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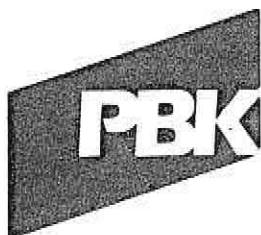
VANCOUVER, BC

EVALUATION REPORT

**NORTHERN AFFAIRS PROGRAM
CURRAGH RESOURCES INC. - FARO
DOWN VALLEY TAILINGS
IMPOUNDMENT DECOMMISSIONING PLAN**

PROJECT NO. 91116

NOVEMBER 1991



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TABLE OF CONTENTS

COVERING LETTER

SECTION 1.0	INTRODUCTION
SECTION 2.0	REVIEW OF CURRAGH DECOMMISSIONING COST
	2.1 Faro Pit Decommissioning Plan
	2.2 Down Valley Tailings Impoundment Decommissioning Plan
	2.3 Lime Addition
SECTION 3.0	COST ESTIMATE FOR ADDITIONAL DECOMMISSIONING WORK
	3.1 Faro Pit Preparation
	3.2 Revegetation
SECTION 4.0	COST ESTIMATE FOR POST DECOMMISSIONING MONITORING AND MAINTENANCE
SECTION 5.0	TECHNICAL AND FINANCIAL FEASIBILITY OF RECYCLING TAILINGS
SECTION 6.0	ESTIMATE OF COST OF PUMPING TAILINGS TO FARO PIT
	6.1 Capital Cost
	6.2 Operating Cost

SECTION 7.0

SUMMARY OF CLOSURE LIABILITY

APPENDIX 1

REFERENCES

1.0 INTRODUCTION

PBK Engineering Ltd. (PBK) was retained by the Government Consulting Group, on behalf of the Department of Indian Affairs and Northern Development, Whitehorse, to review the cost estimates for the Curragh Down Valley Tailings Impoundment Decommissioning plan. The terms of reference for this review, as presented on November 7, 1991 are:

1. Review the costs submitted by Curragh Resources Inc. in the Down Valley Impoundment Tailings Plan (Steffen Robertson & Kirsten - SRK 60635 Volumes I to V) and the closure aspects of the Water Recycle and Tailings Disposition Plan (Kilborn Inc., June 1991) based on the information provided by Curragh to NAP Yukon.
2. Provide an estimate of additional costs of decommissioning the Down Valley Tailings, the Faro and Zone II pits and the water recycling plant not covered in Curragh's submission.
3. Provide a proposed programme and an estimate of costs related to administration, monitoring and maintenance of the site after final closure of the mine.
4. Analyze the technical and financial feasibility of recycling the tailings through the mill as proposed by Curragh.
5. Estimate the costs of pumping the tailings from the Down Valley Tailings Pond directly into the Faro Pit without recycling them through the mill.

The objective of the review was to determine the feasibility of Curragh's proposal for decommissioning and post abandonment, and to assess the adequacy of the financial assurance.

The study was based on a review of the documents (listed in Appendix I) made available by the Northern Affairs Program.

It should be noted that the terms of reference do not include review of costs associated with the Faro open pit mine closure, site rehabilitation or other closure costs. Therefore, PBK has not included these aspects in its review.

2.0 REVIEW OF CURRAGH DECOMMISSIONING COSTS

Five alternatives were studied by Curragh Resources Inc. for the decommissioning of the Down Valley Tailings Impoundment. Briefly stated, these alternatives were:

Alternative 1 - No Cover

The tailings pond would be left uncovered. The creeks and diversions flowing around the impoundment area would be rechannelled and/or upgraded to ensure that a Peak Maximum Flood (PMF) could be handled without damage to the structures.

This alternative is considered to be the base case. It does not include any measures to control Acid Mine Drainage (AMD).

Alternative 2 - Soil Cover

The tailings would be covered with either a composite soil, till, or a synthetic membrane cover. As in Alternative 1, the creeks and diversions would be rechannelled and/or upgraded to ensure that PMF could be handled without damage to the structure.

Alternative 3 - Water Cover

The tailings would be covered with water. In order to maintain a water cover on the pond, the Intermediate Dam must be raised 29.3 m. By rehandling and relocating some of the tailings, the dam need be raised 24.3 m.

As in the previous alternatives, the creeks and diversions are re-channelled and/or upgraded to handle a PMF. In this alternative, Rose Creek would flow through the tailings impoundment to ensure a supply of water for the cover.

Alternative 4 - Water / Composite Soil

The Original and Second Impoundments would be covered with a composite soil cover with a synthetic membrane liner on embankment faces. The Intermediate Impoundment would be covered with water.

The creeks and diversions are re-channelled and/or upgraded to keep water flows away from the soil cover and to maintain the water level in the Immediate Impoundment.

Alternative 5 - Water Cover with Reprocessing

At the end of the milling operation, tailings from the Down Valley impoundment would be remobilized and pumped to the mill for processing. The reprocessed tailings would be pumped to the Faro pit for final disposal. The maximum elevation of the tailings remaining in the impoundment would 1044.3 m. These tailings would be covered with water. The spillway located at the north end of the Intermediate Dam would handle outflows from the tailings impoundment and would be designed to handle a 500 year flood.

The Intermediate Dam would be left standing, with the crest at 1049.3 m.

This is the alternative selected by Curragh, and it is the alternative reviewed in this report. The work required for decommissioning under this scenario is outlined in more detail below.

PBK reviewed the quantities and unit rate estimates prepared for Curragh by SRK. While there were variations, either higher or lower, the differences were minor. For the most part, PBK therefore has used the rates in the SRK report.

An exception is the "Engineering and Contingency" estimate which is estimated to be 20%. For this type of work, engineering, procurement and construction management (EPCM) would commonly cost 8% to 12% of the estimated cost.

A contingency is included in an estimate to cover items which have been forgotten or are not defined. The rate used depends on the level of engineering which has been completed on a project. The "Comparison of Estimates" statement attached at the end of this section indicates the ranges used at various stages of a project. In this case, the estimate is probably equivalent to Type II. The contingency should be 20%.

In addition, it is felt that revegetation of the site is essential. Given the low growth rates in the area, measures must be taken to prevent erosion. Sediments will accumulate in the impoundment area.

2.1 Faro Pit Tailings Impoundment Decommissioning Plan

This review of the Faro pit decommissioning costs covers only those items required by the use of the pit for tailings disposal. The review does not cover any costs associated with the open pit mine closure, such as the waste dumps.

From the review of the Kilborn report, it appears that the Faro outlet spillway is constructed at the end of the reprocessing operation. It is felt that it should be constructed before the pit is full of water (Section 3.1.5). The cost estimate for the outlet spillway is therefore included in that section of the report.

Upon completion of pumping the Down Valley Tailings into Faro pit, the following work will be required:



comparison of estimates

ITEM	TYPE I	TYPE II	TYPE III	TYPE IV
Site				
Plant capacity	Assumed	Preliminary	Optimized	Finalized
Geographical location	Assumed	General	Approximate	Specific
Maps and surveys	None	If available	Available	Detailed
Soil and foundations tests	None	None	Preliminary	Final
Site visits by project team	Possibly	Recommended	Essential	Essential
Process				
Process flowsheets	Assumed	Preliminary	Optimized	Finalized
Bench-scale tests	If available	Recommended	Essential	Essential
Pilot plant tests	Not needed	Recommended	Recommended	Essential
Energy and material balances	Not essential	Preliminary	Optimized	Finalized
Facilities Design				
Nature of facilities	Conceptual	Possible	Probable	Actual
Equipment selection	Hypothetical	Preliminary	Optimized	Finalized
General arrangements, mechanical	None	Minimum	Preliminary	Complete
General arrangements, structural	None	Outline	Outline	Preliminary
General arrangements, other	None	Minimum	Outline	Preliminary
Piping drawings	None	None	One-line	Some detail
Electrical drawings	None	None	One-line	Some detail
Specifications	None	Performance	General	Detailed
Basis for Capital Cost Estimating				
Estimates prepared by	Project Engr	Sr Estimators	Sr Estimators	Est Dept
Vendor quotations	Previous	Single source	Multiple	Competitive
Civil work	Rough sketch	Drawing estimate	Drawing estimate	Take-offs
Mechanical work	% of machinery	% of machinery	Man-hours/ton	Man-hours/ton ¹
Structural work	Rough sketch	Prelim drawings	Take-off/ton	Take-off/ton ¹
Piping and instrumentation	% of machinery	% of machinery	Take-off	Take-off ¹
Electrical work	\$ per hp	\$ per hp	Take-off	Take-off ¹
Indirect costs	% of total	% of total	Calculated	Calculated
Contingency ²	20-25% ²	15-20% ²	15% ²	10% ²
Operating Cost Determination				
Labor rates	Assumed	Investigate	Get contracts	Get contracts ³
Labor burden	Assumed	Calculated	Calculated	Calculated ³
Power costs	Assumed	Actual	Actual	Contract ³
Fuel costs	Assumed	Verbal quote	Letter quote	Contract ³
Expendable supplies	Assumed	Verbal quote	Letter quote	Contract ³
Reagents	Assumed	Verbal quote	Letter quote	Contract ³
Parts	Assumed	Verbal quote	Letter quote	Letter quote
Economic Analysis D.C.F.	Not meaningful	If requested	If requested	If requested
Use of Estimates	Comparison rejection	Feasibility	Budget	Funding

Notes: 1 Often subject to subcontract bids.

2 In this definition the percentage assigned to contingencies is a judgment factor and is not to be interpreted as meaning that estimates are necessarily accurate within this percentage range, nor is there an implied reference to any order of accuracy.

3 Contracts can be solicited if project is near-term.

2.3 Lime Addition

In order to minimize oxidization of the tailings and acid generation, Curragh proposes to spray lime on exposed areas of the tailings impoundment. Testing will be undertaken to assess the effectiveness of lime addition and to establish the optimum quantities. It is expected that lime addition will commence in 1992 and continue until 2008.

The annual cost for lime addition estimated by SRK is:

1992	\$110,900
1993	\$145,100
1994 to 2008	\$130,700

The cumulative cost is \$2,216,000.

2.2.1 Capital Costs for Down Valley Tailing Impoundment Decommissioning

PBK has reviewed unit SRK/Kilborn rates used for construction of the decommissioning facilities and has no reason to take exception unless otherwise noted. Volumes of materials were estimated by PBK for the following cost estimate.

1.	Raise Intermediate Dam (raise to 1049.3m)		\$2,158,000
2.	Intermediate Dam Spillway (lump sum)		1,000,000
3.	Equipment for Surface Lime Addition (lump sum)		100,000
4.	Clean-up tailings 450,000 m ³ x \$2/m ³		900,000
	Regrading with Dozer		
5.	Reclaim areas around impoundment to stabilize soil.		135,000
	Hydroseed 90 ha x \$1500 /ha		
6.	Cross Valley Dam and Polishing Pond		
	Drain pond (lump sum)		\$15,000
	Clean pond bottom	216,000 m ³ x \$5.00/m ³	1,080,000
	Breach Cross Valley Dam	30,000 m ³ x \$3.00/m ³	90,000
	Channel excavation	30,000 m ³ x \$3.00/m ³	90,000
	Rip rap	5,755 m ³ x \$12.00/m ³	69,000
	Reclaim area	22 ha x \$1500/ha	<u>33,000</u>
			1,377,000
7.	Other Diversions		
	North Fork		70,000
	Next Creek		<u>40,000</u>
			110,000
8.	Return Rose Creek to Original Channel		
	Channel excavation	8,000 m ³ x \$3.00/m ³	24,000
	Rip rap	1,000 m ³ x \$12.00/m ³	12,000
	Breach Pumphouse Dam		5,000
	Reclaim	4 ha x \$1500/ha	<u>6,000</u>
			47,000
	Direct Capital Subtotal		5,827,000
	Contingency (20%)		<u>1,165,000</u>
	Subtotal		6,992,000
	EPCM (10%)		<u>699,000</u>
	Total		\$7,691,000

SRK's cost estimate (Report 60635 Table H-2) is \$7,942,500 dollars.

- Volume in the Faro pit (after cessation of mining activities) is sufficient to hold Down Valley Tailings located above the 1044.3m elevation in the impoundment. Tonnages are estimated to be:

Tailings deposited to March 31, 1991 (dry metric tonnes)

(SRK Report 60635 - Table 3.1)

45,571,000

Tailings deposited during 1991-92 (12 months)

4,030,000

Total deposited in Down Valley Impoundment

49,601,000

Amount of Tailings above 1044.3m level (estimated by PBK)

36,601,000

Tailings remaining in Down Valley Impoundment

13,000,000

- Final decommissioning will require the Down Valley Impoundment to be flooded. A side-channel spillway with sufficient capacity to pass the full flow of Rose Creek during a 500 year flood will be constructed at the north end of the Intermediate Dam. A concrete spillway is proposed by Curragh. The long term stability of a concrete structure was not assessed, but it is assumed to require maintenance.
- Down Valley dam is stable in the longer term, without modification.
- Cross Valley dam will be breached, and any accumulated tailings removed from the polishing pond.
- Rose Creek diversion will be abandoned directing flow through the flooded impoundment area.

2.1.5 Plug Dam

Rip Rap protection of till core 2500 m ³ x \$12.00 /m ³	30,000
Sub-Total	\$453,000
Contingency (20%)	<u>91,000</u>
	544,000
EPCM (10%)	<u>54,000</u>
Faro Pit Decommissioning Cost	\$598,000

2.2 Down Valley Tailings Impoundment Decommissioning Plan

Based on Alternative 5, Curragh's recommended decommissioning plan for the tailings impoundment, decommissioning and long term stabilization of the Down Valley tailings area will require a water cover to submerge tailings and minimize acid generation. This alternative leaves the tailings submerged in water, and suggests that reprocessing tailings may be economically viable. The following points highlight key assumptions used to establish the cost for decommissioning the Down Valley Tailings impoundment area.

- Alternative 5 yields the highest ratings for environmental protection and long-term safety and stability, based on SRK's analysis.
- Upon completion of mining activities, the mill will be modified to receive tailings for reprocessing. For the purposes of this report, Curragh will provide these funds based on the economic returns of reprocessing the tailings. The costs of remobilizing the tailings, pumping and depositing them in the Faro pit (without reprocessing) is included in PBK's estimate (Section 6.0).

2.1.1 Dismantle Tailings and Siphon Pipelines

There are 800 metres of pipeline from pit to mill and 910 metres of pipeline from mill to Down Valley pond.

• Tailings line 1,710 metres x \$26/metre	\$45,000
• siphon pipeline 1,710 metres x \$26/metre	45,000
• transport siphon barge off site	<u>10,000</u>
Subtotal	\$100,000

2.1.2 Faro Creek Inlet Spillway

It is assumed that this spillway is located to the east of the waste dump now covering the original Faro Creek channel.

• Excavate 1,700 metre final inlet spillway for Faro Creek at Faro pit = $11,000 \text{ m}^3 \times \$20.00/\text{m}^3$	<u>220,000</u>
	\$220,000

2.1.3 Faro Creek Diversion Channel

• Dam Faro Creek diversion channel	\$10,000
• 2000 metres of site grading	10,000
• revegetation 2 ha x \$1500/ha	<u>3,000</u>
	\$23,000

2.1.4 Pit Revegetation

Grade and revegetate area around Faro pit to stabilize till. The estimate includes only those areas with till or overburden. It does not include the waste dumps.

• 36 ha x \$1500/ha	\$54,000
• grading	<u>26,000</u>
	\$80,000

3.0 COST ESTIMATE FOR ADDITIONAL DECOMMISSIONING WORK

In order to reprocess tailings and dispose of them in the Faro pit, work is required to prepare the pit. This work is included as a closure liability (Section 7.0).

This work is outlined below. These items have been identified in the SRK/Kilborn reports.

3.1 Faro Pit Preparation

3.1.1 Tailings Pumps and Line

Install a pumping system and tailings line at the mill to pump tailings from the plant to the pit. It is assumed work was completed in 1991, and has been excluded from PBK's closure liability.

3.1.2 Faro Creek Bypass

Create a temporary bypass of Faro Creek to fill the Faro pit. Water from Faro Creek is necessary to provide for subaqueous disposition of tailings and water recycle. This cost is included in the closure liability. Construction costs are estimated at \$207,000.

3.1.3 Faro Pit Plug Dam

This dam provides the necessary confinement to raise water levels in the pit to the 1,173.5 m (3,850 feet) elevation to provide sufficient head for siphon discharge of clarified water. The Faro pit also provides impoundment for tailings from the Vangorda mine and a significant quantity of the Down Valley tailings. Water is recycled to the mill for ore processing. This dam is included in the closure liability table. Completion is expected in 1993 and capital costs are estimated at \$442,000 for a till core plug dam.

3.1.4 Water Reclaim System

Water reclaimed from the Faro Pit will be used for hydraulic mining of tailings with monitors. Construction costs are estimated at \$800,000 for the return line to the mill and to the Down Valley Tailings Impoundment. Construction is expected in 1993.

3.1.5 Faro Pit Spillway

Kilborn's report allocates funds for construction of a permanent spillway to handle Faro Creek flow on completion of pumping all tailings into the pit (year 2023). PBK recommends that this spillway be constructed before the water level reaches the 1,173.5m (3,850') level in the pit (1994). As shown in Kilborn's water balance (Figures 6.1 and 6.2 Report No. 350928), once water levels reach 1,173.5 m (3,850'), there is a net outflow of water from the pit. It is expected this flow will be seasonal and subject to flood level design factors.

Our review of Kilborn's drawings 100-30-001 to 100-30-009 inclusive indicated there is not an easy location for spillway construction. Mine waste dumps border the pit in the southwest, south and southeast directions. A permanent spillway in this area will have to be lined with concrete or excavated down to bedrock for adequate water sealing and prevention of water penetration into the mine waste.

The following assumptions were used to derive costs for a spillway in the vicinity of the tailings pipeline.

- Spillway elevation 1173.5m at the siphon alternative pond water elevation.
- A spillway length of 610m (2,000') is required to maintain elevation and flow.
- An average depth of 15.2m (50') (Dwg 100-30-09) of mine waste is excavated to expose bedrock. Stable wall slopes are 35° to the horizontal. Excavation will require 280,000 bcm of waste at \$3.00 per bcm = \$840,000.
- An average depth of 3m (15') of bedrock is excavated to maintain slope and provide seepage control. This requires an excavation of 18,000 bcm at \$12.00 per bcm = \$216,000.
- Total Capital Cost for Faro pit spillway is estimated at \$1,056,000.

Review of alternative spillway locations will be required.

3.1.6 Faro Creek Channel

Water release from the Faro pit through the spillway (Section 3.1.5) will require the old Faro Creek channel to be upgraded. It is assumed that mining operations in the Faro pit have modified the old water course and clean-up will be required (completion recommended in 1994). Costs are estimated to be \$20,000. In addition, rock drains would be required under the Vangorda haul road and the mine access road. The cost is estimated to be \$20,000.

3.1.7 Cost Summary for Faro Pit Preparation

Faro Creek bypass	\$ 207,000
Faro pit plug dam	442,000
Water reclaim	800,000
Faro pit spillway	1,056,000
Faro Creek channel	<u>40,000</u>
Subtotal	2,545,000
Contingency (20%)	<u>509,000</u>
Subtotal	3,054,000
EPCM (10%)	<u>305,000</u>
Total	\$ 3,359,000

3.2 Revegetation

The costs outlined below are included in the estimates in Section 2.0.

3.2.1 Faro Pit

• Reclaim areas to promote vegetation growth and soil stabilization.		
- Faro Creek diversion	2 ha	\$3,000
- Area around Faro Pit	36 ha	54,000
- grading		<u>26,000</u>
Subtotal		83,000
Contingency (20%)		<u>17,000</u>
Subtotal		100,000
EPCM (10%)		<u>10,000</u>
Total		\$110,000

3.2.2 Down Valley Tailings Impoundment

• Reclaim areas to promote vegetation growth and soil stabilization			
-	Down Valley impoundment area	90 ha	\$135,000
-	Cross Valley dam area	22 ha	33,000
-	Return Rose Creek to original channel	4 ha	<u>6,000</u>
Subtotal			174,000
Contingency (20%)			<u>35,000</u>
Subtotal			209,000
EPCM (10%)			<u>21,000</u>
Total			\$230,000

3.2.3 Summary

•	Faro pit revegetation	\$110,000
•	Down Valley impoundment revegetation	<u>230,000</u>
Total - Revegetation		\$340,000

4.0 COST OF POST DECOMMISSIONING MONITORING AND MAINTENANCE

Curragh has outlined a monitoring and maintenance programme extending beyond the decommissioning period. This programme is described in Section 13 of the SRK report #60635. The programme covers only monitoring and maintenance for the Down Valley Tailings Impoundment scheme.

An item which is not addressed in the long term maintenance of the impoundment is the impact of sediments in the creeks feeding the ponds. There are suspended solids in the water, which will be deposited in the pond. Provision must be made to periodically rework these sediments to ensure that water flows to the Intermediate Dam Spillway.

Based on the work outlined by Curragh but being undertaken by third party consultants and contractors, the rates utilized should be higher than the rates utilized in the Curragh reports. The costs of the monitoring programmes are annual costs.

Water Quality Monitoring

Sample Collection	\$7,500
Travel and Lodging	1,500
Sample Analysis	1,600
Report Preparation	<u>2,500</u>
	\$13,100

Biological Monitoring

Site Work (13 days)	7,800
Sample Enumeration	2,500
Report Preparation	2,500
Helicopter	<u>9,000</u>
	\$21,800

Physical Maintenance

It is anticipated by Curragh that maintenance would be required every second year on average.

Mobilization and Demobilization	\$2,000
Equipment (including operators)	
• Loader 80 hr. x \$150/hr	12,000
• Backhoe 80 hr. x \$120/hr	9,600
• Truck 80 hr. x \$100/hr	8,000
Subsistence	
• 4 men x 8 days x \$100/day	3,200
Contractor's Supervisor	
• 8 days x \$700/day	5,600
• Travel and Expenses	2,100
• Pickup	3,200
Miscellaneous	<u>4,000</u>
	49,700
Contingency (20%)	9,900
Construction Management (7%)	<u>4,200</u>
	\$63,800

5.0 TECHNICAL AND FINANCIAL FEASIBILITY OF RECYCLING TAILINGS

In order to effectively assess the technical and financial feasibility of reprocessing tailings, detailed information on the mineralogical composition, lead and zinc grades and particle size distribution of the tailings would be required. Sampling of the tailings by drilling is essential to obtain this information. Processing tests on these samples would provide information on concentrate grades, lead and zinc recoveries, grinding and reagent requirements.

Curragh has proposed a programme for this work and expects to issue a Reprocessing Feasibility Study by July 1994. The sampling programme for the tailings impoundment would be initiated as soon as weather permits.

Appendix I of the SRK report contains a summary description of the hydraulic monitoring operation, monitoring costs and processing cost. There is a graph showing estimated net revenues at various concentrate grades and metal prices. The basic information on lead and zinc grades and on recoveries is not provided. This information would be essential in order to provide an assessment of the reprocessing operation.

The key variables in the assessment are:

Lead and Zinc Grades: The lead and zinc content of the tailings would be determined from detailed exploration of the tailings pond.

Lead and Zinc Recoveries: The tailings are relatively fine (SRK Figure 4.4), with particle sizes ranging from 0.002 mm to 1.0 mm. It can be expected that there has been some surface oxidation of the particles. This, among other factors, will affect recovery.

Concentrate Grade: Curragh has suggested that a bulk lead-zinc concentrate would be produced. The grades contained in the SRK report range from 30% to 64%. More precise information from mineral processing tests on representative samples obtained from the exploration programme would be necessary to determine the concentrate grade.

Metal Prices: Assessment of long term lead and zinc prices requires a thorough review of market demand and supply, which is beyond the scope of this review.

Based on previous work and information available on these markets, realistic long term prices in 1991 constant dollars would be:

Lead	US\$0.29/lb
Zinc	US\$0.55/lb

It is anticipated that Curragh will submit preliminary information on the tailings pond and mineral processing tests. When this information is available, a preliminary assessment would be undertaken on the feasibility of the project. An addendum to this report would be issued to cover this aspect.

6.0 ESTIMATE OF COST OF PUMPING TAILINGS TO FARO PIT

6.1 Capital Cost

Tailings pumping costs were derived to supply and install a system to pump 10,000 gallons per minute from the Down Valley Impoundment area to the mill. For the purpose of this cost estimate, it is assumed the pumping system from the mill to the Faro pit is operational.

1.	Water monitors, single stage pump with 20" diameter slurry pipe.		
-	Pumps and motor starter	\$242,000	
-	Power	135,000	
-	Slurry line	300,000	
-	Return clarified water line	300,000	
-	Monitors and pump house	<u>250,000</u>	
			\$1,227,000
2.	Two stage pumps, pumphouse and power		445,000
3.	Slurry piping and water return line from pump station to mill		<u>604,000</u>
	Subtotal		2,276,000
	Contingency (20%)		<u>455,000</u>
	Subtotal		2,731,000
	EPCM (10%)		<u>273,000</u>
	Total		\$3,004,000

6.2 Operating Costs

Mine closure liability covers the operating costs for pumping tailings from the Down Valley Impoundment to the Faro pit. For the purposes of this report, revenue generated by reprocessing tailings and producing a bulk concentrate is not included to offset mine closure costs. Costs are generated to reflect the situation where mine and mill operations are shut down and contractors are used to complete tasks required to decommission the Down Valley Tailing Impoundment and Faro Pit Tailings Impoundment.

6.2.1 Down Valley Tailings Pumping Operating Cost

Operating costs for pumping include labour, supervision, power and maintenance supplies to sustain pumping operations.

The following summarizes annual operating costs:

1. Labour will operate two pumping stations and one hydraulic monitor station on a continuous basis, six months a year.

Foreman	4 x \$60,000/year x 0.5 yr	\$120,000
Operator/Maintenance	16 x \$50,000/year x 0.5 yr	<u>400,000</u>
Subtotal		520,000
Benefits - travel, vacation, contractor profit @ 75% of salary		<u>390,000</u>
Total Labour		\$ 910,000

2. Maintenance Supplies

- pump supplies are based on 33% of capital costs.

4 pumps x 145,000 x 0.33 191,000

- pipe and other cost maintenance

5% of installed capital. 114,000

Total Maintenance Supplies 305,000

3. Power costs are based on the estimated power requirements for pumps given their total dynamic head. Power cost is estimated at \$0.05/kwh 386,000

4. Miscellaneous - covers mobile equipment, fuel, lubricants, etc.

50,000

Total Annual Operating Cost \$1,651,000

The operating cost unit rate for pumping by contractor is estimated at \$0.69 per tonne pumped (at a rate of 2,400,000 tonnes of tailings solids per year). SRK estimated pumping cost at \$0.50 per tonne.

Total operating cost to pump Down Valley Tailings Pond

$\$0.69/\text{t} \times 36,601,000 = \$25,200,000$

6.2.2 Operating Cost Utilizing a Dredge

As an alternative, PBK contacted a dredging contractor to supply a budgetary estimate for operating a dredge to remove tailings.

Contract dredging costs are summarized as follows:

1.	Mobilization/Demobilization equipment and crew (l.s.)	\$800,000
2.	Daily Dredge Cost	
2.1	Operation of an 18" cutter suction dredge (24 hours/day and 7 days/week basis)	\$14,000
2.2	Diesel fuel: 3030 l/day x \$0.45 per litre	\$1,365
2.3	Camp expenses for crew	<u>\$1,500</u>
	Subtotal Daily Dredge Operating Cost	\$16,865
3.	Unit Cost	
3.1	Tailings tonnage	13,333 t
3.2	Contract dredging cost (mobilization cost excluded)	\$1.26 per tonne
3.3	Total Pumping cost (mobilization cost excluded)	\$1.64 per tonne

7.0 SUMMARY OF CLOSURE LIABILITY

The estimate of closure liability is based on the assumptions outlined by Curragh together with changes noted in this report.

The following table summarizes the estimates prepared by PBK and compares the cost to the estimates in SRK report 60635 and Kilborn report 350928.

Item	Curragh Estimate	PBK Estimate
1. Decommissioning cost for Faro pit tailings area	\$1,020,000	\$598,000
2. Preparation	Not Avail.	3,359,000
Sub-Total - Faro Pit	1,020,000	3,957,000
3. Down Valley Impoundment Decommissioning Cost	7,942,000	7,691,000
4. Lime Addition	* 2,216,000	2,216,000
5. Slurry system capital for pumping tailings	*2,000,000	3,004,000
6. Slurry pumping operating cost (36.6 million tonnes tailings)	*18,300,000	25,200,000
Sub-Total - Down Valley	30,458,000	38,111,000
Total	\$31,478,000	\$42,068,000

* Not included in Curragh decommissioning cost estimate. However, cost is mentioned in SRK/Kilborn reports.

The estimates in 1991 constant dollars are presented in the attached Table 7.1 Summary of Closure Liability. The amounts for a particular year represent the liability remaining at the end of the year.

The liability in current dollar terms, using a 4% inflation rate, are shown in Table 7.2.

CURRAGH - FARO MINE
Table 7.1 - SUMMARY OF CLOSURE LIABILITY
FARO PIT AND DOWN VALLEY TAILINGS IMPOUNDMENT
(CONSTANT 1991 DOLLARS X 1000)

ITEM	1991	1992	1993	1994	1995	1996 to 2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
FARO PIT															
Tailings system															
Temp. Faro Ck to fill pit	207														
Const. of plug dam	442	442													
Siphon water reclaim	800	800													
Pit spillway	1,056	1,056	1,056												
Reroute Faro Ck.	40	40	40												
Dismantle pipelines	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Excavate Faro Ck. inlet	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220
Abandon Faro Ck. diversion	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23
Revegetation and Grading	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
Rip Rap plug dam	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
SUBTOTAL	2,998	2,791	1,549	453	453	453	453	453	453	453	453	453	453	453	453
DOWN VALLEY TAILINGS POND															
Raise intermediate dam	2,158	2,158	2,158	2,158	2,158	2,158	2,158								
Herm. dam spillway	1,000	1,000	1,000	1,000	1,000	1,000	1,000								
Equip for lime addition	100														
Lime addition	2216	2105	1960	1829	1699	261	131	0							
Pump tailings (capital)	2,276	2,276	2,276	2,276	2,276	2,276	2,276								
Pump tailings (operating)	25,200	25,200	25,200	25,200	25,200	25,200	25,200	23,549	21,898	20,247	18,596	16,945	15,294	13,643	11,992
Clean up tailings	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900
Reclaim area around dam	135	135	135	135	135	135	135	135	135	135	135	135	135	135	135
Gross val. dam and pol. pond	1,377	1,377	1,377	1,377	1,377	1,377	1,377	1,377	1,377	1,377	1,377	1,377	1,377	1,377	1,377
Return Rose Ck.	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47
Other Diversions	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110
SUBTOTAL	35,519	35,308	35,163	35,032	34,902	33,464	33,334	26,118	24,467	22,816	21,165	19,514	17,863	16,212	14,561
MONITORING															
SUB - TOTAL	38,517	38,099	36,712	35,485	35,355	33,917	33,787	26,571	24,920	23,269	21,618	19,967	18,316	16,665	15,014
Contingency (20%) **	2,219	2,159	1,910	1,691	1,691	1,691	1,691	604	604	604	604	604	604	604	604
EPCM (10%)	1,332	1,295	1,146	1,015	1,015	1,015	1,015	363	363	363	363	363	363	363	363
TOTAL	42,068	41,553	39,769	38,191	38,061	36,623	36,493	27,538	25,887	24,236	22,585	20,934	19,283	17,632	15,981

** Contingency is not applied to reclaim tailings operating cost nor lime addition.

ITEM	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
FARO PIT										
Tailings system										
Temp. Faro Ck to fill pit										
Const. of plug dam										
Siphon water reclaim										
Pit spillway										
Reroute Faro Ck.										
Dismantle pipelines	100	100	100	100	100	100	100			
Excavate Faro Ck. inlet	220	220	220	220	220	220	220			
Abandon Faro Ck. diversion	23	23	23	23	23	23	23	23		
Revegetation and Grading	80	80	80	80	80	80	80	80		
Rip Rap plug dam	30	30	30	30	30	30	30	30		
SUBTOTAL	453	453	453	453	453	453	453	133	0	0
DOWN VALLEY TAILINGS POND										
Raise intermediate dam										
Inter. dam spillway										
Equip for lime addition										
Lime addition										
Pump tailings (capital)										
Pump tailings (operating)	10,341	8,690	7,039	5,388	3,737	2,086	435			
Clean up tailings	900	900	900	900	900	900	900			
Reclaim area around dam	135	135	135	135	135	135	135	135		
Gross val. dam and pol. pond	1,377	1,377	1,377	1,377	1,377	1,377	1,377			
Return Rose Ck.	47	47	47	47	47	47	47	47		
Other Diversions	110	110	110	110	110	110	110	110		
SUBTOTAL	12,910	11,259	9,608	7,957	6,306	4,655	3,004	292	0	0
MONITORING										
SUB - TOTAL	13,363	11,712	10,061	8,410	6,759	5,108	3,457	425	0	0
Contingency (20%) **	604	604	604	604	604	604	604	85	0	0
EPCM (10%)	363	363	363	363	363	363	363	51	0	0
TOTAL	14,330	12,679	11,028	9,377	7,726	6,075	4,424	561	0	0

** Contingency is not applied to

CURRAGH - FARO MINE
Table 7.2 - SUMMARY OF CLOSURE LIABILITY
FARO PIT AND DOWN VALLEY TAILINGS IMPOUNDMENT
(CURRENT DOLLARS X 1000)

ITEM	1991	1992	1993	1994	1995	1996 to 2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
FARO PIT															
Tailings system															
Temp. Faro Ck to fill pit	207														
Const. of plug dam	442	460													
Siphon water reclaim	800	832													
Pit spillway	1,056	1,098	1,142												
Reroute Faro Ck.	40	42	43												
Dismantle pipelines	100	104	108	112	117	180	187	195	203	211	219	228	237	246	256
Excavate Faro Ck. inlet	220	229	238	247	257	396	412	429	446	464	482	501	521	542	564
Abandon Faro Ck. diversion	23	24	25	26	27	41	43	45	47	48	50	52	55	57	59
Revegetation and Grading	80	83	87	90	94	144	150	156	162	169	175	182	190	197	205
Rip Rap plug dam	30	31	32	34	35	54	56	58	61	63	66	68	71	74	77
SUBTOTAL	2,998	2,903	1,675	510	530	816	849	882	918	954	993	1,032	1,074	1,117	1,161
DOWN VALLEY TAILINGS POND															
Raise intermediate dam	2,158	2,244	2,334	2,427	2,525	3,887	4,042								
Interm. dam spillway	1,000	1,040	1,082	1,125	1,170	1,801	1,873								
Equip for lime addition	100														
Lime addition	2,216	2,169	2,114	2,053	1,982	471	235								
Reclaim tailings (capital)	2,276	2,367	2,462	2,560	2,663	4,099	4,263								
Reclaim tailings (operating)	25,200	26,208	27,256	28,347	29,480	45,387	44,110	42,658	41,020	39,183	37,133	34,855	32,337	29,560	26,511
Clean up tailings	900	936	973	1,012	1,053	1,621	1,686	1,753	1,823	1,896	1,972	2,051	2,133	2,218	2,307
Reclaim area around dam	135	140	146	152	158	243	253	263	274	284	296	308	320	333	346
Gross val. dam and pol. pond	1,377	1,432	1,489	1,549	1,611	2,480	2,579	2,682	2,790	2,901	3,017	3,138	3,264	3,394	3,530
Return Rose Ck.	47	49	51	53	55	85	88	92	95	99	103	107	111	116	120
Other Diversions	110	114	119	124	129	198	206	214	223	232	241	251	261	271	282
SUBTOTAL	35,519	36,700	38,026	39,401	40,825	60,271	59,336	47,663	46,225	44,595	42,762	40,710	38,425	35,893	33,097
MONITORING															
SUB - TOTAL	38,517	39,602	39,702	39,911	41,355	61,087	60,184	48,545	47,143	45,550	43,755	41,742	39,499	37,009	34,258
Contingency (20%) **	2,219	2,245	2,066	1,902	1,978	3,046	3,168	1,177	1,224	1,273	1,324	1,377	1,432	1,490	1,549
EPCM (10%)	1,332	1,347	1,240	1,141	1,187	1,828	1,901	706	735	764	795	826	859	894	930
TOTAL	42,068	43,195	43,008	42,955	44,520	65,961	65,253	50,429	49,102	47,587	45,874	43,946	41,791	39,393	36,737

** Contingency is not applied to reclaim tailings operating cost nor lime addition.

ITEM	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
FARO PIT										
Tailings system										
Temp. Faro Ck to fill pit										
Const. of plug dam										
Siphon water reclaim										
Pit spillway										
Reroute Faro Ck.										
Dismantle pipelines	267	277	288	300	312	324	337			
Excavate Faro Ck. inlet	587	610	634	660	686	714	742			
Abandon Faro Ck. diversion	61	64	66	69	72	75	78	81		
Revegetation and Grading	213	222	231	240	250	259	270	281		
Rip Rap plug dam	80	83	87	90	94	97	101	105		
SUBTOTAL	1,208	1,256	1,306	1,359	1,413	1,469	1,528	467	0	0
DOWN VALLEY TAILINGS POND										
Raise intermediate dam										
Item. dam spillway										
Equip for lime addition										
Lime addition										
Reclaim tailings (capital)										
Reclaim tailings (operating)	23,170	19,520	15,540	11,211	6,510	1,416				
Clean up tailings	2,399	2,495	2,595	2,699	2,807	2,919	3,036			
Reclaim area around dam	360	374	389	405	421	438	455	474		
Gross val. dam and pol. pond	3,671	3,818	3,971	4,130	4,295	4,466	4,645			
Return Rose Ck.	125	130	136	141	147	152	159	165		
Other Diversions	293	305	317	330	343	357	371	386		
SUBTOTAL	30,019	26,643	22,948	18,915	14,523	9,749	8,666	1,024	0	0
MONITORING										
SUB - TOTAL	31,227	27,899	24,254	20,274	15,936	11,218	10,194	1,491	0	0
Contingency (20%) **	1,611	1,676	1,743	1,813	1,885	1,960	2,039	298	0	0
EPCM (10%)	967	1,005	1,046	1,088	1,131	1,176	1,223	179	0	0
TOTAL	33,805	30,580	27,043	23,174	18,952	14,355	13,457	1,968	0	0

** Contingency is not applied to

APPENDIX 1

REFERENCES

1. Amendment #1 to Curragh Resources Inc.
IN89-001. Faro Mine Water Recycle and Tailings Deposition Plan
Volumes I and II.
2. Curragh Resources Inc.
Down Valley Tailings Impoundment Decommissioning Plan SRK Report 60635
Volumes I to IV.
3. Curragh Resources Inc.
Faro Mine Abandonment Plan April 1988.
4. Curragh Resources Inc.
1988 Abandonment Submission Summary Report.



GOVERNMENT OF CANADA

GOVERNMENT CONSULTING AND AUDIT AGENCY

VANCOUVER, BC

EVALUATION REPORT

ADDENDUM

**NORTHERN AFFAIRS PROGRAM
CURRAGH RESOURCES INC. - FARO
DOWN VALLEY TAILINGS
IMPOUNDMENT DECOMMISSIONING PLAN**

PROJECT NO. 91116

JANUARY 1992

ADDENDUM

1.0 INTRODUCTION

Information made available by Curragh Resources Inc. since PBK Engineering Ltd issued its evaluation report can provide a preliminary assessment of the feasibility of reprocessing tailings. The information is preliminary in that additional exploration should be undertaken on the tailings pond to better define the reserves in terms of metal content, particle size, mineralogical and chemical content. Additional processing tests are also required to establish concentrate grade, metal recoveries and flotation capacity requirements.

In contrast to other estimates prepared by PBK, the estimates in this addendum are based on Curragh's costs, not contractor costs. It seems unlikely that the inherent business risks associated with the venture would be acceptable to other parties, such as the government.

Appendices A and C of **Curragh Resources Exhibit 1 (f) Appendices A to D to Report WH9108 December 1991** were reviewed to assess the technical and financial feasibility of recycling tailings through the mill, as proposed by Curragh.

IN89-001-PH91, Curragh Resources Inc.

"Overview of the Environmental Plan"

EXHIBIT 1 (f) - Appendices A to D

Page	Appendix	Title
3	A	Curragh Resources, Faro Mine Tailings Relocation Project, Preliminary Design and Cost Estimates, Report Number 3509-62, Kilborn Inc., Toronto, Ontario, December 1991.
27	B	Sulphate Reduction as a Water Treatment Alternative at the Faro Mine, Report Number 60643, Steffen, Robertson & Kirsten (BC) Inc., Vancouver, BC., December 1991.
121	C	Curragh Resources Inc., Faro Division, Reprocessing Tailings, Report Number WH91-07, R.F. Downs, P.Eng. and G.W. McDonald, Toronto, Ontario, December 1991.
238	D	Letter Report on Geotechnical considerations for Faro Pit Decommissioning, File #85-80413, Alan F. Stewart, P.Eng., Piteau and Associates Engineering Ltd., December 13, 1991.

The technical and financial viability of reprocessing Faro's Down Valley tailings is similar to the assessment for exploitation of a new reserve. The analysis is concentrated in four areas.

- Reserve estimate (metal content in tailings)
- Metal recovery with a viable process
- Capital costs for modifications to the existing mill and an estimate of the operating costs
- Production of a marketable product and the expected prices

The financial feasibility of recycling tailings through the mill is very sensitive to recovery and metal price. Profit margins at projected prices indicate the venture may not pay for itself.

2.0 RESERVE ESTIMATE

Curragh has estimated that 37.7 million tonnes of tailings need to be reprocessed and placed in the Faro pit to properly decommission the Down Valley Tailings Impoundment. This compares favourably to the 36.6 million tonnes estimated by PBK. Curragh has estimated metallic content of the tailings by sampling from 17 holes dug in a grid pattern by a backhoe. From this program, Curragh reports that the following analysis is typical.

	Content
Lead	0.79 %
Zinc	1.23 %
Copper	0.15 %
Silver	15 g/t
Gold	0.12 g/t

This estimate needs to be verified by Curragh by additional processing testwork and by comparing it to documented metal content of the tailings in monthly and yearly reports during the production period when the tailings were deposited.

3.0 METAL RECOVERY

Table A-1 summarizes Curragh's estimate of metal recovery when tailings are reprocessed in the Faro mill which would be modified to accept a slurry feed. It is important to note that metallurgical balance is extrapolated from preliminary test data. The results have not been verified in testwork by Curragh or Lakefield Research.

Table A-1
Tailings Reprocessing
Metallurgical Balance

	Wt (%)	Assay			Recovery		
		Pb (%)	Zn (%)	Ag (g/t)	Pb (%)	Zn (%)	Ag (g/t)
Bulk Concentrate	1.0	14.2	37.1	165	18.0	30.1	11.0
Tailings	99.0	0.65	0.87	13.5	82.0	69.9	89.0
Calc. Head Grade	100.0	0.79	1.23	15.0	100.0	100.0	100.0

The reports are not clear on describing what technological feature Curragh can attribute to recovery of metals that were lost to tailings when the ore was originally processed. Lakefield's testwork indicated some metal recovery is attainable through pH control, bulk flotation and newly developed promoter reagents. Utilization of these reagents is costly. There is some question as to whether the recoveries are achievable at the process rates indicated in the study. The rate of 1200 tonnes per hour is twice the current plant capacity. Although tailings do not require grinding, the proposed flowsheet has rougher/scavenger flotation followed by three stages of cleaning. Additional capital may be required for flotation capacity to provide adequate retention for the proposed flow rates which are twice current capacity. No mention or consideration of this is given in Curragh's report.

4.0 CAPITAL AND OPERATING COSTS

Curragh has estimated capital expenditures to be \$500,000 to convert the process plant for reprocessing tailings. This amount does not include flotation equipment to improve retention time at the higher throughput rates.

Curragh has estimated operating costs for the process plant at \$1.89 per tonne of tailings. The amount is based on Curragh's current operating costs. Reagent costs represent 68% of the total operating cost. The cost can change significantly with changes in quantities of reagents required for reprocessing.

4.1 Estimate of Cost of Pumping Tailings to Faro Pit

4.1.1 Capital Cost

Tailings pumping costs were derived to supply and install a system to pump 20,000 gallons per minute (4,800,000 tons per year) from the Down Valley Impoundment area to the mill. For the purpose of this cost estimate, it is assumed the pumping system from the mill to the Faro pit is operational. However, additional capacity is required to pump at the new rates required for reprocessing.

1. Water monitors, two single stage pumps with two 20" diameter slurry pipes.

- Pumps and motor starter	\$484,000
- Power	150,000
- Slurry line	600,000
- Return clarified water line	600,000
- Monitors and pump house	<u>300,000</u>

		\$2,134,000
2.	Two sets of two stage pumps, pumphouse and power	880,000
3.	Slurry piping and water return line from pump station to concentrator	1,092,000
4.	Additional tailings line, pump system and water return line from Faro pit to concentrator	1,005,000
	Subtotal	5,111,000
	Contingency (20%)	<u>1,022,000</u>
	Subtotal	6,133,000
	EPCM (10%)	<u>613,000</u>
	Total	\$6,746,000

Kilborn's estimate for this work is \$6,582,000.

4.1.2 Operating Costs

Mine closure liability covers the costs for monitor operation, pumping tailings from the Down Valley Tailings Impoundment to the concentrator then pumping concentrator tailings into Faro pit. Costs are generated to reflect the situation where mill is reprocessing tailings and Curragh labour is available for pumping operations.

Down Valley Tailings Pumping Operating Cost

Operating costs for pumping include labour, supervision, power and maintenance supplies to sustain pumping operations.

The following summarizes annual operating costs:

1. Labour will operate two pumping stations and hydraulic monitor stations on a continuous basis, six months a year. Two weeks of labour is "tacked" on the beginning and end of the 6 month period to cover start-up and decommission each year.

Foreman	1 x \$45,000/year x 0.58 yr	\$26,000
Operator/Maintenance	16 x \$37,400/year x 0.58 yr	347,000
Labourers	8 x \$30,800/year x 0.58 yr	<u>143,000</u>
Subtotal		516,000
Benefits - travel, vacation, @ 35% of salary		<u>181,000</u>

Total Labour **\$ 697,000**

2. Maintenance Supplies

-	pump supplies are based on 33% of capital costs.	
	8 pumps x 145,000 x 0.33	382,000
-	pipe and other cost maintenance	
	5% of installed capital.	<u>228,000</u>

Total Maintenance Supplies **\$610,000**

3. Power costs are based on the estimated power requirements for pumps given their total dynamic head. Power cost is estimated at \$0.05/kwh \$773,000

4. Miscellaneous - covers mobile equipment, fuel, lubricants, etc.

\$ 100,000

Total Annual Operating Cost **\$2,180,000**

The operating cost unit rate for pumping by contractor is estimated at \$0.45 per tonne pumped (at a rate of 4,800,000 tonnes of tailings solids per year). Kilborn estimated pumping cost at \$0.39 per tonne.

Total operating cost to pump Down Valley Tailings Pond

$$\$0.45/\text{t} \times 36,600,000 = \$16,470,000$$

4.1.3 Tailings Reprocessing Concentrator Operating Cost

For the purpose of this cost estimate PBK does not take exception to the operating costs as summarized on page 5 of Curragh's report number WH91-07 on Reprocessing Tailings. PBK understands that Curragh is trying to optimize reagent consumption, metal recovery and improve the concentrate grade. Actual testing of the recommended flowsheet is not included in the report, therefore, reagent and media consumption were extrapolated from testwork results.

Concentrator Operating Cost

	\$/Tonne of Tailings	\$ Per Year
Manpower	0.20	960,000
Reagents	1.28	6,144,000
Supplies	0.10	480,000
Power	<u>0.31</u>	<u>1,488,000</u>
	1.89	9,072,000

5.0 PRODUCTION OF A MARKETABLE PRODUCT

From the testwork undertaken by Lakefield Research for Curragh, production of separate zinc and lead concentrates is not economically feasible while reprocessing tailings. Reagent costs are higher than the value of metal in the tailings. This limits production to a bulk zinc-lead concentrate. Rougher flotation followed by multiple stages of cleaning is required to produce a concentrate grade which can be marketable.

6.0 REPROCESSING REVENUES

6.1 Metal Prices

One of the key variables in the feasibility of reprocessing tailings is metal prices. Since zinc is the principal source of revenue in the bulk concentrate, the price of zinc is the critical element. Curragh has used a price of US\$ 0.60 per pound, the average price in 1991 constant dollars over the past twenty two years. However, one characteristic of the zinc metal is the high price peaks reached every fifteen - twenty years. Since tailings reprocessing would extend over a seven to eight year period, the project may not benefit from a high peak in the zinc price. Eliminating the years with these peaks results in an average long term price of US\$ 0.55 in 1991 constant dollars.

6.2 Bulk Concentrate Net Revenue at Minesite

Curragh's "net back" value, as outlined on page 6 of their "Reprocessing Tailings" report, has been recalculated to reflect the change in long term prices for lead and zinc, which are US\$0.29/lb and US\$0.55/lb.

Metal Payments:	zinc	US\$ 365.20
	lead	US\$ 71.62
	silver	<u>US\$ 13.02</u>
		US\$ 449.84
Charges		US\$ (275.45)
Net at Minesite		US\$ 174.39
Net at Minesite @ CDN\$1.14 / US\$1		
per tonne of concentrate		CDN\$ 198.81
Revenue (\$ per year)		\$ 9,543,000
Revenue (\$ per tonne milled)		\$1.99

6.3 Calculation of Revenue from Reprocessing Less Operating Cost

		Curragh Estimate	PBK Estimate
a)	Slurry Pumping		
	\$/tonne	0.39	0.46
	Project total (36.6 million tonnes)	14,274,000	16,470,000
b)	Concentrator Reprocessing		
	\$/tonne	1.89	1.89
	Project Total (36.6 million tonnes)	69,174,000	69,174,000
c)	"Net Back" at Minesite		
	\$/tonne concentrate	US\$199.01	US\$174.39
	\$/tonne tailings	2.27	1.99
	Project Total (36.6 million tonnes)	83,082,000	72,834,000
TOTAL	(a) + (b) - (c) \$/tonne tailing	(0.01)	(0.36)
	Project Total (36.6 million tonnes)	(366,000)	(12,810,000)

7.0 SUMMARY OF CLOSURE LIABILITY INCLUDING TAILINGS REPROCESSING

The estimate of closure liability is based on the assumptions outlined by Curragh together with changes noted in this report.

The following table summarizes the estimates prepared by PBK and compares the cost to the estimates in SRK report 60635 and Kilborn report 350928 and Exhibit 1(f).

Table A-2
Summary of Cost Estimates

Item		Curragh Estimate	PBK Estimate
1.	Decommissioning cost for Faro pit tailings area	\$1,020,000	\$598,000
2.	Preparation	Not Avail.	3,359,000
Sub-Total - Faro Pit		1,020,000	3,957,000
3.	Down Valley Impoundment Decommissioning Cost	7,942,000	7,691,000
4.	Lime Addition	* 2,216,000	2,216,000
Sub-Total - Down Valley		10,158,000	9,907,000
5.	Slurry system capital for pumping tailings	* 6,582,000	6,746,000
6.	Modifications to concentrator	** 660,000	660,000
7.	Slurry pumping operating cost (36.6 million tonnes tailings)	* 14,274,000	16,470,000
8.	Concentrator Reprocessing	69,174,000	69,174,000
9.	Revenue at Minesite	-83,082,000	-72,834,000
Sub-Total - Reprocessing and Pumping		7,608,000	20,216,000
Total		\$18,786,000	\$34,080,000

* Not included in Curragh decommissioning cost estimate. However, cost is mentioned in SRK/Kilborn reports.

** Contingency and EPCM added.

The estimates in 1991 constant dollars are presented in the attached Table A-3 Summary of Closure Liability. The amounts for a particular year represent the liability remaining at the end of the year.

The liability in current dollar terms, using a 4% inflation rate, are shown in Table A-4.

CURRAGH - FARO MINE
Table A.3 - SUMMARY OF CLOSURE LIABILITY
FARO PIT AND DOWN VALLEY TAILINGS IMPOUNDMENT
(CONSTANT 1991 DOLLARS X 1000)

ITEM	1991	1992	1993	1994	1995	1996 to 2006	2007	2008	2009	2010	2011	2012	2013
FARO PIT													
Tailings system													
Temp. Faro Ck to fill pit	207												
Const. of plug dam	442	442											
Siphon water reclaim	800	800											
Pit spillway	1,056	1,056	1,056										
Reroute Faro Ck.	40	40	40										
Dismantle pipelines	100	100	100	100	100	100	100	100	100	100	100	100	100
Excavate Faro Ck. inlet	220	220	220	220	220	220	220	220	220	220	220	220	220
Abandon Faro Ck. diversion	23	23	23	23	23	23	23	23	23	23	23	23	23
Revegetation and Grading	80	80	80	80	80	80	80	80	80	80	80	80	80
Rip Rap plug dam	30	30	30	30	30	30	30	30	30	30	30	30	30
SUBTOTAL	2,998	2,791	1,549	453	453	453	453	453	453	453	453	453	453
DOWN VALLEY TAILINGS POND													
Raise intermediate dam	2,158	2,158	2,158	2,158	2,158	2,158	2,158						
Norm. dam spillway	1,000	1,000	1,000	1,000	1,000	1,000	1,000						
Equip for lime addition	100												
Lime addition	2,216	2,105	1,960	1,829	1,699	261	131						
Clean up tailings	900	900	900	900	900	900	900	900	900	900	900	900	900
Reclaim area around dam	135	135	135	135	135	135	135	135	135	135	135	135	135
Cross val. dam and pol. pond	1,377	1,377	1,377	1,377	1,377	1,377	1,377	1,377	1,377	1,377	1,377	1,377	1,377
Return Rose Ck.	47	47	47	47	47	47	47	47	47	47	47	47	47
Other Diversions	110	110	110	110	110	110	110	110	110	110	110	110	110
SUBTOTAL	8,043	7,832	7,687	7,556	7,426	5,988	5,858	2,569	2,569	2,569	2,569	2,569	2,569
REPROCESSING													
Concentrator Modifications	500	500	500	500	500	500	500						
Pump tailings (capital)	5,111	5,111	5,111	5,111	5,111	5,111	5,111						
Pump tailings (operating cost)	16,470	16,470	16,470	16,470	16,470	16,470	16,470	14,311	12,153	9,994	7,836	5,677	3,518
Concentrator Op. Cost	69,174	69,174	69,174	69,174	69,174	69,174	69,174	60,108	51,042	41,976	32,910	23,844	14,778
Revenue from Conc. Sales	(72,834)	(72,834)	(72,834)	(72,834)	(72,834)	(72,834)	(72,834)	(63,288)	(53,743)	(44,197)	(34,651)	(25,105)	(15,560)
SUBTOTAL	18,421	18,421	18,421	18,421	18,421	18,421	18,421	11,131	9,452	7,773	6,094	4,416	2,737
SUB - TOTAL	29,462	29,044	27,657	26,430	26,300	24,862	24,732	14,153	12,474	10,795	9,116	7,438	5,759
Contingency (20%) **	2,887	2,825	2,576	2,357	2,357	2,357	2,357	603	603	603	603	603	603
EPCM (10%)	1,730	1,695	1,546	1,415	1,415	1,415	1,415	363	363	363	363	363	363
TOTAL	34,080	33,564	31,780	30,202	30,072	28,634	28,504	15,119	13,440	11,761	10,082	8,403	6,725

** Contingency is not applied to pump tailings operating cost, concentrator operating cost, revenue from conc. sales nor lime addition.

ITEM	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
FARO PIT												
Tailings system												
Temp. Faro Ck to fill pit												
Const. of plug dam												
Siphon water reclaim												
Pk spillway												
Reroute Faro Ck.												
Dismantle pipelines	100	100										
Excavate Faro Ck. inlet	220	220										
Abandon Faro Ck. diversion	23	23	23									
Revegetation and Grading	80	80	80									
Rip Rap plug dam	30	30	30									
SUBTOTAL	453	453	133	0	0	0	0	0	0	0	0	0
DOWN VALLEY TAILINGS POND												
Raise intermediate dam												
Item. dam spillway												
Equip for lime addition												
Lime addition												
Clean up tailings	900	900										
Reclaim area around dam	135	135	135									
Cross val. dam and pol. pond	1,377	1,377										
Return Rose Ck.	47	47	47									
Other Diversions	110	110	110									
SUBTOTAL	2,569	2,569	292	0	0	0	0	0	0	0	0	0
REPROCESSING												
Concentrator Modifications												
Pump tailings (capital)												
Pump tailings (operating cost)	1,360											
Concentrator Op. Cost	5,712											
Revenue from Conc. Sales	(6,014)											
SUBTOTAL	1,058											
SUB - TOTAL	4,080	3,022	425	0	0	0	0	0	0	0	0	0
Contingency (20%) **	603	603	84	0	0	0	0	0	0	0	0	0
EPCM (10%)	363	363	51	0	0	0	0	0	0	0	0	0
TOTAL	5,046	3,988	560	0	0	0	0	0	0	0	0	0

** Contingency is not applied to

CURRAGH - FARO MINE
Table A.4 - SUMMARY OF CLOSURE LIABILITY
FARO PIT AND DOWN VALLEY TAILINGS IMPOUNDMENT
(CURRENT 1991 DOLLARS X 1000)
(ESCALATION AT 4 PERCENT)

ITEM	1991	1992	1993	1994	1995	1996 to 2006	2007	2008	2009	2010	2011	2012	2013
FARO PIT													
Tailings system													
Temp. Faro Ck to fill pit	207												
Const. of plug dam	442	460											
Siphon water reclaim	800	832											
Pit spillway	1,056	1,098	1,142										
Reroute Faro Ck.	40	42	43										
Dismantle pipelines	100	104	108	112	117	180	187	195	203	211	219	228	237
Excavate Faro Ck. inlet	220	229	238	247	257	396	412	429	446	464	482	501	521
Abandon Faro Ck. diversion	23	24	25	26	27	41	43	45	47	48	50	52	55
Revegetation and Grading	80	83	87	90	94	144	150	156	162	169	175	182	190
Rip Rap plug dam	30	31	32	34	35	54	56	58	61	63	66	68	71
SUBTOTAL	2,998	2,903	1,675	510	530	816	848	882	918	954	993	1,032	1,074
DOWN VALLEY TAILINGS POND													
Raise intermediate dam	2,158	2,244	2,334	2,427	2,525	3,886	4,042						
Herm. dam spillway	1,000	1,040	1,082	1,125	1,170	1,801	1,873						
Equip for lime addition	100												
Lime addition	2,216	2,189	2,120	2,057	1,988	470	245						
Clean up tailings	900	936	973	1,012	1,053	1,621	1,686	1,753	1,823	1,896	1,972	2,051	2,133
Reclaim area around dam	135	140	146	152	158	243	253	263	273	284	296	308	320
Gross val. dam and pol. pond	1,377	1,432	1,489	1,549	1,611	2,480	2,579	2,682	2,790	2,901	3,017	3,138	3,263
Return Rose Ck.	47	49	51	53	55	85	88	92	95	99	103	107	111
Other Diversions	110	114	119	124	129	198	206	214	223	232	241	251	261
SUBTOTAL	8,043	8,145	8,314	8,499	8,687	10,784	10,972	5,004	5,204	5,412	5,629	5,854	6,088
REPROCESSING													
Concentrator Modifications	500	520	541	562	585	900	936						
Pump tailings (capital)	5,111	5,315	5,528	5,749	5,979	9,205	9,573						
Pump tailings (operating cost)	16,470	17,129	17,129	17,814	18,527	19,268	29,661	27,876	24,620	21,056	17,170	12,937	8,337
Concentrator Op. Cost	69,174	71,941	74,819	77,811	80,924	124,578	129,561	117,084	103,401	88,437	72,110	54,335	35,023
Revenue from Conc. Sales	(72,834)	(75,747)	(78,777)	(81,928)	(85,205)	(131,170)	(136,416)	(123,278)	(108,873)	(93,116)	(75,924)	(57,208)	(36,876)
SUBTOTAL	18,421	19,158	19,239	20,009	20,809	22,781	33,316	21,682	19,148	16,376	13,355	10,063	6,494
SUB - TOTAL	29,462	30,206	29,229	29,018	30,026	34,381	45,136	27,569	25,270	22,743	19,976	16,949	13,646
Contingency (20%) **	2,887	2,938	2,787	2,652	2,758	4,246	4,416	1,176	1,223	1,272	1,323	1,376	1,431
EPCM (10%)	1,730	1,763	1,673	1,591	1,655	2,548	2,650	706	735	764	794	826	859
TOTAL	34,080	34,907	33,688	33,261	34,439	41,175	52,202	29,451	27,228	24,780	22,094	19,152	15,937

** Contingency is not applied to pump tailings operating cost, concentrator operating cost, revenue from conc. sales nor lime addition.

ITEM	2014	2015	2016	2017	2018	2019	2020	2021
FAIRO PIT								
Tailings system								
Temp. Fair Ck to fill pit								
Const. of plug dam								
Siphon water reclaim								
Pit spillway								
Reroute Fair Ck.								
Dismantle pipelines	246	256						
Excavate Fair Ck. inlet	542	564						
Abandon Fair Ck. diversion	57	59	61					
Revegetation and Grading	197	205	213					
Rip Rap plug dam	74	77	80					
SUBTOTAL	1,117	1,161	355	0	0	0	0	0
DOWN VALLEY TAILINGS POND								
Raise intermediate dam								
Item. dam spillway								
Equip for lime addition								
Lime addition								
Clean up tailings	2,218	2,307						
Reclaim area around dam	333	346	360					
Cross val. dam and pol. pond	3,394	3,530						
Return Rose Ck.	116	120	125					
Other Diversions	271	282	293					
SUBTOTAL	6,332	6,585	778	0	0	0	0	0
REPROCESSING								
Concentrator Modifications								
Pump tailings (capital)								
Pump tailings (operating cost)	3,352							
Concentrator Op. Cost	14,078							
Revenue from Conc. Sales	(14,823)							
SUBTOTAL	2,608							
SUB - TOTAL	10,056	7,746	1,133	0	0	0	0	0
Contingency (20%) **	1,489	1,548	226	0	0	0	0	0
EPCM (10%)	894	929	136	0	0	0	0	0
TOTAL	12,438	10,224	1,494	0	0	0	0	0

** Contingency is not applied to