

Considered: *

WATER PERMIT NO. 1437-1

HAP No. same

Name of Applicant Wharf Resources

Post Office Address PO Box 446, Deadwood SD 57732

Amount of Water Claimed 26.5 ac-ft storage capacity Total Acres NA
sedimentation pond

Source of Water Supply dry draw - Ross Valley

Water to be used for industrial use County Lawrence

About 5 miles W of Lead

PROOF OF PUBLICATION: Received Not Received

APPLICATION: Approved Subject to

F.F. & C.L. Adopted Not Approved Deferred

PRIORITY Date Received Apr. 4, 1988 Fee \$150⁰⁰ Remarks

Corrected Application Received Period of Annual Use Jan - Dec 31

WATER QUALITY APPROVAL RECEIVED APPROVED/CONDITIONAL (Circle one)

WI-1 Description same as Application YES NO REMARKS

Diversion Point Sedimentation pond: near center of
the NW $\frac{1}{4}$ section 3-T4N-R2E

~~Land to be Irrigated~~ Contingency pond: SE $\frac{1}{4}$ SW $\frac{1}{4}$
section 33-T5N-R2E

		contingency pond		
				sedimentation pond

Well Log: Driller NA Licensed YES NO

Depth of Well REMARKS

Type of Map topo PREPARED BY John M. Arleth Reviewed and the Number
assigned on April 8, 1988 By Ron Duvall

Mail to: Water Rights Div.
DWNR, Foss Bldg.
Pierre, SD 57501
(605) 773-3352

No. 1437-1 Hydrologic Unit 10120203
Map No. 1437-1 Basin Belle Fourche River
Newspaper Lead Daily Call

Application For Permit To Appropriate Water Within The State Of South Dakota

Check use of water: Industrial ☒ Commercial ☐ Municipal ☐ Other Common Distribution System ☐
Rural Water System ☐ Suburban Housing ☐ Geothermal Heat ☐ Institutional ☐ Recreational ☐
Domestic ☐ (above 18gpm) Other ☐

Type of Application: Check one or more of the following

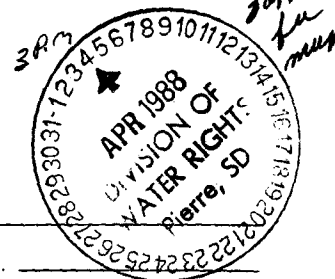
New ☒ Vested Right ☐ Future Use ☐ Change Use ☐

☐ Amend Permit No. _____ with old priority date retained

Change diversion point(s) ☐ Add diversion point(s) ☐ Other ☐

☐ Application to: Change diversion point(s) ☐ Add diversion point(s) ☐ on Permit No. _____

☐ Construction to use water reserved by Future Use Permit No. _____



1. Name of Applicant Wharf Resources Phone No. 584-1441

Post Office Address P. O. Box 446 Deadwood State SD 57732
(Street, RR or Box) (City) Zip Code

2. Amount of water claimed (c.f.s.) 26.5 acre feet (maximum storage capacity) sedimentation dam

3. Source of water supply Storm runoff from dry draw Ross Valley

4. Location of point of diversion SE $\frac{1}{4}$ NW $\frac{1}{4}$ Section 3, Township 4N, Range 2E,
B.H.M., Lawrence County, South Dakota (near center of NW $\frac{1}{4}$)

County Lawrence

5. Counties where water will be used Lawrence County

6. Annual period during which water is to be used Seasonal, spring runoff and precipitation events January 1 - December 31

7. Give a brief description of proposed project. When available include any preliminary engineering report or other reports or information that will help explain the project. (Attach sheet if more space is needed)
Pond is to minimize surface runoff from areas disturbed by mine operations and protect other surface water resources from increased sedimentation. Reference previous plans and specifications dated June, 1984, attached revised plans and specifications, narrative description (attached), and Load/Unload state mining permit amendment on file with DWNR.

Attachments: Attach Form 2A if diversion from a well or dugout, or if storage of water, is proposed. Attach map (see instruction)

STATE OF SOUTH DAKOTA)
County of Lawrence)^{ss}

I, Luther J. Russell, Director, Environmental/Governmental/ Affairs for Wharf Resources, the applicant, certify that I have read this application, have examined the attached map and that the matters stated are true and that I intend, and am able to complete the necessary construction.

Signed [Signature]

Subscribed and sworn to before me this 1st day of April 1988

[Signature]
Notary Public

My commission expires 7-16-90

**SOUTH DAKOTA
WATER PERMIT**

Date of first receipt of application April 5, 1988

Date of return to applicant for correction, amendments or changes required _____

Date of receipt of corrected application _____

The Water Management Board approved Water Permit Application No. 1437-1

on May 12, 1988 for Wharf Resources

(Applicant)

PO Box 446

(Street, RR or Box)

Deadwood

(City)

South Dakota

(State)

57732

(Zip Code)

authorizing the construction of the water use system and the placing of water to beneficial use subject to the following limitations, conditions and qualifications:

1. Water Permit No. 1437-1 authorizes storage of 26.5 acre-feet of water by construction of a sedimentation dam in Ross Valley near the center of the NW $\frac{1}{4}$ Section 3-T4N-R2E. Water is to be stored annually to an approximate outlet elevation of 5940 feet msl with the crest of the dam at approximately 5943 feet msl. Water impounded by the sedimentation dam is to be allowed to evaporate and excess water is to be diverted to the Annie Creek mine pit. (SEE ATTACHMENT 1)
2. The water appropriated shall be used for the purpose of dust control from the Annie Creek mine pit and water from the contingency pond is recycled into the leach process.
and may not exceed the amount of water needed for beneficial use for industrial use
3. The water is to be used during the following described annual period: January 1 - December 31
4. The date from which applicant may claim the right is April 5, 1988
5. One-fifth of the construction is to be completed on or before November 12, 1990
6. All construction is to be completed on or before May 12, 1993
7. Water is to be put to beneficial use on or before May 12, 1997
8. Water rights obtained in compliance with the laws of the State of South Dakota may not be unlawfully impaired by this appropriation.

QUALIFICATIONS

That the operation and maintenance of the 26.5 acre-feet sedimentation dam and 70.7 acre-feet storage contingency pond comply with Board Rules Chapter 74:02:08 Safety of Dams and SDCL 46-7-3.

WATER MANAGEMENT BOARD

NOV 23 1988

By: 

Chief Engineer

Division of Water Rights
Dept. of Water and Natural Resources

Supplemental Information

(type or print in ink)

1. Well Information - Proposed construction

- a) Drill Hole Diameter _____ Depth _____
- b) Casing Type _____ Diameter _____ Thickness _____
- c) Screen Type _____ Diameter _____ Thickness _____
- d) Gravel Pack Thickness _____ Length of Gravel Pack _____
- e) Depth to Top of Water Bearing Material _____
- f) Depth of Water (ground surface to water level) _____
- g) Distance to nearest existing domestic well:
- On applicants property _____ On property owned by others _____

2. Dugout Information Estimates

- a) Surface Dimensions _____ Depth _____
- b) Depth to water (ground surface to water level) _____

3. Water Storage Dams SEDIMENTATION POND WITH EXPANSION.

If the proposed water use system contains one or more storage dams, please furnish the information requested below. The locations of each dam should be shown on the map submitted with the application.

- a) If a private engineering firm or government agency was involved in the design of this dam please give their name and address

FMG, Inc.
1823 W. Main
Rapid City, SD

b) Freeboard _____ 3 feet

c) Crest Width _____ 15 feet

Crest Length _____ 260 feet

d) Height _____ 33 feet

e) Outlet Dimensions:
Pipe diameter _____ 30 inches

Spillway width _____ 13 feet

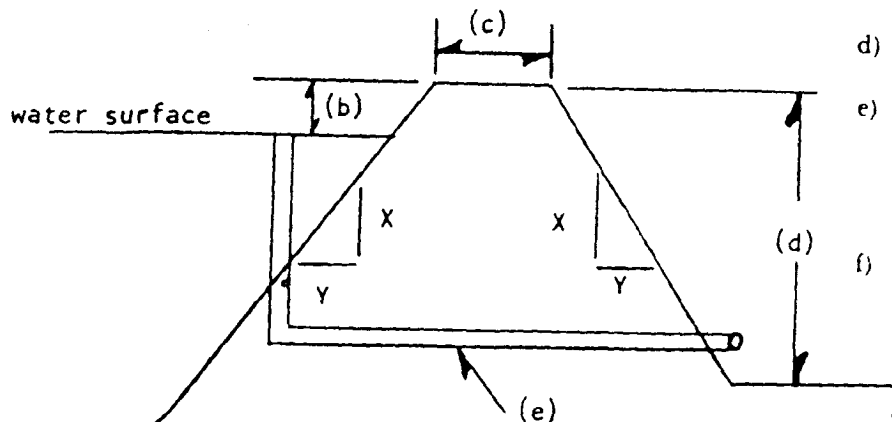
f) X & Y Slope
Upstream $x = 33'$ $y = 82'$

Downstream $x = 33'$ $y = 85'$

Surface Area of Impoundment 1.3 acres

Storage _____ 26.5 _____ acre feet

Drainage area above dam 170 acres



Signature of Applicant

Supplemental Information

(type or print in ink)

1. Well Information - Proposed construction

- a) Drill Hole Diameter _____ Depth _____
- b) Casing Type _____ Diameter _____ Thickness _____
- c) Screen Type _____ Diameter _____ Thickness _____
- d) Gravel Pack Thickness _____ Length of Gravel Pack _____
- e) Depth to Top of Water Bearing Material _____
- f) Depth of Water (ground surface to water level) _____
- g) Distance to nearest existing domestic well:
- On applicants property _____ On property owned by others _____

2. Dugout Information Estimates

- a) Surface Dimensions _____ Depth _____
- b) Depth to water (ground surface to water level) _____

3. Water Storage Dams CONTINGENCY POND W/EXPANSION (Reference Pad No. 4 and Contingency Pond Expansion Plans & Specifications on file with DWNR)

If the proposed water use system contains one or more storage dams, please furnish the information requested below. The locations of each dam should be shown on the map submitted with the application.

- a) If a private engineering firm or government agency was involved in the design of this dam please give their name and address

HWS/FMG w/original plans
1823 W Main, Rapid City, SD

b) Freeboard 2.5'

c) Crest Width 18'

Crest Length 500'

d) Height 43'

e) Outlet Dimensions:
Pipe diameter _____

Spillway width _____

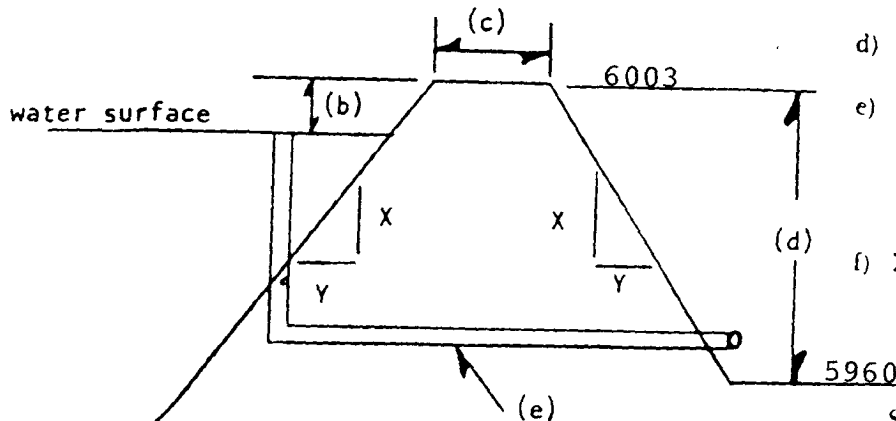
f) X & Y Slope
Upstream 1:2.5

Downstream 1:2.0

Surface Area of Impoundment 2.6 acres

Storage 68.6 acre feet

Drainage area above dam 0



Signature of Applicant

NARRATIVE DESCRIPTION

The upper Ross Valley drainage is dry the majority of the year, although some surface water flow can be found year-round below Ross Springs and for a short distance below the spring area in the upper valley in the early spring. Surface water from these springs is generally lost to infiltration since the Ross Valley drainage is influent over most of its length. However, during periods of rain or spring runoff, surface water may flow down the entire length of Ross Valley and discharge into Annie Creek.

For the natural soils in the upper Ross Valley, available water capacity is relatively high, but permeability is moderate to slow. Vegetative cover throughout the valley is sparse with little understory. The result is moderately rapid runoff. The spent ore water capacity will be moderate, but permeability will be high. Vegetative cover will be almost nonexistent until well into the reclamation period. Therefore, runoff is expected to be low to moderate.

A sediment control pond has been built in Ross Valley. The pond has an approximate capacity of 19.07 acre feet of storage. The pond serves a dual purpose of both sediment control and storm water control. A permanent pump-back system is in place which returns runoff water from the lower control pond to the Annie Creek mine pit for use in the mine. This sedimentation structure will be increased to 26.5 acre feet of storage to accommodate the 100 year storm plus the worst case rain-on-snow event as discussed in the load/unload permit application.

The completed ore disposal site will cover approximately 81 acres. Runoff from the site will flow into the sediment control ponds. Discharge from the lower pond will be controlled with a pump-back system as discussed earlier. Runoff from areas adjacent or above the spent ore will be routed around the site and allowed to discharge into the valley below the lower pond.

RECEIPT

Division of Water Rights

South Dakota Department of Water and Natural Resources

411206

Pierre, Apr 11 4, 19 88

RECEIVED OF Wharf Resources, PO Box 446, Deadwood, SD 57732

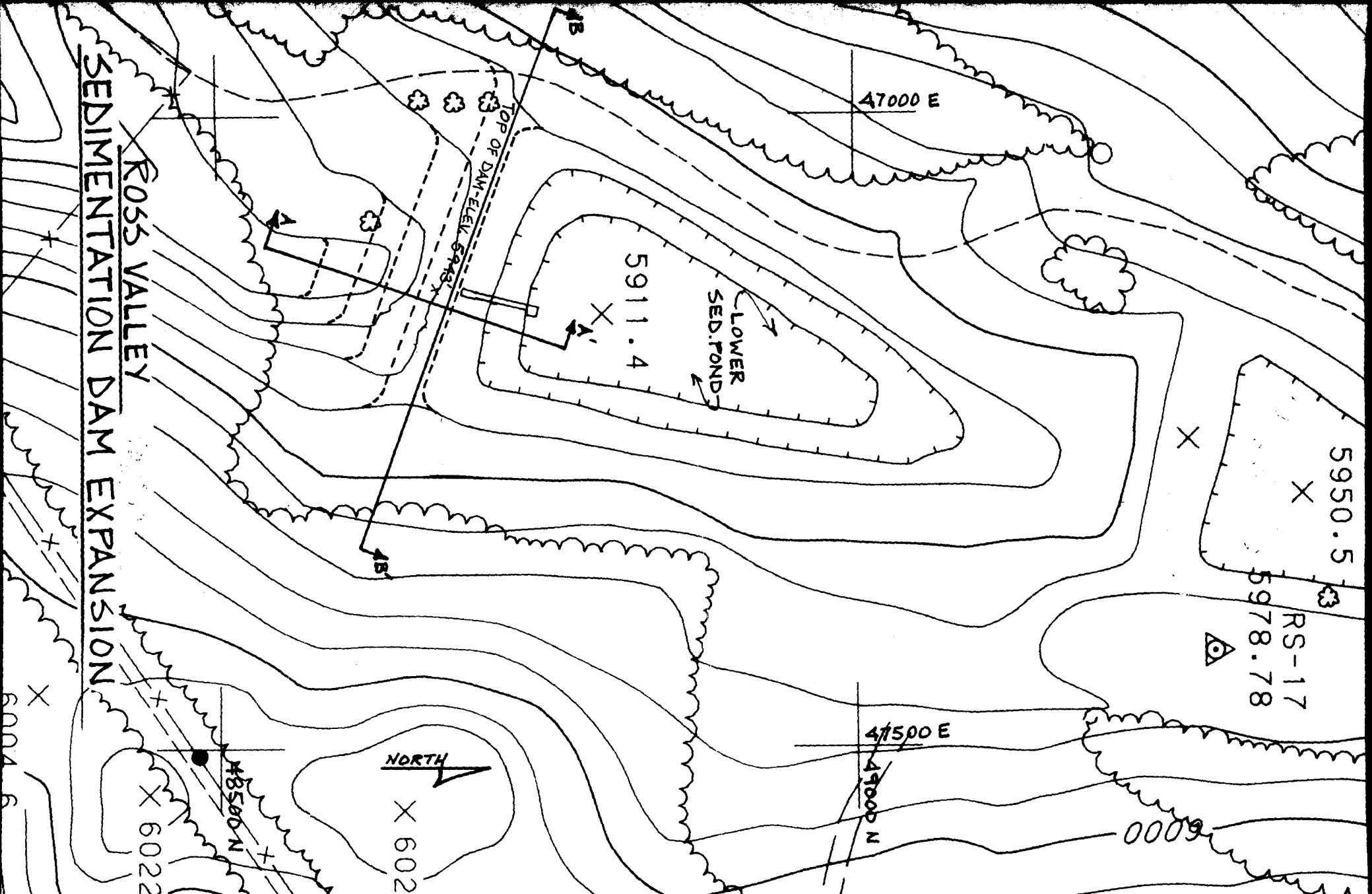
the following amount in fees for services rendered as provided for by law:

Fee for Application for Permit No. <u>1437-1</u> to Appropriate Water, to construct works and to put water to beneficial use _____	150	00
Fee for Application for Permit No. _____ to Appropriate Water for Future Use _____		
Fee to retain Future Use Permit No. _____ after period of seven years.		
Fee for Inspecting Constructed Works, confirming beneficial use and issuing Water License No. _____		
Fee for Filing Transfer Form _____		
Fee for Filing Extension Request _____		
Fee for Certified Copy of _____		
Fee for Print Copy of Map _____		
Fee for Certifying _____		
Fee for _____		
(Any Other Work Provided by Law)	Total	150 00

By

John Hatch

ROSS VALLEY
SEDIMENTATION DAM EXPANSION



WHARF RESOURCES
BOX 446 DEADWOOD, S.D. 57732

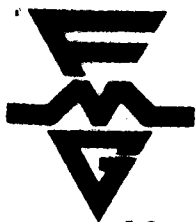
DATE 3-29-88 SCALE 1" = 100'

DRAWN BY BRAD WARE

CHECKED BY

PAGE

1



FMG, INC. 1823 West Main, Rapid City, South Dakota 57702-2591

RECEIVED

March 22, 1988

MAR 24 1988

WHARF RESOURCES

Mr. JD Fenenga
Wharf Resources (USA), Inc.
P.O. Box 446
Deadwood, SD 57732

**RE: PRELIMINARY DESIGN - LOWER SEDIMENTATION POND
ROSS VALLEY - LEAD, SOUTH DAKOTA**

Dear Mr. Fenenga,

The existing sedimentation pond located in the lower portion of Ross Valley is planned to be enlarged to accommodate 26.5 acre-feet of water and 4 acre-feet of sediment (a total capacity of 30.5 acre-feet). Increasing the pond's storage capacity will require increasing the dam height and redesigning the spillway. The proposed spillway will transmit a flow of 9 cubic feet per second (cfs) from the pond.

As requested, we have determined the pond's depth versus area curve, the pond's depth versus capacity curve, the pond's elevation versus capacity curve, the spillway's depth versus discharge curve, cross-sections of the proposed dam and spillway, a photostat copy of the topographic map that indicates the cross-section locations, and the generalized specifications for constructing the dam. These items are attached as Figures 1 through 7.

The findings and recommendations of this letter were prepared in accordance with generally accepted professional engineering principles and practices. We make no other warranty, either expressed or implied. The design capacities of 26.5 acre-feet of water, 4 acre-feet of sediment, and the spillway capacity of 9 cfs were provided by Wharf Resources USA, Inc. No determination was made as to the applicability of the design and spillway capacities to the sedimentation pond's drainage basin. Also, a slope stability analysis was not performed for the structure. We will evaluate these items in detail if requested.

We trust this information to be sufficient. If you have any questions or desire any additional information, please don't hesitate to contact us.

Respectfully submitted,

FMG, INC.

Walter L. Slack

Walter L. Slack, P.E.

R. Rick Baker

R. Rick Baker, P.E.

Enclosures
cc. File Wharf.Geo #6522.02

DEPTH vs. AREA
Sedimentation Pond in Ross Valley
Annie Creek Mine

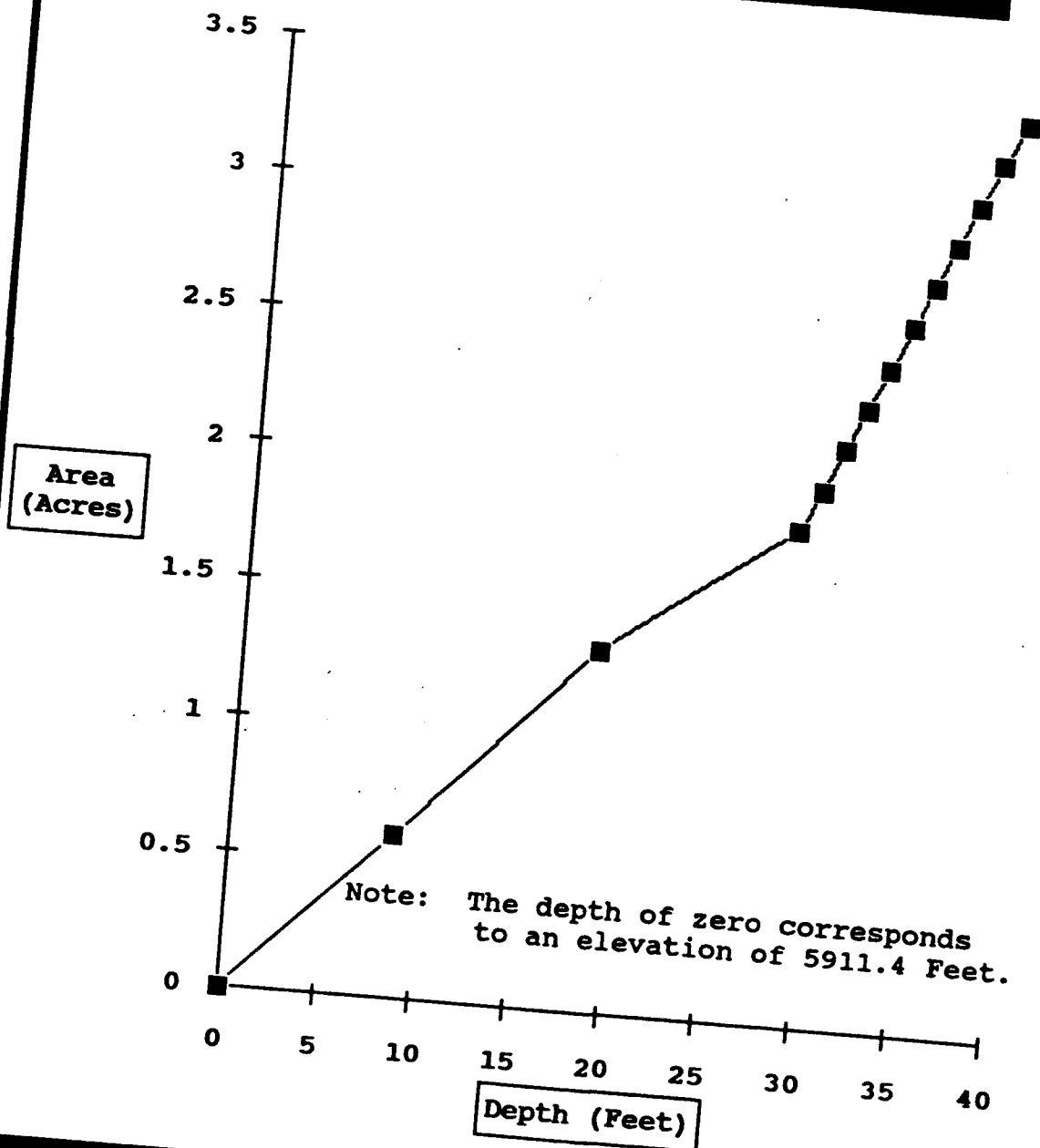


FIGURE 1

DEPTH vs. CAPACITY
Sedimentation Pond in Ross Valley
Annie Creek Mine

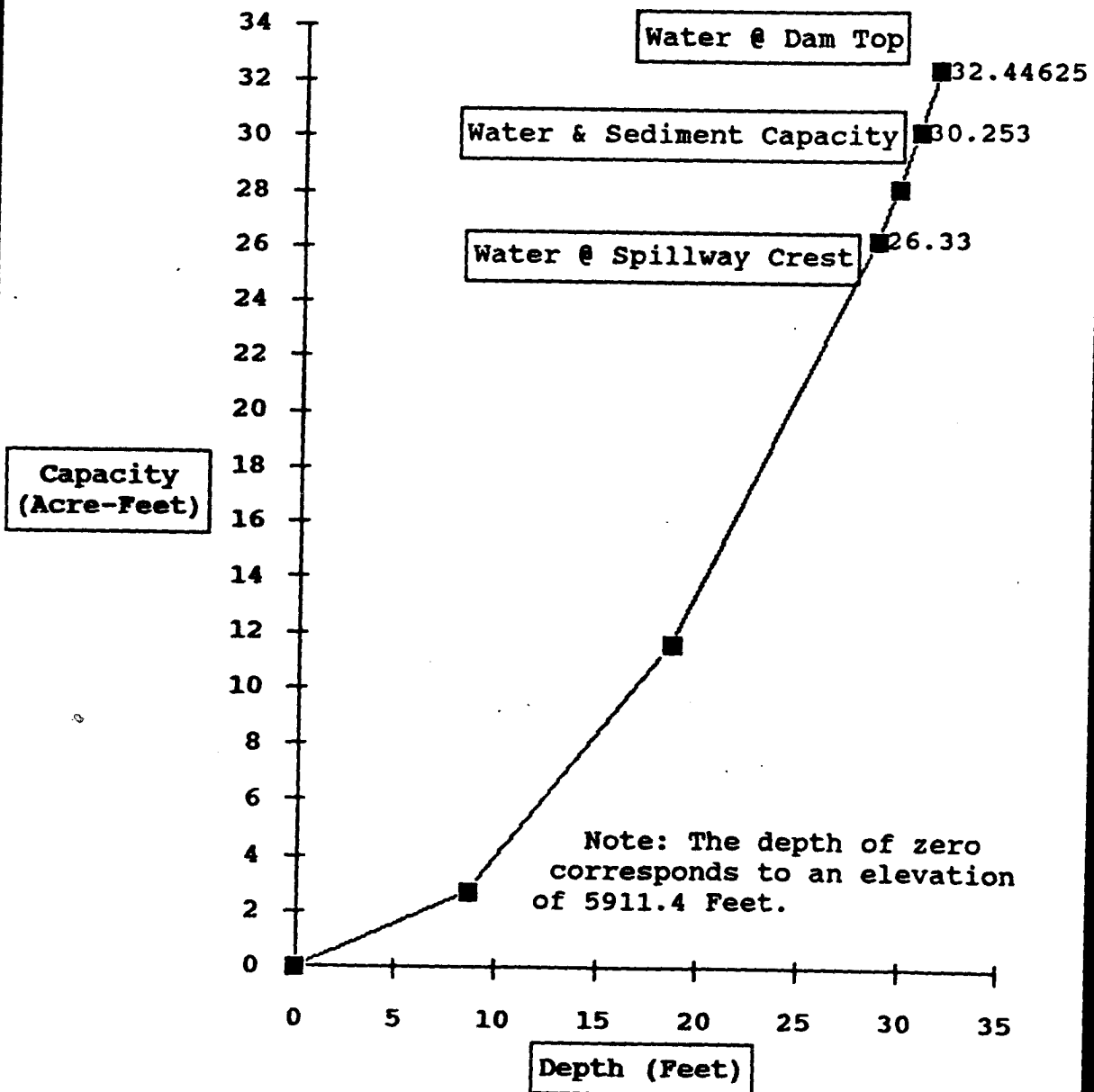


Figure 2

ELEVATION vs. CAPACITY
Sedimentation Pond in Ross Valley
Annie Creek Mine

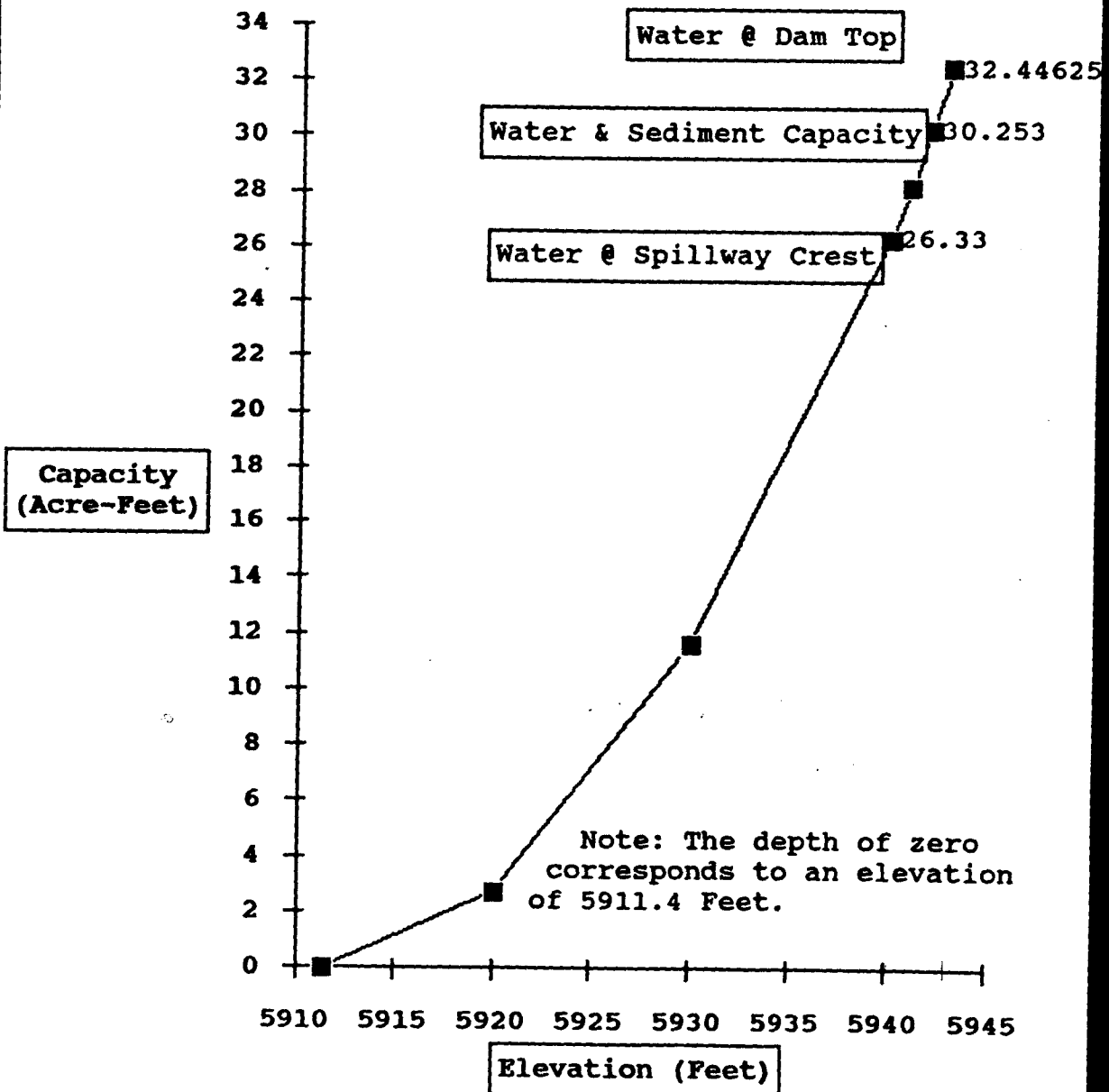


Figure 3

HEAD vs. DISCHARGE
Spillway Entrance
Sedimentation Pond in Ross Valley
Annie Creek Mine

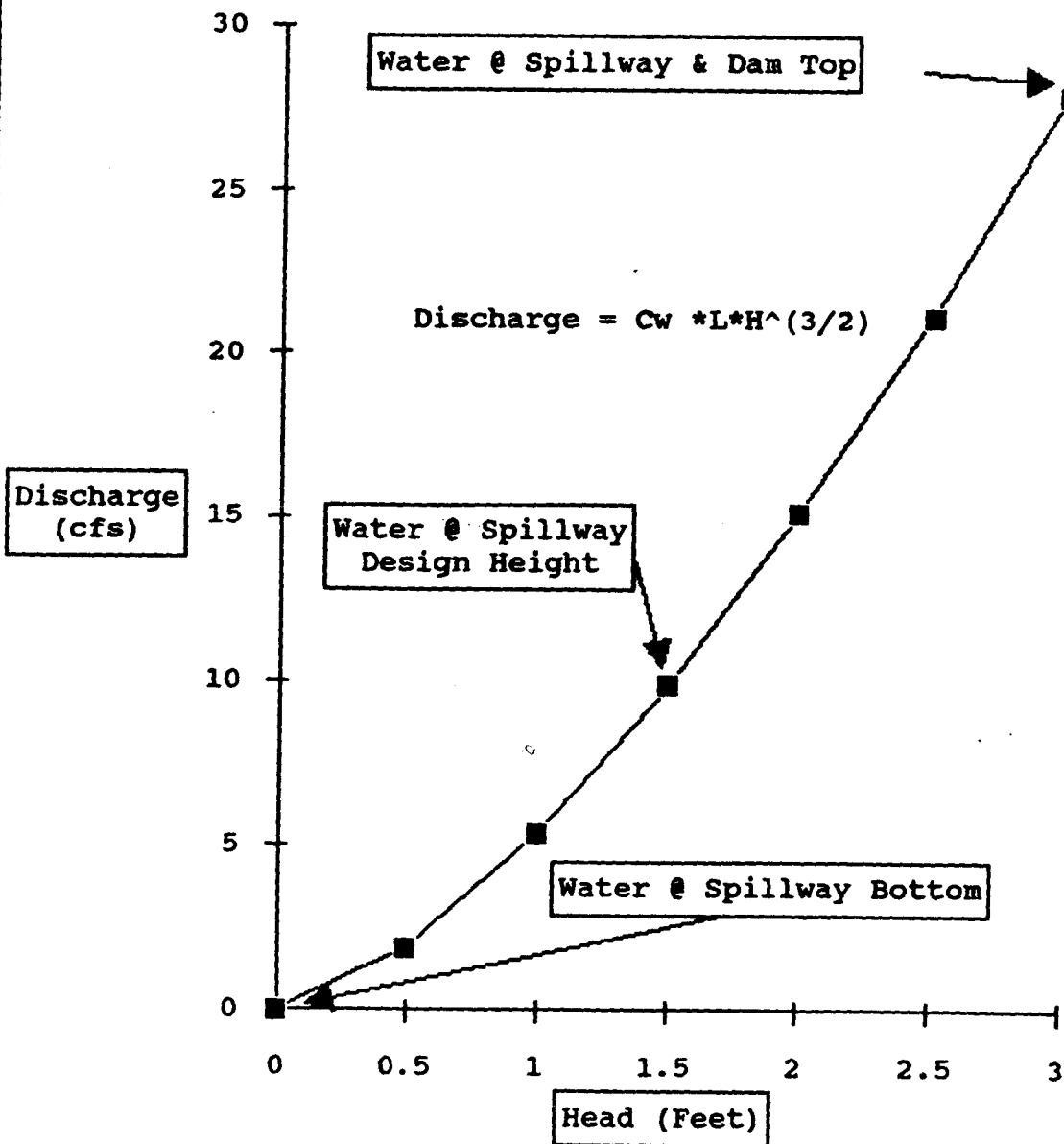
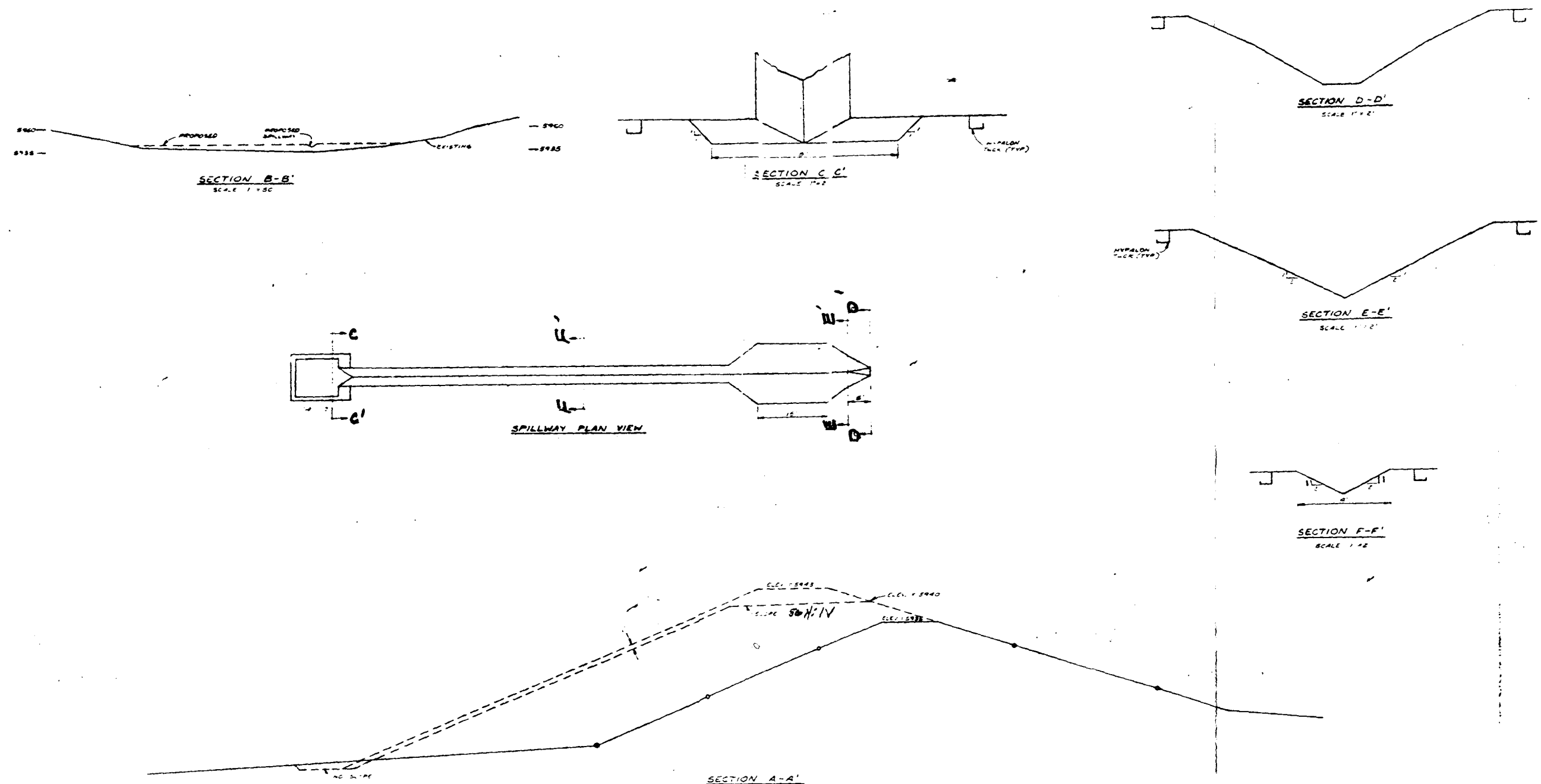


Figure 4



XEROX reduced
not to scale

		F M G, Inc.		SEDIMENTATION POND		6500	
		ROSS VALLEY - ANNIE CREEK MINE		LEAD, S.D.			
		WLB					

FIGURE 6

SEDIMENTATION POND CONSTRUCTION SPECIFICATIONS

A. FOUNDATION PREPARATION

1. Prior to fill placement all topsoil, organic debris and loose unconsolidated soil shall be removed.
2. All non-organic clay soils that exist in sufficient quantities shall be excavated and stockpiled for later use as fill material.
3. Prior to fill placement, the foundation material shall be scarified to a minimum depth of 8 inches and compacted to the specifications applying to the overlying fill.

B. EMBANKMENT MATERIALS

1. The embankment construction materials shall be obtained from the proposed sedimentation pond area and from the mine excavation. They shall consist of any material with 100% (by weight) passing the 12-inch sieve, and 30% passing the #200 sieve.
2. The on-site materials utilized as embankment fill shall not contain topsoil, roots, vegetation, or other foreign debris.

C. FILL PLACEMENT

1. On-site soils derived from the pond cut areas and mine excavation shall be placed in continuous horizontal layers which are not more than 12 inches thick after being compacted.
2. Cobbles and rock fragments in excess of 12 inches nominal size shall not be placed in the embankments.
3. The placed material shall be compacted with a vibratory compactor to the specifications outlined herein. The vibratory compactor shall not weigh less than 4000 pounds per foot of drum length.
4. The moisture content shall be maintained at the specified level during compaction procedures and distributed uniformly throughout each layer.
5. The maximum dry density and optimum moisture content for each soil type are to be determined in accordance with ASTM Designation D-1557-70.

COMPACTION SPECIFICATIONS

MATERIAL	MOISTURE CONTENT	DEGREE OF COMPACTION
Cohesive Soils	0% to 6% above optimum	A minimum of 90% of the maximum dry density
Cohesionless Soils	Workable	A minimum of 94% of the maximum dry density

6. The excavation and filling operations shall be observed by a qualified soils technician and sufficient density tests performed to indicate the degree of compaction attained.

7. Materials shall not be placed on frozen ground, and compaction operations shall not be performed during periods when temperatures are below 25° F.

D. 30 MIL PVC OR HYPALON

1. The spillway shall be lined with 30 mil PVC or Hypalon. The PVC or Hypalon shall be placed to the lines and grades shown on the plans.

2. All seams in the PVC or Hypalon shall be glued their entire length with materials that are approved by Wharf Resources USA, Inc. The seams shall be water tight and they shall be approved by Wharf Resources USA, Inc.

3. All edges of the Hypalon or PVC shall be tucked as shown on the plans.

FIGURE 7

ADDENDUM TO THE
ANNIE CREEK PROJECT
PROFILE DESCRIPTION

Wharf Resources has had a presence in the Northern Black Hills since 1979. The Annie Creek project construction commenced in late 1982 after receiving the necessary permits and the first year of operation was 1983. The Annie Creek project, located approximately four miles southwest of Lead, South Dakota, is Wharf Resources' only mining property. Wharf is a public company with approximately 68 percent of the shareholders United States residents.

The Annie Creek operation currently covers approximately 300 acres, of which nearly 70 acres have been revegetated. A reclamation bond in the amount of \$800,000 is currently deposited in cash for bonding purposes to ensure final reclamation following mining. Short-range goals are to improve operating efficiency and enhance production and profitability. Long-range goals are to continue to investigate our mineral holdings and increase profitable ore reserves and lengthen our estimated mine life. Current ore reserves provide a mine life of nine to ten years.

The temporary disturbance of land surface is reduced whenever possible by reclaiming areas where no mining activity is currently taking place. Eventually all the land will be reclaimed to a future beneficial use. A separate Environmental Activities Department staffed with trained professionals regularly monitor such areas as wildlife, water quality, air quality and revegetation projects. Reclamation is concurrent as possible to return the land to a stable, productive land form as soon as practicable following mining.

The economic contribution to Western South Dakota of the Annie Creek operation includes a nearly \$2.8 million annual payroll which included over \$1 million in state and local taxes in 1986 with an estimated tax liability for 1987 of approximately \$1.5 million. Estimated expenditures for goods and services within the Lead, Deadwood, Spearfish, Sturgis, Belle Fourche area through November, 1986 exceeded \$1.3 million. The same expenditures in the Rapid City area were approximately \$800,000. In other areas of South Dakota, expenditures for services and supplies through November, 1986 was approximately \$700,000.

WHARF RESOURCES
ANNIE CREEK MINE
PROJECT PROFILE DESCRIPTION

INTRODUCTION

Wharf Resources is operating a gold/silver mine approximately three miles southwest of Lead in Lawrence County, South Dakota. The operation was initiated in 1983, with the first ore delivered to the pad in August of that year. This submittal is intended to update the Department of Water and Natural Resources and to provide specific data and analyses related to the mined ore crushing facilities at the site. The contact person for Wharf Resources is Luther J. Russell, Governmental Affairs Director.

PROJECT PROFILE SUMMARY

This project profile presents a summary of the Annie Creek mine and heap leach operation. Wharf will be updating the profile as new information becomes available and/or key operating and reclamation parameters change.

LAND STATUS

Private (patented) land approximately 330 acres are currently bonded for reclamation purposes.

ESTIMATED MINEABLE RESERVES

20-23 million tons*; estimated waste material (excluding spent ore) 20-27 million tons*.

*All material estimates are approximate and subject to modification.

MINING LEVEL (Surface Mining)

3-4,000 tons per day ore; 7-8,000 tons per day waste material. All mining activity is conducted by Wharf Resources.

CRUSHING REQUIREMENTS (Mined Ore)

Approximately 7,000 tons per day. Mining and crushing conducted by Wharf Resources.

ORE WASTE TRANSPORT

Via 50' haul roads.

MINE AREAS

The Annie Creek pit covers approximately 30 acres. Foley Ridge covers approximately 75 acres. Annie Arm covers approximately 15 acres.

WASTE DISPOSAL AREAS

Annie Creek approximately 18 acres and 3.0 million tons. Foley Ridge approximately 55 acres and 12-15 million tons.

PROCESSING METHOD

Cyanide heap leach facility. Hydrogen peroxide or other treatment processes to neutralize ore. Mine plans and specifications submitted to DWNR separately pursuant to mining permit applications. Plans and specifications have been approved.

Processed wastes estimated 20-23 million tons (no grinding or tailings disposal requirements). Neutralized or spent ore disposed with mine waste and end dumped.

DESIGN CRITERIA FOR PADS/PONDS

Six-hour probable maximum precipitation (PMP) storm event plus safety factor.

LEACH PAD/MILLING AREA

Approximately 72 acres affected with pads and ponds.

OPERATING SEASON

365 days annually.

PERSONNEL/INFRASTRUCTURE

Workforce approximately 130 persons. All housing - facilities - utilities provided in the Lead - Deadwood - Spearfish areas in Lawrence County. On site wastewater treatment by septic tank soil absorption systems. Power by Black Hills Power and Light.

POLLUTION ABATEMENT

Dust suppression on haul roads.

ANNUAL WATER MANAGEMENT/RECLAMATION/STABILIZATION PROGRAM

Overall reclamation planning and implementation. Water quality monitoring (ground water and surface water) to ensure effectiveness. Program is described in detail in mining permit applications and mine monitoring plan documents includes waste dumps, leach pads, haul roads and other affected areas.

PROJECT ACCESS

County and state highways.

OTHER ONGOING MONITORING

Stream flow (hydrology). Reclamation treatment efficiencies. Detailed hydro-geologic regime, air quality, blasting, wildlife, meteorological.

PLANT SITE AND PROCESSING FACILITIES

The basic siting criteria involved in selecting the existing processing facility included

General Topography: The area is relatively flat and thereby minimized the amount of earthwork or fill required which in turn reduced facility cost.

Hydrology and Drainage: The pad areas are located high in the subdrainage so as to reduce the volumes of adjacent surface runoff that would effect maintenance of an optimum water balance.

Proximity to the Mining Operations: The facilities are located within one mile of the adjacent mine areas, but do not interfere with the mining activities. Condemnation drilling confirmed that the potential for additional mineralization on the mill sites was limited.

Geotechnical Constraints: Geotechnical reconnaissance investigations performed for leach pad sites indicated that selected areas are structurally stable. The method for pad construction involves a synthetic membrane liner(s) atop a clay subbase.

Integration with Processing Facilities: The ponds, gold recovery systems, potential processed ore disposal sites and ancillary

facilities are all integrated in with the leach pads. This limits the total disturbed area; manpower requirements are reduced and process control is enhanced.

Water Supply and Access: The processing facilities receive a reliable water supply from wells and ambient snow and precipitation events. Access to the processing area is direct and easy.

The pad sites are constructed on competent, engineered foundations. Construction involved placement of 30 mil PVC or 60 mil HDPE material (PVC or HDPE over compacted clay subbase). The PVC and HDPE materials are functionally impervious and resistant to a broad range of chemicals and variations in pH. The membrane liner is glued or welded to produce a totally homogeneous joint. The permeability of such construction is less than 10^{-7} centimeters per second.

The total pad area is approximately 60 acres. Total disturbed area including solution flow corridors and ponds is approximately 72 acres.

Wash water and safety ponds and pregnant and barren solution ponds are also required. The ponds are constructed of a membrane material suitable for their intended use (i.e. 36 mil Hypalon or HDPE).

Barren, pregnant, overflow, contingency and neutralization pond construction involved excavation to a minimum depth below the bottom elevation of the liner system. The excavation was then brought back to the proper elevation with selected fill material and the embankment fills scarified, rolled and mechanically compacted to a prescribed density. Embankments were constructed using on site approved fill and then an 8" clay compacted liner material was emplaced. Atop this was a 36 mil Hypalon flexible synthetic membrane or HDPE. The neutralization pond has one intermediary liner which is 30 mil PVC separated by a leak detection sand filter system. The ponds are designed to accommodate a combined storage capacity of approximately 27 million gallons.

The processing method involves hauling ore to the crushing facilities (primary jaw, secondary and tertiary cone crushers) where the rock is reduced to a -1/2 inch nominal size and loaded onto the functionally impervious pads. The estimated or planned heap height is approximately 100 feet of the design limit.

Figure 1 provides an example of a typical cyanide extraction heap leach process. Crushed ore is piled on a functionally impervious pad. A dilute alkaline sodium cyanide solution 0.025 to 0.05 percent sodium cyanide or one to two pounds sodium cyanide per short ton solution is irrigated over the surface of the ore. The solution passes through the heap complexing the gold and silver into solution. The metal laden solution is then captured

in the pregnant solution pond and further processed through gold recovery system. The process is a totally confined recycling procedure.

DETAILS ON MINED ORE CRUSHING FACILITY

A schematic flowsheet for the crushing operation is shown on Figure 2. The primary crushing equipment includes one hopper feeder, one primary jaw crusher, one secondary cone crusher, and one tertiary cone crusher.

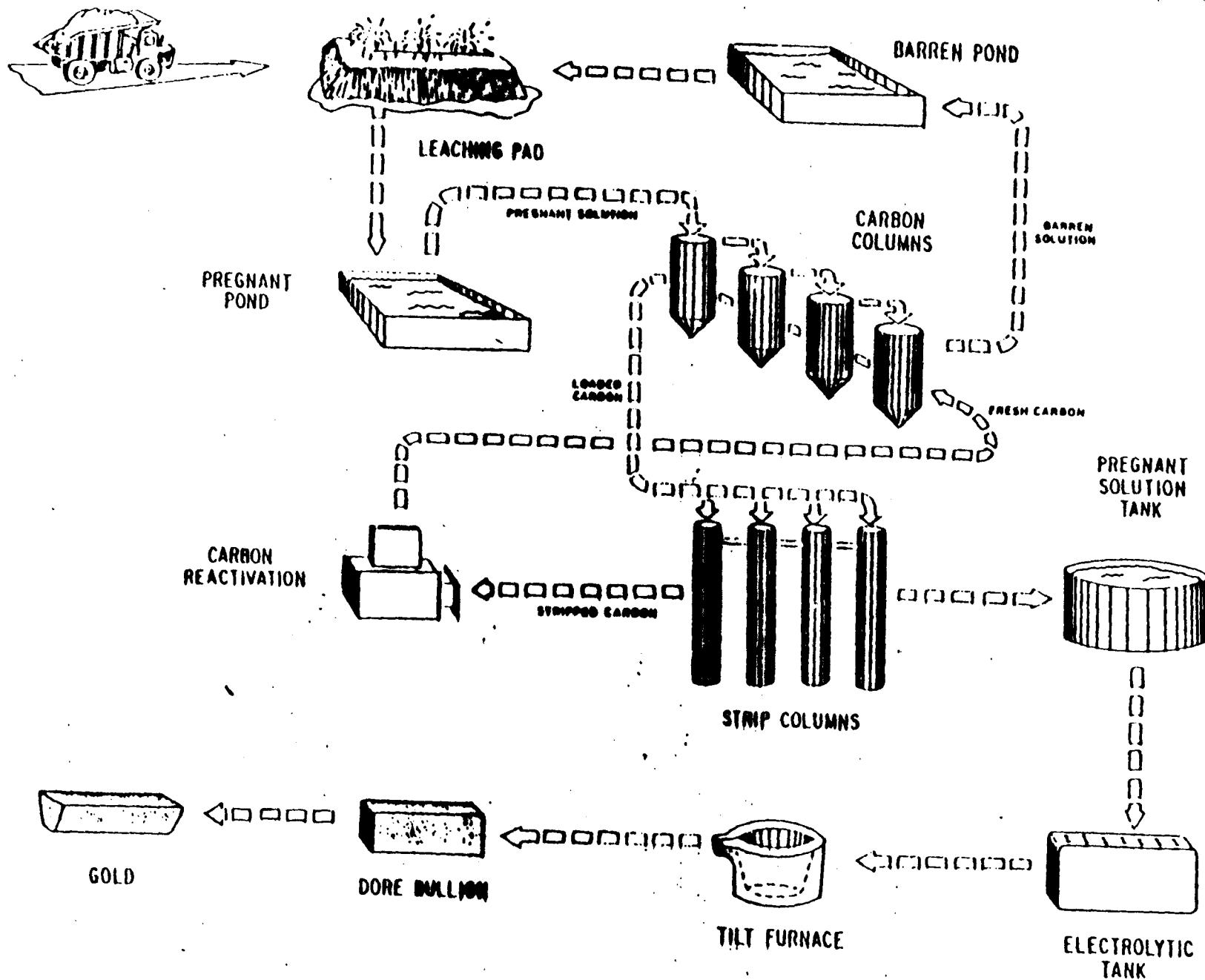
The operating schedule is 20 hours per day six days per week 52 weeks per year. The crusher plant will produce approximately 7,000 tons per day; the total estimated production capacity is 2.30 million tons per year.

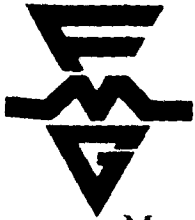
Table 1 presents the estimated emission rates for the various aspects of the project as described in this project profile.

[ACProfile - Updated 2/88]

SCHEMATIC OF TYPICAL HEAP LEACHING PROCESS

FIGURE 1





FMG, INC. 1823 West Main, Rapid City, South Dakota 57702-2591

RECEIVED

March 22, 1988

MAR 24 1988

WHARF RESOURCES

Mr. JD Fenenga
Wharf Resources (USA), Inc.
P.O. Box 446
Deadwood, SD 57732

**RE: PRELIMINARY DESIGN - LOWER SEDIMENTATION POND
ROSS VALLEY - LEAD, SOUTH DAKOTA**

Dear Mr. Fenenga,

The existing sedimentation pond located in the lower portion of Ross Valley is planned to be enlarged to accommodate 26.5 acre-feet of water and 4 acre-feet of sediment (a total capacity of 30.5 acre-feet). Increasing the pond's storage capacity will require increasing the dam height and redesigning the spillway. The proposed spillway will transmit a flow of 9 cubic feet per second (cfs) from the pond.

As requested, we have determined the pond's depth versus area curve, the pond's depth versus capacity curve, the pond's elevation versus capacity curve, the spillway's depth versus discharge curve, cross-sections of the proposed dam and spillway, a photostat copy of the topographic map that indicates the cross-section locations, and the generalized specifications for constructing the dam. These items are attached as Figures 1 through 7.

The findings and recommendations of this letter were prepared in accordance with generally accepted professional engineering principles and practices. We make no other warranty, either expressed or implied. The design capacities of 26.5 acre-feet of water, 4 acre-feet of sediment, and the spillway capacity of 9 cfs were provided by Wharf Resources USA, Inc. No determination was made as to the applicability of the design and spillway capacities to the sedimentation pond's drainage basin. Also, a slope stability analysis was not performed for the structure. We will evaluate these items in detail if requested.

We trust this information to be sufficient. If you have any questions or desire any additional information, please don't hesitate to contact us.

Respectfully submitted,

FMG, INC.

Walter L. Slack, P.E.

R. Rick Baker, P.E.

Enclosures
cc. File Wharf.Geo #6522.02

DEPTH vs. AREA
Sedimentation Pond in Ross Valley
Annie Creek Mine

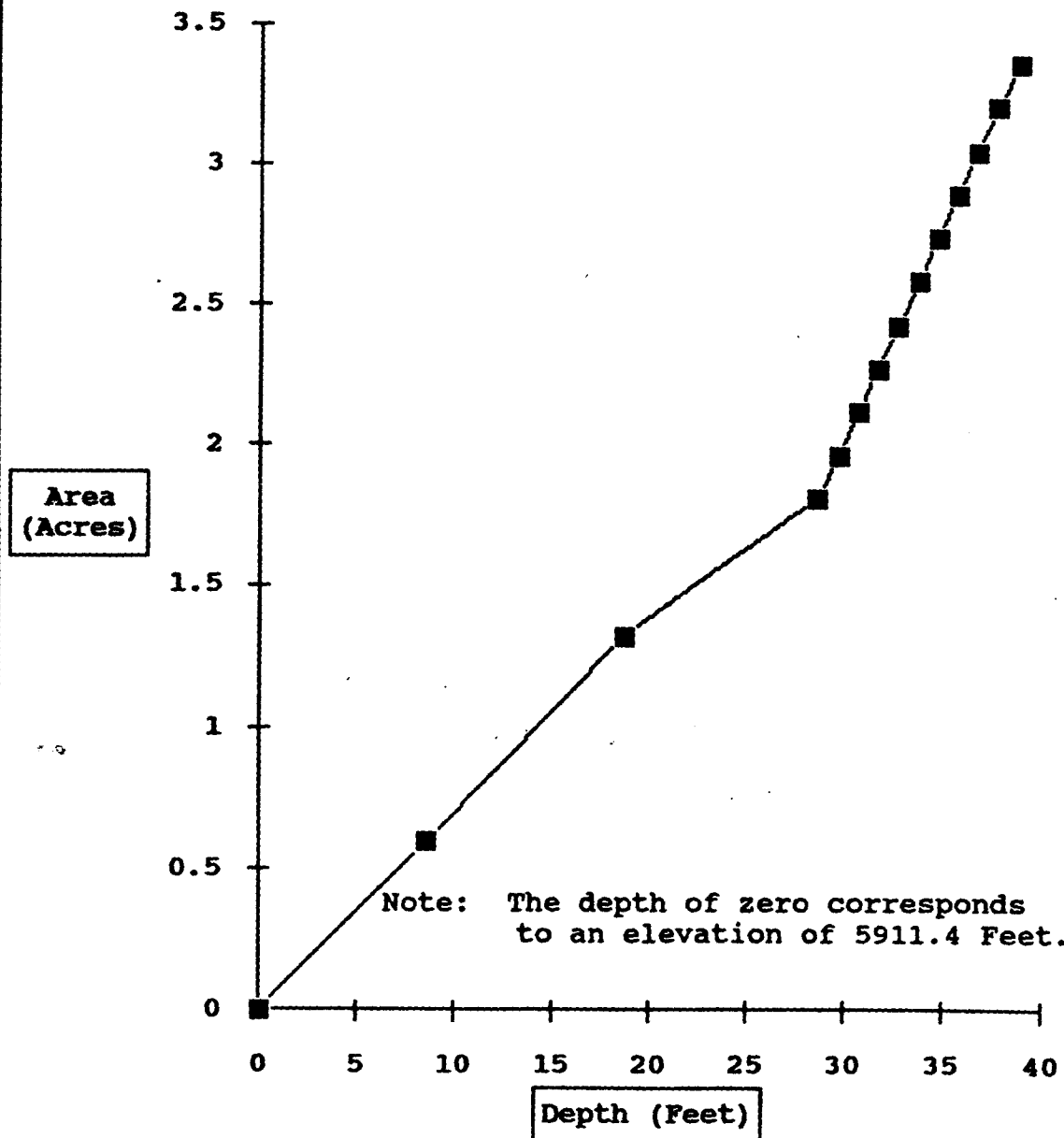


FIGURE 1

DEPTH vs. CAPACITY
Sedimentation Pond in Ross Valley
Annie Creek Mine

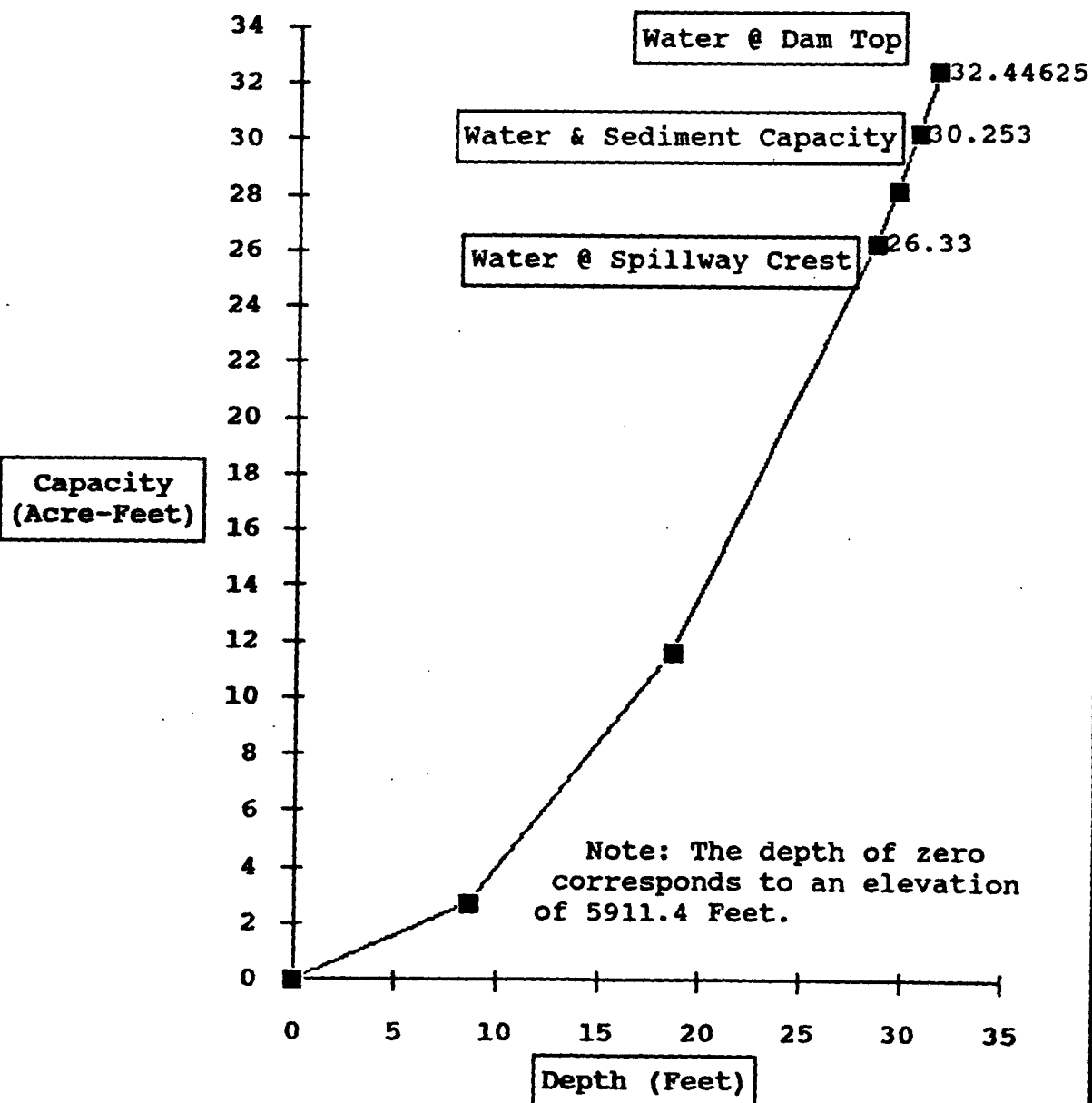


Figure 2

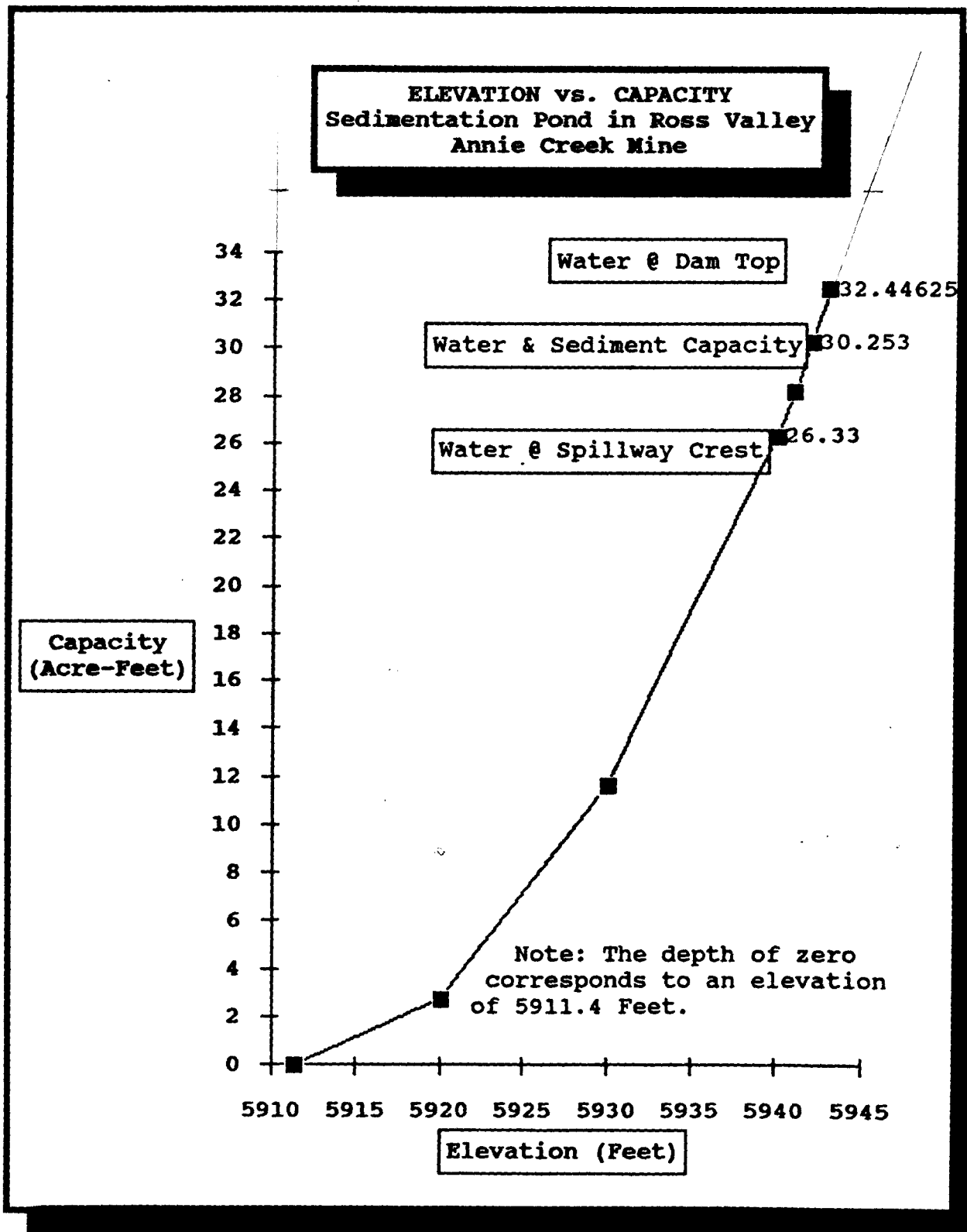


Figure 3

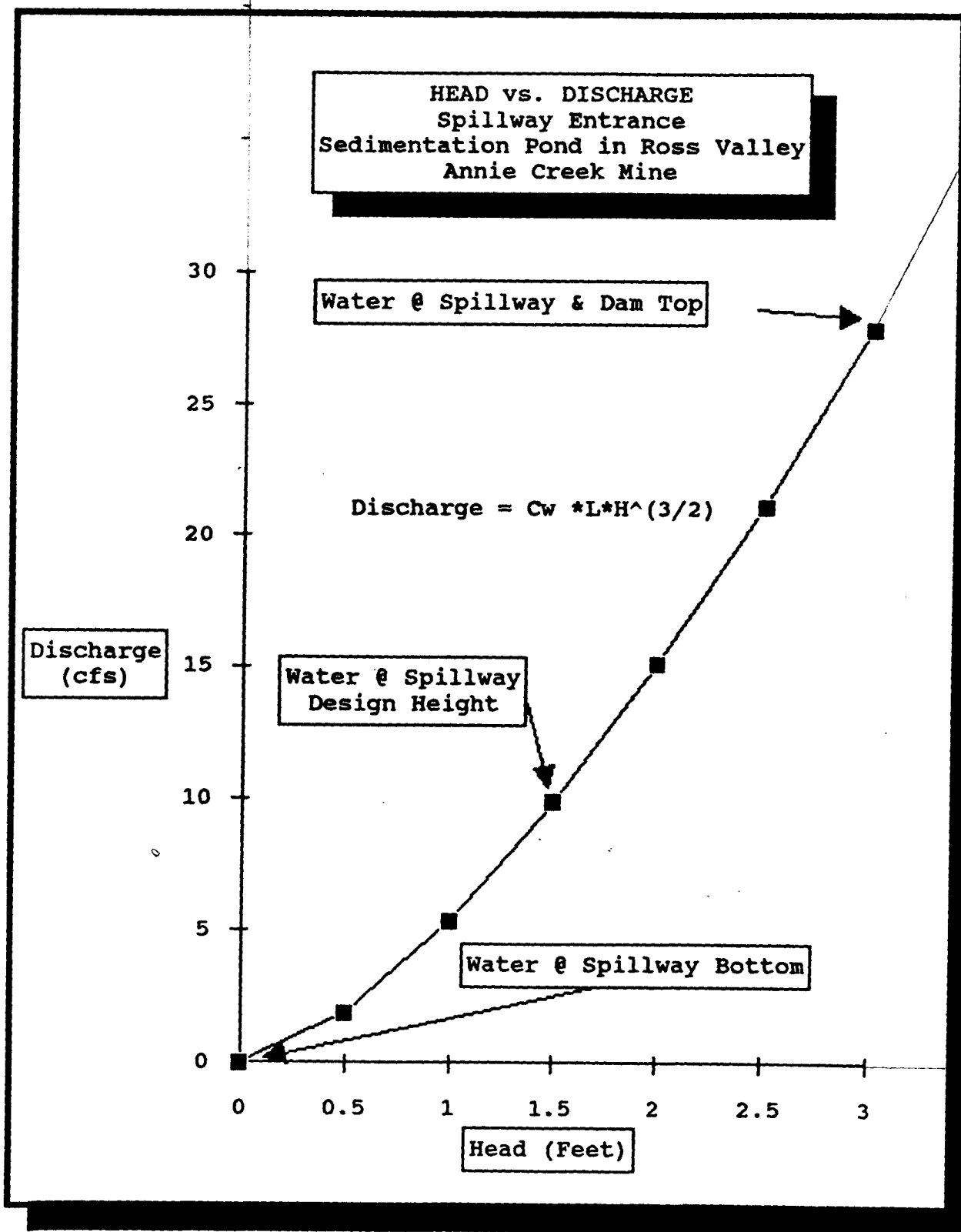
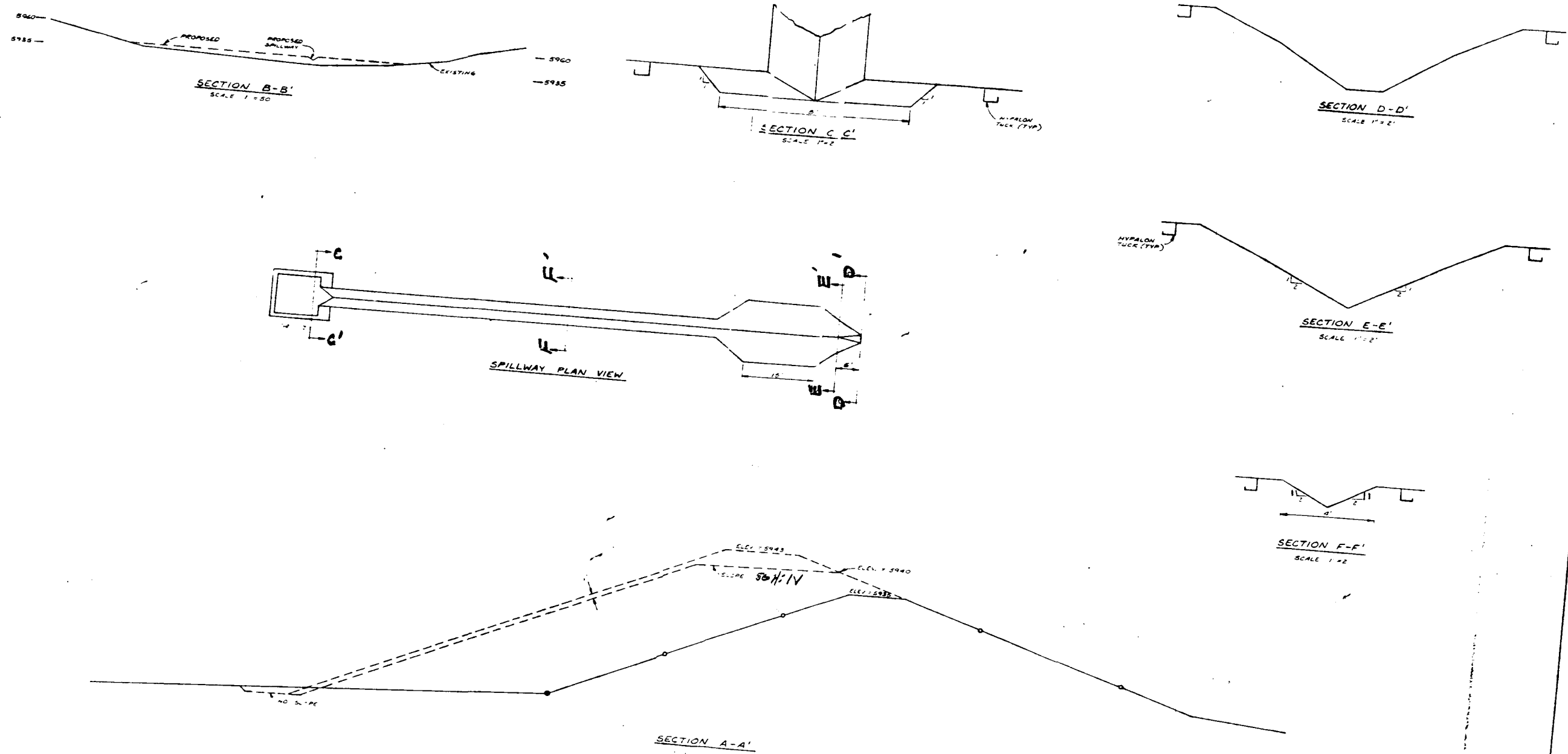


Figure 4



XEROX reduced
not to scale

F.M.G. Inc.		SEDIMENTATION POND	
PLANNING AND DESIGN DIVISION		ROSS VALLEY - ANNIE CREEK MINE	
W48		LEAD, S.D.	
		G300 76	

FIGURE 6



WHARF RESOURCES

(A Montana General Partnership)

Wharf Resources Ltd.

Wharf Resources (U.S.A.) Inc.

March 28, 1988

CERTIFIED/RETURN RECEIPT P-514 165 983

Mr. John Hatch
Office of Water Quality
Department of Water and Natural Resources
Joe Foss Building, Room 217
Pierre, South Dakota 57501-3181



RE: Safety of Dam Permits

Dear Mr. Hatch:

Pursuant to our recent discussions, it has been suggested that a Safety of Dam Permit may be required for the holding ponds associated with our processing facility and for the sedimentation structure associated with our mining operation. Pending a determination of this possible requirement by your office and to facilitate the determination, enclosed please find a Project Profile Description and project facility map to better acquaint you with our operation.

As you are aware, we do not believe that such a permit is required for our facility for the following reasons:

1. The dry draw statute standard refers to permits required for impoundments of 25 acre feet or more for structures constructed across dry draws. These facilities were not constructed across ravines or active watercourses and therefore this standard does not apply to our situation.
2. The contingency pond and the neutralization pond were not constructed on a "dry draw", but in fact were engineered to avoid getting any runoff from any area other than overflow from the solution ponds and pads immediately above them or to be utilized expressly for process solutions. We believe this to be a significant variation in view of the intent of the law with regard to the construction of dams across dry draws.
3. The only additional water that would enter either the contingency pond or the neutralization pond

other than normally recirculated process solution is rainwater and snowmelt falling directly into them or from the leach pads.

4. In regard to the sediment control ponds, their only purpose is to collect stormwater runoff that might flow directly off our spent ore disposal site or haul roads and are not intended either to impound water from a dry draw or to appropriate water, but only to protect other water resources from sediment or runoff from our operation. We have likewise engineered dispersion terraces around this facility to minimize drainage into the sediment control ponds.
5. The ponds are not designed or constructed to appropriate water. The intent in each case is to utilize the various ponds for purposes other than appropriation of water. We go to great lengths to direct water around these facilities to minimize the quantity of water entering into them.
6. We have already obtained the necessary permits for appropriating water for use in our processing operation and for domestic uses under separate water right permits. Therefore, the water in the ponds is water that has been appropriated under existing permits.
7. The dry draw statute standard which refers to the impoundment of 25 acre feet or more was enacted on July 1, 1983. The contingency pond associated with our processing facility had already been completed prior to that date. Therefore, our facility should be grandfathered from this provision.

In addition to the above, the Safety of Dams regulations ARSD 74:02:08 should not apply to our process or sedimentation facilities for the following reasons:

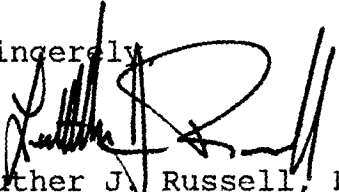
1. In each case, our ponds would be categorized as a Category 3 dam under ARSD 74:02:08:01 which is the lowest hazard category.
2. Subsection 08:02 indicates that the chapter applies to all new dams and all existing Category 1 or Category 2 dams. The regulations have an effective date of October 27, 1986. All of our ponds, with the exception of the neutralization pond, were constructed prior to this date. Therefore, the Safety of Dams chapter does not apply.

Mr. John Hatch
March 28, 1988
Page 3

3. In addition, the provisions of the regulation to provide for spillway requirements are inconsistent with the intent and reasons for the construction of our contingency or neutralization ponds. In our situation, the ponds are designed for a zero discharge of process solutions from the facility; therefore, a spillway is not appropriate. The sedimentation ponds already incorporate spillway designs with plans and specifications approved by the Department of Water and Natural Resources.

In summary, we do not believe that a water permit is required for these existing facilities. We would like to meet with you on Wednesday, March 30, to discuss this further. Please feel free to contact me with any questions or concerns you may have in this regard.

Sincerely,



Luther J. Russell, Director
Governmental/Environmental Affairs

LJR/lkm

Enclosures

CC: J. A. Begeman
M. D. Truhe
R. B. Barnes
H. A. Scholz
Safety of Dams Permit (WR)



WHARF RESOURCES

(A Montana General Partnership)

Wharf Resources Ltd.

Wharf Resources (U.S.A.) Inc.

April 4, 1988

Mr. John Hatch
Office of Water Quality
Department of Water and
Natural Resources
Joe Foss Building, Room 217
Pierre, South Dakota 57501-3181



Dear Mr. Hatch:

Enclosed please find our application to appropriate 26.5 acre feet of water annually within the State of South Dakota. This appropriation is the result of construction of a sediment control structure in Ross Valley to protect surface water resources downstream from our mining operation. The original plans and specifications for this structure were approved by the DWNR in June, 1984. Enclosed please find revised plans and specifications which reflect pond modifications to accommodate 26.5 acre feet of storage capacity. I remit the One Hundred Fifty Dollars (\$150.00) filing fee required for this water right application.

As you know, we are also planning to expand the contingency pond associated with our processing facility. Please find attached Form 2A - Supplemental Information and referenced plans and specifications in regard to this pond expansion pursuant to ARSD 74:02:08 Safety of Dams regulations.

We are eager to complete construction of these facilities and appreciate your timely review of this application. Please contact me at 584-1441 with any questions or concerns you have in this regard.

Sincerely,

Luther J. Russell, Director
Governmental/Environmental Affairs

LJR/lkm

CC: R. B. Barnes
M. D. Truhe
103.0908

Conversation or File Documentation

NAME OF PERSON OR FILE: Wharf Resources
ADDRESS: Deadwood SD COUNTY Lawrence
DATE: 4/5/88 TELEPHONE _____
RE: Office conversation with Luke Russell and via phone
COMMENTS: with John Baggeley

I asked Mr. Russell the reason for deleting the upstream sedimentation pond. Mr. Russell stated that the embankment fill from the upstream pond is to be used to raise the embankment of the lower pond.

Mr. Russell also stated that excess water collected in the remaining sedimentation pond would be pumped to the Annie Creek pit for dust control use from the pit; however, smaller amounts of water in the sedimentation pond would be allowed to evaporate.

Mr. Russell referred a question to Wharf's office regarding the storage capacity to the crest of the contingency pond if the expansion is completed. The office indicated the storage to the crest of the contingency pond, if expanded, would be approximately 70.7 acre-feet. Mr. Russell also stated that any water impounded in the contingency pond would be recycled into the leach process

File in Permit or other file as necessary. Use to document conversations and what the other party was told; why action or decision was made.



WHARF RESOURCES

(A Montana General Partnership)

Wharf Resources Ltd.

Wharf Resources (U.S.A.) Inc.

April 6, 1988

Ron DuVall
Office of Water Quality
Department of Water and Natural Resources
Joe Foss Building, Room 217
Pierre, South Dakota 57501-3181

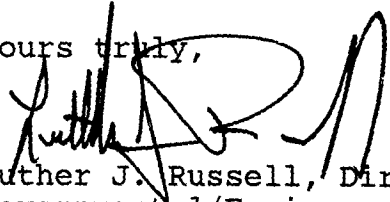


Dear Ron:

Enclosed please find a project map and signature page by Neil J. Stodolski, Registered Professional Engineer.

If you should have any questions or require further information, please do not hesitate to contact me.

Yours truly,


Luther J. Russell, Director
Governmental/Environmental
Affairs

LJR/ld

Enclosures

I, Neil J. Stodolski, certify that the legal descriptions of the sedimentation and neutralization ponds as indicated on the attached map are true and factual.


Neil J. Stodolski
Professional Engineer

3021
State Registration
Number





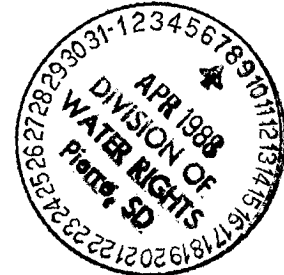
WHARF RESOURCES

(A Montana General Partnership)

Wharf Resources Ltd.

Wharf Resources (U.S.A.) Inc.

April 7, 1988



Ron DuVall
Office of Water Quality
Department of Water and Natural Resources
Joe Foss Building, Room 217
Pierre, South Dakota 57501

Dear Ron:

Enclosed please find a "properly" executed project facility map as per our discussion.

Again, Ron, if you have any questions please give me a call.

Yours truly,

Luther J. Russell /ld

Luther J. Russell, Director
Governmental/Environmental
Affairs

LJR/ld

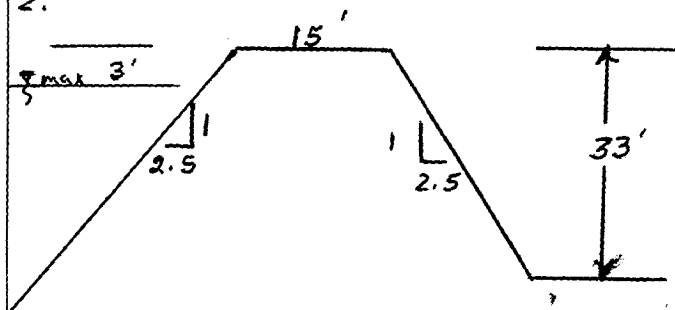
Enclosures

Wharf Resources

Category 3 Dam

1. 26.5 acre-feet

2.



Spillway width = 13 feet

Surface area = 1.3 acres

Storage = 26.5 Ac.ft

drainage = 170 acres

Figure 2

indicates max storage dam crest = 32.4 acre-feet
 spillway crest = 26.3 acre-feet

at spillway design height
 at dam crest

$$Q_{out} = 9 \text{ cfs}$$

$$Q_{out} = 26 \text{ cfs}$$

$$Q = C_w L H^{3/2} \text{ with } C_w = 0.38$$

If category 3 small size SDF = 50yr. storm.

$$Q_{50} = 198 \text{ cfs} \quad V_{50} = 13.4 \text{ Ac.ft}$$

$$Q_{100} = 263 \text{ cfs} \quad V_{100} = 17.3 \text{ Ac.ft}$$

$$Q_{50\%PMF} = 632 \text{ cfs} \quad V_{50\%PMF} = \frac{52}{520} \text{ Ac.ft}$$

$$Q_{100\%PMF} = 1064 \text{ cfs} \quad V_{100\%PMF} = 119 \text{ Ac.ft}$$

$$Q_{50} = 106 A^{0.63} S^{0.45} S_L^{-0.69}$$

$$V_{50} = 491 A^{0.76} S_L^{-1.54}$$

$$S_L = 5.38 \text{ in.}$$

$$S = \frac{50'}{780'} = 338 \text{ Ft/mi}$$

$$Q_{100} = 132 A^{0.65} S^{0.46} S_L^{-0.67}$$

$$V_{100} = 589 A^{0.77} S_L^{-1.49}$$

$$D.A. = 170 \text{ ac.}$$

$$= 0.266 \text{ mi}^2$$

$$Q_{50} = \frac{106 (.266)^{0.63} (338)^{0.45} (5.38)^{-0.69}}{198 \text{ cfs}}$$

$$V_{50} = \frac{491 (.266)^{0.76} (5.38)^{-1.54}}{13.4 \text{ ac-Ft.}}$$

$$Q_{100} = \frac{132 (.266)^{0.65} (338)^{0.46} (5.38)^{-0.67}}{263 \text{ cfs}}$$

$$V_{100} = \frac{589 (.266)^{0.77} (5.38)^{-1.49}}{17.3 \text{ ac-Ft.}}$$

DAM INSPECTION HYDROLOGIC ANALYSIS - SUMMARY TABLE

WHARF RESOURCES STORM RUNOFF DAM
DAM SAFETY ANALYSIS (PMP EVENT)
DWR - WATER RIGHTS
JIM WENDTE 4-5-88
MAIN CONTROL CARD

SYNDERS 0.250 HOUR UNIT HYDROGRAPH DATA AND PARAMETERS

DURATION	DA	L	LCA	CP	CT	QP	TP	W50	W75	UNIT VOL
HOURS	SQ-MI	MILES	MILES			C.F.S	HOURS	HOURS	HOURS	AC-FT
0.250	0.27	0.72	0.39	0.470	0.400	251.2	0.27	0.35	0.21	14.40

PROBABLE MAXIMUM STORM PRECIPITATION AND RUNOFF CHARACTERISTICS

PMP	RAIN	DISTRIBUTION IN PERCENT OF PMP				INT-LOS	INF-RATE	VOLUME IN INCHES		
INDEX	FACTOR	6-HR	12-HR	18-HR	24-HR	INCHES	INCH/HR	RAIN	LOSS	EXCESS
19.00	0.800	102.00	121.00	127.32	132.00	0.0	1.00	20.06	10.45	9.62

LAKE INFLOW HYDROGRAPH ORDINATES

PROBABLE MAXIMUM FLOOD HYDROGRAPH ORDINATES IN CFS AT 0.250 HOUR INTERVALS BEGINNING AT ZERO TIME

0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	32.2	18.3	47.0	44.2	82.1	85.2	189.0	197.0	785.8	1067.9	853.0
747.5	658.4	545.6	387.3	252.9	167.8	133.6	96.3	73.8	59.8	52.5	33.3
35.9	21.6	14.6	9.5	5.5	2.8	1.4	0.2	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

LAKE AND DAM INFORMATION

BEGINNING	OUTLET	BOTTOM	SPILLWAY	SPILLWAY	TOP OF DAM	TOP OF DAM	HEIGHT	DOWNSTREAM	N-VALVE	COEF OF
POOL ELEV	INVERT	OF LAKE	CREST	CREST WIDTH	ELEVATION	LENGTH	OF DAM	SLOPE	ON DS	FLOW
FT,MSL	FT,MSL	FT,MSL	FT,MSL	FEET	FT,MSL	FEET	FEET	OF DAM	SLOPE	OVER DAM
5940.00	0.0	5910.00	5940.00	13.0	5943.00	260.0	33.0	1V ON 3.00H	0.030	2.90

SUMMARY OF FLOOD ROUTINGS OF INFLOW HYDROGRAPH THROUGH THE LAKE

ROUTING	PERCENT	TOTAL	MAXIMUM	DEPTH OF	ESTIMATED	INITIAL	TOTAL	VOLUME	MAXIMUM
NUMBER	@@@	INFLOW	LAKE	LAKE OVER	VELOCITIES	TIME TO	TIME	SPILLED	DISCHARGE
	INFLOW	VOLUME	ELEVATION	TOP OF DAM	CREST	TOE	OVER TOP	OVER DAM	FROM DAM
	HYDROGRAPH	AC-FT	FT,MSL	FEET	FPS	FPS	HOUR	HOURS	CFS
1	100.0	138.	5944.19	1.19	5.06	12.52	13.92	4.47	119.2
2	90.0	125.	5944.12	1.12	4.90	12.04	13.97	4.36	105.7
3	80.0	111.	5944.04	1.04	4.72	11.53	14.04	3.95	92.2
4	70.0	97.	5943.92	0.92	4.45	10.73	14.12	3.79	78.8
5	60.0	83.	5943.79	0.79	4.11	9.75	14.23	3.61	65.4
6	50.0	69.	5943.65	0.65	3.73	8.69	14.33	3.30	52.2
7	40.0	55.	5943.51	0.51	3.31	7.54	14.42	2.92	39.1
8	30.0	42.	5943.37	0.38	2.84	6.26	14.51	2.53	26.3
9	20.0	28.	5943.23	0.23	2.24	4.72	14.66	2.05	13.8
10	10.0	14.	5943.06	0.06	1.12	2.05	15.17	1.05	2.2

***** LISTING OF CARD INPUT DATA ***** PAGE 1

WHARF RESOURCES STORM RUNOFF DAM

DAM SAFETY ANALYSIS (PMP EVENT)

DWNR - WATER RIGHTS

JIM WENDTE 4-5-88

MAIN CONTROL CARD

0.25 0.27 5940. 50. 10. 10.

UNIT HYDROGRAPH DATA

0.72 0.39 0.47 0.27 0.4 47. 28.5

PMP STORM RMF HYDROGRAPH

102. 121. 132. 19. 1.

DAM ELEVATION CAPACITY

4. 5.

5910. 0. 5920. 3. 5930. 12. 5940. 26.3 5943. 32.4

5946. 37.

TYPE 2 SPILLWAY RATING CURVE

2. 6. 5940. 13.

5940. 0. 5941. 5. 5942. 15. 5943. 28. 5944. 43.

5946. 73.

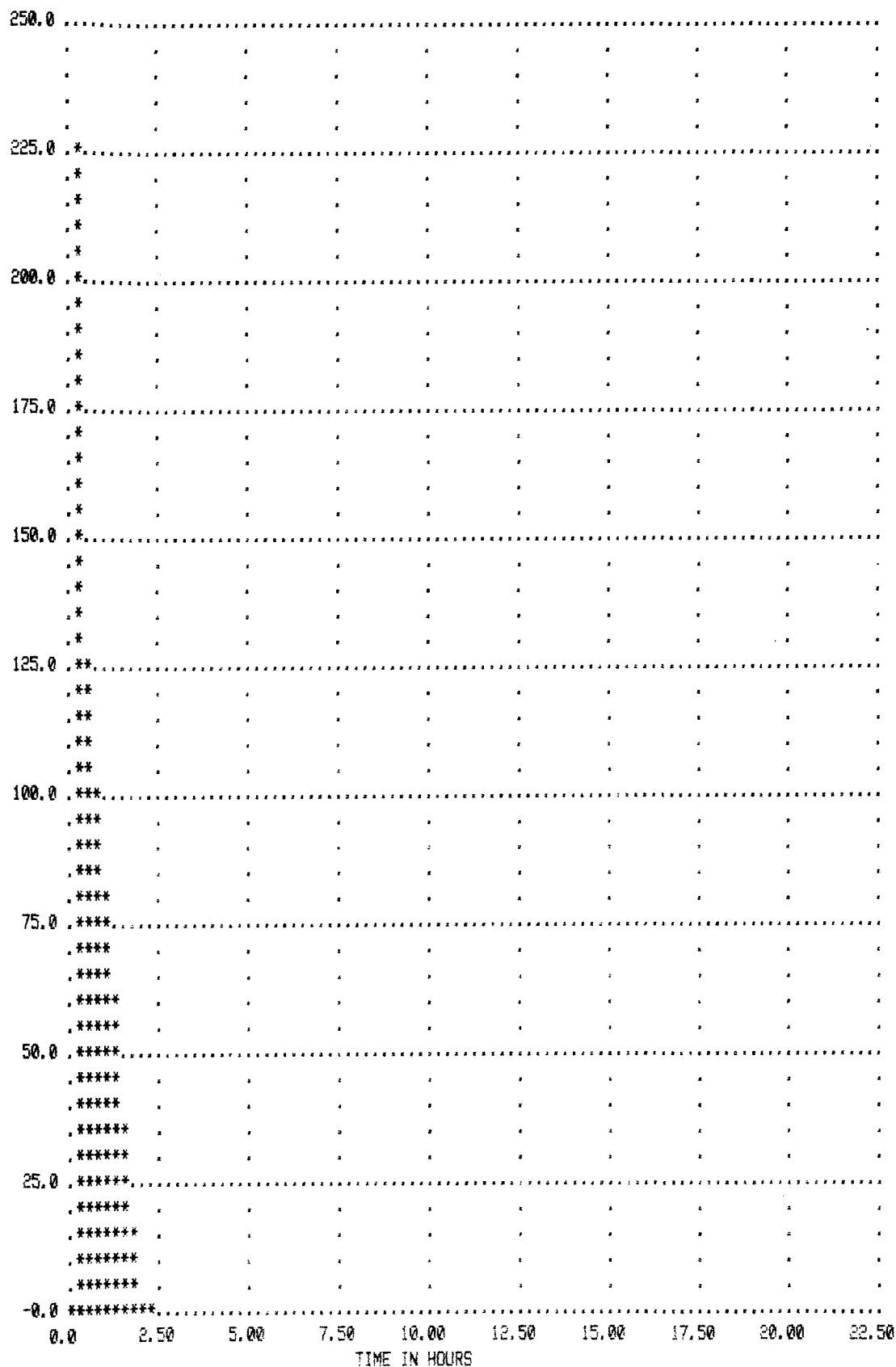
TYPE 3 TOP OF DAM RATING CURVE

3. 5943. 260. 3. 2.9

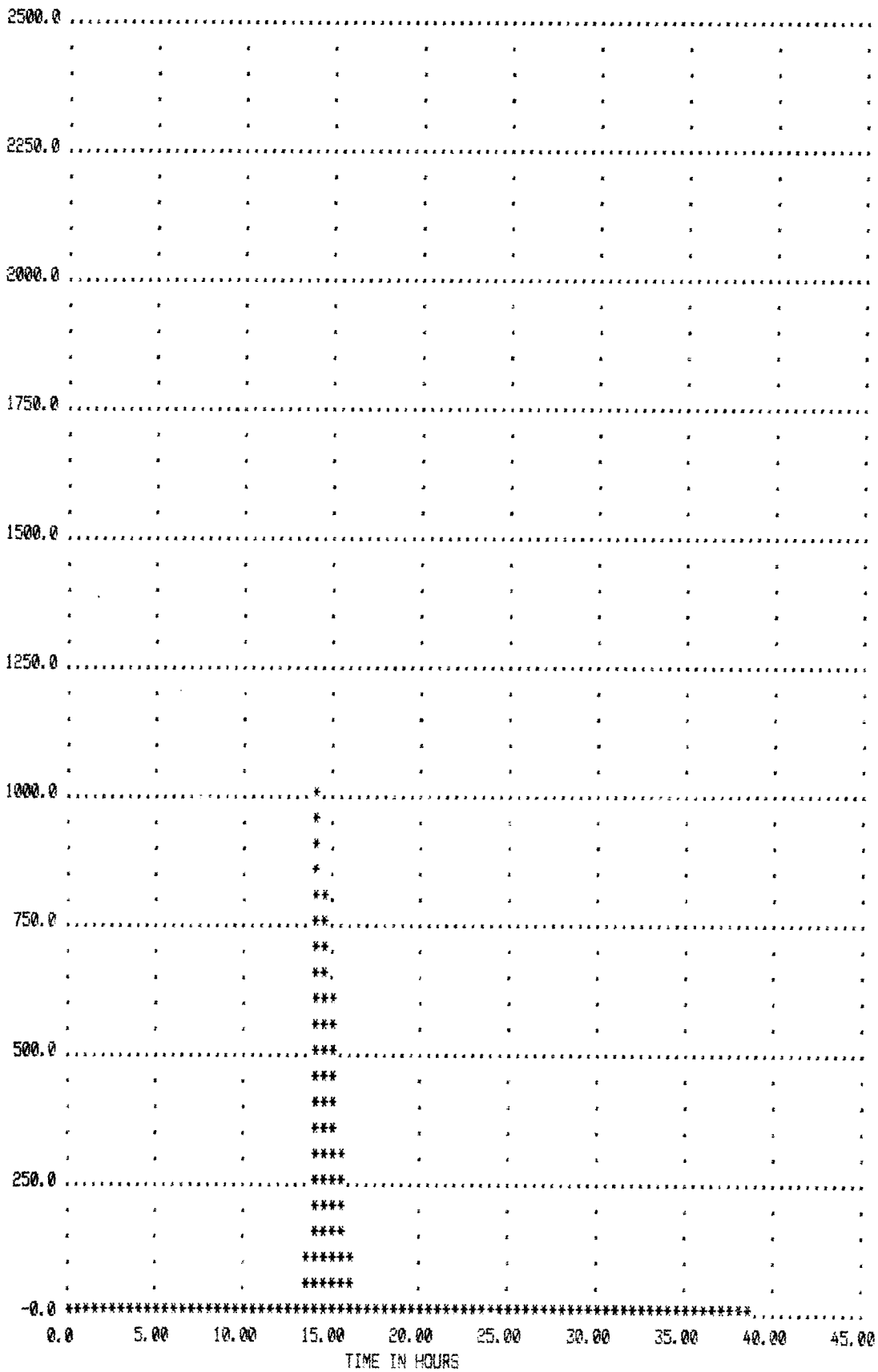
TYPE 0 OUTLET RATING NO OUTLET

0.

FINISHED



DAM INSPECTION HYDROLOGIC ANALYSIS - COMPUTED SNYDERS 0.250 HOUR UNIT HYDROGRAPH
WHARF RESOURCES STORM RUNOFF DAM



DAM INSPECTION HYDROLOGIC ANALYSIS - COMPUTED PROBABLE MAXIMUM FLOOD HYDROGRAPH (LAKE INFLOW HYDROGRAPH)
WHARF RESOURCES STORM RUNOFF DAM

DAM INSPECTION HYDROLOGIC ANALYSIS - SUMMARY OF UNIT HYDROGRAPH ORDINATES AND RAINFALL, LOSS AND EXCESS

WHARF RESOURCES STORM RUNOFF DAM

DAM SAFETY ANALYSIS (PMP EVENT)

DWR - WATER RIGHTS

JIM WENDTE 4-5-88

MAIN CONTROL CARD

SNYDERS 0.250 HOUR UNIT HYDROGRAPH ORDINATES IN CFS AT 0.250 HOUR INTERVALS BEGINNING AT ZERO TIME

0.0	234.1	132.8	107.2	86.3	65.4	44.6	23.7	2.8	0.0
-----	-------	-------	-------	------	------	------	------	-----	-----

PROBABLE MAXIMUM RAINFALL, LOSSES AND EXCESS FOR SUCCESSIVE 0.250 HOUR PERIODS.

[illegible][illegible][illegible][illegible][illegible][illegible][illegible][illegible][illegible][illegible][illegible][illegible]

0.388	0.155	0.388	0.310	0.465	0.388	0.806	0.589	3.023	2.791	0.853	0.698
-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------

[illegible]

0.138	0.0	0.138	0.060	0.215	0.138	0.556	0.339	2.773	2.541	0.603	0.448
-------	-----	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------

0.698	0.620	0.388	0.388	0.388	0.388	0.310	0.310	0.310	0.310	0.233	0.310
-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------

[illegible]

0.448	0.370	0.138	0.138	0.138	0.138	0.060	0.060	0.060	0.060	0.0	0.060
-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-----	-------

[illegible][illegible][illegible][illegible][illegible][illegible]

DAM INSPECTION HYDROLOGIC ANALYSIS - COMPUTED PROBABLE MAXIMUM FLOOD HYDROGRAPH (LAKE INFLOW HYDROGRAPH)

WHARF RESOURCES STORM RUNOFF DAM

DAM SAFETY ANALYSIS (PMP EVENT)

DWR - WATER RIGHTS

JIM WENDTE 4-5-88

MAIN CONTROL CARD

LAKE INFLOW HYDROGRAPH ORDINATES IN CFS AT 0.250 HOUR INTERVALS BEGINNING AT ZERO TIME

[illegible]

DAM INSPECTION HYDROLOGIC ANALYSIS - LAKE ELEVATIONS, STORAGES AND DISCHARGE RATING TABLES

WHARF RESOURCES STORM RUNOFF DAM

LAKE ELEVATION FT,MSL	LAKE STORAGE AC-FT	STORAGE PLUS HALF DISCHARGE AC-FT	OUTLET DISCHARGE C.F.S.	SPILLWAY DISCHARGE C.F.S.	OVER TOP OF DAM C.F.S.	TOTAL DISCHARGE C.F.S.
5946.000	37.000	78.229	0.0	73.000	3917.895	3990.895
5945.000	35.391	58.012	0.0	57.013	2132.633	2189.646
5944.000	33.853	42.086	0.0	43.000	754.000	797.000
5943.000	32.400	32.689	0.0	28.000	0.000	28.000
5942.000	30.215	30.370	0.0	15.000	0.0	15.000
5941.000	28.202	28.254	0.0	5.000	0.0	5.000
5940.000	26.300	26.300	0.0	0.000	0.0	0.000
5939.000	24.310	24.310	0.0	0.0	0.0	0.0
5938.000	22.494	22.494	0.0	0.0	0.0	0.0
5937.000	20.792	20.792	0.0	0.0	0.0	0.0
5936.000	19.219	19.219	0.0	0.0	0.0	0.0
5935.000	17.765	17.765	0.0	0.0	0.0	0.0
5934.000	16.421	16.421	0.0	0.0	0.0	0.0
5933.000	15.194	15.194	0.0	0.0	0.0	0.0
5932.000	14.045	14.045	0.0	0.0	0.0	0.0
5931.000	12.982	12.982	0.0	0.0	0.0	0.0
5930.000	12.000	12.000	0.0	0.0	0.0	0.0
5929.000	10.462	10.462	0.0	0.0	0.0	0.0
5928.000	9.104	9.104	0.0	0.0	0.0	0.0
5927.000	7.923	7.923	0.0	0.0	0.0	0.0
5926.000	6.895	6.895	0.0	0.0	0.0	0.0
5925.000	6.011	6.011	0.0	0.0	0.0	0.0
5924.000	5.231	5.231	0.0	0.0	0.0	0.0
5923.000	4.552	4.552	0.0	0.0	0.0	0.0
5922.000	3.961	3.961	0.0	0.0	0.0	0.0
5921.000	3.447	3.447	0.0	0.0	0.0	0.0
5920.000	3.000	3.000	0.0	0.0	0.0	0.0
5919.000	1.696	1.696	0.0	0.0	0.0	0.0
5918.000	0.959	0.959	0.0	0.0	0.0	0.0
5917.000	0.542	0.542	0.0	0.0	0.0	0.0
5916.000	0.306	0.306	0.0	0.0	0.0	0.0
5915.000	0.173	0.173	0.0	0.0	0.0	0.0
5914.000	0.098	0.098	0.0	0.0	0.0	0.0
5913.000	0.055	0.055	0.0	0.0	0.0	0.0
5912.000	0.031	0.031	0.0	0.0	0.0	0.0
5911.000	0.018	0.018	0.0	0.0	0.0	0.0
5910.000	0.0	0.0	0.0	0.0	0.0	0.0

RECOMMENDATION OF CHIEF ENGINEER FOR WATER PERMIT
APPLICATION NO. 1437-1, Wharf Resources

Pursuant to SDCL 46-2A-2, the following is the recommendation of the Chief Engineer, Water Rights Division, Department of Water and Natural Resources concerning Water Permit Application No. 1437-1, Wharf Resources, PO Box 446, Deadwood SD.

The Chief Engineer is recommending APPROVAL of Application No. 1437-1 because 1) there is reasonable probability that there is unappropriated water available for the applicant's proposed use, 2) the proposed diversion can be developed without unlawful impairment of existing rights, 3) the proposed use is a beneficial use and 4) in the public interest with the following qualification:

That the operation and maintenance of the 26.5 acre-feet sedimentation dam and 70.7 acre-feet storage contingency pond comply with Board Rules Chapter 74:02:08 Safety of Dams and SDCL 46-7-3.

See the attached report for additional information.


JOHN HATCH, Chief Engineer
April 8, 1988

REPORT ON APPLICATION NO. 1437-1
WHARF RESOURCES, INC.
April 8, 1988

Application No. 1437-1, Wharf Resources, Inc. proposes to construct a sedimentation dam (storage capacity of 26.5 acre-feet of water to the outlet elevation) on a dry draw located near the center of the NW 1/4 Section 3, T4N, R2E. In addition, the capacity of a existing contingency pond is to be increased from 62.4 acre-feet to 70.7 acre feet of water stored to the crest elevation. The contingency pond is located in the SE 1/4 SW 1/4 Section 33, T5N, R2E downstream from the pregnant, barren and overflow ponds.

SEDIMENTATION POND:

The sedimentation pond located in the NW 1/4 Section 3, T4N, R2E will control the run off from approximately 170 acres of waste rock from the mining operation. The dam will be 33 feet in height, have a crest length of 260 feet, crest width of 15 feet and will have 3 feet of freeboard. The structure will have an uncontrolled earth spillway 13 feet in width and an outlet and pumping plant consisting of a 30 inch diameter pipe. The outlet will allow pumping of water stored in the sedimentation dam to Annie Creek mine pit for use in the mine.

The proposed sedimentation dam is categorized as a small size category 3 structure. Safety of Dams rules require that a small category 3 dam have a spillway capable of passing a 50 year frequency storm. A 50 year frequency storm over this drainage area would produce a peak run-off of 198 cubic feet per second and yield 13.4 acre-feet of water. The dam as designed would be capable of handling in excess of 100 year frequency storm without overtopping the structure.

CONTINGENCY POND:

Wharf Resources Inc. propose to increase the storage capacity of the existing contingency pond by raising the structure 3 feet. The structure will still be designed for zero discharge and will not have a spillway. The structure is being increased to accommodate the increased surface area gained by the construction of pad #4. Any water accumulating in the pond will be pumped back to the leach pads for re-use.

Conclusions:

1. The sedimentation point as proposed in the submitted plans and specifications will meet the Safety of Dams rules for a small size category 3 dam.
2. The enlargement of the contingency pond will increase the storage to accommodate the additional runoff from the construction of pad #4. The proposed enlargement will meet the requirements for a tailings dam in that there will be no discharge and the capacity will hold a PMP event plus a 100 year frequency storm.



Gale N. Selken, P.E.
Hydrologist



Department of Water & Natural Resources

Joe Foss Building
523 East Capitol
Pierre, South Dakota 57501-3181

April 8, 1988

**NOTE: TO BE SURE OF PUBLICATION ON
THE CORRECT DATES, CONTACT
THE NEWSPAPER RIGHT AWAY.**

Luther J. Russell
Wharf Resources
PO Box 446
Deadwood SD 57732

Dear Mr. Russell:

Your Application No. 1437-1 for a permit to appropriate water for industrial use, has been examined and found to comply with the South Dakota Water Laws and applicable rules. A notice of your intent to appropriate water has been sent to the Publisher of the LEAD DAILY CALL printed at Deadwood SD. Enclosed is a copy of this notice. The recommendation of the Chief Engineer and a report on the application will be following. Please review this notice prior to publication and notify this office, if you have any corrections or questions.

BE SURE TO CONTACT THE ABOVE NEWSPAPER IMMEDIATELY TO AUTHORIZE PUBLICATION OF THE NOTICE OF HEARING AND TO ARRANGE FOR PAYMENT. Early contact with the paper can eliminate delays. The publisher has been instructed to publish the notice once each week for two consecutive weeks with the last publication to occur at least twenty days before the board meeting. We must receive Proof of Publication before the application can be considered by the Water Management Board.

Sincerely,

A handwritten signature in cursive script that reads "Ron Duvall".

RON DUVAL
Natural Resources Engineer
605 773-3352

enclosures



Department of Water & Natural Resources

Joe Foss Building
523 East Capitol
Pierre, South Dakota 57501-3181

April 8, 1988

LEAD DAILY CALL
Box 876
Deadwood SD 57732

Dear Sir:

Enclosed is a Notice of Hearing on Application No. 1437-1 to be published twice. Please publish the first notice on or before April 13, 1988 with the second publication 7 days later.

The APPLICANT MUST VERIFY TO YOU THAT THE NOTICE IS TO BE PUBLISHED, before you make the first publication. Please BILL the APPLICANT for the cost of publication. The APPLICANT is Wharf Resources, PO Box 446, Deadwood SD.

A copy of BOTH publications must be SENT to the WATER RIGHTS DIVISION. IMMEDIATELY return the FIRST publication with the FIRST Transmittal form on the bottom of this page. The first copy is needed to check the publication for errors so any corrections can be made in the second publication. Publication errors can invalidate the public notice and cause the applicant costly delays.

Please be sure the SECOND publication is returned IMMEDIATELY with the enclosed Proof of Publication form. DO NOT WAIT until the end of the month or the billing cycle. The permit application cannot be considered by the Water Management Board until proof of publication has been received.

Sincerely,

Ron Duvall
Natural Resources Engineer
605 773-3352

enclosures

-----CUT HERE-----

FIRST TRANSMITTAL NOTICE
No. -----

TO: Water Rights Division
Joe Foss Building
Pierre SD 57501-3181

Date -----

We are in receipt of your letter of ----- enclosing Notice of Hearing to Appropriate Water by Application No. ----- which was first published in our issue of ----- . ENCLOSED IS A COPY OF THIS FIRST PUBLICATION.

Name

Newspaper

Instruction to Newspaper - Publish first publication of the following Notice on or before April 13, 1988 with 2nd publication 7 days later. The applicant is responsible for payment.

NOTICE OF HEARING on Application No. 1437-1 to Appropriate Water

Notice is hereby given that Wharf Resources whose mailing address is PO Box 446, Deadwood, South Dakota has filed an application for a permit to construct a sedimentation dam (storage capacity of 26.5 acre-feet of water to the outlet) on a dry draw. The sedimentation dam is to be located in Ross Valley near the center of the NW1/4 section 3-T4N-R2E. Water is to be stored to an approximate outlet elevation of 5940 feet mean sea level (msl) with the crest of the sedimentation dam at approximately 5943 feet msl. The sedimentation dam is to be constructed below a spent-ore disposal site to prevent runoff from leaving the site. Water impounded by the sedimentation dam is to be allowed to evaporate and excess water is to be diverted to the Annie Creek mine pit. Water diverted to the Annie Creek mine pit may be used for dust control purposes.

The capacity of the existing contingency pond is also to be increased from 62.4 acre-feet to 70.7 acre-feet of water (storage capacity at crest elevation) with a new crest elevation at approximately 6003 feet msl. The contingency pond is located in the SE1/4 SW1/4, SW1/4 SE1/4 section 33-T5N-R2E downstream from the pregnant, barren and overflow ponds. The purpose of the contingency pond is to contain excess runoff from the heap leach pads and the three upstream ponds due to precipitation events. Water collected in the contingency pond is recycled into the leach process.

This application is to authorize completion of the above described works for the existing heap leach ore-processing facility operated by Wharf Resources. The proposed works will also comply with the Safety of Dams Rules Chapter 74:02:08.

Pursuant to SDCL 46-2A-2 the Chief Engineer of the Water Rights Division recommends APPROVAL of Application No. 1437-1 with qualifications because 1) unappropriated water is available, 2) will be no unlawful impairment of existing rights, 3) it is a beneficial use of water and 4) it is in the public interest.

The application will be considered by the Water Management Board in Room 216, Joe Foss Bldg, 523 E Capitol, Pierre SD on May 12, 1988 at 10:00 am.

The recommendation of the Chief Engineer is not final or binding upon the Board and the Board is authorized to 1) approve, 2) approve with qualifications, 3) defer, or 4) deny the application after it reaches a conclusion based upon facts presented at the public hearing. Any interested person who may be affected by a Board decision and who intends to participate in the hearing before the Board and present evidence or cross-examine witnesses according to SDCL 1-26, must file a written petition with BOTH the applicant and the Chief Engineer by April 29, 1988. The petition may be informal, but it must include a statement describing the petitioner's interest in the application, the reasons for the petitioner's opposition to or support of the application, and the signature and mailing address of the petitioner or his legal counsel if legal counsel is obtained. The applicant need not file a petition.

(continued)

This application is made pursuant to the provisions of SDCL 46-1-1 thru 46-1-9, 46-1-12 thru 46-1-15; 46-2-3.1, 46-2-9, 46-2-11, 46-2-13, 46-2-17; 46-2A-1 thru 46-2A-10, 46-2A-12, 46-2A-14, 46-2A-15, 46-5-1 thru 46-5-11, 46-5-13 thru 46-5-15, 46-5-24, 46-5-25, 46-5-30.2, 46-5-30.4, 46-5-31; and Board Rules ARSD 74:02:01:01 thru 74:02:01:15.

This hearing is an adversary proceeding. The applicant or any person, after filing a petition, has the right to be present or to be represented by a lawyer. These and other due process rights will be forfeited if they are not exercised. Decisions of the Board may be appealed to the Circuit Court and State Supreme Court as provided by law.

Any person wishing a copy of the Chief Engineer's recommendation, further information on this application or to assure access to the hearing by the handicapped can contact the Water Rights Division, Joe Foss Bldg, Pierre SD (605 773-3352) for assistance prior to the hearing date. The time of the hearing will be automatically extended for at least twenty days upon written request of the applicant or person who has filed a petition to oppose or support the application. The request for extension must be filed with the Chief Engineer by April 29, 1988.

AFFIDAVIT OF PUBLICATION

STATE OF SOUTH DAKOTA, { ss.
COUNTY OF LAWRENCE

Jimmie R. Stephenson, of said county and state, being
duly sworn, on his oath says: That the Lead Daily Call Deadwood Pioneer Times
is a legal newspaper of general circulation, printed and published in Lead,
in said county and state, by the Seaton Publishing Company, and has been
such a newspaper during the times hereinafter mentioned; and that I,
Jimmie R. Stephenson, the undersigned, am the
Business Manager of the said newspaper, in charge of the advertising
department thereof, and have personal knowledge of all the facts in this
affidavit, and that the advertisement headed NOTICE OF HEARING

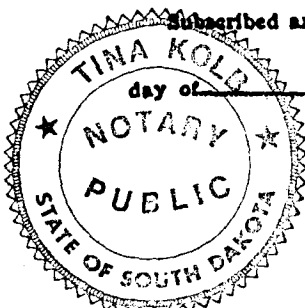
a printed copy of which is hereto attached, was printed in said newspaper
for TWO successive and consecutive WEEKS, the respective publi-
cations thereof being made on April 13, 1988

and on _____, 19____
_____, 19____
_____, 19____
_____, 19____
_____, 19____
_____, 19____
and the last publication thereof on April 20, 1988

and that the full amount of fees charged for publishing the same, to-wit:
the sum of \$ 87.00, inures solely to the benefit of aforesaid
publisher and that no arrangement or understanding for a division thereof
has been made with any person other than the publisher, and that no part
thereof has been agreed to be paid to any other person, whomsoever.

Subscribed and sworn to before me this 20th

April 19 88



Tina Kold
Notary Public, Lawrence County, S. Dak.
My Commission
Expires April 2, 1995
My commission expires _____, 19____

NOTICE OF HEARING on Application No. 1437-1 to Appropriate Water

Notice is hereby given that Wharf Resources whose mailing address is PO Box 446, Deadwood, South Dakota has filed an application for a permit to construct a sedimentation dam (storage capacity of 26.5 acre-feet of water to the outlet) on a dry draw. The sedimentation dam is to be located in Ross Valley near the center of the NW 1/4 section 3-T4N-R2E. Water is to be stored to an approximate outlet elevation of 5940 feet mean sea level (msl) with the crest of the sedimentation dam at approximately 5943 feet msl. The sedimentation dam is to be constructed below a spent-ore disposal site to prevent runoff from leaving the site. Water impounded by the sedimentation dam is to be allowed to evaporate and excess water is to be diverted to the Annie Creek mine pit. Water diverted to the Annie Creek mine pit may be used for dust control purposes.

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This application is to authorize completion of the above described works for the existing heap leach ore-processing facility operated by Wharf Resources. The proposed works will also comply with the Safety of Dams Rules Chapter 74:02:08.

Pursuant to SDCL 46-2A-2 the Chief Engineer of the Water Rights Division recommends APPROVAL of Application No. 1437-1 with qualifications because 1) unappropriated water is available, 2) will be no unlawful impairment of existing rights, 3) it is a beneficial use of water and 4) it is in the public interest.

The application will be considered by the Water Management Board in Room 216, Joe Foss Bldg., 523 E. Capitol, Pierre, SD on May 12, 1988 at 10:00 a.m.

The recommendation of the Chief Engineer is not final or binding upon the Board and the Board is authorized to 1) approve, 2) approve with qualifications, 3) defer, or 4) deny the application after it reaches a conclusion based upon facts presented at the public hearing. Any interested person who may be affected by a Board decision and who intends to participate in the hearing before the Board and present evidence or cross-examine witnesses according to SDCL 1-26, must file a written petition with BOTH the applicant and the Chief Engineer by April 29, 1988. The petition may be informal, but it must include a statement describing the petitioner's opposition to or support of the application, and the signature and mailing address of the petitioner or his legal counsel if legal counsel is obtained. The applicant need not file a petition.

The application is made pursuant to the provisions of SDCL 46-1-1 thru 46-1-9, 46-1-12 thru 46-1-15; 46-2-3.1, 46-2-9, 46-2-11, 46-2-13, 46-2-17; 46-2A-1 thru 46-2A-10, 46-2A-12, 46-2A-14, 46-2A-15, 46-5-1 thru 46-5-11, 46-5-13 thru 46-5-15, 46-5-24, 46-5-25, 46-5-30.2, 46-5-30.4, 46-5-31; and Board Rules ARSD 74:02:01.01 thru 74:02:01:15.

This hearing is an adversary proceeding. The applicant or any person, after filing a petition, has the right to be present or to be represented by a lawyer. These and other due process rights will be forfeited if they are not exercised. Decisions of the Board may be appealed to the Circuit Court and State Supreme Court as provided by law.

Any person wishing a copy of the Chief Engineer's recommendation, further information on this application or to assure access to the hearing by the handicapped can contact the Water Rights Division, Joe Foss Bldg., Pierre, SD (605-773-3352) for assistance prior to the hearing date. The time of the hearing will be automatically extended for at least twenty days upon written request of the applicant or person who has filed a petition to oppose or support the application. The request for extension must be filed with the Chief Engineer by April 29, 1988.



P. O. Box 732 • Lead, South Dakota 57754

June 16, 1988



Mr. John Hatch
Water Rights Division
Department of Water and Natural Resources
Joe Foss Building, 4th floor
523 East Capitol
Pierre, South Dakota 57501-3181

Dear John:

On behalf of the South Dakota Mining Association, I'd like to follow up on our conversation in your office on Friday, June 10, in regard to development of regulations to address dam and pond facilities which contain chemically altered solutions.

As we discussed, it has become obvious that the existing regulations on tailing impoundment structures and stock watering dams (ARSD 74:02:08) cannot be stretched to reasonably apply to heap leach facilities or other structures that contain processed contaminated water. New regulations would clarify the requirements for such structures and meet our mutual goal of ensuring the public health and safety of the citizens of South Dakota, while not imposing unrealistic criteria on their construction.

The Association would like to take an active role in developing regulations in connection with these types of facilities. The regulations should address the design criteria and construction standards for heap leach facilities and other process contaminated solution storage facilities. The South Dakota Mining Association's Environmental Committee will meet on Tuesday, June 21, to discuss our involvement in developing regulations in this regard.

I will keep you apprised of the results of our June 21 meeting and look forward to working with you and the Mining Division of the Department of Water and Natural Resources in development of workable regulations.

Sincerely,

Luther J. Russell, Chairman
Environmental Committee

LJR/lkm

CC: Bob Townsend
Environmental Committee

"Rock Solid For South Dakota's Future"



WHARF RESOURCES

(A Montana General Partnership)

Wharf Resources Ltd.

Wharf Resources (U.S.A.) Inc.

June 20, 1988

CERTIFIED/RETURN RECEIPT P-514 166 008

Mr. John Hatch
Water Rights Division
Department of Water and Natural Resources
Joe Foss Building, 4th Floor
523 East Capitol
Pierre, South Dakota 57501-3181



RE: Process Facility -
Safety of Dams Regulations

Dear John:

This letter is written as a follow-up to the meeting that Marv Truhe and I had with you, members of your staff, and Harold Deering on June 10, 1988 regarding the applicability of the Safety of Dams regulations to the process facilities and ponds of Wharf Resources. In my letter to you of March 28, 1988, I summarized our position regarding many of the issues, so the purpose of this letter is to supplement that prior letter and also summarize our discussions with you following this last meeting.

1. ARSD 74:02:08:07.03. This section of the Safety of Dams regulations describes the construction requirements for "tailings" dams. The questions was raised as to whether the process, neutralization, overflow, or the contingency ponds would be classified as tailings dams. "Tailings" is specifically defined in SDCL 45-6B-3(14) as "the discharged valueless product of a beneficiation process". The process ponds contain a valuable dilute cyanide solution which is used in the processing of the gold ore and that solution which contains gold and silver is, of course, even more valuable. The sole purpose of the overflow and contingency pond is to prevent this valuable solution (whether it be the pregnant solution or the barren solution) from escaping into the environment. Accordingly, at no time would it ever be contemplated that any of the process ponds or facilities would contain "tailings".

2. Mining Division Requirements. As we indicated, the Mining Division requirements for the design and storage capacity of the process facility ponds are that they be able to contain the PMP event. This is a much more stringent standard than even the EPA requires with regard to process facilities and we feel that it is an

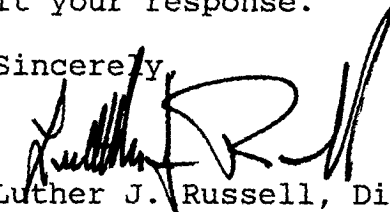
Mr. John Hatch
June 20, 1988
Page Two

extremely conservative and more than adequate standard. Accordingly, we would request that the maximum required storage capacity for the process facilities be the PMP event. Since we are dealing with a process solution and not with tailings, it is also important to point out that should the PMP event occur (or anything even close to it), the already dilute cyanide solution would be further diluted to a tremendous degree such that the solution itself would be of far less concern than the effects the PMP event would have on watersheds and drainages throughout the area.

3. Neutralization of Solution. Our design of the contingency pond allows for the immediate neutralization with hydrogen peroxide of any solution that might ultimately flow into that pond. In fact, this neutralization solution is always available and there is a storage tank immediately adjacent to the contingency pond for this purpose. This additional safety factor and design further distinguishes this type of facility from other facilities that might contain contaminated solutions and alleviates concerns about contaminated solutions finding their way into watersheds outside the process areas.

Accordingly, we would request that you treat this letter as our formal request to the Water Rights Division of the Department of Water and Natural Resources for approval of the designs of the process, neutralization, overflow and contingency ponds to contain, without discharge, the PMP event. The plans and specifications which have been submitted to the Department for additional construction work on the contingency pond are consistent with this standard and would meet that requirement. Thank you for your consideration and we will await your response.

Sincerely,



Luther J. Russell, Director
Governmental/Environmental Affairs

LJR/lkm

CC: Marvin D. Truhe
John A. Lawson
Robert B. Barnes
Contingency Pond File



P. O. Box 732 • Lead, South Dakota 57754



June 23, 1988

Mr. John Smith
Department of Water and Natural Resources
Joe Foss Building, 4th Floor
523 East Capitol
Pierre, South Dakota 57501-3181

Dear John:

As you are aware, numerous regulatory developments are being considered by your staff that will affect the South Dakota mining industry. The South Dakota Mining Association would like to offer its assistance in every way possible to develop pragmatic regulations that achieve our mutual goal of protecting human health and the environment while still providing the industry flexibility to continue operations in the State of South Dakota.

In this regard, the Association, through our Environmental Committee and discussions with your staff, have identified needs in the following regulatory areas:

1. Revision and clarification of the Air Quality regulations to address, among others, administrative procedures, baseline/modeling requirements, and permitting procedures;
2. Clarification of existing solid waste regulations to address mining wastes;
3. Development of new regulations to address storage impoundments of processed contaminated water; and
4. Design specification regulations for cyanidation facilities, specifically heap leach operations.

We have contacted key personnel on your staff, specifically Joel Smith, Steve Pirnir and John Hatch, in regard to the above issues and, through our Environmental Committee, will propose specific language for Departmental review. We would like to invite these key individuals, as well as others you may select, to visit with our committee to discuss these issues and help focus in on the shortcomings of the existing regulations. In addition, we

"Rock Solid For South Dakota's Future"

Mr. John Smith
June 23, 1988
Page Two

believe the South Dakota School of Mines and Technology could serve a vital role in coordinating the development of regulations in these areas. As the State has already solicited technical assistance from the School of Mines, e.g. review of the Golden Reward permit application, this would be a natural extension of their involvement with your Department.

A cooperative effort between the School of Mines, the Department, and the mining industry of South Dakota could develop a working draft of regulations in each of these areas, to be disseminated for further review and ultimate promulgation by the Board of Minerals and Environment.

John, it's our intention that we maintain the developed lines of communication as a basis for an ongoing working relationship with your Department. I await your response to this proposal.

Sincerely,

A handwritten signature in black ink, appearing to read 'Luther J. Russell', with a large, stylized 'R' at the end.

Luther J. Russell, Chairman
Environmental Committee

CC: Duff Erickson
John Hatch
Joel Smith
Bob Townsend
Steve Pirnir
SDMA Environmental Committee

 **Department of
Water & Natural Resources**

Joe Foss Building
523 East Capitol
Pierre, South Dakota 57501-3181

July 8, 1988

Luther J. Russell, Director
Governmental/Environmental Affairs
Wharf Resources
PO Box 446
Deadwood SD 57732-0446

Dear Mr. Russell:

I am writing in response to your letter dated June 20, 1988 concerning our June 10, 1988 meeting. At the meeting, we discussed the applicability of the Safety of Dams rules to the Wharf Resources process facilities and ponds. We also discussed your request for approval of the designs of the process, neutralization, overflow and contingency ponds to contain, without discharge, the PMP event.

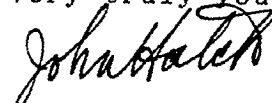
We have reviewed the plans and specifications for the Wharf Resources process, neutralization, overflow and contingency ponds. Since these facilities are no longer considered as "tailings" dams, the Office of Exploration and Mining's requirement for the design and storage capacity of the process facility ponds to contain, without discharge, the PMP event will be used. The plans and specifications as submitted are approved.

Our review was to determine compliance with the requirement for the process facility ponds to contain the PMP event. Approval applies only to the portion of the plans and specifications that involve the storage of the PMP event. Approval of these plans and specifications does not release Wharf Resources from the responsibility for operating and maintaining the facilities in good repair to assure safety.

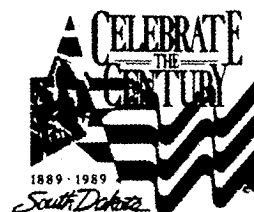
As we discussed before, we will need to make some changes to our Safety of Dams Rules, Chapter 74:02:08 addressing mining operation facilities containing contaminated water. We are planning to work with you on this.

If you have any questions regarding this matter, please contact us.

Very truly yours,



John Hatch, Chief Engineer
Water Rights Division
605 773-3352





Department of Water & Natural Resources

Joe Foss Building
523 East Capitol
Pierre, South Dakota 57501-3181

July 11, 1988

Luther J Russell, Director
Wharf Resources
PO Box 446
Deadwood SD 57732

Dear Mr. Russell:

I am writing in response to your conversation with Tim Schaal and Ron Duvall, Division engineers, on July 8, 1988 regarding tailings dams. You advised that you or Marv Truhe would like to discuss the definition of tailings dams with the Water Management Board at the July Board meeting. The request to discuss the PMP plus 100 year flood requirements for tailings dams and the definition of tailings dams was also made during the May 12, 1988 Board meeting.

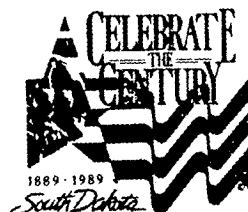
We have scheduled time for you to discuss this with the Water Management Board at 1:30 pm on July 27, 1988 in Room 216, Joe Foss Building, 523 E Capitol, Pierre SD. The agenda time is an estimate. The actual time may be later than 1:30 pm due to prior agenda items.

Please contact us if you have any questions

Very truly yours,

John Hatch, Chief Engineer
Water Rights Division
605 773-3352

cc: Daniel Doyle, Assistant Attorney General
Marv D Truhe, Attorney



**SOUTH Dakota Department of
Water & Natural Resources**

Joe Foss Building
523 East Capitol
Pierre, South Dakota 57501-3181

NOV 23 1988

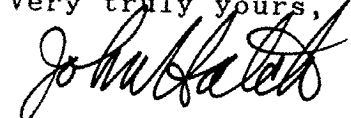
Wharf Resources
PO Box 446
Deadwood, South Dakota 57732

Dear Sir:

Enclosed is Water Permit No. 1437-1 as approved by the Water Management Board authorizing you to construct your water diversion system and put the water to beneficial use, not exceeding the limits as specified in Water Permit No. 1437-1.

Also enclosed is Form 10, Notice of Completion of Works and Application of Water to Beneficial Use, which you are to complete and submit to the Chief Engineer when you have completed the system and/or have put the water to beneficial use. An inspection can then be scheduled so that the Water License may be issued, thus completing your acquisition of a Water Right.

Very truly yours,



JOHN HATCH, Chief Engineer
Water Rights Division
605 773-3352

JH: ms

enclosure

PLEASE NOTE: Certain changes can be made in your permit within the five year construction period, usually without affecting the priority date provided an application to amend your permit is made within the five year period - i.e. changes in location or number of diversion points (wells) or location of land to be irrigated. Well locations for wells into the same aquifer can be moved up to 660 feet without application.

Applications to amend a permit after the five year construction period will be assigned a new priority date. Applications to change water sources, to add lands or increase original diversion rates, if approved will usually receive the date of the new application as a priority date regardless of the five year construction period.

SOUTH Dakota Department of
Water & Natural Resources

Joe Foss Building
523 East Capitol
Pierre, South Dakota 57501-3181

March 13, 1990

John A. Lawson
Environmental Coordinator
Wharf Resources
P.O. Box 446
Deadwood, South Dakota 57732

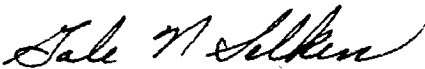
Dear Mr. Lawson:

We have reviewed the plans and specifications for the Expansion of the Wharf Resources Heap Leach Pads 1, 2, and 3, and the Neutralization and Contingency Ponds. The plans and specifications as submitted are approved.

Our review was to determine compliance with the requirement of Section 74:02:08:07.04 of the Safety of Dams Rules for the facility to contain design operating volumes from the operation plus the PMP event falling on the facility. Our approval applies only to the portion of the plans and specifications that involves the Hydrologic Analysis for the proposed expansions. Approval of these plans and specifications does not release Wharf Resources from the responsibility for operating and maintaining the facility in good repair to assure its safety.

If you have any questions regarding this matter, please contact us.

Sincerely,



Gale N. Selken, P.E.
Natural Resources Engineer IV
for John Hatch, Chief Engineer
Water Rights Division
605 773-3352

cc: Mike Cepak, Office of Minerals and Mining

RECEIVED

JAN 16 1990

MINERALS & MINING

TECHNICAL REVISION FOR THE EXPANSION OF HEAP LEACH PADS 1,
2, AND 3, AND THE NEUTRALIZATION AND CONTINGENCY PONDS

Submitted to the South Dakota Department of Water and
Natural Resources

January 17, 1990

Wharf Resources
Annie Creek/Foley Ridge Mine

Deadwood, South Dakota



WHARF RESOURCES

(A Montana General Partnership)

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Wharf Resources Ltd.

Wharf Resources (U.S.A.) Inc.

January 17, 1990

Mr. Mike Cepak
Department of Water and Natural Resources
Joe Foss Building
523 East Capitol
Pierre, South Dakota 57501-3181

RE: TECHNICAL REVISION FOR THE EXPANSION OF THREE HEAP
LEACH PADS AND TWO PONDS

Dear Mike:

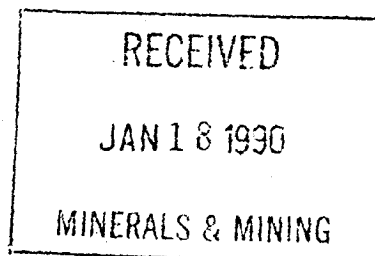
Enclosed is a proposed technical revision to expand the capacity of three heap leach pads, as well as the neutralization and contingency ponds. The project is presented in text and supported by the plans and specifications in the Appendix.

The concept for this expansion was first introduced to the Department last November (1989) in the form of a prospectus. Since that time, we have completed design of the planned changes and formally present them here for your review.

The planned expansion will involve disturbance of 3.6 acres of previously undisturbed ground within the permit boundary. Should the 1990 Legislature enact the proposed "moratorium" legislation that requires an acre for acre trade off for additional disturbed lands for technical revisions (i.e. acreages reclaimed or non-disturbed but permitted for new disturbance), the proposed new disturbance (3.6 acres) can be balanced against the permitted but undisturbed acres associated with the heap leach pads. Those acreages (nine total) were presented in the October, 1989, reclamation bond update.

As explained in the November, 1989, Prospectus, expansion of the leach pads is essential to maximize leach cycle times and ultimately gold recovery. The addition of the ponds, for solution management, corresponds to the pad increase.

Mr. Mike Cepak
Page 2



If during the review of the proposed plan you should develop some questions, please contact Carlos Calderon (Ext. 145), or me (Ext. 111) for assistance.

Sincerely,

A handwritten signature in cursive script, appearing to read "John A. Lawson".

John A. Lawson
Environmental Coordinator

JAL/bls

Enclosure

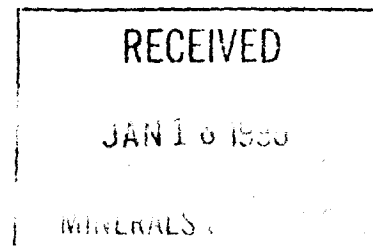
CC: Bob Barnes
Luke Russell
Carlos Calderon
Kent McGrew
Ron Sieg
Chuck Logan
203-08-06-22
S:word:tr-cov



FMG, INC. 1823 West Main, Rapid City, South Dakota 57702-2591 605/342-4105
FAX 605/342-4222

January 17, 1990

Mr. Carlos Calderon
Wharf Resources, U.S.A., Inc.
P.O. Box 446
Deadwood, S.D. 57732



RE: Hydrologic Analysis for Pond and Pad Expansion Project

Dear Carlos:

Presented herein is the HYDROLOGIC ANALYSIS FOR EXPANSION OF PONDS AND PADS 1, 2, AND 3. This report serves as supplemental information to the Engineering Plans and Specifications prepared by FMG, Inc., for the project. The analysis is intended to provide information and guidance to Wharf Resources during construction and operation of the facility.

Please be assured of our readiness to meet with you to discuss the contents of the report. We are available to answer any questions you may have.

Thank you for the opportunity to be of service.

Respectfully submitted,

FMG, Inc.

Jerry D. Foster P.E.

cc: File 6878.04

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HYDROLOGIC ANALYSIS

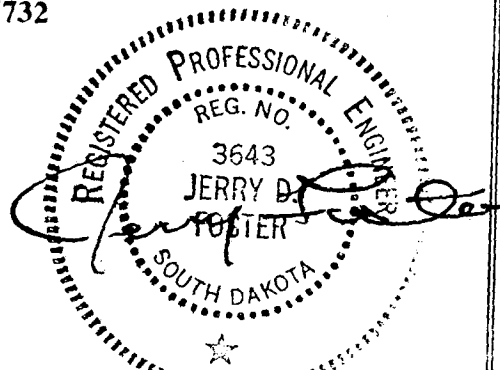
FOR

EXPANSION OF PONDS & PADS 1, 2, & 3
ANNIE CREEK & FOLEY RIDGE MINES
NEAR LEAD, S.D.

January, 1990

PREPARED FOR:

CARLOS CALDERON
WHARF RESOURCES, U.S.A., INC.
P.O. BOX 446
DEADWOOD, S.D. 57732



FMG, INC. 1823 West Main, Rapid City, South Dakota 57702-2591 605/342-4105
FAX 605/342-4222

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INTRODUCTION

Wharf Resources U.S.A., Inc. intends to expand existing Pads 1, 2, and 3 and the Contingency and Neutralization Ponds at the Annie Creek and Foley Ridge Mines near Lead, S.D. The Barren and Overflow Ponds will also be patched as part of the project.

This report is considered as supplemental information to the Engineering Plans and Specifications prepared by FMG, Inc., for the project. All improvements discussed in this report have been incorporated into the Project Plans and Specifications. Liner requirements for the improvements are included in the Plans and Specifications.

PMP PEAK DISCHARGE RATES

Peak discharge rates for the Probable Maximum Precipitation (PMP) event were calculated so that existing and/or proposed stormwater management facilities could be evaluated. Peak discharges were calculated for each total expanded pad. In order to properly analyze the project it was also necessary to calculate discharges for other areas which are (1) existing pad 4, (2) an offsite area to be diverted around the south side of the Contingency Pond, (3) the lined slope at the toe of Pad 2, and (4) a portion of new Pad 3 which will drain to a new intermediate pipeline.

The PMP event used in the analysis is a 6-hour 19.6 inch rainfall. In accordance with the original scope of work provided by Wharf Resources, the PMP distribution assumed 10% of the total rainfall in the first hour, 12% in the second hour, 15% in the third hour, 38% in the fourth hour, 14% in the fifth hour, and 11% in the sixth hour.

Peak discharges were calculated using the U.S. Army Corps of Engineers HEC-1 computer model. HEC-1 subroutines used in the analysis were the SCS Dimensionless Unit Graph and Initial and Uniform Loss Rates.

To provide a worst case scenario pads were assumed to be fully loaded. A fully loaded pad with steep slopes reduces the time of concentration and thus increases peak runoff rates. Times of concentration for use in HEC-1 lag time input were determined from standard engineering equations and charts. Lengths, slopes, and areas were determined from grading plans and topographic maps.

Pads were assumed to have an initial rainfall loss of only 0.1 inch since they will be previously wetted from solution spraying. Initial loss for lined areas was assumed as zero and the initial loss for the offsite diversion area was assumed as 0.6 inch. A uniform infiltration rate for the pads was assumed as 0.6 inches/hour. Lined areas were assumed to have no infiltration loss and the offsite area was assumed to have an infiltration loss of 0.6 inches/hour.

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Discharge

Results of the runoff calculations are summarized as Table 1. hydrographs for the pads are included at the rear of the report as Figures 1, 2, 3, and 4. A complete computer printout is included in the rear pocket.

TABLE 1
PMP PEAK DISCHARGES

BASIN DESCRIPTION	BASIN SIZE (ACRES)	PEAK DISCHARGE (CFS)
EXPANDED PAD 1	14.9	102
EXPANDED PAD 2	16.1	111
EXPANDED PAD 3	19.5	133
EXISTING PAD 4	13.3	93
LINED SLOPE AT TOE OF PAD 2	1.5	10
PORTION OF PAD 3 TO INTERMEDIATE PIPE	2.0	13
OFFSITE AREA DIVERTED SOUTH OF CONTINGENCY POND	18.5	128

PAD OUTLET STRUCTURES

Existing and/or proposed outlet structures for Pads 1, 2, and 3 were evaluated to determine if they were capable of discharging the PMP peak discharges (shown on Table 1) resulting from the expansion of the pads. Each structure was evaluated for process and neutralization flows. The Pad 4 outlet was evaluated previously by Wharf Resources and its capacity meets the flow criteria without creating split flows.

Stage/discharge relationships were developed for each outlet. Weir capacity was determined using the standard weir equation where $Q = C \times L \times H^{1.5}$. C coefficient values were taken from Kings Handbook of Hydraulics. Weir coefficients were varied with depth of overflow and weir lengths were adjusted for end contractions. Pipe and orifice capacities were determined using standard engineering equations and charts. As a safety factor no flow in the plant pipe was assumed since the mesh screen on the pipe is expected to plug during the PMP event.

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Pad 1

The existing outlet structure on Pad 1 is a combination 36 inch CMP and concrete orifice/weir structure. The outlet is capable of discharging the PMP peak flow (102 cfs) during either neutralization or process operations and no improvements are necessary.

During neutralization operations the 36 inch CMP conveys the primary neutralization discharge and the concrete overflow weir is utilized for secondary neutralization discharge. The rectangular orifice in the wall is closed during neutralization. The pipe flow is discharged to the existing neutralization pipeline and the weir overflow is discharged to the process ditch. The 36 inch pipe will discharge 50 cfs before weir flow begins. During the PMP event (102 cfs) the pipe will discharge approximately 62 cfs and 40 cfs will be discharged through the overflow weir. Maximum pipe capacity is 62 cfs and maximum weir capacity is 43 cfs (total of 105 cfs) therefore essentially no safety factor or freeboard is available. No modifications are proposed to provide freeboard since any overtopping flow would be confined to lined slopes and intercepted by lined ditches.

During process operations the 36 inch CMP will be closed. Process flows will discharge through the rectangular orifice and through the overflow weir. Both devices discharge to the process ditch. The orifice will discharge 65 cfs before weir flow begins. During the PMP event (102 cfs) the orifice will be discharging approximately 72 cfs and 30 cfs will be discharging through the overflow weir. Maximum orifice capacity is 76 cfs and maximum weir capacity is 43 cfs (total of 119 cfs) therefore a small capacity safety factor with approximately 0.2 foot of freeboard is present.

Pad 2

The existing outlet structure on Pad 2 is a concrete wall with two weirs. The weirs have different lengths and elevations. The outlet is capable of discharging the PMP peak flow (111 cfs) during either neutralization or process operations and no improvements are necessary.

During neutralization operations the lower weir acts as the primary neutralization weir and the upper weir acts as the secondary neutralization weir. Primary neutralization flow is discharged to the neutralization pipeline and the secondary neutralization weir discharges to the process ditch. The primary weir will pass 38 cfs before secondary weir flow begins. During the PMP event (111 cfs) the primary weir will discharge approximately 69 cfs and 42 cfs will be discharged through the secondary weir. Maximum capacity of the primary weir is 114 cfs and maximum capacity of the secondary weir is 157 cfs (total of 271 cfs) therefore a significant capacity safety factor is present along with approximately 1.5 feet of freeboard.

During process operations the lower weir will be closed and all flow (111 cfs) will be discharged through the upper weir. The upper weir capacity is 157 cfs therefore a

substantial safety factor for flow capacity is present. Freeboard is approximately 0.5 feet.

Pad 3

The existing Pad 3 outlet consists of a graded weir system of inadequate capacity. A weir system was designed for Pad 3 by FMG, Inc., in August of 1989 as part of the neutralization pipeline project however it has not yet been built. The Pad 3 outlet system has now been redesigned as part of this pond and pad expansion project.

The redesigned outlet structure consists of a concrete weir and graded weir. The weirs are of differing elevations and lengths. The concrete weir is the lower of the weirs.

During neutralization operations the concrete weir acts as the primary neutralization weir and the graded weir acts as the secondary neutralization weir. Primary neutralization weir flow is discharged to the neutralization pipeline and the secondary neutralization weir is discharged to the process ditch. The primary weir will pass 34 cfs before secondary weir flow begins. During the PMP event (133 cfs) the concrete primary weir will discharge approximately 68 cfs and 65 cfs will be discharged through the graded secondary weir. Maximum capacity of the primary weir is 112 cfs and maximum capacity of the secondary weir is 241 cfs (total of 355 cfs) therefore a significant safety factor for flow capacity is available. Freeboard of 1.1 feet is present before the concrete wall overtops. An additional 0.5 feet of freeboard is provided by a raised berm on the west side of the graded weir resulting in a total of 1.6 feet of freeboard against spillage to unlined areas.

During process operations the concrete weir will be closed and all flow (133 cfs) will be discharged through the graded weir. The weir capacity is 241 cfs therefore a significant safety factor for flow capacity is present. Freeboard of approximately 0.7 foot is present before the wall overtops and the additional 0.5 foot of west berm height provides total freeboard of 1.2 feet.

PAD 3 INTERMEDIATE PIPELINE

In order to reduce flows in the perimeter ditches on Pad 3 an intermediate pipeline is being installed to convey the PMP discharge. The area draining to the pipe is 2.0 acres with a resulting PMP discharge of 13 cfs. The intermediate pipe is a 14 inch PVC pipe with an improved 18 inch inlet section. The concrete wall at the pipe inlet has an overflow weir to confine flows to the pad ditches in the event that the pipe plugs or has its capacity exceeded.

EXISTING NEUTRALIZATION PIPELINE

The existing 42 inch CMP neutralization pipeline was analyzed to determine if peak discharges from the expanded pads would be conveyed by the pipeline. Primary

neutralization discharges from Pads 1, 2, and 3 are carried in this pipe. Additionally the lined slope below Pad 2 always drains to the pipe.

As per the original design of the pipeline it was assumed that only one pad would be in neutralization at any given time. The maximum primary neutralization flow rate from the pads is 69 cfs (Pad 2) and the lined slope area below Pad 2 generates 10 cfs therefore the maximum peak flow to the pipe is 79 cfs. The pipeline was designed to convey 89 cfs before the inlet overtops, therefore the pipe capacity is adequate and no improvements are necessary. Approximately one foot of freeboard is available at the pipe inlet when the pipe is carrying 79 cfs.

OTHER CONVEYANCE SYSTEM IMPROVEMENTS

The existing pipe culvert in the Neutralization Pond to Overflow Pond ditch is undersized and a new 73 inch by 55 inch CMP arch along with raising of the ditch berm is necessary. It was assumed that only one pad would be in neutralization at any given time to generate peak flows to the pipe. The highest peak flow to reach the pipe is 94 cfs from Pad 4. Flows from the toe of Pad 2 (10 cfs) and other minor areas that always drain into the neutralization system were added to the 94 cfs and a total flow of 125 cfs was thus used for pipe sizing. One foot of freeboard is provided at the pipe inlet by the raised ditch berm.

Two 48 inch CMP pipes are proposed in the Pad 3 process ditch. These pipes are intended to replace the existing wooden bridge. The pipes are sized to carry the peak flow of 133 cfs from Pad 3 and one foot of freeboard is provided.

The existing pipe under the plant access road has adequate capacity if the headwall designed by FMG, Inc., in August of 1989 is constructed. Peak flow to the pipe is approximately 81 cfs. Approximately 1.5 feet of freeboard is provided.

The existing diversion ditch on the "south" side of the Contingency Pond is undersized. The peak discharge to this point is 128 cfs. A new 3 foot deep ditch with a 5 foot bottom is being provided by raising the Contingency Pond berm and reworking the ditch.

CONTAINMENT POND SIZING

All runoff from a PMP event must be contained in storage ponds with zero discharge from the mine. The drainage basin requiring runoff containment includes Pads 1, 2, 3, and 4; the Pregnant, Barren, Overflow, Neutralization, and Contingency Ponds; and all other areas upslope of the ditch between the Neutralization Pond and Overflow Pond (plant area, neutralization ditch, transfer ditch, etc.). The total area of the drainage basin is 84.7 acres.

Runoff volume is calculated by multiplying the 84.7 acre basin by the total 19.6 inch rainfall. This results in a total runoff volume to be contained of 138.3 acre-feet. A safety factor has been provided by not reducing runoff volume for losses that will

occur from initial wetting requirements or infiltration into unlined surfaces. It should be noted that the runoff volumes shown on the HEC-1 printouts do not include the wetting or infiltration volumes as the model does not have return flow capability and assumes they are lost from the system.

It is also necessary to account for process water in the ponds. Process volume is calculated by assuming the Pregnant, Neutralization, Barren, and Overflow Ponds will be 1/3 full at the time of the precipitation event. The Contingency Pond does not routinely store process water however a minor amount of water from rain and snowmelt was assumed in the pond to decoy waterfowl from the other ponds. It was assumed that two feet of water (1.1 acre-feet) would be in the Contingency Pond for decoy purposes. The total required volume of the containment system is therefore calculated by adding the process volume and decoy volume to the 138.3 acre-feet of runoff volume.

The existing pond system is undersized therefore additional capacity is being added to the Neutralization and Contingency Ponds. The Pregnant Pond was increased earlier in 1989 as part of the Pad 2 Load/Unload Facility project.

New and existing pond capacities along with runoff calculations are given on the next page as Table 2. In order to fully utilize the Neutralization Pond it was assumed that one pad would always be directed to the Neutralization Pond. This assumption is reflected in Table 2. Stage/discharge curves for the Neutralization, Barren, Overflow, and Contingency Ponds are included on the engineering drawings.

As shown on Table 2, 163.2 acre-feet of storage is required and 165.9 acre-feet has been provided. This is a safety factor of 2.7 acre-feet which provides approximately one foot of freeboard at the Contingency Pond. All other ponds will be completely full.

For comparison purposes only, a storage analysis using the 24-hour 100-year rainfall (4.5 inches) was performed. Runoff volume for this event is 32 acre-feet. Total storage required for a 100 year storm is then 32 acre-feet + 23.8 acre-feet of process volume for a total of 55.8 acre-feet. Total storage available in the Neutralization, Pregnant, Barren, and Overflow Ponds is 71.6 acre-feet thus no overflow into the Contingency Pond will occur during a 100 year storm.

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TABLE 2
POND CAPACITY AND RUNOFF VOLUME CALCULATIONS

POND	EXISTING VOLUME (AC-FT)	NEW VOLUME (AC-FT)	1/3 OF VOLUME (AC-FT)	DECOY VOLUME (AC-FT)
NEUTRALIZATION	19.0	33.1	11.0	--
PREGNANT	16.1	16.1	5.4	--
BARREN	11.5	11.5	3.8	--
OVERFLOW	10.9	10.9	3.6	--
CONTINGENCY	70.3	94.3	--	1.1
TOTALS	127.8	165.9	23.8	1.1
RUNOFF VOLUME = 84.7 ACRES X 19.6 INCHES = 138.3 ACRE-FEET				
TOTAL STORAGE REQUIRED = 138.3+23.8+1.1 = 163.2 ACRE-FEET				
TOTAL STORAGE PROVIDED = 165.9 ACRE-FEET				

EMPTY NEUTRALIZATION POND ANALYSIS

Runoff volume conveyed to the Neutralization Pond from Pads 1, 2, and 3 is restricted by the existing 42 inch neutralization pipeline. The original pipeline design assumed that the Neutralization Pond would be empty and that its 1/3 capacity process volume would be in use in other ponds. This assumption was used to determine the minimum neutralization pipe size while still insuring filling of an empty Neutralization Pond. It was necessary to repeat this analysis to reflect the modified pad and pond sizes.

To remain consistent with previous calculations, total runoff volumes were determined by multiplying the drainage areas by the total rainfall. Infiltration and wetting losses were assumed to return to system after the runoff peaks calculated by HEC-1 occur and thus were discharged entirely through the primary neutralization system to Neutralization Pond. The HEC-1 model split flow subroutine was used to determine flow volumes diverted through the staged pad outlets to the Pregnant Pond. The volume directed to the Neutralization Pond was then calculated by subtracting the volume diverted to the Pregnant Pond from the total runoff volume. No split flow was calculated at Pad 4 since the outlet has sufficient capacity to direct all flow to the Neutralization Pond with no diversion to the Pregnant Pond. The

results of this analysis are given below as Table 3. Hydrographs of the diverted flow are included on Figures 1, 2, 3, and 4 at the rear of the report.

TABLE 3
NEUTRALIZATION OPERATION RUNOFF VOLUMES

PAD NUMBER	TOTAL RUNOFF VOLUME (ACRE-FEET)	VOLUME DIRECTED TO PREGNANT POND (ACRE-FEET)	VOLUME DIRECTED TO NEUTRALIZATION POND (ACRE-FEET)
1	24.3	3.0	21.3
2	26.3	3.0	23.3
3	32.0	6.0	26.0
4	21.7	0.0	21.7

Runoff volume from the area that always drains to the Neutralization Pond in addition to pad runoff must also be accounted for. This volume is from direct precipitation on the pond and adjacent area, runoff from the neutralization ditch, and runoff from the lined slope below Pad 2. This additional drainage area is 5.8 acres which is multiplied by the 19.6 inch rainfall with a resulting runoff volume of 9.5 acre-feet.

Using the earlier assumption that only one pad will be in neutralization at any given time, the smallest amount of runoff (worst case scenario) directed to the Neutralization Pond is 21.3 acre-feet from Pad 1. Adding 9.5 acre-feet from the additional area results in 30.8 acre-feet of runoff directed to the pond. The empty volume of the Neutralization Pond is 33.1 acre-feet, therefore the Neutralization Pond will be 2.3 acre-feet short of filling if it is empty and the PMP event occurs. This is a loss in effective storage in the Neutralization Pond therefore total available storage in all ponds under this scenario is 163.6 acre-feet. (165.9 acre feet (Table 2) minus 2.3 acre-feet = 163.6 acre-feet) Required storage is 163.2 acre-feet (Table 2) therefore all runoff will still be contained in the combined pond system even though the Neutralization Pond will be slightly less than full. A safety factor of 0.4 acre-feet is available at the Contingency Pond.

CONTAINMENT POND OUTLET STRUCTURES

Pond outlet structures were designed to convey peak PMP discharges. The outlet for the Neutralization Pond is a 15 foot long graded weir designed to discharge 125 cfs. This is the same discharge used for design of the downstream ditch pipe and assumes

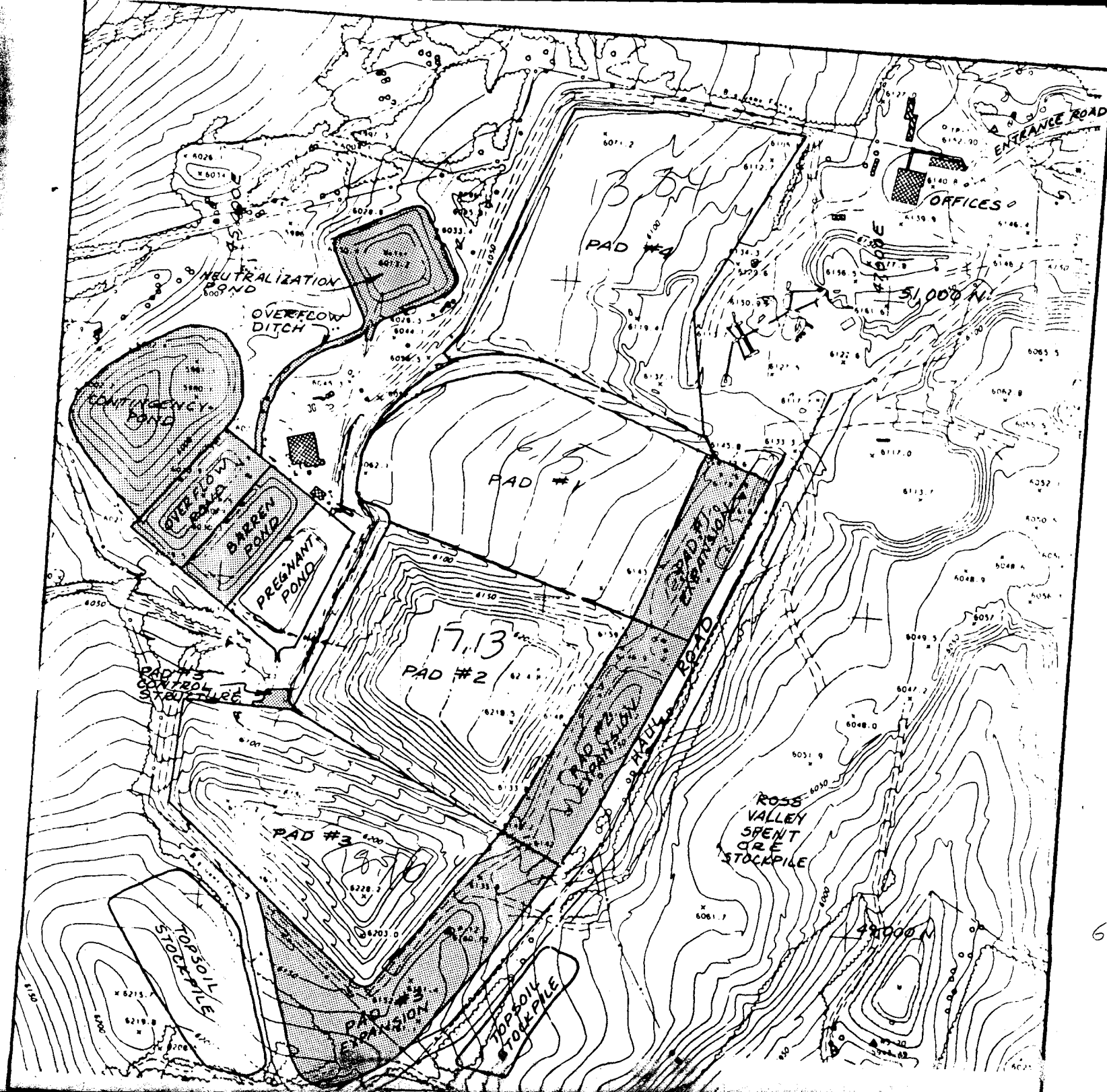
only one pad will be in neutralization at any given time. One foot of freeboard is available at peak discharge.

The Barren Pond and Overflow Pond outlets are being expanded to convey approximately 500 cfs. This is the combined peak flow from all four pads and other incidental areas. The need for a combined discharge capacity was confirmed with a hydrograph volume vs pond storage analysis.

The new outlet for both the Barren Pond and the Overflow Pond is an 80 foot long graded weir. At peak discharge approximately 0.5 feet of freeboard is available. A diffuser system for chemical addition at the Overflow Pond weir will be designed by Wharf Resources.

The existing Pregnant Pond outlet is the full length of the crest. It is adequately sized and no improvements are necessary. No outlet structure is provided for the Contingency Pond as it is a zero discharge facility.

Stage/discharge curves for the Neutralization, Barren, Overflow, and Contingency Ponds are included on the engineering drawings.



12.0 CONTINGENCY POND

12.1 POND CAPACITY

It is difficult to foresee the exact conditions which would exist at the time that a PMP event might occur, but it has been proposed that the barren, pregnant and neutralization ponds be assumed to be one-third (1/3) full. This would indicate a storage capacity of:

827,105	gallons in pregnant solution pond
2,442,889	gallons in barren solution pond
3,685,729	gallons in overflow pond
20,331,107	gallons in contingency pond
4,906,667	gallons in neutralization pond
32,193,497	gallons available storage

With the construction of Heap Leach Pad No. 4, the drainage area which might have runoff resulting from a PMP event would include:

643,816	square feet from Pad No. 1
600,000	square feet from Pad No. 2
490,850	square feet from Pad No. 3
565,000	square feet from Pad No. 4
466,800	square feet from plant and process ponds
95,200	square feet from neutralization pond & ditches
2,861,666	square feet of drainage area

With the circulating process water being a portion of the previously assumed diminished storage capacity, it is not used to determine the additional requirements. The PMP event, with no infiltration, might include a runoff of:

2,861,666 sq. ft. X 19.6 in. + 12 in./ft. = 4,674,054 cu. ft.
4,674,054 cu. ft. X 7.48052 gal./cu. ft. = 34,964,354 gal.

If this were to occur, the storage capacity would be exceeded by approximately 2,770,587 gallons of runoff water. With a two horizontal to one vertical (2:1) slope, this capacity could be added by extending the embankment as shown on the drawings. Additional freeboard capacity has been included in the design.

12.2 CONTINGENCY POND CONSTRUCTION

The contingency impoundment expansion shall be constructed in accordance with the plans, to the lines and grades shown, and as specified herein.

12.2.1 Preparation. Prior to fill placement, all topsoil, organic debris and loose unconsolidated material shall be removed if it would be covered by later fill activity. All

topsoil will be stockpiled in an area designated by the Project Engineer.

12.2.2 Embankment Materials. The embankment construction materials shall be obtained from the proposed Heap Leach Pad No. 4 area or from the mine excavation.

12.2.3 Fill Placement. Materials shall be placed in continuous horizontal layers which are not more than six inches (6") thick after being compacted.

The most impervious materials shall be placed in the upstream portion of the earthfill such that the permeability decreases toward the upstream face.

Cobbles and rock in excess of 5.0 inches nominal diameter shall not be placed in the upstream clay zone. This material will, however, be allowed to reside on the downstream slope.

The placed material shall be rolled with the proper equipment a sufficient number of times to provide the specified compaction.

Hand-held equipment shall be employed in those areas not accessible by the larger equipment.

Materials shall not be placed on frozen ground and compaction operations shall not be performed during periods when temperatures are below 25 degrees Fahrenheit.

12.3 REVEGETATION

The newly extended top and downstream face of the contingency pond dam will be stabilized via revegetation as soon as possible following construction. Seeding will be accomplished by cyclone broadcasting of the following seed mixture at the indicated application rate. Mulching, if necessary, will be conducted using hay or straw applied at one to one and one-half (1-1½) tons per acre. Any applied mulch will be crimped into the soil using a crimper or dull disc, if slope and soil conditions allow the use of such equipment.



WHARF RESOURCES (U.S.A.), Inc.

A wholly owned subsidiary of Goldcorp Inc.

1437-1

Wharf Resources (U.S.A.), Inc.
HC 37 Box 811
Lead SD 57754



SD DENR WATER RIGHTS PROGRAM
523 EAST CAPITOL
PIERRE SD 57501-3181

As a matter of corporate simplification, Wharf Resources will now be doing business as Wharf Resources (U.S.A.), Inc. Therefore, all contracts, statements, invoices, or other documents you may have with Wharf Resources, a Montana General Partnership, or simply in the name of Wharf Resources, should be changed to Wharf Resources (U.S.A.), Inc. All purchase orders or other correspondence to you in the future will be from Wharf Resources (U.S.A.), Inc. The management structure of the company remains the same.

If you have any questions, please do not hesitate to contact me.

Sincerely,

John A. Begeman
General Manager

CHRISTENSEN, MOORE, COCKRELL & CUMMINGS, P.C.

Dana L. Christensen
Mikel L. Moore*
Dale R. Cockrell**
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*Also Admitted in Arizona
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***Also Admitted in Washington

April 16, 1999

John Hatch
Chief Engineer, Water Rights Program
Department of Environment and Natural Resources
Joe Foss Building, 523 East Capitol
Pierre, South Dakota 57501-3181



Re: Wharf Resources

Dear Mr. Hatch:

This letter is being written on behalf of Wharf Resources, a Montana general partnership, and Wharf Resources (U.S.A.), Inc. Pursuant to a corporate reorganization, Wharf Resources, a Montana general partnership, has transferred the following water right permit and license numbers to Wharf Resources (U.S.A.), Inc.:

1346-1	1514-1
1365-1	1173-1
1406A-1	1437-1
1460-1	1493-1
PW-1	1667-1

If you have any questions, please do not hesitate to contact me.

Sincerely,

CHRISTENSEN, MOORE, COCKRELL
& CUMMINGS, P.C.

Dale R. Cockrell
Direct Line No. (406) 751-6003

DRC/bls
cc: John Begeman
Carol Koerner



**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

JOE FOSS BUILDING
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www.state.sd.us/denr

May 24, 1999

Dale R Cockrell
Christensen, Moore, Cockrell & Cummings, PC
PO Box 7370
Kalispell, MT 59904-0370

RE: Water Permits and Water Rights held by Wharf Resources

Dear Mr. Cockrell:

Thank you for your letter of April 16th regarding the transfer of water rights and permits held by Wharf Resources.

Enclosed are seven partially completed "Notice of Transfer of Ownership" forms for use in filing the transfers with Vested Water Right No. 1173-1, Water Right Nos. 1346-1, 1365-1, 1406A-1 and 1493-1 and Water Permit Nos. 1437-1 and 1667-1

Please review the enclosed forms and complete as needed. The forms should be signed in the presence of a notary public by a representative of Wharf Resources (U.S.A.), Inc. Please return the completed forms to our office with a required filing fee of \$2.50 each (total of \$17.50).

Thank you for your help and if I can answer any questions for you, please give me a call.

Sincerely,

Genny McMath
Environmental Scientist
Water Rights Program
(605) 773-3352

enclosures

RECEIPT

Water Rights Program

South Dakota Department of Environment and Natural Resources

No 416143

Pierre,

June 14, 1999

RECEIVED OF Wharf Resources, Inc., HC 37, Box 811, Lead, SD 57754
the following amount in fees for services rendered as provided for by law:

Fee for Application for Permit No. _____ to Appropriate Water, to construct
and to put water to beneficial use _____

Fee for Application for Permit No. _____ to Appropriate Water, for Future
Use _____

Fee to retain Future Use Permit No. _____ after period of seven years.

Fee for Inspecting Constructed Works, confirming beneficial use and issuing Water
License No. _____

Fee for Filing Transfer Form Water Permit No. 1437-1

Fee for Filing Extension Request _____

Fee for _____

(Any Other Work Provided by Law)

Total

2 50

2 50

[Signature]

NOTICE OF TRANSFER OF OWNERSHIP

To: Chief Engineer
Water Rights Program, DENR
523 E. Capitol
Pierre, SD 57501-3181



No. 1437-1

Date: 6-7-99

I/We request that Water Permit No. 1437-1

formerly owned by: Wharf Resources, a Montana general partnership

be transferred to: (name & address) Wharf Resources (U.S.A.) Inc., HC 37, Box 811,

Lead, SD 57754

Telephone No. (605) 584-1441

Title to the following described land(s)/property has been transferred as described above:

26.5 acre-feet sedimentation dam: NW ¼ Section 3, T4N, R2E

I/We understand that the validity of Water Permit No. 1437-1 has not been determined by this transfer action. If I/We have any questions on validity, I/We understand that only the Water Management Board has the authority to determine if a water permit/right is valid (see note).

You are requested to file this "Notice of Transfer" in the appropriate file with the Water Rights Program, as evidence of the change of ownership.

A fee of Two Dollars and Fifty Cents (\$2.50) is required to cover the filing fees as required under SDCL 46-2-13. This form must be signed by the new owner.

STATE OF SOUTH DAKOTA)

County of Lawrence)

I/We John A. Begeman being first duly sworn on my oath depose and say that my relation to the above described undertaking is that of **, that I have read the above foregoing statement, and that I know of my own personal knowledge that the information herein stated is true.

****General Manager of Wharf Resources (U.S.A.) Inc.**

John A. Begeman
(Signed)

Subscribed and sworn to before me this 7th day of June, 19 99.

Julian [Signature]
(Notary Public)

NOTE: Water permits may be cancelled for nonconstruction within the five year construction period. Once a water permit is developed and the water used, the permit becomes a right. A water right may be lost for three reasons:

1. Abandonment - no intent to use water and use is abandoned.
2. Forfeiture - no use of water for three year period without legal excuse.
3. For a third violation of a condition of a water permit/right.

Report of Examination of Works and/or Application of Water to Beneficial Use For Permit No. 1437-1

I have this day, Aug 24, 2017 made a thorough examination of the water use system constructed by Wharf Resources, 10928 Wharf Road, Lead, SD 57754 of Permit No. 1437-1, bearing the priority of 4/5/1998 authorizing storage of 26.5 acre-feet of water from Ross Valley for industrial purposes, in Lawrence County.

Inspection contact & relationship to permit holder, if applicable:

**Lynn Blackman, Environmental Coordinator
605-584-4190**

correspondence:

**% Matt Zietlow, Environmental Coordinator
605-584-4155**

A. Works used to divert the water:

A drainage system at the base of the Ross Valley spent ore dump at the head of Ross Creek collects water and discharges at the toe of the slope into a 22.8 acre-foot collection pond. Water is also pumped from a collection pond located at the base of the Reliance waste rock dump at the head of Annie Creek and piped to the Ross Creek pond. The pond is constructed with an earth fill embankment and an HDPE liner.

Pond Dimensions:

Bottom of pool elevation – 5918

Spillway elevation – 5940

Crest elevation – 5943

Surface area – 1.74 ac-ft.

Volume at spillway – **22.8 ac-ft.**

B. Works used to transport and apply water to beneficial use:

Water collected in Ross Valley is combined with water collected at the head of Annie Creek and pumped to the Ross Valley Denitrification facility for treatment. Water from the treatment facility is discharged to holding/treatment ponds in the SW ¼ SW ¼ and SE ¼ SW ¼ Section 34 T5N R2E; to leach pads for denitrification located in SW ¼ Section 33 T5N R2E, E ½ NE ¼ Section 4 and NW ¼ NW ¼ Section 3 T4N R2E; and to a discharge point in Annie Creek located immediately below the Annie Creek pond in the SE ¼ NW ¼ Section 3 T4N R2E. Except for losses in the system, this appropriation is a non-consumptive use of water.

C. Compliance with Permit Requirements:

- 1) Permit qualifications being abided by Yes
list any extended period of nonuse: **none**
- 2) Exceptions to compliance are: **none**

D. Condition and Location:

1. The system is in good condition with the diversion point located as follows:
1,319' S and 1,271' E of NW corner Section 3 T4N R2E (44.34076, -103.870419).

2. The works are capable of diverting and storing **22.8 acre-feet** of water which is used for **industrial** use and the license should be issued for **22.8 acre-feet**.

3. All structures, wells and lands on map **Yes**

E. Comments or other permit(s) associated with the project:

Wharf Resources also holds Permit #1667-1 which authorized diversion from the collection pond in Annie Creek in the SE ¼ NW ¼ Section 3 T4N R2E.



Steven Quissell
Water Rights Inspector
DENR Water Rights Program

Date Report Completed: **Aug 30, 2017**



Ross Valley collection pond, spent ore dump in background, pumping plant and regulating reservoir at left center.



Ross Valley pond and embankment crest

**Water Right Nos. 1437-1, 1667-1 and 1761-1
Wharf Resources Inc.
August 24, 2017**

**Sec 33
T005N
R02E**

Well PW-2, Lat: 44.350626 Lon: -103.874332
Additional diversion point authorized under
Water Right Nos. 1346-1, 1493-1 and 1761-1

**Sec 34
T005N
R02E**

License # 1365-1
(Joseph well)

**Sec 35
T005N
R02E**

**Sec 36
T005N
R02E**

processing ponds

water treatment plant

Pad 4

water treatment plant

holding/treatment ponds

twin 5,000 gal. storage

Pad 1

Well PW-1 Permit # 1761-1
License # 1493-1
Lat: 44.345159 Lon: -103.877454

Pad 2

Well HDH-8A License #1346-1
Lat: 44.34312 Lon: -103.874241

Pad 3

Topsoil
Stockpile

Ross Valley
Spent Ore

Reliance
waste rock

Permit #1437-1
Sedimentation Pond
Lat: 44.34076 Lon: -103.870419

**Sec 4
T004N
R02E**

Permit 1667-1 Collection Pond
Lat: 44.339098 Lon: -103.86688

**Sec 3
T004N
R02E**

**Sec 2
T004N
R02E**

**Sec 1
T004N
R02E**

Steven Quissell

**Steven Quissell
Water Rights Inspector
DENR Water Rights Program**

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Geomatics, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

1437-1



DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES

JOE FOSS BUILDING
PMB 2020
523 EAST CAPITOL
PIERRE SOUTH DAKOTA 57501-3182
<http://denr.sd.gov>

September 19, 2017

1437-1
1667-1

Matt Zietlow, Environmental Coordinator
Wharf Resources
10928 Wharf Rd
Lead SD 57754

Dear Mr. Zietlow:

On August 24, 2017 the investigation of the water use systems, including the extent of application of water to beneficial use, as developed under Water Permit Nos. 1437-1 and 1667-1, was completed by Steve Quissell, a staff engineer with our program. The final water right document, the water license, can now be issued for each one.

State law requires that we charge a \$50.00 fee (**each**) for the investigation and issuance of the water license. Upon receipt of the \$100.00 fee from you, we will complete processing the water licenses. The check or money order for the fee should be made payable to the "Water Rights Program".

If you have any questions, please contact me.

Sincerely,

Genny McMath
Water Rights Program
(605) 773-3352

Note: A field investigation was also conducted for Water Permit No. 1761-1, held by Wharf Resources. The fee has already been paid for No. 1761-1 and the license is being processed.

RECEIPT

WATER RIGHTS PROGRAM

South Dakota Department of Environment and Natural Resources

Date October 10, 2017

RECEIVED OF Wharf Resources 10928 Wharf Road Lead 57754-9710

The following amount in fees for services rendered as provided for by law:

Fee for Application for Permit No. _____ to Appropriate Water, to construct and to put water to beneficial use	50	00
Fee for Application for Permit No. _____ to Appropriate Water for Future use		
Fee to retain Future Use Permit No. _____ after period of seven years.		
Fee for Inspecting Constructed Works, confirming beneficial use and issuing Water License No. _____		
Fee for Filing Transfer Form _____ 1437 1		
Fee for _____		
Fee for Issuing New Well Driller's License No. _____ for C.Y. _____	50	00
Fee for Renewal of Well Driller's License No. _____ for C.Y. _____		
Fee for Issuing Well Pump Installer's License No. _____ for C.Y. _____		
Fee for Renewal of Well Pump Installer's License No. _____ for C.Y. _____		
(Any Other Work Provided by Law)	TOTAL	50 00

No. **08351**

By Jeane Goodman Chief Engineer ZM



1437-1
DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES

JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3182

denr.sd.gov

OCT 13 2017

1437-1
1667-1

Matt Zietlow
Wharf Resources (USA) Inc
10928 Wharf Rd
Lead SD 57754

Dear Mr. Zietlow:

Enclosed are Water License Nos. 1437-1 and 1667-1. These are the final water right documents completing the process of obtaining Water Rights. Included with the licenses is a map prepared by the staff engineer who conducted the field investigation.

As long as you use the water beneficially, as stated in the Water License, State Water Laws provide that you have a continuing right to use the water.

Sincerely,

Jeanne Goodman, Chief Engineer
Water Rights Program
(605) 773-3352

enclosures: water licenses, map, receipts

**STATE OF SOUTH DAKOTA
WATER LICENSE NO. 1437-1**

(1) Wharf Resources (later transferred to Wharf Resources (USA) Inc., 10928 Wharf Rd, Lead SD 57754 made Application No. 1437-1, April 5, 1988 for a water permit to impound 26.5 acre feet of water from runoff (Ross Valley), Lawrence County, South Dakota for industrial purposes. Permit No. 1437-1, with a priority date of April 5, 1988 was approved May 12, 1988 and issued to the applicant for diversion of water with construction of the described water supply system to be completed on or before May 12, 1993 and for the application to beneficial use of said water on or before May 12, 1997.

(2) It is certified that the permit holder has complied with the provisions of South Dakota State Law relating to construction of the water supply system and is entitled to impound 22.8 acre feet of water for beneficial use. The location of the sedimentation dam in Ross Valley is in the NW ¼ NW ¼, approximately 1,319' S and 1,271' E of NW corner Section 3 T4N R2E (44.34076, -103.870419).

A drainage system at the base of the Ross Valley spent ore dump at the head of Ross Creek collects water and discharges at the toe of the slope into the 22.8 acre-foot collection pond.

(3) The permit holder has complied with the provisions of South Dakota State Law relating to the application of water to beneficial use. Water collected in Ross Valley is combined with water collected at the head of Annie Creek and pumped to the Ross Valley Denitrification facility for treatment. Except for losses in the system, this appropriation is a non-consumptive use of water.

(4) Pursuant to South Dakota Water Law 46-5-30.1 Wharf Resources (USA) Inc., 10928 Wharf Rd, Lead SD 57754 the holder and/or owner of Water Right No. 1437-1 is issued a license to appropriate water, the right to impound 22.8 acre feet of water from Ross Valley with a priority date of April 5, 1988 from the location specified in (2) of this license for industrial purposes.

This license is subject to South Dakota Water Law, any limitations or conditions listed in Water Right No. 1437-1 and subject to the following qualification:

- The operation and maintenance of the 22.8 acre-feet sedimentation dam and 70.7 acre-feet storage contingency pond comply with Board Rules Chapter 74:02:08 Safety of Dams and SDCL 46-7-3. ***The original qualification specified a 26.5 acre-feet dam. The 22.8 acre-feet sedimentation dam described above reflects the system as constructed.***



Jeanne Goodman, Chief Engineer
Water Rights Program
Department of Environment and Natural Resources

OCT 13 2017

date

