

## Stations Included in Model

		Monthly	Quarterly	Once
KV-1	South McQuesten River u/s Christal Creek	■		
KV-2	South McQuesten River @ Pumphouse		■	
KV-4	South McQuesten River d/s Flat Creek		■	
KV-5	South McQuesten River 9 km downstream Flat Creek		■	
KV-6	Christal Creek @ Keno Highway	■		
KV-7	Christal Creek @ Hanson Road		■	
KV-9	Flat Creek u/s South McQuesten River		■	
KV-12	Valley Tailings Pond #3 Decant	■		
KV-14	Silver King Treatment Pond #2 Decant	■		
KV-17	Husky South West Adit		■	
KV-18	Birmingham Adit		■	
KV-19	Ruby Adit		■	
KV-20	No Cash 500 Adit		■	
KV-21	No Cash Creek @ Keno Highway	■		
KV-28	Galkeno 300 Treatment Pond Decant	■		
KV-32	Galkeno 900 Treatment Pond Decant	■		
KV-45	Onek Adit		■	
KV-47	Porcupine Diversion Ditch		■	
KV-53	UN Adit		■	
KV-55	Sandy Creek at Silver Trail Highway		■	
KV-57	Haldane Creek at South McQuesten Road		■	
KV-58	Seepage at toe of #3 dam		■	
KV-59	Galena Creek at mouth (just upstream of Flat Creek		■	
LES-66	Spring along Duncan Creek Road			■

**United Keno Hill Mines Ltd**  
**Water Quality Model - Before Treatment**

**Details of minesite catchments:**

Catchment Description	Catchment Area (km <sup>2</sup> )	Catchment Median Elevation (m.a.s.l.)	MAR - Mean Annual Runoff (mm)
Average monthly flows for minesite streams			% MAR
Christal Creek above Station KV6	7.7	990	240
Bellekeno Flame and Moth Sedimentation Pond Discharge	0.0627		215
Christal Creek between Stations KV6 and KV7	35.8	970	230
Sandy Creek above LES-63	2.3	1180	290
No Cash Creek above LES-21	1.5	1200	300
South McQuesten River above S10 and below LES-1, S 19, LES-21, and LES-63	32.9	650	150
South McQuesten River above LES-1	476	940	230
Catchment of Dam No. 3 of Elsa Tailings Impoundment	4.3	760	180
Porcupine Creek Diversion Channel above LES-47	10.1	1110	270
Galena Creek above the mouth	10.9	970	240
Flat Creek above S9 and below LES-57, LES-47, and S1	31.2	700	170
South McQuesten River above S11 and below S10 and S9	29.9	670	160
South McQuesten River above LES-5 and below S11 and LES-10	95	850	200
Haldane Creek above South McQuesten Road	88.8	830	200

**Details of enclosed basins created by open pits:**

Enclosed Basin Description	Catchment Area (km <sup>2</sup> )	Catchment Median Elevation (m.a.s.l.)	MAR - Mean Annual Runoff (mm)
Open pits within catchment of Element 1 (Calumet "C" and Onek)	0.09	1180	290
Open pits within incremental catchment of Element 2 (sime 6, Sime 4, 35 Vein, and Miller)	0.19	1280	320
Open pits within catchment of Element 3 (Western portion of Calumet 4-11 Veins)	0.05	1400	350
Open pits within catchment of Element 4 (Birmingham and Birmingham SW)	0.18	1350	340
Open pits within incremental catchment of Element 5 (Calumet 3, Calumet 2, and part of Calumet 4-11 Veins)	0.23	1380	350
Open pits within catchment of Element 8 (Silver King)	0.27	860	210

Site	Description	Units	Jan - Mar	Apr - Jun	Jul - Sept	Oct - Dec	Annual	Source of Data/Comment
	Number of days in period	days	90.25	91	92	92	365.25	
	Average monthly flows for minesite streams	% MAR	4.8	54.8	28.5	11.9	12.9	Distribution of WSC Station 09DD004 (McQuesten R.)
KV-32	Galkeno 900 Adit	L/s	2.7	2.9	2.5	2.72	2.71	Ongoing data collected by ERDC
KV-45	Onek Adit	L/s	0.31	0.31	0.31	0.31	0.31	Average of measured flows (ERDC/Access data)
LES-66	Natural spring near Christal Lake	L/s	2.5	2.5	2.5	2.5	2.5	Average of two spot measurements taken in 1995 by LES
KV-28	Galkeno 300 Adit	L/s	11.3	12.2	12.8	12.56	12.20	Ongoing data collected by ERDC
KV-53	UN Adit	L/s	0	0	0	0	0	Dry
KV-18	Birmingham Adit	L/s	2	2	2	2	2	Average of measured flows (ERDC/Access data)
KV-19	Ruby 400 Adit	L/s	1.5	1.5	1.5	1.5	1.5	Average of measured flows (ERDC/Access data)
KV-20	No Cash 500 Adit	L/s	4.4	4.4	4.4	4.4	4.4	Average of measured flows (ERDC/Access data)
KV-58	Dam No.3 seepage	L/s	0	0	0	0	0	No data available - assumed negligible
KV-14	Silver King Adit	L/s	7.119493	8.157606	6.882041	8.03	7.55	Average of measured flows (ERDC/Access data)
KV-17	Husky SW Adit	L/s	3.3	3.3	3.3	3.3	3.3	Average of measured flows (ERDC/Access data)
KV-43	Bellekeno 600 Adit	L/s	2.3	2.3	2.3	2.3	2.3	Average of measured flows (ERDC/Access data)
KV-33	Keno 700 Adit	L/s	2.1	2.1	2.1	2.1	2.1	Average of measured flows (ERDC/Access data)
KV-34	Lucky Queen Adit	L/s	0.9	0.9	0.9	0.9	0.9	Average of measured flows (ERDC/Access data)
KV-35	Sadie Ladue Adit	L/s	10.5	10.5	10.5	10.5	10.5	Average of measured flows (ERDC/Access data)
KV-32	Galkeno 900 Adit	1000m <sup>3</sup>	21.14	22.42	20.15	21.64	85.36	
KV-45	Onek Adit	1000m <sup>3</sup>	2.42	2.44	2.46	2.46	9.78	
LES-66	Natural spring near Christal Lake	1000m <sup>3</sup>	19.49	19.66	19.87	19.87	78.89	
KV-28	Galkeno 300 Adit	1000m <sup>3</sup>	88.01	95.73	101.52	99.86	384.99	
KV-53	UN Adit	1000m <sup>3</sup>	0.00	0.00	0.00	0.00	0.00	
KV-18	Birmingham Adit	1000m <sup>3</sup>	15.60	15.72	15.90	15.90	63.12	
KV-19	Ruby 400 Adit	1000m <sup>3</sup>	11.70	11.79	11.92	11.92	47.34	
KV-20	No Cash 500 Adit	1000m <sup>3</sup>	34.31	34.59	34.97	34.97	138.85	
KV-58	Dam No.3 seepage	1000m <sup>3</sup>	0.00	0.00	0.00	0.00	0.00	
KV-14	Silver King Adit	1000m <sup>3</sup>	55.51	64.14	54.70	63.84	238.19	
KV-17	Husky SQ Adit	1000m <sup>3</sup>	25.73	25.95	26.23	26.23	104.14	
KV-43	Bellekeno 600 Adit	1000m <sup>3</sup>	17.93	18.08	18.28	18.28	72.58	
KV-33	Keno 700 Adit	1000m <sup>3</sup>	16.37	16.51	16.69	16.69	66.27	
KV-34	Lucky Queen Adit	1000m <sup>3</sup>	7.02	7.08	7.15	7.15	28.40	
KV-35	Sadie Ladue Adit	1000m <sup>3</sup>	81.87	82.56	83.46	83.46	331.35	

#### HYDROLOGY STUDY DATA

Site	Description	Units	Jan - Mar	Apr - Jun	Jul - Sept	Oct - Dec	Annual	Source of Data/Comment
	Number of days in period	days	90.25	91	92	92	365.25	
	Average monthly flows for minesite streams	% MAR	4.8	54.8	28.5	11.9	100	Distribution of WSC Station 09DD004 (McQuesten R.)
KV-32	Galkeno 900 Adit	L/s	5.5	8	8	6	6.9	Average of measured flows (UKHM/Govt/LES data)
KV-45	Onek Adit	L/s	0.23	0.32	0.35	0.32	0.31	Average of measured flows (UKHM/Govt/LES data)
LES-66	Natural spring near Christal Lake	L/s	2.5	2.5	2.5	2.5	2.5	Average of two spot measurements taken in 1995 by LES
KV-28	Galkeno 300 Adit	L/s	0.1	0.1	0.1	0.1	0.1	One spot measurement taken in July 1994 by LES
KV-53	UN Adit	L/s	0.3	0.3	0.3	0.3	0.3	Average of measured flows (UKHM/Govt/LES data)
KV-18	Birmingham Adit	L/s	1.2	3.6	1.6	1.5	2	Average of measured flows (UKHM/Govt/LES data)
KV-19	Ruby 400 Adit	L/s	1.2	1.5	1.9	1.5	1.5	Average of measured flows (UKHM/Govt/LES data)
KV-20	No Cash 500 Adit	L/s	4.1	4.1	5.1	4.1	4.4	Average of measured flows (UKHM/Govt/LES data)
KV-58	Dam No.3 seepage	L/s	0	0	0	0	0	No data available - assumed negligible
KV-14	Silver King Adit	L/s	6	8	6	6	6.5	Average of measured flows (UKHM/Govt/LES data)
KV-17	Husky SW Adit	L/s	3.3	3.3	3.3	3.3	3.3	Average of measured flows (UKHM/LES data)
KV-43	Bellekeno 600 Adit	L/s	2	2	2.5	2.5	2.3	Average of measured flows (UKHM/Govt/LES data)
KV-33	Keno 700 Adit	L/s	0.3	3.5	3	1.5	2.1	Average of measured flows (UKHM/Govt/LES data)
KV-34	Lucky Queen Adit	L/s	0.9	0.9	0.9	0.9	0.9	Average of measured flows (UKHM/Govt/LES data)
KV-35	Sadie Ladue Adit	L/s	9	11	11	11	10.5	Average of measured flows (UKHM/Govt/LES data)
	Galkeno 900 Adit	1000m <sup>3</sup>	42.89	62.90	63.59	47.69	217.75	
	Onek Adit	1000m <sup>3</sup>	1.79	2.52	2.78	2.54	9.78	
	Natural spring near Christal Lake	1000m <sup>3</sup>	19.49	19.66	19.87	19.87	78.89	
	Galkeno 300 Adit	1000m <sup>3</sup>	0.78	0.79	0.79	0.79	3.16	
	UN Adit	1000m <sup>3</sup>	2.34	2.36	2.38	2.38	9.47	
	Birmingham Adit	1000m <sup>3</sup>	9.36	28.30	12.72	11.92	63.12	
	Ruby 400 Adit	1000m <sup>3</sup>	9.36	11.79	15.10	11.92	47.34	
	No Cash 500 Adit	1000m <sup>3</sup>	31.97	32.24	40.54	32.59	138.85	
	Dam No.3 seepage	1000m <sup>3</sup>	0.00	0.00	0.00	0.00	0.00	
	Silver King Adit	1000m <sup>3</sup>	46.79	62.90	47.69	47.69	205.12	
	Husky SW Adit	1000m <sup>3</sup>	25.73	25.95	26.23	26.23	104.14	
	Bellekeno 600 Adit	1000m <sup>3</sup>	15.60	15.72	19.87	19.87	72.58	
	Keno 700 Adit	1000m <sup>3</sup>	2.34	27.52	23.85	11.92	66.27	
	Lucky Queen Adit	1000m <sup>3</sup>	7.02	7.08	7.15	7.15	28.40	
	Sadie Ladue Adit	1000m <sup>3</sup>	70.18	86.49	87.44	87.44	331.35	

	KV-1	KV-2	KV-4	KV-5	KV-6	KV-7	KV-9	KV-12	KV-14	KV-17	KV-18	KV-19	KV-20	KV-21	KV-28	KV-32	KV-45	KV-47	KV-53	KV-55	KV-57	KV-58	KV-59
	<b>TOTAL COPPER (mg/L)</b>																						
Average	0.00935	0.0014	0.00109	0.00135	0.00099	0.0012	0.00468	0.007	0.001	0.001	0.001	0.01	0.002	0.004	0.001	0.001	0.005	0.002		0.001	0.00086		
Sum	11	7	6	7	12	14	8	3	11	2	3	2	3	7	14	12	3	1		1	3		
Minimum	<0.001	<0.001	<0.001	<0.001	0.00027	0.00027	0.001	0.002	<0.001	<0.001	<0.001	0.004	<0.001	<0.001	<0.001	<0.001	0.002	0.002		0.001	0.00059		
Maximum	0.0766	0.0026	0.00152	0.003	0.002	0.006	0.012	0.016	0.005	0.001	0.002	0.015	0.002	0.016	0.003	0.001	0.009	0.002		0.001	0.001		
Standard Deviation	0.02241	0.0007	0.00021	0.00075	0.00056	0.00141	0.00494	0.008	0.001	0	0.001	0.008	0.001	0.006	0.001	0	0.004	0		0	0.00024		
	<b>DISCHARGE (L/sec)</b>																						
Average																							
Sum																							
Minimum																							
Maximum																							
Standard Deviation																							

Flow data calculated as an average of 2006-2010 flow during steady-state conditions

	KV-1	KV-2	KV-4	KV-5	KV-6	KV-7	KV-9	KV-12	KV-14	KV-17	KV-18	KV-19	KV-20	KV-21	KV-28	KV-32	KV-45	KV-47	KV-53	KV-55	KV-57	KV-58	KV-59	
	<b>TOTAL COPPER (mg/L)</b>																							
Average	0.00466	0.00354	0.00382	0.0029	0.0019	0.00422	0.00272	0.0029	0.0033	0.0048	0.0118	0.0015	0.106	0.0034	0.0029	0.0014	0.026	0.00824		0.002	0.00244		0.004	
Sum	11	4	3	4	13	14	7	12	14	3	2	3	2	6	15	13	4	4		2	2		1	
Minimum	<0.001	<0.001	0.00343	<0.001	0.00067	0.00034	0.001	0.0015	<0.001	0.0013	0.009	0.001	0.066	0.0007	<0.0002	0.0003	0.003	0.001		0.002	0.002		0.004	
Maximum	0.0083	0.006	0.00403	0.004	0.004	0.02	0.004	0.007	0.0135	0.01	0.0147	0.002	0.145	0.009	0.02	0.006	0.072	0.018		0.003	0.00287		0.004	
Standard Deviation	0.00205	0.0021	0.00034	0.0014	0.00126	0.00519	0.001	0.0016	0.0031	0.0046	0.004	0.0005	0.056	0.0029	0.0053	0.0014	0.032	0.0071		0.001	0.00062		0	
	<b>DISCHARGE (L/sec)</b>																							
Average																								
Sum																								
Minimum																								
Maximum																								
Standard Deviation																								

Flow data calculated as an average of 2006-2010 flow during steady-state conditions

	KV-1	KV-2	KV-4	KV-5	KV-6	KV-7	KV-9	KV-12	KV-14	KV-17	KV-18	KV-19	KV-20	KV-21	KV-28	KV-32	KV-45	KV-47	KV-53	KV-55	KV-57	KV-58	KV-59
	<b>TOTAL COPPER (mg/L)</b>																						
Average	0.00702	0.0064	0.0036	0.00448	0.00148	0.0021	0.00229	0.003	0.002	0.003	0.008	0.002	0.034	0.005	0.001	0.001	0.022	0.00563	0.001	0.006	0.00158	0.042	0.004
Sum	11	4	5	5	11	11	8	9	11	4	4	4	4	7	11	11	4	5	2	4	4	2	3
Minimum	0.004	0.003	0.002	0.002	0.00035	0.0004	0.001	0.002	<0.001	0.001	0.005	0.001	0.023	0.001	<0.001	<0.001	0.004	0.00115	<0.001	0.003	<0.001	0.033	0.004
Maximum	0.012	0.014	0.006	0.009	0.002	0.006	0.004	0.003	0.003	0.005	0.012	0.004	0.044	0.01	0.002	0.003	0.037	0.01	0.001	0.014	0.002	0.05	0.005
Standard Deviation	0.00252	0.00521	0.0015	0.00269	0.00074	0.00173	0.00096	0.001	0.001	0.002	0.004	0.001	0.01	0.003	0	0.001	0.017	0.00374	0	0.005	0.0005	0.012	0.001
	<b>DISCHARGE (L/sec)</b>																						
Average																							
Sum																							
Minimum																							
Maximum																							
Standard Deviation																							

Flow data calculated as an average of 2006-2010 flow during steady-state conditions

	KV-1	KV-2	KV-4	KV-5	KV-6	KV-7	KV-9	KV-12	KV-14	KV-17	KV-18	KV-19	KV-20	KV-21	KV-28	KV-32	KV-45	KV-47	KV-53	KV-55	KV-57	KV-58	KV-59	
	<b>TOTAL COPPER (mg/L)</b>																							
Average	0.00583	0.00798	0.00636	0.00646	0.00341	0.00113	0.00159	0.004	0.003	0.003	0.005	0.005	0.03	0.009	0.002	0.002	0.017	0.002	0.002	0.00172	0.00142		0.003	
Sum	11	2	2	2	11	10	4	7	13	3	3	3	3	6	15	12	3	2	1	2	2		1	
Minimum	0.002	0.00597	0.00471	0.00593	0.00038	0.00027	0.00104	0.003	<0.001	<0.001	0.002	0.002	0.02	<0.001	<0.001	<0.001	0.006	0.001	0.002	0.00145	0.00083		0.003	
Maximum	0.011	0.01	0.008	0.007	0.024	0.003	0.002	0.008	0.012	0.007	0.006	0.011	0.036	0.04	0.01	0.015	0.024	0.004	0.002	0.002	0.002		0.003	
Standard Deviation	0.00298	0.00285	0.00233	0.00076	0.00688	0.00081	0.00049	0.002	0.003	0.003	0.002	0.005	0.009	0.015	0.002	0.004	0.009	0.002	0	0.00039	0.00083		0	
	<b>DISCHARGE (L/sec)</b>																							
Average																								
Sum																								
Minimum																								
Maximum																								
Standard Deviation																								

Flow data calculated as an average of 2006-2010 flow during steady-state conditions

Mass Loading Model, South McQuesten Watershed (total zinc)

Element 1, Christal Creek above KV-6						Zinc (total)
		Jan - Mar	Apr - Jun	Jul - Sept	Oct - Dec	Source of Data/Comment
Catchment runoff (excluding runoff into open pits)	Flow (1000m3)	153	1052	574	288	Estimated using regional hydrology study
	Concentration (mg/L)	0.00	0.00	0.00	0.00	Computed (load divided by flow)
	Load (kg)	0.16	1.89	0.89	1.18	Computed (load at KV-6 minus loads at adits and spring)
Discharge from KV-28	Flow (1000m3)	87.77	94.67	99.32	97.69	Average of measured flows (ERDC/Access data)
	Concentration (mg/L)	0.00	0.00	0.00	0.00	Average observed concentration at KV-28 based on full-time treatment
	Load (kg)	0.09	0.27	0.10	0.20	Computed (flow times concentration)
Discharge from KV-32	Flow (1000m3)	21.08	22.42	20.15	21.64	Average of measured flows (ERDC/Access data)
	Concentration (mg/L)	0.00	0.00	0.00	0.00	Average observed concentrations at KV-32
	Load (kg)	0.02	0.03	0.02	0.04	Computed (flow times concentration)
Discharge from KV-45	Flow (1000m3)	2.42	2.44	2.46	2.46	Estimated using regional hydrology study
	Concentration (mg/L)	0.01	0.03	0.02	0.02	Average observed concentration at KV-45
	Load (kg)	0.01	0.06	0.05	0.04	Computed (flow times concentration)
Discharge from LES-66 (natural spring on Duncan Cr Road)	Flow (1000m3)	19.49	19.66	19.87	19.87	Average of two spot measurements taken in 1995
	Concentration (mg/L)					Average observed concentration at LES-66
	Load (kg)	0.00	0.00	0.00	0.00	Computed (flow times concentration)
Sedimentation Pond at Bellekeno Mill	Flow (1000m3)	0.7	8.0	4.2	1.7	Estimated
	Concentration (mg/L)	0.10	0.10	0.10	0.10	Compliance limit
	Load (kg)	0.07	0.80	0.42	0.17	Computed (flow times concentration)
Adit Input Totals	Flow (1000m3)	130.76	139.19	141.81	141.67	Computed (total of all inflows to element)
	Concentration (mg/L)	0.00092	0.00265	0.00122	0.00198	Computed (load divided by flow)
	Load (kg)	0.12	0.37	0.17	0.28	Computed load at Station KV-6
Totals	Flow (1000m3)	283.40	1191.00	716.13	429.46	Cumulative flow from all catchment elements
Computed KV-6	Load (kg)	0.28	2.26	1.06	1.46	Cumulative load for all catchment elements
OUTFLOWS						
Flow at KV-6	Flow (1000m3)	283.40	1191.00	716.13	429.46	Computed (total of all inflows to element)
	Concentration (mg/L)	0.00099	0.00190	0.00148	0.00341	Average observed concentration for period Jan 1 - Dec 31 2008
	Load (kg)	0.28	2.26	1.06	1.46	Computed (flow times concentration)

Element 2, Christal Creek between KV-6 and KV-7						Zinc (total)
INFLOWS						
		Jan - Mar	Apr - Jun	Jul - Sept	Oct - Dec	Source of Data/Comment
Runoff from incremental catchment (excluding runoff into open pits)	Flow (1000m3)	392	4479	2329	973	Estimated using regional hydrology study
	Concentration (mg/L)	0.00135	0.00484	0.00229	0.00012	Computed (load divided by flow)
	Load (kg)	0.53	21.66	5.34	0.12	Computed (load at KV-7 minus loads at KV-53 and adits)
Flow from Element 1 (i.e., KV-6)	Flow (1000m3)	283.40	1191.00	716.13	429.46	From Element 1
	Concentration (mg/L)	0.00	0.00	0.00	0.00	From Element 1
	Load (kg)	0.28	2.26	1.06	1.46	From Element 1
Discharge from KV-53	Flow (1000m3)	0.00	0.00	0.00	0.00	Average of measured flows (ERDC/Access data)
	Concentration (mg/L)	0.00	0.00	0.00	0.00	Average observed concentration at KV-53
	Load (kg)	0.00	0.00	0.00	0.00	Computed (flow times concentration)
Adit Input Totals	Flow (1000m3)	283.40	1191.00	716.13	429.46	Computed (total of all inflows to element)
	Concentration (mg/L)	0.00	0.00	0.00	0.00	Computed (load divided by flow)
	Load (kg)	0.28	2.26	1.06	1.46	Computed load at Station KV-7
Totals	Flow (1000m3)	675.71	5669.91	3045.49	1402.07	Cumulative flow from all catchment elements
Computed KV-7	Load (kg)	0.81	23.93	6.40	1.58	Cumulative load for all catchment elements
OUTFLOWS						
Flow at KV-7	Flow (1000m3)	675.71	5669.91	3045.49	1402.07	Computed (total of all inflows to element)
	Concentration (mg/L)	0.00	0.00	0.00	0.00	Average observed concentration for period Jan 1 - Dec 31 2008
	Load (kg)	0.81	23.93	6.40	1.58	Computed (flow times concentration)

Element 3, Sandy Creek at Silver Trail Hwy (KV-55)						Zinc (total)
INFLOWS						
		Jan - Mar	Apr - Jun	Jul - Sept	Oct - Dec	Source of Data/Comment
Catchment runoff (excluding runoff into open pits)	Flow (1000m3)	31	356	185	77	Estimated using regional hydrology study
	Concentration (mg/L)	0.50	0.17	0.34	0.00	Average of two grab samples
	Load (kg)	15.50	61.23	62.84		Computed load at Les-63
Computed KV-55	Load (kg)					
OUTFLOWS						
Flow at KV-55	Flow (1000m3)	31	356	185	77	Computed (total of all inflows to element)
	Concentration (mg/L)	0.00	0.00	0.01	0.00	Average of two grab samples
	Load (kg)	0.12	0.71	1.11	0.31	Computed (flow times concentration)

Element 4, No Cash Creek at Keno Highway (KV-21)						Zinc (total)
INFLOWS						
		Jan - Mar	Apr - Jun	Jul - Sept	Oct - Dec	Source of Data/Comment
Runoff from incremental catchment (excluding runoff into open pits)	Flow (1000m3)	19	213	111	46	Estimated using regional hydrology study
	Concentration (mg/L)	0.01159	-0.01377	-0.00426	-0.00007	Computed (load divided by flow)
	Load (kg)	0	-3	0	0	Computed (load at LES-21 minus loads at adits)
Discharge from KV-18	Flow (1000m3)	15.60	15.72	15.90	15.90	Estimated using regional hydrology study
	Concentration (mg/L)	0.00	0.01	0.01	0.01	Average observed concentration at LES-18
	Load (kg)	0.02	0.19	0.13	0.08	Computed (flow times concentration)
Discharge from KV-19	Flow (1000m3)	11.70	11.79	11.92	11.92	Estimated using regional hydrology study
	Concentration (mg/L)	0.00	0.00	0.00	0.01	Average observed concentration at LES-19
	Load (kg)	0.02	0.02	0.02	0.06	Computed (flow times concentration)
Discharge from KV-20	Flow (1000m3)	34.31	34.59	34.97	34.97	Estimated using regional hydrology study
	Concentration (mg/L)	0.00	0.11	0.03	0.01	Average observed concentration at LES-20
	Load (kg)	0.07	3.67	1.19	0.31	Computed (flow times concentration)
Adit Input Totals	Flow (1000m3)	61.60	62.11	62.80	62.80	Computed (total of all inflows to element)
	Concentration (mg/L)	0.00	0.06	0.02	0.01	Computed (load divided by flow)
	Load (kg)	0.10	3.87	1.34	0.45	Computed load at Station LES-21
Totals	Flow (1000m3)	80.26	275.18	173.60	109.06	Cumulative flow from all catchment elements
Computed KV-21	Load (kg)	0.32	0.94	0.87	0.45	Cumulative load for all catchment elements
OUTFLOWS						
Flow at KV-21	Flow (1000m3)	80.26	275.18	173.60	109.06	Computed (total of all inflows to element)
	Concentration (mg/L)	0.00	0.00	0.01	0.00	Average of 3 grab samples
	Load (kg)	0.32	0.94	0.87	0.45	Computed (flow times concentration)

Element 5, South McQuesten River between KV-1 and KV-2						Zinc (total)
INFLOWS						
		Jan - Mar	Apr - Jun	Jul - Sept	Oct - Dec	Source of Data/Comment
Runoff from incremental catchment (excluding runoff into open pits)	Flow (1000m3)	233	2660	1384	578	Estimated using regional hydrology study
	Concentration (mg/L)	0.03	0.08	0.16	0.10	Computed (load divided by flow)
	Load (kg)	8	219	222	55	Computed (load at S10 - loads at 4 u/s stations)
Flow of South McQuesten River at KV-1	Flow (1000m3)	5255.04	5995.04	31201.80	13028.12	Estimated using regional hydrology study
	Concentration (mg/L)	0.01	0.00	0.01	0.01	Average observed concentration at LES-1
	Load (kg)	49.13	279.58	219.04	75.95	Computed (flow times concentration)
Flow from Element 2 (KV-7)	Flow (1000m3)	675.71	5669.91	3045.49	1402.07	From Element 2
	Concentration (mg/L)	0.00	0.00	0.00	0.00	From Element 2
	Load (kg)	0.81	23.93	6.40	1.58	From Element 2
Flow from Element 3 (KV-55)	Flow (1000m3)	31.18	355.93	185.11	77.29	From Element 3
	Concentration (mg/L)	0.00	0.00	0.01	0.00	From Element 3
	Load (kg)	0.12	0.71	1.11	0.31	From Element 3
Flow from Element 4 (KV-21)	Flow (1000m3)	80.26	275.18	173.60	109.06	From Element 4
	Concentration (mg/L)	0.00	0.00	0.01	0.00	From Element 4
	Load (kg)	0.32	0.94	0.87	0.45	From Element 4
Adit Input Totals	Flow (1000m3)	6042.19	66296.05	34606.01	14616.54	Computed (total of all inflows to element)
	Concentration (mg/L)	0.00	0.00	0.00	0.00	Computed (load divided by flow)
	Load (kg)	1.26	25.57	8.37	2.34	Computed load at Station S10
Totals	Flow (1000m3)	6275.21	68956.32	35989.54	15194.22	Cumulative flow from all catchment elements
Computed KV-2	Load (kg)	57.92	523.68	449.37	133.39	Cumulative load for all catchment elements
OUTFLOWS						
Flow at KV-2	Flow (1000m3)	6275.21	68956.32	35989.54	15194.22	Computed (total of all inflows to element)
	Concentration (mg/L)	0.00	0.00	0.01	0.00	Avg. observed concentrations for complete record
	Load (kg)	8.79	244.11	230.33	57.43	Computed (flow times concentration)

Element 6, Valley Tailings Area (KV-12)						Zinc (total)
INFLOWS						
		Jan - Mar	Apr - Jun	Jul - Sept	Oct - Dec	Source of Data/Comment
Catchment runoff	Flow (1000m3)	37	424	221	92	Estimated using regional hydrology study
	Concentration (mg/L)	0.01	0.00	0.00	0.00	Computed (load divided by flow)

		0.26	1.23	0.66	0.37	Computed (combined load of decant and seepage)
OUTFLOWS		Jan - Mar	Apr - Jun	Jul - Sept	Oct - Dec	Source of Data/Comment
Decant from KV-12	Flow (1000m3) Concentration (mg/L) Load (kg)					Computed (catchment runoff minus seepage) Avg. observed conc. at S1 /KV12 Computed (flow times concentration)
Seepage from KV-58 <b>Assume no seepage</b>	Flow (1000m3) Concentration (mg/L) Load (kg)					No data available - SRK VTA geotechnical assessment implies no seepage No data available - SRK VTA geotechnical assessment implies no seepage No data available - SRK VTA geotechnical assessment implies no seepage
Adit Input Totals	Flow (1000m3) Concentration (mg/L) Load (kg)					Computed (total of all outflows from element) Computed (load divided by flow) Computed (total of all outflows from element)
OUTFLOWS		Jan - Mar	Apr - Jun	Jul - Sept	Oct - Dec	Source of Data/Comment
Flow at KV-12	Flow (1000m3) Concentration (mg/L) Load (kg)	37.15 0.01 0.26	424.15 0.00 1.23	220.59 0.00 0.66	92.11 0.00 0.37	

Element 7, Porcupine Creek Diversion Channel (KV-47)						Zinc (total)
INFLOWS		Jan - Mar	Apr - Jun	Jul - Sept	Oct - Dec	Source of Data/Comment
Catchment runoff	Flow (1000m3) Concentration (mg/L) Load (kg)	131 0.00 0.26	1494 0.01 12.31	777 0.01 4.38	325 0.01 1.72	Estimated using regional hydrology study Computed (load divided by flow) Computed load at LES-47
OUTFLOWS		Jan - Mar	Apr - Jun	Jul - Sept	Oct - Dec	Source of Data/Comment
Flow at KV-47	Flow (1000m3) Concentration (mg/L) Load (kg)	130.90 0.00 0.26	1494.40 0.01 12.31	777.20 0.01 4.38	324.51 0.01 1.72	Computed (total of all inflows to element) Average observed concentration at KV-47 Computed (flow times concentration)

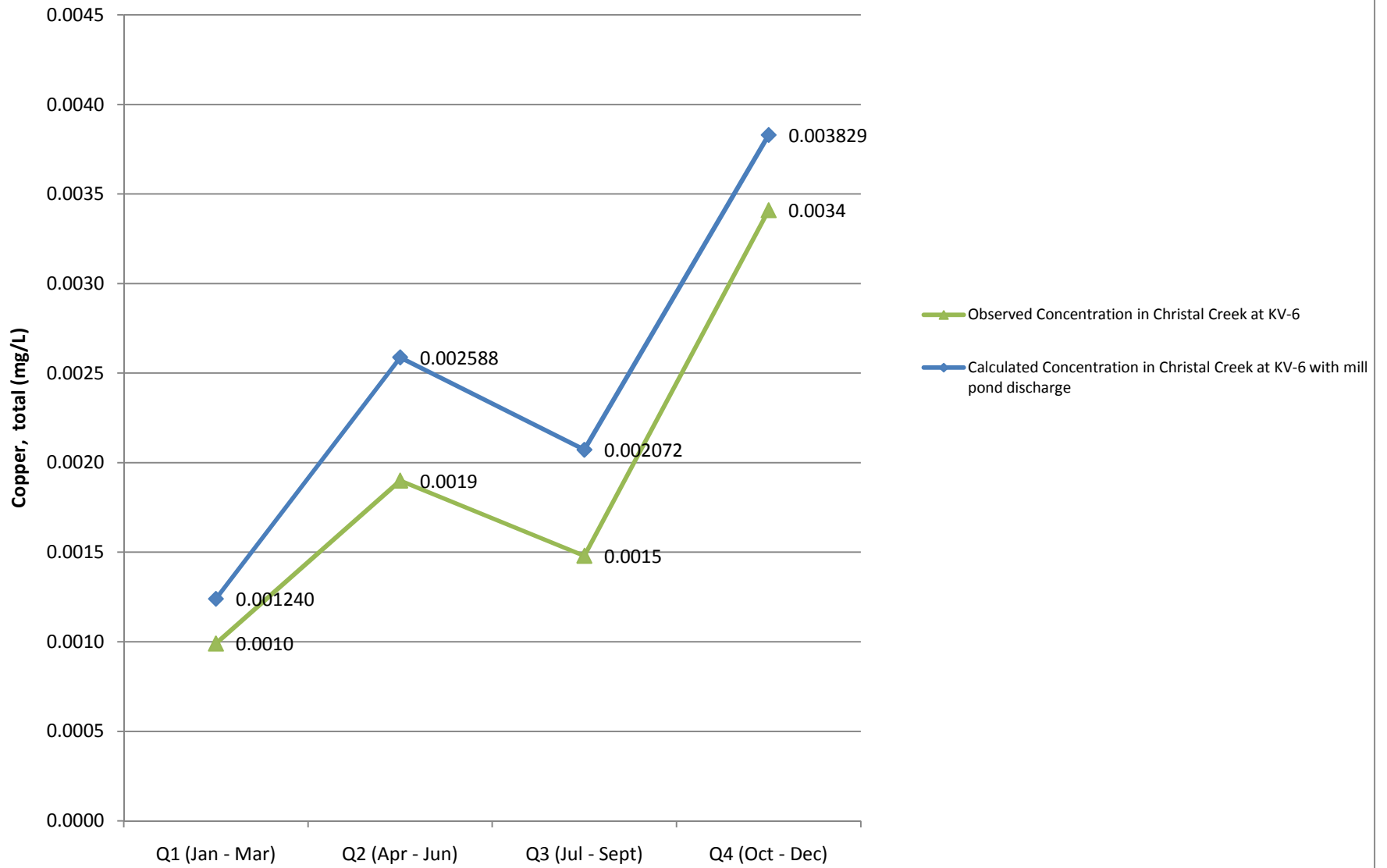
Element 8, Galena Creek @ mouth (KV-59)						Zinc (total)
INFLOWS		Jan - Mar	Apr - Jun	Jul - Sept	Oct - Dec	Source of Data/Comment
Runoff from incremental catchment (excluding runoff into open pits)	Flow (1000m3) Concentration (mg/L) Load (kg)	131 0.01 0.69	1403 0.00 5.66	735 0.00 3.05	319 0.00 1.34	Estimated using regional hydrology study Computed (load divided by flow) Computed (load at LES-57 minus loads at adit)
Discharge from KV-14	Flow (1000m3) Concentration (mg/L) Load (kg)	55.36 0.00 0.06	63.43 0.00 0.21	53.51 0.00 0.11	62.45 0.00 0.19	Average of measured flows (UKHM/Govt/LES data) Average observed concentration at S13 Computed (flow times concentration)
Adit Input Totals	Flow (1000m3) Concentration (mg/L) Load (kg)	55.36 0.00 0.06	63.43 0.00 0.21	53.51 0.00 0.11	62.45 0.00 0.19	Computed (total of all inflows to element) Computed (load divided by flow) Computed load at Station LES-57
Totals <i>Computed KV-59</i>	Flow (1000m3) Load (kg)	186.78 0.75	1466.46 5.87	788.74 3.15	381.77 1.53	Cumulative flow from all catchment elements Cumulative load for all catchment elements
OUTFLOWS		Jan - Mar	Apr - Jun	Jul - Sept	Oct - Dec	Source of Data/Comment
Flow at KV-59	Flow (1000m3) Concentration (mg/L) Load (kg)	186.78 0.00 0.75	1466.46 0.00 5.87	788.74 0.00 3.15	381.77 0.00 1.53	Computed (total of all inflows to element) Measured in Galena Cr. d/s of SK adit "ACG-WQ-O2D" Computed (flow times concentration)

Element 9, Flat Creek above KV-9 and below KV-47						Zinc (total)
INFLOWS		Jan - Mar	Apr - Jun	Jul - Sept	Oct - Dec	Source of Data/Comment
Runoff from incremental catchment	Flow (1000m3) Concentration (mg/L) Load (kg)	5304 0.00 25.31	5304 0.00 4.17	5304 0.00 8.03	5304 0.00 16.10	Estimated using regional hydrology study Computed (load divided by flow) Computed (load at S9 - loads at u/s stations & adits)
Discharge from KV-17	Flow (1000m3) Concentration (mg/L) Load (kg)	25.73 0.00 0.03	25.95 0.00 0.12	26.23 0.00 0.08	26.23 0.00 0.08	Estimated using regional hydrology study Average observed concentration at LES-14 Computed (flow times concentration)
Flow from outlet of Element 6 (both KV-12 and KV-58)	Flow (1000m3) Concentration (mg/L) Load (kg)	37.15 0.01 0.26	424.15 0.00 1.23	220.59 0.00 0.66	92.11 0.00 0.37	From Element 6 From Element 6 From Element 6
Flow from outlet of Element 7 (i.e., flow at KV-47)	Flow (1000m3) Concentration (mg/L) Load (kg)	130.90 0.00 0.26	1494.40 0.01 12.31	777.20 0.01 4.38	324.51 0.01 1.72	From Element 7 From Element 7 From Element 7
Flow from outlet of Element 8 (i.e., flow at KV-59)	Flow (1000m3) Concentration (mg/L) Load (kg)	186.78 0.00 0.75	1466.46 0.00 5.87	788.74 0.00 3.15	381.77 0.00 1.53	From Element 8 From Element 8 From Element 8
Adit Input Totals	Flow (1000m3) Concentration (mg/L) Load (kg)	380.56 0.00 1.29	3410.96 0.01 19.53	1812.75 0.00 8.27	824.62 0.00 3.69	Computed (total of all inflows to element) Computed (load divided by flow) Computed load at Station S9
Totals <i>Computed KV-9</i>	Flow (1000m3) Load (kg)	5684.56 26.60	8714.96 23.70	7116.75 16.30	6128.62 19.80	Cumulative flow from all catchment elements Cumulative load for all catchment elements
OUTFLOWS		Jan - Mar	Apr - Jun	Jul - Sept	Oct - Dec	Source of Data/Comment
Flow at Station KV-9	Flow (1000m3) Concentration (mg/L) Load (kg)	5684.56 0.00 26.60	8714.96 0.00 23.70	7116.75 0.00 16.30	6128.62 0.00 19.80	Measured at Station KV9 Avg. observed concentrations for period 2006-08 Computed (flow times concentration)

Element 10, South McQuesten River between KV-2 and KV-4						Zinc (total)
INFLOWS		Jan - Mar	Apr - Jun	Jul - Sept	Oct - Dec	Source of Data/Comment
Runoff from incremental catchment	Flow (1000m3) Concentration (mg/L) Load (kg)	4784 0.00 -17.14	4784 0.01 47.17	4784 -0.02 -74.23	4784 0.00 -3.17	Estimated using regional hydrology study Computed (load divided by flow) Computed (load at S9 - loads at u/s stations & adit)
Flow from outlet of Element 5 (KV-2)	Flow (1000m3) Concentration (mg/L) Load (kg)	6275.21 0.00 8.79	68956.32 0.00 244.11	35989.54 0.01 230.33	15194.22 0.00 57.43	From Element 5 From Element 5 From Element 5
Flow from outlet of Element 9 (KV-9)	Flow (1000m3) Concentration (mg/L) Load (kg)	5684.56 0.00 26.60	8714.96 0.00 23.70	7116.75 0.00 16.30	6128.62 0.00 19.80	From Element 9 From Element 9 From Element 9
Adit Input Totals	Flow (1000m3) Concentration (mg/L) Load (kg)	11959.77 0.00 35.39	77671.28 0.00 267.81	43106.29 0.01 246.63	21322.84 0.00 77.23	Computed (total of all inflows to element) Computed (load divided by flow) Computed load at Station S11
Totals <i>Computed KV-4</i>	Flow (1000m3) Load (kg)	16743.77 18.25	82455.28 314.98	47890.29 172.41	26106.84 74.06	Cumulative flow from all catchment elements Cumulative load for all catchment elements
OUTFLOWS		Jan - Mar	Apr - Jun	Jul - Sept	Oct - Dec	Source of Data/Comment
Flow at KV-4	Flow (1000m3) Concentration (mg/L) Load (kg)	16743.77 0.00 18.25	82455.28 0.00 314.98	47890.29 0.00 172.41	26106.84 0.00 74.06	Measured KV-4 data Computed (flow times concentration)

Element 11, South McQuesten River between KV-4 and KV-5						Zinc (total)
INFLOWS		Jan - Mar	Apr - Jun	Jul - Sept	Oct - Dec	Source of Data/Comment
Runoff from incremental catchment	Flow (1000m3) Concentration (mg/L) Load (kg)	19000 0.00 30.00	19000 0.00 -20.76	19000 0.01 127.26	19000 0.00 57.20	Estimated using regional hydrology study Computed (load divided by flow) Computed (load at LES-5 minus loads at u/s stations)
Flow of Haldane Creek at KV-57	Flow (1000m3) Concentration (mg/L) Load (kg)					Estimated using regional hydrology study One grab sample taken in July 1994 Computed (flow times concentration)
Flow from outlet of Element 10 (i.e., flow at KV-4)	Flow (1000m3) Concentration (mg/L) Load (kg)	16743.77 0.00 18.25	82455.28 0.00 314.98	47890.29 0.00 172.41	26106.84 0.00 74.06	From Element 10 From Element 10 From Element 10
Adit Input Totals	Flow (1000m3) Concentration (mg/L) Load (kg)	16743.77 0.00 18.25	82455.28 0.00 314.98	47890.29 0.00 172.41	26106.84 0.00 74.06	Computed (total of all inflows to element) Computed (load divided by flow) Computed load at Station LES-5
Totals <i>Computed KV-5</i>	Flow (1000m3) Load (kg)	35743.77 48.25	101455.28 294.22	66890.29 299.67	45106.84 131.26	Cumulative flow from all catchment elements Cumulative load for all catchment elements
OUTFLOWS		Jan - Mar	Apr - Jun	Jul - Sept	Oct - Dec	Source of Data/Comment
Flow at KV-5	Flow (1000m3) Concentration (mg/L) Load (kg)	35743.77 0.00 48.25	101455.28 0.00 294.22	66890.29 0.00 299.67	45106.84 0.00 131.26	Average of 6 grab samples taken by EPS and LES Computed (flow times concentration)

### Current and Estimated Concentrations of Flame and Moth Mill to Christal Creek (Total Copper, 2006-2010 Steady State Conditions)



Station	Name	Watershed	Northing	Easting	UTQ1 (Jan - M)	Q2 (Apr - Ju)	Q3 (Jul - Se)	Q4 (Oct - D)	Annual
KV-6	Observed Load in Christal Creek @ Keno Highway (KV-6)	CC	7088204	483882	0.281	2.263	1.060	1.464	5.068
KV-7	Christal Creek @ Hanson Road	CC	7092443	478790	0.811	23.927	6.396	1.584	32.718
KV-55	Sandy Creek at Silver Trail Highway	SM	7089668	478539	15.500	61.230	62.840	0.000	139.570
KV-21	No Cash Creek @ Keno Highway	NCC	7088750	477500	0.321	0.936	0.868	0.451	2.575
KV-2	South McQuesten River at Pumphouse	SM	7090031	472153	57.920	523.682	449.370	133.388	1164.360
KV-12	Valley Tailings Pond #3 Decant	FC	7088227	474341	0.000	0.000	0.000	0.000	0.000
KV-47	Porcupine Diversion Ditch	FC	7088008	474853	0.262	12.314	4.376	1.717	18.668
KV-59	Galena Creek at mouth (just upstream of Flat Creek)	FC	7087018	471127	0.747	5.866	3.155	1.527	11.295
KV-9	Flat Creek u/s South McQuesten River	FC	7088406	465871	26.604	23.705	16.297	19.795	86.401
KV-4	South McQuesten River d/s Flat Creek	SM	7088336	465620	18.251	314.979	172.405	74.056	579.691
KV-5	South McQuesten River 9 km downstream Flat Creek	SM	7088870	460686	48.254	294.220	299.669	131.261	773.404
KV-1	South McQuesten River u/s Christal Creek	SM	7092956	474078	49.135	279.577	219.037	75.954	623.702
KV-14	Silver King Treatment Pond #2 Decant	FC	7085706	471838	0.055	0.209	0.107	0.187	0.559
KV-17	Husky South West Adit	FC	7086580	473854	0.026	0.125	0.079	0.079	0.308
KV-18	Birmingham Adit	NCC	7087294	478755	0.016	0.186	0.127	0.079	0.408
KV-19	Ruby Adit	NCC	7087765	478549	0.020	0.018	0.024	0.060	0.122
KV-20	No Cash 500 Adit	NCC	7088485	477689	0.069	3.667	1.189	0.315	5.240
KV-28	Galkeno 300 Treatment Pond Decant	CC	7088902	482703	0.088	0.275	0.099	0.195	0.657
KV-32	Galkeno 900 Treatment Pond Decant	CC	7087719	483512	0.021	0.031	0.020	0.043	0.116
KV-45	Onek Adit	CC	7087288	485101	0.012	0.063	0.054	0.042	0.172
KV-53	UN Adit	CC	7089322	481595	0.000	0.000	0.000	0.000	0.000
KV-58	Seepage at toe of #3 dam	FC	7088296	474317	0.000	0.000	0.000	0.000	0.000
F&M POND	Modelled Load from Flame & Moth Mill Treatment Discharge	CC	-	-	0	1	0	0	1
KV-6	Observed Concentration in Christal Creek at KV-6	-	-	-	0.00099	0.0019	0.00148	0.00341	
KV-6	Calculated Concentration in Christal Creek at KV-6 with mill pond discharge				0.001240	0.002588	0.002072	0.003829	

Enter Water Licence discharge criteria requested

Enter Attenuation Factor %

Enter average daily mill sedimentation pond discharge m3/day

0.1	0.1	0.1	0.1
0%	0%	0%	0%
7.77	87.74	45.14	18.85