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CURRAGH RESOURCES INC.

**ASSISTANCE WITH VARIOUS ASPECTS
OF MILL OPERATIONS AT FARO**

APRIL, 1990

Prepared By:

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KILBORN

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April 9, 1990

Mr. M. Pelley,
Executive Vice President - Mining
Curragh Resources Inc.
95 Wellington Street West
Suite 1900, Box 12
Toronto, Ontario
M5J 2N7

Reference: Proposal for Assistance in the Faro Mill

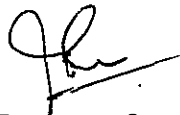
Dear Marvin:

Attached is our proposal for the provision of assistance in the Faro mill. The designated staff are available to commence work as soon as we receive your authorization.

If any questions arise please call either myself or John Wells.

Yours very truly,

KILBORN LIMITED



J.R. Goode, P.Eng.
Manager of Metallurgy

Attach.

cc: Richard Weymark
J.B. Mitchell
J. Wells

JRG/tm

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TABLE OF CONTENTS

<u>SECTION</u>	<u>DESCRIPTION</u>
1.0	INTRODUCTION
1.1	General
1.2	Minutes of Meeting, April 4, 1990
2.0	STATEMENT OF WORK AND METHODOLOGY
2.1	Primary Requirements, Objective and Methodology
2.2	Overall Co-ordination and Reporting
2.3	Schedule and Estimated Man-Hours per Task
3.0	PERSONNEL
3.1	Summary of Nominated Kilborn Personnel
3.2	Resumes

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1.0 INTRODUCTION

1.1 GENERAL

Kilborn carried out a Metallurgical Balance Audit at the Faro Mine in March, 1990 and the results of this were presented to Curragh Resources on April 4, 1990. Following a discussion of the report and its recommendations, Kilborn was requested to prepare a proposal to offer the mine certain assistance with the implementation of the recommendations and certain other specific metallurgical tasks. These are recorded in the minutes of the meeting and included here under Section 1.2.

The overall approach to the assignments is based upon the following key points:

(a) At the outset, it will be necessary to closely define with Mine Management and Curragh Resources personnel the precise details and methods of implementation of the tasks set out in Section 2.0 of this proposal.

(b) Kilborn's role is to assist the mine in achieving their metallurgical targets. This assistance must be provided in the most productive way and, in order to achieve this, we believe frequent meetings will be desirable on, or about, a monthly basis. Such meetings will be supported by written progress reports and clear statements of planned future work. Monthly goals will be set according to Faro Mine and Curragh Resources' requirements.

(c) The nature of the work is such that modifications or additions to the scope of work may be required from time to time. This proposal covers a time period to the end of 1990, following which any additional work or assistance can be redefined.

The Statement of Work section of this proposal provides a description of the basic requirements and objectives of the assignment, together with the methodology by which these objectives will be met.

Schedules and man-hours per task, which are an approximation at this time, are provided in Section 2.3 of this proposal.

1.2 MINUTES OF MEETING, APRIL 4TH, 1990

Subject: Metals Balance Audit of the Faro Mine, March 1990

Present: C. Frame - Curragh Resources
M. Pelley - Curragh Resources
J. Henry - Curragh Resources

J. Mitchell - Kilborn Limited
A. Williams - Kilborn Limited
J. Wells - Kilborn Limited

1. The report of the Metals Balance Audit, carried out by Kilborn in March 1990, was presented to Curragh. This audit concluded that the main contributors to the discrepancy between mine and mill head grades are:

- arbitrary adjustments to mill feed grades.
- sample bias and unreported losses to tailings.

In addition to the above, some relatively minor dilution of ore delivered to the mill was also observed and this also contributes to the discrepancy.

2. Following a discussion of the report and its recommendations the following action was requested of Kilborn.

To prepare a proposal for Curragh Resources that would provide the following assistance and services:

- a) To assist Curragh with the preparation of a metallurgical reporting system that properly reflects metal department. Discrepancies would be shown as unaccounted gains or losses. Kilborn to initiate and follow up the implementation system.
- b) To review the operation of the new column flotation cells, specifically to:
 - recommend best position of column cells in the overall mill flowsheet
 - assist Curragh in optimization of cell performance, both mechanically and metallurgically.
- c) As a result of the Metals Balance Audit it was recommended that the provision of adequate sumps in the mill and the prevention of losses of valuable material to tailings remain the top priority. Money for this has been approved.

Kilborn will provide the services of a person who will supervise the construction of these sumps, retaining walls and associated pumps and pipes.

- d) The person provided in c) will also carry out a maintenance audit of the mill.
- e) In September 1989, Kilborn prepared a list of improvements to the mill. This list will be reviewed with Curragh Resources and Mill Staff and updated and a new list of essential priority, items prepared. This list will bear in mind the current limitations to capital available for such expenditures.
- f) Kilborn will provide the services of a person to assist the Mill Manager, specifically to prevent spillage and the loss of such spillage to tailings. This person will also review the operation of the concentrate thickening and filtration sections.
- g) To assist Curragh with the planning of the metallurgical treatment of Vangorda ore. This assistance would initially entail a review of testwork on these ores and then specific recommendations as to its treatment.
- h) To provide assistance as and when required to the Curragh metallurgical department, but specifically in the short and medium term to audit the mill operation and mill metallurgical accounting on a quarterly basis.

The direction and coordination of Kilborn's assistance to Curragh Resources will be provided by the Kilborn Toronto office, under the direction of a Senior Metallurgist.

A proposal giving the names of specific personnel and their precise duties will be presented to Curragh Resources by 9th April, 1990.

Prepared By: J.A. Wells,
Senior Metallurgist

CURRAGH RESOURCES INC.

**ASSISTANCE WITH VARIOUS ASPECTS
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2.0 STATEMENT OF WORK AND METHODOLOGY

2.1 PRIMARY REQUIREMENTS, OBJECTIVES AND METHODOLOGY

The primary requirements and objectives of this assignment are listed in items 1.0 to 8.0. The methodology by which these objectives will be met is described in items 1.1 to 8.1:

1.0 METALLURGICAL REPORTING SYSTEM

1.1 Objective

To assist Curragh Resources with the preparation of a metallurgical reporting system that properly reflects metal department.

1.2 Methodology

To achieve this, a Kilborn metallurgist will review the current system with Curragh Resources and Mill staff and prepare a new system. This will be applied, tested and implemented for daily and monthly reports. Some follow-ups, checks and modifications will be carried out on an as-required basis.

1.3 Personnel

John Wells, Senior Metallurgist

2.0 FLOTATION COLUMN EVALUATION

2.1 Objective

To review the operation of the new column flotation cells, specifically to:

- Recommend best position of column cells in the overall mill flowsheet.
- Assist Curragh Resources in optimization of cell performance, both mechanically and metallurgically.

2.2 Methodology

A Kilborn metallurgist will spend between four and six weeks on site, working with the operator of the columns. The metallurgist will assess operation of the column and overall circuit metallurgy and conduct plant tests on an ongoing basis. In this, he will liaise closely with the Mill staff. At the end of this time, he will prepare a report with recommendations. The need for any follow-up work will be agreed as the assignment proceeds.

2.3 Personnel

Bob Fukuhara, Metallurgist and/or Dan Kivari, Metallurgist

3.0 SUMP CONSTRUCTION

3.1 Objective

To direct and supervise (or assist with supervision) the construction of the mill sumps, retaining walls and associated pumps and pipes to eliminate concentrate losses.

3.2 Methodology

The Kilborn engineer will report on a daily basis to the Metallurgical Manager and assist in the most efficient way to achieve a rapid and satisfactory conclusion to this critical project.

3.3 Personnel

Glen Peace, Senior Mechanical Engineer

4.0 MAINTENANCE AUDIT

4.1 Objective

A maintenance audit of the mill will look at the organization, personnel, systems, planning and performance, and develop an improvement plan.

4.2 Methodology

The audit will probably take between two and four weeks and will be made simultaneously with the task outlined in item 3.0 above. This will also generate valuable information for the updated list of improvements described in item 5.0 below.

4.3 Personnel

Glen Peace

5.0 GENERAL MILL IMPROVEMENTS

5.1 Objective

To review, with Curragh Resources and Mill staff the list of mill improvements prepared by Kilborn in September, 1989. This will be updated and a new (relatively short) list of essential, priority items prepared. Cost estimates will be prepared for individual items. Wherever possible, the financial benefits of each item (such as additional metal recovery) will be estimated.

5.2 Methodology

At an appropriate time, but probably after the maintenance audit, to itemize the priorities for mill improvements and to estimate costs and benefits. This will be done through consultation between Curragh Resources and Mill staff and the Kilborn team.

5.3 Personnel

Glen Peace, John Wells, Bob Fukuhara, Ted Barbor (or alternates)

6.0 SPILLAGE CONTROL

6.1 Objective

To provide the services of a person to assist the Mill Manager, specifically to prevent spillage and the loss of such spillage to tailings. This person will also review the operation of the concentrate thickening and filtration sections.

6.2 Methodology

This individual will be based at the mine under the direction of the Mill Manager. The duration of this part of the assignment is particularly difficult to define, but is unlikely to be less than six to eight weeks.

6.3 Personnel

Ted Barbor, alternatively Rudy Toffoli

7.0 METALLURGICAL PLANNING

7.1 Objective

To assist Curragh Resources with the planning of the metallurgical treatment of Vangorda ore.

7.2 Methodology

Kilborn Senior Metallurgists, who are already familiar with the Faro mill, will review the plans for the treatment of Vangorda ore and the results of laboratory test work and make appropriate comments. It is probable that some further input will be required during and after initial treatment of this ore.

7.3 Personnel

John Wells with Alan Williams

8.0 ON-GOING MILL AUDIT

8.1 Objective

To provide assistance as and when required to the Curragh Resources metallurgical department but, specifically, to audit the mill operation and mill metallurgical accounting on a quarterly basis.

8.2 Methodology

The Senior Metallurgist will visit the mine on approximately a quarterly basis through 1990 to review ongoing assignment/metallurgical results and accounting. A brief progress report will be prepared after each visit.

8.3 Personnel

John Wells

The above statement of work is based upon the minutes of the meeting of April 4, 1990. It is, of course, liable to modification at the outset or during the period of the assignment, depending upon the needs and objectives of Curragh Resources Head Office and Mine Management.

2.2 OVERALL CO-ORDINATION AND REPORTING

The overall direction and co-ordination of this assignment will be provided by the Kilborn Toronto office, under the direction of the John Wells. In addition to organizing and co-ordinating the efforts of the proposed Kilborn personnel and carrying out some of the metallurgical tasks, John will prepare a monthly summary report. This report will describe the work completed and the time spent on the assignment by the team. The report will also update the schedule and timing of remaining tasks.

2.3 SCHEDULE AND ESTIMATED MAN-HOURS PER TASK

The preliminary schedule is shown in Figure 1, attached. The man-hours per task are approximately estimated at this time to be:

1.	Metallurgical Reporting System	60	hours
2.	Column Cell Assessment and Optimization	160	hours
3.	Sump Construction	}	320 hours
4.	Maintenance Audit		
5.	Review, Update and Cost Mill Priorities	80	hours
6.	Assistance with Operation (Prevention of Spillage)	240	hours
7.	Assistance with Planning of Vangorda Ore	100	hours
8.	Regular Audit of Mill Operation and Metallurgical Balance	40	hours each quarter

KILBORN MANAGEMENT SYSTEMS
 CERRACH RESOURCES INC.
 ASSISTANCE WITH METALLURGICAL OPERATIONS

LEGEND
 EARLIEST START []
 EARLIEST FINISH []
 LATEST FINISH []
 DURATION PROGRESS []
 MILESTONE ○

