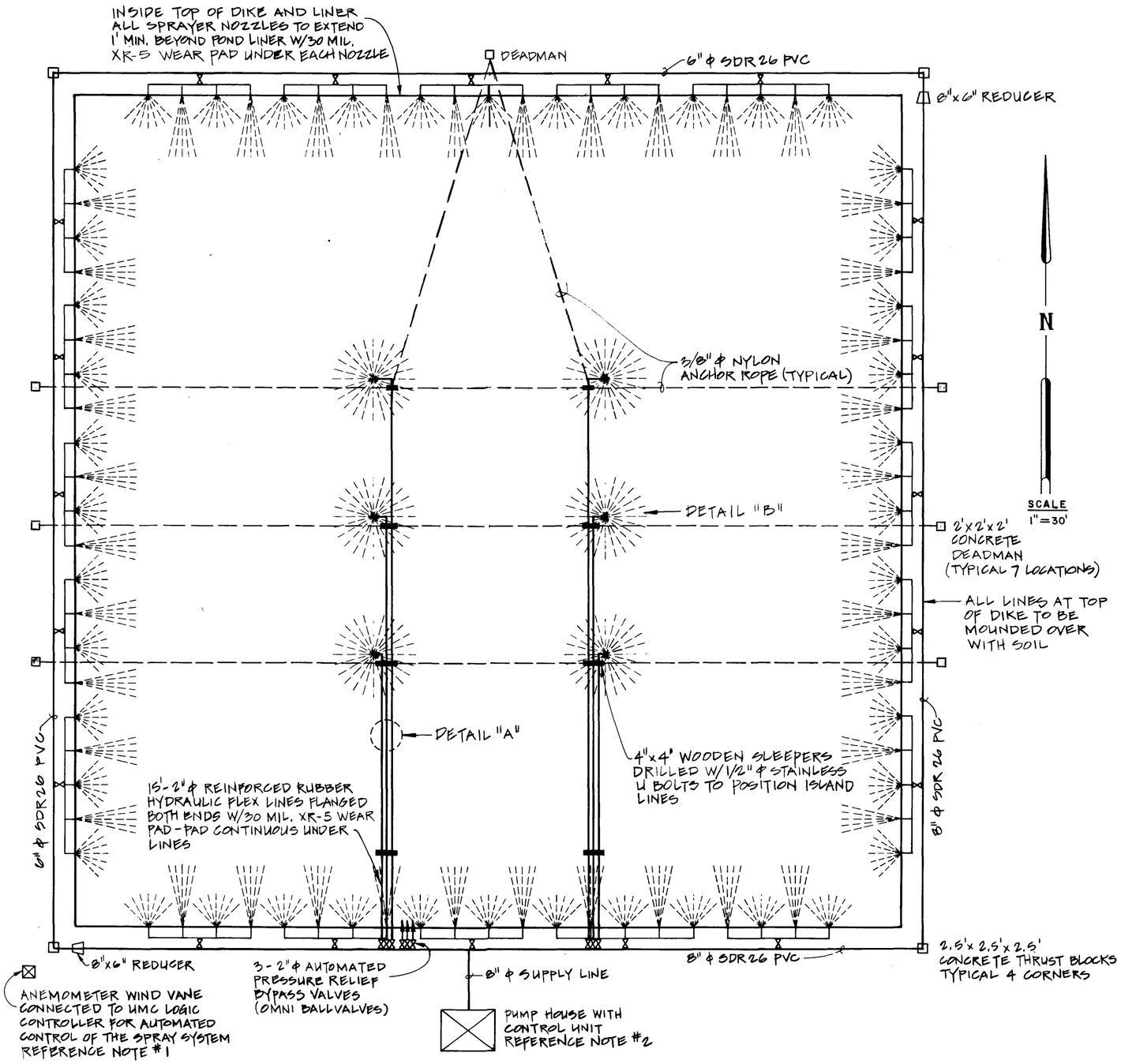
DESIGNER



POND DEPTH OF H_2O VARIES 3'-15'

● REPRESENTS 8 - 3/16" HOLES @ 2" SPACING

NEED 100 - 450 CFM HEAD NEEDS ONLY TO OVERCOME f LOSS AND DEPTH OF H_2O



LEGEND

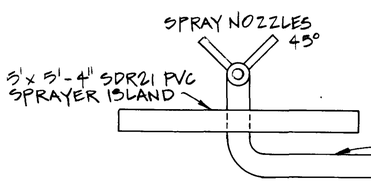
- 2" ELECTRIC OMNI BALLVALVE WITH UNIDIRECTIONAL 1/4 TURN MOTOR
- 1/2" BSJ 50-164 SPIRALJET NOZZLE
- 1" C15 WHIRLJET NOZZLE
- 3/8" BSJ 90-53 SPIRALJET NOZZLE (4 EACH)

NOTES:

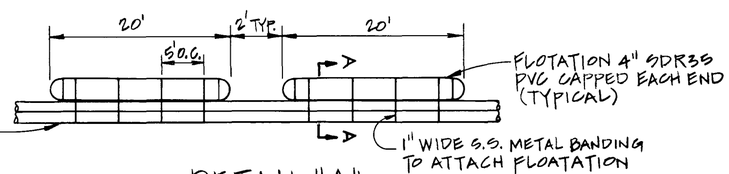
(1) UMC LOGIC CONTROLLER FOR POND AUTOMATION SHALL CONSIST OF THE FOLLOWING:
1 EA. DATA LYNX THRESHOLD WIND VANE, .2 MPH TO 100 MPH WITH ANAMOMETER AND SIGNAL CONDITIONER WITH 5 CHANNEL ANALOG OUTPUT.
1 EA. UMC MODEL 330 PROGRAMMABLE LOGIC CONTROLLER MOUNTED IN NEMA 4 WEATHER-PROOF ENCLOSURE WITH THE FOLLOWING CAPABILITIES:
ANALOG INPUT - FROM DATA LYNX TRANSMITTERS (4 CHANNELS)
RELAY OUTPUT - TO CONTROL VALVES AND PUMPS (EXPANDABLE UP TO 80 OUTPUTS)

(2) PUMP SHALL BE A 6x6 CENTRIFUGAL PUMP THAT PRODUCES 1600 GPM AT 100 PSI

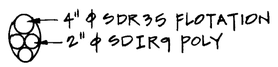
ROY O. WATERS
NEW MEXICO
7788
REGISTERED PROFESSIONAL ENGINEER
Registered Professional Engineer



DETAIL "B"
(TYPICAL 5'x5' SPRAYER ISLAND)



DETAIL "A"
(TYPICAL FLOTATION DETAIL)



SECTION A-A

REVISION #1

SECCO	P.O. BOX 235 FARMINGTON, N.M.
SUNCO TRUCKING CO. FARMINGTON, N.M.	
DISPOSAL SPRAY SYSTEM	

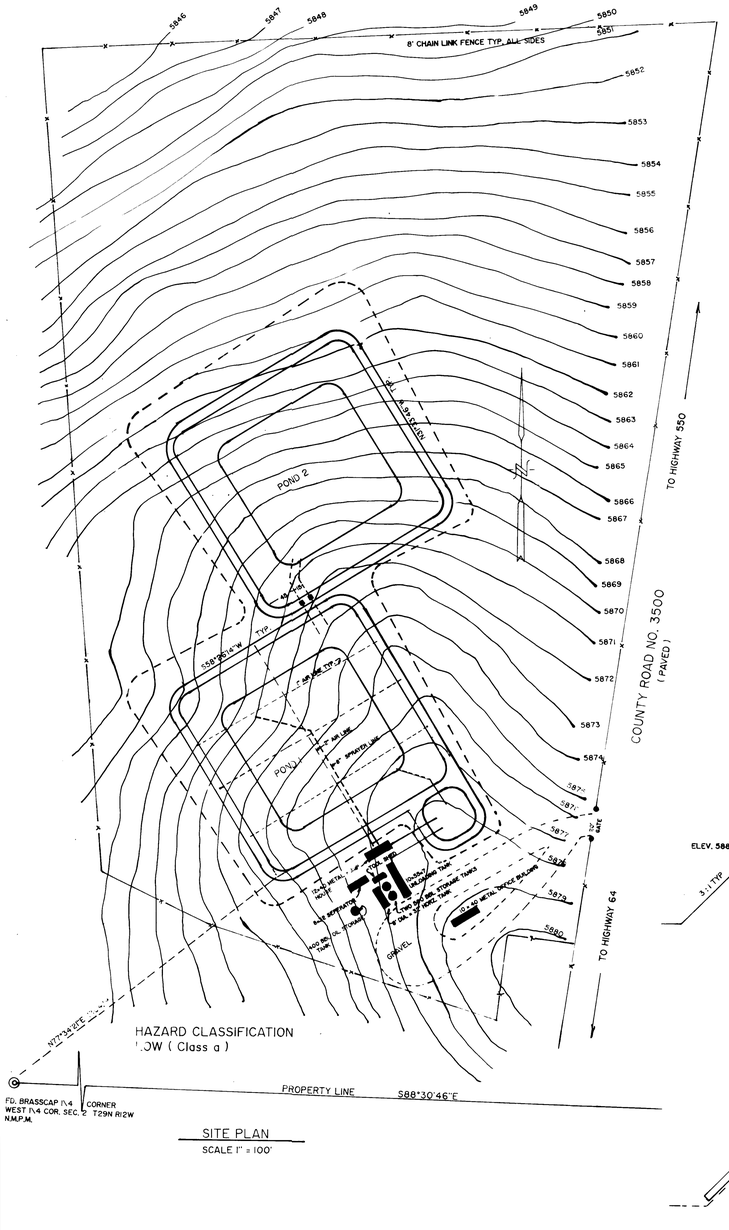
DATE	SCALE	DRAWN BY	SHEET NO.
2/15/93	AS SHOWN	G.T.	

EVAPORATION PONDS FOR SUNCO TRUCKING
ASBUILT DRAWINGS

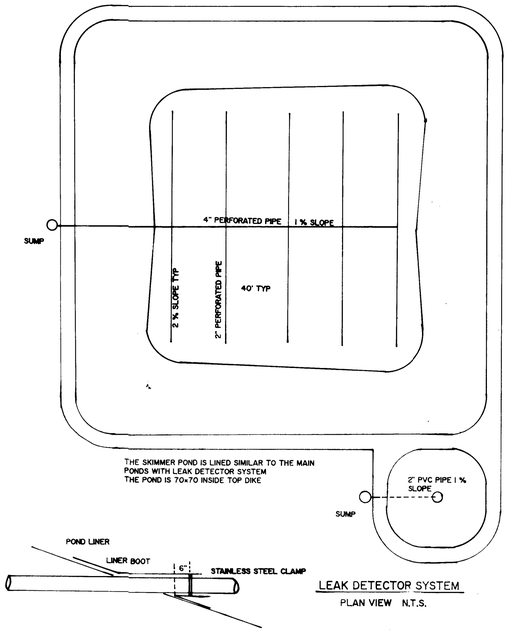
WATER LEVEL MANAGEMENT

1. Water deliveries will only be accepted at the loading facilities located at the South end of pond #1. Water will be gravity fed to the lower pond (pond #2) as the level in pond #1 reaches maximum. A ball valve located between the ponds controls the flow between the ponds. If the water level reaches maximum in both ponds, Sunco Trucking Water Disposal will cease to accept deliveries of water until evaporation (natural and or sprayer enhanced) lowers the ponds levels.

2. Permanent markers are installed at high water line.

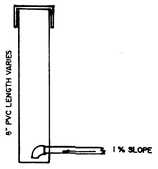


SITE PLAN
SCALE 1" = 100'

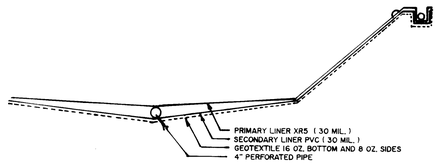


LEAK DETECTOR SYSTEM
PLAN VIEW N.T.S.

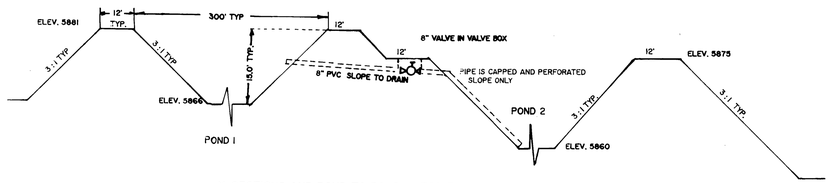
LINER PENERATION DETAIL N.T.S.
TYP. ANY PENETRATION



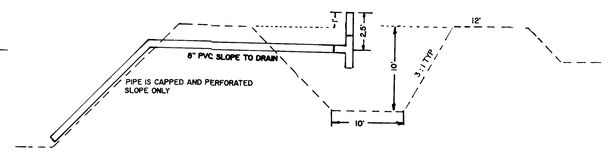
SUMP DETAIL N.T.S.



LINER DETAIL N.T.S.

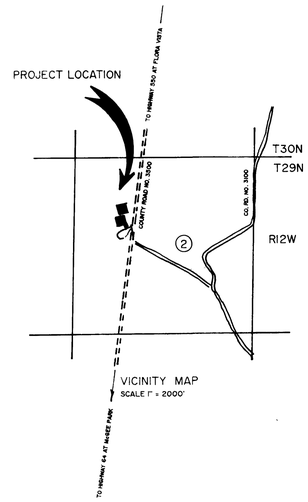


X-SECTIONS AND POND TO POND WATER TRANSFER DETAIL N.T.S.



SKIMMER POND DETAIL N.T.S.

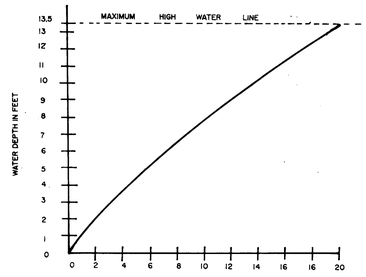
NOTE; THE LINER FOR POND 2 WILL BE INSTALLED WHEN POND 1 REACHES CAPACITY



VICINITY MAP
SCALE 1" = 2000'

SPECIFICATIONS USED FOR SITE PREPARATION AND CONSTRUCTION

1. Strip all loose surface soils, vegetation, roots and debris from the pond and embankment area to a horizontal distance of 5 feet beyond the perimeter of the new construction. Removal should extend 1 foot below the bottom of the new. Remove or 1 foot below the existing grade, whichever is deeper.
2. Clean and widen depressions, swales, etc., to form level working areas to accommodate compaction equipment and fill placement.
3. No material should be placed which is frozen or where the in place material is frozen.
4. Proofroll the exposed subgrade in the embankment and pond areas to densify materials which may have been loosened during the stripping and excavation process. The proof-rolling may be accomplished by a minimum of 2 passes of a loaded scraper or equivalent. All soft areas will be removed and replaced with compacted fill.
5. Place and compact all embankment fill in horizontal lifts to the specified density. Lift thickness should be compatible with the compaction equipment used to achieve the required uniform density. The maximum size of rock to be used for fill will be six inches.
6. All subgrade preparation, fill placement and compaction will be accomplished under observation and testing to assess compliance with the project specifications. All fill material will be at least 95% of ASTM D-698 methods and at a density as determined by ASTM D-698 methods and at a moisture content of optimum to +3 above optimum.
7. Positive drainage will be provided around the ponds during construction and maintained throughout the life of the ponds.
8. All phases of pond construction will be accomplished under the observation and testing directed by a soils engineer, to assess compliance with construction specifications.
9. The State Engineer has full authority regarding inspection during construction and full power to act if specifications are not met.
10. No burrowing animals will be allowed to dig in the embankments or under the liners. No deep rooted trees will be allowed to grow in the embankments.



POND CAPACITY (TYP.)

MAP
of the
SUNCO TRUCKING WATER DISPOSAL FACILITY

Sunco Trucking, Applicant
Located in San Juan County, State of New Mexico
Scale of Map, 1 inch = 100 feet

The undersigned, George Coleman, claimant, whose post office address is 708 S. Tucker Av. Farmington, County of San Juan, State of New Mexico has caused to be located by a qualified Registered Land Surveyor, the SUNCO TRUCKING WATER DISPOSAL FACILITY as herein described and indicated, hereby makes these several statements relative thereto and offers these maps and statements for acceptance and filing in compliance with the laws of the State of New Mexico.

The Sunco Trucking Water Disposal Facility, consisting of (2) ponds, have the following properties;

POND ONE
Maximum height above foundation, 18 feet; maximum length, 405 feet; maximum width at base, 405 feet; crest width, 12 feet; slope of upstream face, 3 horizontal to one vertical; slope of downstream face, three horizontal to one vertical; top of dam elevation, 5881 feet; bottom of pond, 5866 feet; high water line elevation, 5873.5 feet; freeboard distance, 1.5 feet. The pond has two (2) plastic liners, the primary liner is XR5, 30 mils thick, the secondary liner is PVC, 30 mils thick. The dam is constructed of well compacted native materials. The surface area of the pond at high water line is 1.94 Acres; the capacity at high water line is 19.96 acre feet.

POND TWO
Maximum height above foundation, 15 feet; maximum length, 400 feet; maximum width at base, 410 feet; crest width, 12 feet; slope of upstream face, 3 horizontal to one vertical; slope of downstream face, three horizontal to one vertical; top of dam elevation, 5875 feet; bottom of pond, 5860 feet; high water line elevation, 5873.5 feet; freeboard distance, 1.5 feet. The pond has two (2) plastic liners, the primary liner is XR5, 30 mils thick, the secondary liner is PVC, 30 mils thick. The dam is constructed of well compacted native materials. The surface area of the pond at high water line is 1.94 Acres; the capacity at high water line is 19.96 acre feet.

State of New Mexico)
)ss.
County of San Juan)

I, George Coleman, being first duly sworn, upon my oath, state that I have read and examined the accompanying maps and statements consisting of (1) sheet and know the contents tharof and representations theraon, and state that the same are true and correct to the best of my knowledge and belief.

George Coleman, Claimant

Subscribed and sworn before me this 7th day of July, 1992

Notary Public

My commission expires JANUARY 21 1996

State of New Mexico)
)ss.
County of San Juan)

I, Cecil B. Tullis, being first duly sworn upon my oath, state that I am the Registered Professional Land Surveyor who made the asbuilt map of the Sunco Trucking Water Disposal Facility and that such map was prepared form field notes of actual surveys made by me or under my direction and that the same are true and correct to the best of my knowledge and belief.

CECIL B. TULLIS NEW MEXICO 9672 REGISTERED PROFESSIONAL LAND SURVEYOR

Cecil B. Tullis

License No. 9672

Subscribed and sworn before me this ____ day of _____, 1992

Notary Public

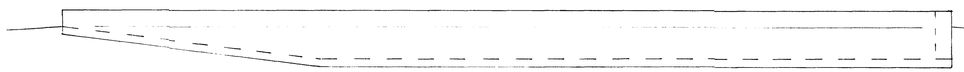
My commission expires_____

State of New Mexico)
)ss.
County of Santa Fe)

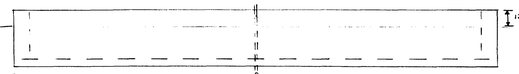
I hereby certify that the accompanying maps and statements have been examined by me and approved as to form and content, and were duly accepted for filing on the_____day of_____, 1992.

State Engineer

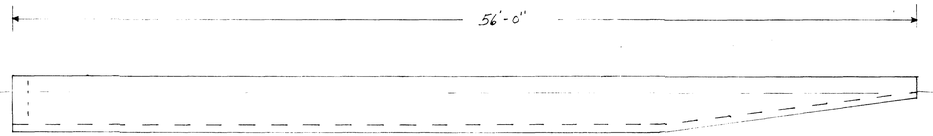
PREPARED BY HIGH COUNTRY SURVEYS FARMINGTON NEW MEXICO 505 326 - 2959



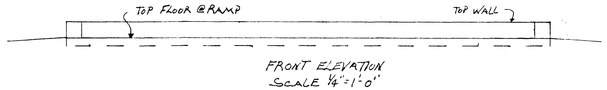
RIGHT ELEVATION
SCALE 1/4"=1'-0"



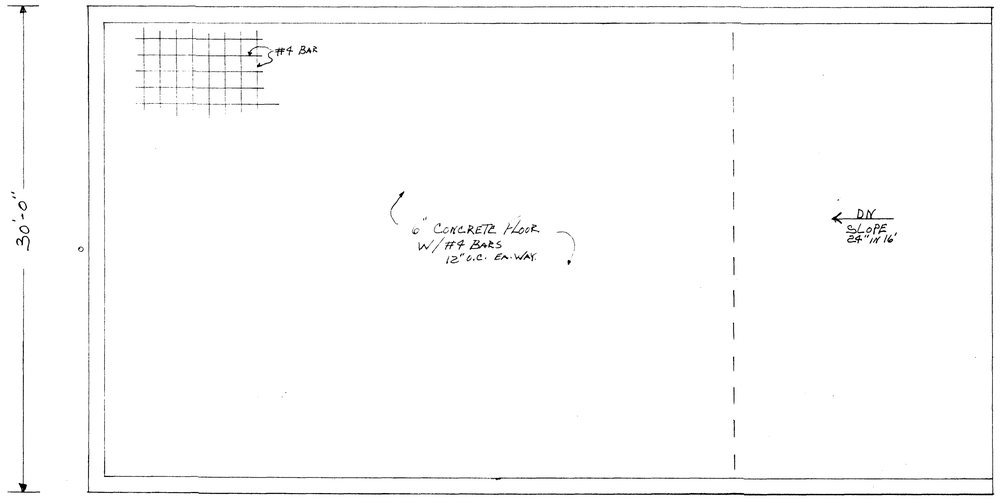
BACK ELEVATION
SCALE 1/4" = 1'-0"



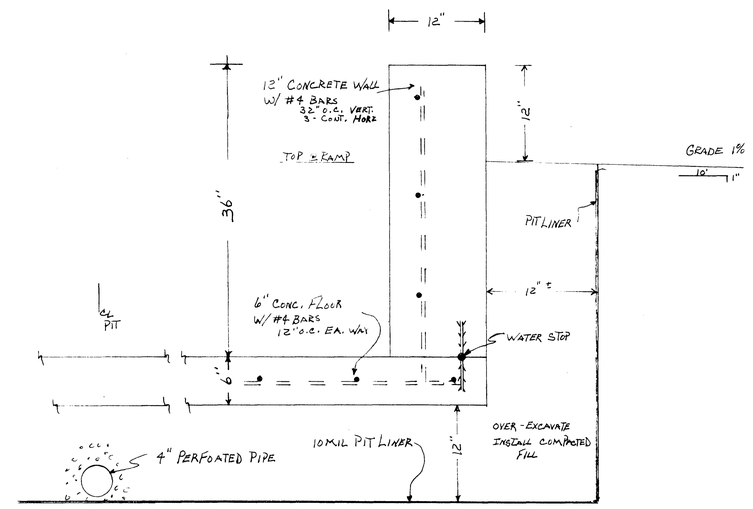
LEFT ELEVATION
SCALE 1/4"=1'-0"



FRONT ELEVATION
SCALE 1/4"=1'-0"



FLOOR PLAN
SCALE 1/4"=1'-0"



WALL SECTION
SCALE 1 1/2"=1'-0"
TYPICAL 3 SIDES

SUNCO DISPOSAL
CROUCH MESA
PROPOSED SUMP PIT

STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

BRUCE KING
GOVERNOR

ANITA LOCKWOOD
CABINET SECRETARY

April 30, 1992

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

CERTIFIED MAIL
RETURN RECEIPT NO. P-670-683-550

Mr. George E. Coleman
President
Sunco Trucking Company
P.O. Box 443
Farmington, New Mexico 87499

RE: **Replacement of Pond Liner**
Sunco Water Disposal Facility
San Juan County, New Mexico

Dear Mr. Coleman:

The Oil Conservation Division (OCD) has received your request, dated April 22, 1992, to replace the HDPE 30 mil primary liner with an upgrade XR-5 liner and also to substitute Geotextile fabric in place of sand and gravel.

Based on the information supplied in your proposal, the request for replacement of the upgrade liner and Geotextile fabric is hereby approved.

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

Sincerely,

Kathy M. Brown

Kathy M. Brown
Geologist

xc: Denny Foust, OCD Aztec Office

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

April 22, 1992

State of New Mexico
Energy, Minerals and Natural
Resources Department
Oil Conservation Commission
P. O. Box 2088
Santa Fe, NM 87504

Case 9955 (DE NOVO)
Order #R-9485-A

Gentlemen:

Sunco Water Disposal Company proposes to replace the HDPE 30 mil primary liner with an upgrade XR-5 liner. We also would substitute Geotextile fabric in place of sand and gravel.

We appreciate your consideration in this matter.

Sincerely,

George E Coleman

George E. Coleman
President

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

BRUCE KING
GOVERNOR

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

April 20, 1992

CERTIFIED MAIL
RETURN RECEIPT NO. P-670-683-582

Mr. George E. Coleman
Sunco Trucking Co.
P.O. Box 443
Farmington, New Mexico 87504

Dear Mr. Coleman:

The New Mexico Oil Conservation Division (OCD) has reviewed Sunco's April 13, 1992 request to modify the compaction procedure used during construction of Sunco's commercial produced water disposal facility which was permitted under New Mexico Oil Conservation Commission Order #R-9485-A.

The OCD approves of Sunco's request to use Fruitland Coal produced water for compaction purposes when constructing the base of the OCC permitted double-lined pond.

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

Sincerely,

William C. Olson
Hydrogeologist
Environmental Bureau

xc: Denny Foust, OCD Aztec District Office

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

April 13, 1992

State of New Mexico
Energy, Minerals and Natural
Resources Department
Oil Conservation Commission
P. O. Box 2088
Santa Fe, NM 87504

Case 9955 (DE NOVO)
Order #R-9485-A

Gentlemen:

Sunco Water Disposal Company proposes to use Fruitland Coal produced water for compaction purposes on the above referenced Disposal Pond System.

We appreciate your consideration in this matter.

Sincerely,

George E. Coleman

George E. Coleman
Chairman

cc: Aztec Office O.C.D.
1000 Rio Brazos Rd.
Aztec, NM 87410