

DND No. 6 - PROPOSED

6229 EMBANKMENT CREST 6229

6228 EMERGENCY SPILLWAY 6228

6227 PRINCIPAL SPILLWAY
6226.9

6226

6225

SEDIMENT STORAGE
6224.6

6224

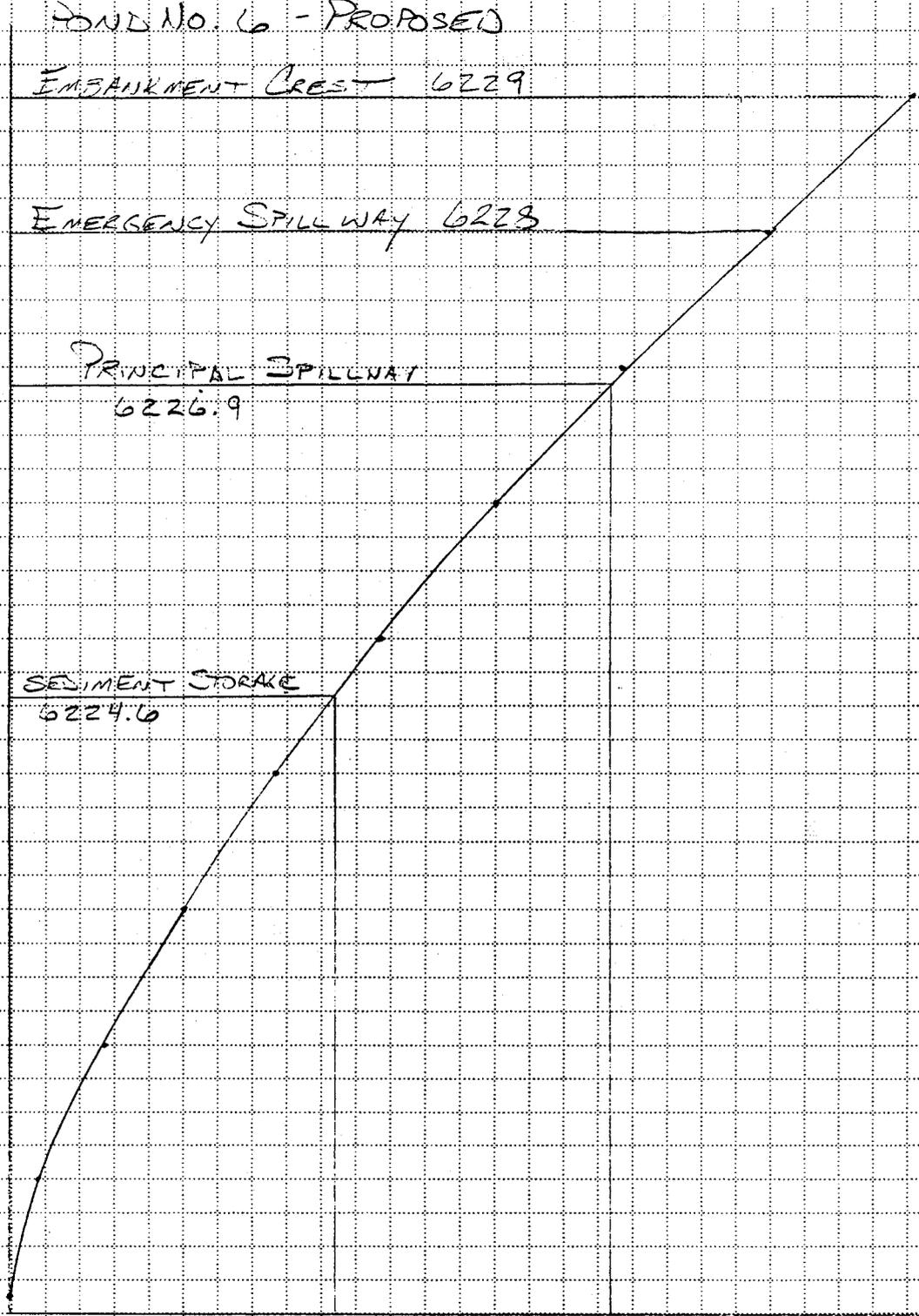
6223

6222

6221

6220

0 0.25 0.5 0.75 1.0 1.25



POND #6 - SCALE 1" = 20'

CONTOUR	VERTICAL UNITS	AREA	AVERAGE AREA	CONTOUR INTERVAL	INCREMENTAL VOLUME	TOTAL VOLUME	COMMENTS
6223.7	0	0	352	0.3	106	106	
6224	1.76	704	1914	1.0	1914	2020	
6225	7.81	3124	4236	1.0	4236	6306	
6226	13.62	5443	6256	0.7	4379	10,684	
6226.7	17.66	7064					
6220.1	0	0	1908	0.9	1717	1717	0.539
6221	9.54	3816	4208	1.0	4208	5925	0.126
6222	11.50	4600	4948	1.0	4948	10,873	0.25
6223	13.24	5296	5680	1.0	5680	16,553	0.33
6224	15.16	6064	6440	1.0	6440	22,993	0.53
6225	17.04	6816	7264	1.0	7264	30,257	0.70
6226	19.28	7712	8146	1.0	8146	38,403	0.83
6227	21.45	8580	9074	1.0	9074	47,477	1.09
6228	23.92	9568					

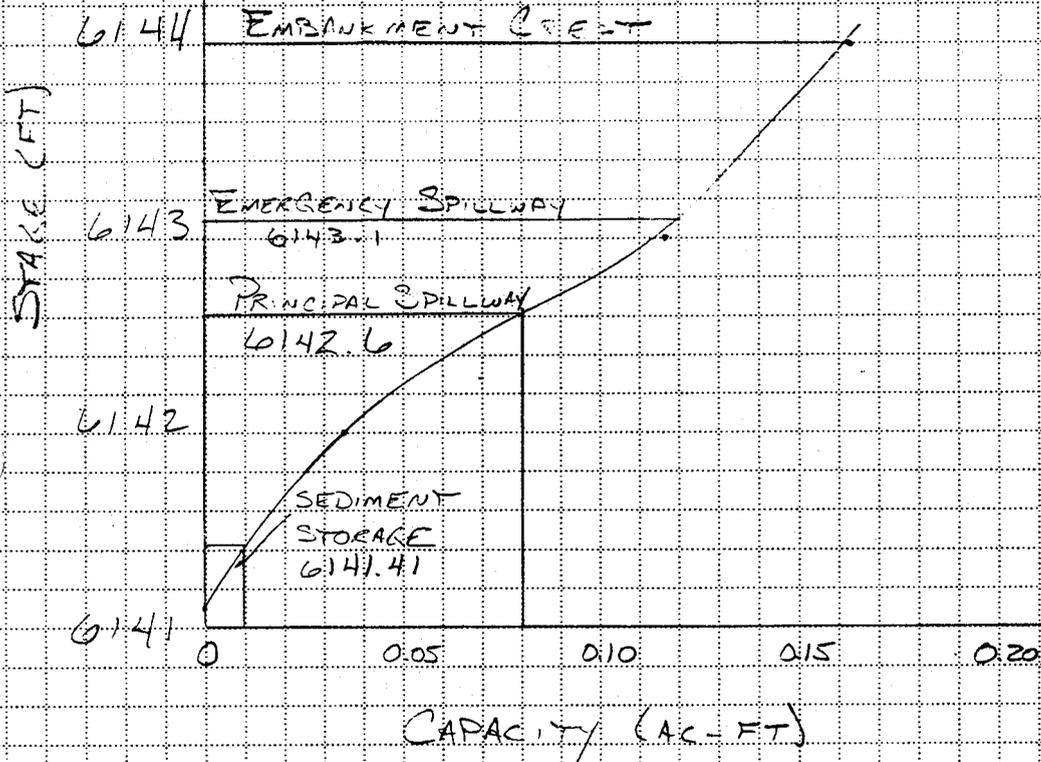
EXISTING

REMOVED

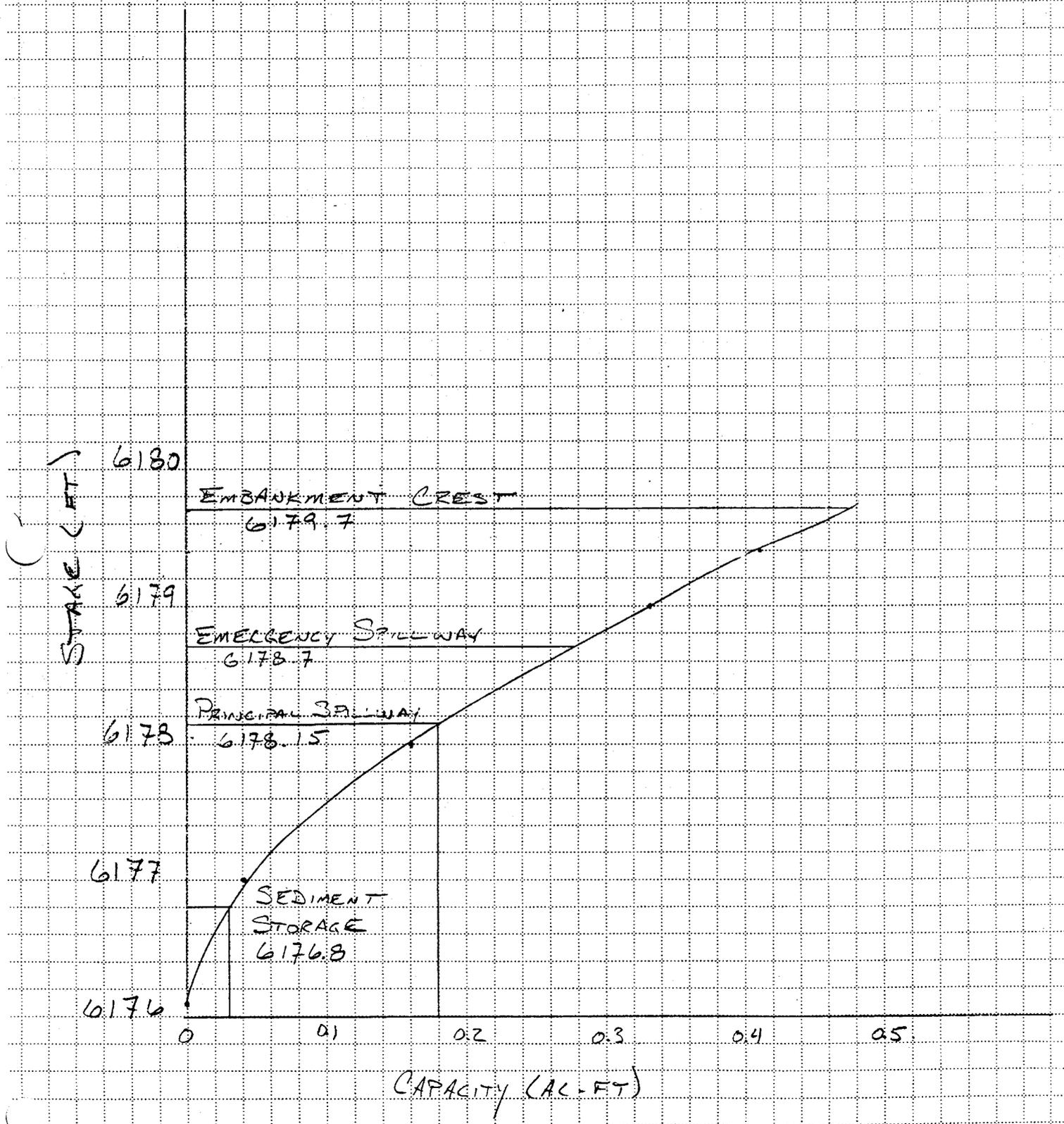
TOTAL VOLUME = 0.25 AC-FT REQUIRE 0.87

POND IS TOO SMALL

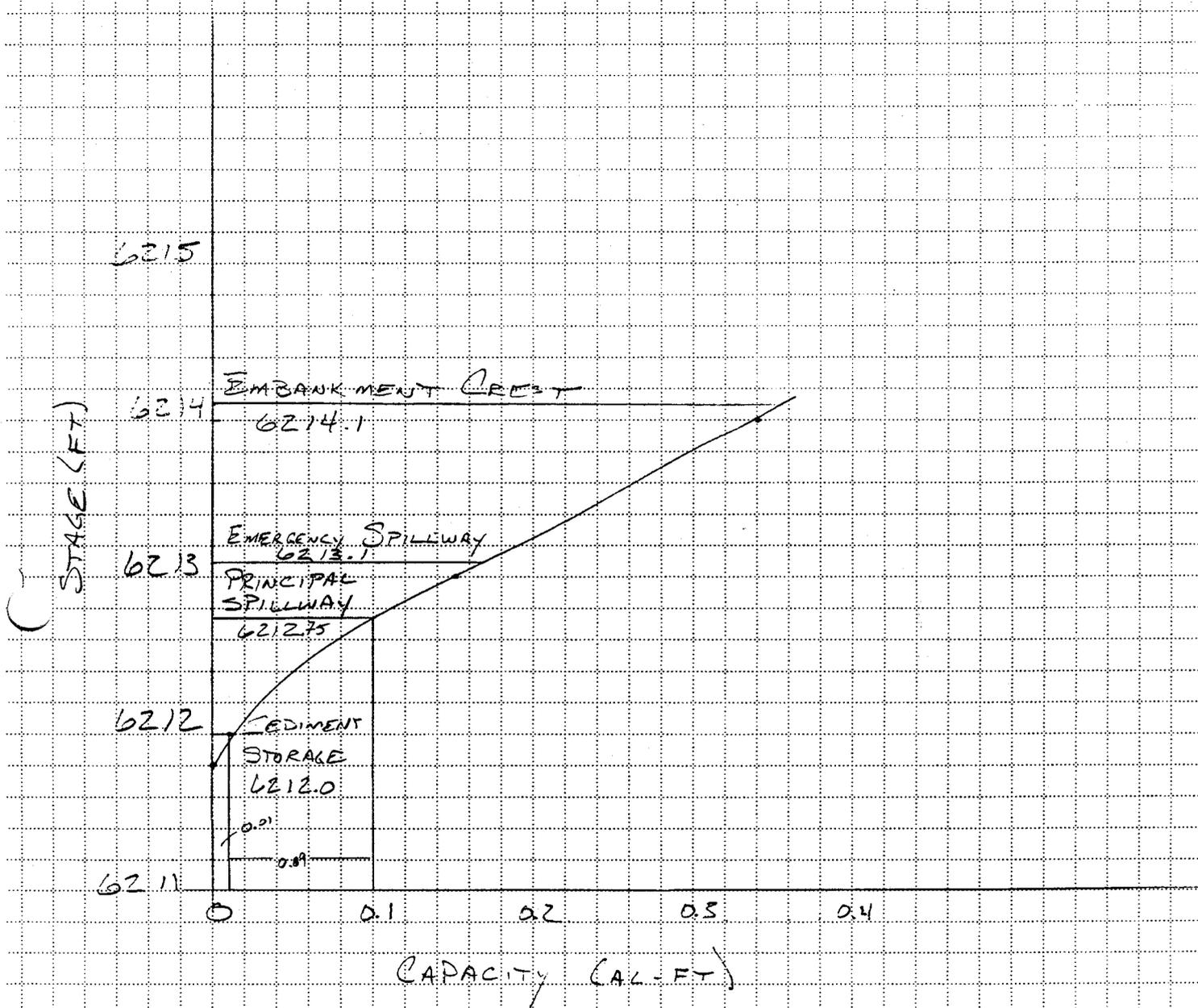
POUND NO. 7 - EXISTING



POUND No. 8 - EXISTING



POND No. 10 - EXISTING



W. D.	CURVE NUMBER	HYDRAULIC LENGTH	AVERAGE WATERSHED SLOPE	LAG TIME	T _c CONC.	AREA	DURATION	PRECIP.	DIST.	PEAK DISCHARGE
POND 1	86	1925	27.2%	0.08	0.14	4.74	24	2.2	"2"	4.81
POND 2	90	720	4.2%	0.08	0.14	3.70	24	2.2	"2"	4.60
POND 3	82	2350	49.5%	0.08	0.14	13.17	24	2.2	"2"	10.61
POND 4	86	2800	19.9%	0.13	0.22	11.65	24	2.2	"2"	21.81
POND 5	82	1600	29.3%	0.08	0.13	8.47	24	2.2	"2"	6.86
POND 6	90	465	7.4%	0.04	0.07	0.88	24	2.2	"2"	1.12
POND 7	86	900	9.3%	0.08	0.13	2.50	24	2.2	"2"	2.55
POND 8	89	930	2.9%	0.13	0.21	1.38	24	2.2	"2"	1.52
POND 9	90	640	3.1%	0.01	0.02	1.15	24	2.2	"2"	1.50
POND 10										

SEWAGE TREATMENT PLANT
 POND 1
 SPILLWAYS
 POND 2
 SPILLWAYS
 POND 3
 SPILLWAYS
 POND 4
 SPILLWAYS
 POND 5
 SPILLWAYS
 POND 6
 SPILLWAYS
 POND 7
 SPILLWAYS
 POND 8
 SPILLWAYS
 POND 9
 SPILLWAYS
 POND 10
 SPILLWAYS

Project: MAINTENANCE
 Job Code: 5505200
 Date Time: 2/18/83 11:30 AM

Sponsor:
 Task Subject: SPILLWAYS FOR POND FLOW
 Author:
 Chkd:
 P. 2 of

$$L = \frac{(Q)^{0.85} (S+1)^{0.7}}{1900 (X)^{0.5}}$$

L = LAG TIME (HRS)

l = HYDRAULIC LENGTH (FT)

Y = WATERSHED SLOPE
 S = $\frac{1000}{CN} - 10$
 CN = CURVE NUMBER

$$T_c = l / 0.6 = \text{Time of Concentration}$$

PEAK DISCHARGE DETERMINED FROM
 STORM HYDROGRAPH COMPUTER PROGRAM

Appendix VI-6

DOGM Water Monitoring Guidelines

TABLE 1

SURFACE WATER BASELINE, OPERATIONAL AND
POSTMINING WATER QUALITY PARAMETER LISTField Measurements:

- * - Water Levels or Flow
- * - pH
- * - Specific Conductivity (umhos/cm)
- * - Temperature (C°)
- * - Dissolved Oxygen (ppm) (perennial streams only)

Laboratory Measurements: (mg/l) (Major, minor ions and trace elements are to be analyzed in total and dissolved forms.)

- # * - Total Settleable Solids
- # * - Total Suspended Solids
- * - Total Dissolved Solids
- * - Total Hardness (as CaCO₃)
- * - Acidity (CaCO₃)
- Aluminum (Al)
- Arsenic (As)
- Barium (Ba)
- Boron (B)
- * - Carbonate (CO₃⁻²)
- * - Bicarbonate (HCO₃⁻)
- Cadmium (Cd)
- * - Calcium (Ca)
- * - Chloride (Cl⁻)
- Chromium (Cr)
- Copper (Cu)
- Fluoride (F⁻)
- * - Iron (Fe)
- Lead (Pb)
- * - Magnesium (Mg)
- * - Total Manganese (Mn)
- Mercury (Hg)
- Molybdenum (Mo)
- Nickel (Ni)
- Nitrogen: Ammonia (NH₃)
- Nitrite (NO₂⁻)
- Nitrate (NO₃⁻)
- * - Potassium (K)
- Phosphate (PO₄⁻³)
- Selenium (Se)
- * - Sodium (Na)
- * - Sulfate (SO₄⁻²)
- Sulfide (S⁻)
- Zinc (Zn)
- * - Oil and Grease
- * - Cation-Anion Balance

Sampling Period:

- Baseline
- *Operational, Postmining
- #Construction

TABLE 2 SURFACE WATER SAMPLING

	Baseline	Operational	Postmining
Type of Sampling Site	Surface Water Bodies	Surface Water Bodies	Surface Water Bodies
Field Measurements (see Table 1)	Performed during water level/flow measurements.	Performed during water level/flow measurements.	Performed during water level/flow measurements.
Sample Frequency	Quarterly for lakes, reservoirs and impoundments (water level and quality); monthly flow measurements and quarterly water quality measurements (one sample at low flow and high flow each) for perennial streams. Monthly flow and water quality measurements during period of flow for intermittent streams. Sampling for ephemeral streams determined at pre-design conference.	Quarterly for lakes, reservoirs and impoundments (water level and quality); monthly flow measurements and quarterly water quality measurements (one sample at low flow and high flow each) for perennial streams. Monthly flow and water quality measurements during period of flow for intermittent streams. Sampling for ephemeral streams determined at pre-design conference.	<u>Two</u> per annum for perennial streams (high & low flow); two per annum during snowmelt and rainfall for intermittent streams.
Sampling Duration	<u>Two</u> years (one complete year of data before submission of PAP.	<u>Every</u> year until two years after surface reclamation activities have ceased.	<u>Every</u> year until termination of bonding.
Type of Data Collected and Reported	Flow and/or water levels and water quality.	Flow and/or water levels and water quality.	Flow and/or water levels and water quality per operational parameters.
Comments	All field measurements should be performed concurrently with water level/flow measurements.	All field measurements should be performed concurrently with water level/flow measurements.	All field measurements should be performed concurrently with water level/flow measurements

TABLE 2 (continued)

Baseline	Operational	Postmining
<p>Comments</p>	<p>For every fifth year preceding repermitting, one sample at low flow and high flow each should be taken for baseline water quality parameters.</p> <p>The construction monitoring program will be conducted on a site-specific basis in addition to the operational monitoring.</p>	

TABLE 3

GROUND WATER BASELINE, OPERATIONAL AND
POSTMINING WATER QUALITY PARAMETER LIST

Field Measurements:

- * - Water Levels or Flow
- * - pH
- * - Specific Conductivity (umhos/cm)
- * - Temperature (C°)

Laboratory Measurements: (mg/l) (Major, minor ions and trace elements are to be analyzed in dissolved form only.)

- * - Total Dissolved Solids
- * - Total Hardness (as CaCO₃)
- Aluminum (Al)
- Arsenic (As)
- Barium (Ba)
- Boron (B)
- * - Carbonate (CO₃⁻²)
- * - Bicarbonate (HCO₃⁻)
- Cadmium (Cd)
- * - Calcium (Ca)
- * - Chloride (CL⁻)
- Chromium (Cr)
- Copper (Cu)
- Fluoride (F⁻)
- * - Iron (Fe)
- Lead (Pb)
- * - Magnesium (Mg)
- * - Manganese (Mn)
- Mercury (Hg)
- Molybdenum (Mo)
- Nickel (Ni)
- Nitrogen: Ammonia (NH₃)
- Nitrite (NO₂)
- Nitrate (NO₃⁻)
- * - Potassium (K)
- Phosphate (PO₄⁻³)
- Selenium (Se)
- * - Sodium (Na)
- * - Sulfate (SO₄⁻²)
- Sulfide (S⁻)
- Zinc (Zn)

Sampling Period:

-Baseline

*Operational, Postmining

TABLE 4 GROUND WATER SAMPLING

	Baseline Monitoring	Operational Monitoring	Postmining Monitoring
Type of Sampling Site	Springs, In-Mine Flows, Boreholes, Observation Wells	Springs, In-Mine Flows, Boreholes, Observation Well	Springs, Observation Wells
Field Measurements (see Table 3)	Yes	Yes	Yes
Sampling Frequency Each Site	At least <u>four</u> samples per annum, at fixed monthly intervals.	<u>Quarterly</u> samples for in-mine flows. For other sites, <u>four</u> samples per annum at fixed monthly intervals.	<u>One</u> sample per annum (spring sampling at low flow).
Sampling Duration	<u>Two</u> years (one complete year of data before submission of PAP).	<u>Every</u> year until two years after surface reclamation activities have ceased.	<u>Every</u> year until termination of bonding.
Type of Data Collected and Reported	Water levels and/or flow and water quality.	Water levels and/or flow. For springs, <u>one</u> water quality sample at low flow.	Water levels and/or flow and water quality per operational parameters.
Comments	First year of baseline monitoring and the year preceding repermitting; spring and seep inventory taken both during the Fall and Spring.	During the year preceding repermitting. For springs, <u>one</u> water quality sample at low flow per baseline parameters. For other sites, <u>one</u> sample per baseline parameter.	