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ORPHAN BOY RESOURCES INC.

THE WILLA PROJECT
Slocan Mining District, British Columbia

A Proposal to Provide
Metallurgical Engineering Services

Submitted by

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1.0 Introduction

Orphan Boy Resources Inc. (ORB) has an option to purchase the Willa gold-copper-silver deposit located near Silverton, British Columbia. ORB wishes to examine the feasibility of processing ore from the Willa Property in the Goldstream mill, located 90 kilometres north of Revelstoke, British Columbia.

Mr. John Chapman, a Director of ORB, has requested this proposal from P. Taggart & Associates Ltd. (PT) to:

- Review and summarize historical metallurgical test data
- Make recommendations for any additional metallurgical work, if deemed necessary
- Prepare design criteria for the proposed milling operation
- Examine various mill throughput/operating schedule options
- Assess process options and recommend the preferred concept
- Prepare estimates of plant operating costs
- Prepare a scope of work that may be used by others to prepare estimates of capital expenditures
- Develop a Net Smelter Return model based on typical smelter schedules
- Prepare a report that will be subject to review by a major engineering firm.

2.0 Proposed Scope of work

This section of the proposal describes the scope of work to be performed by PT, based on Mr. Chapman's e-mail of Sunday, October 27 and discussions held on Friday, October 25 2002.

The work is described under the various headings and sub-headings that will ultimately be included in the written report.

2.1 Review and Summarize Metallurgical Testwork

Review Test Reports

Testwork has been conducted by Lakefield Research, Bethlehem Resources Corporation and Treminco Resources, the latter under direction by Mr. G. Hawthorne, P.Eng (GH) of Westcoast Mineral Testing. A list of the documents provided to PT is shown below.

Willa Project Metallurgical Test Data

Source	Title	Date
Lakefield Research	Progress Report No. 1	December 18 1985
Lakefield Research	Progress Report No. 2	April 16 1986
Lakefield Research	Progress Report No. 3	March 18 1987
Lakefield Research	Progress Report No. 4	December 11 1987
Westcoast Mineral Testing Inc.	Pilot Plant Operation	October 18 1988
Westcoast Mineral Testing Inc.	Letter to Treminco Resources Ltd.	December 19 1990
Bethlehem Resources	Attachment to letter (Test data)	September 16 1992

PT will conduct a detailed review of these reports and prepare a concise summary and interpretation of the test results.

Recommendations for Further Metallurgical Test Programs

PT will make recommendations for additional testwork, should such studies be deemed necessary. Justifications for any additional work will be clearly stated.

It is understood that no samples of mineralization are available for test purposes at this time.

Flowsheet Recommendations

The recommended flowsheet configuration will be presented, based on the results of test data to date. Every effort will be made to maximize use of process equipment within the existing Goldstream plant. It is expected that new equipment will be required to provide the following unit processes:

- Primary and fine crushing
- Gravity concentration (probable)
- Filtration and, possibly, concentrate drying
- Concentrate bagging (possible).

PT will work closely with Mr. Red Daley, Bethlehem Resources' ex: Mill Superintendent in this, and all other areas.

Prepare Preliminary Estimates of Metallurgical Performance

Preliminary estimates of metallurgical performance will be prepared, based on feed grades to be provided by OBR and available metallurgical test data.

Preliminary Plant Throughput Optimization

Various plant throughput rates will be considered with a view to maximizing the instantaneous production rate through the plant, using the existing principal items of process equipment. The results of these analyses will be discussed with OBR to determine if production rates are compatible with the proposed mine plan. Alternatively, increased production rates could result in abbreviated plant operating schedules, with attendant improvements in unit costs.

2.2 Preliminary Plant Design Criteria

Basic Process Design Criteria

A list of process design criteria will be prepared, based on the selected throughput rates, metallurgical considerations, the proposed flowsheet, the availability of process equipment and in-house data.

Preliminary Material Balance

A material balance will be developed. This information is a pre-requisite to the final selection and configuration of process equipment.

2.3 Plant Description

Ore Delivery and Receiving

The delivery of run-of-mine ore to the Goldstream site is beyond the scope of work proposed by PT. For this purpose, it is assumed that the ore will be delivered by trucks that can be dumped at a point yet to be determined, but in close proximity to the mill.

Crushing

The original Goldstream underground crushing facilities have been removed. Since a rod mill is to be used as the primary grinding stage, it will be necessary to reduce the size of run-of-mine ore to a nominal P₈₀ 13 mm.

A number of options could be considered by OBR, including, but not necessarily limited to:

- Restoration and rehabilitation of the underground facilities followed by the replacement of the original crushing and related equipment,
- The purchase and installation of a new crushing facility located on surface, and
- The use of a contractor to provide on-site crushing services.

The application of contract crushing services may be of economic interest, at least until the delineation of additional reserves has been achieved.

PT will review these, and possibly other options. Order-of magnitude capital and operating cost estimates will be used to perform trade-off studies, designed to select the crushing system best suited to the proposed operation. Budget quotations will be solicited from firms capable of providing the contract crushing services.

Grinding

The Goldstream grinding circuit could be the unit process that determines the maximum mill operating rate.

The Willa ore is hard, according to the three work index determinations reported by Mr. G. Hawthorne, P.Eng.. (Ref: *Progress Report #1, October 1987, Section 4.8, Page 5.*) The work index values, assumed to be expressed in metric terms, are 22.5 kWh/t and 21.7 kWh/t at 50 microns and 65 microns respectively.

The rod and ball mills at Goldstream are both 10 1/2' diameter x 13' long, each furnished with an 800HP motor. Power draws, according to Bethlehem Resources (Ref: *Goldstream Concentrator Design and Operation, Stuart McTavish, January 1985*) were 620HP and 770HP respectively for the rod and ball mills.

The final flotation feed size has yet to be determined. However, based on an assumed P₈₀ 60 microns, and subject to more detailed analysis, the grinding circuit should be capable of processing Willa ore at rates in excess of 700 tonnes per operating day.

PT will confirm these assumptions and determine realistic mill throughput rates. In conjunction with OBR, studies will be conducted to determine the optimum economic throughput rate, based on mine production capabilities, mill operating schedules and the like.

Gravity Concentration

Gravity concentration techniques have been applied in tests to recover up to 30% of the gold contained in the test feed. Results have been variable. PT will review these test data and assess the need for inclusion of gravity concentration provisions in the proposed circuit.

It is noted that gravity circuits can be expensive and the retrofitting of existing plants can be difficult. Nevertheless, these expenditures may be well justified, if improved gold recoveries can be assured.

Flotation Circuits

It is expected that adequate flotation equipment will exist in the Goldstream mill to effectively process Willa ore at the range of production rates envisaged.

PT will use the process design criteria, mass balance data and the existing flotation configurations to determine the most cost effective means by which equipment can be used to achieve the metallurgical goals in a safe and operator-friendly manner.

Regrind

PT will assess the need for regrinding, based on analysis of the metallurgical data. The mill houses two regrind mills; the copper mill (8' x 9', 250HP) and the zinc mill (5' x 8', 75HP).

Concentrate Dewatering

Adequate thickener capacity will be available to dewater the Willa concentrate. However, a new concentrate filter will be required, since the initial units have been removed. PT will consider the various options and recommend the unit(s) best suited for the proposed application. In addition, PT will assess the need, if any, for a concentrate dryer.

Concentrate Loadout and Shipping

PT will consider the merits of bulk-concentrate shipment and the delivery of bagged concentrate to the customer. Subject to more detailed analysis, it is unlikely that the Willa operation will produce more than 30 tonnes per day of final product. Should this be the case, and given the current bulk shipping trends (bulk ship holds generally take at least 4,000t), it may be preferable to ship concentrates in bags. While this alternative is more expensive, there could be considerable savings in working capital.

PT will conduct a brief trade-off study and make recommendations.

Concentrator Services

PT will assess the adequacy of existing plant services, including reagent mixing and distribution systems, to process Willa ore. No problems are envisaged.

Tailings Disposal

PT will review the pumping and piping systems available to deliver tailings to the impoundment facilities. PT will provide no opinion on the condition of the tailings impoundment facilities, or related environmental considerations.

2.4 Preliminary Plant Capital Cost Estimate

PT will prepare a scope of work of the various capital programs that will be required to facilitate the processing of Willa ore through the Goldstream plant. This scope of work will, subject to OBR' approval, be provided to Merit Consultants International Inc. to prepare the appropriate capital cost estimate. Mr. Jay Collins of Merit will be in contact with OBR in the near future to discuss details and commercial terms.

2.5 Preliminary Plant Operating Cost Estimate

PT will provide an estimate of the plant operating costs, divided into the cost centers shown below.

- Operating Labour
- Operating Supplies
- Repair Labour
- Repair Supplies
- Power Supply

The basis for the estimate will be clearly defined.

The operating labour costs will be derived from anticipated manpower requirements and current labour rates. The bulk of the operating costs will relate to crushing steel consumption, mill media and liner consumptions and reagent costs. Estimates of consumptions and unit supply prices will be used to determine these costs. Thereafter, allowances will be used, based on in-house data, to estimate the remaining costs.

Repair labour costs will be based on the maintenance crew requirements and current labour rates. Repair supply costs will be a factored cost estimate.

An estimate of the plant power supply costs will be based on the connected load, assumed service factors and current hydro tariff schedule.

2.6 Net Smelter Return Considerations

PT will prepare a net smelter return model in Microsoft Excel format. This model will be used to determine optimum economic grade/recovery relationships, to the extent that the metallurgical test data permits. In addition, the model will be used to examine operating schedule scenarios and concentrate shipment options.

2.7 "Battery Limits" and Exclusions From the Scope of Work

PT's scope of work will commence at the primary crusher and conclude at the tailings pond.

Within these battery limits, the following items are specifically excluded:

- The cost of one site visit, to be invoiced separately as requested.
- Capital cost estimates of proposed mill modifications
- An engineering assessment of the tailings impoundment facilities
- Permitting and environmental issues

3.0 Assumptions

The metallurgical projections, design criteria, flowsheet, mass balance and equipment selection are all based on the results of the limited metallurgical testwork to date. It is possible that additional ore characterization analyses, metallurgical work and mineralogical studies could result in improved metallurgical performance.

4.0 Engineering Services Schedule

The scope of work described can be completed within four weeks, following receipt of authorization to commence work.

5.0 Deliverables

PT will deliver four hard copies (4) of a final report to OBR. In addition, an electronic copy of the report will be provided to the Client.

The report will include a schematic flowsheet, prepared in Excel format. No site plans or revised plant layout drawings will be prepared, at this time.

6.0 Engineering Services Cost Estimate

PT will invoice OBR at an inclusive hourly rate of \$125 per hour, to a maximum of eight (8) hours per day. Travel time will be considered as hours worked. Out-of pocket expenses will be invoiced at cost. Invoices will be submitted on a monthly basis and payment is requested within thirty (30) days following invoice receipt.

An estimate of the man-hour requirements and total project cost is shown below.

Willa Project – Estimate of Engineering Man-Hours and Cost Estimate

No.	Activity	Man-hours
	Estimate of Fees	
1.0	Review and Summarize Metallurgical Testwork	
1.1	Review test reports	12
1.2	Recommendations for further metallurgical test programs, inc. in Activity 1.1	0
1.3	Flowsheet recommendations	1
1.4	Preliminary estimates of metallurgical performance	1
1.5	Preliminary plant throughput optimization	8
	Sub-total	22
2.0	Preliminary Design Criteria	
2.1	Basic process design criteria	2
2.2	Preliminary material balance	8
	Sub-total	10
3.0	Plant Design and Description	
3.1	Ore delivery and receiving	0
3.2	Crushing – consideration of options	12
3.3	Grinding – Time provided in Activity 1.5 above	0
3.4	Gravity concentration – assessment of need, ease of installation and cost	2
3.5	Flotation circuits – design of flotation circuit using existing equipment	6
3.6	Regrind – assessment of need, included in Items 1.2 and 3.5 above	
3.7	Concentrate dewatering – assess filter options, need for dryer o	2
3.8	Concentrate loadout and shipping – examine bagged vs. bulk shipments	2
3.9	Concentrator services – review reagent mixing, air, water availability	2
3.10	Tailings disposal – examine tailings disposal method.	1
	Sub-total	27
4.0	Preliminary Operating Cost Estimate	
4.1	Operating labour – Develop operating crew requirements, determine hourly rates etc	1
4.2	Operating supplies – Prepare estimates of consumption. Obtain reagent prices.	2
4.3	Repair labour - Develop operating crew requirements, determine hourly rates etc	1
4.4	Repair supplies – factored estimate	0
4.5	Power supply – Prepare load list, estimate energy requirements	4
	Sub-total	8
5.0	Prepare Net Smelter Return Model	4
6.0	Administration	
6.1	Report Preparation	16
6.2	Allowance for meetings	16
	Sub-total	32
	Total estimated hours	103
	Total estimated fees at \$125/hour	\$12,875
7.0	Estimate of Expenses	
7.1	Report preparation - allowance	200
7.2	Communications, courier expenses	200
	Sub-total expenses	400
	Total estimated assignment cost, excluding GST	\$13,275

The total cost of the assignment is estimated to be \$13,275.