Items for Dewatering and Discussion

Where to collect samples and what list of parameters to evaluate?

- List of parameters that are being determined in samples from Piezometers at Bremo North and East Ponds
- Proposed list of parameters for Possum dewatering test well wastewater

How will DEQ evaluate data?

- Site- and discharge-specific evaluation based on DEQ Water Quality-Based permitting approach
- Examples of allowable concentrations in dewatering discharge:
    - Bremo
    - Possum Point

Bremo Piezometers

GOLDER ASSOCIATES INC.

SAMPLE MEMO: **March 26, 2015**

To: Stephanie Franz, ENCO, GAI Sample Crew
From: Michele Mathis, GAI
Site: Dominion – Bremo Power Station, Fluvanna County, Virginia
GAI Project No.: **1520-347**
Sample Kit: Need by March 30, 2015 COB, Scheduled March 31, 2015, Event
Deliver to: Attn: Michele Mathis
Golder Associates Inc.
2108 W. Laburnum Avenue, Suite 200
Richmond, Virginia 23227
804-358-7900 phone / 804-358-2900 fax

MM 3/26/15

Sample Points	Analytes	Method	Holding Time
PZ-1	TSS	160.2	
PZ-2	Boron (T&D)	6010	
	Calcium (T&D)	6010	T+D =
	Fluoride	340.2	
	pH (field)	field	Total and
	Turbidity (field)	field	
	Specific Conductance (field)	field	Dissolved
	Temperature (field)	field	
	Sulfate	300.0	
	TDS	160.1	
	Antimony (T&D)	6010	
	Arsenic (T&D)	6010	
	Barium (T&D)	6010	
	Beryllium (T&D)	6010	
	Cadmium (T&D)	6010	
	Chromium (T&D)	6010	
	Cobalt (T&D)	6010	
	Lead (T&D)	6010	
	Lithium (T&D)	6010	
	Mercury (T&D)	7470	
	Molybdenum (T&D)	6010	
	Selenium (T&D)	6010	
	Thallium (T&D)	6010	
	Zinc (T&D)	6010	
	Manganese (T&D)	6010	
	Copper (T&D)	6010	
	Iron (T&D)	200.7	
	Magnesium (T&D)	6010	
	Potassium (T&D)	6010	
	Sodium (T&D)	6010	
	Aluminum (T&D)	6010	
	Chloride	300.0	
	Alkalinity	310.1	
	Radium 226 & 228 (GEL)	903.1/904.1	
	Oil & Grease	413.1	
	BOD	5210	
	Ammonia	350.1	
	Nitrite/Nitrate	353.2	
Field Blank			
Trip Blank			

Notes To Sample Crew:

1. Use peristaltic pump and disposable tubing to micropurge the piezometers for sampling. Shoot for less than 50 NTU before sampling.
2. Use one chain-of-custody form per cooler. Record FedEx tracking number and cooler numbers on each chain-of-custody form.
3. Use signed cooler custody seals on outside of coolers.
4. Place samples and ice in sealed water-tight bag within the coolers.
5. **SIGN DOMINION PRE-JOB BRIEF FOSSIL & HYDRO**

Notes To Laboratory:

1. Please provide one extra bottle set.
2. Please provide a Level II Data Package.
3. Please provide extra chain-of-custody forms.

Please fax a signed copy of this sample request back to Golder Associates to confirm receipt.

Signature _____ Date _____

g:\projects\dominion\bremo\152-0347 ash pond closure\sample memos\bremo - ash pond groundwater sample memo.docx

6. Dissolved samples to be field filtered 0.45 micron filter please.

POSSUM
RECOMMENDED

Possum Point Dewatering Discharge Evaluation

Parameter	Limit (ug/L)
Antimony	1,280
Arsenic	300
Cadmium	1.3
Chromium	81
Hexavalent Chromium	22
Copper	9.8
Lead	11
Mercury	1.54
Nickel	22
Selenium	10
Thallium	0.94
Zinc	126

CS3MCBXII

A. Effluent Limitations and Monitoring Requirements

4. Outfall 005 – Ash Pond E

a. There shall be no discharge of floating solids or visible foam in other than trace amounts.

b. During the period beginning with the permit's effective date and lasting until the expiration date, the permittee is authorized to discharge from Outfall Number 005. Such discharges shall be limited and monitored by the permittee as specified below.

Parameter	Discharge Limitations				Monitoring Requirements	
	Monthly Average[1]	Daily Maximum[1]	Minimum	Maximum[1]	Frequency	Sample Type
Flow[2] (MGD)	NL	NA	NA	NL	2/M	Estimate
pH	NA	NA	6.0 S.U.	9.0 S.U.	2/M	Grab
Oil and Grease (O&G)	15 mg/L	NA	NA	20 mg/L	2/M	Grab
Total Suspended Solids (TSS)	30 mg/L	NA	NA	100 mg/L	2/M	Grab

1. Biological Monitoring for Outfall 001/Outfall 002, Outfall 003, Outfall 004 and Outfall 005

a. In accordance with the schedule in Part I.C.2. below, the permittee shall conduct annual chronic toxicity tests for the duration of the permit. The permittee shall collect grab samples of effluent from Outfall 001/ 002, Outfall 003, Outfall 004 and Outfall 005 at each outfall's respective designated point of compliance.

The chronic tests to use are:

Chronic 3-Brood Static Renewal Survival and Reproduction Test using *Ceriodaphnia dubia*

Chronic 7-Day Static Renewal Survival and Growth Test using *Pimephales promelas*

These chronic tests shall be conducted in such a manner and at sufficient dilutions (minimum of five dilutions) to determine the "No Observed Effect Concentration" (NOEC) for survival and reproduction or growth. Results which cannot be quantified (i.e., a "less than" NOEC value) are not acceptable and a retest shall be performed. The NOEC as determined by hypothesis testing shall be converted to TU_c (Chronic Toxic Units) for DMR reporting where $TU_c = 100/NOEC$. Report the LC_{50} at 48 hours and the IC_{25} with the NOEC's in the test report.

c. The test dilutions shall bracket and include the following endpoints:

Outfall 001/002, Outfall 003 and Outfall 005: Chronic NOEC $\geq$ 35%; equivalent to a $TU_c \leq 2.85$

Bremo Dewatering Discharge Evaluation – Outfall 002

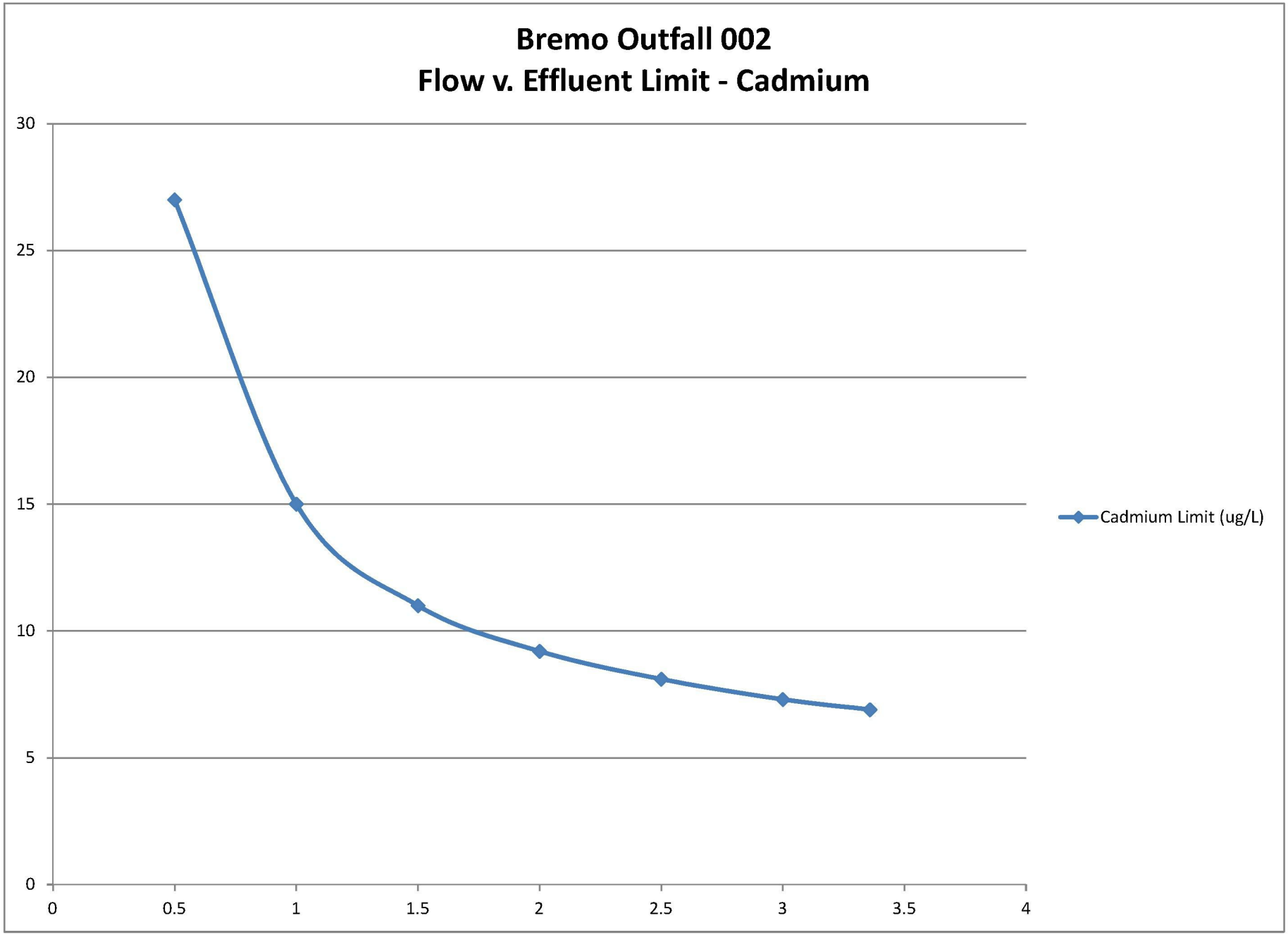
Parameter	Limit at 0.5 MGD (ug/L)	Limit at 1.0 MGD (ug/L)	Limit at 1.5 MGD (ug/L)	Limit at 2.0 MGD (ug/L)	Limit at 2.5 MGD (ug/L)	Limit at 3.0 MGD (ug/L)	Limit at 3.3574* MGD (ug/L)
Ammonia –N (Annual)	59	31	22	18	15	13	12
Antimony	730,000	360,000	240,000	180,000	150,000	120,000	110,000
Arsenic	3,800	2,100	1,500	1,200	1000	920	860
Barium**	N/A	NA	NA	NA	NA	NA	NA
Cadmium	27	15	11	9.2	8.1	7.3	6.9
Chloride	9,600 mg/l	5,300 mg/L	3,800 mg/L	3,100 mg/L	2,600 mg/L	2,300 mg/L	2,200 mg/L
Chromium	4,400	2,500	1,800	1,500	1,300	1,200	1,100
Hexavalent Chromium	180	98	70	57	49	43	40
Copper	99	55	41	34	29	27	25
Iron**	NA	NA	NA	NA	NA	NA	NA
Lead	750	430	320	270	230	210	200
Manganese**	NA	NA	NA	NA	NA	NA	NA
Mercury	16	8.5	6.2	5	4.3	3.8	3.5
Nickel	1,400	780	580	480	410	370	350
Nitrate**	NA	NA	NA	NA	NA	NA	NA
Selenium	220	120	88	71	61	54	50
Thallium	530	270	180	130	110	89	80
Zinc	900	500	370	310	270	240	230

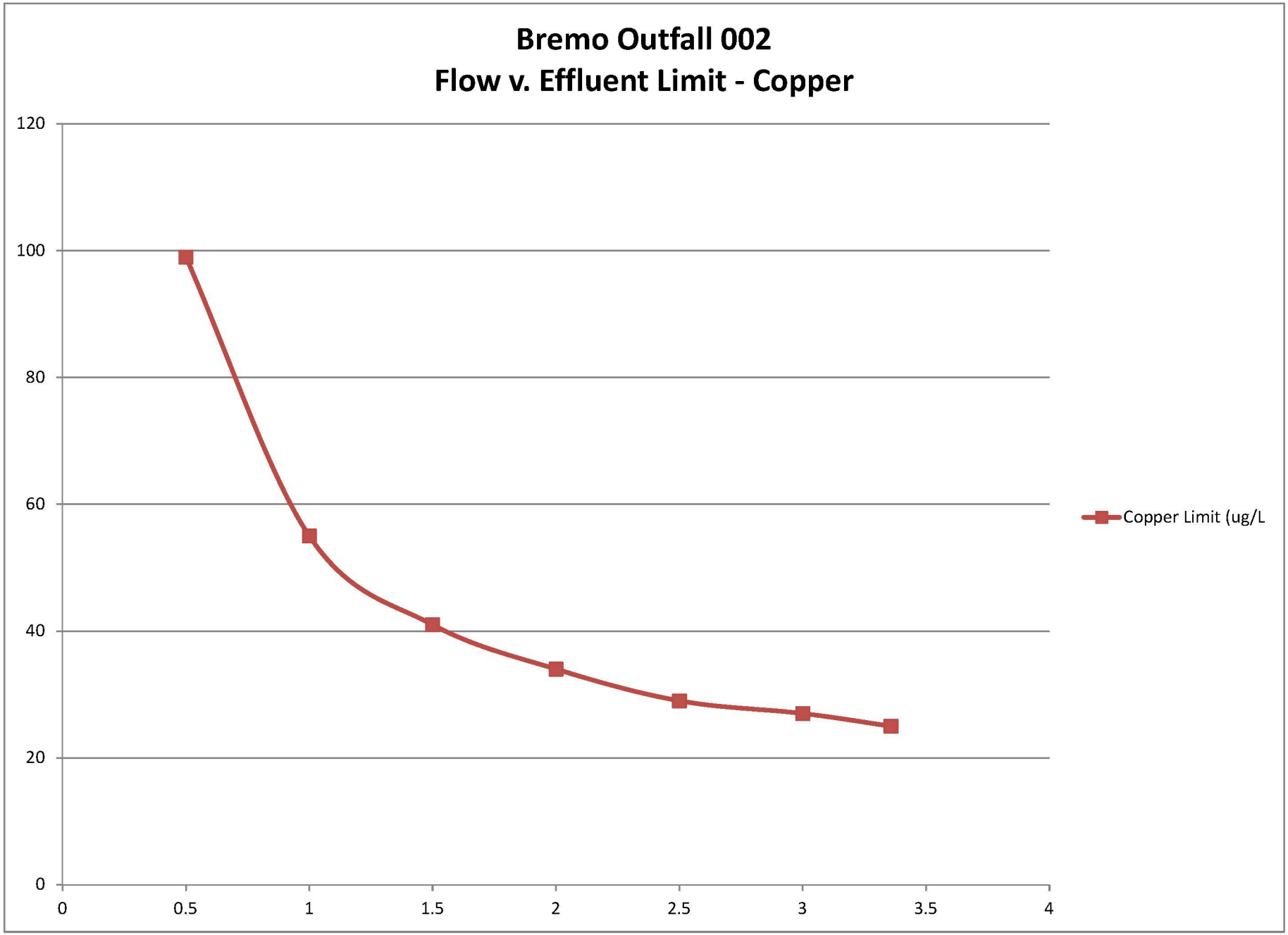
*This is the maximum 30-day average flow based on historical data that is being used by DEQ to generate limits in the current permit renewal.

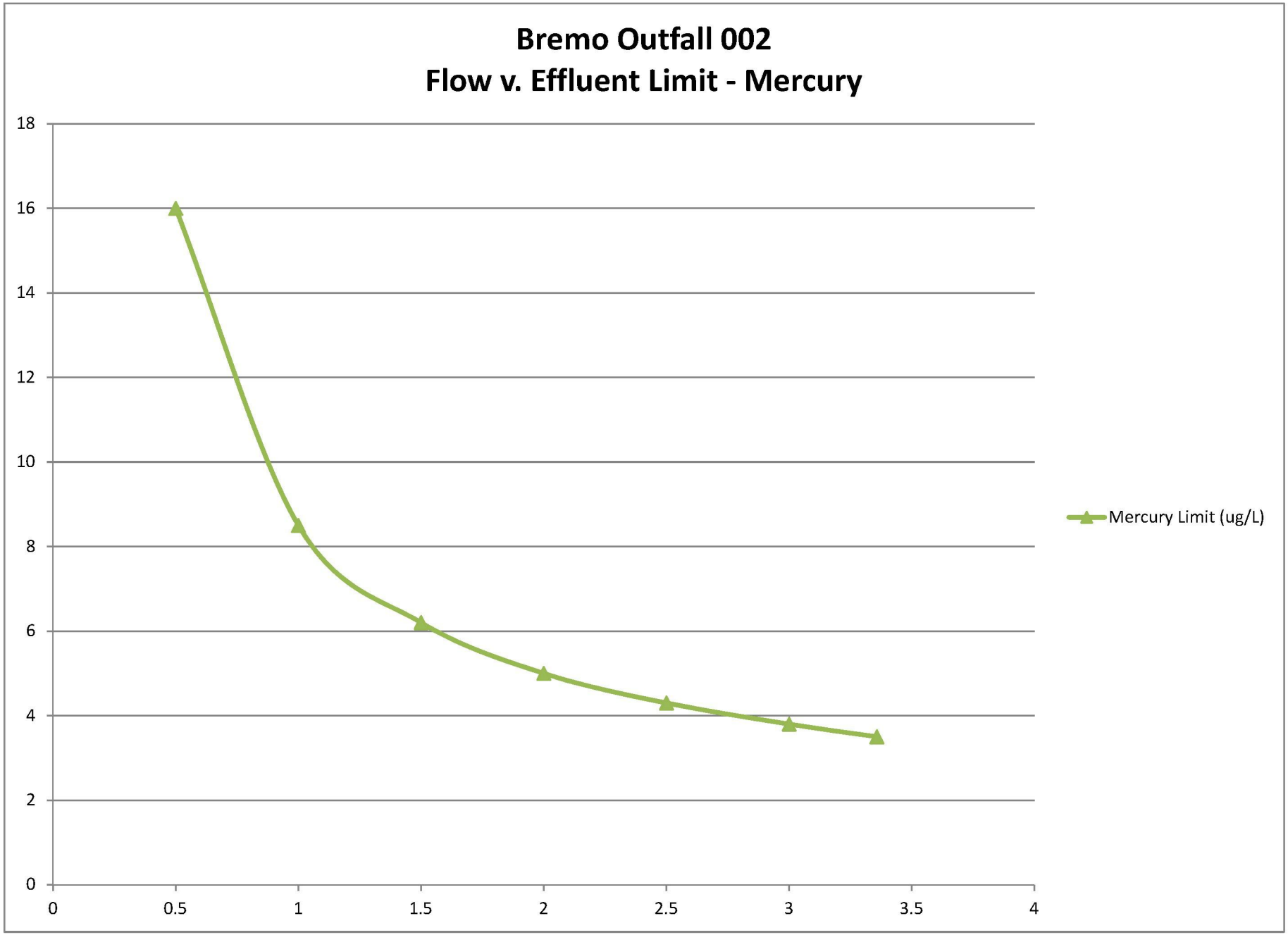
**These parameters have Human Health WQC for public water supplies only; therefore, the WQC for these parameters to not apply at the discharge.

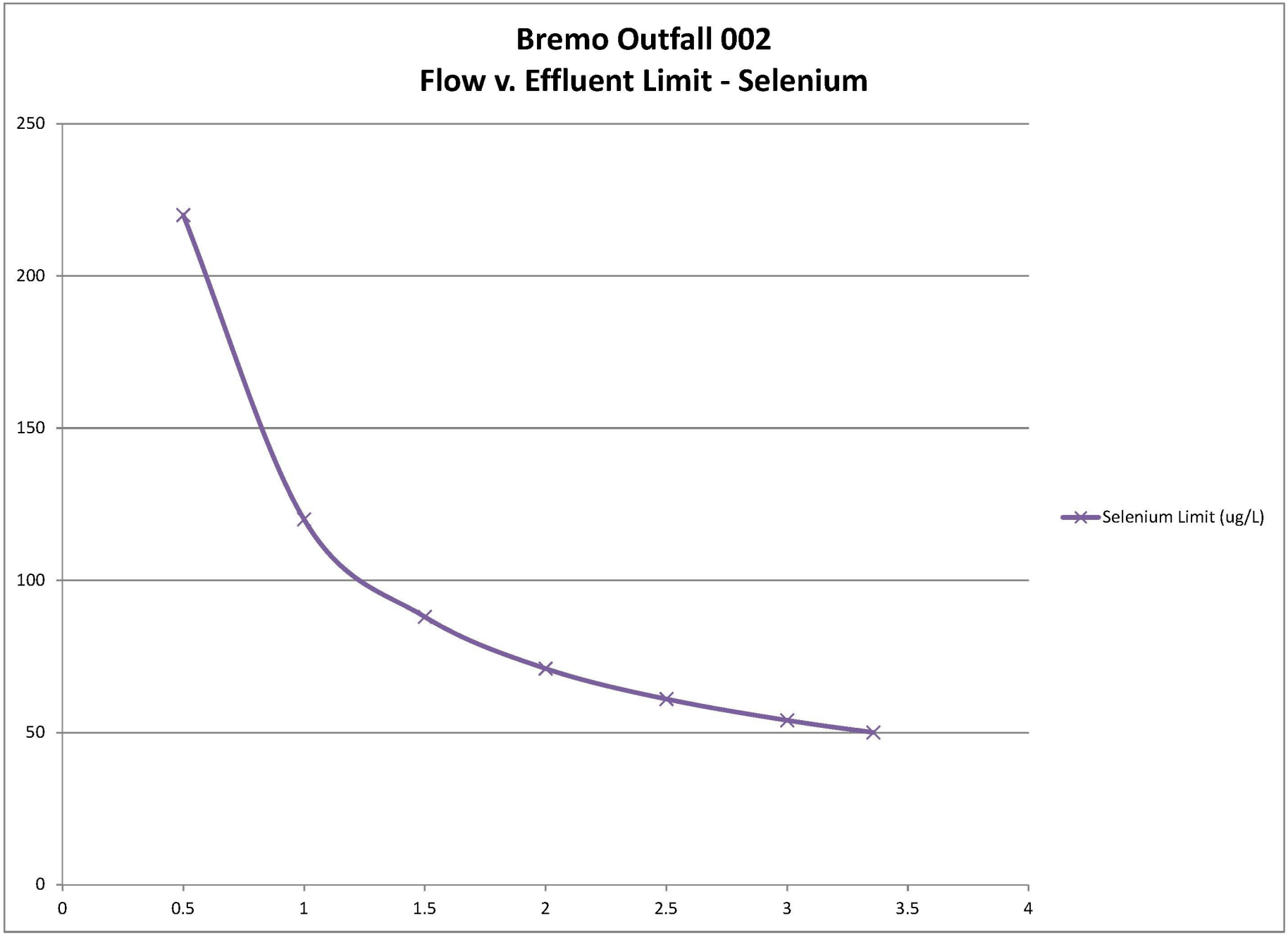
Bremo Effluent Limit Graphs

(Cd, Cu, Hg, Se)


Bremo Outfall 002
Flow v. Effluent Limit - Cadmium
30
25
20
15
10
5
0
0
0.5
1
1.5
2
2.5
3
3.5
4
Cadmium Limit (ug/L)


Bremo Outfall 002
Flow v. Effluent Limit - Copper
120
100
80
60
40
20
0
0
0.5
1
1.5
2
2.5
3
3.5
4
Copper Limit (ug/L


Bremo Outfall 002
Flow v. Effluent Limit - Mercury
18
16
14
12
10
8
6
4
2
0
0
0.5
1
1.5
2
2.5
3
3.5
4
Mercury Limit (ug/L)


Bremo Outfall 002
Flow v. Effluent Limit - Selenium
250
200
150
100
50
0
0
0.5
1
1.5
2
2.5
3
3.5
4
Selenium Limit (ug/L)

Possum Point Dewatering Discharge Evaluation - 005

Parameter	Limit (ug/L)
Antimony	1,280
Arsenic	300
Cadmium	1.3
Chromium	81
Hexavalent Chromium	22
Copper	9.8
Lead	11
Mercury	1.54
Nickel	22
Selenium	10
Thallium	0.94
Zinc	126

A. Effluent Limitations and Monitoring Requirements

4. Outfall 005 – Ash Pond E

a. There shall be no discharge of floating solids or visible foam in other than trace amounts.

b. During the period beginning with the permit's effective date and lasting until the expiration date, the permittee is authorized to discharge from Outfall Number 005. Such discharges shall be limited and monitored by the permittee as specified below.

Parameter	Discharge Limitations				Monitoring Requirements	
	Monthly Average(1)	Daily Maximum(1)	Minimum	Maximum(1)	Frequency	Sample Type
Flow(2) (MGD)	NL	NA	NA	NL	2/M	Estimate
pH	NA	NA	6.0 S.U.	9.0 S.U.	2/M	Grab
Oil and Grease (O&G)	15 mg/L	NA	NA	20 mg/L	2/M	Grab
Total Suspended Solids (TSS)	30 mg/L	NA	NA	100 mg/L	2/M	Grab

1. Biological Monitoring for Outfall 001/Outfall 002, Outfall 003, Outfall 004 and Outfall 005

a. In accordance with the schedule in Part I.C.2. below, the permittee shall conduct annual chronic toxicity tests for the duration of the permit. The permittee shall collect grab samples of effluent from Outfall 001/002, Outfall 003, Outfall 004 and Outfall 005 at each outfall's respective designated point of compliance.

The chronic tests to use are:

Chronic 3-Brood Static Renewal Survival and Reproduction Test using *Ceriodaphnia dubia*

Chronic 7-Day Static Renewal Survival and Growth Test using *Pimephales promelas*

These chronic tests shall be conducted in such a manner and at sufficient dilutions (minimum of five dilutions) to determine the "No Observed Effect Concentration" (NOEC) for survival and reproduction or growth. Results which cannot be quantified (i.e., a "less than" NOEC value) are not acceptable and a retest shall be performed. The NOEC as determined by hypothesis testing shall be converted to TU_c (Chronic Toxic Units) for DMR reporting where $TU_c = 100/NOEC$. Report the LC_{50} at 48 hours and the IC_{25} with the NOEC's in the test report.

c. The test dilutions shall bracket and include the following endpoints:

Outfall 001/002, Outfall 003 and Outfall 005: Chronic NOEC $\geq$ 35%; equivalent to a $TU_c \leq 2.85$

Possum Point Dewatering Discharge Evaluation – Outfall 004

Parameter	Limit (ug/L)
Antimony	32,000
Arsenic	680
Cadmium	3.4
Chromium	620
Hexavalent Chromium	32
Copper	13
Lead	93
Mercury	2.8
Nickel	196
Selenium	40
Thallium	23.5
Zinc	126

A. Effluent Limitations and Monitoring Requirements

3. Outfall 004 – Low Volume Waste Settling Pond

a. There shall be no discharge of floating solids or visible foam in other than trace amounts.

b. During the period beginning with the permit's effective date and lasting until the expiration date, the permittee is authorized to discharge from Outfall Number 004. Such discharges shall be limited and monitored by the permittee as specified below.

Parameter	Discharge Limitations				Monitoring Requirements	
	Monthly Average[1]	Daily Maximum[1]	Minimum	Maximum[1]	Frequency	Sample Type
Flow[2] (MGD)	NL	NA	NA	NL	2/M	Estimate
pH	NA	NA	6.0 S.U.	9.0 S.U.	2/M	Grab
Heat Rejection (Unit 6)[3]	NA	NA	NA	1.9×10^9 BTU/hr	2/M	Calculated
Total Residual Chlorine (TRC)[4]	0.026 mg/L	NA	NA	0.038 mg/L	1/W	Grab
Temperature	NL (°C)	NA	NA	NL (°C)	1/W	IS
Oil and Grease (O&G)	15 mg/L	NA	NA	20 mg/L	2/M	Grab
Total Suspended Solids (TSS)	30 mg/L	NA	NA	100 mg/L	2/M	Grab
Total Nitrogen[5]	NL (mg/L)	NA	NA	NA	1/6M	Calculated
Total Kjeldahl Nitrogen (TKN)	NL (mg/L)	NA	NA	NA	1/6M	Grab
Nitrate+Nitrite ($NO_2 + NO_3$), as N	NL (mg/L)	NA	NA	NA	1/6M	Grab
Ammonia, as N	NL (mg/L)	NA	NA	NA	1/6M	Grab
Total Phosphorus	NL (mg/L)	NA	NA	NA	1/6M	Grab
Chronic Toxicity – *C. dubia* (TU_c)[6]	NA	NA	NA	NL	1/YR	Grab
Chronic Toxicity – *P. promelas* (TU_c)[6]	NA	NA	NA	NL	1/YR	Grab

See Biological Monitoring for Outfall 001/Outfall 002, Outfall 003, Outfall 004 and Outfall 005