

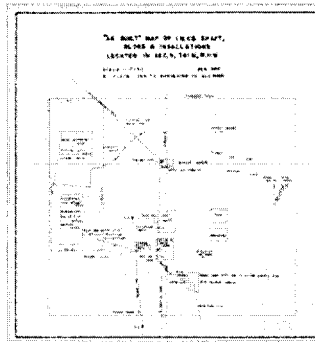
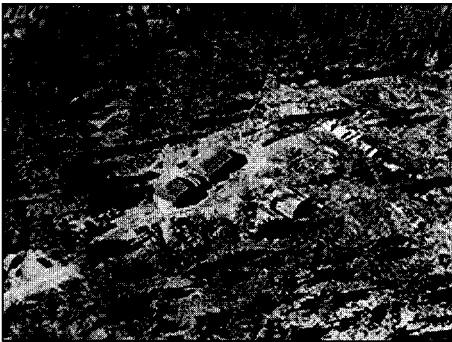
Prepared for:

Twin Metals Minnesota, LLC.



**Bulk Sample Program  
INCO Shaft Access Design Report**

**Final**



Prepared by:

**Cementation USA Inc.**  
10150 Centennial Parkway, Suite 110  
Sandy, Utah 84070  
P: (801) 937-4120 • F: (801) 679-4005



June 28, 2013

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## 1.0 INTRODUCTION

Cementation USA Inc. (Cementation) was contracted by Twin Metals Minnesota, LLC. (Twin Metals Minnesota) to evaluate concepts to collect a 1,000 ton bulk sample from the Maturi Cu-Ni-PGM deposit, which is located in Northern Minnesota. Concepts evaluated included:

- Decline Access – The decline and associated infrastructure would be contained within the State land boundaries. The bulk sample would be extracted from resources fully contained within State mineral boundaries.
- New Shaft Access – The shaft and associated infrastructure would be contained within the State land boundaries. The bulk sample would be extracted from resources fully contained within State mineral boundaries.
- INCO Shaft Access – The existing shaft and associated underground infrastructure are located on Federal land holdings. The bulk sample will be extracted from resources fully contained within Federal mineral boundaries.

Twin Metals Minnesota determined to pursue the INCO Shaft Access concept. Accordingly, this report describes the Surface and Underground Facilities, Equipment, Operational Requirements, and Schedule for the existing INCO Shaft Access concept. The intent is to provide key information to support the U.S. BLM Plan of Operations, and the associated Environmental Assessment Worksheet (EAW) and permitting for the bulk sampling program.

## 2.0 CRITERIA

Key criteria associated with the bulk sample program follow.

- Obtain a 1,000 t bulk sample as soon as possible (and in a cost effective manner) for pilot plant testing.
- Minimize environmental impact (e.g., surface disturbance, air quality, noise, surface water, groundwater, dust/emissions).
- All access facilities are intended to facilitate collecting the bulk sample. Longer term use is outside the scope of this study.
- All deliverables are to be presented using customary US units.

Additional criteria and design parameters are presented elsewhere in this report.

## 3.0 EXISTING INCO SHAFT ACCESS

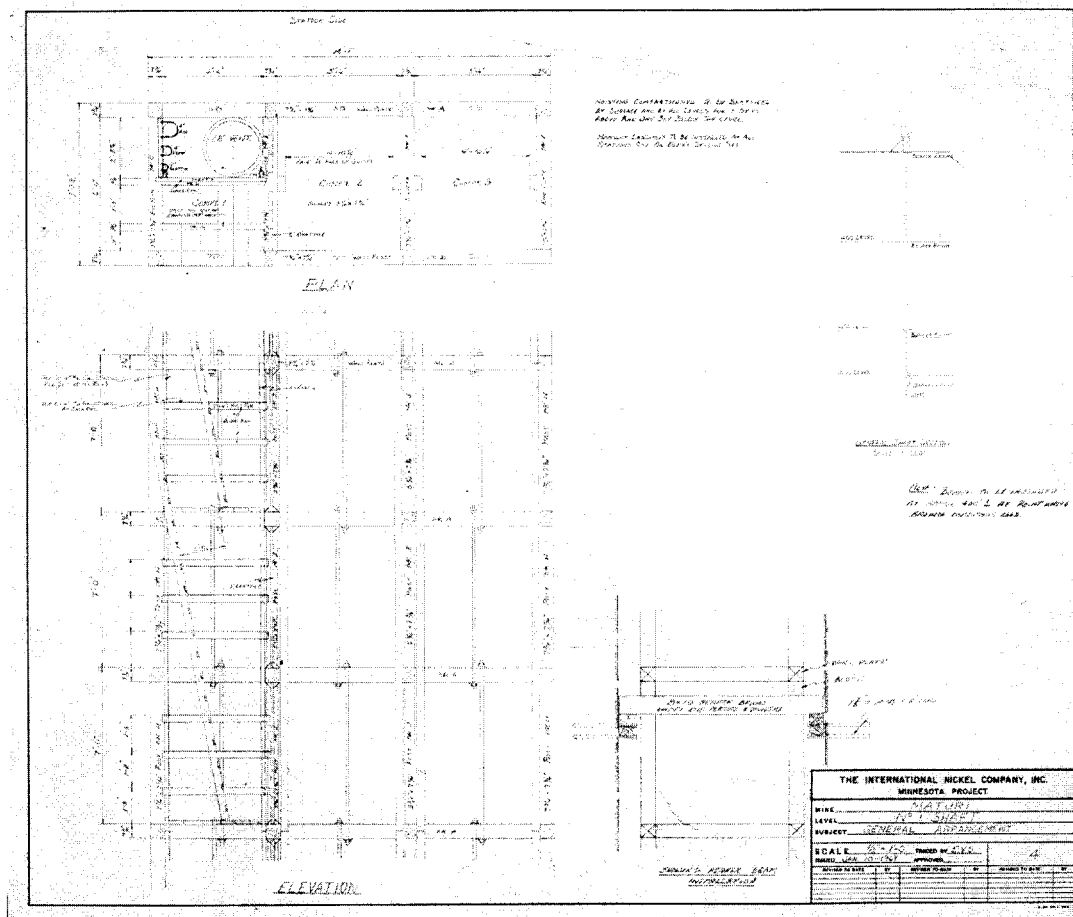
The following sections describe the proposed shaft configuration for reuse of the existing INCO Shaft, previously identified as the Maturi No. 1 Shaft, for access underground, the main activities associated with engineering, mobilizing and rehabilitating the existing

shaft access, followed by the proposed methodology for accessing and excavating the bulk sample.

### 3.1 Shaft Configuration

In the 1950's and 1960's, the International Nickel Company (INCO), with headquarters in New York, NY, USA and nickel mining operations in Canada, began exploration of the Maturi deposit in northern Minnesota. In 1967/1968, a three-compartment timbered shaft nominally excavated 10 ft wide x 20 ft long (Figures 1 and 2) was sunk by Cementation Company of America Inc. (a distant predecessor to Cementation USA Inc.) to a depth of 1,095 ft to gain access for bulk sampling. The shaft has been capped since around 1970 and is flooded to within 14 ft below ground surface.

Figure 1: INCO Shaft Drawing



In December 2011, URS Corporation (URS) conducted an investigation of water quality in the INCO shaft on behalf of TMM. URS Corporation (URS). 2013. *INCO Shaft Investigation Report*. Prepared for Twin Metals Minnesota LLC. June. The report

documents the field investigation, data collection, and analysis activities performed by URS to collect general physical characteristics and conditions of the INCO Shaft and to evaluate water quality.

URS investigated the Maturi shaft by videography and found no visible blockages or rock falls in the shaft and it appears to be accessible to a depth of 1,084 ft. This is 11 ft short of the reported shaft depth. The shorter shaft depth is likely due to rock spillage from earlier hoisting activities and debris that has fallen down the shaft overtime. URS reports the water is neutral pH and that shaft timbers appear to be preserved after being submerged shortly after the shaft was abandoned.

**Figure 2: 3D of INCO Shaft 3 Compartment Timbers**

