NM1 - 8

GENERAL CORRESPONDENCE

YEAR(S):

1989-1986

THE REPRODUCTION OF

THE

FOLLOWING

DOCUMENT (S)

CANNOT BE IMPROVED

DUE TO

THE CONDITION OF

THE ORIGINAL

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
Ecological Services
Suite D, 3530 Pan American Highway, NE
Albuquerque, New Mexico 87107

November 15, 1988

Mr. William J. Lemay, Director
New Mexico Energy, Minerals and Natural Resources Department
Oil Conservation Division
State Land Office Building
310 Old Santa Fe Trail, Room 206
Santa Fe, New Mexico 87503

Dear Mr. Lemay:

This responds to your public notice received October 27, 1988 in which several proposed groundwater discharge plans were described. We have reviewed the plans and have not identified any resource issues of concern to our agency in the following:

GW-8, El Paso Natural Gas Company, Monument Gas Plant, Lea County, NM.
GW-9, Phillips 66 Natural Gas Company, Eunice EP Gas Plant, Lea County, NM.
GW-10, El Paso Natural Gas Company, Jal No. 3 Gas Plant, Lea County, NM.
GW-46, El Paso Natural Gas Company, Eunice Main Line Engine Room, Lea County, NM.
TNT Construction Inc., Rio Arriba County, NM.

Discharge plan GW-49 is for El Paso Natural Gas Company's Blanco Plant located approximately 1 1/2 miles northeast of Bloomfield, New Mexico. El Paso Natural Gas Company proposes to close its unlined process ponds and discharge approximately 119,900 gallons per day of process and cooling tower wastewater to the Bloomfield Municipal Wastewater Treatment Plant.

The Bloomfield Municipal Wastewater Treatment Plant discharges its treated effluent to the San Juan River. The San Juan River from the Hammond Diversion upstream of Bloomfield to Farmington may provide habitat for the federally endangered Colorado squawfish. Surveys conducted downstream of Farmington have documented the presence of both adult and juvenile squawfish in the San Juan River. The section of the San Juan River from Bloomfield to Farmington has a high likelihood of the presence of squawfish as well as other fish and aquatic organisms of importance to the rivers ecological balance.

The Bloomfield Wastewater Treatment Plant has received NPDES re-authorization (permit number NM0020770), to discharge to the San Juan River in Segment No. 2-401. The Fish and Wildlife Service would object to the addition of any new pollutants into the treatment works from an indirect discharger, such as the El Paso Natural Gas Company's Blanco Plant, that would cause an increase in biochemical oxygen demand, an increase in total dissolved solids, or a pass-through of toxic or hazardous materials. The effluent limitations of NPDES permit number NM 0020770 must not be exceeded as a result of the addition of the process and cooling tower wastewater.

These comments represent the views of the Fish and Wildlife Service only. If you have any questions, please contact Tom O'Brien at [illegible] 7877.

Sincerely yours,

[signature]

Jack O. Peterson
Field Supervisor

cc:
Director, New Mexico Department of Game and Fish, Santa Fe, New Mexico
Regional Administrator, Environmental Protection Agency, Dallas, Texas
Director, Environmental Improvement Division, New Mexico Health and Environmental Department, Santa Fe, New Mexico
Regional Director, U.S. Fish and Wildlife Service, Fish and Wildlife Enhancement, Albuquerque, New Mexico

NOTICE OF PUBLICATION
STATE OF NEW MEXICO
ENERGY, MINERALS AND
NATURAL RESOURCES DEPT.
OIL CONSERVATION DIV

Notice is hereby given that pursuant to the New Mexico Oil Conservation Division Rules and Regulations, the following application to modify a commercial evaporation facility has been submitted for approval to the Director of the Oil Conservation Division, State Land Office Building, 310 Old Santa Fe Trail, Room 206, Santa Fe, New Mexico 87503, Telephone (505) 827-5800:

T-N-T Construction, Inc., Tony Schmitz, President, Star Route, Lindrith, New Mexico, 87029, has submitted for approval an application to enlarge the previously approved commercial evaporation facility located in the SE/4, Section 7, Township 25 North, Range 3 West (NMPM), Rio Arriba County, New Mexico. The application proposes to add a second native clay lined evaporation pond to the facility for use as an overflow for excess water from the existing approved evaporation pond. The permit application addresses the construction, operations, spill/leak prevention and monitoring procedures to be utilized at the site. The ground water most likely to be affected by any accidential discharges is at a depth of approximately 150 feet, with a total dissolved solids concentration of approximately 1300 mg/l.

Any interested person may obtain further information from the Oil Conservation Division and may submit written comments to the Director of the Oil Conservation Division at the address given above. Prior to ruling on any proposed permit or its modification, the Director the Oil Conservation Division will allow at least thirty (30) days after the date of publication of this notice during which comments may be submitted to him.

GIVEN under the Seal of New Mexico Oil Conservation Commission at Santa Fe, New Mexico, on this 21st day of October. To be published on or before November 4, 1988.

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION
s/WILLIAM J. LEMAY, Director
Journal, October 30, 1988

RECEIVED
NOV - 1 1988
OIL CONSERVATION DIV.

STATE OF NEW MEXICO } ss
County of Bernalillo }

THOMAS J. SMITHSON

..... being duly sworn declares and says that he is **NAT'L ADV. MGR.** of the **Albuquerque Journal**, and that this newspaper is duly qualified to publish legal notices or advertisements within the meaning of Section 3, Chapter 167, Session Laws of 1937, and that payment therefore has been made or assessed as court costs; that the notice, a copy of which is hereto attached, was published in said paper in the regular daily edition,

for ...1... times, the first publication being on the ...30... day of ...Oct..., 1988..., and the subsequent consecutive publications on ..., 198.....

Thomas J. Smithson

OFFICIAL SEAL
Signature: Angela M. Archibeque
ANGELA M. ARCHIBEQUE
NOTARY PUBLIC - NEW MEXICO
My Commission Expires: 6/30/92

Sworn and subscribed to before me, a Notary Public in and for the County of Bernalillo and State of New Mexico, this ...31... day of ...October..., 198.8

PRICE ...17.33...

Statement to come at end of month.

ACCOUNT NUMBER ...C80932...

EDJ-15 (R-2/86)

RECEIVED
NOV - 7 1988
OIL CONSERVATION DIVISION
SANTA FE

November 4, 1988

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

RE: Application for Enlargement of a Commercial Surface Disposal Facility, SE/4, Sec. 7, T25N-R3W, Rio Arriba County, New Mexico

Dear Jami Bailey:

T-n-T Construction, Inc. agrees to the following requirements in order to obtain final approval for the construction and use of a second pond.

1. A copy of the State Engineer Office approval for the engineering design and construction is attached.

2. Compacted clay liners shall be a minimum of three feet thick uniformly distributed throughout the bottom and sides of the pit, with an extra two feet of clay liner at the toe of sidewall slopes and under aerators, if used.

3. Lift thickness during construction of the pond berms and clay liners will be compatible with size of sheep's foot roller used to achieve the required uniform densities.

4. Post construction maintenance of the pond's embankments will include regular inspections and repair.

5. The OCD shall be notified immediately if fluid is discovered in any of the monitor wells surrounding the proposed pond.

6. The slotted liners in the monitor wells will be slotted with a skill saw--the slots will be 1/8 inch in width by 3 inch in length, every 6 inches in alternating placement, perpendicular with the length of the liner. The slots will be one foot above the sandstone lens of blue shale extending down hole to the bottom of the said formation.

7. H S readings shall be made daily on each side of the pond and the records of the readings shall be retained by T-n-T. A copy of the H S readings will be submitted to the OCD upon request.

8. Upon reclamation of the surface, work will begin as soon as the pond is dry enough to permit heavy equipment to backfill the excavated areas.

T-n-T Construction, Inc.
Tony L. Schmitz, President
Star Route
Lindrith, New Mexico 87029
505-774-6663

Sincerely,

Tony L. Schmitz, President

cc. Oil Conservation Division - Aztec

STATE OF NEW MEXICO

STATE ENGINEER OFFICE

SANTA FE

S. E. REYNOLDS
STATE ENGINEER

BATAAN MEMORIAL BUILDING
STATE CAPITOL
SANTA FE, NEW MEXICO 87503

October 31, 1988

File No. 4320

Tony L. Schmitz
T.N.T. Construction
Star Route
Lindrith, NM 87029

Dear Mr. Schmitz:

Enclosed please find your copy of the Application for Permit to Construct a Evaporation Pond Dam which has been approved.

Please note the conditions of approval which are on the reverse side of the permit.

Sincerely,

S.E. Reynolds
State Engineer

by: D.N. Stone
D.N. Stone, Chief
Water Rights Division

DNS:egr

Enclosure

IMPORTANT - READ INSTRUCTIONS ON BACK BEFORE FILLING OUT THIS FORM

APPLICATION FOR PERMIT TO CONSTRUCT A EVAPORATION POND DAM

File No. 4320 Date of receipt October 24, 1988

1. Name of applicant Tony L. Schmitz T.N.T. CONSTRUCTION
   Address Star Route
   City and State Lindrith, New Mexico Zip code 87029

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

3. Dam is to be located on: (a) Name of stream or watercourse N/A

   (b) Which is a tributary of N/A

4. Location of the intake structure of the principal spillway conduit from detention storage: N/A
   County. (a) Rio Arriba ¼ NE¼-SE¼ & ¼ SE¼-NE¼ ¼ of Section 7,
   Township 25 N, Range 3 W, N.M.P.M. or (b) within feet of
   X = feet, Y = feet, N.M.C.S., zone, within
   Grant.

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

6. Properties of detention dam: (a) maximum height above foundation at downstream toe 16 feet; (b) length of crest 1280 feet; (c) width of crest 12 feet; (d) maximum width at base 133 feet; (e) slope of upstream face 3:1; (f) slope of downstream face 3:1; (g) elevation at crest of dam 7158 feet; (h) elevation of emergency spillway crest N/A feet; (i) elevation of flow line of the intake structure of the principal spillway conduit N/A feet; (j) characteristics of emergency spillway, (1) location N/A
   (2) width N/A feet, (3) maximum capacity N/A cubic feet per second, (4) freeboard above maximum high water line 3 feet, (5) cross-sectional area at maximum flow N/A square feet; (k) characteristics of principal spillway conduit, (1) size, type and numer of gates N/A
   (2) dimension N/A feet, (3) length N/A feet, (4) slope N/A
   (5) Manning coefficient N/A, (6) maximum discharge capacity N/A cubic feet per second, time to empty the detention reservoir N/A hours, (96 hours maximum unless prior approval has been obtained); (l) construction material, etc.
   CLAY
   (m) approximate volume of material in dam 13,258 cubic yards, (n) type of construction
   CLAY LINED EARTH FILL DAM

7.

Height Above Flow Line of Intake Structure	Area of Water Surface, Acres	Storage Capacity; Acre Feet	Remarks and Critical Points
0			Flow line of intake structure
N/A	2.1 AC	17.6 AC	N/A

8. Additional data or explanations

9. Estimated costs: Detention dam and appurtenances . . . $20,000.00
   Other constructed works . . . . . $
   Total cost $20,000.00

10. Estimated date to begin construction as soon as application is approved
    Estimated date to complete construction 20 days thereafter

11. Dam will be constructed under supervision of Tony L. Schmitz

12. Signature of Applicant x Tony Lee Schmitz

ACTION OF STATE ENGINEER

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

1. The qualifications of a professional engineer registered in New Mexico who will supervise construction must be approved by the State Engineer prior to undertaking construction.

2. Construction shall be in accordance with approved plans and specifications. Any modification of the approved plans and specifications or design changes must be approved in writing by the State Engineer prior to undertaking such modifications.

3. Upon completion of the construction, the professional engineer supervising construction shall submit to the State Engineer:

a. a completion report which shall include description of problems encountered and their solution; summary of materials test data and construction photographs;

b. as-built drawings;

c. a certificate that the dam as constructed is safe for the intended use.

Witness my hand and seal this 31st day of October, A.D., 19 88

S.E. Reynolds, State Engineer

By D.N. Stone

D.N. Stone, Chief
Water Rights Division

Instructions

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

Notice is hereby given that pursuant to the New Mexico Oil Conservation Division Rules and Regulations, the following application to modify a commercial evaporation facility has been submitted for approval to the Director of the Oil Conservation Division, State Land Office Building, 310 Old Santa Fe Trail, Room 206, Santa Fe, New Mexico, 87503, Telephone (505) 827-5800:

T-N-T Construction, Inc., Tony Schmitz, President, Star Route, Lindrith, New Mexico, 87029, has submitted for approval an application to enlarge the previously approved commercial evaporation facility located in the SE/4, Section 7, Township 25 North, Range 3 West (NMPM), Rio Arriba County, New Mexico. The application proposes to add a second native clay lined evaporation pond to the facility for use as an overflow for excess water from the existing approved evaporation pond. The permit application addresses the construction, operations, spill/leak prevention and monitoring procedures to be utilized at the site. The ground water most likely to be affected by any accidental discharges is at a depth of approximately 150 feet, with a total dissolved solids concentration of approximately 1300 mg/1.

Any interested person may obtain further information from the Oil Conservation Division and may submit written comments to the Director of the Oil Conservation Division at the address given above. Prior to ruling on any proposed permit or its modification, the Director the Oil Conservation Division will allow at least thirty (30) days after the date of publication of this notice during which comments may be submitted to him.

GIVEN under the Seal of New Mexico Oil Conservation Commission at Santa Fe, New Mexico, on this 21st day of October. To be published on or before November 4, 1988.

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION
WILLIAM J. LEMAY,
Director

(SEAL)
(Published October 27, 1988).

Affidavit of Publication

STATE OF NEW MEXICO
County of Rio Arriba } ss.

I, Robert Trapp, being first duly sworn, declare and say that I am the Publisher of the Rio Grande Sun, a weekly newspaper, published in the English language, and having a general circulation in the City of Espanola and County of Rio Arriba, State of New Mexico, and being a newspaper duly qualified to publish legal notices and advertisements under the provisions of Chapter 167 of the Session Laws of 1937; that the publication, a copy of which is hereto attached,

was published in said paper once each week for 1 consecutive weeks, and on the same day of each week in the regular issue of the paper during the time of publication, and that the notice was published in the newspaper proper, and

not in any supplement, the first publication being on the 27th day of October 19 88. and the last publication on the 27th day of October 19 88.; that payment for said advertisement has been (duly made), or (assessed as court costs); that the undersigned has personal knowledge of the matters and things set forth in this affidavit.

Robert Trapp
Publisher

Subscribed and sworn to before me this 27th day of October, A.D., 19 88.

Notary Public

My Commission expires
5-17-89

BILL
time at $22.95
times $.....
ub-Total $22.95
Tax $1.32
Total $24.27

.....

E SUN

.....

CA - Classified Advertising — DA - Display Advertising — SS - Stand Sales

18% per year, will be charged on unpaid balance after 30 days

NOTICE OF PUBLICATION

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

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GIVEN under the Seal of New Mexico Oil Conservation Commission at Santa Fe, New Mexico, on this 21st day of October. To be published on or before November 4, 1988.

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

WILLIAM J. LEMAY, Director

S E A L

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

MEMORANDUM OF MEETING OR CONVERSATION

☒ Telephone ☐ Personal | Time 9AM | Date 10/5/88

Originating Party	Other Parties
David Boyer	Mrs. Tony Schmitz 734-6863

Subject: Monitor well water Quality - TNT Construction

Discussion: State Lab Results - reported by phone this date - For 9/12/88 Testing were MW #2 TDS 11,332; SO4 128; Cl 5,500; MW #6 TDS 2802, SO4 1160 Cl 385; Pond TDS ~~H35~~ 26,714, SO4 960, Cl 9500. Called Mrs Schmitz to discuss results. She said water levels in MW 2 dropped along with level in mud pit.

Conclusions or Agreements: Told TNT that they could resume accepting water provided mud skimmer pit not used. Should be dry within next week; they will use steel pit and tanks. New application will take time to review; not to be completed in time to start Fall construction.

Distribution: TNT file
J. Bailey

Signed: D Boyer

STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

GARREY CARRUTHERS
GOVERNOR

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

October 24, 1988

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. Tony Schmitz
T-N-T Construction, Inc.
Star Route
Lindrith, NM 87029

RE: Application for Enlargement of a Commercial Surface Disposal Facility, SE/4, 7-25N-3W, Rio Arriba County, New Mexico.

Dear Mr. Schmitz:

The Oil Conservation Division (OCD) has reviewed your September 15, 1988 application for a second pond at the currently existing commercial surface evaporation/disposal facility located in the NW/4 SW/4 Section 8, Township 25 North, Range 3 West. The following requirements must be agreed to by T-N-T before final approval for the construction and use of the second pond can be permitted. (Page numbers refer to T-N-T's September 15th submittal.)

1. A copy of the State Engineer Office approval for the engineering design and construction requirements must be supplied to the OCD.

2. (Page 3, No. 5) As stated on page 8 of the OCD "Guidelines for Permit Application, Design and Construction of Waste Storage/Disposal Pits," revised 8/88 (enclosed), compacted clay liners shall be a minimum of three feet thick uniformly distributed throughout the bottom and sides of the pit, with an extra two feet of clay liner at the toe of sidewall slopes and under aerators, if used.

3. (Page 3, No. 6) Lift thickness during construction of the pond berms and clay liners will be compatible with size of sheep's foot roller used to achieve the required uniform densities.

4. (Page 4, No. 15) Post construction maintenance of the pond's embankments must include regular inspections and repairs.

5. (Page 5, D.1) The OCD must be notified immediately if fluid is discovered in any of the monitor wells surrounding the proposed pond.

6. (Figure 4) Please describe the type, placement and concentration of slots in the slotted liners to be used in the monitor wells.

7. (Page 7, No. 4) H_2S readings shall be made daily on each side of the pond, but records of the readings shall be retained by T-N-T. The OCD does not require submittal of these records on a regular schedule.

8. (Page 8, F) Prior to reclamation of the surface, the ponds need only be dry enough to permit use of heavy equipment to backfill the excavated areas.

Submittal of the information requested in No. 1 and No. 6 above and written commitment by you agreeing to the other requirements, will fulfill the OCD's requirements for permitting of the proposed pond. Public notice has been issued and will be published on or before November 4, 1988. If there are no significant objections, the OCD expects to issue you a permit. If you have any questions, please contact me at 827-5884.

Sincerely,

Jami Bailey

Jami Bailey
Geologist

JB/ag

Enclosure

cc: Oil Conservation Division - Aztec

1988 File Copy

APPLICATION FOR ENLARGEMENT OF A COMMERCIAL SURFACE DISPOSAL FACILITY

SE1/4, Sec.7, T.25N., R.3W.

Rio Arriba County, New Mexico

T-N-T Construction, Inc.

Star Route

Lindrith, NM 87029

SEP 26 1988
OIL CONSERVATION DIVISION

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

September 15, 1988

RE: APPLICATION FOR ENLARGEMENT OF A COMMERCIAL SURFACE DISPOSAL FACILITY, SE/4, SEC. 7, T.25N. R.3W., RIO ARRIBA COUNTY, NEW MEXICO.

Dear Mr. Boyer:

The attached information and permit application are submitted for your review and approval. The information addresses the material required in the New Mexico Oil Conservation Division (OCD) "Guidelines for Permit Application, Design, and Construction of Waste Storage/Disposal Pits" (revised 2/88) and Rule 711 of the Division's Rules and Regulations promulgated June 2, 1988.

The data presented is in response to your letter addressed to me on June 20, 1988. Approval of the previous application for enlargement of our facility was contingent upon submittal for review of information requested in item 2 of said letter. The attached addresses those concerns as well as other recent New Mexico Oil Conservation Division Rules and Regualations.

Please take note that T-N-T proposes to construct one pond rather that two ponds as previously submitted.

If you have further questions reguarding the application, please call, as we would like to commence construction of the proposed pond as soon as possible.

Sincerely,

Tony Schmitz

Tony Schmitz
T-N-T Construction, Inc.
Star Route
Lindrith, NM 87029
(505) 774-6663

Attachments

Copies: OCD District Office-Aztec
New Mexico State Engineer

TABLE OF CONTENTS

New Mexico Oil Conservation Division
P. O. Box 2088
Santa Fe, New Mexico 87501

APPLICATION FOR ENLARGEMENT OF A COMMERCIAL SURFACE DISPOSAL FACILITY, SE/4, SEC. 7, T.25N. R.3W., RIO ARRIBA COUNTY, NEW MEXICO.

The following information and permit application are submitted for your review and approval. The information addresses the material required in the New Mexico Oil Conservation Division (OCD) "Guidelines for Permit Application, Design, and Construction of Waste Storage/Disposal Pits" (revised 2/88) and Rule 711 of the Division's Rules and Regulations promulgated June 2, 1988.

I. General Information.

A. Name and Owner of Legally Responsible Party:

T-N-T Construction, Inc. (a New Mexico Corporation)
Tony Leland Schmitz, President,
Star Route
Lindrith, New Mexico 87029
(505) 774-6663.

B. Name of Local Representative:

The name of the local representative or contact person for T-N-T Construction, Inc. is Tony Lee Schmitz at the above address and phone number.

C. Location:

The proposed evaporation pond is located in: NE/4, SE/4, Sec. 7, T.25N., R.3W. see Figure 1. The pit location is on surveyed lands on the Schmitz Ranch Quadrangle, Rio Arriba Co., New Mexico, a USGS 7.5 Minute Series (Topographic Sheet). The proposed pit will be directly west-northwest (about 200' W-NW) of the existing evaporation pit in the SW/4, Sec. 8, T.25N., R.3W., see also Figure 2.

Proposed Pit Size: 350' in a E-W direction and 400' in a N-S direction or 140,000 square feet of surface area, toe to toe.

D. Type of Operation:

The proposed evaporation pit will be used as an overflow for excess produced water from the existing approved evaporation pit in Section 8. Produced water will be siphoned (drained) from the pit in Section 8 into the proposed evaporation pit in Section 7. The siphoning/gravity feed procedure will be controlled through PVC pipe and valves installed in such a manner as to prevent any surface fluids (oil should it ever exist) from entering the Section 7 pit from the existing Section 8 pit. A schematic diagram of the proposed siphon/gravity feed system is

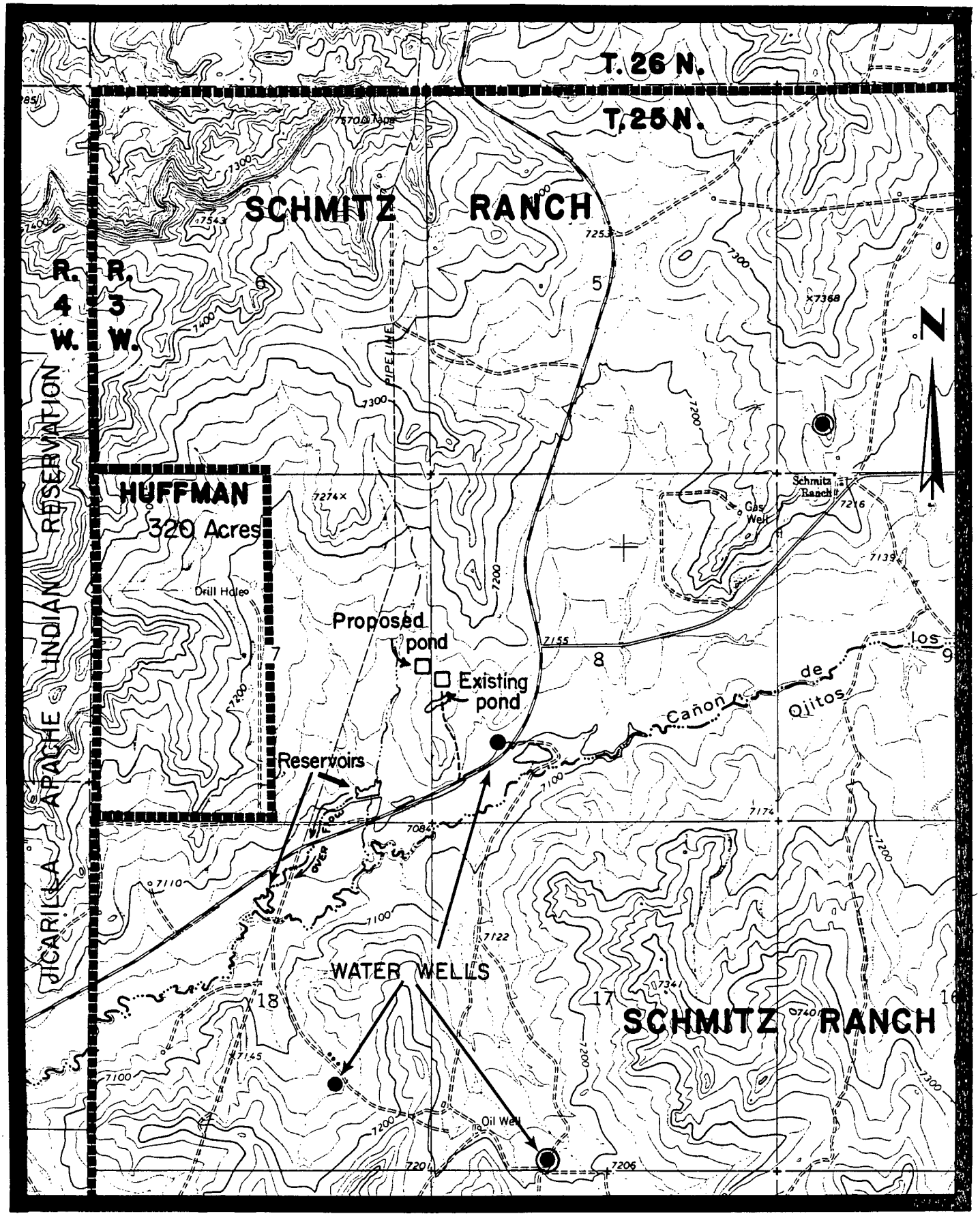

Figure 1. Index map showing proposed and existing ponds, water wells, major drainages, surface owners and topography.

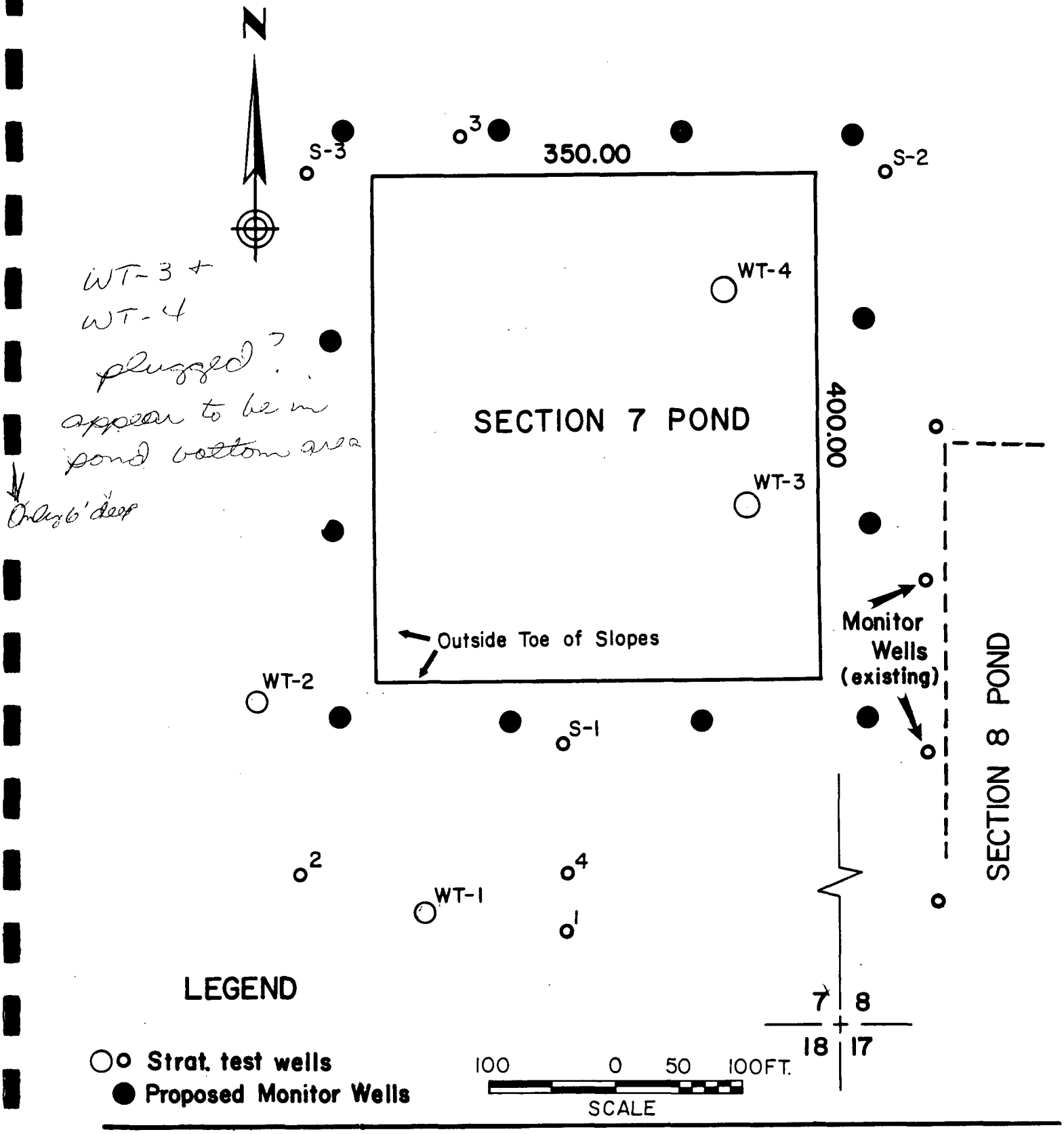

Figure 2. Pond and proposed monitor well locations.

illustrated later on in this application.

E. Landowners of Record within 1/2 mile of the Site: Only one landowner of record falls within 1/2 mile of the proposed site in Section 7, see Figure 1. A copy of proof of such notice, as addressed to John C. Huffman describing the proposed operation by T-N-T in Section 7, can be found in the Appendix of this application.

F. Copies:

Two copies of this application will be provided to the OCD office in Santa Fe and one copy to the District OCD office in Aztec. One additional copy will be provided the New Mexico State Engineer's office in Santa Fe for their review.

G. Affirmation:

Certification by an authorized representative of T-N-T Construction, Inc. that information submitted in this application is true, accurate and complete to the best of the applicant's knowledge; and such information is in compliance with OCD Rules and Regulations. An affirmation and signature is shown at the end of this document.

II. Proposed Operations

A. Storage/Disposal Facilities Description:

The proposed evaporative pit will be used as an overflow for disposed/produced water having already entered the main evaporative pond in Section 8, directly to the east-southeast. The waste/water from the Section 8 pit will be drained into the Section 7 pit via pipes utilizing a siphon mechanism, described later. The location of the site is shown in Figure 2 and on Plate I a, b & c (surface map and pond construction layouts in back pockets). No materials or effluents other than produced water will be discharged into the Section 7 pit. All disposed water will originate from the Section 8 evaporative pond.

B. Technical Construction Information:

The proposed clay lined evaporative pond (Section 7, T.25N., R.3W.) will consist of one pit (not two as originally planned) 400' X 350' with a surface area of about 2 acres, Plate I. The storage capacity of the proposed pit is estimated at 18-20 acre feet. The pit will be constructed partially in cut and fill. The dikes will be built of tightly compacted shale/clay which exhibit a permeability coefficient of 3.8×10^{8} centimeters/second or about .04 feet per year (Western Technologies, Inc. report dated 5-2-88). OCD 'Guidelines' call for the clays to have a maximum permeability of 1×10^{7} .

The widths of the dikes/levees will be approximately twelve (12) feet with at least a 3:1 (horizontal to vertical) slope on the inside and the outside slopes. The freeboard for the dikes will be three (3) feet and the maximum depth of the water is estimated at ten (10) feet.

2' clay liner ?

6" rocks ?

(the thickness determined by
Compaction by
Trepi's foot roller

Levees will rise at least three (3) feet above ground level and will be level, see Figures 2 and 3, or slope to the S.W.

The proposed disposal pit is not located along any water course, lake bed, sink-hole, or other geological depression. The evaporation pits are designed and constructed to provided the minimum evaporation surface needed for the maximum yearly volume of anticipated liquid discharge into the pit. Since the volume of disposed water can be and will be controlled, the amount of discharge into the proposed pit will be governed by climatic-seasonal changes or the use of aerators-sprayers used during the year at the Section 8 pit.

The following procedure for a site preparation and earth work for the embankment and basin portions of the proposed clay lined pit as requested in the 'Guidelines' V.(A), V.(B), V.(D) V.(F) V.(G) and V.(H) are as follows:

1. Strip all loose surface soils, vegetation, roots and debris from the pond and embankment areas to a horizontal distance of five (5) feet beyond the perimeter of the new construction. Removal should extend one foot below the existing grade or one foot below the bottom of the embankment, whichever is deeper. The soil may be stock piled and used to revegetate areas where clay is stripped for use in the construction of the embankments.

2. Clean and widen depressions, washes, swales, etc., to form level working areas to accommodate compaction equipment and fill placement. Removal should extend 3 feet below the existing grade or until all loose soil is removed from the washes.

3. No material will be placed which is frozen or where the in-place material is frozen.

4. Proof-roll the exposed subgrade in the embankment and pond areas to densify materials which may have been loosened during the stripping and excavation process. Proof-rolling may be accomplished by a minimum of two (2) passes of a loaded scraper or equivalent. All soft areas or deep soil horizons will be removed and replaced with compacted fill.

5. Compacted clay liners shall be a minimum of two (2) feet thick uniformly throughout the bottom and sides of the pit, with an extra two (2) feet of clay liner at the toes of sidewall slopes and under aerators.

6. Place and compact all embankment fill in horizontal lifts to the finished grade levels. Lift thicknesses will be compatible with compaction equipment used to achieve the required uniform densities. Lift thicknesses will be in intervals of nine (9) inches or less. The maximum size of rock used for fill will be six inches.

7. All fill material should be compacted to at least 95% of the maximum dry density of the clays utilized (ASTM D-698). Fill which is below 10 feet will be compacted to 95-100% of its

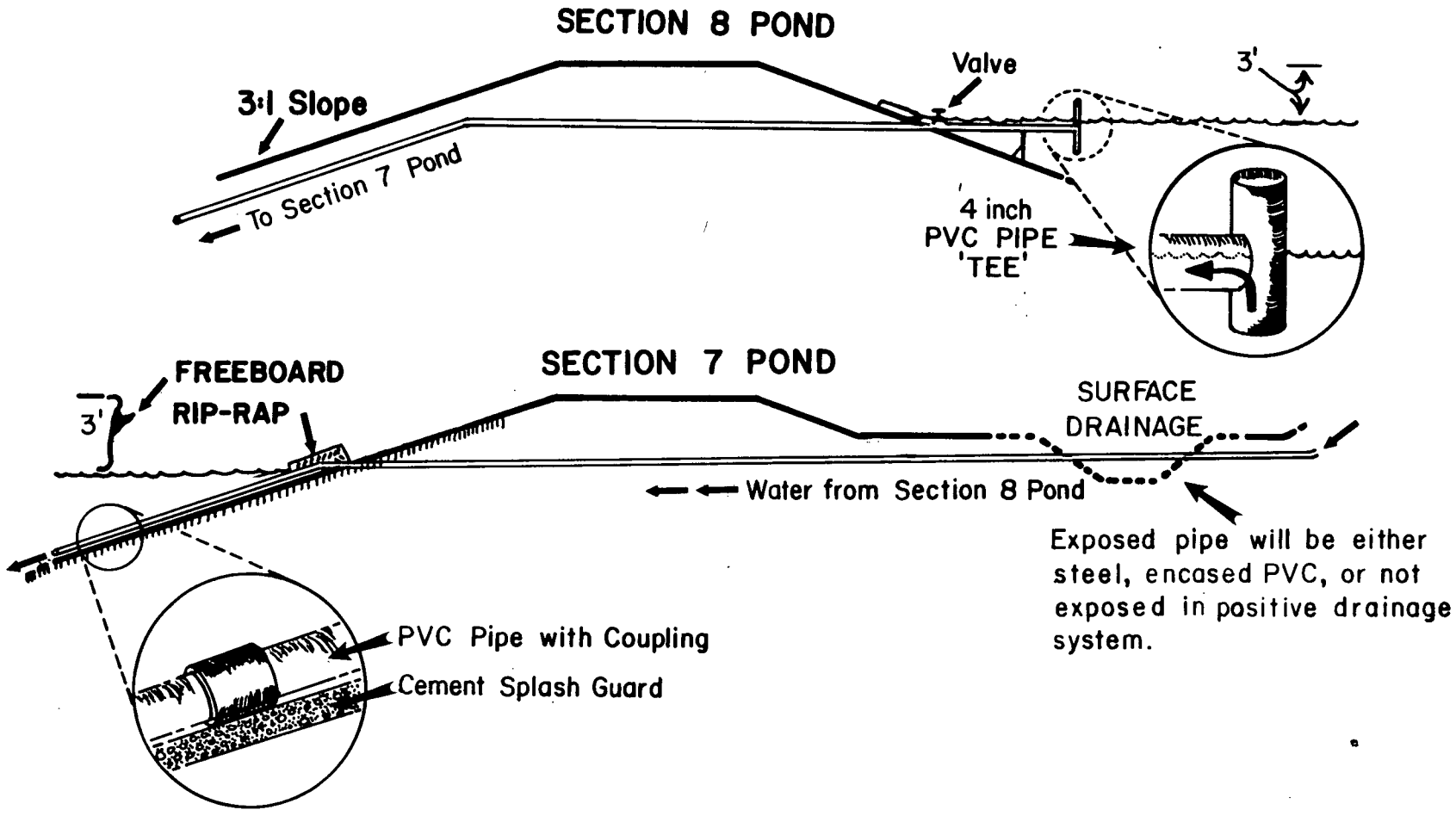

Figure 3. Cross section of ponds showing transfer of water from pit 8 to 7.

maximum dry density. 15. inspection + repair

8. The material used in construction should not be allowed to dry between layers or stages of berm construction. When drying has occurred, the dry material will be reconditioned to proper water content with produced or brine water prior to placing subsequent material.

9. When the compacted surface of any layer is too smooth to bond properly with the succeeding, the layer should be scarified or roughened to provide a satisfactory bonding of surfaces before the next layer is placed.

10. At any point of discharge into the pond, no fluid force shall be directed onto the clay lining. To prevent erosion under aerators and on levees splash guards will be installed and will include appropriate rip-rap (secured tires) synthetic materials, discharge tubes with upward facing outlets or various weirs, see Figure 3.

11. A positive drainage system will be provided around base (toe) of the outside slope of the proposed embankment throughout the life of the proposed pond.

12. A fence will be constructed around the facility perimeter. Adequate space will be provided between the fence and levees for passage of maintenance vehicles. The fence will be constructed of woven and barbed wire. The fence will be constructed so as to prevent livestock from entering the facility area and to prevent any dumping of produced/waste materials that have not been processed through the existing facility in Section 8.

13. A registered professional engineer will submit as-built plans for the proposed pit as soon after construction as possible. Construction data supplied herein conforms to all the recommendations made to T-N-T in the Western Technologies' May 2, 1988 report. This report has already been provided to the OCD.

14. A 'sign' (12" x 24" with letters not smaller than 2") identifying T-N-T as operator of the disposal system, the location of the facility and emergency numbers already exists at the entrance to the facility in Section 8, where disposed water is presently being received.

15. Post construction maintenance of the pond's embankments will include regular inspections of the ponds integrity, holes produced by burrowing animals, storm damage, erosion resulting from water runoff or possible wind damage.

16. T-N-T Construction, Inc. is presently keeping and will make available for inspection records for each calendar month on the source, location, volume and type of waste (produced water), date of disposal, and hauling company that disposes of fluids at the Section 8 facility. Such records are being kept for two (2) years from date of disposal. The proposed Section 7 pond will not

directly receive disposed water from the operators. The proposed pond in Section 7 will be used for overflow from the Section 8 pond.

Should the water level of the Section 7 pit rise above the projected three (3) foot freeboard but remain below the 1 1/2 foot freeboard suggested by the OCD, see Figure 3, T-N-T will curtail the acceptance of additional disposed water at th Section 8 pit untill the water level in the Section 7 pit are lowered below the planned freeboard of three (3) feet.

17. The transfer of water from the Section 8 pit to the Section 7 pit will be accomplished through a gravity flow system in pipe as shown in Figure 3. Water will enter a 'Tee' constructed of 4" PVC pipe or steel pipe at a depth of 6-12 inches below the fluid surface of the Section 8 pond, see enlarged area on Figure 3. Water will enter the 'Tee' at maximum freeboard (three feet) of the Section 8 pit and flow by gravity to the Section 7 pit. Discharge into the Section 7 pit will be onto a concrete splash guard and the pipe will be adjusted to the existing water level of the pit, see enlarged area shown on Figure 3. The pipe line from the Section 8 pit to the Section 7 pit will buried one to two feet. However, should the pipe be exposed at the surface as shown in Figure 3, where it may cross the positive surface drainage ditch, steel pipe will be utilized or a protective cover will be put over the exposed PVC pipe.

C. Ancillary Equipment:

Aerators, sprayers or other types of evaporative equipment are not contemplated at this time. However, should such equipment be necessary to efficiently operate the facility or to keep in compliance with state regulations, T-N-T will notify the OCD and request their approval of any planned installation of said equipment. Sprayers and aerators would be installed in a manner similar to those presently being used on the Section 8 pond.

D. Spill/leak Prevention and Procedures:

1. Monitoring Wells:

Monitor wells will be located at prescribed intervals and depths around the containment pit and will be monitored monthly and fluids sampled, if present. Monitor well data, collected on a monthly basis, will be furnished to the OCD quarterly while the proposed containment pond is in use. Contained in this report will be water levels and conductivity of any fluids in the monitor wells and pits.

D. 1.

Immediate notification if fluid found in MW 5?

Monitor Well - Quarterly Report Schedule/Yearly

Report	Report Period	Date Due
1st. Quarterly Report	Jan., Feb. & March	April
2nd. Quarterly Report	April, May & June	July
3rd. Quarterly Report	July, August & Sept.	October
4th. Quarterly Report	Oct., Nov. & Dec.	January

If after review of the Quarterly Monitoring Reports, the OCD questions the origin of the fluids in the monitor wells, the following contingency plan will be put into operation by T-N-T:

(1) Cease acceptance of disposal fluids until the source of fluids in the monitor wells is determined;
(2) If the liquids are determined to be pit water, T-N-T will submit proposals and timetables for removing the source, determining the extent and degree of contamination, the impact, if any, on the hydrology of the immediate area and for mitigating contamination.

2. Monitor Well Location:

Twelve (12) monitor wells are proposed to be constructed in the same manner as T-N-T's present monitor wells surrounding the pond in Section 8. Placement of the new wells is shown on Figure 2. Each well will be proportionally spaced around the perimeter of the proposed pond near the base of the outside edge or toe of the proposed levee or about 50 feet perpendicular from the crest of the levee. Arroyos will be rerouted for flood protection and to prevent surface flow of water into the monitor wells.

3. Monitor Well Construction:

Proposed monitor wells, see Figure 4, for the Section 7 pond will be drilled to a depth of five feet below the bottom of the sandstone indicated on the log boring No. 1 drilled by Western Technologies. The log indicates that this depth would be about 28 feet. If no additional sands or sandstones are encountered through this interval, the wells will be plugged back to the bottom of the sandstone and completed with slotted liner (slotted four (4") PVC pipe) covering the entire sand lens and extending one foot above the top of the sandstone marker. If the above referenceD sandstone is not encountered in a monitor well, an equivalent total depth, based on strike and dip of the sand lens formation, will be drilled and the pipe slotted through an equivalent interval.

The following completion procedures for monitor wells will be followed unless an alternative procedure for construction is designated by the OCD. A diagram showing a cross section of a typical monitor well is shown in Figure 4. The depth of each monitor well and the locations of necessary slotting of the PVC liner is described in the paragraph above. Four (4) inch PVC pipe/casing

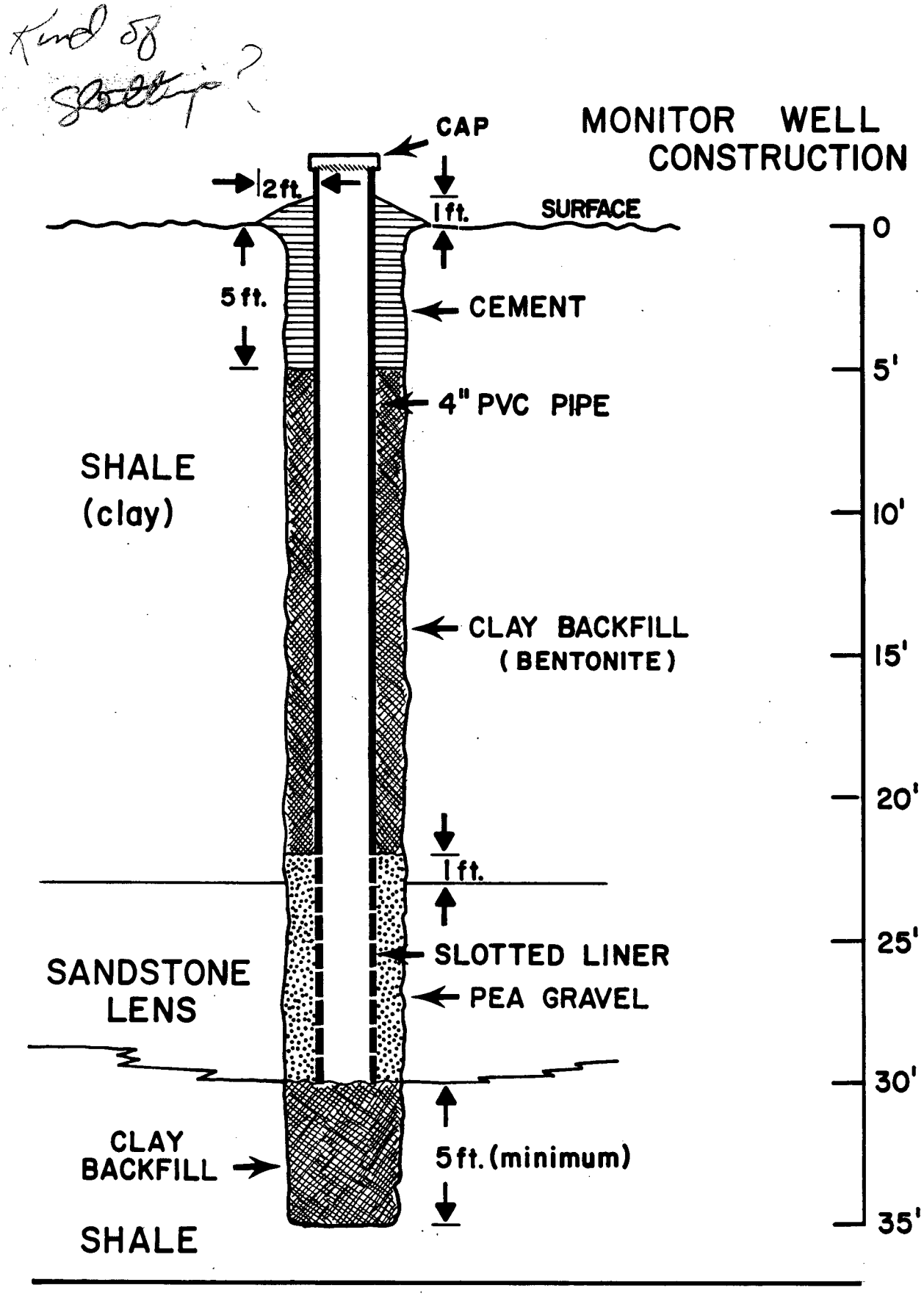

Figure 4. Monitor well construction, cross-section.

will be utilized in each monitor well. Each monitor well annulus will be backfilled with clean native clay or bentonite. Pea gravel will be placed in the well annulus adjacent to any slotted liner. The casing will be cemented five (5) feet from the surface to one foot above the surface, mounded to the casing and extended horizontally for a two foot radius. The wells will have caps and be suitably marked and protected from equipment, Figure 4.
A sample well log or drillers log of each monitor well will be recorded by a professional geologist and furnished to the OCD as soon as possible upon completion of the the drilling program.

4. H_2S Monitoring Program:

The schedule of proposed sampling locations and sample times for H_2S monitoring has been proposed by the OCD. H_2S readings will be made daily on each side of the proposed pond in Section 7 (see Figure 2.) and data reported to the OCD on a bimonthly basis, unless monthly reports would be satisfactory to the OCD.

4.

How often does Basin report H_2S?

V SWD

H_2S Bimonthly Reports (24/year)

Report	Report Period	Date Due
1st. Half of Month	1st. - 15th	16th. - 31st.
2nd. Half of Month	16th. - 31st.	1st. - 15th. of following month

Sprayers and aerators would be installed (with OCD approval) should the H_2S levels in the air be found to be consistently high. Chemically treating of the pit would be an alternative solution.

Should air concentrations of H_2S reach 1 ppm at the top of the pond berm for two consecutive monitor readings, the OCD will be notified immediately.

(a) High H_2S Readings (Scenario):

If air concentrations of H_2S at the top of the pond berm reaches 10 ppm at any time, public safety personnel, such as the County Fire Marshall, County Sheriff's Department, New Mexico State Police, and the OCD will be notified. T-N-T Construction will cooperate with the OCD and appropriate public officials to correct any situation which may arise from the evaporative pond operation in order to protect the public health and safety. Requirements for pond treatment will include daily pH measurements, daily analyses of dissolved sulfides in the pond water, hourly H_2S monitoring, and such additional requirements determined after OCD review. Please realize that T-N-T will not permit the dumping of disposed water with dissolved H_2S contents that might endanger the public health and safety or result in endangering the operation of the facility.

F.

Ponds must be fully dry? How about "dry enough to allow use of equipment for backfilling", or something along those lines.

Agencies to be Notified

Rio Arriba County Fire Marshall - (505) 588-7254
New Mexico State Police --------- (505) 289-3443
Rio Arriba County Sheriff ------- (505) 588-7271

5. Daily Levee and Siphon/Gravity Drain Inspection:

(a) Inspection:

Inspection of pond levees and the drainage system from the Section 8 pond will be conducted on a daily basis during the above H S and monitor well reporting procedure. Should any evidence of leakage be detected the pond will be shut in and repairs made. Any fluids which may have escaped will be returned to the pond and any significant soil contamination will be removed and returned to either pond 7 or 8.

(b) Worst Case Scenario (Major Levee Damage and Spill):

- OCD would be contacted immediately, as well as any other public officials as deamed necessary by the OCD or as shown earlier in this report.
- Immediate repairs of levee or gravity siphon systems.
- Should a major leak or loss of disposed fluid occur from pond 7, remaining fluids in pond 7 would be pumped back into pond 8 to a level where the leak or damage to the levee could be repaired. The positive drainage system around the toe of the levee should contain the fluids and route them to two holding (stock ponds) reservoirs located on the drainage directly to the west of the proposed pond on the Schmitz Ranch, see Figure 1. The two stock ponds are capable of holding the maximum amount of fluids that might exist in the Section 7 pond. Again the pond would be repaired. Fluids and contaminated soil would be returned to the Section 7 pit.
- An investigation by T-N-T and the OCD into the cause of the spill would be made along with recomendations on design changes prior to reuse of the evaporative facility. The operation would be subject to permit modification and OCD approvals.

F. Closure Plan:

T-N-T Construction will notify the OCD of cessation of operations. Upon cessation of disposal operations for six (6) consecutive months, T-N-T will complete cleanup of constructed facilities and restoration of the facility site within the following six (6) months unless an extention of time is granted by the OCD. The closure plan will be in accordance with an approved closure plan by the OCD. Prior to the reclamation of the surface, the ponds will be allowed to fully dry. The closure plan will include removal or demolition of buildings, removal of all tanks, vessels, equipment or hardware, containment and removal of fluids and chemicals, backfilling and grading of pits, removal or burial of contaminated soils, aquifer restoration (if necessary) and reclamation of the general facility site. The surface

of the facility will be returned as close as possible to its original contour. Existing levees and necessary top soil will be utilized in the restoration of the pond site and the surface area will be seeded with appropriate native grasses. Prior to the release of the bond covering the facility, a representative of the OCD will inspect the site to determine if restoration is adequate.

III. SITE CHARACTERISTICS:

A. Hydrologic Features.

1. The proposed evaporation pit is located in the SE/4, Section 7, T.25N., R.3W. in Rio Arriba County as shown on Figure 1. The only significant stream in the area is Canon de los Ojitos one-quarter mile to the southeast and it is considered an intermittent stream. A hill directly separates the planned facility from this arroyo to the east. All water wells within one mile of the proposed site are shown on Figure 1. and are owned and operated by either T-N-T or the Schmitz Ranch.

   Water wells within one (1) mile of the proposed evaporation pond are shown on Figure 1 as solid dots 1/8th inch in diameter. These wells are the property of the Schmitz Ranch and are for domestic or stock use. The wells tap ground water aquifers at depths from 300-900+ feet. Ground water was not encountered at or near the surface to depths of 300 feet in any of these water wells during their drilling or completion. This suggests that the top of the water table in this immediate area is quite deep.

2. Ground water was not encountered in any of the stratigraphic test wells or monitor wells drilled in Section 7 or 8.

3. Cuttings from stratigraphic tests and monitor wells suggest that the near surface sandstone occurrences are dry (above the water table) and presently being oxidized (limonite staining). Sandstone outcrops in the immediate area are generally dipping to the north (north 0-20 degrees east) at about one (1) degree. Strike directions are east 0-20 degrees south. If water were introduced into the sand lens encountered at the interval of 15-35 feet below the surface of the ground, the water would move by gravity to the lowest part of the channel and then down dip to the north-northeast.

   Outcrops in the area which may correlate with the tan sand encountered at about 25 feet in some of the test wells suggests that any water introduced into this sand would be confined, as the unit most likely has little or no lateral continuity with other sand at the same elevation. Sand outcrops pertaining to the horizon just below the surface in the proposed pit site are possibly 200-300 feet wide and 0-17 feet in thickness. Their length is more difficult to determine do to their N-S orientation, but could be 300-800 feet long.

   Figure 5. is an Isopach map of the tan sandstone lens occurring at a depth of 15-35 feet (depending on collar elevation of

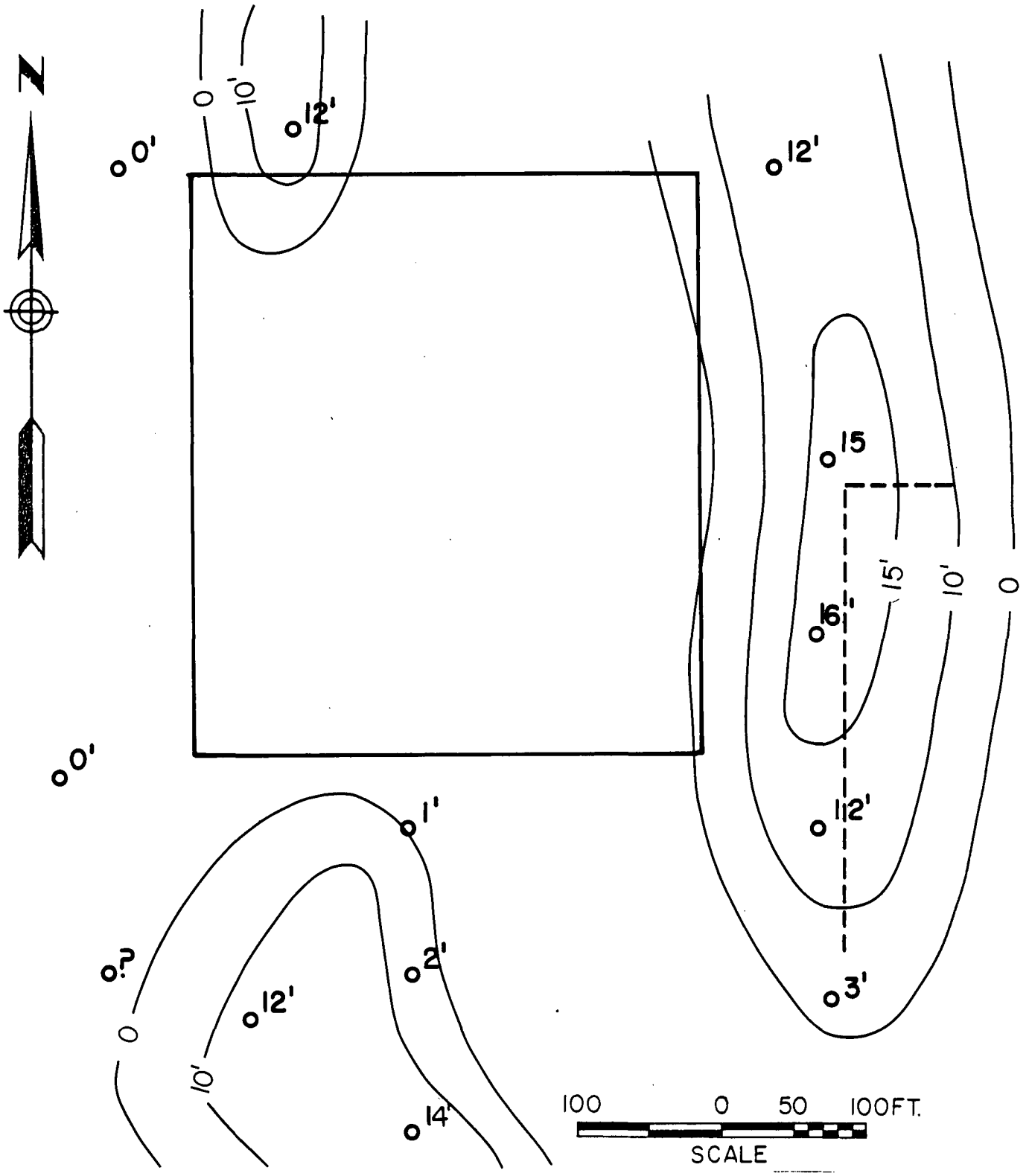

Figure 5. Isopach Map of sand lens at 15'-45' in depth, all contours approximate.

the test hole). Contours can be only be approximated do to the limited available data. However, there is sufficient data to support the above noted widths and lengths of these buried channel sands.

Cross sections of the proposed pit and the underlying lithologies are shown on Plate II. Driller's logs of the stratigraphic test wells drilled in the area of the proposed Section 7 pond are shown in the Appendix. Copies of several of the monitor wells located along the west and north side of the Section 8 pond are also included in this application.

Fine-grained tan sand at the top and coarse-grained and heavily oxidized (dark yellow-brown) arkosic sand at the base of these sandstone lenses suggest a typical channel sand of continental origin. The likelihood that the sandstone encountered at 20-30 feet in the test wells in Section 7 or 8 would act as a conduit/waterway to a water bearing sand/aquifer at a greater depth (300 feet or more) or down dip is considered unlikely.

B. Geologic Description of Pond Site:

1. San Jose Formation:

The San Jose Formation (Eocene Age) is the youngest Tertiary rock unit found within the San Juan Basin and occurs at the surface throughout a great portion of the central part of the basin and in the study area, see Figures 6. This sequence consists of interbedded shales, sandstones and mudstones of continental origin with a maximum thickness of 2700 feet in the basin center. The shale/mudstone portion of the San Jose commonly are silty, sandy, or contain beds and lenses of claystone, siltstone and poorly consolidated sandstone. The abundance of swelling clays/bentonite is attested to by the familiar popcorn weathering habit of these clay/mudstones within the study area. The San Jose was deposited in a fluvial environment consisting of continental sedimentation, derived primarily from the north in southern Colorado.

The primary aquifers in the area are basal sandstones of the San Jose Formation. The most shallow aquifers were encountered at depths in excess of three hundred (300) feet in water wells drilled in the area. These water bearing horizons may correlate with the Cuba Mesa Member of the San Jose Formation as described by Brimhall in 1973 publication of the Four Corners Geological Society.

A description of the composition of the shales/mudstones of the study area are contained in the Western Technologies, Inc. report (May 2, 1988) submitted to the OCD earlier. The pits will be located in unconsolidated-consolidated clay/mudstone composed of illite, montmorillonite and bentonite. The varigated color of the claystone encountered in the stratigraphic tests in the area suggests that mixed layered clays exist. No alluvium or sandstone outcrops were observed at the proposed pit site.

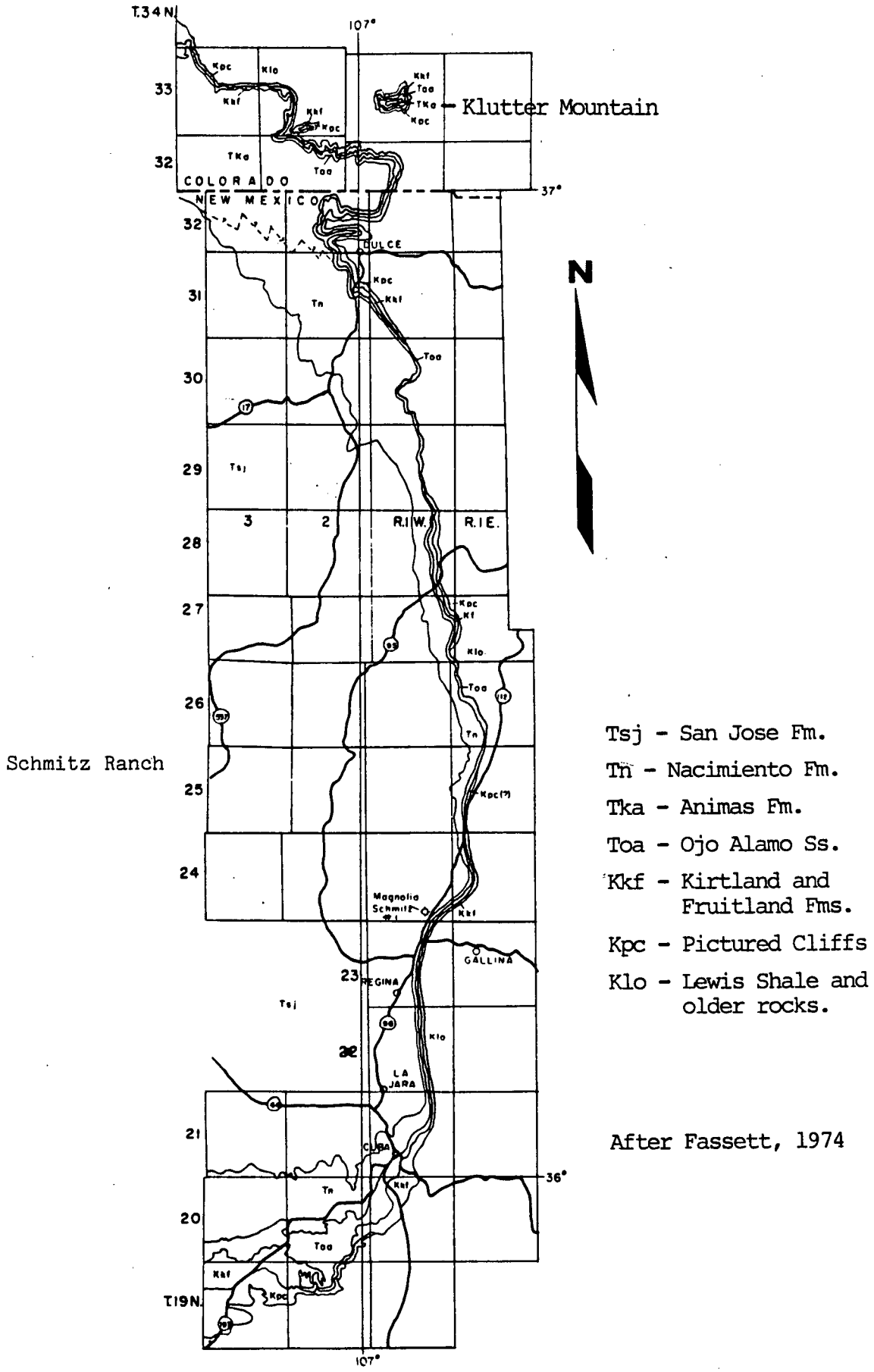

Figure 6. Geologic map of the eastern side of the San Juan Basin showing the surface location of the San Jose Formation.

Detailed geologic cross sections of the stratigraphy will be supplied the OCD upon completion of the proposed monitor wells shown on Figure 2. Lithologic descriptions (drillers logs) of the cuttings of these proposed monitor wells will also be included in this report.

If the foregoing information contained within this application is acceptable to the New Mexico Oil Conservation Division (OCD) and the New Mexico State Engineers's Office, please notify T-N-T Construction, Inc. Should their be additional information needed to commence construction please notify me at your convenience. It is the intention of T-N-T construction to have the proposed facility completed by fall, if at all possible.

Please note that portions of this report, in particular information pertaining to the geology of the proposed facility were provide by James W. Gurney, a consulting geologist in Farmington, NM.

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

Tony Lee Schmitz — 9/15/88
(Authorized Signature) (Date)

TONY LEE SCHMITZ — 9/15/88
(Printed Name of Person Signing) (Title)

JWG/jwg
Copies: Aztec OCD District Office
New Mexico State Engineer's Office

APPENDIX

July 22, 1988

Certified Mail
Return Receipt Requested

John C. Huffman
Box 406
Farmington, NM 87499

Dear Mr. Huffman:

Rule 711, paragraph A.2. of The New Mexico Oil Conservation Division's Rules and Regulations, dated June 2, 1988, requires notification of all landowners of record within one-half mile of any proposed water disposal/evaporation site or the expansion/addition of an existing disposal/evaporation site.

Please be advised that T-N-T Construction, Inc. proposes to enlarge its existing water disposal site by constructing an additional evaporation pit directly west-northwest of its existing facility in the NW/4 NW/4, Section 8, Township 25 North, Range 3 West, Rio Arriba County, New Mexico. Operation of this facility and the proposed evaporation pit will be by T-N-T Construction, Inc. The proposed pit will be located in the NE/4 NE/4 SE/4, Section 7, Township 25 North, Range 3 West or about .4 miles due east of the east side of your acreage in the W/2 of Section 7, Township 25 North, Range 3 West.

The proposed site will be constructed in accordance with all applicable State of New Mexico Oil Conservation Division Rules-Regulations and in accordance with New Mexico State Engineer's Office Guidelines. Both State agencies will review and approve all plans and specifications of the proposed evaporation site prior to construction to insure protection of the environment.

If you have any questions regarding the operation or proposed construction please contact me, Tony Schmitz, T-N-T Construction, Inc., Star Route, Lindrith, New Mexico 87029 or call (505) 774-6663 at your convenience.

Sincerely,

Tony Schmitz

Tony Schmitz
T-N-T Construction, Inc.
Star Route
Lindrith, NM 87029

John C. Huffman

PLEASE SIGN AND RETURN THE ENCLOSED Copy, THANK YOU.

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Sincerely,

Tony Schmitz
T-N-T Construction, Inc.
Star Route
Lindrith, NM 87029

_____

John C. Huffman

PLEASE SIGN AND RETURN THE ENCLOSED Copy, THANK YOU.

DRILLERS LOG

Datum: Assumed elevation of NE corner of proposed pit is 60.3 feet.

WELL NO. S-1
ELEVATION: 47.00 FEET
DATE COMPLETED: 7-5-88
LOCATION: ABOUT 175 FEET WEST AND 50 FEET SOUTH OF SE CORNER OF PROPOSED PIT.
No water encountered in formations (AIR DRILLED).

Depth in Feet	Description
0-20	Claystone/Shale; verigated rd-rdbn, weathered top 2 feet.
20-21	Claystone/Shale; verigated rd-rdbn, 5% silt.
21-30	Shale; verigated rdbn-rdgy. Several thin interbeds (2-3 inches thick) of tan-rdbn siltstone.
30-32	Shale/Siltstone; about 50% tan-rdbn siltstone.
32-35	Shale/Siltstone; SAA with 1-5% very fine sand.
35-41	Shale/Siltstone; tan-rdbn with 5-20% very fine-grained interbedded sand, yelbn-rdbn and tan, angular, fair sorting.
41-44	Siltstone/Shale; 10-20% interbedded tan sandstone.

DRILLERS LOG

Datum: Assumed elevation of NE corner of proposed pit is 60.3 feet.

WELL NO. S-2
ELEVATION: 61 FEET
DATE OF COMPLETION: 7-5-88
LOCATION: 50 FEET EAST OF NE CORNER OF PROPOSED PIT.
No water encountered in formations (AIR DRILLED)

Depth in Feet	Description
0-15	Claystone/Shale; verigated med rdbn-bn.
15-21	Claystone/Shale; several thin (1-4inch) interbeds of siltstone and sandstone, light to med. rdbn sand some of the sand med-grained.
21-24	Shale; med. rebn, silty
24-26	Shale; lt.-med.rdbn, 5-10% siltstone.
26-28	Siltstone; med. rdbn, sandy, sand in tan, fine grained, angular-subangular.
28-38	Sandstone; lt. tan, yelbn, very fine to med. grained, angualar-subangular, poor sorting.
38-50	Shale; verigated yelbn-gy and gybn, some silt at 44-45 feet,

DRILLERS LOG

Datum: Assumed elevation of NE corner of proposed pit is 60.3 feet.

WELL NO. S-3
ELEVATION: 54.5 FEET
DATE COMPLETED: 7-5-88
LOCATION: 25 FEET WEST OF NW CORNER OF PROPOSED PIT.
No water encountered in well (AIR DRILLED).

Depth in Feet	Description
0-18	Claystone/Shale; verigated light-med. rdbn, silty at 7-8 feet.
18-24	Shale; verigated light-med. rdbn.
24-29	Shale, verigated light-med. rdbn, several hard (1"-3") siltstone stringers at 24-25 feet.
29-33	Shale/Siltstone; rdbn to tan, 29-30 feet 5% sand, angular, fine-grained.
33-40	Shale; med. rdbn, silty at 38 feet.
40-41	Siltstone; tan-med. rdbn.

DRILLERS LOG

Datum: Assumed elevation of NE corner of proposed pit is 60.3 feet.

WELL NO. 1
ELEVATION: 49 FEET
DATE COMPLETED: UNKNOWN (1988)
LOCATION: 160 FEET SOUTH OF WELL NO. S-1.
No water encountered in the formations (AIR DRILLED).

Depth in Feet	Description
0-6	Claystone/Shale; red brown.
6-22	Sandstone; shaley and silty.

WELL NO. 2
ELEVATION: ABOUT 43 FEET
DATE OF COMPLETION: UNKNOWN (1988)
LOCATION: 100 FEET SOUTH AND 200 FEET WEST OF WELL NO. S-1
No water encountered in well (AIR DRILLED)

Depth in Feet	Description
0-22	Claystone/Shale; verigated red-red brown.

WELL NO. 3
ELEVATION: 56 FEET
DATE OF COMPLETION; UNKNOWN (1988)
LOCATION: 30 FEET NORTH AND 100 FEET EAST OF THE NW CORNER OF THE PROPOSED PIT.
No water encountered in the well (AIR DRILLED).

Depth in Feet	Description
0-13	Claystone/Shale; rdbn, silty.
13-17	Shale; blue.
17-20	Shale; rdbn, sandy.
20-22	Sand; tan.
22-32	Sand; tan.
32-37	Shale; verigated rdbn, blgy,
37-42	Shale, rdbn.

DRILLERS LOG

Datum: Assumed elevation of NE corner of proposed pit is 60.3 feet.

WELL NO. 4
ELEVATION: 45 FEET
DATE OF COMPLETION: UNKNOWN (1988)
LOCATION: 60 FEET NORTH OF (1) OR 100 FEET SOUTH OF WELL NO. S-1.
No water encountered in the well (AIR DRILLED).

Depth in Feet	Description
0-8	Claystone/Shale; rdbn.
8-18	Claystone/Shale; rdbn, silty some sand.
18-22	Shale; verigated gy-rd.
22-36	Shale; verigated gy-rd.
36-43	Shale; verigated rd-gy.

WELL NO. WT-1
ELEVATION: 44 FEET
DATE OF COMPLETION: 3/30/88
LOCATION: 150 FEET SOUTH AND 145 FEET WEST OF WELL S-1.
No water encountered in the well (AIR DRILLED).

Depth in Feet	Description
0-12	Claystone; rdbn, sandy.
12-23	Sandstone; tan, fine to coarse grained sand. light to moderate cementation.
23-25	Claystone/Shale; brown to red, stiff (consolidated).

WELL NO. WT-2
ELEVATION: 46 FEET
DATE OF COMPLETION: 3/30/88
LOCATION: 250 FEET WEST AND 25 FEET NORTH OF WELL NO. S-1.
No water encountered in the well (AIR DRILLED).

Depth in Feet	Description
0-25	Claystone; verigated rdbn, some thin sandy layers.

DRILLERS LOG

Datum: Assumed elevation of NE corner of proposed pit is 60.3 feet.

WELL NO. WT-3
ELEVATION: 59 FEET
DATE OF COMPLETION: 3/30/88
LOCATION: 200 FEET NORTH AND 160 FEET EAST OF WELL NO. S-1.
No water encountered in the well (AIR DRILLED).

Depth in Feet	Description
0-6	Claystone/Shale; brown-rdbn, sandy.

WELL NO. WT-4
ELEVATION: 59 FEET
DATE OF COMPLETION: 3/30/88
LOCATION: 125 FEET SOUTH AND 150 FEET WEST OF WELL NO. S-2.
No water encountered in the well (AIR DRILLED).

Depth in Feet	Description
0-6	Claystone; brown, sandy.

DRILLER'S LOG

Well No. 10

Ground Elevation: -8.00

Depth	Description
0-15	Interbedded, variable color, undifferentiated clay
15-18	Blue-gray sand, very fine grain, well sorted, well rounded, friable, soft, clay filled, partially unconsolidated, no visible porosity
18-21	Tan sand, very fine grain, fair sorted, subangular, unconsolidated, very flour-like
21-30	Light brown to tan sandstone, very fine grain, fair sorted, subangular, partially unconsolidated, clay filled, moderately flour-like, no visible porosity
30-32	Green-gray to blue-gray clay, no silt
32-34	Light brown to tan sandstone, as above
34-38	Yellow sandstone, very fine grain, well rounded, well sorted, friable, clay filled, no visible porosity
38-40	Tan sandstone, very fine grain, subangular, poor sorting, partially unconsolidated
40-46	Blue-gray clay, 0-10% silt

DRILLER'S LOG

Well No. 9

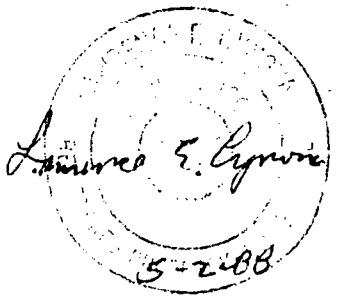
Ground Elevation: -8.00

Depth	Description
0-15	Interbedded clay, variable color, undifferentiated
15-18	Light blue-gray sand, very fine grain, well sorted, well rounded, friable, soft, clay filled, partially unconsolidated, no visible porosity
18-22	Tan sand, very fine grain, fair sorted, subangular, unconsolidated, very flour-like
22-26	Blue-gray clay, 0-15% silt
26-28	Variable color clay, 0-15% silt

Geotechnical Services For:

Water Disposal Pond
Lindrith, New Mexico
Project No. 3128J024

WESTERN TECHNOLOGIES INC.
The Quality People



Submitted to:

Tony Schmitz
Star Route Lindrith
Lindrith, NM 87029

Attn: Mr. Tony Schmitz

May 2, 1988
Inv. No. 31280028

ARIZONA

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

Mesa
Gateway Plaza
663 West Second Avenue, No. 10
Mesa, Arizona 85202
(602) 834-3964

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

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

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

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

Sierra Vista
1827 South Paseo San Luis
Sierra Vista, Arizona 85635
(602) 458-0364

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

NEW MEXICO

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

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

NEVADA

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

WESTERN TECHNOLOGIES INC.

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

May 2, 1988

Tony Schmitz
Star Route Lindrith
Lindrith, New Mexico 87029

Attn: Mr. Tony Schmitz

Re: Water Disposal Pond
Lindrith, New Mexico

Job No. 3128J024
Inv. No. 31280028

Our geotechnical engineering report for the Water Disposal Pond is attached. The work was performed in accordance with our proposal of March 22, 1988.

Soils at the site generally consisted of sandy clay with low to moderate load bearing capabilities. The existing clays can be used for construction of pond embankments.

We are prepared to review your plans and specifications for consistency with the recommendations, and to provide the construction observation and testing recommended.

Sincerely,
WESTERN TECHNOLOGIES, INC.
Geotechnical Engineering Services

Lawrence E. Cynova, P. E.

Reviewed by: George A. Madrid, P. E.

/cb

Copies to: Addressee (3)

TABLE OF CONTENTS

Geotechnical Engineering Evaluation
Water Disposal Pond
Highway 537
Lindrith, New Mexico

INTRODUCTION

This report contains the results of our geotechnical engineering evaluation for the proposed Water Disposal Pond to be located west of Highway 537 near Lindrith, New Mexico. The purpose of these services is to provide results of field and laboratory testing, to evaluate the use of site soils for construction of the dikes, and to provide engineering recommendations for construction of the dikes.

PROPOSED CONSTRUCTION

The proposed construction will consist of two ponds constructed next to each other but at different levels. The upper pond will have plan dimensions of approximately 300 by 300 feet with a surface area of approximately 2 acres and a storage capacity of approximately 20 acre feet. The lower pond will have plan dimensions of approximately 360 by 240 feet with a surface area of approximately 2 acres and a storage capacity of approximately 20 acre feet. The ponds will be constructed partially in cut and fill. It is understood that the top width of the dikes will be approximately 12 feet with a 3 to 1 (horizontal to vertical) slope on the inside and outside. Also it is understood that the free board for the dikes will be 3 feet and the maximum depth of the water will be 10 feet.

SITE CONDITIONS

At the time of our exploration, the site was undeveloped property. The site contained a sparse to moderate growth of weeds, grass and brush. Site drainage was to the southwest on a

gradual and uniform slope. A fence is located on the east side of the site. A dirt road is located on the south side of the site. Two small washes are located on the site, which consist of shallow swales.

SCOPE OF SERVICES

Four borings were drilled to depths of 6 to 25 feet at the locations shown on the site plan. During exploration, subsoils were visually examined and sampled at selected intervals.

The following tests were performed on selected soil samples:

- Water content
- Dry density
- Compression
- Expansion
- Shear strength
- Gradation
- Plasticity Index
- Permeability

Test results were used in the development of foundation and earthwork recommendations.

Western Technologies Inc. performed the services described in this report to develop engineering information for the purposes defined in the "Introduction." We did not intend to uncover nor identify any contaminated subsurface materials that may contain hazardous or flammable substances. Identification of such substances requires specialized exploration techniques and analyses which were not used in this investigation.

INTERPRETATION OF SUBSURFACE CONDITIONS

Exploration: As presented on Logs of Borings, surface soils and subsoils to depths of 6 to 25 feet, which is the full depth of exploration, in all test borings except test boring 1 were found to be sandy clay of firm to stiff consistency and medium plasticity. The materials underlying the surface soils in test boring 1 and extending to the full depth of exploration consisted of sandstone underlain by claystone. A groundwater table was not encountered in any boring at the time of exploration.

Geology: The proposed water disposal pond is to be located in unconsolidated surficial clay material derived from the local topography. This material was deposited as alluvium washed down from the surrounding foothills and probably originated as a shale from the San Jose Formation. This formation is Eocene in age and is described as the buff, fine to coarse grained arkosic sandstone, conglomeratic sandstone and interbedded gray and red shale which makes up a large percentage of the San Juan Basin. In the northern part of the basin, this formation contains some volcanic debris, including andesite pebbles, but the proportion of volcanic debris and sandstone decreases southward.

ANALYSIS PROCEDURES

General: We understand that the proposed Water Disposal Ponds will store water throughout the year. The ponds will be filled with water from oil and gas production. The water will be evaporated by spraying the water into the air. We believe that all soils in the pond areas will be clay, as indicated on the test boring logs, but if a sand lense is encountered in the side of a dike, then the sand lense should be plated with 2 feet of compacted clay. If a sand lense is encountered in the bottom then it should be removed. The south dike, which is the deepest

fill, and the dike between the two ponds, were chosen for stability analysis.

Material Properties: The on-site undisturbed and compacted clay materials exhibit properties of low cohesion and low to moderate angles of internal friction. The underlying sandstone materials encountered in test boring 1 had nil cohesion and moderate to moderately high angles of internal friction. Based upon our observations, the results of laboratory testing, and our experience with similar materials, the following material properties were assigned to the embankment and foundation soils:

Undisturbed Clays
Dry unit weight - 105 pcf
Angle of internal friction - 16^{o}
Cohesion - 600 psf

Compacted Clays
Dry unit weight - 108 pcf
Angle of internal friction - 12^{o}
Cohesion - 300 psf

Sandstone
Dry unit weight - 140 pcf
Angle of internal friction - 30^{o}
Cohesion - 0 psf

Slope Stability Analysis: The static stability of anticipated embankment slopes was analyzed using strength parameters obtained from laboratory and field testing. The analysis was conducted on those dike configurations as discussed with the client for the project. A computer program (SB-SLOPE program developed by Digital Research Inc.) using simplified Bishop's Analysis was performed for both the upstream and downstream slopes for the anticipated embankment configurations.

The following table presents the results of the analysis:

Section	Condition	Slope	Factor of Safety
Dike between Ponds	Steady State Seepage	Downstream	3.8
	Rapid Drawdown	Upstream	2.7
South Dike	Steady State Seepage	Downstream	2.5
	Rapid Drawdown	Upstream	2.3

A minimum factor of safety of 1.5 is recommended under the steady state condition and rapid drawdown in the design of dams, by the New Mexico State Engineer Office.

After reviewing the Deformation Analysis - Embankment Dams section of the manual for the Procedure on Design Criteria and Safety of Dams, for seismic considerations, seismic analysis is not necessary. This is due to the fact that the proposed embankments and foundations are not subject to liquifaction. Also, the dikes will be densely compacted, the slopes will be 3 horizontal to 1 vertical and the static factor of safety is greater than 1.5.

Seepage Analysis: The ponds will be constructed with compacted clay and the surrounding soils are clay. A permeability test indicates the permeability coefficient of the native sandy clay is 3.8×10^{-8} centimeters per second or 0.04 feet per year.

Piping, which is the movement of material by seepage forces in the foundation and embankments, is not expected due to the anticipated very low seepage quantity.

DISCUSSION AND RECOMMENDATIONS

General: Based on the results of this investigation, we anticipate that the existing clay soils could be used for construction of embankments. It is anticipated that the northeast sides of the ponds will be cut and the southwest sides will be fill. The pond may be satisfactorily supported upon prepared subgrade. If subsoil conditions other than those identified during the field exploration are encountered during construction or should design plans change, this firm should be contacted for supplemental review and recommendations.

The following general conclusions and recommendations are presented:

1. Surface soils in native undeveloped areas are loose to depths of approximately one foot. The surface soils in the washes are loose to depths of probably several feet. Therefore, these zones are not deemed suitable for support of earth embankments. However, removal and replacement of native soils in embankment foundation areas can provide adequate support characteristics of these zones.

2. Native soils below levels of surface soil disturbance are generally of moderate densities and will afford support for anticipated embankments.

3. Excavation of the design pond base should be possible with conventional earthmoving equipment.

Embankment: Homogeneous embankments for construction of the storage pond were analyzed. Homogeneous embankments are constructed using the same soil type throughout the embankment. The soil borings indicate that the materials for homogeneous embankments are readily available on the site.

The proposed homogeneous embankment may be constructed with the on-site clay soils identified during exploration, provided site preparation and earthwork is accomplished as recommended hereinafter. The upstream embankment should be constructed no steeper than 3 to 1 (horizontal to vertical). The downstream embankment should be constructed no steeper than 3 to 1 (horizontal to vertical).

Materials: An investigation of borrow materials in the pond area was performed and test boring logs are provided. The logs indicate there are clays in the cut portion of the pond which would be used for construction of the dikes. A permeability test was also conducted on the soils from these test borings. Based on these test boring logs and permeability test we believe that the on-site soils are suitable to construct the dikes.

Site Preparation and Earthwork: The following procedure is recommended for site preparation and earthwork for the embankment portions of the water disposal pond.

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 existing grade or 1 foot below the bottom of the embankment, whichever is deeper. This soil could be used for revegetating if it is needed.

2. Clean and widen depressions, washes, swales, etc., to form level working areas to accommodate compaction equipment and fill placement. Removal should extend 3 feet below the existing grade or until all loose soil is removed from the washes.

3. No material should be placed which is frozen or where the in-place material is frozen.

4. Proof-roll the exposed subgrade in the embankment and pond areas to densify materials which may have been loosened during the stripping and excavation process. Proof-rolling may be accomplished by a minimum of 2 passes of a loaded scraper or equivalent. All soft areas should be removed and replaced with compacted fill.

5. Place and compact all embankment fill in horizontal lifts to the finished grade levels. Lift thicknesses should be compatible with compaction equipment used to achieve the required uniform densities. The maximum size of rock used for fill should be 6 inches.

6. All subgrade preparation, fill placement and compaction should be accomplished under observation and testing to assess compliance with project specifications. All fill material should be compacted to at least 95% of the maximum dry density as determined by ASTM: D-698 methods and at a moisture content of 3% below optimum to 3% above optimum. Fill which is below 10 feet should be compacted to at least 100% of the maximum dry density as determined by ASTM D-698 methods and at a moisture content of 3% below to 3% above optimum.

7. The material should not be allowed to dry between layers or stages of berm construction. When drying has occurred, the dry material should be reconditioned to the proper water content and recompacted prior to placing subsequent material. Between stages of berm construction the embankment should be covered by at least 2 feet of temporary fill.

8. When the compacted surface of any layer is too smooth to bond properly with the succeeding, the layer should be scarified of otherwise roughened to provide a satisfactory bonding surface before the next layer of fill material is placed.

Drainage: Positive drainage should be provided around tbe proposed lagoon during construction and maintained throughout the life of the proposed development.

Borrow excavation, basin excavation, surface stripping, subgrade preparation, and embankment fill placement should be accomplished under the observation and testing directed by a soils engineer to assess compliance with recommendations.

Post Construction Maintenance: During the life of the water disposal pond, burrowing animals should not be allowed to dig holes in the embankments.

Corrosion: We recommend a Type II portland cement be used for all concrete on and below grade.

CLOSURE

Our conclusions and recommendations are predicated on observation and testing of the earthwork and foundation preparations directed by a geotechnical engineer. It would be logical for Western Technologies Inc. to provide these services since we are most qualified to determine consistency of field conditions with those data used in our analyses.

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

DEFINITION OF TERMINOLOGY

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

METHOD OF SOIL CLASSIFICATION
(ASTM D 2487)

COARSE-GRAINED SOILS

LESS THAN 50% FINES*

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

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

FINE-GRAINED SOILS

MORE THAN 50% FINES*

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

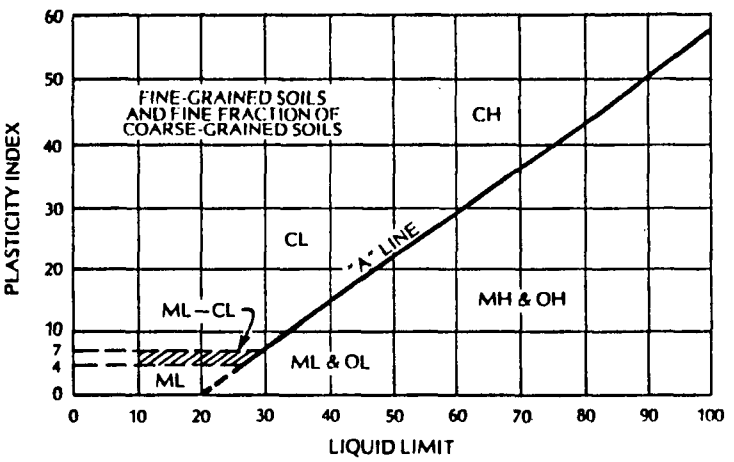
NOTE:
Fine-grained soils receive dual symbols if their limits plot in the hatched zone on the Plasticity Chart (ML-CL)

SOIL SIZES

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

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

PLASTICITY CHART



SOIL PROPERTIES

Job No. 3128J024

Boring No.	Depth, ft	Soil Class.	Soil Property		Compression/Consolidation			Expansion			Shear Strength			Water Soluble Matter, PPM		Remarks
			Initial Dry Density pcf	Initial Water Content, %	Surcharge KSF	Total Comp. %	Void Ratio	Surcharge KSF	Expansion %	Max. Swell Pressure KSF	Test Method	C KSF	ø Deg.	Salts	Sulfates	
2	3 - 4	CL	115	10.6							DS	0.6	16			
4	0 - 5	CL	108(1)	16.3							DS	0.3	12			
4	0 - 5	CL	108(1)	9.1				0.1(3)	+7.0					0.1	< 0.1	

Boring No.	Depth, ft	Comments

Note: Initial Dry Density and Initial Water Content are in-situ values unless otherwise noted.

LEGEND

Shear Strength Test Method
- DS Direct Shear
- DS Direct Shear (saturated)
- UC Unconfined Compression
- UU Unconsolidated Undrained
- CU Consolidated Undrained w/pore press.
- CU Consolidated Undrained

REMARKS

1. Compacted density (approx. 95% of ASTM D698 max. density at moisture content slightly below optimum).
2. Compacted density (approx. 95% of ASTM D1557 max. density at moisture content slightly below optimum).
3. Submerged to approximate saturation.
4.

Job No. 3128J024

Boring No.	Depth, ft.	Soil Class.	Particle Size Distribution, %				Atterberg Limits			Moisture - Density Rel.			Specific Gravity	Permeability		'R' Value		Permeability K cm/sec
			Cobbles 3" to 12"	Gravel 3" to #4	Sand #4 to 200	Fines - 200	PL	LL	PI	Dry Density pcf	Optimum Moisture %	Meth.		Dry Density pcf	K Ft./Yr.	Corrected 'R'	Expansion Pressure psf	
4	0 - 5	CL												108	0.042			3.8×10^{-8}

Boring No.	Depth, ft.	Remarks
4	0 - 5	Maximum Density 113.5 pcf @ Optimum Moisture of 16.3% ASTM D-698

LEGEND

Moisture Density Relationship
1. Tested D-1556/AASHTO T-217
2. Tested ASTMD-2922/D-3017
3. Tested ASTMD-2922/AASHTO T-217
4. Rock correction applied to maximum dry density. AASHTO T-224
5. Other_____

Specific Gravity
6. Minus #4
7. Plus #4

Classification/Particle Size
8. Visual
9. Laboratory Tested

SOIL PROPERTIES

page ___ of ___ part

Type of Material Clay Job No. 3128JQ24

Source of Material Water Disposal Ponds

Test Procedure ASTM Tested/Calc. By J. Hutchinson/WT Date 03/30/88

Reviewed By L. Cynova/WT Date 04/20/88

Hole No.	Location	Depth	Classification		LL	PI	Sieve Analysis - Accum % Passing												Lab No./I.D.
			AASHTO	Unified			200	100	40	16	10	4	¼	⅜	½	1	1½	2	3	
4		0 - 5		CL	40	22	66	76	93	99	100									

TABULATION OF TEST RESULTS

LOG OF BORING NO. 1

Project: Water Disposal Pond — Job No. 3128J024

Elevation: 83.5 — Datum: Assumed Elev. 100.0 - S.E. Corner, N. Pond

Type/Size Boring: 7" Auger — Rig Type: CME-55

Groundwater Conditions: No groundwater was encountered on 03/30/88 — Date: 03/30/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
					PL-LL	CL	SANDY CLAY; brown, firm to stiff. Medium to high plasticity.
					PL		
5		50/9"	R	105	10.9		
		50/8.5"	R	NR-G			
		27	R	102	12.2		
10		12	S				
					SLT. DAMP		SANDSTONE; tan, fine to coarse grained sand. Light to moderate cementation.
15		50/1"	S				
20		50/3"	S				
25		50/5.5"	S		SL		CLAYSTONE; brown to red, stiff to very stiff.
							Stopped at 25 feet.
30							NR-G - No recovery, but took grab sample.

LOG OF BORING NO. 2

Project Water Disposal Pond Job No. 3128J024

Elevation 85.2 Datum Assumed Elev. 100.0 - S.E. Corner, N. Pond

Type/Size Boring 7" Auger Rig Type CME-55

Groundwater Conditions No groundwater was encountered on 03/30/88 Date 03/30/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
					PL	CL	SANDY CLAY; brown, firm to stiff. Medium to high plasticity. Some thin sand layers.
		50/8"	R	115	10.6		
5		50/6"	R	124	9.6		
		36	S				
10							
			G				
		24	S				
15							
		20	S				
20							
		19	S				
25							
							Stopped at 25 feet.
							G = 50# Grab (12-20 feet)
30							

LOG OF BORING NO. 3

Project Water Disposal Pond Job No. 3128J024

Elevation 98.0 Datum Assumed Elev. 100.0 - S.E. Corner, N. Pond

Type/Size Boring 7" Auger Rig Type CME-55

Groundwater Conditions No groundwater was encountered on 03/30/88 Date 03/30/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
5					PL	CL	SANDY CLAY; brown, firm to stiff. Medium to high plasticity.
		41	R	106	12.5		
10							Stopped at 6 feet.
15							
20							
25							
30							

LOG OF BORING NO. 4

Project Water Disposal Pond Job No. 3128J024

Elevation 98.1 Datum Assumed Elev. 100.0 - S.E. Corner, N. Pond

Type/Size Boring 7" Auger Rig Type CME-55

Groundwater Conditions No groundwater was encountered on 03/30/88 Date 03/30/88

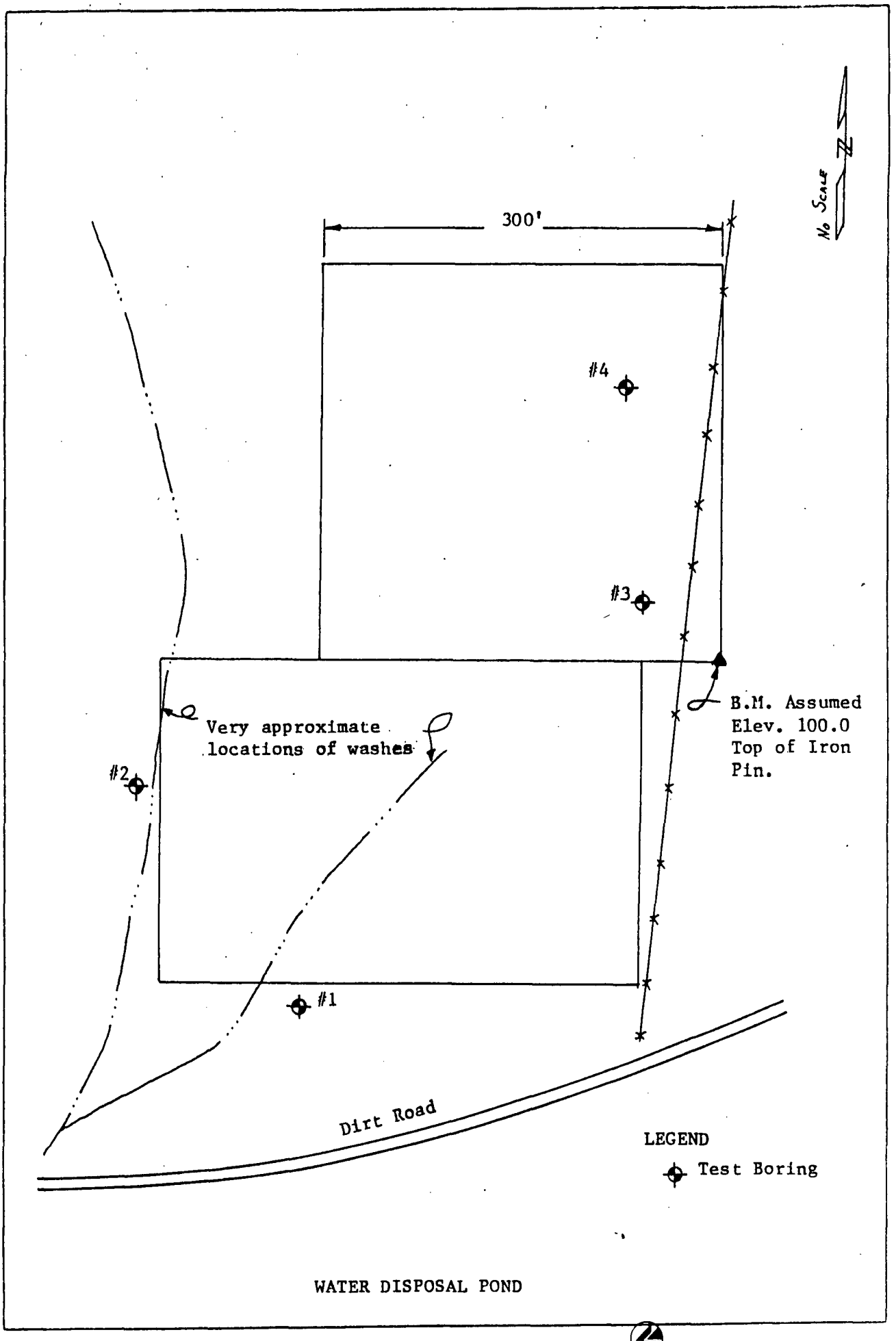
Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
					PL	CL	SANDY CLAY; brown, firm to stiff. Medium to high plasticity.
5		36	R	113	11.7		
							Stopped at 6 feet.
10							
15							
20							
25							
30							

Prepared By L. E. C. Date 04/21/88

Checked By Date

Job No. 3128JQ24

Client Tony Schmitz



WATER DISPOSAL POND

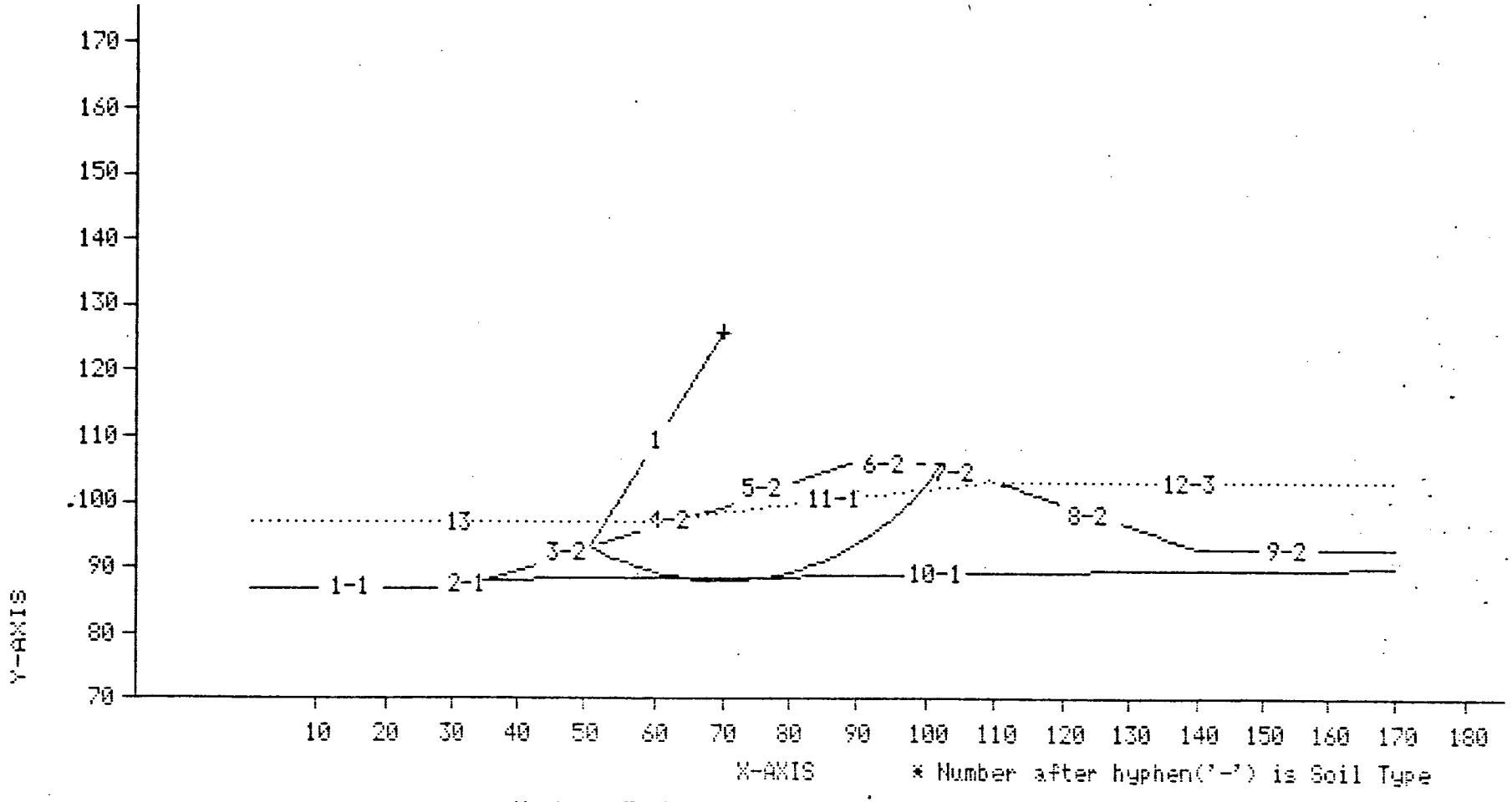
SB-SLOPE

Simplified Bishop Slope Stability Analysis

PROJECT: WATER DISPOSAL POND
LOCATION: LINDRITH, NEW MEXICO
FILE: LINDOU2
COMPLETE SLOPE CROSS SECTION

CIRCLE	X	Y	RADIUS	FS
1	70.0	126.0	38.0	3.79

SOIL*	DENSITY	COHESION	PHI
1	105.0	600.0	16.0
2	108.0	300.0	12.0
3	62.4	0.0	0.0



Western Technologies Inc. - Phoenix, AZ

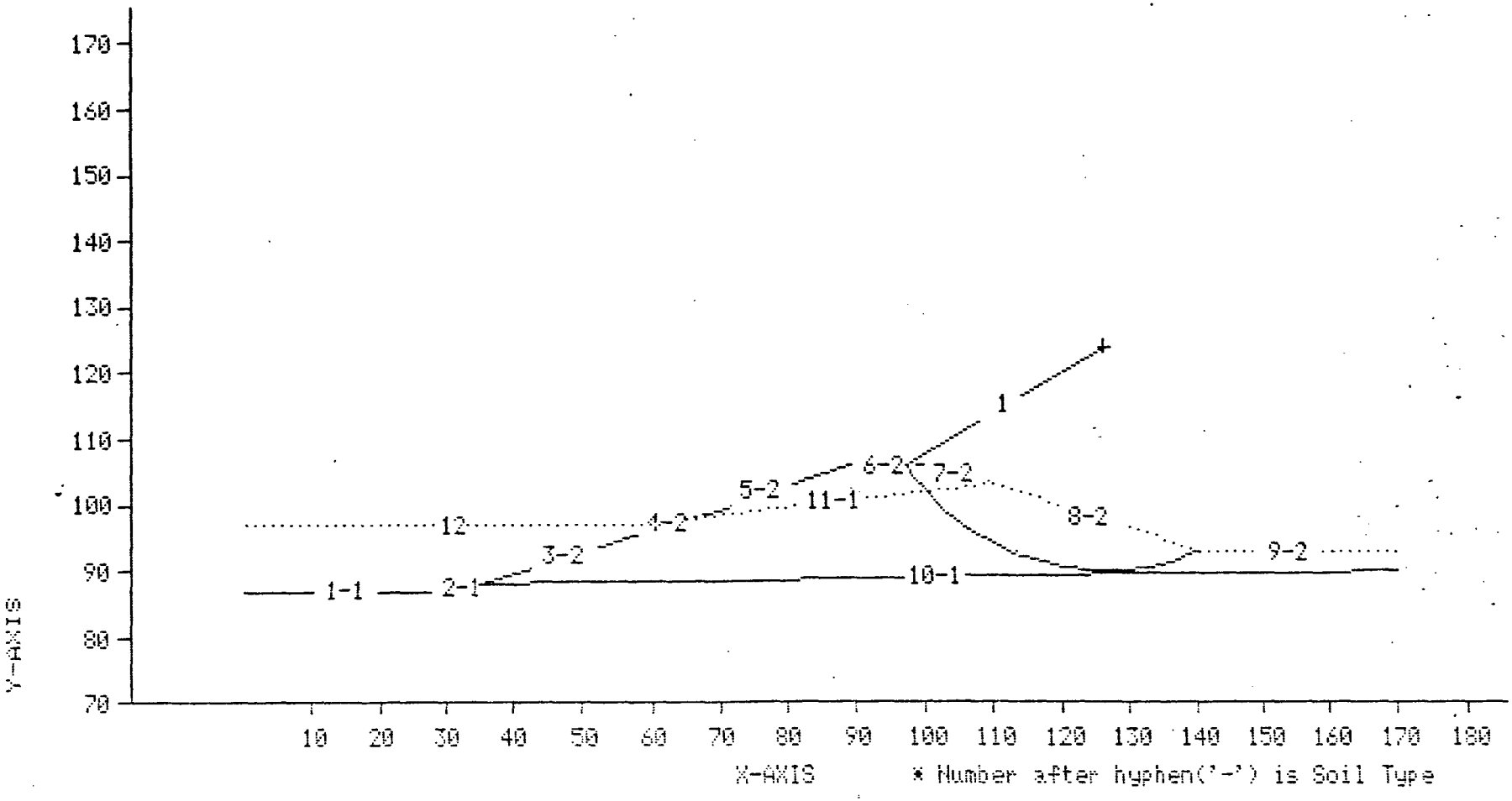
SB-SLOPE

Simplified Bishop Slope Stability Analysis

PROJECT: WATER DISPOSAL POND
LOCATION: LINDRITH, NEW MEXICO
FILE: LINDOU3
COMPLETE SLOPE CROSS SECTION

SOIL*	DENSITY	COHESION	PHI
1	105.0	600.0	16.0
2	108.0	300.0	12.0

CIRCLE	X	Y	RADIUS	FS
1	126.0	124.0	34.0	2.74



* Number after hyphen('-') is Soil Type

Western Technologies Inc. - Phoenix, AZ

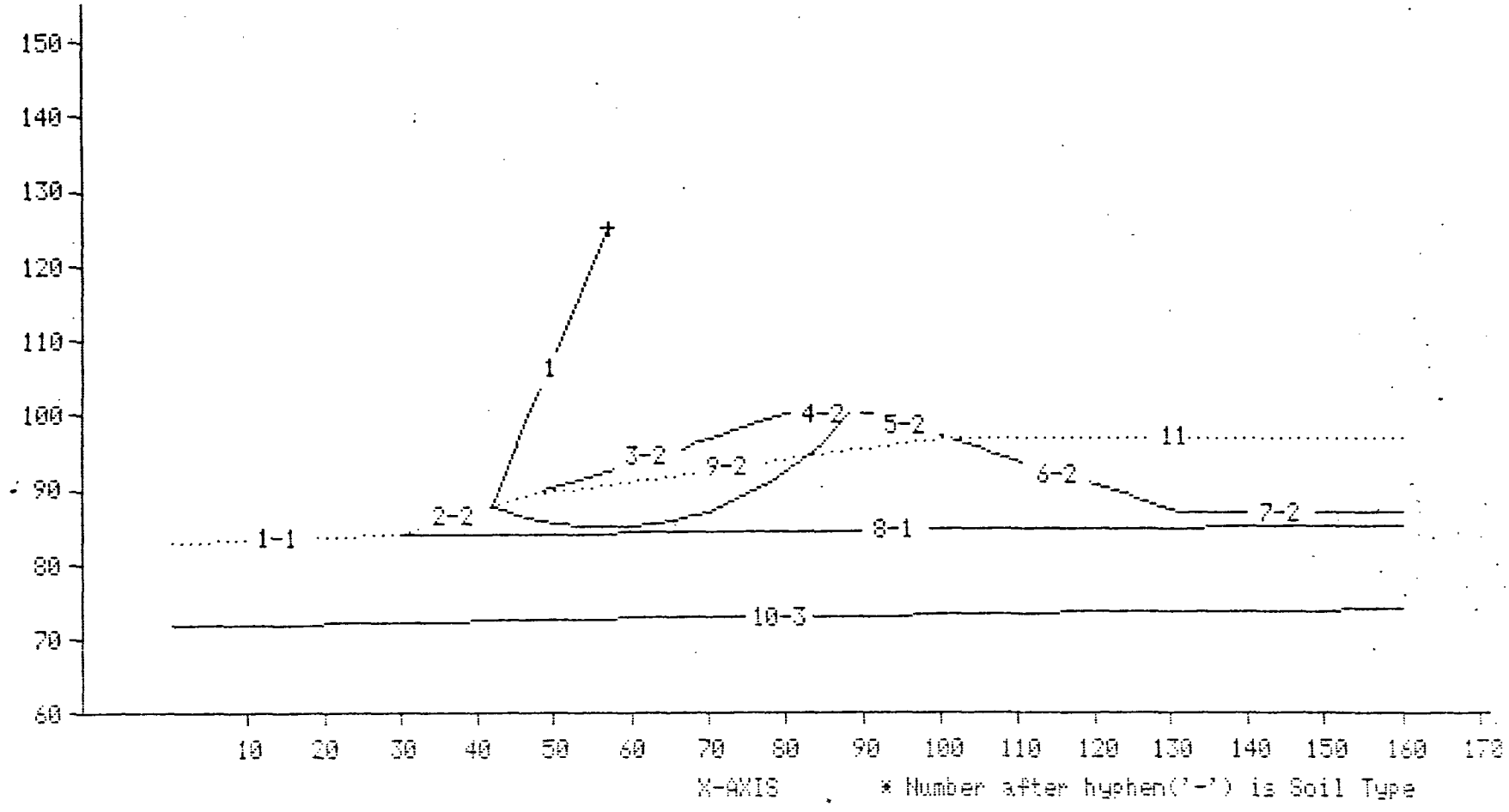
SB-SLOPE

Simplified Bishop Slope Stability Analysis

PROJECT: WATER DISPOSAL POND
LOCATION: LINDRITH,NEW MEXICO
FILE: LIN2
COMPLETE SLOPE CROSS SECTION

SOIL*	DENSITY	COHESION	PHI
1	115.0	600.0	16.0
2	108.0	300.0	12.0
3	140.0	0.0	30.0

CIRCLE	X	Y	RADIUS	FS
1	57.0	125.0	40.0	2.51



* Number after hyphen('-') is Soil Type

Western Technologies Inc. - Phoenix, AZ

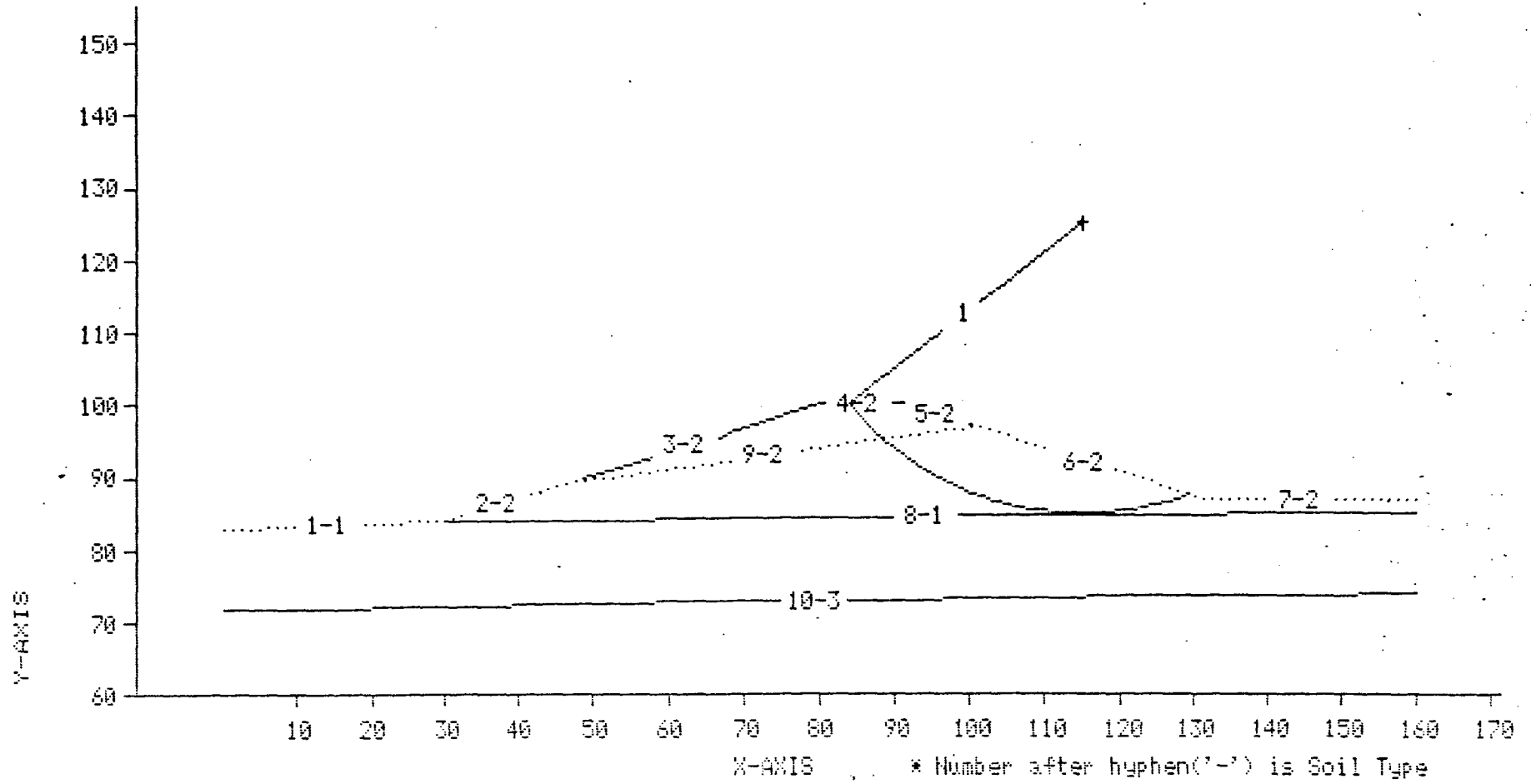
SB-SLOPE

Simplified Bishop Slope Stability Analysis

PROJECT: WATER DISPOSAL POND
LOCATION: LINDRITH, NEW MEXICO
FILE: LIN3
COMPLETE SLOPE CROSS SECTION

SOIL*	DENSITY	COHESION	PHI
1	115.0	600.0	16.0
2	108.0	300.0	12.0
3	140.0	0.0	30.0

CIRCLE	X	Y	RADIUS	FS
1	115.0	125.0	40.0	2.31



* Number after hyphen('-') is Soil Type

Western Technologies Inc. - Phoenix, AZ

VOLUMES AND X-SECTIONS

TNT Construction

HIGH COUNTRY SURVEYS
FARMINGTON, NM

JOB
TNT CONSTRUCTION

****
***** QUANTITY TOTALS *****
****

ACCUMULATED QUANTITIES
(cubic yards)

CUT	FILL UNCOMPACTED	FILL COMPACTED
17818.1	13258.6	13258.6

****

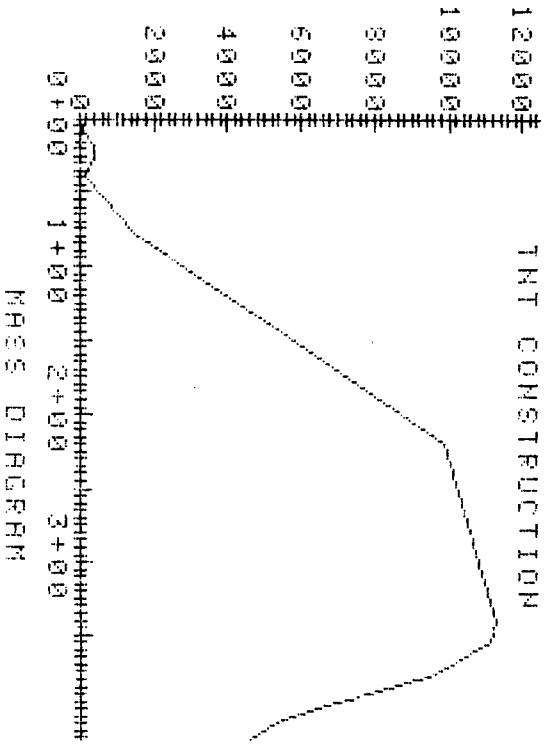
AREAS & VOLUMES

STATION	CUT AREA (sf) / VOL (cy)	FILL AREA (sf) / VOL (cy)
0+00	0.0	0.0
	107.9	0.0
0+08	728.3	0.0
	262.8	2.9
0+18	690.5	15.4
	148.6	111.3
0+27	201.2	652.2
	80.1	311.2
0+39	159.5	748.1
	1974.5	642.3
0+78	2574.5	141.3
	10368.9	1987.2
2+20	1368.6	614.5
	4495.1	3101.0
3+40	654.2	781.0
	251.5	420.2
3+54	315.8	839.9
	128.7	1565.0
3+76	0.0	3001.5
	0.0	1578.7
3+88.5	0.0	3818.5
	0.0	1373.2
3+98	0.0	3987.3
	0.0	1459.5
4+09	0.0	3177.6
	0.0	706.1
4+21	0.0	0.0

MASS DIAGRAM ORDINATE
(cubic yards)

STATION	UNCOMPACTED	COMPACTED
0+00	0.0	0.0
0+08	107.9	107.9
0+18	367.8	367.8
0+27	405.1	405.1
0+39	174.1	174.1
0+78	1506.3	1506.3
2+20	9888.0	9888.0
3+40	11282.2	11282.2
3+54	11113.4	11113.4
3+76	9677.1	9677.1
3+88.5	8098.4	8098.4
3+98	6725.2	6725.2
4+09	5265.6	5265.6
4+21	4559.5	4559.5

STATION	COMPACTION RATIO
0+08	1.000
0+18	1.000
0+27	1.000
0+39	1.000
0+78	1.000
2+20	1.000
3+40	1.000
3+54	1.000
3+76	1.000
3+88.5	1.000
3+98	1.000
4+09	1.000
4+21	1.000



JOB
TNT CONSTRUCTION

INITIAL
STATION 0+00
Compaction Ratio 1.000

	CUT	FILL
AREA (sf)	0.0	0.0
VOLUME (cy)	0.0	0.0

JOB
TNT CONSTRUCTION

STATION 0+08
Compaction Ratio 1.000

	CUT	FILL
AREA (sf)	728.3	0.0
VOLUME (cy)	107.9	0.0
COMPACTED FILL (cy)		0.0

ACCUMULATED QUANTITIES
(cubic yards)

CUT	FILL UNCOMPACTED	FILL COMPACTED
107.9	0.0	0.0

MASS DIAGRAM ORDINATE
(cubic yards)

UNCOMPACTED	COMPACTED
107.9	107.9

TERRAIN

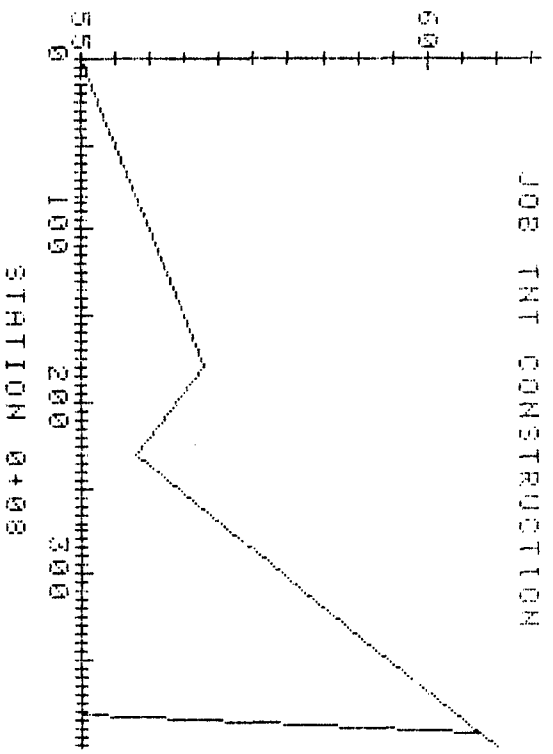
#	ELEV	DIST
1	55.00	0.00
2	56.80	180.00
3	55.80	230.00
4	61.00	402.00

TEMPLATE

#	ELEV	DIST
1	55.00	10.00
2	55.00	382.00

SIDE SLOPES

	LEFT	RIGHT
CUT:	3/1	2/1
FILL:	3/1	2/1



CATCH POINTS

	ELEV	DIST
LEFT:	55.10	9.71
RIGHT:	60.74	393.49

JOB
TNT CONSTRUCTION

STATION 0+18
Compaction Ratio 1.000

	CUT	FILL
AREA (sf)	690.5	15.4
VOLUME (cy)	262.8	2.9
COMPACTED FILL (cy)		2.9

ACCUMULATED QUANTITIES
(cubic yards)

CUT	FILL UNCOMPACTED	FILL COMPACTED
370.7	2.9	2.9

MASS DIAGRAM ORDINATE
(cubic yards)

UNCOMPACTED	COMPACTED
367.8	367.8

TERRAIN

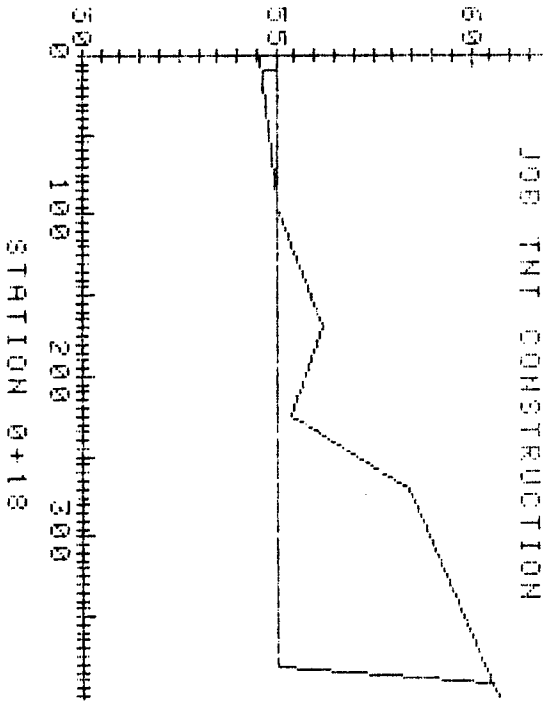
#	ELEV	DIST
1	54.60	0.00
2	55.00	95.00
3	56.20	170.00
4	55.40	226.00
5	58.40	271.00
6	60.70	402.00

TEMPLATE

#	ELEV	DIST
1	55.00	10.00
2	55.00	382.00

SIDE SLOPES

	LEFT	RIGHT
CUT:	3/1	2/1
FILL:	3/1	2/1



CATCH POINTS

	ELEV	DIST
LEFT:	54.64	8.91
RIGHT:	60.54	393.09

CROSSOVER AT 95.0

JOB
TNT CONSTRUCTION

STATION 0+27
Compaction Ratio 1.000

	CUT	FILL
AREA (sf)	201.2	652.2
VOLUME (cy)	148.6	111.3
COMPACTED FILL (cy)		111.3

ACCUMULATED QUANTITIES
(cubic yards)

CUT	FILL UNCOMPACTED	FILL COMPACTED
519.3	114.1	114.1

MASS DIAGRAM ORDINATE
(cubic yards)

UNCOMPACTED	COMPACTED
405.1	405.1

TERRAIN

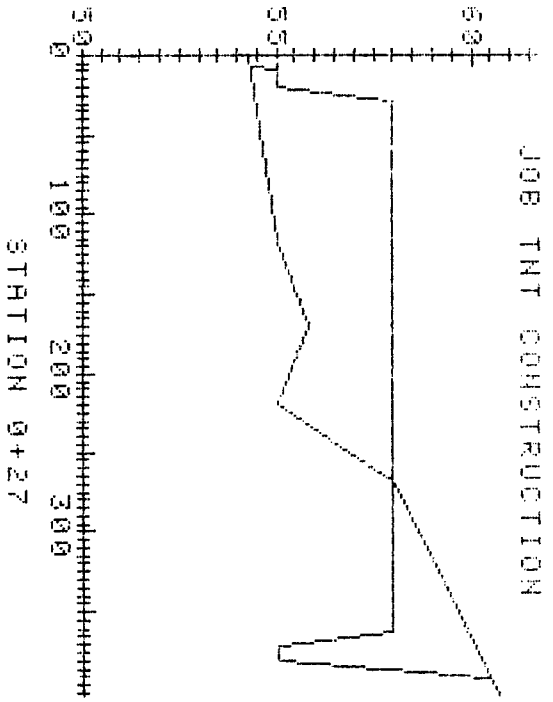
#	ELEV	DIST
1	54.30	0.00
2	55.00	117.00
3	55.80	170.00
4	55.00	220.00
5	58.00	268.00
6	60.70	402.00

TEMPLATE

#	ELEV	DIST
1	55.00	10.00
2	55.00	20.00
3	58.00	29.00
4	58.00	362.00
5	55.00	371.00
6	55.00	381.00

SIDE SLOPES

	LEFT	RIGHT
CUT:	3/1	2/1
FILL:	3/1	2/1



CATCH POINTS

	ELEV	DIST
LEFT:	54.35	8.04
RIGHT:	60.50	392.00

CROSSOVER AT 268.0

JOB
INT CONSTRUCTION

STATION 0+39
Compaction Ratio 1.000

	CUT	FILL
AREA (sf)	159.5	748.1
VOLUME (cy)	80.1	311.2
COMPACTED FILL (cy)		311.2

ACCUMULATED QUANTITIES
(cubic yards)

CUT	FILL UNCOMPACTED	FILL COMPACTED
599.4	425.3	425.3

MASS DIAGRAM ORDINATE
(cubic yards)

UNCOMPACTED	COMPACTED
174.1	174.1

TERRAIN

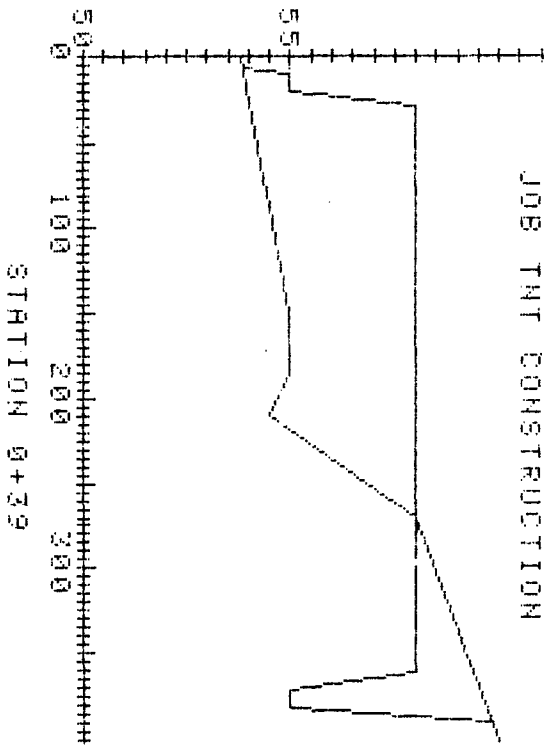
#	ELEV	DIST
1	53.80	0.00
2	55.00	150.00
3	55.00	185.00
4	54.50	210.00
5	58.00	270.00
6	60.00	402.00

TEMPLATE

#	ELEV	DIST
1	55.00	10.00
2	55.00	20.00
3	58.00	29.00
4	58.00	362.00
5	55.00	371.00
6	55.00	381.00

SIDE SLOPES

	LEFT	RIGHT
CUT:	3/1	2/1
FILL:	3/1	2/1



CATCH POINTS

	ELEV	DIST
LEFT:	53.85	6.56
RIGHT:	59.83	390.66

CROSSOVER AT 270.0

JOB
TNT CONSTRUCTION

STATION 0+78
Compaction Ratio 1.000

	CUT	FILL
AREA (sf)	2574.5	141.3
VOLUME (cy)	1974.5	642.3
COMPACTED FILL (cy)		642.3

ACCUMULATED QUANTITIES
(cubic yards)

CUT	FILL UNCOMPACTED	FILL COMPACTED
2573.9	1067.6	1067.6

MASS DIAGRAM ORDINATE
(cubic yards)

UNCOMPACTED	COMPACTED
1506.3	1506.3

TERRAIN

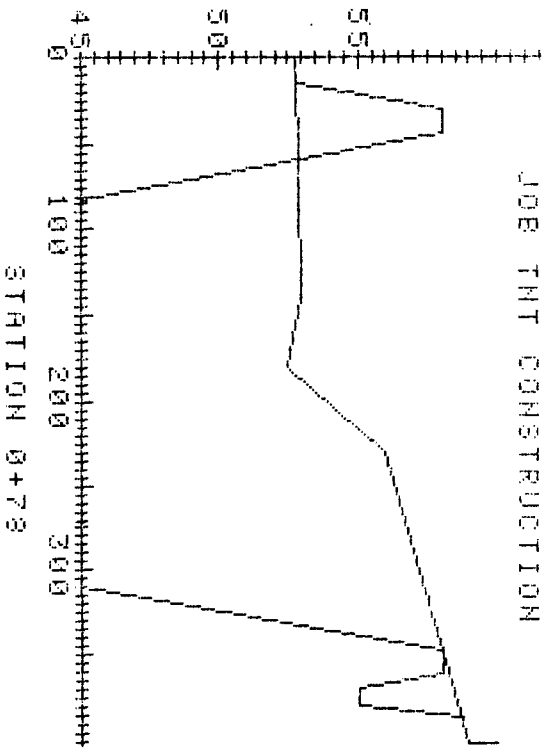
#	ELEV	DIST
1	52.80	0.00
2	53.00	140.00
3	52.50	180.00
4	56.00	230.00
5	59.00	402.00
6	60.00	402.00

TEMPLATE

#	ELEV	DIST
1	58.00	31.00
2	58.00	43.00
3	45.00	82.00
4	45.00	310.00
5	58.00	349.00
6	58.00	361.00
7	55.00	370.00
8	55.00	380.00

SIDE SLOPES

	LEFT	RIGHT
CUT:	3/1	2/1
FILL:	3/1	2/1



CATCH POINTS

	ELEV	DIST
LEFT:	52.82	15.47
RIGHT:	58.75	387.49

CROSSOVER AT 58.4

JOB
TNT CONSTRUCTION

STATION 2+20
Compaction Ratio 1.000

	CUT	FILL
AREA (sf)	1368.6	614.5
VOLUME (cy)	10368.9	1987.2
COMPACTED FILL (cy)		1987.2

ACCUMULATED QUANTITIES
(cubic yards)

CUT	FILL UNCOMPACTED	FILL COMPACTED
12942.8	3054.8	3054.8

MASS DIAGRAM ORDINATE
(cubic yards)

UNCOMPACTED	COMPACTED
9888.0	9888.0

TERRAIN

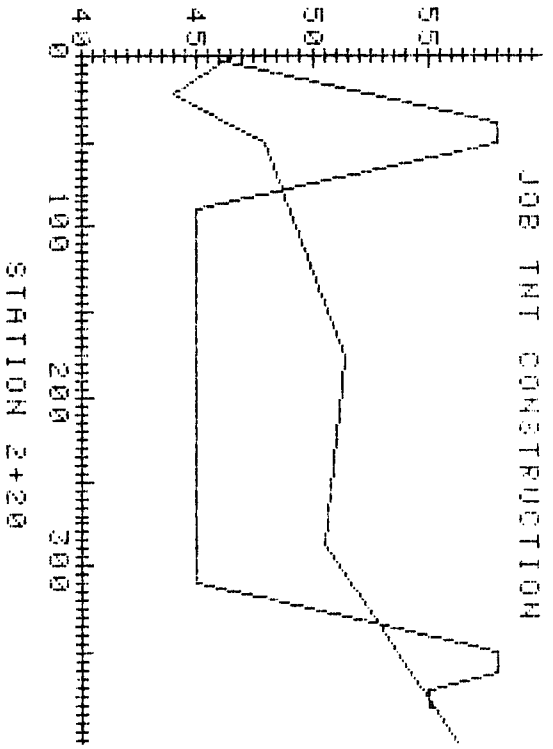
#	ELEV	DIST
1	46.60	0.00
2	44.00	22.00
3	48.00	50.00
4	51.40	176.00
5	50.60	287.00
6	56.30	402.00

TEMPLATE

#	ELEV	DIST
1	58.00	38.00
2	58.00	50.00
3	45.00	89.00
4	45.00	310.00
5	58.00	350.00
6	58.00	362.00
7	55.00	371.00
8	55.00	381.00

SIDE SLOPES

	LEFT	RIGHT
CUT:	3/1	2/1
FILL:	3/1	2/1



CATCH POINTS

	ELEV	DIST
LEFT:	46.27	2.81
RIGHT:	55.29	381.58

CROSSOVER AT 77.8
CROSSOVER AT 334.5
CROSSOVER AT 375.8

JOB
TNT CONSTRUCTION

STATION 3+40
Compaction Ratio 1.000

	CUT	FILL
AREA (sf)	654.2	781.0
VOLUME (cy)	4495.1	3101.0
COMPACTED FILL (cy)		3101.0

ACCUMULATED QUANTITIES
(cubic yards)

CUT	FILL UNCOMPACTED	FILL COMPACTED
17437.9	6155.7	6155.7

MASS DIAGRAM ORDINATE
(cubic yards)

UNCOMPACTED	COMPACTED
11282.2	11282.2

TERRAIN

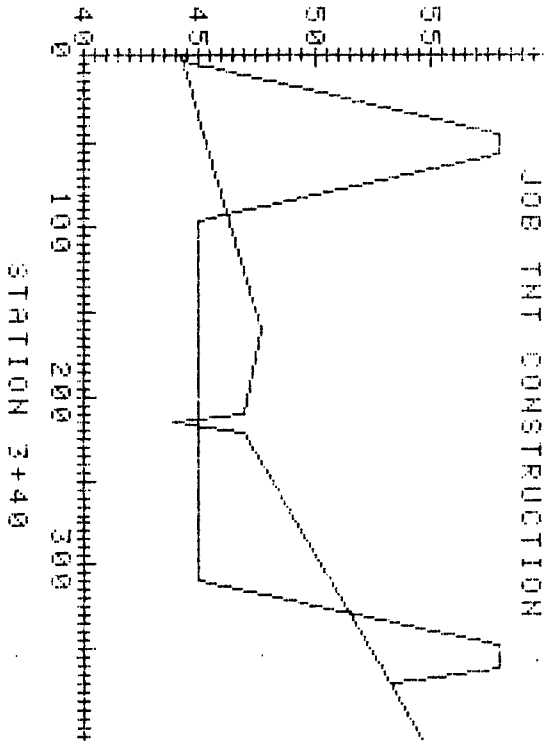
#	ELEV	DIST
1	44.20	0.00
2	47.70	160.00
3	47.00	210.00
4	43.80	216.00
5	47.00	222.00
6	54.70	402.00

TEMPLATE

#	ELEV	DIST
1	58.00	45.00
2	58.00	57.00
3	45.00	96.00
4	45.00	310.00
5	58.00	349.00
6	58.00	361.00

SIDE SLOPES

	LEFT	RIGHT
CUT:	3/1	2/1
FILL:	3/1	2/1



CATCH POINTS

	ELEV	DIST
LEFT:	44.28	3.85
RIGHT:	53.34	370.31

CROSSOVER AT 92.3
CROSSOVER AT 213.8
CROSSOVER AT 218.3
CROSSOVER AT 329.8

JOB
TNT CONSTRUCTION

STATION 3+54
Compaction Ratio 1.000

	CUT	FILL
AREA (sf)	315.8	839.9
VOLUME (cy)	251.5	420.2
COMPACTED FILL (cy)		420.2

ACCUMULATED QUANTITIES
(cubic yards)

CUT	FILL UNCOMPACTED	FILL COMPACTED
17689.4	6576.0	6576.0

MASS DIAGRAM ORDINATE
(cubic yards)

UNCOMPACTED	COMPACTED
11113.4	11113.4

TERRAIN

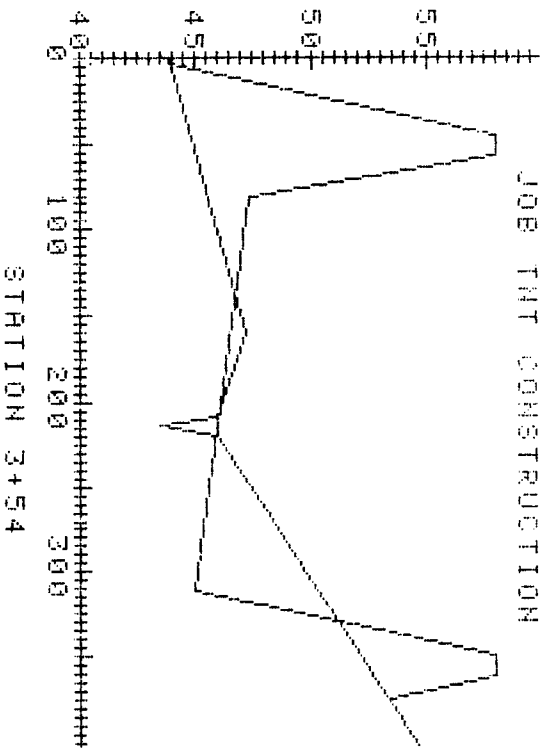
#	ELEV	DIST
1	43.80	0.00
2	47.20	160.00
3	46.00	209.00
4	43.50	214.00
5	46.00	220.00
6	54.60	402.00

TEMPLATE

#	ELEV	DIST
1	58.00	45.50
2	58.00	57.50
3	47.30	81.00
4	45.00	310.50
5	58.00	349.50
6	58.00	361.50

SIDE SLOPES

	LEFT	RIGHT
CUT:	3/1	3/1
FILL:	3/1	3/1



CATCH POINTS

	ELEV	DIST
LEFT:	43.87	3.10
RIGHT:	53.35	375.46

CROSSOVER AT 137.9
CROSSOVER AT 207.8
CROSSOVER AT 219.8
CROSSOVER AT 328.9

JOB
TNT CONSTRUCTION

STATION 3+76
Compaction Ratio 1.000

	CUT	FILL
AREA (sf)	0.0	3001.5
VOLUME (cy)	128.7	1565.0
COMPACTED FILL (cy)		1565.0

ACCUMULATED QUANTITIES
(cubic yards)

CUT	FILL UNCOMPACTED	FILL COMPACTED
17818.1	8141.0	8141.0

MASS DIAGRAM ORDINATE
(cubic yards)

UNCOMPACTED	COMPACTED
9677.1	9677.1

TERRAIN

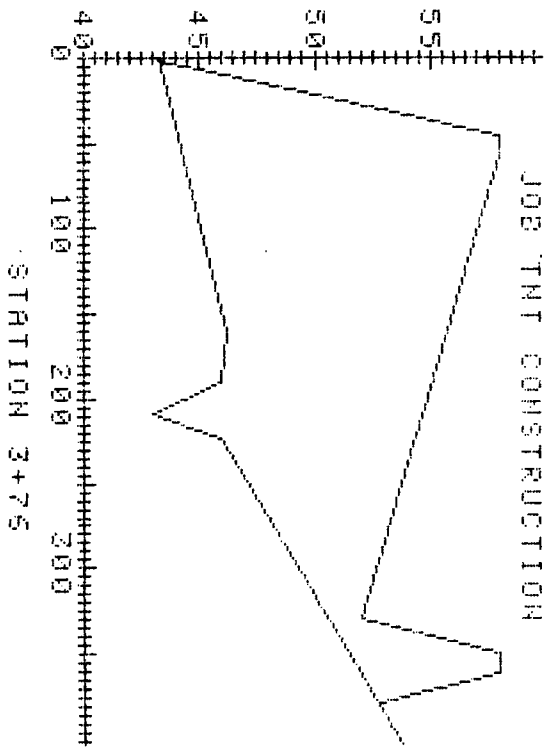
#	ELEV	DIST
1	43.20	0.00
2	46.20	160.00
3	46.00	190.00
4	43.00	208.00
5	46.00	224.00
6	53.80	402.00

TEMPLATE

#	ELEV	DIST
1	58.00	46.00
2	58.00	58.00
3	52.00	330.00
4	58.00	350.00
5	58.00	362.00

SIDE SLOPES

	LEFT	RIGHT
CUT:	3/1	3/1
FILL:	3/1	3/1



CATCH POINTS

	ELEV	DIST
LEFT:	43.23	1.70
RIGHT:	52.74	377.78

JOB
TNT CONSTRUCTION

STATION 3+88.5
Compaction Ratio 1.000

	CUT	FILL
AREA (sf)	0 0	3818.5
VOLUME (cy)	0 0	1578.7
COMPACTED FILL (cy)		1578.7

ACCUMULATED QUANTITIES
(cubic yards)

CUT	FILL UNCOMPACTED	FILL COMPACTED
17818.1	9719.7	9719.7

MASS DIAGRAM ORDINATE
(cubic yards)

UNCOMPACTED	COMPACTED
8098.4	8098.4

TERRAIN

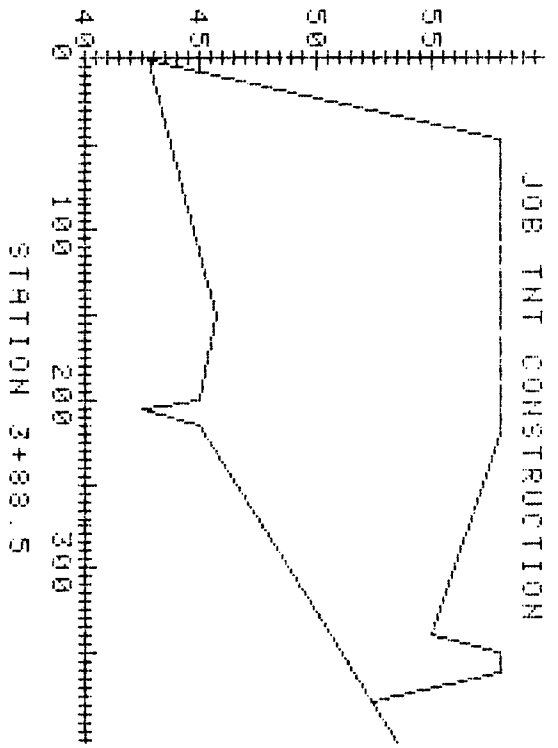
#	ELEV	DIST
1	42.80	0.00
2	45.70	150.00
3	45.00	200.00
4	42.50	205.00
5	45.00	215.00
6	53.50	402.00

TEMPLATE

#	ELEV	DIST
1	58.00	47.00
2	58.00	220.00
3	55.00	340.00
4	58.00	350.00
5	58.00	362.00

SIDE SLOPES

	LEFT	RIGHT
CUT:	3/1	3/1
FILL:	3/1	3/1



CATCH POINTS

	ELEV	DIST
LEFT:	42.83	1.49
RIGHT:	52.44	378.68

JOB
TNT CONSTRUCTION

STATION 3+98
Compaction Ratio 1.000

	CUT	FILL
AREA (sf)	0.0	3987.2
VOLUME (cy)	0.0	1373.2
COMPACTED FILL (cy)		1373.2

ACCUMULATED QUANTITIES
(cubic yards)

CUT	FILL UNCOMPACTED	FILL COMPACTED
17818.1	11092.9	11092.9

MASS DIAGRAM ORDINATE
(cubic yards)

UNCOMPACTED	COMPACTED
6725.2	6725.2

TERRAIN

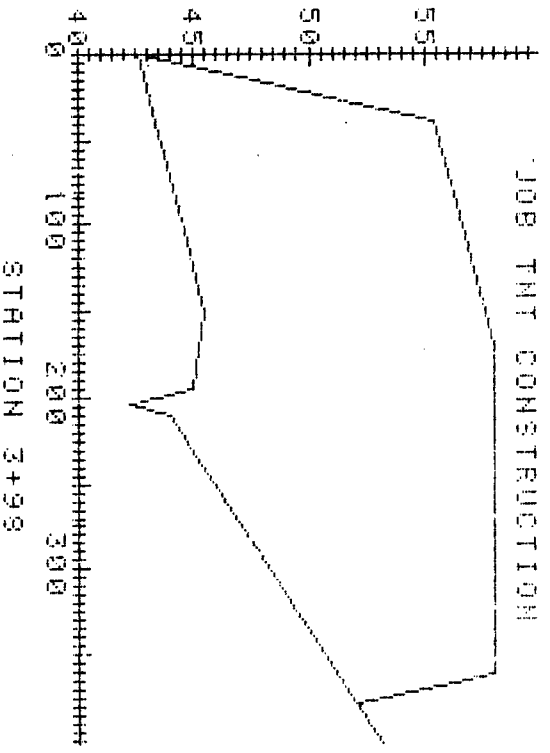
#	ELEV	DIST
1	42.60	0.00
2	45.50	150.00
3	45.00	195.00
4	42.30	204.00
5	44.00	210.00
6	53.10	402.00

TEMPLATE

#	ELEV	DIST
1	55.33	39.00
2	58.00	170.00
3	58.00	361.00

SIDE SLOPES

	LEFT	RIGHT
CUT:	3/1	3/1
FILL:	3/1	3/1



CATCH POINTS

	ELEV	DIST
LEFT:	42.62	.86
RIGHT:	52.01	378.97

JOB
TNT CONSTRUCTION

STATION 4+09
Compaction Ratio 1.000

	CUT	FILL
AREA (sf)	0.0	3177.6
VOLUME (cy)	0.0	1459.5
COMPACTED FILL (cy)		1459.5

ACCUMULATED QUANTITIES
(cubic yards)

CUT	FILL UNCOMPACTED	FILL COMPACTED
17818.1	12552.4	12552.4

MASS DIAGRAM ORDINATE
(cubic yards)

UNCOMPACTED	COMPACTED
5265.6	5265.6

TERRAIN

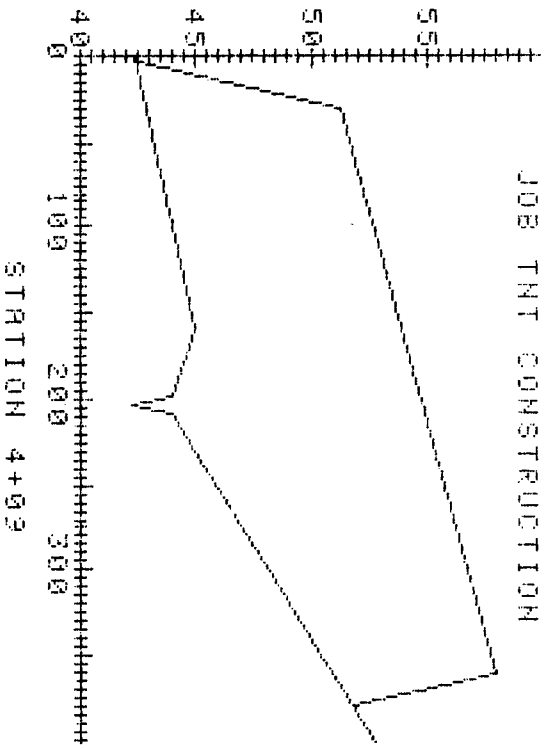
#	ELEV	DIST
1	42.40	0.00
2	45.00	160.00
3	44.00	198.00
4	42.20	204.00
5	44.00	208.00
6	52.80	402.00

TEMPLATE

#	ELEV	DIST
1	51.33	30.00
2	58.00	362.00

SIDE SLOPES

	LEFT	RIGHT
CUT:	3/1	3/1
FILL:	3/1	3/1



CATCH POINTS

	ELEV	DIST
LEFT:	42.45	3.37
RIGHT:	51.83	380.52

JOB
TNT CONSTRUCTION

STATION 4+21
Compaction Ratio 1.000

	CUT	FILL
AREA (sf)	0.0	0.0
VOLUME (cy)	0.0	706.1
COMPACTED FILL (cy)		706.1

ACCUMULATED QUANTITIES
(cubic yards)

CUT	FILL UNCOMPACTED	FILL COMPACTED
17818.1	13258.6	13258.6

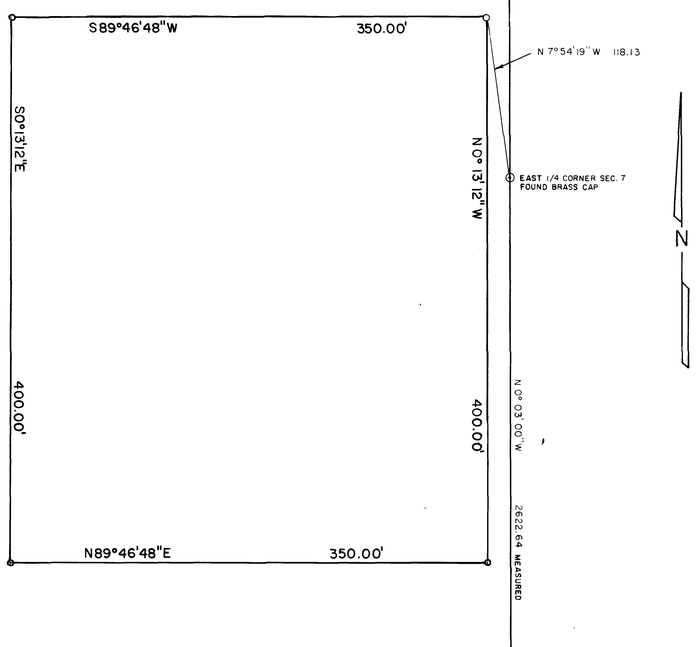
MASS DIAGRAM ORDINATE
(cubic yards)

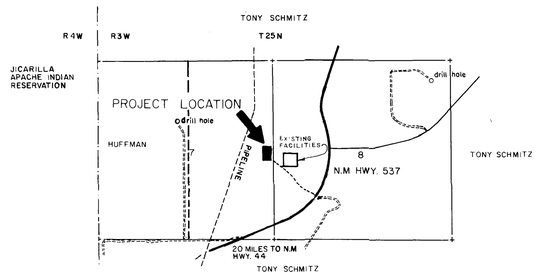
UNCOMPACTED	COMPACTED
4559.5	4559.5

EVAPORATION PIT FOR T.N.T. CONSTRUCTION INC.

PLATE IA

PLAN VIEW
Scale: 1" = 50'





VICINITY MAP
Scale: 1" = 2000'

N

SHEET (1) = LOCATION & FILING SHEET
SHEET(2) = TOPOGRAPHY & DETAILS
SHEET(3) = SOIL ID MAP

EXISTING FACILITIES

7 | 8
18 | 17 FOUND BRASS CAP

SPECIFICATIONS FOR POND CONSTRUCTION

1. Strip all loose surface soils, vegetation, roots and debris from the pond and embankment areas to a horizontal distance of five (5) feet beyond the perimeter of the new construction. Removal should extend one foot below the existing grade or one foot below the bottom of the embankment, whichever is deeper. The soil may be stock piled and used to revegetate areas where clay is stripped for use in the construction of the embankments.

2. Clean and widen depressions, washes, swales, etc., to form level working areas to accommodate compaction equipment and fill placement. Removal should extend 3 feet below the existing grade or until all loose soil is removed from the washes.

3. No material will be placed which is frozen or where the in-place material is frozen.

4. Proof-roll the exposed subgrade in the embankment and pond areas to densify materials which may have been loosened during the stripping and excavation process. Proof-rolling may be accomplished by a minimum of two (2) passes of a loaded scraper or equivalent. Ill soft areas or deep soil horizons will be removed and replaced with compacted fill.

5. Compacted clay liners shall be a minimum of two (2) feet thick uniformly throughout the bottom and sides of the pit, with an extra two (2) feet of clay liner at the toes of sidewall slopes and under aerators.

6. Place and compact all embankment fill in horizontal lifts to the finished grade levels. Lift thicknesses will be compatible with compaction equipment used to achieve the required uniform density. Lift thicknesses will be in intervals of nine (9) inches or less. The maximum size of rock used for fill will be six inches.

7. All fill material should be compacted to at least 95% of the maximum dry density of the clays utilized (ASTM D-698). Fill which is below 10 feet will be compacted to 95-100% of its maximum dry density.

8. The material used in construction should not be allowed to dry between layers or stages of berm construction. When drying has occurred, the dry material will be reconditioned to proper water content with produced or brine water prior to placing subsequent material.

9. When the compacted surface of any layer is too smooth to bond properly with the succeeding, the layer should be scarified or roughened to provide a satisfactory bonding of surfaces before the next layer is placed.

10. At any point of discharge into the pond, no fluid force shall be directed onto the clay lining. To prevent erosion under aerators and on levees splash guards will be installed and will include appropriate rip-rap (secured tires) synthetic materials, discharge tubes with upward facing outlets or various weirs.

11. A positive drainage system will be provided around base (toe) of the outside slope of the proposed embankment throughout the life of the proposed pond.

12. A fence will be constructed around the facility perimeter. Adequate space will be provided between the fence and levees for passage of maintenance vehicles. The fence will be constructed of woven and barbed wire. The fence will be constructed so as to prevent livestock from entering the facility area and to prevent any dumping of produced/waste materials that have not been processed through the existing facility in Section 8.

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_____, 19___.

_____
State Engineer

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

I James P. Leese, being first duly sworn, upon my oath, state that I am a Registered Professional Engineer, qualified in civil engineering, and the accompanying plan(s) consisting of 2 (TWO) sheet(s) were prepared by me and are true and correct to the best of my knowledge and belief.

James P. Leese

License No. 1463

Subscribed and sworn before me this 14th day of September, 1988

Notary Public

OFFICIAL SEAL
JOHN L MARTIN
NOTARY PUBLIC STATE OF NEW MEXICO
My commission expires Apr 12, 1989

JAMES P. LEESE NEW MEXICO 1463 REGISTERED PROFESSIONAL ENGINEER & LAND SURVEYOR
Registered Professional Land Surveyor AND Engineer

MAP
of the
T.N.T. CONSTRUCTION WATER DISPOSAL FACILITY

T.N.T. Construction, Applicant
Located in Rio Arriba County, State of New Mexico.
All courses true

Scale of Map, 1 inch = 50 feet

The undersigned, Tony L. Schmitz, claimant, whose post office address is STAR ROUTE LINDRITH, NM 87029, County of Rio Arriba, State of New Mexico has caused to be located by a qualified Registered Land Surveyor the T.N.T. CONSTRUCTION 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 T.N.T. Construction Water Disposal Facility has the following properties; maximum height above foundation 16 feet; maximum length, 421 feet; maximum width at base, 133 feet; crest width, 12 feet; slope of upstream face, 3 horizontal to one vertical; slope of downstream face, 3 horizontal to one vertical; top of dam elevation, 7158 feet; bottom of pond elevation, 7145 feet; high water line elevation, 7155 feet; freeboard distance 3 feet. The dam will be constructed of well compacted native clay materials. The dam will have a 2 foot thick compacted clay liner. The surface area of the pond at high water line is, 2.1 acres; the capacity at high water line is, 17.6 acre feet.

State of New Mexico)
)ss.
County of Rio Arriba)

I, Tony L. Schmitz, being first duly sworn, upon my oath, state that I have read and examined the accompanying maps and statements consisting of THREE(3) sheets and know the contents thereof and representations thereon, and state that the same are true and correct to the best of my knowledge and belief.

Tony Lee Schmitz
Claimant

Subscribed and sworn before me this 14th day of September, 1988

OFFICIAL SEAL
JOHN L MARTIN
NOTARY PUBLIC STATE OF NEW MEXICO
My commission expires Apr 12, 1989

Notary Public

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 maps of the T.N.T Construction Water Disposal Facility and that such maps consisting of 2 sheets were prepared from field notes of actual surveys 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

License No. 9672

Subscribed and sworn before me this 12th day of September, 1988.

OFFICIAL SEAL
JOHN L MARTIN
NOTARY PUBLIC STATE OF NEW MEXICO
My commission expires Apr 12, 1989

Notary Public

CECIL B. TULLIS NEW MEXICO 9672 REGISTERED PROFESSIONAL LAND SURVEYOR

HIGH COUNTRY SURVEYS
FARMINGTON, NEW MEXICO

SEPTEMBER 13, 1988

T.N.T. CONSTRUCTION INC.

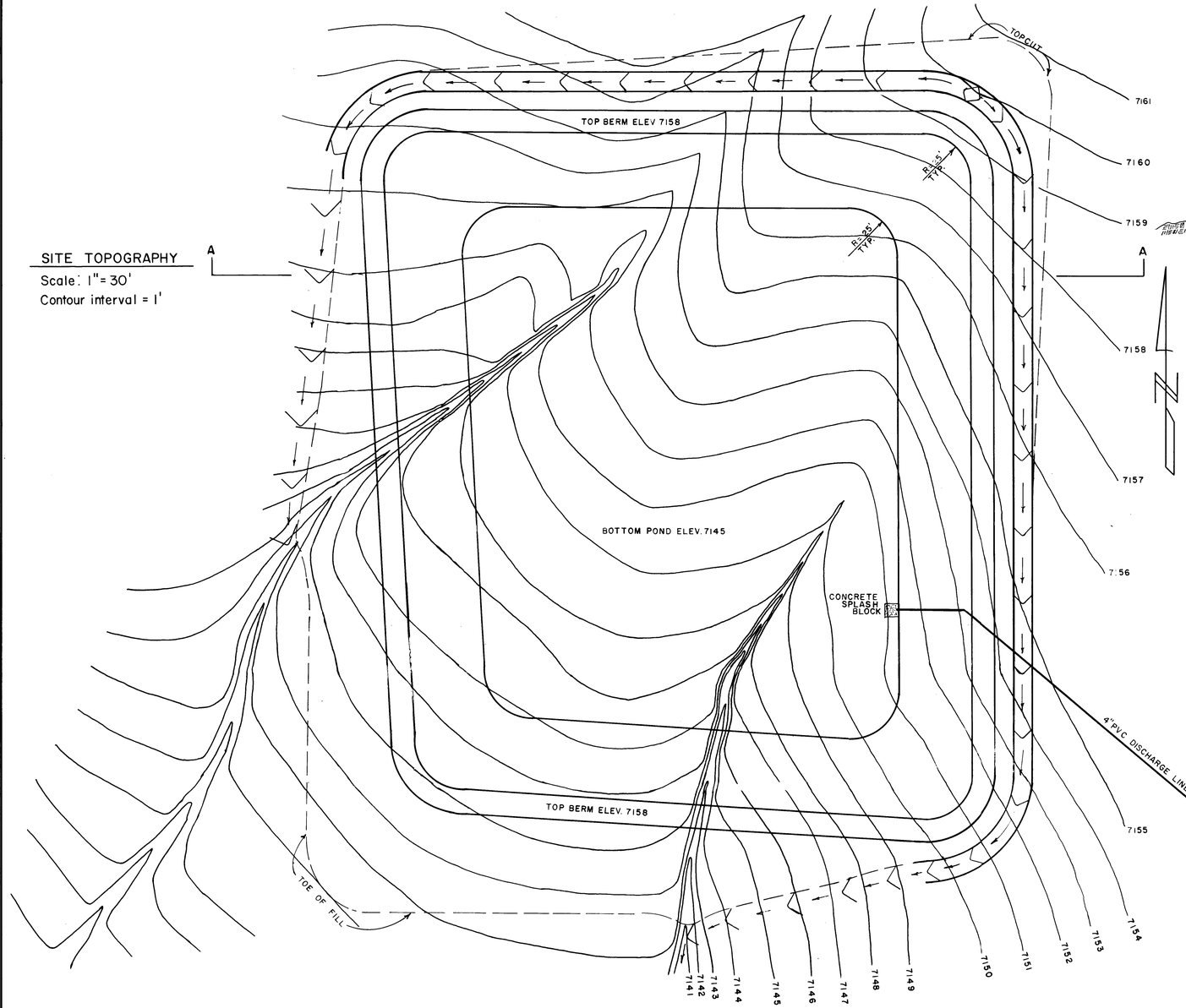
PROPOSED EVAPORATION POND FOR EXPANSION

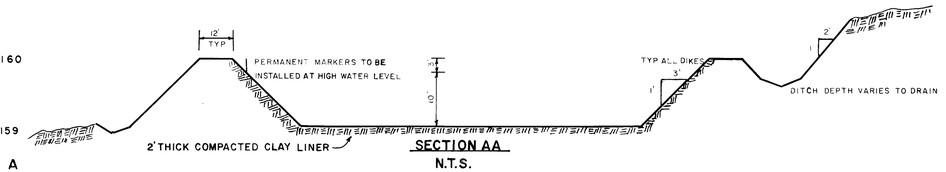
PLATE IB

SITE TOPOGRAPHY

Scale: 1"= 30'

Contour interval = 1'

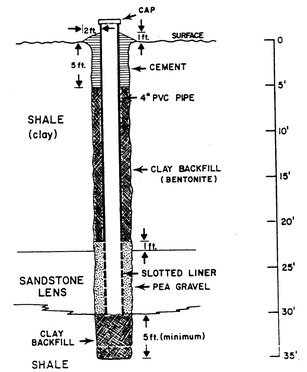




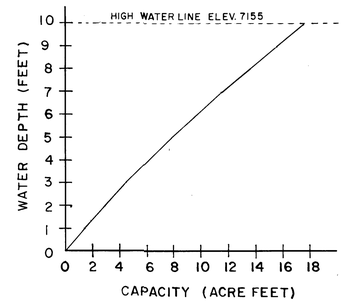
SECTION AA

N.T.S.

MONITER WELL (TYPICAL)

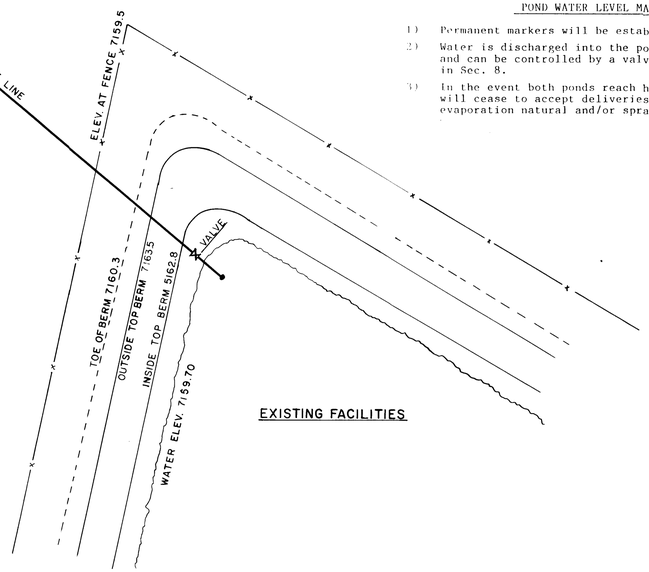


POND CAPACITY



POND WATER LEVEL MANAGEMENT

1) Permanent markers will be established at high water line, elev.(7155)
2) Water is discharged into the pond by means of a gravity flow system and can be controlled by a valve to be located near the existing pond in Sec. 8.
3) In the event both ponds reach high water level T.N.T Construction will cease to accept deliveries of water, until such a time as evaporation natural and/or sprayer enhanced lowers the ponds levels.



EXISTING FACILITIES

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

I James P. Leese, being first duly sworn, upon my oath, state that I am a Registered Professional Engineer, qualified in civil engineering, and the accompanying plan(s) consisting of 2 (TWO) sheet(s) were prepared by me and are true and correct to the best of my knowledge and belief.

James P. Leese

License No. 1463

Subscribed and sworn before me this 14th day of SEPT., 1988

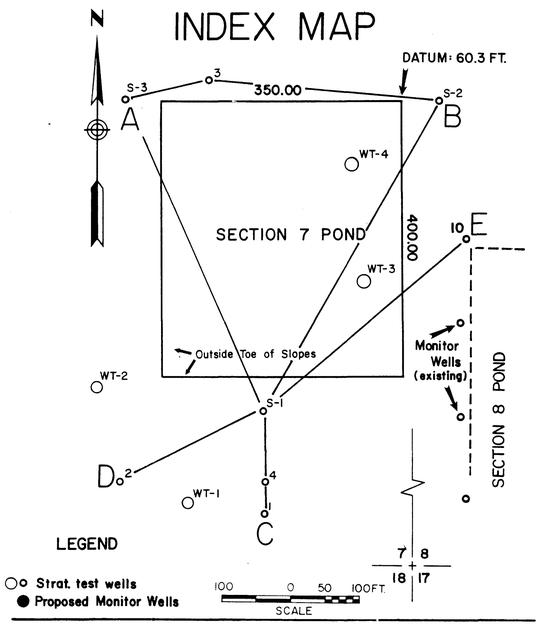
Notary Public

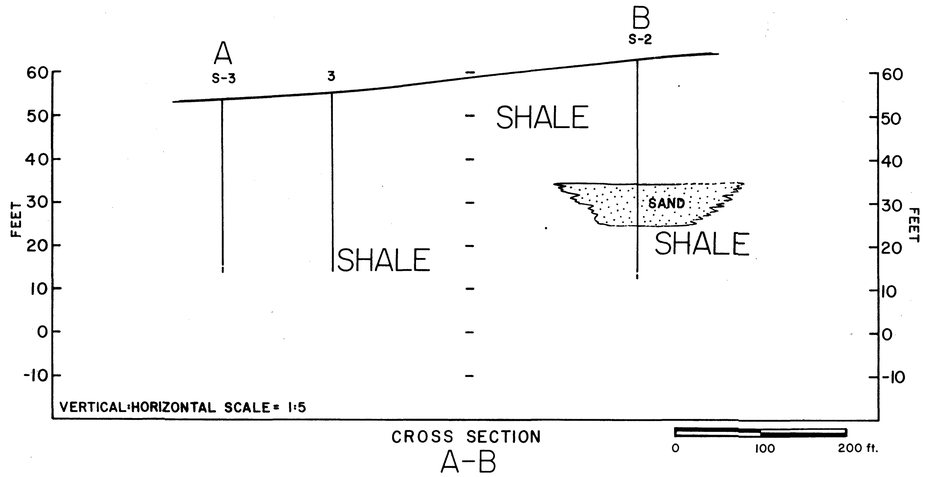
OFFICIAL SEAL
JOHN L MARTIN
NOTARY PUBLIC - STATE OF NEW MEXICO
My commission expires April 16, 1989

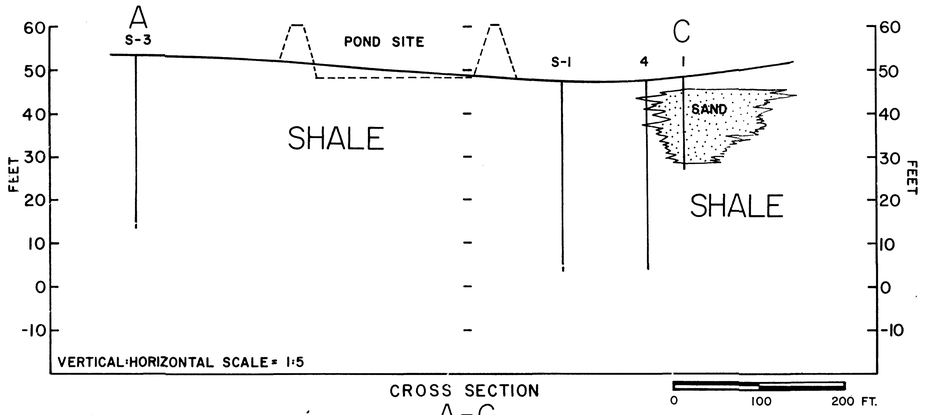
JAMES P. LEESE NEW MEXICO 1463 REGISTERED PROFESSIONAL ENGINEER & LAND SURVEYOR
Registered Professional Land Surveyor AND Engineer

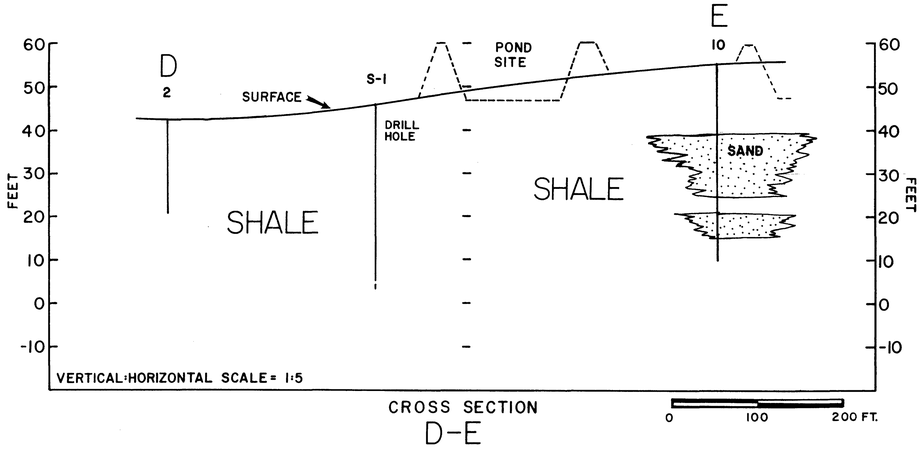
SEPT. 13 1988

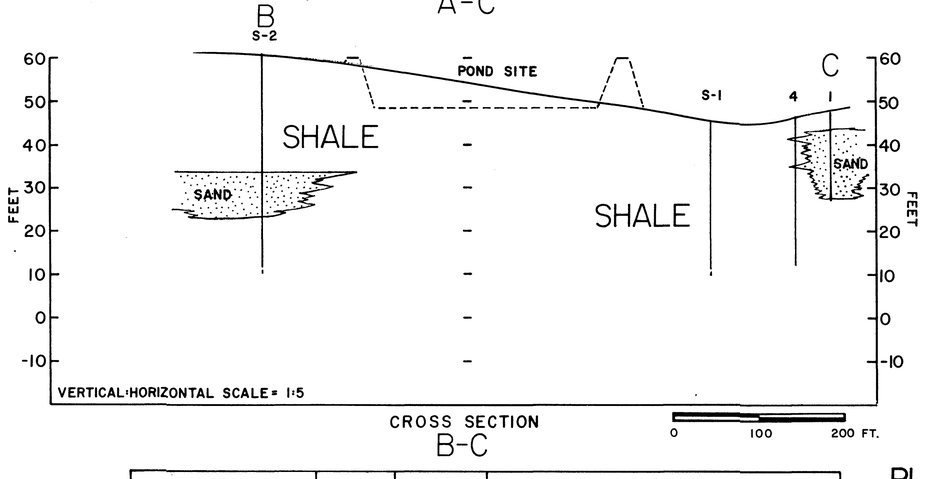
HIGH COUNTRY SURVEYS
FARMINGTON NEW MEXICO











BY:	8/88		TNT CONSTRUCTION, INC. APPLICATION SURFACE DISPOSAL FACILITY

PLATE II.

STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

GARREY CARRUTHERS
GOVERNOR

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

June 20, 1988

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. Tony Schmitz
T-N-T CONSTRUCTION, INC.
Star Route
Lindrith, New Mexico 87029

RE: Enlargement of Commercial Surface Disposal Facility, NW/4, SW/4, Sec. 8, T-25-N, R-3-W, Rio Arriba County, New Mexico.

Dear Mr. Schmitz:

The Oil Conservation Division (OCD) approval of the application for enlargement of your facility is contingent upon the submittal for review, or firm dates for submittal, of the information requested in item 2 below. In addition, requirements for monitor wells around the proposed pits and flood protection measures are listed.

1. Construction of the pits may proceed only after State Engineer approval is obtained. All copies of State Engineer correspondence and proposed engineering diagrams should be filed with this office.

2. Submittal of all items requested in the OCD letter dated March 3, 1988. These items include:

   a) A schedule of proposed sampling locations and sample times for H_2S monitoring.

   b) An H_2S Contingency Plan committing that 1) if air concentration of H_2S reaches 1 ppm at the top of the pond berm for two consecutive monitor readings, the OCD will be notified immediately and 2) if air concentration of H_2S at the top of the pond berm reaches 10 ppm at any time, public safety personnel, such as County Fire Marshal, County Sheriff's Department, New Mexico State Police, and the OCD will be notified. T-N-T must submit plans for actions to be taken to protect public health and safety. Requirements for pond treatment will include daily pH measurement, daily analyses of dissolved sulfides in the pond water, hourly H_2S monitoring, and such additional requirements determined after OCD review.

c) A schedule for submittal of quarterly reports on water levels and conductivity measurements of any fluids in monitor wells and pits. Monitor wells will be checked for fluids monthly.

d) A commitment that if after review of the quarterly monitoring reports, the OCD questions the origin of fluids in the monitor wells, the following contingency plan will be put in operation:

(1) Cease acceptance of disposal fluids until the source of fluids in the monitor wells is determined;

(2) If the liquids are determined to be pit water, submit proposals and timetable for removing the source, determining the extent and degree of contamination, and for mitigating contamination.

3. A registered professional engineer will submit as-built plans for the additional pits as soon as possible after construction. Construction and operation shall include all recommendations made to you in the Western Technologies' May 2, 1988 report.

4. Thirteen monitor wells should be constructed in the same manner as your current monitor wells with placement of the new wells as shown on the attached diagram. The monitor wells should be drilled to a depth of five feet below the bottom of the sandstone indicated on the log of boring No. 1. The log indicates this depth is about 28 feet. If no additional sands or sandstones are encountered, the wells will be plugged back to the bottom of the sandstone and completed with a slotted liner covering the entire lens and extending one foot above the top of the sandstone marker. If the reference sandstone is not encountered in a well, an equivalent total depth, based on strike and dip of the formation, should be drilled and perforated.

5. Complete drillers' log of the monitor wells shall be recorded and furnished to the OCD.

6. Arroyos will be rerouted for flood protection and to prevent flow of arroyo waters into the monitor wells.

Submittal of the items listed in #2 above will allow review of the application to proceed. The OCD will publish public notice after receiving those submittals. After State Engineer approval is obtained, and if no hearing is required, construction of the pits and monitor wells may begin. Use of the new pits will be allowed after OCD approval.

If you have any questions, feel free to contact Jami Bailey at 827-5884.

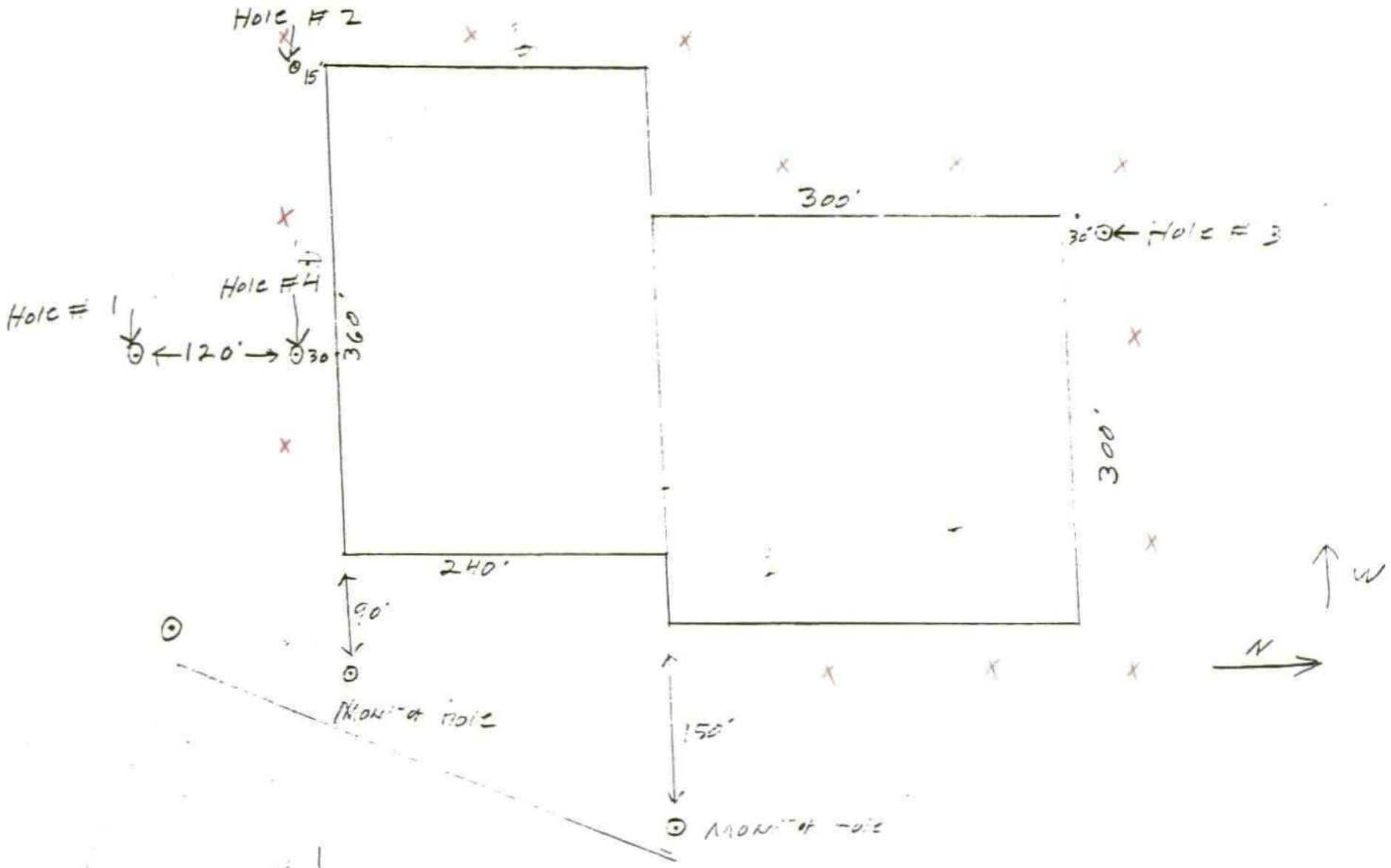
Sincerely,

David G. Boyer
Environmental Bureau Chief

Attachment

DGB:JB:sl

cc: OCD - Aztec



X REQUIRED MONITOR WELLS

T-N-T Construction Inc.
Tony Schmitz
Star Rt.
Lindrith, N.M. 87029

198B

[redacted]

[redacted]

Geotechnical Services For:

Water Disposal Pond
Lindrith, New Mexico
Project No. 3128J024

WESTERN TECHNOLOGIES INC.
The Quality People

ARIZONA

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

Mesa
Gateway Plaza
663 West Second Avenue, No. 10
Mesa, Arizona 85202
(602) 834-3964

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

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

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

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

Sierra Vista
1827 South Paseo San Luis
Sierra Vista, Arizona 85635
(602) 458-0364

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

NEW MEXICO

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

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

NEVADA

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

Terrence E. Lynnox

5-2-88

Submitted to:

Tony Schmitz
Star Route Lindrith
Lindrith, NM 87029

Attn: Mr. Tony Schmitz

May 2, 1988
Inv. No. 31280028

WESTERN TECHNOLOGIES INC.

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

Tony Schmitz
Star Route Lindrith
Lindrith, New Mexico 87029

May 2, 1988

Attn: Mr. Tony Schmitz

Re: Water Disposal Pond
Lindrith, New Mexico

Job No. 3128J024
Inv. No. 31280028

Our geotechnical engineering report for the Water Disposal Pond is attached. The work was performed in accordance with our proposal of March 22, 1988.

Soils at the site generally consisted of sandy clay with low to moderate load bearing capabilities. The existing clays can be used for construction of pond embankments.

We are prepared to review your plans and specifications for consistency with the recommendations, and to provide the construction observation and testing recommended.

Sincerely,

WESTERN TECHNOLOGIES, INC.
Geotechnical Engineering Services

Lawrence E. Cynova, P. E.

Reviewed by: George A. Madrid, P. E.

5-2-88

/cb

Copies to: Addressee (3)

TABLE OF CONTENTS

Geotechnical Engineering Evaluation
Water Disposal Pond
Highway 537
Lindrith, New Mexico

INTRODUCTION

This report contains the results of our geotechnical engineering evaluation for the proposed Water Disposal Pond to be located west of Highway 537 near Lindrith, New Mexico. The purpose of these services is to provide results of field and laboratory testing, to evaluate the use of site soils for construction of the dikes, and to provide engineering recommendations for construction of the dikes.

PROPOSED CONSTRUCTION

The proposed construction will consist of two ponds constructed next to each other but at different levels. The upper pond will have plan dimensions of approximately 300 by 300 feet with a surface area of approximately 2 acres and a storage capacity of approximately 20 acre feet. The lower pond will have plan dimensions of approximately 360 by 240 feet with a surface area of approximately 2 acres and a storage capacity of approximately 20 acre feet. The ponds will be constructed partially in cut and fill. It is understood that the top width of the dikes will be approximately 12 feet with a 3 to 1 (horizontal to vertical) slope on the inside and outside. Also it is understood that the free board for the dikes will be 3 feet and the maximum depth of the water will be 10 feet.

SITE CONDITIONS

At the time of our exploration, the site was undeveloped property. The site contained a sparse to moderate growth of weeds, grass and brush. Site drainage was to the southwest on a

gradual and uniform slope. A fence is located on the east side of the site. A dirt road is located on the south side of the site. Two small washes are located on the site, which consist of shallow swales.

SCOPE OF SERVICES

Four borings were drilled to depths of 6 to 25 feet at the locations shown on the site plan. During exploration, subsoils were visually examined and sampled at selected intervals.

The following tests were performed on selected soil samples:

- Water content
- Dry density
- Compression
- Expansion
- Shear strength
- Gradation
- Plasticity Index
- Permeability

Test results were used in the development of foundation and earthwork recommendations.

Western Technologies Inc. performed the services described in this report to develop engineering information for the purposes defined in the "Introduction." We did not intend to uncover nor identify any contaminated subsurface materials that may contain hazardous or flammable substances. Identification of such substances requires specialized exploration techniques and analyses which were not used in this investigation.

INTERPRETATION OF SUBSURFACE CONDITIONS

Exploration: As presented on Logs of Borings, surface soils and subsoils to depths of 6 to 25 feet, which is the full depth of exploration, in all test borings except test boring 1 were found to be sandy clay of firm to stiff consistency and medium plasticity. The materials underlying the surface soils in test boring 1 and extending to the full depth of exploration consisted of sandstone underlain by claystone. A groundwater table was not encountered in any boring at the time of exploration.

Geology: The proposed water disposal pond is to be located in unconsolidated surficial clay material derived from the local topography. This material was deposited as alluvium washed down from the surrounding foothills and probably originated as a shale from the San Jose Formation. This formation is Eocene in age and is described as the buff, fine to coarse grained arkosic sandstone, conglomeratic sandstone and interbedded gray and red shale which makes up a large percentage of the San Juan Basin. In the northern part of the basin, this formation contains some volcanic debris, including andesite pebbles, but the proportion of volcanic debris and sandstone decreases southward.

ANALYSIS PROCEDURES

General: We understand that the proposed Water Disposal Ponds will store water throughout the year. The ponds will be filled with water from oil and gas production. The water will be evaporated by spraying the water into the air. We believe that all soils in the pond areas will be clay, as indicated on the test boring logs, but if a sand lense is encountered in the side of a dike, then the sand lense should be plated with 2 feet of compacted clay. If a sand lense is encountered in the bottom then it should be removed. The south dike, which is the deepest

fill, and the dike between the two ponds, were chosen for stability analysis.

Material Properties: The on-site undisturbed and compacted clay materials exhibit properties of low cohesion and low to moderate angles of internal friction. The underlying sandstone materials encountered in test boring 1 had nil cohesion and moderate to moderately high angles of internal friction. Based upon our observations, the results of laboratory testing, and our experience with similar materials, the following material properties were assigned to the embankment and foundation soils:

Undisturbed Clays
Dry unit weight - 105 pcf
Angle of internal friction - 16^{o}
Cohesion - 600 psf

Compacted Clays
Dry unit weight - 108 pcf
Angle of internal friction - 12^{o}
Cohesion - 300 psf

Sandstone
Dry unit weight - 140 pcf
Angle of internal friction - 30^{o}
Cohesion - 0 psf

Slope Stability Analysis: The static stability of anticipated embankment slopes was analyzed using strength parameters obtained from laboratory and field testing. The analysis was conducted on those dike configurations as discussed with the client for the project. A computer program (SB-SLOPE program developed by Digital Research Inc.) using simplified Bishop's Analysis was performed for both the upstream and downstream slopes for the anticipated embankment configurations.

The following table presents the results of the analysis:

Section	Condition	Slope	Factor of Safety
Dike between Ponds	Steady State Seepage	Downstream	3.8
	Rapid Drawdown	Upstream	2.7
South Dike	Steady State Seepage	Downstream	2.5
	Rapid Drawdown	Upstream	2.3

A minimum factor of safety of 1.5 is recommended under the steady state condition and rapid drawdown in the design of dams, by the New Mexico State Engineer Office.

After reviewing the Deformation Analysis - Embankment Dams section of the manual for the Procedure on Design Criteria and Safety of Dams, for seismic considerations, seismic analysis is not necessary. This is due to the fact that the proposed embankments and foundations are not subject to liquifaction. Also, the dikes will be densely compacted, the slopes will be 3 horizontal to 1 vertical and the static factor of safety is greater than 1.5.

Seepage Analysis: The ponds will be constructed with compacted clay and the surrounding soils are clay. A permeability test indicates the permeability coefficient of the native sandy clay is 3.8×10^{-8} centimeters per second or 0.04 feet per year.

Piping, which is the movement of material by seepage forces in the foundation and embankments, is not expected due to the anticipated very low seepage quantity.

DISCUSSION AND RECOMMENDATIONS

General: Based on the results of this investigation, we anticipate that the existing clay soils could be used for construction of embankments. It is anticipated that the northeast sides of the ponds will be cut and the southwest sides will be fill. The pond may be satisfactorily supported upon prepared subgrade. If subsoil conditions other than those identified during the field exploration are encountered during construction or should design plans change, this firm should be contacted for supplemental review and recommendations.

The following general conclusions and recommendations are presented:

1. Surface soils in native undeveloped areas are loose to depths of approximately one foot. The surface soils in the washes are loose to depths of probably several feet. Therefore, these zones are not deemed suitable for support of earth embankments. However, removal and replacement of native soils in embankment foundation areas can provide adequate support characteristics of these zones.

2. Native soils below levels of surface soil disturbance are generally of moderate densities and will afford support for anticipated embankments.

3. Excavation of the design pond base should be possible with conventional earthmoving equipment.

Embankment: Homogeneous embankments for construction of the storage pond were analyzed. Homogeneous embankments are constructed using the same soil type throughout the embankment. The soil borings indicate that the materials for homogeneous embankments are readily available on the site.

The proposed homogeneous embankment may be constructed with the on-site clay soils identified during exploration, provided site preparation and earthwork is accomplished as recommended hereinafter. The upstream embankment should be constructed no steeper than 3 to 1 (horizontal to vertical). The downstream embankment should be constructed no steeper than 3 to 1 (horizontal to vertical).

Materials: An investigation of borrow materials in the pond area was performed and test boring logs are provided. The logs indicate there are clays in the cut portion of the pond which would be used for construction of the dikes. A permeability test was also conducted on the soils from these test borings. Based on these test boring logs and permeability test we believe that the on-site soils are suitable to construct the dikes.

Site Preparation and Earthwork: The following procedure is recommended for site preparation and earthwork for the embankment portions of the water disposal pond.

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 existing grade or 1 foot below the bottom of the embankment, whichever is deeper. This soil could be used for revegetating if it is needed.

2. Clean and widen depressions, washes, swales, etc., to form level working areas to accommodate compaction equipment and fill placement. Removal should extend 3 feet below the existing grade or until all loose soil is removed from the washes.

3. No material should be placed which is frozen or where the in-place material is frozen.

4. Proof-roll the exposed subgrade in the embankment and pond areas to densify materials which may have been loosened during the stripping and excavation process. Proof-rolling may be accomplished by a minimum of 2 passes of a loaded scraper or equivalent. All soft areas should be removed and replaced with compacted fill.

5. Place and compact all embankment fill in horizontal lifts to the finished grade levels. Lift thicknesses should be compatible with compaction equipment used to achieve the required uniform densities. The maximum size of rock used for fill should be 6 inches.

6. All subgrade preparation, fill placement and compaction should be accomplished under observation and testing to assess compliance with project specifications. All fill material should be compacted to at least 95% of the maximum dry density as determined by ASTM: D-698 methods and at a moisture content of 3% below optimum to 3% above optimum. Fill which is below 10 feet should be compacted to at least 100% of the maximum dry density as determined by ASTM D-698 methods and at a moisture content of 3% below to 3% above optimum.

7. The material should not be allowed to dry between layers or stages of berm construction. When drying has occurred, the dry material should be reconditioned to the proper water content and recompacted prior to placing subsequent material. Between stages of berm construction the embankment should be covered by at least 2 feet of temporary fill.

8. When the compacted surface of any layer is too smooth to bond properly with the succeeding, the layer should be scarified of otherwise roughened to provide a satisfactory bonding surface before the next layer of fill material is placed.

Drainage: Positive drainage should be provided around tbe proposed lagoon during construction and maintained throughout the life of the proposed development.

Borrow excavation, basin excavation, surface stripping, subgrade preparation, and embankment fill placement should be accomplished under the observation and testing directed by a soils engineer to assess compliance with recommendations.

Post Construction Maintenance: During the life of the water disposal pond, burrowing animals should not be allowed to dig holes in the embankments.

Corrosion: We recommend a Type II portland cement be used for all concrete on and below grade.

CLOSURE

Our conclusions and recommendations are predicated on observation and testing of the earthwork and foundation preparations directed by a geotechnical engineer. It would be logical for Western Technologies Inc. to provide these services since we are most qualified to determine consistency of field conditions with those data used in our analyses.

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

DEFINITION OF TERMINOLOGY

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

METHOD OF SOIL CLASSIFICATION
(ASTM D 2487)

COARSE-GRAINED SOILS

LESS THAN 50% FINES*

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

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

FINE-GRAINED SOILS

MORE THAN 50% FINES*

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

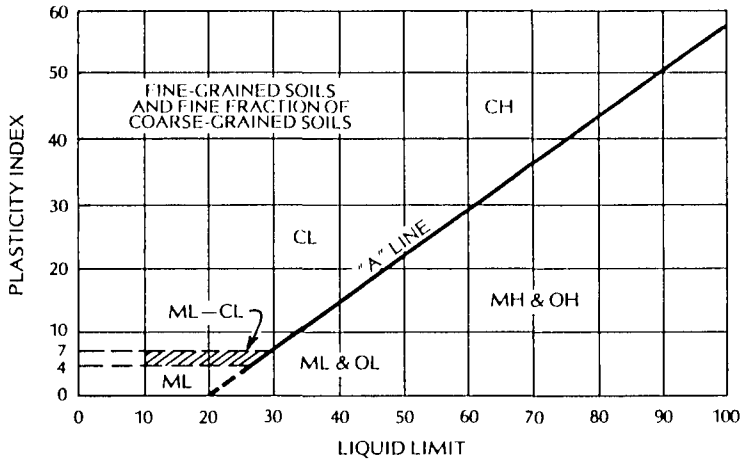
NOTE:
Fine-grained soils receive dual symbols if their limits plot in the hatched zone on the Plasticity Chart (ML-CL)

SOIL SIZES

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

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

PLASTICITY CHART



SOIL PROPERTIES

Job No. 3128J024

Boring No.	Depth, ft	Soil Class.	Soil Property		Compression/Consolidation			Expansion			Shear Strength			Water Soluble Matter, PPM		Remarks
			Initial Dry Density pcf	Initial Water Content, %	Surcharge KSF	Total Comp. %	Void Ratio	Surcharge KSF	Expansion %	Max. Swell Pressure KSF	Test Method	C KSF	ø Deg.	Salts	Sulfates	
2	3 - 4	CL	115	10.6							DS	0.6	16			
4	0 - 5	CL	108(1)	16.3							DS	0.3	12			
4	0 - 5	CL	108(1)	9.1				0.1(3)	+7.0					0.1	< 0.1	

Boring No.	Depth, ft	Comments

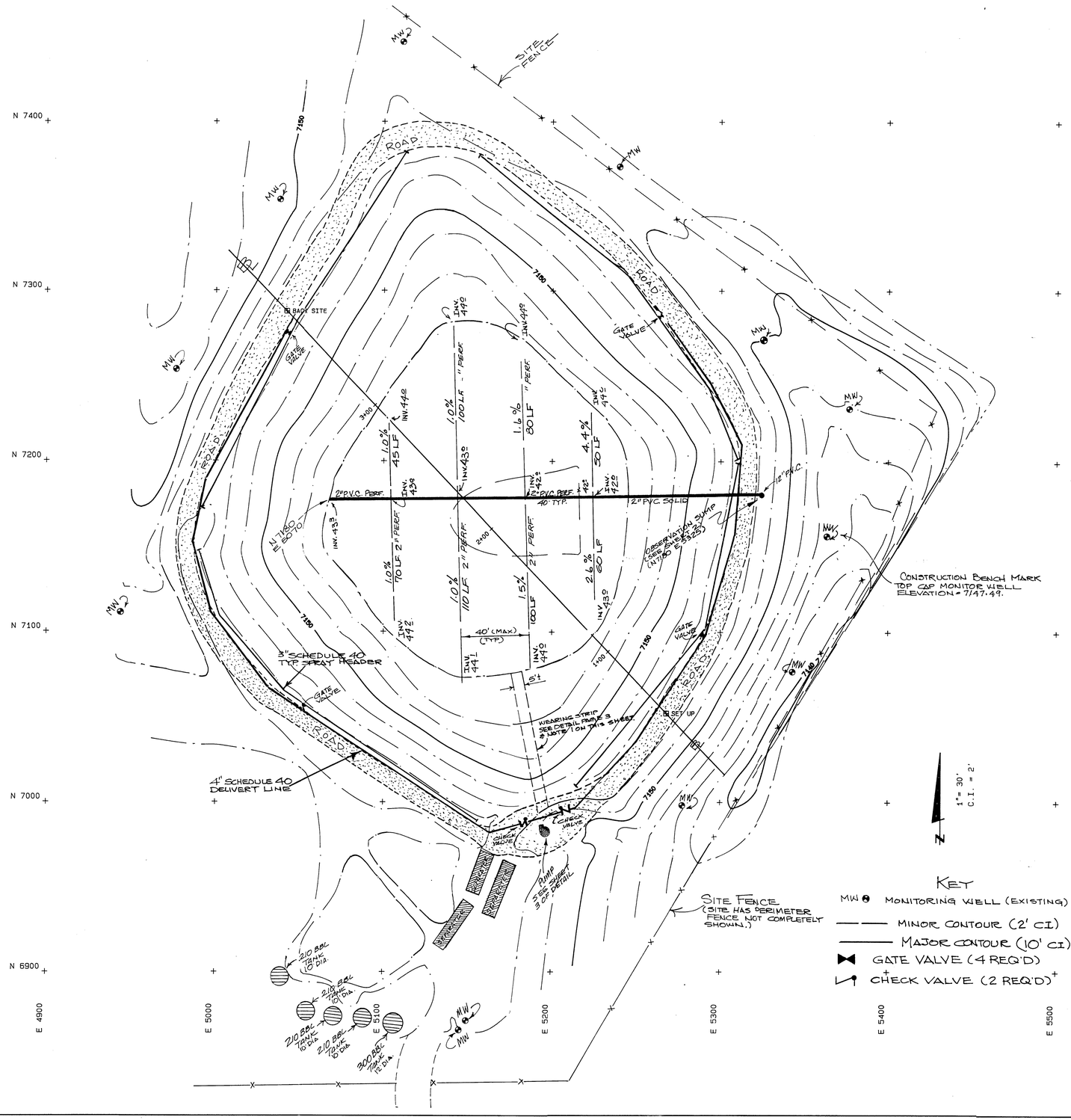
Note: Initial Dry Density and Initial Water Content are in-situ values unless otherwise noted.

LEGEND

Shear Strength Test Method
- DS Direct Shear
- DS Direct Shear (saturated)
- UC Unconfined Compression
- UU Unconsolidated Undrained
- CU Consolidated Undrained w/ pore press.
- CU Consolidated Undrained
- CD Consolidated Drained

REMARKS

1. Compacted density (approx. 95% of ASTM D698 max. density at moisture content slightly below optimum).
2. Compacted density (approx. 95% of ASTM D1557 max. density at moisture content slightly below optimum).
3. Submerged to approximate saturation.
4.



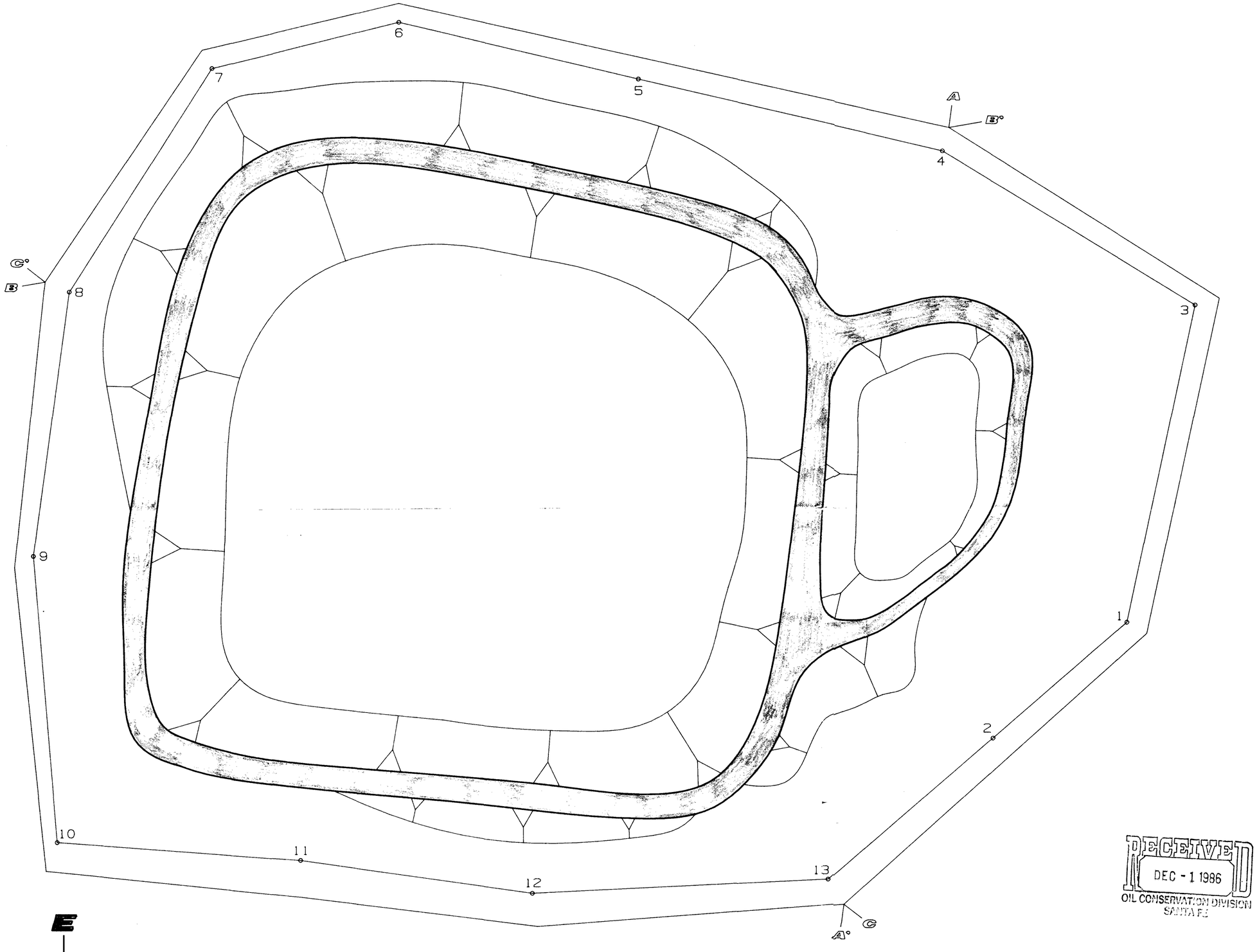
NOTE 1.
PUMP LOCATION APPROXIMATE ONLY. MAY BE ADJUSTED IN FIELD, MOVE ALSO WEARING STRIP.

ACTUAL SUCTION PIPE LENGTH DEPENDANT ON LOCATION SELECTED.

TNT CONSTRUCTION
EVAPORATION POND
PLAN

SCALE:	DATE:	REVISED:	DRAFTED BY:	SHEET	OF
HORIZ. 1"=30'			STANNARD	1	5
	63521		CHECKED BY:		

SAN JUAN ENGINEERS
2101 SAN JUAN BLVD.
FARMINGTON, N.M. 87401



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SANTA FE

T·N·T CONSTRUCTION EVAPORATION POND NW/4. SW/4 SECTION 9·T26N·R3W RIO ARRIBA COUNTY. NEW MEXICO	REV	PAGE 1 OF 4 SCALE: 1"=30' 11-16-86 DRAWN BY:

10-37

Job No. 3128J024

Boring No.	Depth, ft.	Soil Class.	Particle Size Distribution, %				Atterberg Limits			Moisture - Density Rel.			Specific Gravity	Permeability		'R' Value		Permeability K cm/sec
			Cobbles 3" to 12"	Gravel 3" to #4	Sand #4 to 200	Fines - 200	PL	LL	PI	Dry Density pcf	Optimum Moisture %	Meth.		Dry Density pcf	K Ft./Yr.	Corrected 'R'	Expansion Pressure psf	
4	0 - 5	CL												108	0.042			3.8×10^{-8}

Boring No.	Depth, ft.	Remarks
4	0 - 5	Maximum Density 113.5 pcf @ Optimum Moisture of 16.3% ASTM D-698

LEGEND

Moisture Density Relationship
1. Tested D-1556/AASHTO T-217
2. Tested ASTMD-2922/D-3017
3. Tested ASTMD-2922/AASHTO T-217
4. Rock correction applied to maximum dry density. AASHTO T-224
5. Other _____

Specific Gravity
6. Minus # 4
7. Plus # 4

Classification/Particle Size
8. Visual
9. Laboratory Tested

SOIL PROPERTIES

page _____ of _____ part

Type of Material Clay Job No. 3128J024

Source of Material Water Disposal Ponds

Test Procedure ASTM Tested/Calc. By J. Hutchinson/WT Date 03/30/88

Reviewed By L. Cynova/WT Date 04/20/88

Hole No.	Location	Depth	Classification		LL	PI	Sieve Analysis - Accum % Passing												Lab No./I.D.
			AASHTO	Unified			200	100	40	16	10	4	¼	⅜	¾	1	1½	2	3	
4		0 - 5		CL	40	22	66	76	93	99	100									

TABULATION OF TEST RESULTS

LOG OF BORING NO. 1

Project Water Disposal Pond — Job No. 3128J024

Elevation 83.5 — Datum Assumed Elev. 100.0 - S.E. Corner, N. Pond

Type/Size Boring 7" Auger — Rig Type CME-55

Groundwater Conditions No groundwater was encountered on 03/30/88 — Date 03/30/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
					PL-LL	CL	SANDY CLAY; brown, firm to stiff. Medium to high plasticity.
					PL		
5		50/9"	R	105	10.9		
		50/8.5"	R	NR-G			
		27	R	102	12.2		
10		12	S				
					SLT. DAMP		SANDSTONE; tan, fine to coarse grained sand. Light to moderate cementation.
15		50/1"	S				
		50/3"	S				
20							
25		50/5.5"	S		SL		CLAYSTONE; brown to red, stiff to very stiff.
							Stopped at 25 feet.
30							NR-G - No recovery, but took grab sample.

LOG OF BORING NO. 2

Project Water Disposal Pond — Job No. 3128J024

Elevation 85.2 — Datum Assumed Elev. 100.0 - S.E. Corner, N. Pond

Type/Size Boring 7" Auger — Rig Type CME-55

Groundwater Conditions No groundwater was encountered on 03/30/88 — Date 03/30/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
					PL	CL	SANDY CLAY; brown, firm to stiff. Medium to high plasticity. Some thin sand layers.
		50/8"	R	115	10.6		
5		50/6"	R	124	9.6		
		36	S				
10							
			G				
		24	S				
15							
		20	S				
20							
		19	S				
25							
							Stopped at 25 feet.
							G = 50# Grab (12-20 feet)
30							

LOG OF BORING NO. 3

Project Water Disposal Pond — Job No. 3128J024

Elevation 98.0 — Datum Assumed Elev. 100.0 - S.E. Corner, N. Pond

Type/Size Boring 7" Auger — Rig Type CME-55

Groundwater Conditions No groundwater was encountered on 03/30/88 — Date 03/30/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
5					PL	CL	SANDY CLAY; brown, firm to stiff. Medium to high plasticity.
		41	R	106	12.5		
10							Stopped at 6 feet.
15							
20							
25							
30							

LOG OF BORING NO. 4

Project Water Disposal Pond Job No. 3128J024

Elevation 98.1 Datum Assumed Elev. 100.0 - S.E. Corner, N. Pond

Type/Size Boring 7" Auger Rig Type CME-55

Groundwater Conditions No groundwater was encountered on 03/30/88 Date 03/30/88

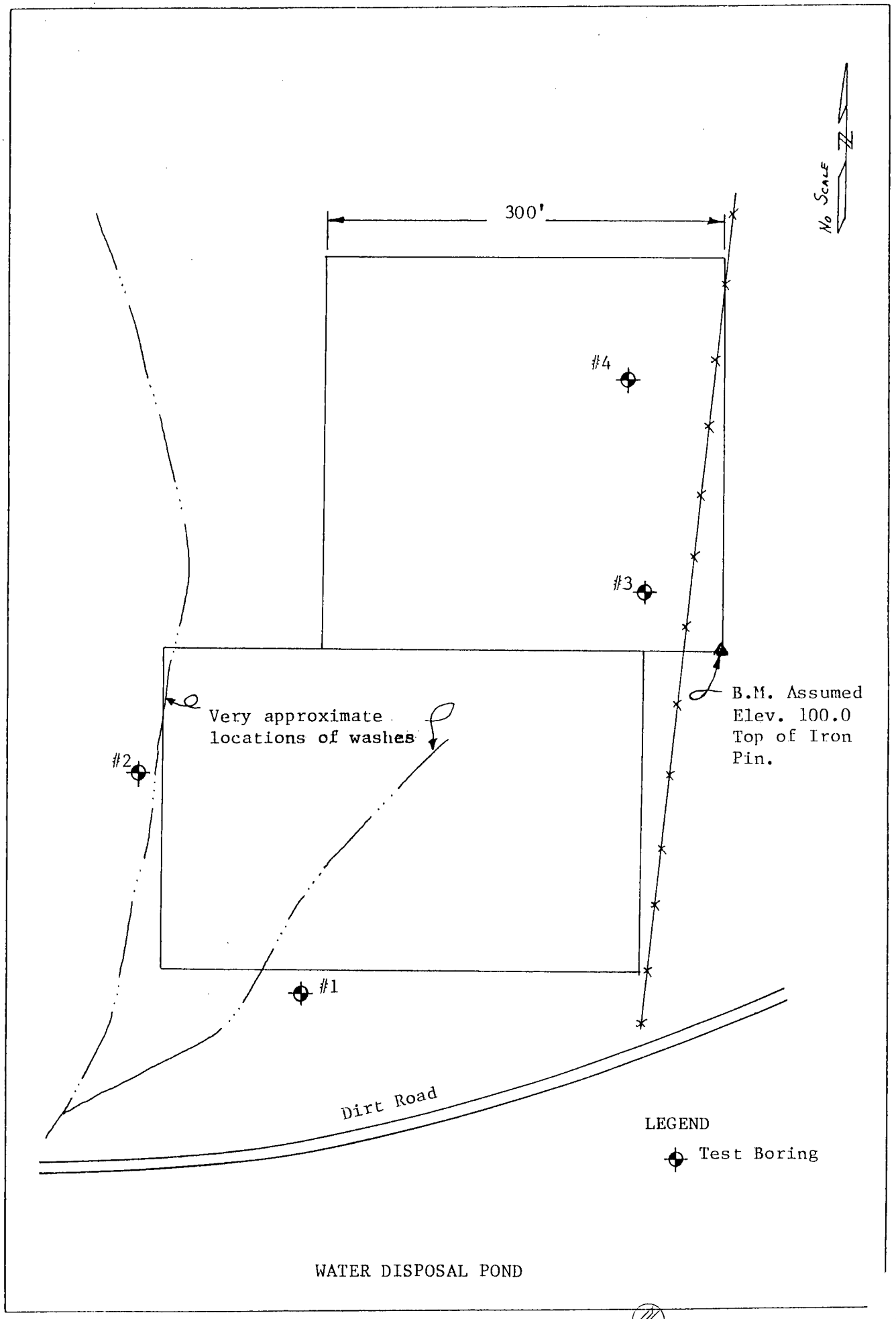
Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
5					PL	CL	SANDY CLAY; brown, firm to stiff. Medium to high plasticity.
		36	R	113	11.7		
10							Stopped at 6 feet.
15							
20							
25							
30							

Prepared By L. E. C. Date 04/21/88

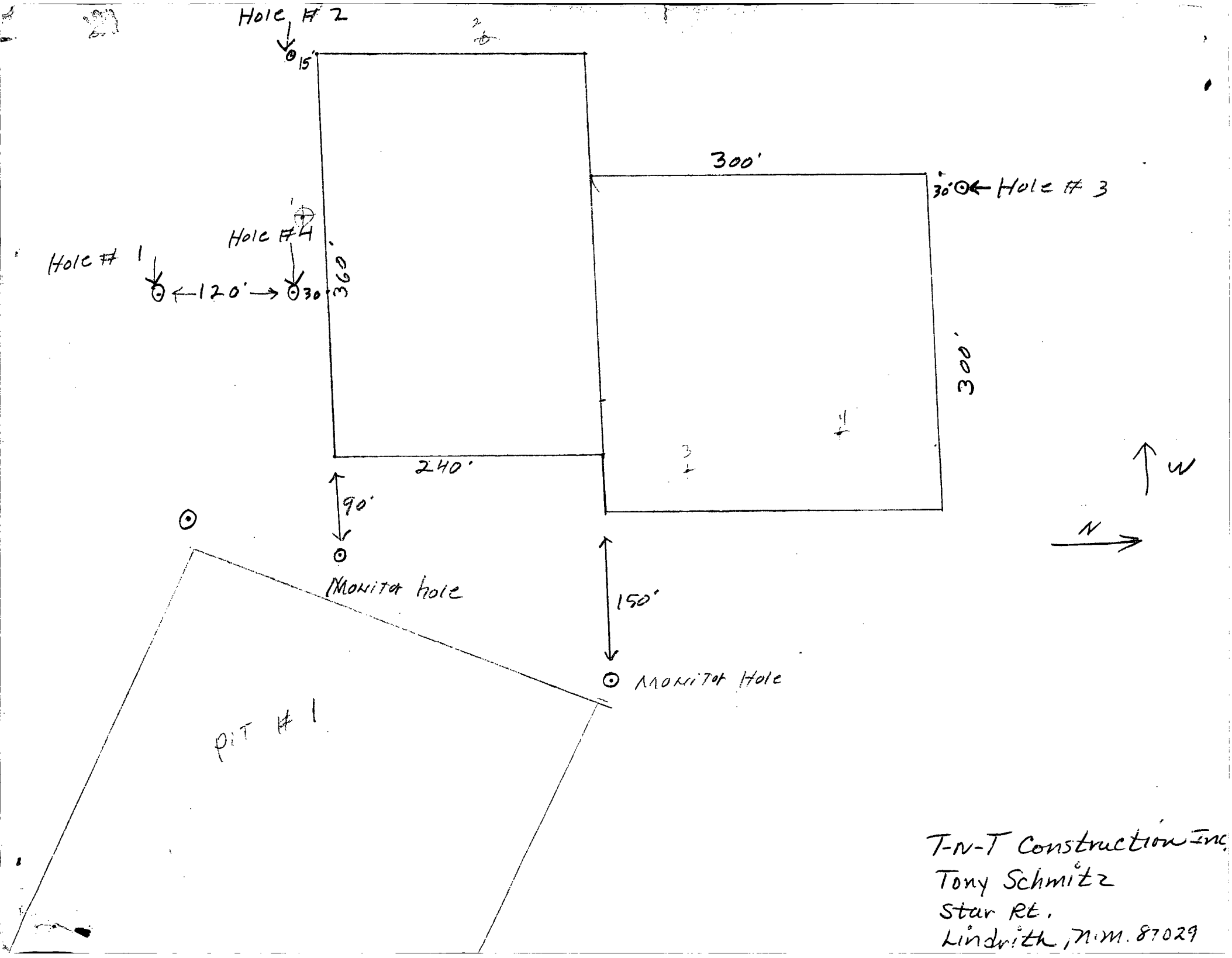
Checked By _____ Date _____

Job No. 3128J024

Client Tony Schmitz



WATER DISPOSAL POND



T-N-T Construction Inc.
Tony Schmitz
Star Rt.
Lindrith, N.M. 87029

RPT #DHU

SAN JUAN PRODUCTION SCHEDULE

RUN DATE 85/12/13

OPERATOR 8745 - LOCALE 35

FOR JANUARY, 1986

OPER	POS NO	METER	WELL NAME	FO	SW	PROD ABIL	CUM PROD ABIL
8745	702	76356	GAINES UTE #1	02	22	35	35
8747	1782	76109	SAM BURCH #1	02	64	10	45
8745	1785	76191	SO UT TRB IN #5	02	64	10	55
8745	2479	76185	SO UT TRB IN #4	02	64	19	74
8747	2998	76163	SAM BURCH #3	02	64	29	103
8745	3034	76176	SOUTHERN UTE #1	02	22	30	133
8745	3172	76184	SO UT TRB IN #3	02	64	35	168
8745	3522	76192	SO UT TRB IN #6	02	64	52	220
8747	5169	76428	SAM BURCH #12	02	64	69	289
8747	5179	76153	SAM BURCH #2	02	64	42	331
8747	5179	76426	SAM BURCH #10	02	64	79	410
8745	5312	76399	TIFFANY #2	02	28	249	659
8745	5418	76204	SO UT TRB IN #7	02	22	101	760
8745	5454	76398	TIFFANY #1	02	28	111	871
8745	5504	76307	SO UTE TRIBE OF INDS #8	02	64	77	948
8745	5966	76458	SAM BURCH #15	02	64	336	1284
8747	5966	76155	SAM BURCH #5	02	64	18	1302
8745	6006	76177	SOUTHERN UTE #2	02	22	87	1389
8745	6106	76352	GAINES UTE #2	02	22	111	1500
8747	6218	76429	SAM BURCH #13	02	64	151	1651
8745	6912	76326	SO. UTE GOVT. #1	02	64	100	1751
8747	7405	76427	SAM BURCH #11	02	64	151	1902
8745	7683	76459	SAM BURCH #14	02	64	513	2415

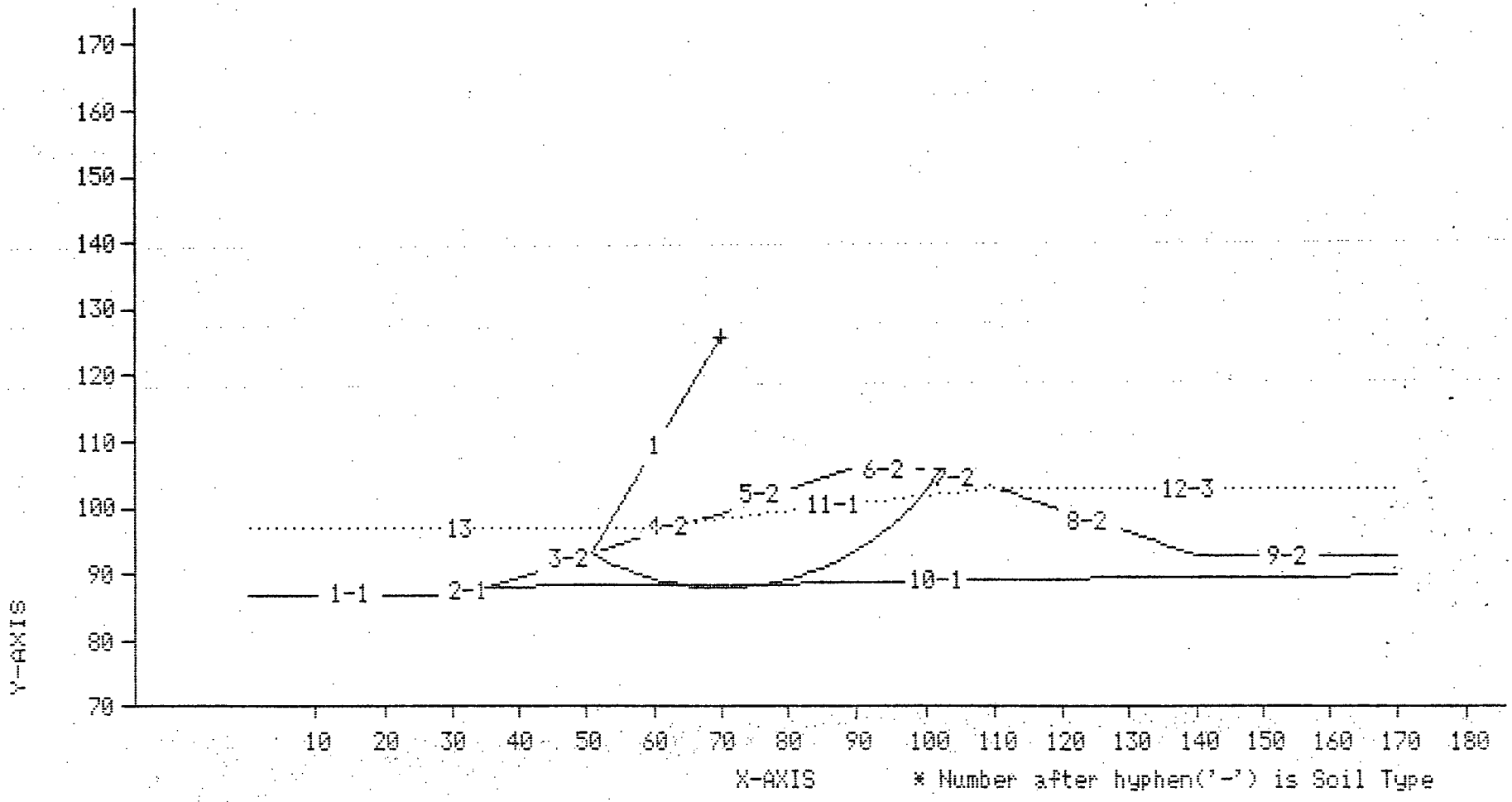
SB-SLOPE

Simplified Bishop Slope Stability Analysis

PROJECT: WATER DISPOSAL POND
LOCATION: LINDRITH, NEW MEXICO
FILE: LINDOU2
COMPLETE SLOPE CROSS SECTION

SOIL*	DENSITY	COHESION	PHI
1	105.0	600.0	16.0
2	108.0	300.0	12.0
3	62.4	0.0	0.0

CIRCLE	X	Y	RADIUS	FS
1	70.0	126.0	38.0	3.79



* Number after hyphen('-') is Soil Type

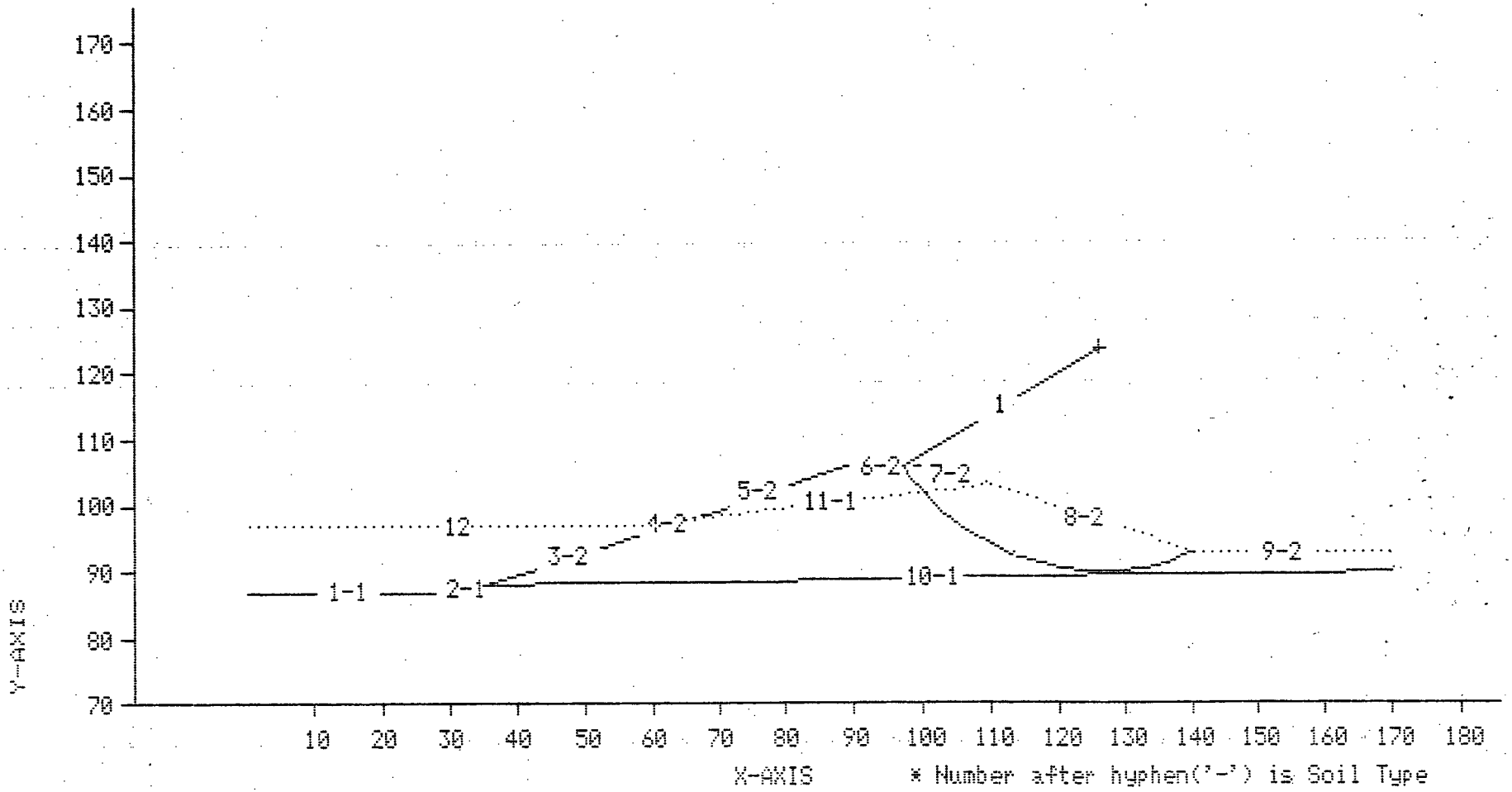
SB-SLOPE

Simplified Bishop Slope Stability Analysis

PROJECT: WATER DISPOSAL POND
LOCATION: LINDRITH, NEW MEXICO
FILE: LINDOU3
COMPLETE SLOPE CROSS SECTION

SOIL*	DENSITY	COHESION	PHI
1	105.0	600.0	16.0
2	108.0	300.0	12.0

CIRCLE	X	Y	RADIUS	FS
1	126.0	124.0	34.0	2.74



* Number after hyphen('-') is Soil Type

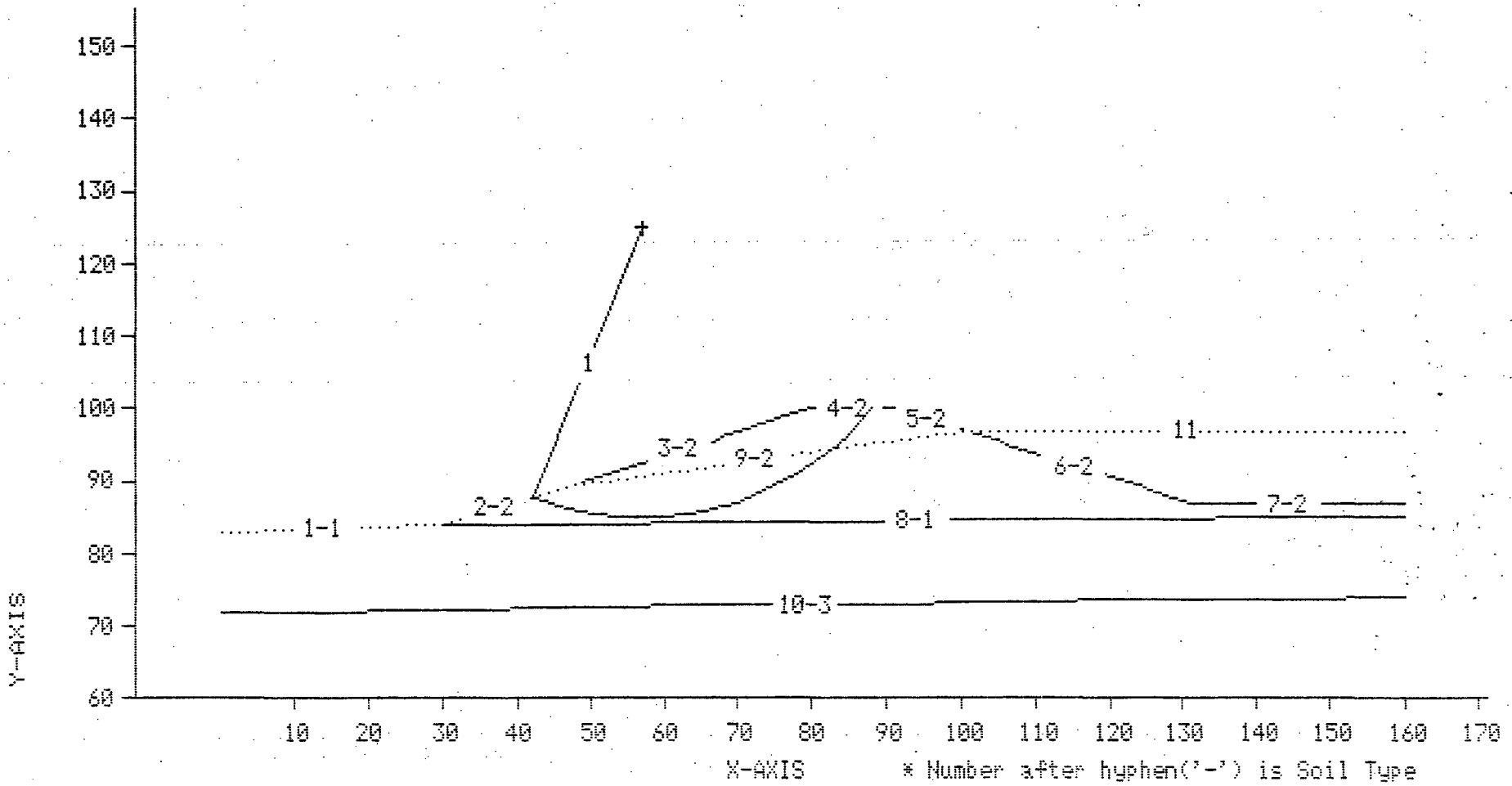
SB-SLOPE

Simplified Bishop Slope Stability Analysis

PROJECT: WATER DISPOSAL POND
LOCATION: LINDRITH,NEW MEXICO
FILE: LIN2
COMPLETE SLOPE CROSS SECTION

SOIL*	DENSITY	COHESION	PHI
1	115.0	600.0	16.0
2	100.0	300.0	12.0
3	140.0	0.0	30.0

CIRCLE	X	Y	RADIUS	FS
1	57.0	125.0	40.0	2.51



* Number after hyphen('-') is Soil Type

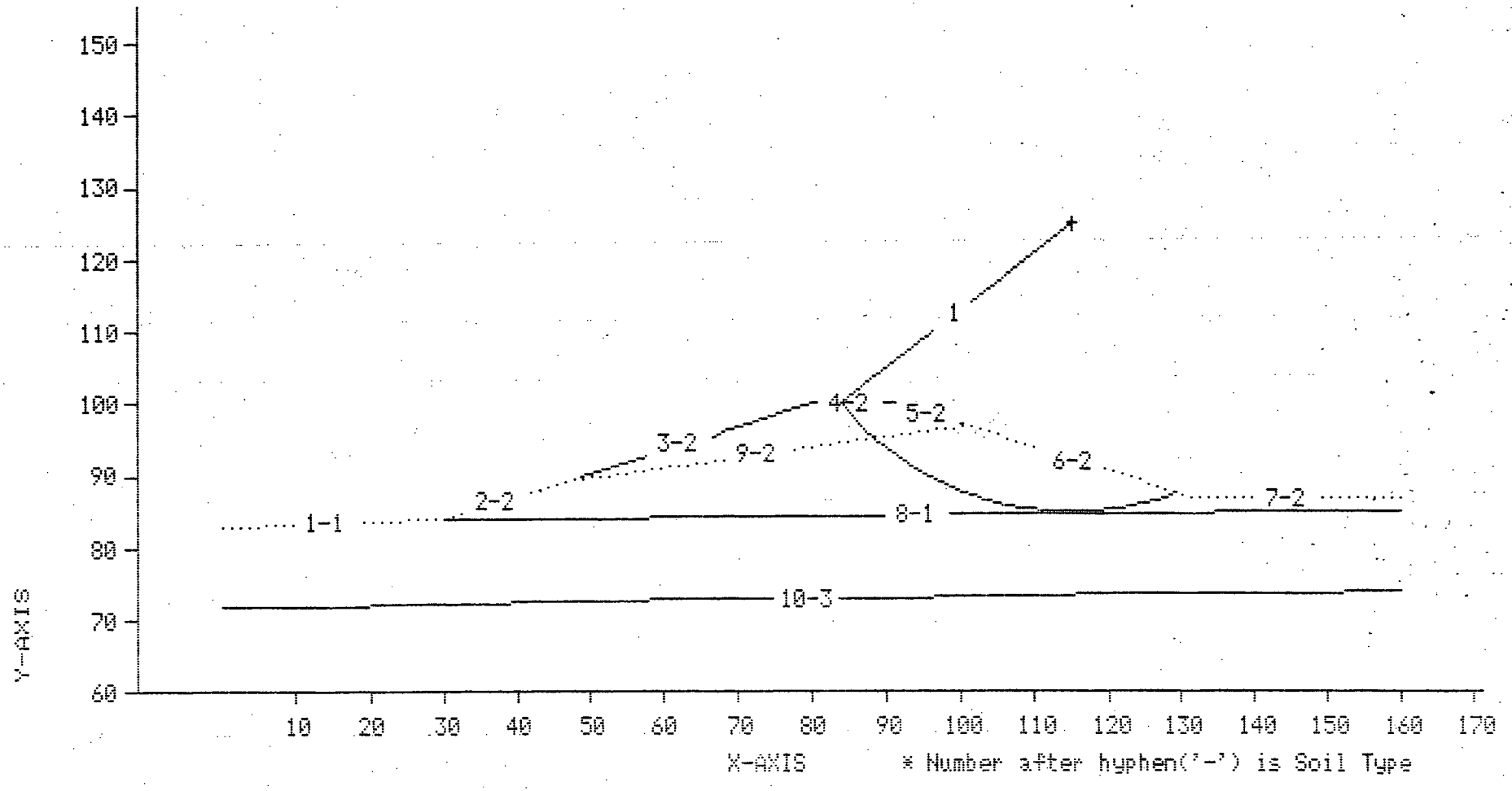
SB-SLOPE

Simplified Bishop Slope Stability Analysis

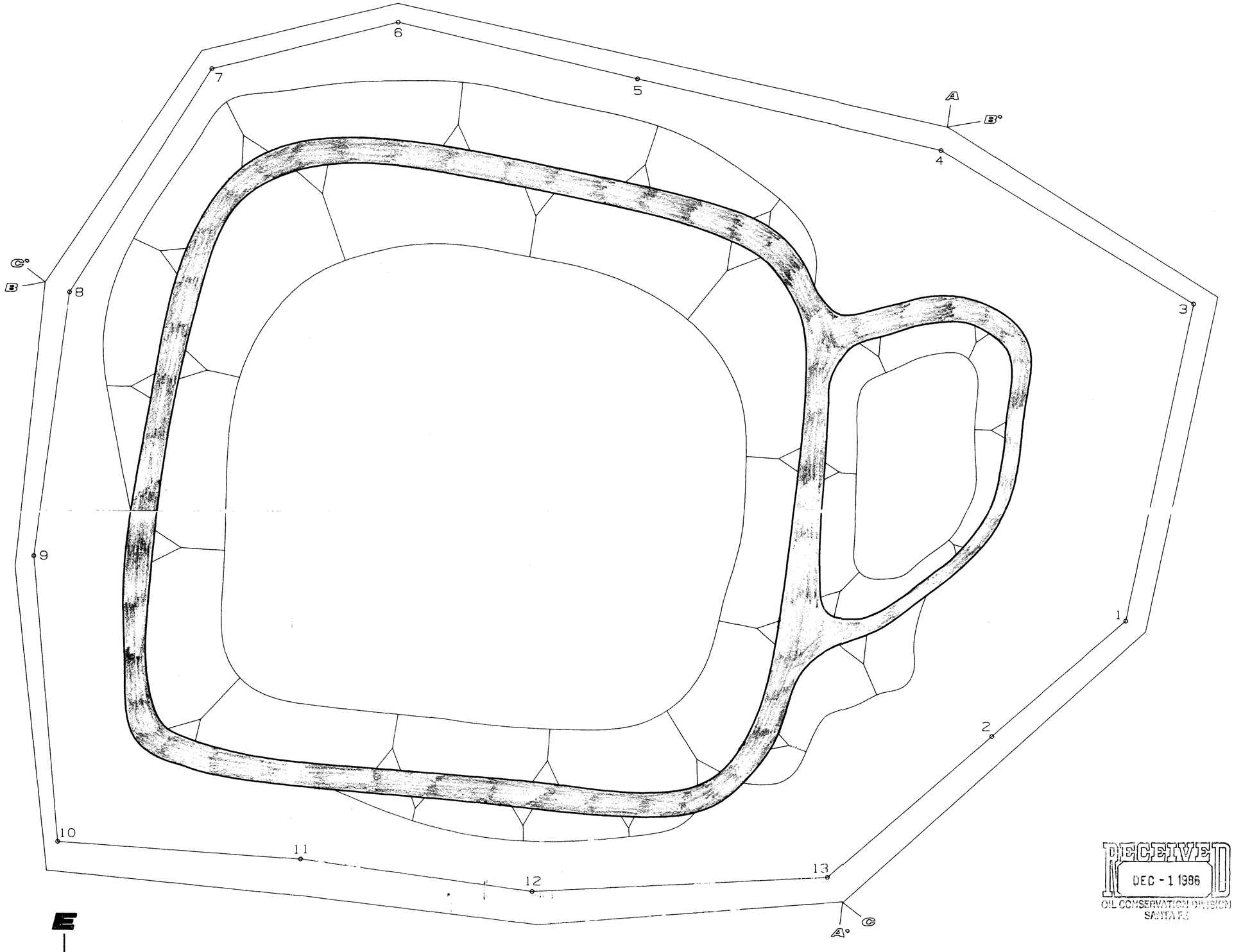
PROJECT: WATER DISPOSAL POND
LOCATION: LINDRITH, NEW MEXICO
FILE: LIN3
COMPLETE SLOPE CROSS SECTION

SOIL*	DENSITY	COHESION	PHI
1	115.0	600.0	16.0
2	108.0	300.0	12.0
3	140.0	0.0	30.0

CIRCLE	X	Y	RADIUS	FS
1	115.0	125.0	40.0	2.31



* Number after hyphen('-') is Soil Type



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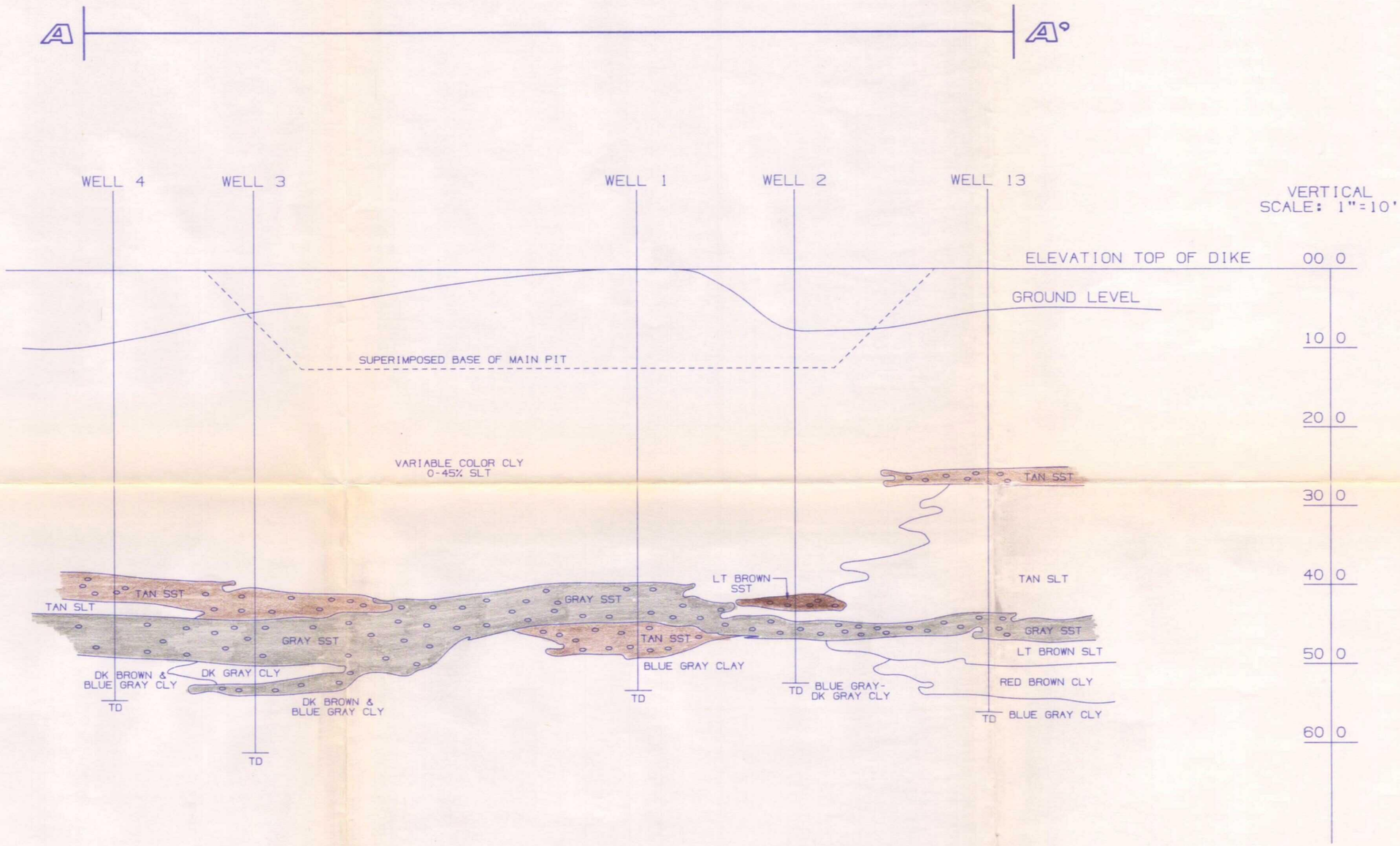
T·N·T CONSTRUCTION EVAPORATION POND NW/4. SW/4 SECTION 8·T26N·R8W RIO ARRIBA COUNTY. NEW MEXICO	REV
	PAGE 1 OF 4
	SCALE: 1"=30'
	11-16-86
	DRAWN BY:



LEGEND:

SST- SANDSTONE
SLT- SILTSTONE
CLY- CLAY
DK- DARK
LT- LIGHT
VAR- VARIABLE

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T'N'T CONSTRUCTION
EVAPORATION POND
NW/4. SW/4
SECTION 8'T25N'R3W
RIO ARRIBA COUNTY.
NEW MEXICO

REV

PAGE 2 OF 4
SCALE: 1"=30'
11-16-86
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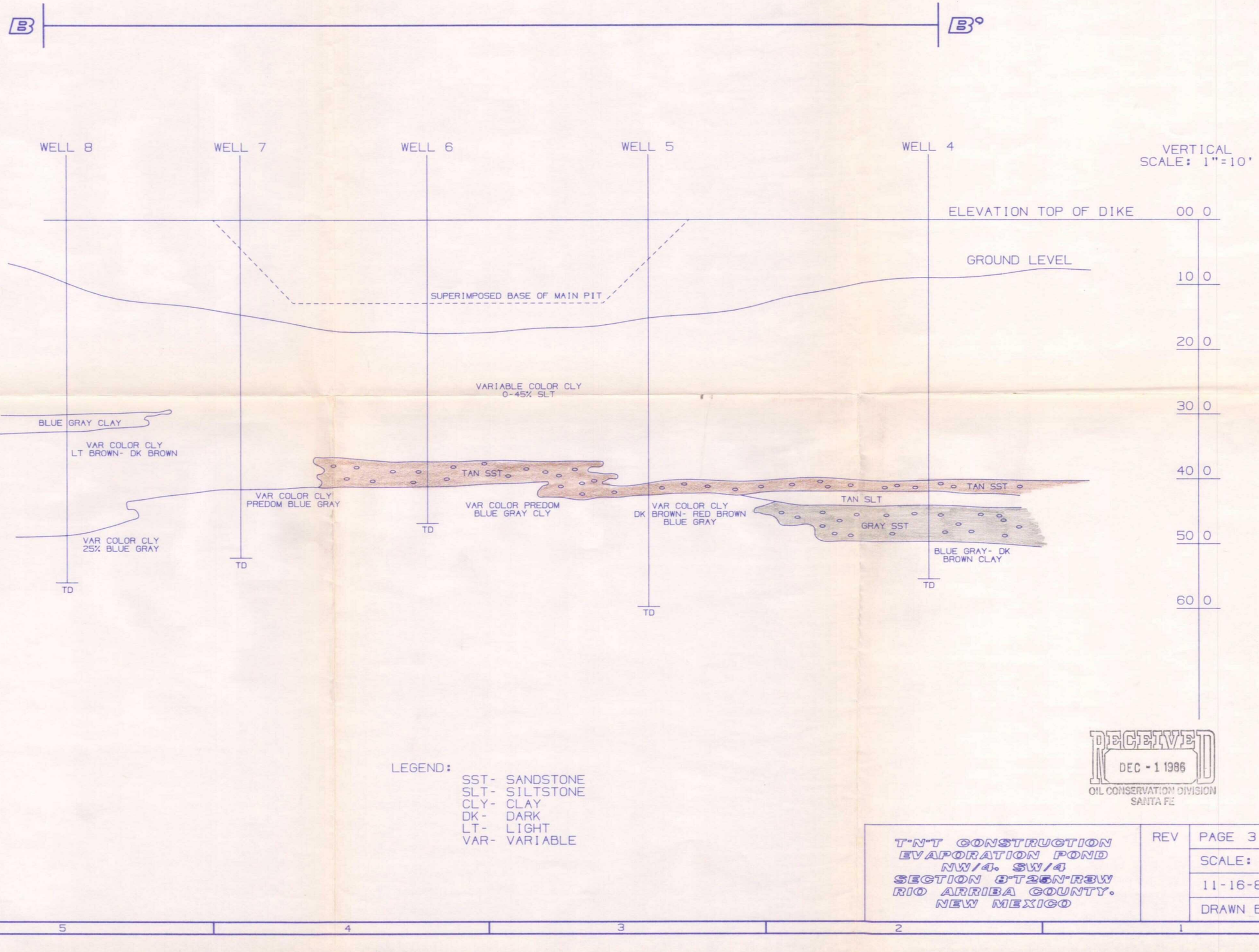

LEGEND:

SST- SANDSTONE
SLT- SILTSTONE
CLY- CLAY
DK- DARK
LT- LIGHT
VAR- VARIABLE

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T·N·T CONSTRUCTION
EVAPORATION POND
NW/4. SW/4
SECTION 8·T25N·R3W
RIO ARRIBA COUNTY.
NEW MEXICO

REV

PAGE 3 OF 4
SCALE: 1"=30'
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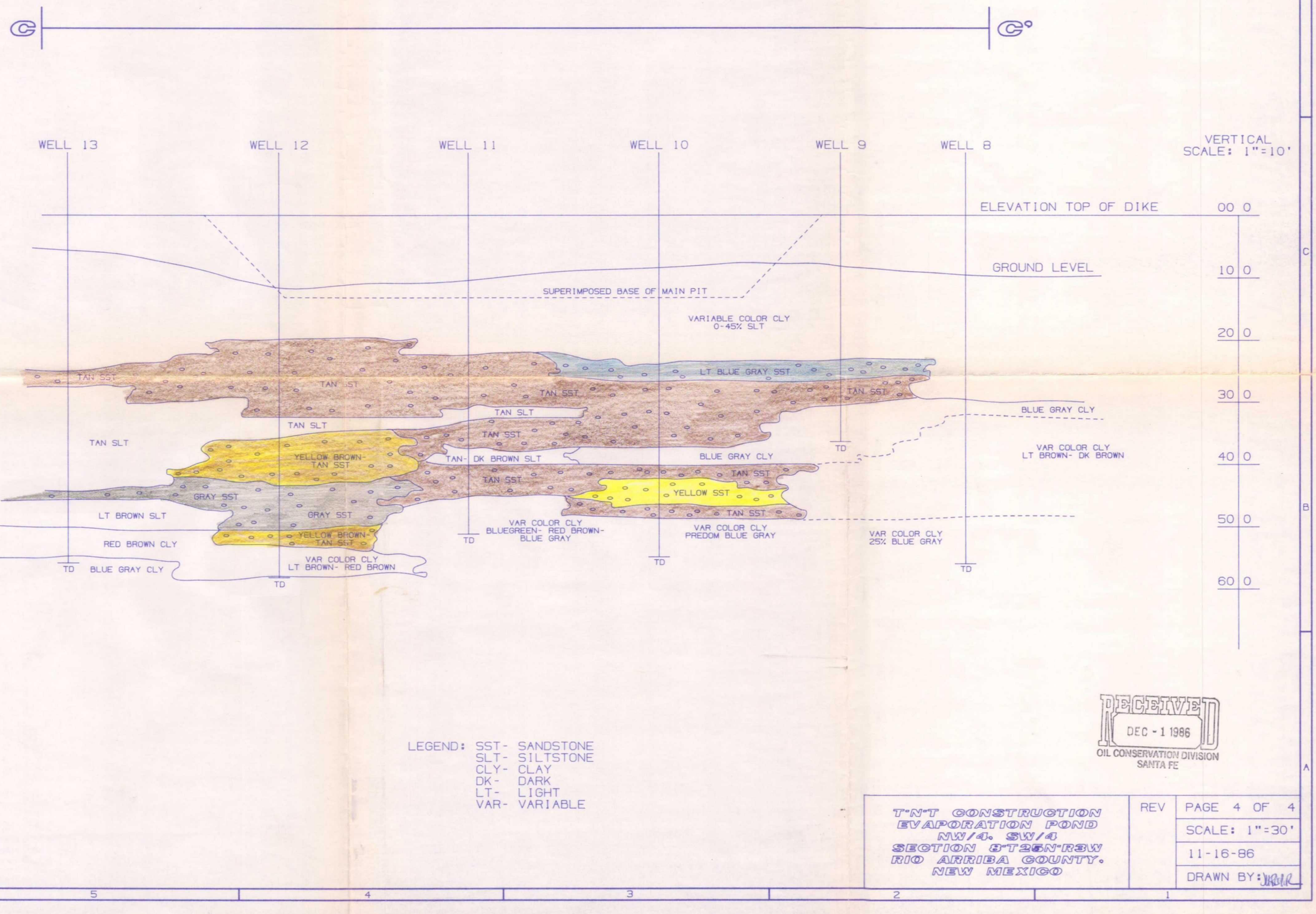

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REV

PAGE 4 OF 4
SCALE: 1"=30'
11-16-86
DRAWN BY: JRB/R

522'-0"

10' DIKE

INLET

10' DEEP

1:1

3:1

3:1

10' DIKE

3:1

GRAVITY SIPHON

420'-0"

MONITOR WELL (TYPICAL)

10' DIKE

10' DIKE

300'-0" SQUARE

3:1

10' DIKE

3:1

NORTH

ENTIRE FACILITY ENCLOSED WITH FENCE

PLOT PLAN

SIPHON

MONITOR WELL (TYPICAL)

ELEVATION

REV	PAGE 1 OF 1
	SCALE: 1"=30'
	7-12-88
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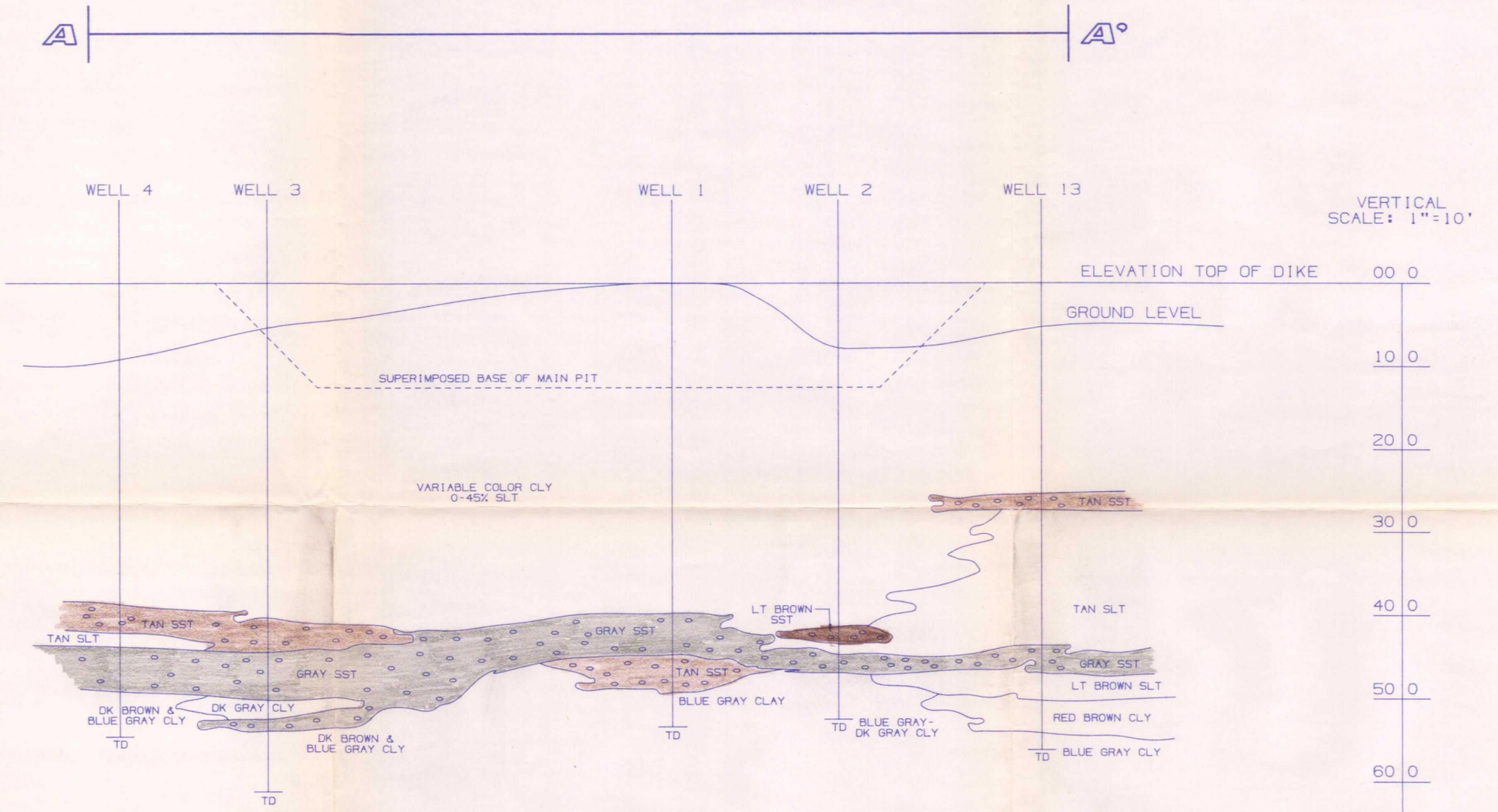
EVAPORATION POND-
300' X 300', FOR
T-N-T INC.

Exhibit 2



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PAGE 2 OF 4
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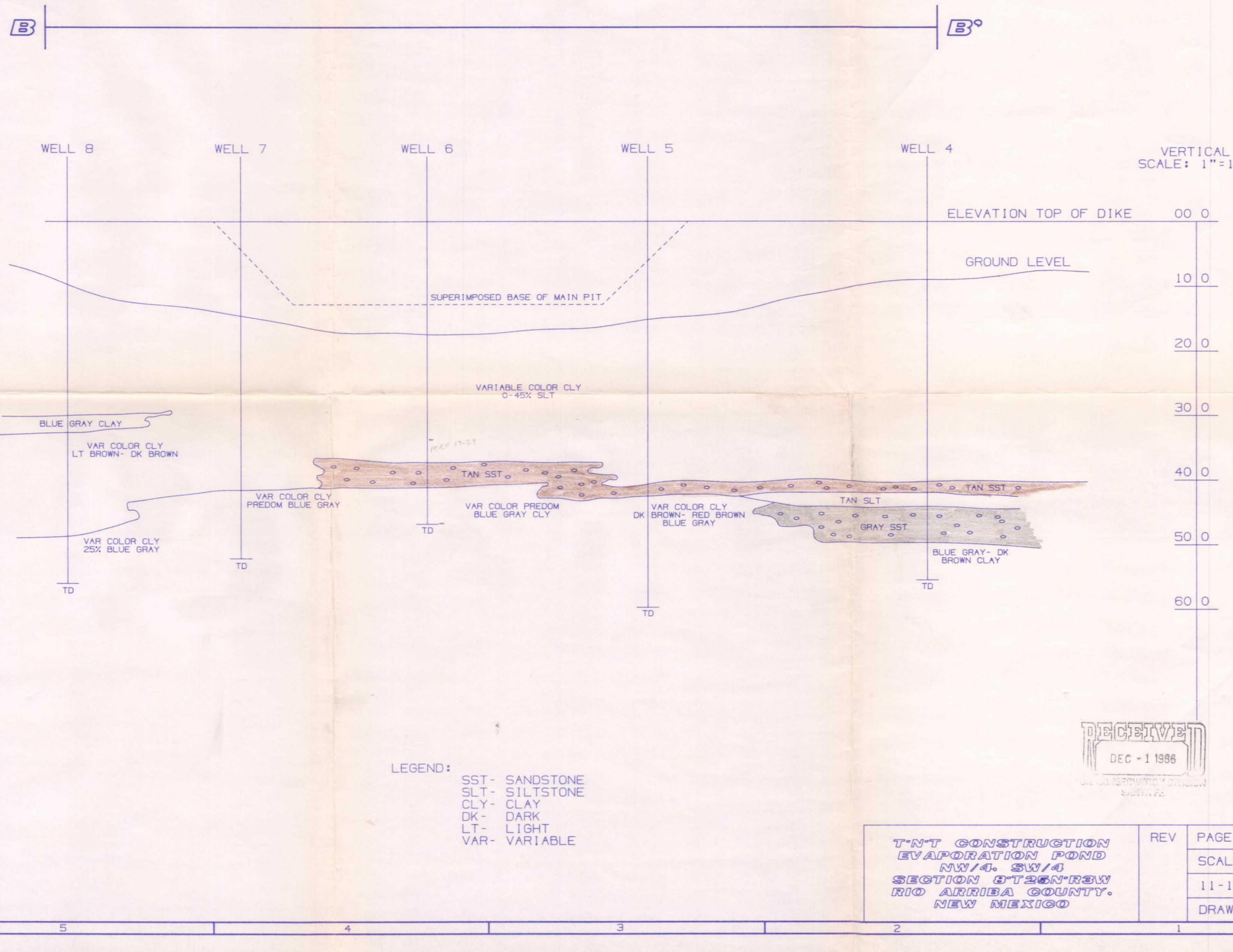

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PAGE 3 OF 4
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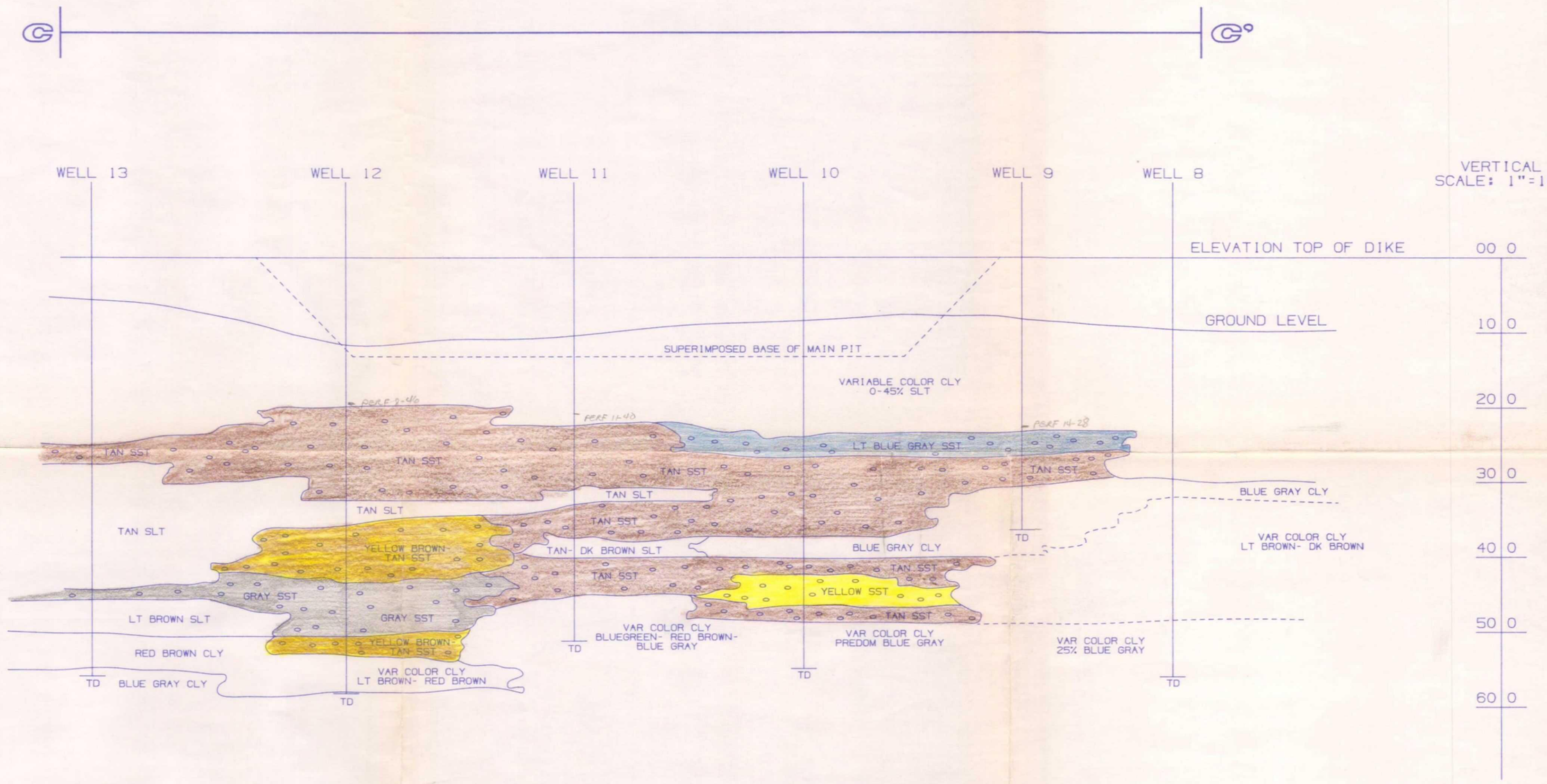

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NEW MEXICO

REV

PAGE 4 OF 4
SCALE: 1"=30'
11-16-86
DRAWN BY: JRAR

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420'-0"

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10' DEEP

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MONITOR WELL (TYPICAL)

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REV	PAGE 1 OF 1
	SCALE: 1"=30'
	7-12-86
	DRAWN BY:

EVAPORATION POND-
300' X 300', FOR
T-N-T INC.

Exhibit 2

STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

GARREY CARRUTHERS
GOVERNOR

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

March 3, 1988

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. Tony Schmitz
T-N-T Construction, Inc.
Star Route
Lindrith, New Mexico 87029

RE: Application For Facility Expansion, NW/4 SW/4, 8-25N-3W, Rio Arriba County

Dear Mr. Schmitz:

The Oil Conservation Division (OCD) has reviewed your September 16, 1987 request for a second pond and analyses of fluids taken from the current pond and monitor wells. The March 1, 1988 meeting between the OCD Environmental Bureau staff and you clarified the permitting issues remaining.

The following is a summary of our concerns as discussed in the meeting, and the information needed and requirements that must be met by T-N-T to complete permitting and for you to commence construction.

State Engineer Office Requirements

If any levee to be constructed is more than ten feet in height from ground level, or if a pit volume is more than 10 acre-feet (77,500 bbls) the State Engineer Office must also review and issue a permit for construction of the pit. What is the proposed depth of pit and height of levees? Please submit detailed proposed engineering diagrams for the second pit.

Construction Requirements

1. OCD will be notified one week prior to starting any earth work.

2. All earthwork will be performed under the supervision of a registered professional engineer. Following completion of construction, the registered P.E. will submit as-built plans for the facility.

3. Results of Proctor compaction tests performed during construction will be certified and submitted to the OCD along with the as-built plans.

4. No construction work will be performed using frozen earth materials.

5. Berms will be keyed into the native undisturbed clay.

6. The outside slope of all berms will be 3:1.

7. OCD requires 6" or less lifts for compaction during construction for the top 2 feet of the liner. Nine inches or less are the thickness limits for compaction of any fill below the top 2 feet. The total thickness of the compacted clay liner will be a minimum of 3 feet.

Skimmer Pit/Liquids Storage Area

1. All above ground oil/water storage facilities shall be enclosed by diked fire walls that will form a reservoir having a capacity one-third larger than the enclosed tanks. Submit an as-built plat showing the location of pits, tanks, diked areas, numbered monitor wells, etc.

Monitor Wells

1. Monitor wells will be drilled and completed the same as required in our August 29, 1986 letter to you. Spacing of the wells will be equivalent to the requirements previously imposed.

2. All monitor wells will be numbered consistently in order.

3. All monitor wells will be surveyed in at a notch at the top of the casing to some relative datum.

Operating Procedures

1. No drilling muds will be accepted for disposal.

2. No hazardous waste such as unspent acids, caustics, chlorinated solvents, etc., will be accepted for disposal.

3. Prior to approval, information on the final disposition of any incidental and/or waste oil recovered at the facility must be submitted. If OCD determines that your facility is a treating plant, OCD Rule 312 will apply to your facility, including the required $25,000 bond.

4. All berms will be inspected monthly and after any major storm event, and required maintenance will be performed immediately to maintain integrity of the berms.

5. All requirements of Order No. R-7940-A will be observed.

6. In accordance with OCD Rule 1120, a monthly water disposal report (Form C-120-A) will be filed with the OCD.

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

Aeration System

1. Submit to the OCD design specifications, operating schedule and anticipated start-up date of any spray evaporation system at least 30 days in advance of planned use.

H_2S

1. A portable H_2S meter for use of personnel is required for monitoring and as a safety measure.

2. Air concentrations in tenths of parts per million (ppm) of H_2S and the pH of the pond(s) will be monitored once daily during operating hours. Records of such measurements shall be kept at the facility.

3. Submit a schedule of proposed sampling locations and sample times for H_2S monitoring.

4. A sign shall be posted at the gate saying that H_2S may be present.

H_2S Contingency Plan

1. Prior to utilization of the pit a signed contingency plan will be submitted for OCD review. The OCD will assist in the preparation of the plan which will include, but is not limited to, the following commitments:

   a) If air concentration of H_2S reaches 1 ppm at the top of the pond berm for two consecutive monitor readings, the OCD will be notified immediately.

   b) If air concentration of H_2S at the top of the pond berm reaches 20 ppm at any time, public safety personnel, such as County Fire Marshal, County Sheriff's Department, and New Mexico State Police, and the OCD will be notified. T-N-T must submit plans for actions to be taken to protect public health and safety. Requirements for pond treatment will include daily pH measurement, daily analyses of dissolved sulfides in the pond water, hourly H_2S monitoring, and such additional requirements determined after OCD review.

Monitoring

1. A pond freeboard limit must be established.

2. Due to the presence of fluids in the current monitor wells, quarterly reports shall be sent in to the OCD on water levels and conductivity measurements of any fluids in any monitor wells and of the pit fluids.

   The following sampling procedure should be observed:

   1. Water level measurements shall first be recorded in the monitor wells prior to bailing of the wells.

   2. The wells should be allowed to recover until enough fluid is available to take samples for conductivity measurements. The container and conductivity probe should be rinsed with fresh water between samplings to prevent erroneous readings.

   3. Pond samples for conductivity measurements should always be taken from the same location, preferably on the far side away from the inlet. Oil and floating debris should be kept off the probe to prevent erroneous readings.

   4. If after review of the quarterly monitoring reports, the OCD questions the origin of fluids in the monitor wells, the following contingency plan will be put in operation:

      a) Cease acceptance of disposal fluids until the source of fluids in the monitor wells is determined;

      b) If the liquids are determined to be pit water, submit proposals and timetable for removing the source, determining the extent and degree of contamination, and for mitigating contamination.

The above information was discussed with you March 1 and March 3 and informally agreed to by you pending your review of this letter summarizing the meeting's discussions. A commitment from you agreeing to these requirements, and to provide the requested necessary information will be necessary to complete review of the application.

If you feel that any of the understandings formalized in this letter are different from what was discussed and agreed to in the meeting, or if you feel additional clarification is needed, please contact Jami Bailey at 827-5884.

Sincerely,

David G. Boyer
Environmental Bureau Chief

DGB:sl

Encl.

cc: Frank Chavez, OCD-Aztec

February 26, 1988

Energy and Minerals Department
Oil Conservation Division
P.O. Box 2088
Santa Fe, New Mexico 87501

Jamie Bailey:

Record on test holes for Commercial Evaporation Pit:

12/22/88-----North hole 6" water.
Inside of fence West 4" water.
West 14" water.

2/4/88------North ½"mud.
Inside of fence West ½" mud.
West 4" water.
No water was bailed out, any loss was due to absorption or evaporation. These are the other holes that you found water in when you tested wells.

1/29/88-----East hole 7' 6". T.D.S. .13

Tony Schmitz

T-n-T Construction, Inc.
Tony L. Schmitz
Star Route
Lindrith, New Mexico 87029

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OIL CONSERVATION DIVISION
SANTA FE

since 1940!

SALES ○ SERVICE ○ INSTALLATION

(505) 247-4036

1988

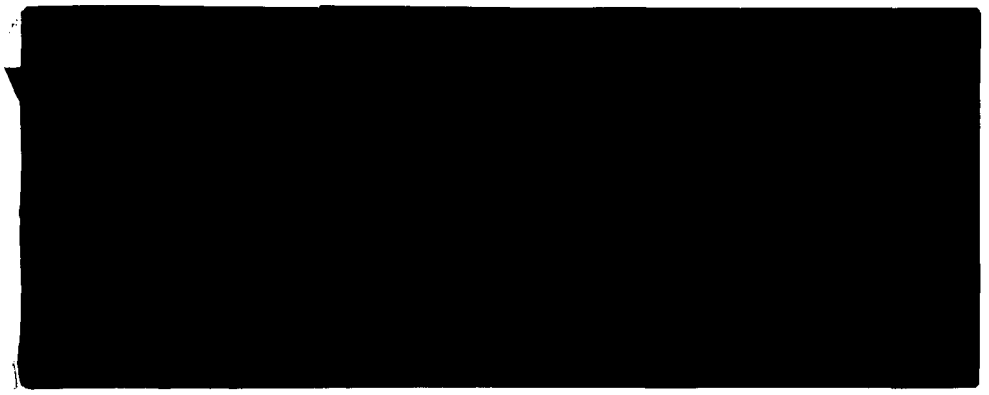
PUMP & PIPE COMPANY

1824 SECOND STREET, N.W.

P.O. BOX 25144 ALBUQUERQUE, NEW MEXICO 87125-0144

PROPOSAL

EQUIPMENT & ACCESSORIES



EVAPORATION POND PROJECT
FOR
TONY SCHMITZ
STAR ROUTE
LINDRETH, N.M. 87029

FEBRUARY 26, 1988

SALES ○ SERVICE ○ INSTALLATION
PHONE (505) 247-4036

PUMP & PIPE COMPANY
1824 SECOND STREET, N.W.
P.O. BOX 25144 ○ ALBUQUERQUE, NEW MEXICO 87125-0144

February 26, 1988

Mr. Tony Schmitz
Star Route
Lindreth, N.M. 87029

Dear Mr. Schmitz:

We offer the attached bill of materials for installing a sprinkler system to be used for evaporating water at a rate of approximately ten thousand gallons per day. Selection of equipment was made based on calculations resulting from published records of temperature, wind speed, and wet bulb/relative humidity for the area involved. Predicated on these records, we are assuming that an average rate of 5% is reasonable. To this end we are planning to pump and recirculate 200,000 gallons per day.

The pump selected is rated for 450 GPM (27,000 GPH) vs 207 ft. (90 lbs PSI), when operating at 1900 RPM and will require not more than 36 Brake Horsepower.

We plan to use 72 9/64" spray nozzels which will discharge approximately six GPM each at 75lbs PSI at the nozzel entry. Discharge piping and related equipment are selected to hold losses to not more than 7lbs PSI.

Suction pipe and fittings will permit the intake from the pond to be located in the pond bottom, and provisions for an adequate suction strainer are included. Because of ground elevation extra consideration has been given to design of suction equipment to permit the pump to have the necessary Net Positive Suction Head required for proper performance. Because this item can be critical, we have included 10 feet of 6" suction hose which will facilitate repositioning the pump when the pond level is lowered. The remainder of the suction pipe is new 6" steel pipe.

In addition, we have included flange connections which will allow an optimum positioning of the discharge manifolds to permit best utilization of the angle of spray pattern. Also provision for liquid chemical injection is included.

In closing we must point out that we can only guarantee that the pump will perform as stated, but we feel that the system as offered will produce the desired results.

Yours very truly,

Sol Taylor
T-P Pump & Pipe Co.

enc.
ST/jt

FEB 22 1988

Sprinkler Evaporation Losses

K. R. Frost and H. C. Schwalen
Member ASAE Member ASAE

Engineers prepare nomograph for estimating spray losses based on temperature, wind movement, operating pressure, humidity, nozzle diameter and breaking of spray

A STUDY of spray losses in sprinkler irrigation was undertaken to determine the percent of water reaching the ground or vegetative surfaces during application. It was also desirable to study the factors influencing the losses in order that application efficiencies might be improved under Arizona conditions. Results of previous work on the determination of evaporation losses from sprinkler spray indicate that application efficiencies would be extremely low at high temperatures and low humidities. If these results are applied to Arizona conditions and no practical means is found to improve the efficiency of application, it is evident that the sprinkler method of irrigation cannot be generally recommended for this state.

A test plot was set up for collecting the discharge from sprinklers by arranging quart cans on the ground at 6-ft spacings in which the catch in each can is representative of the average depth of application on a 36-sq-ft area. A depth of 1 in of water in each can was equal to a volume of 197 cc and over the 36-sq-ft area it represents is equivalent to 3 cu ft of water. The total volume of water reaching the ground surface in cubic feet is equal to the total measured catch in all the gage cans in cubic centimeters divided by 197 and multiplied by 3, or

$$\text{Volume (cu ft)} = \frac{\text{Total catch (cc)}}{197} \times 3$$

The discharge from the sprinkler nozzles was measured through a calibrated meter reading in cubic feet. The loss from the spray in the air is the difference between the metered discharge and the computed amount of water reaching the ground surface, corrected for the evaporation losses which occur after the water reaches the gage cans. Nozzle pressures were measured with a pressure gage attached to the lateral at the base of the riser. Wind velocity was obtained with a Biram anemometer equipped with a directional vane at an elevation of 6 ft above the ground surface. Wet and dry bulb temperature readings were taken four or five times during each test run, at an elevation of 4 ft above the ground surface and outside the sprinkler test area.

About 100 tests of 1 to 2 hr duration were first run with only a single sprinkler in the test area. Test runs were made in daytime and at night, at clear and cloudy weather under various temperatures, humidities, and wind conditions, and operating pressures. No corrections were made for evaporation loss from the water collected in the cans during the test period, since in previous work they had appeared to be negligible. Spray losses under extreme conditions of bright sunlight at high temperatures and low humidity ran as high as 35 to 45 percent. These results were in line with those reported previously by others under similar conditions.

It was suspected that, in operating a single sprinkler alone, losses in the outer fringe area were not comparable with those occurring under field conditions with overlapping spray from adjacent sprinklers. This was verified in following tests in which two sprinklers were operated and the losses were computed on the basis of the overlapping area between the two sprinklers. This arrangement, which closely similates field conditions with a row of sprinklers on a lateral, resulted in greatly reduced spray losses as shown by the comparative curve losses in Fig. 1.

In all of the test runs it was found that spray losses could be closely correlated with vapor pressure deficit of the atmosphere during the test period. The vapor-pressure deficit is equal to the difference between the vapor pressure of the moisture in the air and the vapor pressure at saturation

Paper presented at the annual meeting of the American Society of Agricultural Engineers at Urbana, Ill., June, 1955, on a program arranged by the Soil and Water Division.

The author—K. R. FROST and H. C. SCHWALEN—are, respectively, associate agricultural engineer and agricultural engineer, agricultural experiment station, University of Arizona.

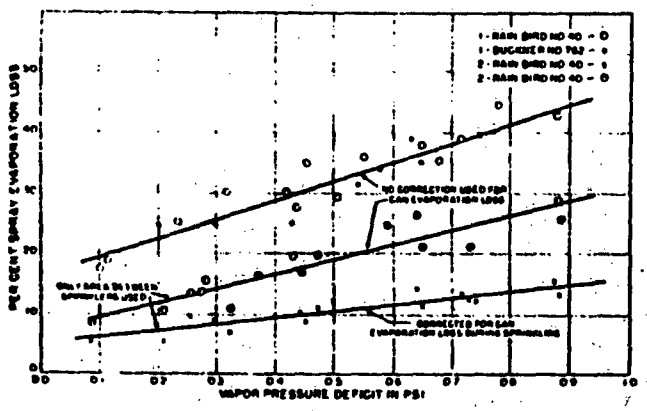


Fig. 1 Relation of spray losses with 5/16 x 1/8-in nozzles to vapor pressure deficit under the following test conditions: *(top curve)* using a single sprinkler head without correction for can evaporation loss, *(center curve)* using two sprinklers and considering only the overlapping area between them with no corrections, and *(lower curve)* same as center but corrected for can evaporation

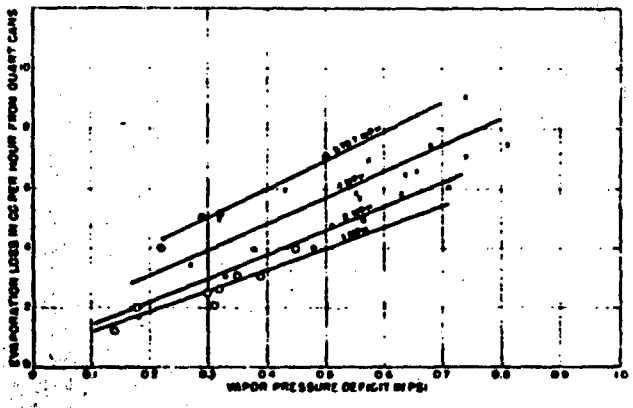


Fig. 2 Correction factor to be added to the catch in regular gage cans to compensate for evaporation from cans during test runs under bright sunlight conditions at various wind velocities. This correction is equal to the catch in regular cans at same locations

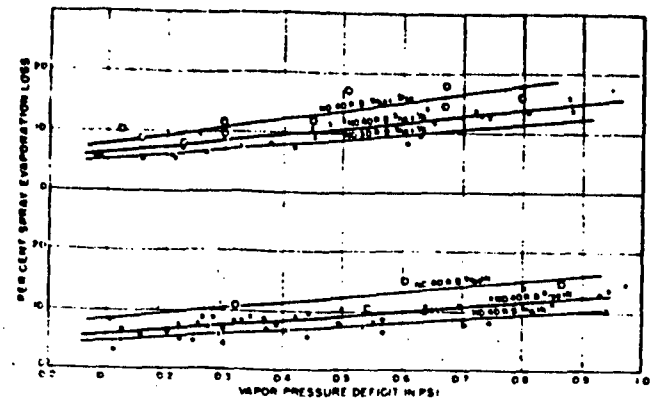


Fig. 3 The upper group of curves shows the comparative losses from two sizes of nozzles and two different sprinkler heads. The lower group shows the losses obtained from range nozzles of different sizes. All tests at less than 5 mph average wind velocity

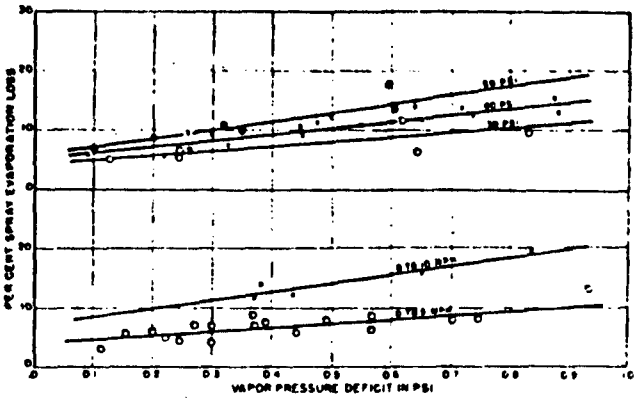


Fig. 4 The upper group of curves is a comparison of spray evaporation losses with two $^{3}/_{16}$ x $^{1}/_{8}$-in sprinkler heads at an average wind velocity of less than 5 mph. The two lower curves show the comparative losses at less than 5 mph and 8 to 10 mph with a $^{3}/_{16}$-in range nozzle at 40 psi

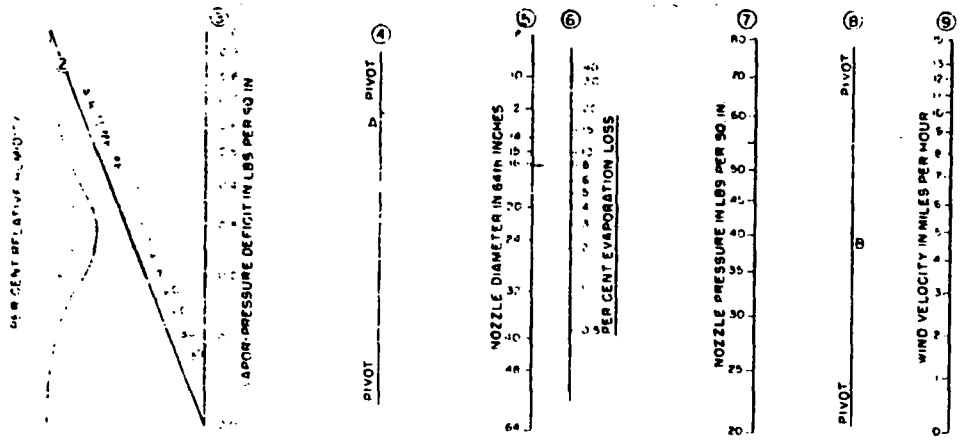


Fig. 5 Nomograph for estimating the evaporation spray losses under various climatic and operating conditions in sprinkler irrigation

at the same air temperature. However, comparative losses at the same vapor-pressure deficit were found to be consistently higher on clear days than on cloudy days. It was evident that direct solar radiation was affecting the results. A check with a pyrheliometer showed that the difference in loss was not due to interception by the spray of the radiant heat of the sun.

Painting the gage cans white eliminated the greater part of the heat absorbed by direct solar radiation which resulted in greatly reduced evaporation losses. The use of oil in the cans further reduced these losses to a negligible amount during the test periods. The reduction in loss due to the use of oil in the cans is attributed to the fact that the first droplets striking the oil surface splashed a thin film on the inside walls of the cans. Succeeding droplets of water striking the sidewalls immediately flowed into the collecting reservoir below the oil surface.

From the standpoint of measuring the total catch it was impractical to use oil in all of the gage cans. Gage cans filled about one-half full with either diesel fuel or kerosene were placed adjacent to regular cans at between 5 and 7 different locations, depending upon wind conditions, to obtain an average correction factor for each test run. The bottom line in Fig. 1 shows the results obtained when this correction factor is applied to the losses from the regular gage cans when using a test area between two adjacent sprinklers. It is evident that losses formerly attributed to evaporation from the spray while in the air were actually due to loss which occurred after the water reached the gage cans. The average correction values required on bright, clear days at midday for various wind velocities are shown in Fig. 2.

Influence of Nozzle Size on Losses

A large number of tests, at the most common operating pressure of 40 psi, were run on Rain Bird No. 40 sprinkler heads, both with and without spreader nozzles. Test runs in this series were all made with wind velocities averaging less than 5 mph, but under a wide range in other weather conditions. Results shown in Fig. 3 indicate that evaporation losses vary inversely with the diameter of nozzle. Comparison of the No. 30 Rain Bird sprinkler with special type nozzle openings and the standard No. 40 with spreader pins shows lower losses with the former due to less breaking up of the stream as shown in the lower curve in the upper group in Fig. 3.

The lower group of curves shows the evaporation losses to be expected when only a range nozzle is used at 40 psi operating pressure. Individual test points indicate that losses as low as 3 percent may be expected at low vapor pressure deficits and with nearly zero wind movement and

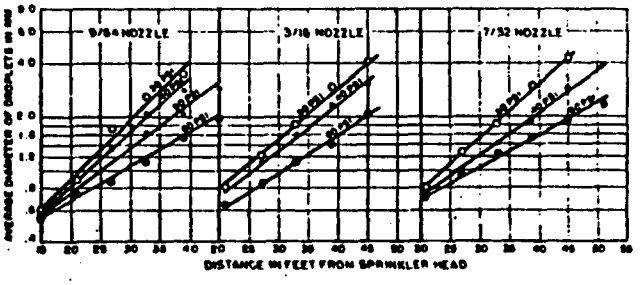


Fig. 6 Determination of droplet size in respect to distance from sprinkler head. Droplets were collected in cans partially filled with bentonite. By weighing cans before and after passes of the sprinkler and by counting the number of droplets in each can, the average diameter was computed

comparable losses on a hot, dry day may run up to 10 percent, as shown by the bottom curve in this group.

Influence of Nozzle Pressure on Losses

Nozzle pressures were varied from 20 psi for small low-angle sprinkler heads to 80 psi for large ½-in nozzles. Results of tests with Rain Bird No. 40 sprinklers equipped with 5/16 x ⅛-in nozzles and spreader pins at 30, 40, and 50 psi nozzle pressures and at low wind velocities are plotted in the upper group of curves in Fig. 4. Removing the spreader pins decreased losses by about one-fifth in tests under comparable conditions.

Under the higher pressures the streams issuing from the nozzle jets are broken up into much finer spray with correspondingly greater surface area. Both evaporation loss and wind drift losses are increased. Losses in general are about proportional to nozzle pressure, that is, increasing the pressure from 40 to 50 psi will give an increase of one-fourth in spray losses. This is especially apparent when significant losses occur under moderate and hot weather conditions.

Near the saturation point or at a very low vapor-pressure deficit, the losses were about 3 percent at 30 psi and noticeably greater at 50 psi, with the difference increasing with the vapor pressure deficit.

Influence of Wind Velocity

Tests were run on various nozzles and arrangements at 8 to 10 mph (average) wind velocity for comparison with those at 0 to 5 mph. Comparative results obtained at 0 to 5 mph and 8 to 10 mph are plotted in the lower half of Fig. 4 for 5/16-in nozzles at 40 psi nozzle pressures. Losses were considerably higher at the high wind velocities as much of the fine spray was carried out of the collecting area and therefore failed to reach the ground surface in measurable quantities. As this drift did not moisten the soil outside of the can area, it was assumed that it was a complete loss for irrigation purposes. Doubling the wind velocity approximately doubled the losses for all weather conditions for the nozzles used in these tests. Since average wind velocities were measured for the test period, peak velocities were no doubt 50 to 100 percent higher than those shown in Fig. 4.

Nomograph for Estimating Spray Losses

Evaporation spray losses from sprinklers are dependent upon both climatic factors and operating conditions. The following general conclusions are based upon some 700 test runs under a variety of climatic conditions. Losses increase with temperature, wind movement, operating pressure and degree of breaking of spray, and decrease with increase in humidity, and nozzle diameter. They are most directly related to the vapor-pressure deficit in the atmosphere which is dependent upon the temperature and relative humidity.

The nomograph in Fig. 5 has been prepared on the basis of the experimental tests and follows as closely as possible the relationships established in them. The use of the nomograph is explained by following through the example below:

Given: Single 5/16-in range nozzle, at 40 psi, average wind velocity 5 mph, air temperature 90 degrees F., and relative humidity 10 percent.

Object: Determine the estimated spray loss.

Method: 1 Draw a line from 10 percent relative humidity point on scale (1) through 90 degrees F. temperature on scale (2) and extend line to scale (3) giving a vapor pressure deficit of 0.63.

2 Then draw line from 0.63 on scale (3) to diameter of nozzle scale (5) at the 13/64 or 5/16-in mark, intersecting pivot line (4) at point *A*.

3 Connect 40 psi on scale (7) with the wind velocity of 5 mph on scale (9) with a line, intersecting the pivot line (8) at *B*.

4 Connect pivot points *A* and *B* intersecting scale (6) at the 8.3 percent evaporation point—the answer.

Measurement of Droplet Size

The total surface area of a given volume of water varies inversely as the diameter of the droplets. The smaller the droplet, the greater is the surface area exposed to the air and direct solar radiation and the greater the evaporation from the sprinkler spray.

A study was made to determine the approximate size of the droplets for a comparison of the computed theoretical evaporation loss with that determined experimentally. The results of the study as shown in Fig. 6 indicate that, for a given nozzle size, the diameter of droplet increases with the distance from the sprinkler head and varies inversely with the nozzle pressure.

It was found possible to measure the approximate size of the droplets by collecting them in cans partially filled with bentonite, weighing cans before and after 5 or 6 passes of the sprinkler and counting the number of droplets in each can after each pass. This enabled the average diameter to be computed for a given distance from the nozzle.

Computed evaporation losses from the spray based upon the total exposed water surface as determined from droplet sizes were considerably lower than the experimental losses, even though in the calculations it is assumed that the temperature of each droplet is reduced to the wet-bulb temperature by the time it reaches the ground surface. It is believed that the wind drift and loss of the extremely fine droplets accounts for at least part of this difference.

Engineering the Hillside Combine

(Continued from page 525)

soil with the steering wheels turned up a steep slope, and individual brakes are used to help steer.

Automatic leveling controls are, in themselves, a good safety device to guard against the operator leveling the wrong way and to help cut down "operator fatigue." The automatic controls should have a handy manual overriding control to guard against failure.

If hydraulic leveling is used, some method should be provided to prevent the breaking of a hydraulic line from letting the machine level over to the heavy side, such as pilot-operated check valves at the cylinder outlets. If mechanical leveling is used, it is well to have the drive through a low-helix angle, non-reversing worm.

Power steering helps decrease operator fatigue and in that way is a good safety device.

All controls should be placed in a natural and accessible location to cut down operator fatigue and to make it natural for the operator to actuate the proper control in the correct direction in case of emergency.

Thought and care must be given to the emergency-brake locking control to make it unlikely the operator will drive the machine with the brake on, as this has been the cause of many grain fields being set on fire.

Evaporation Loss Calculation

Assumed:

Temp = °F

Rel. Humidity = %

Wind Speed = mph

Nozzle dia = ins

Nozzle pressure = psi

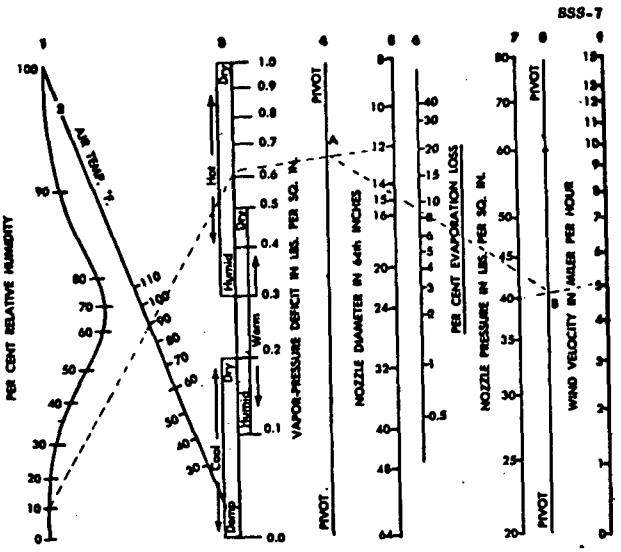


FIG. NO. V-9 Nomograph for Estimating the Evaporation Spray Losses Under Various Climatic and Operating Conditions in Sprinkler Irrigation.

QUOTATION

PUMPS IS OUR BUSINESS
SALES ○SERVICE ○INSTALLATION
PHONE (505) 247-4037 ○ NITE (505) 255-7448
OR 296-1461

PUMP & PIPE COMPANY
1824 SECOND ST., NW ○ P.O. BOX 25144 ○ ALBUQUERQUE, NEW MEXICO 87125

MR. TONY SCHMITZ
STAR ROUTE
LINDRETH, N.M. 87029

Date 2-26-88
F.O.B.
Reference LETTER 2/26/88

QUANTITY	DESCRIPTION	WEIGHT	UNIT PRICE	EXTENSION
1	BERKELEY B3JRMS PUMP			$1,950.00
1	FABRICATED 6X36X3 TEE MANIFOLD			$295.00
2	4" X 9" FLANGED FLEX STEEL CONNECTIONS			$220.00
2	CLEMONS/AMES 4" FLANGED CHECK VALVES			$538.00
	4" SUPPLY LINE - PUMP TO SPRAY BARS			
600FT.	4" SCH. 40 PVC PIPE			
4	4" PVC VANSTONE SLIP FLANGES			
2	4" X 3" PVC REDUCING TEES			
5	4" PVC 90° ELS			
2	4" X 3" PVC BUSHINGS			
2	4" PVC COMP. FLANGES			
6	SETS 4" NB AND G			$1,003.00
	3" SPRAY BAR SYSTEM			
800FT.	3" SCH 40 PVC PIPE			
8	3" PVC CAPS			
8	3" PVC FLANGES			
4	3" PVC TEES			
16	3" PVC VANSTONE SLIP FLANGES			
4	3" IBM NRS FLANGED GATE VALVES			
8	SETS 3" NB & G			$1,752.35
40'	6" SUCTION PIPE, FABRICATED FOR FIELD ASSEMBLY, 6" STRAINER, 6" FLEX COUPLING, 6X4 ECC. REDUCER			$893.00
10FT.	6" PVC SUCTION HOSE WITH FLANGED ENDS, NB & G			$275.00
	TO FABRICATE, DRILL AND TAP SPRAY BARS			$450.00
90	9/64" NOZZELS			$52.00
	ESTIMATED INCOMING FREIGHT, PUMP, VALVES, FITTINGS			$380.00
				$7,808.35
	PLUS APPLICABLE TAXES:			

Accepted_____

By_____

Date_____

T-P PUMP & PIPE COMPANY

By Sol Taylor
SOL TAYLOR

Date 2-26-88

Ps

QUOTATION

PUMPS **IS** OUR BUSINESS
SALES SERVICE INSTALLATION
PHONE (505) 247-4037 · NITE (505) 255-7448
OR 296-1461

PUMP & PIPE COMPANY
1824 SECOND ST., NW P.O. BOX 25144 ALBUQUERQUE, NEW MEXICO 87125

MR. TONY SCHMITZ
STAR ROUTE
LINDRETH, N.M. 87029

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2	4" PVC COMP. FLANGES			
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	3" SPRAY BAR SYSTEM			
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	ESTIMATED INCOMING FREIGHT, PUMP, VALVES, FITTINGS			$380.00
				$7,808.35
	PLUS APPLICABLE TAXES:			

Accepted_____

By_____

Date_____

T-P PUMP & PIPE COMPANY

By_____
SOL TAYLOR

Date 2-26-88

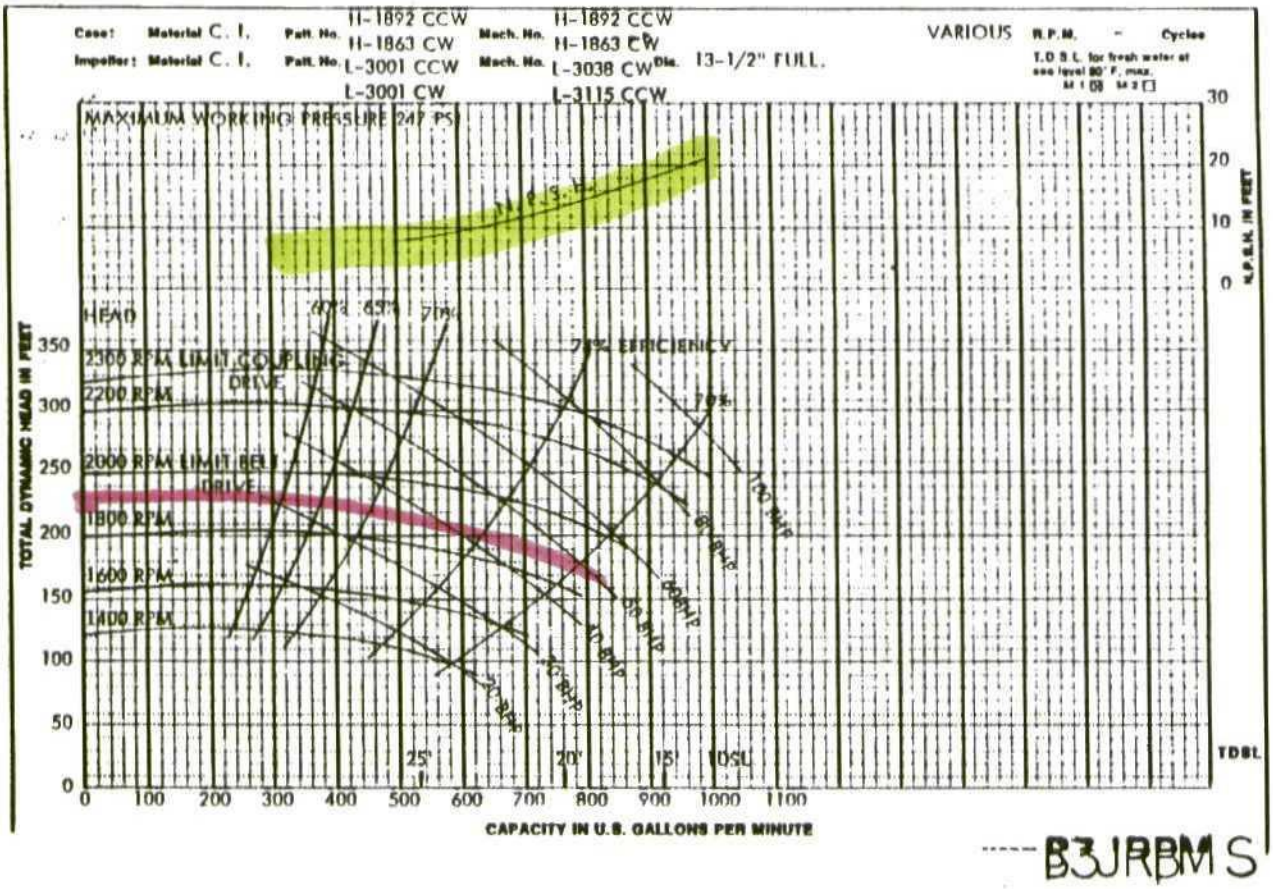
Ps

BERKELEY PUMP COMPANY

TYPE "B" RATING CURVES

BELT OR COUPLING DRIVE

CURVE	4165
DATE	8-17-81
PAGE	7.51
SUPERSEDES	
NEW	



B3JRBMS

BAROMETRIC PRESSURE	6500-7000 FT	23.30 FT.
℄ PUMP ABOVE WATER	5.00 FT	
FRICTION (450 GPM-6" PIPE AND STRAINER)	4.35 FT	
VAPOR PRESSURE, 70° F	.89	
	10.24	10.24
		13.06 FT.
NPSH REQUIRED AT 450 GPM		9.00 FT.
AVAILABLE OVER NPSH REQUIRED		4.06 FT.

LOSSES RESULTING FROM REDUCTION IN SUCTION ASSEMBLY SIZE OR INCREASE IN SUCTION LIFT COULD JEOPARDIZE PROPER PUMP PERFORMANCE.

BERKELEY PUMP COMPANY

TYPE "B" RATING CURVES

BELT OR COUPLING DRIVE

CURVE	4165
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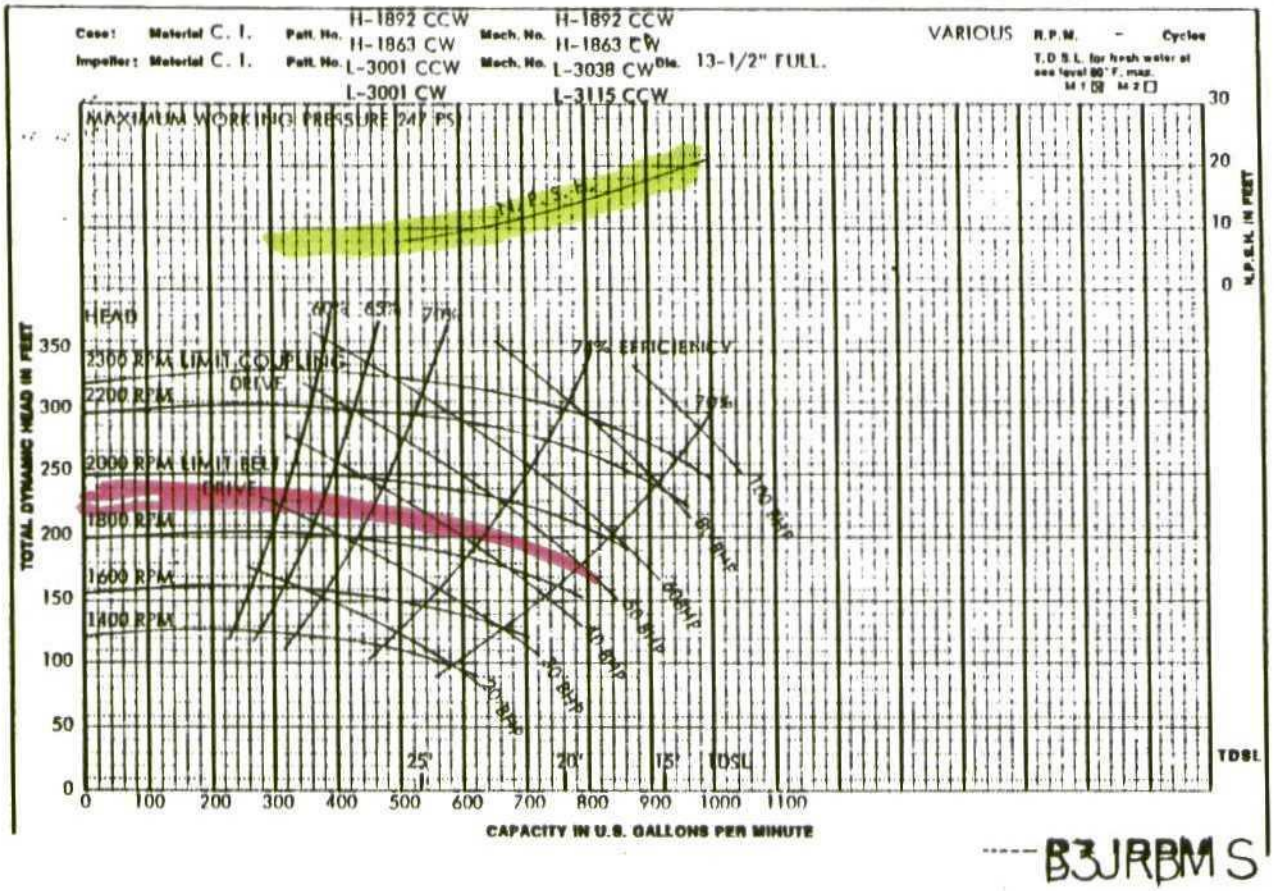
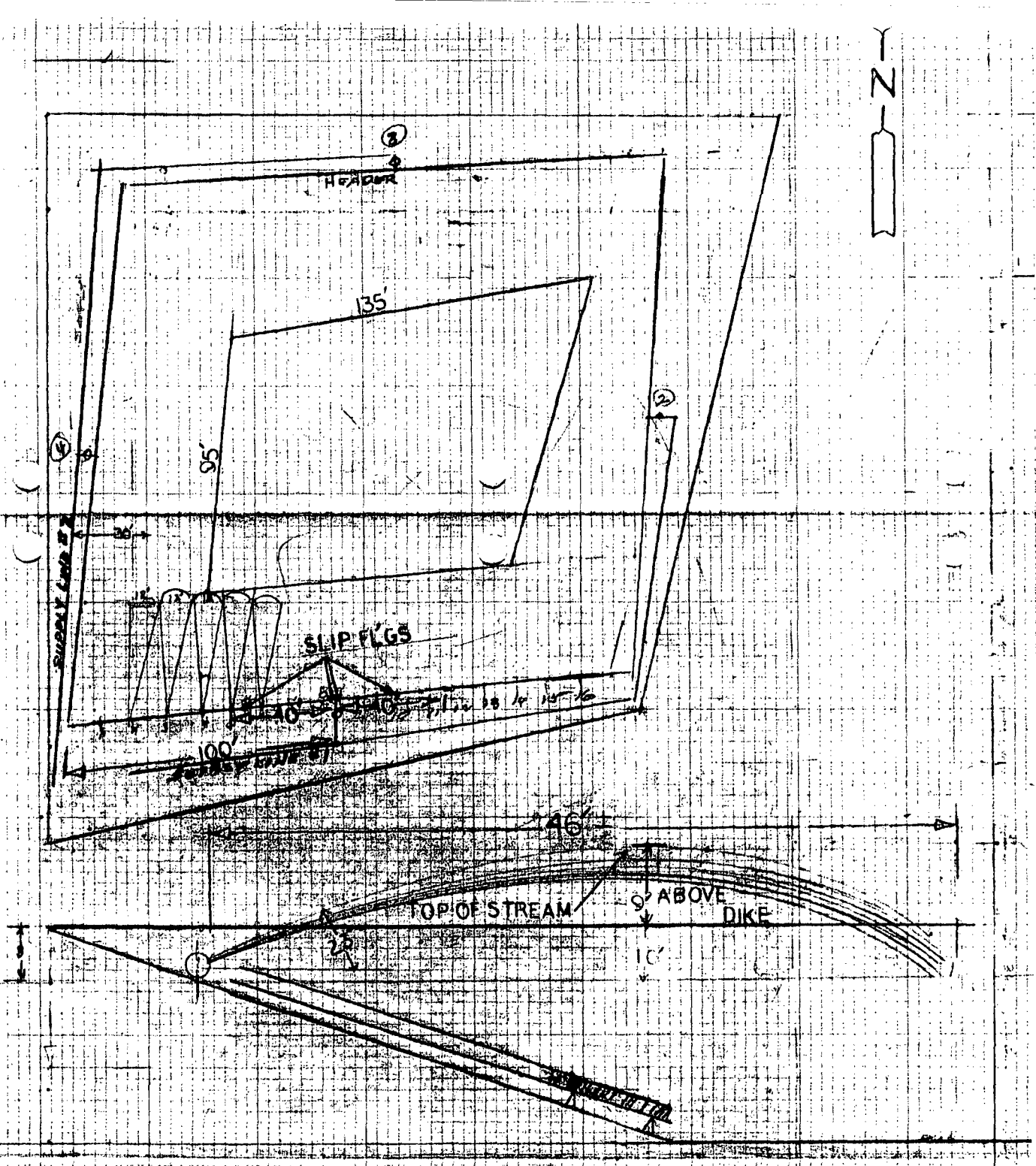
NEW	

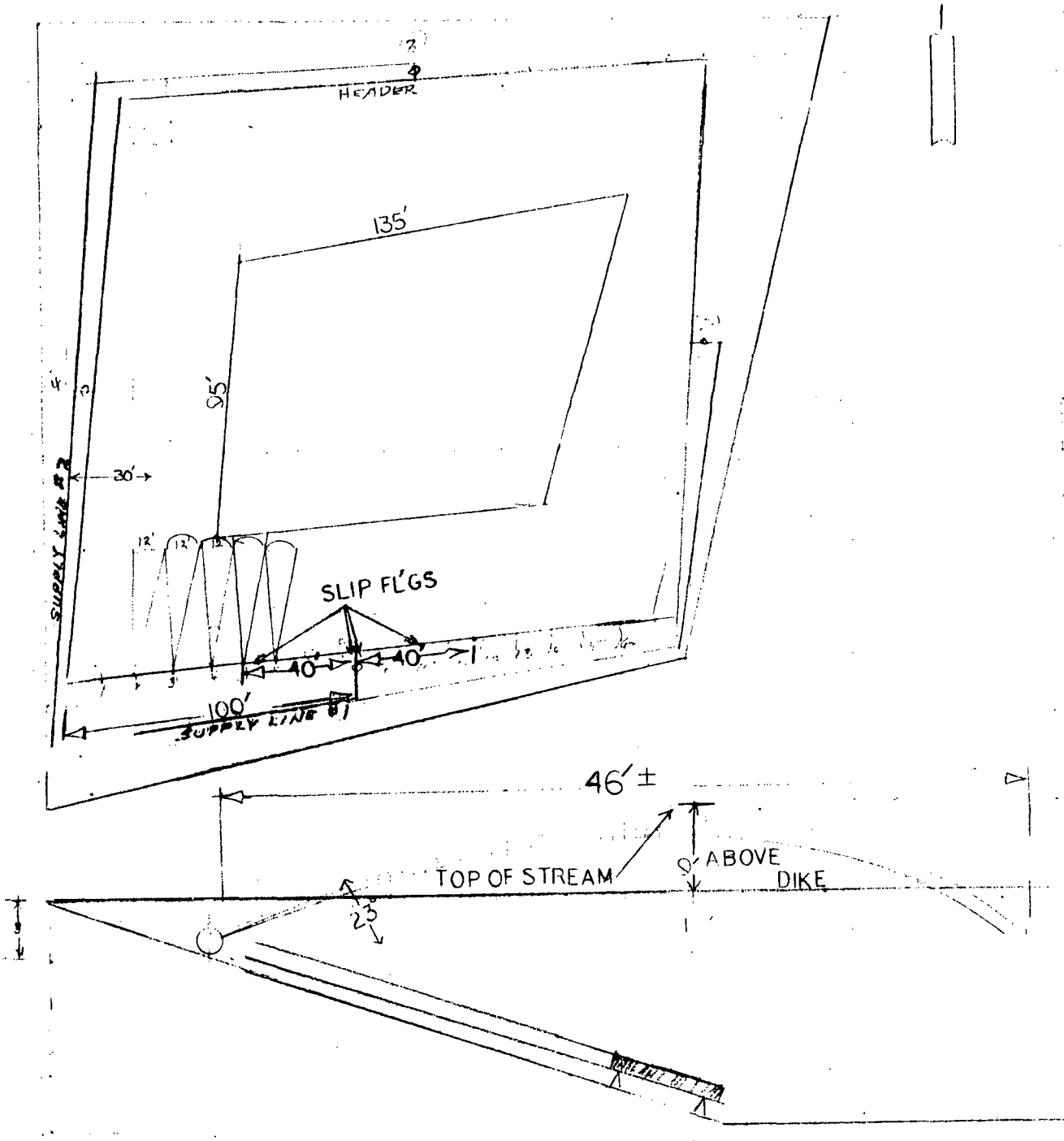


B3JRBM S

BAROMETRIC PRESSURE	6500-7000 FT	23.30 FT.
℄ PUMP ABOVE WATER	5.00 FT	
FRICTION (450 GPM-6" PIPE AND STRAINER)	4.35 FT	
VAPOR PRESSURE, 70° F	.89	
	10.24	10.24
		13.06 FT.
NPSH REQUIRED AT 450 GPM		9.00 FT.
AVAILABLE OVER NPSH REQUIRED		4.06 FT.

LOSSES RESULTING FROM REDUCTION IN SUCTION ASSEMBLY SIZE OR INCREASE IN SUCTION LIFT COULD JEOPARDIZE PROPER PUMP PERFORMANCE.


N
HEADER
135'
95'
SLIP FLGS
30
100'
46'+
TOP OF STREAM
9' ABOVE
DIKE
10'
25


N
HEADER
135'
95'
30'
SUPPLY LINE #2
12'
12'
12'
SLIP FL'GS
40'
40'
100'
SUPPLY LINE #1
46'±
TOP OF STREAM
8' ABOVE
DIKE
23'

1/4/88

T-n-T Construction, Inc.
Tony L. Schmitz
Star Route
Lindrith, New Mexico 87029

RECEIVED
JAN - 5 1988
OIL CONSERVATION DIVISION
SANTA FE

Record on test holes for Commercial Evaporation Pit:

10/29/87---Bailed east hole- 9' 0" down to 1' 6"-- O. C. D. checked water levels.

11/10/87---Bailed east hole 8' 4" down to 2' 6".

11/11/87---Bailed east hole 8' 4" down to 2' 6"--Gained 1' 10" in 24 hours.

Bailed north hole-12"- Bailed to 6".

Bailed west hole-24"-Bailed to 1' 6".

Inside fence 4".

12/09/87---East hole 8' 6"-Bailed to 2' 6".

East hole checked Total Desolved Solids--.13

Skimmer pit overflow T.D.S.--.70

Evaporation pit T.D.S.--.50

Frac pit-water from water well--.06

Water from well at my house--.09

12/22/87---East hole-6' 0"--Gained 3' 6" in 3 days. T.D.S.--.13.

North hole-6".

West hole-14".

Inside fence-4".

12/28/87---East hole-7'9"--Gained 1'9" in 6 days--T.D.S. .12.

Bailed to 2'6".

12/30/87---East hole-4'6"--Gained 2'0". T.D.S. .14

Total Desolved Solids Tester--Cole-Parmer Chicago, Il. 60648
Range--100/10000 T.D.S. - Model 1491-51

September 16, 1987

RECEIVED
SEP 21 1987
OIL CONSERVATION DIVISION
SANTA FE

Mr. Roger Anderson
New Mexico Oil Conservation Division
P. O. Box 2088
Santa Fe, New Mexico 87501-2088

Re: Second Unlined Commercial Evaporation Pit
NW/4, SW/4, Section 8-T25N-R3W
Rio Arriba County, New Mexico

Dear Mr Anderson:

T-n-T Construction, Inc. requests administrative approval to build a second unlined commercial evaporation pit directly north of the existing facility. The new pit will be 150 feet wide and 400 feet long and will use the existing skimmer pit to overflow into the already approved evaporation pit and then will be pumped into the new evaporation pit as the new pit is on a higher elevation than the first pit.

Stevenson Construction drilled 5 test holes and I have enclosed the drillers logs along with drawings of location of test holes. Also the drawing shows size and location of the proposed new pit in relation to the first pit.

The construction will be the same material, native clay, and workmanship, with the same compaction and test varification, as the first pit. Monitor holes will be drilled, cased, gravel packed and cemented as was done on the first pit.

If this application meets with your approval, please advise as construction start-up is waiting for authorization. If I may be of further assistance, please advise.

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

Tony Lee Schmitz, President

9/16/87
date

T-n-T Construction, Inc.
Star Route
Lindrith, New Mexico 87029

STEVENSON CONSTRUCTION
Gen. Del.
Lindrith, New Mexico, 87029

September 10, 1987

Drillers log for 5 test holes for T-n-T Construction, Inc.

Test hole # 1--Drilled to 21 feet------Blue and Red Clay

Test hole # 2--Drilled to 21 feet------Blue and Red Clay

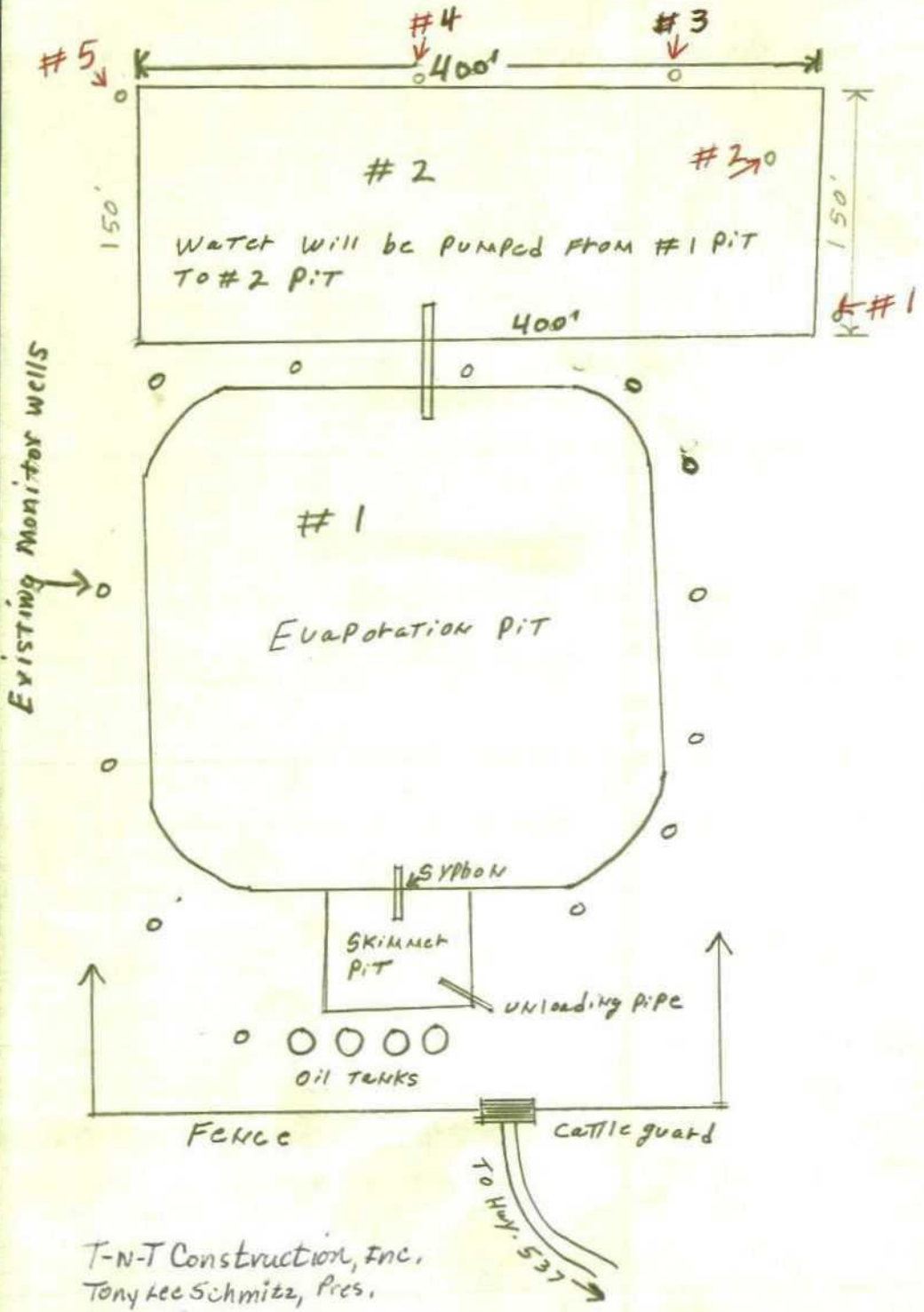
Test hole # 3--Drilled to 16 feet------Red Clay

Test hole # 4--Drilled to 17 feet------Red Clay

Test hole # 5--Drilled to 21 feet------Red Clay

Steve Stevenson

Steve Stevenson, President



Test hole #1 - Drilled to 21' Blue & Red Clay
" " #2 - " " 21' Blue & Red Clay
" " #3 - " " 16' - Red clay
" " #4 - " " 17' - Red Clay
" " #5 - " " 21' - Red clay

T-N-T Construction, Inc.
Tony Lee Schmitz, Pres.
Star Rt.
Lindrith, N.M. 87029

STATE OF NEW MEXICO

ENERGY AND MINERALS DEPARTMENT

OIL CONSERVATION DIVISION

GARREY CARRUTHERS
GOVERNOR

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

July 27, 1987

Mr. Tony L. Schmitz
T-N-T Construction, Inc.
Star Route
Lindrith, New Mexico 87029

RE: Surface Disposal Facility

Dear Mr. Schmitz:

The Oil Conservation Division has received your letter dated July 21, 1987 requesting permission to receive clear drilling fluids (no muds) from reserve pits. These fluids will be received into your skimmer pit where oil will be skimmed off into tanks.

Based on the information contained in your letter and on a field inspection, the OCD has determined that the proposed disposal does not require a public notice and administrative approval is hereby granted. Please be advised that the approval of this modification does not relieve you of liability should your operation result in actual pollution of surface or ground waters which may be actionable under N.M. laws and/or regulations.

If any oil is received at the facility in excess of 2/10 of 1% (0.2%) of the volume of water received, or any waste or miscellaneous oil, it will result in your facility being classified and regulated as a treating plant. OCD Rule 312 is enclosed for your information and consideration in your future plans.

Sincerely,

WILLIAM J. LEMAY
Director

WJL/JB/cr

xc: OCD-Aztec

RECEIVED
JUL 22 1987
OIL CONSERVATION DIVISION
SANTA FE

July 21, 1987

Energy and Minerals Department

Oil Conservation Division

P. O. Box 2088

Santa Fe, New Mexico 87501

Dear Mr. Boyer;

T-N-T Construction, Inc. would like to request permission to take drilling fluids from reserve pits into the Evaporation Pit, The oil companys need to get rid of the fluid so they can clean the location up. It will be all clear fluid after the drilling mud has settled out. Approximately 3200 barrels are in these pits.

The fluids will go into the skimmer pit then overflow into the big evaporation pit. The oil, if any, will be skimmed off into tanks.

Thank you.

Sincerely;

Tony L. Schmitz

Tony L. Schmitz, President
T-n-T construction, Inc.
Star Route
Lindrith, New Mexico 87029

TNT P.7 (Lindrith)

McWhorter, Nelson Approach to infiltration during Ponding

$$g = \frac{y + D_l - \psi_b \left(\frac{8}{K_f}\right)^{\frac{1}{2+3\lambda}}}{\frac{D_l}{K_l}} \qquad (\text{for } \psi_f < \psi_b)$$

K_l = conductivity of liner = 2.7×10^{-8} cm/sec (worst case)

g = infiltration rate [L/T] (steady state rate)

y = depth of ponding = 4.5 ft = 137.1 cm

D_l = thickness of Liner = 2 ft = 61 cm

ψ_b = -25 cm (assumed for a light clay) typical value Clapp & Hornberger WRR 1978, 14(4)

λ = 0.78 (") range $\approx 1 < \lambda < 3$ (fine to coarse) Nelson & McWhorter

K_f = saturated conductivity of formation = 1×10^{-5} cm/sec (assumed worst case)

For 1st approximation McWhorter & Nelson use

$$g = \frac{y + D_l - \psi_b}{\frac{D_l}{K_l}}$$

$$= \frac{137.1 \text{ cm} + 61 \text{ cm} - (-25 \text{ cm})}{\frac{61 \text{ cm}}{2.7 \times 10^{-8} \text{ cm/sec}}}$$

$$g = 9.9 \times 10^{-8} \text{ cm/sec}$$

now use this value in full eqn. so

$$q = \frac{137.1\text{ cm} + 61\text{ cm} - (-25\text{ cm})\left(\frac{9.9\times10^{-8}\text{ cm/sec}}{1\times10^{-5}\text{ cm/sec}}\right)^{\frac{1}{2+3(0.78)}}}{\frac{61\text{ cm}}{2.7\times10^{-8}\text{ cm/sec}}}$$

$$q = 1.2\times10^{-7}\text{ cm/sec}$$

again using this value

$$q = \frac{137.1\text{ cm} + 61\text{ cm} - (-25\text{ cm})\left(\frac{1.2\times10^{-7}\text{ cm/sec}}{1\times10^{-5}\text{ cm/sec}}\right)^{\frac{1}{2+3(0.78)}}}{\frac{61\text{ cm}}{2.7\times10^{-8}\text{ cm/sec}}}$$

$$q = 1.18\times10^{-7}\text{ cm/sec}$$

again using this vale

$$q = 1.18\times10^{-7}\text{ cm/sec}$$

?

Does criteria of $\psi_f < \psi_b$ apply

$$\psi_f = \psi_b\left(\frac{q}{K_f}\right)^{\frac{1}{2+3\lambda}}$$

Yes

$$\psi_f = (-25\text{ cm})\left(\frac{1.18\times10^{-7}\text{ cm/sec}}{1\times10^{-5}\text{ cm/sec}}\right)^{\frac{1}{2+3(0.78)}}$$

$$\psi_f = -69.5\text{ cm} < \psi_b = -25\text{ cm}$$

For $(\psi_f < \psi_b)$:

$$T = \frac{\theta_f}{q}\left((n-\theta_r)\left(\frac{g}{K_f}\right)\frac{\lambda}{2+3\lambda} + (\theta_r - \theta_i)\right)$$

θ_f = depth to wetting front = 10 ft. = 305 cm (thickness of upper clay)

? θ_r = residual moisture content = 0.2376 (assumed for light clay)

θ_i = initial " " = 0.238 (assuming at or near residual moisture content initially)

n = 0.495 (porosity assumed for clay)

$$T = \frac{305\text{ cm}}{1.18\times10^{-7}\text{ cm/sec}}\left\{(0.495-0.2376)\left(\frac{1.18\times10^{-7}\text{ cm/sec}}{1\times10^{-5}\text{ cm/sec}}\right)^{\frac{0.78}{2+3(0.78)}} + (0.2376-0.238)\right\}$$

4×10^{-7}

$$= 2.99\times10^{8}\text{ sec}\left(\frac{\text{min}}{60\text{ sec}}\right)\left(\frac{\text{hr}}{60\text{ min}}\right)\left(\frac{\text{day}}{24\text{ hr}}\right) = 9.5\text{ yrs}$$

Cum. Infil. Vol. $= I = qTA$

A = area of pit ? = 300 × 300 ft = 90000 ft²

= 8360 m²

for $T = 9.5$ yrs

$$I = \left(1.18\times10^{-7}\text{ cm/sec}\right)\left(2.99\times10^{8}\text{ sec}\right)\left(8360\text{ m}^2\right)\left(\frac{\text{m}}{100\text{ cm}}\right)$$

$$I = 2950\text{ m}^3\left(\frac{264.2\text{ gal}}{\text{m}^3}\right)\left(\frac{\text{barrel}}{40\text{ gal}}\right) \approx 19500\text{ barrels}$$

Affidavit of Publication

STATE OF NEW MEXICO
County of Rio Arriba } ss.

I, Robert Trapp, being first duly sworn, declare and say that I am the Publisher of the Rio Grande Sun, a weekly newspaper, published in the English language, and having a general circulation in the City of Espanola and County of Rio Arriba, State of New Mexico, and being a newspaper duly qualified to publish legal notices and advertisements under the provisions of Chapter 167 of the Session Laws of 1937; that the publication, a copy of which is hereto attached, was published in said paper once each week for ../... consecutive weeks, and on the same day of each week in the regular issue of the paper during the time of publication, and that the notice was published in the newspaper proper, and not in any supplement, the first publication being on the ....18th.... day of ....Dec.... 19 86 and the last publication on the ..... day of ..... 19....; that payment for said advertisement has been (duly made), or (assessed as court costs); that the undersigned has personal knowledge of the matters and things set forth in this affidavit.

Robert Trapp
Publisher

Subscribed and sworn to before me this ....18th.... day of ....Dec.... A.D., 19 86

Notary Public

My Commission expires
5-17-89

PUBLISHER'S BILL

84 lines one time at $ 22.68

..... lines .....times $.....

Sub-Total $.....

Tax $ 1.25

Total $ 23.93

Received payment
RIO GRANDE SUN

.....

By .....

NOTICE OF PUBLICATION
STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

Notice is hereby given that pursuant to New Mexico Oil Conservation Division Rules and Regulations, the following permit to construct and operate a commercial evaporation facility has been submitted for approval to the Director of the Oil Conservation Division, P.O. Box 2088, State Land Office Building, Santa Fe, New Mexico 87504-2088, (505) 827-5800.

T-N-T Construction, Tony Scmitz, owner/operator, Star Route, Lindrith, New Mexico, 87029, has submitted for approval an application to construct and operate a commercial evaporation pit located in the NW/4, SW/4 of Section 8, Township 25 North, Range 3 West, NMPM, Rio Arriba County, New Mexico. Produced water and clear drilling and completion fluids associated with the drilling, completion and production operations of oil and gas wells will be disposed of in a wastewater evaporation pond lined with compacted native clays. The permit application addresses the construction, operations, spill/leak prevention and monitoring procedures to be utilized at the site. The ground water most likely to be affected by any accidental discharges is at a depth of approximately 150 feet, with a total dissolved solids content of approximately 1300 mg/1.

Any interested person may obtain further information from the Oil Conservation Division and may submit written comments to the Director of the Oil Conservation Division at the address given above. Prior to ruling on any proposed permit or its modification, the Director of the Oil Conservation Division will allow at least thirty (30) days after the date of publication of this notice which comments may be submitted to him.

GIVEN Under the Seal of the New Mexico Oil Conservation Commission at Santa Fe, New Mexico, on this 5th day of December, 1986. To be published on or before December 12, 1986.

STAE OF
NEW MEXICO
OIL CONSERVATION
DIVISION

DIVISION
R. L. STAMETS
Director

(SEAL)
(Published December 18, 1986)

AFFIDAVIT OF PUBLICATION

No. 19253

STATE OF NEW MEXICO,
County of San Juan:

Margaret Billingsley being duly sworn, says: That he is the Sec. to the Publisher of THE FARMINGTON DAILY TIMES, a daily newspaper of general circulation published in English at Farmington, said county and state, and that the hereto attached Legal Notice

was published in a regular and entire issue of the said FARMINGTON DAILY TIMES, a daily newspaper duly qualified for the purpose within the meaning of Chapter 167 of the 1937 Session Laws of the State of New Mexico for 1 consecutive (days) (weeks) on the same day as follows:

First Publication Dec. 11, 1986

Second Publication

Third Publication

Fourth Publication

and that payment therefor in the amount of $ 22.96 has been made.

Margaret Billingsley

Subscribed and sworn to before me this 11th day of Dec., 1986.

Connie Dixon

NOTARY PUBLIC, SAN JUAN COUNTY, NEW MEXICO

My Commission expires: July 3, 1989

Copy of Publication

NOTICE OF PUBLICATION
STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

Notice is hereby given that pursuant to New Mexico Oil Conservation Division Rules and Regulations, the following permit to construct and operate a commercial evaporation facility has been submitted for approval to the Director of the Oil Conservation Division, P.O. Box 2088, State Land Office Building, Santa Fe, New Mexico, 87504-2088, (505) 827-5800.

T-N-T Construction, Tony Schmitz, owner/operator, Star Route, Lindrith, New Mexico, 87029, has submitted for approval an application to construct and operate a commercial evaporation pit located in the NW/4, SW/4 of Section 8, Township 25 North, Range 3 West, NMPM, Rio Arriba County, New Mexico. Produced water and clear drilling, completion fluids associated with the drilling, completion and production operations of oil and gas wells will be disposed of in a wastewater evaporation pond lined with compacted native clays. The permit application addresses the construction operations, spill/leak prevention and monitoring procedures to be utilized at the site. The ground water most likely to be affected by any accidental discharges is at a depth of approximately 150 feet, with a total dissolved solids content of approximately 1300 mg/l.

Any interested person may obtain further information from the Oil Conservation Division and may submit written comments to the Director of the Oil Conservation Division at the address given above. Prior to ruling on any proposed permit or its modification, the Director of the Oil Conservation Division will allow at least thirty (30) days after the date of publication of this notice during which comments may be submitted to him.

GIVEN: Under the Seal of the New Mexico Oil Conservation Commission at Santa Fe, New Mexico, on this 5th day of December, 1986. To be published on or before December 12, 1986.

STATE OF NEW MEXICO
OIL CONSERVATION DIVISON
R.L. STAMETS
Director

SEAL

Legal No. 19253 published in the Farmington Daily Times, Farmington, New Mexico on Thursday, December 11, 1986.

NOTICE OF PUBLICATION
STATE OF NEW MEXICO
ENERGY AND MINERALS
DEPARTMENT
OIL CONSERVATION DIVISION

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Any interested person may obtain further information from the Oil Conservation Divsion and may submit written comments to the Director of the Oil Conservation Division at the address given above. Prior to filing on any proposed permit or its modification, the Director of the Oil Conservation Division will allow at least thirty (30) days after the date of publication of this notice during which comments may be submitted to him.

GIVEN under the Seal of the New Mexico Oil Conservation Commission at Santa Fe, New Mexico, on this 5th day of December, 1986. To be published on or before December 12 1986.

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION
s/R.L. Stamets
Director

Journal, December 12, 1986

RECEIVED
DEC 15 1986
OIL CONSERVATION DIVISION
SANTA FE

STATE OF NEW MEXICO }
County of Bernalillo } ss

THOMAS J. SMITHSON

..... being duly sworn declares and says that he is ...**NAT'L ADV. MGR.** of the **Albuquerque Journal,** and that this newspaper is duly qualified to publish legal notices or advertisements within the meaning of Section 3, Chapter 167, Session Laws of 1937, and that payment therefore has been made or assessed as court costs; that the notice, a copy of which is hereto attached, was published in said paper in the regular daily edition,

for ..... 1 ..... times, the first publication being on the ..... 12 ..... day of ..... December ..... ,198..6.., and the subsequent consecutive publications on ..... ,198.....

..... Thomas J. Smithson

OFFICIAL SEAL
VINNIE MONTOYA
NOTARY PUBLIC - STATE OF NEW MEXICO
My Commission Expires 9-18-89

Sworn and subscribed to before me, a Notary Public in and for the County of Bernalillo and State of New Mexico, this ..12.... day of ...December..... ,198....6

Vinnie Montoya

Filed with Secretary of State

PRICE ..... 17.56 .....

Statement to come at end of month.

EDJ-15 (R-2/86)

ACCOUNT NUMBER ..... C80932 .....

NOTICE OF PUBLICATION

STATE OF NEW MEXICO

ENERGY AND MINERALS DEPARTMENT

OIL CONSERVATION DIVISION

Notice is hereby given that pursuant to New Mexico Oil Conservation Division Rules and Regulations, the following permit to construct and operate a commercial evaporation facility has been submitted for approval to the Director of the Oil Conservation Division, P. O. Box 2088, State Land Office Building, Santa Fe, New Mexico, 87504-2088, (505) 827-5800.

T-N-T Construction, Tony Schmitz, owner/operator, Star Route, Lindrith, New Mexico, 87029, has submitted for approval an application to construct and operate a commercial evaporation pit located in the NW/4, SW/4 of Section 8, Township 25 North, Range 3 West, NMPM, Rio Arriba County, New Mexico. Produced water and clear drilling and completion fluids associated with the drilling, completion and production operations of oil and gas wells will be disposed of in a wastewater evaporation pond lined with compacted native clays. The permit application addresses the construction, operations, spill/leak prevention and monitoring procedures to be utilized at the site. The ground water most likely to be affected by any accidental discharges is at a depth of approximately 150 feet, with a total dissolved solids content of approximately 1300 mg/l.

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GIVEN Under the Seal of the New Mexico Oil Conservation Commission at Santa Fe, New Mexico, on this 5th day of December, 1986. To be published on or before December 12, 1986.

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

R. L. STAMETS
Director

S E A L

November 25, 1986

RECEIVED
DEC - 1 1986
OIL CONSERVATION DIVISION
SANTA FE

Mr. Roger Angerson
New Mexico Oil Conservation Division
P. O. Box 2088
Santa Fe, New Mexico 87501-2088

Re: T-N-T Construction, Inc.
Unlined Commericial Evaporation Pit
NW/4, SW/4, Section 8-T25N-R3W
Rio Arriba County, New Mexico

Dear Mr. Anderson:

In reference to your letter of August 29, 1986, I would like to address each contingency on a case by case basis:

1. Upon construction, it became apparent that the skimmer pit would be more beneficially utilized if it were outside the main pit. The pit was placed pursuant to the original drawings.

2. The oil that will be removed from the skimmer pit will be collected by General Crude Processing, Flora Vista, New Mexico. General Crude Processing will store the oil at their facilitity until such time as they deem it economic to treat and eventualy market.

3. A diversion ditch has been incorporated into the construction so as to prevent storm runoff from entering the pit.

4. The location will be unmanned. Access willl be gained by appointment only. The facility will be fenced and locked so as to prohibit unauthorized dumping.

5. A sign will be posted at the intersection of the access road and NM 537. The sign will indicate the owner, site location, phone number for dumping appointments, and that the pond will only accept liquid wastes associated with oilfield production operations, ie. produced water.

6. Solids removed from the skimmer pit will be placed in a small unlined pit located adjacent to the skimmer pit. When the solids are dried they will be removed and dumped into the main evaporation pit.

7. Thirteen monitor wells were drilled around the perimeter of the main pit and skimmer pit. The placement of the monitor wells is indicated on the attached map.

8. A driller's log is attached for each of the 13 monitor wells. A tabulation indicating the drilled depth, casing setting depth, perforated interval and backfilling method is attached as well.

9. No water was found when the thirteen monitor wells were drilled. The wells were drilled with air so any water in the wellbore would have been noticed immediately. If water is encountered in any of the wellbores during the operation of the pond, it will be analysed to determine if the water is from the pit or natural groundwater. If the water is from the pit, we will follow the contingency planned as outlined in the initial application. If the water is from natural groundwater, then an attempt to determine the static water level will be made. If the water level is correlatable with an apparent permeable member, ie. sandstone, a draw down test will be run to determine apparent permeability and recharge ability. Once these are determined, the N.M.O.C.D. and other agencies as as necessary will be contacted to work out a contingency plan.

I believe that all of your questions and/or concerns have been adequately addressed. If I may be of any further assistance, please advise.

Very truly yours,

Tony Schmitz

Tony Schmitz

DRILLER'S LOG

Well No. 1

Ground Elevation: 0.00

Depth	Description
0-9	Blue-gray clay, bentonitic, 5% silt
9-10	Red clay, bentonitic, 5% silt
10-13	Gray clay, bentonitic, no silt
13-18	Red clay mottled with blud-gray, no silt
18-19	Red-brown clay, no silt
19-21	Blue-gray clay, no silt
21-22	Red clay, no silt
22-23	Blue gray clay, no silt
23-24	Red clay, no silt
24-25	Blue-gray clay, no silt
25-26	Red claystone, brittle
26-28	Red clay, no silt
29-34	Mottled blue-gray, dark gray and red clay, no silt
34-36	Red-brown clay, 5-10% silt
36-37	Blue-gray clay, soft, bentonitic, flour-like
37-39	Red-brown clay, no silt
39-41	Dark gray clay, no silt
41-46	Gray sandstone, very find grain, well sorted, well rounded, very friable, clay filled 50% sand 50% clay, no visible porosity.
46-49	Tan sandstone, very fine, fine grain quartzitic, poorly sorted, subangular, 20-30% clay, moderately friable, no visible porosity.
49-54%	Blue-gray clay with 35% silt

DRILLER'S LOG

Well No. 2

Ground Elevation: -8.00

Depth	Description
0-24	Interbedded, undifferentiated clay as in Well No. 1 with red claystone at 19'
24-25	Dark gray, medium hard clay, 5% silt
25-26	Brown clay, no silt
26-27	Red brown clay, 35-45% silt
27-28	Blue-gray clay, bentonitic, flour-like
29-29-1/2	Tan siltstone, clay filled
29-1/2-31	Red-brown clay, no silt
31-32	Dark gray clay, 15-30% silt
32-35	Blue-gray, gray siltstone, 45-60% clay filled
35-36	Light brown, very fine grain sandstone, well sorted, well rounded, clay filled, no visible porosity, moderately friable
36-37	Light brown siltstone, clay filled
37-37-1/2	Light gray siltstone
37-1/2-39	Light gray sandstone, very fine grain, fair sorting, subangular, very bentonitic, clay filled, flour-like, very friable to unconsolidated
39-45	Blue-gray and dark gray clay

DRILLER'S LOG

Well No. 3

Ground Elevation: -5.00

Depth	Description
0-20	Interbedded, undifferentiated clay as Well No. 1, no claystone
20-22	Light gray siltstone interbedded with red-brown siltstone, hard, brittle
22-32	Red-brown clay interbedded with blue-gray clay, 10-15% silt
32-37	Blue-gray clay, flour-like
37-40	Light brown sandstone, very fine grain, fair sorting, subangular, clay filled, no visible porosity
40-46	Gray sandstone, very fine grain, well sorted, well rounded, very friable, clay filled, no visible porosity
46-47	Dark gray clay
47-49	Gray sandstone as above
49-52	Dark gray clay, no silt
52-57	Light gray to blue-gray clay, 15% silt

DRILLER'S LOG

Well No. 4

Ground Elevation: -9.00

Depth	Description
0-24	Interbedded, undifferentiated clay as Well No. 1, no claystone
24-27	Blue-gray clay, very bentonitic, flour-like
27-29	Light brown siltstone, clay filled
29-31	Gray clay, 35% silt
31-33	Light brown, very fine grain sandstone, well sorted, well rounded, firm, no visible porosity
33-35	Light brown siltstone
35-41	Gray sandstone, very fine grain, well sorted, well rounded, very friable, clay filled, no visible porosity
41-42	Variable color, predominantly light brown clay, 25% silt
42-46	Dark brown mottled with blue gray clay, no silt

DRILLER'S LOG

Well No. 5

Ground Elevation: -14.00

Depth	Description
0-27	Interbedded, undifferentiated clay (red/blue-gray/brown)
27-29	Light brown to tan sandstone, well sorted, well rounded, friable, clay filled, no visible porosity
29-46	Variable color clay (dark brown/red-brown/blue-gray)

DRILLER'S LOG

Well No. 6

Ground Elevation: -18.00

Depth	Description
0-20	Interbedded, undifferentiated clay
20-22	Light brown to tan sand, very fine grain, unconsolidated, clay filled
22-23-1/2	Light brown to tan sand, very fine grain, well sorted, well rounded, clay filled, partially consolidated, no visible porosity
23-1/2-29	Variable color clay

DRILLER'S LOG

Well No. 7

Ground Elevation: -15.00

Depth	Description
0-12	Interbedded, variable color undifferentiated clay
12-13	Light blue-gray clay, bentonitic, flour-like
13-20	Red-brown clay, no silt, flour-like
20-28	Dark brown clay, 0-10% silt
28-38	Light brown clay interbedded with blue-gray clay, 0-10% silt

DRILLER'S LOG

Well No. 8

Ground Elevation: -10.00

Depth	Description
0-14	Interbedded, variable colored, undifferentiated clay
14-16	Blue-gray siltstone, clay filled
16-20	Variable color clay
20-22	Dark gray to light blue-gray clay, moderately flour-like
22-26	Dark brown clay, 0-10% silt
26-29	Variable color clay
31-34	Dark brown clay, 15% silt
34-38	Dark brown interbedded with dark gray clay, moderately flour-like
38-46	Variable color clay (dark brown/dark gray/light blue-gray/ yellow)

DRILLER'S LOG

Well No. 9

Ground Elevation: -8.00

Depth	Description
0-15	Interbedded clay, variable color, undifferentiated
15-18	Light blue-gray sand, very fine grain, well sorted, well rounded, friable, soft, clay filled, partially unconsolidated, no visible porosity
18-22	Tan sand, very fine grain, fair sorted, subangular, unconsolidated, very flour-like
22-26	Blue-gray clay, 0-15% silt
26-28	Variable color clay, 0-15% silt

DRILLER'S LOG

Well No. 10

Ground Elevation: -8.00

Depth	Description
0-15	Interbedded, variable color, undifferentiated clay
15-18	Blue-gray sand, very fine grain, well sorted, well rounded, friable, soft, clay filled, partially unconsolidated, no visible porosity
18-21	Tan sand, very fine grain, fair sorted, subangular, unconsolidated, very flour-like
21-30	Light brown to tan sandstone, very fine grain, fair sorted, subangular, partially unconsolidated, clay filled, moderately flour-like, no visible porosity
30-32	Green-gray to blue-gray clay, no silt
32-34	Light brown to tan sandstone, as above
34-38	Yellow sandstone, very fine grain, well rounded, well sorted, friable, clay filled, no visible porosity
38-40	Tan sandstone, very fine grain, subangular, poor sorting, partially unconsolidated
40-46	Blue-gray clay, 0-10% silt

DRILLER'S LOG

Well No. 11

Ground Elevation: -11.00

Depth	Description
0-8	Interbedded, variable color clay
8-9	Yellow siltstone
9-12	Tan to buff siltstone
12-13	Tan sand, unconsolidated, poor to fair sorting, clay filled, subangular
13-22	Tan siltstone
22-27	Tan sandstone, very fine grained, well sorted, well rounded, clay filled, very friable
27-29	Light brown to dark brown siltstone
29-34	Tan sandstone, as above
34-40	Variable color clay

DRILLER'S LOG

Well No. 12

Ground Elevation: -12.00

Depth	Description
0-8	Interbedded, variable color clay, undifferentiated
8-21	Tan, very fine grain sandstone, well sorted, well rounded, clay filled, very friable, no visible porosity
21-24	Tan siltstone
24-32	Yellow-brown to tan sandstone, poor sorting, subangular, very fine grain, very flour-like
32-39	Blue-gray sandstone, very fine grain, well sorted, subrounded, moderately flour-like, no visible porosity
39-41	Yellow-brown to tan sand, very fine grain, well sorted, subrounded, no visible porosity
41-46	Variable color clay

DRILLER'S LOG

Well No. 13

Ground Elevation: -5.00

Depth	Description
0-16	Interbedded, variable color clay, undifferentiated
16-20	Tan siltstone
20-22	Tan sandstone, very fine grain, well rounded, fair sorting, very friable, no visible porosity
22-24	Red-brown clay, 10-20% silt
24-40	Tan siltstone, very friable
40-42	Light blue-gray sandstone, very fine grain, well sorted, well rounded, clay filled, no visible porosity
42-46	Brown siltstone
46-50	Red-brown clay, 0-10% silt
50-51	Blue-gray clay, no silt

WELLBORE TABULATION

Well No.	Depth (ft)	Casing Set (ft)*	Perf. Interval (ft)	Gravel Pack Interval (ft)
1	54	54	33-54	30-54
2	45	45	24-45	20-45
3	57	57	36-57	30-57
4	46	46	25-46	20-46
5	46	46	34-46	30-46
6	29	29	17-29	15-29
7	38	38	28-38	25-38
8	46	46	36-46	30-46
9	28	28	14-28	13-28
10	46	46	12-40	11-40
11	40	40	11-40	10-40
12	46	46	8-46	7-46
13	51	51	9-42	8-51

*All casing is 4" P.V.C.

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

LABORATORY REPORT

SOIL/AGGREGATE FIELD DENSITY TESTS

RECEIVED
DEC - 3 1986
OIL CONSERVATION DIVISION
SANTA FE

Client: Tony Schmitz 31044
Star Route
Lindrith, NM 87029

Job No.
Lab/Invoice No. 31461291
Date 10/14/86
Reviewed By D. A. Madrid

Project: Evaporation Ponds
Location: Lindrith, NM
Type of Material: Clay — Authorized By: Client — Date: 10/09/86
Source of Material: Native — Tested/Calc. By: T. Krake
Moisture/Density Relationship: ASTM D698 — Meth.: A — Test Locations Designated By: Client

Test No.	Date	Location of Test Hole	Elevation of Test Datum †
1	10/09/86	Pond Embankment, 30' E. of W. End	97'
2	10/09/86	Pond Embankment, 80' W. of E. End	97'

Test No.	Moisture Density Lab No.	Optimum Moisture %	Max. Dry Density pcf	In-Place Characteristics: Moisture %	In-Place Characteristics: Dry Density pcf	Relative Compaction %	Within Specs. †	Comments *
1		7.1	112.3	9.2	112.2	100	Yes	1/11/14
2		7.1	112.3	10.4	114.7	100+	Yes	1/11/14

* Comments
1. Subgrade
2. Subbase Fill
3. Base Course
4. Backfill
5. Pavement Area
6. Below Footing Bottom
7. Above Footing Bottom
8. 100% min. req'd.
9. 98% min. req'd.
10. 95% min. req'd.
11. 90% min. req'd.
12. 85% min. req'd.
13. _____
14. Tested D-1556/AASHTO T-217
15. Tested ASTM D-2922/D-3017
16. Tested ASTM D-2922/AASHTO T-217
17. Rock correction applied to maximum dry density. AASHTO T-224
18. Other _____
19. Test Locations on Accompanying Site Plan
20. Specifications Unknown

† Datum 100'=Top of Embankment

Note: Tests reported herein are not part of a continuous monitoring program of compaction operations and accordingly apply only to the actual location tested.

Copies to: Client (3)
/cb

WESTERN TECHNOLOGIES INC.

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

LABORATORY REPORT

SOIL/AGGREGATE FIELD DENSITY TESTS

RECEIVED
DEC - 3 1986
OIL CONSERVATION DIVISION
SANTA FE

Client: Tony Schmitz
Star Route
Lindrith, NM 87029

Job No. 31044
Lab/Invoice No. 31461218
Date 10/06/86
Reviewed By S. A. Madrid

Project: Evaporation Pond
Location: Lindrith, NM
Type of Material: Silty Clay — Authorized By: Client — Date: 10/02/86
Source of Material: Native — Tested/Calc. By: T. Krake
Moisture/Density Relationship: ASTM D698 — Meth.: A — Test Locations Designated By: Client

Test No.	Date	Location of Test Hole	Elevation of Test Datum †
1	10/02/86	E. Berm, 100' N. of S. End on Centerline	90'5"
2	10/02/86	E. Berm, 60' S. of N. End, 10' W. of Centerline	91'

Test No.	Moisture Density Lab No.	Optimum Moisture %	Max. Dry Density pcf	In-Place Characteristics: Moisture %	In-Place Characteristics: Dry Density pcf	Relative Compaction %	Within Specs. ?	Comments *
1		17.1	112.3	9.2	111.0	99	Yes	11/14/18
2		17.1	112.3	8.6	105.9	94	Yes	11/14/18

* Comments
1. Subgrade
2. Subbase Fill
3. Base Course
4. Backfill
5. Pavement Area
6. Below Footing Bottom
7. Above Footing Bottom
8. 100% min. req'd.
9. 98% min. req'd.
10. 95% min. req'd.
11. 90% min. req'd.
12. 85% min. req'd.
13. _____
14. Tested D-1556/AASHTO T-217
15. Tested ASTM D-2922/D-3017
16. Tested ASTM D-2922/AASHTO T-217
17. Rock correction applied to maximum dry density. AASHTO T-224
18. Other Embankment Fill
19. Test Locations on Accompanying Site Plan
20. Specifications Unknown

† Datum 100'=Top of Berm

Note: Tests reported herein are not part of a continuous monitoring program of compaction operations and accordingly apply only to the actual location tested.

Copies to: Client (3)
/cb

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

LABORATORY REPORT

RECEIVED
DEC - 3 1986
OIL CONSERVATION DIV.

SOIL/AGGREGATE FIELD DENSITY TESTS

Client: Tony Schmitz 31044
Star Route
Lindrith, New Mexico 87029

Job No.
Lab/Invoice No. 31461530
Date 11-19-86
Reviewed By

Project: Evaporation Ponds
Location: Lindrith, New Mexico
Type of Material: Silty Clay — Authorized By: Client — Date: 11-18-86
Source of Material: Native — Tested/Calc. By: G. Anaya
Moisture/Density Relationship: ASTM D698 — Meth.: A — Test Locations Designated By: Client

Test No.	Date	Location of Test Hole	Elevation of Test Datum †
1	11-18-86	65' N., 40' E. from SW Corner of Skimmer Pit.	90'
2	11-18-86	40' N., 40' E. from SW Corner of Skimmer Pit	95'
3	11-18-86	70' W., 90' S. from NW Corner of Evaporation Pond	90'
4	11-18-86	30' W., 90' S. from NW Corner of Evaporation Pond	95'

Test No.	Moisture Density Lab No.	Optimum Moisture %	Max. Dry Density pcf	In-Place Characteristics: Moisture %	In-Place Characteristics: Dry Density pcf	Relative Compaction %	Within Specs. ?	Comments *
1		17.1	112.3	10.2	124.5	100+	Yes	1/10/14
2		17.1	112.3	10.6	119.6	100+	Yes	1/10/14
3		17.1	112.3	9.7	115.3	100+	Yes	1/10/14
4		17.1	112.3	12.2	114.8	100+	Yes	1/10/14

* Comments
1. Subgrade
2. Subbase Fill
3. Base Course
4. Backfill
5. Pavement Area
6. Below Footing Bottom
7. Above Footing Bottom
8. 100% min. req'd.
9. 98% min. req'd.
10. 95% min. req'd.
11. 90% min. req'd.
12. 85% min. req'd.
13. _____
14. Tested D-1556/AASHTO T-217
15. Tested ASTM D-2922/D-3017
16. Tested ASTM D-2922/AASHTO T-217
17. Rock correction applied to maximum dry density. AASHTO T-224
18. Other _____
19. Test Locations on Accompanying Site Plan
20. Specifications Unknown

† Datum 100' + Top of Berm

Note: Tests reported herein are not part of a continuous monitoring program of compaction operations and accordingly apply only to the actual location tested.

Copies to: Client (3)
/lv

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

TONEY ANAYA
GOVERNOR

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

August 29, 1986

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. Tony Schmitz
T-N-T Construction, Inc.
Star Route
Lindrith, New Mexico 87029

RE: APPLICATION FOR UNLINED COMMERCIAL EVAPORATION PIT, NW/4 NW/4, SECTION 8, TOWNSHIP 25 NORTH, RANGE 3 WEST, RIO ARRIBA COUNTY, NEW MEXICO

Dear Mr. Schmitz:

We have reviewed the plans and specifications in your application for the above-referenced evaporation pit dated July 14, 1986. The design specifications submitted for the construction of the pit are acceptable, but before approval to accept fluids and commence operations can be granted, a number of geologic, hydrologic and operational concerns must be addressed. Commencement of construction is at your option. However, approval to operate is contingent on the following:

(1) During our site inspection you mentioned constructing the skimmer pit within the confines of the evaporation pit. If this is still an option, please supply the specifications.

(2) What will be the disposition of any oil removed from the skimmer pit?

(3) The pits must be constructed in such a manner that no storm water runoff will enter. For those areas where the surrounding terrain is above the dike, a diversion ditch or berm must be incorporated.

(4) What is the policy on access? Will water haulers have 24-hour continuous access? Will the facility be manned? What controls will be in place?

(5) Signs must be posted in a conspicuous location identifying the owner, location, access restrictions, and facility type.

(6) You stated that any solids will be removed from the skimmer pit, spread on the surface and left to dry. Where are they to be

spread and what approved landfill is to be utilized?

(7) The actual number of monitor wells needed is less than the number proposed. The final number will depend on the location for the skimmer pond, but will likely number 12. The suggested locations are shown on the attached sheet. They should be placed between 15 and 25 feet from the toe of the pit dikes and protected so normal operations do not disturb them. The final locations of the wells should be submitted.

(8) Monitor well construction details were not included in the application. The following procedures should be followed unless OCD approval for alternative construction is given. The monitor wells will be drilled to a depth of five feet below the bottom of the yellow sandstone indicated on the driller's log, Exhibit 5 of the application. The log indicates this depth is about 23 feet. If no additional sands are encountered, the well will be plugged back to the bottom of the sandstone and completed with a slotted liner covering the entire lens and extending one foot above the top of the sandstone marker. If the yellow sandstone is not encountered in a well, an equivalent total depth, based on strike and dip of the formation, should be drilled and perforated.

Complete drillers' logs shall be recorded and furnished to the OCD.

Each monitor well annulus should be backfilled with clean native clay or bentonite to within five (5) feet of the surface. The monitor well casing will be cemented from five feet below ground surface to one foot above surface, mounded to the casing, and extending horizontally for a two-foot radius (See Attachment). The casing shall be a minimum 2-inch diameter to allow for sampling. The wells should have caps and be suitably protected from equipment, trucks, etc.

(9) What are your contingency plans if water is found in the monitor wells, both during drilling and after operations begin?

Results of the drilling, and a geological and hydrological subsurface investigation based on the drilling results must be submitted before final operational approval can be granted. These must show that ground water will not be contaminated by your operations. The geologic investigation shall include strike and dip and correlation of subsurface sands, projected outcrop location, cross-sections of the pit area, and formation description.

Many of these items have been already discussed with Bob Frank. If you have any questions, please contact Dave Boyer or myself at (505) 827-5885.

Sincerely,

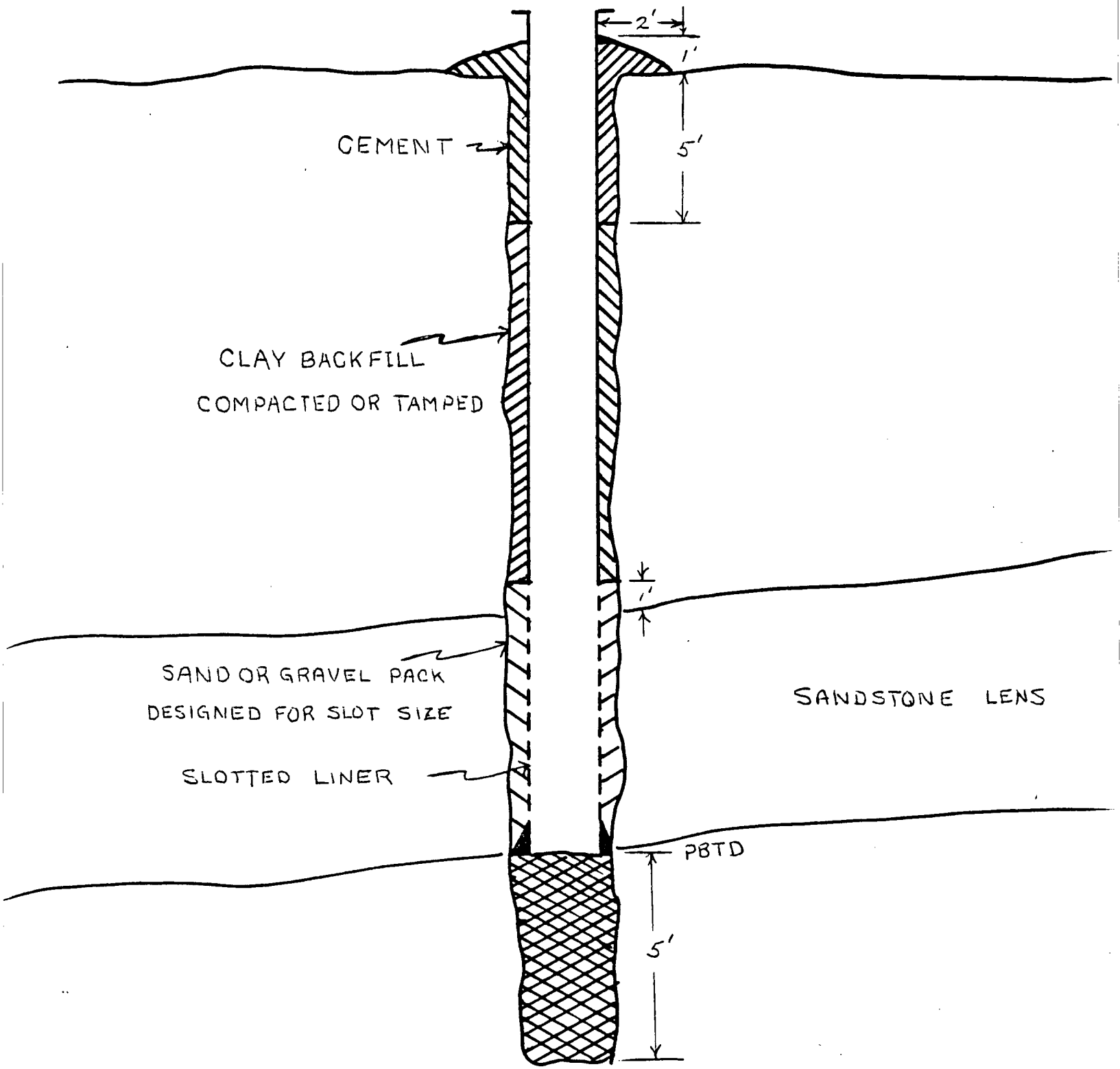
ROGER C. ANDERSON
Environmental Engineer

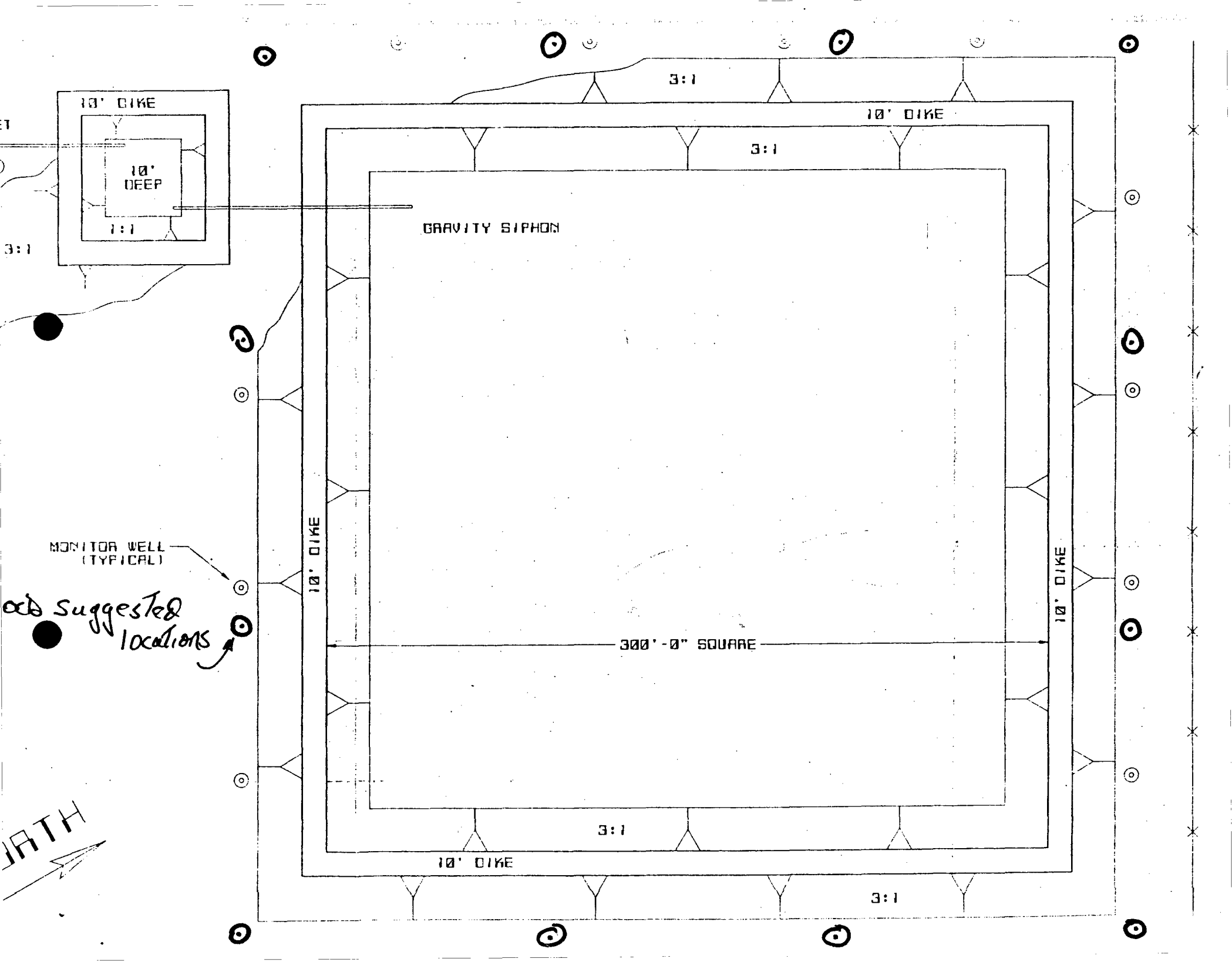
RCA:dp

Attachment

cc: OCD - Aztec
Bob Frank

Monitor Well Installation




10' DIKE
10' DEEP
1:1
3:1
3:1
10' DIKE
3:1
GRAVITY SIPHON
10' DIKE
10' DIKE
MONITOR WELL (TYPICAL)
300'-0" SQUARE
3:1
10' DIKE
3:1

Pond Design: TNT Construction

8/13/80

Wave Calculations

I Wind speed = 50 mph
Fetch = 425 ft
Depth = 4.5 ft
Slope of side = 3:1

From Fig 3-28
Wave Height = H = 0.5 ft
Period = T = 0.9 sec

II Determine Breaking Wave Height, H_b

From Fig 7-3 (using Slope = 0.1)

$$\frac{H}{gT^2} = \frac{0.5}{(32.2)(0.9)^2} = .0192$$

$$\frac{H_b}{H_o} = 1 \quad \therefore \quad H_b = H_o = H = 0.5 \text{ ft}$$

From Fig 7-2

$\alpha \approx 2.0$; $\beta \approx 1.43$

$\ell_{B\max} = \alpha H_b = 2(0.5) = 1$

$\ell_{B\min} = \beta H_b = 1.43(0.5) = .72$

∴ With a slope of 3:1 breaking waves can occur with a dike toe depth bet 0.72 and 1.0 ft.

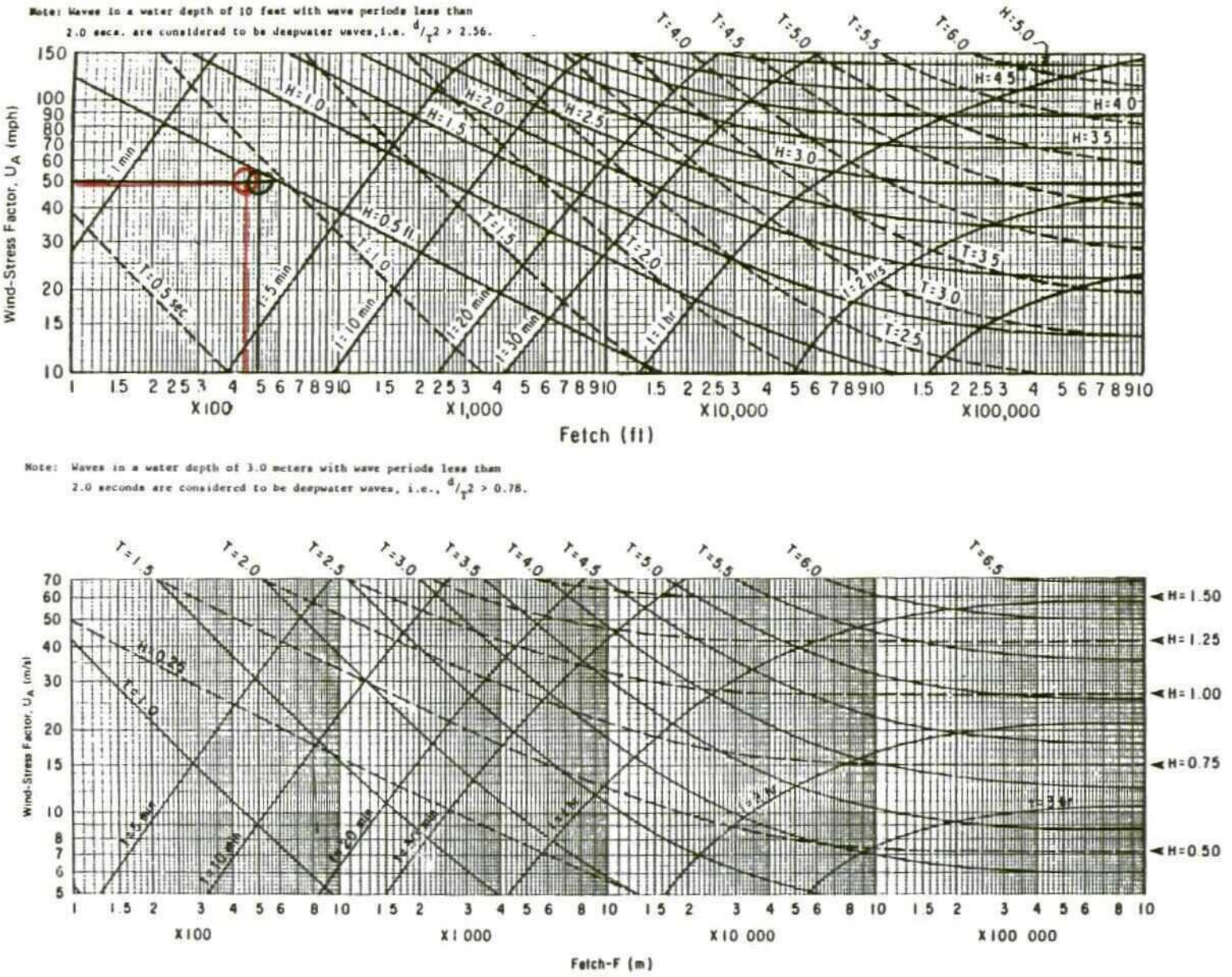


Figure 3-28. Forecasting curves for shallow-water waves; constant depths = 10 feet (upper graph) and 3.0 meters (lower graph).

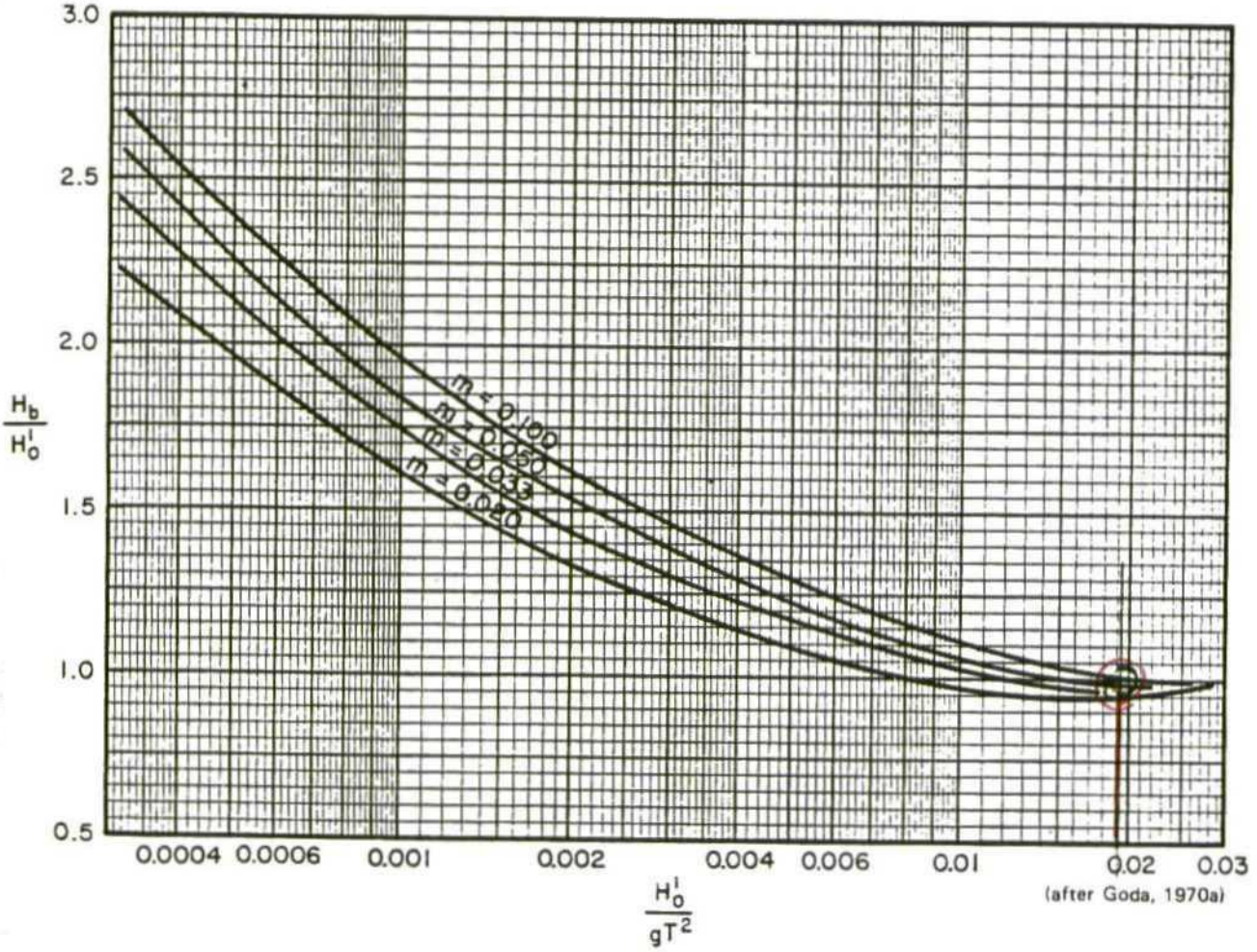


Figure 7-3. Breaker height index H_b/H_o' versus deepwater wave steepness H_o'/gT^2 .

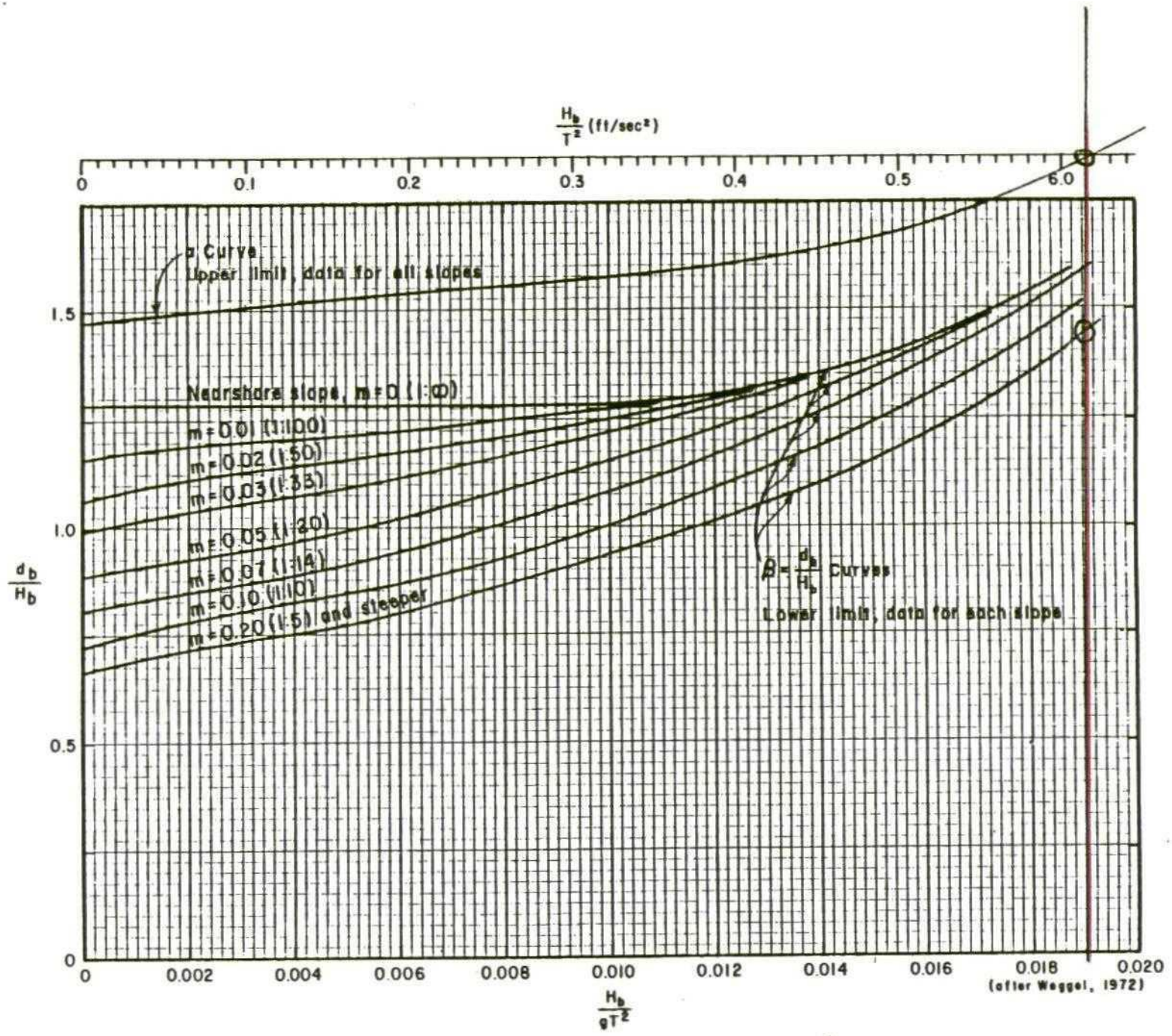


Figure 7-2. α and β versus H/gT^2.

II FREEBOARD DETERMINATIONS

$d = 4.5$ ft

ASSUME SMOOTH WALL, $X = 1.0$

$$y_c = d + h_o + \frac{1+X}{2} H_i$$

$H_i = 0.5$ ft $\qquad \frac{H_i}{d} = \frac{0.5}{4.5} = .111$

FROM Fig 7-90

$$\frac{h_o}{H_i} \approx .037$$

$$h_o = 0.37(H_i) = 0.37(0.5) = 0.19$$

$$y_c = 4.5 + 0.19 + \left(\frac{1+1}{2}\right) 0.5 = 4.769$$

$y_c = 4.769$

WITH TOTAL DEPTH OF PIT = 6 FT: WE STILL HAVE 1 1/4' OF FREEBOARD.

∴ NO OVERTOPING WILL OCCUR AT MAX STILL WATER LEVEL OF 4.5 FT.

III FORCE CALCULATIONS

FROM Fig 7-91 AND CALCULATION OF FW

$$\frac{H_i}{gT^2} = 0.0192 \qquad \frac{H_i}{d} = .111$$

$$\frac{F_w}{wd^2} \approx 0 \qquad \therefore F_w = 0$$

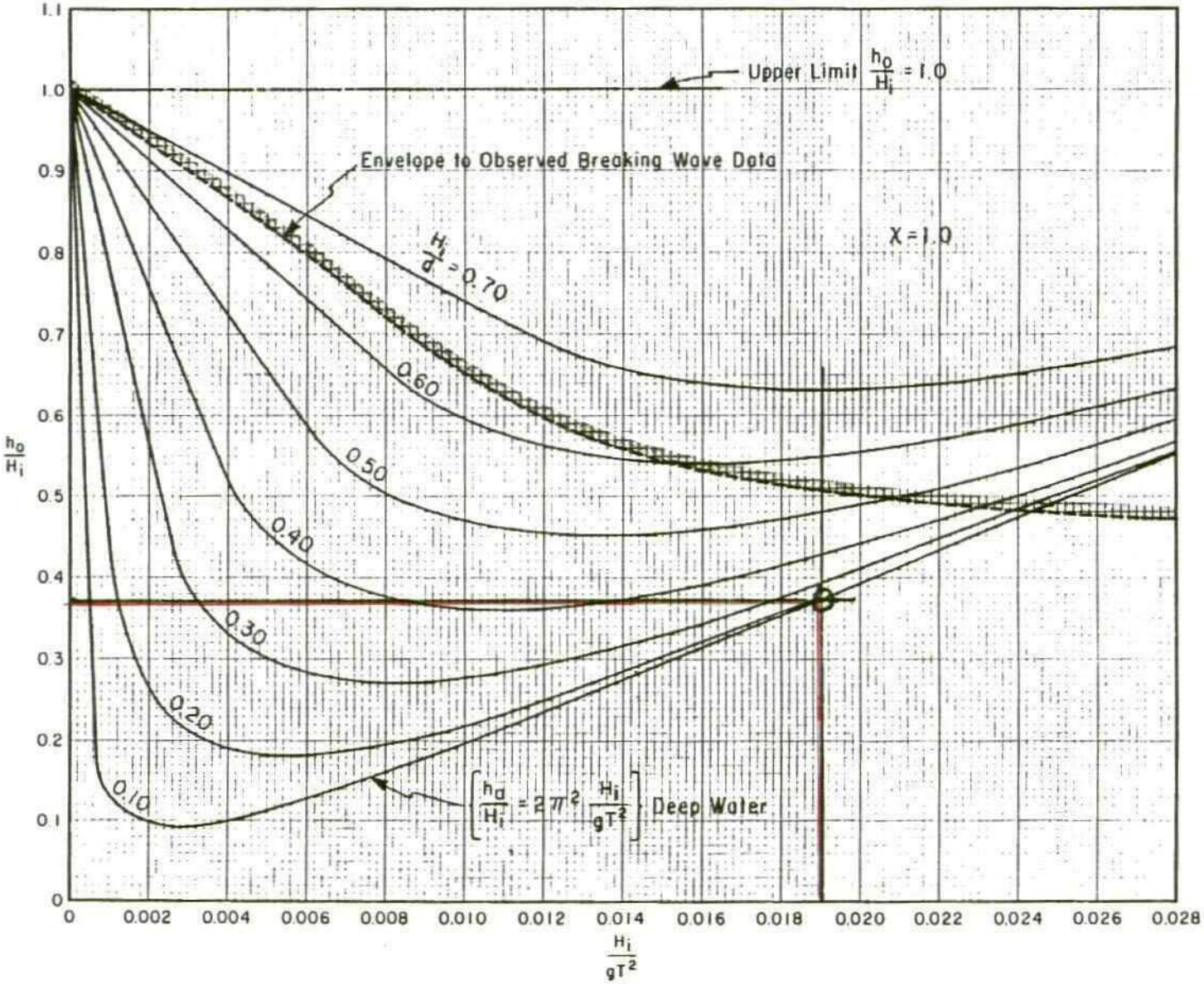


Figure 7-90. Nonbreaking waves; $\chi = 1.0$.

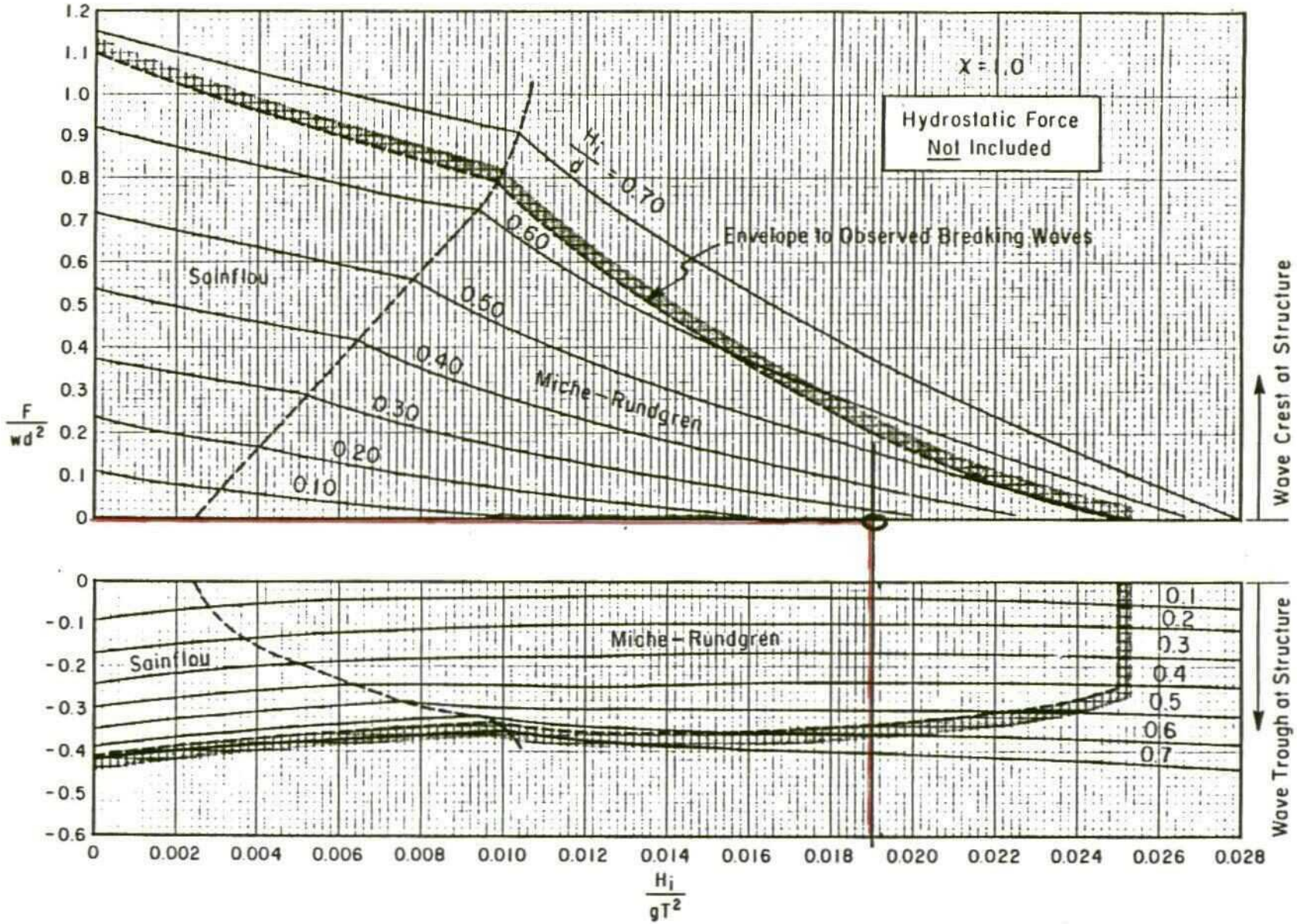


Figure 7-91. Nonbreaking wave forces; $\chi = 1.0$.

FORCE DUE TO HYDROSTATIC PRESSURE = F_{HS}

$$F_{HS} = \int_0^d \rho d \, \ell(d) = \rho_w \frac{d^2}{2}\Big|_0^d = \rho_w \frac{d^2}{2}$$

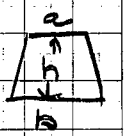
LET $\rho_w \approx 66 \frac{lb}{ft^3}$ FOR PRODUCED WATER

SHEAR FORCE FOR BERM = F_S

$$F_S = V_L \rho_s \mu_s$$

$$V_L = Vol/Lin\ ft = A\,(1\ ft)$$

$$A = \frac{a+b}{2} h$$



$\rho_s = 80\ lb/ft^3$

μ_s = friction factor ≈ 0.4

$$F_{HS} = 66 \cdot \frac{4.5^2}{2} = 668$$

$$F_S = \left[\frac{10+14}{2}(6)\right](80)(.4) = 2304$$

$$\text{SAFETY FACTOR} = \frac{F_S}{F_{HS}} = \frac{2304}{668} = 3.5$$

∴ BERMS SHOULD HOLD 4.5 ft of WATER.

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

TONEY ANAYA
GOVERNOR

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

August 11, 1986

Mr. Tony Schmitz
T-N-T Construction, Inc.
Star Route
Lindrith, New Mexico 87029

Dear Mr. Schmitz:

Enclosed are the logs of the Schalk 41-2 water well which we obtained from you during the inspection of your proposed disposal site. Dave Boyer will contact you and Bob Franks concerning placement and number of monitor wells required for permit approval.

If you have any questions, please contact Roger Anderson at 827-5885.

Sincerely,

JAMI BAILEY
Field Representative

JB:dp

Enc.

4 # 2 (WATER WELL)

12-4-80
Schalk
Gulf #3
TB6-959
CS6-962

2-8498

FT.			AMT.	
48	- BROWN SANDSTONE		5'	
88 – 108	SD & SH	(BLUE)	20'	
118 – 128	SAND	(BLUE)	10'	
160 – 168	SAND	(BLUE)	8'	
188	SAND	(BLUE)	5'	
418	SHALE	(BLACK)		TRACE OF COAL @ 400'
418 – 423	SAND	(BLUE	5'	
490 – 505	SAND	(BLUE	15'	
510 – 550	SAND	BLUE (SM AMT. SH)		
550 – 580	SHALE			
580 – 590	SAND		10'	

Read 8/7/86

Southwest Surveys

FILING NO.

COMPANY Arapahoe Drilling Company

WELL 41 #2 Water Well

FIELD Jicarilla

LOCATION:

SW¼ S8, T25N, R3W

OTHER SERVICES:

Thank You.

PERMANENT DATUM: Ground Level, ELEV.

LOG MEASURED FROM G.L. 0 FT. ABOVE PERM. DATUM

DRILLING MEASURED FROM G.L

ELEV.: K.B.

D.F.

G.L

DATE	12-12-80		
RUN NO.	ONE		
TYPE LOG	Combination.		
DEPTH—DRILLER	1050		
DEPTH—LOGGER	1036		
BOTTOM LOGGED INTERVAL	1036		
TOP LOGGED INTERVAL	0		
TYPE FLUID IN HOLE	Mud		
SALINITY, PPM CL.			
DENSITY			
LEVEL	Full		
MAX. REC. TEMP., DEG F.			
OPERATING RIG TIME	2 Hours		
RECORDED BY	Henrie, Nelson		
WITNESSED BY	Mr. Evens		

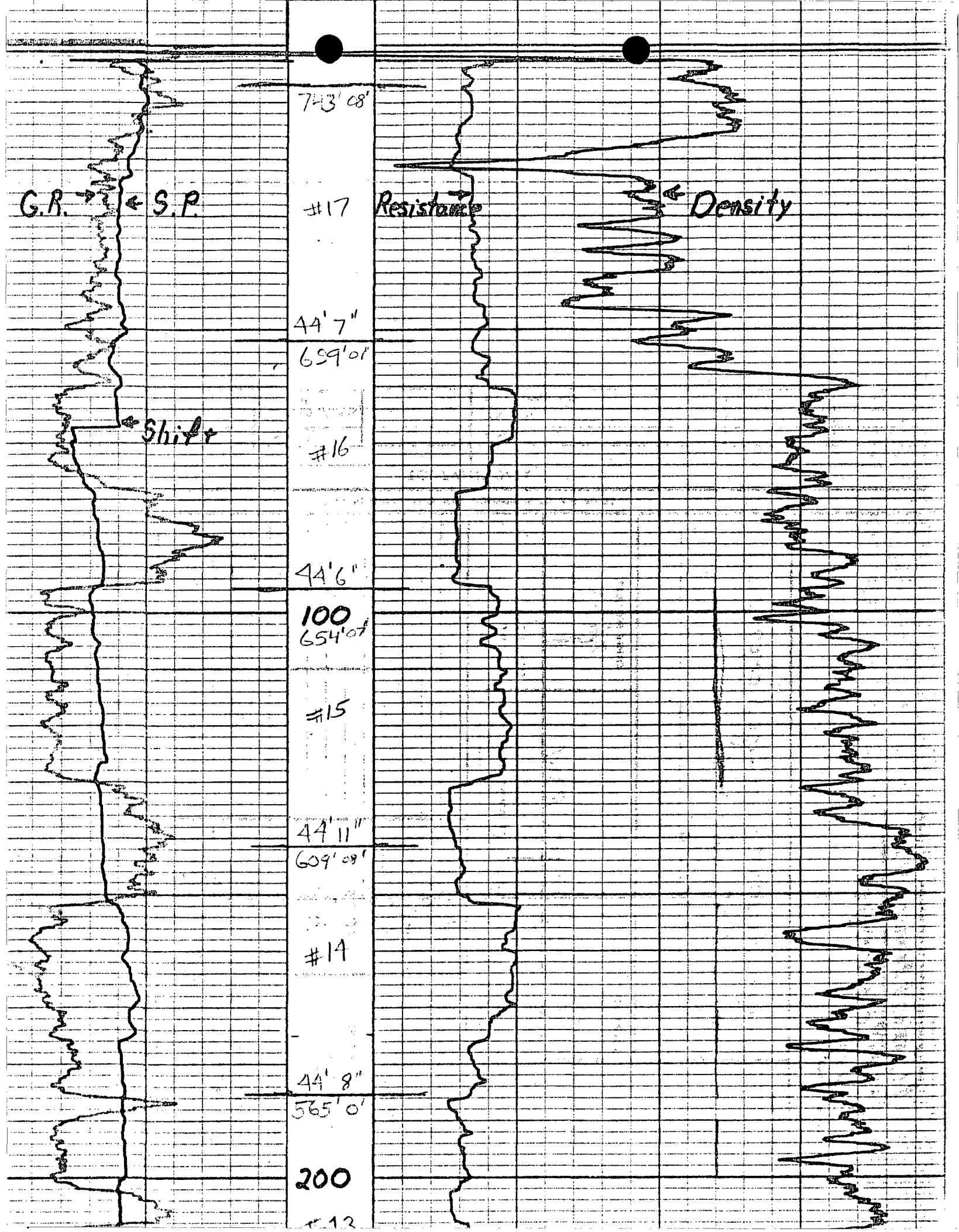
RUN	BORE-HOLE RECORD			CASING RECORD			
NO.	BIT	FROM	TO	SIZE	WGT.	FROM	TO
ONE	7⅞	0	T.D.				

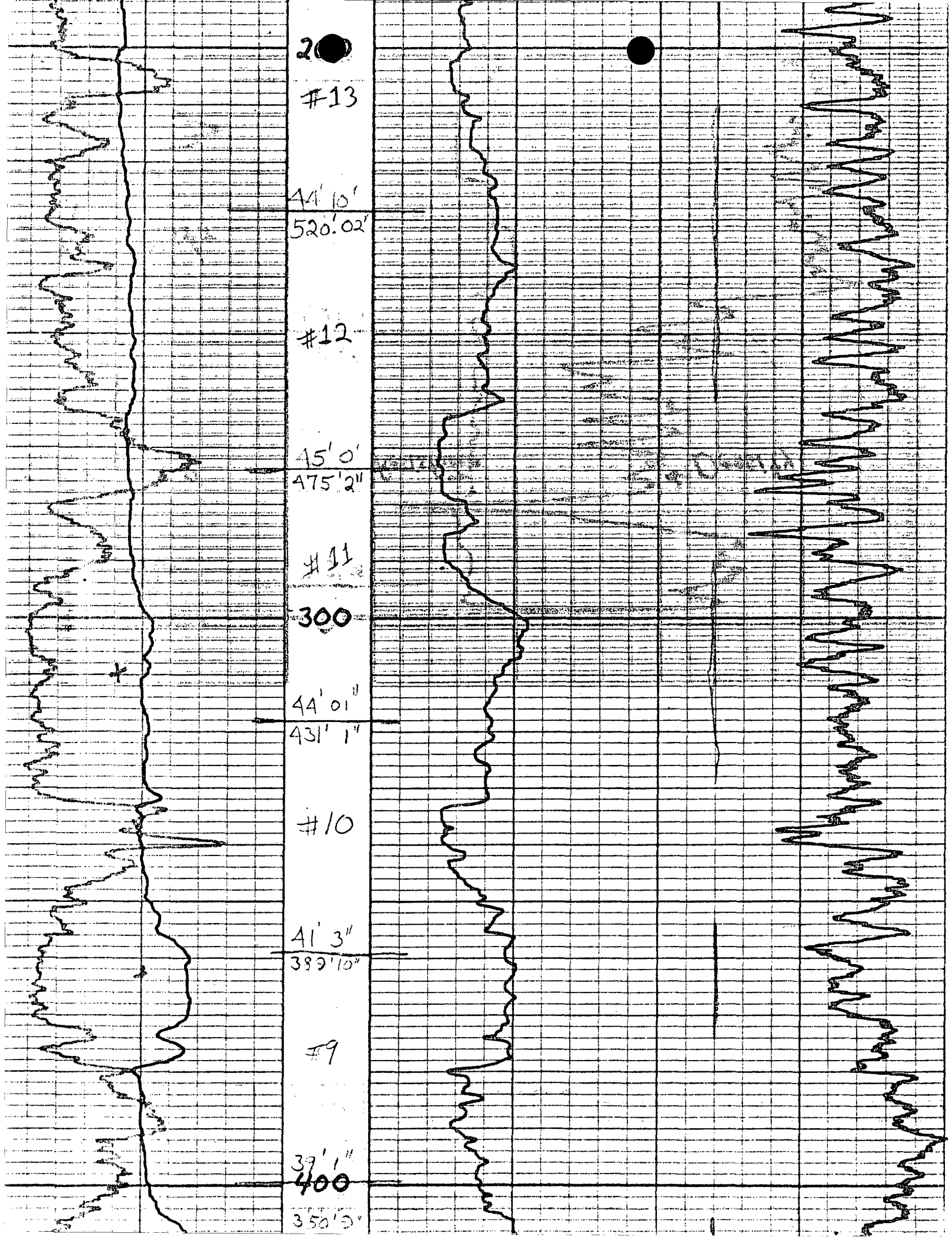
FOLD HERE

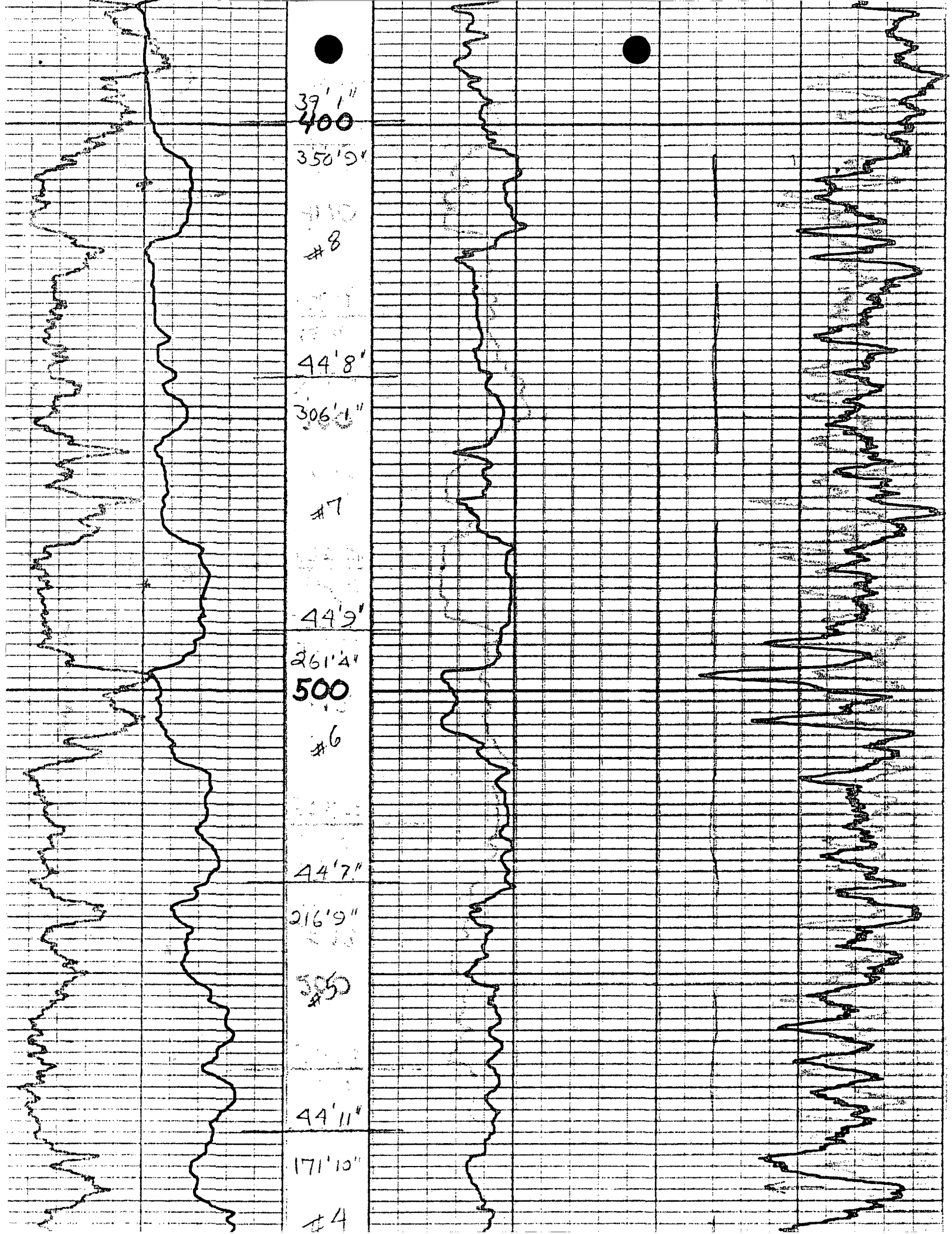
THIS HEADING AND LOG CONFORMS TO API RP 33

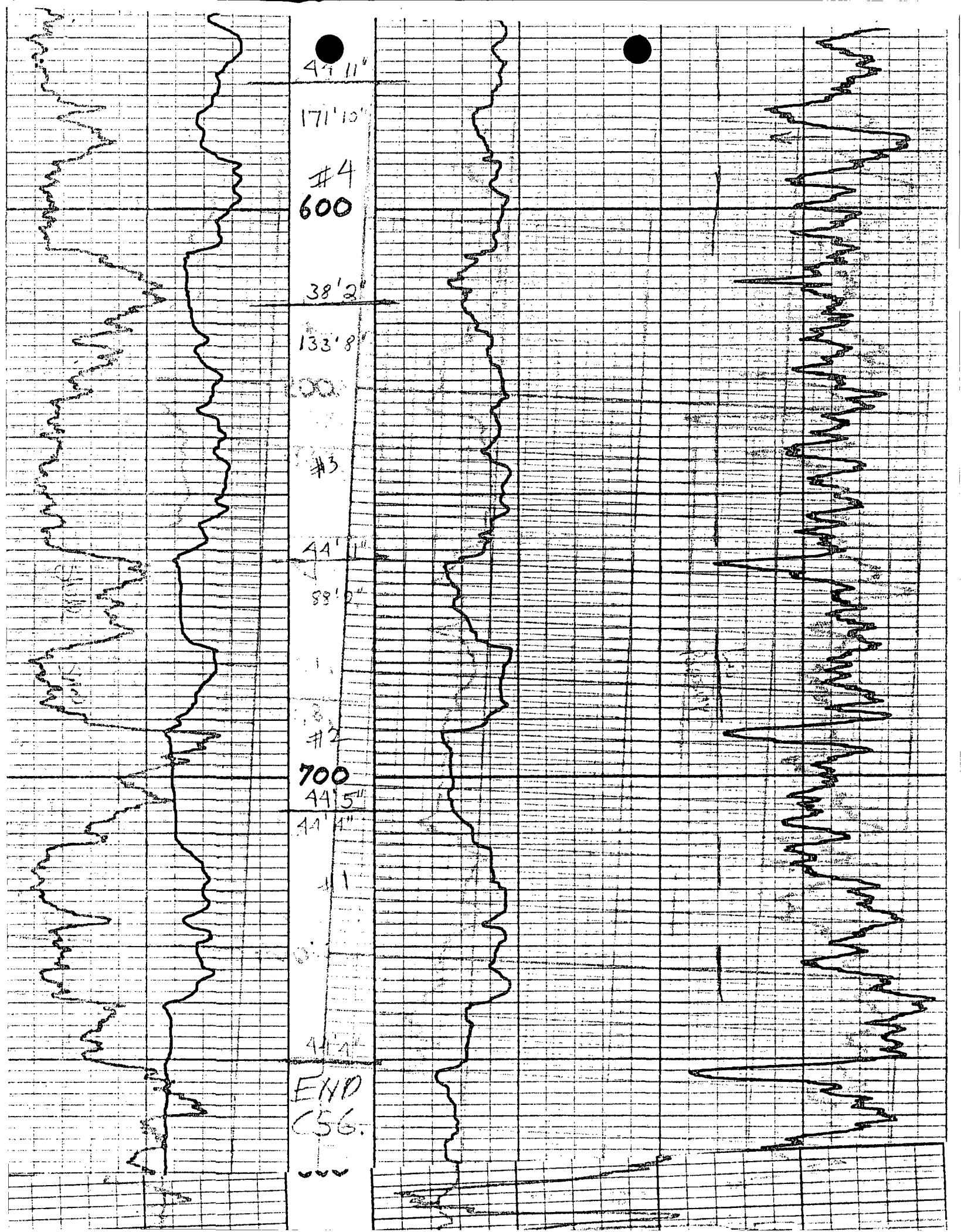
EQUIPMENT DATA

RUN NO.			
LOG TYPE			
TOOL MODEL NO.			
RUN NO.	ONE		
TOOL MODEL NO.	Combination		
DIAMETER	7⅞		


G.R.
S.P.
Shale
Resistance
Density
#17
#16
#15
#14
#13
713' 08'
44' 7"
659' 01'
44' 6"
100
654' 07'
44' 11"
609' 09'
44' 8"
565' 0'
200

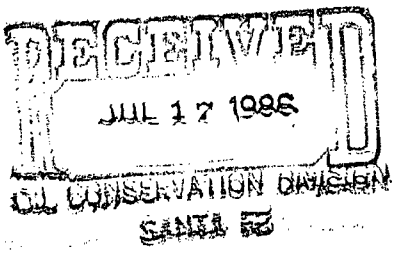

200
#13
44' 10"
520' 02"
#12
45' 0"
475' 2"
#11
300
44' 01"
431' 1"
#10
41' 3"
389' 10"
#9
39' 1"
400
350' 5"


39'1"
400
350'5"
#8
44'8"
306'1"
#7
44'9"
261'4"
500
#6
44'7"
216'9"
#5
44'11"
171'10"
#4


44' 11"
171' 10"
#4
600
38' 2"
133' 8"
#3
44' 11"
88' 2"
#2
700
44' 5"
44' 1"
#1
44' 1"
END
CSG.

July 14, 1986

Mr. Roger Anderson
New Mexico Oil Conservation Division
P. O. Box 2088
Santa Fe, New Mexico 87501-2088



Re: Unlined Commercial Evaporation Pit
NW/4, SW/4, Section 8-T25N-R3W
Rio Arriba County, New Mexico

Dear Mr. Anderson:

T-N-T Construction, Inc. requests administrative approval to build and operate an unlined commercial evaporation pit. In the absence of any specific guidelines for unlined pits, the "Guidelines for Application for Lined Evaporation Pit Permits" format will be utilized. Those portions that are not applicable to the design, construction or operation of an unlined will be left unanswered.

I. General Information

A. T-N-T Construction, Inc. Owner/Operator
Star Route
Lindrith, New Mexico 87029

B. T-N-T Construction, Inc. Owner/Operator
Star Route
Lindrith, New Mexico 87029

C. The facility will be located in the NW/4, SW/4 of Section 8-T25N-R3W (refer to Exhibits 1,2 and 3).

D. The purpose of the facility is to provide an economic and environmentally sound disposal site for produced water associated with the drilling, completion and production operations of oil and gas wells. The primary purpose will be that of produced water disposal. However, the facility will accept clear drilling and completion fluids, provided they are analyzed and are chemically compatible for disposal with produced water.

E. The original and two copies are enclosed for your review.

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

Tony Schmitz
(signature)

7-15-86
(date)

Tony Schmitz

President
(title)

II. General Description

A. Proposed Operations

1. The facility will be located on privately owned land and will be used to contain and evaporate produced water associated with oil and gas drilling, completion and production operations (refer to Exhibits 1 and 2). The produced water will be hauled in. Access will be gained from State Highway 537. The entire facility will be fenced so as to inhibit vandalism and unauthorized dumping.

2. a. Construction will commence after the facility is approved. Construction will take approximately three weeks. Start-up of operations, pending permit approval, are anticipated to begin September 1, 1986.

Skimmer Pit:

Dimensions: 50' x 50' x 10'
Inside Slope: 1:1
Outside Slope: 3:1
Holding Capacity: 3,000 barrels
Evaporative Capacity: 1.5 B.W.P.D. (if clean)
Subgrade Description: Native Clay
Liner: Natural clay compacted to 90% of proctor (refer to Exhibit 3)
Liner Thickness: Minimum 2'
Installation Method: Native clay to be ripped up, replaced, and compacted
Leak Detection: Monitor wells drilled around perimeter of location.
Freeboard: 1.5'
Runoff/Runon Protection: The pit is located on top of a broad, gentle ridge. No runoff or runon should occur.

Evaporation Pit:

The evaporative capacity is based on a net evaporation rate of 15 inches per year. The pan evaporation rate for this area averages 29.2 inches per year. The average annual rainfall for this area is 14 inches per year.

Dimensions: 300' x 300' x 6' (approx. 486,000 ft^3)
Inside Slope: 3:1
Outside Slope: 3:1
Holding Capacity: 64,900 barrels (364,402 ft^3)
Evaporative Capacity: 55 B.W.P.D. (yearly average)
Subgrade Description: Native clay
Liner: Natural clay compacted to 90% (refer to Exhibit 3)
Liner Thickness: Variable, 2' minimum
Installation Method: Native clay to be ripped up, replaced and compacted
Leak Detection: 18 - 20' monitoring wells will be drilled and cased with a bottom slotted liner and gravel packed. Liner to be of sufficient size so samples may be easily obtained.
Freeboard: 1.5'
Runoff/Runon Protection: The pit is located on top of a broad, gentle ridge. No runoff or runon should occur.

2. b. No drying beds are anticipated. Salt generation calculations* indicate that at a designed evaportion rate of 55 B.P.D., only 2,310 ft^3 of salt will be formed on a yearly basis. Two assumptions were made to generate these figures. The first is that NaCl is the main precipitate. The second is that the average concentration (T.D.S) is 15,000 ppm.
The freeboard capacity of the evaporation pit is approximately 364,402 ft^3. The salt generated by total evaporation of the initial fill-up will be approximately 7,468 ft^3. When the pit reaches freeboard capacity, the yearly salt generation, based on 55 B.P.D. will be 2,310 ft^3. At this evaporation rate the pit, when compensated for initial fill-up, will not fill up to freeboard capacity with precipitated salts for 154 years. The effect of loess material will be minimal as the area is 75% covered with natural vegetation and the project life of the facility is 50 years.
From time to time it may become necessary to remove solids from the skimmer pit. As it becomes necessary, the solids will be removed, spread on the surface and left to dry. At such times as the dried solids may be moved, they will be transported to an approved sanitary landfill.

3. At this time no ancillary equipment is anticipated. At such times as market conditions become more favorable, a sprayer system may be installed. Sprayer installation will be contingent upon NMOCD review and approval.

B. Spill/Leak Prevention Procedures

1. If a leak should be detected, the pond and monitoring wells will be the containment vessels. No further deliveries will be accepted. Artificial means will be employed to expedite the evaporation process. Due to the geologic nature of the site, downward percolation is less probable than horizontal migration. This being the case, the monitor wells will serve as the conduit to remove the contaminating water. The NMOCD will be promptly notified of any leaks.

2. The monitoring wells will provide the means in which to detect leaks. The water level in each well will be measured on a weekly basis. If water level fluctuations are noticed, a sample will be collected and analyzed to determine if the water is from the pit.

* Zygmut, S.J.: "Gas and Oil Production Wastewater Disposal Alternatives for the San Juan Basin", New Mexico Energy Research and Development Institute, June, 1985.

III. A. Hydrologic Features

1. There are six stock ponds, one water well for stock use, and the Ojito Arroyo within a one mile radius of the proposed site. The depth of this well is 1,000', with casing set at 700'. The casing is perforated from top to botton. In addition, there are three other wells within 1-1/2 miles of the site. They range in depth from 175' to 315'. One well is for human consumption, whereas the remaining wells are for domestic stock.

2. a. The T.D.S. of the wells range from 751-2246 ppm. The water in the Ojito Arroyo is fresh, containing a T.D.S. of 751 ppm (Exhibit 4).

   b. A water analysis of the water used for human consumption is attached (Exhibit 4).

3. The flow direction is unknown; however, a westerly flow is indicated by topography.

B. Three wells were drilled outside the perimeter of the proposed site. The driller's log for each is attached. The depth to a permeable medium ranges from 18' to 40' (Exhibit 5). The permeable medium (sandstone) is not to be construed as an aguifer as it outcrops only 400-500' to the south-southwest. The permeability of the undisturbed clay will be low; however, it will not be as low as the compacted clay (5.4×10^{-9} cm/sec and 2.7×10^{-8} cm/sec).
The name of the shallowest aquifer is unknown; however, the depth is estimated to be ±150'. The depth of the aquifer is estimated from existing water well data and is consistent with the definition of aquifer as proposed in Order R-7940.
The aquifer is a composite of sandstone grading to siltstone, with shale stringers. The lateral continuity of each is unknown.

C. Flooding of this site is highly unlikely as it is located on top of a gentle ridge some 50' above the Ojito wash. Flooding of the pit by rainfall is unlikely as the pit has a freeboard of 1.5'. Rainfall amounts of this magnitude are remote at best.

IV. Additional Information

Operation of this facility will be consistent with those required by Order R-7940A. All approvals necessary will be coincident with approval of this application.

Records including dates, transporter, operator, location of source, volume and type of fluid will be kept for each calender month. These records will be available for inspection and will be maintained for a period of at least two years.

If this application meets with your approval, please advise as construction start-up is waiting for authorization. If I may be of further assistance, please advise. Phone number 774-6663

Very truly yours,

Tony Schmitz

Tony Schmitz

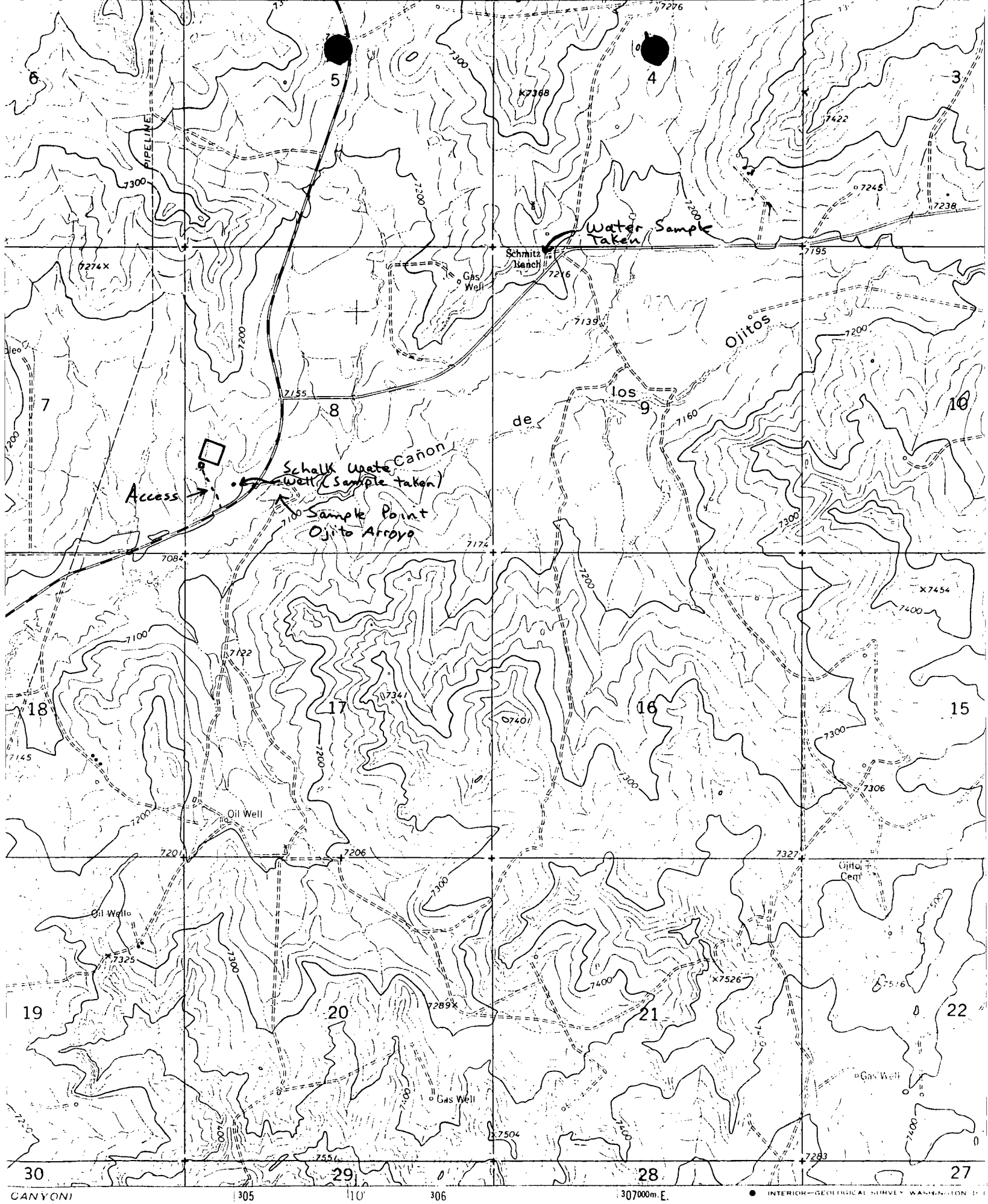

Water Sample Taken
Schmitz Ranch
Gas Well
Ojitos
de los
Schalk Water Well (Sample taken)
Cañon
Access
Sample Point Ojito Arroyo
PIPELINE
Oil Well
Oil Well
Gas Well
Gas Well
Ojito Cem
CANYON SW
24 000
1 MILE
4000 5000 6000 7000 FEET
305
10'
306
307000m.E.
INTERIOR—GEOLOGICAL SURVEY WASHINGTON
ROAD CLASSIFICATION
Medium-duty
Light-duty

EXHIBIT 1

WESTERN TECHNOLOGIES INC.

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

LABORATORY REPORT

Client: Mr. Tony Schmitz 31044
Star Route
Lindrith, New Mexico 87029

Job No.:
Lab./Invoice No.: 31460297
Date of Report: 04/25/86
Reviewed By: D.a. Mudid

Project: Evaporation Pond
Location: Lindrith, New Mexico
Material/Specimen: As Shown Below — Sampled By: Client — Date: 04/10/86
Source: As Show Below — Submitted By: Client — Date: 04/10/86
Test Procedure: Constant Head Permeability — Authorized By: B. Franks/Union Tx. — Date: 04/15/86

RESULTS

MATERIAL VISUAL CLASSIFICATION	SOURCE OF MATERIAL	ASTM D698A PROCTOR Max. Density	ASTM D698A PROCTOR Optimum Moisture	PERMEABILITY RATE
Silty Clay-Reddish	N.W. End 24"	112.3 pcf	17.1%	$5.4.10^{-9}$ CM/SEC
Silty Clay-Grayish	West 3"-6"	115.0 pcf	13.0%	$2.7x10^{-8}$ CM/SEC

NOTE: Permeability Test specimens molded at 90% of Maximum Dry Density and Optimum Moisture Content.

EXHIBIT 3

Copies to: Client (3)
/cb

API FORM 45-1

API WATER ANALYSIS REPORT FORM

Company	Sample No.	Date Sampled
Union Texas Petroleum	5	07/-7/86

Field	Legal Description	County or Parish	State
		Rio Arriba	NM

Lease or Unit	Well	Depth	Formation	Water, B/D
Schalk	H_2O well			

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

DISSOLVED SOLIDS

CATIONS	mg/l	me/l
Sodium, Na (calc.)	646	28.2
Calcium, Ca	28	1.4
Magnesium, Mg	10	0.8
Barium, Ba		
Potassium, K	26	

ANIONS		
Chloride, Cl	39	1.1
Sulfate, SO_4	1150	23.9
Carbonate, CO_3	24	0.8
Bicarbonate, HCO_3	323	5.3

Total Dissolved Solids (calc.) 2246

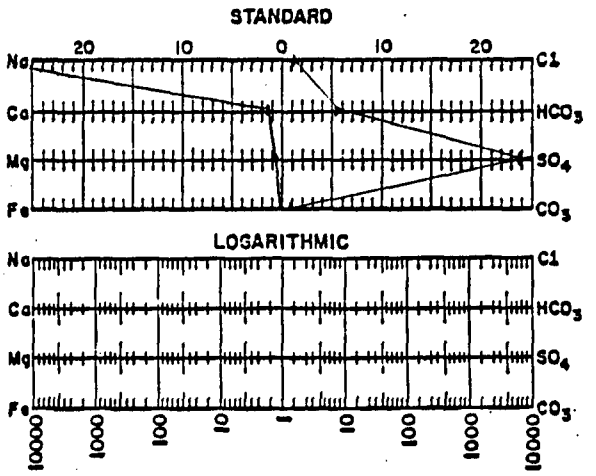
Iron, Fe (total) -0-

Sulfide, as H_2S -0-

OTHER PROPERTIES

pH	8.08
Specific Gravity, 60/60 F.	1.002
Resistivity (ohm-meters) 73 F.	3.40
Total Hardness	110

WATER PATTERNS — me/l



REMARKS & RECOMMENDATIONS:

Analyst Clay Bay

EXHIBIT 4
1 of 3

API FORM 45-1

API WATER ANALYSIS REPORT FORM

Company		Sample No.	Date Sampled
Union Texas Petroleum		4	07/06/86
Field	**Legal Description**	**County or Parish**	**State**
		Rio Arriba	NM
Lease or Unit	**Well**	**Depth**	**Formation** / **Water, B/D**
Ojito Arroyo	--	-0-	
Type of Water (Produced, Supply, etc.)	**Sampling Point**	**Sampled By**	
Surface runoff		BF	

DISSOLVED SOLIDS

CATIONS	*mg/l*	*me/l*
Sodium, Na (calc.)	163	7.1
Calcium, Ca	20.	1.0
Magnesium, Mg	12	0.9
Barium, Ba		
Potassium, K	28	0.7

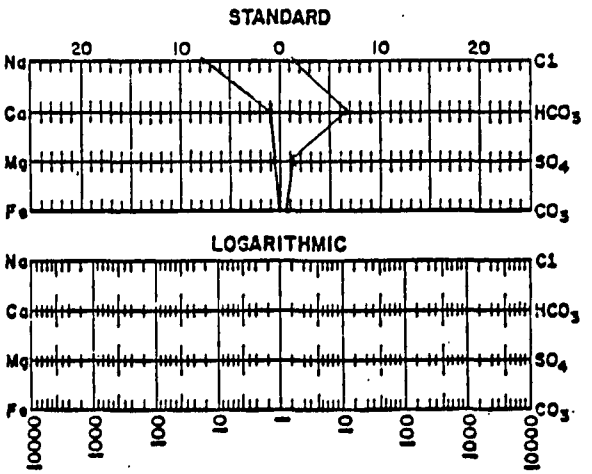
ANIONS		
Chloride, Cl	39	1.1
Sulfate, SO_4	55	1.1
Carbonate, CO_3	24	0.8
Bicarbonate, HCO_3	410	6.7

Total Dissolved Solids (calc.)	751
Iron, Fe (total)	-0-
Sulfide, as H_2S	-0-

OTHER PROPERTIES

pH	7.99
Specific Gravity, 60/60 F.	1.000
Resistivity (ohm-meters) 73 F.	10.00
Total Hardness	100

WATER PATTERNS — *me/l*



REMARKS & RECOMMENDATIONS:

Analyst Clay Bow

EXHIBIT 4
2 of 3

API FORM 45-1

API WATER ANALYSIS REPORT FORM

Company		Sample No.	Date Sampled
Union Texas Petroleum		6	07/-7/86
Field	**Legal Description**	**County or Parish**	**State**
Lease or Unit	**Well**	**Depth**	**Formation**	**Water, B/D**
Schmitz Ranch	House Tap			
Type of Water (Produced, Supply, etc.)	**Sampling Point**		**Sampled By**
tap supply water			BF

DISSOLVED SOLIDS

CATIONS	mg/l	me/l
Sodium, Na (calc.)	403	17.6
Calcium, Ca	4.	0.2
Magnesium, Mg	10	0.8
Barium, Ba		
Potassium, K	11	0.3

ANIONS		
Chloride, Cl	78	2.2
Sulfate, SO_4	520	10.8
Carbonate, CO_3	36	1.2
Bicarbonate, HCO_3	286	4.7

Total Dissolved Solids (calc.) 1348

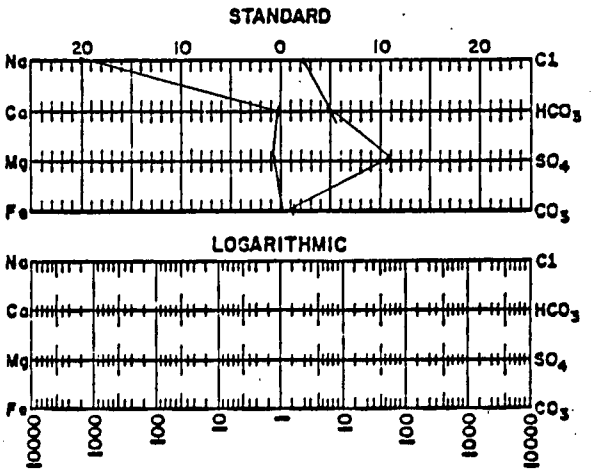
Iron, Fe (total) -0-

Sulfide, as H_2S -0-

OTHER PROPERTIES

pH	8.42
Specific Gravity, 60/60 F.	1.002
Resistivity (ohm-meters) 73 F.	5.0
Total Hardness	50

WATER PATTERNS — me/l



REMARKS & RECOMMENDATIONS:

Analyst Clay Tenny

EXHIBIT 4
3 of 3

DRILLER'S LOG

Subject: Test Well

Location: Northwest side of proposed evaporation pit
NW/4, SW/4, Section 8-T25N-R3W
Rio Arriba County, New Mexico

Depth		Description
0 '- 18'	18'	Blue Clay
18 '- 23'	5'	Sandy shale
23' - 25'	2'	Yellow sandstone
25' - 29'	4'	Blue clay
29' - 44'	15'	Red clay
44' - 46'	2'	Blue clay
46' - 48'	2'	Sandy blue-gray shale
48' - 60	12'	Blue-gray sandstone

Witness: Tony Schmitz
Tony Schmitz

EXHIBIT 5

522'-0"

420'-0"

10' DIKE

INLET

10' DEEP

1:1

3:1

3:1

10' DIKE

3:1

GRAVITY SIPHON

10' DIKE

MONITOR WELL
(TYPICAL)

10' DIKE

300'-0" SQUARE

10' DIKE

3:1

3:1

10' DIKE

NORTH

ENTIRE FACILITY ENCLOSED WITH FENCE

PLOT PLAN

SIPHON

MONITOR WELL
(TYPICAL)

ELEVATION

REV	PAGE 1 OF 1
	SCALE: 1"=30'
	7-12-86
	DRAWN BY:

EVAPORATION POND-
300' X 300' FOR
T-N-T INC.

Exhibit 2

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

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

PHOTOS

TNT Site Lindsith
Aug 7, '86

TNT Site Landfill
Aug 7, '86

TNT Site Lindsith
Aug 7, '86

TNT site Lindsith

Aug 7, '86

TNT Site Landfill

Aug 7, '86

TNT Site Landfill
Aug 7, '86