

Considered: _____

WATER PERMIT NO. 1421-1

23

MAP No. Same

578-2107

Name of Applicant Brohm Mining Company

Post Office Address P.O. Box 488, Deadwood SD 57732

Amount of Water Claimed 0.75 cfs add'l, 180 ac-ft add'l Total Acres N/A

Source of Water Supply Oro Fino Mine Shaft and well 7D (proposed)

Water to be used for IND - heap leach op. County Lawrence

About 6 miles E of Lead.

PROOF OF PUBLICATION: Received _____ Not Received _____

APPLICATION: Approved _____ Subject to _____

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

PRIORITY _____ Date Received Oct. 8, 1987 Fee \$225⁰⁰ Remarks _____

Corrected Application Received _____ Period of Annual Use Jan 1 - Dec 31

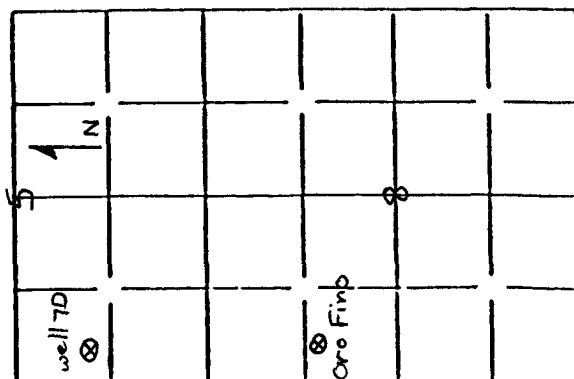
WATER QUALITY APPROVAL RECEIVED N/A APPROVED/CONDITIONAL (Circle one)

WI-1 Description same as Application YES _____ NO _____ REMARKS _____

Diversion Point Shaft: SW 1/4 NW 1/4 section 8;

well: NW 1/4 SW 1/4 section 5; all in T4N-R4E

Land to be Irrigated N/A



Well Log: Driller well not constructed Licensed YES _____ NO _____

Depth of Well ≈ 190 feet REMARKS _____

Type of Map topo PREPARED BY Ron Duwall Reviewed and the Number

assigned on October 16, 1987 By Ron Duwall

No. 1421-1 Hydrologic Unit 10120202
 Map No. same Basin Belle Fourche R.
 Newspaper Lead Daily Call, P.O. Box 876

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 ☐ Recreation ☐
 Domestic ☐ (above 18gpm) Other ☐

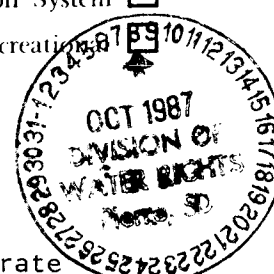
Type of Application: Check one or more of the following

New ☒ Vested Right ☐ Future Use ☐ Change Use ☐☐ Amend Permit No. _____ with old priority date retained

Increase diversion rate

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

see Permit No. 1324-1

☐ 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 Brohm Mining Company Phone No. 578-2107

Post Office Address 485
P.O. Box 178, Deadwood SD 57732
(Street, RR or Box) (City) Zip Code

2. Amount of water claimed (c.f.s.) 0.75 cfs add'l 180 ac-ft add'l3. Source of water supply ground water Oro Fino Mine Shaft and Well 7D (stand by)

4. Location of point of diversion Shaft: W $\frac{1}{2}$ NW $\frac{1}{4}$ section 8; well 7D: NW $\frac{1}{4}$ SW $\frac{1}{4}$ section 5;
both in T4N-R4E

County Lawrence5. Counties where water will be used Lawrence6. Annual period during which water is to be used Jan 1 - Dec 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)

This application is to increase the diversion rate authorized by Permit No. 1324-1 from 0.25 cfs to 1.00 cfs. The total annual water appropriation authorized by Permit No. 1324-1 and this application is not to exceed 360 ac-ft.

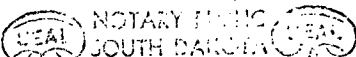
Attachments: Attach Form 2A if diversion from a well or dugout, or if storage of water, is proposed. Attach map (see instruction)

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

I, John Wilbanks 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.

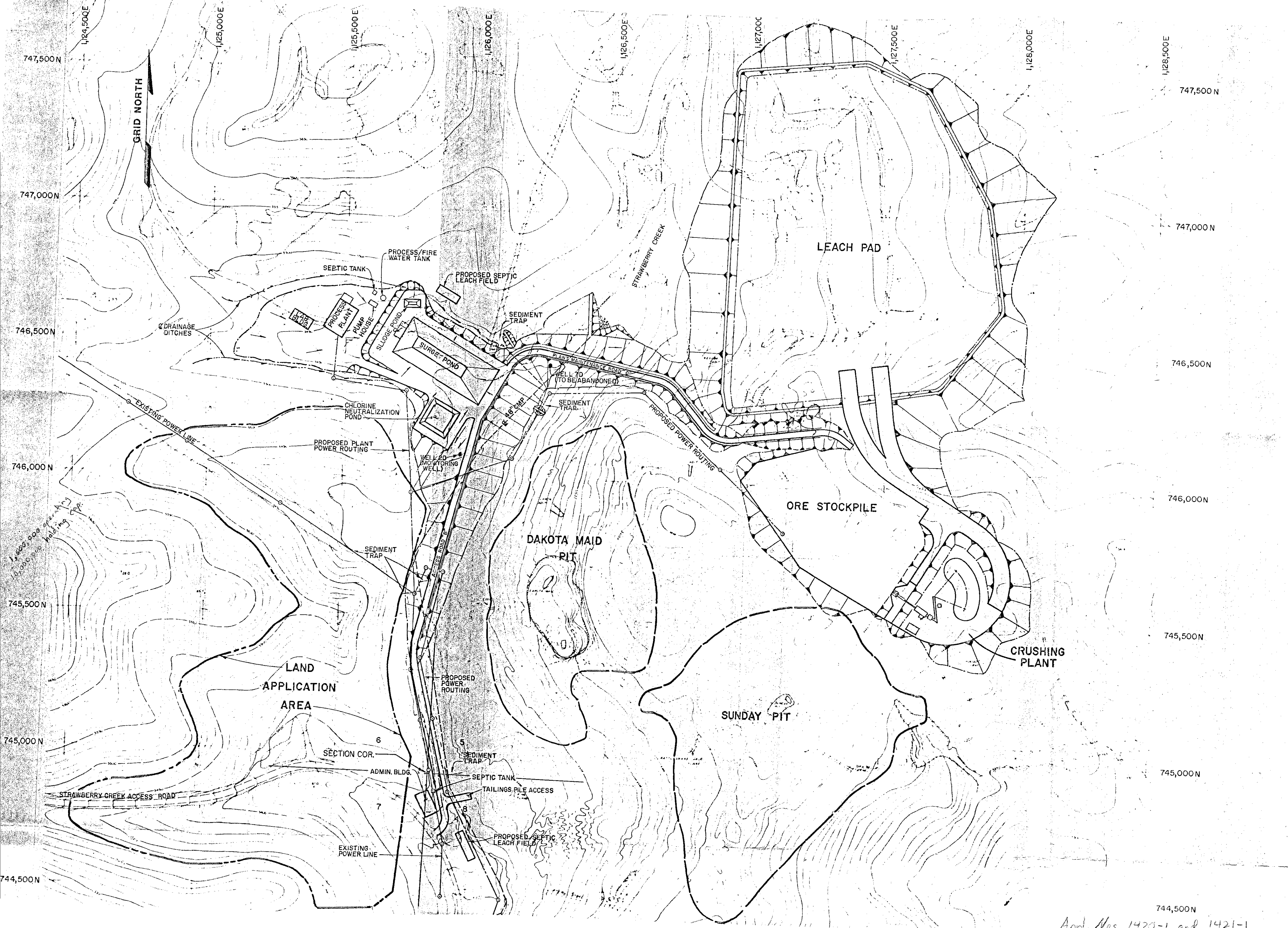
Signed John Wilbanks

KAREN SCHLAACK

Subscribed and sworn to before me this 8th day of October 19 87

My Commission Expires Apr. 1, 1993

Karen Schlaack
 Notary Public



Apr. Nos. 1420-1 and 1421-1

WATER PERMIT

The Water Management Board hereby approves Water Permit Application No. 1421-1
Brahm Mining Company PO Box 485
(Applicant) (Street, RR or Box)
Deadwood SD 57732 With the following qualifications.
(City) (State) (Zip Code)

SEE ATTACHED SHEET

Date of first receipt of application October 8, 1987.
 Date of return to applicant for correction, amendments or changes required October 8, 1987.
 Date of receipt of corrected application Oct 16, 1987. Approved March 2, 1988.

The Water Management Board approved this Water Permit No. 1421-1 authorizing the construction of the water use system and the placing of water to beneficial use as stated in the Application and as qualified in the Water Permit approval, subject, however, to the following limitations and conditions:

1. The date from which applicant may claim right is October 8, 1987.
2. The equivalent of at least one-fifth of the specified work is to be completed on or before September 2, 1990.
3. The whole of said work is to be completed on or before March 2, 1993.
4. The limit of time for proof of beneficial use of water appropriated in accordance herewith is March 2, 1997.
5. The water appropriated shall be used for the purpose of industrial use in a heap leach ore-processing facility
6. The prior right of all persons who, by compliance with the laws of the State of South Dakota, have acquired a right to the use of water must not be unlawfully impaired by this appropriation.
7. The amount of the appropriation granted shall not exceed 180 acre-feet annually 0.75 cubic feet per second; neither shall it exceed the amount of water needed for the beneficial uses served and to which water is actually and beneficially applied for industrial use on or before March 2, 1997. The water is to be used during the following described annual period: Jan 1 - Dec 31

WATER MANAGEMENT BOARD

By: John H. Hales
Chief Engineer

Division of Water Rights
 Dept. of Water and Natural Resources

APR 28 1988, 1988

Qualifications for Water Permit No. 1421-1 Brohm Mining Company

1. The Oro Fino Mine Shaft water supply and the well approved under this Permit may be located near domestic wells and other wells which may obtain water from the same aquifer. The Oro Fino Mine Shaft and the well owner, under this Permit, shall control his withdrawals so there is not a reduction of needed water supplies in adequate domestic wells or in adequate wells having prior water rights.
2. Approval of Permit No. 1421-1 authorizes maximum withdrawals under Permits No. 1421-1, 1324-1 and 1324A-1 of up to 360 acre feet of water annually.
4. Approval of Permit No. 1421-1 is subject to compliance with the following then existing and applicable Water Management Board rules:
 - a. Chapter 74:03:15 Ground Water Quality Standards,
 - b. Chapter 74:03:16 Ground Water Discharge Permit,
 - c. Chapter 74:03:30 Heap Leach Design and Construction,
 - d. Chapter 74:03:02 Surface Water Quality Standards,
 - e. Chapter 74:03:04 Uses Assigned to Streams,
 - f. Chapter 74:03:17 Surface Water Discharge Permit - General Provisions,
 - g. Chapter 74:03:18 Surface Water Discharge Permit Application Requirements,
 - h. Chapter 74:03:19 Surface Water Discharge Permit Conditions,
 - i. Chapter 74:03:20 Transfer Modification, Revocation and Reissuance and Termination of Surface Water Discharge Permits,
 - j. Chapter 74:03:21 Procedure For Permit Processing,
 - k. Chapter 74:03:22 Secondary Treatment Standards,
 - l. Chapter 74:03:23 Criteria and Standards for Surface Water Discharge Permit,
 - m. Chapter 74:03:24 Toxic Pollutant Effluent Standards for Surface Water Discharge Permits,
 - n. Chapter 74:03:25 Effluent Guidelines and Standards for Surface Water Discharge Permits, and
 - o. Chapter 74:03:26 Pretreatment Regulations for Surface Water Discharge Permits.

Supplemental Information

Proposed Well

NW 1/4, SW 1/4, Section 5

(type or print in ink)

1. Well Information - Proposed construction

- a) Drill Hole Diameter 6-1/4 inch Depth 190 feet
- b) Casing Type steel Diameter 7 inch Thickness _____
- c) Screen Type (open hole) Diameter _____ Thickness _____
- d) Gravel Pack Thickness _____ Length of Gravel Pack _____
- e) Depth to Top of Water Bearing Material 150 feet
- f) Depth of Water (ground surface to water level) 50 feet
- g) Distance to nearest existing domestic well: (unknown)
- 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

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

b) Freeboard _____

c) Crest Width _____

Crest Length _____

d) Height _____

e) Outlet Dimensions:

Pipe diameter _____

Spillway width _____

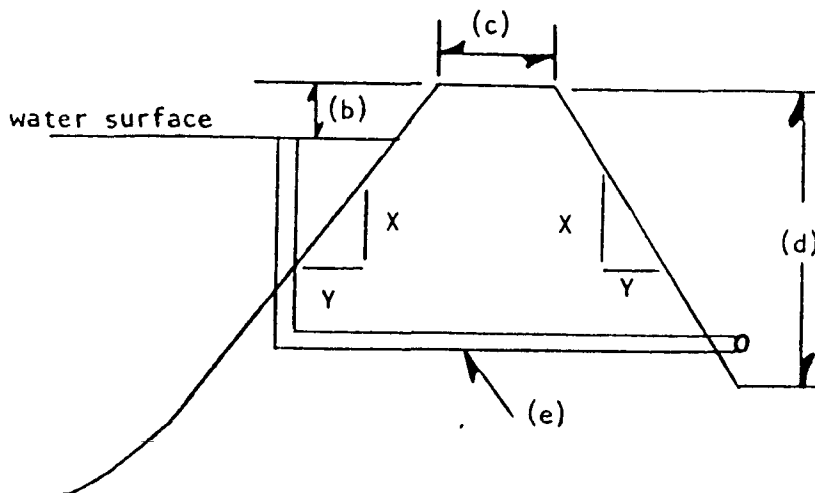
f) X & Y Slope
Upstream _____

Downstream _____

Surface Area of Impoundment _____

Storage _____ acre feet

Drainage area above dam _____



Signature of Applicant _____

Supplemental InformationExisting Mine Shaft (Oro Fino)
SW 1/4, NW 1/4, Section 8

(type or print in ink)

1. Well Information - Proposed construction

- a) Drill Hole Diameter 8 x 16 feet Depth 300 feet
- 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) 30 feet
- g) Distance to nearest existing domestic well: (unknown)
- 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

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

b) Freeboard _____

c) Crest Width _____

Crest Length _____

d) Height _____

e) Outlet Dimensions:
Pipe diameter _____

Spillway width _____

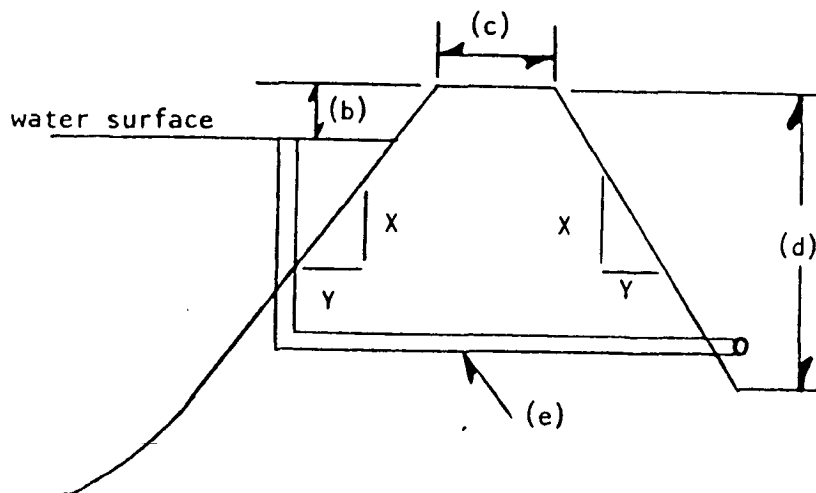
f) X & Y Slope
Upstream _____

Downstream _____

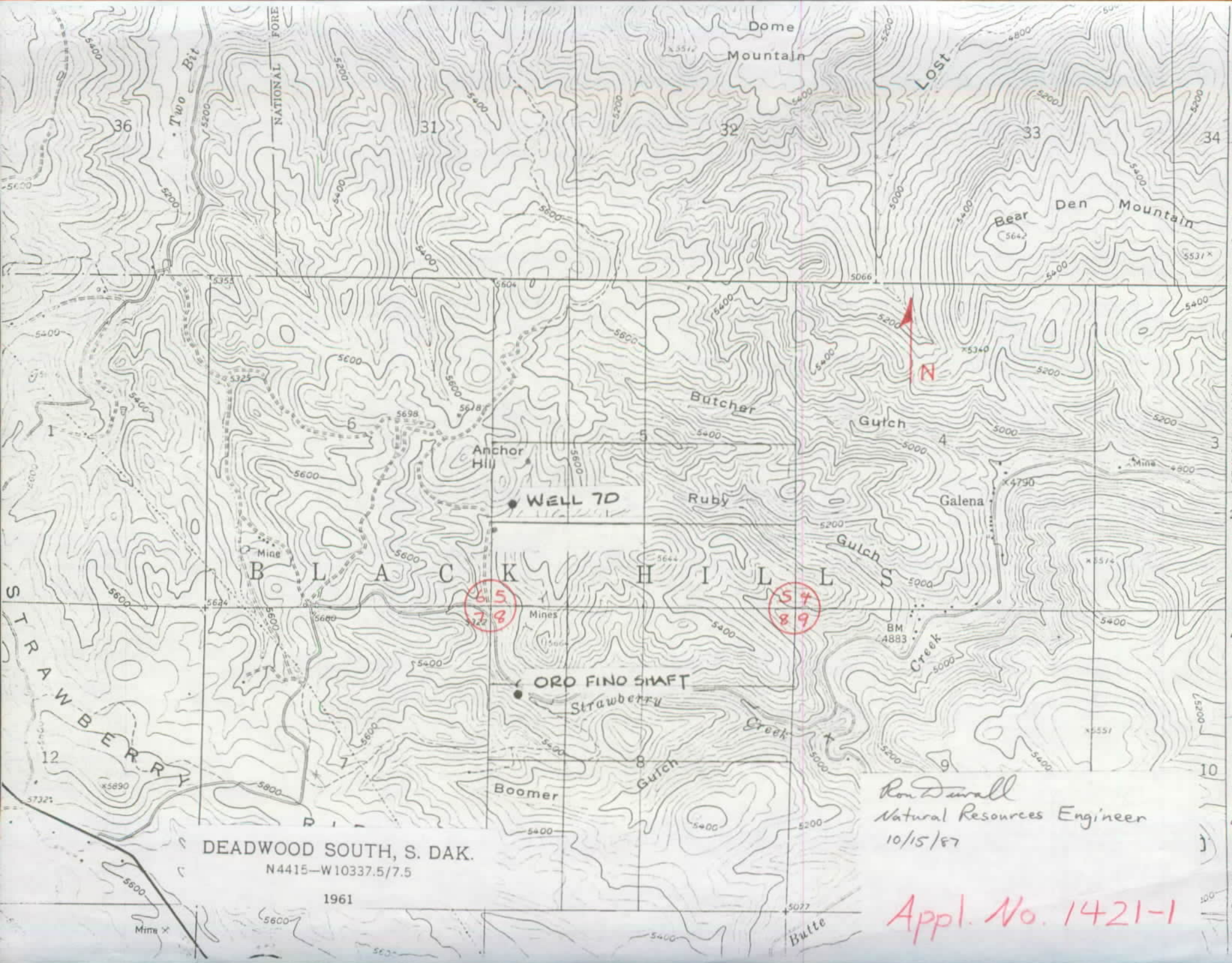
Surface Area of Impoundment _____

Storage _____ acre feet

Drainage area above dam _____



Signature of Applicant _____



DEADWOOD SOUTH, S. DAK.
N4415-W10337.5/7.5

1961

Ron Duwall
Natural Resources Engineer
10/15/87

Appl. No. 1421-1

RECEIPT

Division of Water Rights

South Dakota Department of Water and Natural Resources

611011

Pierre, _____ October 16, 1987, 19____

RECEIVED OF Brohm Mining Co., PO Box 485, Deadwood, SD 57732

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

Fee for Application for Permit No. <u>1421-1</u> to Appropriate Water, to construct works and to put water to beneficial use _____	200	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 * \$250 previously submitted (9-2-87) of which \$25 will apply to this permit (Any Other Work Provided by Law)			
Total	200	00	

By John Hatch
Chief Engineer
JOHN HATCH

ms

completed in the same water-bearing zone. A slug test involves instantaneously adding or removing a volume of water from a well and measuring water level recovery back to static.

Aquifer Test of MW85-7D

During drilling, only wells MW85-2D and MW85-7D produced more than 5 gpm of flow. The wells are located 500 feet apart, (completed in the same zone) and both produce more than 50 gpm. The production comes from a 3- to 6-foot thick vuggy mineralized zone of pyrite, quartz, and galena at the top of the basal Deadwood quartzite. MacLeod (verbal communication) believes that the zone once consisted of a dolomitic sandy layer at the top of the quartzite which, due to its composition, was susceptible to replacement by iron sulfides by way of the circulation of mineralized fluids. The zone is planar and follows the bedding of the Deadwood, dipping to the north at 2 to 3 degrees and outcropping at the surface less than 1,000 feet south of the wells. In wells MW85-2D and 7D, the water-bearing zone was encountered at depths of 116 and 155.5 feet, respectively but the static water levels rose to 37 and 55 feet below ground surface. The Precambrian schist-basal Deadwood contact was penetrated on MW85-7D, but no appreciable flow increase was noted.

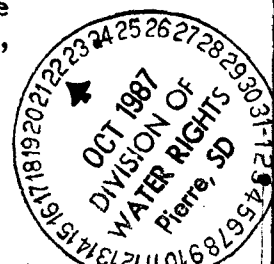
The aquifer test of MW85-7D was performed on July 3, 1985. A three horsepower submersible pump was set on a 2-inch drop pipe at a depth of 165 feet. The well was pumped 6 hours at 33.8 gpm. At the end of 6 hours the total drawdown was 10 feet. Drawdown was also monitored in well MW85-2D, located 500 feet south. Water levels in the observation well began dropping within the first minute of pumping and total drawdown was 8.4 feet.

Figure 4 shows an arithmetic plot of the drawdown and recovery of MW85-2D and 7D. Note that after a short period of time, the plots are straight lines. In addition, semi-log plots of the drawdown (Figure 5) yielded curves. The response of a typical aquifer should yield a straight line on a semi-log plot, and it is the slope of that line which is used to calculate transmissivity. In a similar fashion, only the early time data on a log-log plot (Figure 6) of drawdown in the observation well fit the Theis curve. The response observed indicates that the source of water to the well is a confined fracture of limited areal extent.

The Theis curve match of the early time drawdown data in well MW85-2D was a good fit and gave an aquifer transmissivity of $890 \text{ ft}^2/\text{day}$ and a storage coefficient of 1.8×10^{-5} , indicating a confined aquifer.

Based on the aquifer response to a short period of pumping, it appears that if the pumping period is extended the drawdown in the well would continue at a constant rate until the aquifer zone was depleted. The amount of time the well would produce would depend on the pumping rate and the number of wells producing from the same zone. At 34 gpm, well MW85-7D would pump for 2 to 3 days and then the projected water level would be at the top of the aquifer zone at 155 feet. Furthermore, the time of well recovery back to static after a period of pumping is calculated to be several days, suggesting that the fracture slowly fills up with leakage from the less permeable saturated rock surrounding it.

The extent of the fracture can be roughly estimated by relating the aquifer drawdown observed during pumping to the storage coefficient. By definition, storage coefficient is the volume of water an aquifer releases or takes into storage per unit surface area of the aquifer per unit change in head (Theis 1938). Therefore,



knowing the quantity pumped, the resultant drawdown, and the storage coefficient, the aquifer area can be estimated with the following equation:

$$A = \frac{V}{S \times h}$$

Where: Values for 300 minutes pumping test of MW85-7D at 33.8 gpm

A = Aquifer area
V = Volume pumped, in cubic feet = 1,356 cubic feet
S = Storage coefficient = 1.8×10^{-5}
h = Change in water level, in feet = 8.4 feet in MW85-2D
A = 8,968,250 square feet; assuming a square aquifer the length of one side would be about 3,000 feet

Results of the aquifer test of MW85-7D suggest that the wells in that zone could be pumped at a rate of 50 gpm or more, but that the production would not be dependable for a period of more than a few days. However, previous work on fractured aquifer systems by Jenkins (1982) and others has shown that after extended periods of pumping some wells completed in fractures begin to show characteristics of radial flow typical of large aquifers. That is, the rate of drawdown decreases as water is contributed from beyond the fracture itself. Consequently, an aquifer test of MW85-7D of three or more days is recommended desirable so that the behavior of the aquifer after an extended period of pumping can be observed.

Slug Tests

Slug tests also were performed on wells which did not show indications of producing more than a few gallons per minute during drilling. A 3-1/2-inch diameter PVC bailer of 7 feet length was used to bail a known volume of water from the wells, which resulted in a water level decline of a few feet. Water level recovery back to static was measured with an electric sounder.

Two methods of slug test analysis were used to evaluate the value of aquifer transmissivity. A method devised by Bouwer and Rice (1976) was used for wells MW85-1S and 2S which are completed in the unconfined perched water zone at the base of the valley fill. The Bouwer and Rice method can be used for partially or completely penetrating wells in both unconfined and leaky confined aquifers. Results are tabulated in Table 1. Permeability values for MW85-1S and 2S are 0.8 ft/day (2.9×10^{-4} cm/sec) and 0.5 ft/day (1.9×10^{-4} cm/sec), respectively. The wells are not capable of producing more than a few gallons per minute. Data plots are included in Appendix C.

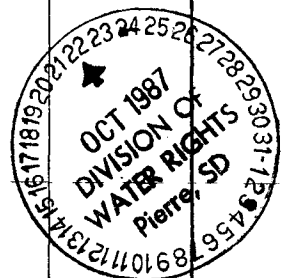
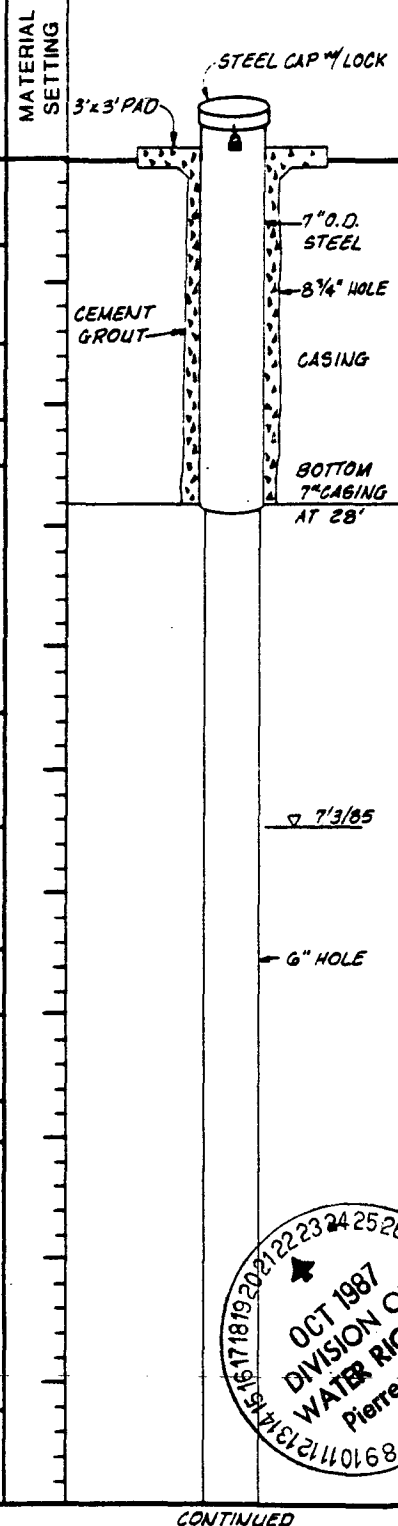
Slug tests were run on four of the bedrock wells. A method developed by Cooper and Papadopulos (1967) was used to evaluate the transmissivity of the confined bedrock zones. Values ranged from 2.6 ft²/day to 740 ft²/day. Permeability was calculated by dividing transmissivity by the saturated thickness. Permeability ranged from less than 1 ft/day to 8 ft/day. Values represent the average for the saturated bedrock penetrated. Fractured zones within the saturated thickness may have higher individual permeabilities. It is interesting to note that the slug test of MW85-2D gave a transmissivity value of 740 ft²/day which is comparable to the value of 890 ft²/day obtained from the aquifer pump test.

MONITOR WELL INSTALLATION

SHEET 1 OF 2

CLIENT: LACANA GOLD JOB NO.: 1568.0020 DATE DRILLED: 6/29/85 WELL NO.: MW85-7D
 SITE: SILT EDGE SOUTH DAKOTA ELEVATION: 3408 GROUND: 3408 TOP OF PVC CASING: 3410
 TOTAL DEPTH: 185 ft. CASING SIZE & TYPE: 7" O.D. STEEL SURFACE SCREEN SIZE: 6" OPEN BOREHOLE
 WATER LEVEL: 56.52' T.O.C. ON 7/3/85 COORDINATES: 746,440N 1,126,267E
 COMMENTS: PRODUCES MORE THAN 75 GPM FROM MINERALIZED ZONE AT TOP OF QUARTZITE (153'-158')

DEPTH	SYMBOL	STRATIGRAPHY	SAMPLE DESCRIPTION	COMPLETION DATA	
				MATERIAL SETTING	
	GC-CL		CLAYEY GRAVEL, VALLEY FILL, COLLUVIUM MIX OF PORPHYRY AND HORNFELS FRAGMENTS w/SOME BROWN, SILTY CLAY.		
10	CL		SILTY CLAY, YELLOW BROWN w/ABUNDANT ANGULAR PORPHYRY FRAGMENTS, MOISTURE CONTENT INCREASING w/DEPTH.		
20	ROCK		DEADWOOD FM. - WEATHERED BEDROCK, HORNFELS, BROKEN AND WEATHERED w/SOME BROWN CLAY, SATURATED.		
			DEADWOOD FM. HORNFELS, BECOMING HARDER w/DEPTH, LESS CLAY THAN ABOVE.		
30			DEADWOOD FM. HORNFELS, HARD, DARK GRAY, DRY SOME GREEN AND BROWN		
40					
50			PORPHYRY SILL, LIGHT GREEN, FELDSPAR PHENOCRYSTS		
60			DEADWOOD FM HORNFELS, GREEN AND BROWN, HARD. NO SIGNIFICANT WATER.		
70			PORPHYRY SILL, GREEN AND GRAY		
			DEADWOOD FM. HORNFELS, GRAY, BLACK, GRITTY		
80			PORPHYRY SILL, GREEN		
			DEADWOOD FM. HORNFELS, VERIGATED COLOR, BEGAN MAKING 1 GPM AT 97'.		
90					
100			PORPHYRY SILL, WHITE-GRAY, SOME GREEN, w/ PYRITE		



CONTINUED

SHEET 2 OF 2

CLIENT: LACANA GOLD JOB NO.: 1568-0020 DATE DRILLED: 6/29/85 WELL NO.: MN85-10
SITE: GILT EDGE SOUTH DAKOTA ELEVATION: _____ GROUND: 5408 TOP OF PVC CASING: 5410
TOTAL DEPTH: 185 FT. CASING SIZE & TYPE: 7" OD STEEL SURFACE SCREEN SIZE: 6" OPEN BOREHOLE
WATER LEVEL: 56.52' T.O.C. ON 7/3/85 COORDINATES: 746.440 N 1126.267 E
COMMENTS: PRODUCES MORE THAN 75 GPM FROM MINERALIZED ZONE AT TOP OF QUARTZITE (155'-158')

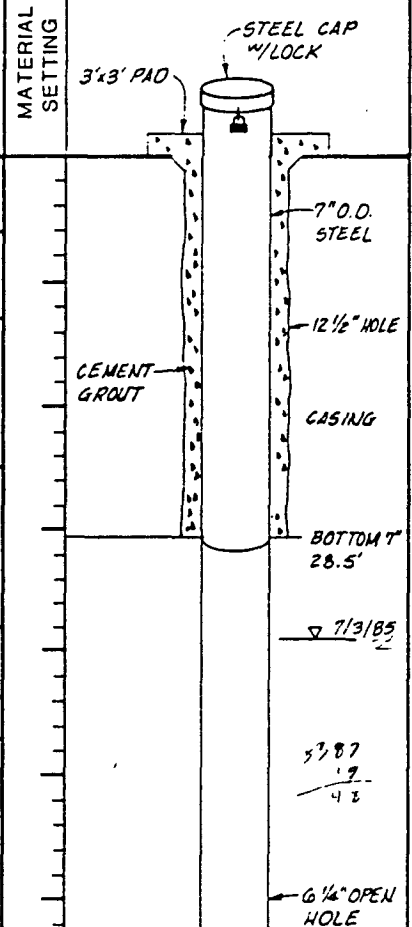
DEPTH	SYMBOL	STRATIGRAPHY	SAMPLE DESCRIPTION	COMPLETION DATA	
				MATERIAL	SETTING
	ROCK		<u>PORPHYRY SILL, WHITE-GRAY, SOME GREEN, w/PYRITE</u>		
120			<u>DEADWOOD FM. HORNFELS, BROWN, PYRITE BECOMING ABUNDANT BELOW 135', 1-2 GPM TOTAL WATER PRODUCTION.</u>		
130					
140					
150					
160			<u>MINERALIZED YUGGY ZONE, PYRITE AND QUARTZ, BIT DROPPED 2 FEET. HOLE BEGAN MAKING MORE THAN 75 GPM.</u>		
			<u>DEADWOOD FM. QUARTZITE, WHITE, HARD, GRANULAR SUGARY TEXTURE w/ABUNDANT PYRITE.</u>		
170					
180					
			<u>PRECAMBRIAN SCHIST, GRAY BLACK, MICACEOUS. NO SIGNIFICANT INCREASE IN WATER PRODUCTION.</u>		
190					

MONITOR WELL INSTALLATION

SHEET 1 OF 2

CLIENT: LACANA GOLD JOB NO.: 1568.0020 DATE DRILLED: 6/21/85 WELL NO.: MW85-2D
 SITE: GILT EDGE SOUTH DAKOTA ELEVATION: 5387 GROUND: 5387 TOP OF PVC CASING: 5389
 TOTAL DEPTH: 125' CASING SIZE & TYPE: 7" O.D. STEEL SURFACE SCREEN SIZE: 6 1/4" OPEN BOREHOLE
 WATER LEVEL: 38.37' T.O.C. ON 7/3/85 COORDINATES: 746,101 N 1,125,943 E
 COMMENTS: WELL MAKES 75 GPM FROM MINERALIZED ZONE AT TOP QUARTZITE (116'-120')
N DEADWOOD FORMATION. BACKGROUND WATER QUALITY WELL

DEPTH	SYMBOL	STRATIGRAPHY	SAMPLE DESCRIPTION	COMPLETION DATA	
				MATERIAL SETTING	
	ML		FILL, SILT, SL. CLAYEY w/ WOOD CHIPS AND ROOT MATERIAL, SOME PEBBLES & COBBLES.		
10	ML		SILT, BROWN, SANDY-PEBBLY w/ SOME COBBLES. ABUNDANT HORNFELS FRAGMENTS		
20	GC-GL		WEATHERED BEDROCK, HORNFELS, GRAY-BLACK, WITH INTERBEDDED CLAYS. DAMP AT 16 FEET, SATURATED AT 17 FEET; PERCHED WATER ZONE		
30	ROCK		DEADWOOD FM, GRAY, BLOCKY HARD, DRY HORNFELS		
40			PORPHYRY SILL, TAN-GRAY, FELDSPAR PHENOCRYSTS 1-2 GPM AT BASE OF SILL		
50			DEADWOOD FM, GRAY-BLACK, PYRITE IN FRACTURE HORNFELS VEINS AT 55'-60'		
60					
70			PORPHYRY SILL, GRAY, SILICIC, ABUNDANT PYRITE THIN QUARTZITE INTERBEDS 70'-72'		
80					
90			DEADWOOD FM, DARK GREEN w/ ABUNDANT PYRITE HORNFELS BECOMING DARKER COLORED w/ DEPTH.		
100					



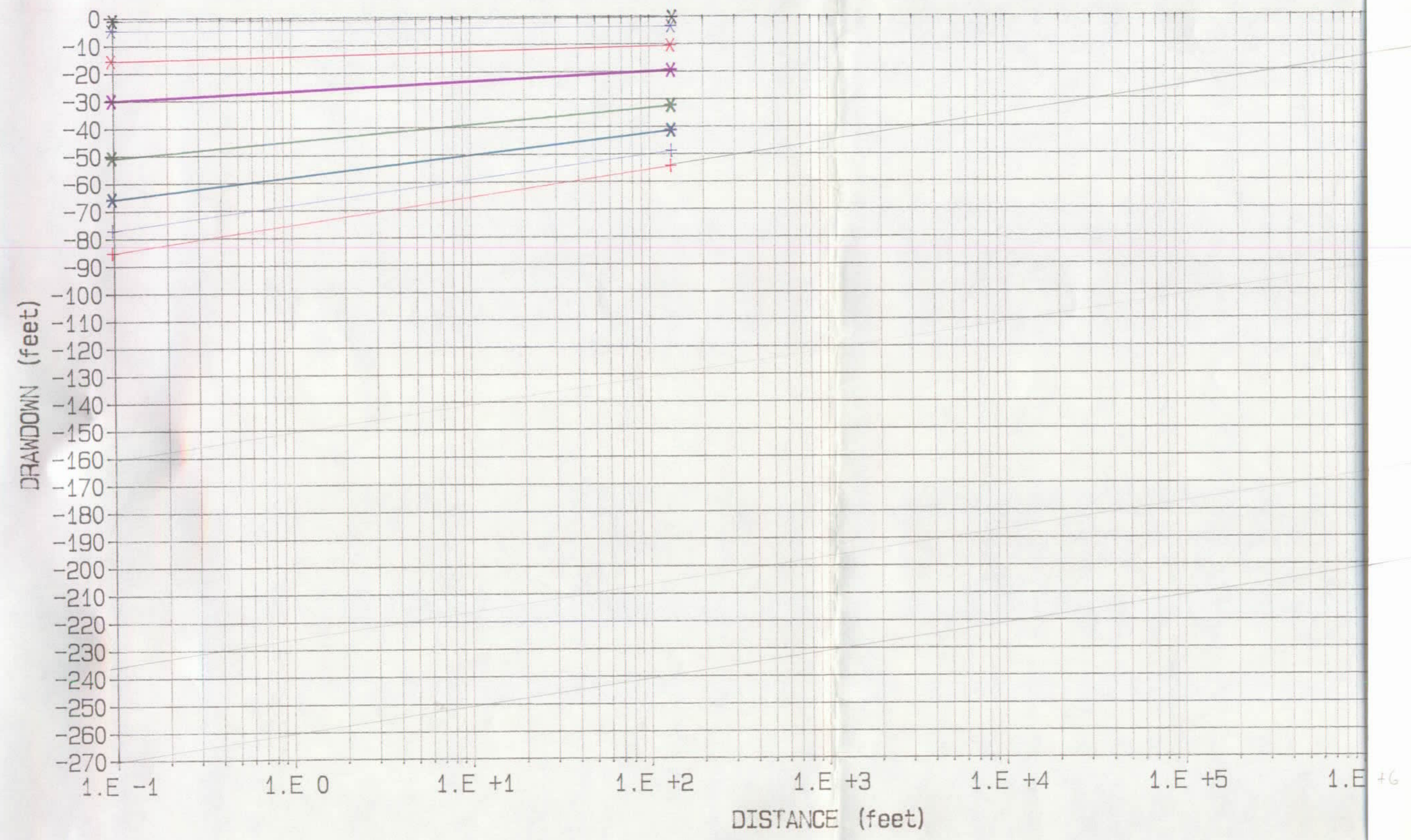
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SHEET 2 OF 2

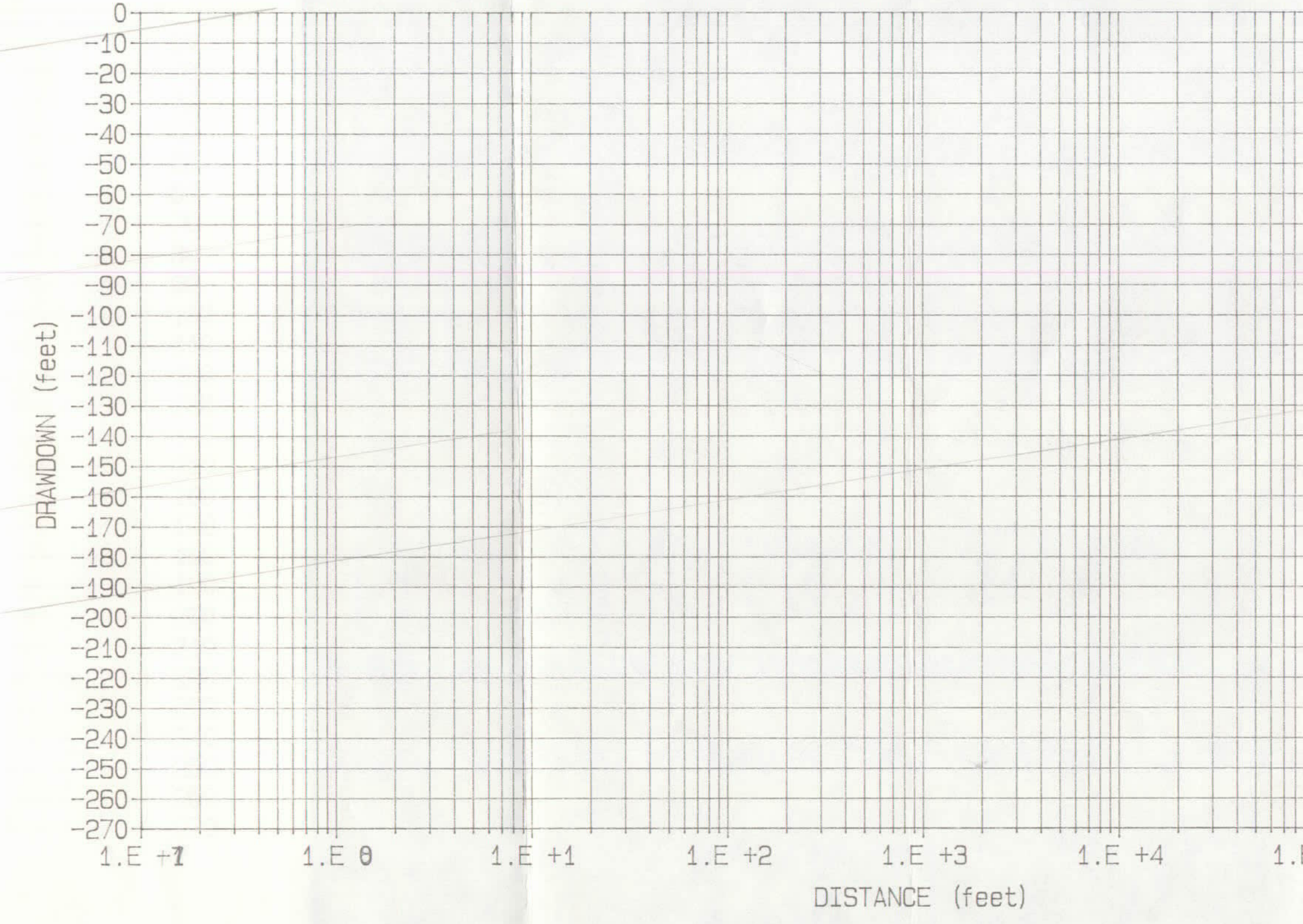
CLIENT: LACANA GOLD JOB NO.: 1568.0020 DATE DRILLED: 4/21/85 WELL NO.: MW85-2D
SITE: GILT EDGE SOUTH DAKOTA ELEVATION: _____ GROUND: 5387 TOP OF PVC CASING: 5389
TOTAL DEPTH: 125 ft CASING SIZE & TYPE: 1" O.D. STEEL SURFACE SCREEN SIZE: 6 1/4" OPEN BOREHOLE
WATER LEVEL: 38.87' F.O.C. ON 7/3/85 COORDINATES: 746,101N 1,125,943E
COMMENTS: HOLE MAKES 75 GPM FROM MINERALIZED ZONE AT TOP QUARTZITE (116'-120') IN
DEADWOOD FORMATION. BACKGROUND WATER QUALITY WELL

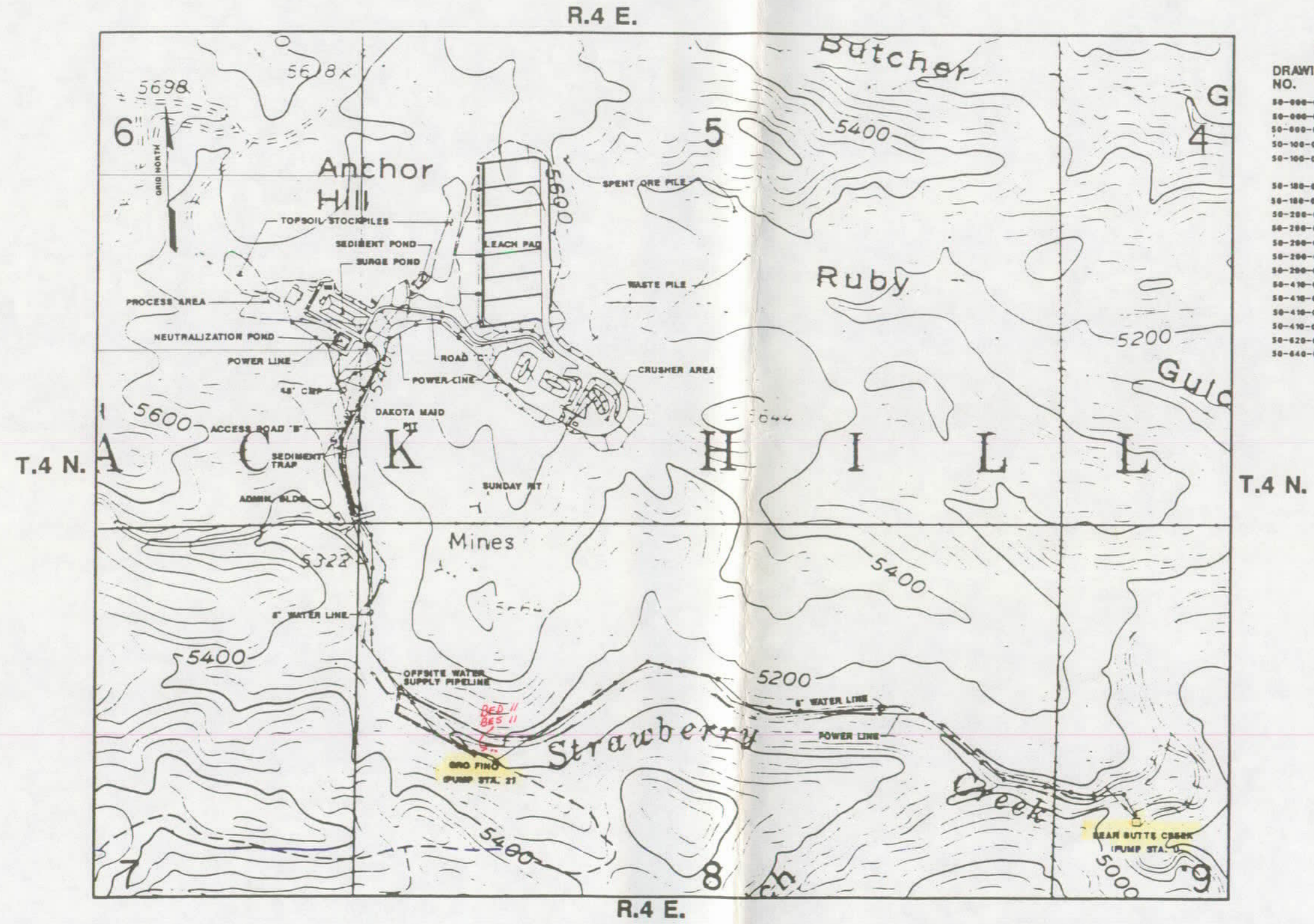
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DISTANCE-DRAWDOWN
"SHORT WELL"



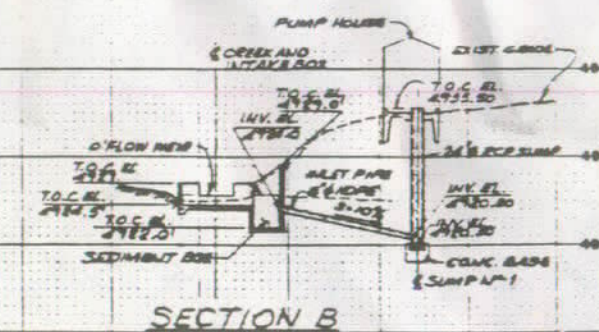
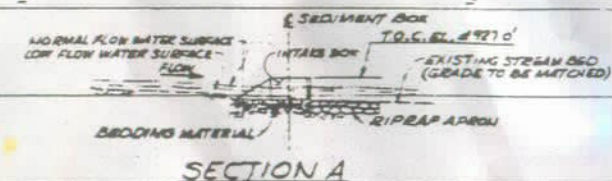
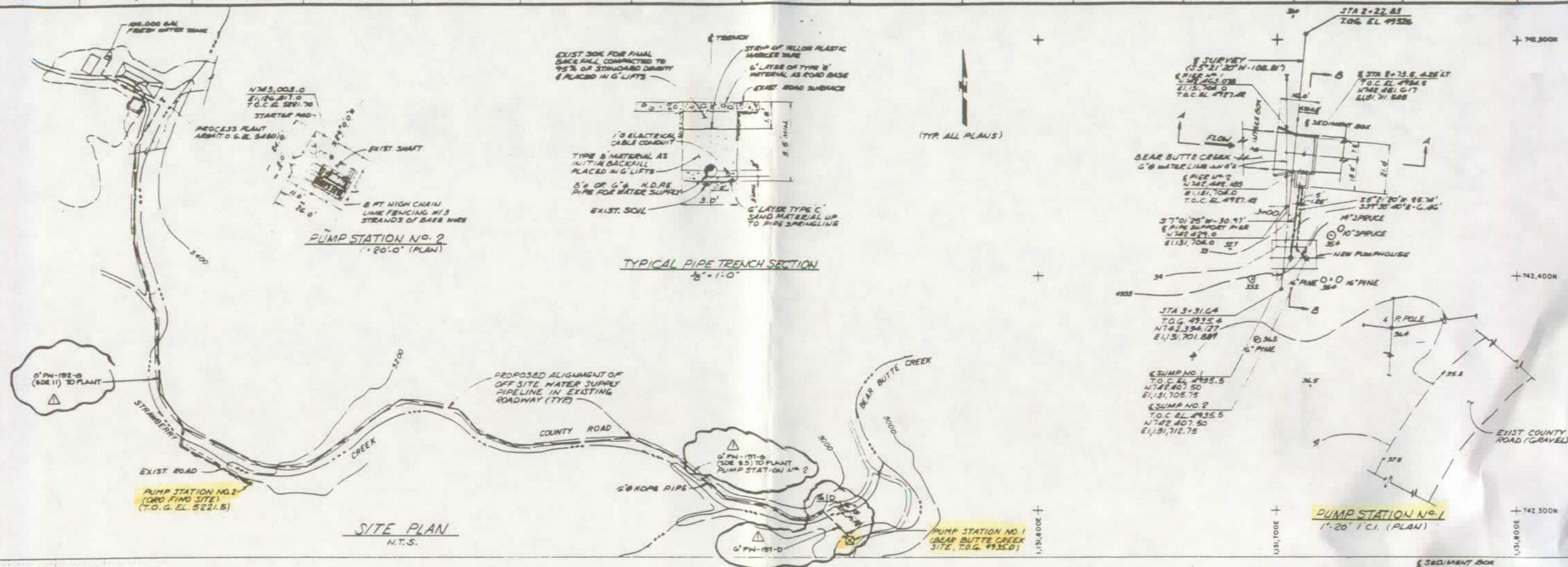
DISTANCE-DRAWDOWN
"SHORT WELL"



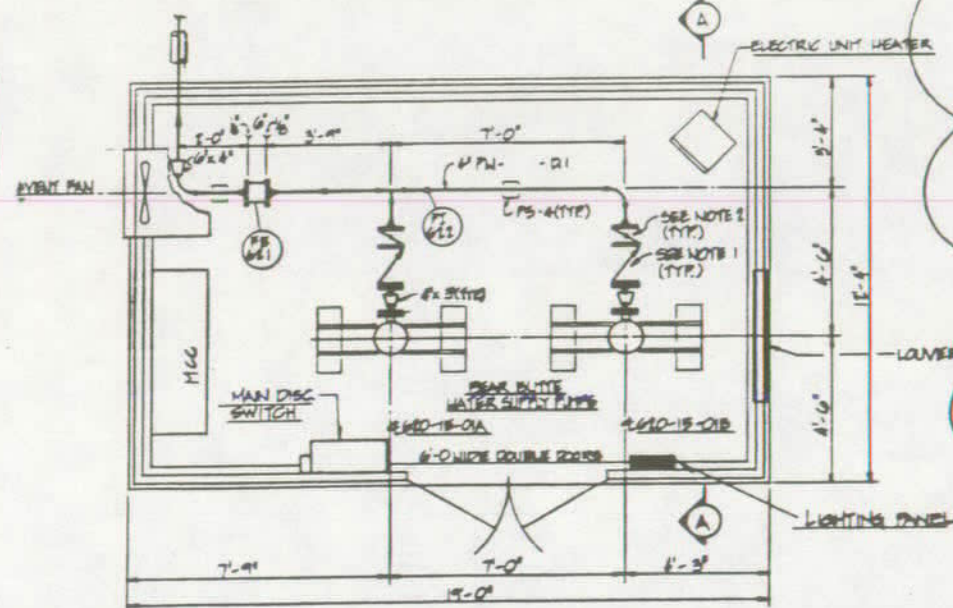
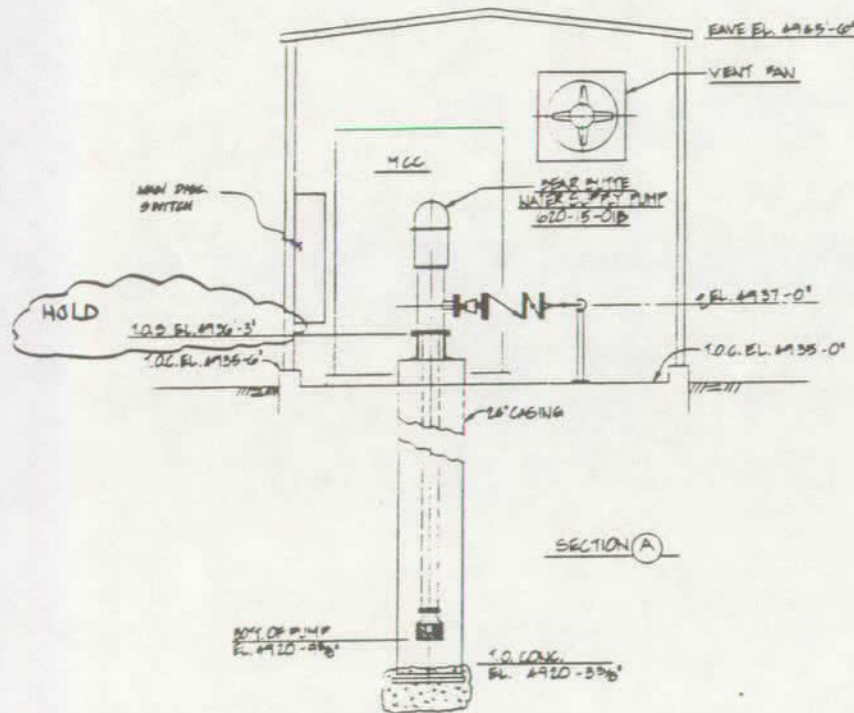


CIVIL DRAWING LIST	
DRAWING NO.	TITLE
50-000-01	GENERAL NOTES AND LEGEND
50-000-02	ROADWAY AND SITE STANDARDS
50-000-03	DRAINAGE AND SITE STANDARDS
50-100-01	KEY PLAN AND INDEX
50-100-02	SITE PLAN
50-180-01	BASIN BOUNDARY MAP
50-180-02	SEDIMENTATION CONTROL - PLAN, SECTIONS AND DETAILS
50-200-01	CRUSHER AREA - PLOT PLAN AND GRADING
50-200-02	CRUSHER AREA - SECTIONS
50-200-03	ROAD 'C' - PLAN AND PROFILE
50-200-04	LEACH PAD - SECTIONS
50-200-05	LEACH PAD - SECTIONS
50-410-01	PROCESS AREA - SITE GRADING AND PLOT PLAN
50-410-02	PROCESS AREA - CROSS SECTIONS AND DETAILS
50-410-03	CROSS SECTIONS AT SEDIMENT TRAPS
50-410-04	LINER DETAILS
50-620-01	OFF-SITE WATER SUPPLY - PLANS AND DETAILS
50-640-01	ROAD 'B' - PLAN AND PROFILE

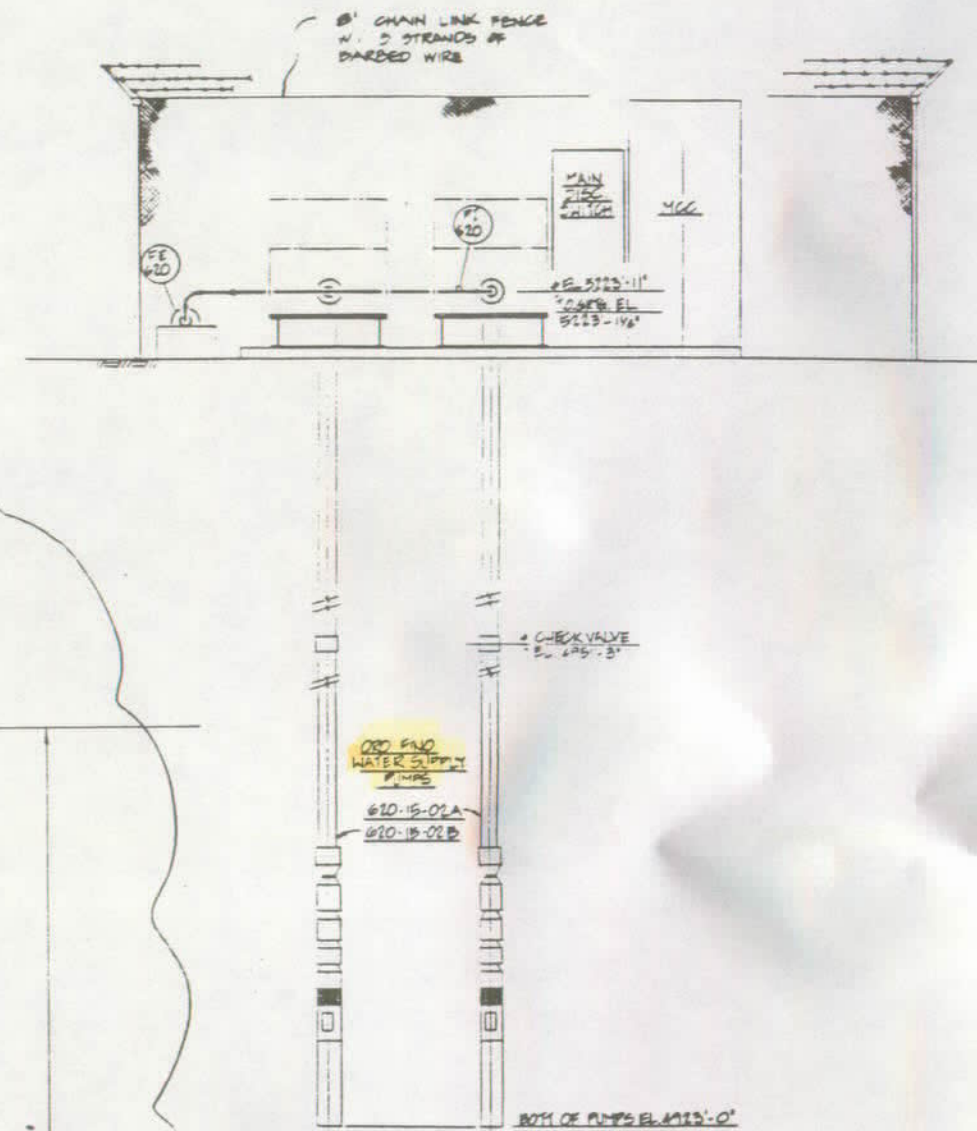
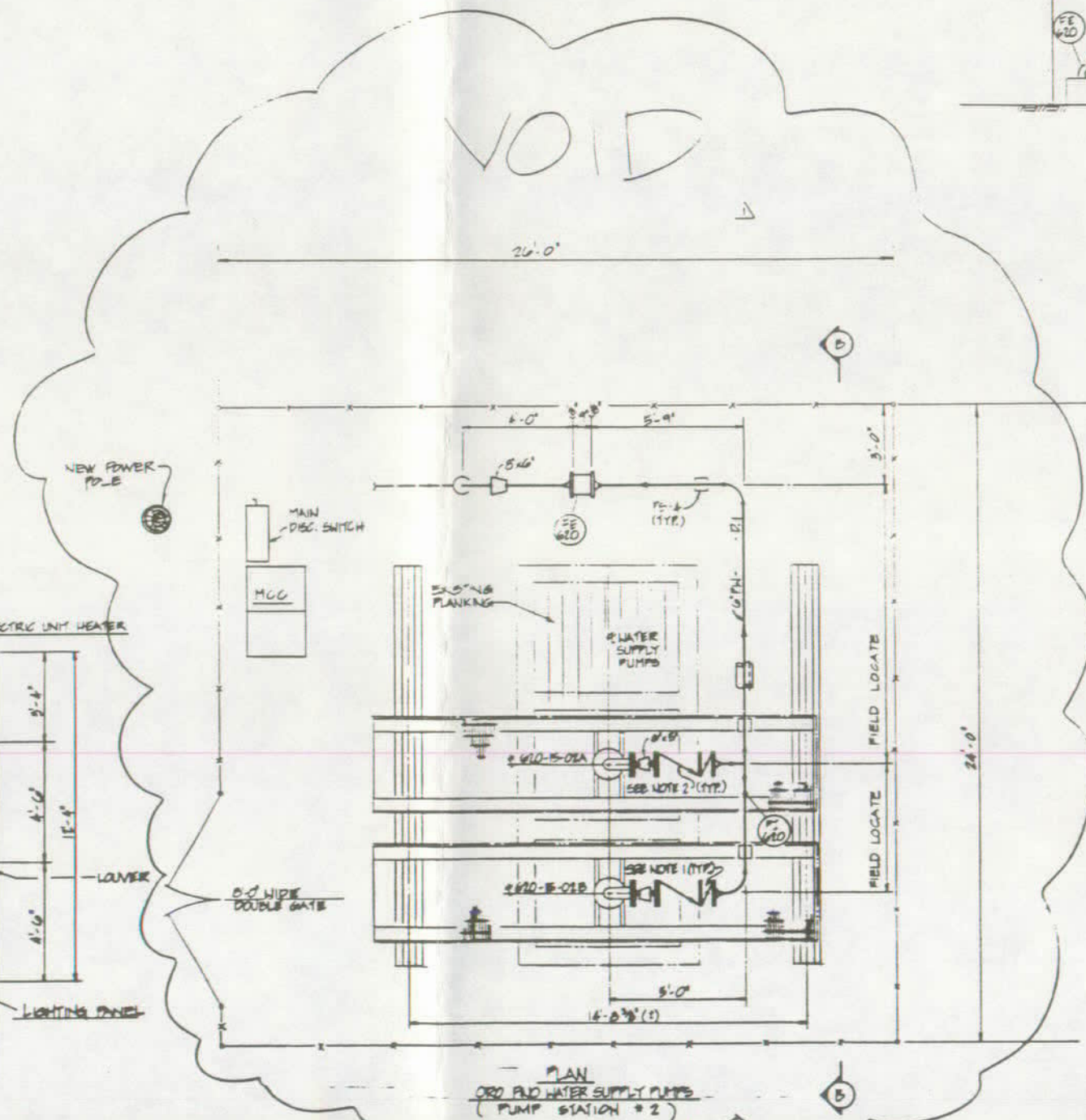
THIS DRAWING IS THE PROPERTY OF - BATEMAN ENGINEERS INC. It is subject to return upon demand, and may not be passed on to any third party, or used directly or indirectly for any other purpose than the manufacture or construction of equipment, or in the design and installation of plant to the order of BATEMAN ENGINEERS INC.	REFERENCE DRAWINGS		REVISIONS		DATE BY CHKD APVD		PRINT RECORD		ENG RECORD		DRAWING STATUS		BROHM MINING CORPORATION GILT EDGE PROJECT DEADWOOD, SOUTH DAKOTA PREPARED BY BATEMAN ENGINEERS INC. 777 SOUTH WASHINGTON BOULEVARD LAKEWOOD, COLORADO, 80225 725 SPICE ISLANDS DRIVE SPOKE, WYOMING, 82435	TITLE KEY PLAN AND INDEX CUSTOMER APPROVAL [Signature] J-8740 SCALE 48" C.I. SHEET 1		
			1	ISSUE FOR CLIENT APPROVAL	DATE	BY	CHKD	APVD	DATE	BY	CHKD	APVD			ISSUED	DATE
			2	ISSUE FOR CONSTRUCTION	DATE	BY	CHKD	APVD	DATE	BY	CHKD	APVD			FOR COMMENTS AND OR APPROVAL	DATE
			3	GENERAL REVISIONS	DATE	BY	CHKD	APVD	DATE	BY	CHKD	APVD			FOR COMMENTS AND OR APPROVAL	DATE
		4	REVISED DRAWING LIST	DATE	BY	CHKD	APVD	DATE	BY	CHKD	APVD	APPROVED FOR CONSTRUCTION	DATE			
		5	AGREE T&E, R&E	DATE	BY	CHKD	APVD	DATE	BY	CHKD	APVD	REVISED & REV APPROVED FOR CONSTRUCTION	DATE			
		6		DATE	BY	CHKD	APVD	DATE	BY	CHKD	APVD		DATE			
		7		DATE	BY	CHKD	APVD	DATE	BY	CHKD	APVD		DATE			
		8		DATE	BY	CHKD	APVD	DATE	BY	CHKD	APVD		DATE			
		9		DATE	BY	CHKD	APVD	DATE	BY	CHKD	APVD		DATE			
		10		DATE	BY	CHKD	APVD	DATE	BY	CHKD	APVD		DATE			



THIS DRAWING IS THE PROPERTY OF - BATEMAN ENGINEERS INC.	REFERENCE DRAWINGS		NO.	REVISIONS		DATE BY CHKD APVD		PRINT RECORD				ENG. RECORD		DRAWING STATUS		BROHM MINING CORPORATION GILT EDGE PROJECT DEADWOOD, SOUTH DAKOTA BATEMAN ENGINEERS INC. 177 SOUTH UNIVERSITY BOULEVARD SIOUX FALLS, S.D. 57105 TEL: 605/336-1234 FAX: 605/336-1235		TITLE OFF-SITE WATER SUPPLY PLANS AND DETAILS		CUSTOMER APPROVAL J.D. Blahner 9/24/02 JOB NUMBER J874Q		DRAWING NUMBER 50-620-01 SHEET OF		REV. 1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
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PLAN
BEAR BUTTE PUMP HOUSE
(PUMP STATION #1)



SECTION B
50-610-01

NOTES: 1. BAILEY 4-51 OR EQUAL.
2. KIRKSTONE PIG. 504 OR EQUAL.

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REFERENCE DRAWINGS	NO.
40-610-01 CONCRETE-WATER SUPPLY PUMPS DETAILS	1
50-610-01 OFFSITE-WATER SUPPLY PUMPS & DETAILS	1

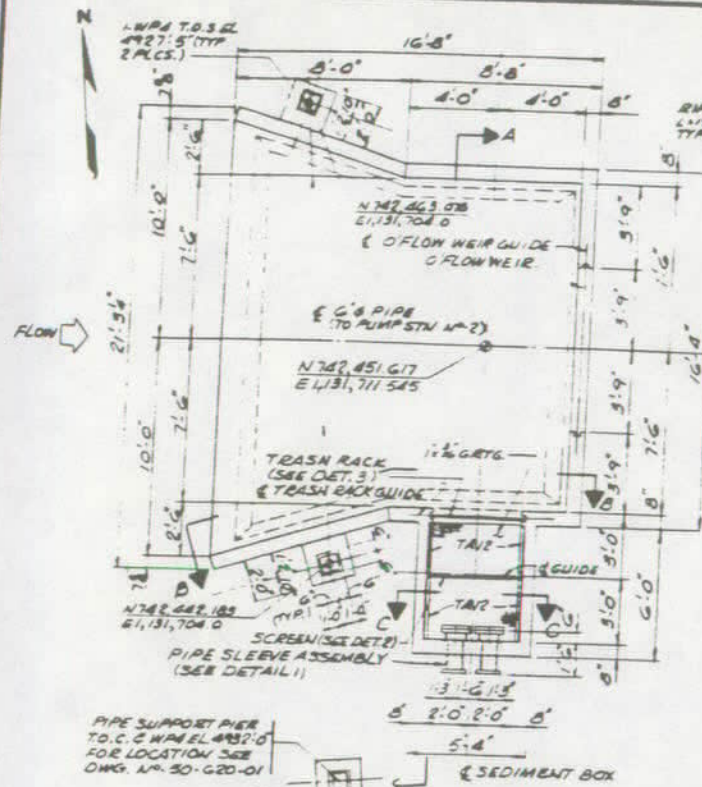
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REVISED FOR CONSTRUCTION	10/1/87	WJG	WJG	WJG

PRINT RECORD	DATE	BY	CHKD	APVD
FOR APPROVAL	10/1/87	WJG	WJG	WJG
REVISED	10/1/87	WJG	WJG	WJG
CUSTOMER	10/1/87	WJG	WJG	WJG
FIELD	10/1/87	WJG	WJG	WJG
INTRA CO	10/1/87	WJG	WJG	WJG

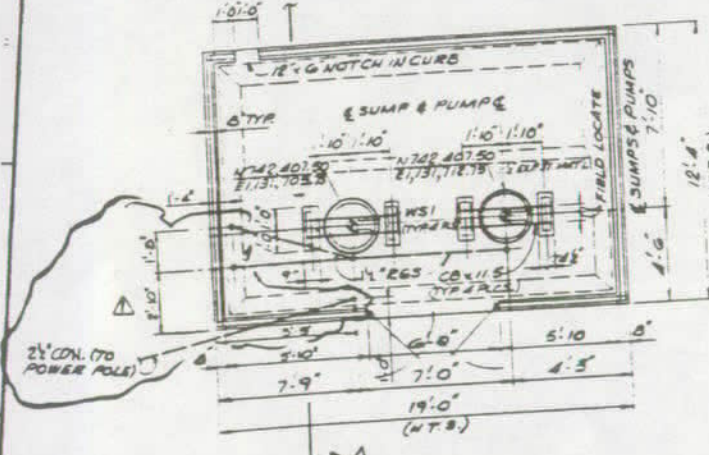
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MECH. CHK	10/1/87	WJG	WJG	WJG
STRUCT. CHK	10/1/87	WJG	WJG	WJG
ELECT. CHK	10/1/87	WJG	WJG	WJG
PIPING CHK	10/1/87	WJG	WJG	WJG
INSTR. CHK	10/1/87	WJG	WJG	WJG
CIVIL CHK	10/1/87	WJG	WJG	WJG
PROC. CHK	10/1/87	WJG	WJG	WJG

DRAWING STATUS	DATE
ISSUED	10/1/87
FOR COMMENTS AND OR APPROVAL	10/1/87
APPROVED FOR CONSTRUCTION	10/1/87
REVISED & APPROVED FOR CONSTRUCTION	10/1/87

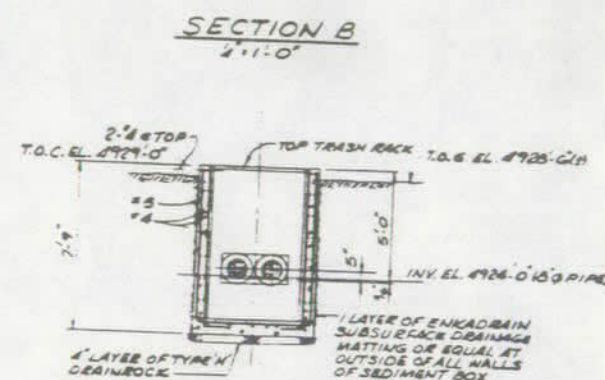
BROHM MINING CORPORATION		PIPING & GENERAL ARRANGEMENT	
GILT EDGE PROJECT		OFF SITE WATER SUPPLY	
BATEMAN ENGINEERS INC.		SHEET	
777 SOUTH WASHINGTON BOULEVARD LAKEWOOD, COLORADO, 80226	777 SOUTH WASHINGTON BOULEVARD LAKEWOOD, COLORADO, 80226	777 SOUTH WASHINGTON BOULEVARD LAKEWOOD, COLORADO, 80226	777 SOUTH WASHINGTON BOULEVARD LAKEWOOD, COLORADO, 80226
3-8748	3/8"-1'-0"	3-8748	3/8"-1'-0"



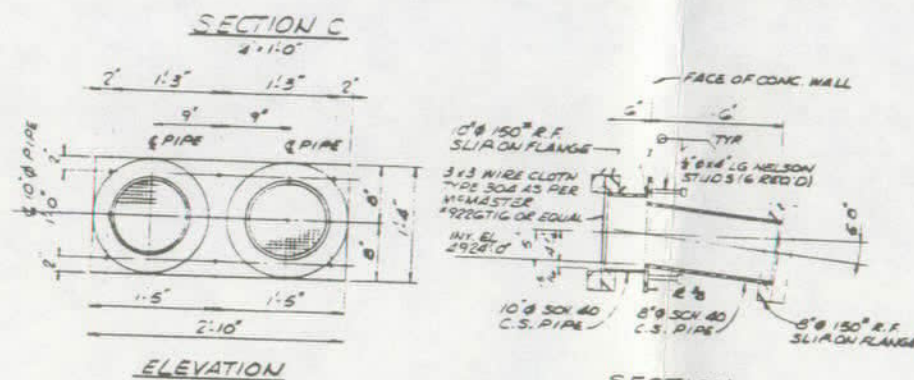
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4'-11.0"



PLAN OF PUMP STATION NO. 2
4'-11.0"



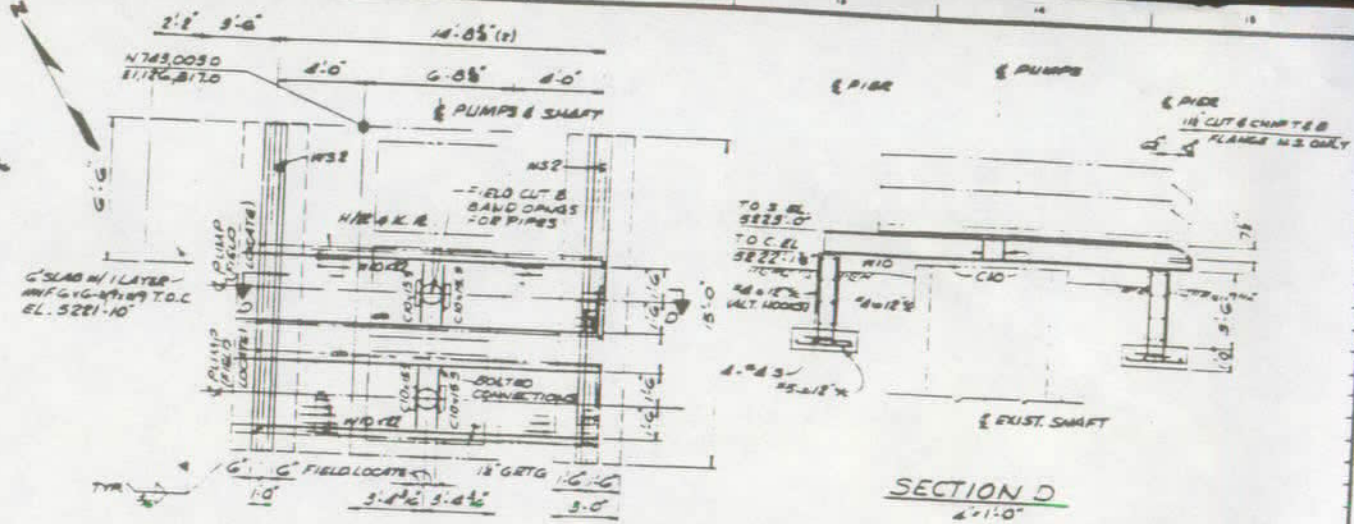
SECTION B
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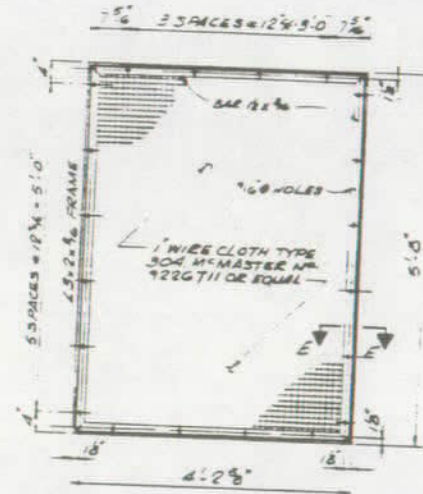
SECTION C
2'-11.0"

DETAIL 1
1'-1.0"

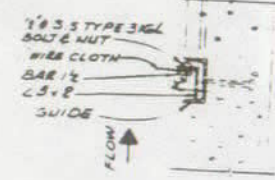
GUIDE DETAIL
12'-11.0"



SECTION D
2'-11.0"

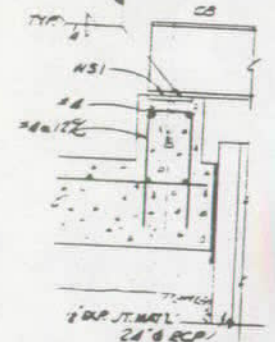


DETAIL 2
2'-11.0"

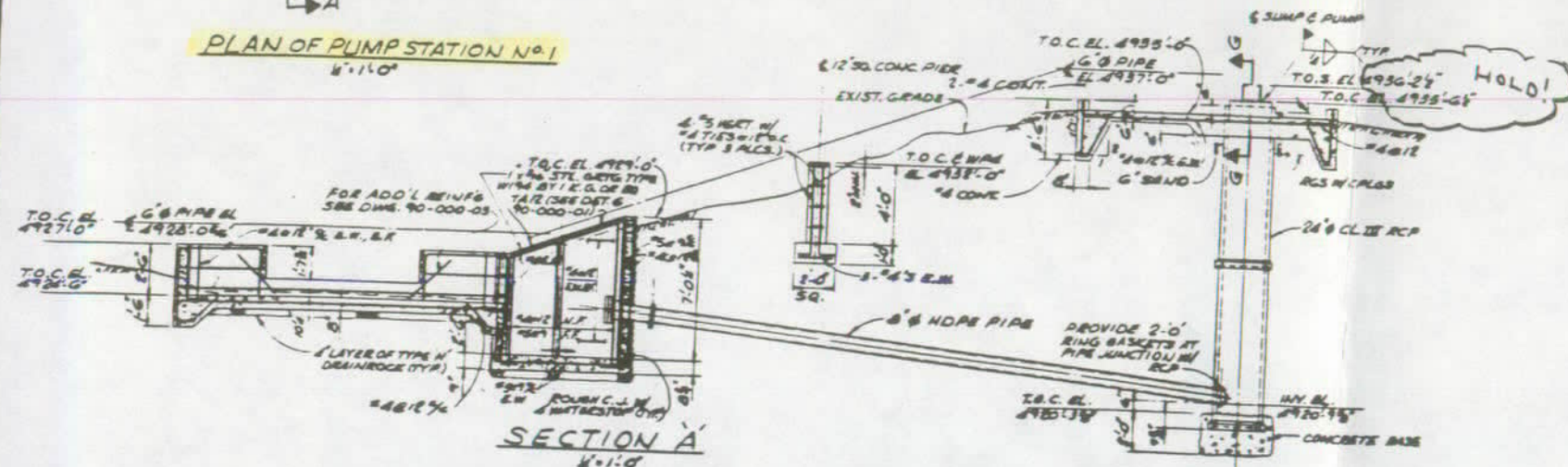


SECTION E
12'-11.0"

SECTION F
12'-11.0"



SECTION G
1'-1.0"



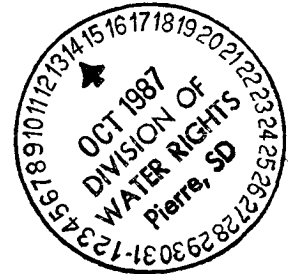
SECTION A
4'-11.0"

- NOTE:
1. FOR CONCRETE GENERAL NOTES SEE DWG 90-000-01.
 2. FOR STRUCTURAL STEEL GENERAL NOTES SEE DWG 40-000-01.
 3. FOR THIS DWG. WITH DWG. 50-000-01.
 4. CONCRETE CONTRACTOR TO SUPPLY, FABRICATE, PLACE & FINISH EMBEDDED ITEMS.
 5. HOPE PIPE SHALL BE SDR 35 FOR PIPE & FITTINGS SHALL BE SDR 15.5 DRISCO 1000 OR EQUAL.
 6. FOR SUMP USE CLASS III REINFORCED CONCRETE PIPE WITH BELL & SPIGOT ENDS.
 7. MAXIMUM AGGREGATE SIZE SHALL BE 3/4" FOR CONCRETE MAX FOR THE INTAKE & SEDIMENT BOXES.

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90-000-01		CONC. STANDARDS - EMBEDDED ITEMS (NOTES)		1. ISSUED FOR APPROVAL		DATE		DATE		DRAWN		ISSUED		771 SOUTH BROADWAY SOUTHWEST		BATEMAN ENGINEERS INC.		J8740		90-020-01		SHEET		1	
90-000-02		CONC. DETAILS		2. REVISED FOR CONSTRUCTION		DATE		DATE		CHECKED		FOR COMMENTS AND/OR APPROVAL		771 SOUTH BROADWAY SOUTHWEST		BATEMAN ENGINEERS INC.		J8740		90-020-01		SHEET		1	
90-000-03		CONC. DETAILS		3. REVISED FOR CONSTRUCTION		DATE		DATE		MECH CHK		FOR COMMENTS AND/OR APPROVAL		771 SOUTH BROADWAY SOUTHWEST		BATEMAN ENGINEERS INC.		J8740		90-020-01		SHEET		1	
50-000-01		CIVIL OFF-SITE WATER SUPPLY PLANS & DETS.		4. REVISED FOR CONSTRUCTION		DATE		DATE		ELECT CHK		FOR COMMENTS AND/OR APPROVAL		771 SOUTH BROADWAY SOUTHWEST		BATEMAN ENGINEERS INC.		J8740		90-020-01		SHEET		1	
40-000-01		STRUCT. STL. STD. - STEEL DETS & GEN. NOTES		5. REVISED FOR CONSTRUCTION		DATE		DATE		PIPING CHK		FOR COMMENTS AND/OR APPROVAL		771 SOUTH BROADWAY SOUTHWEST		BATEMAN ENGINEERS INC.		J8740		90-020-01		SHEET		1	
60-000-02		STAIR & HANDRAIL DETS.		6. REVISED FOR CONSTRUCTION		DATE		DATE		INSTR CHK		FOR COMMENTS AND/OR APPROVAL		771 SOUTH BROADWAY SOUTHWEST		BATEMAN ENGINEERS INC.		J8740		90-020-01		SHEET		1	
										CIVIL CHK		FOR COMMENTS AND/OR APPROVAL		771 SOUTH BROADWAY SOUTHWEST		BATEMAN ENGINEERS INC.		J8740		90-020-01		SHEET		1	
										PROC CHK		FOR COMMENTS AND/OR APPROVAL		771 SOUTH BROADWAY SOUTHWEST		BATEMAN ENGINEERS INC.		J8740		90-020-01		SHEET		1	

BROHM MINING CORP.

October 9, 1987



Ron Duvall
Division of Water Rights
Department of Water & Natural Resources
Joe Foss Building
Pierre, SD 57501

RE: Amendment to Permit No. 1324A-1.

Dear Ron:

Following further review of the status of well 7D it was determined the existing well was not suitable for development. It was originally intended for water quality monitoring and has since been plugged and reclaimed in accordance with state regulations.

We still wish to maintain 7D on the permit application in case future needs require developing a new well in this location. We will then hire a certified driller, keep an accurate well drilling log, and properly develop the new well for sustained production. At that time we will send you all appropriate and relevant information.

If you have any questions or suggestions please feel free to give me a call at 578-2107.

Thank you.

Sincerely,

John Wilbanks
Director - Gov/Environ Affairs

SW,JW/scw

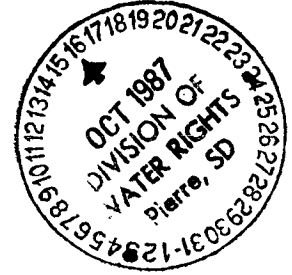
South Dakota Office: P.O. Box 485, Deadwood, South Dakota 57732
Telephone: (605) 578-2107

Head Office: #1580 - 999 West Hastings Street, Vancouver, B.C. V6C 2W2
Telephone: (604) 662-8383 Telex: 04-51472 P V C VCR Telecopier: (604) 684-1329

BROHM MINING CORP.

October 14, 1987

Ron Duvall
Division of Water Rights
Department of Water and Natural Resources
Joe Foss Building
Pierre, SD 57501



RE: Fee for Amendment to Permit No. 1324-1 & 1345-1

Dear Ron:

The attached check is to pay the balance of the application fee for the increased diversion rate for Permit No. 1324-1 and 1345-1.

If you have any questions or suggestions please feel free to give me a call at 578-2107.

Thank you.

Sincerely,

John Wilbanks
Director - Gov/Environ Affairs

SW,JW/dvl

enc:

South Dakota Office: P.O. Box 485, Deadwood, South Dakota 57732
Telephone: (605) 578-2107

Head Office: #1580 - 999 West Hastings Street, Vancouver, B.C. V6C 2W2
Telephone: (604) 662-8383 Telex: 04-51472 P V C VCR Telecopier: (604) 684-1329

BROHM MINING CORP.

October 20, 1987

Ron Duvall
Division of Water Rights
Department of Water & Natural Resources
Joe Foss Building
Pierre, SD 57501



RE: Water Well Log

Dear Ron:

A review of well 7-D shows that it was only drilled as a monitoring well and never completed as a water supply well. This and the low yield is why the contractor chose not to use 7-D as a water supply well. The well was reclaimed and a new well would have to be drilled if we used this area for water supply. The log of the monitor well is attached.

If you have any questions or suggestions, please feel free to give me a call at 578-2107.

Thank you.

Sincerely,

John Wilbanks

John Wilbanks
Director - Gov/Environ Affairs

JW/jms

South Dakota Office: P.O. Box 485, Deadwood, South Dakota 57732
Telephone: [605] 578-2107

Head Office: #1580 - 999 West Hastings Street, Vancouver, B.C. V6C 2W2
Telephone: [604] 662-8383 Telex: 04-51472 P V C VCR Telecopier: [604] 684-1329



Division of Water Rights

Attn: Mr. Ron Duval

11 - 24 - 87

Dear Sir,

Pursuant to our telephone conversation of 11 - 24 - 87, I am requesting time to testify concerning home owners water rights during the water permit application hearings 1420-1 and 1421-1.

I am a resident of Galena, South Dakota and the matters being brought before the commission during these hearings with regard to the permitting of the water rights concerning the Brohm Mine operation is of vital concern to myself and other residents of the Galena community.

Thank you for your consideration,

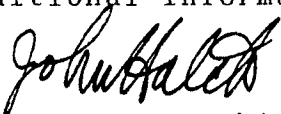
Michael E. Germann
Michael E. Germann
HCR 73 Box 580
Deadwood, South Dakota 57732

RECOMMENDATION OF CHIEF ENGINEER FOR WATER PERMIT
APPLICATION NO. 1420-1 and 1421-1, Brohm Mining Corporation

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 Nos. 1420-1 and 1421-1, Brohm Mining Corporation, PO Box 478, Deadwood SD.

The Chief Engineer is recommending DEFERRAL of Application Nos. 1420-1 and 1421-1 because 1) unable to verify that Oro Fino Mine will supply 1.0 cfs and to determine if unappropriated water is available, and 2) it may not be in the public interest to pump surface water into Oro Fino Mine a ground water supply.

See the attached report for additional information.


JOHN HATCH, Chief Engineer
October 29, 1987

REPORT ON APPLICATION NO. 1421-1
BROHM MINING CORPORATION
October 27, 1987

Water Permit Application No. 1421-1 proposed to appropriate an additional 0.75 cubic feet per second (cfs), and an additional 180 acre-feet annually from the Oro Fino Mine Shaft (300 feet deep) and/or a proposed standby well approximately 190 feet deep. Permit No. 1324-1 authorizes an appropriation of 0.25 cfs from 2 wells. Permit No. 1324A-1 amended Permit No. 1324-1 by changing one diversion location to the Oro Fino Mine Shaft and added 2 additional well sites with no additional water appropriation. Application No. 1421-1 proposes to increase the water appropriation from 0.25 cfs to 1.00 cfs (360 acre-feet total annual use) from the Oro Fino Mine Shaft and/or the stand by well used individually or together. Water is to be used for industrial purposes in a heap leach ore processing facility operated by Brohm Mining Corporation, located primarily in the SW 1/4 Section 5; and the SE 1/4 Section 6; all in T4N, R4E, Lawrence County.

Aquifer: Unknown-Deadwood Formation and/or tertiary intrusives

Geology and Aquifer Characteristics

Well logs submitted with this application, domestic well logs from the area (Water Rights Division, 1987), and a review of the areal geology of the Lead Quadrangle (Darton, 1925), indicate geologically, the area is a very heterogeneous lithologic assemblage. Tertiary igneous rocks consisting primarily of quartz monzonite and monzonite porphyries, were forcibly injected through Pre-cambrian micaceous schist or phyllite, and emplaced as sills in the Cambrian Deadwood Formation.

The importance of these formation as aquifers is largely due to zones of secondary porosity and permeability, in the form of fractures, joints and fissures. The distribution, orientation and interconnection of porous and permeable zones and unpredictable, and the aquifer characteristics are site specific, and difficult to assess.

Limited hydrologic information is available for this area, except that information supplied with this application and from the domestic wells in the area. Most domestic wells produce 1.5 - 20 gpm, and the applicant indicates well yields of 50 gpm to 75 gpm from test wells. A six hour pump test was performed by the applicant to delineate the characteristics of the aquifer. The results of the test indicate the source of water to the test well was a confined fracture of limited areal extent. The aquifer transmissivity was calculated to equal 890 ft²/day and the storage coefficient was calculated to be 1.8×10^{-5} , indicating a confined aquifer. Based on the information supplied with this application, the specific capacity of the test well equals less than 3.38 gpm/ft (it is likely the drawdown after only 6 hours of pumping has not stabilized). The extent of this aquifer, the amount of recoverable water in storage in this aquifer, and the average annual recharge to this aquifer have not been quantified.

Review of Existing Water Rights

The Division of Water Rights has record of several domestic wells in this area, and three existing appropriative rights held by other. The permits include:

<u>Permit No.</u>	<u>Owner</u>	<u>Diversion Rate</u>	<u>Source</u>
407-1	Jerry Loader	0.88 cfs	3 wells (TD= <u>±</u> 20')
1308-1	Daniel A Fredlund	0.10 cfs	3 wells (TD= <u>±</u> 14') and 2 wells (TD=150'-300')
1366-1	Wild Bill's Campground	0.066 cfs	1 well (TD=70')

Conclusions

1. It is likely there is groundwater available, however, there is not definite testing to show this.
2. Approval of this application would increase the appropriation of ground water to the applicant from 0.25 cfs to 1.00 cfs. This application does not add any new diversion points to those covered under Permit Nos. 1324-1 and 1324A-1, and would increase the diversion rate authorized, only from the Oro Fino Mine and/or one well.
3. The proposed primary source of ground water for this permit is the Oro Fino Mine Shaft. The mine shaft has not been test pumped and the sustained yield of the mine shaft has not been evaluated.
4. Brohm Mining Corporation proposes, through Application No. 1420-1 to divert water from Bear Butte Creek into Oro Fino Mine and divert twice that quantity from the mine (Application Nos. 1420-1 and 1421-1). The applicants concept is, by diverting twice the rate from the mine that is diverted to the mine, artificial recharge to the aquifer from Bear Butte Creek will not take place. Surface water diversion are to be "staged" at the Oro Fino Mine Shaft because of pumping limitations dictated by the lift required to divert surface water directly to the Brohm mining site.
5. The total diversion from the Oro Fino Mine Shaft as authorized by Application Nos. 1420-1 and 1421-1 must be greater than the diversion of surface water to the mine or artificial recharge may take place.
6. It is recommended that Permit Application No. 1421-1 be deferred until the Oro Fino Mine and the proposed stand by well are test pumped for at least 72 hours, to evaluate the capacity of the mine and the test well, further evaluate the aquifer characteristics, and determine if groundwater is available.



KENT BUHLER
Natural Resources Engineer

References

- Water Rights Division, 1987, "Domestic Well Log Files, and Water Permit Files", DWNR, Water Rights Division, Joe Foss Building, Pierre SD.
- Darton, N.H., Paige, S., 1925, Geologic Atlas of the United States, Central Black Hills Folio, South Dakota, USGS, Folio No. 219.



Department of Water & Natural Resources

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

Water Rights Division
(605) 773-3352

October 30, 1987

NOTE:

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

John Wilbanks
Brohm Mining Corp.
P.O. Box 485
Deadwood, South Dakota 57732

Dear Mr. Wilbanks:

Your Application No. 1420-1 and 1421-1 for a permits 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 Lead

South Dakota. For your information, a copy of this notice, the recommendation
of the Chief Engineer and a report on the application are enclosed. 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 YOUR NOTICE OF INTENT TO APPROPRIATE WATER AND TO ARRANGE FOR PAYMENT.
Early contact with the paper can eliminate delays. The publisher has been
instructed to publish your 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,

RON DUVAL
Natural Resources Engineer

enclosures



Department of Water & Natural Resources

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

October 30, 1987

Lead Daily Call
P.O. Box 876
Lead, South Dakota 57754

Dear Sir:

Enclosed is a Notice of Hearing on Application No\$ 1421-1 & /1420-1. Please publish this notice once each week for two consecutive weeks in your paper. The first publication should be on or before November 4, 1987.

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 Brohm Mining Co., PO Box 478, Deadwood, SD 57732.

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.

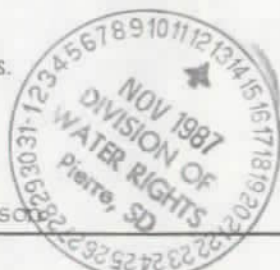
Name

Newspaper

No. 1420-1 / 1421-1

PROOF OF PUBLICATION

STATE OF SOUTH DAKOTA)
County Lawrence) ss.



I, Jimmie R. Stephenson hereby

certify that the annexed printed copy of Notice of Intent to Appropriate
Water was taken from the Lead Daily Call

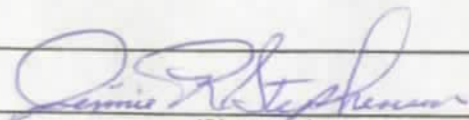
A newspaper which during the whole time of publication of said notice
herein after stated, has been and is printed and published in the

City of Lead

County of Lawrence and State of South Dakota;
that the said notice was published in said newspaper on the following
two dates:

November 5th, 1987

November 12th, 1987


(Signature)

Publisher
(Title)

11-12-87
(Date Signed)

Cost of Printing: _____

144 lines x .2564 = 36.92

144 lines x .2051 = 29.54

Total = 66.46

NOTICE OF HEARING

On Application Nos.
1420-1 and 1421-1
to Appropriate Water

Notice is hereby given that Brohm Mining Corporation whose mailing address is PO Box 478, Deadwood, South Dakota has filed Application No. 1420-1 for a permit to appropriate an additional 0.75 cubic feet of water per second (cfs) and an additional 180 acre-feet of water annually from Bear Butte Creek. Water Permit No. 1345-1 authorizes an appropriation of 0.25 cfs from Bear Butte Creek or one of several other area creeks. This application proposes to increase the water appropriation from 0.25 cfs to 1.00 cfs (360 acre-feet total annual use) from Bear Butte Creek in the SW 1/4 NW 1/4 Section 9, T4N, R4E. Water is to be diverted into the Oro Fino Mine Shaft located in the SW 1/4 NW 1/4 Section 8; and then be diverted primarily to the SW 1/4 Section 5; SE 1/4 Section 6; all in T4N, R4E for industrial use in a heap leach ore-processing facility operated by Brohm Mining Corporation.

Application No. 1421-1 is to appropriate an additional 0.75 cubic feet of water per second (cfs) and an additional 180 acre-feet of water annually from the Oro Fino Mine Shaft 300 feet deep and/or a proposed stand by well approximately 190 feet deep. Water Permit No. 1324-1 authorizes an appropriation of 0.25 cfs from 2 wells. Permit No. 1324A-1 amended Permit No. 1324-1 to change one diversion location to the Oro Fino Mine Shaft and added 2 additional well sites with no additional water appropriation. This application proposes to increase the water appropriation from 0.25 cfs to 1.00 cfs (360 acre-feet total annual use) from the Oro Fino Mine Shaft located in the SW 1/4 NW 1/4 Section 8; and/or the proposed stand by well located in the NW 1/4 SW 1/4 Section 5; both in T4N, R4E. The total diversion rate authorized by Application No. 1421-1 and Permit Nos. 1324-1 and 1324A-1 shall not exceed 1.00 cfs (360 acre-feet annually) from the Oro Fino Shaft and stand by well used individually or together. Water is to be used for industrial purposes in a heap leach ore processing facility operated by Brohm Mining Corporation located primarily in the SW 1/4 Section 5; SE 1/4 Section 6; all in T4N, R4E.

Pursuant to SDCL 46-2A-2 the Chief Engineer of the Water Rights Division recommends DEFERRAL of Application Nos. 1420-1 and 1421-1 because 1) unable to verify that Oro Fino Mine will supply 1.0 cfs and to

determine if unappropriated water is available, and 2) it may not be in the public interest to pump surface water into Oro Fino Mine, a groundwater supply.

These applications will be considered by the Water Management Board at the Howard Johnson's, Roosevelt and Jefferson Rooms, 2211 LaCrosse, Rapid City SD on December 2, 1987 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 the with qualifications, 3) defer or 4) deny these applications 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 November 20, 1987. The petition may be informal, but it must include a statement describing the petitioner's interest in an application, the reasons for the petitioner's opposition to or support of an 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.

These applications are 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; 46-6-3, 46-6-3.1, 46-6-6.1, 46-6-10, 46-6-13, 46-6-14; and Board Rules ARSD 74:02:01:01 thru 74:02:01:15.

These hearings are adversary proceedings. 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 an application or to assure access to a 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 an 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 an application. The request for extension must be filed with the Chief Engineer by November 20, 1987.

LAW OFFICES

LYNN, JACKSON, SHULTZ & LEBRUN, P.C.

DONALD R. SHULTZ
GENE N. LEBRUN
GREGORY A. EIESLAND
THOMAS G. FRITZ
HAVEN L. STUCK
MARVIN D. TRUHE
ROBERT J. BURNS
GARY D. JENSEN
STEVEN C. BEARDSLEY
LEE A. MAGNUSON
STEVEN J. HELMERS
JAY C. SHULTZ
LARRY M. VON WALD
JANE L. WIPF
JON C. SOGN
KURT E. SOLAY
R. ALAN PETERSON

FIRST FEDERAL PLAZA - 8TH FLOOR
9TH & ST. JOE - P.O. BOX 8250
RAPID CITY, SOUTH DAKOTA 57709
(605) 342-2592

601 S. PHILLIPS AVENUE
SUITE 105
SIOUX FALLS, SOUTH DAKOTA 57104
(605) 332-5999

KELTON S. LYNN
(1946-1974)

HORACE R. JACKSON
(1961-1986)

TELECOPIER
605/342-5185

REPLY TO: RAPID CITY

November 25, 1987

Mr. John Hatch, Chief Engineer
Department of Water and Natural Resources
Division of Water Rights
Joe Foss Building
523 East Capitol Avenue
Pierre, SD 57501-3181

Re: Brohm Mining Corp.
Water Permit Application Nos. 1420-1 and 1421-1
Our File No. 86-142-1

Dear John:

This letter will confirm my telephone conversation with you of November 25, 1987 regarding the above-referenced water permit applications of my client, Brohm Mining Corp.

You indicated that since there was an objection to Application No. 1420-1 relating to Bear Butte Creek there would be an automatic continuance of that hearing until the next Water Management Board meeting, currently scheduled for March 2, 1988.

With regard to Application No. 1421-1 which relates to the Oro Fino mine shaft, you indicated that no objections or requested continuances had been submitted and that the time for submitting any such requests had expired. You also indicated, however, that due to a lack of sufficient pump test information or other data regarding that permit, you would recommend deferral of a decision until the next Water Management Board hearing. Although pump tests are currently being conducted it is not anticipated that the results will be available for your review prior to the scheduled December 2, 1987 meeting. Accordingly this letter will confirm that Brohm Mining Corp. has no objection to your recommendation to defer that application until the next board meeting.



Mr. John Hatch
November 25, 1987
Page Two

Brohm's consent to deferring action is made based upon your indication that the time has lapsed for any objections to the application to be filed. In other words, the deferral will not renew the time in which objections can be filed. This is an extremely important point because, Brohm has a timely need for this permit and they do not want to be subject to additional continuances beyond the next scheduled meeting.

In the meantime Brohm will be working with you and your hydrologist, Jim Goodman, to supply you with any necessary information to support a favorable recommendation from your office regarding the application. Thank you again for your consideration and you can expect to hear from Brohm directly in the near future regarding their pump test results.

Sincerely,

LYNN, JACKSON, SHULTZ & LEBRUN, P.C.



Marvin D. Truhe

MDT/lt

cc: Mr. Rex Outzen
Mr. John Wilbanks

SOUTH Dakota Department of
Water & Natural Resources

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

December 8, 1987

NOTICE

TO: John Wilbanks, Brohm Mining Corporation
PO Box 485, Deadwood SD 57732

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

SUBJECT: Deferral of Consideration on Water Permit Application
No. 1421-1, Brohm Mining Corporation

The Water Management Board deferred consideration of Water Permit Application No. 1421-1 at the December 2 and 3, 1987 Board meeting in Rapid City. Consideration of Application No. 1421-1 was deferred to allow completion of pumping tests on the Oro Fina Mine Shaft. Application No. 1421-1 will be rescheduled for consideration pursuant to submitting the pump test results to the Division of Water Rights.

cc: John Guhin, Assistant Attorney General
Harold Deering, Assistant Attorney General
Marvin D Truhe, Attorney

CERTIFICATION

I hereby certify that on December 9, 1987 I have personally deposited with the U.S. Mail, postage prepaid envelopes containing Notice on Deferral of Consideration on Water Permit Application No. 1421-1, Brohm Mining Corporation addressed as stated on the notice with a copy sent to:

Marvin D Truhe, Attorney
PO Box 8250
Rapid City SD 57709

Karen Schlaak
KAREN SCHLAACK
Senior Secretary

STATE OF SOUTH DAKOTA)
) SS
COUNTY OF HUGHES)

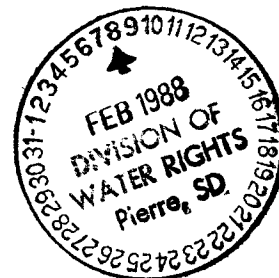
Sworn to, before me, this 11th day of December, 1987.



John Hatch
Notary Public

February 3, 1988

Mr. Ron Duvall
Division of Water Rights
Department of Water & Natural Resources
Joe Foss Building
Pierre, SD 57501



RE: Permit No. 1420-1 and 1421-1

Dear Ron:

We have modified our proposal on pumping water from Bear Butte Creek into the Oro Fino mine shaft. We will pump into a tank as shown on attached Drawings 80-620-01 and 80-620-02. Brohm still wants the additional .75 CFS from Bear Butte Creek. As stated in the application, Brohm would extract water from Bear Butte during high flow such that sufficient water would be left for downstream users.

Brohm wants to acquire the additional .75 CFS appropriation from the Oro Fino shaft. Pumping tests were conducted on the well in December, 1987 and results of the pumping test and site drawings are attached. Old mine drawings show an area in the Oro Fino mine capable of containing a 3 million gallon reservoir. Brohm thinks the shaft can yield 1 CFS on a short term project start up basis and wants the appropriation to meet this demand.

The water supply system is designed for both the Bear Butte pump station and the Oro Fino shaft pumps to feed an intermediate storage tank located adjacent the Oro Fino shaft. The combined flow is pumped from this tank to the main process/firewater tank located on the plant site. Water is stored at the plant site in the 90,000 gallon process/firewater tank and pumps are provided to distribute process and firewater to the various process facilities.

If you have any questions or suggestions, please feel free to give me a call at 578-2107.

Sincerely,

John Wilbanks

John Wilbanks
Dir. - Environmental Affairs

JW/dvl

enc:

South Dakota Office: 1000 East 10th, Pierre, SD 57501
Telephone: (605) 773-2107 Telecopier: (605) 773-2108

Head Office: #1380-988 West Hastings Street, Vancouver, B.C. V6C 2W2
Telephone: (604) 382-6288 Telex: 0456472 PWC WCA Telecopier: (604) 384-1828

MEMORANDUM

TO: George Robinson, Barry Hansen/Minproc

169-005

FROM: Frank Hagar *FH*

DATE: January 28, 1988

SUBJECT: Oro Fino Pumping Test

DRAFT
DATE 1/28/88

Analysis of the Oro Fino test data indicates that flow is apparently radial at the shaft but regional flow is indicated from both the linear nature of the log-log plot of the BED-11 observation well data and a knowledge of the regional geology.

The Popadopolus-Cooper large diameter well method of aquifer test analysis was used for the pumped shaft. Pertinent data included:

Length of Test	124 hrs.
Average pumping rate	217 gpm
BED-11 distance from shaft	135 ft.

The test from 0 to 100 minutes removed water from storage. From the 100 minute point until 7440 minutes a curve begins to form but the sharp inflection point associated with equilibrium pumping is never reached. While the curve matched the $\beta = 10^{-3}$ line extremely well in the period in question, we have to assume that the line would not curve but would be essentially linear from the 7,440 minute point on.

Results of the Popadopolus-Cooper method give a K_d value of $270 \text{ ft}^2/\text{day}$. The linear flow analysis of Jenkins and Prentice gives a value of $L(TS)^{1/2}$ of $273 \text{ ft}^2/\text{day}^{1/2}$. Assuming fracture lengths of 500 ft. and storage of 10^{-5} results in a K_d of $298 \text{ ft}^2/\text{day}$.

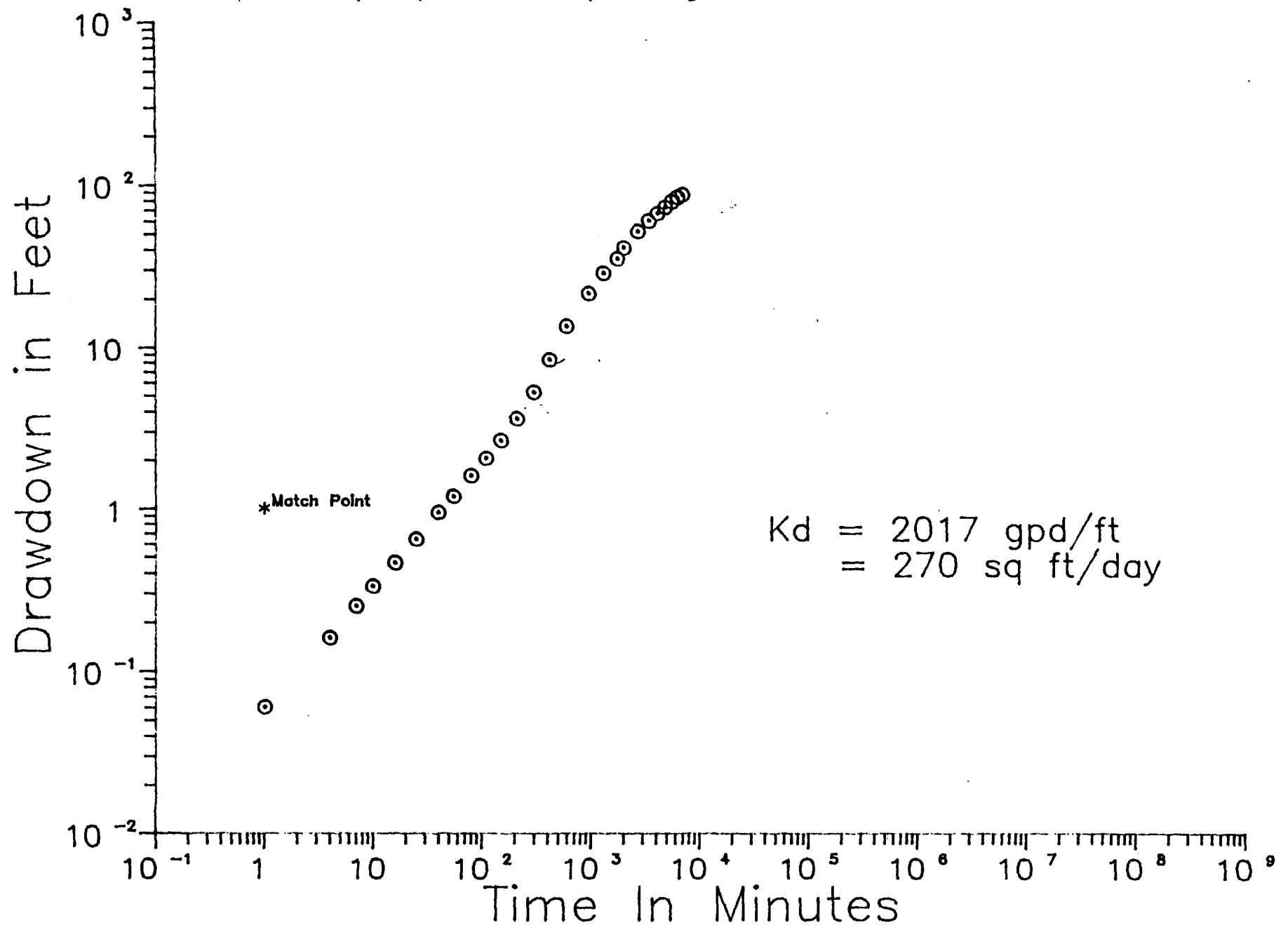
The question of safe yield from this source is complicated by the amount of water presently in storage in the Oro Fino shaft. Using the Popadopolus-Cooper equations the shaft can be pumped at 220 gpm for approximately 28 days with approximately 250 feet of drawdown. At 120-150 gpm after one year of pumping there will be about 175-200 feet of

January 28, 1988

DRAFT
DATE 1/28/88
drawdown. I would only place a low confidence on these pumping figures at this time. Further analysis of the other pumping tests in the area and the Oro Fino data using a discrete kernel approach for linear flow as described by Zen should refine our estimates.

FJH:bjg

Oro Fino Shaft Pumping Test
Papadopulus - Cooper Large Diameter Well Method



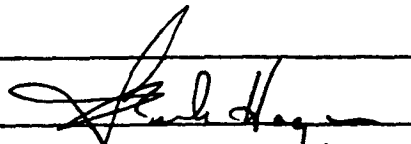
Preliminary analysis of Oro Fino shaft pumping test data:

Estimated transmissivity range
using both radial and linear flow
equations 5000 - 13000 Rt^2/day

Using linear flow analysis (and extremely speculative data estimates, ignoring the effect of storage in the workings, the obvious interconnect of the alluvial aquifer and the fractured bedrock and the influence of Strawberry Creek flow the Oro Fino can be pumped at approximately 200 gpm for a period of approximately 6.5 days with an expected drawdown of no more than 250 feet.

Recovery data indicates that the pumping transmissivity estimates are high. In 72 hours only - 42.5 feet of recovery had been realized out of 87 feet of drawdown.

Final analysis of pumping test data will be completed by 12/23/87


12/18/87

ELEVATIONS FOR PUMP TEST

ORO FINO SHAFT-STEEL PLATE 5222.8

MONITORING WELLS

DEEP WELL TOP OF COLLAR 5201.4

SHALLOW WELL TOP OF COLLAR 5203.0

BEAVER DAM WATER LEVEL @ DISCHARGE PT. 5191.7

CREEK BELOW "DEWATERING SHAFT" 5187.9

WATER LEVEL IN "DEWATERING SHAFT" 5188.4

Side of shaft caved in 12/11/87
Plywood inserted in hole &
backfilled $\pm$ 3 c.y.

12/8/87

POINT	DESCRIPTION / COMMENTS	NORTHING	EASTING
LIST			
10	MON. WELL #11 ELEV'S & COORD'S	0.0000	0.0000
1	"BED 11" TOP OF STEEL EL.=5201.3 (GROUND EL. IS 2.9' LOWER)	43130.0157	26861.3258
2	"BES 11" TOP OF STEEL EL.=5203.0 (GROUND EL. IS 4.0' LOWER)	43125.4824	26847.6506

THANKS WELL

Owner BROHM MINING CORP. Address DEADWOOD County LAWRENCE State S.D.

As _____ Company performing test BATEMAN ENGINEERS INC Measured by _____

Well No. 000 FINE SHAFT Distance from pumping well _____ Type of test DRAWDOWN TEST. Test No. CS-0.

Measuring equipment BADGER FLOWMETER 3" TURBINE; M SCOPE 0-300' LEVEL PROBE.

Time Data				Water Level Data				Discharge Data				Comments on factors affecting test data
Pump on: Date	Time	(%)		Static water level				How Q measured				
Pump off: Date	Time	(%)		Measuring point				Depth of pump/air line				
Duration of aquifer test:				Elevation of measuring point				Previous pumping? Yes ☒ No ☐				
Pumping	Recovery							Duration	End			

Date	Clock time	Time since pump started	Time since pump stopped	1/2"	Water level measurement	Correction or Conversion	Water level	Water level change s or s'	Discharge measurement	Rate
10:10	6:00	48'	18'10"							
	10:00	40'8"	18'10"							
11:00	2:00	45.5'	18'10"							
	6:00	44.5'	18'10"							
	10:00	43'3"	18'10"							
Noon	12:00	42'10"	18'10"							

DRAW DOWN

MONITORING WELL.

BLO-BES II Monitoring - Oro Fino Shaft Pumping Test

12/3/87

Time

Short

Tall

(Measure at Top of Casing
above chain)

(Measure at top of Casing
Above hole)

12/3 AM 1000

1030

1100

1130

12/3 PM

1200

12' 0"

12' 3"

1300

12' 7"

12' 3"

200

13' 4"

12' 3"

300

14' 4"

12' 5"

400

15' 8"

12' 6"

500

16' 3"

12' 7"

600

18'

12' 8"

8:00

19' 10"

12' 11"

10:00

21' 6"

13'

12-4 AM

12:00

23' 3"

13' 3"

2:00

24' 9"

13' 5"

4:00

26' 5"

13' 6"

6:00

28' 4"

13' 9"

9:00

30'

13' 9"

10:00

31'

14'

12-4 PM

12:00

32' 4"

14'

2:00

33' 8"

14' 2"

4:00

35'

14' 4"

6:00

36' 2"

14' 5"

20' 11"

14' 2"

016 1/4
11/25
11/25
11/25

52/10/6
10/17/4

63/53/10/6

SHORT

TALL

12-5 AM	2:00	40' 9"	15'
	6:00	42' 9"	15' 3"
	10:00	45'	15' 6"
PM	2:00	46' 11"	15' 4"
	6:00	48.30	15.9
	10:00	49.90	16.10
12-6 AM	2:00	51.35	16.25
	6:00	52.80	16.40
	10:00	54.25	16.60
P.M.	2:00	55.50	16.75
	6:00	56.75	16.90
	10:00	58.0	17.0
12-7 AM	2:00	59.10	17.20
	6:00	60.45	17.35
	10:00	61' 6"	17.50
P.M.	2:00	62.55	17.60
	6:00	63.60	17.75
	10:00	64.50	17.85
12-8 AM	2:00 AM	65.50	17.95
	6:00	66.45	18.05
	10:00	67.10	18.15
	Next 12:00	67.4	18.6
		65.50	

RECOVERY

SHAFT AQUIFER TEST DATA

Owner BROHM MINING CORP. Address DEADWOOD County LAWRENCE State S.D.

Company performing test BATEMAN ENGINEERS INC Measured by _____

Well No. ORO FINO SHAFT Distance from pumping well _____ Type of test DRAWDOWN TEST Test No. CS-01

Measuring equipment BADGER FLOWMETER 3" TURBINE; M SCOPE 0-300' LEVEL PROBE.

Time Data Pump on: Date _____ Time _____ (L) Pump off: Date _____ Time _____ (L) Duration of aquifer test: Pumping _____ Recovery _____		Water Level Data Static water level <u>115' 8"</u> Measuring point _____ Elevation of measuring point _____		Discharge Data How Q measured <u>BADGER METER</u> Depth of pump/air line <u>240'</u> Previous pumping? Yes ☒ No ☐ Duration _____ End _____		Comments on factors affecting test data!
--	--	---	--	--	--	--

Date	Clock time	Time since pump started		1/4"	Water level measurement	Correction or Conversion	Water level	Water level change s or s'	Discharge measurement	Rate		
		1	2									
12-8	12:00	1 min			115' 8"				4000732			
	12:02	2 min			115' 6"							
	12:03	3 min			115' 6"							
	12:04	4 min			115' 6"							
	12:05	5 min			115' 5"							
	12:06	6 min			115' 5"							
	12:07	7 min			115' 5"							
	12:08	8 min			115' 4 1/2"							
	12:09	9 min			115' 4 1/2"							
	12:10	10 min			115' 4"							
	12:12	12 min			115' 4"							
	12:14	14 min			115' 4"							
	12:16	16 min			115' 4"							
	12:18	18 min			115' 3 1/2"							
	12:20	20 min			115' 3 1/2"							
	12:25	25 min			115' 3 1/2"							
	12:30	30 min			115' 1 1/2"							
	12:35	35 min			115' 1"							
	12:40	40 min			115' 0"							
	12:45	45 min			115' 0"							
	12:50	50 min			114' 9"							
	12:55	55 min			114' 8 1/2"							
	1:00	1 hr			114' 8"							
	1:10	1:10			114' 7"							
	1:20	1:20			114' 7"							
	1:30	1:30			114' 6"							
	1:40	1:40			114' 5"							
	1:50	1:50			114' 3 1/2"							

12-8-87 Well Recovery

AQUIFER TEST DATA

Page 5 of 5

Owner BROHM MINING CORP. Address DEADWOOD County LAWRENCE State S.D.

Company performing test BATEMAN ENGINEERS INC Measured by _____

Well No. ORO FINO SHAFT Distance from pumping well _____ Type of test DRAWDOWN TEST Test No. CS-0

Measuring equipment BADGER FLOWMETER 3" TURBINE; M SCOPE 0-300' LEVEL PROBE.

Time Data					Water Level Data				Discharge Data			Comments on factors affecting test data
Pump on: Date _____ Time _____ (h) Pump off: Date _____ Time _____ (h) Duration of aquifer test: _____ Pumping _____ Recovery _____					Static water level _____ Measuring point _____ Elevation of measuring point _____				How Q measured <u>BADGER METER</u> Depth of pump/air line <u>240'</u> Previous pumping? Yes ☒ No ☐ Duration _____ End _____			
Date	Clock time	Time since pump started	Time since pump stopped	1/r	Water level measurement	Correction or Conversion	Water level	Water level change s or s'	Discharge measurement	Rate		
	2:00	2 hr			14' 2"							
		2:15			14' 0"							
		2:30			13' 10"							
		2:45			13' 7"							
	3:00	3 hr			112' 5"							
		3:50			112' 0"							
	4:00	4:00			112' 7"							
		4:30			112' 5"							
	5:00	5:00			111' 6"							
		5:30			111' 3"							
	6:00	6 hr			110' 10"							
		7:00			110'							
		8:00			109' 2"							
		9 hr			108' 4"							
	10:00	10 hr			107' 6"							
12-9	12:00	12 hr			106' 0"							
		14 hr			104' 3"							
	4:00	16 hr			102' 7"							
	6:00	18 hr			101' 2"							
	8:00	20 hr			99' 4 1/2"							
	10:00	22 hr			98.30							
	12:00	24 hr			96.80							
	2:00	26 hr			95.50							
	4:00	28 hr			94.50							
	6:00	30 hr			93.20							
	8:00	32 hr			92.0							
	10:00	34 hr			91.0							
12-10	2:00	38 hr			88.80							

K

Owner BROHM MINING CORP. Address Peaslee County _____ State _____

de _____ Company performing test DATEMAN ENGINEERS INC Measured by _____

Well No. ORO FINE SHAFT Distance from pumping well _____ Type of test DRAWDOWN TEST. Test No. CS-0.

Measuring equipment BADGER FLOWMETER 3" TURBINE; M SCOPE 0-300' LEVEL PROBE.

Time Data					Water Level Data				Discharge Data		Comments on factors affecting test data
Pump on: Date _____ Time _____ (h)	Pump off: Date _____ Time _____ (h)	Duration of aquifer test: Pumping _____ Recovery _____	Static water level _____	Measuring point _____	Elevation of measuring point _____	How Q measured <u>BADGER METER</u>	Depth of pump/air line <u>+240'</u>	Previous pumping? Yes ☒ No ☐	Duration _____ End _____		
Date	Clock Time	Time since pump started h m	Time since pump stopped h m	1/r	Water level measurement	Correction or Conversion	Water level	Water level change s or s'	Discharge measurement	Rate	
	6:00	43 h			86'75"						dropped from 85' 1/2 to 85' 3" filled water truck from 11:15 AM 11:15 dropped 2" in debit
	10:00	46 h			85'70"						
	PM 3:00	50 h			85'20"						
	6:00	54 h			81'20"						
	10:00	58 h			79'15"						
12-11	AM 2:00	62 h			77'30"						
	6:00	66 h			75'60"						
	10:00	70 h			73'80"						
	Norm 2:00	72 h			73'15"						

DRAWDOWN

SHAFT
AQUIFER TEST DATA

page 1 of 1

Owner BROHM MINING CORP. Address DEADWOOD County LAWRENCE State S.D.

Company performing test BATEMAN ENGINEERS INC Measured by

Well No. ORO FINO SHAFT Distance from pumping well Type of test DRAWDOWN TEST Test No. CS-02

Measuring equipment BADGER FLOWMETER 3" TURBINE; M SCOPE 0-300' LEVEL PROBE.

Time Data					Water Level Data				Discharge Data			Comments on factors affecting test data	
Pump on: Date _____ Time _____ (h)					Static water level <u>28.26</u>				How Q measured <u>BADGER METER</u>				
Pump off: Date _____ Time _____ (h)					Measuring point <u>Top of well</u>				Depth of pump/air line <u>240'</u>				
Duration of aquifer test: _____					Elevation of measuring point _____				Previous pumping? Yes ☒ No ☐				
Pumping _____ Recovery _____									Duration _____ End _____				
													2355320
2/3	Date	Clock time	Time since pump started t	Time since pump stopped t'	1/f	Water level measurement	Correction or Conversion	Water level	Water level change s or s'	Discharge measurement	Rate		
		8:16	1 min			28.32				2355520			
		8:18	2 min			28.35							
			3 min			28.40							
			4 min			28.42							
			5 min			28.45							
		5:22	6 min			28.48				2355665		2355665	
			7 min			28.51							
			8 min			28.54							
			9 min			28.57							
			10 min			28.59				2356875		2356875	
			12 min			28.64				2357385			
			14 min			28.70							
			16 min			28.73							
			18 min			28.76				2358100			
			20 min			28.80							
			25 min			28.90							
			30 min			29.00				2361860			
			35 min			29.10							
			40 min			29.20							
			45 min			29.30				2365665			
			50 min			29.37							
			55 min			29.45							
		7:12	1 h			29.55				2369465			
			1 h 10			29.68							
			1 h 20			29.85							
			1 h 30			30.00				2377055			
			1 h 40			30.15							
			1 h 50			30.30							

AQUIFER TEST DATA

Owner BROHM MINING CORP. Address DEADWOOD County LAWRENCE State S.D.
 Company performing test BATEMAN ENGINEERS INC Measured by _____
 Well No. ORO FINO SHAFT Distance from pumping well _____ Type of test DRAWDOWN TEST Test No. CS-02
 Measuring equipment BADGER FLOWMETER 3' TURBINE; M SCOPE 0-300' LEVEL PROBE.

Time Data					Water Level Data					Discharge Data		Comments on factors affecting test data
Pump on: Date _____	Time _____	(h)			Static water level _____					How Q measured <u>BADGER METER</u>		
Pump off: Date _____	Time _____	(h)			Measuring point _____					Depth of pump/air line <u>240'</u>		
Duration of aquifer test: _____					Elevation of measuring point _____					Previous pumping? Yes ☒ No ☐		
Pumping _____	Recovery _____									Duration _____	End _____	
Date	Clock time	Time since pump started t	Time since pump stopped T	t/T	Water level measurement	Correction or Conversion	Water level	Water level change s or s'	Discharge measurement	Rate		
12/3	10:20 AM	2 Hr			30.47				2388590			
	10:30	2:15			30.65				2388590			
	10:40	2:25			30.90							
	11:00	3:25			31.20							
	11:10	2 Hr			31.25				2399885			
	11:20	2:25			31.85							
12/3	11:00	4:00			32.30				2413740			
	12:50 PM	4:30			32.79							
	1:20 PM	5:00			33.50							
	1:50 PM	5:30			34.10				2428460			
	2:20 PM	6:00			34.90							
	3:20 PM	7:00			36.60				2450700			
	4:20 PM	8:00			38.30				2465875			
	5:20 PM	9:00			40.60				2481110			
	6:20 PM	10:00			41.80				2496820			
	8:20 PM	12:00			44.60				2527105			
12/4	10:20 AM	14:00			47.20				2557420			
	12:20 PM	16:00			49.75				2587745			
	2:20 PM	18:00			52.20				2618267			
	4:20 PM	20:00			54.60				2648650			
	6:20 PM	22:00			56.90				2678600			
	8:20 AM	24:00			59.10				2708200			
	10:20 AM	26:00			61.25				2739800			
	12:20 PM	28:00			63.20				2769900			
	2:20 PM	30:00			65.10				2799500			
	4:20 PM	32:00			67.10				2828700			
	6:20 PM	34:00			69.15				2859980			
	8:20 PM	36:00			73.00				2919980			

AQUIFER TEST DATA

Owner BROHM MINING CORP. Address DEADWOOD County LAWRENCE State S.D.

Company performing test BATEMAN ENGINEERS INC Measured by _____

Well No. ORO FINO SHAFT Distance from pumping well _____ Type of test DRAWDOWN TEST Test No. CS-02

Measuring equipment BADGIER FLOWMETER 3" TURBINE; M SCOPE 0-300' LEVEL PROBE.

Time Data					Water Level Data					Discharge Data			Comments on factors affecting test data)
Pump on: Date _____ Time _____ (h)					Static water level _____					How Q measured <u>BADGER METER</u>			
Pump off: Date _____ Time _____ (h)					Measuring point _____					Depth of pump/air line <u>+240'</u>			
Duration of aquifer test: _____					Elevation of measuring point _____					Previous pumping? Yes ☒ No ☐			
Pumping _____ Recovery _____										Duration _____ End _____			
Date	Clock time	Time since pump started t	Time since pump stopped T	1/T	Water level measurement	Correction or Conversion	Water level	Water level change s or s'	Discharge measurement	Rate			
2/20	AM	42.4			76.62				2979575				
6:20	AM	46.4			79.80				3037430				
10:20	AM	50.4			82.90				3083200				
2:20	PM	54.4			85.50				3125320				
6:20	PM	58.4			88'3"				3173935				
10:20	PM	1:28.4			90'8"				3227175				
2:20	AM	1:42.4			92'10"				3270310				
6:20	AM	70.4			95'				3333245				
10:20	AM	74.4			97'2"				3385900				
2:20	PM	78.4			99'				3435900				
6:20	PM	82.4			100'9"				3484590				
10:20	PM	86.4			102'8"				3534350				
2:20	AM	90.4			104.3'				3584945				
6:20	AM	94.4			106.4'				3634530				
10:20	AM	98.4			107.8'				3685100				
2:20	PM	102.4			109.1'				3734000				
6:20	PM	106.4			110'6"				3783555				
10:20	PM	110			111'10"				3832870				
2:20	AM	114			113'2"				3882110				
6:20	AM	118			114.4'				3932720				
10:20	AM	122			115.8'				3982900				
12:20	PM	124			115.8'				4000732				

BROHM MINING CORP.

February 19, 1988

Mr. Kent Buhler
Department of Water and Natural Resources
Joe Foss Building
523 East Capitol
Pierre, South Dakota 57501



Dear Kent:

As per our telephone conversation today I am enclosing copies of the well logs for BED-11 and BES-11 to help you analyze the pumping test of the Oro Fino Shaft.

If you have any questions please feel free to call me at 578-2107.

Thank you.

Sincerely,

A handwritten signature in cursive script, appearing to read "Scott Wanstedt".

Scott Wanstedt
Environmental Specialist

enc:

cc: John Wilbanks - Director of Environmental Affairs

South Dakota Office: P.O. Box 485, Deadwood, South Dakota 57732
Telephone: [605] 578-2107

Head Office: #1580 - 999 West Hastings Street, Vancouver, B.C. V6C 2W2
Telephone: [604] 662-8383 Telex: 04-51472 P V C VCR Telecopier: [604] 684-1329

PRELIMINARY DATA

Subject to Review

December 15, 1987

ENECOTECH



WELL ID BED-11

01

Location: BELOW ORDFINO SHAFT ALONG
STRAW. CRK

N _____ E _____

Elevation: ±5200 ft above SL (2.75 ft stick up) ±5203 elev TOC

Well Total Depth: 145'

Well Inside Diameter: 4.5"

Static Water Level

Date

Measured By

6.0

11-24-87

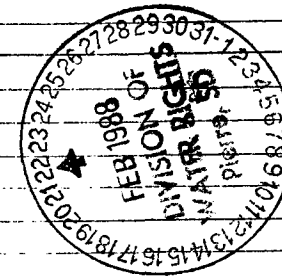
T. SCHREINER



M
0

Contractor Taylor Drlg. Coordinates _____ Project Gilt Edge Mining (Brohm) Hole No. BED -11
 Drill Type Porta Drill Casing Depth 145' State South Dakota Sheet 1 of 5
 Hole Size 8" Bearing _____ Inclination 0° Date Started 10/31/87 Property BROHM
 Collar Elev. _____ Final Depth 145' Date Completed 11/2/87 Hole Surveyed _____

DISTANCE (feet)	GRAPHIC LOGS										DOWN HOLE LOCATION		GEOLOGIC NOTES		
	ALTERATION										ROCK TYPE	DESCRIPTION	MINERALIZATION		
	TOTAL SULFIDES (vol %)														
0											0		Surface alluvium		
5											5		unsorted - well, ang-subang. quartz grains		
10											10		dry, brown shale with heavy pyrite content. micaceous; balls under heavy pressure, but separates easily		
15											15		As Above. slightly wet		
20											20		As Above. very wet		
25											25		As Above too wet to sample; added foam to remove samples from hole.		
30											30		weathered bedrock; of schist dark gray-green; heavy pyrite coating on fragments; oxidation on many fragments. heavy clay content, produced water in almost black color.		
35															

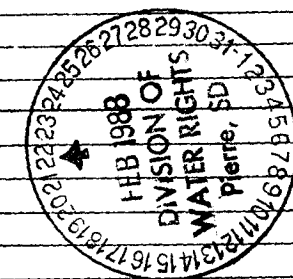


DRILL CUTTING LOG

More - EncoTech
Logged by:

Contractor _____ Coordinates _____ Project _____ Hole No. BED - 11
 Drill Type _____ Casing Depth _____ State _____ Sheet 2 of 5
 Hole Size _____ Bearing _____ Inclination _____ Date Started _____ Property _____
 Collar Elev. _____ Final Depth _____ Date Completed _____ Hole Surveyed _____

DISTANCE (feet)	GRAPHIC LOGS							DOWN HOLE LOCATION		GEOLOGIC NOTES			
	ALTERATION							ROCK TYPE	DESCRIPTION	MINERALIZATION			
	TOTAL SULFIDES (vol %)									DISTANCE DOWN HOLE (feet)	ELEVATION	DISTRIBUTION	TYPE
35								35		pe schist	As Above dark water may dr. b. with clays		
40								40			As Above water has turned gray-green		
45								45			As Above but very fractured, several oxidized chips; some pyrite formation		
50								50			Unweathered bedrock gray-green, some fractures scattered quartz grains; moderate pyrite formation		
55								55			As Above heavier pyrite content; some free muscovite flakes in washed sample		
60								60			As Above		
65								65			As Above		
70													



DRILL CUTTING LOG

Logged by:

Contractor_____Coordinates_____Project_____Hole No. BED-11

Drill Type_____Casing Depth_____State_____Sheet 3 of 5

Hole Size_____Bearing_____Inclination_____Date Started_____Property_____

Collar Elev. _____Final Depth_____Date Completed_____Hole Surveyed_____

DISTANCE (feet)	GRAPHIC LOGS							DOWN HOLE LOCATION		GEOLOGIC NOTES		
	ALTERATION							DISTANCE DOWN HOLE (feet)	ELEVATION	ROCK TYPE	DESCRIPTION	MINERALIZATION TYPE
	1 Weak 2 Moderate 3 Strong											
	TOTAL SULFIDES % (vol %)											
70								70		pc schist	As Above.	
75								75			As Above	
80								80			As Above quartz chips, one with Hematite(?) inclusions; heavily fractured	
85								85			As Above. slightly less fracturing	
90								90			As Above increase in oxidation on chips increase in fracturing	
95								95			As Above	
100								100			As Above	
105												

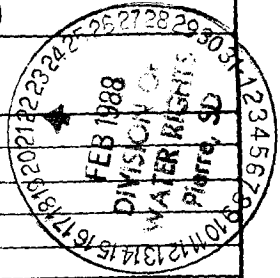
2122324252627282930

FEB 1988

DIVISION OF

WATER RIGHTS

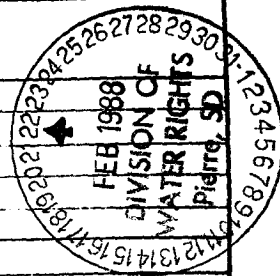
Piute, SD



DRILL CUTTING LOG

Contractor _____ Coordinates _____ Project _____ Hole No. BED-11
 Drill Type _____ Casing Depth _____ State _____ Sheet 4 of 5
 Hole Size _____ Bearing _____ Inclination _____ Date Started _____ Property _____
 Collar Elev. _____ Final Depth _____ Date Completed _____ Hole Surveyed _____

DISTANCE (feet)	GRAPHIC LOGS										DOWN HOLE LOCATION		GEOLOGIC NOTES			
	ALTERATION										ROCK TYPE	DESCRIPTION	MINERALIZATION			
	TOTAL SULFIDES															
	1 Weak 2 Moderate 3 Strong															
105												105		pe schist	dark gray-green; pyrite on 50% of fragments; several light green fragments	
110												110			As above increase in pyrite; some oxidation on scattered fragments	
115												115			As Above several large chips due to more pronounced fracturing; increase towards yellow color	
120												120			As Above some scattered quartz grains less pyrite	
125												125			As Above very fine fragments; less pyrite	
130												130			As Above some larger fragments; some light green fragments; few quartz grains	
135												135			As Above increase in pyrite	
140																



DRILL CUTTING LOG

Contractor Taylor Drlg
Drill Type Air Hammer
Hole Size 8"
Collar Elev. _____

Coordinates _____
Casing Depth 145
Bearing _____ Inclination _____
Final Depth 145

Project Gilt Edge
State South Dakota
Date Started 10/31/87
Date Completed 11/2/87

Hole No. BED-11
Sheet 5 of 5
Property _____
Hole Surveyed _____

GRAPHIC LOGS										GEOLOGIC NOTES					
DISTANCE (feet)	ALTERATION						TOTAL SULFIDES % (vol %)	ROCK TYPE & STRUCTURE	DOWN HOLE LOCATION		ROCK TYPE	DESCRIPTION MINERALOGY, ALTERATION, TEXTURES, GRAIN SIZE, FRAGMENT SIZE	MINERALIZATION		
	1	2	3	4	5	6			DISTANCE DOWN HOLE (feet)	ELEVATION			DISTRIBUTION	TYPE	
140										140		schist	dark gray-green; small fragments; few fractures; decrease in pyrite		
145										145		As Above but changing towards medium green with increase in pyrite dark oxidation on larger chips T.D. 145			

DRILL CUTTING LOG

BOREHOLE/WELL CONSTRUCTION LOG

WELL ID: Gilt Edge LOCATION ID: BED-11 FIELD REP: Martin V. Elmore

APPROX. SITE COORDINATES (FT.): N _____ E _____

GROUND ELEVATION (FT. MSL): _____ COMPLETION DATE: 11/2/87

BOREHOLE SUMMARY

DRILLER: Taylor Drilling

RIG TYPE: Porta Drill

BIT TYPE	HOLE DIA. (in.)	END DEPTH (ft.)	FLUID TYPE
Tri-Cone	10 5/8"	33'	water
Air hammer	8"	145'	water

CASING SUMMARY

CASING TYPE*	DESCRIPTION	DIA. (in.)	END DEPTH (ft.)
S	PVC-80; .020	5	145
B	PVC-80		55

* P-Protective S-Screen B-Blank O-Open N-None

† Depth from Top of Casing String

WELL CONSTRUCTION

TYPE CODE*	DESCRIPTION	END DEPTH (ft.)
F	Silica sand #10-20	145
S	Bentonite pellets;	51
B	Cement w/bentonite additive	47

* B - Backfill S - Seal F - Filter Pack

• Depth from Ground Surface

CONSTRUCTION TIME LOG

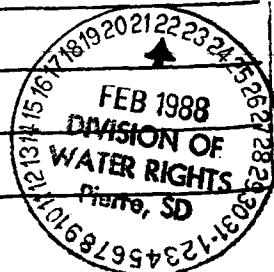
ACTIVITY	START		END TIME
	DATE	TIME	
DRILLING	10-31-87	12:00 noon	4:50 pm
	11/1/87	2:20 pm	5:15 pm
	11/2/87	8:20 am	10:35 am
CASING	11/2/87	12 noon	1:30 pm
	11/2/87	1:35 pm	2:02 pm
FILTER PACK	11/2/87	2:00 pm	2:10 pm
SEAL	11/2/87	2:45	3:30 pm
BACKFILL	11/2/87	4:20 pm	5:00 pm
DEVELOPMENT surge block	11/2/87		
OTHER air lift	11/3/87		

WELL DEVELOPMENT

40 min. of surge block development across upper screen and blank

Blow down for 5 min. then gauge by bucket @ 2+ GPM

COMMENTS:



WELL COMPLETION RECORD

05

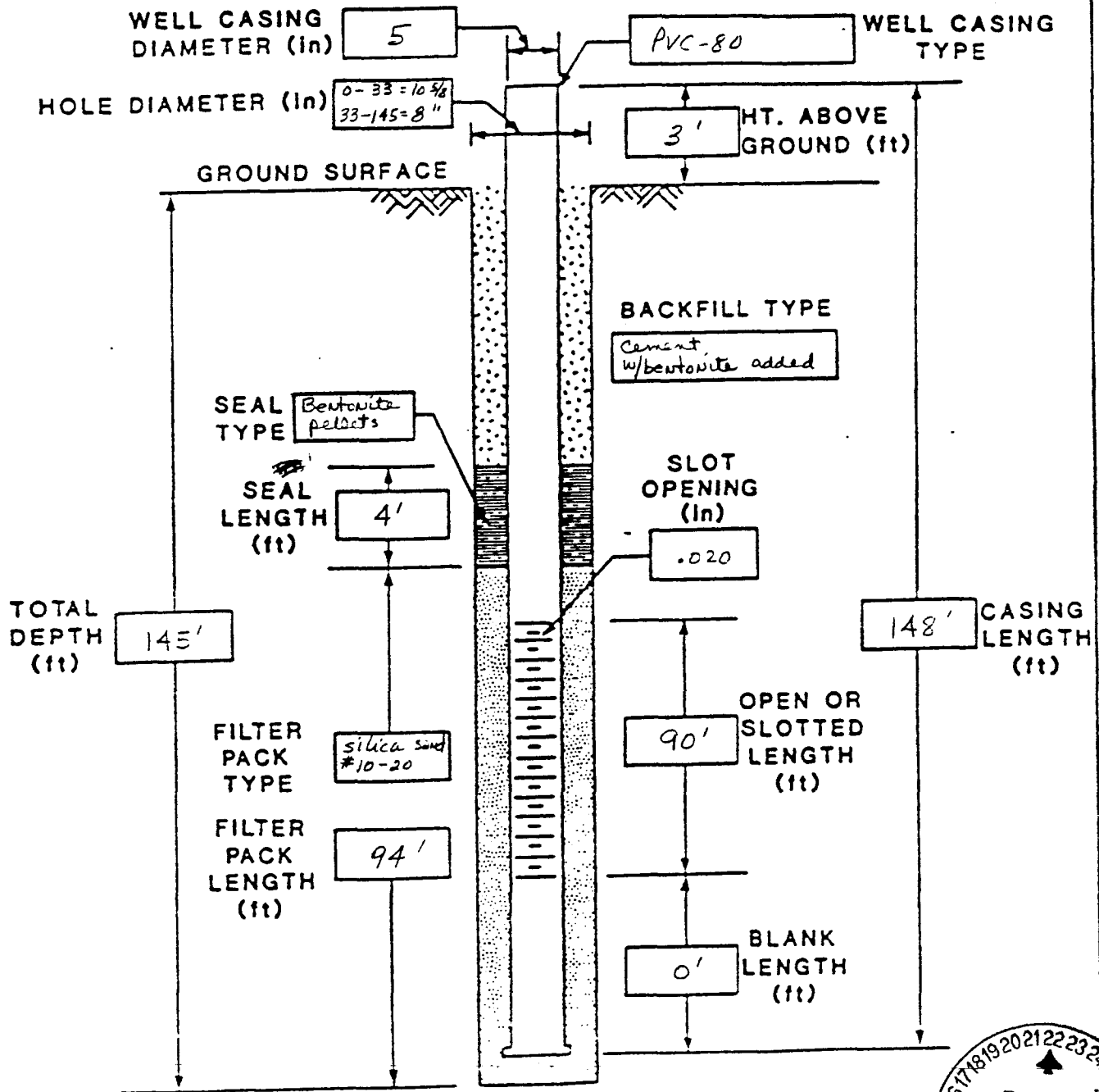
SITE ID: Gilt Edge LOCATION ID: BED-11 DATE INSTALLED: 11/2/87

APPROX. SITE COORDINATES: (FT.) N _____ E _____

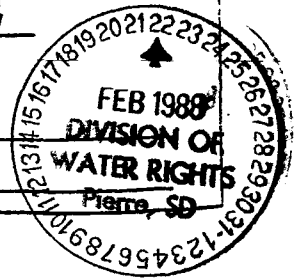
OPEN AREA PER LINEAL FT. (IN²/FT.) _____

FORMATION OF COMPLETION: pc schist

FIELD REP.: Martin V. Elmore DRILLER: Taylor Drlg. - Frank Conway



COMMENTS: _____



BED-11-07

- - Spud @ 12:00 Pm w/10⁵/₈"
 - made water @ 22'
 - Drilling ahead w/foam to bedrock
- - Bedrock @ 33'; circulating 3:10 Pm
 - Begin to circulate mud @ 3:20 Pm
 - Finished circulating @ 3:35 Pm
- - Welding surface casing @ 3:50 Pm
 - surface set @ 4:50 Pm

11/1/87

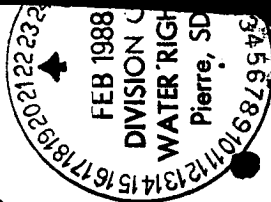
- Delayed start till 2:20 Pm
the immediate start because of
location decision (Elmore/Hager)
- Turning ahead at 2:30 Pm
- Making 6 GPM @ 85' (4 + 2 ~~allured~~)
- - Down for nite @ 105 (5-6 GPM)

11/2/87

- - Start up @ 8:10 Am
- Drilling ahead @ 8:20 Am
- Making 8-8¹/₂ GPM at 125'
- - TD @ 145' in PE chat @ 10:35
 - 5 min blow, then gauge @ 8+ GPM
 - start casing @ 12:00

16 17 18 19 20 21 22 23
FEB 10

56 k



- set sand (Top @ 51') @ 2:00 P.
- set pellets (top @ 47') @ 2:10 P. (1 bucket)
- Cement to surface (14") @ 3:30 Pm
- develop well w/surge block 4:15 Pm
till 5:00 Pm - down for day

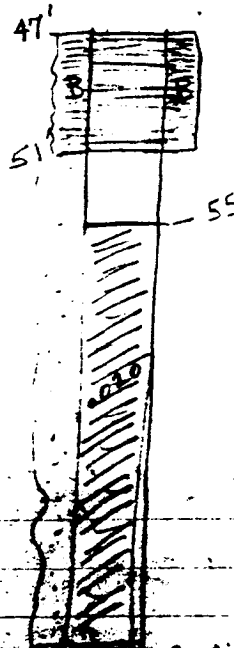
11/3/87

- Crew in field @ 8:00 Am
- Static level @ 6'7" feet
- Blow down (5 min) @ 9:30 Am
- Air lift production is 7 GPM.
- * Shut down to skid rig for 11-5 (10:15)
- Mixing polymer for 11-5 @ 12:30
- spud with polymer @ 12:45 (Lv. 6:00 Pm)
- TD of 48 feet @ 8:30 Am 11/4/87
- casing to 48 feet @ 10:30
- sand (Top @ 12) set @ 11:00 Am
- seal (Top @ 9'10") set @ 11:30 Am
- cement to surface @ 2:30 Pm
- develop w/surge block 15 min
- Air lift @ 3:30 Pm for 2+ GPM

ended 11/2/87 Pm - field/site muddy !!

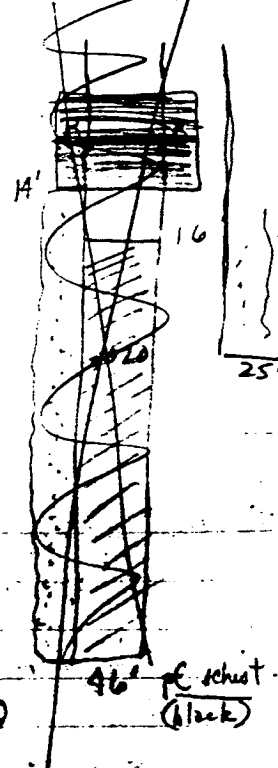
"As Built"

11-D



Exhaust
(grey)

11-S



Exhaust
(black)

15 16 17 18 19 20 21 22 23 24
DIVISION
FEB 1988

NJS ENGINEERING

Consulting Engineers

Box 226
348 E. Colorado Blvd.
Spearfish, SD 57783
(605) 642-4772

C. SEWARD

LETTER OF TRANSMITTAL

R. SINCLAIR
file: EN-7.

DATE 12/8/87	JOB NO. 1620
ATTENTION BOB SINCLAIR	
RE: MONITOR WORK "BES 11" AND "BED 11"	

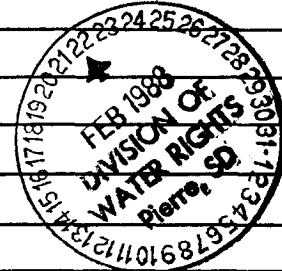
TO BATEMAN ENGR'S.
GILT EDGE SITE OFFICE

GENTLEMEN:

WE ARE SENDING YOU ☒ Attached ☐ Under separate cover via _____ the following items:

- | | | | | |
|---|---------------------------------------|--------------------------------|----------------------------------|---|
| ☐ Shop drawings | ☐ Prints | ☐ Plans | ☐ Samples | ☐ Specifications |
| ☐ Copy of letter | ☐ Change order | ☐ _____ | | |

COPIES	DATE	REV. NO.	DESCRIPTION
1	12/8/87		COORD LIST W/ELMS



THESE ARE TRANSMITTED as checked below:

- | | | |
|--|---|---|
| ☐ For approval | ☐ Approved as submitted | ☐ Resubmit _____ copies for approval |
| ☒ For your use | ☐ Approved as noted | ☐ Submit _____ copies for distribution |
| ☒ As requested | ☐ Returned for corrections | ☐ Return _____ corrected prints |
| ☐ For review and comment | ☐ _____ | |
| ☐ FOR-BIDS DUE _____ 19 _____ | ☐ PRINTS RETURNED AFTER LOAN TO US | |

REMARKS _____

COPY TO DOUG STEWART SIGNED: JW

12/8/87

POINT	DESCRIPTION / COMMENTS	NORTHING	EASTING
LIST			
10	MON. WELL #11 ELEV'S & COORD'S	0.0000	0.0000
1	"BED 11" TOP OF STEEL EL.=5201.3 (GROUND EL. IS 2.9' LOWER)	43130.0157	26861.3258
2	"BES 11" TOP OF STEEL EL.=5203.0 (GROUND EL. IS 4.0' LOWER)	43125.4824	26847.6506

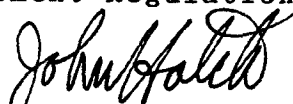


REVISED RECOMMENDATION OF CHIEF ENGINEER FOR WATER PERMIT
APPLICATION NO. 1421-1, Brohm Mining Corporation

Pursuant to SDCL 46-2A-2, the following is the revised recommendation of the Chief Engineer, Water Rights Division, Department of Water and Natural Resources concerning Water Permit Application No. 1421-1, Brohm Mining Corporation, PO Box 485, Deadwood SD.

The Chief Engineer is recommending APPROVAL of Application No. 1421-1 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 qualifications:

1. The Oro Fino Mine Shaft water supply and the well approved under this Permit may be located near domestic wells and other wells which may obtain water from the same aquifer. The Oro Fino Mine Shaft and ~~the~~ well owner, under this Permit, shall control his withdrawals so there is not a reduction of needed water supplies in adequate domestic wells or in adequate wells having prior water rights.
2. Approval of Permit No. 1421-1 authorizes maximum withdrawals under Permits No. 1421-1, 1324-1 and 1324A-1 of up to 360 acre feet of water annually.
4. Approval of Permit No. 1421-1 is subject to compliance with the following then existing and applicable Water Management Board rules:
 - a. Chapter 74:03:15 Ground Water Quality Standards,
 - b. Chapter 74:03:16 Ground Water Discharge Permit,
 - c. Chapter 74:03:30 Heap Leach Design and Construction,
 - d. Chapter 74:03:02 Surface Water Quality Standards,
 - e. Chapter 74:03:04 Uses Assigned to Streams,
 - f. Chapter 74:03:17 Surface Water Discharge Permit - General Provisions,
 - g. Chapter 74:03:18 Surface Water Discharge Permit Application Requirements,
 - h. Chapter 74:03:19 Surface Water Discharge Permit Conditions,
 - i. Chapter 74:03:20 Transfer Modification, Revocation and Reissuance and Termination of Surface Water Discharge Permits,
 - j. Chapter 74:03:21 Procedure For Permit Processing,
 - k. Chapter 74:03:22 Secondary Treatment Standards,
 - l. Chapter 74:03:23 Criteria and Standards for Surface Water Discharge Permit,
 - m. Chapter 74:03:24 Toxic Pollutant Effluent Standards for Surface Water Discharge Permits,
 - n. Chapter 74:03:25 Effluent Guidelines and Standards for Surface Water Discharge Permits, and
 - o. Chapter 74:03:26 Pretreatment Regulations for Surface Water Discharge Permits.


JOHN HATCH, Chief Engineer
February 23, 1988

SUPPLEMENT TO THE REPORT
ON PERMIT APPLICATION NO 1421-1
FEBRUARY 24, 1988

The Water Management Board deferred Water Permit Application No. 1421-1 at the December 2 and 3, 1987, Board meeting to allow completion of pumping tests on the Oro-Fino Mine Shaft. A pump test of the Oro-Fino Mine Shaft was conducted by the applicant from December 3, to December 11, 1987. The mine shaft was pumped for 124 hours at an average rate of 221 gallons per minute and recovery was monitored for 72 hours. The water levels of the mine shaft and two observation wells (BES-11 AND BED-11) were measured during the pumping and recovery periods of the test. The Oro-Fino Mine Shaft is reported to be 300 feet deep, BED-11 or the "Short Well", is a 145 feet deep observation well completed into the unweathered Pre-cambrian rock, and BES-11 or the "Tall Well", is a 48 feet deep observation well completed into alluvium and/or weathered Pre-cambrian rock. The "Short Well" is screened from 55 feet below ground surface to total depth and the casing is grouted with cement from approximately 55 feet below ground surface to the ground surface. The "Tall Well" is screened from 18 feet below the ground surface to total depth and the casing is grouted with cement from approximately 18 feet below ground surface to the ground surface.

The total drawdown of the Oro-Fino Mine Shaft during the pump test was 87.41 feet. The drawdown had not stabilized after 124 hours of pumping, however it did appear to be nearing stabilization, indicating the mine shaft should be able to sustain a yield near the test rate. The water level of the "short well" indicated an immediate response to pumping the Oro-Fino Mine Shaft and immediately began recovery when pumping ceased. Total drawdown of the "short well" was 55.40 feet. The water level of the "tall well" also showed immediate response to pumping; however, there was a lag time between when the pumping ceased and when the well began to recover. The total drawdown of the "tall well" was 6.75 feet. It can be seen on the composite hydrograph of the observation wells and the Oro-Fino Mine Shaft, (figure 1), that there is a hydrologic connection between the "alluvium" and the Pre-cambrian rock. Using the standard methods of evaluating an aquifer test: the Jacob's Method; and the Theis Method; (figures 2-8) the aquifer characteristics can be delineated. The transmissivity values for the unweathered Pre-cambrian rock range from 685-1912 gpd/ft. The storage coefficient values for the aquifer range from 1×10^{-1} to 1×10^{-2} . The test looks reasonable for this type of aquifer and indicates the effects of stress on the aquifer are predictable. Boundary conditions were apparent during the 124 hours of the test, and the test indicates that groundwater is available for this appropriation.

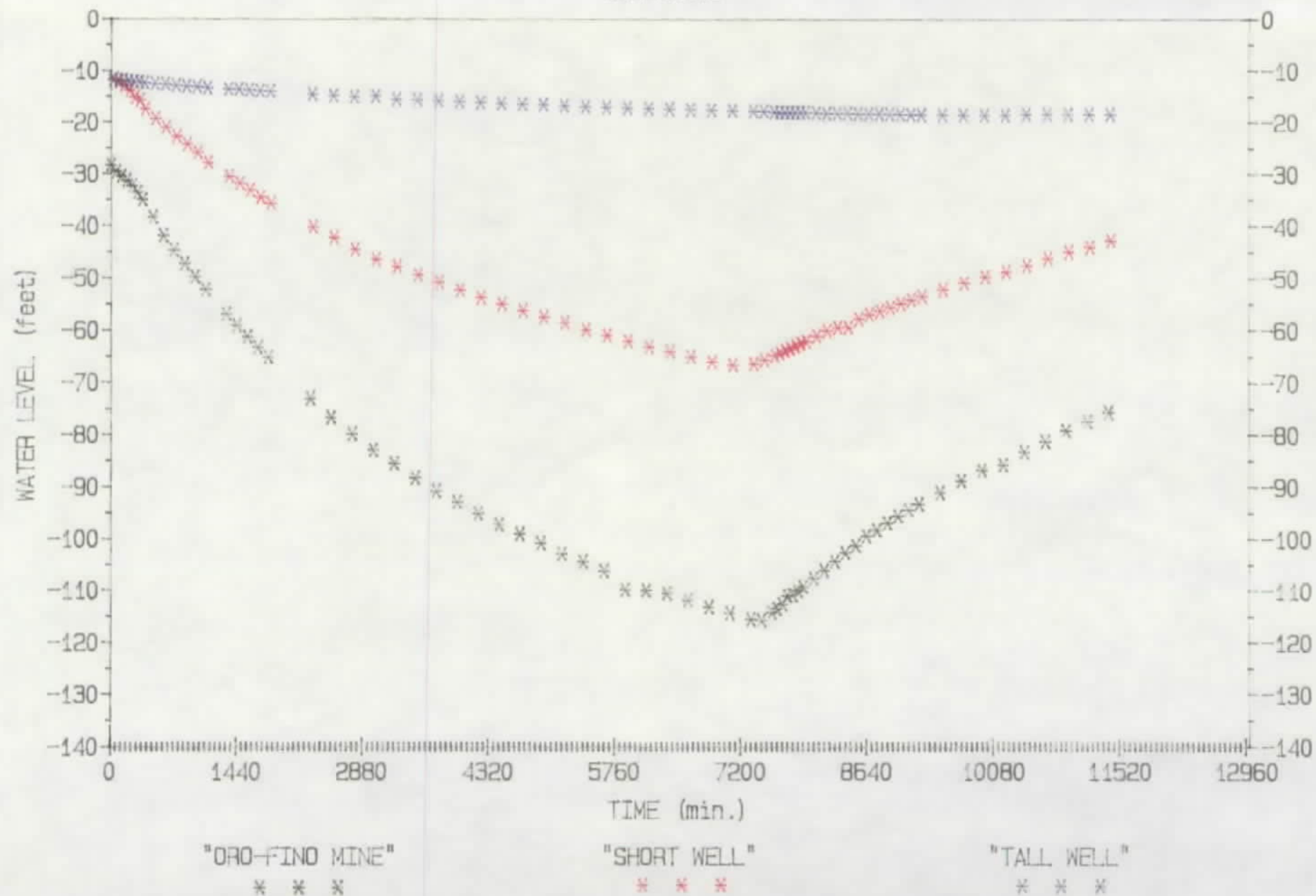
CONCLUSIONS:

1. Testing of the Oro-Fino Mine Shaft indicates there is a reasonable probability that groundwater is available for this appropriation.
2. Approval of Application No. 1421-1 would increase the appropriation of ground water to the applicant from 0.25 cfs to 1.00 cfs. This application does not add any new diversion points to those covered under Permit Nos. 1324-1 and 1324A-1, and would increase the diversion rate authorized, only from the Oro-Fino Mine Shaft.
3. The proposed primary source of ground water for this permit is the Oro-Fino Mine Shaft. The mine shaft has an estimated storage of 3,000,000 gallons, and has been test pumped at 221 gpm for 124 hours.
4. The drawdown measured in the Oro-Fino Mine Shaft and the two observation wells indicate vertical leakage from the alluvium to the Pre-cambrian rock occurs when the mine shaft is pumped.
5. Strawberry Creek is identified on the USGS quadrangle map as an intermittent stream. DWNR classifies the creek as "cold water marginal fish life propagation waters" and "limited contact recreation waters". The creek is probably hydraulically connected to the alluvium. Pumping from the Oro-Fino Mine Shaft may effect the stream flow, however, there should be no adverse effect on downstream water rights.

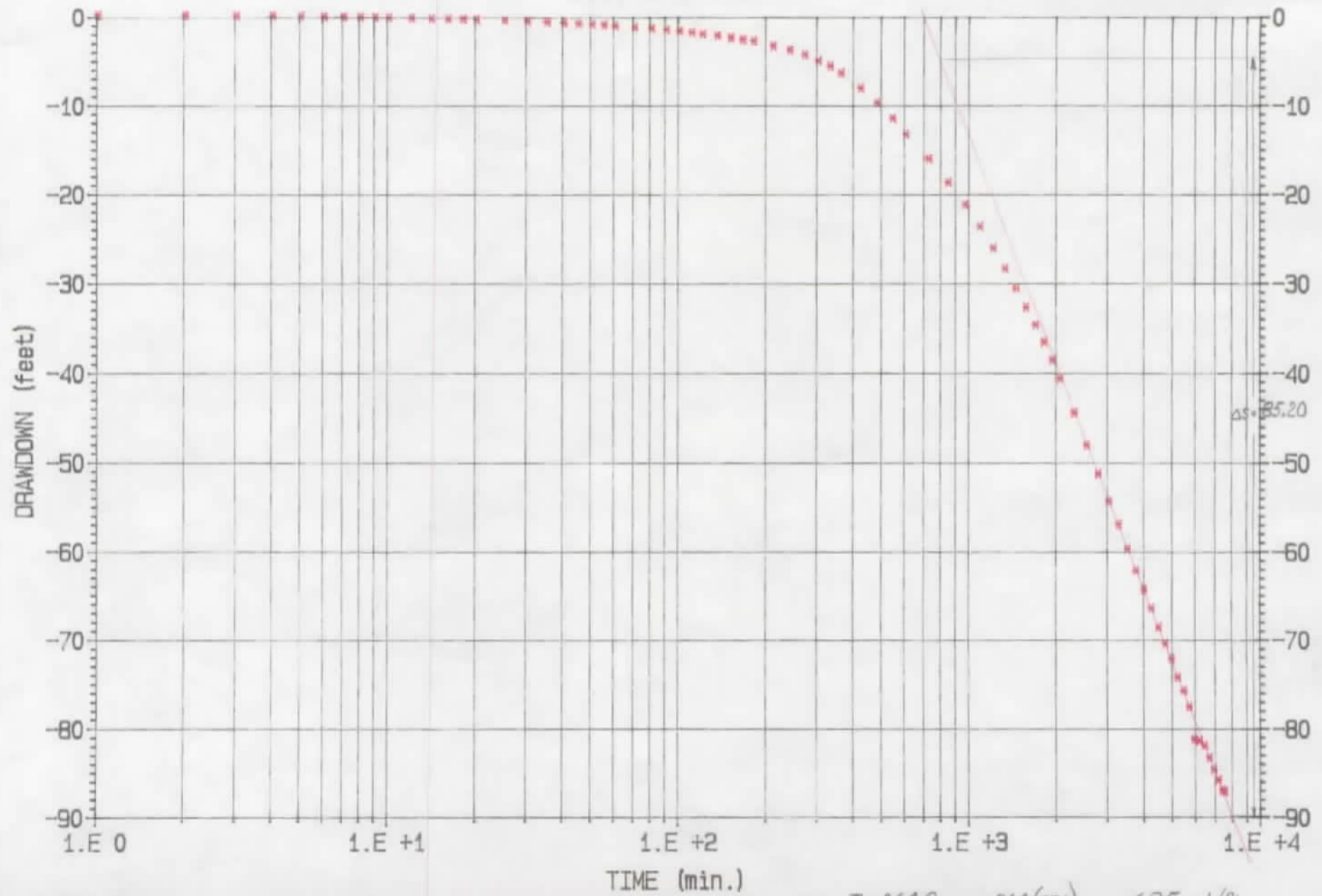


KENT BUHLER
Natural Resources Engineer

HYDROGRAPH COMPOSITE

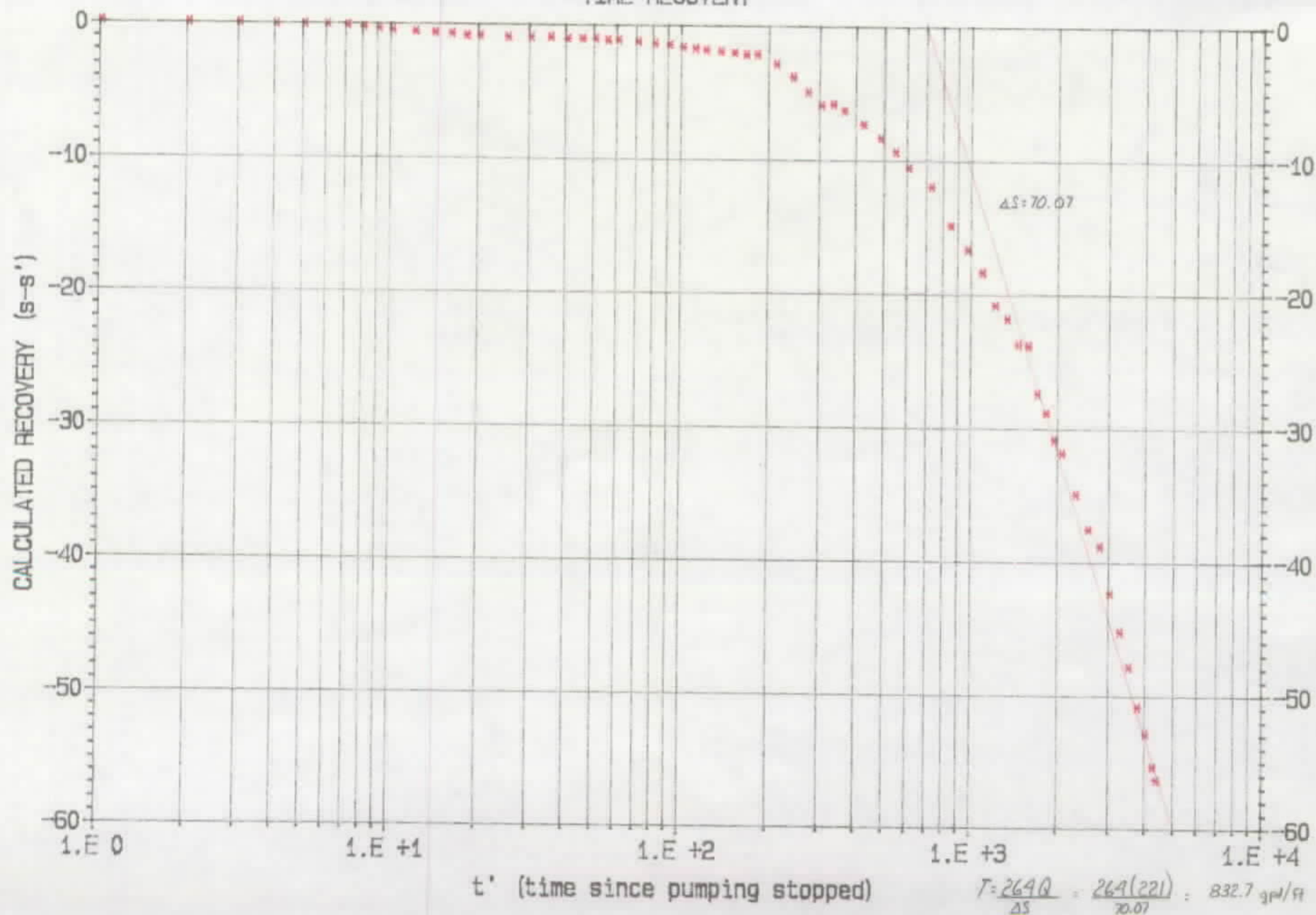


OROFINO MINE TIME-DRAWDOWN

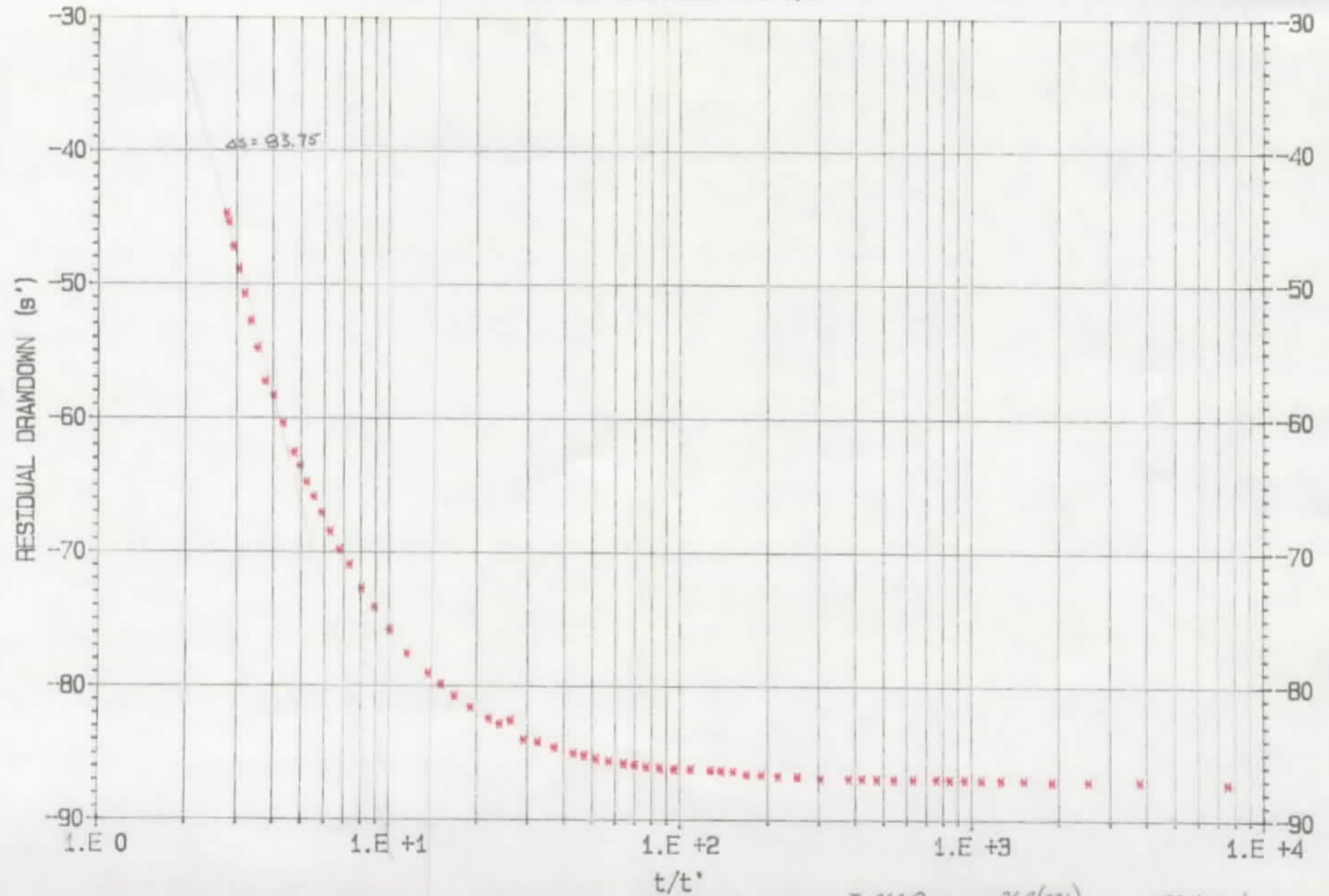


$$T = \frac{264Q}{\Delta S} = \frac{264(221)}{85.20} = 685 \text{ gpd/ft}$$

OROFINO MINE TIME-RECOVERY

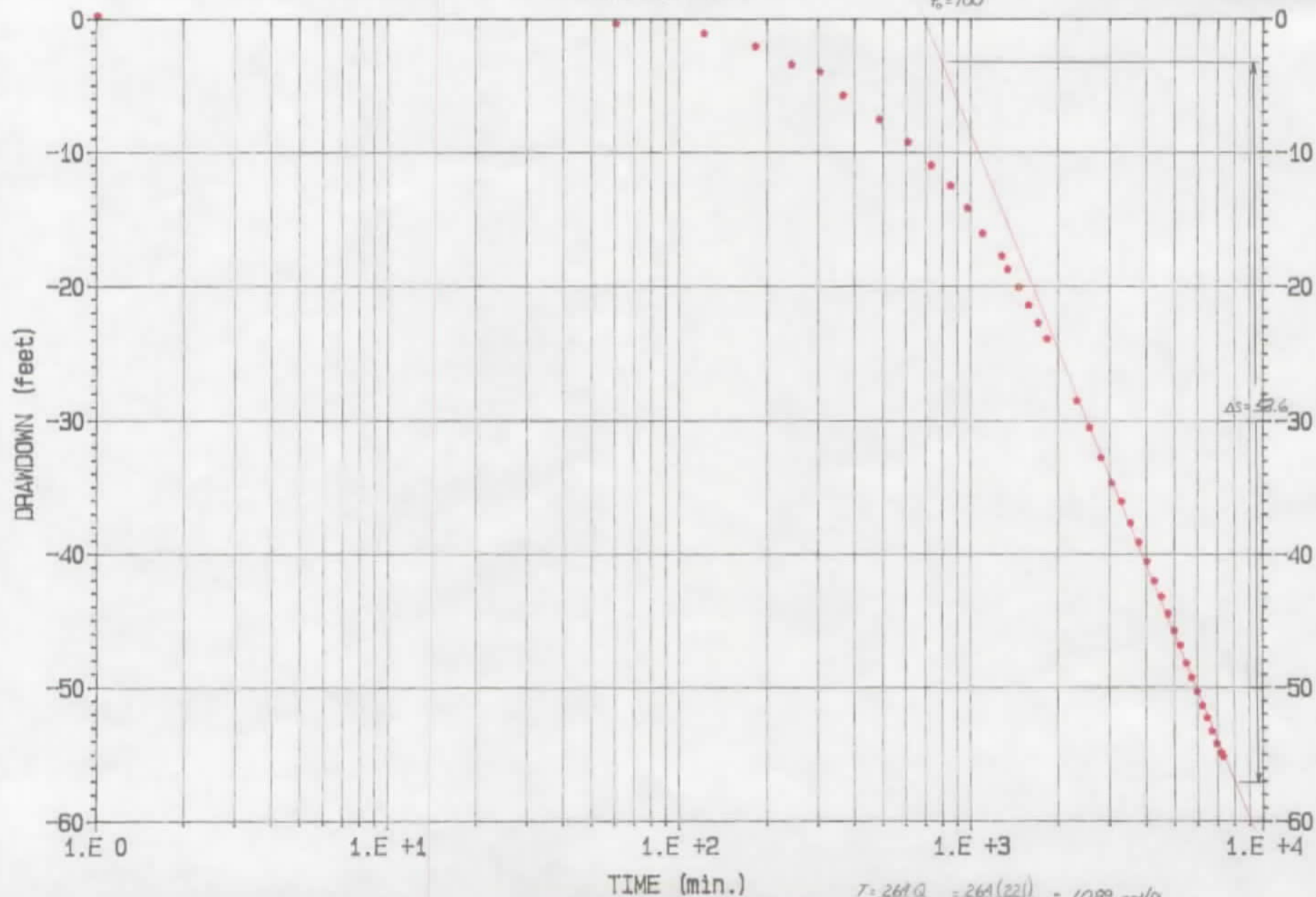


OROFINO MINE RESIDUAL DRAWDOWN vs. t/t'



$$T = \frac{264 Q}{\Delta s} = \frac{264(221)}{83.75} = 696.6 \text{ gpd/ft}$$

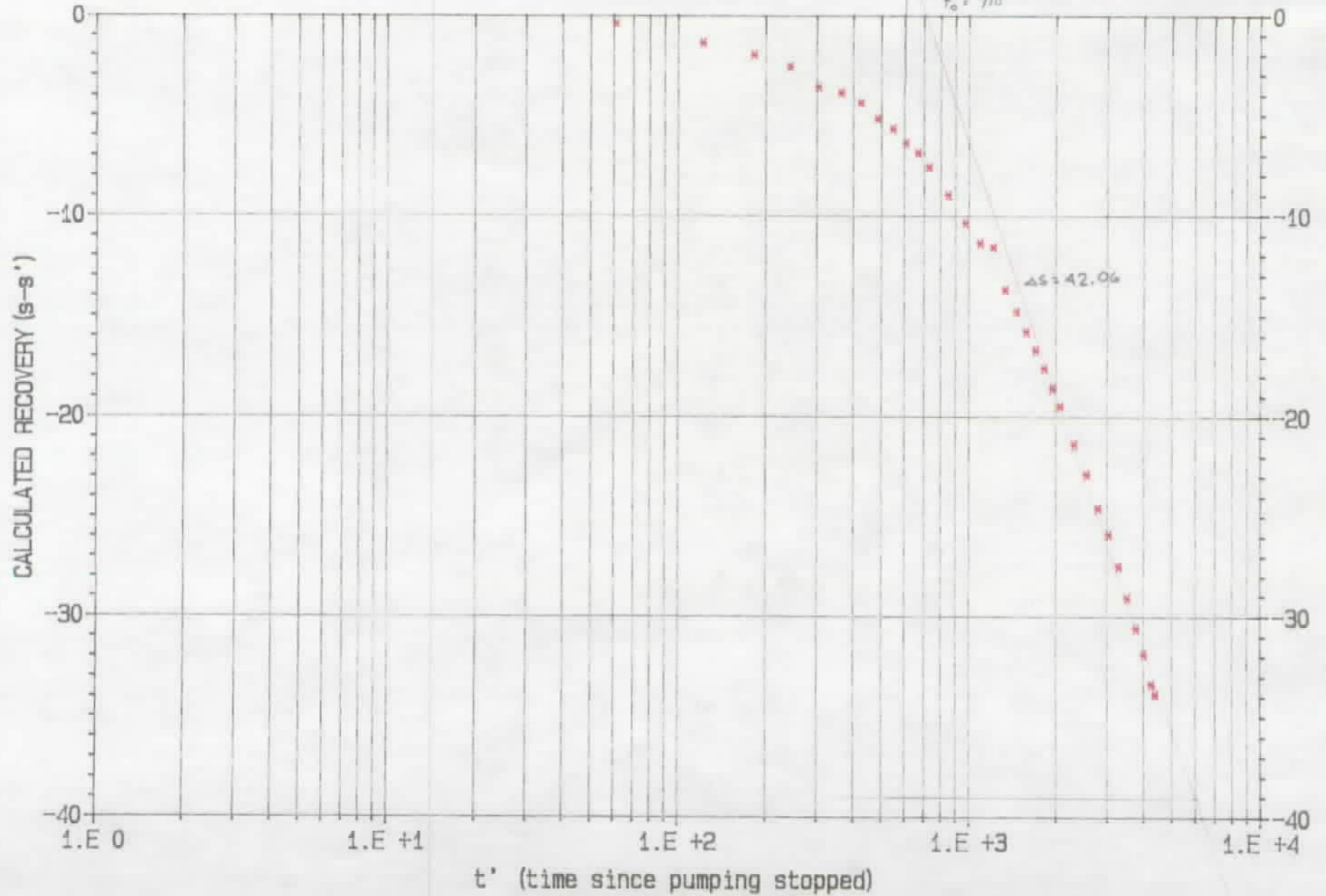
"SHORT WELL" TIME-DRAWDOWN



$$T = \frac{264Q}{\Delta S} = \frac{264(221)}{52.6} = 1089 \text{ gal/r}$$

$$S = \frac{Tt_0}{4790 r^2} = \frac{(1089)(700)}{4790 (185^2)} = 0.0087$$

"SHORT WELL" TIME-RECOVERY

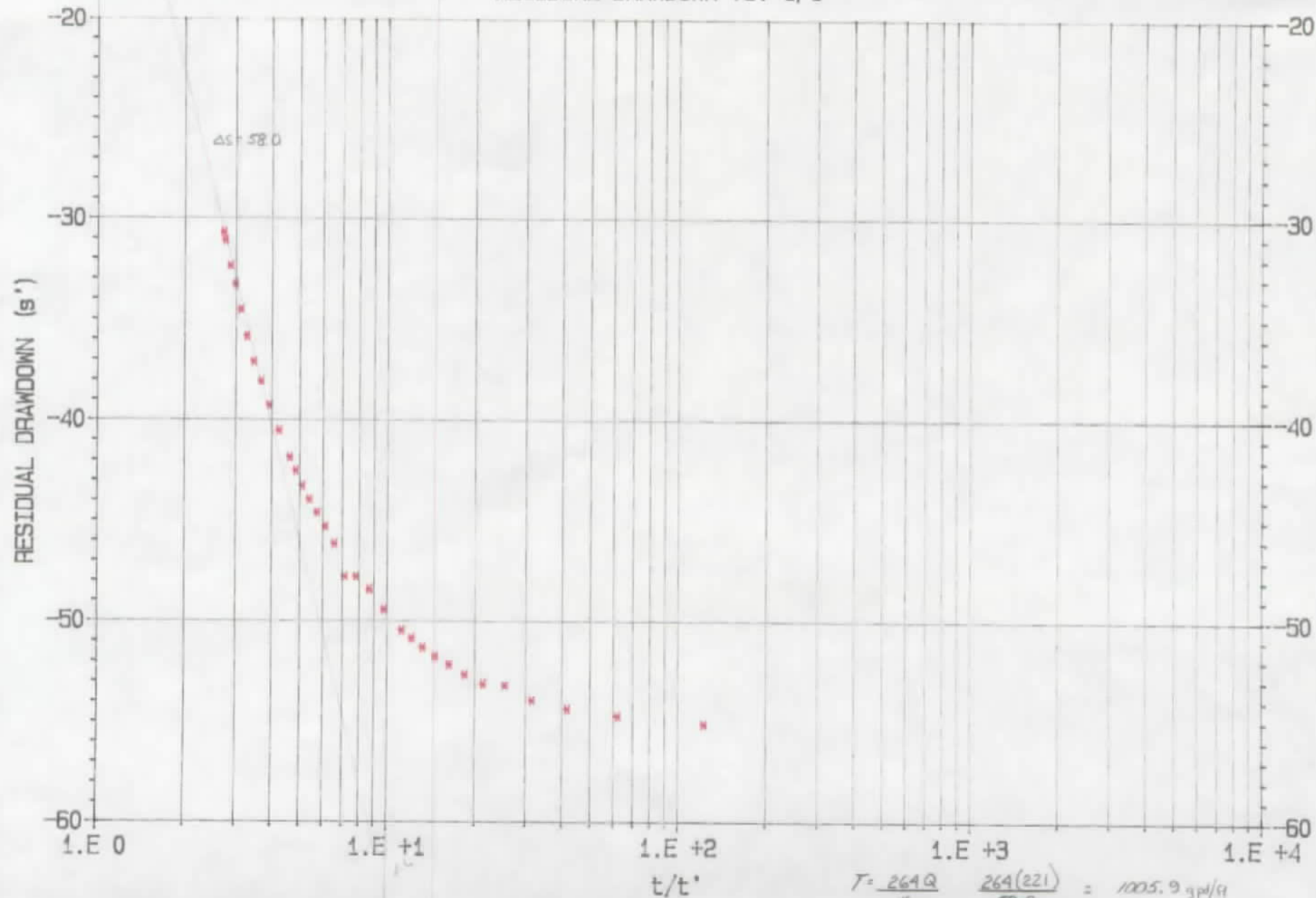


$$T = \frac{264 Q}{\Delta s} = \frac{264(221)}{42.0\%} = 1712.6$$

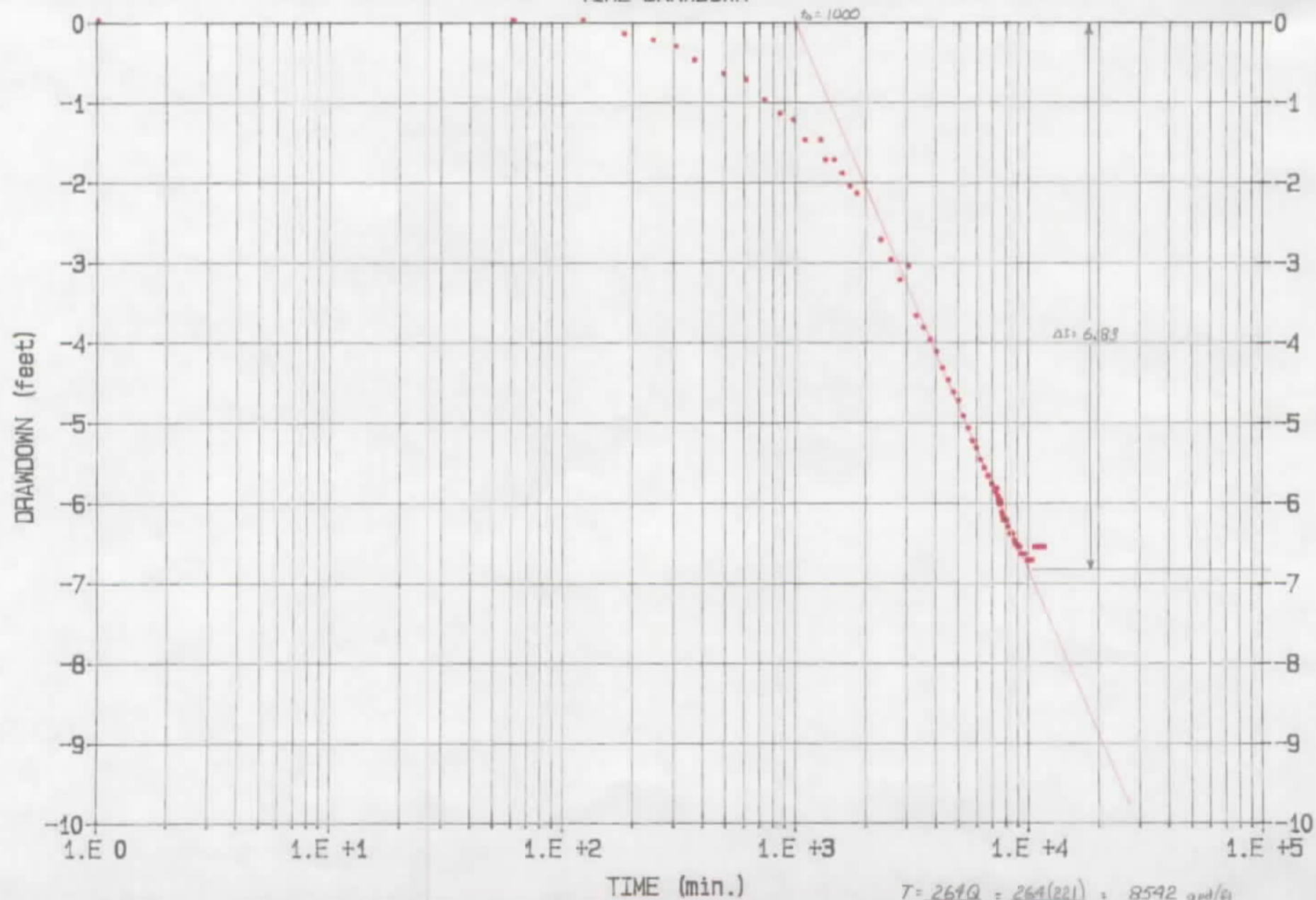
$$S = \frac{T h_0}{4750 r^2} = \frac{1712.6(710)}{4750(135^2)} = 0.0156$$

"SHORT WELL"

RESIDUAL DRAWDOWN vs. t/t'



"TALL WELL" TIME-DRAWDOWN



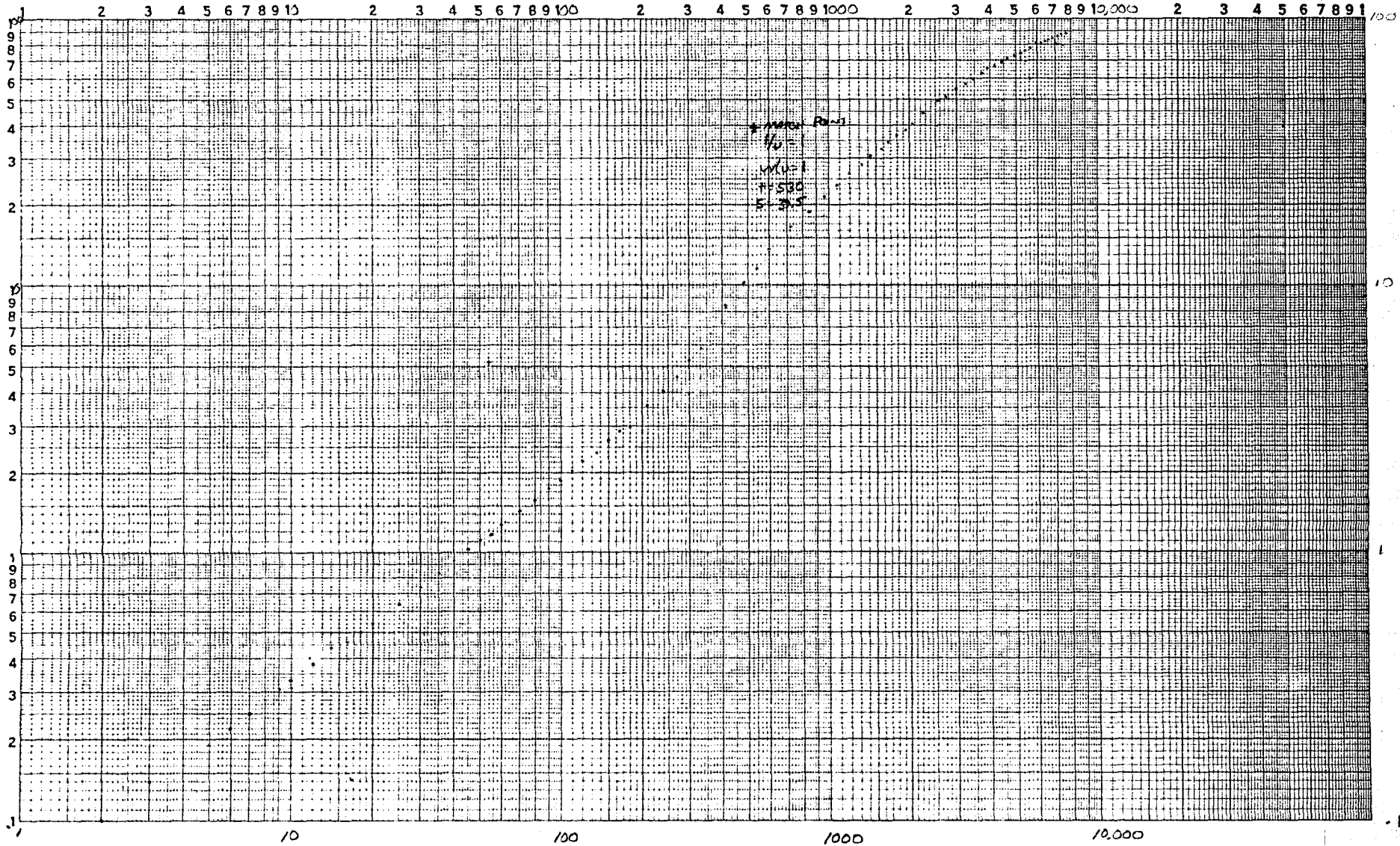
$$T = \frac{264Q}{\Delta s} = \frac{264(221)}{6.83} = 8542 \text{ gpd/ft}$$

$$S = \frac{Tt_0}{4790r^2} = \frac{(8542)(1000)}{4790(135^2)} = 0.0978$$

Time (min)

ORD FWD MIN

DRAINDOWN (Fe³⁺)



$$T = \frac{114.6 Q W(u)}{c}$$

$$T = \frac{114.6 (221)}{39.5} = 641.2 \text{ gpd/ft}$$

Time (min)

"ORO-FINO MINE"

TIME(t) (min.)	t'	t/t'	W/L (ft)	DD	(s-s')
1			-28.32	-0.06	
2			-28.35	-0.09	
3			-28.40	-0.14	
4			-28.42	-0.16	
5			-28.45	-0.19	
6			-28.48	-0.22	
7			-28.51	-0.25	
8			-28.54	-0.28	
9			-28.57	-0.31	
10			-28.59	-0.33	
12			-28.64	-0.38	
14			-28.70	-0.44	
16			-28.72	-0.46	
18			-28.76	-0.50	
20			-28.80	-0.54	
25			-28.90	-0.64	
30			-29.00	-0.74	
35			-29.10	-0.84	
40			-29.20	-0.94	
45			-29.30	-1.04	
50			-29.37	-1.11	
55			-29.45	-1.19	
60			-29.55	-1.29	
70			-29.68	-1.42	
80			-29.85	-1.59	
90			-30.00	-1.74	
100			-30.15	-1.89	
110			-30.30	-2.04	
120			-30.47	-2.21	
135			-30.65	-2.39	
150			-30.90	-2.64	
165			-31.10	-2.84	
180			-31.25	-2.99	
210			-31.85	-3.59	
240			-32.30	-4.04	
270			-32.79	-4.53	
300			-33.50	-5.24	
330			-34.10	-5.84	
360			-34.90	-6.64	
420			-36.60	-8.34	
480			-38.30	-10.04	
540			-40.00	-11.74	
600			-41.80	-13.54	
720			-44.60	-16.34	
840			-47.20	-18.94	
960			-49.75	-21.49	
1080			-52.20	-23.94	
1200			-54.60	-26.34	
1320			-56.90	-28.64	
1440			-59.10	-30.84	
1560			-61.25	-32.99	
1680			-63.20	-34.94	
1800			-65.10	-36.84	

"ORO-FINO MINE"

TIME(t) (min.)	t'	t/t'	W/L (ft)	DD	(s-s')
1920			-67.10	-38.84	
2040			-69.15	-40.89	
2280			-73.00	-44.74	
2520			-76.62	-48.36	
2760			-79.80	-51.54	
3000			-82.90	-54.64	
3240			-85.50	-57.24	
3480			-88.25	-59.99	
3720			-90.67	-62.41	
3960			-92.83	-64.57	
4200			-95.00	-66.74	
4440			-97.17	-68.91	
4680			-99.00	-70.74	
4920			-100.75	-72.49	
5160			-102.80	-74.54	
5400			-104.30	-76.04	
5640			-106.10	-77.84	
5880			-109.80	-81.54	
6120			-109.92	-81.66	
6360			-110.50	-82.24	
6600			-111.83	-83.57	
6840			-113.17	-84.91	
7080			-114.33	-86.07	
7320			-115.50	-87.24	
7440			-115.67	-87.41	
7441	1	7441.00	-115.67	-87.41	0.00
7442	2	3721.00	-115.50	-87.24	-0.10
7443	3	2481.00	-115.50	-87.24	-0.10
7444	4	1861.00	-115.50	-87.24	-0.20
7445	5	1489.00	-115.42	-87.16	-0.20
7446	6	1241.00	-115.42	-87.16	-0.20
7447	7	1063.86	-115.42	-87.16	-0.30
7448	8	931.00	-115.38	-87.12	-0.40
7449	9	827.67	-115.38	-87.12	-0.50
7450	10	745.00	-115.33	-87.07	-0.60
7452	12	621.00	-115.33	-87.07	-0.70
7454	14	532.43	-115.33	-87.07	-0.80
7456	16	466.00	-115.33	-87.07	-0.90
7458	18	414.33	-115.29	-87.03	-1.00
7460	20	373.00	-115.29	-87.03	-1.00
7465	25	298.60	-115.29	-87.03	-1.10
7470	30	249.00	-115.13	-86.87	-1.10
7475	35	213.57	-115.08	-86.82	-1.10
7480	40	187.00	-115.00	-86.74	-1.20
7485	45	166.33	-115.00	-86.74	-1.20
7490	50	149.80	-114.75	-86.49	-1.20
7495	55	136.27	-114.71	-86.45	-1.30
7500	60	125.00	-114.67	-86.41	-1.30
7510	70	107.29	-114.58	-86.32	-1.40
7520	80	94.00	-114.58	-86.32	-1.50
7530	90	83.67	-114.50	-86.24	-1.60
7540	100	75.40	-114.42	-86.16	-1.80
7550	110	68.64	-114.29	-86.03	-1.90
7560	120	63.00	-114.17	-85.91	-2.00

"ORO-FINO MINE"

TIME(t) (min.)	t'	t/t'	W/L (ft)	DD	(s-s')
7575	135	56.11	-114.00	-85.74	-2.10
7590	150	50.60	-113.83	-85.57	-2.20
7605	165	46.09	-113.58	-85.32	-2.30
7620	180	42.33	-113.42	-85.16	-2.30
7650	210	36.43	-113.00	-84.74	-3.00
7680	240	32.00	-112.58	-84.32	-4.00
7710	270	28.56	-112.42	-84.16	-5.10
7740	300	25.80	-111.00	-82.74	-6.10
7770	330	23.55	-111.25	-82.99	-6.00
7800	360	21.67	-110.83	-82.57	-6.50
7860	420	18.71	-110.00	-81.74	-7.50
7920	480	16.50	-109.17	-80.91	-8.50
7980	540	14.78	-108.33	-80.07	-9.50
8040	600	13.40	-107.50	-79.24	-10.70
8160	720	11.33	-106.00	-77.74	-12.10
8280	840	9.86	-104.25	-75.99	-15.00
8400	960	8.75	-102.58	-74.32	-16.80
8520	1080	7.89	-101.17	-72.91	-18.50
8640	1200	7.20	-99.38	-71.12	-21.00
8760	1320	6.64	-98.30	-70.04	-22.00
8880	1440	6.17	-96.90	-68.64	-23.90
9000	1560	5.77	-95.50	-67.24	-24.00
9120	1680	5.43	-94.30	-66.04	-27.60
9240	1800	5.13	-93.20	-64.94	-29.00
9360	1920	4.88	-92.00	-63.74	-31.00
9480	2040	4.65	-91.00	-62.74	-32.00
9720	2280	4.26	-88.80	-60.54	-35.10
9960	2520	3.95	-86.75	-58.49	-37.70
10200	2760	3.70	-85.70	-57.44	-39.00
10440	3000	3.48	-83.20	-54.94	-42.50
10680	3240	3.30	-81.20	-52.94	-45.40
10920	3480	3.14	-79.15	-50.89	-48.00
11160	3720	3.00	-77.30	-49.04	-51.00
11400	3960	2.88	-75.60	-47.34	-53.00
11640	4200	2.77	-73.80	-45.54	-55.50
11760	4320	2.72	-73.15	-44.89	-56.50

"SHORT & TALL WELLS"

TIME(t) (min.)	(t')	t/t'	W/L(s) (ft)	W/L(t) (ft)	DD(s)	DD(t)	(s-s')
0			-12.00	-12.25	0.00	0.00	
60			-12.58	-12.25	-0.58	0.00	
120			-13.33	-12.25	-1.33	0.00	
180			-14.33	-12.42	-2.33	-0.17	
240			-15.67	-12.50	-3.67	-0.25	
300			-16.25	-12.58	-4.25	-0.33	
360			-18.00	-12.75	-6.00	-0.50	
480			-19.83	-12.92	-7.83	-0.67	
600			-21.50	-13.00	-9.50	-0.75	
720			-23.25	-13.25	-11.25	-1.00	
840			-24.75	-13.42	-12.75	-1.17	
960			-26.42	-13.50	-14.42	-1.25	
1080			-28.33	-13.75	-16.33	-1.50	
1260			-30.00	-13.75	-18.00	-1.50	
1320			-31.00	-14.00	-19.00	-1.75	
1440			-32.33	-14.00	-20.33	-1.75	
1560			-33.67	-14.17	-21.67	-1.92	
1680			-35.00	-14.33	-23.00	-2.08	
1800			-36.17	-14.42	-24.17	-2.17	
2280			-40.75	-15.00	-28.75	-2.75	
2520			-42.75	-15.25	-30.75	-3.00	
2760			-45.00	-15.50	-33.00	-3.25	
3000			-46.92	-15.33	-34.92	-3.08	
3240			-48.30	-15.95	-36.30	-3.70	
3480			-49.90	-16.10	-37.90	-3.85	
3720			-51.35	-16.25	-39.35	-4.00	
3960			-52.80	-16.40	-40.80	-4.15	
4200			-54.25	-16.60	-42.25	-4.35	
4440			-55.50	-16.75	-43.50	-4.50	
4680			-56.75	-16.90	-44.75	-4.65	
4920			-58.00	-17.00	-46.00	-4.75	
5160			-59.10	-17.20	-47.10	-4.95	
5400			-60.45	-17.35	-48.45	-5.10	
5640			-61.50	-17.51	-49.50	-5.26	
5880			-62.55	-17.60	-50.55	-5.35	
6120			-63.60	-17.75	-51.60	-5.50	
6360			-64.50	-17.85	-52.50	-5.60	
6600			-65.50	-17.95	-53.50	-5.70	
6840			-66.45	-18.05	-54.45	-5.80	
7080			-67.10	-18.15	-55.10	-5.90	
7200			-67.40	-18.10	-55.40	-5.85	
7260	60	121.00	-67.25	-18.20	-55.25	-5.95	-0.50
7320	120	61.00	-66.85	-18.25	-54.85	-6.00	-1.50
7380	180	41.00	-66.50	-18.30	-54.50	-6.05	-2.10
7440	240	31.00	-66.08	-18.25	-54.08	-6.00	-2.70
7500	300	25.00	-65.33	-18.29	-53.33	-6.04	-3.70
7560	360	21.00	-65.25	-18.40	-53.25	-6.15	-4.00
7620	420	18.14	-64.80	-18.45	-52.80	-6.20	-4.50
7680	480	16.00	-64.30	-18.50	-52.30	-6.25	-5.30
7740	540	14.33	-63.90	-18.50	-51.90	-6.25	-5.80
7800	600	13.00	-63.45	-18.50	-51.45	-6.25	-6.50
7860	660	11.91	-63.00	-18.50	-51.00	-6.25	-7.00
7920	720	11.00	-62.60	-18.50	-50.60	-6.25	-7.70
8040	840	9.57	-61.58	-18.58	-49.58	-6.33	-9.10

"SHORT & TALL WELLS"

TIME(t) (min.)	(t')	t/t'	W/L(s) (ft)	W/L(t) (ft)	DD(s)	DD(t)	(s-s')
8160	960	8.50	-60.58	-18.67	-48.58	-6.42	-10.50
8280	1080	7.67	-59.92	-18.67	-47.92	-6.42	-11.50
8400	1200	7.00	-59.92	-18.67	-47.92	-6.42	-11.70
8520	1320	6.45	-58.30	-18.75	-46.30	-6.50	-13.80
8640	1440	6.00	-57.45	-18.80	-45.45	-6.55	-14.90
8760	1560	5.62	-56.75	-18.80	-44.75	-6.55	-15.90
8880	1680	5.29	-56.10	-18.83	-44.10	-6.58	-16.80
9000	1800	5.00	-55.42	-18.83	-43.42	-6.58	-17.70
9120	1920	4.75	-54.67	-18.92	-42.67	-6.67	-18.70
9240	2040	4.53	-54.00	-18.92	-42.00	-6.67	-19.60
9480	2280	4.16	-52.67	-18.92	-40.67	-6.67	-21.50
9720	2520	3.86	-51.42	-19.00	-39.42	-6.75	-23.00
9960	2760	3.61	-50.21	-19.00	-38.21	-6.75	-24.70
10200	3000	3.40	-49.25	-19.00	-37.25	-6.75	-26.00
10440	3240	3.22	-48.00	-18.83	-36.00	-6.58	-27.60
10680	3480	3.07	-46.67	-18.83	-34.67	-6.58	-29.20
10920	3720	2.94	-45.42	-18.83	-33.42	-6.58	-30.70
11160	3960	2.82	-44.50	-18.83	-32.50	-6.58	-32.00
11400	4200	2.71	-43.25	-18.83	-31.25	-6.58	-33.50
11520	4320	2.67	-42.83	-18.83	-30.83	-6.58	-34.00



Department of Water & Natural Resources

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

February 24, 1988

NOTICE

TO: John Wilbanks, Brohm Mining Corporation
PO Box 485, Deadwood SD 57732

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

SUBJECT: Reconsideration of Deferred Water Permit Application No. 1421-1, Brohm Mining Corporation and Notice that the Board May Consider an Environmental Bond Requirement Qualification

The Water Management Board will reconsider Water Permit Application No. 1421-1 at 1:30 pm, March 2, 1988, in Room 216, Joe Foss Building, 523 E Capitol, Pierre SD. Application No. 1421-1 was deferred at the December 2 and 3, 1987 Board meeting to allow completion of pumping tests on the Oro Fino Mine Shaft.

Enclosed is a copy of the Revised Recommendation of the Chief Engineer to Approve Application No. 1421-1. The applicable provisions of the Notice of Hearing published November 5 and 12, 1987 will still apply at this hearing.

If the Board approves Applications No. 1420-1 and 1421-1, the Board may also consider conditioning the Permits with the following Environmental Bond Requirement.

That prior to beginning construction of the Brohm Mining Project an Environmental Bond in the form of either a performance bond or a cash deposit in the amount of \$ _____ shall be filed with the Chief Engineer to guarantee the performance of conditions to Permits No. 1420-1 and 1421-1 that were imposed to protect the environment. In the event of Permit condition(s) violation, the Board, following a hearing may determine the cost of damage to the environment and the cost to comply with the condition violation(s). The costs shall be deducted from the Environmental Bond and used for compliance with violated condition(s) and to mitigate damages to the environment.

The dollar value of the Environmental Bond will be determined by the Board at the time of the hearing.

cc: Harold Deering, Assistant Attorney General
Marvin D Truhe, Attorney

CERTIFICATION

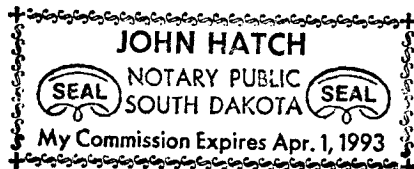
I hereby certify that on February 24, 1988 I have personally deposited with the U.S. Mail, postage prepaid envelopes containing Notice of Reconsideration of Deferred Application No. 1421-1 addressed as stated on the notice with a copy sent to:

Marvin D Truhe, Attorney
PO Box 8250
Rapid City SD 57709

Karen Schlaak
KAREN SCHLAACK
Senior Secretary

STATE OF SOUTH DAKOTA)
) SS
COUNTY OF HUGHES)

Sworn to, before me, this 25th day of February, 1988.



John Hatch
Notary Public



Department of Water & Natural Resources

Joe Foss Building
523 East Capitol
Pierre, South Dakota 57501

Water Rights Division
605 773-3352

APR 28 1988

Brohm Mining Company
P.O. Box 485
Deadwood, South Dakota 57732

Dear Sir:

Enclosed herewith is your Water Permit No. 1421-1 as approved by the Water Management Board authorizing you to construct your water diversion system and the water to beneficial use, not exceeding the limits as specified in said Water Permit No. 1421-1.

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 your Water License may be issued to you, thus completing your acquisition of a Water Right.

Very truly yours

JOHN HATCH, Chief Engineer
Water Rights Division

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.



**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE SOUTH DAKOTA 57501-3181

August 9, 1993

1421-1
1454-1

John Wilbanks
Brohm Mining Corporation
P.O. Box 485
Deadwood, SD 57732

Dear Mr. Wilbanks:

The inspection of your water use system and the inspection of the extent of application of water to beneficial use, as developed under Water Permit Nos. 1421-1 and 1454-1, has been completed. Your final water right document, the Water Licenses, can now be issued.

Statutes require that we charge a \$50.00 fee per license for the inspection and issuance of the Water Licenses. Upon receipt of the \$100.00 fee from you, we will begin processing your Water Licenses.

South Dakota Water Law 46-5-30.1 requires that a permit holder may not divert water until the \$50.00 license fee has been paid. Please contact us if you have any questions.

Sincerely,

Cheryl F. Frost
Secretary
Water Rights Division
(605) 773-3352

NOTE: On check or money order, please specify your permit number. This will insure proper handling of the fee.

RECEIPT

413868

Division of Water Rights

South Dakota Department of Environment and Natural Resources

Pierre, _____ August 19 _____, 19 93

RECEIVED OF Brohm Mining Corp, PO Box 485, Deadwood, SD 57783

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. <u>1421-1</u>	50	00
Fee for Filing Transfer Form _____		
Fee for Filing Extension Request _____		
Fee for _____		

(Any Other Work Provided by Law)	Total	50 00

By

Chief Engineer

John Hatch



December 5, 1995



Eric Grunlund
Division of Water Rights
SDDENR
523 E Capitol
Pierre, SD 57501

Dear Mr. Grunlund:

This letter is a follow-up to our telephone conversation of this morning. Brohm Mining Corporation's primary permitted water source is a mine shaft associated with the Oro Fino workings. A total of one cubic feet per second (CFS) has been appropriated for mine make up water. The water is withdrawn from the shaft with either of two submersible pumps nominally rated at 250 gpn. However, as these pumps are placed approximately 280 feet down in the shaft and plumbed to the surface with 3 1/2" outside diameter pipe, their actual pump capacity is in the range of 150 gpn each. Additionally, the pumps are interlocked electronically through a programmable logic computer (PLC) so that only one pump will run at a time. A copy of the PLC program is available to your department for review. Attached please find a specification sheet for the original installation.

Brohm also has an appropriation of 50 gpn for well MW-7D. This well has been renamed GW-4 and is routinely monitored at a lesser pump rate. Brohm requests that well GW-4 be included in their water license as a back-up water source.

If you have any further questions, please don't hesitate to call.

Thank you,

BROHM MINING CORP


Lance Hubbard
Environmental/Safety Coordinator

LJH:aja

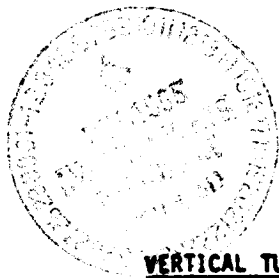
Enc.

cc: John Trimble, BMC
Dale Shay, BMC
File
corres\Grunlund.doc

South Dakota Office: P.O. Box 485, Deadwood, South Dakota 57732
Telephone: (605) 578-2107 Telecopier: (605) 578-1709

Brohm Mining Corp. is a wholly owned affiliate of  Mirven Gold Corporation

BATEMAN ENGINEERS INC.



VERTICAL TURBINE PUMP

SPECIFICATION SHEET

REV. 1
12-21-87

to: Engr
Est.
N. Connolly
Mrtg.

Equip. No.(s) 620-15-02

No. Req'd. 2

Type SUBMERSIBLE TURBINE

Description/Name 002 FINE WATER SUPPLY PUMPS

Conditions of Service

Liquid WATER S.G. @ P.T. 1.0 Elev. 4973 Ft.

Rated Capacity 150 GPM Visc. @ P.T. 1.68 CP Duty CONTINUOUS

At Total Head 342 Ft. Vap. Press. @ P.T. .7 PSIA NPSHA 29.8 Ft.

At Pump. Temp. 35 °F Solids Present MINE DE-WATERING APPLICATION

Reagents/Corrosives (ph) NONE

Total Pump Hydraulic Friction Losses _____

PUMP DESCRIPTION

Manufacturer	<u>DRESSER PUMP</u>	Bowl	<u>LI</u>	Col./Mat'l	<u>3/2" CS</u>	Efficiency	<u>73</u>
Model	<u>GM11</u>	Imp. Wrg. Ring	<u>NONE</u>	Col. I Dia./Lgth	<u>4#1250'</u>	BHP Rtg.	<u>17.6</u>
Size/Stgs.	<u>6"/6</u>	Bowl. Brg.	<u>BRONZE</u>	Col. Brg/Mat'l	<u>N/A</u>	BHP Max.	<u>20</u>
Lube	<u>PRODENT</u>	Bowl Shaft	<u>416 SS.</u>	Col. Shaft/Mat'l	<u>N/A</u>	Pump Thr. Rtg.	<u>899</u>
Tot. Pump Lgth.	<u>N/A</u>	Bowl. Wrg. Ring	<u>BRONZE</u>	Col. Shaft/Sz.	<u>N/A</u>	Pump Thr. Max.	<u>1032</u>
Seal Type	<u>N/A</u>	Strainer	<u>NONE</u>	Disch. Hd./Mat'l	<u>CS</u>	Imp. Dia. Rtg.	<u>3.88</u>
Min. Sus. Depth	<u>N/A</u>	Imp. Wrg. Ring	<u>NONE</u>	Disch. Hd./Size	<u>3/2"</u>	Imp. Dia. Min/Max	<u>3.38/4.0</u>

DRIVE

Motor H.P.	<u>20</u>	RPM	<u>3600</u>	Volts/PH./HZ.	<u>460/3/60</u>
Insulation	<u>-</u>	Encl/Frame	<u>SUB.</u>	S.F.	<u>1.15</u>
Type of Shaft	<u>-</u>	Thrust Rating	<u>1500*</u>	MFG.	<u>FRANKLIN</u>

WEIGHTS

Pumps 210 Motor 176* Column 2375 Sol. In Col. -

ACCESSORIES REQUIRED

① PUMP STRAINER ② 250'-4" COL. ③ 300' DROP CABLE
④ SPLICE KIT ⑤ CONTROL PANEL ⑥ LOW LEVEL PROBE
⑦ CHECK VALVE W/ BLEED

Customer BROHM
Project GILT EDGE
Location DEADWOOD S.D.

Project No. J-8740
By: RWS Date: 12-21-87
Appvd: _____ Date: _____

REPORT ON INSPECTION OF PERMIT NUMBER 1324A-1 (Oro Fino Shaft) DATE 9/3/92

DIVERSION POINT LEGAL LOCATION: SW1/4 NW1/4 Section 8, T4N-R4E

WELL INFORMATION: Well Drilling Firm NA

- a) Pump* 1) make Submersible No. of Wells NA Depth(s) 300⁺ feet
2) model c) Shaft: 1) diameter 8 by 16 feet
3) size inches 2) length 300⁺ feet
4) capacity 150 ~~250~~ GPM 3) type
5) turbine pump - No. of stages d) Screen: 1) type
6) operating pressure PSI 2) length feet
- b) Motor* 1) make Submersible e) Static Water Level variable
2) model No.
3) horsepower rating 20 HP

DISTRIBUTION LINES OR CANALS:

- a) type Steel b) size 6 inches c) length 3960 feet

~~* Two identical pumps and motors are used for a total capacity of 500 gallons per minute.~~

PERMIT QUALIFICATIONS AND REGULATIONS:

- a) Soil and water permit lands agree with lands being irrigated and lands listed on permit NA (Y/N)
b) Special qualifications to permit being abided by Y (Y/N)
c) All structures, wells and lands on map Y (Y/N)
d) Irrigation Questionnaires checked to determine if permit owner started irrigation by the end of construction period NA (Y/N)

REPORT ON INSPECTION OF PERMIT NUMBER 1324A-1 (Well 7D)

DATE 9/3/92

DIVERSION POINT LEGAL LOCATION: NW1/4 SW1/4 Section 5, T4N-R4E

WELL INFORMATION: Well Drilling Firm NA

- a) **Pump** 1) make Berkeley-submersible No. of Wells 1 Depth(s) 200 feet
2) model c) **Casing:** 1) diameter 7 inches
3) size 3 inches 2) length 28 feet
4) capacity 50 GPM 3) type Steel
5) turbine pump - No. of stages d) **Screen:** 1) type Open Hole
6) operating pressure PSI 2) length feet
- b) **Motor:** 1) make Berkeley e) Static Water Level 55 feet
2) model No. 14-4050-2W
3) horsepower rating 1/3 HP

DISTRIBUTION LINES OR CANALS:

- a) type Steel b) size 2 inches c) length 300 feet

This well is used for water quality monitoring and also as a backup source of water.

PERMIT QUALIFICATIONS AND REGULATIONS:

- a) Soil and water permit lands agree with lands being irrigated and lands listed on permit NA (Y/N)
b) Special qualifications to permit being abided by Y (Y/N)
c) All structures, wells and lands on map Y (Y/N)
d) Irrigation Questionnaires checked to determine if permit owner started irrigation by the end of construction period NA (Y/N)

Permit No. 1421-1
(includes 1324-1 & 1324A-1)
Belle Fourche - Water District

Report of Examination of Works and/or Application of Water to Beneficial Use

TO: Chief Engineer, Water Rights Program, DENR, Foss Bldg., Pierre, SD 57501

On September 3, 1992, Rassool Ahadi, made a thorough examination of the water use system constructed by Brohm Mining Company of PO Box 485, Deadwood, SD 57732-0485 holder of Permit Nos. 1324-1, 1324A-1 and 1421-1, bearing priority dates of December 26, 1984 and October 8, 1987 authorizing the diversion of 1.00 cu. ft. per second of the waters of ground water for industrial purposes, in Lawrence County.

I have to report on the conditions of the same as follows:

A. Works used to divert the water:

Capacities for pumps at mine shaft and GW-4 taken from December 5, 1995 letter received from Lance Hubbard, Environmental Safety Coordinator for Brohm Mining Corp.

ORO FINO MINE SHAFT: two identical pumps rated at 250 gpm (actual pump capacity is 150 gpm each)*; motors are 20 hp each	MONITORING WELL 7D: (renamed GW-4) Berkeley pump - 50 gpm capacity (monitored at lesser pump rate, with Berkeley motor 1/3 hp
---	--

*pumps at the Oro Fino Mine Shaft are interlocked electronically through a programmable logic computer allowing only one pump to run at a time

B. Works used to transport water to place of use:

approximately 4300 feet of 2-6 inch steel pipes

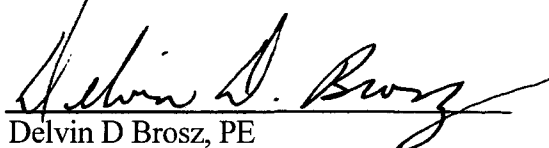
The system is in the following condition: good. The points of diversion is located Oro Fino Mine Shaft: 552 feet east & 1650 feet south of the NW corner of Section 8, T4N, R4E (SW $\frac{1}{4}$ NW $\frac{1}{4}$); GW-4: 315 feet east & 1695 feet north of the SW corner of Section 5, T4N, R4E (NW $\frac{1}{4}$ SW $\frac{1}{4}$).

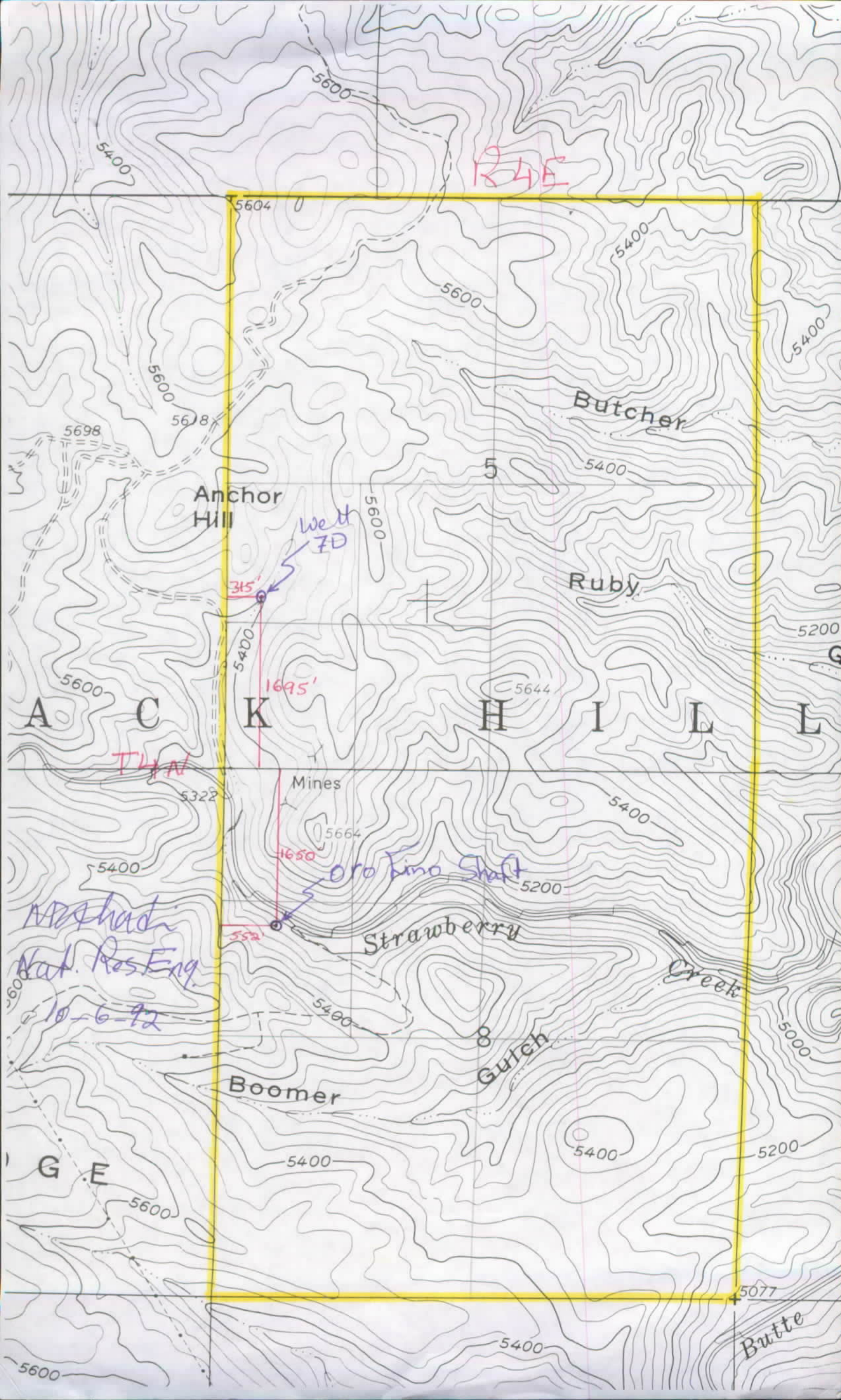
The works are capable of diverting and conveying to the place of use 0.33 cu. ft. per second of water (150 gpm) which is to be used for industrial purposes (mining operation).

The license should be issued for 0.33 cfs (150 gpm). Monitoring well (GW-4) is to be included in the water license as a back up water supply source. The applicable permit qualifications have been complied with.

Report completed: July 10, 1996 (by Genny McMath, Environmental Scientist)

Report reviewed by:


Delvin D Brosz, PE
Natural Resources Engineer IV
DENR, Water Rights Program



R4E

Anchor Hill

Butcher

Ruby

Mines

Oro Fino Shaft

Strawberry

Creek

Boomer

Gulch

Butte

M. Phad
Nat. Res. Eng.
10-6-92

A C K H I L L

T4N

1695'

315'

1650

552

5600

5400

5604

5600

5400

5400

5400

5600

5698

5618

5600

5644

5200

5400

5400

5200

5400

5000

5400

5200

5600

5400

5600

5077

STATE OF SOUTH DAKOTA

WATER LICENSE NO. 1421-1

(1) Brohm Mining Corporation made Application No. 1421-1, October 8, 1987 for a water permit to divert an additional 0.75 cubic feet of water per second (180 acre feet annually) from ground water (Oro Fino Mine Shaft and Well 7D), Lawrence County, South Dakota for industrial purposes. Permit No. 1421-1, with a priority date of October 8, 1987 was approved March 2, 1988 and issued to the applicants for diversion of water with construction of the described water supply system to be completed on or before March 2, 1993 and for the application to beneficial use of said water on or before March 2, 1997.

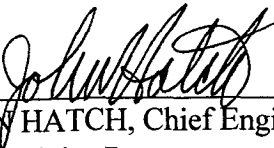
Water Permit No. 1324-1, carrying a priority date of December 26, 1984, authorized diversion of 0.25 cubic feet of water per second (cfs) from two wells. Water Permit No. 1324A-1, amended No. 1324-1 by adding two wells and changing the location of a ground water diversion point (authorized by 1324-1) from a 400 feet deep well to the 300 feet deep Oro Fino Mine Shaft. No. 1324A-1 did not authorize additional water appropriation.

The applicable portions of Water Permit Nos. 1324-1 and 1324A-1 are incorporated into this Water License No. 1421-1. A priority date of December 26, 1984 (established under Nos. 1324-1 & 1324A-1) is retained for 0.25 cfs and a priority date of October 8, 1987 (established under No. 1421-1) is retained for 0.08 cfs.

(2) It is certified that the applicant has complied with the provisions of South Dakota State Law relating to completion of the construction of the water supply system and is entitled to divert 0.33 cubic feet of water per second for beneficial use. The location of the diversion points are 1) Oro Fino Mine Shaft: 552 feet east & 1,650 feet south of the NW corner of Section 8, T4N, R4E (SW¼ NW¼); 2) GW-4 (formerly called monitoring well 7D) 315 feet east & 1,695 feet north of the SW corner of Section 5, T4N, R4E (NW¼ SW¼)

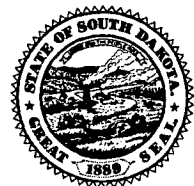
(3) The applicant has complied with the provisions of South Dakota State Law relating to the application of water to beneficial use in a heap leach ore processing facility.

(4) Pursuant to South Dakota Water Law 46-5-30.1 Brohm Mining Corporation, PO Box 485, Deadwood, SD 57732-0485 the holder and/or owner of Incorporated Water Permit No. 1421-1 is issued a license to appropriate water, the right to use 0.33 cubic feet of water per second from ground water (Oro Fino Mine Shaft and GW-4) with priority dates of December 26, 1984 (0.25 cfs) and October 8, 1987 (0.08) from the locations specified in (2) of this license, for industrial use purposes. This license is subject to any limitations or qualifications listed in Incorporated Water Permit No. 1421-1 and subject to South Dakota State Law.


JOHN HATCH, Chief Engineer
Water Rights Program
Department of Environment and Natural Resources

JUL 29 1996

date





**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3181

JUL 29 1996

1421-1

Lance Hubbard
Brohm Mining Corporation
P.O. Box 485
Deadwood, SD 57732-0485

Dear Mr. Hubbard:

Enclosed is Water License No. 1421-1 and Receipt No. 413868 for \$50.00 which was assessed for an investigation and issuance of the license. Water License No. 1421-1 is the final document which completes the process of obtaining a water right.

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.

Very truly yours,

JOHN HATCH, Chief Engineer
Water Rights Program
(605) 773-3352

gm
enclosures

NOTE: The applicable portions of Water Permit Nos. 1324-1 and 1324A-1 are incorporated into this Water License No. 1421-1.

NOTICE OF TRANSFER OF OWNERSHIP

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

No. 1421-1

Date: 8/21/18

I/We request that Water Right No. 1421-1

formerly owned by: Brohm Mining Corporation

be transferred to: (name & address) South Dakota School & Public Lands, 500 East Capitol
Avenue, Pierre SD 57501

Telephone No. (605) 773-3303

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

Diversion point locations: Oro Fino Mine Shaft – SW ¼ NW ¼ Section 8, T4N, R4E;

well – NW ¼ SW ¼ Section 5, T4N, R4E

I/We understand that the validity of Water Right No. 1421-1 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 Fifty Dollars (\$50.00) is required to cover the filing fees as required under SDCL 46-2-13. This form must be signed by the new owner.

I, Ryan Brunner, Commissioner, the owner, certify that the above information is true and correct.


(Signed by Commissioner, SD School & Public Lands)

NOTE: Water permits may be cancelled for nonconstruction after the five year construction period has expired. 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.

1421-1

State of South Dakota
VOUCHER

APPL. AREA 75 APPROVAL NUMBER _____
 D A T E 08.21.2018 APPROVAL DATE _____
 DOCUMENT ID N20908003 D A T A T Y P E 1

FROM: DENR

to: SD School and Public Lands
 500 E Capitol AV
 Pierre SD 57501

LINE	COMP	ACCOUNT	CENTER	AMOUNT	SIGN
1	3072	4299805	2020000800	50.00	CR
2					DR
3					DR
4					
5					
6					
7					
8					
TOTAL			DR	50.00	
TOTAL			CR		
VOUCHER TOTAL					
DESCRIPTION OF SERVICE, PRODUCT, OR TRANSFER					

Notice of Transfer of Ownership
 Brohm Mining Corp.

I declare and affirm under the penalties of perjury that this claim has been examined by me, and to the best of my knowledge and belief, is in all things true and correct.

Sandy Verhelst

Claimant

8-21-18

Date

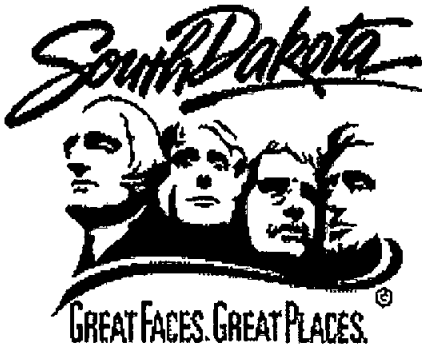
Authorization

Date

773-5242

Authorization

Date



DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES

JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE SOUTH DAKOTA 57501-3182
www.denr.sd.gov

(INTEROFFICE)

August 29, 2018

1421-1

Ryan Brunner, Commissioner
SD School & Public Lands
500 E Capitol Ave
Pierre SD 57501

Dear Commissioner Brunner:

I am writing to acknowledge receipt of the transfer of ownership form and fee for Water Right No. 1421-1.

The ownership change has been completed. Water Right No. 1421-1 formerly held by Brohm Mining Corporation is now listed in the name of the South Dakota School & Public Lands.

Thank you for following up on the ownership change. If I can answer any questions for you, please let me know.

Sincerely,

Genny McMath
Water Rights Program
(605) 773-3352
email: genny.mcmath@state.sd.us