

**EVENT RATING FORM (ERF)**

Event No.: 44986

Sent Date:

| <b>THE INTERNATIONAL NUCLEAR EVENT SCALE (INES)</b>  |                                     |                    |                          |   |                          |                                     |                          |                              |                          |                          |                          |                                     |                                     |                                     |                          |
|--|-------------------------------------|--------------------|--------------------------|---|--------------------------|-------------------------------------|--------------------------|------------------------------|--------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|-------------------------------------|--------------------------|
| <b>EVENT TITLE</b> Worker Overexposure   |                                     |                    |                          |   |                          |                                     |                          | <b>EVENT DATE</b> 2009.02.03 |                          |                          |                          |                                     |                                     |                                     |                          |
| <b>RATING</b>  |                                     | <b>RATING DATE</b> | <b>OUT OF SCALE</b>      | <b>DEVIATION</b>  | <b>INCIDENT</b>          |                                     |                          | <b>ACCIDENT</b>              |                          |                          |                          | <b>FACILITY TYPE</b>                |                                     |                                     |                          |
| PROVISIONAL  | <input type="checkbox"/>            | 2009.07.01         | <input type="checkbox"/> | 0   | 1                        | 2                                   | 3                        | 4                            | 5                        | 6                        | 7                        | Power Reactor                       | <input type="checkbox"/>            | Research Reactor                    | <input type="checkbox"/> |
| FINAL  | <input checked="" type="checkbox"/> |                    |                          | <input type="checkbox"/>                                    | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>     | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | RadWaste Facility                   | <input checked="" type="checkbox"/> | Radiation Source         |
| <b>COUNTRY</b><br>United States of America   |                                     |                    |                          | <b>FACILITY NAME / PLACE</b><br>Perma-Fix, NW, Richland, WA |                          |                                     |                          |                              |                          |                          |                          | Irradiation                         | <input type="checkbox"/>            | Transportation                      | <input type="checkbox"/> |
|  |                                     |                    |                          |   |                          |                                     |                          |                              |                          |                          |                          | Fuel Fabrication                    | <input type="checkbox"/>            | Fuel Reprocessing                   | <input type="checkbox"/> |
|  |                                     |                    |                          |   |                          |                                     |                          |                              |                          |                          |                          | Research Facility                   | <input type="checkbox"/>            | Mining/Milling                      | <input type="checkbox"/> |
|  |                                     |                    |                          |   |                          |                                     |                          |                              |                          |                          |                          | Enrichment Facility                 | <input type="checkbox"/>            | Other                               | <input type="checkbox"/> |
|  |                                     |                    |                          |   |                          |                                     |                          |                              |                          |                          |                          | <b>YES</b>                          | <b>NO</b>                           |                                     |                          |
| <b>Off-site impact</b>   |                                     |                    |                          |   |                          |                                     |                          |                              |                          |                          |                          |                                     |                                     |                                     |                          |
| Release Beyond Authorised Limits   |                                     |                    |                          |   |                          |                                     |                          |                              |                          |                          |                          | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |                                     |                          |
| Overexposure of Members of Public  |                                     |                    |                          |   |                          |                                     |                          |                              |                          |                          |                          | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |                                     |                          |
| <b>On-Site Impact</b>  |                                     |                    |                          |   |                          |                                     |                          |                              |                          |                          |                          |                                     |                                     |                                     |                          |
| Contamination Spread   |                                     |                    |                          |   |                          |                                     |                          |                              |                          |                          |                          | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |                                     |                          |
| Worker Overexposure  |                                     |                    |                          |   |                          |                                     |                          |                              |                          |                          |                          | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |                                     |                          |
| Damage to Radiological Barriers  |                                     |                    |                          |   |                          |                                     |                          |                              |                          |                          |                          | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |                                     |                          |
| Degradation of Defence In-depth  |                                     |                    |                          |   |                          |                                     |                          |                              |                          |                          |                          | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |                                     |                          |
| Person Injured Physically or Casualty  |                                     |                    |                          |   |                          |                                     |                          |                              |                          |                          |                          | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |                                     |                          |
| Is There a Continuing Problem  |                                     |                    |                          |   |                          |                                     |                          |                              |                          |                          |                          | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |                                     |                          |
| Press Release Issued (if yes, please attach)   |                                     |                    |                          |   |                          |                                     |                          |                              |                          |                          |                          | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |                                     |                          |
| <b>Event Description</b>   |                                     |                    |                          |   |                          |                                     |                          |                              |                          |                          |                          |                                     |                                     |                                     |                          |
| <i>Note: the below updates the initial report language in its entirety.</i>  |                                     |                    |                          |   |                          |                                     |                          |                              |                          |                          |                          |                                     |                                     |                                     |                          |
| <p>On February 12, 2009, the licensee employee was sent for a lung count at the Battelle (Pacific Northwest National Laboratory) for a bioassay measurement of the lung. The licensee employer ordered the lung bioassay because airborne contamination levels exceeded action levels. The employee's first lung count detected an average of approximately 14.8 Bq (0.4 nCi) of Am-241. Assuming the exposure was from 10 days prior (based on post exposure investigation findings), the intake was approximately 70 Bq (1.9 nCi) Am-241. In the U.S., the annual limit on intake for Am-241 is 222 Bq (6 nCi) (1 micron Activity Median Aerodynamic Diameter particle size). The estimated dose was about 1/3 of the annual limit, or 0.16 Sv (16 rem) Committed Dose Equivalent, which exceeded the statutory annual limit of 0.5 Sv (50 rem). The worker had previous whole body exposure, but this added amount did not cause the statutory limit to be exceeded.</p> <p>On March 25, 2009 the licensee employer informed the Washington State Department of Health that further testing by Battelle necessitated a revision to the original calculated dose and the new calculated dose would exceed the 0.5 Sv (50 rem) Committed Dose Equivalent limit. The licensee employer assumed that the date of exposure was February 3, 2009, Fecal bioassay results from one other employee who was also in the containment showed a small amount of activity, and a dose was assigned to this second worker that did not exceed regulatory limits. The second employee's lung bioassay was less than detection limits.</p> <p>On June 22, 2009 the licensee informed the Washington State Department of Health that the Committed Effective Dose Equivalent for the employee was 68 mSv (6.8 rem) and the Committed Dose Equivalent was 1.2 Sv (120 rem) to the bone surface. The employee's Deep Dose Equivalent from his dosimetry for the first quarter of 2009 was 0.3mSv (30 mrem). Intake was calculated using methodology of ICRP 30, modified for clearance function. Intake for Am-241 was calculated from lung deposition and calculated clearance rates. Intake of Plutonium (Pu) was inferred from excreta bioassay results and assumed ratios of Am-241 to Pu. Dose was calculated using CINDY code version 1.2. The particle size was considered, and a 1 micron Activity Median Aerodynamic Diameter was chosen as the most appropriate particle size.</p> |                                     |                    |                          |   |                          |                                     |                          |                              |                          |                          |                          |                                     |                                     |                                     |                          |

This form is provided by the **IAEA INES Coordinator**: Rejane Spiegelberg Planer,  
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**NOTE:** This form *should not* be used for sending information to the IAEA about an actual event!  
 For this purpose the Nuclear Events Web-based System (<http://www-news.iaea.org>) should be used instead.

## EVENT RATING FORM (ERF)

The exact cause of the incident is unknown, but the assumed cause is a failure of the respiratory protection system.

The licensee's corrective actions to prevent recurrence include: testing each worker with a challenge gas prior to high risk work; implementing increased engineering controls to mitigate airborne contaminants; providing specific training using phosphorescent powder and black lights for workers; performing more frequent bioassay samples; inclusion of nasal smears for immediate detection of intakes; the use of supplied air respirators for high risk work, and training for workers, managers and health physics staff. Work was resumed in the area, and no further exposures have occurred.

### Rating Justification and Difficulties Encountered

(quote relevant user manual paragraphs)

The final rating for this event is Level 2.

A Level 2 is warranted for exposure of a worker in excess of the statutory annual limits. See the INES User's Manual 2008 Edition (IAEA-INES-2009), Section 2.3.1, at [http://www-pub.iaea.org/MTCD/publications/PDF/INES-2009\\_web.pdf](http://www-pub.iaea.org/MTCD/publications/PDF/INES-2009_web.pdf)

### Contact Person for Further Information

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|--|--|--|
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