

FORM: MMDMN
REV. DATE: 4/27/97
[MMDMN.FRM]



FOR MMD USE ONLY:
PROJECT NAME U-MATE
PERMIT # MK 010 MN
DATE RECEIVED: 8/5/97
DATE APPROVED: 1/1
LEAD INSPECTOR: RSY

STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

Director
Mining and Minerals Division
2040 South Pacheco St.
Santa Fe, New Mexico 87505
Telephone: (505) 827-5970

SUBPART 3
MINIMAL IMPACT NEW MINING OPERATIONS
PERMIT APPLICATION

The following information is required under the New Mexico Mining Act (Sections 69-36-1 through 69-36-20, NMSA 1978) and associated rules. The Mining and Minerals Division of the Energy, Minerals and Natural Resources Department is the administrative agency through which this application is to be processed. See §304, Minimal Impact New Mining Operations, of the New Mexico Mining Act Rules for all regulations associated with Minimal Impact Mining operations.

Permit Application Requirements: (§304.A-C and §601)

- A minimal impact new mining operation will not be considered a minimal impact mining operation if it exceeds **10 acres of disturbed land**, except that pre-existing roads and reclaimed areas within the permit area will not be counted.
Reclaimed, for this purpose means all financial assurance has been released, except the amount held to reestablish vegetation pursuant to §1204.
- Permit applications shall be submitted in ample time to have the permit issued before mining operations begin, and operations shall not begin until after the permit is issued.
- Six copies of the completed application need to be submitted.
- Confidential information needs to be clearly indicated and submitted separately.

Permit Application Requirements (con't): (Subpart 1)

- Check the "YES" or "NO" box for each of the following characteristics as related to the proposed minimal impact mining operation:

- | <u>YES</u> | <u>NO</u> | |
|--------------------------|-------------------------------------|--|
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Located in or having a direct surface impact on wetlands, springs, perennial or intermittent streams, lakes, rivers, reservoirs or riparian areas. |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Located in designated critical habitat areas as determined in accordance with the federal Endangered Species Act of 1973 or in areas determined by the Department of Game and Fish likely to result in an adverse impact on an endangered species designated in accordance with the Wildlife Conservation Act, Sections 17-2-37 through 17-2-46 NMSA 1978 or by the State Forestry Division for the Endangered Plants Act, section 75-6-1 NMSA 1978. |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Located in an area designated as Federal Wilderness Area, Wilderness Study Area, Area of Critical Environmental Concern, or an area within the National Wild and Scenic River System. |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Located in a known cemetery or other burial ground. |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Located in an area with cultural resources listed on either the National Register of Historic Places or the State Register of Cultural Properties. |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Having or expected to have a direct impact on ground water that has a total dissolved solids concentration of less than 10,000 mg/l, except exploratory drilling intersecting ground water may be performed as a minimal impact operation. |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Expected to use or using cyanide, mercury amalgam, heap leaching or dump leaching in its operations. |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Expected to result in point or non-point source surface or subsurface releases of acid or other toxic substances from the permit area. |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Requiring a variance from any part of these Rules as part of the permit application. |

IMPORTANT NOTES!:

- If you have checked "YES" to any of the above boxes, the mining operation does not qualify as a minimal impact mining operation. Do not continue to fill out the remainder of this form.
- If you do meet the above requirements and have checked "NO" to all of the above boxes, continue filling out this application.
- Obtaining a Mining Act permit does not necessarily satisfy the obligation to obtain permits required by other governmental entities.

- PLEASE FILL IN ALL APPLICABLE INFORMATION AS COMPLETELY AS POSSIBLE.

- PLEASE PRINT OR TYPE ALL INFORMATION.

1. OPERATOR INFORMATION (§304.D.1)

LIST PROJECT NAME:	U-MATE
NAME OF APPLICANT:	U-MATE INTERNATIONAL, INC
ADDRESS:	P.O. Box 4131 SCOTTSDALE, AZ 85261
PHONE #:	⁴⁸⁰ (602) 948-9273
NAME OF OWNER (if different from applicant's name and address):	of Land GAMERCO ASSOCIATES, LTD c/o CHARLES HIGH
ADDRESS:	300 WEST HILL AVE. GALLUP, N.M. 87315
PHONE #:	(505) 722-6615
NAME OF ON-SITE CONTACT OR OPERATOR'S REPRESENTATIVE:	DENNIS JONES
ADDRESS:	217 BOULDER RD. GALLUP, N.M. 87305
PHONE #:	(505) - 863-1911 OR (602) 948-9273 OR (602) 531-9100

2. RIGHT TO ENTER INFORMATION (§304.D.1)

✓ A. Describe or provide evidence for the basis of the applicant's right to enter the property to conduct the mining and reclamation: SEE LEASE OF PRIVATELY OWNED LAND DATED 5/13/97 AND CONFIRMATION OF LEASE AND ASSIGNMENT OF LEASE FROM SUNDANCE HOLDINGS, INC TO U-MATE INTERNATIONAL

B. List the names and addresses of surface and mineral ownership within the proposed permit area:

1. Surface owners:

Name	Address	Phone #
<u>GAMERCO ASSOCIATES</u> <u>40 CHARLES HIGH</u>	<u>300 WEST HILL AVE</u> <u>GALLUP, NM 87305</u>	<u>1-505-722-6615</u>

2. Mineral owners:

Name	Address	Phone #
<u>SAME AS ABOVE IN 2(B)1</u>		

✓ C. List the author(s), title(s), date(s) and report number(s) of any cultural resource survey report(s) submitted to the agency(ies) or landowner(s) listed above:

NOT KNOWN AT THIS TIME.

3. MAPS (§304.D.2)

- ✓ A. Provide a legal description of the site [Township(s), Range(s) and Section(s):

SEE MAP ATTACHED

T15N, R19W, SEC. 10

- B. Provide a topographic map(s) of at least 1 inch = 2,000 feet (or appropriate for the size of disturbance) showing the areas of land to be disturbed by the proposed mining and reclamation. Identify general area shown on the map(s) by Township, Range and Section(s). If the area to be mined contains the following features, show them on the map(s):

1. Boundary of the proposed permit area with the existing and proposed area of disturbance.
2. Previously disturbed areas.
3. Perennial, intermittent and ephemeral streams; springs; wetlands; riparian areas; lakes and reservoirs.
4. Proposed and existing roads and other access routes.
5. Residences.
6. Support facilities.
7. Cemeteries, burial grounds; cultural resources listed or eligible for listing on either the National Register of Historic Places or the State Register of Cultural Properties.
8. Pipelines.
9. Oil, gas, water and monitoring wells on and within ½ mile of the permit area.
10. Identify the location of shafts, adits, trenches, ponds, pits, quarries, stockpiles, waste dumps etc.

4. ENVIRONMENTAL PERMITS HELD FOR OTHER OPERATIONS (§304.D.3)

Provide a list of other environmental permits held for other mining operations within the United States and any violations issued for non-compliance with those permits.

NAMES OR TYPES OF ENVIRONMENTAL PERMITS:

NONE Explor Permit

LIST PERMIT VIOLATIONS; NUMBER, TYPE AND ISSUING AGENCY:

NONE

5. MINING DESCRIPTION (§304.D.4)

→ 710 acres?

A. Type of mineral or minerals to be mined: HUMATE

B. Check (✓) the method of proposed mining:

Surface or Underground

C. Describe the sizes and volumes of the facilities to be used:

Plant Site/Staging Area:

How Many 1 Acreage ~~5~~ 1

Pits or Quarries : How Many 1 Acreage ~~10~~ 3 Volume (cu.yds.) _____

Stockpiles: How Many 1 Acreage 1 Volume (cu.yds.) 1000

Waste Dumps: How Many ~~1~~ 0 Acreage ~~0~~ 5 Volume (cu.yds.) _____

List for New road(s) the following: NONE

Length (ft.) _____ Width (ft.) _____

Length (ft.) _____ Width (ft.) _____

List for Extension or widening of existing road(s) the following: NONE

Length (ft.) _____ Width (ft.) _____

Length (ft.) _____ Width (ft.) _____

Other Disturbances: Type NONE

How Many _____ Acreage _____ Volume (cu.yds.) _____

TOTAL ACREAGE TO BE DISTURBED: _____ acres.

D. Describe the type of processing that will be conducted on site: _____

CRUSHING EQUIPMENT - HUMATES TAKEN OUT OF
THE GROUND WITH FRONT END, RUBBER
TIRED, FRONT END LOADER.

E. Describe the typical equipment to be used for the mining operations:

SMALL CAT TRACTOR - BULLDOZER, SMALL RUBBER
TIRED FRONT END LOADER

5. CHEMICAL USE (§304.D.4)

A. List all chemicals proposed to be used by the mining operation. NONE

Name: _____

Use: _____

✓6. GROUND WATER INFORMATION (§304.D.5)

- A. Provide an estimate of depth to ground water and the total dissolved solids concentration.

Depth to ground water (ft.) _____ T.D.S. concentration _____

- B. Describe the source of ground water information:

PLEASE REFER TO CARBON COAL COMPANY'S
GROUND WATER INFORMATION - PROVIDED BY CARBON
COAL AND ON FILE WITH ENERGY, MINERALS + NATURAL
RESOURCES DEPT.

- C. Describe any dewatering activities to be conducted during mining operations:

NONE

7. PERFORMANCE STANDARDS (§304.D.7)

- A. Provide a general description of how the mining and reclamation will be designed and operated using the most appropriate technology and best management practices:

THE MINING WILL BE DONE WITH 2 OR 3 PIECES
OF EARTH MOVING EQUIPMENT, WITHOUT USE OF
ANY CHEMICALS OR DEEP MINING. THE LAND
WILL BE PLACED BACK TO ITS ORIGINAL
USE AND AS CLOSE TO ORIGINAL CONDITION AS
PRACTICAL.

- B. Provide a general description of how the mining and reclamation will be designed and operated to assure protection of human health and safety, the environment, wildlife, and domestic animals:

THE MINING & RECLAMATION WILL COMPLY WITH ALL
APPLICABLE FEDERAL AND STATE LAWS & REGULATIONS.
THE MINING & RECLAMATION WILL BE LIMITED
IN SIZE AND SCOPE.

- C. Provide a general description of how the mining and reclamation will be designed and operated to safeguard the public from unauthorized entry into shafts, adits and tunnels and to prevent falls from highwalls or pit edges:

THERE WILL BE NO SHAFTS, TUNNELS, ADITS OR
PIT EDGES. THERE MAY BE A 20-30 FT SLOPE.

- D. Provide a general description of how the mining and reclamation will be designed and operated so the disturbed area will not contribute suspended solids above background levels, or where applicable the Water Quality Control Commission's standards, to intermittent and perennial streams:

THE MINING AND RECLAMATION WILL BE DESIGNED
AND OPERATED IN SUCH A WAY AS TO
VIRTUALLY ELIMINATED SUSPENDED SOLIDS ABOVE
GROUND LEVELS OR ANY WATER RESOURCES.

- E. Provide a general description of how the mining and reclamation will be designed and operated to control erosion:

THE LIMITED MINING AND RECLAMATION WILL
BE DESIGNED TO LIMIT EROSION TO
NATURAL CONDITIONS

8. RECLAMATION PLAN (§304.D.8)

The operation will be operated and reclaimed to a self-sustaining ecosystem appropriate for the life zone of the surrounding areas following closure unless conflicting with the approved post-mining land use.

A. List adjacent land use other than mining: GRAZING

B. List the proposed post mining land use: GRAZING

C. Describe how reclamation activities will avoid adverse impact to cultural resources:

IT IS EXPECTED THAT THERE WOULD BE NO MATERIAL IMPACT ON CULTURAL RESOURCES

D. Describe any backfilling and grading operations to be performed after mining:

BACKFILLING AND GRADING WILL BE AS CLOSE TO NATURAL LEVELS AS PRACTICAL.

E. Describe what mitigation steps will be taken to reconstruct or protect the hydrologic balance of the site after mining:

THERE SHOULD BE NOT MATERIAL IMPACT HYDROLOGIS BALANCE OF THE SITE AFTER MINING.

F. Describe how topsoil or topdressing will be salvaged, stockpiled and distributed for the re-establishment of vegetation:

TOPSOIL AND TOP DRESSING WILL BE SALVAGED AND WILL BE STOCKPILED WITHIN 10 ACRE MINING PERMIT.

G. Describe what kind of seed bed preparation will take place prior to seeding. What soil amendments will be added? Scarification of the seed bed needs to take place. Will this involve discing or ripping?

RE-SEEDING OF THE SOIL WILL GENERALLY BE
WITH THE SAME SEED MIX USED BY CARBON COAL

- ✓ H. Describe in detail the plant species to be used in the re-establishment of vegetation:

Plant Name: _____ Rate of application (lb/ac.) _____

PLEASE SEE CARBON COAL COMPANIES

RE-SEEDING PLAN SUBMITTED BY

CARBON COAL COMPANY

- I. Will the seeds be broadcast or drilled into the seed bed? BROADCAST

- J. Describe the type of mulch material and rate per acre to be applied after seeding:

SEE CARBON COAL COMPANY'S PLAN.

- K. What structures are on site and how will they be removed or reclaimed? (Buildings, portals, adits, shafts, bore holes, ponds, etc.):

NONE

- L. What roads are part of the mine site and how will they be reclaimed. Please provide an estimate of square feet of road and explain if reclamation will involve ripping, scarification, backfilling and recontouring, retopsoiling, etc.:

NONE

M. What will be the time frame for reclamation, (e.g. time of year, during mining, after mining, etc)?

TWO YEARS AFTER SITE IS EXHAUSTED

TWO YEARS AFTER MINING STOPS ON SITE
Proposed reclamation dates: Begin: ___ / ___ / ___ End: ___ / ___ / ___

9. OTHER REQUIRED PERMITS FOR THIS OPERATION (§304.D.9)

A. Provide a list of other permits required for the operation and the anticipated schedule for receipt of these.

<u>Permit Name & Issuing Agency</u>	<u>Date or anticipated date of receipt</u>
<u>NONE OTHER THAN</u>	<u>THIS PERMIT.</u>
<u>NPDES</u>	

10. FINANCIAL ASSURANCE AND PERMIT FEES (§304.E & F)

- A. Provide a financial assurance estimate based on the cost of reclaiming the site by a third party. Include supporting calculations. Operations with less than 2 acres total disturbance are not required to provide financial assurance.
- B. Attach the permit fees as determined pursuant to Subpart 2. The permit fee for a minimal impact new mine is \$350.00.

11. CERTIFICATION REQUIREMENT (§304.J.5)

Each application shall be signed **and notarized** by an applicant for the operation with the following certification made:

I certify that I have personally examined and am familiar with the information submitted herein, and based on my inquiry of those individuals responsible for obtaining the information, I believe the submitted information is true, accurate, and complete. I agree to comply with the requirements of the permit, these Rules, and the Act. Further, I hereby allow the Director to enter the permit area for the purpose of conducting inspections until release of financial assurance.

Signature of Applicant:

Dennis Jones

Name (typed or print):

DENNIS JONES

Title/Position:

PRESIDENT

Date:

8/2/97

Signature of Notary:

Wesley Orty
My Commission Expires
4-11-98

┌ Notary Seal ─

6435'

YEAR #2

YEAR 3

PROCESSING SITE

Shop
Ice

Water line
Death

Fresh Water Pond
Pond



MINING SITE

(Permit Area)

DRILL
6449

10/11/76

6508

6500

6568

6588

6600

6600

6700

YEAR 4

15

ce Mine

6500

6700

Attachment

Diversions

Diversions consist of an excavated channel and generally contain a ridge of compacted soil on the lower side. These channels, like dikes, are used to divert water to a suitable outlet. Unlike dikes, they are established as a permanent structure on the site. Besides controlling erosion, diversions are an excellent device for reducing the possibility of flooding at lower elevations and are used especially where protection of high-risk areas are involved. Other uses include surface drainage where seepage is a problem.

Three major types of diversions are presently used by mining operators. Diversion channels may be parabolic, trapezoidal or vee-shaped.

IMPORTANT FACTORS

Location should be determined by considering outlet conditions, topography, land use, soils, slope and seepage areas.

Channels should have a capacity to handle a 10-year storm, except when used as a flood prevention structure. Flood prevention structures require a 50-year storm frequency where the protection of building structures exist.

They should be constructed with a freeboard of at least 0.5 feet.

The design should allow for a 10% settlement of the compacted soil ridge.

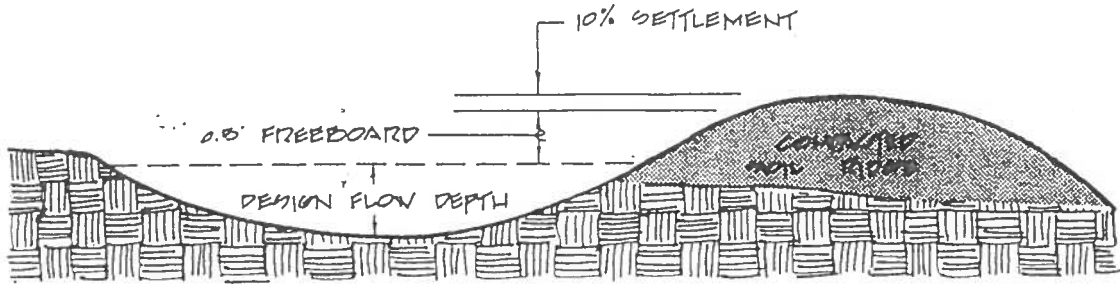
Channel width at the maximum design water depth should be at least 4 feet.

Side slopes should not be less than 2H:1V.

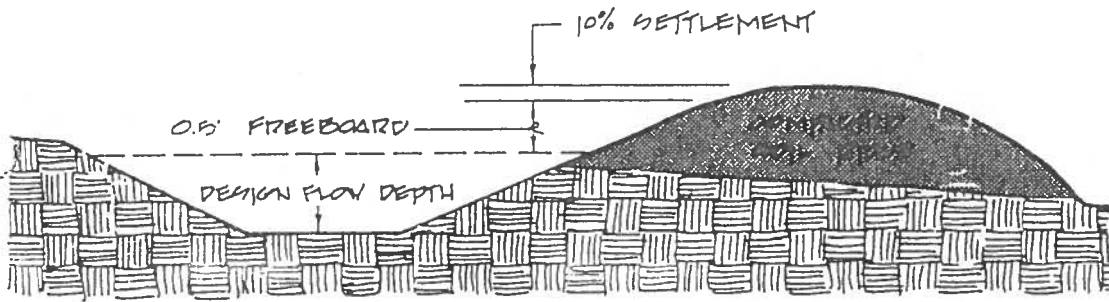
The ridge and channel should be seeded and mulched within 15 days of installation.

Newly constructed diversions should be monitored after every rainfall and any collected sediment removed from the channel. This should be continued until an adequate vegetative cover can be established. Damages will need to be repaired and non-vegetated areas will need to be reseeded.

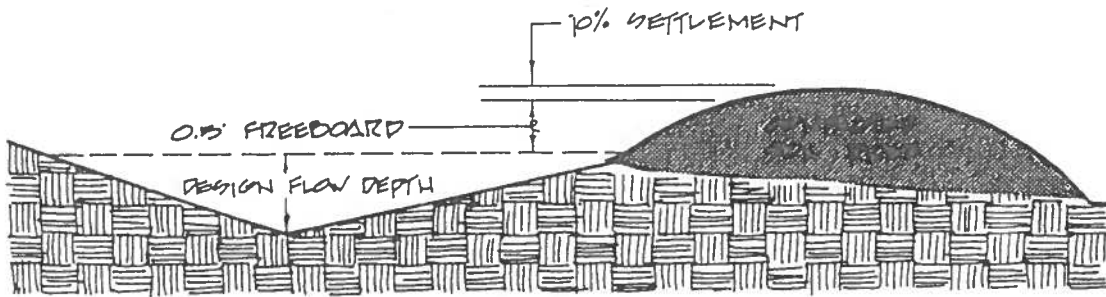
DIVERSIONS



PARABOLIC DIVERSION



TRAPEZOIDAL DIVERSION



VEE-SHAPED DIVERSION

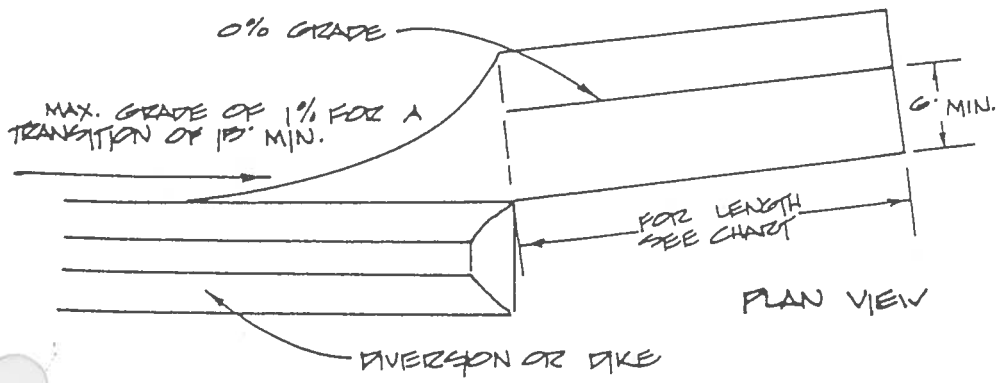
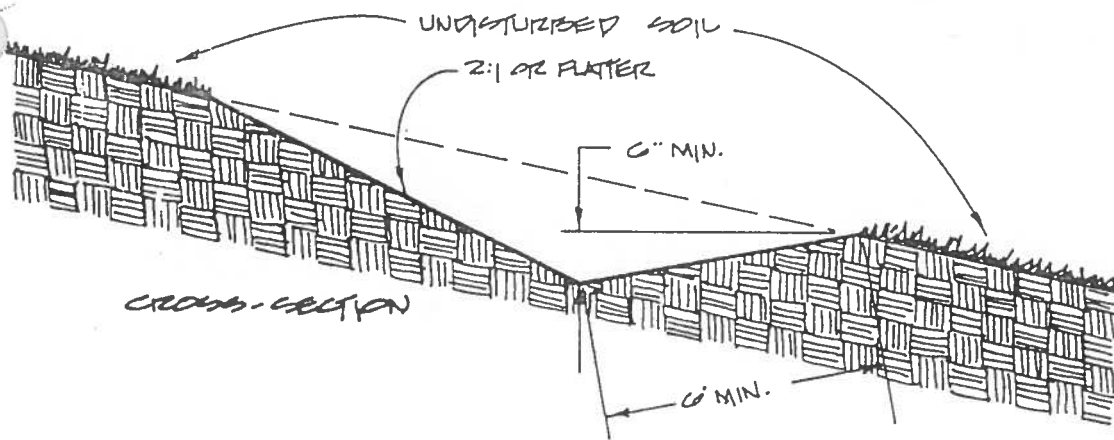
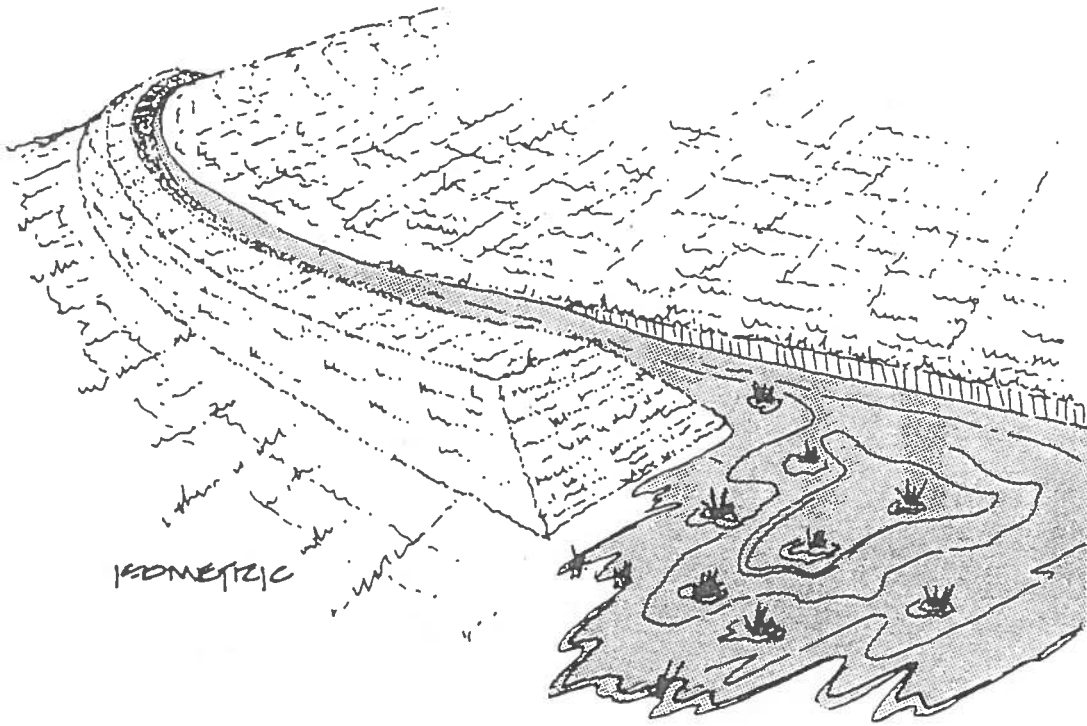
Level Spreader

Level spreaders are outlets constructed at zero grade across the slope where concentrated runoff may be spread at non-erosive velocities over undisturbed areas stabilized by existing vegetation. This practice applies only in those situations where the spreader can be constructed in undisturbed soil and where the area directly below the level lip is stabilized by existing vegetation.

A formal design for level spreaders is not needed. Spreader length, however, may be determined by estimating Q value (cubic feet/second at outlet) and selecting the appropriate length from the table below.

<u>DESIGN Q (CFS)</u>	<u>MINIMUM LENGTH (FEET)</u>
Up to 10	15
11 to 20	20
21 to 30	26
31 to 40	36
41 to 50	44

WATER LEVEL SPREADER



TEMPORARY SEDIMENT TRAPS

Temporary sediment traps are small ponding areas that trap sediment transported by stream runoff from small disturbed areas. These traps detain stream runoff long enough to allow the majority of sediment to settle out. Sediment traps are used to prevent sediment from entering natural or constructed drainage systems before permanent stabilization can be established on the disturbed area.

It is important to remember that sediment traps are to be used only for small drainage areas. For areas greater than 5 acres, the mine operator should refer to the section entitled "Sediment Basins".

IMPORTANT FACTORS

Sediment traps should have at least 67 cubic yards of storage area per acre of drainage area.

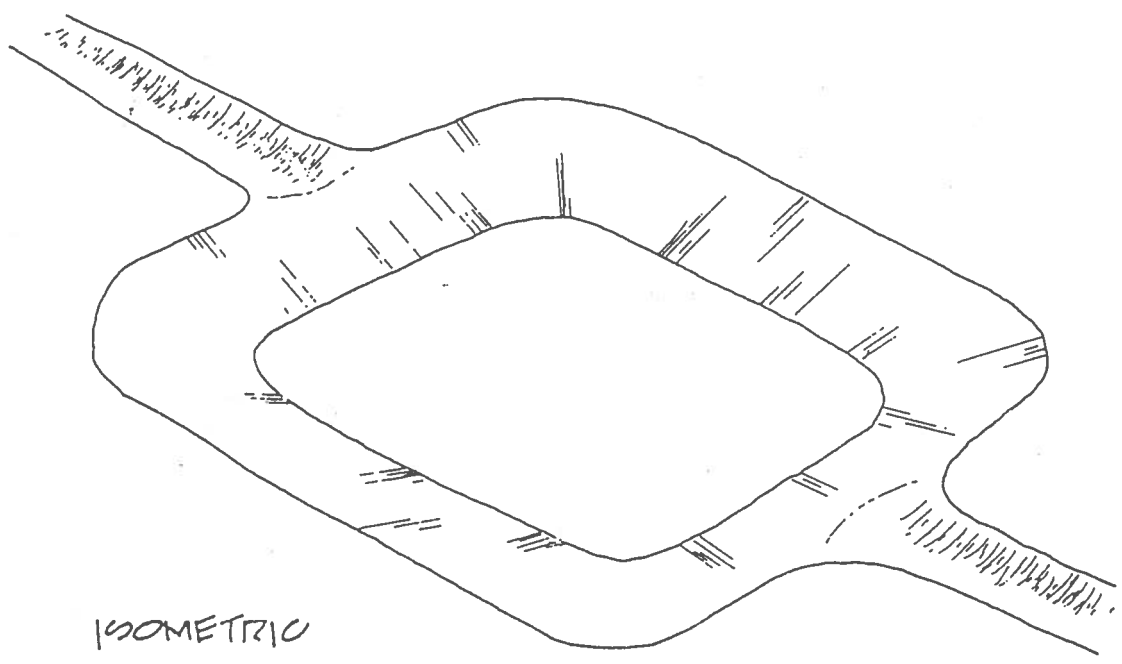
Sediment should be removed from trap when the storage capacity is reduced by one-half.

If traps are to be excavated, a 2:1 (minimum) side slope is recommended.

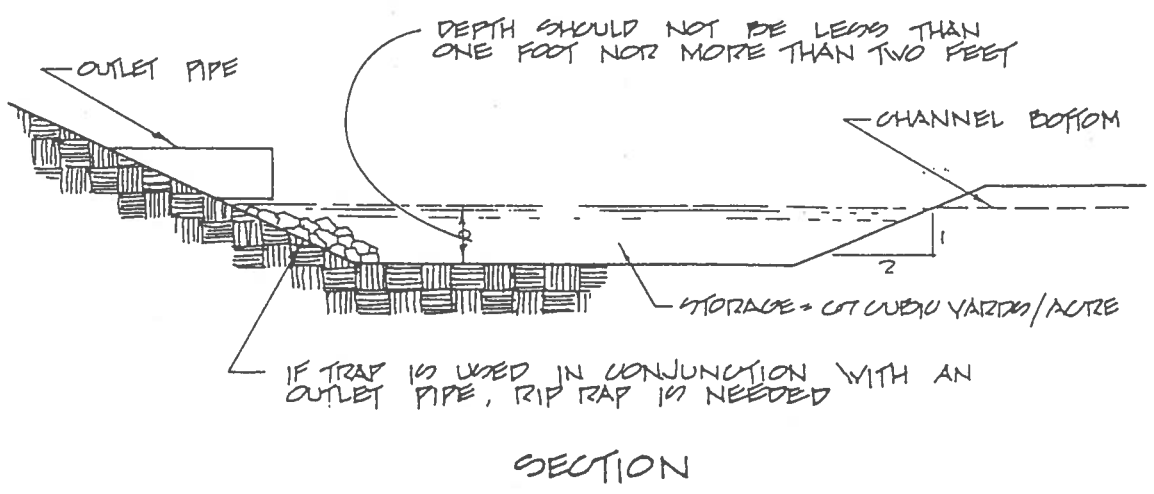
Traps should be located so they do not interfere with the mine operation but have easy access for periodic clean-out and maintenance.

Sediment traps should be monitored after every rainfall and repairs made as needed. Traps with constructed earthen retaining walls should be mulched (if needed) and seeded. When mining is terminated, temporary sediment traps will need to be removed and vegetated.

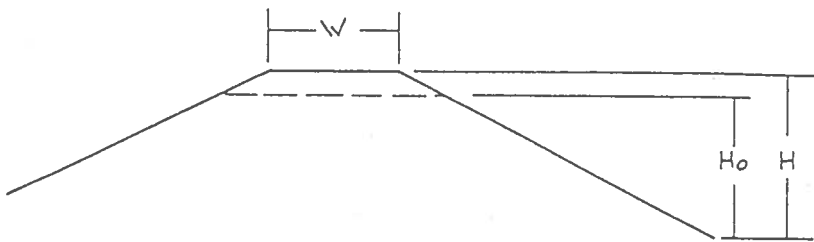
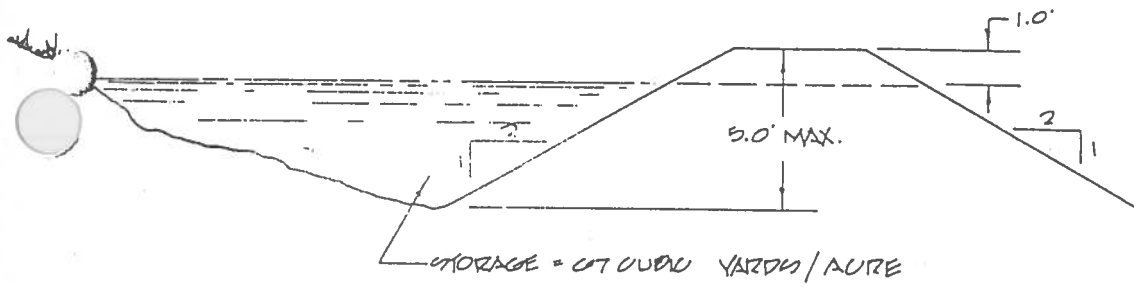
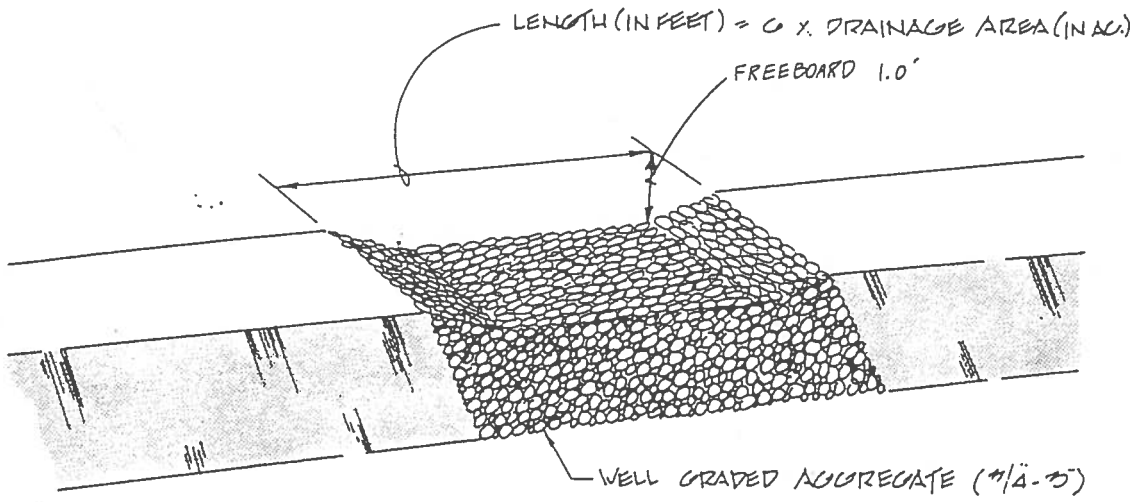
EXCAVATED SEDIMENT TRAP



NOTE: THIS TYPE OF TRAP IS LOCATED AROUND STORM DRAIN INLETS, IN DRAINAGEWAYS, OR AT POINTS OF DISCHARGE OF SEDIMENT-LADEN STORM RUNOFF.



DIKED SEDIMENT TRAP



MINIMUM TOP WIDTH (W) REQUIRED
ACCORDING TO HEIGHT OF EMBANK-
MENT (H) IN FEET

H	H ₀	W
1.5	0.5	2.0
2.0	1.0	2.0
2.5	1.5	2.5
3.0	2.0	2.5
3.5	2.5	3.0
4.0	3.0	3.0
4.5	3.5	4.0
5.0	4.0	4.5

Permit Boundary and
Area to be Disturbed:



Existing
Road

Sed.
Trap

Area to be Mined

Initial
Pit

Area to be Mined

Initial
Waste
Pit

Initial
Staging
and St-clip
Area

SW 1/4 SW 1/4
NE 1/4 SEC. 10

EXISTING ROAD →

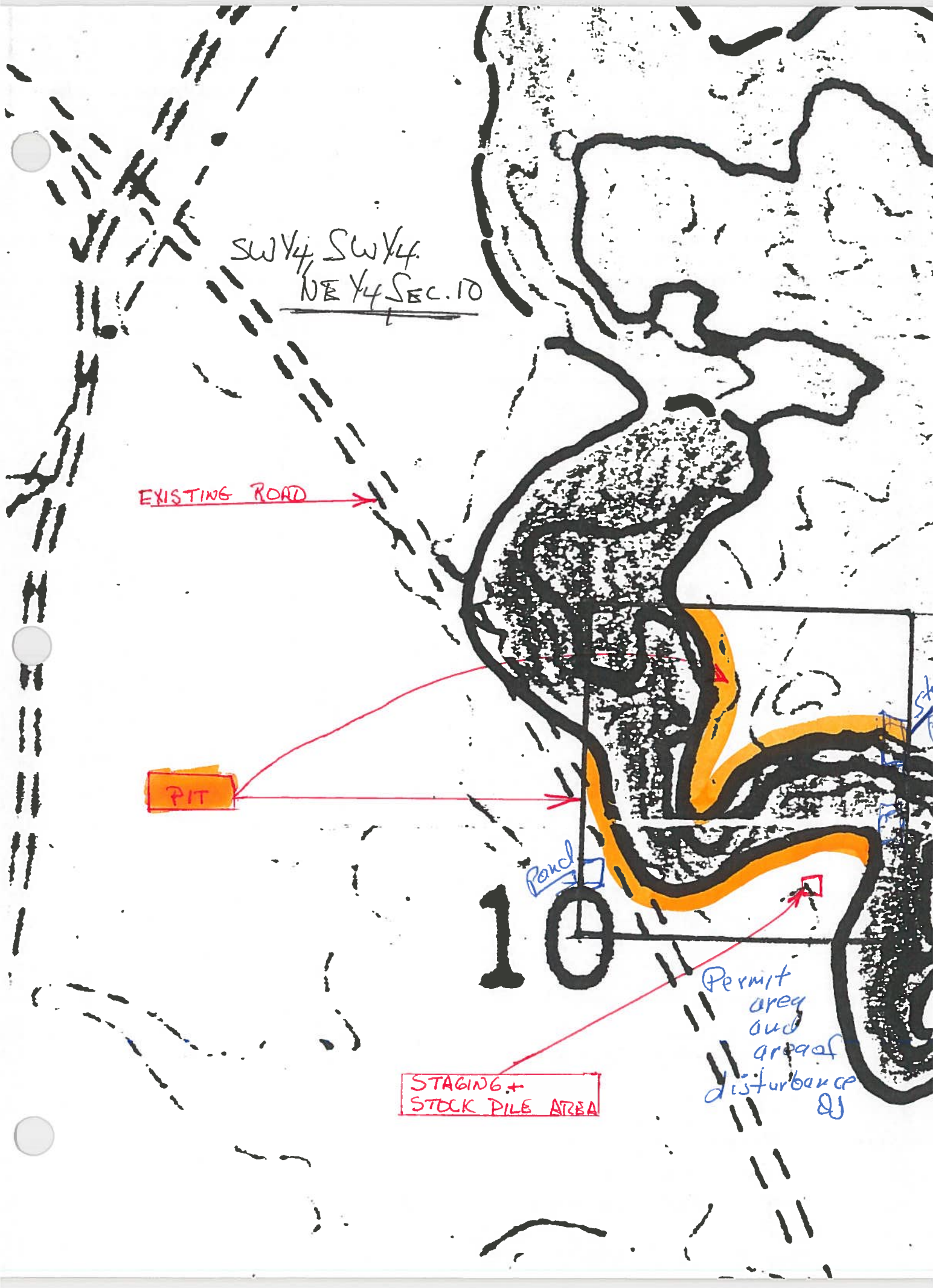
PIT →

Pond

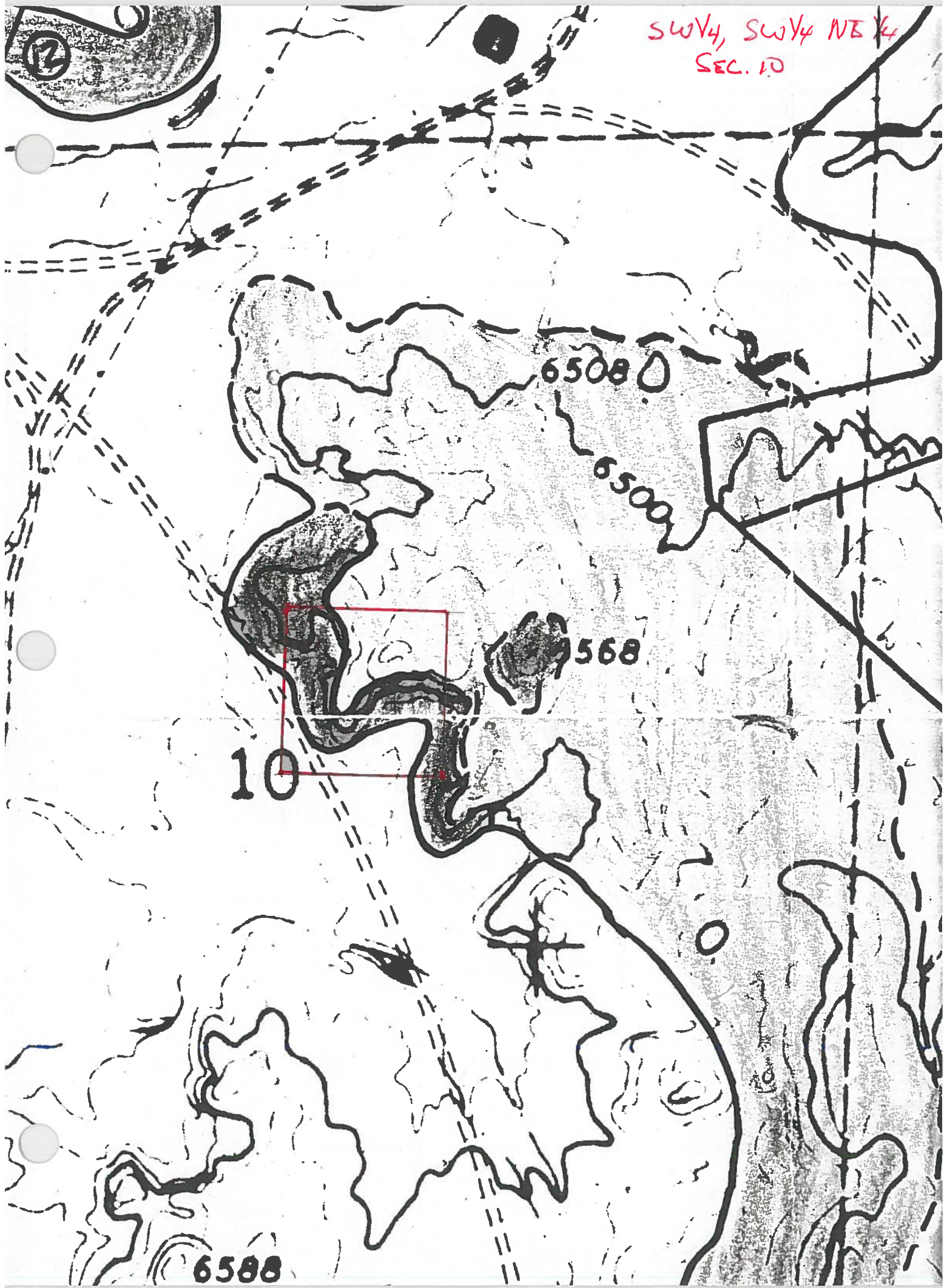
10

STAGING +
STOCK PILE AREA

Permit
area
and
area of
disturbance
D



SW 1/4, SW 1/4 NE 1/4
SEC. 10



10

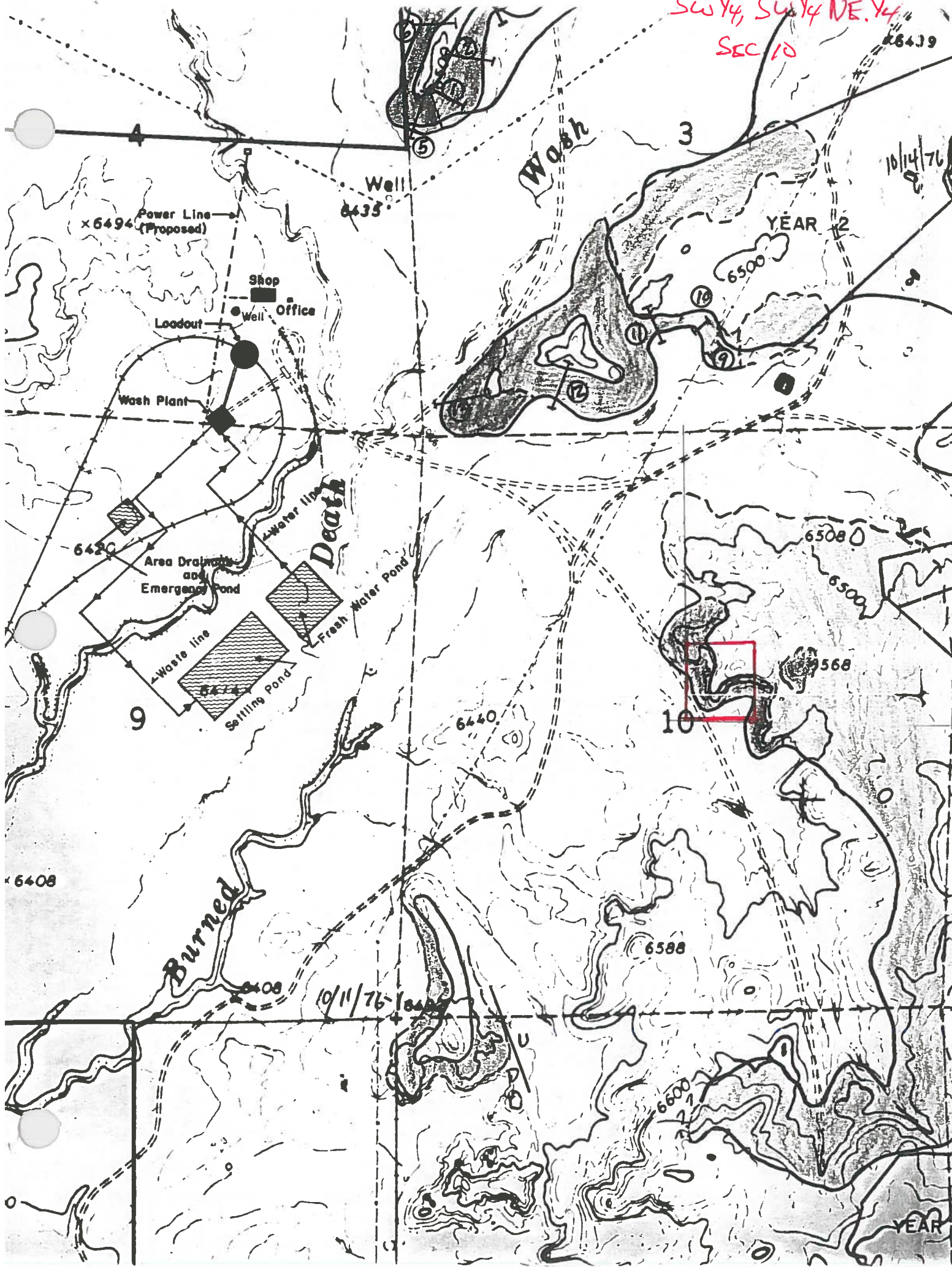
6508

6500

6568

6588

SW 1/4, SW 1/4 NE 1/4
SEC 10



6439

10/14/76

Well
6433

x6494
Power Line
(Proposed)

Shop
Office

Lodout
Well

Wash Plant

YEAR 2

6500

6420
Area Drains
and
Emergency Pond

Death

Water line
Fresh Water Pond

9

Waste line
6474
Sediment Pond

6440

10

6568

6508

6500

6408

Burned

6408

10/11/76

6588

6600

YEAR

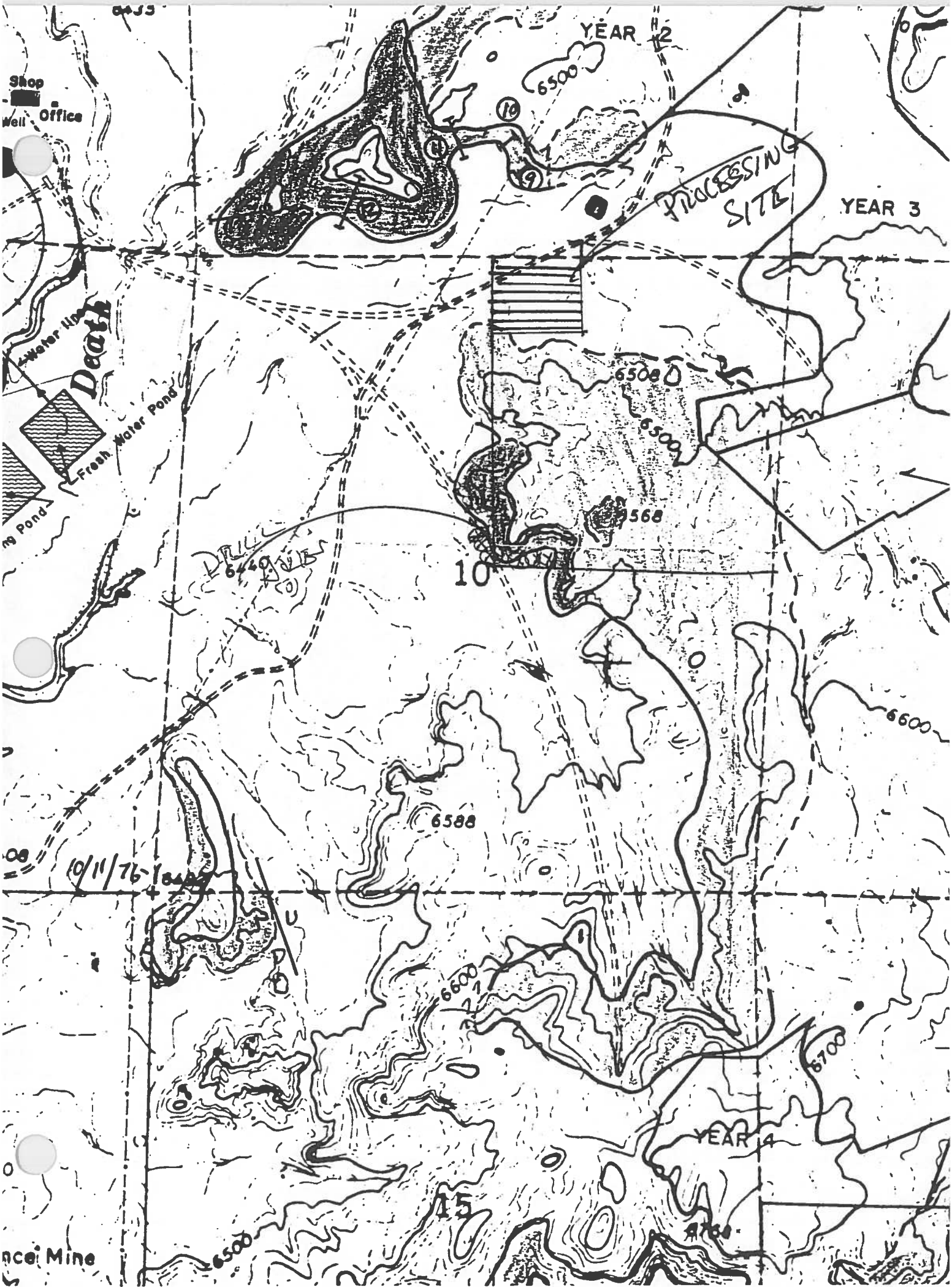
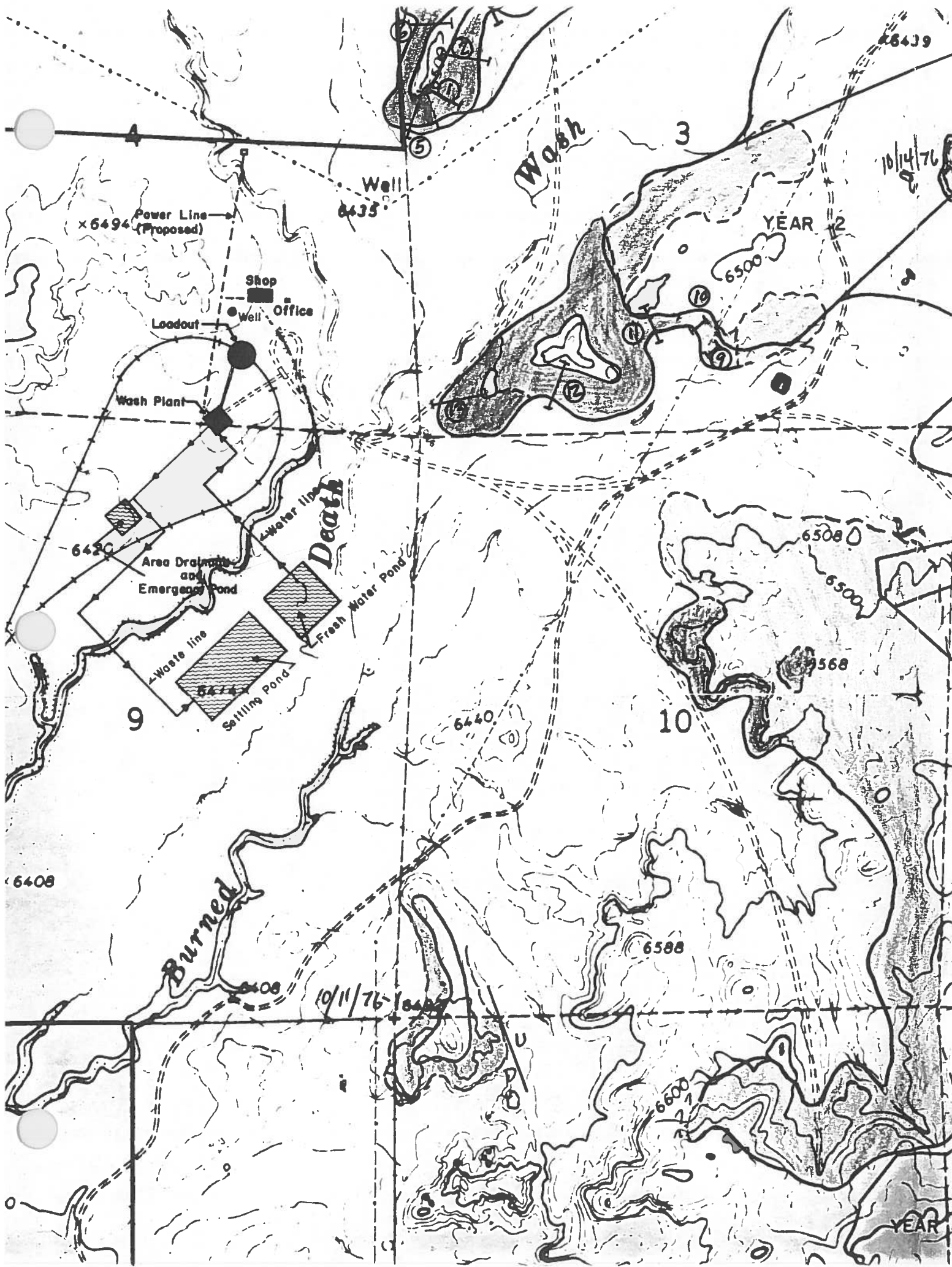


EXHIBIT 1

**DRILL HOLES WILL BE LIMITED TO
THE SOUTH $\frac{1}{2}$, SW $\frac{1}{4}$, SW $\frac{1}{4}$, NE $\frac{1}{4}$ OF SECTION 10,
T15N, R19W, BEING 5 ACRES OF REAL ESTATE AND NO MORE.**

**THE DRILL HOLES, NO MORE THAN 10 IN NUMBER, MAY BE
DRILLED 5 ON THE WESTERN MOST LINE OF THE SUBJECT PARCEL
AND 5 ON THE SOUTHERN MOST LINE OF THE SUBJECT PARCEL
GENERALLY EVENLY SPACED APPROXIMATELY 66 FEET APART, MORE
OR LESS, ON THE WESTERN BOUNDARY LINE AND 132 FEET APART,
MORE OR LESS, ON THE SOUTHERN BOUNDARY LINE.**



AFFIRMATION AND CERTIFICATION

The undersigned, the authorized representatives of **Gamerco Associates, Ltd.**, a New Mexico partnership, c/o Charles High, 300 West Hill Avenue, Gallup, New Mexico 87315 ("Lessor") and **Sundance Holdings, Inc.**, an Arizona corporation, 9100 Morning Glory, Paradise Valley, Arizona 85253 ("Lessee") do hereby affirm and certify as follows:

1. The attached Lease of Privately Owned Property dated May 13, 1997 by and between Gamerco Associates No. 1, Ltd., Lessor and Sundance Holdings, Inc., Lessee is the true, correct and complete document thereof.

2. The reference in the Lease to Gamerco Associates No. 1 Ltd. is hereby corrected to reflect the true name of Lessor as "**Gamerco Associates, Ltd.**"

3. Said Lease consists of pages 1 through 8, together with Exhibits attached thereto consisting of:

Exhibit A - Pages 9, 9A, 9B, 9C and 9D

Exhibit B - Page 10 and 10A

Exhibit C - Page 11

Exhibit D - Pages 12, 12A and 12B

4. Upon execution of this Affirmation and Certification, Charles High, authorized representative and partner of Lessor and Dennis Jones, President and authorized representative of Lessee shall individually initial each page of said Lease.

GAMERCO ASSOCIATES, LTD.,
a New Mexico partnership

By Charles High
Charles High

SUNDANCE HOLDINGS, INC.,
an Arizona corporation

By Dennis Jones President
Dennis Jones

State of Arizona)
) ss.
County of Maricopa)

Sworn to and subscribed before me this 27th day of May, 1997 by Dennis Jones,
President of Sundance Holdings, Inc.

J. Darlene Lundy
Notary Public

My Commission Expires:
December 25, 1999

State of New Mexico)
) ss.
County of McKinley)

Sworn to and subscribed before me this 26th day of May, 1997 by Charles High,
Partner of Gamarco Associates, Ltd.



OFFICIAL SEAL
ELIZABETH A. GOMEZ
NOTARY PUBLIC-STATE OF NEW MEXICO
My Commission Expires: 5/21/01

Elizabeth A. Gomez
Notary Public

My Commission Expires:
may 21, 2001

LEASE OF PRIVATELY OWNED LAND

THIS AGREEMENT is made and entered into this 13 day of ^{May}~~April~~, 1997 by and between **Gamerco Associates No. 1, Ltd.**, a New Mexico limited partnership, c/o Charles High, 300 West Hill Avenue, Gallup, New Mexico 87315 ("Lessor") and **Sundance Holdings, Inc.**, an Arizona corporation, 9100 Morning Glory, Paradise Valley, Arizona 85253 ("Lessee").

WHEREAS, Lessor is the fee owner of all the lands in McKinley County, New Mexico described on Exhibit A attached hereto (the "Property"); and

WHEREAS, the parties are desirous of an exclusive lease for the Property to explore, produce, extract and take out crop coal, inferior coal, which is generally unusable for heating purposes and which has a high concentration of humic, ulmic, and fulmic acids or their extracts (collectively "Humates").

NOW, THEREFORE, in consideration of the mutual covenants and agreements herein made and the rents to be paid hereunder, the parties hereby agree to the following:

1. Lease. Lessor hereby grants to Lessee through its agents, servants and third parties, the sole and exclusive right to explore for, produce, extract and take Humates from the Property for organic uses such as fertilizers, soil additives, industrial uses, farm uses, and all other lawful uses. Specifically excluded from this Lease and the grant to Lessee and reserved unto Lessor is all combustible coal and other minerals which are not Humates or humate compounds.

(a) In addition thereto, for the term of the Lease, Lessor hereby grants to Lessee, a lease of a five (5) acre pad at the railroad right-of-way and right to a siding ("Railroad Pad") for the transportation of the Humates by rail and transportation of other property by rail. This Railroad Pad shall be reasonably convenient to Lessee for its use. The location of this Railroad Pad shall be mutually agreed upon, all as set forth on Exhibit B attached hereto. Lessor shall not unreasonably withhold its approval for such Railroad Pad.

(b) Furthermore, Lessor hereby grants to Lessee, a lease of a ten (10) acre site for processing and crushing purposes ("Processing Site"). The location of the Processing Site shall be mutually agreed upon and shall be reasonably conveniently located for Lessee's uses, all as set forth on Exhibit C attached hereto. Lessor shall not unreasonably withhold its approval of the specific Processing Site.

(c) Over the term of this Lease or during any extension thereof, the Railroad Pad, the Processing Site and the Extraction Site may be relocated by Lessee. Lessee shall have the right to relocate the Railroad Pad, the Processing Site and Extraction Site to meet Lessee's reasonable requirements to more convenient locations. Lessee and Lessor shall cooperate in

connection with the relocation of the Railroad Pad, the Processing Site and Extraction Site. Provided further, that the parties shall jointly first obtain the approval of any tenant using the Railroad Pad and Lessor shall use its best efforts to obtain such approval for the initial Railroad Pad or any relocation thereof. Once the new Railroad Pad, Processing Site and Extraction Site are relocated, the Lessee shall restore the previous Railroad Pad, Processing Site or the Extraction Site, as the case may be, to as close to the original condition as is reasonably practical.

(d) Notwithstanding that the Lessee has exclusive lease rights to the whole of the Property, Lessee shall limit its humate operations to 160 acres of the Property at one time. This 160 acre parcels shall be identified by Lessee at the time of the execution of the Lease ("Extraction Site"), all as set forth in Exhibit "D" attached hereto. Lessee has identified two (2) separate 160 acre parcels: NE¼, Section 10, T15N, R19W ("Parcel One") and Parcel 2: SW¼, Section 3, T15N, R19W ("Parcel Two"). Within 180 days of the execution of this Lease, Lessee shall notify Lessor of its election to commence excavation operations either in Parcel One or Parcel Two. Upon such election, Lessee shall undertake its excavation operations in the parcel so elected.

2. **Grant.** Lessee shall have the right, through agents, servants and third parties, to construct, erect, maintain, operate, use, repair, replace telephone and power lines, tanks, machinery, appliances, buildings and other structures, useful, necessary or proper for carrying out its operations on the Property together with rights-of-way for passage over, upon and across, ingress and egress to and from the Property for any or all of the above-mentioned purposes. Lessee shall have the right to extract, use, retrieve, explore, investigate, take and remove Humates from the Property. Lessor reserves the right to occupy and use the Property for agricultural and horticultural purposes and coal mining purposes and other commercial and lawful uses subject to the rights of Lessee hereunder.

It is understood that the surface of the Property may be excavated, in whole or in part, in connection with the removal of the Humates from the Property. Lessee shall reclaim and restore the surface of the Property as is reasonably required and compatible with the nature and quality of the Property. Lessee's obligation to reclaim and restore the Property shall survive any cancellation, termination, avoidance, lapse or other end to the Lease and shall survive amendment of the Lease.

3. **Term.** Lessee shall have and hold the Property for the initial term of twenty (20) years from the date hereof in consideration of Lessee paying Lessor the rents and royalties hereinafter provided.

4. **Commencement.** Lessor understands that Lessee will not commence the use or occupancy of the Property until sometime in the future and the rental and royalty payments payable to Lessee hereunder shall commence only at the earlier of six (6) months from the date of this Agreement or the date that Lessee enters on the Property and commences regular use thereof for extraction, processing and loading of Humates. Provided, however, that Lessee's

traversal of the Property, inspection, testing or other investigations shall not constitute use and occupancy of the Property.

5. **Rent.** Lessee shall pay Lessor a minimum rent commencing on the rental commencement date as identified above in the amount of \$2,500 and thereafter on a regular and consecutive quarterly basis, \$2,500 for a minimum rental payment of \$10,000 for each lease year. The date of the rent payment shall be the commencement of the lease year.

6. **Royalty.** For the first 10 years, Lessee shall pay Lessor a royalty of \$1.00 per ton of Humates extracted from the Property, provided, however, that Lessee shall receive full credit for any quarterly minimum rent payments made by Lessee to Lessor. In short, Lessor shall receive a minimum rent under all circumstances of \$10,000 each lease year payable quarterly and Lessee shall receive a credit of all quarterly payments made to Lessor toward the royalty payment. During lease years 11 through 20, Lessee shall pay a royalty of \$1.50 per ton of Humates extracted from the Property, and during the renewal option term for years 21 through 30, Lessee shall pay Lessor a royalty of \$2.00 per ton of Humates extracted from the Property.

The obligation to pay a royalty payment shall accrue upon the crushing of the Humates and transportation of the Humates from the Property. The amount of royalty payment shall be first reduced by the cumulative total minimum rental payments. After the removal of more than 10,000 tons of Humate from the Property during a lease year, Lessee shall pay Lessor the applicable royalty payment no later than thirty (30) days after the last day of the calendar quarter in which 10,000 tons of Humates are extracted from the Property and removed from the Property. With the royalty payment, Lessee shall furnish Lessor a statement showing the amount of Humate removed from the Property. All royalty payments shall be based on actual weights and measurements.

7. **Books and Records.** Lessee shall maintain adequate books, records, plans and maps to enable Lessor to verify the payment of the royalty payments. Lessor or his designated representatives shall have the right upon reasonable prior request at all reasonable times during normal working hours to inspect all such books, records, plans and maps to verify Lessee's compliance with the royalty payments hereunder. In the event of any dispute as to the payment of royalties, Lessor shall have access to records made available by Lessee to any railroad which transports the Humates from the Property. Lessor will respect the confidentiality of all information made available to it and shall not disclose any such information without the prior written consent of Lessee except as necessary to disclose information to its attorney or account or in litigation for the sole purpose of enforcing Lessor's rights under this Lease.

8. **Method of Operation.** Lessee shall, within its sole good faith and discretion, determine the method of operation and removal of the Humates from the Property. Any and all operations on the Property shall, be conducted by Lessee in a good and commercially reasonable matter with the objective of producing as much Humate as can be reasonably and

economically produced from the Property consistent with good operations and commercial practices.

9. **Assignment.** The rights of either party hereunder may be assigned in whole or in part and the provisions hereof shall extend to their heirs, successors and assigns but no change or division in the ownership of the Property or rentals or royalties or other payments hereunder or the right to receive the same, however accomplished, shall operate to enlarge the obligations or diminish the rights of Lessee. No change or division in ownership or right to receive rentals, royalties or other payment hereunder shall be binding upon the Lessee for any purpose until thirty (30) days after Lessee shall have been furnished at Lessee's office first indicated above, a duly recorded instrument or instruments or certified copies thereof or other legal authenticated written evidence of such change of ownership satisfactory to Lessee. In the event of the death of any person entitled to payments hereunder or in the event of any dispute as to the recipient of the payments, Lessee may pay or tender such payments to a depository bank to the credit of all disputing parties including their estates until such time as Lessee is furnished satisfactory evidence and instruction regarding the rightful payee of the rental payments and royalties hereunder. If at any time two or more persons are entitled to participate in payments hereunder, Lessee may pay or tender such payments jointly to such persons for their joint credit in a depository designated herein; or, at Lessee's election, the proportionate part or parts to which any participant(s) may be entitled may be paid or tendered to such participant(s) separately, or to their separate credit in such depository. Any payment or tender to any participant or his portion, jointly or separately, shall maintain this Lease as to such participant.

10. **Title.** Lessor hereby warrants and agrees to defend title to said Property, to the extent of the interest to be covered by this Lease, and agrees that Lessee, at Lessee's option, may purchase or discharge in whole or in part, any tax, mortgage or other lien upon such Property and thereupon be subrogated to the rights of the holder thereof and may apply rentals and royalties payable hereunder toward satisfying the same or toward reimbursing Lessee. Lessor further agrees that the interest of Lessor is and at all times shall be and remain primarily liable for such lien indebtedness and that in an proceeding for the enforcement or collection thereof, the interest of Lessor shall first be subjected to the payment thereof.

11. **Default.** In the event that Lessee is in breach hereof, Lessor shall notify Lessee in writing of the fact relied upon as constituting a breach and Lessee, if in default, shall have sixty (60) days after receipt of such notice, in which to commence the compliance with the obligations imposed by virtue of this instrument. In the case of cancellation or termination of this Lease under the terms hereof, Lessee shall have the right to retain, under the terms hereof, all equipment, fixtures and operations being conducted by Lessee, on 100 acres of the Property thereof. Lessee may retain such existing roadways and other easements upon such cancellation or termination of the Lease as is necessary or convenient to Lessee's operations of the Property retained hereunder. Any default by Lessee of any obligation arising hereunder shall not cause a forfeiture or termination of this Lease or cause a termination or reversion of the interest hereby

created, or be grounds for cancellation hereof in whole or in part, save as herein expressly provided.

12. **Rights of Lessee.** Except as provided herein, Lessee shall the right at any time during or within twelve (12) months after the expiration and termination of this Lease to remove all property, buildings and fixtures placed by Lessee on said Property. Lessee shall have the right of ingress and egress over existing roads on or to the Property. Before constructing any roads, whether temporary or permanent, Lessee shall consult with and secure the approval of Lessor with respect to the location thereof, which approval shall not be unreasonably withheld. Any permanent road constructed by Lessee, on or to the Property and all existing roads on said Property or on Property owned by Lessor, used by Lessee in its operation, shall be maintained throughout the term of the Lease in such condition as is appropriate for Lessee. Lessee shall also install at its expense, cattle guards where necessary or required on both temporary and permanent roads which Lessee uses.

13. **Obligations of Lessee.** If Lessee enters upon the Property in connection with any of Lessee's operations, Lessee agrees to provide and maintain a gate at such point (to keep the gate locked and furnish Lessor a key, or combination) and to provide and maintain a road from said point to the entrance of Lessee's processing facility or Processing Site. Lessee agrees to enclose by fence, any machinery, buildings and equipment placed on the Property to prevent cattle and livestock from entering therein or thereto. Lessee shall compensate Lessor or other proper tenants using the Property as their respective interests may appear, for any and all damage to gates, fences, roads, water wells, irrigation canals, bridges, buildings or other improvements, livestock or cattle on said Property arising out of any negligence of Lessee, its agents and employees. Lessee shall comply with all applicable federal, state and local laws and regulations relating to its use and operation of the Property including particularly all federal and state environmental laws and regulations ("EPA Laws"). Further, Lessee shall indemnify and hold Lessor harmless from and against any claims, costs or damages arising out of Lessee's violation of such EPA Laws.

14. **Insurance.** Upon the commencement of the Lease payments, Lessee shall obtain and keep in full force and effect, general liability insurance in the amount of no less than \$1 million comprehensive general liability naming Lessor as an additional insured. A copy of the policy of insurance shall be provided to Lessor upon request.

15. **Worker's Compensation Insurance.** Lessee shall carry worker's compensation insurance for any and all persons employed upon, in or about the Property in connection with any of Lessee's operations thereon. Lessee agrees to comply with the laws of the State of New Mexico with respect to worker's compensation and occupational disease and to comply and abide by all federal and state regulations and all other applicable legislation or regulations now or subsequently applicable to the operation of the Property and Lessee agrees to make all payments, returns and reports required by such laws.

16. **Renewal.** If Lessee is not in default, then in such event, Lessee shall, at any time during the base term, have the right to extend the base term for an additional ten (10) year term on the same terms and conditions as herein provided.

17. **Taxes.** Lessee shall pay all taxes levied upon or assessed against its improvements, fixtures and personal property on the Property including machinery and any products stored thereon.

18. **No Liens.** Lessee, at its own cost and expense, shall pay for all labor performed and materials furnished in the operations of Lessee hereunder and Lessor shall not be chargeable with or liable for any part thereof. Lessee shall protect the Property from liens of any character arising from its operations. Lessor, at all reasonable times, may inspect the Property and the work done and in progress thereon and the production thereon. Lessor may also examine the books kept by Lessee in relationship to the amount and character of the production of the Property and the disposition thereof.

19. **Default in Rent Payment.** If Lessee shall fail to promptly pay any installment of royalty or minimum rent and if such default shall continue for a period of fifteen (15) days after written demand, then at the option of Lessor, this Lease may be terminated, provided, however, that if there be a bona fide dispute as to the amount due and all undisputed amounts are paid, said fifteen (15) day period shall be extended until ten (10) days after such dispute is resolved by arbitration or mutual agreement.

20. **Termination of Lease.** Upon the expiration or sooner termination of this Lease, Lessee shall quietly and peacefully surrender possession to Lessor and deliver to Lessor or file of record a quit claim deed if so requested by Lessor.

21. **Sublease.** Lessor understands that an affiliated or related enterprise of Lessee may be conducting the processing and extraction of the Humates from the Property. Accordingly, Lessee shall have the right to sublease its rights hereunder provided, however, any sublease shall incorporate this Lease as a master lease and the sub-Lessee shall be responsible for all terms and conditions of the master Lease and fully have the same carried out.

22. **Notices.** Formal notices, demands and communications between Lessor and Lessee shall be sufficiently given if personally delivered or dispatched by certified mail, postage prepaid, return receipt requested to the principal offices of Lessor and Lessee or if delivered by confirmed fax addressed to each party as follows:

As to Lessor:

Gamerco Associates No. 1, Ltd.
c/o Charles High
300 West Hill Avenue
Gallup, New Mexico 87315
-and-

Phil Ingram
7410 Montgomery
Albuquerque, New Mexico 87109

As to Lessee: Sundance Holdings, Inc.
9100 Morning Glory
Paradise Valley, Arizona 85253

Said notices, demands and communications may be sent in the same manner to such other addresses either party may from time to time designate as provided in this section. For purposes of this section, personal delivery shall include actual receipt of a delivery by a commercial courier or telephone facsimile transmission.

23. **Disputes.** If any good faith disputes arises out of, or in connection with any default or alleged default, the dispute shall be submitted to final and binding arbitration. Either party may submit the dispute to binding arbitration by giving the other party written notice demanding written notice of demanding arbitration of the dispute, identify the issue or issues to be arbitrated and the appointment of an arbitrator. The receiving party, by written notice to the party requesting the arbitration, shall nominate its arbitrator. The two arbitrators shall nominate a third arbitrator who shall be independent of any affiliation or interest with any of the parties hereto. Within ten (10) business days of the selection of the third arbitrator, the arbitrators shall commence a hearing at a suitable location in Gallup, New Mexico or Albuquerque, New Mexico as it deems appropriate on the arbitration issue and complete such hearing within three (3) consecutive business days thereafter. The parties shall have the right to submit evidence with the privilege of cross-examination, presentation of arguments, presentation of witness testimony and documentary evidence. Except as otherwise provided herein the arbitration shall be conducted in connection with the Commercial Arbitration Rules of the American Arbitration Association. All fees and costs of the arbitration shall be paid as determined by the arbitrator. Within five (5) days after the hearing, the arbitrator shall issue a determination in writing on the question in issue and shall give written notice to the parties. The arbitration award shall be final and binding and enforceable in any court of competent jurisdiction.

24. **Assignment.** Lessee shall have the right to assign or transfer this Lease in whole or in part provided, however, that the full amount of the minimum rental and the royalties are paid to Lessor.

25. **Termination.** Termination of Lease by Lessee. In the event that Lessee determines that it is no longer commercially viable to extract Humates from the Property, then in such event, Lessee shall give Lessor a minimum of six (6) months' notice of the lack of economic viability of further commercial processing and after such six (6) month period, this Lease shall be terminated without either party having any further obligations to the other.

26. **Reclamation.** Upon any termination of this Lease, Lessee hereby agrees to reclaim the Property as close to the original condition as reasonably feasible and practical given the circumstance, terrain and nature of the Property. This reclamation shall be undertaken at Lessee's cost and expense.

27. **Counterparts.** This Lease may be executed in any number of counterparts, and all such counterparts shall be deemed to constitute a single lease and the execution of one counterpart by Lessor shall have the same force and effect as if he had signed all other counterparts. This Lease and any disputes under this Lease shall be governed by the laws of New Mexico.

IN WITNESS WHEREOF, the parties hereto have executed this Lease this 13 day of May, 1997.

GAMERCO ASSOCIATES NO. 1, LTD.,
a New Mexico partnership

By Charles M. H.

By Loren H. Head

By _____

SUNDANCE HOLDINGS, INC.,
an Arizona corporation

By [Signature]

EXHIBIT "A"

**DESCRIPTION OF PROPERTY
(McKinley County, New Mexico)**

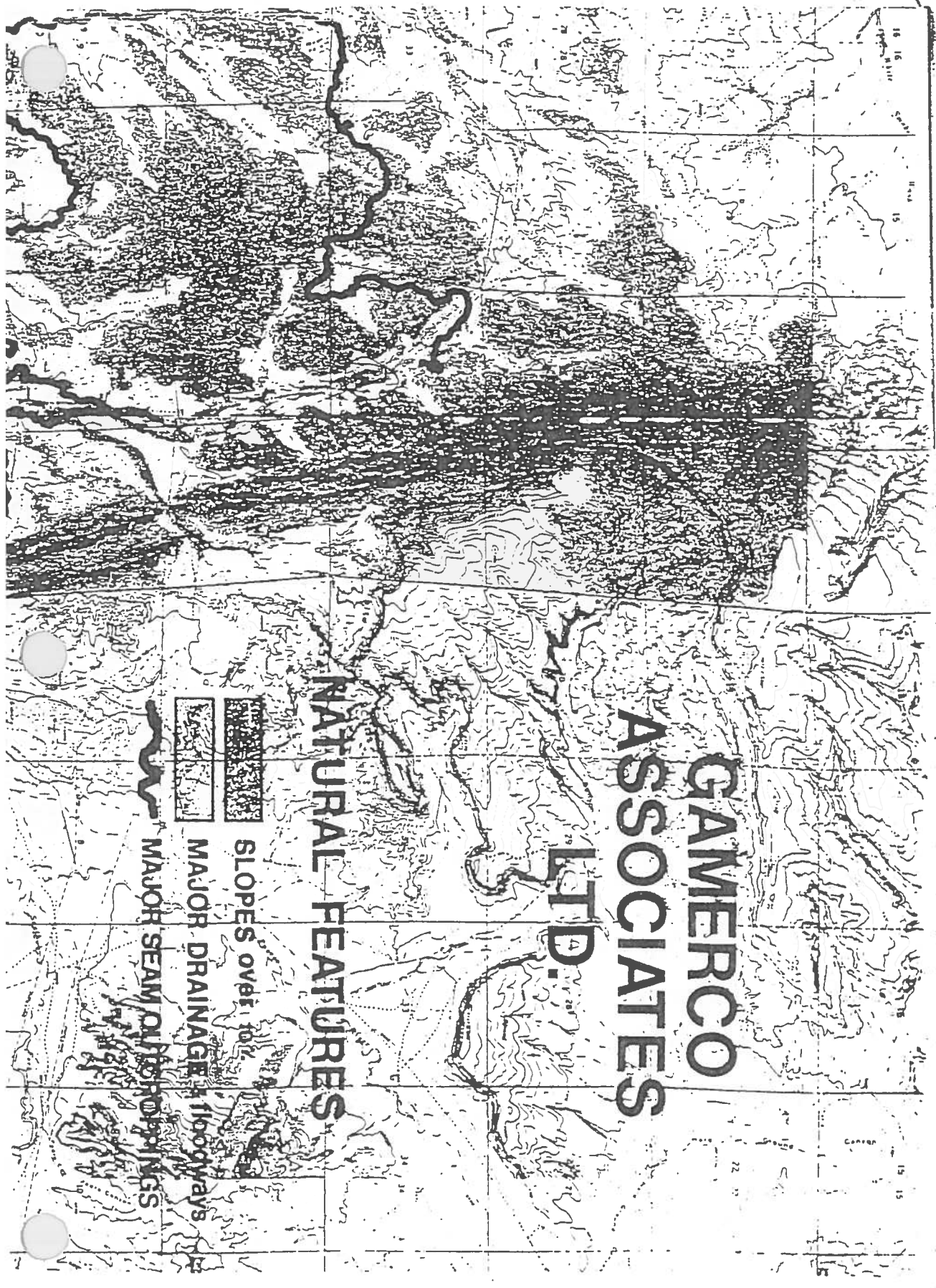
Section Nos.

Township

Range

SEE Gamerco Associates, Ltd. map of property holdings in McKinley County by
Chambers - Campbell, Isaacson - Champlan. (Non-residential only.)






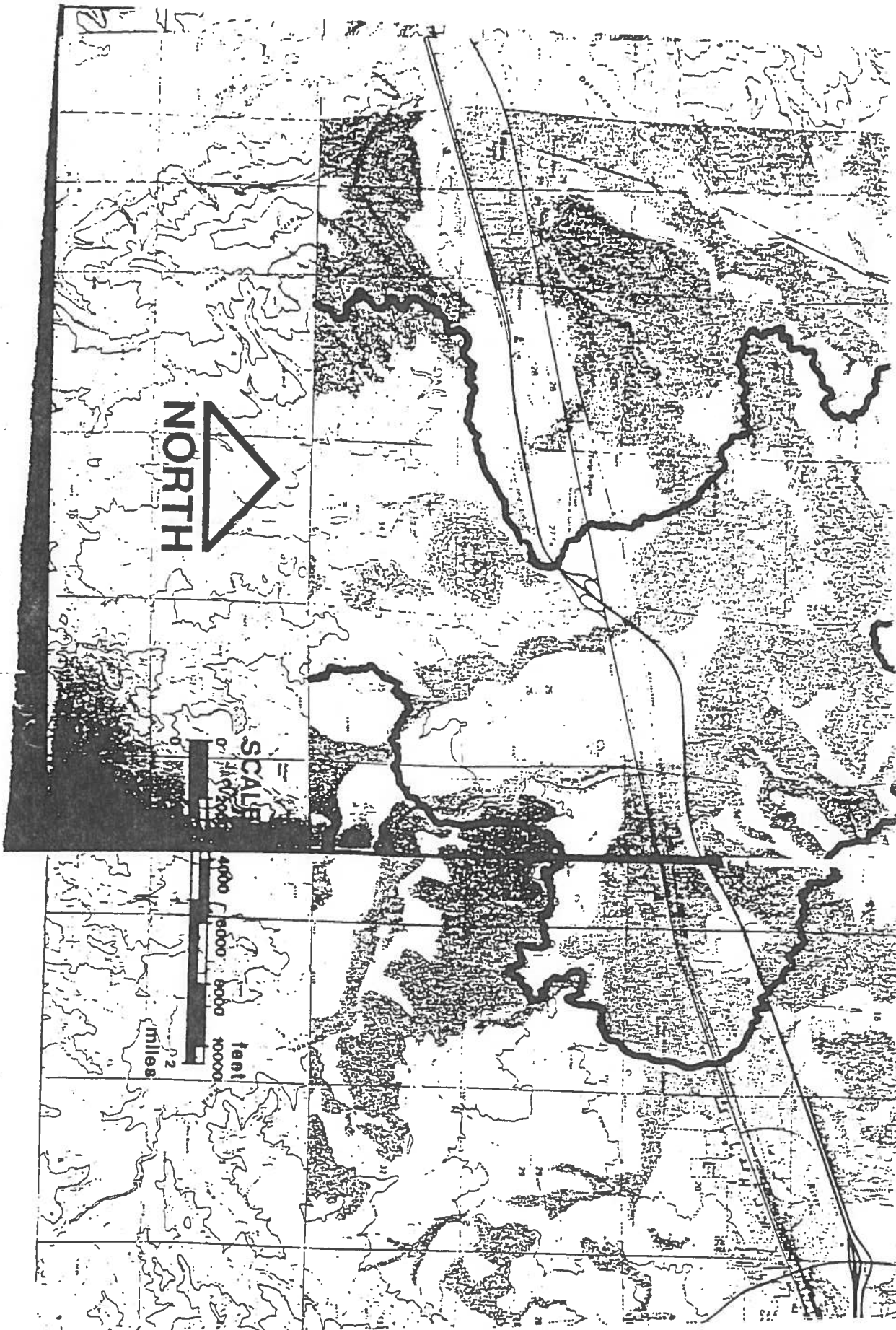


GAMERCO ASSOCIATES

LTD.

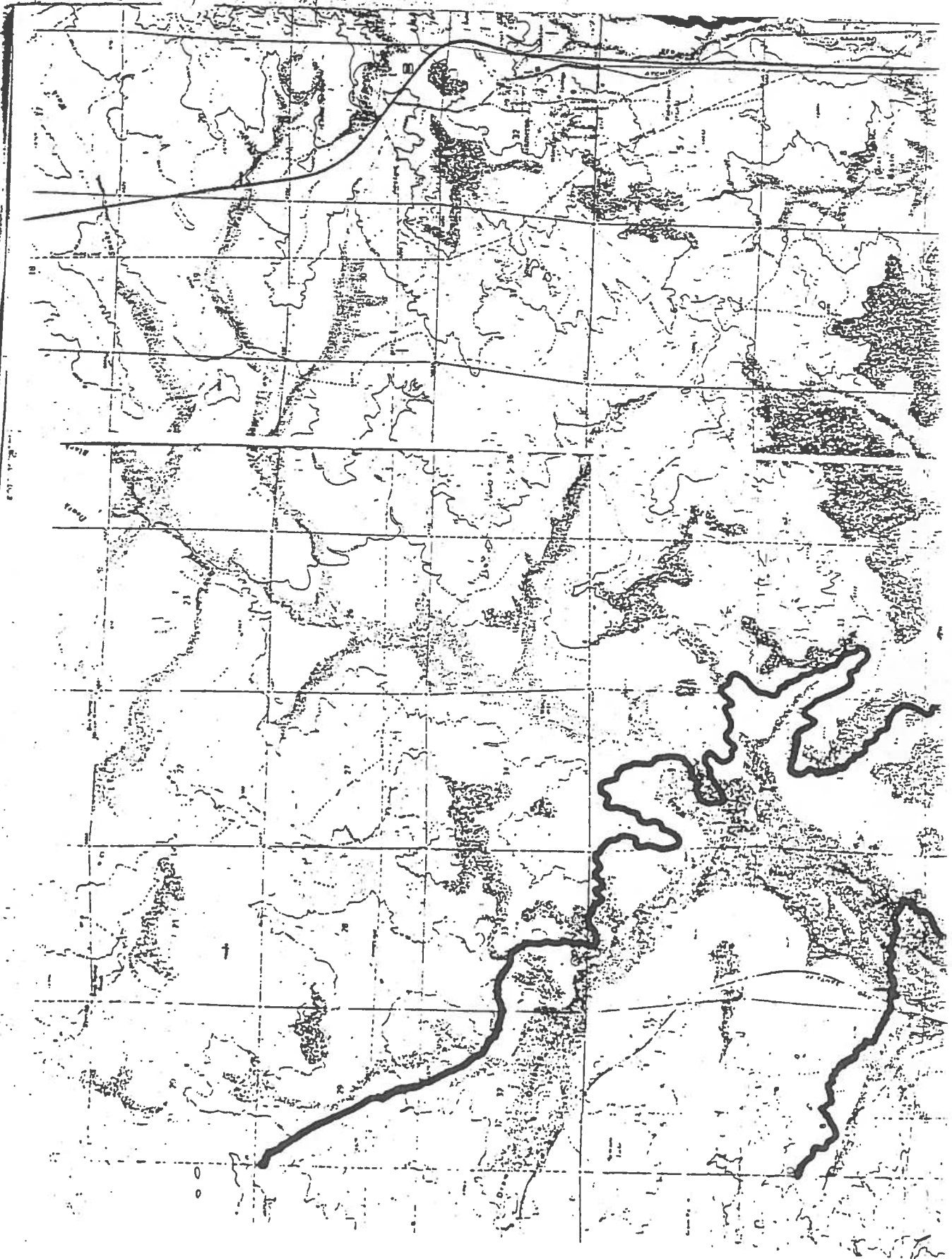
NATURAL FEATURES

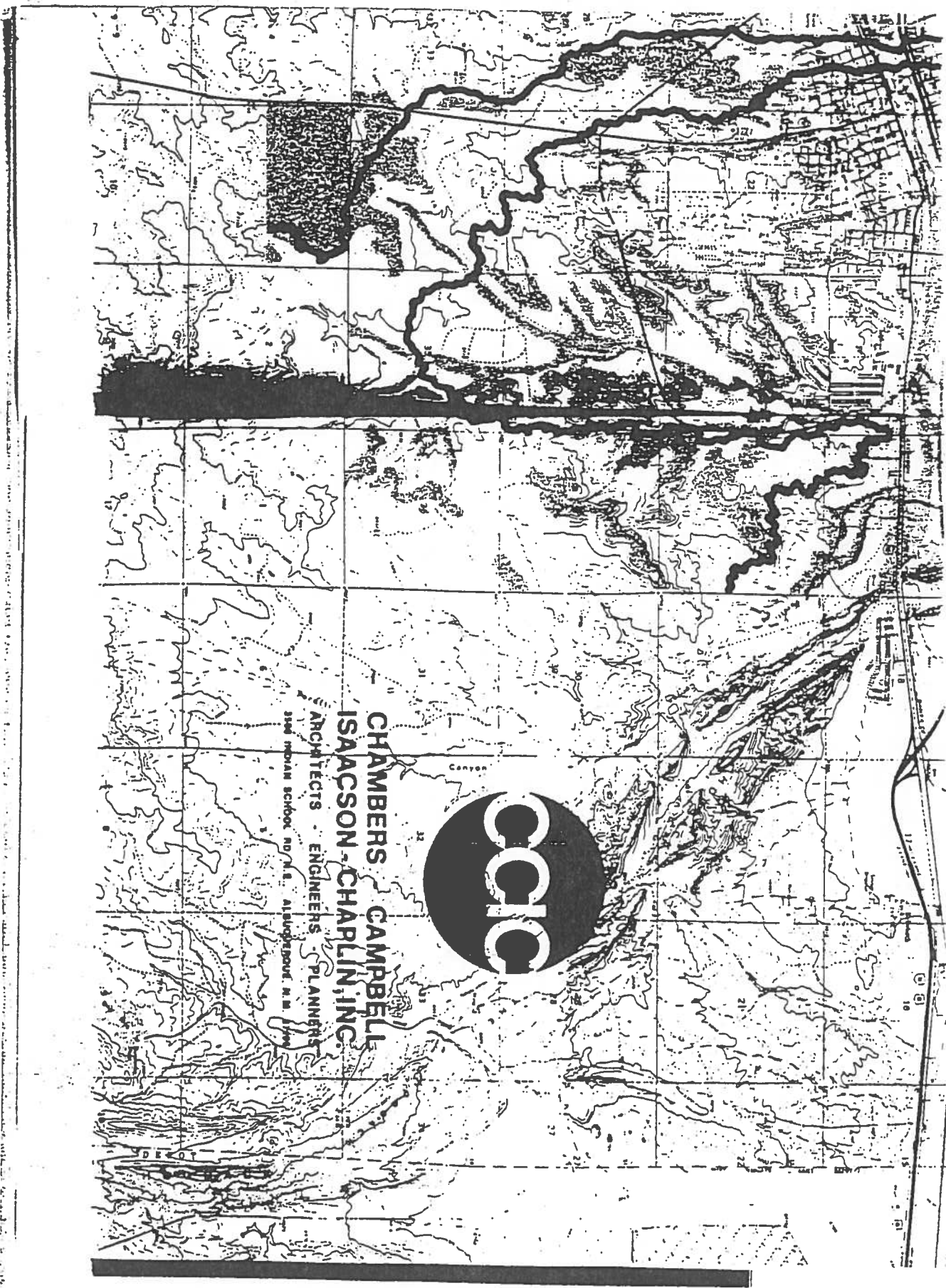
-  SLOPES over 10%
-  MAJOR DRAINAGE & floodways
-  MAJOR SEAM OR FOLD ZONINGS



NORTH







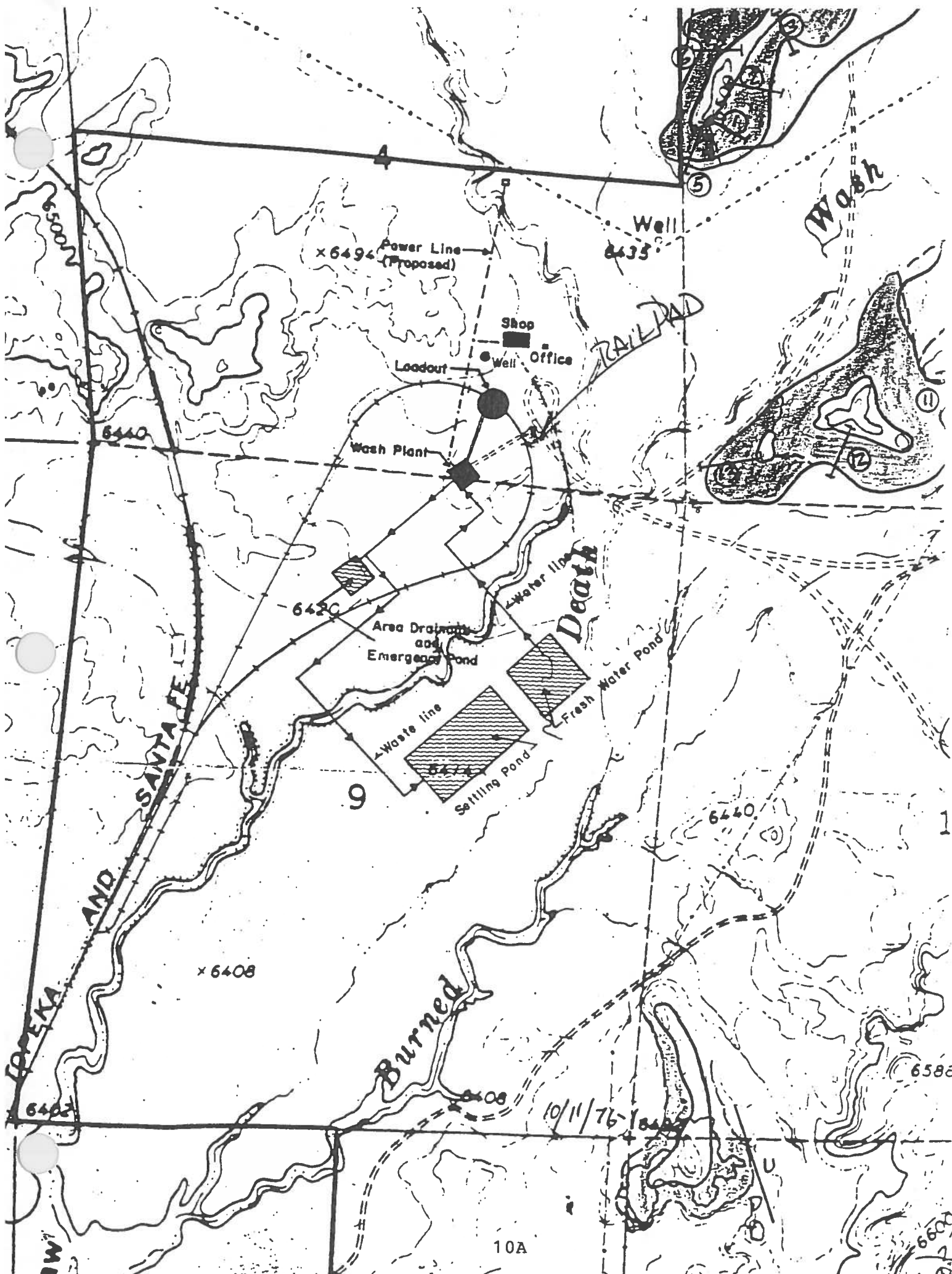
**CHAMBERS CAMPBELL
ISAACSON-CHARLIN, INC.**

ARCHITECTS · ENGINEERS · PLANNERS
3300 IRVING SCHOOL RD N.E. ALBUQUERQUE, N.M. 87110

EXHIBIT "B"

LOCATION OF RAILROAD PAD

Five (5) Acres: SW $\frac{1}{4}$, Section 4, T15N, R19W



x 6494 Power Line (Proposed)

Well 6435

Shop Office

Loadout

Wash Plant

RAILROAD

Wash

642C Area Drains and Emergency Pond

Water line

Death

Waste line

Fresh Water Pond

6474 Settling Pond

9

6440

x 6408

Burned

6408

10/11/76

6462

6586

10A

6602

EXHIBIT "C"

LOCATION OF PROCESSING SITE

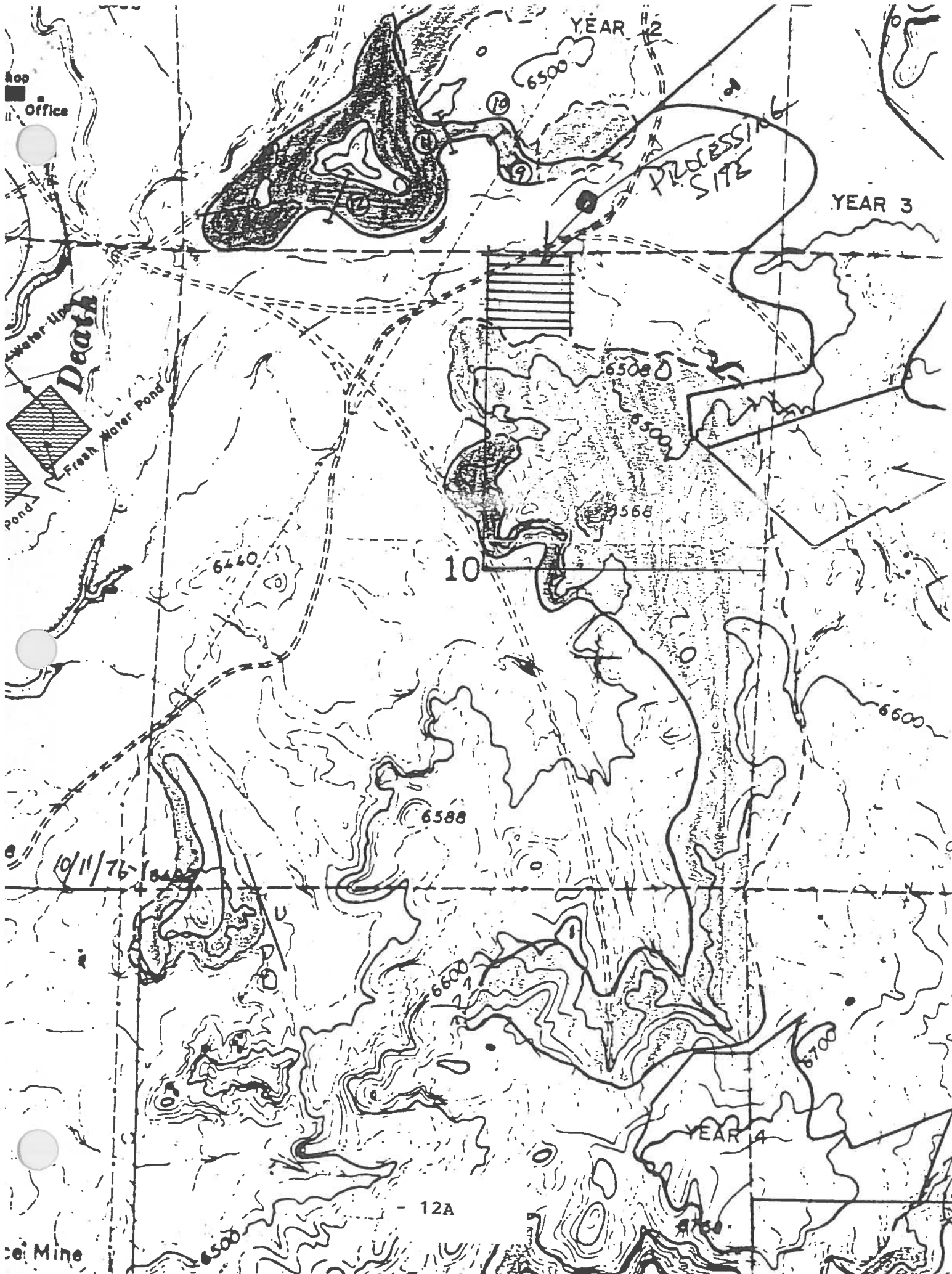
Ten (10) Acres: NW¼, NW¼ of the NE¼, Section 10, T15N, R19W

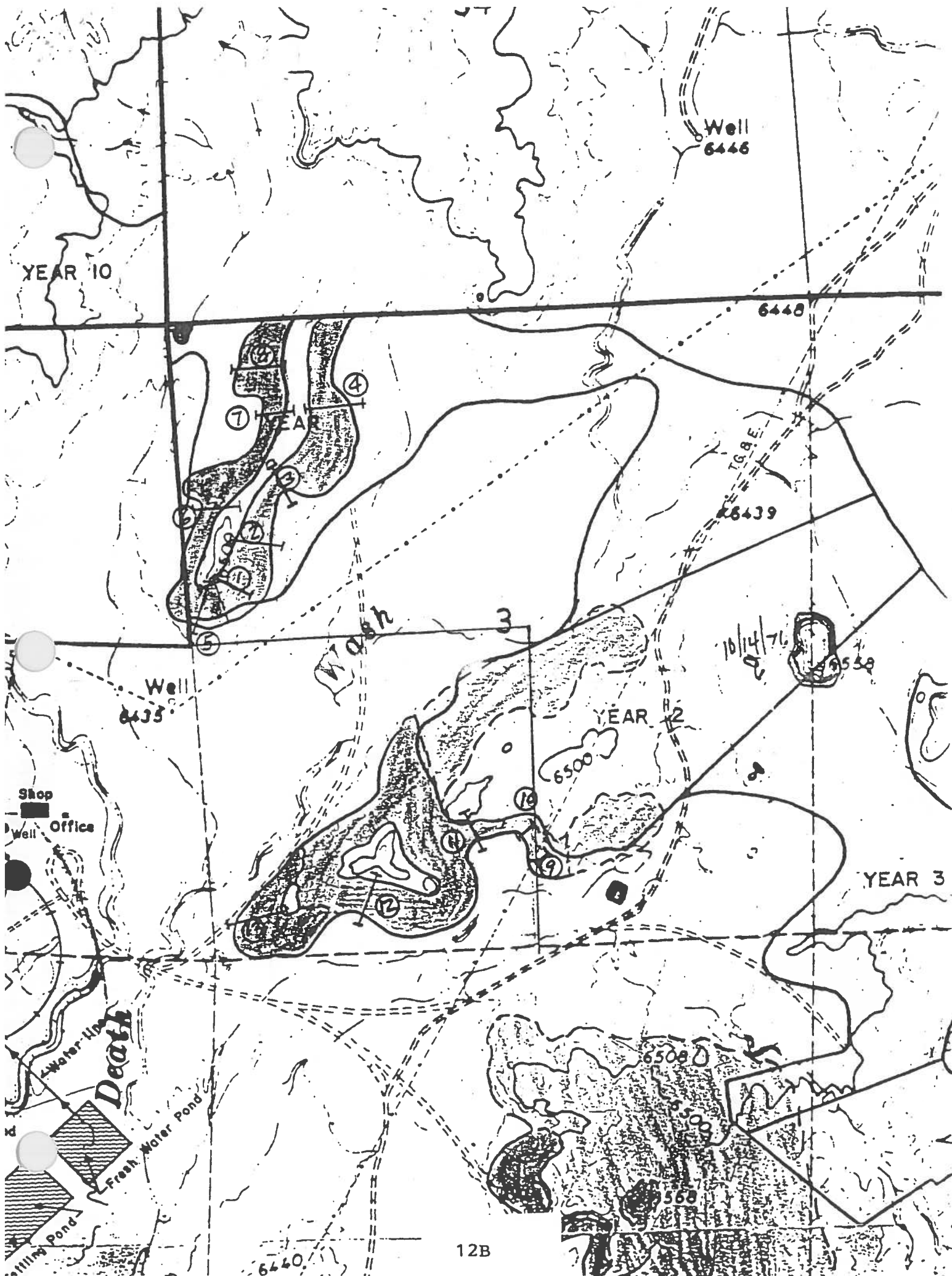
EXHIBIT "D"

LOCATION OF EXTRACTION SITE

Parcel One: 160 Acres, NE¼, Section 10, T15N, R19W

Parcel Two: 160 Acres, SW¼, Section 3, T15N, R19W





YEAR 10

Well 6446

6448

⑦
④
③
②
①

T.G. & E.
6439

Well 6435

10/14/76
6538

Shop
Office

YEAR 2

YEAR 3

6500

6508

Water-Up
Death

Fresh Water Pond

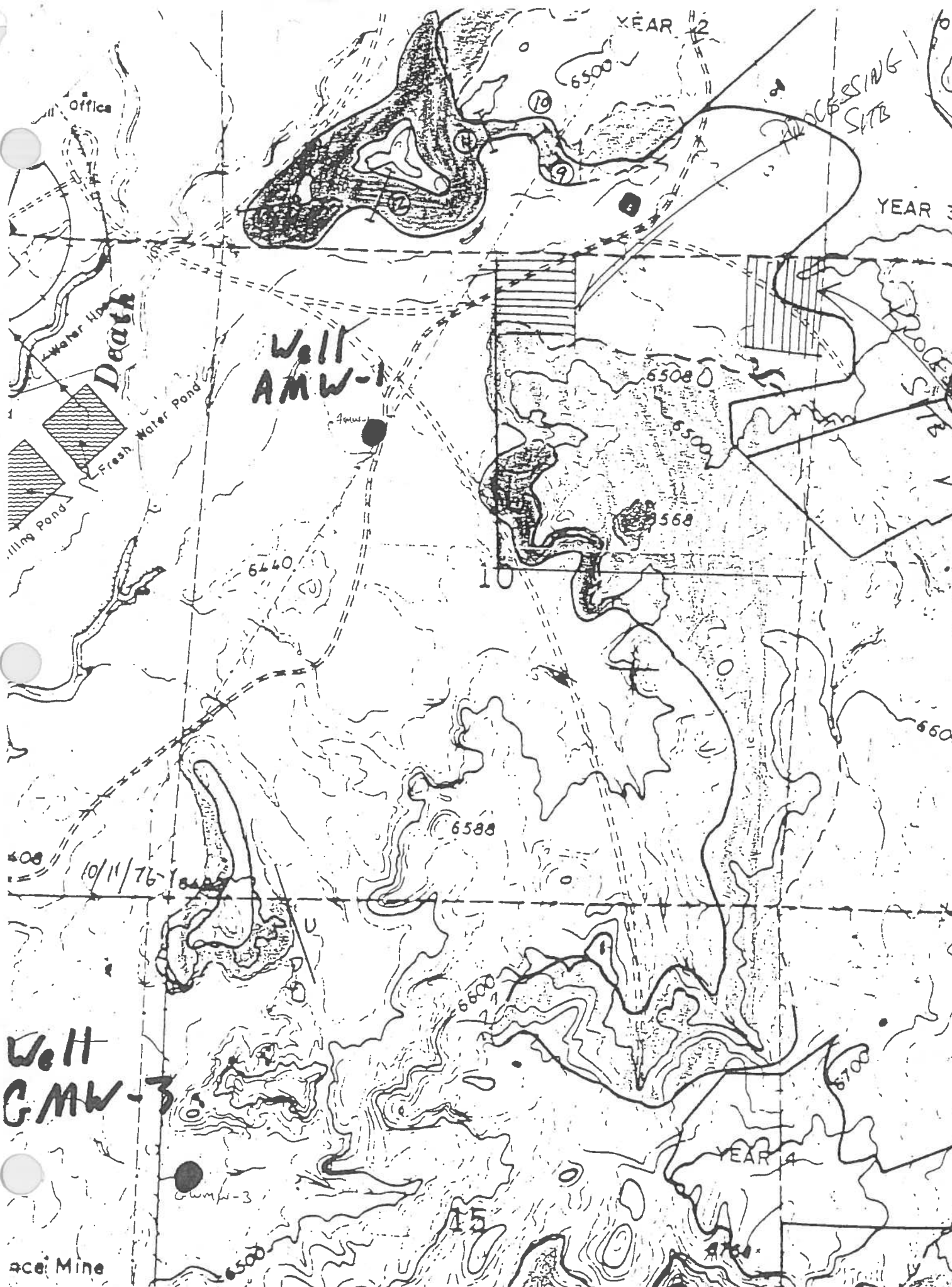
Milling Pond

5568

6440

12B

<u>Well</u>	<u>Depth to Water</u>	<u>TDS</u>
AMW-1	26' (1994)	
GW MW-3	100' (approx)	550
SW/4, SW/4, Sec 35 GWN S-2	107'	480



From Permit Application, Carbon Coal Company
Mentmore Mine

SURFACE MANIPULATIONS AND EROSION CONTROL PRACTICES

Carbon Coal utilized a variety of erosion and conservation practices on every reclaimed area. Mulching and disking were utilized as standard practices, however numerous other water harvesting and erosion prevention techniques were used successfully.

MULCHING

A mulching material was applied on all areas that were reclaimed. The mulch was native grass hay. The hay was clean, unweathered, long-stemmed and relatively free of viable weed seeds. Mulching materials were applied to all other seeded areas immediately after seeding to provide surface litter for moisture retention and to reduce erosion during plant establishment. The rate of application has been and will continue to be at least two tons per acre with the mulch being disc crimped to hold it in place.

SEEDING MIXTURES

The seeding mixtures used were based upon several considerations. Native species were used and a comparable blend of warm and cool season species seeded. Purity and germination rates of a given species are taken into account as well as past successes or failures of each species.

The success of one species as compared to others in terms of frequency, density, cover and production varies widely over the range of environmental conditions present on reclaimed areas. Factors that limit the use of a species include slope, aspect and gradient, edaphic conditions, and the range of climatic factors including precipitation, the limiting factor. At the Mentmore Mine, the use of a broad range seeding mixture (Tables 6 & 7) is essential to insure a successful reclamation program.

The following plant species have met with at least moderate success on reclaimed areas; Western, Thickspike and Tall Wheatgrass, Indian Ricegrass, Blue Grama, Yellow Sweetclover and Fourwing Saltbush. All of these are native except the Tall Wheatgrass and Sweetclover which have been eliminated from the standard seed mixture. The remaining species have exhibited their adaptability to the Mentmore reclaimed areas and were used. Depending upon seed availability, quality and costs, Carbon Coal has varied the seed mixtures to obtain the best blend for a given year.

The prudent approach to insuring revegetation success is to concentrate on those species that have proven successful and to continue experimentation with other native species that have yet to be evaluated.

In 1994 Carbon Coal, Rocky Mountain Reclamation and MMD made the decision, after evaluating the revegetative success of the reclaimed areas, to develop a more specialized mixture. This mixture of native seeds was used on sandy areas where the vegetation was spotty and consisted mostly of Indian Ricegrass, which was thriving. It was our finding that we should interseed existing stands of Indian Ricegrass with the specialized mixtures listed in Table 7 on page 21.

TABLE 7
1994 SEED MIXTURES (K)

SCIENTIFIC NAME	COMMON NAME	VARIETY	P.L.S #/AC
DRILL MIXTURE: SANDY SOIL INTERSEED MIXTURE*			
<i>Stipa comata</i>	needle and thread grass	Southwest regional collection	3.0
<i>Hilaria jamesii</i>	galleta grass	Viva	1.0
<i>Atriplex canescens</i>	fourwing saltbush	New Mexico or SW collection	1.5
<i>Bouteloua curtipendula</i>	sideoats grama	Vaughn	1.5
<i>Agropyron smithii</i>	western wheatgrass	Arriba	3.0
			9.0
BROADCAST MIXTURE: SANDY SOIL INTERSEED MIXTURE*			
<i>Hilaria jamesii</i>	galleta grass	Viva	0.5
<i>Sporobolus cryptandrus</i>	sand dropseed	SW regional collection	0.5
<i>Ceratoides lanata</i>	common winterfat	SW regional collection	1.0
Forb mixture	(forb mixture attached)	(see attached)	0.35
*to be interseeded into existing stands of indian ricegrass			2.35
REGULAR MIXTURE			
DRILL MIXTURE			
<i>Agropyron smithii</i>	western wheatgrass	Arriba	3.0
<i>Oryzopsis hymenoides</i>	indian ricegrass	Paloma	2.5
<i>Stipa comata</i>	needle and thread grass		1.0
<i>Bouteloua gracilis</i>	blue grama	Vaughn	1.5
<i>Hilaria jamesii</i>	galleta grass	Viva	1.0
<i>Atriplex canescens</i>	fourwing saltbush		1.5
<i>Atriplex confertifolia</i>	shadescale saltbush		1.5
<i>Festuca arizonica</i>	arizona fescue	Redondo	0.5
			13.5
BROADCAST MIXTURE			
<i>Hilaria jamesii</i>	galleta grass	Viva	0.5
<i>Sporobolus airoides</i>	alkali sacaton	SW regional collection	0.3
<i>Sporobolus cryptandrus</i>	sand dropseed	SW Regional collection	0.3
<i>Ceratoides lanata</i>	common winterfat	SW Regional collection	1.0
Forb Mixture (attached)	(Forb Mixture attached)	(see attached)	0.35
			2.45
FORB MIXTURE			
<i>Aster tanacetifolius</i>	prarie aster		0.05
<i>Gaillardia aristata</i>	blanket flower		0.05
<i>Linum lewisii</i>	lewis blue flax	Appar	0.05
<i>Penstemon palmerii</i>	palmer penstemon		0.025
<i>Petalostemum purpureum</i>	purple prarie clover		0.025
<i>Penstemon strictus</i>	rocky mountain penstemon		0.05
<i>Ratibida columnaris</i>	yellow prarie coneflower		0.05
<i>Sphaeralcea grossulifolia</i>	gooseberry leaf globemallow		0.025
			0.35

This mixture was broadcast seeded by use of a tractor mounted broadcast seeder. Because these species have either many small seeds or large bulky seeds, their compatibility with the drill seeded mixtures was questionable.

The mixture was seeded just prior to mulching. In this manner, most of the seed will be lightly covered in the crimping process. This method, coupled with the standard seeding methods have created a mosaic of vegetation types and provide seed sources for a variety of species.

Although forb species are not evaluated in revegetation success, it is Carbon's intent to supplement the overall diversity by continuing to plant and experiment with a wide variety of native species.

SEEDING METHODS

The standard method of planting was with a rangeland drill. Seed was drilled at specified rates along the contour at 1/4 to 1/2 of an inch. The seed was then covered to insure good soil contact.

The standard time frames for revegetation varied slightly depending on climatic factors, however, the following time table was generally used.

June 1 -August 15 - All areas were seeded utilizing the standard methods detailed within this plan.

Other facilities such as ponds, reclaimed roads and unused storage areas were seeded with the standard mixture.

The pure live seed estimate table gives estimates on a per pound basis for all species mentioned. This data facilitates ease of review and provided justification for the seeding rates used.

REVEGETATION SUCCESS AND MEASUREMENT TECHNIQUES

In 1981, Carbon initiated a seven year historical record vegetation data collection program on the Mentmore Mine permit area (pursuant to Section 20-116 of the State of New Mexico, Rule 80-1) from which a standard to evaluate the success of revegetation on reclaimed areas could be developed. Four years of cover, production, and shrub density data were collected under this program. However, as the result of a detailed analysis of this yearly data (Mariah, 1985) it was concluded that sampling design and methodology for the first three years of the program were both statistically incorrect and inconsistent from year to year. In addition, it was found that there were significant data gaps, in the program's first three annual reports. These data gaps, combined with the incorrect and inconsistent data collection methodologies left Carbon with only one year (1984) of useable historical record data.

In consideration of these problems and in consultation with Mr. Bob Sivinski of the New Mexico Mining and Minerals Division (MMD), it was concluded that two options were available to Carbon to fulfill its Rule 80-1 obligation to develop a revegetation success standard:

- Continue with the historical record program, using 1984 as the first year in a seven year program which would end in 1990.
- Develop a technical standard for the evaluation of revegetation success (pursuant to Section 20-116 of Rule 80-1) using published data (e.g., Soil Conservation Service range site data) and collected vegetation data from the Mentmore Mine area.