

# Annual ALARA Audit For 2014-2015 PATHFINDER MINES CORPORATION Shirley Basin Mine Source Material License SUA-442

November 1, 2015

## **A. Introduction**

An annual ALARA audit of the radiation safety program at the Shirley Basin site was conducted the week of October 12, 2015 by Bill Kearney, Radiation Protection Specialist. The audit was conducted in fulfillment of License Condition 36 of NRC License Number SUA-442. The last audit was completed on November 20, 2014 by John Cash, President (Pathfinder). This audit covers the period November 14, 2014 through October 15, 2015. The audit entailed a review of the radiation safety records and an evaluation of conformance with requirements of the license for this period. The audit also included a site visit on October 13, 2015.

## **B. Review of By-Product Material Shipping and Disposal Records**

A total of 122 truckloads of ISL byproduct waste were received at the Shirley Basin Site during the period November 21, 2014 and October 15, 2015. A spot check of the shipping and disposal manifest records showed them to be complete (all required forms filed) although the following recommendations from the 2014 audit still need to be fully addressed:

1. It appears that Uranium One is using an outdated Exhibit A (dated 4/28/94). The current form should be forwarded to Uranium One for future use.
2. The "Estimated Arrival Time" was not included on a couple of forms (Uranium One shipment of 10/15/14 and the Lost Creek shipment of 10/08/2014). Shippers should be reminded to fill these in or if this information is not required the form should be revised such that this requirement is removed.
3. The "Release Survey" form used by Pathfinder Mines Corporation should have the release limits included on it for alpha and gamma. It is recommended that "Beta/Gamma" be replaced with just "Gamma". The SOP should be revised accordingly.

## **C. Personnel Dose Records**

No doses were assigned during the period. 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. Depending on the particular

time this worker was a contractor or UR Energy (Pathfinder) employee. Over the period, the site Radiation Safety Program has been overseen by the Radiation Safety Officers (RSO's), from UR Energy (Pathfinder Mines Corporation). The RSO's visited the site periodically when disposal activities were occurring. 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 10% of the applicable ALIs from Appendix B to 10 CFR 20. Historic 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 Rn 222 with daughters, well below the 10 uCi threshold that requires monitoring. Other previously monitored radionuclides such as Unat and Ra 226 measured zero or near-zero intake for years prior to 2008.

#### **D. Bioassays**

No bioassay samples were taken during the period. 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.

#### **E. Inspections**

During the period there were no NRC inspections.

#### **F. Radiological Surveys and Sampling Data**

Surveys of equipment (primarily ISL waste *delivery* trucks) prior to release from the restricted area were reviewed. They were found to be well documented with and no significant concerns were noted. 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 are routinely monitored by Ken Hurley for alpha contamination prior to leaving the property. No other radiological surveys or sampling were done during the period, consistent with the site status.

#### **G. 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. Calibration records for all instruments (four) were reviewed and they were determined to be current.

#### **H. Reports on Overexposures**

There were no overexposures during the period.

#### **I. Standard Operating Procedures Review**

The records with the SOPs documented that the required annual review of all active SOPs by the RSO was completed twice during the period (February 6, 2013 and April 1, 2014).

## **J. Radiation Work Permits**

There were no radiation work permits (RWP's) issued during the period.

## **K. Annual Land Use Survey**

In accordance with License Condition 21 the Annual Land Use Survey records show that the survey was completed on August 12, 2015.

## **L. Field Audit**

On October 13, 2015 Bill Kearney, Radiation Safety Specialist met Ken Hurley, Site Contractor, at the site to observe the disposition of a shipment of 11E2 By-Product Material at the disposal site and review applicable NRC License SUA- 442 requirements such as radiation monitoring equipment and calibrations, and records that pertain to the shipment. The weather was clear and warm (60 degrees F). The shipment arrived at 0800 from Crow Butte Resources (Shipment No W-3-15). Ken Hurley reviewed the accompanying paperwork and the lab data to ensure the material met disposal site requirements (TCLP limits). The truck and roll off container was directed to the disposal site by Ken Hurley.

It was observed that there were two trenches open and they were more than 100 feet from the dam. The west trench was approximately 12 feet deep and 40 feet long. The east trench was approximately 12 feet deep and 75 feet long. The cover was removed from the container and the material was dumped into the east trench. It was observed that the material predominantly consisted of 7-10 super sacks of soil and trash, electric motors/pumps and downhole wire. No drums were evident, nor was there any wet material observed. The roll off container was fitted with a plastic liner that resulted in the container being very clean after it was dumped. There was no concern with voids in the material after it was dumped. Ken Hurley will use the track hoe to cover the material within 30 days.

After replacing the cover on the roll off container Ken Hurley completed a comprehensive alpha survey and beta/gamma survey of the roll off container, trailer and truck. No significant radioactivity was determined. The results of the surveys were documented on the appropriate form. B. Kearney checked the last calibration date of each instrument utilized. The results follow:

Ludlum Alpha Meter #242319- Last calibration December 19, 2014

Ludlum Beta/Gamma Meter # 2533- Last calibration July 28, 2015

Ludlum Alpha Meter #488- Last calibration September 12, 2015

Both the instruments met the requirements of License Condition 34 which requires that instrument calibrations must be completed on an annual basis.

At approximately 1000 Ken Hurley made all the required copies of the paperwork for Pathfinder and the driver, including the survey form for the return shipment of the empty roll off container. No concerns were noted.



Minor recommendations from the field audit are included in Section M (Nos. 1-3).

1. A copy of NRC License No. SUA-442 should be at the site or in possession of Ken Hurley when he goes to the site.
2. A copy of the appropriate SOPs should be at the site or in possession of Ken Hurley when he goes to the site.
3. When recording the personal alpha survey results the time should be included with the date for the survey.

**M. Recommendations on Ways Maintain Compliance with the NRC License and Further Reduce Personnel Exposures**

1. A copy of NRC License No. SUA-442 should be at the site or in possession of Ken Hurley (or other contractor) when he goes to the site.
2. A copy of the appropriate SOPs should be at the site or in possession of Ken Hurley (or other contractor) when he goes to the site.
3. When recording the personal alpha survey results the time should be included with the date for the survey.
4. Continue to emphasize good housekeeping and personal hygiene practices as a means to avoid contamination problems, particularly in conjunction with ISL waste shipments delivery and dumping into the disposal cell.
5. Continue to conduct bi-monthly safety meetings during times of operation.
6. Continue careful attention to calibration due dates for survey instrumentation.

**N. Summary/Conclusions**

During period radiation doses were likely at background levels with only one part time contractor and/or company employee on site to handle the limited ISL waste shipment deliveries and disposal operations. In summary, the radiation safety program at Shirley Basin conforms to the requirements of NRC License Number SUA-442 and it is appropriate for the kind and level of activity at the site.

  
Bill Kearney

Radiation Protection Specialist