Attachment A: Flow Frequency Memorandum

MEMORANDUM

DEPARTMENT OF ENVIRONMENTAL QUALITY
Piedmont Regional Office
4949-A Cox Road Glen Allen, Virginia 23060

SUBJECT: Flow Frequency Determination
Iluka Resources - Concord Mine Concentrator – VA00091456

TO: Janine Howard

FROM: Jennifer Palmore, P.G.

DATE: November 3, 2010

COPIES: File

The Iluka Resources - Concord Mine Concentrator facility discharges to an unnamed tributary of Hardwood Creek in Sussex County, VA. The discharge is located at rivermile 5AXFQ001.02. Flow frequencies have been requested at this site for use in developing effluent limitations for the VPDES permit.

At the discharge point, the receiving stream is shown on the USGS Cherry Hill 7 ½' topographic quadrangle to be a dry ditch. The flow frequencies for dry ditches and intermittent streams are listed below:

UT to Hardwood Creek:

1Q30 = 0.0 MGD	High Flow 1Q10 = 0.0 MGD
1Q10 = 0.0 MGD	High Flow 7Q10 = 0.0 MGD
7Q10 = 0.0 MGD	High Flow 30Q10 = 0.0 MGD
30Q10 = 0.0 MGD	HM = 0.0 MGD
30Q5 = 0.0 MGD	

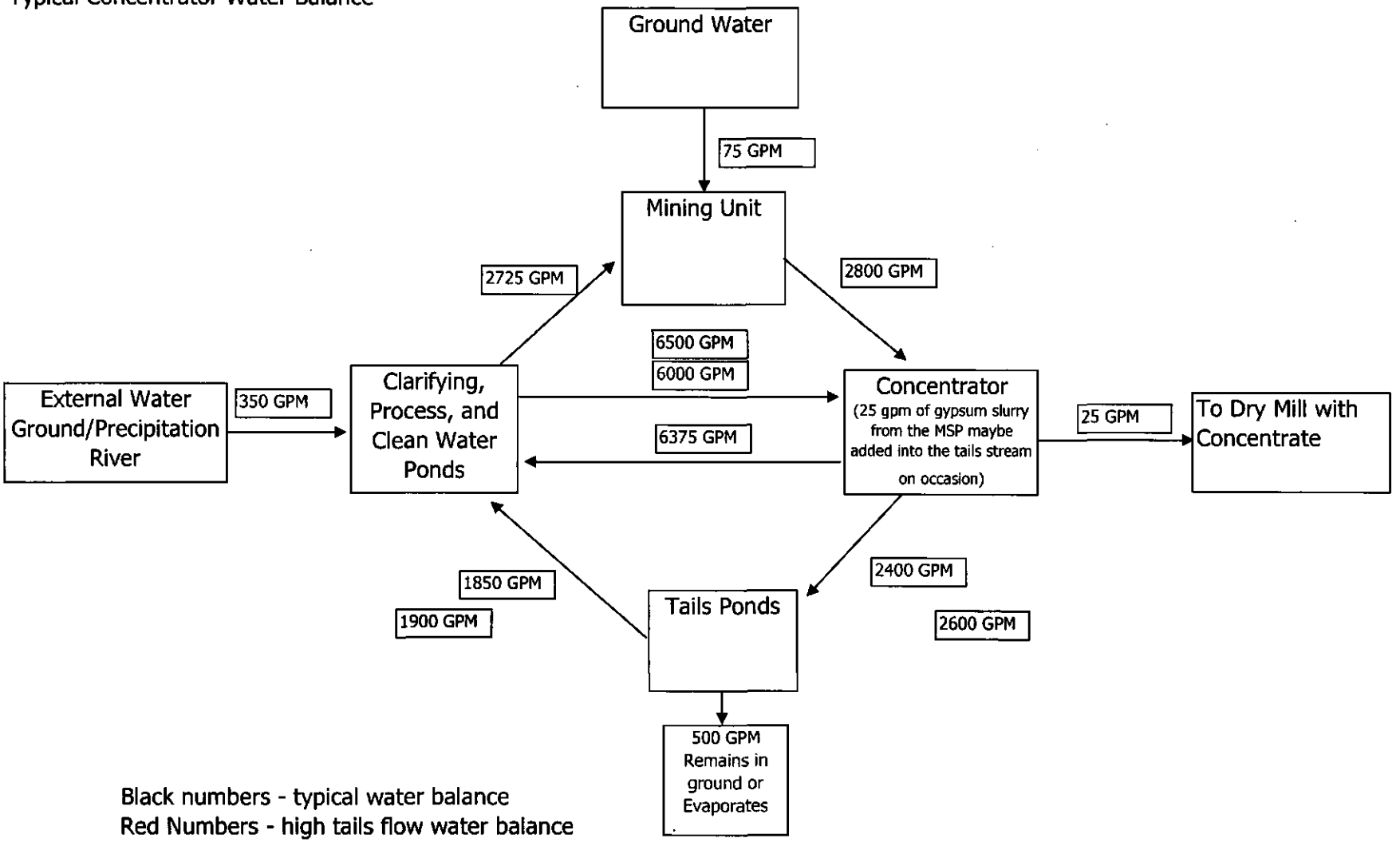
Due to its ephemeral nature, the receiving stream is considered a Tier 1 water.

During the 2010 305(b)/303(d) Water Quality Assessment, the receiving stream was not assessed for any designated uses, therefore it is considered a Category 3A water. The stream has not been included in any approved TMDL.

If you have any questions concerning this analysis, please let me know.

Attachment B: Plant Flow Diagram, Facility Diagram

Typical Concentrator Water Balance



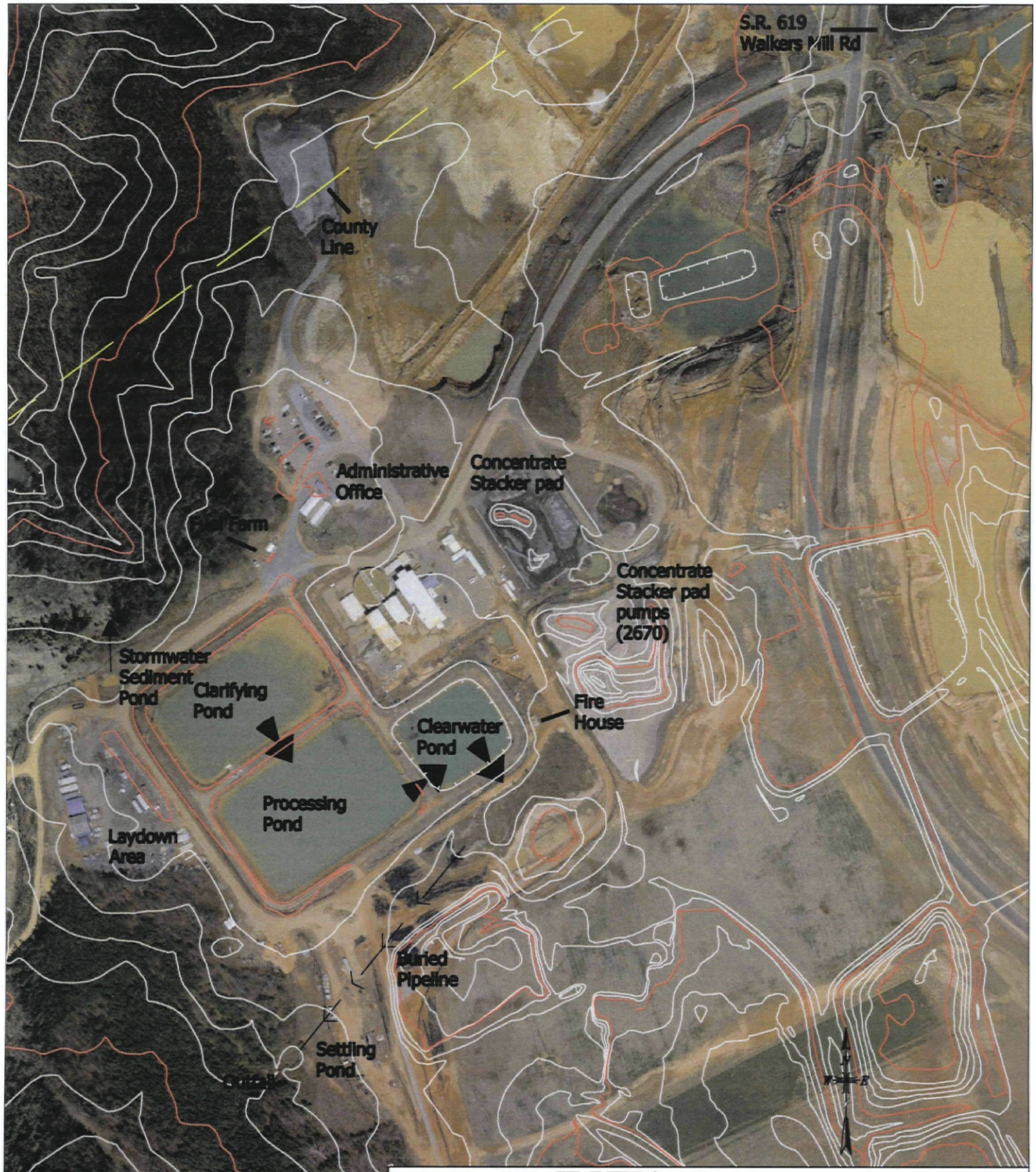
Black numbers - typical water balance
Red Numbers - high tails flow water balance

ILUKA RESOURCES INC.
12472 St. John Church Road Stony Creek, Virginia 23882-3239
Phone (434) 348-4300 FAX (434) 246-3039

VIRGINIA OPERATIONS

VPDES Permit Map
Concord

SCALE 1"=600'	DRAWING PATH M:\MinePlanning\Permitting\DEQ\VPDES\2010\9\	DRAFTED C. Zimmerman	04-16-04	REVISED	
DATUM Local		REVISED C. Warren	09-13-10	REVISED	
FILE NAME CC VPDES 10 v1.dwg		REVISED		REVISED	
		REVISED		APPROVED	



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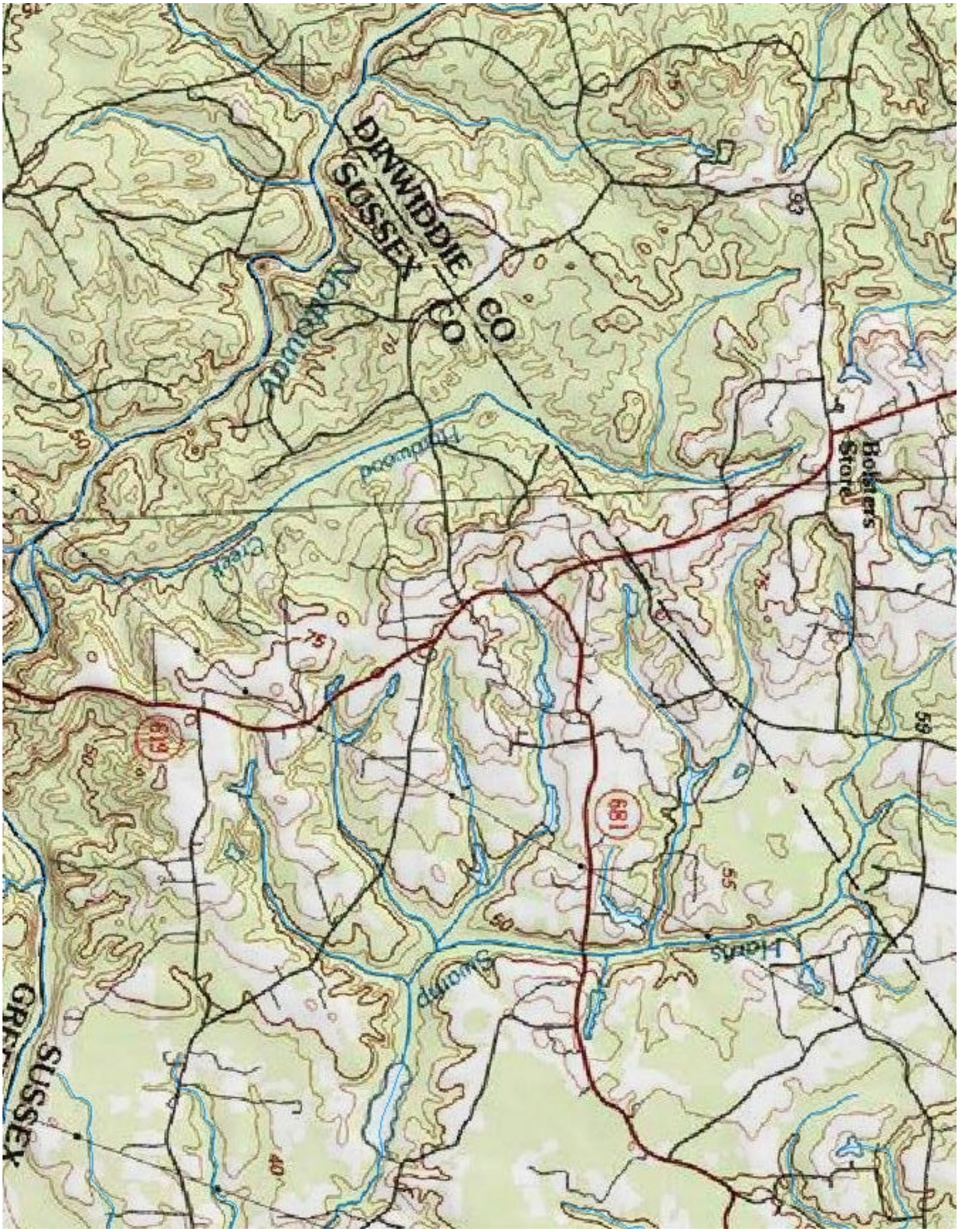
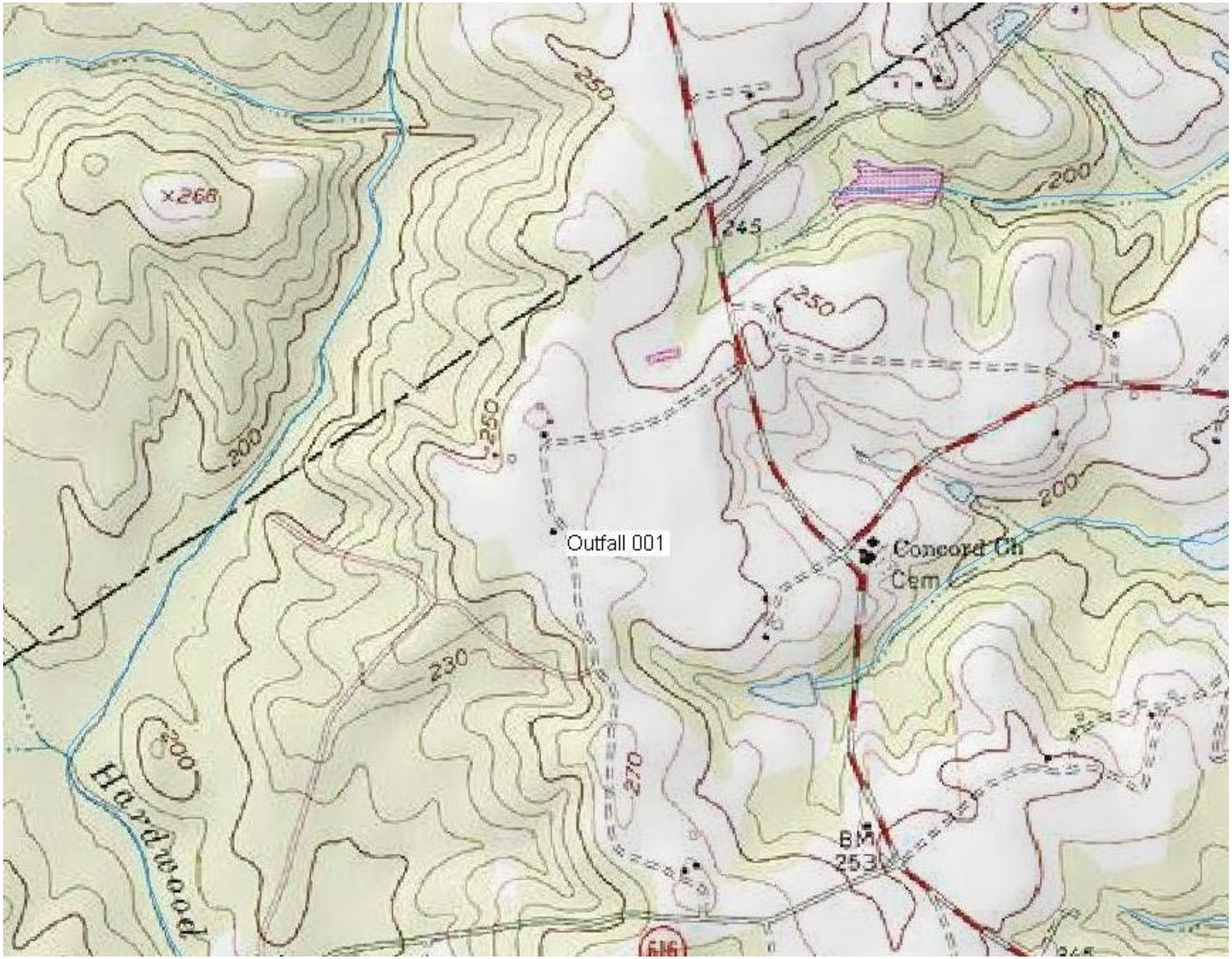
VIRGINIA OPERATIONS

VPDES Permit Map
Concord

SCALE 1"=300'	DRAWING PATH M:\MinePlanning\Permitting\DEQ\VPDES\2010\9\	DRAFTED C. Zimmerman	04-15-04	REVISED	
DATE Local		REVISED C. Warren	09-21-10	REVISED	
FILE NAME CC VPDES 10 v1.dwg		REVISED		REVISED	
		REVISED		APPROVED	

Attachment C: USGS Cherry Hill Topographic Map (040 A)


DINWIDDIE CO
SUSSEX CO
Bolsters Store
Creek
Swamp
Harris
SUSSEX
619
681
75
50
55
40


Outfall 001
Concord Ch
Cem
Hardwood
x268
250
245
200
230
270
BM
253
616

Attachment D: Site Inspection Report

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

Piedmont Regional Office

WASTEWATER FACILITY INSPECTION REPORT

FACILITY NAME:	ILUKA, Concord Mine Concentrator	**INSPECTOR:**	Charles Stitzer
PERMIT No.:	VA0091456	**INSPECTION DATE:**	August 5, 2009
TYPE OF FACILITY:	Industrial Minor	**REPORT COMPLETED:**	
COUNTY/CITY:	Sussex Co.	**UNANNOUNCED INSPECTION:**	NO
REVIEWED BY:			
PRESENT DURING INSPECTION:	Kevin Rideout		

I. OPERATIONAL UNIT REVIEW AND CONDITION:

The operational units associated with VA0091456 are three settling ponds at the Concorde Mineral Sands Separator which is located at 16474 Walkers Mill Rd. in Sussex Co. These ponds are used to settle fine solids from recycled process water which is used in the concentration of heavy mineral sands from the local mining operation. Aluminum Chloride Hydroxide and Calcium Chloride based flocculants are used to enhance sediment settling characteristics. The combined volume of the 3 ponds is 12, 830,677 gallons. Under normal operation conditions (2000 gal per day discharged at 001) the ponds provide 4 days of retention time.

These lagoons discharge at outfall 001 to an unnamed Tributary to Hardwood Creek.

At the time of the inspection the sedimentation ponds were clear, had sufficient freeboard, and appeared to have adequate solids holding capacity. They were not discharging. The outfall at 001 was clear of vegetation and there was no evidence of excessive erosion, sedimentation, or other obvious impacts.

This facility also is the subject of Industrial Storm Water General Permit VAR051396 which addresses storm water runoff from the site.

The overall condition of the Concord operation is good. The product storage area at the rotating stacker contained significantly less product than has been observed at previous inspections. There is very little fugitive product at this site due to the improved design of the stacker and storage yard. Product is well contained within the site's boundaries. The long entrance road to the facility and good drainage control keep fugitive product migration under control. There are a few areas of minor erosion and sedimentation, especially at the pipe storage location, but all are contained within the site's BMPs and do not contribute to any off-site problems. General maintenance of ditches and erosion control BMPs appear to be effective at keeping eroded sediment from leaving the site. All petroleum products are stored within secondary containment. Groundwater monitoring wells were all caped and locked.

II. ULTIMATE DISPOSAL OF SOLIDS:

Solids are used to reclaim mined areas.

III. FIELD DATA:

Flow:	Not meas. MGD	**Dissolved Oxygen:**	___mg/L	**Contact Chlorine Res.:**	_____mg/L
pH:	__S.U.	**Final Chlorine Res.:**	__ mg/L	**Temperature:**	_____ EC

Calibration Time/Initials/documentation:

Condition of Effluent: Not discharging at time of inspection

Condition of Receiving Stream: Good

Samples Collected during the inspection: NO

IV. PLANT OPERATIONS AND MAINTENANCE:

Operations and Maintenance Manual:	Under review
Class and Number of Licensed Operators:	One Class III Wastewater Operator
Alarm Systems and Alternate Power:	Systems are monitored on Computerized Control CRTs when the Concentrator is running. No alternate power exists .
Any bypassing since last inspection?	NO
When was the RPZ device last checked?	NA
Name, number and description of pump stations:	Four pumps are used in the process. The water intake from the Nottoway River is the main pump and there are three "booster pumps" used to move water from processing systems and back to settling ponds.

V. COMMENTS:

Items evaluated during this inspection include (check all that apply):

[x] Yes	[ ] No		Operational Units
[ ] Yes	[x] No		O & M Manual
[ ] Yes	[x] No		Maintenance Records
[ ] Yes	[ ] No	[x] N/A	Pathogen Reduction & Vector Attraction Reduction
[ ] Yes	[ ] No	[x] N/A	Sludge Disposal Plan
[ ] Yes	[x] No	[ ] N/A	Groundwater Monitoring Plan
[ ] Yes	[x] No	[ ] N/A	Storm Water Pollution Prevention Plan
[ ] Yes	[ ] No	[ ] N/A	Permit Special Conditions
[ ] Yes	[x] No	[ ] N/A	Permit Water Quality Chemical Monitoring
[x] Yes	[ ] No	[ ] N/A	Laboratory Records (see Lab Report)

VI. GENERAL RECOMMENDATIONS:

Address E&S control BMP deterioration when identified by existing inspection program. Following heavy rain events double check problem areas and initiate corrective actions/repairs as needed.

VII. COMPLIANCE RECOMMENDATIONS/REQUEST FOR CORRECTIVE ACTION:

None

VII. PHOTOGRAPHS:

Rock check dam used as E&S BMP at site entrance.

Filter fence BMP preceding culvert under state highway.

Attachment E: Effluent Data, MSTRANTI data source report, MSTRANTI, STATS results

ATTACHMENT A
DEPARTMENT OF ENVIRONMENTAL QUALITY
WATER QUALITY CRITERIA MONITORING

CASRN#	CHEMICAL	EPA ANALYSIS NO.	QUANTIFICATION LEVEL[1]	REPORTING RESULTS	SAMPLE TYPE[2]	SAMPLE FREQUENCY
METALS						
7440-36-0	Antimony, dissolved	(3)	1.4	<QL	G or C	1/5 YR
7440-38-2	Arsenic, dissolved	(3)	1.0	<QL	G or C	1/5 YR
7440-43-9	Cadmium, dissolved	(3)	0.3	<QL	G or C	1/5 YR
16065-83-1	Chromium III, dissolved [8]	(3)	3.6	<QL	G or C	1/5 YR
18540-29-9	Chromium VI, dissolved [8]	(3)	1.6	<QL	G or C	1/5 YR
7440-50-8	Copper, dissolved	(3)	0.50	<QL	G or C	1/5 YR
7439-92-1	Lead, dissolved	(3)	0.50	<QL	G or C	1/5 YR
7439-97-6	Mercury, dissolved	(3)	1.0	<QL	G or C	1/5 YR
7440-02-0	Nickel, dissolved	(3)	0.94	<QL	G or C	1/5 YR
7782-49-2	Selenium, Total Recoverable	(3)	2.0	<QL	G or C	1/5 YR
7440-22-4	Silver, dissolved	(3)	0.20	<QL	G or C	1/5 YR
7440-28-0	Thallium, dissolved	(4)	(5)	<QL	G or C	1/5 YR
7440-66-6	Zinc, dissolved	(3)	3.6	<QL	G or C	1/5 YR
PESTICIDES/PCB'S						
309-00-2	Aldrin	608	0.05	<QL	G or C	1/5 YR
57-74-9	Chlordane	608	0.2	<QL	G or C	1/5 YR
2921-88-2	Chlorpyrifos (synonym = Dursban)	(4)	(5)	<0.2	G or C	1/5 YR
72-54-8	DDD	608	0.1	<QL	G or C	1/5 YR
72-55-9	DDE	608	0.1	<QL	G or C	1/5 YR
50-29-3	DDT	608	0.1	<QL	G or C	1/5 YR
8065-48-3	Demeton	(4)	(5)	<1	G or C	1/5 YR
333-41-5	Diazinon	(4)	(5)	<1	G or C	1/5 YR
60-57-1	Dieldrin	608	0.1	<QL	G or C	1/5 YR
959-98-8	Alpha-Endosulfan	608	0.1	<QL	G or C	1/5 YR
33213-65-9	Beta-Endosulfan	608	0.1	<QL	G or C	1/5 YR
1031-07-8	Endosulfan Sulfate	608	0.1	<QL	G or C	1/5 YR

CASRN#	CHEMICAL	EPA ANALYSIS NO.	QUANTIFICATION LEVEL[1]	REPORTING RESULTS	SAMPLE TYPE[2]	SAMPLE FREQUENCY
72-20-8	Endrin	608	0.1	<QL	G or C	1/5 YR
7421-93-4	Endrin Aldehyde	(4)	(5)	<QL	G or C	1/5 YR
86-50-0	Guthion	(4)	(5)	<QL	G or C	1/5 YR
76-44-8	Heptachlor	608	0.05	<QL	G or C	1/5 YR
1024-57-3	Heptachlor Epoxide	(4)	(5)	<0.1	G or C	1/5 YR
319-84-6	Hexachlorocyclohexane Alpha-BHC	608	(5)	<0.05	G or C	1/5 YR
319-85-7	Hexachlorocyclohexane Beta-BHC	608	(5)	<0.05	G or C	1/5 YR
58-89-9	Hexachlorocyclohexane Gamma-BHC or Lindane	608	(5)	<0.05	G or C	1/5 YR
143-50-0	Kepone	(9)	(5)	<0.1	G or C	1/5 YR
121-75-5	Malathion	(4)	(5)	<1	G or C	1/5 YR
72-43-5	Methoxychlor	(4)	(5)	<0.1	G or C	1/5 YR
2385-85-5	Mirex	(4)	(5)	<0.1	G or C	1/5 YR
56-38-2	Parathion	(4)	(5)	<1	G or C	1/5 YR
1336-36-3	PCB Total	608	7.0	<QL	G or C	1/5 YR
8001-35-2	Toxaphene	608	5.0	<QL	G or C	1/5 YR
BASE NEUTRAL EXTRACTABLES						
83-32-9	Acenaphthene	625	10.0	<QL	G or C	1/5 YR
120-12-7	Anthracene	625	10.0	<QL	G or C	1/5 YR
92-87-5	Benzidine	(4)	(5)	<10.0	G or C	1/5 YR
56-55-3	Benzo (a) anthracene	625	10.0	<QL	G or C	1/5 YR
205-99-2	Benzo (b) fluoranthene	625	10.0	<QL	G or C	1/5 YR
207-08-9	Benzo (k) fluoranthene	625	10.0	<QL	G or C	1/5 YR
50-32-8	Benzo (a) pyrene	625	10.0	<QL	G or C	1/5 YR
111-44-4	Bis 2-Chloroethyl Ether	(4)	(5)	<10.0	G or C	1/5 YR
108-60-1	Bis 2-Chloroisopropyl Ether	(4)	(5)	<10.0	G or C	1/5 YR
85-68-7	Butyl benzyl phthalate	625	10.0	<QL	G or C	1/5 YR
91-58-7	2-Chloronaphthalene	(4)	(5)	<10	G or C	1/5 YR
218-01-9	Chrysene	625	10.0	<QL	G or C	1/5 YR
53-70-3	Dibenz(a,h)anthracene	625	20.0	<QL	G or C	1/5 YR

CASRN#	CHEMICAL	EPA ANALYSIS NO.	QUANTIFICATION LEVEL[1]	REPORTING RESULTS	SAMPLE TYPE[2]	SAMPLE FREQUENCY
84-74-2	Dibutyl phthalate (synonym = Di-n-Butyl Phthalate)	625	10.0	<QL	G or C	1/5 YR
95-50-1	1,2-Dichlorobenzene	624	10.0	<QL	G or C	1/5 YR
541-73-1	1,3-Dichlorobenzene	624	10.0	<QL	G or C	1/5 YR
106-46-7	1,4-Dichlorobenzene	624	10.0	<QL	G or C	1/5 YR
91-94-1	3,3-Dichlorobenzidine	(4)	(5)	<10.0	G or C	1/5 YR
84-66-2	Diethyl phthalate	625	10.0	<QL	G or C	1/5 YR
117-81-7	Bis-2-ethylhexyl phthalate	625	10.0	<QL	G or C	1/5 YR
131-11-3	Dimethyl phthalate	(4)	(5)	<10.0	G or C	1/5 YR
121-14-2	2,4-Dinitrotoluene	625	10.0	<QL	G or C	1/5 YR
122-66-7	1,2-Diphenylhydrazine	(4)	(5)	<10.0	G or C	1/5 YR
206-44-0	Fluoranthene	625	10.0	<QL	G or C	1/5 YR
86-73-7	Fluorene	625	10.0	<QL	G or C	1/5 YR
118-74-1	Hexachlorobenzene	(4)	(5)	<10.0	G or C	1/5 YR
87-68-3	Hexachlorobutadiene	(4)	(5)	<10.0	G or C	1/5 YR
77-47-4	Hexachlorocyclopentadiene	(4)	(5)	<10.0	G or C	1/5 YR
67-72-1	Hexachloroethane	(4)	(5)	<10.0	G or C	1/5 YR
193-39-5	Indeno(1,2,3-cd)pyrene	625	20.0	<QL	G or C	1/5 YR
78-59-1	Isophorone	625	10.0	<QL	G or C	1/5 YR
98-95-3	Nitrobenzene	625	10.0	<QL	G or C	1/5 YR
62-75-9	N-Nitrosodimethylamine	(4)	(5)	<10.0	G or C	1/5 YR
621-64-7	N-Nitrosodi-n-propylamine	(4)	(5)	<10.0	G or C	1/5 YR
86-30-6	N-Nitrosodiphenylamine	(4)	(5)	<10.0	G or C	1/5 YR
129-00-0	Pyrene	625	10.0	<QL	G or C	1/5 YR
120-82-1	1,2,4-Trichlorobenzene	625	10.0	<QL	G or C	1/5 YR
VOLATILES						
107-02-8	Acrolein	(4)	(5)	<5.0	G	1/5 YR
107-13-1	Acrylonitrile	(4)	(5)	<5.0	G	1/5 YR
71-43-2	Benzene	624	10.0	<QL	G	1/5 YR
75-25-2	Bromoform	624	10.0	<QL	G	1/5 YR

CASRN#	CHEMICAL	EPA ANALYSIS NO.	QUANTIFICATION LEVEL (1)	REPORTING RESULTS	SAMPLE TYPE (2)	SAMPLE FREQUENCY
56-23-5	Carbon Tetrachloride	624	10.0	<QL	G	1/5 YR
108-90-7	Chlorobenzene (synonym = monochlorobenzene)	624	50.0	<QL	G	1/5 YR
124-48-1	Chlorodibromomethane	624	10.0	<QL	G	1/5 YR
67-66-3	Chloroform	624	10.0	<QL	G	1/5 YR
75-09-2	Dichloromethane (synonym = methylene chloride)	624	20.0	<QL	G	1/5 YR
75-27-4	Dichlorobromomethane	624	10.0	<QL	G	1/5 YR
107-06-2	1,2-Dichloroethane	624	10.0	<QL	G	1/5 YR
75-35-4	1,1-Dichloroethylene	624	10.0	<QL	G	1/5 YR
156-60-5	1,2-trans-dichloroethylene	(4)	(5)	<5.0	G	1/5 YR
78-87-5	1,2-Dichloropropane	(4)	(5)	<5.0	G	1/5 YR
542-75-6	1,3-Dichloropropene	(4)	(5)	<5.0	G	1/5 YR
100-41-4	Ethylbenzene	624	10.0	<QL	G	1/5 YR
74-83-9	Methyl Bromide	(4)	(5)	<5.0	G	1/5 YR
79-34-5	1,1,2,2-Tetrachloroethane	(4)	(5)	<5.0	G	1/5 YR
127-18-4	Tetrachloroethylene	624	10.0	<QL	G	1/5 YR
10-88-3	Toluene	624	10.0	<QL	G	1/5 YR
79-00-5	1,1,2-Trichloroethane	(4)	(5)	<5.0	G	1/5 YR
79-01-6	Trichloroethylene	624	10.0	<QL	G	1/5 YR
75-01-4	Vinyl Chloride	624	10.0	<QL	G	1/5 YR
ACID EXTRACTABLES (6)						
95-57-8	2-Chlorophenol	625	10.0	<QL	G or C	1/5 YR
120-83-2	2,4 Dichlorophenol	625	10.0	<QL	G or C	1/5 YR
105-67-9	2,4 Dimethylphenol	625	10.0	<QL	G or C	1/5 YR
51-28-5	2,4-Dinitrophenol	(4)	(5)	<10.0	G or C	1/5 YR
534-52-1	2-Methyl-4,6-Dinitrophenol	(4)	(5)	<10.0	G or C	1/5 YR
25154-52-3	Nonylphenol	(5)	(5)	<10.0	G or C	1/5 YR
87-86-5	Pentachlorophenol	625	50.0	<QL	G or C	1/5 YR
108-95-2	Phenol	625	10.0	<QL	G or C	1/5 YR
88-06-2	2,4,6-Trichlorophenol	625	10.0	<QL	G or C	1/5 YR

CASRN#	CHEMICAL	EPA ANALYSIS NO.	QUANTIFICATION LEVEL (1)	REPORTING RESULTS	SAMPLE TYPE (2)	SAMPLE FREQUENCY
MISCELLANEOUS						
776-41-7	Ammonia as NH3-N	350.1	200	.06 mg/L (2006) .02 mg/L (2010)	C	1/5 YR
16887-00-6	Chlorides	(4)	(5)	9.1 mg/L	C	1/5 YR
7782-50-5	Chlorine, Total Residual	(4)	100	<QL	G	1/5 YR
57-12-5	Cyanide, Free	(4)	10.0	<QL	G	1/5 YR
N/A	*E. coli* (N/CML)	(4)	(5)	<2	G	1/5 YR
7783-06-4	Hydrogen Sulfide	(5)	(5)	<0.05	G	1/5 YR
60-10-5	Tributyltin (7)	NBSR 85-3295	(5)	<0.03	G or C	1/5 YR
	Hardness (mg/L as $CaCO_3$)	(4)	(5)	35.2	G or C (10)	1/5 YR

_____

Name of Principal Exec. Officer or Authorized Agent/Title

_____

Signature of Principal Officer or Authorized Agent/Date

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment for knowing violations. See 18 U.S.C. Sec. 1001 and 33 U.S.C. Sec. 1319. (Penalties under these statutes may include fines up to $10,000 and or maximum imprisonment of between 6 months and 5 years.)

FOOTNOTES:

(1) Quantification level (QL) is defined as the lowest concentration used for the calibration of a measurement system when the calibration is in accordance with the procedures published for the required method.

The quantification levels indicated for the metals are actually Specific Target Values developed for this permit. The Specific Target Value is the approximate value that may initiate a wasteload allocation analysis. Target values are not wasteload allocations or effluent limitations. The Specific Target Values are subject to change based on additional information such as hardness data, receiving stream flow, and design flows.

Units for the quantification level are micrograms/liter unless otherwise specified.

Quality control and quality assurance information shall be submitted to document that the required quantification level has been attained.

(2) Sample Type

G = Grab = An individual sample collected in less than 15 minutes. Substances specified with "grab"

sample type shall only be collected as grabs. The permittee may analyze multiple grabs and report the average results provided that the individual grab results are also reported. For grab metals samples, the individual samples shall be filtered and preserved immediately upon collection.

C = Composite = A 24-hour **(PW - Revise as required to require same composite duration as BOD_5)** composite unless otherwise specified. The composite shall be a combination of individual samples, taken proportional to flow, obtained at hourly or smaller time intervals. The individual samples may be of equal volume for flows that do not vary by +/- 10 percent over a 24-hour period.

(3) A specific analytical method is not specified; however a target value for each metal has been established. An appropriate method to meet the target value shall be selected from the following list of EPA methods (or any approved method presented in 40 CFR Part 136). If the test result is less than the method QL, a "<[QL]" shall be reported where the actual analytical test QL is substituted for [QL].

Metal	**Analytical Method**
Antimony	1638; 1639
Arsenic	1632
Chromium[(8)]	1639
Cadmium	1637; 1638; 1639; 1640
Chromium VI	1639
Copper	1638; 1640
Lead	1637; 1638; 1640
Mercury	1631
Nickel	1638; 1639; 1640
Selenium	1638; 1639
Silver	1638
Zinc	1638; 1639

(4) Any approved method presented in 40 CFR Part 136.

(5) The QL is at the discretion of the permittee. For any substances addressed in 40 CFR Part 136, the permittee shall use one of the approved methods in 40 CFR Part 136.

(6) Testing for phenols requires continuous extraction.

(7) Analytical Methods: NBSR 85-3295 or DEQ's approved analysis for Tributyltin may also be used [See A Manual for the Analysis of Butyltins in Environmental Systems by the Virginia Institute of Marine Science, dated November 1996].

(8) Both Chromium III and Chromium VI may be measured by the total chromium analysis. If the result of the total chromium analysis is less than or equal to the lesser of the Chromium III or Chromium VI method QL, the results for both Chromium III and Chromium VI can be reported as "<[QL]", where the actual analytical test QL is substituted for [QL].

(9) The lab may use SW846 Method 8270D provided the lab has an Initial Demonstration of Capability, has passed a PT for Kepone, and meets the acceptance criteria for Kepone as given in Method 8270D

(10) The sample type for Hardness (as $CaCO_3$) shall match the sample type selected for Dissolved Metals.

MSTRANTI DATA SOURCE REPORT

Stream information	
Mean Hardness	Same as effluent for discharge to dry ditch
90% Temperature (annual)	Same as effluent for discharge to dry ditch
90% Temperature (wet season)	NA
90% Maximum pH	Same as effluent for discharge to dry ditch
10% Maximum pH	Same as effluent for discharge to dry ditch
Tier Designation	Tier Determination
Stream Flows	
All Data	Flow Frequency Determination
Mixing Information	
All Data	Standard 100% for 0 MGD flows
Effluent Information	
Mean Hardness	Effluent data submitted with application
90% Temperature (annual)	Application Form 2C Section V
90% Maximum pH	Calculated from DMR data
10% Maximum pH	Calculated from DMR data
Discharge flow	Permit Application

Data Location:

Flow Frequency Memo – Attachment A

DMR pH Data (VA0091456)

DMR Due Date	Minimum pH (SU)	Maximum pH (SU)
10-Jul-06	6.67	6.82
10-Oct-06	5.22	7.8
10-Jan-07	4.86	8.87
10-Apr-07	6.01	6.3
10-Jul-07	6.26	6.26
10-Apr-08	7.88	7.88
10-Jul-08	6.2	8.92
10-Oct-08	6.08	8.48
10-Jan-09	6.04	8.8
10-Apr-09	7.77	8.81
10-Jul-09	6.07	8.22
10-Jan-10	6.08	8.89
10-Apr-10	6.12	8.5
		90% Max pH: 8.886 10% Max pH: 6.404

FRESHWATER
WATER QUALITY CRITERIA / WASTELOAD ALLOCATION ANALYSIS

Facility Name: Iluka Resources Concord Mine Concentrator Permit No.: VA0091456

Receiving Stream: UT to Hardwood Creek Version: OWP Guidance Memo 00-2011 (8/24/00)

Stream Information		
Mean Hardness (as CaCO3) =	35.2	mg/L
90% Temperature (Annual) =	27.7	deg C
90% Temperature (Wet season) =	NA	deg C
90% Maximum pH =	8.886	SU
10% Maximum pH =	6.404	SU
Tier Designation (1 or 2) =	1	
Public Water Supply (PWS) Y/N? =	n	
Trout Present Y/N? =	n	
Early Life Stages Present Y/N? =	y	

Stream Flows		
1Q10 (Annual) =	0	MGD
7Q10 (Annual) =	0	MGD
30Q10 (Annual) =	0	MGD
1Q10 (Wet season) =	0	MGD
30Q10 (Wet season)	0	MGD
30Q5 =	0	MGD
Harmonic Mean =	0	MGD

Mixing Information		
Annual - 1Q10 Mix =	100	%
- 7Q10 Mix =	100	%
- 30Q10 Mix =	100	%
Wet Season - 1Q10 Mix =	100	%
- 30Q10 Mix =	100	%

Effluent Information		
Mean Hardness (as CaCO3) =	35.2	mg/L
90% Temp (Annual) =	27.7	deg C
90% Temp (Wet season) =	NA	deg C
90% Maximum pH =	8.886	SU
10% Maximum pH =	6.404	SU
Discharge Flow =	3.168	MGD

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Acenapthene	0	--	--	na	9.9E+02	--	--	na	9.9E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**9.9E+02**
Acrolein	0	--	--	na	9.3E+00	--	--	na	9.3E+00	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**9.3E+00**
Acrylonitrile[C]	0	--	--	na	2.5E+00	--	--	na	2.5E+00	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.5E+00**
Aldrin [C]	0	3.0E+00	--	na	5.0E-04	3.0E+00	--	na	5.0E-04	--	--	--	--	--	--	--	--	**3.0E+00**	**--**	**na**	**5.0E-04**
Ammonia-N (mg/l) (Yearly)	0	1.59E+00	2.47E-01	na	--	1.6E+00	2.5E-01	na	--	--	--	--	--	--	--	--	--	**1.6E+00**	**2.5E-01**	**na**	**--**
Ammonia-N (mg/l) (High Flow)	0	1.59E+00	#VALUE!	na	--	1.6E+00	#######	na	--	--	--	--	--	--	--	--	--	**1.6E+00**	**#VALUE!**	**na**	**--**
Anthracene	0	--	--	na	4.0E+04	--	--	na	4.0E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.0E+04**
Antimony	0	--	--	na	6.4E+02	--	--	na	6.4E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**6.4E+02**
Arsenic	0	3.4E+02	1.5E+02	na	--	3.4E+02	1.5E+02	na	--	--	--	--	--	--	--	--	--	**3.4E+02**	**1.5E+02**	**na**	**--**
Barium	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Benzene [C]	0	--	--	na	5.1E+02	--	--	na	5.1E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**5.1E+02**
Benzidine[C]	0	--	--	na	2.0E-03	--	--	na	2.0E-03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.0E-03**
Benzo (a) anthracene [C]	0	--	--	na	1.8E-01	--	--	na	1.8E-01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.8E-01**
Benzo (b) fluoranthene [C]	0	--	--	na	1.8E-01	--	--	na	1.8E-01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.8E-01**
Benzo (k) fluoranthene [C]	0	--	--	na	1.8E-01	--	--	na	1.8E-01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.8E-01**
Benzo (a) pyrene [C]	0	--	--	na	1.8E-01	--	--	na	1.8E-01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.8E-01**
Bis2-Chloroethyl Ether [C]	0	--	--	na	5.3E+00	--	--	na	5.3E+00	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**5.3E+00**
Bis2-Chloroisopropyl Ether	0	--	--	na	6.5E+04	--	--	na	6.5E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**6.5E+04**
Bis 2-Ethylhexyl Phthalate [C]	0	--	--	na	2.2E+01	--	--	na	2.2E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.2E+01**
Bromoform [C]	0	--	--	na	1.4E+03	--	--	na	1.4E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.4E+03**
Butylbenzylphthalate	0	--	--	na	1.9E+03	--	--	na	1.9E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.9E+03**
Cadmium	0	1.2E+00	5.0E-01	na	--	1.2E+00	5.0E-01	na	--	--	--	--	--	--	--	--	--	**1.2E+00**	**5.0E-01**	**na**	**--**
Carbon Tetrachloride [C]	0	--	--	na	1.6E+01	--	--	na	1.6E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.6E+01**
Chlordane [C]	0	2.4E+00	4.3E-03	na	8.1E-03	2.4E+00	4.3E-03	na	8.1E-03	--	--	--	--	--	--	--	--	**2.4E+00**	**4.3E-03**	**na**	**8.1E-03**
Chloride	0	8.6E+05	2.3E+05	na	--	8.6E+05	2.3E+05	na	--	--	--	--	--	--	--	--	--	**8.6E+05**	**2.3E+05**	**na**	**--**
TRC	0	1.9E+01	1.1E+01	na	--	1.9E+01	1.1E+01	na	--	--	--	--	--	--	--	--	--	**1.9E+01**	**1.1E+01**	**na**	**--**
Chlorobenzene	0	--	--	na	1.6E+03	--	--	na	1.6E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.6E+03**

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Chlorodibromomethane[C]	0	--	--	na	1.3E+02	--	--	na	1.3E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.3E+02**
Chloroform	0	--	--	na	1.1E+04	--	--	na	1.1E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.1E+04**
2-Chloronaphthalene	0	--	--	na	1.6E+03	--	--	na	1.6E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.6E+03**
2-Chlorophenol	0	--	--	na	1.5E+02	--	--	na	1.5E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.5E+02**
Chlorpyrifos	0	8.3E-02	4.1E-02	na	--	8.3E-02	4.1E-02	na	--	--	--	--	--	--	--	--	--	**8.3E-02**	**4.1E-02**	**na**	**--**
Chromium III	0	2.4E+02	3.2E+01	na	--	2.4E+02	3.2E+01	na	--	--	--	--	--	--	--	--	--	**2.4E+02**	**3.2E+01**	**na**	**--**
Chromium VI	0	1.6E+01	1.1E+01	na	--	1.6E+01	1.1E+01	na	--	--	--	--	--	--	--	--	--	**1.6E+01**	**1.1E+01**	**na**	**--**
Chromium, Total	0	--	--	1.0E+02	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Chrysene [C]	0	--	--	na	1.8E-02	--	--	na	1.8E-02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.8E-02**
Copper	0	5.0E+00	3.7E+00	na	--	5.0E+00	3.7E+00	na	--	--	--	--	--	--	--	--	--	**5.0E+00**	**3.7E+00**	**na**	**--**
Cyanide, Free	0	2.2E+01	5.2E+00	na	1.6E+04	2.2E+01	5.2E+00	na	1.6E+04	--	--	--	--	--	--	--	--	**2.2E+01**	**5.2E+00**	**na**	**1.6E+04**
DDD [C]	0	--	--	na	3.1E-03	--	--	na	3.1E-03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**3.1E-03**
DDE [C]	0	--	--	na	2.2E-03	--	--	na	2.2E-03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.2E-03**
DDT [C]	0	1.1E+00	1.0E-03	na	2.2E-03	1.1E+00	1.0E-03	na	2.2E-03	--	--	--	--	--	--	--	--	**1.1E+00**	**1.0E-03**	**na**	**2.2E-03**
Demeton	0	--	1.0E-01	na	--	--	1.0E-01	na	--	--	--	--	--	--	--	--	--	**--**	**1.0E-01**	**na**	**--**
Diazinon	0	1.7E-01	1.7E-01	na	--	1.7E-01	1.7E-01	na	--	--	--	--	--	--	--	--	--	**1.7E-01**	**1.7E-01**	**na**	**--**
Dibenz(a,h)anthracene [C]	0	--	--	na	1.8E-01	--	--	na	1.8E-01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.8E-01**
1,2-Dichlorobenzene	0	--	--	na	1.3E+03	--	--	na	1.3E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.3E+03**
1,3-Dichlorobenzene	0	--	--	na	9.6E+02	--	--	na	9.6E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**9.6E+02**
1,4-Dichlorobenzene	0	--	--	na	1.9E+02	--	--	na	1.9E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.9E+02**
3,3-Dichlorobenzidine[C]	0	--	--	na	2.8E-01	--	--	na	2.8E-01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.8E-01**
Dichlorobromomethane [C]	0	--	--	na	1.7E+02	--	--	na	1.7E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.7E+02**
1,2-Dichloroethane [C]	0	--	--	na	3.7E+02	--	--	na	3.7E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**3.7E+02**
1,1-Dichloroethylene	0	--	--	na	7.1E+03	--	--	na	7.1E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**7.1E+03**
1,2-trans-dichloroethylene	0	--	--	na	1.0E+04	--	--	na	1.0E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.0E+04**
2,4-Dichlorophenol	0	--	--	na	2.9E+02	--	--	na	2.9E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.9E+02**
2,4-Dichlorophenoxy acetic acid (2,4-D)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
1,2-Dichloropropane[C]	0	--	--	na	1.5E+02	--	--	na	1.5E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.5E+02**
1,3-Dichloropropene [C]	0	--	--	na	2.1E+02	--	--	na	2.1E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.1E+02**
Dieldrin [C]	0	2.4E-01	5.6E-02	na	5.4E-04	2.4E-01	5.6E-02	na	5.4E-04	--	--	--	--	--	--	--	--	**2.4E-01**	**5.6E-02**	**na**	**5.4E-04**
Diethyl Phthalate	0	--	--	na	4.4E+04	--	--	na	4.4E+04	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.4E+04**
2,4-Dimethylphenol	0	--	--	na	8.5E+02	--	--	na	8.5E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**8.5E+02**
Dimethyl Phthalate	0	--	--	na	1.1E+06	--	--	na	1.1E+06	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.1E+06**
Di-n-Butyl Phthalate	0	--	--	na	4.5E+03	--	--	na	4.5E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.5E+03**
2,4 Dinitrophenol	0	--	--	na	5.3E+03	--	--	na	5.3E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**5.3E+03**
2-Methyl-4,6-Dinitrophenol	0	--	--	na	2.8E+02	--	--	na	2.8E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.8E+02**
2,4-Dinitrotoluene [C]	0	--	--	na	3.4E+01	--	--	na	3.4E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**3.4E+01**
Dioxin 2,3,7,8-tetrachlorodibenzo-p-dioxin	0	--	--	na	5.1E-08	--	--	na	5.1E-08	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**5.1E-08**
1,2-Diphenylhydrazine[C]	0	--	--	na	2.0E+00	--	--	na	2.0E+00	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.0E+00**
Alpha-Endosulfan	0	2.2E-01	5.6E-02	na	8.9E+01	2.2E-01	5.6E-02	na	8.9E+01	--	--	--	--	--	--	--	--	**2.2E-01**	**5.6E-02**	**na**	**8.9E+01**
Beta-Endosulfan	0	2.2E-01	5.6E-02	na	8.9E+01	2.2E-01	5.6E-02	na	8.9E+01	--	--	--	--	--	--	--	--	**2.2E-01**	**5.6E-02**	**na**	**8.9E+01**
Alpha + Beta Endosulfan	0	2.2E-01	5.6E-02	--	--	2.2E-01	5.6E-02	--	--	--	--	--	--	--	--	--	--	**2.2E-01**	**5.6E-02**	**--**	**--**
Endosulfan Sulfate	0	--	--	na	8.9E+01	--	--	na	8.9E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**8.9E+01**
Endrin	0	8.6E-02	3.6E-02	na	6.0E-02	8.6E-02	3.6E-02	na	6.0E-02	--	--	--	--	--	--	--	--	**8.6E-02**	**3.6E-02**	**na**	**6.0E-02**
Endrin Aldehyde	0	--	--	na	3.0E-01	--	--	na	3.0E-01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**3.0E-01**

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Ethylbenzene	0	--	--	na	2.1E+03	--	--	na	2.1E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.1E+03**
Fluoranthene	0	--	--	na	1.4E+02	--	--	na	1.4E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.4E+02**
Fluorene	0	--	--	na	5.3E+03	--	--	na	5.3E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**5.3E+03**
Foaming Agents	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Guthion	0	--	1.0E-02	na	--	--	1.0E-02	na	--	--	--	--	--	--	--	--	--	**--**	**1.0E-02**	**na**	**--**
Heptachlor [C]	0	5.2E-01	3.8E-03	na	7.9E-04	5.2E-01	3.8E-03	na	7.9E-04	--	--	--	--	--	--	--	--	**5.2E-01**	**3.8E-03**	**na**	**7.9E-04**
Heptachlor Epoxide[C]	0	5.2E-01	3.8E-03	na	3.9E-04	5.2E-01	3.8E-03	na	3.9E-04	--	--	--	--	--	--	--	--	**5.2E-01**	**3.8E-03**	**na**	**3.9E-04**
Hexachlorobenzene[C]	0	--	--	na	2.9E-03	--	--	na	2.9E-03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.9E-03**
Hexachlorobutadiene[C]	0	--	--	na	1.8E+02	--	--	na	1.8E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.8E+02**
Hexachlorocyclohexane Alpha-BHC[C]	0	--	--	na	4.9E-02	--	--	na	4.9E-02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.9E-02**
Hexachlorocyclohexane Beta-BHC[C]	0	--	--	na	1.7E-01	--	--	na	1.7E-01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.7E-01**
Hexachlorocyclohexane Gamma-BHC[C] (Lindane)	0	9.5E-01	na	na	1.8E+00	9.5E-01	--	na	1.8E+00	--	--	--	--	--	--	--	--	**9.5E-01**	**--**	**na**	**1.8E+00**
Hexachlorocyclopentadiene	0	--	--	na	1.1E+03	--	--	na	1.1E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.1E+03**
Hexachloroethane[C]	0	--	--	na	3.3E+01	--	--	na	3.3E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**3.3E+01**
Hydrogen Sulfide	0	--	2.0E+00	na	--	--	2.0E+00	na	--	--	--	--	--	--	--	--	--	**--**	**2.0E+00**	**na**	**--**
Indeno (1,2,3-cd) pyrene [C]	0	--	--	na	1.8E-01	--	--	na	1.8E-01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.8E-01**
Iron	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Isophorone[C]	0	--	--	na	9.6E+03	--	--	na	9.6E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**9.6E+03**
Kepone	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	--	--	--	--	--	--	--	**--**	**0.0E+00**	**na**	**--**
Lead	0	3.1E+01	3.6E+00	na	--	3.1E+01	3.6E+00	na	--	--	--	--	--	--	--	--	--	**3.1E+01**	**3.6E+00**	**na**	**--**
Malathion	0	--	1.0E-01	na	--	--	1.0E-01	na	--	--	--	--	--	--	--	--	--	**--**	**1.0E-01**	**na**	**--**
Manganese	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Mercury	0	1.4E+00	7.7E-01	- -	- -	1.4E+00	7.7E-01	- -	- -	--	--	--	--	--	--	--	--	**1.4E+00**	**7.7E-01**	**- -**	**- -**
Methyl Bromide	0	--	--	na	1.5E+03	--	--	na	1.5E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.5E+03**
Methylene Chloride [C]	0	--	--	na	5.9E+03	--	--	na	5.9E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**5.9E+03**
Methoxychlor	0	--	3.0E-02	na	--	--	3.0E-02	na	--	--	--	--	--	--	--	--	--	**--**	**3.0E-02**	**na**	**--**
Mirex	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	--	--	--	--	--	--	--	**--**	**0.0E+00**	**na**	**--**
Nickel	0	7.5E+01	8.4E+00	na	4.6E+03	7.5E+01	8.4E+00	na	4.6E+03	--	--	--	--	--	--	--	--	**7.5E+01**	**8.4E+00**	**na**	**4.6E+03**
Nitrate (as N)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Nitrobenzene	0	--	--	na	6.9E+02	--	--	na	6.9E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**6.9E+02**
N-Nitrosodimethylamine[C]	0	--	--	na	3.0E+01	--	--	na	3.0E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**3.0E+01**
N-Nitrosodiphenylamine[C]	0	--	--	na	6.0E+01	--	--	na	6.0E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**6.0E+01**
N-Nitrosodi-n-propylamine[C]	0	--	--	na	5.1E+00	--	--	na	5.1E+00	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**5.1E+00**
Nonylphenol	0	2.8E+01	6.6E+00	--	--	2.8E+01	6.6E+00	na	--	--	--	--	--	--	--	--	--	**2.8E+01**	**6.6E+00**	**na**	**--**
Parathion	0	6.5E-02	1.3E-02	na	--	6.5E-02	1.3E-02	na	--	--	--	--	--	--	--	--	--	**6.5E-02**	**1.3E-02**	**na**	**--**
PCB Total[C]	0	--	1.4E-02	na	6.4E-04	--	1.4E-02	na	6.4E-04	--	--	--	--	--	--	--	--	**--**	**1.4E-02**	**na**	**6.4E-04**
Pentachlorophenol [C]	0	4.8E+00	3.7E+00	na	3.0E+01	4.8E+00	3.7E+00	na	3.0E+01	--	--	--	--	--	--	--	--	**4.8E+00**	**3.7E+00**	**na**	**3.0E+01**
Phenol	0	--	--	na	8.6E+05	--	--	na	8.6E+05	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**8.6E+05**
Pyrene	0	--	--	na	4.0E+03	--	--	na	4.0E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.0E+03**
Radionuclides	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Gross Alpha Activity (pCi/L)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Beta and Photon Activity (mrem/yr)	0	--	--	na	4.0E+00	--	--	na	4.0E+00	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.0E+00**
Radium 226 + 228 (pCi/L)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Uranium (ug/l)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Selenium, Total Recoverable	0	2.0E+01	5.0E+00	na	4.2E+03	2.0E+01	5.0E+00	na	4.2E+03	--	--	--	--	--	--	--	--	**2.0E+01**	**5.0E+00**	**na**	**4.2E+03**
Silver	0	5.7E-01	--	na	--	5.7E-01	--	na	--	--	--	--	--	--	--	--	--	**5.7E-01**	**--**	**na**	**--**
Sulfate	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
1,1,2,2-Tetrachloroethane[C]	0	--	--	na	4.0E+01	--	--	na	4.0E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.0E+01**
Tetrachloroethylene[C]	0	--	--	na	3.3E+01	--	--	na	3.3E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**3.3E+01**
Thallium	0	--	--	na	4.7E-01	--	--	na	4.7E-01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.7E-01**
Toluene	0	--	--	na	6.0E+03	--	--	na	6.0E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**6.0E+03**
Total dissolved solids	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Toxaphene [C]	0	7.3E-01	2.0E-04	na	2.8E-03	7.3E-01	2.0E-04	na	2.8E-03	--	--	--	--	--	--	--	--	**7.3E-01**	**2.0E-04**	**na**	**2.8E-03**
Tributyltin	0	4.6E-01	7.2E-02	na	--	4.6E-01	7.2E-02	na	--	--	--	--	--	--	--	--	--	**4.6E-01**	**7.2E-02**	**na**	**--**
1,2,4-Trichlorobenzene	0	--	--	na	7.0E+01	--	--	na	7.0E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**7.0E+01**
1,1,2-Trichloroethane[C]	0	--	--	na	1.6E+02	--	--	na	1.6E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.6E+02**
Trichloroethylene [C]	0	--	--	na	3.0E+02	--	--	na	3.0E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**3.0E+02**
2,4,6-Trichlorophenol [C]	0	--	--	na	2.4E+01	--	--	na	2.4E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.4E+01**
2-(2,4,5-Trichlorophenoxy) propionic acid (Silvex)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Vinyl Chloride[C]	0	--	--	na	2.4E+01	--	--	na	2.4E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.4E+01**
Zinc	0	4.8E+01	4.9E+01	na	2.6E+04	4.8E+01	4.9E+01	na	2.6E+04	--	--	--	--	--	--	--	--	**4.8E+01**	**4.9E+01**	**na**	**2.6E+04**

Notes:

1. All concentrations expressed as micrograms/liter (ug/l), unless noted otherwise
2. Discharge flow is highest monthly average or Form 2C maximum for Industries and design flow for Municipals
3. Metals measured as Dissolved, unless specified otherwise
4. "C" indicates a carcinogenic parameter
5. Regular WLAs are mass balances (minus background concentration) using the % of stream flow entered above under Mixing Information.
   Antidegradation WLAs are based upon a complete mix.
6. Antideg. Baseline = (0.25(WQC - background conc.) + background conc.) for acute and chronic
   = (0.1(WQC - background conc.) + background conc.) for human health
7. WLAs established at the following stream flows: 1Q10 for Acute, 30Q10 for Chronic Ammonia, 7Q10 for Other Chronic, 30Q5 for Non-carcinogens and Harmonic Mean for Carcinogens. To apply mixing ratios from a model set the stream flow equal to (mixing ratio - 1), effluent flow equal to 1 and 100% mix.

Metal	Target Value (SSTV)
Antimony	6.4E+02
Arsenic	9.0E+01
Barium	na
Cadmium	3.0E-01
Chromium III	1.9E+01
Chromium VI	6.4E+00
Copper	2.0E+00
Iron	na
Lead	2.1E+00
Manganese	na
Mercury	4.6E-01
Nickel	5.0E+00
Selenium	3.0E+00
Silver	2.3E-01
Zinc	1.9E+01

Note: do not use QL's lower than the minimum QL's provided in agency guidance

Stats.exe Analyses

Facility = Iluka- Concord Mine Concentrator Chemical = Ammonia Chronic averaging period = 30 WLAa = 1.6 WLAc = 0.25 Q.L. = .01 # samples/mo. = 1 # samples/wk. = 1 Summary of Statistics: # observations = 1 Expected Value = .06 Variance = .001296 C.V. = 0.6 97th percentile daily values = .146005 97th percentile 4 day average = .099827 97th percentile 30 day average= .072363 # < Q.L. = 0 Model used = BPJ Assumptions, type 2 data No Limit is required for this material The data are: 0.06 mg/L	Facility = Iluka- Concord Mine Concentrator Chemical = Chloride Chronic averaging period = 4 WLAa = 860 WLAc = 230 Q.L. = .1 # samples/mo. = 1 # samples/wk. = 1 Summary of Statistics: # observations = 1 Expected Value = 9.1 Variance = 29.8116 C.V. = 0.6 97th percentile daily values = 22.1440 97th percentile 4 day average = 15.1404 97th percentile 30 day average= 10.9750 # < Q.L. = 0 Model used = BPJ Assumptions, type 2 data No Limit is required for this material The data are: 9.1 mg/L

Ammonia and chloride were both detected at quantifiable levels and/or above an agency establish quantification level in the effluent. However no limit is needed to protect water quality standards.

Attachment F: NPDES Permit Rating Worksheet

NPDES PERMIT RATING WORK SHEET

? Regular Addition
? DiscretionaryAddition
? Score change, but no status change
? Deletion

NPDES NO. VA0091456

Facility Name: Iluka Resources Inc- Concord Mine Concentrator

City: Sussex County

Receiving Water: Unnamed Tributary to Hardwod Creek

Reach Number: Rivermile 5AXFQ001.02

Is this facility a steam electric power plant (SIC=4911) with one or more of the following characteristics?
1. Power output 500 MW or greater (not using a cooling pond/lake)
2. A nuclear power plant
3. Cooling water discharge greater than 25% of the receiving stream's 7Q10 flow rate

? YES; score is 600 (stop here) X NO (continue)

Is this permit for a municipal separate storm sewer serving a population greater than 100,000?

? YES; score is 700 (stop here)
X NO (continue)

FACTOR 1: Toxic Pollutant Potential

PCS SIC Code: _____ Primary SIC Code: 1099 Other SIC Codes:
Industrial Subcategory Code: _____ (Code 000 if no subcategory)

Determine the Toxicity potential from Appendix A. Be sure to use the TOTAL toxicity potential column and check one)

Toxicity Group	Code	Points	Toxicity Group	Code	Points	Toxicity Group	Code	Points
? No process waste streams	0	0	? 3.	3	15	? 7.	7	35
? 1.	1	5	X 4.	4	20	? 8.	8	40
? 2.	2	10	? 5.	5	25	? 9.	9	45
			? 6.	6	30	? 10.	10	50

Code Number Checked: _4____

Total Points Factor 1: 20

FACTOR 2: Flow/Stream Flow Volume (*Complete either Section A or Section B; check only one)*

Section A ? Wastewater Flow Only Considered

Wastewater Type (See Instructions)		Code	Points
Type I: Flow < 5 MGD	?	11	0
Flow 5 to 10 MGD	?	12	10
Flow > 10 to 50 MGD	?	13	20
Flow > 50 MGD	?	14	30
Type II: Flow < 1 MGD	?	21	10
Flow 1 to 5 MGD	X	22	20
Flow > 5 to 10 MGD	?	23	30
Flow > 10 MGD	?	24	50
Type III: Flow < 1 MGD	?	31	0
Flow 1 to 5 MGD	?	32	10
Flow > 5 to 10 MGD	?	33	20
Flow > 10 MGD	?	34	30

Section B ? Wastewater and Stream Flow Considered

Wastewater Type (See Instructions)	Percent of instream Wastewater Concentration at Receiving Stream Low Flow		Code	Points
Type I/III:	< 10 %	?	41	0
	10 % to < 50 %	?	42	10
	> 50 %	?	43	20
Type II:	< 10 %	?	51	0
	10 % to <50 %	?	52	20
	> 50 %	?	53	30

Code Checked from Section A or B: _22____
Total Points Factor 2: 20

FACTOR 3: Conventional Pollutants NPDES NO:
(only when limited by the permit)

A. Oxygen Demanding Pollutant: (check one) ? BOD ? COD ? Other:_____

			Code	*Points*
Permit Limits: (check one)	?	< 100 lbs/day	1	0
	?	100 to 1000 lbs/day	2	5
	?	> 1000 to 3000 lbs/day	3	15
	?	> 3000 lbs/day	4	20

Code Checked: _NA____

Points Scored:__0____

B. Total Suspended Solids (TSS)

			Code	*Points*
Permit Limits: (check one)	?	< 100 lbs/day	1	0
	X	100 to 1000 lbs/day	2	5
30 mg/L @ 3.168 MGD	?	> 1000 to 5000 lbs/day	3	15
~793 lbs/d	?	> 5000 lbs/day	4	20

Code Checked: _2____

Points Scored: __5___

C. Nitrogen Pollutant: (check one) X Ammonia ? Other: _____

		Nitrogen Equivalent	*Code*	*Points*
Permit Limits: (check one)	X	< 300 lbs/day	1	0
	?	300 to 1000 lbs/day	2	5
	?	> 1000 to 3000 lbs/day	3	15
	?	> 3000 lbs/day	4	20

0.02 mg/L at 3.168 MGD
~0.53 lbs/day

Code Checked: _1____

Points Scored:___0___

Total Points Factor 3: __5___

FACTOR 4: Public Health Impact

Is there a public drinking water supply located within 50 miles downstream of the effluent discharge (this includes any body of water to which the receiving water is a tributary)? A public drinking water supply may include infiltration galleries, or other methods of conveyance that ultimately get water from the above referenced supply.

X YES (If yes, check toxicity potential number below)

? NO (If no, go to Factor 5)

Determine the *human health* toxicity potential from Appendix A. Use the same SIC code and subcategory reference as in Factor 1. (Be sure to use the human health toxicity group column ? check one below)

Toxicity Group	Code	Points	Toxicity Group	Code	Points	Toxicity Group	Code	Points
? No process waste streams	0	0	? 3.	3	0	? 7.	7	15
X 1.	1	0	? 4.	4	0	? 8.	8	20
? 2.	2	0	? 5.	5	5	? 9.	9	25
			? 6.	6	10	? 10.	10	30

Code Number Checked: ___1__

Total Points Factor 4:__0___

FACTOR 5: Water Quality Factors NPDES NO.

A. *Is (or will) one or more of the effluent discharge limits based on water quality factors of the receiving stream (rather than technology-based federal effluent guidelines, or technology-based state effluent guidelines), or has a wasteload allocation been assigned to the discharge:*

		Code	Points
X	Yes	1	10
?	No	2	0

B. *Is the receiving water in compliance with applicable water quality standards for pollutants that are water quality limited in the permit?*

		Code	Points
X	Yes	1	0
?	No	2	5

C. *Does the effluent discharged from this facility exhibit the reasonable potential to violate water quality standards due to whole effluent toxicity?*

		Code	Points
?	Yes	1	10
X	No	2	0

Code Number Checked: A __1 B _1 C 2__

Points Factor 5: A 10 + B 0 + C 0 = 10 TOTAL

FACTOR 6: Proximity to Near Coastal Waters

A. *Base Score: Enter flow code here (from Factor 2):* 22 *Enter the multiplication factor that corresponds to the flow code:* _0.30____

Check appropriate facility HPRI Code (from PCS):

	HPRI#	*Code*	*HPRI Score*
?	1	1	20
?	2	2	0
?	3	3	30
X	4	4	0
?	5	5	20

Flow Code	*Multiplication Factor*
11, 31, or 41	0.00
12, 32, or 42	0.05
13, 33, or 43	0.10
14 or 34	0.15
21 or 51	0.10
22 or 52	0.30
23 or 53	0.60
24	1.00

HPRI code checked: 4

Base Score: (HPRI Score) 0 X (Multiplication Factor) 0.30_ = 0 (TOTAL POINTS)

B. *Additional Points ? NEP Program*
For a facility that has an HPRI code of 3, does the facility discharge to one of the estuaries enrolled in the National Estuary Protection (NEP) program (see instructions) or the Chesapeake Bay?

		Code	Points
?	Yes	1	10
?	No	2	0

NA

C. *Additional Points ? Great Lakes Area of Concern*
For a facility that has an HPRI code of 5, does the facility discharge any of the pollutants of concern into one of the Great Lakes' 31 areas of concern (see Instructions)

		Code	Points
?	Yes	1	10
?	No	2	0

NA

Code Number Checked: A 4 B NA C _NA

Points Factor 6: A 0 + B NA + C NA = 0 TOTAL

SCORE SUMMARY NPDES NO.

Factor	Description	Total Points
1	Toxic Pollutant Potential	20
2	Flows/Streamflow Volume	20
3	Conventional Pollutants	5
4	Public Health Impacts	0
5	Water Quality Factors	10
6	Proximity to Near Coastal Waters	0
	TOTAL (Factors 1 through 6)	55

S1. Is the total score equal to or greater than 80? ? Yes (Facility is a major) X No

S2. If the answer to the above questions is no, would you like this facility to be discretionary major?

X No

? Yes (Add 500 points to the above score and provide reason below:

Reason:

NEW SCORE: 55

OLD SCORE: 55

Janine Howard
Permit Reviewer's Name

(804) 527-5046
Phone Number

December 15, 2010
Date

Attachment G: DGIF report

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VaFWIS Search Report Compiled on 11/1/2010, 3:49:21 PM

Help

Known or likely to occur within a **2 mile radius of null**
(at 36,53,39.9 77,34,39.9)
in **053 Dinwiddie County, 081 Greensville County, 183 Sussex County, VA**

94 Known or Likely Species ordered by Status Concern for Conservation
(displaying first 20) (10 species with Status* or Tier I**)

BOVA Code	Status*	Tier**	Common Name	Scientific Name	Confirmed	Database(s)
010214	FESE	I	Logperch, Roanoke	Percina rex	Yes	TEWaters,BOVA,HU6
060003	FESE	II	Wedgemussel, dwarf	Alasmidonta heterodon	Yes	TEWaters,HU6
010347	SE	I	Sunfish, blackbanded	Enneacanthus chaetodon		BOVA
060173	FSST	II	Pigtoe, Atlantic	Fusconaia masoni	Yes	TEWaters,HU6
060029	FSSS	III	Lance, yellow	Elliptio lanceolata		HU6
070105	FS	III	Crayfish, Chowanoke	Orconectes virginiensis		BOVA,HU6
010077	SS	I	Shiner, bridle	Notropis bifrenatus		BOVA
010174	SS	II	Bass, Roanoke	Ambloplites cavifrons		BOVA,HU6
010032	SS	II	Sturgeon, Atlantic	Acipenser oxyrinchus		BOVA
060071	SS	III	Lampmussel, yellow	Lampsilis cariosa		HU6
060145		III	Rainbow, notched	Villosa constricta		BOVA,HU6
010038		IV	Alewife	Alosa pseudoharengus		BOVA
010107		IV	Chubsucker, lake	Erimyzon sucetta		BOVA
010131		IV	Eel, American	Anguilla rostrata		BOVA,HU6
010359		IV	Lamprey, American brook	Lampetra appendix		HU6
010040		IV	Shad, American	Alosa sapidissima		BOVA,HU6
010375		IV	Shiner, ironcolor	Notropis chalybaeus		BOVA
010179		IV	Sunfish, banded	Enneacanthus obesus		BOVA
010173		IV	Sunfish, mud	Acantharchus pomotis		BOVA,HU6
010149		IV	Swampfish	Chologaster cornuta		BOVA,HU6

To view **All 94 species** View 94

• | DGIF |

* FE=Federal Endangered; FT=Federal Threatened; SE=State Endangered; ST=State Threatened; FP=Federal Proposed; FC=Federal Candidate; FS=Federal Species of Concern; SC=State Candidate; CC=Collection Concern; SS=State Special Concern

** I=VA Wildlife Action Plan - Tier I - Critical Conservation Need; II=VA Wildlife Action Plan - Tier II - Very High Conservation Need; III=VA Wildlife Action Plan - Tier III - High Conservation Need; IV=VA Wildlife Action Plan - Tier IV - Moderate Conservation Need

Anadromous Fish Use Streams (1 records)

View Map of All Anadromous Fish Use Streams

Stream ID	Stream Name	Reach Status	Anadromous Fish Species			View Map
			Different Species	Highest TE*	Highest Tier**	
C55	Nottoway River	Confirmed	4		IV	Yes

Impediments to Fish Passage (2 records)

View Map of All Fish Impediments

ID	Name	River	View Map
278	PARSONS NO.1 DAM	MANLOVE BR. OF HARRIS SWAMP	Yes
279	PARSONS NO.2 DAM	MANLOVE BR. OF HARRIS SWAMP	Yes

Threatened and Endangered Waters (1 Reaches)

View Map of All Threatened and Endangered Waters

Stream Name	T&E Waters Species						View Map
	Highest TE*	BOVA Code, Status*, Tier**, Common & Scientific Name					
Nottoway River (03010201)	FESE	010214	FESE	I	Logperch, Roanoke	Percina rex	Yes
		060003	FESE	II	Wedgemussel, dwarf	Alasmidonta heterodon	
		060173	FSST	II	Pigtoe, Atlantic	Fusconaia masoni	

Cold Water Stream Survey (Trout Streams)
Managed Trout Species

N/A

Scientific Collections

N/A

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- Site tested using browsers Firefox 2+, IE 6+, Opera 9+, and Safari 4 (AMD November 01, 2010 3:49:28PM piedmont I 314514)
- W3C HTML validation <BASE href="http://www.vafwis.org/fwis/NewPages/">VaFWIS_report_search.asp

Howard, Janine (DEQ)

From: Aschenbach, Ernie (DGIF)
Sent: Monday, March 21, 2011 10:50 AM
To: Howard, Janine (DEQ); Daub, Elleanore (DEQ)
Cc: ProjectReview (DGIF); Cindy Kane (cindy_kane@fws.gov); Watson, Brian (DGIF); Pinder, Mike (DGIF)
Subject: ESSLog# 31404; VPDES re-issuance permit No. VA0091456, ILUKA Resources Inc. Concord Mine Concentrator recieving stream UT to Hardwood Creek, headwater trib to Nottoway River, near Stoney Cr., Virginia

We have reviewed the VPDES re-issuance for the above-referenced facility. The facility discharges into an intermittent unnamed tributary to Hardwood Creek, a headwater tributary to the Nottoway River.

According to our records, According to our records, the federally Endangered state Endangered (FESE) Roanoke logperch, FESE dwarf wedgemussel, and federal Species of Concern state Threatened (FSST) Atlantic pigtoe are known from the Nottoway River. The Nottoway River is a designated T&E species water for these species. The discharge is approximately 3.5 river miles from the confluence of Hardwood Creek with the Nottoway River.

Provided the project adheres to the effluent limitations and monitoring requirements specified in the permit, we do not anticipate the re-issuance of this existing permit to result in adverse impact to this designated T&E waters or its associated species. We recommend contacting the USFWS regarding all federally listed species.

Thank you for the opportunity to provide comments.

Ernie Aschenbach

Environmental Services Biologist

Virginia Dept. of Game and Inland Fisheries

4010 West Broad Street

Richmond, VA 23230

Phone: (804) 367-2733

FAX: (804) 367-2427

Email: Ernie.Aschenbach@dgif.virginia.gov

Attachment H: WETLIM results, Toxics Management Plan (TMP) Memorandum

MEMORANDUM

DEPARTMENT OF ENVIRONMENTAL QUALITY
Piedmont Regional Office

4949-A Cox Road, Glen Allen, VA 23060-6296 **804/527-5020**

SUBJECT: **Whole Effluent Toxicity (WET) Test Data Review and Permit Language: Iluka Resources- Concord Mine Concentrator, VPDES VA0091456**

TO: **Deborah DeBiasi, CO- WET**

FROM: **Janine Howard**

DATE: **December 13, 2010; Amended December 14, 2010**

Facility Name: Concord Mine Concentrator, Sussex County
Permit Number: VA0091456
Receiving Stream: UT to Hardwood Creek
Facility SIC: 1099
In-stream Waste Concentration (IWC): Outfall 001: IWC_{acute} 100%, $IWC_{chronic}$ 100%
Effluent Design Flow: 3.168 MGD

FACILITY DESCRIPTION
Iluka Resource Inc. mines heavy mineral sands for ilmenite, zircon, and staurolite. This is the first reissuance for Concord Mine Concentrator (VA0091456). At the concentrator plants the facility uses process water to move and separate mineral sands from clay and gangue minerals in the ore body. Coarse waste material such as pebbles, gravel, and quartz sand is removed from the process water during the physical separation using screens and a gravity separation drum. The process water enters a thickener, where suspended clays will settle out with the aid of biodegradable flocculent. The settled clays are pumped along with the previously removed coarse materials, to tailings ponds for disposal and post-mining land reclamation. The water then flows from the thickener to the operational units associated with VA0091456, three Settling Ponds (clarifying pond, processing pond, and clearwater pond). The ponds are used to settle fine solids from the process water. The water is then recycled back into the plant in most circumstances. The applicant predicts that the Clearwater Pond will seldom discharge because the concentrator process includes the recycling and reuse of most of its water supply. Discharge is often weather-dependant and discharges are most common during periods of high precipitation. The combined volume of the 3 ponds is 12,830,677 gallons. Under normal operation conditions (2000 gal per day discharged at 001) the ponds provide 4 days of retention time.

This facility is subject to the Industrial Storm Water General Permit under permit number VAR051396, which addresses storm water runoff from the site.

FACILITY REQUIREMENTS
The expiring VPDES permit contains a WET Testing Program (Biological Monitoring) that required four acute toxicity tests to be run in the first year following the permit issuance with a minimum of one month between each set of tests. The WET special condition required two 48 Hour Static Acute Tests using *Ceriodaphnia dubia* and *Pimephales promelas* with a test endpoint of NOAEC = 100%. A review of the four test results submitted by the facility in 2006 and 2007 indicated no water quality concerns with each test meeting the NOAEC = 100% endpoint. The special condition required grab samples and all toxicity tests were completed by Coastal Bioanalysts, Inc.

The proposed special condition language for the Concord Mine Concentrator is attached. Also attached is the WETLIM10 spreadsheet which was used to compute the endpoints for the acute toxicity testing contained in the special condition.

DATA SUMMARY

This data presented below is from the first year of the previous permit issuance. Results of the whole effluent toxicity tests performed on samples since the permit issuance in 2006 indicate compliance with the WET Program in the permit.

Table 1: Results of Acute Toxicity Tests *Ceriodaphnia dubia*.

TEST DATE	**TEST RESULT**	**% SURVIVAL IN 100% EFFLUENT**
June 2006	NOEC= 100%	100%
August 2006	NOEC= 100%	100%
November 2006	NOEC= 100%	100%
March 2007	NOEC= 100%	100%

Table 2: Results of Acute Toxicity Tests *Pimephales promelas*.

TEST DATE	**TEST RESULT**	**% SURVIVAL IN 100% EFFLUENT**
June 2006	NOEC= 100%	100%
August 2006	NOEC= 100%	100%
November 2006	NOEC= 100%	100%
March 2007	NOEC= 100%	100%

CONCLUSION & RECOMMENDATIONS
DEQ recommends that the 2011 permit include annual acute toxicity testing with *Ceriodaphnia dubia* and *Pimephales promela*s, to show compliance with an endpoint of NOAEC = 100%. Draft WET special condition language follows.

****

C. Whole Effluent Toxicity (WET) Monitoring Program

1. Commencing within one (1) month of the effective date of this permit, the permittee shall perform annual toxicity testing on Outfall 001 using 24-hour composite samples. If the discharge is not continuous, then the requirement to collect a 24-hour composite sample shall be interpreted as a composite collected during the duration of discharge for a typical operating day. The acute tests to use are:

   48 Hour Static Acute Test with *Ceriodaphnia dubia*
   48 Hour Static Acute Test with *Pimephales promelas*

   These acute tests are to be conducted using 5 geometric dilutions of effluent with a minimum of 4 replicates, with 5 organisms in each. The NOAEC (No Observed Adverse Effect Concentration), as determined by hypothesis testing, shall be reported on the DMR. The LC50 should also be determined and noted on the submitted report. Tests in which control survival is less than 90% are not acceptable.

2. The test dilutions should be able to determine compliance with the following endpoint(s):

   NOAEC = 100%

3. The permittee may provide additional samples to address data variability. These data shall be reported and may be included in the evaluation of effluent toxicity. Test procedures and reporting shall be in accordance with the WET testing methods cited in 40 CFR 136.3

4. The test data will be evaluated statistically for reasonable potential at the conclusion of the test period. The data may be evaluated sooner if requested by the permittee, or if toxicity has been noted. Should the DEQ evaluation of the data indicate that a limit is a WET limit and compliance schedule will be required and following written notification from the DEQ of the need for including a WET limit, the toxicity tests of Part I.D.1 may be discontinued.

5. The permit may be modified or revoked and reissued to include pollutant specific limits in lieu of a WET limit should it be demonstrated that toxicity is due to specific parameters. The pollutant specific limits must control the toxicity of the effluent.

6. The permittee shall report the results on the DMR and submit a copy of each toxicity test report in accordance with the following schedule:

Reporting Schedule:

The permittee shall report the results on the DMR and submit a copy of each toxicity test reports specified in this Toxics Management Program in accordance with the following schedule:

Period	Test Period Dates	Compliance Date
Annual 1	May 1, 2011- April 30, 2012	May 10, 2012
Annual 2	May 1, 2012- April 30, 2013	May 10, 2013
Annual 3	May 1, 2013- April 30, 2014	May 10, 2014
Annual 4	May 1, 2014- April 30, 2015	May 10, 2015
Annual 5	May 1, 2015- March 30, 2016	April 10, 2016 .

In the event that sampling of Outfall 001 is not possible due to the absence of effluent flow during a particular testing period, the permittee shall provide written notification to the Department's Piedmont Regional Office with the DMR submitted for the month following the period in which the toxicity tests were to have been conducted.

Virginia DEQ
Deborah L. DeBiasi
804-698-4028 dldebiasi@deq.virginia.gov

Spreadsheet for determination of WET test endpoints or WET limits

Excel 97
Revision Date: 01/10/05
File: WETLIM10.xls
(MIX.EXE required also)

Acute Endpoint/Permit Limit — **Use as LC_{50} in Special Condition, as TUa on DMR**

ACUTE	100% =	NOAEC	LC_{50} =	NA	% Use as	NA	TUa
ACUTE WLAa		0.3					

Note: Inform the permittee that if the mean of the data exceeds this TUa: 1.0 a limit may result using WLA.EXE

Chronic Endpoint/Permit Limit — **Use as NOEC in Special Condition, as TUc on DMR**

CHRONIC	1.462574684	TU_c	NOEC =	69	% Use as	1.44	TU_c
BOTH*	3.000000074	TU_c	NOEC =	34	% Use as	2.94	TU_c
AML	1.462574684	TU_c	NOEC =	69	% Use as	1.44	TU_c

ACUTE WLAa,c	3	
CHRONIC WLAc	1	

Note: Inform the permittee that if the mean of the data exceeds this TUc: 1.0 a limit may result using WLA.EXE

* Both means acute expressed as chronic

Enter data in the cells with blue type:

Entry Date:	12/15/10	
Facility Name:	Iluka- Concord Mine Conc	
VPDES Number:	VA0091456	
Outfall Number:	1	

			% Flow to be used from MIX.EXE		Difuser /modeling study?		
Plant Flow:	3.168	MGD			Enter Y/N	N	
Acute 1Q10:	0	MGD	100	%	Acute	1	:1
Chronic 7Q10:	0	MGD	100	%	Chronic	1	:1

Are data available to calculate CV? (Y/N)	N	(Minimum of 10 data points, same species, needed)	Go to Page 2
Are data available to calculate ACR? (Y/N)	N	(NOEC<LC50, do not use greater/less than data)	Go to Page 3

IWC_a	100	%	Plant flow/plant flow + 1Q10
IWC_c	100	%	Plant flow/plant flow + 7Q10
Dilution, acute	1		100/IWCa
Dilution, chronic	1		100/IWCc

NOTE: If the IWCa is >33%, specify the NOAEC = 100% test/endpoint for use

WLA_a	0.3	Instream criterion (0.3 TUa) X's Dilution, acute
WLA_c	1	Instream criterion (1.0 TUc) X's Dilution, chronic
$WLA_{a,c}$	3	ACR X's WLA_a - converts acute WLA to chronic units
ACR -acute/chronic ratio	10	LC50/NOEC (Default is 10 - if data are available, use tables Page 3)
CV-Coefficient of variation	0.6	Default of 0.6 - if data are available, use tables Page 2)
Constants eA	0.4109447	Default = 0.41
eB	0.6010373	Default = 0.60
eC	2.4334175	Default = 2.43
eD	2.4334175	Default = 2.43 (1 samp)

No. of samples: 1

****The Maximum Daily Limit is calculated from the lowest LTA, X's eC. The LTAa,c and MDL using it are driven by the ACR.**

$LTA_{a,c}$	1.2328341	WLAa,c X's eA						
LTA_c	0.6010373	WLAc X's eB				Rounded NOEC's		%
MDL** with $LTA_{a,c}$	3.000000074	TU_c	NOEC =	33.333333	(Protects from acute/chronic toxicity)	NOEC =	34	%
MDL** with LTA_c	1.462574684	TU_c	NOEC =	68.372577	(Protects from chronic toxicity)	NOEC =	69	%
AML with lowest LTA	1.462574684	TU_c	NOEC =	68.372577	Lowest LTA X's eD	NOEC =	69	

IF ONLY ACUTE ENDPOINT/LIMIT IS NEEDED, CONVERT MDL FROM TU_c to TU_a

						Rounded LC50's		%
MDL with $LTA_{a,c}$	0.300000007	TU_a	LC50 =	333.333325	% Use NOAEC=100%	LC50 =	NA	%
MDL with LTA_c	0.146257468	TU_a	LC50 =	683.725769	% Use NOAEC=100%	LC50 =	NA	

Attachment I: Groundwater Monitoring Plan (Approved 7/22/2005) and Data Evaluation

COMMONWEALTH of VIRGINIA

DEPARTMENT OF ENVIRONMENTAL QUALITY

W. Tayloe Murphy, Jr.
Secretary of Natural Resources

PIEDMONT REGIONAL OFFICE
4949-A Cox Road
Glen Allen, Virginia 23060
(804) 527-5020
Fax (804) 527-5106
www.deq.virginia.gov

Robert G. Burnley
Director

Gerard Seeley, Jr.
Piedmont Regional Director

July 28, 2005

Mr. Jack Rayburn
Environmental Health and Safety Officer
Iluka Resources Inc.
12472 St. Johns Church Rd.
Stony Creek, VA 23882-3039

RE: Groundwater monitoring plan for VPDES Permit No. VA0091456 – Concord Mine Concentrator

Dear Mr. Rayburn:

The proposed groundwater monitoring plan received at this office on July 22nd is approved as part of the requirements for the issuance of the referenced permit.

If you have any questions, please contact me at (804) 527-5081 or cdchamberlain@deq.virginia.gov.

Sincerely,

Corwin Chamberlain
Environmental Specialist II

cc: Eric Powers, Marshall Miller & Assoc.

RECEIVED
JUL 22 2005
PRO

ILUKA RESOURCES INC.

July 20, 2005

RE: Revision to Proposed Groundwater Monitoring Plan – Iluka Resources Inc.
Concord Mine Concentrator Site, Sussex County

Corwin Chamberlain
Environmental
Department of Environmental Quality
Piedmont Regional Office
4949-A Cox Road
Glen Allen, VA 23060

Dear Mr. Chamberlain:

Iluka Resources is submitting this revised proposed Groundwater Monitoring Plan for the Concord Mine Concentrator Site in Sussex County for your review. The groundwater monitoring plan is modeled after the one previously approved (September 22, 2000) for the Hickory Mine Concentrator and Mineral Separation Plant (MSP) and has incorporated your comments from July 14. Tables 1 – 3 as well as the attached map have been revised. Iluka proposes to install three (3) monitoring wells at the Concord Mine Concentrator site and conduct semi-annual sampling for specified parameters listed in Table 3. Iluka also proposes to combine the reporting for the semi-annual groundwater sampling at Concord with the semi-annual groundwater sampling report submitted for the Hickory Mine Concentrator and MSP sites. If you have any questions please contact me at 434.348.4300 or jack.rayburn@iluka.com.

Regards,

Jack Rayburn
EHS Supervisor

Attachment:

1) Revised Proposed Groundwater Monitoring Plan, Iluka Resources Inc.,
Concord Mine Concentrator Site, Sussex County

Cc: Eric Powers, CPG, Marshall Miller & Associates

ILUKA RESOURCES INC.
12472 St. Johns Church Road, Stony Creek, VA 23882-8016
Tel: (434) 246-8016 Fax: (434) 246-3039

Revised
Proposed Groundwater Monitoring Plan
Iluka Resources Inc.
Concord Mine Concentrator Site, Sussex County

Iluka Resources Inc. operates a mineral sands mining and mineral separation operation in Dinwiddie and Sussex Counties in southeastern Virginia. The mining operations consists of two active surface mining operations which are associated with two mine concentrators – the Hickory Mine Concentrator in Dinwiddie County and the Concord Mine Concentrator in Sussex County. Mineral sand concentrate produced by the mine concentrators is trucked to the Mineral Separation Plant (MSP) in Stony Creek where it is processed into the final mineral sand products - Ilmenite and Zircon.

Groundwater Monitoring Plan

Iluka proposes to monitor the surficial water-table aquifer at the Concord Mine Concentrator site using a set of three (3) monitoring wells installed in the vicinity of the site. One (1) monitoring well will be an up-gradient well which serves to monitor background groundwater conditions. Two (2) additional monitoring wells will be installed to monitor water quality down-gradient of major operations at the mine concentrator. The details of the proposed groundwater monitoring system are described in the following sections.

Well Construction and Installation Details

A series of three (3) shallow water-table monitoring wells are proposed for the Concord Mine Concentrator Site to monitor groundwater quality. The locations of these wells CMW-1 through CMW-3, are shown on Figure 1. The rationale for the placement of these wells was discussed previously and will be summarized in Table 1.

Wells will be installed to a maximum depth of twenty-five (25) feet below land surface. Total depth for each well will be determined at the time of installation, and based on the estimated depth to groundwater. Wells will be installed such that they extend a maximum of twenty (20) feet below the estimated water-table.

The monitoring wells shall be constructed of 2-inch diameter Schedule 40 threaded PVC well screen (0.010-inch machine slot) and casing. Each well shall be constructed such that a minimum of five (5) feet of well casing will be installed below grade to provide adequate vertical space to install a proper well seal. The annular space around the well shall be filled with clean 20 – 30 silica sand to one (1) to two (2) feet above the screened interval. A one (1) to two (2) foot thick hydrated bentonite seal shall be installed above the filter pack. The remaining one (1) to two (2) feet of annular space from the top of the bentonite seal to the ground surface shall be filled with Type-I neat cement grout (with 5% bentonite).

Wells will be finished at the surface as either above-grade or flush-to-grade installations. The above-grade completions shall consist of a 4-inch square aluminum, or comparable, well protector with a lockable hinged cover set into a three (3) foot by three (3) foot square concrete pad. The well shall be capped with a two (2) inch diameter PVC slip cap. A small hole with be drilled through the PVC casing at least an inch below the bottom of the slip cap.

Flush-to-grade completions will only be utilized in traffic areas. For this type of installation, the wellhead will be completed inside a 10-inch diameter steel manhole with bolt-on cover set into a 2-foot by 2-foot square concrete pad that has been sloped to shed water. The well will be fitted with a lockable expanding plug-type cap and padlock.

Installation Timeframe

Iluka proposes to install the three (3) wells – CMW-1 – CMW-3 – within sixty (60) days following approval of the groundwater monitoring plan.

Sampling Frequency and Analytes

The proposed sampling frequency and analytes for each well are shown in Table 2. All wells on the Concord Mine Concentrator site will be analyzed semi-annually (twice per year) for pH, total dissolved solids (TDS), total suspended solids (TSS), sodium (Na), and conductivity. In addition, since CMW-2 is located closest to the fuel farm where hydrocarbon fuels and lubricants are stored, it will be sampled and analyzed semi-annually for Diesel Range Organics (DRO) and Gasoline Range Organics (GRO) using EPA Method 8015.

Reporting

Following the completion of each sampling event, a letter-report will be submitted to the Virginia Department of Environmental Quality (DEQ) Piedmont Regional Office (PRO). The report will combine results from the groundwater sampling conducted at the Hickory Mine Concentrator site and the Mineral Separation Plant (MSP). The report will include a brief description of the wells sampled, a summary table of laboratory results, a description of any unusual observations made during the sampling event, and a copy of the certified laboratory analytical report. The semi-annual report shall be submitted to the DEQ-PRO within ten (10) days following the end of July and January. Table 3 presents a proposed timetable for sampling and reporting.

Table 1
Rationale for Monitoring Well Locations
Groundwater Sampling Plan
Iluka Resources Inc.
Concord Mine Concentrator Site

Monitoring Well No.	Rationale
CMW-1	Background groundwater monitoring station. Well to be located north of parking lots, mine office trailer and east of site deep well.
CMW-2	Down-gradient of Clarifying Pond and Fuel Farm. Well to be located northwest of Clarifying Pond, southwest of Fuel Farm between the tree line and prior disturbed areas.
CMW-3	Down-gradient of Clarifying Pond and Process Water Pond. Well to be located southwest of southwest corner of the Process Water Pond between roads and tree line.

Table 2
Proposed Analytes and Sampling Frequency
Groundwater Sampling Plan
Iluka Resources Inc.
Concord Mine Concentrator Site

Monitoring Well No.	Analytes	Frequency
CMW-1	pH, TDS, TSS, Conductivity, Na	Semi-annual
CMW-2	pH, TDS, TSS, Conductivity, Na, DRO, GRO	Semi-annual
CMW-3	pH, TDS, TSS, Conductivity, Na	Semi-annual

TDS = Total Dissolved Solids
TSS = Total Suspended Solids
Na = Sodium
DRO = Diesel Range Organics (EPA Method 8015)
GRO = Gasoline Range Organics (EPA Method 8015)

Table 3

Proposed Sampling and Reporting Timetable
Groundwater Monitoring Plan
Iluka Resources Inc.
Concord Mine Concentrator Site

Monitoring Period	Sampling Event Type of Event	Report Due Due Date	Date
January – March	Quarterly	March 31	April 10
April – June	Semi-annual *	June 31	July 10
July – September	Quarterly	September 31	October 10
October – December	Semi-annual *	December 31	January 10

The report and results of the semi-annual sampling proposed for the four (4) monitoring wells to be installed at the Concord Mine Concentrator Site will be combined with the report for the groundwater monitoring conducted at the Hickory Mine Concentrator site and Mineral Separation Plant (MSP) site. Monitoring wells MW-1, MW-4 and MW-5 at the Mineral Separation Plant (MSP) site are required to be sampled quarterly while the remainder of the monitoring wells installed at the MSP site (MW-7, MW-8, and MW-11) as well as the monitoring wells at the Hickory Mine Concentrator MW-A through MW-D) require semi-annual sampling.

Prepared By:

Marshall Miller and Associates
Geology, Environmental Sciences & Engineering, Geophysics

- Bluefield, VA
- Lexington, KY
- Raleigh, NC
- Richmond, VA
- Charleston, WV
- Harrisburg, PA
- Lenexa, KS
- Kingsport, TN
- Morgantown, WV
- Bossier City, LA

DESIGNED:	ERP
DRAWN:	BPW
CHECKED:	CLS
DATE:	07/06/05
SCALE:	1" = 60'
PROJECT NO.:	P04120
FILE NO.:	HICKORY_1.dwg

ILUKA RESOURCES INC.

ILUKA RECOURCES INC.
CONCORD MINE CONCENTRATOR SITE
SUSSEX COUNTY, VIRGINIA

SITE MAP SHOWING REVISED
PROPOSED GROUNDWATER MONITORING WELL SITES

FIGURE
1

MEMORANDUM

DEPARTMENT OF ENVIRONMENTAL QUALITY
Piedmont Regional Office

4949-A Cox Road, Glen Allen, VA 23060-6296 **804/527-5020**

SUBJECT: Iluka Resources, Inc- Concord Mine Concentrator Groundwater Evaluation

TO: File

FROM: Janine Howard

DATE: November 24, 2010

Process and Background:

Iluka Resources Inc. operates a mineral sands mining and mineral separation business in Sussex and Greensville Counties in southeastern Virginia. Concord Mine Concentrator (Sussex Co.) is one of two active mining sites, the second being the Brink Mine Concentrator (Greensville Co.). The mineral sand concentrate produced at the two concentrator sites is transported to the Mineral Separation Plant in Stony Creek, Virginia. The final products of the process are Ilmenite, Zircon, and Staurolite.

The operation of the Concord Mine Concentrator results in an intermittent discharge to State waters via Outfall 001. The plant uses settling ponds to treat process water prior to discharge. Sediment generated in the mining process settles out in the settling ponds; the supernatant is discharged periodically from the site. Much of the process water is recycled in the mining process and generally a discharge occurs only during periods of heavy rainfall. Sediment from the settling basins is periodically pumped out of the basins and into the mine pits throughout the reclamation process. The maximum daily effluent flow for the facility is 3.168 MGD. The facility is located in the Coastal Plain Physiographic Province for which there are specific standards (9VAC25-280-50) and criteria (9VAC25-280-70). Virginia also has groundwater standards that are applicable statewide (9VAC25-280-40).

Groundwater Monitoring:

The groundwater monitoring plan was approved in July 2005. There are three monitoring wells associated with this facility's groundwater monitoring plan. MW-1, located north of the mine office trailer and parking lots, is the up-gradient well. MW-2 is located down-gradient of the clarifying pond and fuel farm. MW-3 is located down-gradient of the clarifying pond and process water pond. Parameters monitored are: TSS, TDS, pH, sodium and specific conductivity. Diesel range organics (DRO) and gasoline range organics (GRO) are monitored in supplement to the aforementioned parameters at MW-2, down-gradient of the fuel farm. Monitoring is semi-annual and began with the second quarter of 2006.

Monitoring data from July 2006- July 2010 was used for the evaluation. The data were evaluated for normality using the DEQ Piedmont Regional Office, Groundwater Analysis Spreadsheet

which employs the Kolmorogov-Smirnov Test of Normality to make the determination. A Non-Parametric test was used to evaluate the presence or absence of a statistically significant difference between the background concentrations and down gradient concentrations of each pollutant for non-normal data; Student's t-test was used to evaluate normally distributed data. Table 1 summarizes the groundwater data distribution type. Table 2 summarizes significant differences between the upgradient and downgradient wells. See Tables A.1- A.3 for the raw data for each well. Linear regression analysis (Table A.4 - A.8) was used to analyze whether there is a particular trend in groundwater concentration of certain parameters by means of a coefficient of determination (R^2 value).

July 2007 and January 2008 data were omitted from the statistical analysis due to missing data for the upgradient well for these time periods. During sampling for the second and fourth quarter of 2007 the upgradient well was found to be dry. This was due to the excavation of an area east and down-gradient of MW-1. The area was mined and in the process of being converted into a tailings pond. The 5.95 acre open pit had depths exceeding thirty feet and the surface elevation of the pit was approximately 10-15 feet down gradient of MW-1 resulting in an open cut that was slightly deeper than the bottom of the well. For the two aforementioned time-periods no groundwater samples were collected; however, once the tailing dam was built the groundwater returned to normal and sampling resumed for the second quarter of 2008.

Table 1. Summary of Groundwater Data Distribution Type

Parameter	**MW-2**	**MW-3**
Sodium	Normal	Non-normal
TDS	Normal	Non-normal
TSS	Non-normal	Normal
pH	Non-normal	Non-normal
Specific Conductivity	Normal	Normal

Table 2. Summary of Groundwater Data Analysis

Parameter	**Significant Difference from up-gradient well? (Up-gradient well= MW-1)**	
	MW-2	**MW-3**
Sodium	No	No
TDS	Yes	No
TSS	No	No
pH	Yes- lower range only	Yes- lower range only
Specific Conductivity	Yes	No
Temperature	No	No

<u>Sodium:</u>
Sodium concentration in the groundwater showed no significant difference between the up-gradient and down-gradient locations. The groundwater standard for sodium in the coastal plain is 100 mg/L. Average sodium concentrations for all three wells were less than 10 mg/L. MW-2 had the highest average of 9.14 mg/L, however omitting the July 2006 value of 50.9 mg/L which appears to be an outlier, brings the average down to 3.95 mg/L. The July 2006 data for sodium was omitted for all wells for the statistical analysis to avoid skewed results of significance based on a single unusually high number from the first sampling event at MW-2. A Discordance Test per EPA's guidance document entitled "Data Quality Assessment: Statistical Methods for

Practitioners, EPA QA/G-9S" (EPA/240/B-06/003, February 2006) was carried out. The test assumes that the data is normally distributed with the omission of the outlier; this assumption was true for the MW-2 sodium dataset. This statistical test confirmed that the MW-2 July 2006 data point of 50.9 mg/L sodium is an outlier. Regression analysis indicated no trend in sodium concentrations at MW-2 and MW-3 with R^2 values of near zero (Table A.4). Based on the tests of significance and the data collected during the permit term, the facility does not appear to be contributing to elevated sodium values at down-gradient sites or a violation of the groundwater standard for sodium.

Total Dissolved Solids (TDS):
Statistical analysis indicated a significant difference in TDS concentrations at the down-gradient well MW-2. The TDS water quality criteria for the coastal plain is 1000 mg/l. The average TDS concentration at the background well was 41 mg/l. MW-2 has an average TDS concentration of 226 mg/l and MW-3 had an average concentration of 63 mg/l. Despite an apparent increase in TDS concentration at the downgradient wells, the average concentrations are below the groundwater standard. Linear regression analysis indicates no trend in TDS concentration at MW-2 although this well features the highest average value over the five year permit term (Table A.5) Continued monitoring for this parameter is recommended.

Total Suspended Solids (TSS):
No significant difference in TSS concentrations was found at either down-gradient well. Five-year average concentrations for MW-1, MW-2, and MW-3 respectively were 1099 mg/L, 1031 mg/L, and 1155 mg/L. There is no groundwater standard for TSS. The linear regression analysis (Table A.6) did not indicate a particular trend in TSS concentrations at any of the wells. The July 2006 TSS concentration of 6096 mg/L for MW-3 was omitted from the statistical analysis to avoid a skewed result due to the outlier; all subsequent samples had a concentration of well under 2000 mg/L. The Discordance Test, as discussed earlier, confirmed that this value is an outlier and the assumption of normality was met. This value is retained for the average calculation.

pH:
The groundwater criterion for pH in the Coastal Plain physiographic province is 6.5-9.0. The average concentration at all three wells was more acidic than 6.5 SU. MW-3 had the most acidic average pH of 4.03 SU, while MW-1 and MW-2 had average pH values of 4.46 SU and 4.47 SU, respectively. A statistical significant difference in pH was found at the acidic end of the scale for MW-2 and MW-3, as compared to the data for MW-1. All three wells appear to be in violation of the groundwater standard. However, a statistically significant difference in groundwater pH levels was determined to be present at both down-gradient wells. For this reason it appears that the facility treatment units (Process Water Pond and Clarifying Pond) are impacting the acidity of the groundwater at down-gradient wells. A Corrective Action Plan (CAP) is therefore required by this permit and pH should continue to be monitored closely at down-gradient wells in accordance with the approved monitoring plan.

Specific Conductivity:
No significant difference was found for this parameter between the up-gradient MW-1 and down-gradient wells MW-3. There was a significant difference in specific conductivity found at MW-2, not surprising when the five-year average of 289.8 umhos/cm is compared to that of MW-1 (83.96 umhos/com) and MW-3 (93.6 umhos/cm). Specific conductivity is associated with ion concentration in the groundwater and can be used as an indicator to estimate TDS. MW-2 did show a significant difference in TDS in the groundwater compared to MW-1 whereas MW-3 did not, therefore the raised specific conductance at MW-2 is likely associated with the elevated TDS

concentration. There is no groundwater standard for specific conductivity; this parameter is mainly used as an indicator for potential contamination from other pollutants.

Diesel Range Organics (DRO) and Gasoline Range Organics (GRO):
GRO and DRO are monitored at MW-2 due to the well's proximity to the fuel farm. The groundwater standard for petroleum hydrocarbons is 1 mg/L; additionally, DEQ's Underground Storage Tank (UST) Program, in accordance with the UST Technical Regulation and 9 VAC 25-580-10 et seq require owners of UST to report only Total Petroleum Hydrocarbons (TPH) concentrations in water that are greater than or equal to 1 mg/L. If petroleum concentrations are less than this value they are considered absent for the purpose of the groundwater investigation. Table A.2 shows the TPH values reported for both gasoline and diesel at MW-2. Each reported value is less than the 1 mg/L groundwater standard, barring the January 2008 value for TPH GRO gas of 5 mg/L. Based on the data reported it is DEQ's Best Engineering Judgment that the fuel farm at Concord Mine Concentrator is not contributing to groundwater contamination with regard to TPH.

Summary and Recommendation:
pH appears to be the primary groundwater parameter of concern due to an apparent violation of the groundwater standard. Particular attention shall be paid to the pH at MW-3, the well with the lowest average pH. The groundwater evaluation identified a statistically significant difference in pH at both down-gradient wells; degradation of the groundwater pH appears to be occurring in association with the on-site treatment units. A CAP is required by the permit to address the groundwater degradation. TDS concentrations were somewhat elevated at MW-2, contributing to a raised specific conductance as compared to the other wells, however the concentrations are in conformance with the groundwater standard. A statistically significant difference in TDS concentration, identified at the downgradient well, MW-2, is an indication of the reasonable potential that leakage of the treatment units may affect groundwater, specifically with regard to pH. All other monitored parameters are below the associated standard and do not appear to be affected by the treatment units on site. Groundwater monitoring in accordance with the approved plan and VPDES permit shall be continued.

Appendix
Note: Values shown in red were reported as less than a certain quantification level (QL). For the purposes of this evaluation these values were treated as equal to the reported QL.

Table A.1. MW-1 raw groundwater data

Date	Sodium (mg/L)	TDS (mg/L)	TSS (mg/L)	Temperature (^{o}C)	pH	Specific Conductivity (umhos/cm)
Jul-06	4.03	66	2639	18.5	4.35	45.9
Jan-07	3.78	30	755.6	15.5	4.52	41.4
Jul-07	well dry	well dry	well dry	well dry	well dry	well dry
Jan-08	well dry	well dry	well dry	well dry	well dry	well dry
Jul-08	4.34	40	215.3	18.1	4.57	90.7
Jan-09	3.53	10	76	16.8	4.62	72
Jul-09	4.29	67	116	20.3	4.3	124.6
Jan-10	4.71	54	1390	16	4.54	149.8
Jul-10	4.92	22	2500	20.3	4.33	63.3
Average	4.23	41	1099	17.9	4.46	83.96

Table A.2. MW-2 raw groundwater data

Date	Sodium (mg/L)	TDS (mg/L)	TSS (mg/L)	Temperature (^oC)	pH	Specific Conductivity (umhos/cm)	TPH-Gas mg/L	TPH-Diesel mg/L
Jul-06	50.9	126	3327	12.1	4.92	244	-------	-------
Jan-07	3.98	166	700.3	---	4.49	191.9	1	1
Jul-07	6.45	360	438.8	17.7	4	454.9	1	1
Jan-08	5.6	348	1031	18.4	3.74	377.1	5	1
Jul-08	2.67	120	122.6	16.8	4.87	149.8	1	1
Jan-09	5.6	426	649	18	4.03	437	0.5	0.2
Jul-09	3.73	243	121	19.2	4.33	328	0.5	0.5
Jan-10	0.964	102	1075	16.8	5.02	169.9	1	1
Jul-10	2.64	140	1818	19.3	4.81	256	1	1
Average	9.17	226	1031	17.3	4.47	289.8	-------	-------

Table A.3. MW-3 raw groundwater data

Date	Sodium (mg/L)	TDS (mg/L)	TSS (mg/L)	Temperature (^oC)	pH	Specific Conductivity (umhos/cm)
Jul-06	4.04	90	6096	11.8	3.27	62
Jan-07	3.34	144	1310	17.2	4.17	57.6
Jul-07	3.15	90	415.9	17.2	4.21	76
Jan-08	3	22	23.3	17.4	3.51	67.6
Jul-08	4.31	38	149	18	4.27	69.2
Jan-09	3.41	53	14	17.1	4.26	101.6
Jul-09	3.51	70	100	17.4	4.15	151.5
Jan-10	3.68	50	773.3	17	4.27	106.8
Jul-10	3.43	10	1510	19.9	4.2	150
Average	3.54	63	1155	17	4.03	93.6

TableA.4. Regression Analysis for Sodium at MW-1, MW-2, and MW-3

Monitoring Well	**R^2 Value**
MW-1	0.5182
MW-2	0.1817
MW-3	0.0008

Table A.5. Regression Analysis for TDS at MW-1, MW-2, and MW-3.

Monitoring Well	**R^2 Value**
MW-1	0.5182
MW-2	0.0105
MW-3	0.6160

Table A.6. Regression Analysis for TSS at MW-1, MW-2, and MW-3.

Monitoring Well	**R^2 Value**
MW-1	0.2833
MW-2	0.2604
MW-3	0.0003

Table A.7. Regression Analysis for pH at MW-1, MW-2, and MW-3.

Monitoring Well	**R^2 Value**
MW-1	0.0060
MW-2	0.0001
MW-3	0.4433

Table A.8. Regression Analysis for Specific Conductivity at MW-1, MW-2, and MW-3.

Monitoring Well	**R^2 Value**
MW-1	0.4070
MW-2	0.0302
MW-3	0.7243

Attachment J: Waiver Request, Waiver Memorandum and Approval Letter

ILUKA

4 January 2011

Ms. Janine Howard
Water Permit Writer
Department of Environmental Quality – Piedmont Regional Office
4949-A Cox Road
Glen Allen, VA 23060

RE: Renewal Package for VPDES Permit #VA0091456, Iluka Resources – Concord
Request for waiver on metals analysis method

Ms. Howard:

Iluka requests the agency to allow and use the data submitted for metals analysis as "dissolved metals" rather than the requested "Total Metals" for the above referenced Permit renewal application. Iluka believes the laboratory analysis already performed and reported to the agency as part of the renewal application is representative and adequate for the required purposes.

Should you have any questions or require further information, I may be reached via mobile at 804.721.9613 or via email at jack.rayburn@iluka.com.

Sincerely,

Jack

W.T. "Jack" Rayburn
Environment, Health & Safety Supervisor
Iluka Resources Inc. – US Region

Iluka Resources Inc. – VA Operations
12472 St. John Church Rd., Stony Creek, VA 23882
Phone: 434.348.4300 Fax: 434.246.3039

MEMORANDUM
DEPARTMENT OF ENVIRONMENTAL QUALITY
Piedmont Regional Office

4949-A Cox Road, Glen Allen, Virginia 23060-6295 **804/527-5020**

TO: **Curt Linderman**
FROM: **Janine Howard**
DATE: **January 5, 2011**
SUBJECT: **Waiver Request for VA0091456 – Iluka Resources, Inc. - Concord Mine Concentrator**
COPIES: **File**

Iluka Resources, Inc. is requesting a waiver for the metals testing requirements included in Form 2C required as part of the application for reissuance. Specifically, the permittee wishes to use dissolved metals data, instead of the requested total recoverable metals data, to complete Page V-3 of EPA Form 2C. The parameters affected are:

Antimony, Total
Arsenic, Total
Beryllium, Total
Cadmium, Total
Chromium, Total
Copper, Total
Lead, Total
Mercury, Total
Nickel, Total
Silver, Total
Thallium, Total
Zinc, Total

The permit will expire on April 11, 2011 and the reissuance application was due on October 13, 2010. The testing waiver request was originally received October 29, 2010 in response to the application deficiency letter. The revised waiver request was submitted January 5, 2011.

Recommendation:
Virginia Water Quality Standards (9 VAC 25-260) are written in terms of dissolved metals, therefore dissolved metals data is an appropriate form to assess against the standard. The dissolved metals data is sufficient to allow the permit writer to evaluate the need for water quality based permit limitations; therefore, the waiver request is recommended for approval.

☒ Approved ☐ Denied

Comments: As recommended , for this permit cycle, only.

Signature

01/20/2011
Date