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Laboratory-wide Procedure

Response to Abnormal Radiological Situations

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1. PURPOSE

This procedure provides guidance for responding to and mitigating the effects of abnormal radiological situations. It covers initial response to abnormal radiological situations including criticality monitor alarm, continuous air monitor (CAM) alarm, radiation area monitor (RAM) alarm, stack monitor alarm, and electronic dosimeter alarm.

This procedure also contains guidance for responding to radiological spills, radiological casualties, radiological fires, and personnel and/or equipment off-site suspected of radiological contamination.

2. APPLICABILITY

This procedure applies to individuals that may be involved in an abnormal radiological event, Radiological Control personnel who respond to abnormal events and those individuals who provide re-entry and recovery actions during the event. It also applies to line management and outlines their responsibilities in the event of an abnormal radiological situation. Response to a personnel contamination monitor (PCM) alarm is outlined in LWP-15010, "Personnel Radiological Survey."

3. ALL EMPLOYEE KEY ACTIONS

Key Actions	Section	Tools
Activating Emergency Response Organizations	Step 4.1	NA
Responding to an Accidental Criticality	Step 4.2	NA
Responding to a CAM Alarm	Step 4.3	NA
Responding to a RAM Alarm	Step 4.4	NA
Responding to a Suspected Intake	Step 4.5	NA
Responding to a Stack Monitor Alarm	Step 4.6	NA
Responding to an Electronic Dosimeter Integrated Dose Alarm	Step 4.7	NA
Responding to a Electronic Dosimeter Dose Rate Alarm	Step 4.8	NA
Responding to an Electronic Dose Rate Failure and/or Undetermined Alarm	Step 4.9	NA
Responding to Radiological Spills	Step 4.10	NA
Responding to Radiological Casualty	Step 4.11	NA
Responding to Fires	Step 4.12	NA
Responding to Personnel and/or Equipment Off-Site Suspected of Being Radiologically Contaminated	Step 4.13	NA

4. INSTRUCTIONS

NOTE: *Surveys in facilities that contain tritium or transuranic isotopes may require survey techniques that are specifically adapted to those isotopes.*

4.1 Activating Emergency Response Organizations

4.1.1 Affected Personnel: Activate facility emergency response organizations or Emergency Operations Center (EOC) by contacting the Warning Communications Center (WCC) at 526-1515 when an event with serious consequences is identified.

4.1.2 Facility Management: Control ventilation systems, valves, controls, and switches in the event of an emergency.

4.1.3 Exercise caution to ensure that Technical Specifications, Operational Safety Requirements, or other operational procedures are not violated if the following are changed:

- Ventilation systems
- Equipment such as valves, controls, and switches.

4.1.4 Ensure provisions are in place to accommodate rapid radiological area access by onsite and offsite emergency workers such as firefighters, medical personnel, and security personnel.

4.1.5 Emergency Response Personnel from onsite and offsite locations: Provide emergency response support when responding to an event.

4.1.6 Emergency Response Management: Prior to responding to an event, train and brief each individual who will be authorized to perform emergency actions in the known or anticipated hazards to which the individual will be subjected; response is likely to result in occupational doses exceeding limits established in LRD-15001, "INL Radiological Control Manual," (Table 2-1) and 10 CFR 835.1302(d).

4.1.6.1 Develop response training on DOE radiological worker core course and site-specific training materials.

4.1.6.2 If such workers are not trained, trained escorts will be assigned.

4.1.6.3 Confirm that lifesaving has priority over radiological controls.

4.1.6.4 Maintain training records.

4.1.7 Ensure each individual authorized to perform emergency actions likely to result from a radiological occurrence shall receive counseling and risk communication per MCP-1, "Radiation Risk Counseling and Special Dose Control Level," as applicable.

4.2 Responding to Accidental Criticality

NOTE: *Some personnel protective equipment (PPE), such as airline respiratory equipment, must be partially doffed in order to evacuate an area. The amount of PPE removed should be minimized to reduce the time in the area and reduce any radiation dose to as low as reasonably achievable (ALARA).*

4.2.1 Affected Personnel: Immediately evacuate the area, without stopping to remove protective clothing or perform exit monitoring.

4.2.2 Report to designated assembly area.

4.2.3 To minimize contamination, segregate personnel wearing PPE from others.

4.2.4 Radiological Control Personnel: Provide on-scene support for an accidental criticality to screen personnel for possible exposure to high neutron fluxes.

4.2.5 Initiate Form 441.86, "Accidental Criticality Personnel Information Form," utilizing the checklist for actions to take. Document applicable information as each subsequent step/section is completed.Survey and sort individuals by completing the following steps:

NOTE: *The method can give inaccurate results when the subject is contaminated with radioactivity. The induced activity may mimic contamination, but the activation readings will not be significantly reduced on a closed window reading whereas the contamination readings will be reduced.*

4.2.5.1 Obtain exposure rates (mrad/hr) due to activation of the body by positioning the probe of a closed side-window Geiger Mueller (GM)-type portable radiation survey instrument under the left arm pit and flat against the side of the chest.

4.2.5.2 Document exposure rate (mrad/hr) for body on Form 441.86.

4.2.5.3 Document the date and time the measurement was taken for the exposure rate (mrad/hr) for the body on Form 441.86.

NOTE: *Some optically stimulated luminescent (OSL) dosimeters used at the INL have a CR-39 element. The CR-39 element has the capability to measure neutron dose, but it does not become activated in the event of a criticality. The personal nuclear accident dosimeter (PNAD) is a separate dosimeter that will become activated in the event of a criticality.*

4.2.5.4 Use the same GM-type portable radiation survey instrument to measure the closed window exposure rate from the PNAD. Align the probe lengthwise, and in contact with the PNAD, covering both sets of activation foils.

4.2.5.5 Document PNAD exposure rate (mrad/hr) on Form 441.86.

4.2.5.6 Document date and time the PNAD exposure rate (mrad/hr) measurement was taken on Form 441.86.

4.2.5.7 If the PNAD reading for any individual is >0.2 mR/hr above background or whose body is >0.05 mR/hr above background, collect the PNAD and OSL, bag, label, and send for processing.

4.2.5.7.1 Restrict individual from further radiation work until PNAD and OSL readout is completed.

4.2.5.7.2 Send restricted individual to Medical for possible blood and hair sampling and notify the Warning Communications Center (WCC) 526-1515.

NOTE: *PNADs are not issued or tracked for any one individual; therefore, it is vital the PNAD and OSL are not separated.*

4.2.5.8 If an increase above background for an individual's PNAD or body is detectable but less than the values in Step 4.2.6.7, collect the PNAD and OSL, bag, label, then send for processing. Restrict individual from radiation work until a dose evaluation is complete.

4.2.5.9 Notify Facility Radiological Control Management.

4.2.5.10 Record as much detail about the event as possible (location of event, position of personnel during exposure, length of exposure, and time of event) on Form 441.86.

4.2.5.11 Provide a copy of Form 441.86 with the information recorded during the screening of personnel to the Health Physics Dosimetry Laboratory (HPDL) by FAX at 526-7020. Include copies of any additional information noted or requested. Provide copy to emergency response and management personnel.

NOTE: *The following can be used to perform a quick neutron dose field estimate. HPDL has the ultimate responsibility for calculating actual dose received using LI-15013, "Dose Analysis and Reporting of Nuclear Accident Dosimeters."*

4.2.6 Radiological Control Management: If a quick neutron dose field estimate is desired, then direct the Radiological Engineer/HPT/RCT to perform filed estimate in accordance with section 4.2.8.

4.2.7 Radiological Engineer/HPT/RCT: Use the data received from the incident scene on Form 441.86 to perform preliminary field estimate using either of the two methods provided below:

4.2.7.1 Use the following formula:

$PD = 8000\ D/W$

where

PD = Neutron dose in rads estimated from body activation

D = Exposure rate of the person in mrad/hr after subtracting background

W = Body weight (lb)

OR

4.2.7.2 Use the nomograph supplied in Appendix B.

4.2.7.3 Document field estimate calculated above on Form 441.86.

NOTE: *The PNAD and OSLs will be radioactive and may also be contaminated.*

4.2.8 Transport PNADs and OSLs for processing by completing the following steps:

4.2.8.1 Do not attempt any decontamination or disassembly of the PNADs or OSLs. Code numbers or other labels do not identify the PNAD assembly and its parts so individual components could be misidentified or lost if the PNAD or OSL is disassembled.

NOTE: *PNADs are not issued or tracked for any one individual; therefore, it is vital the PNAD and OSL are not separated.*

4.2.8.2 Package PNAD and OSL using one bag for each affected individual. Seal and label the bag as radioactive material; prepare it for transportation as appropriate.

4.2.8.3 Transport bag with the PNADs and OSLs and a copy of Form 441.86 with the information recorded during the screening of personnel to the analysis location as soon as possible.

NOTE 1: *PNAD disassembly and analyses will normally occur at a facility designated by Radiological Control Management.*

NOTE 2: *Ensure personnel are wearing proper dosimetry prior to re-entry into the affected area.*

4.2.8.4 Reentry and recovery actions will be per PLN-114, "INL Emergency Plan/RCRA Contingency Plan", EPI-77, "Reentry", and EPI-80, "Recovery."

4.2.9 HPT/RCT: Complete Form 441.45, "Radiological Survey Report," and Form 441.56, "Radcon Daily Log Sheet," or electronic equivalents; documenting actions taken and survey results.

4.2.10 HPDL Personnel: Using LI-15013, calculate PD and ND results to estimate neutron dose.

4.2.10.1 Document results of PD (rad) and ND (rad) on Form 441.86.

4.3 Responding to CAM Alarm

NOTE: *Airborne radioactivity (see def.) may be caused by a breach in a system, or resuspension of particulate radioactivity due to work evolutions such as welding, grinding, or other heavy-duty work. Indications that an airborne radioactivity event is occurring include CAM alarms, air samples exceeding limits, and increasing radiation levels.*

4.3.1 General

4.3.1.1 Emergency Response Personnel: Some CAM alarms initiate building evacuation alarms. Respond in accordance with the specific facility evacuation emergency procedure in those cases.

4.3.1.2 Consider the CAM alarm and indications real until verifications are made otherwise. Where a positive determination of equipment malfunction can be made remotely, air sampling and other follow-up activities to characterize the affected area shall be determined by Radiological Control Management.

4.3.1.3 Arrange the supplemental actions in a logical sequence assuming the alarm is caused by a radiological event. Some actions during reentry are performed simultaneously, and the applicability of subsequent actions is determined as data becomes available. If for instance, initial assessment determines the instrument has malfunctioned, air sampling and radiation surveys may not be required. Likewise, if high radiation levels exist at the CAM and air samples are normal, there may be no need to remove the CAM filter.

4.3.1.4 HPT/RCT: Notify Facility Radiological Control Management.

4.3.1.5 To document a radiological event, remove the portion of the recorder chart that contains radiological data of significance as directed by the responsible Radiological Control Management and with facility management permission.

4.3.1.5.1 The removed section of the chart may be copied for placement in the logbook or for storage with the routine survey maps and check sheets.

4.3.1.5.2 Information describing and detailing the event should accompany the chart section.

4.3.1.5.3 Replace the original portion of the chart back into the chart recorder.

4.3.1.6 Because removal of the CAM filter will interrupt the ability to track or trend a release that is still in progress, chart recorders or electronic history files should be used to obtain air activity information.

4.3.1.7 Continue grab sampling until the event has stabilized.

4.3.1.8 Remove the filter as appropriate for analysis or to clear the alarm condition.

4.3.2 **Initial Response**

4.3.2.1 Affected Personnel: Stop work activities, and if safe to do so, place the area in a safe condition (e.g., secure welding equipment and terminate activities that may result in more severe conditions).

4.3.2.2 Evacuate to an area physically isolated from the affected area, such as an adjacent room, stairwell, immediately outside the building, or to an area up-wind from the source. Otherwise, relocate to an area of lower airborne radioactivity concentrations as designated by Radiological Control personnel.

4.3.2.3 Notify Radiological Control personnel and facility management of CAM alarm.

4.3.2.4 Facility Operations: Secure unfiltered ventilation to help control the spread of airborne radioactivity, if applicable.

4.3.2.5 Affected Personnel: Remain in the area adjacent to, but isolated from the affected area, until released by Radiological Control. Notify Radiological Control personnel if any personal contamination monitors (PCM), hand and foot monitors or frisking stations were bypassed during the evacuation so that a whole body survey may be performed.

4.3.3 **Supplemental Actions**

4.3.3.1 HPT/RCT: Evaluate radiological conditions remotely prior to reentry for on site characterization. One or more of the following may assist in determination of area conditions:

- Check remote readouts such as computer consoles, charts, or remote meters. (A malfunctioning CAM will normally show as a single spike, followed by a return to normal levels or to zero. High radiation will show as a sudden increase that will be sustained at a higher level, or in the case of a transient field, return to normal levels.)

- Check maintenance and tag out logs to determine if maintenance is being performed on the affected instrument or if electronic interference adjacent to the area (such as welding) could be the cause of the alarm.

- Check other instruments in the same area such as RAMs or additional CAMs to see if levels are rising or if there is an alarm condition present on these instruments.

4.3.3.2 Based on an evaluation of the radiological conditions, don respiratory protection and protective clothing; perform applicable supplementary actions below.

4.3.3.2.1 Where the CAM has exceeded the alarm set point, take an air sample of the affected area(s) to determine the derived air concentration (DAC) and institute appropriate radiological controls.

4.3.3.2.2 Acknowledge alarms as appropriate to silence the audible alarm.

4.3.3.2.3 Perform a radiation survey near the CAM detector to determine if an external source of radiation is affecting the detector. If radiation levels are high at the detector, initiate procedures to isolate and control the source of radiation affecting the detector.

4.3.3.2.4 Follow up with additional air samples to ensure that 0.3 DAC is not exceeded.

4.3.3.2.5 Inspect CAM(s) for electrical malfunction. If the inspection indicates an electrical malfunction, take the CAM out of service and request repairs as applicable.

4.3.3.3 If needed to characterize the event, remove the CAM filter and count it as follows:

4.3.3.3.1 Perform an initial count of the filter.

NOTE: *As a rule of thumb, the presence of naturally occurring radioactive material (NORM) is usually indicated by a beta-gamma to alpha ratio of 1:1 to 5:1 when corrected for instrument efficiency, with a half-life of approximately 50 minutes or less.*

4.3.3.4 Count it again in about 30 minutes to evaluate for naturally occurring radioactive material (NORM) and to determine the DAC.

4.3.3.5 Consult facility-specific technical basis documents for information that may differ from the general thumb rule, use as applicable.

4.3.3.6 Perform a half-life calculation to determine if the activity of the sample is decaying at a rate that indicates the presence of NORM using the following formula:

$$T_{1/2} = (-0.693\ (t))/\ln(A/A_o)$$

where

t = time elapsed since the initial count (units match $T_{1/2}$)

A = Activity from the recount

A_o = Activity from initial count

4.3.3.7 Document count data on Form 441.48, "Airborne Survey Results."

4.3.3.8 Save the filter for further analysis if applicable.

4.3.3.9 If the alarm was not caused by naturally occurring radioactivity, take additional air samples to determine the airborne radioactivity boundary.

4.3.3.10 Bag and label filters, then submit to analytical laboratory for analysis.

4.3.3.11 Identify radionuclide(s) to help determine the problem source.

4.3.3.12 Consider use of additional ventilation to minimize personnel exposure and reduce the need for respiratory equipment. High efficiency particulate air (HEPA) filtered ventilation should be used.

4.3.3.13 Obtain facility management and Radiological Engineer approval prior to using additional ventilation.

4.3.3.14 Measure the removable contamination on horizontal surfaces to determine if levels have increased and as necessary control surface contamination to minimize the spread of contamination.

4.3.3.15 Survey exhaust systems, ventilation filters, and ducts, as applicable.

4.3.3.16 If intake is suspected as a result of the CAM alarm, see MCP-148, "Personnel Decontamination," for follow up actions.

4.3.3.16.1 Restrict individual from radiological work until dose is evaluated.

4.3.3.16.2 Proceed to Section 4.5 to perform necessary actions to aid in internal dose assessment.

4.3.3.17 Take air samples, once operations resume, verifying the cause of the airborne release has been corrected.

4.3.3.18 Complete Form 441.45 and Form 441.56, or electronic equivalents; document actions taken and survey results.

4.4 Responding to a RAM Alarm

NOTE: *Some RAM alarms initiate building evacuation alarms. Personnel should respond in accordance with the specific facility evacuation emergency procedure in those cases. Facility specific emergency procedures may include actions for affected personnel to place nuclear facilities into a safe shutdown configuration prior to evacuation. These actions may take several minutes and should be performed as directed by applicable supervision if there is no immediate threat to personal safety based on area dose rates and facility conditions.*

4.4.1 Affected Personnel: Stop work activities and place the area in a safe condition (e.g., secure welding equipment and terminate activities that may result in more severe conditions).

4.4.2 Alert others.

4.4.3 Exit the area.

4.4.4 When exiting the area, attempt to exit to a location isolated from the source of the radiation, such as a shield wall, an adjacent room, or to outside the affected facility. Otherwise, exit to an area of lower radiation levels designated by Radiological Control personnel.

4.4.5 Notify Radiological Control personnel and facility management.

4.4.6 Remain in the area adjacent to, but isolated from the affected area, until released by Radiological Control. Notify Radiological Control personnel if any PCMs, hand and foot monitors or frisking stations were bypassed during the evacuation so that a whole body survey may be performed.

4.4.7 HPT/RCT: Perform radiation surveys to determine the extent and magnitude of the situation and to calculate dose and stay times.

4.4.8 Notify Facility Radiological Control Management.

4.4.9 Ensure radiation boundaries are established, posted, and verified.

4.4.10 Check for loss of shielding integrity.

4.4.11 Determine, to the extent practicable, the radiation source and take corrective actions to reduce radiation fields.

4.4.12 Check radiation levels in adjacent areas to ensure personnel are not exposed to abnormal radiation fields.

4.4.13 As applicable, estimate exposure of unbadged personnel, complete Form 441.04A, "Personnel Exposure Questionnaire," and route dosimeters to HPDL for readout.

4.4.14 HPT/RCT: Complete Form 441.45 and Form 441.56, or electronic equivalents; document actions taken and survey results.

4.5 Responding to Suspected Intake

NOTE 1: *Accidental radionuclide intake (see def.) by an individual may result in treatment of the individual by medical personnel.*

NOTE 2: *The decision to administer treatment is solely the responsibility of the Medical physician in charge. HPDL personnel and Radiological Control Management provide advice on dose consequence of performing or not performing treatment.*

4.5.1 Radiological Control Personnel: Immediately notify Radiological Control managers and the Radiological Control director in the event of a suspected intake.

NOTE: *When using an instrument with a Dual Phosphor detector (e.g. Thermo Electra, Ludlum 2224), Do Not use the instrument in the dual count mode to perform the survey.*

4.5.2 HPT/RCT: If possible, perform direct measurements and contamination surveys of affected individual.

4.5.3 If individual is contaminated and decontamination facilities are not available, contain contamination to the extent possible prior to transport to Medical.

4.5.4 Radiological Control Personnel: Accompany affected individual to Medical.

4.5.5 Radiological Control Management/Radiological Engineer: As soon as possible following the event, provide Medical physician with the following information:

- Radiological inventory of facility where individual received potential intake.
- Chemical form of radioactive material
- Absorption type (e.g., F, M, or S)
- Physical properties of the radioactive materials present.

4.5.6 Provide any other additional information such as nose/mouth swab or sputum results, surface contamination results, skin contamination levels, preliminary air monitoring results, radiological survey data or any other pertinent information to aid in determining if possible early medical intervention is required in an internal contamination event.

NOTE: *Direct measurements can be useful when the radionuclide or its daughter emits gamma or x-rays that have a detectable energy level. GM survey instruments can be useful to initially screen and confirm intake to lungs, GI tract, systemic organs, and contaminated wounds.*

4.5.7 HPDL Personnel: Determine bioassay requirements for individual suspected of a potential intake.

4.5.8 Radiological Control Personnel: Restrict individual(s) suspected of an intake in Access Control in order to prevent a second uptake or additional exposure during the course of the investigation.

4.5.9 HPDL Personnel: Perform calculations to estimate dose received by the individual, as outlined in TEV-500, "Internal Dosimetry."

4.5.10 Provide individual(s) with *dose assessment* (see def.) results as outlined in TEV-500.

4.5.11 Radiological Control Mgmt: Perform dose counseling in accordance with MCP-1.

4.5.12 HPT/RCT: Document all survey results and pertinent information on Form 441.56 or electronic equivalent.

4.6 Responding to a Stack Monitor Alarm

NOTE: *This section is provided for response to stack monitor alarms in facilities that do not have a stack monitor response procedure. If a facility has a procedure, then that stack monitor response procedure should be followed.*

4.6.1 Operations: Immediately notify facility management (or representative) and responsible Radiological Control manager upon annunciation of a stack monitor alarm.

4.6.2 HPT/RCT: Verify the alarm indication in the facility control room and evaluate other facility radiation monitors.

4.6.3 As applicable, proceed to the alarming unit. Observe the count-rate meters and recorder charts of the channel(s) in alarm status. Determine if the count rate meter indicates a single spike or continuing release.

4.6.4 If the gaseous channel alarms, request/obtain a grab sample of the effluent if sampling equipment is available.

NOTE: *Follow applicable facility procedures for pulling stack samples and chain of custody, as applicable.*

4.6.5 If a particulate channel indicates that a release above the alarm point may have occurred but the increase has leveled off:

4.6.5.1 Pull filters for counting and analysis if authorized by facility management. Use applicable technical procedures to pull filters for analysis when applicable.

4.6.5.2 Survey the filter with a portable instrument upon removal.

4.6.5.3 Count the filter in a scaler and determine the first count ratio. If NORM ratios are not apparent or if there are unusually high counts, have the filter analyzed to identify the isotopes.

4.6.5.4 Record results on Form 441.48.

4.6.5.5 Save the filters for the end of month release calculation, if applicable.

4.6.6 If activity levels on the channel are still increasing, notify the responsible Radiological Control Management and facility management so that mitigating actions may be taken, if required.

4.6.6.1 If the channel is reading within the normal background range and the chart indicates a spike or short-term release, reset the monitor alarm as directed by facility management. Do not change the filter unless directed by the responsible Radiological Control Management or facility management.

4.6.7 Provide the following release information to the responsible Radiological Control Management and Facility Management:

- Type of release (which channel)
- Time and duration of release
- Maximum and average counts per minute or μCi/ml during the release
- Results of filter count data (if applicable).

4.6.8 HPT/RCT: Complete Form 441.56, or electronic equivalent, documenting actions taken and survey results.

4.7 Responding to an Electronic Dosimeter (ED) Integrated Dose Alarm

NOTE: *For purposes of this section, "affected personnel" is considered the individual or individuals who are wearing the ED and received the alarm.*

4.7.1 Affected Personnel: If the ED alarms, observe the digital readout and complete the following steps if a "DOSE" alarm is indicated.

4.7.1.1 Stop work activities and place the area in a safe condition.

4.7.1.2 Alert other workers in the area.

4.7.1.3 Exit the area and notify Radiological Control personnel.

4.7.2 Radiological Control Personnel: Evaluate the cause of the ED integrated dose alarm and have the worker dosimeter(s) processed if needed.

4.7.3 Notify Facility Radiological Control Management.

4.7.4 Document any evaluations on Form 441.56, or equivalent, or Form 441.A81, "Radiological Control Evaluation Form."

4.8 Responding to an ED Dose Rate Alarm

NOTE: *For purposes of this section, "affected personnel" is considered the individual or individuals who are wearing the ED and received the alarm.*

4.8.1 Affected Personnel: If the ED alarms, observe the digital readout.

4.8.2 If a "RATE" alarm is indicated but was not anticipated and discussed with Radiological Control, then move to an area of lower radiation level until the dose rate alarm stops.

4.8.3 Alert other workers in the area.

4.8.4 If the HPT/RCT is not present, exit the area.

4.8.5 Follow any direction given by the HPT/RCT, which may include continuing work with a "Dose Rate" alarm, but will not allow work to proceed if a "Limiting Condition" or a "Dose Alarm" is met or exceeded.

4.8.6 HPT/RCT: Document findings and evaluations on Form 441.56, or electronic equivalent, or Form 441.A81.

4.8.7 Notify Facility Radiological Control Management.

4.9 Responding to an ED Failure and/or Undetermined Alarm

NOTE: *For purposes of this section, "affected personnel" is considered the individual or individuals who are wearing the ED and received the alarm.*

4.9.1 Affected Personnel: If the ED alarms, observe the digital readout.

4.9.2 If the cause of the alarm cannot be determined or if a "FAILURE MODE" is indicated, then perform the following:

4.9.2.1 Stop work activities and place the area in a safe condition.

4.9.2.2 Alert other workers in the area.

4.9.2.3 Exit the area and notify Radiological Control personnel.

4.9.3 Radiological Control Personnel: Evaluate the cause of the ED alarm/failure if possible.

4.9.4 Notify Facility Radiological Control Management.

4.9.5 Send the workers OSL to HPDL for processing, if needed.

4.9.6 Document evaluation on Form 441.56, or electronic equivalent, or Form 441.A81.

4.10 Responding to Radiological Spills

NOTE 1: *Indications that a radiological spill has occurred include contaminated personnel at a control point, abnormal contamination levels within a contamination area, and CAM alarms.*

NOTE 2: *As a general rule, use of the "SWIMS" philosophy (stop, warn, isolate, minimize, shut off) for initial response actions in the event of a radiological spill will help control the situation.*

4.10.1 Initial Response

4.10.1.1 Affected Personnel: When spills may contain transuranic materials or mixed waste, immediately exit the area without attempting to stop or secure the spill unless specific

response actions are developed for the facility or activity being performed.

4.10.1.2 Notify facility and Radiological Control management.

4.10.1.3 Radiological Workers: Control radiological spills with assistance from HPT/RCT.

4.10.1.4 Keep personnel away from the spill until trained personnel with appropriate PPE for the hazards expected arrive to stop the spill, unless the source of the spill is known and the spill can be safely stopped by the first responder.

4.10.1.5 Try to set any overturned containers upright, if applicable. When the spill or event is from a system or in a work area, ask cognizant personnel if it is feasible to close applicable valves, controls, and switches.

4.10.1.6 Warn personnel in the vicinity of the spill or others who may arrive to help control the spill.

4.10.1.7 Isolate the area by closing doors, roping off, and guarding the area to keep personnel away from the spill.

4.10.1.8 Minimize individual exposure to radiation and contamination by moving to the edge of the affected area, taking care to minimize the spread of contamination (for example stepping outside the room in which a spill occurred and closing the access).

4.10.1.9 Stay near the boundary to maintain control unless otherwise directed.

4.10.1.10 With facility management approval, shut off unfiltered ventilation. Filtered ventilation should also be turned off if airflow spreads contamination.

4.10.1.11 Ensure Facility and Radiological Control Management is notified.

4.10.1.12 HPT/RCT: Ensure boundaries are established, properly posted, and verified. Upgrade radiological controls as necessary.

4.10.2 **Supplemental Actions**

NOTE 1: *Dry radioactive spills require different cleanup techniques than wet spills. Techniques may include promptly covering the spill with damp rags and using HEPA filtered vacuum cleaners for cleanup. Large dry spills may require consultation with cognizant professionals to determine if additional actions or techniques are needed to contain the spill.*

NOTE 2: *Supplementary actions below should be tailored to the extent of the spill, hazards associated with the spill source, and the effectiveness of the steps taken in the immediate actions. If the steps taken in the immediate actions are effective in stopping the spill and result in the removal of the contamination, required recovery actions will be limited. Not all of the supplementary actions will apply to each recovery operation.*

4.10.2.1 Line Management/Radiological Control: Complete follow-up actions to recover from a radiological spill and to minimize potential actions that may magnify the original problem.

4.10.2.2 Plan recovery and cleanup using the work control process or other reentry procedures, in order to identify and mitigate hazards associated with the specific area and systems involved.

4.10.2.3 HPT/RCT: Complete Form 441.45 and Form 441.56, or electronic equivalents; document actions taken and survey results.

4.10.2.4 Radiological Control Personnel: If an intake is suspected as a result of the spill, refer to MCP-148 for follow-up actions.

4.10.2.5 HPT/RCT: If no contamination is detected on nasal swabs, contact Radiological Engineer to determine if any further evaluation is needed (e.g., whole body count, urine sample, fecal sample, etc.).

4.11 Responding to Radiological Casualty

NOTE 1: *An injured individual has priority in a casualty event, and medical response to life-threatening or serious injury situations should not be deterred or restricted by radiological control requirements.*

NOTE 2: *Casualty events occurring in contamination or high airborne radioactivity areas may require an internal dose evaluation for both injured and rescue personnel.*

4.11.1 General

4.11.1.1 Radiological Worker/HPT/RCT: Do not decontaminate a severely injured individual without the guidance of medical personnel or the consent of the injured individual.

4.11.1.2 Treat less severe casualties as soon as possible. Observe applicable personnel protection counter measures (such as universal precautions, labeling, and use of personal protective equipment) at all times to minimize occupational exposure to blood and other potentially infectious materials.

4.11.1.3 WCC: Notify EOC personnel when an event with serious consequences is identified by line managers.

4.11.1.4 EOC Personnel: Notify area medical facilities such as Eastern Idaho Regional Medical Center and Portneuf Medical Center to handle INL casualties when necessary.

4.11.2 Initial Response

4.11.2.1 First Responder: Call 777 at the site or WCC 526-1515 to request on-scene medical assistance. Call 9-911 for emergencies in Idaho Falls.

4.11.2.2 Radiological Workers/HPT/RCTs: Ensure when responding to a casualty resulting from or involving high radiation exposure, that the requirements of EPI-76, "Emergency Radiation Exposure Control," are implemented and the following needs are considered:

- An immediate evacuation of the injured in a life threatening situation

- Radiation exposure to rescuers and others in the immediate area from the source or possibly from the injured

- The need to administer first aid prior to evacuation of the injured.

4.11.2.3 Respond to life threatening injuries with consideration given to the items in Step 4.11.2.2 as well as the following if properly trained:

- Do not move the injured (especially those with head, neck or back injuries or with compound fractures) unless directed to do so by medical personnel

- Control bleeding, treat for shock, and restrict movement to the extent possible.

4.11.2.4 HPT/RCT: Ensure the area remains controlled by setting up barriers to restrict access.

4.11.2.5 Perform radiation and contamination surveys to determine the extent and magnitude of the event and to calculate dose and stay times for rescue personnel.

4.11.2.6 Maintain ALARA exposure levels to responding personnel.

4.11.2.7 Radiological Control Personnel: Determine, to the extent practicable, the radiation or contamination source and take corrective actions to reduce radiation field intensity or contamination.

4.11.2.8 Line Management/Radiological Control: Contact appropriate plant personnel for technical assistance if a retrieval procedure becomes necessary.

4.11.2.9 Responsible Person: Set up evacuation route and install barriers along the route to prevent the spread of contamination, if possible.

4.11.2.10 HPT/RCT: Survey the injured individual for contamination. In non-life-threatening situations, consult medical personnel to determine if wounds should be decontaminated.

4.11.2.11 If the individual has gross contamination, wrap in a blanket or other covering to contain contamination, as directed by medically-qualified personnel.

4.11.2.12 If the individual has been in an area with high radiation levels, provide an estimated dose to medically-qualified personnel.

4.11.2.13 Line Management/Radiological Control: If potentially contaminated personnel are transported offsite, notify the receiving medical facility, WCC at 526-1515 and request an HPT/RCT to accompany the injured, or meet the injured at the medical facility.

4.11.2.14 Radiological Control Management: Accompany the HPT/RCT or meet the HPT/RCT at the offsite medical facility.

4.11.2.15 HPT/RCT: If the event occurs on a back shift, weekend, or holiday, accompany the injured individual to the medical facility and ensure the facility Radiological Control Manager is contacted.

4.11.2.16 Take survey instruments and decontamination supplies to the medical facility to monitor and control the spread of contamination as applicable.

4.11.3 **Supplemental Actions**

4.11.3.1 Radiological Control Personnel: Send dosimetry of those involved in the event to Health Physics Dosimetry Laboratory (HPDL) for processing.

4.11.3.2 Radiological Engineer: Estimate the dose to personnel involved in the event and complete Form 441.04A, as applicable.

4.11.3.3 Line Management/Radiological Control Personnel: Ensure response personnel and the affected area(s) are decontaminated per recovery procedure and MCP-148. Maintain control of waste materials.

4.11.3.4 Ensure applicable reports are completed and notifications are made.

NOTE: *Bio-hazard waste is any waste containing infectious materials or potentially infectious substances such as blood. Of special concern are wastes such as needles, blades, glass pipettes, or other wastes that can cause injury during handling.*

4.11.3.5 Consult with Medical to determine steps that need to be taken if the waste has the potential for being non radiological bio-hazard waste. If waste has the potential for radioactive contamination, consult waste generator services for proper disposition path.

4.11.3.6 HPT/RCT: Complete Form 441.45 and Form 441.56, or electronic equivalents; documenting actions taken and survey results.

4.12 Responding to Fires

NOTE: *Hazards associated with a fire are usually more dangerous than those associated with only radiological hazards. Fires that contain pyrophoric materials like sodium (Na) and sodium potassium (NaK) have additional hazards.*

4.12.1 General

4.12.1.1 Emergency Responders: When responding to fires involving radioactivity, use caution and situational awareness so that radiological controls do not impair fire fighting effectiveness or endanger individual safety.

4.12.1.2 Individual Reporting a Fire: Call 777 at the site and 9-911 in Idaho Falls to report a fire.

4.12.1.3 Line Management/Radiological Control Personnel: Ensure response personnel are aware of shielding around containers holding radioactive materials or sealed sources that could create increased radiological consequences should the shielding material melt or become deformed due to the fire.

4.12.2 **Initial Response**

4.12.2.1 Affected Personnel: Evacuate the area and report to designated assembly areas. Personnel initiating any fire alarm should make themselves available to responding fire department personnel to report their observations.

4.12.2.2 Radiological Control Personnel: Provide support by establishing barriers, air monitoring/sampling and surveys of personnel, material, and equipment. Do not impair fire-fighting effectiveness.

4.12.2.3 Provide assistance to the fire response personnel by ensuring response personnel are aware of radiological conditions at the fire location.

4.12.2.4 Perform airborne radioactivity and contamination surveys, as required. Ensure barriers are established at locations to contain radiological hazards and that contaminated material are properly bagged and tagged.

4.12.3 **Supplemental Actions**

4.12.3.1 Line Management: Ensure proper reports and notifications are completed in a timely manner.

4.12.3.2 Ensure the area is cleaned up and decontaminated after the fire.

4.13 Responding to Personnel and/or Equipment Off-Site Suspected of Being Radiologically Contaminated

4.13.1 Line Management: Use LWP-9301, "Event Investigation and Occurrence Reporting," to determine appropriate notifications when information is received that personnel and/or equipment suspected of being radiological contamination have left the INL.

4.13.2 INL Facility Management: Initiate occurrence reporting as required by LWP-9301.

4.13.3 Radiological Control Management: Ensure INL Line Management has made notification to WCC and that there is a Region 6 Radiological Assistance Program (RAP) team leader that will accompany the INL HPTs/RCTs to the off-site location to conduct surveys of suspected personnel and/or equipment.

4.13.4 HPT/RCT: Conduct surveys of the suspected personnel and/or equipment in accordance with procedures with a RAP team leader at the scene.

4.13.5 When surveys indicate radioactive contamination levels are equal to or greater than those defined in Title 10 of the Code of Federal Regulations 835, "Occupational Radiation Exposure," Appendix D, "Surface Contamination Values," the response becomes a RAP response in accordance with RAP procedures.

5. RECORDS

Executed copies of:

Forms:

441.04A, "Personnel Exposure Questionnaire"

441.45, "Radiological Survey Report" or electronic equivalent

441.48, "Airborne Survey Results"

441.56, "Radcon Daily Log Sheet" or electronic equivalent

441.48, "Airborne Survey Results"

441.86, "Accidental Criticality Personnel Information Form"

441.A81, "Radiological Control Evaluation Form"

441.86, "Accidental Criticality Personnel Information Form"

NOTE: *LWP-1202, "Records Management," the INL Records Schedule Matrix, and associated record types list(s) provide current information on the retention, quality assurance, and/or destruction moratorium requirements for these records. Contact a Records Coordinator for assistance if needed.*

6. DEFINITIONS

None.

7. REFERENCES

10 CFR 835, "Occupational Radiation Protection"

EPI-76, "Emergency Radiation Exposure Control"

EPI-77, "Reentry"

EPI-80, "Recovery"

Form 441.04A, "Personnel Exposure Questionnaire"

Form 441.45, "Radiological Survey Report" or electronic equivalent

Form 441.48, "Airborne Survey Results"

Form 441.56, "Radcon Daily Log Sheet," or electronic equivalent

Form 441.48, "Airborne Survey Results"

Form 441.86, "Accidental Criticality Personnel Information Form"

Form 441.A81, "Radiological Control Evaluation Form"

Form 441.86, "Accidental Criticality Personnel Information Form"

LI-15013, "Dose Analysis and Reporting of Nuclear Accident Dosimeters"

LRD-15001, "INL Radiological Control Manual"

LWP-15010, "Personnel Radiological Survey"

LWP-1202, "Records Management"

LWP-9301, "Event Investigation and Occurrence Reporting"

MCP-1, "Radiation Risk Counseling and Special Dose Control Level"

MCP-148, "Personnel Decontamination"

PLN-114, "INL Emergency Plan/RCRA Contingency Plan"

TEV-500, "Internal Dosimetry"

8. APPENDIXES

Appendix **A**, Responsibilities

Appendix B, Criticality Field Estimate Nomograph

Appendix A

Responsibilities

Performer	Section	Responsibilities
Affected Personnel	4.1	Activate facility EOC and contact WCC when an event is identified.
Facility Management	4.1	Control ventilation systems, valve controls, and switches in the event of an emergency. Ensure technical specifications, operational safety requirements or other operational procedures are not violated if changing ventilation systems or equipment such as valves, controls, or switches. Ensure provisions are in place to accommodate rapid radiological area access by onsite and offsite emergency workers.
Emergency Response Personnel from onsite and offsite locations	4.1	Provide emergency response support when responding to an event.
Emergency Response Management	4.1	Train and brief each individual who will be authorized to perform emergency actions. Ensure each individual authorized to perform emergency actions likely to result from a radiological occurrence receive counseling and risk communication.
Affected Personnel	4.2	Immediately evacuate area without stopping to remove PPE or perform exit monitoring and report to designated assembly area. Segregate as needed.
Radiological Control Personnel	4.2	Provide on-scene support for accidental criticality. Complete required paperwork, segregate personnel, perform radiological surveys, and collect dosimetry for processing and send to HPDL. Obtain exposure rates in mR/hr due to activation by positioning the probe of a closed window GM portable survey instrument under the left arm pit and flat against the side of the chest. Obtain an exposure rate on the PNAD by using a closed window GM portable survey instrument and aligning the probe lengthwise, and in contact with the PNAD, covering both sets of activation foils.

Performer	Section	Responsibilities
Radiological Control Management	4.2	If the PNAD reading exceeds 0.2 mR/hr above background or body exceeds 0.05 mR/hr above background, collect the PNAD and OSL, bag and label and send for processing. Restrict individual from radiation work. Send individual to medical for possible blood and hair sampling and notify WCC at 6-1515. If an increase above background for the individual's PNAD or body is detectable but less than the values listed above collect the individual's PNAD and OSL, bag and label and send for processing. Restrict individual form radiation work until a dose evaluation is complete. Notify Facility Radiological Control Management Record the event details on Form 441.86. Provide a copy of Form 441.86 to HPDL by fax at 526-7020. Include copies of any additional information as needed. If applicable, direct the Radiological Engineer/HPT/RCT to perform filed estimate in accordance with section 4.2.8.
Radiological Engineer/HPT/RCT`	4.2	Calculate neutron dose estimate and document estimated on Form 441.86.
HPT/RCT	4.2	Complete Form 441.45 and Form 441.56 or electronic equivalents; documenting actions taken and survey results. Transport PNADs and OSLs for processing to the analysis location. Do not attempt decontamination or disassembly. Package and label PNAD and OSL using one bag for each affected individual. Send a copy of Form 441.86 along with the PNADs and OSLs. Follow PLN-114 for reentry and recovery actions.
HPDL Personnel	4.2	Document results of PD and ND on Form 441.86.
Emergency Response Personnel	4.3	Respond in accordance with specific facility evacuation emergency procedure if the CAM alarm initiates a building evacuation.

Performer	Section	Responsibilities
Affected Personnel	4.3	Stop work activities, place work area in safe condition and evacuate to an area physically isolated from the affected area. Notify Radiological Control personnel. Remain in the area adjacent to, but isolated from the affected area until released by Radiological Control personnel.
Facility Operations	4.3	Secure unfiltered ventilation.
HPT/RCT	4.3	Evaluate radiological conditions remotely. Check remote readouts and maintenance and tag out logs to determine if maintenance is being performed. Consider CAM alarms and indications actual until verification is made otherwise. Arrange supplemental actions in a logical sequence assuming alarm was caused by a radiological event. Notify Facility Radiological Control Management Remove CAM chart that contains the radiological data of significance as directed by Radiological Control Management and facility management permission. Evaluate radiological conditions. Remove filer as appropriate for analysis and clear the alarm condition. Based on the evaluation, don respiratory protection and PPE and perform supplementary actions by taking representative air samples to determine the DAC and institute radiological controls. Acknowledge and silence audible alarm. Follow up with additional air samples to ensure 0.3 DAC is not exceeded. Consult facility specific technical basis documents for information that may differ from the general rule of thumb.
		Document count data for Form 441.48. Bag and label filters and submit to analytical lab for analysis. Identify radionuclides to help determine source of problem. Obtain facility management and Radiological Engineer concurrence prior to using additional ventilation.

Performer	Section	Responsibilities
		If intake is suspected as a result of a CAM alarm, refer to MCP-148. Take air samples when operations resume verifying cause of release has been corrected. Complete Form 441.45 and Form 441.56, or electronic equivalents.
Radiological Control Organization	4.3	Verify alarms are not false. Perform radiation surveys to determine the extent and magnitude of situation. Ensure radiation boundaries are established, posted and verified. Take corrective actions to reduce radiation fields and check radiation fields in adjacent areas to ensure personnel are not exposed to abnormal radiation fields. Estimate exposure of unbadged personnel and complete Form 441.04A.
Affected Personnel	4.4	Stop work activities and place area in a safe condition. Exit the area to an isolated location from the source of radiation or as designated by Radiological Control personnel and alert others. Notify Radiological Control personnel and facility management. Remain in the area adjacent to, but isolated from the affected area until released by Radiological Control personnel. Notify Radiological Control personnel if personnel contamination monitors were bypassed during the evacuation so a whole body survey may be performed.
HPT/RCT	4.4	Perform radiation surveys. Complete Form 441.45 and Form 441.56, or electronic equivalent.
HPT/RCT	4.5	Perform direct measurements and contamination surveys of affected individual. Notify Facility Radiological Control Manager.. Document all surveys and pertinent information on Form 441.56 or electronic equivalent.

Performer	Section	Responsibilities
Radiological Control Personnel	4.5	Accompany affected individual to Medical.
Radiological Control Management/Radiological Engineer	4.5	Provide the physician with necessary information.
HPDL Personnel	4.5	Determine bioassay requirements and determine dose received by individual. Provide dose assessment results. Perform calculations to estimate dose received by the individual as per TEV-500. Provide individual with dose assessment results outlined in TEV-500.
Radiological Control Personnel	4.5	Restrict individual from Access Control. Perform dose counseling in accordance with MCP-1.
Operations	4.6	When a stack monitor alarms, immediately notify facility management and the responsible Radiological Control Management.
HPT/RCT	4.6	Verify alarm readout. As applicable, determine if spike or continuing release. If gaseous channel alarms, obtain a grab sample of the effluent is sampling equipment is available. If particulate channel indicates release above the alarm setpoint, pull filters if authorized and survey with a portable hand held instrument and count filter in a scaler. Document results on Form 441.48 and save filters, if applicable. Provide release information to Radiological Control Management and facility management. Complete Form 441.56, or electronic equivalent, documenting actions taken and survey results. If activity is increasing make notifications for mitigating actions if needed. Reset if channel within normal background range and chart indicates spike or short-term release, as directed by facility management. Do not change filter unless directed to.

Performer	Section	Responsibilities
Affected Personnel	4.7	If an ED alarms, observe readout, stop work and place area in safe condition. Alert others and exit area. Notify Radiological Control personnel.
Radiological Control Personnel	4.7	Evaluate cause of ED alarm and process individual's dosimeter, if applicable. Notify Facility Radiological Control Management. Document any evaluations on Form 441.56 or electronic equivalent, or Form 441.A81.
Affected Personnel	4.8	If ED alarms, observe readout. Move to an area of lower radiation. Alert other and exit the area if HPT/RCT is not present. Follow HPT/RCT instructions.
HPT/RCT	4.8	Document findings and evaluations from dose rate alarm on Form 441.56, or electronic equivalent, or Form 441.A81. Notify Facility Radiological Control Management.
Affected Personnel	4.9	If an ED alarms, observe the digital readout. If the cause of the alarm cannot be determined or if in a "FAILURE MODE" stop work, alert others and place the area in a safe condition. Exit the area and notify Radiological Control personnel.
Radiological Control Personnel	4.9	Evaluate the cause of alarm/failure and pull worker's dosimeter if needed. Notify Facility Radiological Control Management. Document evaluation on Form 441.56, or electronic equivalent, or Form 441.A81.
Affected Personnel	4.10	If spill contains highly toxic chemicals, TRU material or mixed waste, and you have not been trained or briefed on a specific response plan, immediately exit area. Notify Facility Radiological Control Management.
Radiological Workers	4.10	Control spill with assistance from HPT/RCT. Keep personnel away from spill until trained personnel arrive to stop spill. Isolate the area. Ensure facility management and Radiological Control Management is notified of the spill.

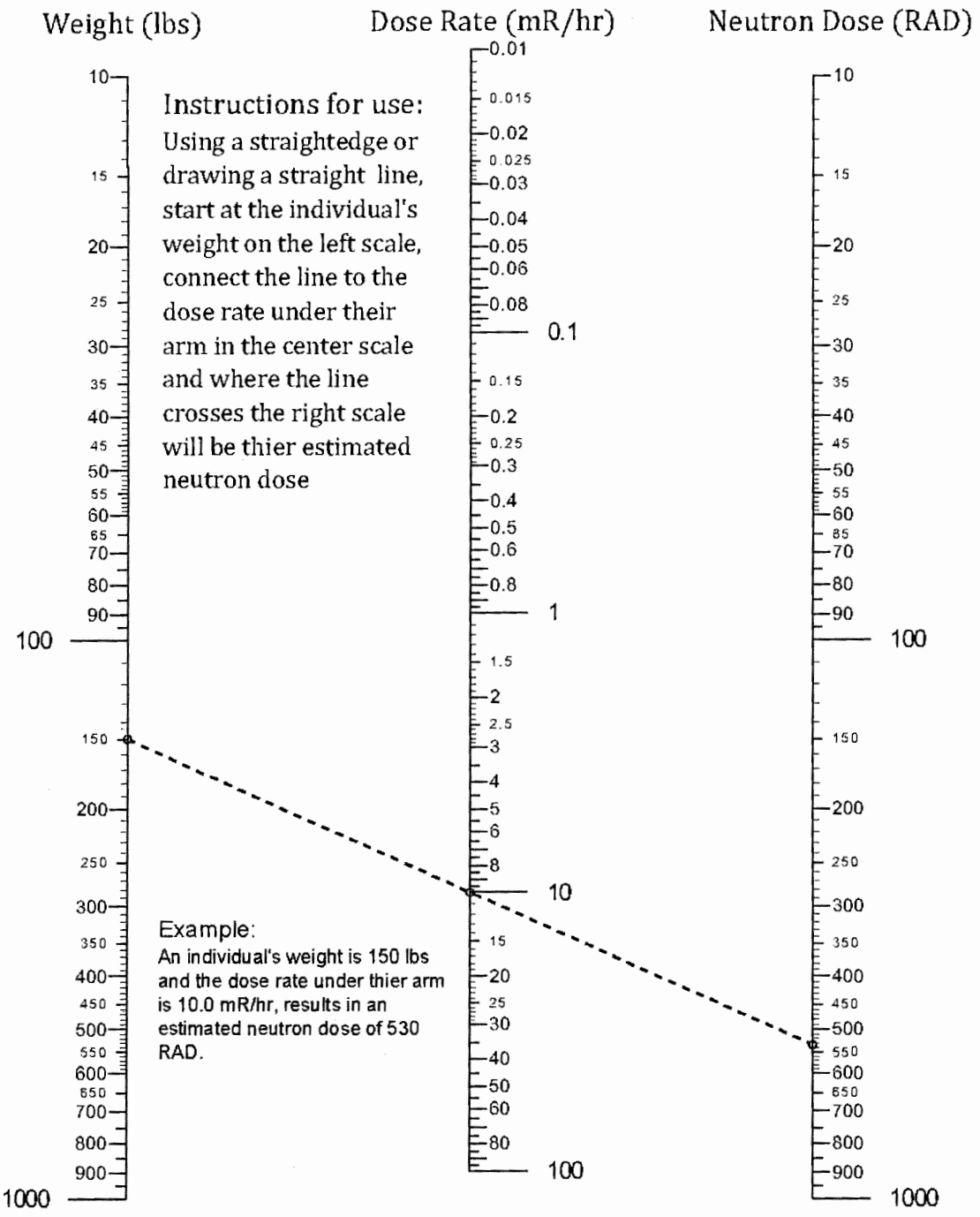
Performer	Section	Responsibilities
HPT/RCT	4.10	Ensure boundaries are established and properly posted and verified. Document actions taken, in Form 441.45 and Form 441.56 or equivalent. Survey results. If an uptake is suspected, take nasal swabs and document results. If no contamination is found on nasal swabs, contact Radiological Engineer to determine if further evaluation is needed.
Radiological Control Personnel	4.10	If an intake is suspected, refer to MCP-148 for follow-up actions.
Line Management/ Radiological Control	4.10	Complete actions to recover from spill. Plan recovery and cleanup using the work control process or other reentry procedures.
Radiological Worker/HPT/RCT	4.11	Do not decontaminate a severely injured individual without Medical personnel or the consent of the injured individual. Treat less severe causalities as soon as possible.
WCC	4.11	Notify EOC personnel when an event with serious consequences is identified by line managers.
EOC	4.11	Notify area medical facilities, if necessary.
First Responder	4.11	Call 777 at the Site or WCC to request assistances. In town facilities call 9-911.
Radiological Worker/HPT/RCT	4.11	When responding to a casualty resulting from or involving high radiation follow requirements of EPI-76. Respond to life threatening injuries.
HPT/RCT	4.11	Restrict access by establishing barriers. Perform radiation and contamination surveys. Maintain ALARA exposure levels to responding personnel. Survey injured individual for contamination. If the individual has gross contamination, cover or wrap in a blanket to contain contamination, as directed by medically qualified individuals. If individual was in a high radiation area provide and exposure estimate to medically qualified personnel. On backshift, accompany injured individual and notify Facility Radiological Control Manager.

Performer	Section	Responsibilities
		Document all actions taken and survey results. Complete Form 441.45 and Form 441.56 or electronic equivalents.
Radiological Control Personnel	4.11	Determine the radiation and contamination sources and take any necessary actions to reduce radiation fields or contamination. Send dosimetry of those involved in the event to HPDL.
Line Management/ Radiological Control Personnel	4.11	Contact plant personnel for technical assistance if retrieval becomes necessary. If contaminated individual is transported offsite, notify receiving facility, WCC and request an HPT/RCT to accompany injured individual. Ensure response personnel are decontaminated per MCP-148. Ensure applicable reports are completed and notifications made. Consult with Medical to determine steps that need to be taken for non-radiological; bio-hazard waste disposal. If was has the potential for radioactive contamination, contact waste generator services for proper waste disposition.
Radiological Control Management	4.11	Accompany HPT/RCT or meet them at offsite medical facility.
Responsible Person	4.11	Establish evacuation route and install barriers, as necessary.
Radiological Engineer	4.11	Estimate personnel dose and complete form 441.04A, as applicable.
Emergency Responder	4.12	Use caution and situational awareness when responding to fires involving radioactivity.
Individual Reporting a Fire	4.12	Call 777 at the Site and 9-911 in Idaho Falls to report a fire.
Line Management/ Radiological Control Personnel	4.12	Ensure response personnel are aware of shielding around containers holding radioactive materials or sealed sources that could increase radiological consequences.
Affected Personnel	4.12	Evacuate the area and report to designated assembly

Performer	Section	Responsibilities
		areas.
Radiological Control Personnel	4.12	Provide support by establishing barriers, air sampling and personnel surveys and surveys of materials or equipment. Provide assistance to the fire response personnel by making them aware of radiological conditions at the fire location. Perform airborne radioactivity and contamination surveys. Ensure barriers are established at locations to contain radiological hazards and that contaminated material is properly bagged and labeled.
Line Management	4.12	Ensure proper reports are made and area is cleaned up and/or decontaminated after the fire.
Line Management	4.13	Using LWP-9301, determine appropriate notifications when information is received that personnel and/or equipment is suspected of being contaminated off-site.
INL Facility Management	4.13	Initiate occurrence reporting.
Radiological Control Management	4.13	Ensure line management has made notification to WCC and the RAP team leader will conduct surveys of suspected personnel and/or equipment.
HPT/RCT	4.13	Conduct surveys in accordance with procedures with a RAP team leader at the scene. If surveys indicate contamination levels are equal to or greater than 10 CFR 835 Appendix D values, the response becomes a RAP response.

Appendix B

Criticality Field Estimate Nomograph



Neutron Dose from Criticality Accident

$ND = 8000 * D/W$