

**Annual ALARA Audit**

**For 2012**

**PATHFINDER MINES CORPORATION**

**Shirley Basin Mine**

**Source Material License SUA-442**

**Prepared By**

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**August 22, 2013**

## A. Introduction

An annual ALARA audit of the radiation safety program at the Shirley Basin Mine was conducted August 22, 2013. The audit was conducted in fulfillment of condition 36 of the license. The audit entailed a review of 2012 radiation safety records and an evaluation of conformance with requirements of the license.

## B. Personnel Dose Records

No doses were assigned during 2012. The mill has been decommissioned, and the tailings area has been reclaimed for a number of years now, eliminating most sources of personnel exposure at the site. The remaining un-reclaimed portion of the tailings area consists of approximately 25 acres in the Pond 3 basin dedicated to the licensed disposal of byproduct waste materials from ISL licensees. This disposal activity has been ongoing for over sixteen years, and the historical exposure/dose records for the site have demonstrated very low exposure potential due to the manner in which the incoming wastes are handled.

There continues to be only one worker on site on a part time basis, working as a contractor. The only other employee, the general manager who also functions as radiation safety officer (RSO), visits the site periodically. The lack of recent exposure records is consistent with the requirements of 10 CFR 20.1502 since individual exposure monitoring is required if the external exposure is greater than 500 mrem, or if the internal exposure is greater than ten percent of the applicable ALIs from Appendix B to 10 CFR 20. Individual TLD monitoring had indicated zero external dose for over ten years prior to 2008, and the highest recorded average individual annual ALI for the previous nine years was 0.7 uCi Rn222 with daughters, well below the 10 uCi threshold for monitoring. Other previously monitored radionuclides such as Unat and Ra226 measured zero or near-zero intake for years prior to 2008.

## C. Bioassays

No bioassay samples were taken in 2012. The NRC license does not require routine urinalyses, and no measurable intakes were indicated for bioassays done prior to 2008 for a number of years.

## D. Inspections

There were no inspections by the NRC during 2012

## E. Radiological Surveys and Sampling Data

Surveys of equipment (primarily ISL waste delivery trucks) prior to release from the restricted area are well documented with no problems apparent. Typical surface alpha and gamma levels were at or near background levels. Besides ISL

waste delivery trucks, various items, namely personal vehicles, were also released with documented surveys demonstrating that residual surface alpha and gamma levels were well below release limits. The truck drivers routinely monitored themselves for alpha contamination prior to leaving the property. No other radiological surveys or sampling were done in 2012, consistent with the site status. During 2012 a total of 10 truckloads of ISL byproduct waste was received at the Shirley Basin Site.

F. Equipment Used for Exposure Control

Overall, the radiation safety instrumentation program is in order. A review was made to determine that all instruments were in appropriate calibration and usable status. One instrument, an alpha meter used for personnel monitoring required repair of a cable and connector, (causing a short in the instrument), and is now back in service. All instruments were calibrated when used, and check sources were always utilized to confirm instrument function prior to use. For better redundancy an additional alpha meter will be purchased in 2013.

G. Reports on Overexposures

There were no overexposures during 2012.

H. Standard Operating Procedures Review

The records with the SOPs documented the required annual review of all active SOPs by the RSO.

K. Radiation Work Permits

There were no radiation work permits (RWP) issued during 2012.

L. Recommendations on Ways to Further Reduce Personnel Exposures

- Continue to emphasize good housekeeping and personal hygiene practices as a means to avoid contamination problems, particularly in conjunction with ISL waste shipments delivery.
- Continue to conduct bi-monthly safety meetings.
- Insure that the form documenting equipment/ISL waste delivery truck release surveys is carefully completed, including the notation of calibration due dates for the instruments used for the surveys. Continue careful attention to calibration due dates for survey instrumentation.
- One change implemented during 2011 was the contamination monitoring of mobile vehicles normally done quarterly is now accomplished each time a vehicle is used inside the by-product disposal area. This is related to the low level of activity on the site occasionally without such activity within a calendar

quarter. No contamination has been observed consistent with previous results.

**M. Concluding Comment**

During 2012 radiation doses were likely at background levels with only one part time contractor on site to handle the ISL waste shipments delivery and disposal. The radiation safety program at Shirley Basin conforms with the requirements of the license and is appropriate for the kind and level of activity at the site.

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