ROSE CREEK MASS BALANCE FOR SULPHATE AND TOTAL ZINC AT LOCATIONS X2 AND X14

May 2000

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ROSE CREEK MASS BALANCE FOR SULPHATE AND TOTAL ZINC AT LOCATIONS X2 AND X14 FROM 1995 TO 1999

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Summary

This mass balance model has been developed to be a tool for environmental planning for the Faro minesite and to be a starting point for future reclamation planning work.

This model predicts the loadings of sulphate and total zinc at location X2 in the North Fork of Rose Creek and at location X14 in Rose Creek immediately downstream of the minesite. The model predictions are reasonably close to actual measured values from 1995 to 1999 with the exception of a significant (47% over 5 years) underestimation of sulphate loading at location X14. The sources of the unaccounted sulphate at location X14 are unknown.

All available sources of information were used in the development of this model. This included continuous flow monitoring records at locations R7 and X14, measured contaminant concentrations from the Anvil Range Mining Corp. database, surface hydrology calculations presented in the 1996 Integrated Comprehensive Abandonment Plan, and annual precipitation data as measured at the Faro airport. Where actual information was not available, a reasonable approach was used to fill in information gaps. All of the relevant information is included here.

The most interesting findings of this exercise were:

- water chemistry reconciliations were performed at locations X2, X3, X10 and X14
- water from upstream of location R7 in the North Fork of Rose Creek is the most important source of flow, sulphate, and total zinc in the North Fork
- an unknown source of total zinc is suggested entering the Rose Creek diversion canal between locations X3 and X10 (this may or may not be lateral seepage from the tailings ponds and it would be premature to assume so at this time)
- an unknown source of sulphate is suggested entering Rose Creek between locations X10 and X14 but which is not X13 or X5
- the primary contributor of total zinc and flow in Rose Creek at location X14 is the North Fork of Rose Creek as monitored at location X2
- the primary contributor of sulphate in Rose Creek at location X14 is discharge from the Cross Valley Pond as monitored at location X5 although this is not conclusive because the model accounts for only 53% (over 5 years) of the actual sulphate loading present at location X14.

A summary of the 5 year (1995 to 1999) totals for the mass balance model is provided below.

Summary of 5 Year (1995-99) Totals for the Rose Creek Mass Balance for Locations X2 and X14

Source	SO_4 mil t / % of act	Zn(t) '000 t / % of act	Flow '000 m3 / % of act
u/s of R7	1,817 / 50%	5,070 / 53%	189,956 / 82%
Faro Ck div	376 / 10%	1,901 / 20%	27,582 / 12%
s.side/clean runoff	116 / 3%	314 / 3%	11,873 / 5%
n. side/dumps runoff	382 / 11%	90 / 1%	1,533 / 1%
grdwtr discharge	295 / 8%	180 / 2%	401 / 0%
X2 predicted	2,984 / 83%	7,554 / 80%	231,345 / 100%
X2 actual	3,609 / 10%	9,484 / 41%	231,345 / 63%
s. fork/fwsd	1,328 / 4%	2,080 / 9%	78,803 / 22%
main&int dumps runoff	25 / 0%	6 / 0%	101 / 0%
Rose Ck diversion runoff	939 / 2%	6,058 / 26%	21,674 / 6%
grdwtr discharge	328 / 1%	12 / 0%	844 / 0%
X-V Dam seepage	4,957 / 13%	319 / 1%	9,278 / 3%
X-V Dam discharge	7,363 / 20%	4,565 / 20%	17,000 / 5%
N.W. Interceptor	183 / 0%	358 / 1%	6,765 / 2%
X14 predicted	18,731 / 51%	22,882 / 98%	365,810 / 100%
X14 actual	36,930	23,366	365,810

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Introduction

A mass balance model for Rose Creek is an important component of the development of a practical and efficient reclamation plan for the minesite. The mass balance model will describe the contribution of contaminants into Rose Creek from various sources and will allow predictions to be made of the effectiveness of alternative reclamation plans with respect to surface water quality.

The mass balance described here was developed in-house for environmental planning purposes. This model provides some important information regarding the impact of the Faro minesite in Rose Creek but does not represent a final product regarding a Rose Creek mass balance.

This model is intended to be used for on-going environmental management of the minesite and as a starting point for the development of a more rigorous mass balance model at some time in the future.

Sub-Catchement Areas

The Integrated Comprehensive Abandonment Plan ("ICAP") which was filed with the Yukon Territory Water Board by Anvil Range Mining Corp. in 1996 includes a description of the surface hydrology of the Rose Creek catchement and a breakdown of the entire catchement area into relevant sub-catchements.

The sub-catchement areas as presented in the ICAP were used in this model. These areas are illustrated on the attached figure and are listed with their respective areas on the attached table. A brief description of the areas is as follows:

For the North Fork of Rose Creek (location X2):

- upstream of location R7
- Faro Creek diversion channel
- run off from the south side of the North Fork
- run off from the north side of the North Fork including rock dumps
- shallow groundwater discharge into the North Fork

For Rose Creek Immediately Downstream of the Minesite (location X14):

- North Fork of Rose Creek (location X2)
- South Fork of Rose Creek (fresh water supply dam)
- run off from the main and intermediate rock dumps into Rose Creek
- run off into the Rose Creek diversion canal
- seepage from the Cross Valley Dam (location X13)

- discharge from the Cross Valley Dam (location X5)
- shallow groundwater discharge into Rose Creek
- North West Interceptor Ditch

Mean Annual Runoff

The ICAP also includes calculations of mean annual runoff ("m.a.r.") values for sub-catchement areas. The m.a.r. values were calculated by relating the mean ground elevation of the sub-catchement area to an m.a.r.-elevation relationship developed from regional long term flow monitoring stations.

The m.a.r. values for each sub-catchement area as presented in the ICAP are attached here so that the ICAP document is not required to follow the development of this mass balance. However, a more detailed description of the ICAP work is not included here and interested parties are referred to the ICAP document.

Model Inputs - Annual Precipitation

The annual precipitation measured at the Faro airport as reported in the Golder Associates Annual Inspection report for 1999 was used to adjust the m.a.r. values presented in the ICAP to produce run off values specific for each year. The factor which was introduced was the percentage of the actual annual precipitation to the average annual precipitation based on the available 20 year precipitation record.

The precipitation record is attached in tabular and graphical format.

Model Inputs - Flow

The hydrology description in the ICAP presented a breakdown of annual flows into four annual periods and this format was also used in this model. The four periods are: (1) January to April, (2) May to July, (3) August to October, and (4) November to December.

Continuous flow recorders are installed at two locations in Rose Creek. These are at location R7 in the North Fork upstream of the minesite and at location X14 immediately downstream of the minesite. The information from these continuous data recorders was used in the model for these locations. Where significant time gaps exist wherein no flow data was recorded, then the m.a.r. values calculated in the ICAP were used as adjusted according to the measured precipitation.

There were several instances where the measured flows were significantly different than the calculated flows on an annual basis and, in these cases, the measured flows were taken as being correct.

The following modifications were made to the m.a.r. values for sub-catchement areas based on measured flows (detailed support information is included in the attached notes):

- The calculated m.a.r. for the Faro Main pit was found to be 1.3 million m^3 per year lower, on average, than the observed inflows over a four year period; the difference was assumed to be due primarily to leakage from the Faro Creek diversion channel and the difference was subtracted from the calculated m.a.r. for the Faro Creek diversion channel (Note #1).
- The measured flows at location R7 for three years were, on average, 52% greater than the flows predicted from the calculated m.a.r. values; the calculated m.a.r. values for the other catchement areas reporting to the North Fork of Rose Creek (location X2) were increased by 52% (Notes #2&#5).
- The measured distribution of annual flow into the four annual periods at location R7 over a three year period was slightly different than the predicted distribution and the measured distribution was used where applicable (Note #2).
- The measured flow at location X14 was close to the calculated flows after application of the adjustments described above (Notes #3&#5).
- the actual ratio of flows at the confluence of the Faro Creek diversion and the North Fork of Rose Creek were calculated and verified that the flow adjustment to the Faro Creek diversion flow described above was reasonable (Note #4).
- the discharge of shallow groundwater into the North Fork of Rose Creek (location X2) was assumed to be at a rate of 95,000 m^3 per year (~3 Lps) for an average precipitation year
- the discharge of shallow groundwater into Rose Creek immediately downstream of the minesite (location X14) was assumed to be at a rate of 200,000 m^3 per year (~6.3 Lps) for an average precipitation year
- water drawn from Rose Creek for mine operations and water added into Rose Creek from the water wells located near the pumphouse pond were accounted for

Model Inputs - Contaminant Concentrations (SO4 & Zn(t))

Measured contaminant concentrations were used in this model from 1995 to 1999 where available. Generally complete monthly concentration records were available for locations X2, X3, X5, X13 and X14 and these were used as average concentrations for the four annual periods.

For other locations, any available concentrations were used except where the measured concentrations were clearly anomalous. Contaminant concentrations for periods where no measured concentrations were available were filled in based on a reasonable evaluation of each individual case.

A summary of the sources of information regarding contaminant concentrations for the sub catchement areas is as follows:

For the North Fork of Rose Creek (location X2):

- upstream of location R7 - measured ("R7") and filled in - Note #8
- Faro Creek diversion channel - measured ("FAROCR") and filled in - Note #6
- run off from the south side of the North Fork - as location R7 - Note #8
- run off from the north side of the North Fork including rock dumps - measured ("NE1"," NE2"&"NE3") and filled in - Note #6
- shallow groundwater discharge into the North Fork - measured (average "S3&"P96-6") and filled in - Note #6

For Rose Creek Immediately Downstream of the Minesite (location X14):

- North Fork of Rose Creek (location X2) - measured ("X2") - Note #9
- South Fork of Rose Creek (fresh water supply dam) - calculated from X3 reconciliation - Notes #7&#10
- run off from the main and intermediate rock dumps into Rose Creek - measured ("NE1"," NE2"&"NE3") and filled in - Note #6
- run off into the Rose Creek diversion canal - calculated from X10 reconciliation - Note #11
- seepage from the Cross Valley Dam (location X13) - measured
- discharge from the Cross Valley Dam (location X5) - measured
- shallow groundwater discharge into Rose Creek - measured ("X18A") and filled in - Note #12
- North West Interceptor Ditch - measured ("NWINT") and filled in - Note #7

The attached Notes #6 to #12 show the measured contaminant concentrations which were available and the filled in concentrations where no measured concentrations were available.

The measured contaminant concentrations at location X3 were used to determine the contributory concentrations from the South Fork of Rose Creek via the fresh water supply dam. This was necessary because the available information regarding contaminant concentrations in the South Fork of Rose Creek is too sparse to be used in the model. This calculation accounted for the partial splitting of flow from the North Fork of Rose Creek either into the pumphouse pond to location X3 or around the pumphouse pond and directly into the Rose Creek diversion canal. Refer to Note #10 for a description of this calculation.

The measured contaminant concentrations at location X10 were used to determine the contributory concentrations from run off into the Rose Creek diversion canal. This was

necessary because the available information regarding contaminant concentrations at location X10 did not match closely with the predicted concentrations. The reasons for the absence of a reasonable match are suspected to include inflow of two unmonitored tributary creeks into the Rose Creek diversion canal and possible lateral seepage from the tailings impoundments. Refer to Note #11 for a description of this calculation.

Model Results - 1995 to 1999

The results of the model calculations for 1995 to 1999 show that the model is reasonably accurate with the exception of a significant underestimation of the sulphate loading at location X14.

For the 5 year period from 1995 to 1999, the model predicts 83% of the actual sulphate loading , 80% of the actual total zinc loading, and 98% of the total flow for location X2. The model predicts 51% of the actual sulphate loading, 98% of the actual total zinc loading, and 102% of the total flow for location X14.

The North Fork of Rose Creek upstream of the minesite (location R7) is the primary contributor of sulphate (52%), total zinc (53%) and flow (82%) to location X2. The North Fork of Rose Creek (location X2) is the primary contributor of total zinc (43%) and flow (63%) to location X14. Discharge from the Cross Valley Pond (location X5) is the primary contributor of sulphate (21%) to location X14 although the model only predicts 53% of the actual sulphate loading at location X14. These percentages are averages for the 5 year period from 1995 to 1999.

The 20% underestimation of sulphate and total zinc loading for location X2 is suspected to be due to underestimation of loadings from the primary flow contributor at location R7 and/or underestimation of loadings from shallow groundwater discharge. A small error in the contaminant concentrations at location R7 could result in a significant error in loadings at location X2 because flow from location R7 represents such a large component (82%) of the flow at location X2. Therefore, it would be premature to assume that the difference between the predicted and actual loadings is due primarily to shallow groundwater discharge without the benefit of additional data.

The sources of the unaccounted sulphate loading at location X14 are unknown but may include run off over the area of a previous tailings spill and/or an underestimation of the contributions from shallow groundwater discharge.

The detailed calculations for each year (1995 to 1999) are attached as is a one page summary of the results.

TABLE 1:

Subcatchment Characteristics of Anvil Creek Watershed

Subcatchment ID No.	Subcatchment description	Drainage area (km^2)	Median elevation (m)	Average annual unit runoff (mm)	Average annual flow ($1000\ m^3$)
1 + 2 + 3	Total catchment of Faro Creek Diversion Channel	16.2	1510	349	5655
4a	Incremental catchment of Faro Valley Dump	0.58	1290	259	150
4b	Incremental catchment of Main Pit	1.6	1250	243	388
5	Incremental catchment of Zone II Pit	0.33	1160	206	68
6	North Fork of Rose Creek above Station R7	95	1470	333	31607
7a	Catchment of potential collection system for Northeast Waste Dump	0.44	1190	218	96
7b	Catchment of potential collection system for Intermediate Waste Dump	0.74	1130	193	143
7c	North Fork of Rose Creek between X2 and R7 (excl. Subcatchments 7a and 7b)	7.9	1230	234	1851
8a	Catchment of potential collection system for Outer Haul Road West Waste Dump	0.12	1140	197	24
9	South Fork of Rose Creek at embankment of Fresh Water Reservoir	67	1420	312	20917
8b + 10 + 14 + 17	Rose Creek above X14 and below NWID, X5, X2 and Fresh Water Reservoir	29	1260	247	7151
11	Approximate catchment of X23 (a portion of catchment of proposed Millsite Reservoir)	1.02	1160	206	210
12	Old Faro Creek channel above proposed Millsite Reservoir and below Station X23	0.80	1170	210	168
13a	Catchment of potential collection system for Parking Lot and Lower NW Waste Dumps	0.34	1190	218	74
13b	Incremental catchment of Down Valley Tailings Impoundment (excl. Subcatchment 13a)	4.1	1050	161	658
15	Guardhouse Creek above Northwest Waste Dump	1.8	1480	337	606
16a	Catchment of potential collection system for Upper Northwest Waste Dumps	0.23	1290	259	60
16b	Incremental catchment of North Wall Interceptor Ditch	4.3	1190	218	937
18	Rose Creek between Station R4 and Station X14	105	1280	255	26754
19	Anvil Creek above Station R6	322	1450	325	104489
20	Anvil Creek above the mouth and below Stations R4 and R6	321	1170	210	67314
1 to 20	Anvil Creek above the mouth	980	-	-	269319

report to X2

report to Main Pit

report to X2

report to X14

report to Init. Pond

report to X14

Notes: Area "17" assumed = 620 Km^3

Area "8b+14" assumed = 4,516 Km^3

Area "9+10" assumed = 22,932 Km^3

TABLE 2
~~TABLE 3~~

TOTAL MONTHLY PRECIPITATION (mm) AT FARO AIRPORT, YUKON

Year	Jan	Feb.	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total (mm)
1978	0.4	miss.	trace	4.1	11.6	27.0	38.1	41.6	7.8	32.4	20.2	19.0	202.2
1979	8.9	18.3	20.2	6.7	10.5	68.2	55.4	13.8	13.4	11.6	12.4	34.4	273.8
1980	19.7	2.4	11.7	12.5	10.5	11.1	95.4	33.2	46.7	miss.	21.3	13.3	277.8
1981	6.5	23.1	4.0	4.5	7.8	42.8	41.3	22.5	41.9	21.5	17.0	5.4	238.3
1982	10.2	18.0	9.5	4.1	18.2	14.3	58.3	47.3	47.2	42.3	11.8	13.6	294.8
1983	35.7	6.6	9.8	2.2	20.6	55.6	49.1	65.8	21.2	16.3	11.4	3.9	298.2
1984	27.6	24.1	5.9	2.4	38.8	49.0	16.6	64.9	5.5	10.8	10.7	22.5	278.8
1985	22.5	24.8	2.2	13.8	17.2	28.1	62.6	80.8	46.3	20.0	22.2	26.1	366.6
1986	8.4	4.7	34.6	12.9	35.1	12.8	81.8	77.4	44.4	22.7	15.9	5.6	356.3
1987	3.1	14.0	2.8	10	40.1	50.8	92.4	63.5	30.2	26.6	17.8	6.2	357.5
1988	7.0	10.4	17.2	8.2	38.0	37.3	97.2	25.5	43.8	29.0	17.9	16.5	348.0
1989	19.8	3.6	19.8	2.0	17.9	41.0	51.7	16.9	30.8	46.3	39.8	13.8	303.4
1990	14.4	25.8	5.0	7.0	23.4	45.4	30.0	64.4	66.2	22.7	25.4	24.8	354.5
1991	17.2	22.6	16.6	2.8	22.4	30.2	115.4	33.0	48.2	49.6	43.4	40.0	441.4
1992	22.8	24.6	7.6	15.8	14.4	11.4	66.1	34.4	47.8	13.8	18.8	13.0	290.5
1993	22.2	15.0	1.6	6.0	76.7	48.6	50.2	56.0	50.8	35.7	miss.	miss.	362.8
1994	20.2	8.4	11.4	5.0	39.8	24.2	19.6	25.2	45.6	41.6	24.4	8.0	273.4
1995	8.4	7.8	18.4	5.2	10.9	33.9	73.4	63.4	28.8	12.2	22.3	15.4	300.1
1996	10.2	9.1	27.1	7.2	13.4	20.0	64.4	70.8	52.7	34.8	3.5	5.9	319.1
1997	6.6	8.7	1.4	14	16.5	39.3	86.4	33.2	trace	25.2	6.4	12.4	250.1
1998	7.0	2.8	4.8	4.2	14.4	29.6	19.2	24.2	23.4	24.0	4.6	8.2	166.4
1999	**24.4**	**10.0**	**15.4**	**1.8**	**44.4**	**64.8**	**42.0**	**33.8**	**27.0**	**22.4**	**12.8**	**21.6**	**320.4**
Max	35.7	25.8	34.6	15.8	76.7	68.2	115.4	80.8	66.2	49.6	43.4	40.0	
Year	1983	1990	1986	1992	1993	1979	1991	1985	1990	1991	1991	1991	
Mean	**15.4**	**13.6**	**11.8**	**7.3**	**25.8**	**37.4**	**62.2**	**47.2**	**36.7**	**26.7**	**18.1**	**15.7**	**317.8**
Min	0.4	2.4	trace	1.8	7.8	11.1	16.6	13.8	trace	10.8	3.5	3.9	
Year	1978	1980	1978	1999	1981	1980	1984	1979	1997	1984	1996	1983	
St.Dev	9.0	8.1	8.9	4.4	16.4	16.6	27.3	20.9	16.0	11.5	10.0	9.8	

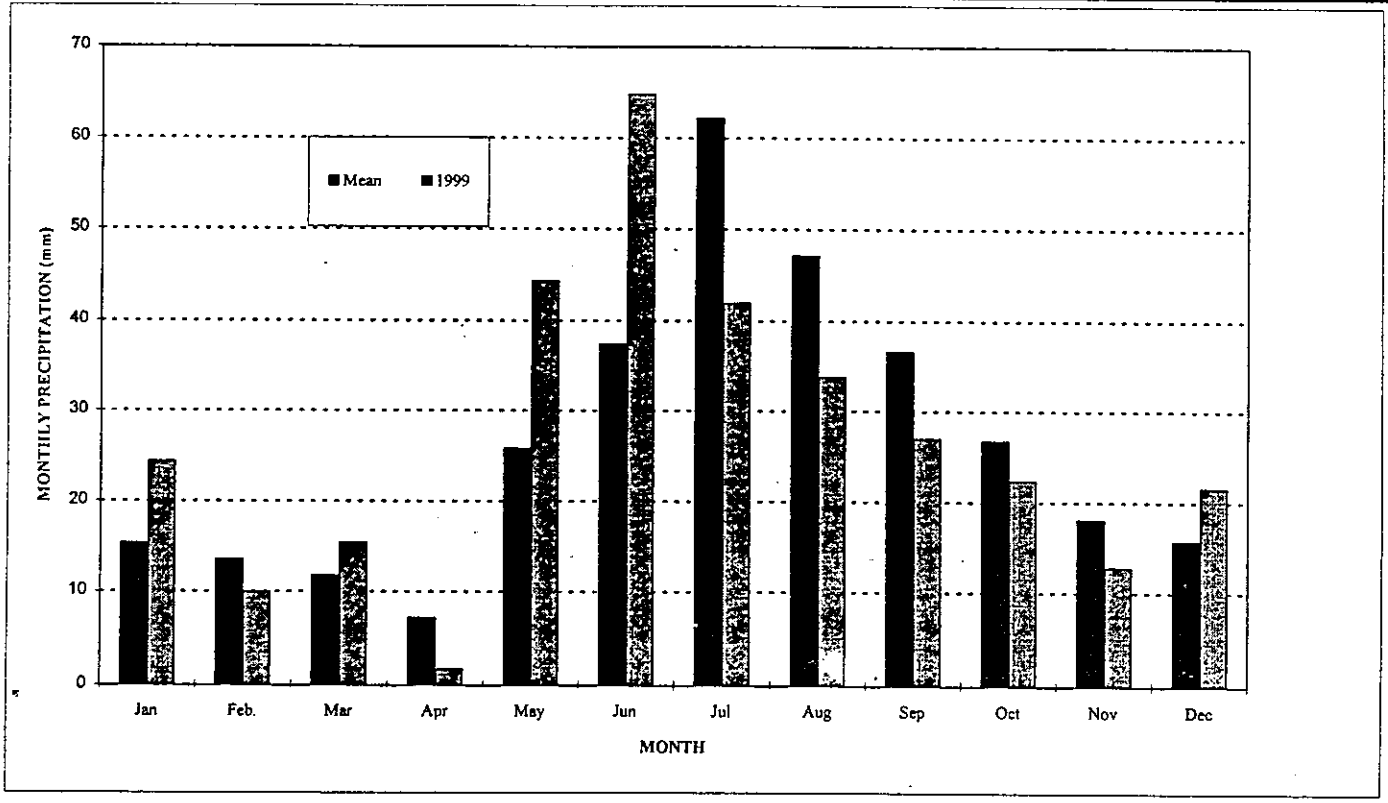


TABLE 3: SUMMARY OF ROSE CREEK MASS BALANCE FOR SULPHATE AND TOTAL ZINC AT LOCATIONS X2 AND X14 FROM 1995 TO 1999

FOR X2 (NORTH FORK ROSE CREEK)

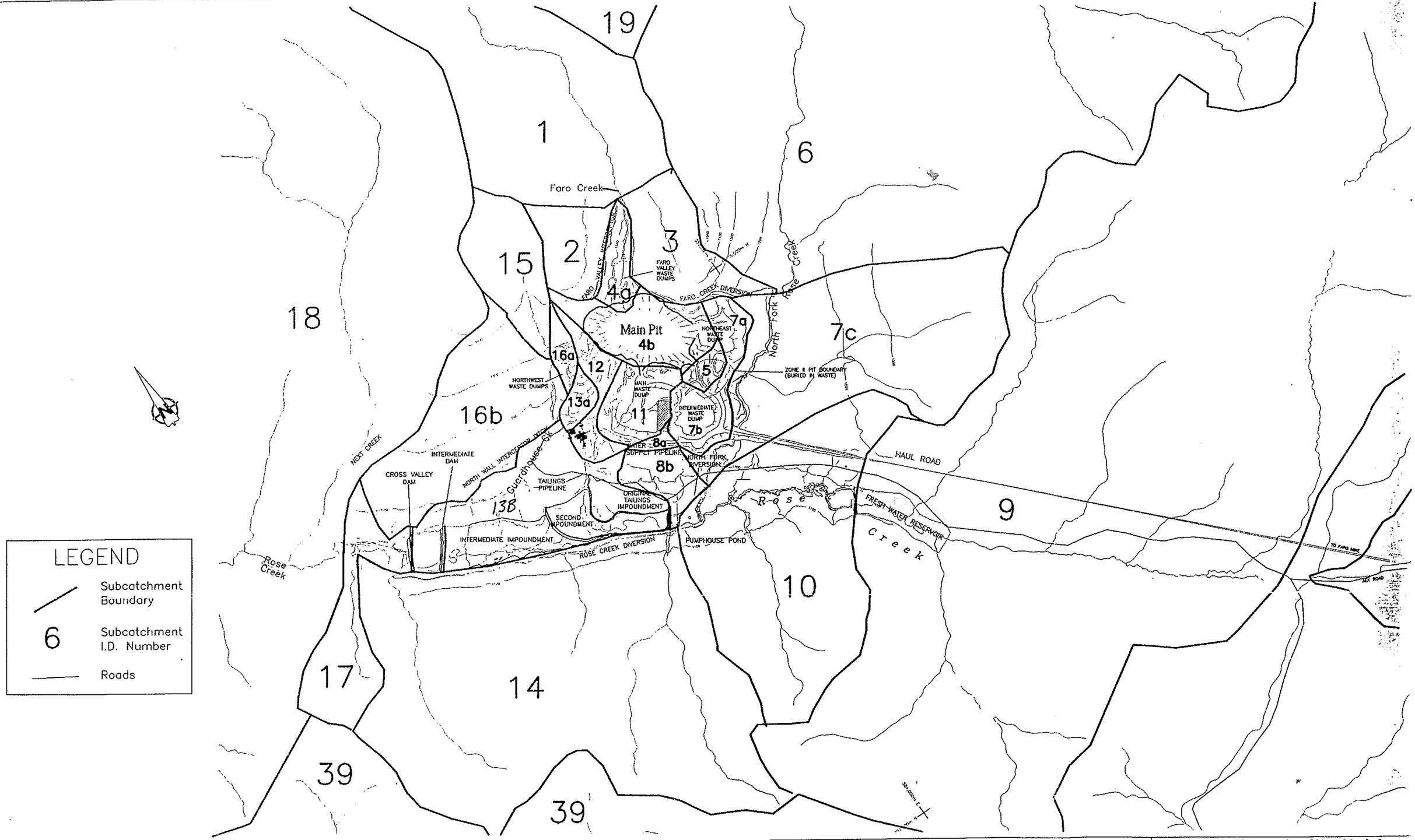
% of "actual"	SO4						Zn(t)						FLOW					
loading from	1999	1998	1997	1996	1995	avg	1999	1998	1997	1996	1995	avg	1999	1998	1997	1996	1995	avg
FAROCR	16%	11%	6%	14%	3%	10%	28%	17%	16%	25%	15%	20%	15%	10%	10%	13%	11%	12%
R7	51%	46%	67%	47%	51%	52%	48%	51%	59%	56%	50%	53%	77%	85%	85%	81%	83%	82%
RO-DUMPS	15%	7%	13%	8%	13%	11%	1%	1%	0%	1%	2%	1%	1%	1%	1%	1%	1%	1%
RO-CLEAN	4%	2%	3%	3%	3%	3%	4%	3%	3%	4%	3%	3%	7%	4%	4%	5%	5%	5%
GRDWTR	15%	5%	11%	4%	10%	9%	3%	1%	2%	1%	2%	2%	0%	0%	0%	0%	0%	0%
TOTAL X2	101%	73%	100%	76%	80%	86%	85%	72%	80%	88%	72%	79%	-	-	-	-	-	-
							total est. X2 flow - Km3						45672	37496	45201	44590	58386	-
							% of "normal" precipitation						108%	56%	71%	86%	101%	84%
							"normalized" est. X2 flow - Km3						42289	66958	63663	51849	57808	56513
							% of predicted normal flow						73%	116%	110%	90%	100%	98%
													predicted normal X2 flow - Km3					57808

loading	SO4 (mil t)						Zn(t) ('ooo t)						FLOW (Km3)					
from	1999	1998	1997	1996	1995	5 yrs	1999	1998	1997	1996	1995	5 yrs	1999	1998	1997	1996	1995	5 yrs
FAROCR	93	78	23	158	24	376	492	272	371	510	256	1901	7059	3660	4641	5621	6601	27582
R7	286	318	253	534	426	1817	836	839	1390	1132	873	5070	35080	32004	38237	36155	48480	189956
RO-DUMPS	83	49	49	91	110	382	24	10	8	20	28	90	392	203	258	312	367	1533
RO-CLEAN	25	16	13	37	25	116	72	41	73	76	51	314	3039	1576	1998	2420	2842	11873
GRDWTR	84	36	41	48	85	295	53	13	47	27	40	180	103	53	67	82	96	401
TOTAL X2	571	497	378	868	670	2984	1477	1176	1888	1765	1248	7554	45672	37496	45201	44590	58386	231345
ACTUAL X2	563	686	377	1144	839	3609	1735	1642	2364	2008	1734	9484	45672	37496	45201	44590	58386	231345
% Tot/Act	101%	73%	100%	76%	80%	83%	85%	72%	80%	88%	72%	80%	100%	100%	100%	100%	100%	100%

FOR X14 (ROSE CREEK IMMEDIATELY DOWNSTREAM OF MINESITE)

% of "actual"	SO4						Zn(t)						FLOW					
loading from	1999	1998	1997	1996	1995	avg	1999	1998	1997	1996	1995	avg	1999	1998	1997	1996	1995	avg
X2	8%	10%	9%	15%	8%	10%	41%	24%	50%	63%	39%	43%	56%	60%	65%	68%	67%	63%
FWSD	5%	3%	5%	3%	3%	4%	17%	8%	9%	7%	4%	9%	30%	21%	20%	17%	19%	21%
RO-DUMPS	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
RO-X10	1%	1%	1%	1%	6%	2%	39%	28%	31%	4%	21%	25%	7%	5%	5%	7%	6%	6%
GRDWTR	1%	1%	1%	1%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
X13	15%	17%	21%	11%	9%	14%	1%	2%	2%	1%	1%	1%	2%	4%	3%	3%	2%	3%
X5	12%	33%	31%	13%	17%	21%	13%	29%	15%	15%	19%	18%	2%	9%	5%	3%	4%	5%
NWINT	0%	1%	1%	1%	0%	1%	2%	2%	2%	1%	0%	1%	2%	1%	2%	2%	2%	2%
TOTAL X14	43%	64%	68%	44%	45%	53%	113%	93%	109%	91%	84%	98%	-	-	-	-	-	-
							total est. X14 flow excl X5&X13 - Km3						81429	62109	69285	65765	87223	-
							% of "normal" precipitation						108%	56%	71%	86%	101%	84%
							"normalized" est. X14 flow excl X5&X13 - Km3						75397	110908	97584	76470	86359	89344
							% of predicted normal flow (excl X5&X13)						86%	127%	112%	87%	99%	102%
													predicted normal X14 flow excl X5&X13 - Km3					87503

loading	SO4 (mil t)						Zn(t) ('000 t)						FLOW (Km3)					
from	1999	1998	1997	1996	1995	5 yrs	1999	1998	1997	1996	1995	5 yrs	1999	1998	1997	1996	1995	5 yrs
X2 (actual)	563	686	377	1144	839	3609	1735	1642	2364	2008	1734	9484	45672	37496	45201	44590	58386	231345
FWSD	371	192	218	203	343	1328	743	540	409	225	163	2080	24767	12783	13641	11287	16326	78803
RO-DUMPS	5	3	3	6	7	25	2	1	1	1	2	6	26	13	17	21	24	101
RO-X10	83	43	58	80	674	939	1664	1870	1459	133	934	6058	5547	2876	3647	4417	5187	21674
GRDWTR	93	41	46	68	80	328	4	2	1	2	2	12	216	112	142	172	202	844
X13	1046	1189	917	867	937	4957	39	102	117	24	37	319	1710	2250	2000	1700	1618	9278
X5	852	2315	1381	1037	1778	7363	574	1936	718	479	859	4565	1760	5680	3500	2200	3860	17000
NWINT	33	47	25	56	21	183	69	154	91	28	16	358	1731	898	1138	1379	1619	6765
TOTAL X14	3048	4517	3026	3461	4680	18731	4830	6246	5160	2899	3747	22882	81429	62109	69285	65765	87223	365810
ACTUAL X14	7088	7035	4431	7862	10514	36930	4263	6703	4723	3201	4477	23366	81429	62109	69285	65765	87223	365810
% Tot/Act	43%	64%	68%	44%	45%	51%	113%	93%	109%	91%	84%	98%	100%	100%	100%	100%	100%	100%



LEGEND

- Subcatchment Boundary
- 6 — Subcatchment I.D. Number
- Roads

SCALE 1:50 000

ROBERTSON GEOCONSULTANTS INC.
Consulting Geotechnical and Environmental Engineers

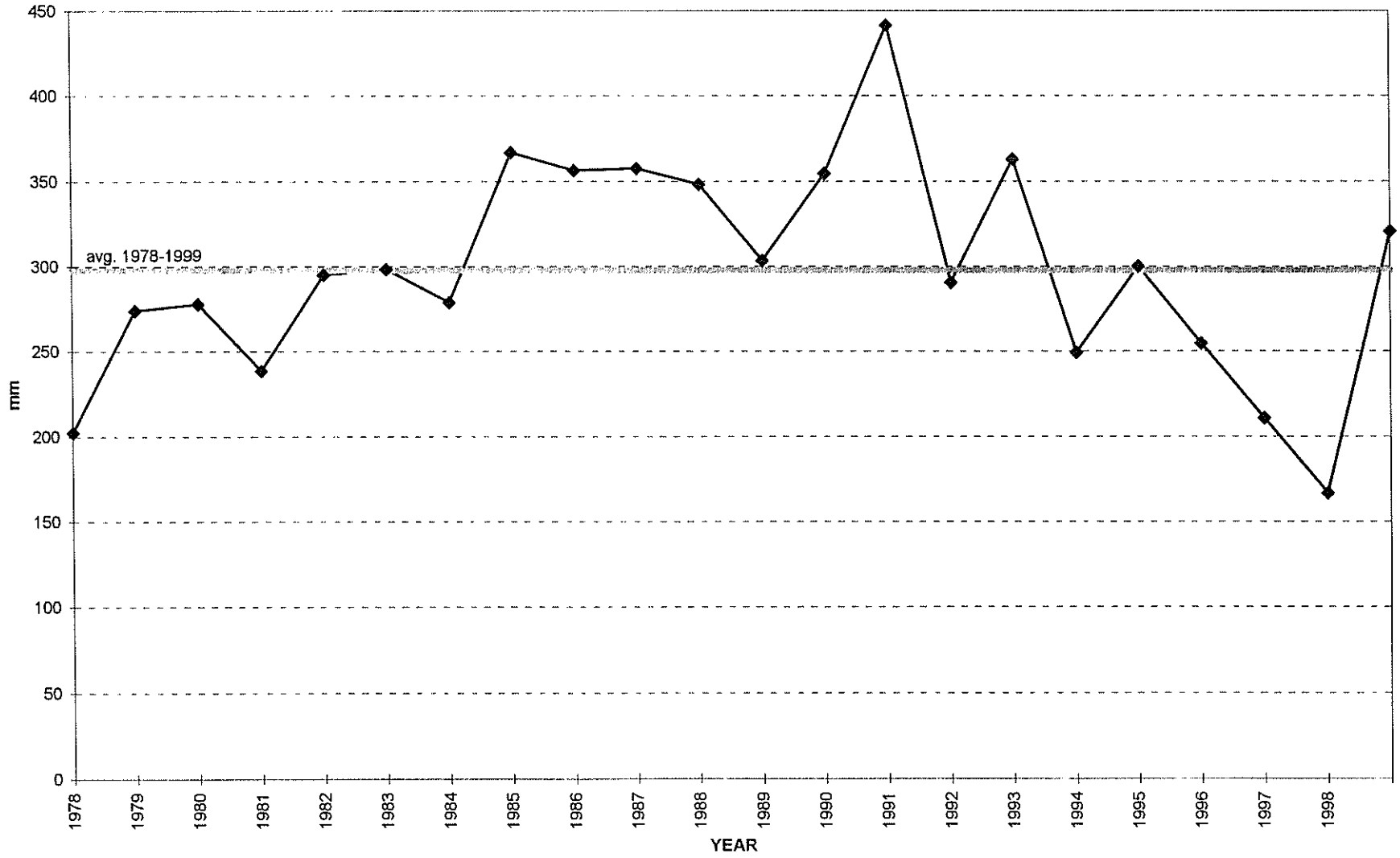
Anvil Range Mining Corporation

Anvil Water Quality Model

Minesite Subcatchments in Vicinity of Faro Development

PROJECT NO.	DATE	APPROVED	FIGURE
033003	July 1997		1-2

Figure 2: Faro Annual Precipitation Summary



EXPLANATORY NOTES TO DENHOLM ROSE CREEK MASS BALANCE APRIL 2000

1. Faro Pit Inflows from net uncontrolled sources (precip, evap, grndwtr)

1996 = 1.3 mil m3 @ 86% precip = 1.5 mil m^3 "normalized"
1997 = 1.9 mil m3 @ 71% precip = 2.7 mil m^3 "normalized"
1998 = 1.17 mil m3 @ 56% precip = 2.1 mil m^3 "normalized"
1999 = 1.18 mil m3 @ 108% precip = 1.1 mil m^3 "normalized"
average '96-'99 = 1.8 mil m^3 for a normal precip. year

the "predicted" inflow is only 538,000 m^3/year (or 1.3 mil m^3 too low)

therefore, take the "missing" flow from the predicted flow in Faro Creek diversion
i.e. Faro Creek diversion = 5.655 - 1.3 = 4.3 mil m^3

this adjusted flow for Faro Creek diversion (~136 Lps avg) will be used

2. R7 Flows

(a) Complete annual flows measured in 1997, 1998 and 1999 from transducer installed in 1996 (brief missing gaps only)

1997 = 32,004 Km^3 @ 56% precip = 57,150 Km^3 "normalized"
1998 = 38,237 Km^3 @ 71% precip = 53,855 Km^3 "normalized"
1999 = 35,080 Km^3 @ 108% precip = 32,481 Km^3 "normalized"
average '97-'99 = 47,829 Km^3 (say 48,000 Km^3)

the "predicted" flow is only 31,607 Km^3 which is 16,000 Km^3 too low

therefore, increase the predicted flow by 52% to 48,000 Km^3

further, increase all contributory flows to X2 by 152% to account for the underestimation for R7

(b) R7 Seasonal Flow Distribution

Year	Jan-Apr	May-Jul	Aug-Oct	Nov-Dec	Total
1997	2639/7%	25116/66%	8102/21%	2380/6%	38237/100%
1998	3986/12%	12093/38%	7087/22%	8838/28%	32004/100%
1999	4666/13%	19604/56%	5945/17%	4864/14%	35080/100%
average '97-'99					
	11%	53%	20%	16%	
"predicted"					
	8%	56.5%	31.5%	4%	

-the "predicted" distribution assumes a low flow (2% per month) from Nov through Apr
-however, the actual average is more reasonable showing continued higher flows in Nov & Dec prior to the onset of the coldest winter conditions
-therefore, use the actual average distribution where applicable

3. X14 Annual Flow

An estimation of the "normalized" annual flow at X14 from natural run off should exclude sources from X13 and X5 and should include fresh water pumped to the mill from Rose Creek pumphouse
There were fairly complete flow measurements (brief gaps only) for 1996 and 1997; no readings from Feb/98 to Jun/99

1996: 54,668 Km^3 measured @ 86% precip less X5&X13 @ 3.9 mil m^3 plus freshwater to mill @ 8.4 mil m^3 = 68,000 Km^3 "normalized"
1997: 75,563 Km^3 measured @ 71% precip less X5&X13 @ 5.5 mil m^3 plus freshwater to mill @ 2.6 mil m^3 = 103,500 Km^3 "normalized"

therefore measured "normalized" flow average '96&'97 = 83,750 Km^3

the "predicted" X14 flow = X2 flow * 152% (per notes 1&2) plus X14 area runoff
= 37,997*1.52 + 29,695
= 87,450 Km^3

therefore, no adjustment necessary to X14 predicted flow except application of notes 1&2 to flows u/s of X2

EXPLANATORY NOTES TO DENHOLM ROSE CREEK MASS BALANCE APRIL 2000

4. Mass Balance for R7, R8 & FAROCR

Compare dates for which the three data sets are available

Date	SO4 mg/L			Zn(t) mg/L			Zn(d) mg/L		
	R7	f.ck.	R8	R7	f.ck.	R8	R7	f.ck.	R8
3/4/96	20	239	10	<0.01	1.02	<0.01			
15/5/96	3	131	3	0.02	0.68	0.02			
13/5/97	5	7	4	0.01	0.15	0.02			
23/6/97*	7	2	5	0.02	0.03	0.02			
15/7/97	6	6	6	0.09	0.07	0.07			
19/5/98*	3	54	6	<0.01	0.16	0.08			
15/6/98*	14	2	13	0.03	0.04	0.05			
19/10/98	9	12	9	0.01	0.02	0.02			
17/5/99	6	34	2	0.04	0.10	0.04	0.02	0.08	0.02
4/7/99	5	4	5	0.03	0.09	0.04	<0.01	<0.01	<0.01
30/10/99*	10	6	9	<0.01	<0.01	<0.01	0.26	<0.01	0.02

given simple mass balance: R7(x) + f.ck. (1-x) = R8(1)

then x (proportion of R8 flow sourcing from R7) varies from: 60%-94% for SO4
and from: 50% to 93% for Zn(t)

this is based on those sample results where the three concentrations fit the model (i.e. R8 in between R7 and f.ck.)

therefore the "observed" ratio of flows for R7:fck is from 1:1 to 16:1

check: the adjusted annual R7 flow per note 2 is 48,000 Km3
and the adjusted annual Faro Ck diversion flow per note 1 is 4.3 mil m3
therefore, the ratio of predicted flows for R7:fck is 11:1 which is within the "observed" range

therefore, the adjusted flows from Notes 1&2 can be used where applicable

Note 5. Run Off Estimates in N. Fork above X2

5.(a) per Note 2, adjust predicted annual run off flows upwards by 152%

therefore, "R-O Clean" from s. side = 1851 * 1.52 = 2,814 Km^3
and, "R-O Dumps" from n. side = 239 * 1.52 = 363 Km^3

5.(b) Run Off Estimates for X14

per Note 3, no adjustments necessary to run off flows for X14 except for N. Fork above X2 per notes 1,2,4&5(a)

therefore, "FWSD" = 22,932 Km^3
and, "NWINT" = 1,603 Km^3
and, "R-O Dumps" from main&int rock dumps = 24 Km^3
and, "RO-X10" runoff into Rose Ck diversion canal = 5,136 Km^3

Note 6. Concentrations for X2 Sources

time periods: 1=Jan-Apr; 2=May-Jul; 3=Aug-Oct; 4=Nov-Dec

6.(a) measured concentrations

	SO4 mg/L				Zn(t) mg/L			
	1	2	3	4	1	2	3	4
faro creek diversion								
1999:	-	19	6	-	-	0.10	0.01	-
1998:	-	28	12	-	-	0.10	0.02	-
1997:	-	5	-	-	-	0.08	-	-
1996:	239	131	-	-	1.02	0.68	-	-
1995 "FDL":	-	2	-	-	-	0.02	-	-
R-O Dumps (NE1, NE2, NE3)								
1999:	-	195	262	-	-	0.06	0.06	-
1998:	-	236	-	-	-	0.05	-	-
1997:	-	189	-	-	-	0.03	-	-
1996:	-	930	-	-	-	2.47	-	-
1995:	-	-	-	-	-	-	-	-
Groundwater (S3&P96-6)								
1999:	-	428/-	34/2119	-	-	.76/-	.41/.03	-
1998:	-	250/1323	254/1862	342/-	-	.33/.11	.98/.10	.11/-
1997:	-	17/1345	97/708	-	-	1.26/3.73	1.29/.12	-
1996:	-	1371/-	108/876	-	-	.09/-	.5/.08	-
1995:	-	-	1380/-	-	-	-	.15/-	-

EXPLANATORY NOTES TO DENHOLM ROSE CREEK MASS BALANCE APRIL 2000

6.(b) Concentrations Used

	SO4 mg/L				Zn(t) mg/L			
	1	2	3	4	1	2	3	4
faro creek diversion								
1999:	6	19	6	5	0.06	0.10	0.01	0.03
1998:	20	28	12	20	0.08	0.10	0.02	0.08
1997:	5	5	5	5	0.08	0.08	0.08	0.08
1996:	30/239	42/131	12	20	.10/1.02	.10/.68	0.08	0.08
1995 "FDL":	5	2	5	5	0.06	0.02	0.06	0.06
R-O Dumps (NE1, NE2, NE3)								
1999:	195	195	262	236	0.06	0.06	0.06	0.06
1998:	236	236	262	236	0.05	0.05	0.05	0.05
1997:	189	189	189	189	0.03	0.03	0.03	0.03
1996:	236	354/930	236	236	0.05	.08/2.47	0.05	0.05
1995:	236	354	236	236	0.05	0.08	0.08	0.08
Groundwater (S3&P96-6)								
1999:	452	900	1230	342	0.14	0.81	0.22	0.05
1998:	452	786	1058	342	0.14	0.22	0.54	0.11
1997:	145	760	402	131	0.06	.81/2.50	0.71	0.14
1996:	452	792	492	145	0.07	0.44	0.31	0.06
1995:	750	1100	766	452	0.09	0.54	0.54	0.07

" ": used as measured
where two conc. shown, use reasonable concentrations in place of very high concentrations for more reasonable fit (used/meas)

EXPLANATORY NOTES TO DENHOLM ROSE CREEK MASS BALANCE APRIL 2000

Note 7. Concentrations Reporting to X14

time periods: 1=Jan-Apr; 2=May-Jul; 3=Aug-Oct; 4=Nov-Dec

7.(a) measured concentrations

	SO4 mg/L				Zn(t) mg/L			
	1	2	3	4	1	2	3	4
FWSD								
1999:	-	-	-	-	-	-	-	-
1998:	-	-	10	-	-	-	0.05	-
1997:	-	-	-	-	-	-	-	-
1996:	-	8	11	-	-	0.01	0.03	-
1995:	-	-	-	-	-	-	-	-
NWINT								
1999:	-	19	-	-	-	0.04	-	-
1998:	-	74	-	-	-	0.29	-	-
1997:	-	22	-	-	-	0.08	-	-
1996:	-	42	-	-	-	0.02	-	-
1995:	-	13	-	-	-	0.01	-	-

7.(b) Concentrations Used (refer also to Note #10)

	SO4 mg/L				Zn(t) mg/L			
	1	2	3	4	1	2	3	4
FWSD								
1999:	15	15	15	15	0.03	0.03	0.03	0.03
1998:	15	15	15	15	0.04	0.04	0.05	0.04
1997:	16	16	16	16	0.03	0.03	0.03	0.03
1996:	18	18	18	18	0.03	0.01	0.03	0.03
1995:	21	21	21	21	0.01	0.01	0.01	0.01
NWINT								
1999:	19	19	19	19	0.04	0.04	0.04	0.04
1998:	40	74	40	40	0.10	0.29	0.10	0.10
1997:	22	22	22	22	0.08	0.08	0.08	0.08
1996:	40	42	40	40	0.02	0.02	0.02	0.02
1995:	13	13	13	13	0.01	0.01	0.01	0.01

"_": used as measured

EXPLANATORY NOTES TO DENHOLM ROSE CREEK MASS BALANCE APRIL 2000

Note 8. R7 Concentrations

time periods: 1=Jan-Apr; 2=May-Jul; 3=Aug-Oct; 4=Nov-Dec

	SO4 mg/L				Zn(t) mg/L			
	1	2	3	4	1	2	3	4
R7								
1999:	13	6	10	10	0.03	.03/.04	0.01	0.01
1998:	13	8	9	12	0.03	0.02	0.03	0.03
1997:	9	6	7	9	0.005	0.04	0.04	0.02
1996:	11	9/4	25/6	14	0.009	.03/.01	.04/.015	0.025
1995:	11	9	6/25	10/23	0.01	0.01	0.05	0.01

" ": used as measured
where two conc. shown, use largest or smallest of other concentrations for more reasonable fit (used/meas)

Note 9. X2 Concentrations

time periods: 1=Jan-Apr; 2=May-Jul; 3=Aug-Oct; 4=Nov-Dec

	SO4 mg/L				Zn(t) mg/L			
	1	2	3	4	1	2	3	4
X2								
1999:	28	6	13	22	0.04	0.04	0.02	0.05
1998:	18	10	18	30	.08/.11	0.05	0.03	0.03
1997:	20	6	9	18	0.04	0.05	0.07	0.03
1996:	23	35/41	13	20	0.03	0.05	0.04	.05/.09
1995:	21	10	13	26	0.06	.03/.01	0.02	0.02

" ": used as measured
where two conc. shown, adjustment made for more reasonable fit (used/meas)

Note 10. X3 Comparison

Water chemistry info. for location X3 was used to cross check the predictions.

The observed concentrations at X3 are as follows:

EXPLANATORY NOTES TO DENHOLM ROSE CREEK MASS BALANCE APRIL 2000

time periods: 1=Jan-Apr; 2=May-Jul; 3=Aug-Oct; 4=Nov-Dec

	SO4 mg/L				Zn(t) mg/L			
	1	2	3	4	1	2	3	4
1999:	24	7	14	20	0.04	0.04	0.01	0.03
1998:	14	11	16	23	0.10	0.04	0.02	0.02
1997:	22	7	9	18	0.02	0.04	0.05	0.02
1996:	19	9	13	21	0.02	0.02	0.01	0.04
1995:	19	7	14	20	0.01	0.01	0.02	0.01

"_": used as measured

Using the "actual" concentrations and loadings for location X2, the following observations were made:
- it was found that the predicted concentrations and loadings of total zinc at X3 were close to "actual"
- the actual sulphate concentrations and loadings at X3 were used to back calculate some minor adjustments to the concentrations of sulphate predicted to report to X3 from the Fresh Water Supply Dam (S. Fork of Rose Creek); back calculating these minor adjustments was considered appropriate because the data available for the FWSD is sparse (only one or two samples every second year) as compared to the nearly complete monthly record available for X3; the sulphate concentrations listed for the FWSD in Note #7 include the minor adjustments mentioned here

The summary comparison of predicted versus actual loadings at X3 is as follows:

	1999	1998	1997	1996	1995	5 yr avg
Zn(t)	94%	103%	104%	99%	109%	102%
SO4 pre FWSD adjustment	84%	89%	81%	77%	74%	81%
SO post FWSD adjustment	99%	98%	98%	99%	98%	98%

The partial diversion of the N. Fork of Rose Creek from X2 into the pumphouse pond (location X3) and away from its natural channel which passes from X2 around the pumphouse pond and directly into the Rose Creek diversion canal (bypassing location X3) was accounted for in this comparison to actual concentrations and loadings at X3. During 1995 and 1996, a substantial portion of the N. Fork flow was routed through the natural channel during the summer season and the majority of the N. Fork flow was diverted into the pumphouse pond during the winter season. Since 1996, no alterations to the flow regime have been made and most of the N. Fork flow passes into the pumphouse pond to location X3. The data used are as follows:

N. Fork	1999	1998	1997	1996	1995
to X3	85%-all yr	85%-all yr	85%-all yr	85/30/30/85	85/30/30/85
bypass X3	15%-all yr	15%-all yr	15%-all yr	15/70/70/15	15/70/70/15

time periods: 1=Jan-Apr; 2=May-Jul; 3=Aug-Oct; 4=Nov-Dec

Note 11. X10 Comparison

Water chemistry info. for location X10 was used to cross check the predictions. The sampling at X10 is less frequent than for downstream location X14 and upstream location X3 but still sufficient to allow this comparison.

The observed and estimated concentrations at X10 are as follows:

time periods: 1=Jan-Apr; 2=May-Jul; 3=Aug-Oct; 4=Nov-Dec

	SO4 mg/L				Zn(t) mg/L			
	1	2	3	4	1	2	3	4
1999:	26	8	13	23	0.04	0.05	0.05	0.08
1998:	12	12	20	27	0.07	0.07	0.05	0.10
1997:	23	8	13	21	0.13	0.05	0.09	0.09
1996:	30	32	14	40	0.02	0.03	0.05	0.09
1995:	12	23	15	40	0.07	0.01	0.01	0.13

"_": used as measured

Using the adjusted sulphate concentrations for FWSD as described in Note #10 and "actual"concentrations and loadings for location X2, the following observations were made:
- it was found that the predicted concentrations and loadings of sulphate at X10 were close to "actual" using the same sulphate concentrations for runoff into the Rose Creek diversion canal as were calculated for the FWSD in Note #11
- the exception to the close match on sulphate loadings described above was in 1995 when the sulphate concentration entering the Rose Creek diversion canal was increased to 130 mg/L for the year
- the actual total zinc concentrations and loadings at X10 were used to back calculate the concentrations of total zinc predicted to report to X10 from inflow into the Rose Creek diversion canal; these back calculated zinc concentrations are noticeably higher than those used for natural run off (i.e. from FWSD or R7) and this indicates that there are sources of zinc entering the Rose Creek diversion canal between locations X3 and X10; the flow attached to these sources for the predictions was the flow estimated for natural run off between locations X3 and X10

The summary comparison of predicted versus actual loadings at X10 is as follows:

	1999	1998	1997	1996	1995	5 yr avg
SO4	101%	97%	96%	91%	98%	97%
Zn(t) using natural r.o. concentrations	61%	59%	69%	95%	71%	71%
Zn(t) using back calculated concentrations	99%	98%	97%	96%	99%	98%

The back calculated concentrations of total zinc for inflows into the Rose Creek diversion canal between locations X3 and X10 are as follows. These concentrations are calculated from zinc loadings and, therefore, the concentrations are dependent on the flows used (the flows used are the estimated run off flows entering the Rose Creek diversion canal between locations X3 and X10) :

1999: 0.30 mg/L - all year
1998: 0.65 mg/L - all year
1997: 0.40 mg/L - all year
1996: 0.03 mg/L - all year
1995: 0.18 mg/L - all year

Note 12. Groundwater to X14

There is assumed to be some shallow groundwater discharge into Rose Creek (or Rose Creek catchement) generally between locations X10 and X14. An assumed flow of 200Km^3 per year was used (~6.3 Lps) for a "normal" precipitation year.

The following concentrations were used to represent this shallow groundwater discharge using the measured concentrations at piezometer X18A which is located on the lower north side of the Rose Creek valley just downstream of the Cross Valley pond and which is installed at 10 metres depth. The concentrations used are as follows:

time periods: 1=Jan-Apr; 2=May-Jul; 3=Aug-Oct; 4=Nov-Dec

	SO4 mg/L				Zn(d) mg/L			
	1	2	3	4	1	2	3	4
1999:	455	455	382	382	0.02	0.02	0.02	0.02
1998:	313	313	413	413	0.02	0.02	0.02	0.02
1997:	323	323	323	323	0.01	0.01	0.01	0.01
1996:	390	390	400	400	0.01	0.01	0.01	0.01
1995:	397	397	397	397	0.01	0.01	0.01	0.01

"_": used as measured

ROSE CREEK MASS BALANCE FOR SO4 AND ZN(t) AT X2 AND X14 FOR 1995

KNOWN FLOWS Km3	101% of normal precip		Jan-Apr	May-Jul	Aug-Oct	Nov-Dec	Year	
		R7	-	-	-	-	-	
		Faro Pit Pumped	0	0	0	0	0	
		X5	0	1130	1421	1309	3860	
		X14	2513	-	-	-	-	stop Feb11/95
		X23	16	16	13	9	54	
		X13	492	487	436	203	1618	
		FWSD TO MILL	1627	1248	2424	2011	7310	
		PW's	0	0	0	475	475	

		Jan-Apr	May-Jul	Aug-Oct	Nov-Dec	Year	"normal"	
		11%	53%	20%	16%	100%	-	est, #2
X2 FLOWS Km3	FAROCR	726	3499	1320	1056	6601	6536	est, #1, #2
	R7	5333	25694	9696	7757	48480	48000	est, #2
	RO-DUMPS	40	194	73	59	367	363	est, #2
	RO-CLEAN	313	1506	568	455	2842	2814	est, #2
	GROUNDWTR	11	51	19	15	96	95	est
	X2	6422	30945	11677	9342	58386	57808	sum
X2 CONC - mg/L SO4	FAROCR	5	2	5	5			#6
	R7	11	9	6	10			#8
	RO-DUMPS	236	354	236	236			#6
	RO-CLEAN	11	9	6	10			use R7
	GROUNDWTR	750	1100	766	452			#6
							% of "actual"	
X2 LOADING- '000 t SO4	FAROCR	3631	8397	6601	5281	23910	3%	
	R7	58661	231250	58176	77568	425654	51%	
	RO-DUMPS	9525	68840	17318	13855	109538	13%	
	RO-CLEAN	3438	13555	3410	4547	24950	3%	
	GROUNDWTR	7916	55939	14700	6939	85493	10%	
	PREDICTED X2	83171	377980	100205	108189	669546	80%	
ACTUAL X2 CONC - mg/L SO4		21	10	13	26			#9
"ACTUAL" X2 LOADING - '000 t SO4		134871	309445	151803	242885	839005		
X2 CONC - mg/L Zn(t)	FAROCR	0.06	0.02	0.06	0.06			#6
	R7	0.01	0.01	0.05	0.01			#8
	RO-DUMPS	0.05	0.08	0.08	0.08			#6
	RO-CLEAN	0.01	0.01	0.05	0.01			use R7
	GROUNDWTR	0.09	0.54	0.54	0.07			#6
							% of "actual"	
X2 LOADING- '000 t Zn(t)	FAROCR	44	70	79	63	256	15%	
	R7	53	257	485	78	873	50%	
	RO-DUMPS	2	16	6	5	28	2%	
	RO-CLEAN	3	15	28	5	51	3%	
	GROUNDWTR	1	27	10	1	40	2%	
	PREDICTED X2	103	385	609	151	1248	72%	
ACTUAL X2 CONC - mg/L Zn(t)		0.06	0.03	0.02	0.02			#9
"ACTUAL" X2 LOADING - '000 t Zn(t)		385	928	234	187	1734		

ROSE CREEK MASS BALANCE FOR SO4 AND ZN(t) AT X2 AND X14 FOR 1995

		Jan-Apr	May-Jul	Aug-Oct	Nov-Dec	Year	"normal"	
		11%	53%	20%	16%	100%		est, #2
X14 FLOWS Km3	X2	6422	30945	11677	9342	58386	57808	est per above
	FWSD-MILL+PW's	921	11027	2101	2277	16326	22932	est, #3
	RO-DUMPS	3	13	5	4	24	24	est, #3
	RO-X10	571	2749	1037	830	5187	5136	est, #3
	GRDWTR	22	107	40	32	202	200	est, #12
	X13	492	487	436	203	1618		meas
	X5	0	1130	1421	1309	3860		meas
	NWINT	178	858	324	259	1619	1603	est, #3
	X14	8609	47316	17042	14256	87223	87703	sum
X14 CONC - mg/L SO4	X2	21	10	13	26			#9
	FWSD-MILL+PW's	21	21	21	21			#7
	RO-DUMPS	236	354	236	236			#6
	RO-X10	130	130	130	130			#11
	GRDWTR	397	397	397	397			#12
	X13	662	516	559	572			meas
	X5	495	360	499	506			meas
	NWINT	13	13	13	13			#7
							% of "actual"	
X14 LOADING- '000 t SO4	X2	134871	309445	151803	242885	839005	8%	
	FWSD-MILL	19336	231577	44127	47813	342853	3%	
	RO-DUMPS	629	4548	1144	915	7237	0%	
	RO-X10	74179	357409	134871	107897	674357	6%	
	GRDWTR	8821	42503	16039	12831	80194	1%	
	X13	325704	251292	243724	116116	936836	9%	
	X5	0	406800	709079	662354	1778233	17%	
	NWINT	2315	11155	4209	3368	21047	0%	
	PREDICTED X14	565856	1614730	1304997	1194179	4679762	45%	
ACTUAL X14 CONC - mg/L SO4		159	51	129	318			meas
"ACTUAL" X14 LOADING - '000 t SO4		1368796	2413132	2198414	4533336	10513677		
X14 CONC - mg/L Zn(t)	X2	0.06	0.03	0.02	0.02			#9
	FWSD-MILL	0.01	0.01	0.01	0.01			#7
	RO-DUMPS	0.05	0.08	0.08	0.08			#6
	RO-X10	0.18	0.18	0.18	0.18			#11
	GRDWTR	0.01	0.01	0.01	0.01			#12
	X13	0.04	0.02	0.01	0.01			meas
	X5	0.44	0.06	0.25	0.33			meas
	NWINT	0.01	0.01	0.01	0.01			#7
							% of "actual"	
X14 LOADING- '000 t Zn(t)	X2	385	928	234	187	1734	39%	
	FWSD-MILL	9	110	21	23	163	4%	
	RO-DUMPS	0	1	0	0	2	0%	
	RO-X10	103	495	187	149	934	21%	
	GRDWTR	0	1	0	0	2	0%	
	X13	19	12	4	2	37	1%	
	X5	0	62	361	436	859	19%	
	NWINT	2	9	3	3	16	0%	
	PREDICTED X14	519	1618	811	800	3747	84%	
ACTUAL X14 CONC - mg/L Zn(t)		0.01	0.03	0.06	0.14			meas
"ACTUAL" X14 LOADING - '000 t Zn(t)		86	1372	1023	1996	4477		

ROSE CREEK MASS BALANCE FOR SO4 AND ZN(t) AT X2 AND X14 FOR 1996

KNOWN FLOWS Km3	86% of normal precip		Jan-Apr	May-Jul	Aug-Oct	Nov-Dec	Year	
		R7	-	-	4788	1994	-	start Sep16/96
		Faro Pit Pumped	0	0	0	0	0	
		X5	1010	212	560	418	2200	
		X14	3533	25519	19254	6362	54668	
		X23	16	12	11	11	50	
		X13	407	412	552	329	1700	
		FWSD TO MILL	3390	2599	2599	1723	10311	
		PW's	1244	0	0	632	1876	

		Jan-Apr	May-Jul	Aug-Oct	Nov-Dec	Year	"normal"	
		7%	46%	35%	11%	100%		per X14
X2 FLOWS Km3	FAROCR	405	2610	1969	637	5621	6536	est, #1, #2
	R7	2972	19171	12019	1994	36155	48000	meas, #2
	RO-DUMPS	22	145	109	35	312	363	est, #2
	RO-CLEAN	174	1124	848	274	2420	2814	est, #2
	GROUNDWTR	6	38	29	9	82	95	est
	X2	3579	23088	14974	2949	44590	57808	sum
X2 CONC - mg/L SO4	FAROCR	30	42	12	20			#6
	R7	11	9	25	14			#8
	RO-DUMPS	236	354	236	236			#6
	RO-CLEAN	11	9	25	14			use R7
	GROUNDWTR	452	792	492	145			#6
							% of "actual"	
X2 LOADING- '000 t SO4	FAROCR	12140	109636	23631	12734	158140	14%	
	R7	32689	172535	300474	27916	533614	47%	
	RO-DUMPS	5308	51361	25831	8352	90852	8%	
	RO-CLEAN	1916	10113	21192	3837	37058	3%	
	GROUNDWTR	2658	30050	14082	1342	48132	4%	
	PREDICTED X2	54711	373695	385210	54180	867797	76%	
ACTUAL X2 CONC - mg/L SO4		23	35	13	20			#9
"ACTUAL" X2 LOADING - '000 t SO4		82316	808067	194661	58988	1144032		
X2 CONC - mg/L Zn(t)	FAROCR	0.10	0.10	0.08	0.08			#6
	R7	0.009	0.03	0.04	0.025			#8
	RO-DUMPS	0.05	0.08	0.05	0.05			#6
	RO-CLEAN	0.009	0.03	0.04	0.025			use R7
	GROUNDWTR	0.07	0.44	0.31	0.06			#6
							% of "actual"	
X2 LOADING- '000 t Zn(t)	FAROCR	40	261	158	51	510	25%	
	R7	27	575	481	50	1132	56%	
	RO-DUMPS	1	12	5	2	20	1%	
	RO-CLEAN	2	34	34	7	76	4%	
	GROUNDWTR	0	17	9	1	27	1%	
	PREDICTED X2	70	898	687	110	1765	88%	
ACTUAL X2 CONC - mg/L Zn(t)		0.03	0.05	0.04	0.05			#9
"ACTUAL" X2 LOADING - '000 t Zn(t)		107	1154	599	147	2008		

ROSE CREEK MASS BALANCE FOR SO4 AND ZN(t) AT X2 AND X14 FOR 1996

		Jan-Apr	May-Jul	Aug-Oct	Nov-Dec	Year	"normal"	
		7%	46%	35%	11%	100%		per X14
X14 FLOWS Km3	X2	3579	23088	14974	2949	44590	57808	est per above
	FWSD-MILL+PW's	152	5682	4310	1143	11287	22932	est
	RO-DUMPS	1	10	7	2	21	24	est
	RO-X10	318	2051	1547	500	4417	5136	est
	GRDWTR	12	80	60	19	172	200	est, #12
	X13	407	412	552	329	1700		meas
	X5	1010	212	560	418	2200		meas
	NWINT	99	640	483	156	1379	1603	est
	X14 actual (check only)	3533	25519	19254	6362	54668		meas
	X14 calc	5579	32174	22494	5518	65765	87703	sum
X14 CONC - mg/L SO4	X2	23	35	13	20			#9
	FWSD-MILL+PW's	18	18	18	18			#7
	RO-DUMPS	236	354	236	236			#6
	RO-X10	18	18	18	18			#11
	GRDWTR	390	390	400	400			#12
	X13	512	556	507	454			meas
	X5	494	502	444	438			meas
	NWINT	40	42	40	40			#7
							% of "actual"	
X14 LOADING- '000 t SO4	X2	82316	808067	194661	58988	1144032	15%	
	FWSD-MILL	2731	102271	77583	20572	203157	3%	
	RO-DUMPS	351	3393	1707	552	6002	0%	
	RO-X10	5724	36922	27854	9006	79505	1%	
	GRDWTR	4829	31152	24103	7793	67877	1%	
	X13	208384	229072	279864	149366	866686	11%	
	X5	498940	106424	248640	183084	1037088	13%	
	NWINT	3970	26889	19319	6246	56424	1%	
	PREDICTED X14	807244	1344190	873731	435607	3460772	44%	
ACTUAL X14 CONC - mg/L SO4		442	51	86	330			meas
"ACTUAL" X14 LOADING - '000 t SO4		2465817	1640887	1934484	1820802	7861991		
X14 CONC - mg/L Zn(t)	X2	0.03	0.05	0.04	0.05			#9
	FWSD-MILL	0.03	0.01	0.03	0.03			#7
	RO-DUMPS	0.05	0.08	0.05	0.05			#6
	RO-X10	0.03	0.03	0.03	0.03			#11
	GRDWTR	0.01	0.01	0.01	0.01			#12
	X13	0.01	0.01	0.02	0.02			meas
	X5	0.21	0.42	0.19	0.17			meas
	NWINT	0.02	0.02	0.02	0.02			#7
							% of "actual"	
X14 LOADING- '000 t Zn(t)	X2	107	1154	599	147	2008	63%	
	FWSD-MILL	5	57	129	34	225	7%	
	RO-DUMPS	0	1	0	0	1	0%	
	RO-X10	10	62	46	15	133	4%	
	GRDWTR	0	1	1	0	2	0%	
	X13	4	5	10	5	24	1%	
	X5	212	90	104	73	479	15%	
	NWINT	2	13	10	3	28	1%	
	PREDICTED X14	339	1382	899	278	2899	91%	
ACTUAL X14 CONC - mg/L Zn(t)		0.07	0.03	0.05	0.11			meas
"ACTUAL" X14 LOADING - '000 t Zn(t)		407	1062	1125	607	3201		

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ROSE CREEK MASS BALANCE FOR SO4 AND ZN(t) AT X2 AND X14 FOR 1997

KNOWN FLOWS Km3	71% of normal precip		Jan-Apr	May-Jul	Aug-Oct	Nov-Dec	Year	
		R7	2639	25116	8102	2380	38237	
		Faro Pit Pumped	0	0	646	261	907	
		X5	597	137	2027	739	3500	
		X14	9664	35393	24386	6120	75563	
		X23	25	10	14	10	59	
		X13	408	436	820	336	2000	
		FWSD TO MILL	3422	6	30	116	3574	
		PW's	933	0	0	0	933	

		Jan-Apr	May-Jul	Aug-Oct	Nov-Dec	Year	"normal"	
		7%	66%	21%	6%	100%		per R7
X2 FLOWS Km3	FAROCR	320	3048	983	289	4641	6536	est
	R7	2639	25116	8102	2380	38237	48000	meas
	RO-DUMPS	18	169	55	16	258	363	est
	RO-CLEAN	138	1312	423	124	1998	2814	est
	GROUNDWTR	5	44	14	4	67	95	
	X2	3120	29690	9577	2813	45201	57808	sum
X2 CONC - mg/L SO4	FAROCR	5	5	5	5			#6
	R7	9	6	7	9			#8
	RO-DUMPS	189	189	189	189			#6
	RO-CLEAN	9	6	7	9			use R7
	GROUNDWTR	145	760	402	131			#6
							% of "actual"	
X2 LOADING- '000 t SO4	FAROCR	1601	15241	4916	1444	23203	6%	
	R7	23751	150696	56714	21420	252581	67%	
	RO-DUMPS	3364	32021	10329	3034	48749	13%	
	RO-CLEAN	1241	7873	2963	1119	13195	3%	
	GROUNDWTR	675	33671	5745	550	40642	11%	
	PREDICTED X2	30633	239502	80668	27568	378370	100%	
ACTUAL X2 CONC - mg/L SO4		20	6	9	18			#9
"ACTUAL" X2 LOADING - '000 t SO4		62392	178140	86197	50642	377371		
X2 CONC - mg/L Zn(t)	FAROCR	0.08	0.08	0.08	0.08			#6
	R7	0.005	0.04	0.04	0.02			#8
	RO-DUMPS	0.03	0.03	0.03	0.03			#6
	RO-CLEAN	0.005	0.04	0.04	0.02			use R7
	GROUNDWTR	0.06	0.81	0.71	0.14			#6
							% of "actual"	
X2 LOADING- '000 t Zn(t)	FAROCR	26	244	79	23	371	16%	
	R7	13	1005	324	48	1390	59%	
	RO-DUMPS	1	5	2	0	8	0%	
	RO-CLEAN	1	52	17	2	73	3%	
	GROUNDWTR	0	36	10	1	47	2%	
	PREDICTED X2	40	1342	431	74	1888	80%	
ACTUAL X2 CONC - mg/L Zn(t)		0.04	0.05	0.07	0.03			#9
"ACTUAL" X2 LOADING - '000 t Zn(t)		125	1485	670	84	2364		

ROSE CREEK MASS BALANCE FOR SO4 AND ZN(t) AT X2 AND X14 FOR 1997

		Jan-Apr	May-Jul	Aug-Oct	Nov-Dec	Year	"normal"	
		15%	48%	30%	7%	100%		per X14
X14 FLOWS Km3	X2	3120	29690	9577	2813	45201	57808	est per above
	FWSD-MILL+PW's	8	7793	4800	1040	13641	22932	est
	RO-DUMPS	3	8	5	1	17	24	est
	RO-X10	559	1747	1082	259	3647	5136	
	GRDWTR	22	68	42	10	142	200	est, #12
	X13	408	436	820	336	2000		meas
	X5	597	137	2027	739	3500		meas
	NWINT	175	545	338	81	1138	1603	est
	X14 actual (check only)	9664	35393	24386	6120	75563		meas
	X14 calc	4890	40424	18691	5279	69285	87703	sum
X14 CONC - mg/L SO4	X2	20	6	9	18			#9
	FWSD-MILL+PW's	16	16	16	16			#7
	RO-DUMPS	189	189	189	189			#6
	RO-X10	16	16	16	16			#11
	GRDWTR	323	323	323	323			#12
	X13	447	475	448	478			meas
	X5	447	383	383	386			meas
	NWINT	22	22	22	22			#7
							% of "actual"	
X14 LOADING- '000 t SO4	X2	62392	178140	86197	50642	377371	9%	
	FWSD-MILL	121	124690	76804	16637	218252	5%	
	RO-DUMPS	494	1543	955	229	3221	0%	
	RO-X10	8946	27948	17309	4142	58345	1%	
	GRDWTR	7033	21970	13607	3256	45866	1%	
	X13	182376	207100	367360	160608	917444	21%	
	X5	266859	52471	776341	285254	1380925	31%	
	NWINT	3839	11994	7428	1777	25039	1%	
	PREDICTED X14	532060	625856	1346003	522544	3026462	68%	
ACTUAL X14 CONC - mg/L SO4		210	20	92	166			meas
"ACTUAL" X14 LOADING - '000 t SO4		1026939	808484	1719611	876340	4431374		
X14 CONC - mg/L Zn(t)	X2	0.04	0.05	0.07	0.03			#9
	FWSD-MILL	0.03	0.03	0.03	0.03			#7
	RO-DUMPS	0.03	0.03	0.03	0.03			#6
	RO-X10	0.40	0.40	0.40	0.40			#11
	GRDWTR	0.01	0.01	0.01	0.01			#12
	X13	0.02	0.10	0.07	0.02			meas
	X5	0.17	0.24	0.25	0.10			meas
	NWINT	0.08	0.08	0.08	0.08			#7
							% of "actual"	
X14 LOADING- '000 t Zn(t)	X2	125	1485	670	84	2364	50%	
	FWSD-MILL	0	234	144	31	409	9%	
	RO-DUMPS	0	0	0	0	1	0%	
	RO-X10	224	699	433	104	1459	31%	
	GRDWTR	0	1	0	0	1	0%	
	X13	6	45	60	6	117	2%	
	X5	102	33	509	74	718	15%	
	NWINT	14	44	27	6	91	2%	
	PREDICTED X14	471	2539	1843	306	5160	109%	
ACTUAL X14 CONC - mg/L Zn(t)		0.05	0.05	0.11	0.06			
"ACTUAL" X14 LOADING - '000 t Zn(t)		254	2021	2131	317	4723		

ROSE CREEK MASS BALANCE FOR SO4 AND ZN(t) AT X2 AND X14 FOR 1998

			Jan-Apr	May-Jul	Aug-Oct	Nov-Dec	Year	
KNOWN	56%							
FLOWS	of normal	R7	3986	12093	7087	8838	32004	
Km3	precip	Faro Pit Pumped	750	1424	583	0	2757	
		X5	1758	2027	1895	0	5680	
		X14	4986					stop Feb22/98
		X23	24	10	10	8	52	
		X13	695	653	620	282	2250	
		FWSD TO MILL	59	0	0	0	59	

		Jan-Apr	May-Jul	Aug-Oct	Nov-Dec	Year	"normal"	
		12%	38%	22%	28%	100%		per R7
X2 FLOWS Km3	FAROCR	456	1383	811	1011	3660	6536	est
	R7	3986	12093	7087	8838	32004	48000	meas
	RO-DUMPS	25	77	45	56	203	363	est
	RO-CLEAN	196	595	349	435	1576	2814	est
	GROUNDWTR	7	20	12	15	53	95	
	X2	4670	14168	8303	10355	37496	57808	sum
X2 CONC - mg/L SO4	FAROCR	20	28	12	20			#6
	R7	13	8	9	12			#8
	RO-DUMPS	236	236	262	236			#6
	RO-CLEAN	13	8	9	12			use R7
	GROUNDWTR	452	786	1058	342			#6
							% of "actual"	
X2 LOADING- '000 t SO4	FAROCR	9117	38725	9726	20215	77783	11%	
	R7	51818	96744	63783	106056	318401	46%	
	RO-DUMPS	5980	18141	11803	13258	49182	7%	
	RO-CLEAN	2551	4763	3140	5221	15675	2%	
	GROUNDWTR	2995	15800	12464	5024	36284	5%	
	PREDICTED X2	72461	174173	100916	149775	497325	73%	
ACTUAL X2 CONC - mg/L SO4		18	10	18	30			#9
"ACTUAL" X2 LOADING - '000 t SO4		84061	141683	149458	310642	685845		
X2 CONC - mg/L Zn(t)	FAROCR	0.08	0.10	0.02	0.08			#6
	R7	0.03	0.02	0.03	0.03			#8
	RO-DUMPS	0.05	0.05	0.05	0.05			#6
	RO-CLEAN	0.03	0.02	0.03	0.03			use R7
	GROUNDWTR	0.14	0.22	0.54	0.11			#6
							% of "actual"	
X2 LOADING- '000 t Zn(t)	FAROCR	36	138	16	81	272	17%	
	R7	120	242	213	265	839	51%	
	RO-DUMPS	1	4	2	3	10	1%	
	RO-CLEAN	6	12	10	13	41	3%	
	GROUNDWTR	1	4	6	2	13	1%	
	PREDICTED X2	164	400	248	363	1176	72%	
ACTUAL X2 CONC - mg/L Zn(t)		0.08	0.05	0.03	0.03			#9
"ACTUAL" X2 LOADING - '000 t Zn(t)		374	708	249	311	1642		

ROSE CREEK MASS BALANCE FOR SO4 AND ZN(t) AT X2 AND X14 FOR 1998

		Jan-Apr	May-Jul	Aug-Oct	Nov-Dec	Year	"normal"	
		12%	38%	22%	28%	100%		per R7
X14 FLOWS Km3	X2	4670	14168	8303	10355	37496	57808	est per above
	FWSD-MILL	1540	4852	2844	3546	12783	22932	est
	RO-DUMPS	2	5	3	4	13	24	est
	RO-X10	358	1087	637	794	2876	5136	
	GRDWTR	14	42	25	31	112	200	est, #12
	X13	695	653	620	282	2250		meas
	X5	1758	2027	1895	0	5680		meas
	NWINT	112	339	199	248	898	1603	est
	X14	9149	23174	14525	15260	62109	87703	sum
X14 CONC - mg/L SO4	X2	18	10	18	30			#9
	FWSD-MILL	15	15	15	15			#7
	RO-DUMPS	236	236	262	236			#6
	RO-10	15	15	15	15			#11
	GRDWTR	313	313	413	413			#12
	X13	428	624	545	520			meas
	X5	402	369	454	569			meas
	NWINT	40	74	40	40			#7
							% of "actual"	
X14 LOADING- '000 t SO4	X2	84061	141683	149458	310642	685845	10%	
	FWSD-MILL	23106	72787	42656	53195	191744	3%	
	RO-DUMPS	395	1199	780	876	3249	0%	
	RO-X10	5373	16302	9553	11914	43142	1%	
	GRDWTR	4366	13246	10243	12774	40629	1%	
	X13	297460	407472	337900	146640	1189472	17%	
	X5	706716	747963	860330	0	2315009	33%	
	NWINT	4472	25101	7951	9916	47440	1%	
	PREDICTED X14	1125950	1425752	1418872	545956	4516530	64%	
ACTUAL X14 CONC - mg/L SO4		264	32	80	178			meas
"ACTUAL" X14 LOADING - '000 t SO4		2415368	741573	1162034	2716256	7035231		
X14 CONC - mg/L Zn(t)	X2	0.08	0.05	0.03	0.03			#9
	FWSD-MILL	0.04	0.04	0.05	0.04			#7
	RO-DUMPS	0.05	0.05	0.05	0.05			#6
	RO-X10	0.65	0.65	0.65	0.65			#11
	GRDWTR	0.02	0.02	0.02	0.02			#12
	X13	0.07	0.05	0.03	0.02			meas
	X5	0.17	0.34	0.50	0.00			meas
	NWINT	0.10	0.29	0.10	0.10			#7
							% of "actual"	
X14 LOADING- '000 t Zn(t)	X2	374	708	249	311	1642	24%	
	FWSD-MILL	62	194	142	142	540	8%	
	RO-DUMPS	0	0	0	0	1	0%	
	RO-X10	233	706	414	516	1870	28%	
	GRDWTR	0	1	0	1	2	0%	
	X13	49	29	19	6	102	2%	
	X5	299	689	948	0	1936	29%	
	NWINT	11	98	20	25	154	2%	
	PREDICTED X14	1027	2427	1792	1000	6246	93%	
ACTUAL X14 CONC - mg/L Zn(t)		0.11	0.14	0.09	0.08			meas
"ACTUAL" X14 LOADING - '000 t Zn(t)		1006	3244	1307	1144	6703		

ROSE CREEK MASS BALANCE FOR SO4 AND ZN(t) AT X2 AND X14 FOR 1999

			Jan-Apr	May-Jul	Aug-Oct	Nov-Dec	Year	
KNOWN	108%							
FLOWS	of normal	R7	4666	19604	5945	4864	35080	
Km3	precip	Faro Pit Pumped	78	473	509	0	1060	
		X5	0	670	1090	0	1760	
		X14	nr	11058	14083	3782	28923	start Jun 25/99
		X23	14	13	12	8	47	
		X13	477	566	412	255	1710	
		FWSD TO MILL	0	0	0	0	0	

		Jan-Apr	May-Jul	Aug-Oct	Nov-Dec	Year	"normal"	
		13%	56%	17%	14%	100%		per R7
X2 FLOWS Km3	FAROCR	939	3945	1196	979	7059	6536	est
	R7	4666	19604	5945	4864	35080	48000	meas
	RO-DUMPS	52	219	66	54	392	363	est
	RO-CLEAN	404	1698	515	421	3039	2814	est
	GROUNDWTR	14	57	17	14	103	95	
	X2	6075	25524	7740	6333	45672	57808	sum
X2 CONC - mg/L SO4	FAROCR	6	19	6	5			#6
	R7	13	6	10	10			#8
	RO-DUMPS	195	195	262	236			#6
	RO-CLEAN	13	6	10	10			use R7
	GROUNDWTR	452	900	1230	342			#6
							% of "actual"	
X2 LOADING- '000 t SO4	FAROCR	5634	74952	7177	4894	92657	16%	
	R7	60662	117625	59448	48644	286379	51%	
	RO-DUMPS	10177	42756	17420	12840	83192	15%	
	RO-CLEAN	5255	10189	5149	4214	24806	4%	
	GROUNDWTR	6169	51604	21386	4866	84025	15%	
	PREDICTED X2	87896	297125	110580	75457	571059	101%	
ACTUAL X2 CONC - mg/L SO4		28	6	13	22			#9
"ACTUAL" X2 LOADING - '000 t SO4		170109	153142	100618	139331	563199		
X2 CONC - mg/L Zn(t)	FAROCR	0.06	0.10	0.01	0.03			#6
	R7	0.03	0.03	0.01	0.01			#8
	RO-DUMPS	0.06	0.06	0.06	0.06			#6
	RO-CLEAN	0.03	0.03	0.01	0.01			use R7
	GROUNDWTR	0.14	0.81	0.22	0.05			#6
							% of "actual"	
X2 LOADING- '000 t Zn(t)	FAROCR	56	394	12	29	492	28%	
	R7	140	588	59	49	836	48%	
	RO-DUMPS	3	13	4	3	24	1%	
	RO-CLEAN	12	51	5	4	72	4%	
	GROUNDWTR	2	46	4	1	53	3%	
	PREDICTED X2	213	1093	84	86	1477	85%	
ACTUAL X2 CONC - mg/L Zn(t)		0.04	0.04	0.02	0.05			#9
"ACTUAL" X2 LOADING - '000 t Zn(t)		243	1021	155	317	1735		

ROSE CREEK MASS BALANCE FOR SO4 AND ZN(t) AT X2 AND X14 FOR 1999

		Jan-Apr	May-Jul	Aug-Oct	Nov-Dec	Year	"normal"	
		13%	56%	17%	14%	100%		per R7
X14 FLOWS Km3	X2	6075	25524	7740	6333	45672	57808	est per above
	FWSD-MILL	3294	13841	4197	3434	24767	22932	est
	RO-DUMPS	3	14	4	4	26	24	est
	RO-X10	738	3100	940	769	5547	5136	
	GRDWTR	29	121	37	30	216	200	est, #12
	X13	477	566	412	255	1710		meas
	X5	0	670	1090	0	1760		meas
	NWINT	230	967	293	240	1731	1603	est
	X14	10847	44803	14713	11065	81429	87703	sum
X14 CONC - mg/L SO4	X2	28	6	13	22			#9
	FWSD-MILL	15	15	15	15			#7
	RO-DUMPS	195	195	262	236			#6
	RO-X10	15	15	15	15			#11
	GRDWTR	455	455	382	382			#12
	X13	625	612	594	616			meas
	X5	0	373	552	0			meas
	NWINT	19	19	19	19			#7
							% of "actual"	
X14 LOADING- '000 t SO4	X2	170109	153142	100618	139331	563199	8%	
	FWSD-MILL	49417	207611	62956	51515	371498	5%	
	RO-DUMPS	672	2825	1151	848	5496	0%	
	RO-X10	11068	46498	14100	11538	83203	1%	
	GRDWTR	13073	54924	13983	11442	93421	1%	
	X13	298125	346392	244728	157080	1046325	15%	
	X5	0	249910	601680	0	851590	12%	
	NWINT	4376	18382	5574	4561	32894	0%	
	PREDICTED X14	546840	1079684	1044790	376314	3047627	43%	
ACTUAL X14 CONC - mg/L SO4		265	31	110	109			meas
"ACTUAL" X14 LOADING - '000 t SO4		2874481	1388893	1618458	1206118	7087950		
X14 CONC - mg/L Zn(t)	X2	0.04	0.04	0.02	0.05			#9
	FWSD-MILL	0.03	0.03	0.03	0.03			#7
	RO-DUMPS	0.06	0.06	0.06	0.06			#6
	RO-X10	0.30	0.30	0.30	0.30			#11
	GRDWTR	0.02	0.02	0.02	0.02			#12
	X13	0.03	0.03	0.01	0.01			meas
	X5	0.00	0.36	0.31	0.00			meas
	NWINT	0.04	0.04	0.04	0.04			#7
							% of "actual"	
X14 LOADING- '000 t Zn(t)	X2	243	1021	155	317	1735	41%	
	FWSD-MILL	99	415	126	103	743	17%	
	RO-DUMPS	0	1	0	0	2	0%	
	RO-X10	221	930	282	231	1664	39%	
	GRDWTR	1	2	1	1	4	0%	
	X13	14	17	4	3	39	1%	
	X5	0	241	332	0	574	13%	
	NWINT	9	39	12	10	69	2%	
	PREDICTED X14	588	2666	912	664	4830	113%	
ACTUAL X14 CONC - mg/L Zn(t)		0.04	0.05	0.05	0.07			meas
"ACTUAL" X14 LOADING - '000 t Zn(t)		434	2375	736	719	4263		