Red Dog Mine
Closure and Reclamation Plan

J3: Basis of Estimate – Suspension Costs

Basis of Estimate – Suspension Costs
Red Dog Mine, Alaska

Prepared for

Teck Alaska Incorporated

Prepared by

SRK Consulting
Engineers and Scientists

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Red Dog Mine, Alaska

Teck Alaska Incorporated

3105 Lakeshore Drive, Building A, Suite 101
Anchorage, Alaska 99517

SRK Consulting (Canada) Inc.
Suite 2200, 1066 West Hastings Street
Vancouver, B.C. V6E 3X2

Tel: 604.681.4196 Fax: 604.687.5532
E-mail: vancouver@srk.com Web site: www.srk.com

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1 Introduction

Teck Alaska Incorporated and NANA are working closely with State of Alaska agencies, through the Large Mine Permitting Team, to develop an integrated Closure and Reclamation Plan that will support issuance of a Solid Waste Permit for Red Dog Mine, pursuant to 18 AAC 60.210. One objective of the process is to estimate the cost of suspension, closure and post-closure activities. This document provides details about the estimates of suspension costs.

Estimates of the annual suspension costs were developed for two different scenarios:

- **Suspension:** All site costs during a hypothetical five-year period after mining and milling cease unexpectedly, but before closure is implemented.
- **Closure Period:** Water treatment and related costs for the two-year period during which closure is implemented.

The estimated annual cost for each case is as follows, in undiscounted 2009 dollars.

Scenario	Annual Cost
Suspension	$13,290,000
During Closure	$7,850,000

2 Scope of Estimate

The estimates were prepared using the post-closure estimate as a basis, so the structure of the estimate is as described in “Basis of Estimate – Post-Closure Costs”.

3 Assumptions by Cost Item

General and specific assumptions described in “Basis of Estimate – Post-Closure Costs” were adopted for the suspension estimates, with the following exceptions only.

3.1 Consumables

3.1.1 Suspension

During a short-term suspension of operations the waste rock piles and pit walls would remain uncovered, and water treatment reagent costs would be higher than in the post-closure case.

The water and load balance model presented in the Red Dog Mine Closure and Reclamation Plan was used to estimate the total amount of acidity that would need to be treated in order to prevent

deterioration of the tailings pond water quality. Under the further assumption that current treatment and discharge rates would be maintained, it was possible to estimate the average annual lime requirement for the treatment systems. Over a hypothetical five-year suspension period, the average annual lime requirement would be approximately 13,100 tonnes per year. Estimates of the annual requirements for the other treatment consumables (flocculant, sodium sulfide and antiscalant) were increased in proportion to the lime demand. Unit costs were assumed to be the same as in the post-closure cost estimate.

The increases in lime and reagent demand lead to estimates of total consumables costs that are significantly higher than those in the post-closure cost estimate.

3.1.2 During Closure

In contrast, during the two years in which closure is implemented, water treatment costs will be much less than in the post-closure period. The reason is that excess water will be transferred to either the Aqqaluk or Main Pit. Water treatment would only be required to prevent the build-up of additional acidity in the transferred water.

Calculations with the water and load model show that, during the closure period, it would only be necessary to treat about 200 million gallons of water per year, with an associated lime requirement of about 800 tonnes per year. Requirements for other consumables would reduce proportionately.

As a result, estimates of consumables costs during closure are much lower than in either the suspension period or the post-closure period.

3.2 Power

3.2.1 Suspension

During the suspension periods, the site would continue to use the current generators.

Estimates of fuel consumption for power generation were therefore based on current Red Dog rates. The current generator set produces power at an efficiency of 12.9 kW-hours per gallon, slightly lower than the efficiency assumed for the post-closure period.

The current generator set requires a powerhouse operator. Labor costs for a powerhouse operator were therefore included during the summer months at a rate of $52.13 from May to the end of September.

3.2.2 During Closure

The limited level of water treatment during the closure period could allow a decrease in power consumption. However, water would need to be pumped from the tailings pond to either the Aqqaluk or Main Pit, and the additional power for pumping would partially compensate for the

savings in water treatment power. As a simple but conservative assumption, the overall power cost was assumed to be the same as in the suspension period.

4 Summary – Suspension Costs

The estimated total annual cost during a suspension is as follows:

	Annual Cost
Manpower	$1,940,000
Consumables	$5,700,000
Mobile Equip	$290,000
Maintenance Materials	$370,000
Capital Replacement	$580,000
Power	$2,250,000
Environmental	$570,000
Camp & Admin	$990,000
Insurance	$40,000
Contractor Overhead	$190,000
Contractor Profit	$220,000
State Contract Mgmt.	140,000
Total Cost	**$13,290,000**

5 Summary – Closure Period

The estimated annual cost during closure are as follows:

	Annual Cost
Manpower	$1,940,000
Consumables	$360,000
Mobile Equip	$290,000
Maintenance Materials	$370,000
Capital Replacement	$580,000
Power	$2,250,000
Environmental	$470,000
Camp & Admin	$990,000
Insurance	$40,000
Contractor Overhead	$190,000
Contractor Profit	$220,000
State Contract Mgmt.	$140,000
Total Cost	**$7,850,000**

Tables

Table 1: Summary of Estimated Suspension Costs

Annual Water Treatment Cost

	Annual Cost
Manpower	$570,000
Consumables	$5,700,000
Maintenance Materials	$180,000
Capital Replacement	$300,000
Power	$1,350,000
Subtotal	**$8,090,000**

Annual Camp, Site Maintenance, Environmental & Administration Costs

	Annual Cost
Manpower	$1,370,000
Maintenance Materials	$190,000
Mobile Equip	$290,000
Capital Replacement	$290,000
Power	$910,000
Environmental	$570,000
Camp & Admin	$990,000
Subtotal	**$4,610,000**

Total Annual Suspension Operating Cost

	Annual Cost
Manpower	$1,940,000
Consumables	$5,700,000
Mobile Equip	$290,000
Maintenance Materials	$370,000
Capital Replacement	$580,000
Power	$2,250,000
Environmental	$570,000
Camp & Admin	$990,000
Insurance	$40,000
Contractor Overhead	$190,000
Contractor Profit	$220,000
State Contract Mgmt.	$140,000
Total Cost	**$13,290,000**

Table 2: Summary of Estimated Camp and Water Treatment Costs during Closure

Annual Water Treatment Cost

	Annual Cost
Manpower	$570,000
Consumables	$360,000
Maintenance Materials	$180,000
Capital Replacement	$300,000
Power	$1,350,000
Subtotal	**$2,750,000**

Annual Camp, Site Maintenance, Environmental & Administration Costs

	Annual Cost
Manpower	$1,370,000
Maintenance Materials	$190,000
Mobile Equip	$290,000
Capital Replacement	$290,000
Power	$910,000
Environmental	$470,000
Camp & Admin	$990,000
Subtotal	**$4,510,000**

Total Annual Camp and Water Treatment Costs during Closure

	Annual Cost
Manpower	$1,940,000
Consumables	$360,000
Mobile Equip	$290,000
Maintenance Materials	$370,000
Capital Replacement	$580,000
Power	$2,250,000
Environmental	$470,000
Camp & Admin	$990,000
Insurance	$40,000
Contractor Overhead	$190,000
Contractor Profit	$220,000
State Contract Mgmt.	$140,000
Total Cost	**$7,850,000**

Table 3: Suspension Manpower Schedule

	On Roll	On Site	Coverage	Turnaround	Hourly Wage	Hourly Wage*	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Year-around ops							31	28	31	30	31	30	31	31	30	31	30	31	365
Summer Ops							0	0	0	15	31	30	31	31	30	0	0	0	168
Year-Round																			
Site Manager	1	1				159,135	13,261	13,261	13,261	13,261	13,261	13,261	13,261	13,261	13,261	13,261	13,261	13,261	159,135
Enviro. Co-ord	2	1	12/7	2x2	76.11	63.15	23,492	21,219	23,492	22,734	23,492	22,734	23,492	23,492	22,734	23,492	22,734	23,492	276,599
Enviro. Tech.																			0
Mechanic	2	1	12/7	2x2	71.58	55.85	20,775	18,765	20,775	20,105	20,775	20,105	20,775	20,775	20,105	20,775	20,105	20,775	244,610
Electrician	2	1	12/7	2x2	85.61	55.85	20,775	18,765	20,775	20,105	20,775	20,105	20,775	20,775	20,105	20,775	20,105	20,775	244,610
quip. Operator Group 1A	2	1	12/7	2x2	68.99	52.44	19,508	17,620	19,508	18,878	19,508	18,878	19,508	19,508	18,878	19,508	18,878	19,508	229,686
Camp Support	0	2	12/7	2x2	0.00	36.07	included in camp costs in supplies and services												0
Nightshift coverage	0		12/7	2x2	0.00		0	0	0	0	0	0	0	0	0	0	0	0	0
	9	7					$97,811	$89,629	$97,811	$95,084	$97,811	$95,084	$97,811	$97,811	$95,084	$97,811	$95,084	$97,811	$1,154,640
Summer																			
WTP Operator	2	1	12/7	2x2	76.11	52.44	0	0	0	9,439	19,508	18,878	19,508	19,508	18,878	0	0	0	105,718
Operator Assistant	2	1	12/7	2x2	58.17	43.44	0	0	0	7,819	16,159	15,638	16,159	16,159	15,638	0	0	0	87,573
PowerHouse Operator												included in power cost							0
Technicians	2	1	12/7	2x2	76.11	54.31	0	0	0	9,777	20,205	19,553	20,205	20,205	19,553	0	0	0	109,497
Mechanic	2	1	12/7	2x2	71.58	55.85	0	0	0	10,052	20,775	20,105	20,775	20,775	20,105	0	0	0	112,588
Electrician	2	1	12/7	2x2	85.61	55.85	0	0	0	10,052	20,775	20,105	20,775	20,775	20,105	0	0	0	112,588
Truck Driver	4	2	12/7	2x2	68.76	52.44	0	0	0	0	0	37,757	39,015	39,015	37,757	0	0	0	153,543
quip. Operator Group 1A	2	1	12/7	2x2	68.99	52.44	0	0	0	9,439	19,508	18,878	19,508	19,508	18,878	0	0	0	105,718
	16	8					$0	$0	$0	$56,579	$116,929	$150,914	$155,944	$155,944	$150,914	$0	$0	$0	$787,225
Total - Manpower Cost							**$97,811**	**$89,629**	**$97,811**	**$151,662**	**$214,740**	**$245,998**	**$253,755**	**$253,755**	**$245,998**	**$97,811**	**$95,084**	**$97,811**	**$1,941,865**

Table 4: Water Treatment Consumables for Suspenison and Closure Periods

				Suspension		Closure	
Supply	Cost/Tonne FOB Seattle	Freight Cost/Tonne	Cost/Tonne Delivered	Tonnes*	Total Cost	Tonnes*	Total Cost
Flocculant			$3,924	131	$513,691	8	$32,059
Lime			$350	13091	$4,581,850	817	$285,950
Sodium sulfide			$1,007	342	$344,067	21	$21,473
Antiscalant	$4,482	$266	$4,748	55	$261,055	3	$16,292
					$5,700,663		$355,774

*Ratios of consumption of flocculant, sodium sulfide and antiscalant from Susp Study Consumables sheet, Cell S9

Calculation of Suspension Period Lime Requirement (to maintain water quality in pond)

	Year	Flow	Acidity	Acidity	Theoretical Lime Demand	Lime Requirement
		10^6 USGal	mg/L as CaCO3	Load t/Year	t/Y	t/Y
WTP1	Suspension Years 1 - 5	3130	1275	3493	1956	2201
WTP2				15107	8460	9517
WTP3				2180	1221	1373
Total						13091

1) Assumes actual demand : theoretical demand = 1.125
2) Based on water and load balance model update as of April 2008 File Ref: Red Dog Load Balance_2012 Closure_K_2008_10_13_Tetratech.xls

Calculation of Flooding Period Lime Requirement (to maintain water quality in pond)

	Year	Flow	Acidity	Acidity	Theoretical Lime Demand	Lime Requirement
		10^6 USGal	mg/L as CaCO3	Load t/Year	t/Y	t/Y
WTP1	Suspension Yrs			0	0	0
WTP2	6-7 Closure Yrs			1297	726	817
WTP3	1-2			0	0	0
Total						817

Filling Period Calcs

Load to Pit	13005	2012 and 2013 load inputs to pit
Load to storage	11708	(i.e. steady state load inputs = outputs)
Excess load to be treated	1297	

In the W&L balance, it was assumed that these would be flushed out over several years
For costing purposes, assume that this excess would be treated during the filling period

Table 5. Suspension Mobile Equipment Schedule

	$/hr	Total	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Totals
16G Grader	37.62	$19,188	30	30	30	30	60	60	60	60	60	30	30	30	510
966 Loader	44.43	$66,640	125	125	125	125	125	125	125	125	125	125	125	125	1500
35 ton Haul Truck	34.04	$16,340	10	10	10	10	10	100	100	100	100	10	10	10	480
2.3 cy Excavator	32.72	$16,689				10	100	100	100	100	100				510
988B Loader	78.43	$9,412	20	20	20							20	20	20	120
V-900 Forklift	31.36	$20,384						300	110	110	110	20			650
Portable Generator	25.00	$3,000	10	10	10	10	10	10	10	10	10	10	10	10	120
D6-7 Dozer	46.88	$22,503	10	10	10	10	10	100	100	100	100	10	10	10	480
Field Service Truck	8.79	$15,827	150	150	150	150	150	150	150	150	150	150	150	150	1800
Semi Tractor 6x4, 75klbs	27.90	$80,366					0	720	720	720	720				2880
Pueumatic Trailer	1.52	$1,139					150	150	150	150	150				750
Heavy equipment Trailer 50t	3.04	$759					50	50	50	50	50				250
Van Mounted Steam Generato	4.18	$669			20	60	60	20							160
Snowblower	35.00	$3,500	20	20	20	10							10	20	100
SUBTOTALS		$276,415	375	375	395	415	725	1885	1675	1675	1675	375	365	375	10310
Pickups	5.38	$12,912	200	200	200	200	200	200	200	200	200	200	200	200	2400
Total - Mobile Equipment		**$289,327**													
	Maint. Hrs	3923													

	State	SRK Revised
Fuel Price Adj.	4.08	2.58

Hourly Op Cost Components	Total $/hr Maint. Parts and Consumables	Maint. Parts	Overhaul Parts	Fuel	Adjusted Fuel	Lube	Tires	GET		
16G Grader	$ 37.62	$ 3.01	4.45	$ 35.80	$ 22.63	$ 4.69	$ 1.65	$ 1.19		
966 Loader	$ 44.43	$ 3.88	2.09	$ 35.49	$ 22.44	$ 3.44	$ 12.12	$ 0.46		
35 ton Haul Truck	$ 34.04	$ 2.78	1.5	$ 31.18	$ 19.71	$ 4.34	$ 5.71			
2.3 cy Excavator	$ 32.72	$ 4.17	2.78	$ 32.51	$ 20.55	$ 3.09	$ -	$ 2.13		
988B Loader	$ 78.43	$ 7.04	3.79	$ 61.95	$ 39.16	$ 6.79	$ 20.95	$ 0.70		
V-900 Forklift	$ 31.36				$ -					
Portable Generator	$ 25.00				$ -					
D6-7 Dozer	$ 46.88	$ 5.05	3.37	$ 39.08	$ 24.71	$ 4.85		$ 8.91	used half of D10 costs	
Field Service Truck	$ 8.79	$ 0.88	0.47	$ 10.37	$ 6.56	$ 0.72	$ 0.17	$ -		
Semi Tractor 6x4, 75klbs	$ 27.90	$ 2.78	2.48	$ 26.36	$ 16.66	$ 3.67	$ 2.31	$ -		
Pueumatic Trailer	$ 1.52	$ 0.71	0.56	$ -	$ -	$ 0.17	$ 0.08	$ -		
Heavy equipment Trailer 50t	$ 3.04	$ 1.42	1.12	$ -	$ -	$ 0.33	$ 0.17	$ -		
Van Mounted Steam Generato	$ 4.18	$ 0.18	0.375	$ 4.70	$ 2.97	$ 0.66	$ -	$ -		
Snowblower	$ 35.00				$ -					
Pickups	$ 5.38				$ -					

Costs taken from Mine Cost Service Handbook or Equipmentwatch handbook

Table 6. Suspension Material Costs

	Jan 30	Feb 28	Mar 31	Apr 30	May 31	Jun 30	Jul 31	Aug 31	Sep 30	Oct 31	Nov 30	Dec 31	Total	Water Treatment	Maint. manhours
Water Treatment Plant Maintenance															
Non-exempt															267
Stores	0	0	0	1,000	500	500	500	500	500	0	0	0	3,500		
Equipment													0		
Other	0	0	0	5,000	500	500	500	500	500	0	0	0	7,500		
Total				6,000	1,000	1,000	1,000	1,000	1,000	0			11,000	11,000	267
Sand Filter Maintenance															
Filter 1							0			30,000					
Filter 2							0			30,000					
Filter 3							0			30,000					
Total							0			90,000			90,000	90,000	0
Reagent Systems Maintenance															
Non-exempt													0		
Stores				1000	250	250	250	250	250				2250		
Equipment													0		
Other				250	100	100	100	100	100				750		
Total	0	0	0	1250	350	350	350	350	350	0	0	0	3,000	3,000	0
Lime Slaking Maintenance															
Non-exempt													0		259
Stores				2000	500	500	500	500	500				4500		
Equipment				2000									2000		
Other				500	100	100	100	100	100				1000		
Total	0	0	0	4500	600	600	600	600	600	0	0	0	7,500	7,500	259
Red Dog Creek Pumpback															
Non-exempt													0		1,049
Stores	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	54000		
Equipment													0		
Other	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	12000		
Total	5500	5500	5500	5500	5500	5500	5500	5500	5500	5500	5500	5500	66,000		1,049
Tailings Seepage Pumpback															
Non-exempt													0		24
Stores	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	12000		
Equipment													0		
Other	500	500	500	500	500	500	500	500	500	500	500	500	6000		
Total	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	18,000		24
Overburden Pumpback															
Non-exempt													0		1,781
Stores	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100	13200		
Equipment	500	500	500	500	500	500	500	500	500	500	500	500	6000		
Other	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	19200		
Total	3200	3200	3200	3200	3200	3200	3200	3200	3200	3200	3200	3200	38,400		1,781
Sullaire Compressor															
Non-exempt													0		36
Stores	500	500	500	500	500	500	500	500	500	500	500	500	6000		
Equipment													0		
Other	100	100	100	100	100	100	100	100	100	100	100	100	1200		
Total	600	600	600	600	600	600	600	600	600	600	600	600	7,200	7,200	36
#1 Reclaim Barge															
Non-exempt													0		366
Stores	500	500	500	500	500	500	500	500	500	500	500	500	6000		

	Jan 30	Feb 28	Mar 31	Apr 30	May 31	Jun 30	Jul 31	Aug 31	Sep 30	Oct 31	Nov 30	Dec 31	Total	Water Treatment	Maint. manhours
Equipment	50	50	50	50	50	50	50	50	50	50	50	50	600		
Other	100	100	100	100	100	100	100	100	100	100	100	100	1200		
Total	650	650	650	650	650	650	650	650	650	650	650	650	7,800	7,800	366
Bonns Creek Pumps															
Non-exempt													0		78
Stores					1200	250	250	250	250	500			2700		
Equipment													0		
Other													0		
Total	0	0	0	0	1200	250	250	250	250	500	0	0	2,700	2,700	78
Temporary Facilities															
Non-exempt															240
Stores	500	500	500	500	500	500	500	500	500	500	500	500	6000		
Equipment															
Other	200	200	200	200	200	200	200	200	200	200	200	200	2400		
Total	700	700	700	700	700	700	700	700	700	700	700	700	8,400		240
Building and Camp Maintenance															
Supplies	800	800	800	800	800	800	800	800	800	800	800	800	9,600		
Total	800	800	800	800	800	800	800	800	800	800	800	800	9600		
Miscellaneous															
lubricants	25	25	25	25	50	50	50	50	50	25	25	25	425		
supplies	100	100	100	100	100	100	100	100	100	100	100	100	1200		
Total	125	125	125	125	150	150	150	150	150	125	125	125	1,625		
Total Maint. Cost (including freig	**17,842**	**17,842**	**17,842**	**33,875**	**22,174**	**20,878**	**20,878**	**20,878**	**20,878**	**141,334**	**17,842**	**17,842**	**370,103**	**176,301**	**5,590**

Table 7. Capital Replacement Allowances

Water Treatment Equipment
Total Capital Cost for two new plants $14,442,000 see Water Treatment Capital estimate in Red Dog Closure Cost workbook
Annual capital replacement cost $298,716

Equipment
Total Capital Cost for replacement fleet $6,572,400
Annual capital replacement cost $262,896

Generator/Power Equipment
Total Capital Cost for replacement $810,000
Annual capital replacement cost $18,677

Monitoring Equipment (piezometers, thermistor installations)
Total Capital Cost for new installations $250,000 estimate for installations of 10
Annual capital replacement cost $4,238 piezometers, 5 thermistors

Total Annual Capital Replacement (less Water Treatment)
Equip., Generator/Power and Monitoring $285,810

Equipment Capital Costs

Equipment	Capital Cost	Tt Capital	Tt Capital with Freight and Assembly
16G Grader	$ 700,000	$ 630,000	$ 756,000
966 Loader	$ 375,000	$ 394,000	$ 472,800
35 ton Haul Truck	$ 475,000	$ 472,000	$ 566,400
2.3 cy Excavator	$ 300,000	$ 345,000	$ 414,000
988B Loader	$ 800,000	$ 826,000	$ 991,200
V-900 Forklift	$ 175,000	$ 930,000	$ 1,116,000
Portable Generator	$ 100,000	$ 100,000	$ 120,000
D6-7 Dozer	$ 925,000	$ 600,000	$ 720,000
Snowblower	$ 100,000	$ 100,000	$ 120,000
Van Mounted Steam Gen.		$ 150,000	$ 180,000
Field Service Truck	$ -	$ 256,000	$ 307,200
Semi Tractor 6x4, 75klbs		$ 258,000	$ 309,600
Pueumatic Trailer		$ 50,000	$ 60,000
Heavy equipment Trailer 50t		$ 106,000	$ 127,200
Pickups	$ 260,000	$ 260,000	$ 312,000
Total Fleet	$ 4,210,000	$ 5,477,000	$ 6,572,400
Power Equipment			$ -
500 kW Gen	$ -	$ 180,000	$ 216,000
1000 kW Gen	$ -	$ 205,000	$ 246,000
Switchgear	$ -	$ 290,000	$ 348,000
Total Power	$ -	$ 675,000	$ 810,000
Total Capital Cost	$ 4,210,000	$ 6,152,000	$ 7,382,400

Capital Replacement Schedule

NPV at net discount of 4.3% per year

	Cost Component					
	Water Treatment	Mobile Equipment	Generator/ power	Monitoring Equipment	Total Annual Cost	Annual Equivalent
Total Capital Replacement	$14,442,000	$6,572,400	$810,000	$250,000		
Replacement time (years)	30	25	20	30		
Total NPV:	**$6,945,357**	**$6,112,513**	**$434,247**	**$98,525**	**$13,590,642**	**$13,590,642**
Year						
1	$0	$262,896	$0	$0	$262,896	$584,526
2	$0	$262,896	$0	$0	$262,896	$584,526
3	$0	$262,896	$0	$0	$262,896	$584,526
4	$0	$262,896	$0	$0	$262,896	$584,526
5	$0	$262,896	$0	$0	$262,896	$584,526
6	$0	$262,896	$0	$0	$262,896	$584,526
7	$0	$262,896	$0	$0	$262,896	$584,526
8	$0	$262,896	$0	$0	$262,896	$584,526
9	$0	$262,896	$0	$0	$262,896	$584,526
10	$0	$262,896	$0	$0	$262,896	$584,526
11	$0	$262,896	$0	$0	$262,896	$584,526
12	$0	$262,896	$0	$0	$262,896	$584,526
13	$0	$262,896	$0	$0	$262,896	$584,526
14	$0	$262,896	$0	$0	$262,896	$584,526
15	$3,610,500	$262,896	$0	$0	$3,873,396	$584,526
16	$0	$262,896	$0	$0	$262,896	$584,526
17	$0	$262,896	$0	$0	$262,896	$584,526
18	$0	$262,896	$0	$0	$262,896	$584,526
19	$0	$262,896	$0	$0	$262,896	$584,526
20	$0	$262,896	$0	$0	$262,896	$584,526
21	$0	$262,896	$0	$0	$262,896	$584,526
22	$0	$262,896	$0	$0	$262,896	$584,526
23	$0	$262,896	$0	$0	$262,896	$584,526
24	$0	$262,896	$0	$0	$262,896	$584,526
25	$0	$262,896	$810,000	$0	$1,072,896	$584,526
26	$0	$262,896	$0	$0	$262,896	$584,526
27	$0	$262,896	$0	$0	$262,896	$584,526
28	$0	$262,896	$0	$0	$262,896	$584,526
29	$0	$262,896	$0	$0	$262,896	$584,526
30	$10,831,500	$262,896	$0	$250,000	$11,344,396	$584,526
31	$0	$262,896	$0	$0	$262,896	$584,526
32	$0	$262,896	$0	$0	$262,896	$584,526
33	$0	$262,896	$0	$0	$262,896	$584,526
34	$0	$262,896	$0	$0	$262,896	$584,526
35	$0	$262,896	$0	$0	$262,896	$584,526
36	$0	$262,896	$0	$0	$262,896	$584,526
37	$0	$262,896	$0	$0	$262,896	$584,526
38	$0	$262,896	$0	$0	$262,896	$584,526
39	$0	$262,896	$0	$0	$262,896	$584,526
40	$0	$262,896	$0	$0	$262,896	$584,526
41	$0	$262,896	$0	$0	$262,896	$584,526
42	$0	$262,896	$0	$0	$262,896	$584,526
43	$0	$262,896	$0	$0	$262,896	$584,526
44	$0	$262,896	$0	$0	$262,896	$584,526
45	$3,610,500	$262,896	$0	$0	$3,873,396	$584,526
46	$0	$262,896	$0	$0	$262,896	$584,526
47	$0	$262,896	$0	$0	$262,896	$584,526
48	$0	$262,896	$0	$0	$262,896	$584,526
49	$0	$262,896	$0	$0	$262,896	$584,526
50	$0	$262,896	$810,000	$0	$1,072,896	$584,526
51	$0	$262,896	$0	$0	$262,896	$584,526
52	$0	$262,896	$0	$0	$262,896	$584,526
53	$0	$262,896	$0	$0	$262,896	$584,526
54	$0	$262,896	$0	$0	$262,896	$584,526
55	$0	$262,896	$0	$0	$262,896	$584,526
56	$0	$262,896	$0	$0	$262,896	$584,526
57	$0	$262,896	$0	$0	$262,896	$584,526
58	$0	$262,896	$0	$0	$262,896	$584,526
59	$0	$262,896	$0	$0	$262,896	$584,526
60	$10,831,500	$262,896	$0	$250,000	$11,344,396	$584,526
199	$0	$262,896	$0	$0	$262,896	$584,526
200	$0	$262,896	$810,000	$0	$1,072,896	$584,526

Table 8 - Suspension Power Costs

			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Summer	Winter
	New	500	31	28	31	30	0	0	0	0	0	31	30	31			
	New	2000	0	0	0	0	31	30	31	31	30	0	0	0			
kWh Produced			371,994	335,994	371,994	359,994	1,487,835	1,439,840	1,487,835	1,487,835	1,439,840	371,994	359,994	371,994	9,887,140	7,343,184	2,543,956
			$74,399	$67,199	$74,399	$71,999	$297,567	$287,968	$297,567	$297,567	$287,968	$74,399	$71,999	$74,399			
500 kW op hrs			744	672	744	720	1488	1440	1488	1488	1440	744	720	744			
Maintenance and Supplies $/hr	no labor		4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2			
1000 kW op hrs			0	0	0	0	744	720	744	744	720	0	0	0			
Maintenance and Supplies $/hr	no labor		9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1			
Powerhouse Operator	$	52.13	$ -	$ -	$ -	$ -	$ 38,787	$ 37,535	$ 38,787	$ 38,787	$ 37,535	$ -	$ -	$ -			
500 kW Cost			$ 3,125	$ 2,822	$ 3,125	$ 3,024	$ 6,250	$ 6,048	$ 6,250	$ 6,250	$ 6,048	$ 3,125	$ 3,024	$ 3,125			
1000 kW Cost			$ -	$ -	$ -	$ -	$ 6,733	$ 6,516	$ 6,733	$ 6,733	$ 6,516	$ -	$ -	$ -			
Total Cost			**$ 77,524**	**$ 70,021**	**$ 77,524**	**$ 75,023**	**$ 349,336**	**$ 338,067**	**$ 349,336**	**$ 349,336**	**$ 338,067**	**$ 77,524**	**$ 75,023**	**$ 77,524**	**$ 2,254,305**	$ 1,724,144	$530,161
500 kW Labor			47.3	42.7	47.3	45.8	94.6	91.6	94.6	94.6	91.6	47.3	45.8	47.3			
1000 kW Labor			0.0	0.0	0.0	0.0	115.9	112.2	115.9	115.9	112.2	0.0	0.0	0.0			
Maint. Labor hours needed			47.3	42.7	47.3	45.8	210.5	203.8	210.5	210.5	203.8	47.3	45.8	47.3			
$/kWhr			0.21	0.21	0.21	0.21	0.23	0.23	0.23	0.23	0.23	0.21	0.21	0.21			

Average Fuel Cost **$/gal** **$ 2.58** **Based on 5-year average of Red Dog costs**

Powerhouse operator

Hourly		Load factor	
$	28.96	1.80	$ 52.13

Fuel Consumption Rates

12.9 kW-hr per gall **Consumption from current Red Dog rates**

$ 0.20 per kW-hr

Water Treatment Power Cost

New HDS Plant 600 KW in use for 150 days	2,160,000	KWh - covered by available power
Summer power with one treatment plant treating 1.9 B gallons	7,343,184	KWh
Factored power for 1.3 B gallons	5,024,284	KWh
	7,184,284	

Total Power Cost		$2,254,305
Winter	7	$530,161
Summer	5	$1,724,144
Treatment Power Cost		$1,345,458

Other Power Cost $908,847

Table 9: Suspension Camp, Administration & Environmental Costs

	Basis	Jan. 31	Feb 28	Mar 31	Apr 30	May 31	Jun 30	Jul 31	Aug 31	Sep 30	Oct 31	Nov 30	Dec 31	Total
Environmental														
Maintenance	mostly snowmachines	2,000	2,000	1,000	1,000	500	500	500	500	1,000	2,000	2,000	2,000	15,000
Sampling Equipment		250	250	250	500	350	350	350	350	350	350	350	300	4,000
Outside Analytical	Outfall001, Stations 2,9,10,12,2	1,000	1,000	1,000	1,000	15,000	15,000	15,000	15,000	15,000	2,750	1,000	1,000	83,750
Consulting Services	Bioassesment Program	300	300	300	300	25,300	25,300	25,000	25,000	300	300	300	300	103,000
Sampling Supplies		350	350	350	350	350	350	350	350	350	350	350	350	4,200
Helicopter Time						10,000	10,000	10,000	10,000	10,000				50,000
Sub-total - Environmental		3,900	3,900	2,900	3,150	51,500	51,500	51,200	51,200	27,000	5,750	4,000	3,950	259,950
Administration														
Worker Compensation	11% of Labor cost						covered in labor burden							$0
Insurance	covered on Summary Tab													$0
Office Supply	allow $100/mo	$100	$100	$100	$100	$100	$100	$100	$100	$100	$100	$100	$100	$1,200
Communications	assume Iridium phone	$1,030	$940	$1,030	$1,000	$1,030	$1,000	$1,030	$1,030	$1,000	$1,030	$1,000	$1,030	$12,150
Office Heating Fuel	500/200 gal/mo	$1,290	$1,290	$1,290	$1,290	$516	$516	$516	$516	$1,290	$1,290	$1,290	$1,290	$12,384
Misc. Supplies	allow $500/mo	$500	$500	$500	$500	$500	$500	$500	$500	$500	$500	$500	$500	$6,000
Camp Operation	$100 per person-day	$21,700	$19,600	$21,700	$48,000	$49,600	$48,000	$49,600	$49,600	$48,000	$21,700	$21,000	$21,700	$420,200
Turnaround costs	$770/trip x 231 trips	$9,186	$8,297	$9,186	$20,318	$20,996	$20,318	$20,996	$20,996	$20,318	$9,186	$8,889	$9,186	$177,870
Sub-total - Administration		$33,806	$30,727	$33,806	$71,208	$72,742	$70,434	$72,742	$72,742	$71,208	$33,806	$32,779	$33,806	$629,804
Road and Port Maintenance														
Grading	(covered by additional grader time in Mobile Equipment)													$0
Additional Maintenance														$100,000
Sub-total - Road and Port Maintenance		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$100,000
Total - Supplies and Services		**$37,706**	**$34,627**	**$36,706**	**$74,358**	**$124,242**	**$121,934**	**$123,942**	**$123,942**	**$98,208**	**$39,556**	**$36,779**	**$37,756**	**$989,754**

Table 10: Suspension Environmental Monitoring Costs

Analyte	Unit Cost	Used Oil and Fuel Samples	Used Oil and Fuel Cost	NPDES Samples	NPDES Cost
Aluminum Total EPA 200.8 (W)	$11.00			160	$1,760
Ammonia-N by EPA 350.2 (W)	$23.00			95	$2,185
Arsenic, SW7060 GF (O)	$22.95	1	$23		
Biochemical Oxygen Demand 5	$34.00			6	$204
Cadmium by SW6010 ICP (O)	$13.60	1	$14		
Cadmium Total EPA 200.8 (W)	$11.00			240	$2,640
Calcium Total EPA 200.8 (W)	$11.00			145	$1,595
Chloride by Ion Chrom. (W)	$20.00			150	$3,000
Chromium by SW6010 ICP (O)	$13.60	1	$14		
Chromium Total EPA 200.8 (W)	$11.00			160	$1,760
Cobalt Total EPA 200.8 (W)	$11.00			65	$715
Copper Total EPA 200.8 (W)	$11.00			235	$2,585
Cyanide, Total (W)	$40.00			60	$2,400
Fecal Coliform (MF)	$22.10			8	$177
Flash Point by ASTM D-3828	$33.15	1	$33		
Hardness CaCO3 ICP-MS (W)	$14.00			125	$1,750
Iron Total EPA 200.8 (W)	$11.00			155	$1,705
Lead by SW6010 ICP (O)	$13.60	1	$14		
Lead Total EPA 200.8 (W)	$11.00			240	$2,640
Manganese Total EPA 200.8 (W)	$11.00			150	$1,650
Mercury by EPA 245.1 CV (DW)	$30.00			85	$2,550
Metals Acid Digestion	$22.95			250	$5,738
Nickel Total EPA 200.8 (W)	$11.00			160	$1,760
Selenium Total EPA 200.8 (W)	$11.00			150	$1,650
Silver Total EPA 200.8 (W)	$11.00			140	$1,540
Total Dissolved Solids (W)	$14.00			190	$2,660
Total Halogens	$50.15	1	$50		
Total Sulfur	$40.00	2	$80		
Total Suspended Solids	$15.30			45	$689
VOC, EPA 624 (W)	$222.70			4	$891
Zinc Total EPA 200.8 (W)	$11.00			240	$2,640
Monthly WET Tests	$2,220			12	$26,640
Courier					$70,000
Other Manipulations					$5,000
Total Analytical			**$227**		**$148,523**

Bioassessment Program	
Fish Population and Diversity	
Fish Tissue Sampling	
Benthic Invertebrate Sampling	
Dolly Varden Aerial Surveys	$100,000
Equipment	
Miscellaneous Sampling Supplies	$4,200
Sampling Equipment	$4,000
Telemetry/MET Station Maintenance	$5,000
Helicopter Time	$50,000
Meteor Burst Telemetry contract	$3,000
Snow Mobile Maintenance	$10,000
Allowance for Additional Monitoring and Inspections	**$250,000**
Total	**$426,200**
Grand Total	**$574,950**

Table 11: Suspension Winter Power Consumption

		Number Available	Connected Power	Number Operating	Power kW	
Red Dog Pumpback	pumps	3	140		0	
	pumps	4	87	1	65	
	heat tracing				18	
Waste pile seepage	pumps	2				
	heat tracing					
Tailings Seepage	pumps	3	100	2	149	
	heat tracing				2	
Seepage-Seepage	pumps		5	1	4	
	heat tracing				0	
Overburden Pumpback	pumps		50	1	37	
	heat tracing				8	
Pumping Systems					283	283
Temporary Heat	heat tracing				19	
	compressor				15	
	lime plant				15	
	flocculant system				15	
	Reclaim Barge#1				20	
	Generator				25	
	6016 MCC				10	
	2021 MCC				10	
	2020 MCC				10	
	6030 MCC				10	
Barge De-Icing	pump		25	1	19	
Temporary Heat					167	167
Potable Water Plant					0	
Temporary Accommodation	misc heating				30	
	appliances				10	
	lighting				10	
Temporay Accommodation					50	50
Total						**500**

Table 12: Suspension Summer Power Consumption

			Number Available	Connected Power	Number Operating	Power kW	Standalone Power
Red Dog Pumpback	pumps		3	140	2	146.2	
			4	87	2	90.8	
	heat tracing			17.6	0	0.0	
Tailings Seepage	pumps		3	100	2	104.4	
						0.0	
	heat tracing			1.9	0	0.0	
Seepage-Seepage	pumps			10	2	10.4	
						0.0	
	heat tracing			0.475	0	0.0	
Overburden Pumpback	pumps			50	1	26.1	
						0.0	
	heat tracing			7.64	0	0.0	
						0.0	
Potable Water Plant				1	1	0.7	
						0.0	
Sub-total - Water Collection Pumps						379	379
Reclaim Barge #1	pumps		4	300	4	626.4	
	misc.					0.0	
Sub-total - reclaim barge						626	626
WTP#2	Lime/sludge Agitator	2021-1901	1	15	1	7.8	
	Rapid Mix Agitator	2021-1902	1	25	1	13.0	
	Lime Reactor Agitator	2021-1903	1	100	1	52.2	
	Floc Mix Agitator	2021-1904	1	5	1	2.6	
	Clarifier - rake drive	2006-3301	2	7.5	2	7.8	
	Clarifier - lift drive		1	2	1	1.0	
	Sludge Recycle pumps	2005-1509	2	150	2	156.6	
	Overflow Bypass pump	2020-1540	1	75	1	39.1	
	Emergency Spill Pump	2021-1503	1	10	1	5.2	
Sub-total - WTP2						286	286
Lime Mixing System	Screw Conveyor	2020-2004	1	3	1	1.6	
	Lime slaker	2020-2101	1	5	1	2.6	
	MOL transfer pump	2020-1510	1	7.5	1	3.9	
	MOL storage tank agitator	2020-1920	1	7.5	1	3.9	
	Lime feed pumps	2020-1511	2	25	1	13.0	
	Overhead crane	2020-1002	1	5	1	2.6	
	Sump pump	2020-1521	1	10	1	5.2	
	Dust Collection Filter	2020-2905	1	5	1	2.6	
Sub-total - Lime slaking system						35	35
Flocculant System	Flocculant Transfer Pump	2025-1507	2	5	1	2.6	
	Flocculant Area Sump Pump	2025-1510	1	7.5	1	3.9	
	Flocculant Feed Pump	2025-1512	2	1	1	0.5	
	Flocculant Transfer Blower		1	2.5	1	1.3	
	Flocculant Screw Feeder		1	0.5	1	0.3	
	Flocculant Day Tank Agitator	2025-1902	1	1	1	0.5	
	Flocculant Mix Tank Agitator		1	5	1	2.6	
	Flocculant Hoist	2025-1004	1	1	1	0.5	
Sub-total - flocculant system						12	12
Sodium Sulphide System	Mix tank agitator	2016-2407	1	2	1	1.0	
	Transfer pump	2016-1511	2	5	1	2.6	
	Day tank agitator	2016-24__	1	1.5	1	0.8	
	Head tank feed pumps	2016-1517	2	5	1	2.6	
	Overhead Crane	2016-1002	1	25	1	13.0	
	Exhaust fan	2016-2903	1	2	1	1.0	
	Spill sump pump					0.0	
Sub-total - Sulphide system						21	21

			Number Available	Connected Power	Number Operating	Power kW	Standalone Power
Air Compressor	Sullair compressor	2021-1801	4	200	1	104.4	
	Cooling circulating pumps	2021-1510	2	5	1	2.6	
	Mechical room sump pump	2021-1508	1	2	1	1.0	
	Air Dryer	2021-2801	1	25	1	13.0	
Sub-total - Air Compressor						121	121
Fresh Water Supply	Bon's Creek Pumps		2	50	1	26.1	
	Fresh water transfer pumps	2020-1522	2	5	1	2.6	
	Reagent water supply pumps	2016-1513	2	10	1	5.2	
	Potable Water Plant					0.0	
Sub-total - Fresh water supply						34	34
Process Water Distribution	Cooling Water Standby pump	2025-1513	1	75	1	39.1	
Sub-total - Process water distribution						39.1	39
Generator	Fuel Feed Pump Skid		2	3	1	1.6	
	Fuel Return Skid		1	1	1	0.5	
	Fuel Treatment Feed Pump No.1		2	15	1	7.8	
	Fuel Treatment Heater No.1 (24 kW)		2	24	1	12.5	
	Fuel Treatment Sludge Tank Heater		1	1	1	0.5	
	Lube Oil Reclaim Skid Separator Motor		1	20	1	10.4	
	Lube Oil Reclaim Skid Feed Pump		1	3	1	1.6	
	Lube Oil Reclaim Skid Electric Heater		1	64	1	33.4	
	Waste Oil Centrifuge		1	5	1	2.6	
	25t / 5t Powerhouse Bridge Crane		1	30	1	15.7	
	Water Pre-Heater (15 kW)		2	15	1	7.8	
	Portable Clean Lube Oil Transfer Pump		2	2	1	1.0	
	Pre-Lube Circulation Oil Pump		1	20	1	10.4	
	Engine Water Jacket Pre-Heating Pump		2	1	1	0.5	
	Oil/Water Separator Sump Pump		1	7.5	1	3.9	
	Spill Trays Sump Pump		1	7.5	1	3.9	
	Heat Recovery Circulating Pump		2	40	1	20.9	
	Starting Air Compressor (Electric) Skid		1	10	1	5.2	
	Starting Air Compressor (Diesel) Skid		1	10	1	5.2	
	Door Heater		1	0.5	1	0.3	
	Electric Unit Heater		1	0.5	1	0.3	
	Control Room HVAC Unit		1	5	1	2.6	
	Switchroom Ventilation (AC) Unit		1	10	1	5.2	
	Mechanical Bay Area Ventilation Unit		1	5	1	2.6	
	Powerhouse Make-Up Air Unit		2	30	1	15.7	
	Mechanical Bay Area Exhaust Fan		1	0.5	1	0.3	
	Vertical Lift Door		1	2	1	1.0	
	Modulating Motorized Relief Damper		3	1	1	0.5	
Sub-total - Generator						174	174
Misc. Heating & Lighting						30	
Temporary Accommodation	Heating					30.0	
	appliances					10.0	
	lighting					10.0	
Sub-total - Temporary & Miscellaneous						80	80
Contingency							192
Total							**2000**