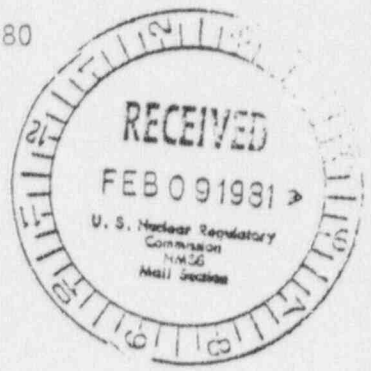
DAWN MINING COMPANY
PO BOX 25
FORD WASHINGTON 99013

June 30, 1980



Mr. Roger K. Ray
District Supervisor
Department of Ecology
East 103 Indiana
Spokane, WA 99207

Re: State Waste Discharge Permit No. 5230, and Environmental Checklist

Dear Mr. Ray:

Enclosed is an application for renewal of the Dawn Mining Company's Waste Discharge Permit No. 5230 authorizing the company to discharge its waste effluents to a tailings pond for disposal by evaporation and seepage. Also enclosed is an environmental checklist covering the proposal.

As noted in the application, some of the waste effluents discharged into the tailings pond eventually seep into a surface water, Chamokane Creek. In our view, such seepage is plainly not from a point source and therefore needs no NPDES permit under section 402 of the Federal Water Pollution Control Act and RCW 90.48.260 and WAC Chapter 173-220. It is our understanding that your Department agrees with this position. We would appreciate a letter from you confirming the Department's position as to the lack of need for Dawn to obtain an NPDES permit. If we do not hear from you, we will assume that you agree that no NPDES permit is required.

Please let me know if you have any questions about our application or environmental checklist.

Sincerely yours,

J. E. Thompson
Resident Manager

JET:jc

Enc.

cc: D. Ridinger
W.A. Humphrey
J. Bekie
File

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8103050 491

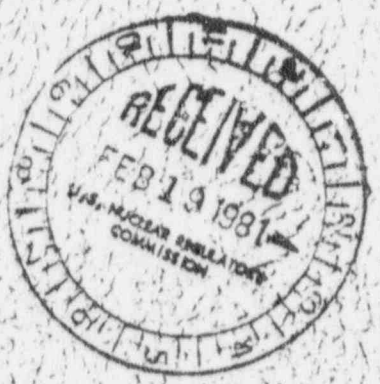
PDR

WM-33

STATE WASTE DISCHARGE PERMIT

APPLICATION

JUNE 30, 1980



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State of Washington
Department of Ecology

For Office Use Only

Date Received _____
Application/Permit No. _____
Type of Industry _____
Waterway Segment No. _____

INDUSTRIAL/COMMERCIAL WASTE DISCHARGE
PERMIT APPLICATION FORM

Application is hereby made for a permit to discharge wastewater to state waters or to a municipal sewerage system in accordance with Chapter 90.48 RCW and Chapter 372.24 WAC.

1. NAME OF FIRM Dawn Mining Company

   Type of Industry (description of industrial or commercial activity) Uranium Milling

2. MAILING ADDRESS P.O. Box 25 - Ford, WA 99013

3. PLANT LOCATION 1/2 mile S.W. of Ford, WA

   PHONE (509) 258-4511 CONTACT PERSON J. E. Thompson, Resident Manager

   EMERGENCY PHONE (nights, weekends) (509) 466-5745 or (509) 258-4511

4. TYPE OF WASTEWATER TREATMENT (if any) Impoundment behind earthen dam

5. WASTE FLOW: (Submit on separate sheet)

   Describe in detail the sources, treatment and disposal of all liquid wastes at the plant. Include a schematic flow diagram showing the sources and flow pattern of all wastes.

6. SOLID WASTE DISPOSAL: (Submit on separate sheet)

   Describe the types of solid wastes accumulated at the plant and list the source, volume, storage provision, frequency of removal, and final disposal of each solid waste. Include all sludges, dusts, scraps, trimmings and left-over, spoiled or returned products.

7. WASTEWATER DISPOSAL:

	Maximum Gallons/Day
XX Evaporation Lagoon or Pond	300,000 Tailings Solution
XX Subsurface Ground Disposal	12,000 Sanitary wastes
☐ To Surface Waterway _____ (name of waterway)	
☐ To Sanitary Sewerage System _____ (name of municipal system)	

   Location of Discharge Point(s) and/or connection to municipal sewer system: (Include latitude and longitude)

   Sec. 25, Township 28N, Range 39E W.M.

   Latitude 47° 53' 05" Longitude 117° 50' 00"

8. WATER SUPPLY:

☐ Private Well — Recorded Water Right No. _____

XX Surface Water Chamokane Creek Drainage (name of waterway) — Recorded Water Right No. 7142

☐ Public System _____ (name of system)

Location of private well or plant surface water intake:

Section 19, Township 28N, Range 40E W.M.

9. WATER SUPPLY VOLUMES:	Average Gallons/Day	Maximum Gallons/Day
Private Well		
Surface water (springs	200,000	300,000
Public System		
TOTAL	200,000	300,000

10. WASTEWATER DESCRIPTION:	Average Gallons/Day	Maximum Gallons/Day
Sanitary Wastes Septic tank	1,000 est	12,000
Process Wastewater	199,000	298,800
Cooling Water Discharge		
Other (Specify)		
TOTAL	200,000	300,000

11. EFFLUENT ANALYSIS: (Submit on separate sheet)

List the significant physical and chemical properties of the effluent(s) to be discharged, and include a description of the sampling and analytical methods used to derive this information. Include BOD, COD, suspended solids, pH, fecal coliform bacteria, heavy metals, etc.

12. DOES YOUR DISCHARGE CONTAIN ONE OR MORE OF THE FOLLOWING SUBSTANCES: cyanide, aluminum, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, zinc, phenols.

XX Yes ☐ No

13. PLANNED WASTE TREATMENT IMPROVEMENTS: (Submit on separate sheet)

Describe any additional treatment or changes in waste disposal methods in planning or under construction.

14. STORMWATER TREATMENT AND CONTROL: Name of Waterway or Storm Sewer

☒ No Treatment _____

☐ Treated Stormwater to Waterway _____

Type of Treatment: _____

☐ Contaminated Stormwater to Sanitary Sewer Type of Treatment (if any)

Size of Intercepted Area _____

_____ Square Feet

15. PLANT OPERATION:

	Days per Year	Number of Employees per Shift		
		Day	Night	Swing
Average	346	25	4	4
Maximum	363	27	5	5

16. RAW MATERIALS AND CHEMICALS USED IN PROCESSES:

Brand Name	Chemical, Scientific or Actual Name	Quantity Used per Day	
		Average	Maximum
	H_2SO_4	41 tons	65 tons
	Pebble lime	1.5 tons	2.0 tons
Separan MG 200	Poly Acrilimid (flocculant)	75 lbs	140 lbs
	NH_4OH	536 lbs	1000 lbs
	MnO_2	660 lbs	1000 lbs

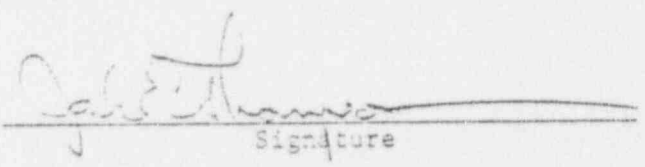
17. Are there any oil products or hazardous materials stored or used at the plant site?

☒ Yes ☐ No

If yes, give quantities and type and indicate whether a spill could reach a sewer, storm drain, or public waters.

See seperate sheet

The information given on this application is complete and accurate to the best of my knowledge.



Signature

Jack E. Thomason

Printed

Resident Manager

Title

June 30 1989

Date

5. Waste Flow

The sources, treatment and disposal of the liquid wastes at the plant is best described by detailing the entire mill process. The front end of the process, ie.crushing, is dry until the ore is fed to the grinding circuit.

Grinding

The grinding circuit at Dawn Mining Company consists of a primary and secondary mill treating approximately 550 DST per day.

New feed is sent to the primary mill from five, 300 ton fine ore bins, at approximately 75% - 5/8". Feed rate is controlled automatically by U.S. varidrive units on slide belt feeders working in conjunction with a belt scale.

The primary mill, a 7 by 5 grate type Marcy mill, is charged with 3-1/2", 3", and 2" balls, to approximately 48% of its volume. The ball mill discharge at .72 - 75% solids flows by gravity to an Esperanza type drag belt classifier. Classifier sands are returned to the primary mill through the external scoop, while the classifier overflow is sent to the cyclone feed pump.

The cyclone feed pump, a 3" by 4" Galigher centrifugal, combines the drag classifier overflow and the secondary ball mill discharge to feed a D-10 B Krebs cyclone with a hydraulically adjustable apex finder. The cyclone overflow at 95% - 28 miesh and 40% - 200 mesh is sent to the leaching circuit at 48 - 50% solids.

Cyclone underflow is discharged at about 80% solids, diluted to 70 - 74% solids and gravity fed to the secondary mill, a 5' by 4' Marcy grate discharge mill charged to 45% of its volume with 2" grinding balls. Ball mill discharge is gravity fed to the cyclone feed pump. A spare cyclone feed pump and cyclone and an automatic sampler on the cyclone overflow complete the circuit.

Ball consumption averages 1.0#/ton while liner consumption is approximately 0.3#/ton. A schematic of the circuit is included as figure No. 5.1

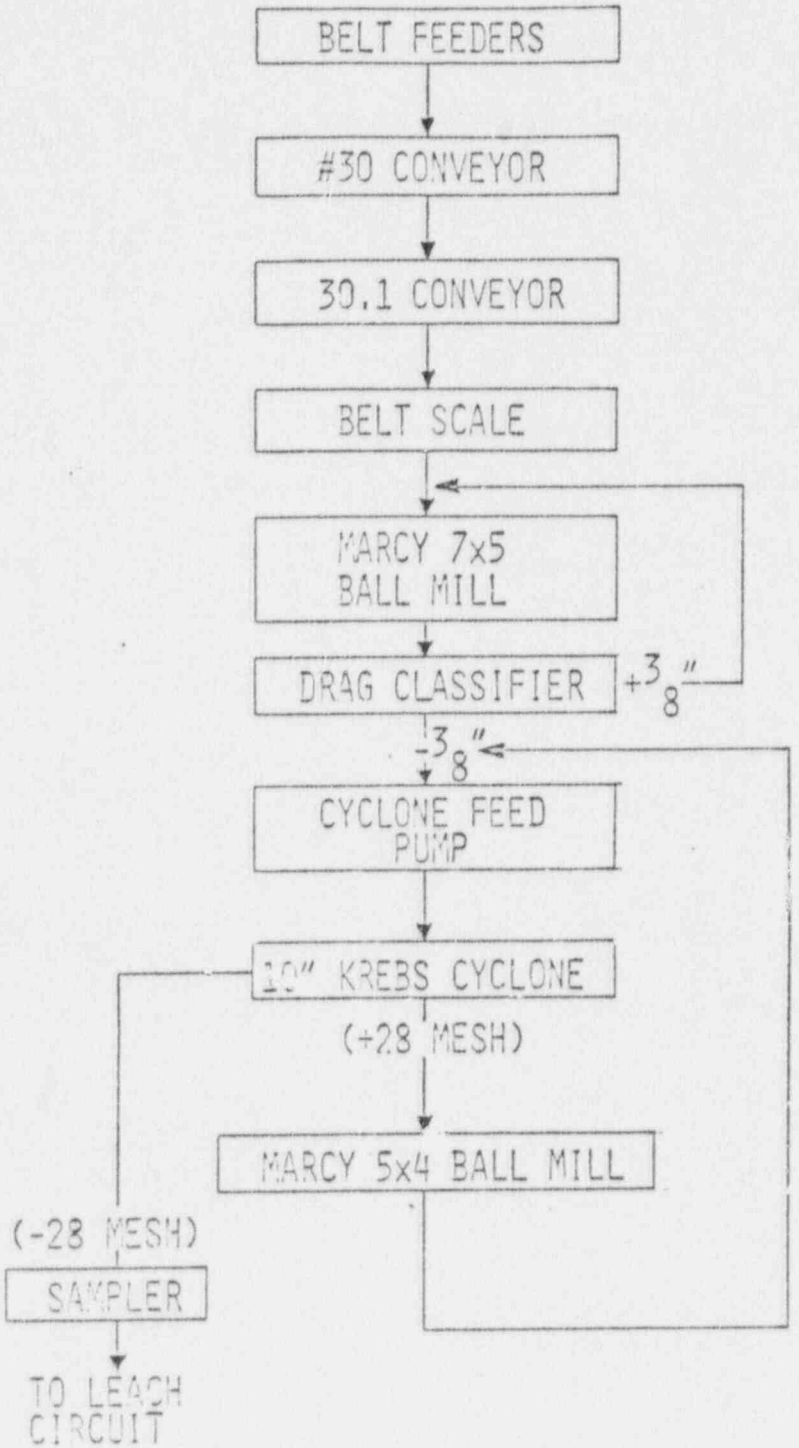
Leaching (Figure 5.2)

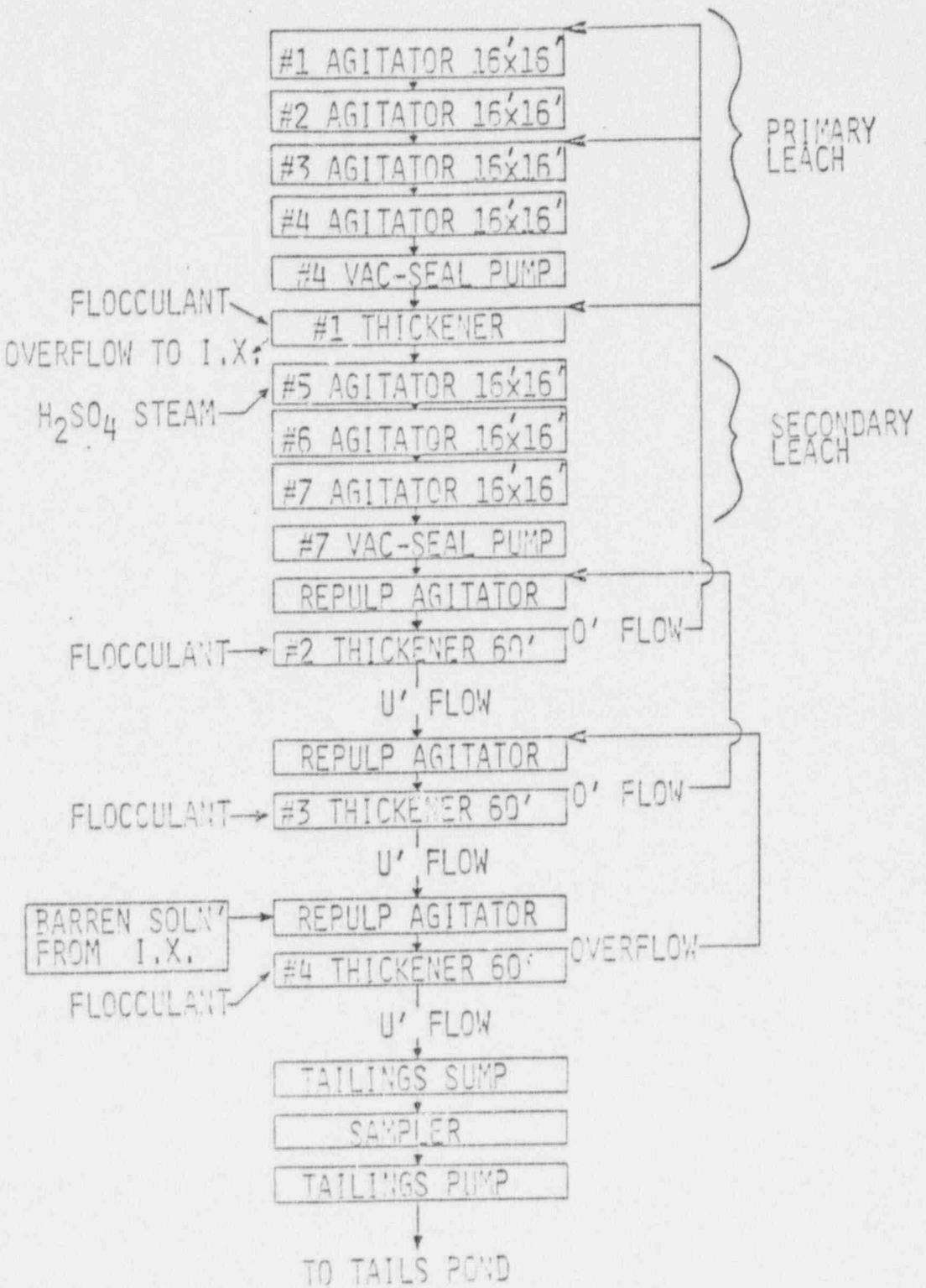
The Dawn mill is somewhat unique in that leaching is done in a two stage circuit. The primary circuit consists of 4 Deveraux agitators in series. Cyclone overflow slurry at 50% solids is treated with a portion of the No. 2 thickener overflow solution to 2.0 g/l H_2SO_4 and 1.0 g/l Fe^{+++}. Temperature is adjusted by direct steam injection to approximately 30° C. Extraction of 20 to 40% of the U_3O_8 is accomplished in this stage with 6 hours of retention time.

Number one thickener serves as an interim thickener between the two leaching stages. Overflow solution from this unit, containing 0.3 to 0.5 g/l U_3O_8 and 7 g/l H_2SO_4 is the ion exchange feed solution, while the number one thickener underflow slurry is pumped to the secondary leach at 40 - 45% solids.

H_2SO_4 in the secondary leach, and MnO_2 are added to concentrations of 17 - 20 g.l and 1.5 lb/ton respectively while temperature, again controlled by steam injection, is maintained at 38 - 40° C. Total extraction in the leach circuit is 93 - 94% with a total residence time of 4.5 hours in 3 Devereaux agitators.

GRINDING & CLASSIFICATION FIGURE 5.1




#1 AGITATOR 16'x16'
#2 AGITATOR 16'x16'
#3 AGITATOR 16'x16'
#4 AGITATOR 16'x16'
#4 VAC-SEAL PUMP
PRIMARY LEACH
FLOCCULANT
#1 THICKENER
OVERFLOW TO I.X.
#5 AGITATOR 16'x16'
H_2SO_4 STEAM
#6 AGITATOR 16'x16'
#7 AGITATOR 16'x16'
SECONDARY LEACH
#7 VAC-SEAL PUMP
REPULP AGITATOR
FLOCCULANT
#2 THICKENER 60'
O' FLOW
U' FLOW
REPULP AGITATOR
FLOCCULANT
#3 THICKENER 60'
O' FLOW
U' FLOW
BARREN SOLN' FROM I.X.
REPULP AGITATOR
FLOCCULANT
#4 THICKENER 60'
OVERFLOW
U' FLOW
TAILINGS SUMP
SAMPLER
TAILINGS PUMP
TO TAILS POND

5. Waste Flow con't.

Counter Current Decantation (Figure 5.2)

Slurry from the leach circuit is pumped to No. 2 thickener which is actually the first stage of the CCD circuit. This pulp flows counter currently to barren solution from the ion exchange. Pulp and wash solution are combined in mechanically agitated repulpers and fed to the thickeners at approximately 20% solids. Flocculant, Dow Seperan MG-200, is added to the thickener feed launders and underflow densities are maintained at approximately 50% solids by Galigher centrifugal pumps with air operated Reeves vari-drive units.

The underflow slurry from #4 thickener is repulped with fresh water and pumped to tails at 35-40% solids. Flocculant usage in the circuit averages 0.2 lb/ton of ore.

Ion-Exchange

Ion Exchange at Dawn is by the downflow, fixed bed method in a merry-go-round type circuit. Since solution clarity is quite important, a pair of anthracite bed filters precede the ion exchange circuit. These units remove any solids in suspension to a level of 5 - 20 ppm. The clarifiers are used alternately and the backwash is used as ball mill feed water.

Four beds of anionic exchange resin (350 ft^3 ea) are employed as follows. Three beds are loaded in series at flowrates of 300 - 350 gpm or 6 - 7 gal/min/ft^2. Loading continues until the first cell discharge is equal in uranium content to the pregnant solution; and the cell #2 discharge assays to 0.2 g/l U_3O_8. See figure No. 5.3.

Uranium stripping or elution is carried out with 100 g/l H_2SO_4 solution in a completely closed system, ie, all solutions are recycled. Make up water is from the U_3O_8 thickener overflow in the precipitation stage.

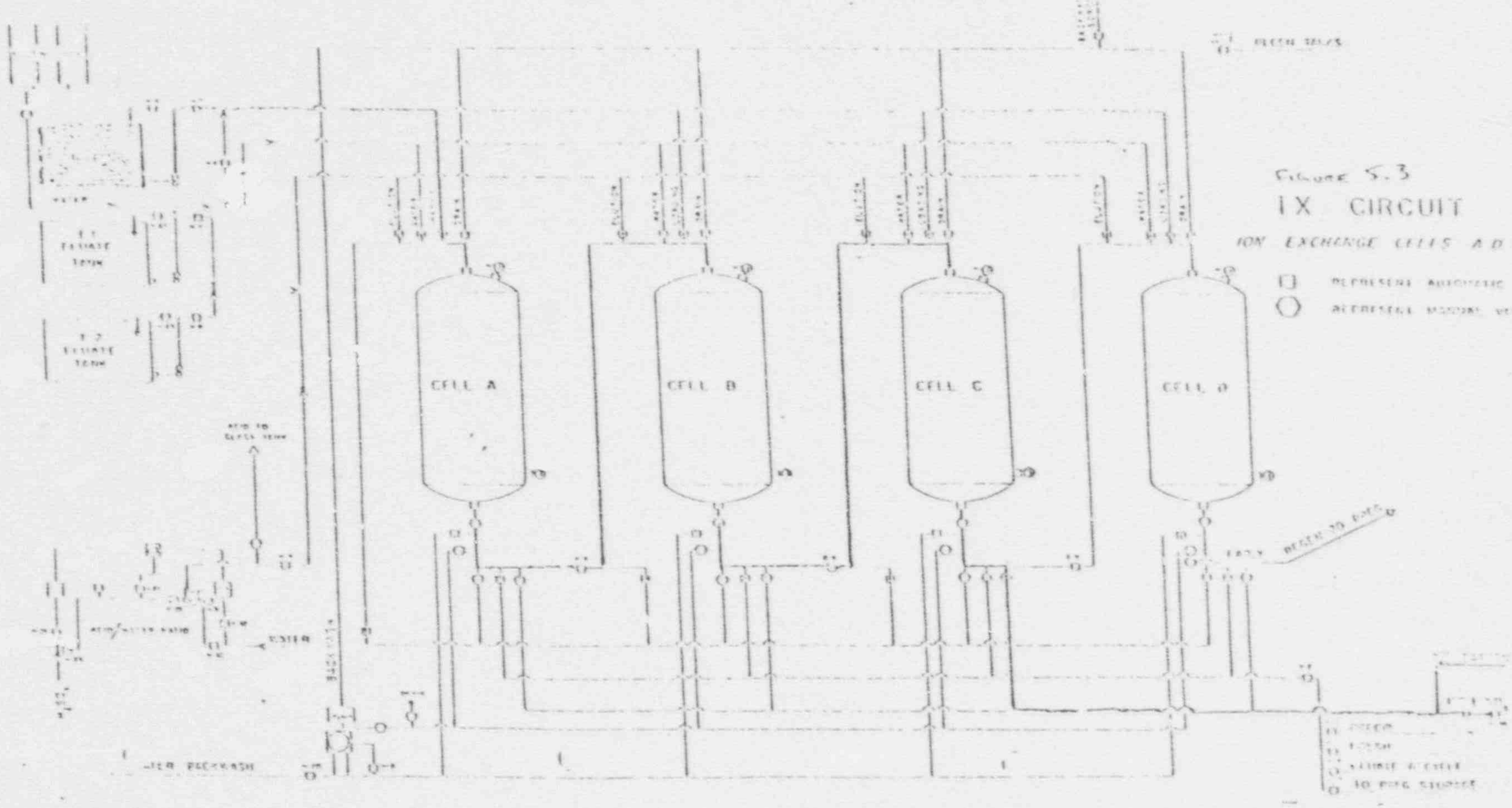


Figure 5.3

IX CIRCUIT

ION EXCHANGE CELLS A-D

[] REPRESENT AUTOMATIC VALVES

○ REPRESENT MANUAL VALVES

5. Wate Flow con't.

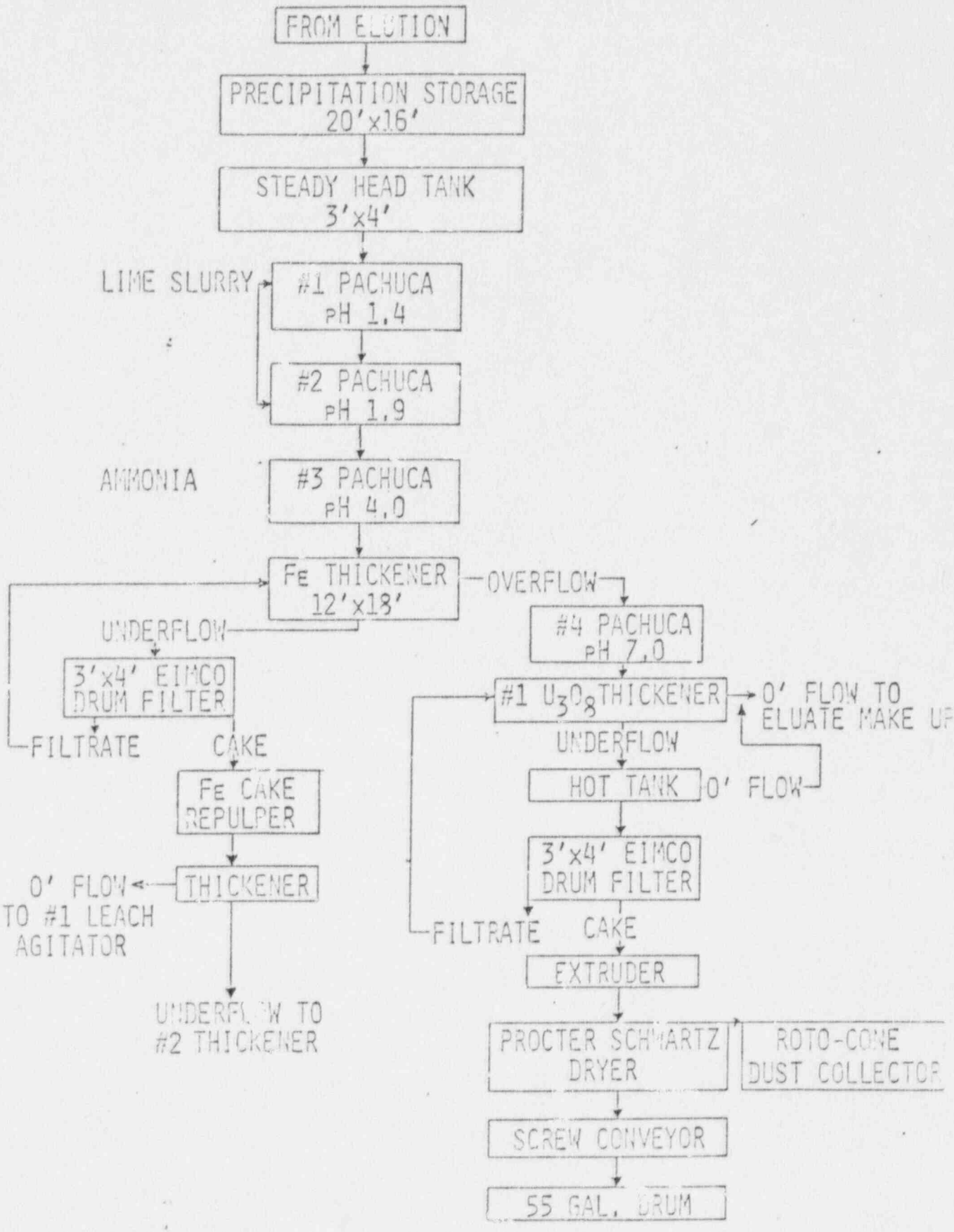
Precipitation

Concentrated eluate from the ion exchange circuit assaying 10 to 15 g/l U_3O_8 is treated in a two stage precipitation circuit. In the first stage, 2.5 - 3.5 lb lime/lb U_3O_8 are added raising the pH to 2.8. Next, gaseous ammonia is added until the pH reaches 4.0. At this point, a calcium sulfate precipitate containing iron hydroxide has formed. This precipitate, which also contains such other impurities as molybdeneum and zinc, is thickened and filtered on a Dorr-Oliver drum type vacuum filter.

The calcium sulfate filter cake is repulped with acid solution to allow dissolution of any contained uranium and of the iron. This pulp is thickened in a 12' diameter thickener. Overflow solutions are pumped to No. 1 leach agitator where they serve as a source of ferric iron. The underflow slurries are pumped to the CCD circuit and are disposed of as tailings. The filtrate and thickener overflow solutions are combined and pumped to #4 Pachuca. The uranium is precipitated as ammonium diuranate by rising the pH to 7.0 using gaseous ammonia.

The uranium precipitate is then thickened, heated to 130-140° C to facilitate crystal formation, and filtered. The filter cake is extruded through a roller-extruder and dried in a Procter-Schwartz steam heated dryer. The dried cake is then screw coveyed into 55 gallon barrels. Each drum is then weighed, sampled, and prepared for shipment. Shipment is by truck in fifty barrel lots. The precipitation circuit is exhibited in figure No. 5.4.

PRECIPITATION & DRYING Figure 5.4



6. Solid Waste Disposal

Tailings:

Dawn Mining Company's tailings are pumped at 50% solids to an earthen dam built with native sands and gravels from near by borrow pits. The slurry is dewatered by evaporation and seepage. Solid waste production is 500 D.S. Tons per day. Analysis of this waste shows it to be basically the original rock types from which the uranium was extracted i.e. finely ground shist, granite and limestone. Specifically, the significant physical and chemical properties of the solid waste are as follows:

Composition:

(80% shist unit) Principal minerals:
- -Quartz 60%
- -Muscovite 20%
- -Pyrite 5%
- -Kaolinite 5%
- -Biotite 5%
- -Chlorite 5%
- -Apatite trace

(10% granite unit) Principal minerals:
- -K-spar 34%
- -Plagioclase 31%
- -Quartz 34%
- -Botite 0.8% or less
- -Magnetite trace
- -Muscovite trace

(10% limestone unit) Principal minerals:
- -Idocrase 60%
- -Quartz 25%
- -Garnet 10%

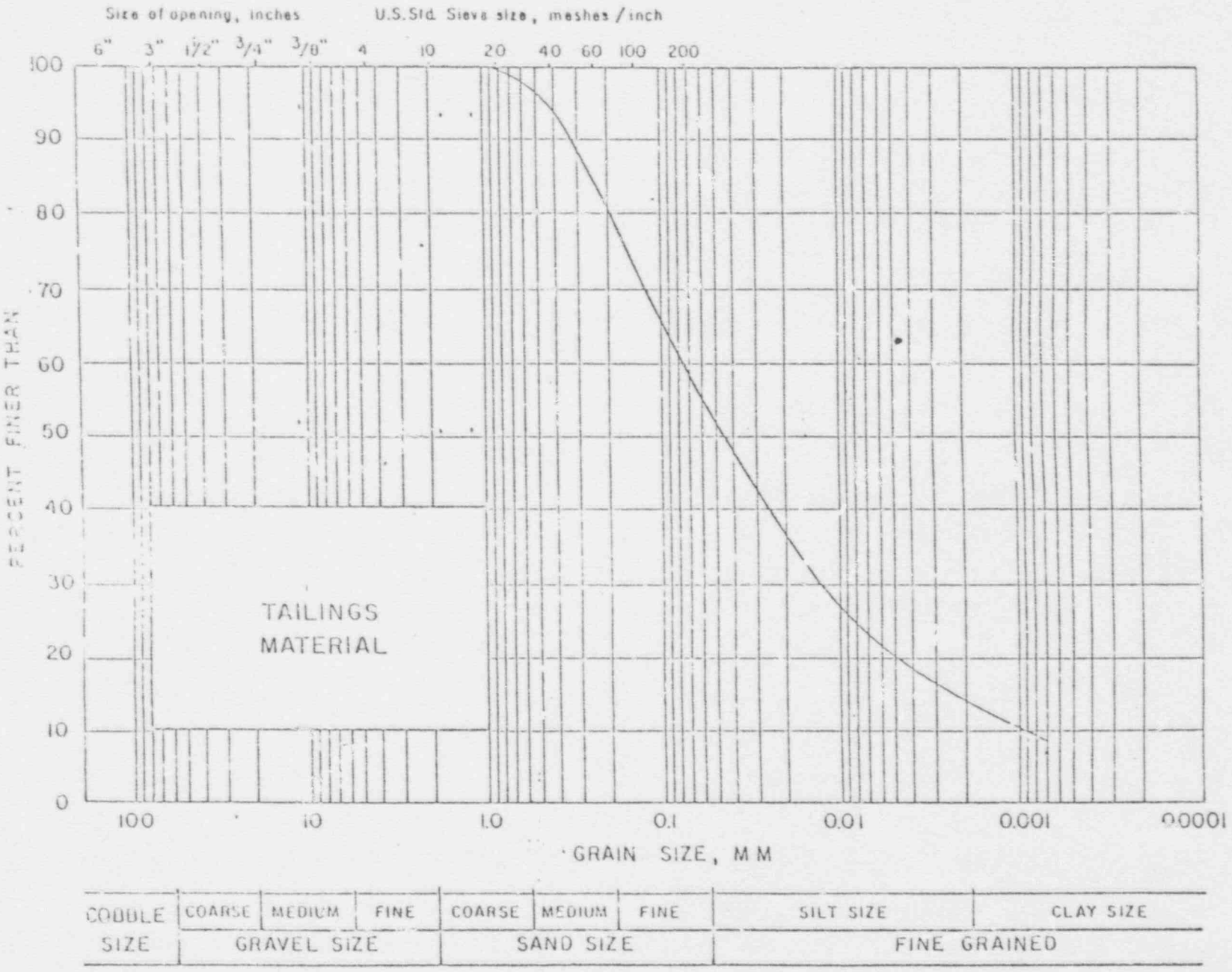
Radioactivity:

Uranium - 27 pCi/g
Radium 226 - 100 pCi/g
Thorium 230 - 100 pCi/g
Lead 210 - 200 pCi/g

Physical Properties:

Grain size distribution: see figure #6.1
Permeability: 2.2×10^{-6} cm/sec.
Moisture: 50% by weight (initial)
25-30% (after dewatering)
Bulk density @ 70% solids: 110.59 lbs/ft^3
(18.086 ft^3/ton)

M.I.T. GRAIN SIZE SCALE



GRAIN SIZE DISTRIBUTION

FIGURE 6.1

6. Solid Waste Disposal con't.

The earthen dam impounding the solid wastes is the final disposal site for the material. Dawn has committed itself to a full stabilization and reclamation plan for the site. This reclamation plan is identical to the one recommended by the NRC. The proposed program is as follows:

1. The tailings will be allowed to dewater for a period of 1-3 years to allow heavy equipment to work on the tailings surface. Interim dust control measures will be taken to control wind dispersion on tailings.

2. Tailings surface will be graded to enhance drainage.

3. A layer of clay 2 feet thick will be placed and compacted over the tailings surface.

4. An additional layer of fill 8 feet thick will be placed overlaying the clay.

5. No topsoil will be added to this cover since the area surrounding the project site has a minimal natural "A" horizon soil development.

6. The cover over the tailings will be graded and contoured so as to eliminate the possibility of ponding rainfall over the area. In addition the out-slopes of the pile will be reduced to a slope of 5 horizontal to 1 vertical by the addition of fill material.

7. The entire area will be seeded and fertilized to stabilize the cover. Natural re-forestation will ensue fairly rapidly as evidenced by 20 foot plus trees presently growing on the abandoned tailings berm around areas #1 and 2.

8. The revegetation effort will be monitored for success and remedial measures will be taken to insure coverage of the area.

In addition Dawn will post a bond to cover the cost of Reclamation. Dawn has also agreed to transfer title of the tailings area to the state upon permanent closure of the operation.

6. Solid Waste Disposal con't.

Scrap:

Used processed vessels removed from the mill are monitored for radioactivity. If none is found, the scrap is allowed to accumulate and is sold periodically to a scrap dealer. If readioactivity is encountered the material is placed inside a fenced area approved by the Radiation Control Branch of the D.S.H.S. and monitored on a regular basis. In 20 years of operation only 20 items have been placed in this "Hot" storage. Final dispostion depends on the D.S.H.S.. They will be either buried in the tailings pond or shipped to Hanford, WA for permanent storage.

Sewage:

Sanitary sewage is disposed of in one of two septic tanks and drainfields complying with Stevens County requirements.

Other:

All other solid waste, ie paper, bags, rags, scrap wood, etc. is disposed of in a small landfill directly adjacent to the Dawn tailings pond. In twenty years of operation only a volume of 7,000 cubic yards has been generated. The land fill will buried much the same as the tailings at the end of plant operations.

11. Effluent Analysis

In this application Dawn seeks renewal of its waste discharge permit authorizing it to discharge its tailings solution through a pipe to a tailings pond for disposal by evaporation and seepage. The significant physical and chemical properties of the tailings effluents so discharged to the pond are as follows:

Parameter	Average Concentration
Non Radionuclides: (readings in mg/l)	
As	.95
Zn	15.5
Cu	1.91
U	16.4
NH_3	138
pH	1.82
Se	<.01
Na	62.5
TDS	25356
SO_4	21875
NO_3	543.7
Mo	.185
Pb	1.09
Ca	101.5
Co	3.55
Ni	5.05
Cd	.102
Cr	5.7
Ag	.045
Fe	1966.7
Hg	<.0002
V	2.785
Cl	101.3
Si	1110
Mg	117.5
PO_4	.02
$CaCO_3$	25
Mn	301.3
Al	820
Ba	.04
F	.11
NO_2	<.01

11. Effluent Analysis con't.

Parameter	Average Concentration
Radionuclides: (readings in pCi/l)	
U^{234}	9800
U^{235}	380
U^{238}	9600
Po^{210}	1800
Th^{230}	125850 ± 60000
Ra^{226} (Diss)	260 ± 80
Ra^{226} (Total)	300 ± 85
Pb^{210}	15333 ± 1000
Gross Alpha	9800

11. Effluent Analysis con't.

The wastewaters discharged into the tailings pond eventually seep into Chamokane Creek. Through complex geochemical and retardation reactions in the underlying soils, most of the contaminants are removed from the waters. Thus, the seepage waters have the following physical and chemical properties:

	Parameter	Average Concentration
Non Radionuclides:	(Readings in mg/l)	
	TSS	22
	COD	25.7
	As	.003
	Zn	.046
	Cu	.023
	U	.085
	NH_3	.112
	pH	7.29
	Se	.005
	Na	51.3
	TDS	3176
	SO_4	1679
	NO_3	31.9
	MO	.004
	Pb	.052
	Ca	170
	CO	.02
	Ni	.01
	Cd	.009
	Cr	.045
	Ag	.005
	Fe	213
	Hg	$<$.0002
	V	.1
	Cl	7.56
	Si	.025
	Mg	290
	PO_4	$<$.001
	$CaCO_3$	672.7
	Mn	1.20
	Al	1.17
	HCO_3	1150
	NO_2	.068

11. Effluent Analysis con't.

Parameter	Average Concentration
Radionuclides: (Readings in pCi/l)	
U^{234}	25 ± 3
U^{235}	.85 ± .2
U^{238}	26 ± 3
Po^{210}	.08 ± .2
Th^{230}	.08 ± .1
Ra^{226} (Diss)	.12 ± .1
Ra^{226} (Total(	.37 ± .13
Pb^{210}	.18 ± .5

Sampling and analytical methods used to derive the above information conform to U.S. Nuclear Regulatory Commission Regulatory Guide 4.14 (Revesion 1, April, 1980) and recent E.P.A. proposed analytic methods (12/4/79 Federal Register).

Special efforts have been made to ensure that representative samples are obtained from the monitoring program. Only quality, proven equipment is used, ie Eberline, Calibrated Instruments Inc., United Testing, etc. Tailings samples are taken with a continuous automatic sampler and composited for a month. Water samples where required are filtered through a .45 micron membrane and the filtrate presereved with 1% hydrocloric acid. The lower limits of detection for analysis are as per N.R.C. Regulatory Guide 4.14. Random error for radionuclide anylyses is always reported with the results. Most of Dawn Mining Company's analyses are done by reputable companies such as Eberline, L.F.E., Hazen, etc. An ongoing quality assurance program based on N.R.C. Regulatory Guide 4.15 in in effect.

13. Planned Waste Treatment Improvements

Substantial improvements are planned in waste treatment methods. The most important is the contruction of a new tailings disposal area. This new facility will incorporate the latest requirements as set by the Nuclear Regulatory Commission i.e., subgrade and fully lined. A more detailed description of the proposal is as follows:

A. Impoundment Structure

A new tailings disposal area will be developed for subgrade disposal of future tailings. A pit will be excavated immediately to the south of the present tailings dams. (Figure 13.1). The surface area at natural ground level will be 1,224,800 square feet (28.12 acres). The structure would be 65 feet deep, below grade, with inslopes at 1 vertical on 3 horizontal. Some of the excavated materials will be used to construct a 35-foot high dike/stockpile around the new structure, and the remainder will be strategically stockpiled around the periphery of the existing impoundment. The stockpiled material will later be used to cap the entire disposal facility after final termination of milling operations. (Figure 13.2).

The total volume available for tailings storage to ground level will be 1.6 million cubic yards, which is adequate for approximately ten years of mill production at the present rate of 160,000 tons per year. The five vertical foot lined area above ground level may be used for temporary solution storage during the final stages of pond life.

The excavation will principaly encounter the sands and gravels. It is possible that the surface of the deeply weathered basalt may be encountered in the western most part of the pit floor.

Where the proposed excavation adjoins the existing dike impoundment, a fifty foot wide bench will be preserved at the downstream toe of the dike to assure structural integrity of the dam foundation while pit excavation is underway.

Pit inslopes will be maintained at 3 horizontal on 1 vertical. If sharp or irregular geologic units are encountered by the excavation, they will be blanketed with fine sands to provide a smooth base for liner installation.

Ingress and egress ramps for the excavation work will be located at the northern and eastern extremes of the pit area.

The five foot, membrane liner portion of the above ground dike mentioned previously may be used for solution storage when the pit is nearly full. A typical section of the overall dike/stockpile is shown in Figure 13.3. Material to be used for dike construction will be taken from the upper layer of sands and gravels from which all previous dikes have been constructed at Dawn. Maximum rock dimension is less than 4 inches. Each lift during construction will be 12" thick and will be compacted by use of a minimum 25,000 pound viratory compactor. This will allow compaction levels in excess of Department of Ecology requirements. Moisture content will be maintained so as to insure proper compaction. The original safety berm and dam construction

A. Impoundment Structure Con't.

removed most of the topsoil from the area; what remains will be excavated. The foundation material is identical to embankment fill material, eliminating the need for any base preparation other than scoring the surface. The previous dams constructed at the site have shown good bonding between embankment and foundations. The upstream side of the dike will be lined by the same method as the subgrade portion of the tailings impoundment. Residual freeboard will be maintained greatly in excess of 5 feet. Side slopes on the dike will be 2h:1v upstream and 2h:1v down stream. Top width will be 30 to 35 feet, double the Department of Ecology requirement of 15 feet for this height of dam.

It should be noted that the upper portion of this dike is basically a reclamation material stockpile, under no foreseen circumstances to be used as an impoundment dike beyond a level five feet above ground surface. As described below, this portion will be lined and utilized only for temporary solution storage.

B. Tailings Pond Liner

The entire pit floor and side slope surface will be lined with a fabric reinforced 30-mil synthetic rubber (Hypalon) liner. The liner membrane will be carried up the dike inslope to a level five vertical feet above the original ground surface elevation in order to permit the lower part of above-grade area to be utilized for solution storage during the final stages of pond life.

A one foot thick cover layer of stabilized sand will be placed over the membrane to prevent aerodynamic wind billowing and to shield the membrane from ultraviolet rays for longer life. Membrane anchorage will be achieved by means of peripheral trench burial in accordance with recommended practice.

C. Underdrain System

Since the proposed facility will be fully lined, normal dewatering by means of seepage into the substrate is precluded. It is therefore necessary to provide a system capable of aiding in the dry-out phase of reclamation and long-term stabilization.

Engineering studies are still in progress to determine the optimum configuration for the drainage duct system. Generally, the system envisioned would include an underdrain of French or pip drains feeding into a combined French/perforated PVC pipe collection sump where solutions can be pumped to the surface for disposal by evaporation. It will likely be necessary to cover the drain system with a sand filter or polyester filter fabric to prevent clogging of the drainage ducts with tailings fines.

D. Process Water

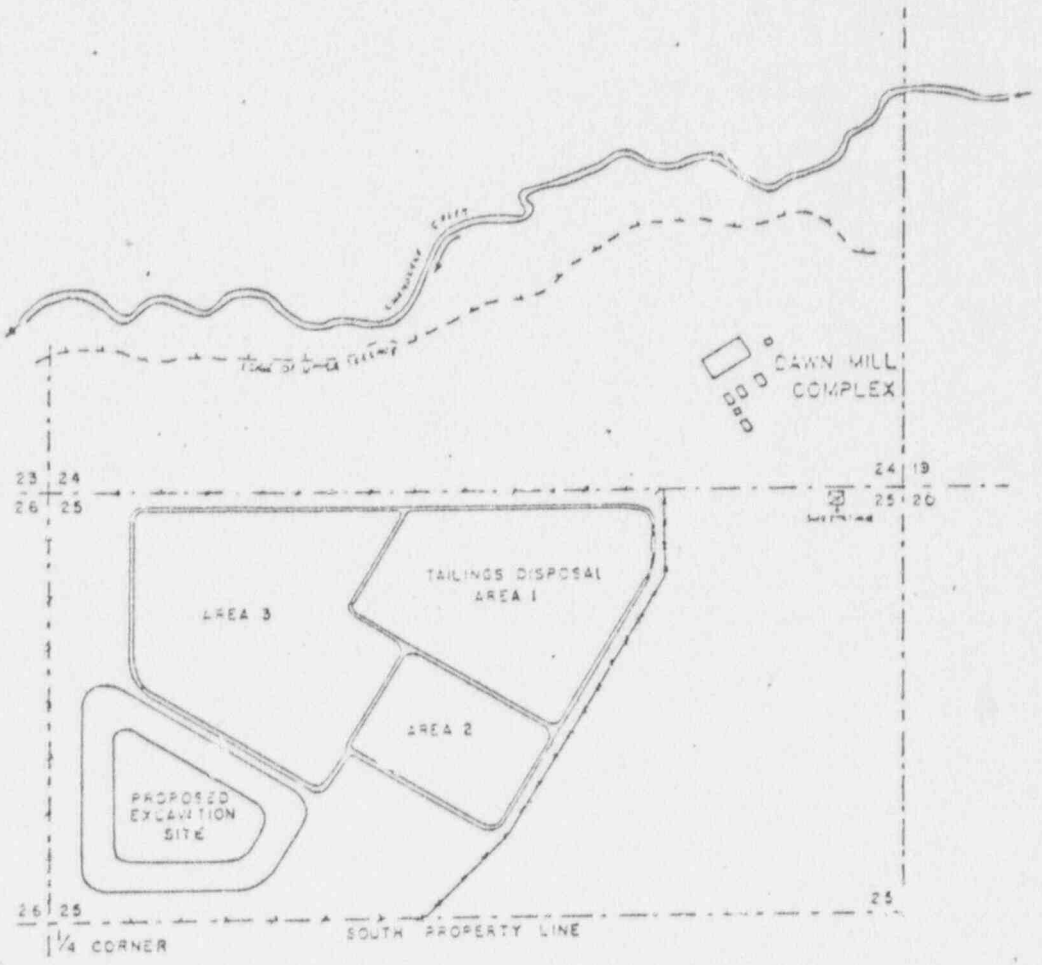
Elimination of seepage from the tailings pond area by use of the new lined disposal area will result in a solution disposal problem. If some means of handling the excess solution is not developed, the pond area will fill up to the freeboard limit long before the full life of the pond is reached.

Due to the pressing need to develop a new tailings disposal area, Dawn has concentrated its engineering and design work on the actual pond excavation, etc. As soon as personnel are available, attention will then turn to process water management. It will be three years before the solution build up in the pond will become critical. Present methods being examined for managing the process water problem are:

1. Solution recycle to mill
2. Treating solution for discharge
3. Spray evaporation ponds
4. Dry tailings deposition
5. Other

Final design of the process water management facility will be submitted for approval to the D.S.H.S. and D.O.E. on a timely basis.

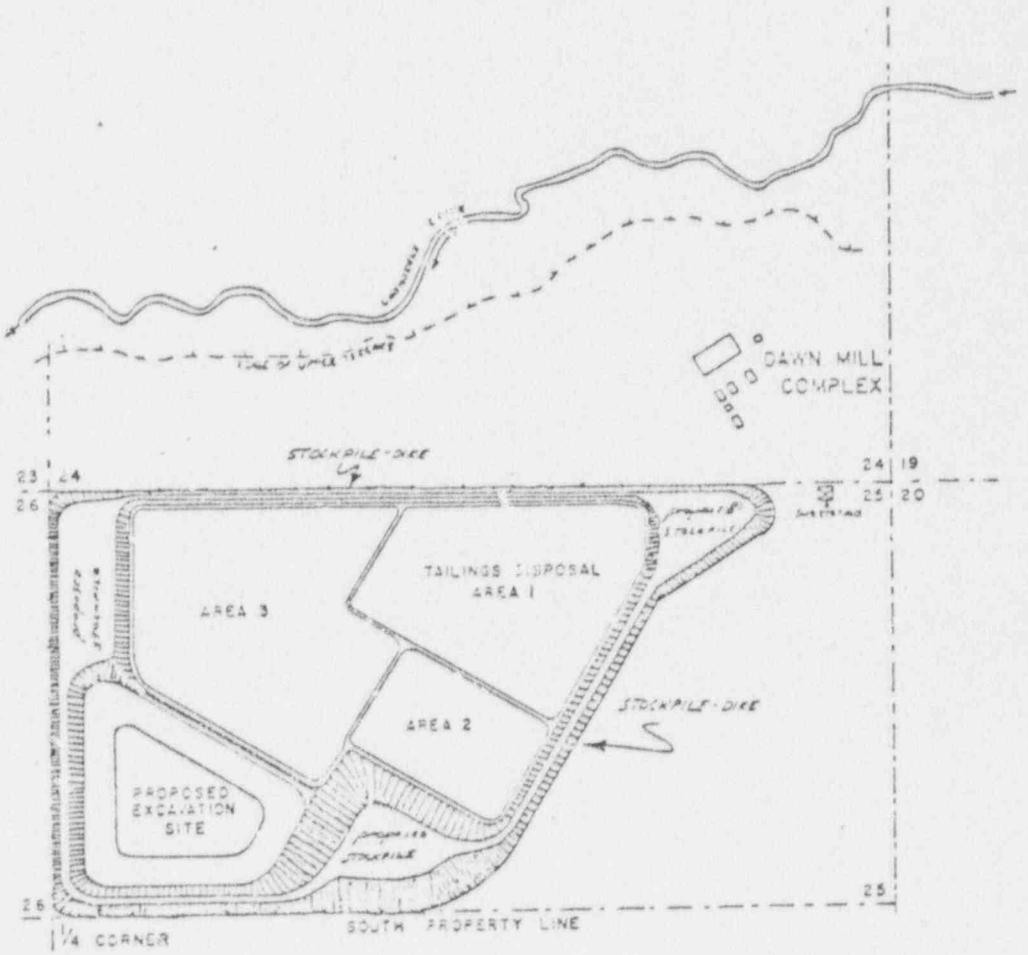
Figure 13.1



PLAN MAP
DAWN MINING COMPANY
MILL & TAILINGS POND AREA
FORD, WA.

1" = 1200'

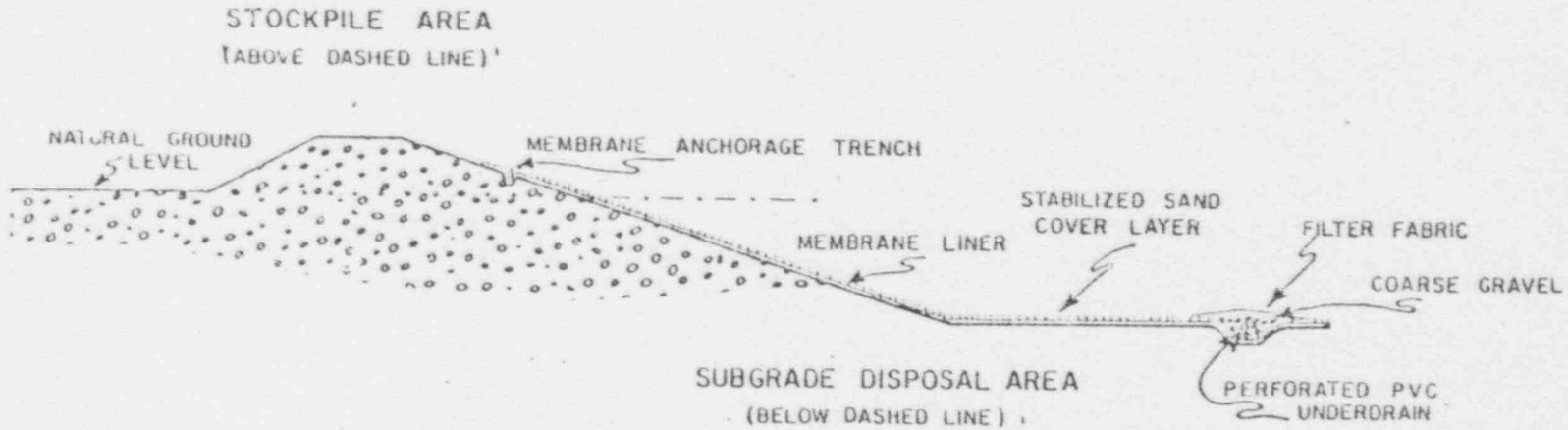
FIGURE 13.2



PLAN MAP
OF
PROPOSED PERIPHERAL RECLAMATION STOCKPILES
MILL & TAILINGS POND AREA

1" = 1200'

DIKE/STOCKPILE & SUBGRADE DISPOSAL FACILITY



ENGINEERING SECTION

Figure 13.3

17. Oil Products or Hazardous Materials

Items falling into this category include gasoline, diesel oil, fuel oil, and sulfuric acid. These items are stored in steel tanks of various capacities at three general locations in the mill yard. (See figure 17.1). All of the above products are delivered in tanker trucks and unloaded by the drivers. Constant attention by the drivers during unloading minimizes the likelyhood of spills. In addition, all tanks are equipped with sight gauges which will also restrict the possiblity of spills.

HISTORY

Dawn Mining Company has been operating steadily since September, 1956, except for the period from August, 1966 to January, 1970. No major spills have occurred on the property since that time.

POTENTIAL SPILLS

1. The sulfuric acid tanks are located approximately 120 feet west of the mill building at ground level. These have capacity for 113,000 gallons when full. However, maximum on hand at any time is 85,000 gallons.

2. The #6 fuel oil and #2 diesel tanks are located south of the mill building and have maximum capacities of 110,000 gallons and 16,000 gallons respectively.

3. The gasoline storage tanks are underground and thus do not present a spill danger.

PREVENTION AND CONTROL

The berms surrounding the #6 fuel oil and #2 diesel oil tanks would act both as collision protection and as a containment for spills. (See figure 17.1).

Dawn plans to build in the near future a partial berm to the northwest side of the tanks together with a system of runoff ditches and an emergency pond would both contain spills and provide protection from possible vehicular collision. (See figure 17.2).

In the unlikely event that a major uncontained spill should occur, the shift foreman will make every effort to control the spill with equipment and material on hand. He will immediately notify both the mill and maintenance superintendents and advise them of the spill. They will then obtain all required manpower, equipment and material required to control the spill. The mill superintendent will notify the general manager.

Since Chamokane Creek is 1,250 feet from any storage facility, it is extremely unlikely that a spill could reach the creek. This is especially true because the ground in the area is porous gravel to a depth of 60 to 80 feet. However, should a spill reach the creek, the State of Washington, Department of Ecology, Eastern Regional office, E. 103 Indiana Street, Spokane, Washington Ph (509) 456-2926, will be notified immediately.

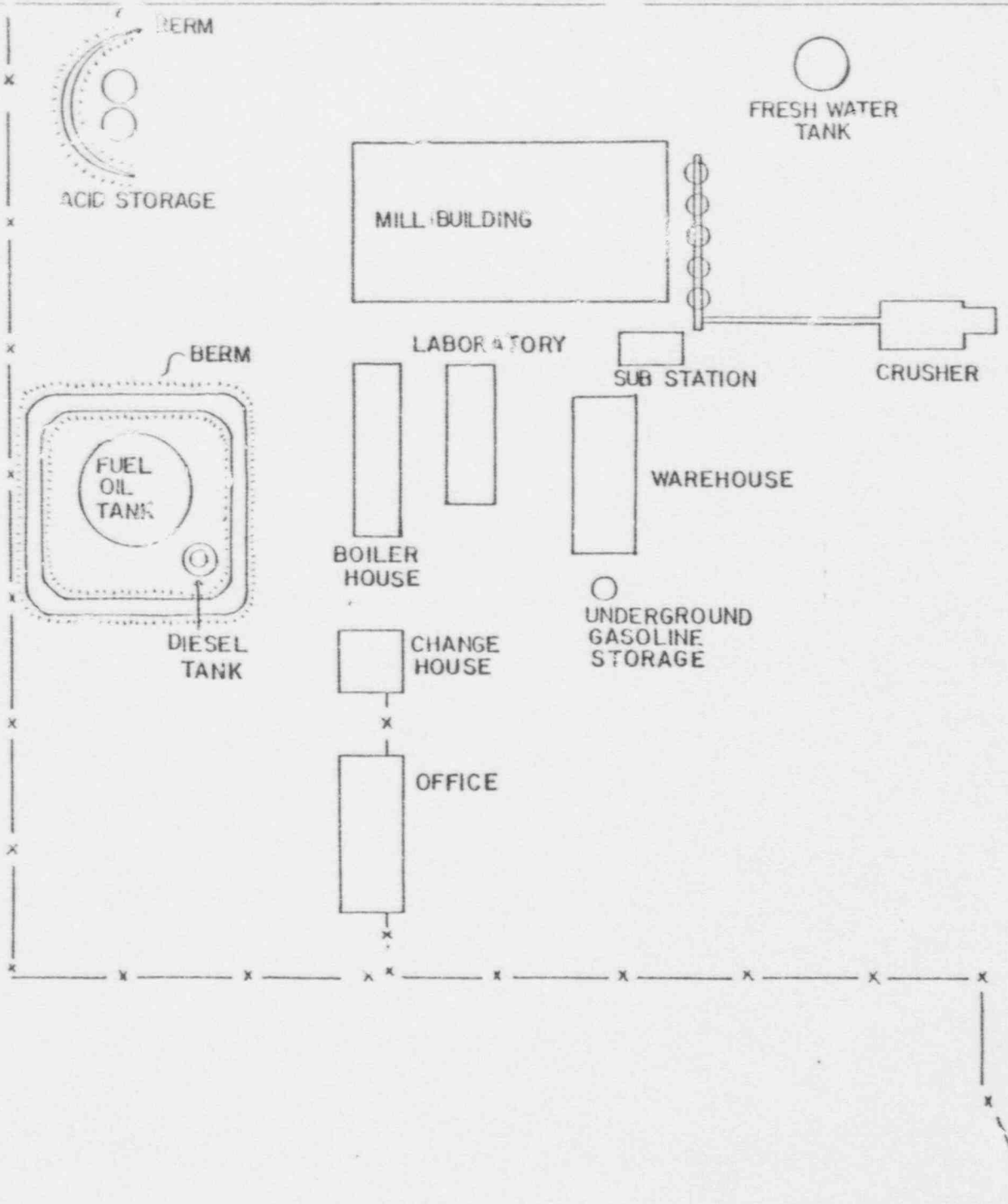


FIGURE 17.1
DAWN MINING COMPANY
LIQUID STORAGE LOCATIONS
24 JUNE 1980

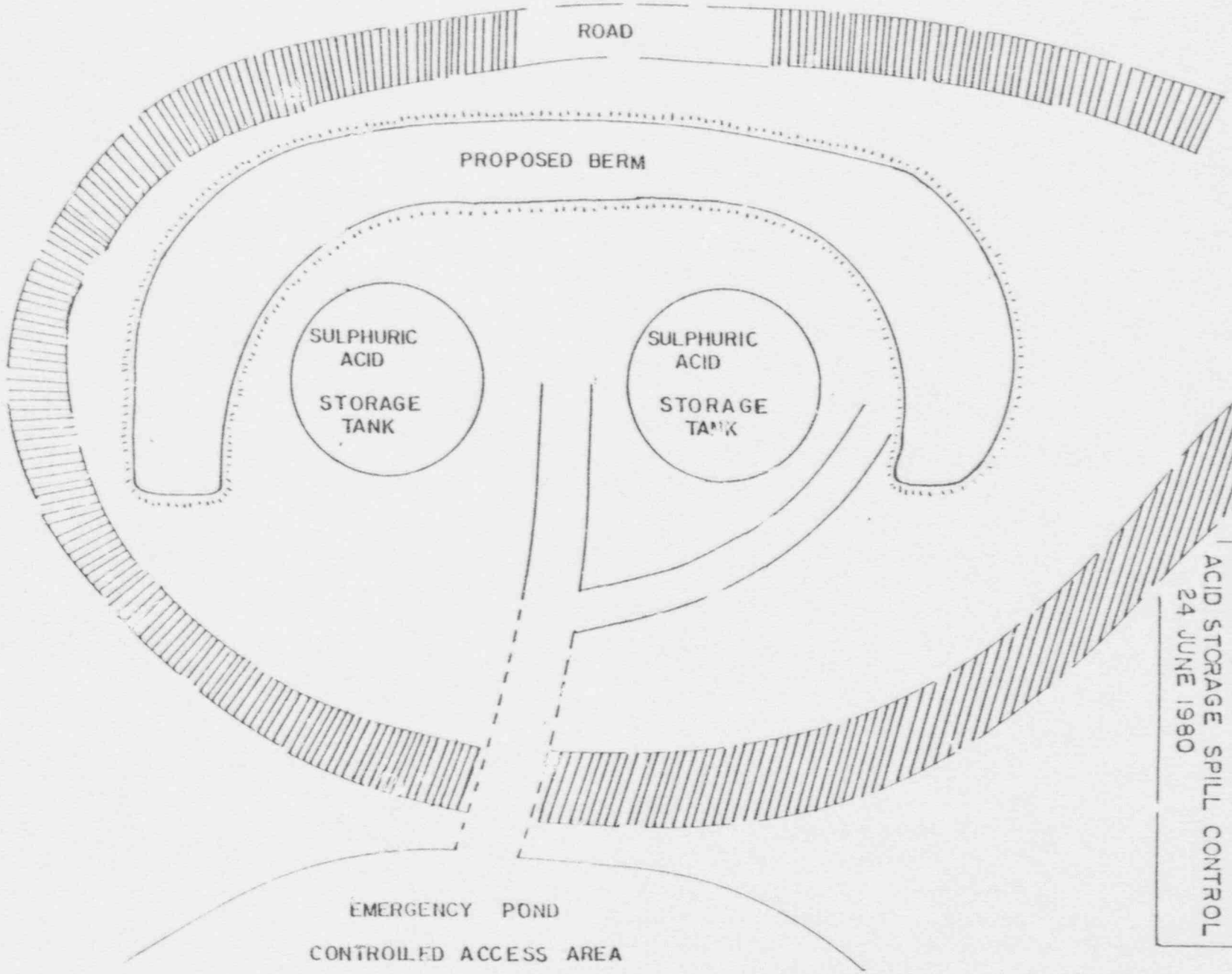


FIGURE 17.2
DAWN MINING COMPANY
ACID STORAGE SPILL CONTROL
24 JUNE 1980

17. Oil Products or Hazardous Materials con't.

It is also unlikely that any spill would reach the groundwater table which is 60 to 80 feet below the surface . The amound of diesel stored on site is too small to be of much significance and would probably be absorbed by the soils before reaching the water table. Fuel oil is too viscous to infiltrate into the ground. The acid would be neutralized by the natural buffering capabilities of the soils in the area. This fact is evident when one compares the pH of the tailings solution (1.6) and that of the groundwaters sampled immediately adjacent to the tailings pond (8.03).

MANPOWER, EQUIPMENT AND MATERIALS

The Dawn mill is operated on a three shift basis by three operators and a shift foreman per crew. On dayshift, a total of 12 workers and 3 supervisors are on the property. During the evening and night shifts employees from the off shifts, many of whom live nearby, can be called in if necessary. Two dozers and a loader are available for spill control if required. Absorbents such as gravel, tailings and wood chips used for tailings dust control are all available in large quantities if needed.

In the extremly unlikely event that a spill should reach Chamokane Creek the wood chips should be effective as an absorbent.

ENVIRONMENTAL CHECKLIST

I. BACKGROUND

1. Name of Proponent: Dawn Mining Company
2. Address: P.O. Box 25
   Ford, WA Phone (509) 258-4511
3. Date Checklist Submitted:
4. Agency Requiring Checklist: Department of Ecology
5. Name of Proposal, if applicable: Waste discharge permit renewal
6. Nature and Brief Description of the Proposal (including but not limited to its size, general design elements, and other factors that will give an accurate understanding of its scope and nature): The renewal of the Company's waste discharge permit No. 5230 which authorizes the company to discharge its waste effluents to a lagoon for disposal by evaporation and seepage.
7. Location of Proposal (describe the physical setting of the proposal, as well as the extent of the land area affected by any environmental impacts, including any other information needed to give an accurate understanding of the environmental setting of the proposal): See attached comments.
8. Estimated Date for Completion of the Proposal: November 7, 1980
9. List all Permits, Licenses or Government Approvals Required for the Proposal (federal, state and local--including rezones):
   Radioactive Material License WN-1043-2 (D.S.H.S.)
10. Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal? If yes, explain: As described in the permit application form Section 13, a new lined subgrade disposal area is being planned.
11. Do you know of any plans by others which may affect the property covered by your proposal? If yes, explain: No
12. Attach any other application form that has been completed regarding the proposal; if none has been completed, but is expected to be filed at some future date, describe the nature of such application form: Attached are the license renewal application and accompaning environmental report required for the Radioactive Materials License Renewal

II. ENVIRONMENTAL IMPACTS (Explanations of all "yes" and "maybe" answers are required)

	Yes	Maybe	No
1. Earth. Will the proposal result in:			
a. Unstable earth conditions or in changes in geologic substructures?	☐	☐	☒
b. Disruptions, displacements, compaction or overcovering of the soil?	☐	☐	☒
c. Change in topography or ground surface relief features?	☒	☐	☐
d. The destruction, covering or modification of any unique geologic or physical features?	☐	☐	☒
e. Any increase in wind or water erosion of soils, either on or off the site?	☐	☐	☒
f. Changes in deposition or erosion of beach sands, or changes in siltation, deposition or erosion which may modify the channel of a river or stream or the bed of the ocean or any bay, inlet or lake?	☐	☐	☒

Explanation: The continued addition of tailings and the construction of the new tailings pond will modify the topography in the project area.

2. Air. Will the proposal result in:			
a. Air emissions or deterioration of ambient air quality?	☐	☐	☒
b. The creation of objectionable odors?	☐	☐	☒
c. Alteration of air movement, moisture or temperature, or any change in climate, either locally or regionally?	☐	☐	☒

Explanation: _____

3. Water. Will the proposal result in:			
a. Changes in currents, or the course or direction of water movements, in either marine or fresh waters?	☐	☐	☒
b. Changes in absorption rates, drainage patterns, or the rate and amount of surface water runoff?	☐	☐	☒
c. Alterations to the course or flow of flood waters?	☐	☐	☒
d. Change in the amount of surface water in any water body:	☐	☐	☒
e. Discharge into surface waters, or in any alteration of surface water quality, including but not limited to temperature, dissolved oxygen or turbidity?	☒	☐	☐
f. Alteration of the direction or rate of flow of ground waters?	☒	☐	☐

Environmental Checklist

(I) 7. The point of discharge is within Section 25, Township 28N, Range 39 E, W.M. The tailings disposal area encompasses 150 acres near Ford, WA, about 25 miles northwest of Spokane. The site is located on Walkers Prairie, a northeast trending valley about 2 miles wide and 15 miles long. It is bordered along the northwest by rimrock cliffs of plateau basalts and along the southeast by rounded granitic hills. A few erosional remnants of basalt veneer the flanks of the granitic terrain. The valley floor is a flat plain cut by the meandering channel of Chamokane Creek. At the project site, valley floor elevations range from 1740 to 1760 above sea level, while Chamokane Creek has incised its channel to an elevation about 100 feet below the Dawn mill level.

	Yes	Maybe	No
g. Change in the quantity of ground waters, either through direct additions or withdrawals, or through interception of an aquifer by cuts or excavations?	☒	☐	☐
h. Deterioration in ground water quality, either through direct injection, or through the seepage of leachate, phosphates, detergents, waterborne virus or bacteria, or other substances into the ground waters?	☒	☐	☐
i. Reduction in the amount of water otherwise available for public water supplies?	☐	☐	☒

Explanation: See attached comments

4. Flora. Will the proposal result in:

a. Change in the diversity of species, or numbers of any species of flora (including trees, shrubs, grass, crops, microflora and aquatic plants)?	☐	☐	☒
b. Reduction of the numbers of any unique, rare or endangered species of flora?	☐	☐	☒
c. Introduction of new species of flora into an area, or in a barrier to the normal replenishment of existing species?	☐	☐	☒
d. Reduction in acreage of any agricultural crop?	☐	☐	☒

Explanation:

5. Fauna. Will the proposal result in:

a. Changes in the diversity of species, or numbers of any species of fauna (birds, land anumals including reptiles, fish and shellfish, benthic organisms, insects or microfauna)?	☐	☐	☒
b. Reduction of the numbers of any unique, rare or endangered species of fauna?	☐	☐	☒
c. Introduction of new species of fauna into an area, or result in a barrier to the migration or movement of fauna?	☐	☐	☒
d. Deterioration to existing fish or wildlife habitat?	☐	☐	☒

Explanation:

6. Noise. Will the proposal increase existing noise levels? ☐ ☐ ☒

Explanation:

	Yes	Maybe	No
7. Light and Glare. Will the proposal produce new light or glare?	☐	☐	☒

Explanation: _____

_____

8. Land Use. Will the proposal result in the alteration of the present or planned land use of an area? ☐ ☐ ☒

Explanation: _____

_____

9. Natural Resources. Will the proposal result in:

a. Increase in the rate of use of any natural resources? ☐ ☐ ☒

b. Depletion of any nonrenewable natural resource? ☐ ☐ ☒

Explanation: _____

_____

10. Risk of Upset. Does the proposal involve a risk of an explosion or the release of hazardous substances (including, but not limited to, oil, pesticides, chemicals or radiation) in the event of an accident or upset condition? ☐ ☒ ☐

Explanation: Any tailings impoundment must involve some element of risk, in this instance no new risk would be introduced. A recent inspection by the Army Corps of Engineers has declared the impoundment stable.

11. Population. Will the proposal alter the location, distribution, density, or growth rate of the human population of an area? ☐ ☐ ☒

Explanation: _____

_____

12. Housing. Will the proposal affect existing housing, or create a demand for additional housing? ☐ ☐ ☒

Explanation: _____

_____

13. Transportation/Circulation. Will the proposal result in:

a. Generation of additional vehicular movement? ☐ ☐ ☒

b. Effects on existing parking facilities, or demand for new parking? ☐ ☐ ☒

c. Impact upon existing transportation systems? ☐ ☐ ☒

d. Alterations to present patterns of circulation or movement of people and/or goods? ☐ ☐ ☒

e. Alterations to waterborne, rail or air traffic? ☐ ☐ ☒

f. Increase in traffic hazards to motor vehicles, bicyclists or pedestrians? ☐ ☐ ☒

Explanation: _____

_____

(II) 3.e) The wastewaters discharged into the tailings pond eventually seep (through the ground and ground water regime) into Chamokane Creek. Through complex geochemical and retardation reactions in the underlying soils most of the contaminants are removed from the waters. This striking sorptive capacity of the soils is illustrated in Section 11 of Dawn's application for renewal of its waste discharge permit.

Changes can be observed in the water quality of Chamokane Creek, but the seepage does not appear to result in deterioration of the water quality of the Creek below accepted standards as reflected in the Washington Water Quality Standards and E.P.A.'s Drinking Water Regulations. The Washington Water Quality Standards, which apply to surface waters of the State, provide, in pertinent part, that deleterious concentrations of radioactive materials shall not exceed 1/100 of the values listed in W.A.C. 402-24-220 (table II, column 2) or the E.P.A. Drinking Water Regulations for Radionuclides, and that deleterious concentrations of toxic or other nonradioactive materials shall be determined in consideration of the Quality Criteria for Water, published by E.P.A. in 1976, as revised. W.A.C. 173-201-045 (11), (12). E.P.A.'s Drinking Water Regulations are not themselves directly applicable to Dawn's seepage situation. Both the primary drinking water regulations (40 C.F.R. Part 141) and the secondary drinking water regulations (40 C.F.R. Part 143) apply only to public water systems; and the limits specified therein apply to the contaminant levels at the point where water is delivered "to the free flowing outlet of the ultimate user of a public water system" (40 C.F.R. 141.2(c)). The secondary regulations are not federally enforceable at all.

In any case, Figure 3.1 shows that Dawn's seepage is not causing deterioration of Chamokane Creek waters below the State standards or E.P.A. drinking water limits. For all pollutants sampled, the average and highest values below the seepage emergence zone are within those limits except for iron, manganese (highest reading), and radium 266 (highest reading). As to each of those pollutants, the levels <u>above</u> the seep are <u>higher</u> than the levels below the seep, thus indicating that Dawn's seepage is not causing whatever elevated levels there might be.

The current proposal would allow Dawn to continue to place tailings in the present tailings pond and would thus allow the seepage into ground water and eventually to Chamokane Creek to continue. But the proposal should not result in any significant <u>additional</u> impact on Chamokane Creek, since the ponds have been active for almost 20 years (and even now, as noted above, the seepage does not appear to be causing any violation of applicable standards). Moreover, Dawn's new lined, subgrade tailings disposal facility will result in the substantial reduction, and eventually the elimination, of the seepage.

ANALYSIS OF [illegible] CREEK

	Downstream			Upstream			Spokane River	State Water	EPA Drinking Water Standards	
	Low	High	Avg.	Low	High	Avg.	(One Sample Only)	Quality Standards	Primary	Secondary
Arsenic (11)	.001	<.01	.004	<.01	<.01	.004	.001	.05*	.05	-
Chloride (6)	3.0	12.0	5.58	2.0	3.5	2.58	-	250*	-	250
Chromium (7)	.01	.05	.023	<.02	.02	.02	-	.05*	.05	-
Copper (10)	.001	.04	.017	.001	.023	.013	.001	1*	-	1.0
Iron (6)	.02	2.6	.97	.2	2.5	1.04	-	0.3*	-	.3
Lead (9)	.001	.03	.017	.001	<.02	.014	.004	.05*	.05	-
Manganese (10)	.015	.07	.029	.015	.08	.037	.06	.05*	-	.05
Mercury (6)	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	-	.002	.002	-
Nitrate (10)	.3	6.6	2.27	.1	5.3	1.1	.03	10*	10	-
pH (104)	7.8	8.3	8.0	7.0	8.4	7.6	7.9	6.5 - 8.5** (with man-caused variation w/in .5)	-	6.5 - 8.5
Radium-226 (43)	0	.82	.21	0	1.5	.29	-	10***	5#	-
Selenium (6)	<.005	<.01	.006	<.005	<.01	.006	-	.01*	.01	-
Sulfate (11)	20	70	40.8	5	20	9.7	5	250*	-	250
TDS (10)	148	369	256	62	257	139	68	-	-	500
Thorium-230 (43)	0	1.71	.51	0	1.71	.63	-	20***	-	-
Zinc (10)	.003	.16	.039	.002	.12	.026	.095	5*	-	-
Gross Alpha (1)	<1.6	<3.6	<1.6	2.2	2.2	2.2	-	15	15	-

Notes:

1. After each contaminant listed, the number of samples is marked in parentheses.
2. All values in milligrams per liter except Ra-226, Th 230, and gross alpha, which are in Picocuries per liter.
3. Under State water quality standards:
   - * Indicates that the standard is from Quality Criteria for Water, EPA 1976, which is incorporated in W.A.C. 173-201-035 (12). The standards used from that document are the domestic water supply standards.
   - ** Indicates the pH standard for Class A waters, which include Chamokane Creek. W.A.C. 173-201-045 (2), 173-201-070 (6)
   - *** Indicates 1/100 of the value listed in W.A.C. 402-24 220 (Table II, column 2). See W.A.C. 173-201-035 (11).
4. The E.P.A. primary and secondary drinking water standards are set out in 40 C.F.R. Parts 141 and 143, respectively. The standard noted for radium-226, marked with "#", actually applies to combined radium-226 and radium-228. 40 C.F.R. 141.15. That provision also sets a limit of 15 pCi/l for gross alpha particle activity (including radium-226, but excluding radon and uranium).

Figure 21

Environmental Checklist con't.

f & g) The continued influx of wastewater into the ground water regime has had an impact on the direction, rate of flow, and quantity of ground water. Again, however, since the ponds have been active for almost 20 years, the current proposal will result in no significant added impact on those parameters.

h) Figure 3.2 summarizes the monitoring data available on ground water quality in the near vicinity of Dawn's tailings disposal area. We note that the highest pH reading in Dawn's monitor wells cannot have been caused by Dawn's tailings, which are highly acidic. (Note also that the E.P.A. drinking water regulations and the State's water quality standards do not apply to these wells.) The current proposal will not have a significant added impact on ground water quality.

Figure 3.2

GROUND WATER ANALYSIS

Parameter	Uncontaminated Springs			Dawn Monitor Wells		
	Low	Avg.	High	Low	Avg.	High
TDS	160	222	334	100	643.9	5323
Sulfate	5	10.5	50	<.1	305.2	2453
Nitrate	<.05	.789	2.22	.01	3.67	66.9
Selenium	-	-	-	<.005	.006	<.01
Uranium	.001	.004	.018	<.001	.010	.1
Manganese	.01	.066	.15	<.01	.288	1.8
pH	7.4	8.05	8.9	6.7	8.03	10.0
Lead	.001	.001	.001	<.02	.035	.10
Zinc	.002	.0042	.009	.001	.045	.2
Arsenic	.001	.001	.001	.001	.009	.01
Copper	.002	.0027	.004	.01	.024	.05
Ammonium	<.1	<.1	<.1	.01	1.11	4.94
Chromium	.01	.038	.08	<.01	.053	.18
Radium-226 (Total)	1.5	2.75	4.1	0	1.71	9.2
Radium-226 (Dissolved)	.3	1.15	2.1	.2	.42	1.0
Cadmium	.001	.001	.001	.001	.005	.02
Mercury	-	-	-	<.0002	.0004	<.001
Chloride	.5	2.1	5.0	<.1	3.9	22.0

(All values expressed as mg/l, except for Ra-226 which is expressed in pCi/l)

	Yes	Maybe	No
14. Public Services. Will the proposal have an effect upon, or result in a need for new or altered governmental services in any of the following areas:			
a. Fire protection?	☐	☐	☒
b. Police protection?	☐	☐	☒
c. Schools?	☐	☐	☒
d. Parks or other recreational facilities?	☐	☐	☒
e. Maintenance of public facilities, including roads?	☐	☐	☒
f. Other governmental services?	☐	☐	☒

Explanation: _____

_____

15. Energy. Will the proposal result in:			
a. Use of substantial amounts of fuel or energy?	☐	☐	☒
b. Demand upon existing sources of energy, or require the development of new sources of energy?	☐	☐	☒

Explanation: _____

_____

16. Utilities. Will the proposal result in a need for new systems, or alterations to the following utilities:			
a. Power or natural gas?	☐	☐	☒
b. Communications systems?	☐	☐	☒
c. Water?	☐	☐	☒
d. Sewer or septic tanks?	☐	☐	☒
e. Storm water drainage?	☐	☐	☒
f. Solid waste and disposal?	☐	☐	☒

Explanation: _____

_____

17. Human Health. Will the proposal result in the creation of any health hazard or potential health hazard (excluding mental health)?	☐	☐	☒

Explanation: See Attached comments

_____

	Yes	Maybe	No
18. Aesthetics. Will the proposal result in the obstruction of any scenic vista or view open to the public, or will the proposal result in the creation of an aesthetically offensive site open to public view?	☐	☐	☒
19. Recreation. Will the proposal result in an impact upon the quality or quantity of existing recreational opportunities?	☐	☐	☒

Explanation: _____

_____

20. Archeological/Historical. Will the proposal result in an alteration of a significant archeological or historical site, structure, object or building? ☐ ☐ ☒

Explanation: _____

_____

III. SIGNATURE

I, the undersigned, state that to the best of my knowledge the above information is true and complete. It is understood that the lead agency may withdraw any declaration of non-significance that it might issue in reliance upon this checklist should there be any willful misrepresentation or willful lack of full disclosure on my part.

Proponent: Jack E. Thompson

J. E. Thompson

Environmental Checklist

(II) 17) While the proposed permit renewal would allow the current seepage of tailings effluents into ground water and eventually into Chamokane Creek to continue for some period of time, the risk of any health hazard from this seepage is remote in the extreme. As noted above, the seepage does not appear to be causing a violation of any applicable requirement or standard. In addition, the owner of the adjacent land between the tailings pond and the seepage emergence zone has been notified of the problem and has indicated that no drinking-water wells will be sunk into the aquifer under that land. In any case, the current proposal to renew the permit will not create any new or added hazard, since the pond has been active for almost twenty years. Furthermore, the new sub-grade tailings disposal facility is designed to meet new requirements set by the State and the NRC. Compliance with these requirements will ensure that human health is well protected.