ENERGY NORTHWEST

INTEROFFICE MEMORANDUM

DATE: October 16, 2002

TO: Distribution

FROM: Procedure Control, Administrative Services, (927A)

SUBJECT: **PLANT PROCEDURES MANUAL - VOLUME 13**
Distribution Package: 2002-604

REFERENCE:
The following Procedure(s) have been revised/approved and are to be inserted in your controlled copy of the Manual and the superseded revisions are to be removed and destroyed

Procedure	Rev.	Title/Comments
13.13.2	14	EMERGENCY EVENT TERMINATION AND RECOVERY OPERATIONS
13.13.3	15	INTERMEDIATE PHASE MUDAC OPERATIONS

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++137	*MPF Field Team Kits **(13.7.5, 13.9.1, 13.9.5, 13.9.8, 13.13.4, 13.14.4) (J. Ittner)**	PE30
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13.13.2

ENERGY NORTHWEST		USE CURRENT REVISION
COLUMBIA GENERATING STATION PLANT PROCEDURES MANUAL		
PROCEDURE NUMBER *13.13.2	APPROVED BY JLP for JEW - Revision 14	DATE 10/16/02
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1.0 PURPOSE

The purpose of this procedure is to provide the decision making criteria and instructions for termination of the Emergency phase and transition to the Recovery phase. The procedure also provides guidance for the Recovery Manager, the designated Recovery Organization, and the Recovery Phase Task Force, on onsite recovery planning. {R-1600}

2.0 REFERENCES

2.1 FSAR, Chapter 13.3, Emergency Plan, Section 7 {R-4842}

2.2 Plant Tech Spec, Section 6.7, Safety Limit Violation

2.3 10CFR50.47(b), Emergency Plans {R-1600}

2.4 10CFR50.54(x), Conditions of Licenses

2.5 SWP-CAP-01, Problem Evaluation Reqests

2.6 SWP-IRP-02, Corporate Nuclear Safety Review Board

2.7 SWP-OPS-05, Restart Evaluation Process

2.8 PPM 1.1.8, Incident Review Board

2.9 PPM 1.3.48, Root Cause Analysis

2.10 PPM 1.16.8, Outage Management and Shutdown Safety

2.11 PPM 13.4.1, Emergency Notifications

2.12 Classification Notification Form, 24075

2.13 Emergency Classification or Other Emergency Message, 26045

2.14 10CFR50 Appendix E, IV.H, Recovery R-5929

2.15 PER 298-0928 {2.15}

3.0 DISCUSSION

This procedure provides guidance and instructions for the termination of an Unusual Event or Alert emergency classification or the transition from a Site Area Emergency or General Emergency classification to the Recovery phase.

The individual responsible for emergency command and control and referred to as the Emergency Director, i.e., the Shift Manager, TSC Manager, or EOF Manager, is responsible for implementation of this procedure.

For an Unusual Event classification the close-out of the event will normally involve termination of the emergency classification and notification of the Emergency Response

Organization. Any necessary follow-up activities would be limited to in-plant or onsite areas and coordinated and managed by the site organization through normal work management and corrective action procedures.

For an Alert classification, the close-out of the event will normally involve termination of the emergency classification and dismissal of the in-center Emergency Response Organization. Any necessary follow-up activities would be limited to in-plant or onsite areas and coordinated and managed by the site organization. In some cases, a Recovery Phase Operational Plan may be appropriate for the close-out of an Alert classification if substantial damage has occurred to plant structures or equipment. The Emergency Director should make this determination based on the extent of damage and other considerations.

For the Site Area Emergency and General Emergency classifications, the proper close-out of the event involves the establishment of a Recovery Phase Task Force under the direction of a Recovery Manager, and the transition to the Recovery phase. During Recovery, overall management of recovery activities is the responsibility of the Recovery Manager with the Plant General Manager overseeing recovery activities within the respective Plant organizations.

Conditions required for entry into the Recovery Phase are:

- The plant is stable
- Significant radioactive releases are terminated
- The immediate emergency is mitigated

4.0 PRECAUTIONS

4.1 The termination of an emergency classification or the transition to Recovery should be closely coordinated with the state and local authorities and federal agencies.

4.2 The Recovery Manager shall notify appropriate agencies before initiating recovery operations with a potential for radiological releases.

5.0 PROCEDURE

5.1 Termination Of An Unusual Event Or Alert

NOTE: If substantial damage has occurred to plant systems or equipment, or if significant radiological releases or contamination have occurred onsite, Recovery may be the more appropriate action.

5.1.1 When conditions have improved, stabilized and the following criteria are met, consider termination of the emergency classification.

- Emergency Action Level criteria are no longer exceeded, and
- Prognosis for plant conditions is stable or improving

NOTE: Ensure that a summary of event close-out is provided in the "Description Of Incident" section of the Classification Notification Form (CNF) (24075).

5.1.2 When the criteria for termination are met, terminate the emergency classification, fill out a Classification Notification Form, and using the guidance found in PPM 13.4.1 or 26045, notify offsite agencies.

5.1.3 Notify the Senior NRC Resident Inspector and NRC Headquarters upon termination of the event.

5.1.4 Upon termination of an Unusual Event, announce the termination to the Control Room staff and direct the communicator to notify the on-call TSC Manager and EOF Manager.

5.1.5 Upon termination of an Alert, direct the TSC to make the following PA announcement:

"Attention all personnel. The Alert classification is terminated. Secure the Emergency Response Organization and Emergency Facilities and resume normal duties."

The JIC Manager should be directed to do the same in the Joint Information Center. Additional comments may be added as necessary to update personnel.

5.2 Termination Of A Site Area Emergency Or General Emergency And Transition To Recovery

5.2.1 Continue to assess plant and environmental conditions. When all of the following criteria are met, and all of the entry conditions for Site Area Emergency or General Emergency are cleared, transition to the Recovery Phase per step 5.2.2.

- The conditions which caused the emergency have stabilized and are under control.
- There is no longer a threat of radioactive release to the environment.
- The immediate emergency has been mitigated.
- At least one fission product barrier is intact.
- The reactor is in a stable safe shutdown condition and long-term core cooling is available as required,

- NRC Headquarters (or the Director of Site Operations of the onsite response team), State, and County Officials concur with the transition to Recovery.

5.2.2 Initiate a Crash call to inform emergency centers and offsite agencies of the transition into the Recovery phase.

5.2.3 Initiate efforts to establish a Recovery Phase Task Force to recommend the recovery phase actions and special procedures that may be needed as suggested by the following steps.

a. The Recovery Phase Task Force should initially be made up of the key center Managers, i.e., the OSC, TSC, and JIC Managers, the Shift Manager or TSC Operations Manager, and the company Public Information Officer (PIO).

b. The center Managers should be permitted to relax facility staffing levels at this point based on projected facility activities during the transition.

5.2.4 Direct the TSC Manager and staff, the OSC Manager and staff, and EOF staff to assess conditions in their respective areas and identify actions necessary to return the plant to a normal operational or cold shutdown status. These assessments should include, but not be limited to:

- The current operational status and condition of plant systems, structures and equipment involved in the emergency.
- Identification of all systems, components or equipment damaged or made inoperable during the event.
- An estimate of necessary repairs, parts and tools to restore all affected systems and equipment back to an operational condition.
- Special tools, equipment or offsite support that may be required during the restoration period
- Identification of applicable plant surveillance tests and procedures required for post maintenance testing.
- Identification of applicable system operability tests and procedures to restore plant systems to normal operation (or shutdown) configuration.
- An estimate of liquid and solid radioactive waste generated during the event and recommendations on management and disposal.

- Identification of special radiological requirements for personnel entry into affected areas with elevated dose rates or contamination levels.
- An estimate of the decontamination and monitoring activities necessary to restore affected areas onsite, and offsite areas within the plant exclusion area boundary to preaccident levels.

- Establishment of a recovery phase environmental monitoring program. (EOF action)

- Identification of special recovery actions that may need to be coordinated with the U.S. Department of Energy - Richland Operations. (EOF action)

- Identification of special recovery actions or prior approval recommendations that require coordination with NRC, FEMA, or the State of Washington. (EOF action)

5.2.5 Direct the Site Support Manager to compile the action lists developed by the TSC and OSC which identify short and long term recovery items.

5.2.6 Recovery Phase Task Force Duties

a. Conduct a preliminary Recovery discussion in accordance with Attachment 6.1.

b. Direct the Recovery Phase Task Force to develop the Recovery Phase Operational Plan using the prioritization methodology in Attachment 6.2 and the development guidelines in Attachment 6.3. Instruct them to include:

- A Shutdown Safety Plan established in accordance with PPM 1.16.8, and

- The needed recovery organization similar to Attachment 6.4 to address the list of required action items.

c. Emergency response facilities can be secured as conditions permit and responsibilities for recovery turned over to the Task Force or Recovery Organization if established.

d. The Recovery Phase Task Force should:

- Review, validate and complete the action list provided.

- If not already accomplished, identify specific Recovery Task priorities for each item on the action list (refer to Attachment 6.2).
- Produce initial plans to cope with both the near term and long term recovery activities. (The Shutdown Safety Plan should be followed once cold shutdown is achieved, whenever possible.)
- Provide direct input to Maintenance to produce an integrated outage plan which reflects the recovery priorities.
- Provide assistance to the Recovery Manager to coordinate transition of recovery activities from the recovery phase into a plant outage as deemed appropriate.

CAUTION: Those activities with a potential for radiological release require offsite agency notification prior to implementation.

5.2.7 When the transition to Recovery occurs, control of work at the station should be conducted using the normal administrative control procedures as specified in the Site Wide Procedures unless special conditions require preparation of specific Recovery Procedures.

5.2.8 Following transition to Recovery from a Site Area Emergency or General Emergency, CNSRB will review and comment on the recovery planning effort to assure that all nuclear safety aspects of the recovery effort are addressed per SWP-IRB-02. {R-4842}

6.0 ATTACHMENTS

6.1 Conduct Of Preliminary Recovery Discussion

6.2 Recovery Phase Prioritization Methodology

6.3 Recovery Phase Operational Plan Development Guidelines

6.4 Recovery Task Force Organization Chart

CONDUCT OF PRELIMINARY RECOVERY DISCUSSIONS {R-5929}

The EOF Manager should lead the preliminary recovery discussions as follows:

1. Establish a conference call at the start of the discussions with those individuals that cannot attend the designated meeting location.

2. An individual should be assigned to take detailed notes in order to permit the ideas and suggestions made during the discussions to be incorporated in the Recovery Phase Operational Plan.

3. The discussions should begin with a review of the event chronology by the TSC Operations Manager, including:

   - The initial Plant conditions,
   - How and when the event was initiated,
   - Important transient situations, and
   - Current Plant conditions.

4. Review the radiological consequences of the event by the Radiological Emergency Manager, including:

   - The radionuclide source (i.e., spent fuel, core, condensate storage tank, etc.), {2.15}
   - The offsite release path (or potential release path),
   - Current offsite radiological conditions (e.g., plume dispersed, any contaminated areas, etc.), and
   - Current Plant radiological conditions (e.g., rad levels decreasing, release secured, high rad areas exist, etc.).

5. Review the offsite impact of the event by the Assistant EOF Manager, including:

   - The protective action recommendations made to the state and counties,
   - The success of emergency warning siren and EAS actuation,
   - The areas evacuated or sheltered by the counties,
   - Current actions being taken by the state.

6. Review the media attention that has been placed on the event including:

   - The timeliness of news releases and joint briefings (i.e., between Columbia Generating Station, NRC, FEMA, the states, and counties),
   - Major network or news agency actions, and
   - Current activities at the Joint Information Center.

7. Ensure that the Energy Northwest MUDAC personnel are assigned to support reentry and decontamination activities.

CONDUCT OF PRELIMINARY RECOVERY DISCUSSIONS

8. Finally, the EOF Manager should open the discussion to the group to provide input on the following items:

	Discussion Item/Concern	Needed In Plan (Circle One)
a.	Are entries needed to high radiation areas in order to assess damage?	Yes / No
b.	Are there any Site/Plant areas that should have restricted access due to hazardous conditions?	Yes / No
c.	Are there any dose limitations on available personnel that could prevent satisfactory completion of recovery operations?	Yes / No
d.	Are there any immediate support equipment needs? And is accessibility or availability a problem?	Yes / No
e.	Are there any sabotage or security concerns that require incident investigations?	Yes / No
f.	Is long-term cooling and protection of the core a concern?	Yes / No
g.	Can future radiation releases be controlled or prevented?	Yes / No
h.	Are communication systems and methods adequate to implement the recovery effort?	Yes / No
i.	Are state recovery organizations being established which will require our participation?	Yes / No
j.	Are periodic news releases and briefings going to be required to maintain a public dialogue?	Yes / No
k.	Are nuclear insurers going to be needed to assist with recovery costs and public compensation?	Yes / No
l.	Are offsite radiological conditions going to require Columbia Generating Station support of ingestion exposure concerns?	Yes / No
m.	Are recovery operations capable of being performed using current Plant procedures, including the ability to maintain exposure levels to 10 CFR 20 limits?	Yes / No

PRIORITY 1 - Protect the health and safety of the general public

- Personnel Safety
- Ensure no new release
- Maintain shutdown protection
- Maintain defense in depth

PRIORITY 2 - Protect the health and safety of plant staff and contractors

- Personnel safety
- Radiation protection/ALARA
- Enhance shutdown protection

PRIORITY 3 - Maintain and enhance the stability of plant systems and components

- Return components to operability
- Enhance system operability

PRIORITY 4 - Corrective or preventive modifications to systems or facilities for effective plant recovery

- Take preventive actions to enhance safety during recovery
- Determine and implement modifications for recovery

PRIORITY 5 - Logistics and/or facilities necessary to provide for reintroduction of full Energy Northwest work force

- Staff recovery activities
- Provide organization/facilities for recovery
- Determine and obtain supplies and logistical support

RECOVERY PHASE OPERATIONAL PLAN DEVELOPMENT GUIDELINES

R-5920

A Recovery Phase Operational Plan should be developed as follows:

1. The Recovery Manager is responsible for coordinating the development of the Recovery Phase Operational Plan.

   NOTE: If a section listed below is deemed inapplicable to the event which had occurred, it should still remain in the Plan with a description of why it is not applicable. Additional sections can be added or titles changed if recommended or approved by the Recovery Phase Task Force.

2. The Recovery Phase Operational Plan should, as a minimum, include the following:

   - Title Page
   - Table Of Contents
   - Sections:
     - Introduction/Event Description
     - Goals Of Recovery Efforts
     - Objectives And Objective Criteria
     - Description Of The Recovery Organization
     - Recovery Facilities
     - Major Tasks Onsite
     - Major Tasks Offsite
     - Recovery Schedule, including:
       - Statement on Prioritization Methodology similar to Attachment 6.1 used to Assess/Prioritize/Sequence Recovery Operations
       - Short Term Prioritized Recovery Plan (7 Days) Detailed, Resource Loaded Gantt Chart
       - Long Term Prioritized Recovery Plan (30-90 Day) Detailed, Resource Loaded Gantt Chart
   - Attachments

3. Members of the Recovery Phase Task Force should be assigned to:

   a. Perform a preliminary assessment of the event in order to draft the Introduction/Event Description section of the Recovery Phase Operational Plan.

   b. Perform a detailed analysis of the event including as a minimum:

      - Establishing pertinent initial conditions prior to the start of the event,
      - Preparing a detailed chronology of the event, and
      - Performing a root cause analysis (guidance can be found in PPM 1.3.48, Root Cause Analysis).

RECOVERY PHASE OPERATIONAL PLAN DEVELOPMENT GUIDELINES (Contd.)

4. The initial goals of the Recovery Phase Operational Plan should include:

   NOTE: The Recovery Phase Operational Plan goals should support the primary goal of the State and Local Recovery Plan to take those actions which are necessary to compensate, relocate, or permit the return of members of the public who had been evacuated or otherwise affected by the event.

   a. To restore the Plant to an operational preemergency condition.

   OR

   b. To place the Plant in a safe, long-term shutdown condition.

5. The initial objectives of the Recovery Phase Operational Plan should include the following:

   a. The determination of the extent of the damage to equipment and plans to restore and maintain equipment necessary for plant safety.

   b. The necessity for installation of additional radiation shielding.

   c. The necessity for placement of additional rope barriers and signs, including the need to redefine or extent the boundaries of the Radiological Controlled Area (RCA).

   d. The identification of areas and methods for performing decontamination.

   e. The identification of the necessary cleanup that will be required to place the Plant in an acceptable long-term condition.

   f. The ability to keep the news media and the public informed of actions and progress being made during the recovery.

6. Criteria should be developed to indicate how each objective will be accomplished and at what time it will be considered complete.

7. A Recovery Organization chart should be included along with a description of the responsibilities of the key individuals involved (refer to Attachment 6.4).

8. A description of the recovery facilities should be included, along with the identification of the major activities being performed at each facility.

NOTE: If the description of a major onsite task requires extensive discussion or detailed drawings (e.g., installation of an independent or backup support system), a summary of the task should be provided in the body of the Plan with the details provided in an attachment following the last section of the Plan.

9. A description of the major tasks to be accomplished onsite should list all surveillance, equipment repair, procedure development, report writing, etc., that must occur along with the individual or group assigned to accomplish it.

NOTE: If a reentry activity requires extensive discussion or detailed drawings (e.g., entry into a contaminated Containment Building), a summary of the reentry should be provided in the body of the Plan with the details provided in an attachment following the last section of the Plan. The quarantine of equipment should be coordinated with the NRC's Augmented Inspection Team.

10. A list of those areas that have been restricted or quarantined as a result of the emergency should be provided, along with descriptions of how reentry will be accomplished for each situation.

NOTE: If the description of a major onsite task requires extensive discussion or detailed drawings (e.g., installation of an independent or backup support system), a summary of the task should be provided in the body of the Plan with the details provided in an attachment following the last section of the Plan.

11. A description of the major tasks to be accomplished onsite should list all field surveys, disposition of contaminated properties and/or foodstuffs, procedure development, report writing, etc., that must occur along with the individual or group assigned to accomplish it.

12. A list of those offsite areas that have been evacuated and/or contaminated as a result of the emergency should be provided, along with a discussion of how this may or may not impact the onsite recovery efforts, including access requirements to the site for each situation.

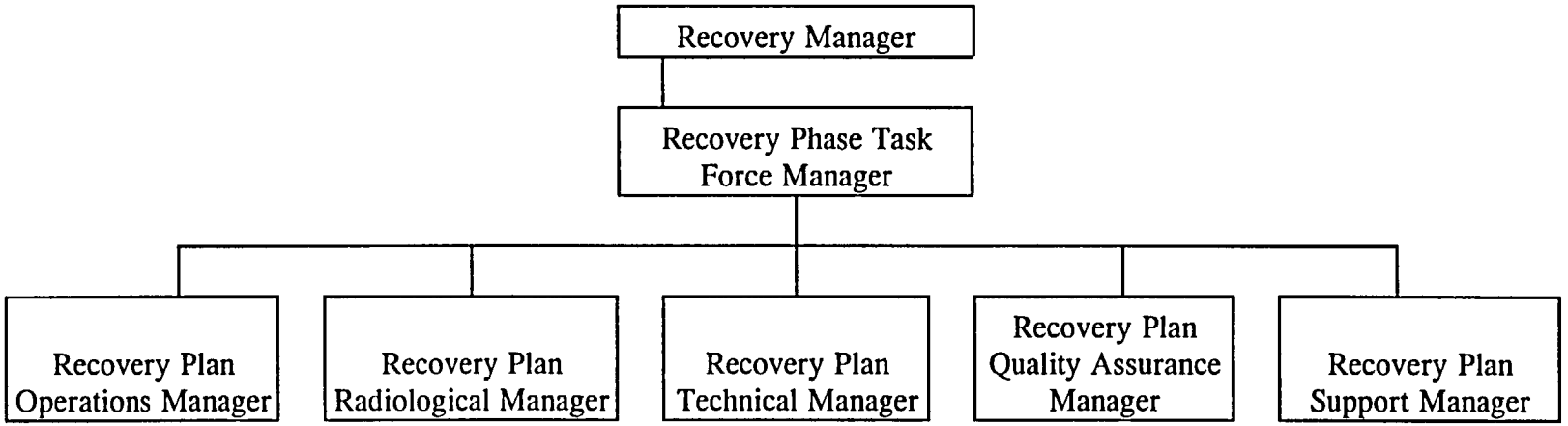
13. An overview should be provided of the methods to be used to interface the recovery efforts with the standard site procedures that normally are used to handle significant Plant events (such as SWP-CAP-01, Problem Evaluation Request; PPM 1.1.8, Incident Review Board; SWP-OPS-05, Restart Evaluation Process).

14. A description of the overall schedule of events shall be provided in the Recovery Phase Operational Plan, including:

    a. Expected start and completion dates of major tasks (supported by resource loaded Gantt Charts if possible).

    b. Identification of when periodic updates or meetings will be conducted for state, county, federal officials, and the news media.

RECOVERY TASK FORCE ORGANIZATION CHART



Areas of Oversight Responsibilities:

Production Scheduling	Environmental	Fuels	Commitments	Procedures
Safety	Decon	Licensing	Reviews	Scheduling
Maintenance	Restoration HP	Vendors	Oversight	Finance
Security (Plant)	Radwaste	Analysis	Qualifications	Public Relations
OPS	Surveys	Plant Support		Legal
Shutdown Safety				Site Support
				Procurement
				Add'l Staffing

NOTE: The NRC will be invited to participate in this task force as deemed appropriate.

13.13.3

ENERGY NORTHWEST		USE CURRENT REVISION
COLUMBIA GENERATING STATION PLANT PROCEDURES MANUAL		
PROCEDURE NUMBER *13.13.3	APPROVED BY JLP for JEW - Revision 15	DATE 10/16/02
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1.0 PURPOSE

This procedure describes MUDAC operations for the intermediate phase of emergency response. This procedure provides direction for evaluating post accident radiological conditions and for developing recommendations that lead to protection of the public from chronic radiation exposure and return of population to unaffected areas.

2.0 REFERENCES

2.1 FSAR, Chapter 13.3, Columbia Generating Station Emergency Plan

2.2 Washington State Fixed Nuclear Facility Emergency Response Plan

2.3 Radiological Emergency Response Plan and Procedures (WA DOH documents)

2.4 Oregon Columbia Generating Station Emergency Response Plan

2.5 Oregon State Health Division Response Procedures for Radiation Emergencies

2.6 PPM 13.2.1, Emergency Exposure Levels/Protective Action Guides

2.7 PPM 13.2.2, Determining Protective Action Recommendations

2.8 PPM 13.8.1, Emergency Dose Projection System Operations

2.9 PPM 13.9.1, Environmental Field Monitoring Operations

2.10 PPM 13.9.5, Environmental Sample Collection

2.11 EPA 400-R-92-001, Manual of Protective Action Guides and Protective Guides and Protective Actions for Nuclear Incidents, October 1991.

2.12 Cooper, J., Goevelinger, N., "A Methodology to Allow the Rapid Development of Post-Plume Protective Action Recommendations for the Ingestion Pathway", Lessons Learned from the 1991 Trojan Nuclear Plant Post-Emergency Exercise, 2nd Edition, April 1993; Oregon Department of Energy, Oregon State Health Division, Columbia County Oregon Emergency Services.

2.13 Intermediate Phase Duties Checklist, Part 1, Transfer of Leadership, 25975

2.14 Intermediate Phase Duties Checklist, Part 2, Dose Assessment Coordinator, 25978

2.15 Intermediate Phase Duties Checklist, Part 3, Dose Assessor, 25980

2.16 Intermediate Phase Duties Checklist, Part 4, Field Team Coordinator, 25981

2.17 Berkey, J., Cowley, R., DOH White Paper "Defining the Methodology for Developing a Food Control Area Boundary for Radiological Emergencies", August 2001.

3.0 DISCUSSION

During the intermediate phase, offsite activities focus on relocation and return, and ingestion (food control) concerns. The Washington State staff in the EOF should at this time assume leadership from Energy Northwest for MUDAC and EOF offsite operations in the following roles; a Washington State Health Liaison, a Washington State Dose Assessment Coordinator, a Washington State Field Team Coordinator, a Washington State Dose Assessor, and a Protective Actions Decision Group (PADG) Chairperson. The PADG Chairperson is normally the Dose Assessment Coordinator but may be any individual appointed by the PADG. If the State of Oregon is affected, then a representative(s) from the State of Oregon may respond to the EOF and assist in this process for the State of Oregon.

The first objective of field monitoring is to determine not only contaminated areas but also those areas not affected by plume deposition. Existing field data may provide verification of unaffected upwind areas. Allowing displaced people to return to their homes is a high priority. As soon as field data verifies the clearly unaffected, evacuated, or sheltered areas, the MUDAC may issue an initial Return PAR.

An Isopleth Survey Plan provides the blueprint to obtain data to characterize "clean" or unaffected areas, the Relocation Area and the Food Control Area. The amount of time required to complete the field team monitoring depends on extent of the land area affected, the number of available field teams and the levels of contamination. When the data acquisition from the Isopleth Survey Plan is complete and has been plotted on a map, several actions occur concurrently in the MUDAC; a Relocation isopleth is drawn (if applicable), a Revised Return PAR may be developed, approved and issued. The food control isopleth is calculated and/or projected. The Interim sampling plan is drawn up and initiated while the Food Control PAR is developed, approved and issued, and the recommendation may also be made to reopen affected transportation corridors.

After the Relocation Boundary and Food Control Boundary are decided by the county and received in the MUDAC, the Sampling Plan is developed to verify the food control boundary and identify via laboratory analyses, quantitative levels of radionuclides, if any, in milk, pasture, agricultural crops and products, water and/or soil. The laboratory analyses provide the technical basis for agricultural embargoes, total population dose assessment and reduction of the food control boundary. The Sampling Plan is a living document which may be revised and added to obtain the level of comprehensive coverage desired.

4.0 DEFINITIONS

4.1 Relocation Area - is a geographical area where ground deposition levels would expose a resident to greater than 2 rem during the first year following the accident; greater than 0.5 rem during the second year; or more than 5 rem TEDE over 50 years. (This is synonymous with the Environmental Protection Agencies "Restricted Zone" as defined in EPA-400-R-92-001.) Access to the Relocation Area is controlled. Residents not previously evacuated from these areas are relocated if their calculated dose will exceed these guidelines.

- Relocation Area = Relocation Isopleth + buffer

4.2 Food Control Area - A geographical area in which food control measures may be implemented. Measures are enacted due to potential or actual contamination of food products above State intervention levels. The food control area includes the relocation area, if a relocation decision is appropriate.

- Food Control Area = Food Control Isopleth + buffer

4.3 Food Control Isopleth - The calculated and/or projected isopleth used to determine the food control area.

4.4 20 microR/hr Isopleth - A measurable reference isopleth used to calculate the Food Control Isopleth.

4.5 Relocation Isopleth - The measured isodose line used to determine the relocation area.

4.6 Relocation Boundary - A geo-political designation which defines and surrounds the Relocation area and includes a buffer area. Residents will be relocated from this area to avoid chronic radiation exposure.

4.7 Food Control Boundary - A geo-political designation which defines and surrounds the Food Control area, where food control measures may be implemented.

4.8 Protective Action Decision Group (PADG) - Technical group of Dose Assessment experts assigned by Washington State, DOE-RL and when applicable, State of Oregon. The PADG Chairperson is normally the Dose Assessment Coordinator.

4.9 Radioactive Hot Spot(s) - Areas radioactively contaminated to levels exceeding relocation or food control limits that are outside of the already established Relocation or Food Control Areas.

4.10 Dispersed Plume - A dispersed plume is one that can no longer be located in air, and has ceased to make a contribution to the groundshine dose component by deposition.

5.0 PREREQUISITES

MUDAC operations officially enter the intermediate phase when the plant has stabilized to the point that no further release that could approach accepted plume exposure Protective Action Guides (PAGs) is expected and plant conditions will have no further impact on offsite protective action decisions.

6.0 PRECAUTIONS AND LIMITATIONS

None

7.0 PROCEDURE

NOTE: The Checklist for Intermediate Phase MUDAC Activities may be used as deemed necessary to track the actions that have been accomplished. It is a controlled form.

7.1 Transfer of MUDAC Leadership

7.1.1 The transfer of MUDAC Leadership occurs after the radiological conditions move from the plume (early release) to the ingestion pathway (intermediate phase) and the Emergency Operations Facility (EOF) Manager verifies the following conditions:

a. Plant conditions stabilize, and 1) no further release threat exists that could exceed the plume exposure PAGs, and 2) Plant conditions will no longer have an effect on offsite protective action decision making.

b. The plume has dispersed and it no longer poses a threat that could approach the plume exposure PAGs.

7.1.2 Energy Northwest formally transfers lead offsite responsibility to the State of Washington when:

a. The Radiological Emergency Manager (REM) has provided documentation and status for all previously issued Protective Actions Recommendations (PARS) to the Washington State Dose Assessment Coordinator, and

b. The REM briefs and turns over leadership responsibility to the Washington State Dose Assessment Coordinator for all MUDAC activities, and

c. The REM assures continued Energy Northwest technical, administrative, and field monitoring support for ingestion pathway actions, and

d. The REM and the EOF Manager brief and turn over leadership responsibility to the State Health Liaison for all offsite activities.

7.1.3 Energy Northwest assumes a support role with continued availability of qualified MUDAC staff. The REM is the EOF Manager's representative for offsite radiological matters and for coordination with onsite activities. If the ingestion pathway threat involves the State of Oregon, a representative from Oregon may join the Protective Action Decision Group in MUDAC and participate in development of protective action recommendations.

7.1.4 The State Health Liaison and EOF Manager brief the EOF staff on the transfer of leadership.

7.1.5 The State Health Liaison or EOF Manager notifies the State and affected County Emergency Operations Centers (EOCs) when the transfer of leadership occurs.

7.1.6 The State Health Liaison coordinates requesting the following resources:

a. Washington State Agriculture Representative be dispatched to MUDAC, if not already present.

b. FRMAC (Federal Radiological Monitoring and Assessment Center) assets, in accordance with DOH procedures, if not previously requested.

7.1.7 The Field Team Coordinator contacts the Washington State Lab Liaison at the Public Health Lab (206-361-2891) to verify contact with all sample laboratories to:

a. Confirm contact phone and fax numbers.

b. Provide alternate lab locations or addresses.

c. Review the expected distribution of sample analysis data.

7.1.8 The Field Team Coordinator or designee coordinates sample transfer operations from the field and transfer locations to laboratories. Consider logistics for all parties involved as well as radiological and weather conditions.

7.2 Initial Return Protective Action Recommendations (PARs) for Radiologically Unaffected Areas

7.2.1 The PADG evaluates the feasibility of recommending the release of clearly unaffected areas previously evacuated or sheltered.

Consider the following:

a. Other available meteorological data: US DOE Hanford site; Richland Airport; Pasco Airport, etc.

b. Available upwind field team monitoring data.

c. Initial return should be considered only if sufficient data is available to verify unaffected areas. The Initial Return PAR should be initiated only when sufficient data supports the recommendations.

d. Discontinue sheltering.

e. Open air space and Columbia River corridors using the Reopening of the Transportation Corridor Recommendation, Attachment 8.8.

f. Status of roads in areas marked for the initial return and roads that may be used for access to return areas.

7.2.2 The PADG completes and concurs with the Initial Return PAR, Attachment 8.1.

7.2.3 The Dose Assessment Coordinator approves the Initial Return PAR.

7.2.4 The Dose Assessment Coordinator briefs the State Health Liaison the REM, and the affected state and county representatives.

7.2.5 The Dose Assessment Coordinator or State Health Liaison will conduct periodic briefings of the facility staff, including PAR disposition, utilizing guidance contained in Update Briefing Guide, Attachment 8.12.

7.2.6 The State Health Liaison ensures transmission of the Initial Return PAR to the State/County Emergency Centers and the Joint Information Center, and verifies receipt of the PAR package.

7.2.7 If incorrect information is issued, a written correction shall be distributed to all of the original recipients, and receipt of the correction verified.

7.3 Isopleth Survey Plan Development

7.3.1 The PADG assisted by the Field Team Coordinator, develops the "Isopleth Survey Plan" (Attachment 8.2). The plan designates the geographical areas where field teams will monitor to identify the 500 microR/hr (gross) and 20 microR/hr (gross) isopleths. Refer to Attachment 8.13 for hot spot management.

Consider the following:

a. Obtain a dose projection map depicting the 10 μR (net) and 500 μR (gross) line ground shine exposure lines per PPM 13.8.1, Attachment 5.1.

b. Projected and actual field team monitoring data of plume travel paths.

c. The number of available field teams and their present locations and mission.

d. Minimize the number of teams assigned to monitor known contaminated areas.

e. Laboratory analysis of plume air samples.

7.3.2 The Dose Assessment Coordinator reviews and approves the Isopleth Survey Plan.

7.3.3 The Dose Assessment Coordinator provides the Isopleth Survey Plan to the Field Team Coordinator for implementation.

7.3.4 The Dose Assessment Coordinator briefs the State Health Liaison and the REM.

7.4 Isopleth Survey Plan Implementation

7.4.1 The Field Team Coordinator assigns and directs the field teams to specified areas to identify gross 500 microR/hr and gross 20 microR/hr isopleths. The readings should be based on waist high, closed window readings. The Field Team Coordinator needs to consider the following points when making assignments:

a. Keep the number of teams assigned to determine the relocation area to a reasonable minimum because of contamination.

b. The Field Team(s) assigned to locate the 500 microR/hr isopleth should not be the same Team(s) assigned to locate the 20 microR/hr isopleth. If resources permit, teams should be instructed to approach the assigned isopleth until the 500 microR/hr or 20 microR/hr reading is registered, then retreat to lower contamination levels to begin the next survey track.

NOTE: Transmit and receive field team and sampling locations using latitude and longitude readings. Use map grid coordinates when Global Positioning System (GPS) is not available. Supplement location descriptions with geo-political landmarks to clarify locations.

c. The Field Teams and Field Team Dispatcher will use the Isopleth Survey Log, Attachment 8.6, to document field team data.

7.4.2 The Field Team Coordinator ensures that field team data is plotted properly on the map(s) and verifies any questionable information. Ensure that background readings are noted when plotting data.

7.4.3 The Field Team Coordinator will update the PADG on field data and information from evacuated areas not yet released for return.

7.5 Constructing the Relocation Area Isopleth

7.5.1 The Field Team Coordinator ensures incoming isopleth field data points are plotted and labeled on the appropriate map. The Field Team Coordinator may request additional monitoring in areas of uncertainty or where data is lacking.

7.5.2 The emergency dose assessor plots the 500 μR/hr field team isopleth survey data points on the map using Street Atlas. Refer to Attachment 8.14.

7.5.3 Once sufficient points are plotted, the Dose Assessor or designee draws the isopleth(s) connecting the relocation area (500 microR/hr) data points. Consider the guidelines contained in Attachment 8.13 for hot spot management.

a. The Dose Assessor adds an appropriate buffer zone considering wind, stability class, quantity of field team data available, etc., to form the Relocation Area.

b. The Dose Assessor or designee prepares a map of the Relocation Area for transmission with the Relocation Area PAR paperwork and the associated Revised Return PAR.

7.6 Relocation Area PAR

7.6.1 The PADG prepares a Relocation Area PAR, Attachment 8.4, based on the measured data points, the plotted relocation isopleth and the added buffer zone.

Consider the following:

a. The gamma exposure rate will decrease rapidly if deposited material includes a significant fraction of short-lived radionuclides.

b. Until additional radiological data is available, the relocation isopleth plus buffer zone represents a conservative relocation area and serves as the basis for affected County EOC to determine and the State EOC to endorse the Relocation Boundary.

c. It is essential to complete this task in a timely manner.

d. A relocation area prohibits immediate residency, but may allow local industry and possibly interstate commerce.

7.6.2 The Dose Assessment Coordinator reviews and approves the Relocation PAR package, Attachment 8.4, and attaches the relocation map as prepared in Section 7.5.

7.6.3 The Dose Assessment Coordinator briefs the State Health Liaison the REM, and the affected state and county representatives.

7.6.4 The State Health Liaison ensures transmission of the Relocation PAR to the State/County Emergency Centers, the Laboratory Liaison at the Public Health Laboratory, the Joint Information Center, and the FRMAC (if activated), with receipt verification.

7.6.5 If incorrect information is issued, a written correction shall be distributed to all of the original recipients, and receipt of the correction verified.

7.7 Revised Return PAR

7.7.1 The Dose Assessment Coordinator initiates the Revised Return PAR, Attachment 8.3, based on Relocation Area determination. It is recommended that this PAR be sent with the Relocation PAR paperwork, when the return recommendation is based upon the Relocation PAR map. Refer to Attachment 8.13 for hot spot management guidelines.

7.7.2 The PADG determines those geographic areas that were previously evacuated which exhibit a verified dose of less than 2 rem for the first year.

7.7.3 The PADG completes a Revised Return PAR, Attachment 8.3, and provides a written description of the area(s) released for return in terms of geographic landmarks. If applicable, check "map attached" box. (This means a map is not always required).

7.7.4 The Dose Assessment Coordinator reviews and approves the Revised Return PAR.

7.7.5 The Dose Assessment Coordinator briefs the State Health Liaison the REM, and the affected state and county representatives.

7.7.6 The State Health Liaison ensures the transmission of the Revised Return PAR package to the State/County Emergency Centers and the Joint Information Center and verifies receipt of the PAR package.

7.7.7 If incorrect information is issued, a written correction shall be distributed to all of the original recipients, and receipt of the correction verified.

7.8 Constructing the Food Control Isopleth

7.8.1 The Dose Assessor constructs the Food Control Isopleth as follows:

a. The emergency dose assessor plots the 20 μR/hr field team isopleth survey data points on the map using Street Atlas. Refer to Attachment 8.14.

b. Draw an isopleth connecting the 20 microR/hr data points when sufficient points are plotted on the ingestion map. Consider the hot spot management guidance in Attachment 8.13 when performing this step.

c. Construct a minimum of five to seven radial lines originating from the accident release site (more frequently for complex patterns), and extend the lines through the 20 microR/hr isopleth.

d. Determine d_1 as the distance from the source (point of release) to the intersect of the Relocation Isopleth (500 microR/hr) and d_2 as the distance from the source to the intersect of the 20 microR/hr isopleth.

NOTE: The following reference to values of d_3 in Attachment 8.5 is only valid for the initial calculation based on the default Food Control Boundary (FCA) value of 0.4 microR/hour. Subsequent calculations will be based on laboratory analysis and may vary significantly from the default.

NOTE: The 0.4 microR/ hr points for the food control isopleths are generated from a centerline dose extrapolation equation. Radial lines drawn off the centerline may overestimate the distance to the 0.4 microR/ hr line. To minimize this overestimation avoid radial lines where the angle of the line creates an exaggerated distance between the 50 microR/ hr line and the 20 microR/ hr line.

e. Determine the value of d_3 using the values contained in Attachment 8.5. Skip to step 7.8.1.h. Otherwise, continue with step 7.8.1.f.

f. Alternately, determine the value of "x" using equation 1 (see equations for calculating the Food Control area) and proceed to Step 7.8.1.g.

g. Using Equation 2, calculate the location of the Food Control isopleth points. Use this calculated point as the center line point. Then using the same value of "x," calculate the location for each of the remaining radial lines using their respective d_1, d_2 distances.

h. Plot and draw the food control area isodose rate line.

i. For areas within the State of Washington, add an appropriate buffer area considering EDPS and the quantity of field team data available, etc. For areas within the State of Oregon, do not specify any additional buffer areas.

j. The Dose Assessor prepares a map of the Food Control Area (Isopleth plus buffer zone).

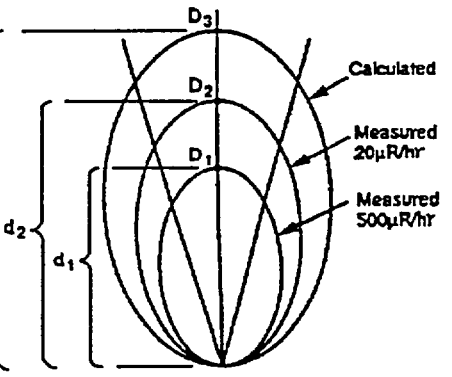
k. The Dose Assessor labels the FCA map with a specific dose rate prior to sending the map to the State and Counties EOCs.

ALTERNATE METHOD

Equations for Calculating the Food Control Area

Equation 1: $x = \dfrac{\ln ((D_2-10)/D_1)}{\ln (d_1/d_2)}$

Equation 2: $d_3 = d_2 \left[\dfrac{D_3}{D_2-10}\right]^{-\frac{1}{x}d_3}$



Where:
D_1 = Dose rate (500 microR/hr)
d_1 = Distance from source to D_1
D_2 = Dose rate (20 microR/hr)
d_2 = Distance from source to D_2
D_3 = Dose rate (0.4 microR/hr)
d_3 = Distance from source to D_3
x = Constant related to atmospheric conditions

7.9 Food Control Area PAR

7.9.1 The Dose Assessment Coordinator initiates the preparation of a Food Control Area PAR based on the recommended food control isopleth developed by the Dose Assessor.

7.9.2 The PADG prepares Food Control Area PAR paperwork using Attachment 8.7 and attaches the Food Control Isopleth map developed in Section 7.8.1.

7.9.3 The Dose Assessment Coordinator reviews and approves the PAR package.

7.9.4 The Dose Assessment Coordinator briefs the State Health Liaison the REM, and the affected state and county representatives.

7.9.5 The State Health Liaison ensures transmission of the Food Control Area PAR paperwork to the State/County Emergency Centers, the Laboratory Liaison at the Public Health Laboratory, the Joint Information Center, and the FRMAC (if activated), with receipt verification.

7.9.6 The State Health Liaison informs the EOF of PAR disposition.

7.9.7 If incorrect information is issued, a written correction shall be distributed to all of the original recipients, and receipt of the correction verified.

7.10 Re-opening Transportation Corridor Recommendation

7.10.1 The PADG determines what transportation corridors are located entirely or partially within the recommended relocation area.

7.10.2 The PADG evaluates available radiological data from along the corridors.

7.10.3 The Field Team Coordinator obtains additional radiological data from the field teams, if necessary to adequately assess the situation.

7.10.4 The PADG assesses the situation and recommends action(s) to facilitate transportation corridor use, e.g., additional field sampling if more data is needed, restricting only portions of the corridor to traffic flow, etc.

7.10.5 The PADG completes a Reopening Transportation Corridor Recommendation (Attachment 8.8) and considers the following:

a. Release all transportation corridors in unaffected areas.

b. Reopen the airspace (if closed) and river to unrestricted use once the plume has dissipated. Contact the REM for this information, if needed.

c. Other than the river and airspace, do not reopen any transportation corridor for restricted or unconditional use until the Dose Assessment Coordinator has issued the Relocation PAR.

d. Be aware that the Relocation Boundary set by the county may include transportation corridors not previously identified in the Relocation Area determined by MUDAC.

e. Reopen a transportation corridor to unrestricted use only when the recommended relocation area does not encompass any part of the transportation corridor.

f. Boats docked or moored within the recommended relocation area should be surveyed prior to leaving. If contamination is found, the field team member conducting the survey should contact the Field Team Coordinator for further instructions.

7.10.6 The Dose Assessment Coordinator reviews and approves the reopening of the Transportation Corridor Recommendation, Attachment 8.8.

7.10.7 The Dose Assessment Coordinator briefs the State Health Liaison the REM, and the affected state and county representatives.

7.10.8 The State Health Liaison ensures transmission of the Transportation Corridor PAR to the State/County Emergency Centers and the Joint Information Center, and verifies receipt of the PAR package.

7.10.9 If incorrect information is issued, a written correction shall be distributed to all of the original recipients, and receipt of the correction verified.

7.11 Interim Sampling Plan

The Field Team Coordinator determines and assigns the Interim Sampling Plan, Attachment 8.9, when the Monitoring Plan is complete and the Relocation and Food control PARs have been issued, but not yet decided upon. This is an opportunity to obtain additional data to get an overall "thumb-nail sketch" of the affected area, isolated "hot spots", areas of concern, areas upwind, or areas where data has yet to be collected. The Interim Sampling Plan does not require a PAR. Obtain input from the Washington State Department of Agriculture and/or County Agriculture Representatives.

The Interim Sampling plan is a broad based, generalized information sweep. This plan relies on the field teams to carry out any of the following requests from MUDAC:

- General Area dose rates
- General deposition readings
- Hot spots and other areas of concern
- Deposition in soil
- Deposition on pasture grass
- Clean Area Survey (Negative data)
- Collection and replacement of environmental thermoluminescent dosimeters (TLDs)
- Collection of air samples in areas where re-suspension is suspected
- Surveys/smears of contaminated road and rail surfaces, and vehicle filters
- Collection of samples, e.g. "Hot" samples, etc.
- Other duties as requested

7.11.1 The Field Team Coordinator directs a field team to obtain a soil and/or vegetation sample from a highly contaminated location for source term evaluation.

7.11.2 The Field Team Coordinator arranges distributions to appropriate laboratories with the Laboratory Liaison.

7.11.3 The Field Team Coordinator or designee coordinates sample transfer operations from the field and transfer locations to laboratories.

a. Sample transfer locations may vary due to radiological conditions and sampling locations. (Consider Emergency Worker Assistance Centers (EWACs) and other easily accessible locations.)

b. Ensure the area reads background and that no contamination is present.

7.11.4 The Field Team Coordinator assigns the field teams to geographical areas to obtain general dose rate and deposition readings, and to take soil, vegetation and air samples as appropriate.

7.11.5 The Field Team Coordinator instructs the teams to report their data every hour, or as appropriate.

7.12 Detailed Sampling Plan

7.12.1 The second phase of the sampling plan is more formal and is developed after the relocation and food control boundaries are approved. The PADG with the assistance of the Washington State Department of Agriculture and the Field Team Coordinator develop the Detailed Sampling Plan, Attachment 8.10.

a. The Washington State Department of Agriculture agents and/or the County Extension Agents provide information on crops in harvest and farm locations inside and outside the Food Control Boundary.

b. The DOH Drinking Water staff provides locations of any potentially affected open drinking water supplies to the PADG.

c. The Field Team Coordinator will assign sampling points nearest to the Food Control boundary, working in toward the center and outward from the boundary to verify clean areas and appropriate boundary placement.

d. The Field Team Coordinator notifies the Laboratory Liaison of the estimated time of arrival and the number of samples for analysis.

e. The Field Team Coordinator or WA dose assessment staff is the point of contact for all in-coming laboratory analyses.

7.12.2 The PADG with the assistance of the Washington State Department of Agriculture and the Field Team Coordinator establish the sample collection priorities and locations.

Considering the following:

a. Begin sampling of foodstuffs and open sources of drinking water supplies as soon as possible following passage of the plume.

b. Begin routine milk monitoring 12 to 18 hours after plume passage.

c. Sample and monitor the most perishable crops first.

d. Sample harvested food ready for market before other foodstuffs and crops requiring harvest within 30 days.

e. Sampling of above ground crops should have priority over root crops.

7.12.3 The Field Team Coordinator and PADG should select broad based, general monitoring and/or sampling locations.

7.12.4 The Field Team Coordinator or designee records the coordinates of these sampling locations for the Detailed Sampling Plan, Attachment 8.10.

7.12.5 The PADG reviews and assembles the pages of the Detailed Sampling Plan for completeness and presents it to the Dose Assessment Coordinator.

7.12.6 The Dose Assessment Coordinator reviews the Detailed Sampling Plan with the PADG to ensure it adequately addresses all credible short-term potential direct exposure and ingestion pathways.

7.12.7 The Dose Assessment Coordinator approves and signs the Detailed Sampling Plan.

7.12.8 The Dose Assessment Coordinator provides the approved Detailed Sampling Plan to the Field Team Coordinator for implementation in accordance with Step 7.13.

7.12.9 The Dose Assessment Coordinator briefs the State Health Liaison the REM, and the affected state and county representatives.

7.12.10 The State Health Liaison should ensure that a copy of the Detailed Sampling Plan is transmitted to the Health Physicist (HP) at the State EOC, the DOH Laboratory Liaison, the FRMAC Liaison (if applicable), and the County EOCs with receipt verification.

7.12.11 The PADG, with Department of Agriculture assistance, updates the sampling plan as needed:

a. Incorporates appropriate feedback received from the HP at the State EOC; the DOH Laboratory Liaison; the Dose Analyst at the Oregon EOC; the FRMAC Liaison (if applicable); and County EOCs, into the Detailed Sampling Plan.

b. Provides updates and revisions as approved to the Field Team Coordinator for immediate implementation.

c. Periodically updates the plan to accommodate unexpected data results, meteorological conditions.

d. Provides copies of periodic revisions to the DOH Laboratory Liaison; the HP at the State EOC; the Dose Analyst at the Oregon EOC; the FRMAC Liaison (if applicable); and county EOCs. Incorporate appropriate feedback from these agencies into revisions of the Detailed Sampling Plan.

7.13 Detailed Sampling Plan Implementation

7.13.1 To implement the "Sampling Plan" the Field Team Coordinator performs the following:

a. Assigns and dispatches field teams to selected monitoring and/or sampling locations. Instruct field teams to collect specified samples from assigned locations and call in their information.

b. Confirms the arrangements made for transporting samples from transfer locations to laboratories using one or more of the following:

- Washington State Patrol
- Local Sheriff's office
- National Guard
- FRMAC
- others, as available

c. Reviews personnel and equipment resources available for monitoring, sampling, and analysis. Advise the Dose Assessment Coordinator of any needs.

7.13.2 The Field Team Dispatcher or designee logs the field team data on a Sample Data and Analysis Summary (Attachment 8.11) as follows; the sample tag number, the field team designation, the location in grid coordinates plus any other designation. Also check the sample type, recording only one type of sample per line. Record the time that the sample was taken, the area dose rate and the deposition reading.

7.13.3 The Field Team Coordinator plots the sample location using sequentially numbered color discs and marks the correlating disc number on the Sample Data and Analysis Summary (Attachment 8.11) in the first column on the same line with the sample information.

7.13.4 The Field Team Coordinator and PADG identify locations for boundary adjustments based on dose rates or where additional sampling is necessary.

7.13.5 The PADG initiates revised PARs when appropriate. (See Relocation, Return and Food Control PARs.)

7.13.6 The Field Team Coordinator briefs the PADG on the results of the field team dose rate and deposition data.

7.13.7 If incorrect information is issued, a written correction shall be distributed to all of the original recipients, and receipt of the correction verified.

7.14 Revising the Relocation Area Based Upon Laboratory Analysis Data

The Relocation Area was initially determined using field team readings. Once sufficient lab results from soil samples are available, MUDAC must reevaluate the affected area. Once the initial Relocation Area has been established, evaluation of laboratory analysis of ground deposition in and around the Relocation Area can be done to assess the actual isotopic mix of the deposition. This mix is used to more accurately determine the area where the public may be exposed to levels exceeding EPA PAGs and revise the Relocation Area.

The PADG reviews the results of laboratory analyses of ground deposition samples from in and around the Relocation Area for consistency and to determine if they have an adequate number of samples to assure confidence in the revised the Relocation Area.

7.14.1 Enter isotopic concentration for each deposition sample (in pCi/m2 units) into the "GROUNDSHINE" excel spread sheet (column B, rows 11 through 23). Results should be read from the "Without Weathering" table, cell G-56.

7.14.2 Groundshine calculation results will be entered on the Sample Data and Analysis Summary form, Attachment 8.11, as time permits. If any exposures are greater than or equal to the first year PAGs, consider the need for relocation of residents, pets, or livestock. If any exposures are greater than or equal to the second year or 50 year PAGs, consider possible mitigation actions.

7.14.3 Record 'Sample Number', location, and mR/hr value from cell G-56 for each sample on Attachment 8.16.

7.14.4 Use the most restrictive (lowest) mR/hr value from the table as the new Relocation Area isodose line.

7.14.5 The Field Team Dispatcher should dispatch field teams into the Relocation Area to identify the locations for the new isodose line and to report the locations of these points back to the Field Team Coordinator.

7.14.6 The Field Team Coordinator ensures incoming isopleth field data points are plotted and labeled on the appropriate map. The Field Team Coordinator may request additional monitoring in areas of uncertainty or where data is lacking.

7.14.7 The emergency dose assessor plots the revised field team isopleth survey data points on the map using Street Atlas. Refer to Attachment 8.14.

7.14.8 Once sufficient points are plotted, the Dose Assessor or designee draws the isopleth(s) connecting the revised relocation area data points. Consider the guidelines contained in Attachment 8.13 for hot spot management.

a. The Dose Assessor does not need to add a buffer zone to form the Relocation Area since no weathering was considered in determining the revised value.

b. The Dose Assessor or designee prepares a map of the Relocation Area for transmission with the Relocation Area PAR paperwork and the associated Revised Return PAR.

7.14.9 The Dose Assessment Coordinator reviews and approves the Relocation PAR package, Attachment 8.4, and attaches the relocation map as prepared in Section 7.5.

7.14.10 The Dose Assessment Coordinator briefs the State Health Liaison, the REM, and the affected state and county representatives.

7.14.11 The State Health Liaison ensures transmission of the Relocation PAR to the State/County Emergency Centers, the Laboratory Liaison at the Public Health Laboratory, the Joint Information Center and the FRMAC (if activated), with receipt verification.

7.14.12 If incorrect information is issued, a written correction shall be distributed to all of the original recipients, and receipt of the correction verified.

7.15 Revising the Food Control Area Based Upon laboratory Analysis Data

The Food Control Area was initially determined using field team readings. Once sufficeint lab results from samples of milk and food are available, MUDAC must reevaluate the affected area.

The largest contributors in the Food Control lab results will probably be from four isotopes: I-131, Cs-134 & Cs-137 (grouped together), and Sr-90. (Sr-90 results may not be immediately available from the laboratory.) Concentrations of other isotopes will be calculated by the labs and reported to MUDAC but the Dose Assessors primary focus should be on these four isotopes.

Ratios for all isotopes are determined by dividing the lab result by the corresponding Derived Intervention Level (refer to Attachment 8.15). If any one of the ratios for a specific sample is ≥ 1, interdiction of all food in that area should continue. The ratios of Washington State DILs are used independently except as indicated in Attachment 8.15.

7.15.1 Distribution of lab sample analyses data is as follows:

a. Original to the WA State Dose Assessor

b. Copy to WA State Dose Assessment Coordinator

c. Copy to the WA State Field Team Coordinator

d. Other copies as needed or requested

e. If time allows, the MUDAC staff should consolidate lab sample analysis data and the field team sample data on the Sample Data and Analysis Summary Form, Attachment 8.11.

7.15.2 The Dose Assessor reviews laboratory analyses of samples and identifies samples with activities above the affected state's Derived Intervention Levels found in the Department of Health Procedures for that state.

7.15.3 The dose Assessor also reviews the laboratory analyses for the uniformity of the isotopic mix. If the results are not uniform, take these results into consideration to define the Food Control Area.

7.15.4 The Field Team Coordinator posts the Limiting DIL Ratio for each sample on an ingestion EPZ map. Use different colored symbols to identify less that 1.0 and greater than or equal to 1.0, e.g., less than 1.0 = green dot and greater than or equal to 1.0 = red dot. Identify dot with map disk number.

7.15.5 The State Health Liaison verifies that the data is received by radiological counterparts at the State Emergency Centers.

7.15.6 The Field Team Coordinator and PADG identify locations for boundary adjustments based on sample results, or where additional sampling is necessary.

7.15.7 The PADG prepares PARs to refine, i.e., relax or rescind, existing ingestion PADs as necessary, based on sampling results.

7.15.8 If incorrect information is issued, a written correction shall be distributed to all of the original recipients and receipt of the correction verified.

8.0 ATTACHMENTS

8.1 Initial Return Protective Action Recommendation

8.2 Isopleth Survey Plan

8.3 Revised Return Protective Action Recommendation

8.4 Relocation Area Protective Action Recommendation

8.5 Determining the Value of d (3)

8.6 Isopleth Survey Log

8.7 Food Control Area Protective Action Recommendation

8.8 Reopening of the Transportation Corridor Recommendation

8.9 Interim Sampling Plan

8.10 Detailed Sampling Plan

8.11 Sample and Data Analysis Summary

8.12 Update Briefing Guide

8.13 Hot Spot Management And Control

8.14 Plotting and Transmitting Ingestion Data Points

8.15 Washington State Derived Intervention Levels (DILs)

8.16 Revised Relocation Area Data Worksheet

INITIAL RETURN
PROTECTIVE ACTION RECOMMENDATION

Date _____

The following areas have been evacuated/sheltered. Time _____

Section 1		Section 2		Section 3		Section 4	
evacuated	sheltered	evacuated	sheltered	evacuated	sheltered	evacuated	sheltered
☐ 0 - 2 miles ☐ 2 - 10 miles	☐ 2 - 10 miles	☐ 0 - 2 miles ☐ 2 - 10 miles ☐ Schools	☐ 2 - 10 miles ☐ Schools	☐ 0 - 2 miles ☐ 3A ☐ 3B ☐ 3C	☐ 3A ☐ 3B ☐ 3C	☐ 0 - 2 miles ☐ 2 - 10 miles	☐ 2 - 10 miles

☐ No change at this time

The Protective Action Decision Group Recommends the Following Actions:

☐ SECTION 1	RETURN	DISCONTINUE SHELTERING
0 - 2 MILES	☐	
2 - 10 MILES	☐	☐
Ringold Fishing Area	☐	☐
Wahluke Hunting Area	☐	☐
☐ SECTION 2	RETURN	DISCONTINUE SHELTERING
0 - 2 MILES	☐	
2 - 10 MILES	☐	☐
Schools	☐	☐
☐ SECTION 3	RETURN	DISCONTINUE SHELTERING
0 - 2 MILES	☐	
3A	☐	☐
3B	☐	☐
3C	☐	☐
Horn Rapids Recreational Area and ORV Park	☐	☐
☐ SECTION 4	RETURN	DISCONTINUE SHELTERING
0 - 2 MILES	☐	
2 - 10 MILES	☐	☐

☐ Map attached

Approved by: (signature)
PADG Chairperson/Dose Assessment Coordinator _____

Concurred by: (signature)
WA State Health Liaison _____

Attachment 8.1

ISOPLETH SURVEY PLAN

Date:_____ Time:_____ Page ____ of ____

Field Team	GENERAL LOCATION: Grid/landmarks /Latitude & Longitude	Instructions

Monplan 2

APPROVED:_____ ____/____ DISPATCHED:_____ ____/____

PADG Chairperson/Dose Assessment Coordinator Date/Time FIELD TEAM COORDINATOR Date / Time

Attachment 8.2

REVISED RETURN
PROTECTIVE ACTION RECOMMENDATION Date: _____

The following areas are still evacuated: Time: _____

Section 1	Section 2	Section 3	Section 4
☐ 0 - 2 miles ☐ 2 - 10 miles	☐ 0 - 2 miles ☐ 2 - 10 miles ☐ Schools	☐ 0 - 2 miles ☐ 3A ☐ 3B ☐ 3C	☐ 0 - 2 miles ☐ 2 - 10 miles

☐ No change at this time

The Protective Action Decision Group recommends the following actions:

☐ SECTION 1: RETURN
☐ 0 - 2 miles ☐ 2 - 10 miles
☐ OTHER_____

☐ SECTION 2: RETURN
☐ 0 - 2 miles ☐ 2 - 10 miles ☐ Schools
☐ OTHER_____

☐ SECTION 3: RETURN
☐ 0 - 2 miles ☐ 3A
☐ 3B
☐ 3C
☐ OTHER_____

☐ SECTION 4: RETURN
☐ 0 - 2 miles ☐ 2 - 10 miles
☐ OTHER_____

Approved by: (signature)
PADG Chairperson/Dose Assessment Coordinator_____

Concurred by: (signature)
WA State Health Liaison _____

Map attached ☐

RELOCATION AREA
PROTECTIVE ACTION RECOMMENDATION

Date _____

☐ Initial ☐ Revised

Time _____

☐ Establish/Revise (circle one) the relocation area boundary in accordance with the attached map.

☐ Relocate persons not yet evacuated from the relocation area.

☐ Change the status of those already evacuated from the Relocation Area to relocation status.

☐ Establish access control points around the Relocation Area and limit access to Emergency workers, residents with radiation protection escorts, and persons with temporary Emergency worker status.

Initial PAR Monitoring and Decontamination

☐ Establish monitoring stations at appropriate locations, (e.g., Access Control Points and Emergency Worker/Assistance Centers).

Revised PAR Monitoring and Decontamination

☐ Establish monitoring stations at access control points, and send those requiring decontamination to an Emergency Worker/Assistance Center.

☐ Have all monitoring and decontamination conducted at Emergency Worker/Assistance Centers.

☐ Establish monitoring and decontamination stations at access control points to the Relocation Area.

Initial PAR Dose Tracking

☐ Establish Dose tracking at appropriate locations for any persons entering the relocation area, (e.g. Access Control Points and Emergency Worker/Assistance Centers).

Revised PAR Dose Tracking

☐ Establish Dose tracking at Emergency Worker/Assistance Centers.

☐ Establish dose tracking at access control points.

Other:

☐ Cancel PAR for administering KI to emergency workers.

☐ Terminate the relocation PAR.

Approved by:
PADG Chairperson/Dose Assessment Coordinator _____

Concurred by:
WA State Health Liaison _____

DETERMINING THE VALUE OF d(3)

(d1)	(d2)	(d3)
500 uR/hr	20 uR/hr	0.4 uR/hr
5.0	5.5	5.9
5.0	6.0	7.0
5.0	6.5	8.1
5.0	7.0	9.2
5.0	7.5	10.5
5.0	8.0	11.8
5.0	8.5	13.2
5.0	9.0	14.6
5.0	9.5	16.1
5.0	10.0	17.7
5.0	10.5	19.3
5.0	11.0	21.0
5.0	11.5	22.8
5.0	12.0	24.7
5.0	12.5	26.6
5.0	13.0	28.5
5.0	13.5	30.6
5.0	14.0	32.7
5.0	14.5	34.8
5.0	15.0	37.0
5.0	15.5	39.3
5.0	16.0	41.7
5.0	16.5	44.1
5.0	17.0	46.5
5.0	17.5	49.1
5.0	18.0	51.6
5.0	18.5	54.3
5.0	19.0	57.0
5.0	19.5	59 8
5.0	20.0	62.6
5.0	20.5	65 5
5.0	21.0	68 4
5.0	21.5	71.4
5.0	22.0	74.5
5.0	22.5	77.6
5.0	23.0	80 7
5.0	23.5	84.0
5.0	24.0	87.2
5 0	24.5	90.6

(d1)	(d2)	(d3)
500 uR/hr	20 uR/hr	0.4 uR/hr
5.5	6.0	6.4
5.5	6.5	7.5
5.5	7.0	8.5
5.5	7.5	9.7
5.5	8.0	10.9
5.5	8.5	12.2
5.5	9.0	13.5
5.5	9.5	14.9
5.5	10.0	16.4
5.5	10.5	17.9
5.5	11.0	19.5
5.5	11.5	21.1
5.5	12.0	22.8
5.5	12.5	24.6
5.5	13.0	26.4
5.5	13.5	28.3
5.5	14.0	30.2
5.5	14.5	32.2
5.5	15.0	34.2
5.5	15.5	36.4
5.5	16.0	38.5
5.5	16.5	40.7
5.5	17.0	43.0
5.5	17.5	45.4
5.5	18.0	47.7
5.5	18.5	50.2
5.5	19.0	52.7
5.5	19.5	55.2
5.5	20.0	57.9
5 5	20.5	60.5
5 5	21.0	63.2
5.5	21.5	66.0
5 5	22.0	68.8
5.5	22 5	71.7
5 5	23.0	74.6
5 5	23.5	77.6
5.5	24 0	80.7
5.5	24.5	83.8
5 5	25.0	86.9

(d1)	(d2)	(d3)
500 uR/hr	20 uR/hr	0.4 uR/hr
6.0	6.5	6.9
6.0	7.0	7.9
6.0	7.5	9.0
6.0	8.0	10.1
6.0	8.5	11.3
6.0	9.0	12.6
6.0	9.5	13.9
6.0	10.0	15.2
6.0	10.5	16.6
6.0	11.0	18.1
6.0	11.5	19.6
6.0	12.0	21.2
6.0	12.5	22.9
6.0	13.0	24.6
6.0	13.5	26.3
6.0	14.0	28.1
6.0	14.5	30.0
6.0	15 0	31.9
6.0	15.5	33.8
6.0	16.0	35.9
6.0	16.5	37.9
6.0	17.0	40.1
6.0	17.5	42.2
6.0	18.0	44.4
6.0	18.5	46.7
6.0	19.0	49.1
6.0	19.5	51.4
6.0	20.0	53.9
6.0	20.5	56.3
6.0	21.0	58.9
6.0	21.5	61.4
6.0	22.0	64.1
6.0	22.5	66.8
6.0	23.0	69.5
6.0	23.5	72.3
6.0	24.0	75.1
6.0	24.5	78.0
6.0	25.0	80.9
6.0	25.5	83.9

DETERMINING THE VALUE OF d(3)

(d1)	(d2)	(d3)
500 uR/hr	20 uR/hr	0.4 uR/hr
6.5	7.0	7.4
6.5	7.5	8.4
6.5	8.0	9.5
6.5	8.5	10.6
6.5	9.0	11.8
6.5	9.5	13.0
6.5	10.0	14.3
6.5	10.5	15.6
6.5	11.0	17.0
6.5	11.5	18.4
6.5	12.0	19.9
6.5	12.5	21.4
6.5	13.0	23.0
6.5	13.5	24.6
6.5	14.0	26.3
6.5	14.5	28.1
6.5	15.0	29.8
6.5	15.5	31.7
6.5	16.0	33.6
6.5	16.5	35.5
6.5	17.0	37.5
6.5	17.5	39.5
6.5	18 0	41.6
6.5	18 5	43.7
6.5	19.0	45.9
6 5	19.5	48.2
6.5	20 0	50.4
6.5	20.5	52.7
6.5	21 0	55.1
6.5	21.5	57.5
6.5	22.0	60.0
6.5	22.5	62.5
6.5	23.0	65.1
6.5	23.5	67.7
6.5	24.0	70.3
6.5	24.5	73.0
6.5	25.0	75.7
6.5	25.5	78.5
6.5	26.0	81.4

(d1)	(d2)	(d3)
500 uR/hr	20 uR/hr	0.4 uR/hr
7.0	7.5	7.9
7.0	8.0	8.9
7.0	8.5	10.0
7.0	9.0	11.1
7.0	9.5	12.2
7.0	10.0	13.4
7.0	10.5	14.7
7.0	11.0	16.0
7.0	11.5	17.3
7.0	12.0	18.7
7.0	12.5	20.1
7.0	13.0	21.6
7.0	13.5	23.2
7.0	14.0	24.8
7.0	14.5	26.4
7.0	15.0	28.1
7.0	15.5	29.8
7.0	16.0	31.6
7.0	16.5	33.4
7.0	17.0	35.3
7.0	17.5	37.2
7.0	18.0	39.2
7.0	18.5	41.2
7.0	19.0	43.2
7.0	19.5	45.3
7.0	20.0	47.4
7.0	20.5	49.6
7.0	21.0	51.9
7.0	21.5	54.1
7.0	22.0	56.4
7.0	22.5	58.8
7.0	23.0	61.2
7.0	23 5	63.7
7.0	24 0	66.1
7.0	24.5	68.7
7.0	25.0	71.3
7.0	25.5	73.9
7.0	26.0	76.5
7.0	26.5	79.2

(d1)	(d2)	(d3)
500 uR/hr	20 uR/hr	0.4 uR/hr
7.5	8.0	8.4
7.5	8.5	9.4
7.5	9.0	10.5
7.5	9.5	11.5
7.5	10.0	12.7
7.5	10.5	13.8
7.5	11.0	15.1
7.5	11.5	16.3
7.5	12.0	17.7
7.5	12.5	19.0
7.5	13.0	20.4
7.5	13.5	21.9
7.5	14.0	23.4
7.5	14.5	24.9
7.5	15.0	26.5
7.5	15.5	28.2
7.5	16.0	29.8
7.5	16.5	31.6
7.5	17.0	33.3
7.5	17.5	35.1
7.5	18.0	37.0
7.5	18.5	38.9
7.5	19.0	40.8
7.5	19.5	42.8
7.5	20.0	44.8
7.5	20.5	46.9
7.5	21.0	49.0
7.5	21.5	51.1
7.5	22.0	53.3
7.5	22.5	55.6
7.5	23.0	57.8
7.5	23.5	60.1
7.5	24.0	62.5
7.5	24.5	64.9
7.5	25.0	67.3
7.5	25.5	69.8
7.5	26.0	72.3
7.5	26.5	74.9
7.5	27.0	77.5

DETERMINING THE VALUE OF d(3)

(d1)	(d2)	(d3)
500 uR/hr	20 uR/hr	0.4 uR/hr
8.0	8.5	8.9
8.0	9.0	9.9
8.0	9.5	10.9
8.0	10.0	12.0
8.0	10.5	13.1
8.0	11.0	14.3
8.0	11.5	15.5
8.0	12.0	16.8
8.0	12.5	18.0
8.0	13.0	19.4
8.0	13.5	20.8
8.0	14.0	22.2
8.0	14.5	23.7
8.0	15.0	25.2
8.0	15.5	26.7
8.0	16.0	28.3
8.0	16.5	29.9
8.0	17.0	31.6
8.0	17.5	33.3
8.0	18.0	35.1
8.0	18.5	36.9
8.0	19.0	38.7
8.0	19.5	40.6
8 0	20.0	42.5
8.0	20.5	44.5
8.0	21.0	46.5
8.0	21.5	48.5
8.0	22.0	50.6
8.0	22.5	52.7
8.0	23.0	54.8
8.0	23.5	57.0
8.0	24.0	59.3
8.0	24.5	61.5
8.0	25.0	63.8
8.0	25.5	66.2
8.0	26.0	68.6
8.0	26.5	71.0
8.0	27.0	73.5
8.0	27.5	76.0

(d1)	(d2)	(d3)
500 uR/hr	20 uR/hr	0.4 uR/hr
8.5	9.0	9.4
8.5	9.5	10.4
8.5	10.0	11.4
8.5	10.5	12.5
8.5	11.0	13.6
8.5	11.5	14.7
8.5	12.0	15.9
8.5	12.5	17.2
8.5	13.0	18.4
8.5	13.5	19.8
8.5	14.0	21.1
8.5	14.5	22.5
8.5	15.0	23.9
8.5	15.5	25.4
8 5	16.0	26.9
8.5	16.5	28.5
8.5	17.0	30.1
8.5	17.5	31.7
8 5	18.0	33.4
8.5	18 5	35.1
8 5	19.0	36.8
8 5	19.5	38 6
8 5	20.0	40.4
8 5	20 5	42.3
8 5	21.0	44.2
8 5	21 5	46 1
8 5	22.0	48 1
8 5	22.5	50.1
8 5	23 0	52.2
8 5	23.5	54.3
8 5	24 0	56 4
8 5	24 5	58.5
8 5	25 0	60.7
8 5	25 5	63.0
8 5	26 0	65.2
8.5	26 5	67.5
8.5	27.0	69.9
8.5	27.5	72.3
8.5	28.0	74.7

(d1)	(d2)	(d3)
500 uR/hr	20 uR/hr	0.4 uR/hr
9.0	9.5	9.9
9.0	10.0	10.9
9.0	10.5	11.9
9.0	11.0	13.0
9.0	11.5	14.1
9.0	12.0	15.2
9.0	12.5	16.4
9.0	13.0	17.6
9.0	13.5	18.8
9.0	14.0	20.1
9.0	14.5	21.5
9.0	15.0	22.8
9.0	15.5	24.2
9.0	16.0	25.7
9.0	16.5	27.2
9.0	17.0	28.7
9.0	17.5	30.2
9.0	18.0	31.8
9.0	18.5	33.5
9.0	19.0	35.1
9.0	19.5	36.8
9.0	20.0	38.6
9.0	20.5	40.4
9.0	21.0	42.2
9.0	21.5	44.0
9.0	22.0	45.9
9.0	22.5	47.8
9.0	23.0	49.8
9.0	23.5	51.8
9.0	24.0	53.8
9.0	24.5	55.9
9.0	25.0	57.9
9.0	25.5	60.1
9.0	26.0	62.2
9.0	26.5	64.4
9.0	27.0	66.7
9.0	27.5	68.9
9.0	28.0	71.2
9.0	28.5	73.6

DETERMINING THE VALUE OF d(3)

(d1)	(d2)	(d3)
500 uR/hr	20 uR/hr	0.4 uR/hr
9.5	10.0	10.4
9.5	10.5	11.4
9.5	11.0	12.4
9.5	11.5	13.5
9.5	12.0	14.5
9.5	12.5	15.7
9.5	13.0	16.8
9.5	13.5	18.0
9.5	14.0	19.3
9.5	14.5	20.5
9.5	15.0	21.8
9.5	15.5	23.2
9.5	16.0	24.6
9.5	16.5	26.0
9.5	17.0	27.4
9.5	17.5	28.9
9.5	18.0	30.5
9.5	18.5	32.0
9.5	19.0	33.6
9.5	19.5	35.2
9.5	20.0	36.9
9.5	20.5	38.6
9.5	21.0	40.3
9.5	21.5	42.1
9.5	22.0	43.9
9.5	22.5	45.7
9.5	23.0	47.6
9.5	23.5	49.5
9.5	24.0	51.4
9.5	24.5	53.4
9.5	25.0	55.4
9.5	25.5	57.5
9.5	26.0	59.5
9.5	26.5	61.6
9.5	27.0	63.8
9.5	27.5	65.9
9.5	28.0	68.1
9.5	28.5	70.4
9.5	29.0	72.6

(d1)	(d2)	(d3)
500 uR/hr	20 uR/hr	0.4 uR/hr
10.0	10.5	10.9
10.0	11.0	11.9
10.0	11.5	12.9
10.0	12.0	13.9
10.0	12.5	15.0
10.0	13.0	16.1
10.0	13.5	17.3
10.0	14.0	18.5
10.0	14.5	19.7
10.0	15.0	20.9
10.0	15.5	22.2
10.0	16.0	23.6
10.0	16.5	24.9
10.0	17.0	26.3
10.0	17.5	27.7
10.0	18.0	29.2
10.0	18.5	30.7
10.0	19.0	32.2
10.0	19.5	33.8
10.0	20.0	35.4
10.0	20.5	37.0
10.0	21.0	38.7
10.0	21.5	40.4
10.0	22.0	42.1
10.0	22.5	43.8
10.0	23.0	45.6
10.0	23.5	47.5
10.0	24.0	49.3
10.0	24.5	51.2
10.0	25.0	53.1
10.0	25.5	55.1
10.0	26.0	57.1
10.0	26.5	59.1
10.0	27.0	61.1
10.0	27.5	63.2
10.0	28.0	65.3
10.0	28.5	67.5
10.0	29.0	69.6
10.0	29.5	71.8

(d1)	(d2)	(d3)
500 uR/hr	20 uR/hr	0.4 uR/hr
10.5	11.0	11.4
10.5	11.5	12.4
10.5	12.0	13.4
10.5	12.5	14.4
10.5	13.0	15.5
10.5	13.5	16.6
10.5	14.0	17.7
10.5	14.5	18.9
10.5	15.0	20.1
10.5	15.5	21.4
10.5	16.0	22.6
10.5	16.5	23.9
10.5	17.0	25.3
10.5	17.5	26.6
10.5	18.0	28.0
10.5	18.5	29.5
10.5	19.0	31.0
10.5	19.5	32.5
10.5	20.0	34.0
10.5	20.5	35.5
10.5	21.0	37.1
10.5	21.5	38.8
10.5	22.0	40.4
10.5	22.5	42.1
10.5	23.0	43.8
10.5	23.5	45.6
10.5	24.0	47.4
10.5	24.5	49.2
10.5	25.0	51.0
10.5	25.5	52.9
10.5	26.0	54.8
10.5	26.5	56.8
10.5	27.0	58.7
10.5	27.5	60.7
10.5	28.0	62.8
10.5	28.5	64.8
10.5	29.0	66.9
10.5	29.5	69.0
10.5	30.0	71.2

DETERMINING THE VALUE OF d(3)

(d1)	(d2)	(d3)
500 uR/hr	20 uR/hr	0.4 uR/hr
11.0	11.5	11.9
11.0	12.0	12.9
11.0	12.5	13.9
11.0	13.0	14.9
11.0	13.5	16.0
11.0	14.0	17.1
11.0	14.5	18.2
11.0	15.0	19.4
11.0	15.5	20.6
11.0	16.0	21.8
11.0	16.5	23.0
11.0	17.0	24.3
11.0	17.5	25.6
11.0	18.0	27.0
11.0	18.5	28.4
11.0	19.0	29.8
11.0	19.5	31.2
11.0	20.0	32.7
11.0	20.5	34.2
11.0	21.0	35.8
11.0	21.5	37.3
11.0	22.0	38.9
11.0	22.5	40.5
11.0	23.0	42.2
11.0	23.5	43.9
11.0	24.0	45.6
11.0	24.5	47.3
11.0	25.0	49.1
11.0	25.5	50.9
11.0	26.0	52.8
11.0	26.5	54.6
11.0	27.0	56.5
11.0	27.5	58.4
11.0	28.0	60.4
11.0	28.5	62.4
11.0	29.0	64.4
11.0	29.5	66.4
11.0	30.0	68.5
11.0	30.5	70.6

(d1)	(d2)	(d3)
500 uR/hr	20 uR/hr	0.4 uR/hr
11.5	12.0	12.4
11.5	12.5	13.4
11.5	13.0	14.4
11.5	13.5	15.4
11.5	14.0	16.5
11.5	14.5	17.5
11.5	15.0	18.7
11.5	15.5	19.8
11.5	16.0	21.0
11.5	16.5	22.2
11.5	17.0	23 4
11.5	17.5	24.7
11.5	18.0	26.0
11.5	18.5	27.4
11.5	19.0	28.7
11.5	19.5	30.1
11.5	20.0	31.5
11.5	20.5	33.0
11.5	21.0	34.5
11.5	21.5	36.0
11.5	22.0	37.5
11.5	22.5	39.1
11.5	23.0	40.7
11.5	23.5	42.3
11.5	24.0	44.0
11.5	24.5	45.6
11.5	25.0	47.4
11.5	25.5	49.1
11.5	26 0	50.9
11.5	26.5	52.7
11.5	27.0	54.5
11.5	27.5	56.3
11.5	28.0	58.2
11.5	28.5	60.1
11.5	29.0	62.1
11.5	29.5	64.0
11.5	30.0	66.0
11.5	30.5	68.1
11.5	31.0	70.1

(d1)	(d2)	(d3)
500 uR/hr	20 uR/hr	0.4 uR/hr
12.0	12.5	12.9
12.0	13.0	13.9
12.0	13.5	14.9
12.0	14.0	15.9
12.0	14.5	16.9
12.0	15.0	18.0
12.0	15.5	19.1
12.0	16.0	20.3
12.0	16.5	21.4
12.0	17.0	22.6
12.0	17.5	23.9
12.0	18.0	25.1
12.0	18.5	26.4
12.0	19.0	27.7
12.0	19.5	29.1
12.0	20.0	30.4
12.0	20.5	31.9
12.0	21.0	33.3
12.0	21.5	34.7
12.0	22.0	36.2
12.0	22.5	37.7
12.0	23.0	39.3
12.0	23.5	40.9
12.0	24.0	42.5
12.0	24.5	44.1
12.0	25.0	45.7
12.0	25.5	47.4
12.0	26.0	49.1
12.0	26.5	50.9
12.0	27.0	52.6
12.0	27.5	54.4
12.0	28.0	56.2
12.0	28.5	58.1
12.0	29.0	59.9
12.0	29.5	61.8
12.0	30.0	63.8
12.0	30.5	65.7
12.0	31.0	67.7
12.0	31.5	69.7

DETERMINING THE VALUE OF d(3)

(d1)	(d2)	(d3)
500 uR/hr	20 uR/hr	0.4 uR/hr
12.5	13.0	13.4
12.5	13.5	14.4
12.5	14.0	15.4
12.5	14.5	16.4
12.5	15.0	17.4
12.5	15.5	18.5
12.5	16.0	19.6
12.5	16.5	20.7
12.5	17.0	21.9
12.5	17.5	23.1
12.5	18.0	24.3
12.5	18.5	25.5
12.5	19.0	26.8
12.5	19.5	28.1
12.5	20.0	29.4
12.5	20.5	30.8
12.5	21.0	32.2
12.5	21.5	33.6
12.5	22.0	35.0
12.5	22.5	36.5
12.5	23.0	38.0
12.5	23.5	39.5
12.5	24.0	41.1
12.5	24.5	42.6
12.5	25.0	44.2
12.5	25.5	45.8
12.5	26.0	47.5
12.5	26.5	49.2
12.5	27.0	50.9
12.5	27.5	52.6
12.5	28.0	54.4
12.5	28.5	56.2
12.5	29.0	58.0
12.5	29.5	59.8
12.5	30.0	61.7
12.5	30.5	63.5
12.5	31.0	65.5
12.5	31.5	67.4
12.5	32.0	69.4

(d1)	(d2)	(d3)
500 uR/hr	20 uR/hr	0.4 uR/hr
13.0	13.5	13.9
13.0	14.0	14.9
13.0	14.5	15.9
13.0	15.0	16.9
13.0	15.5	17.9
13.0	16.0	19.0
13.0	16.5	20.1
13.0	17.0	21.2
13.0	17.5	22.3
13.0	18.0	23.5
13.0	18.5	24.7
13.0	19.0	26.0
13.0	19.5	27.2
13.0	20.0	28.5
13.0	20.5	29.8
13.0	21.0	31.2
13.0	21.5	32.5
13.0	22.0	33.9
13.0	22.5	35.3
13.0	23.0	36.8
13.0	23.5	38.3
13.0	24.0	39.7
13.0	24.5	41.3
13.0	25.0	42.8
13 0	25.5	44.4
13.0	26.0	46.0
13 0	26.5	47.6
13 0	27.0	49.3
13 0	27.5	50.9
13.0	28.0	52.6
13.0	28.5	54.4
13.0	29.0	56.1
13.0	29.5	57.9
13.0	30.0	59.7
13.0	30.5	61.5
13.0	31.0	63.4
13.0	31.5	65.2
13.0	32.0	67.1
13.0	32.5	69.1

(d1)	(d2)	(d3)
500 uR/hr	20 uR/hr	0.4 uR/hr
13.5	14.0	14.4
13.5	14.5	15.4
13.5	15.0	16.4
13.5	15.5	17.4
13.5	16.0	18.4
13.5	16.5	19.5
13.5	17.0	20.6
13.5	17.5	21.7
13.5	18.0	22.8
13.5	18.5	24.0
13.5	19.0	25.2
13.5	19.5	26.4
13.5	20.0	27.6
13.5	20.5	28.9
13.5	21.0	30.2
13.5	21.5	31.5
13.5	22.0	32.9
13.5	22.5	34.3
13.5	23.0	35.7
13.5	23.5	37.1
13.5	24.0	38.5
13.5	24.5	40.0
13.5	25.0	41.5
13.5	25.5	43.0
13.5	26.0	44.6
13.5	26.5	46.2
13.5	27.0	47.8
13.5	27.5	49.4
13.5	28.0	51.0
13.5	28.5	52.7
13.5	29.0	54.4
13.5	29.5	56.1
13.5	30.0	57.9
13.5	30.5	59.6
13.5	31.0	61.4
13.5	31.5	63.3
13.5	32.0	65.1
13.5	32.5	67.0
13.5	33.0	68.9

DETERMINING THE VALUE OF d(3)

(d1)	(d2)	(d3)
500 uR/hr	20 uR/hr	0.4 uR/hr
14.0	14.5	14.9
14.0	15.0	15.9
14.0	15.5	16.9
14.0	16.0	17.9
14.0	16.5	18.9
14.0	17.0	19.9
14.0	17.5	21.0
14.0	18.0	22.1
14.0	18.5	23.3
14.0	19.0	24.4
14.0	19.5	25.6
14.0	20.0	26.8
14.0	20.5	28.1
14.0	21.0	29.3
14.0	21.5	30.6
14.0	22.0	31.9
14.0	22.5	33.2
14.0	23.0	34.6
14.0	23.5	36.0
14.0	24.0	37.4
14.0	24.5	38.8
14.0	25.0	40.3
14.0	25.5	41.8
14.0	26 0	43.3
14.0	26.5	44.8
14.0	27.0	46.4
14.0	27.5	47.9
14.0	28.0	49.5
14.0	28.5	51.2
14.0	29.0	52.8
14.0	29.5	54.5
14.0	30.0	56.2
14.0	30.5	57.9
14.0	31.0	59.6
14.0	31.5	61.4
14.0	32.0	63.2
14.0	32.5	65.0
14.0	33.0	66 8
14.0	33.5	68.7

(d1)	(d2)	(d3)
500 uR/hr	20 uR/hr	0.4 uR/hr
14.5	15.0	15.4
14.5	15.5	16.4
14.5	16.0	17.3
14.5	16.5	18.4
14.5	17.0	19.4
14.5	17.5	20.4
14.5	18.0	21.5
14.5	18.5	22.6
14.5	19.0	23.7
14.5	19.5	24.9
14.5	20.0	26.1
14.5	20.5	27.3
14.5	21.0	28.5
14.5	21.5	29.7
14.5	22.0	31.0
14.5	22.5	32.3
14.5	23.0	33.6
14.5	23.5	35.0
14.5	24.0	36.3
14.5	24.5	37.7
14.5	25.0	39.1
14.5	25.5	40.6
14.5	26.0	42.0
14.5	26.5	43.5
14.5	27.0	45.0
14 5	27.5	46.6
14 5	28.0	48.1
14.5	28.5	49.7
14.5	29.0	51.3
14.5	29.5	52.9
14.5	30.0	54.6
14 5	30.5	56.2
14 5	31.0	57.9
14.5	31.5	59.6
14.5	32.0	61.4
14.5	32.5	63.1
14.5	33 0	64.9
14.5	33 5	66.7
14.5	34 0	68.6

(d1)	(d2)	(d3)
500 uR/hr	20 uR/hr	0.4 uR/hr
15.0	15.5	15.9
15.0	16.0	16.9
15.0	16.5	17.8
15.0	17.0	18.8
15.0	17.5	19.9
15.0	18.0	20.9
15.0	18.5	22.0
15.0	19.0	23.1
15.0	19.5	24.2
15.0	20.0	25.3
15.0	20.5	26.5
15.0	21.0	27.7
15.0	21.5	28.9
15.0	22.0	30.1
15.0	22.5	31.4
15.0	23.0	32.7
15.0	23.5	34.0
15.0	24.0	35.3
15.0	24.5	36.7
15.0	25.0	38.1
15.0	25.5	39.5
15.0	26.0	40.9
15.0	26.5	42.3
15.0	27.0	43.8
15.0	27.5	45.3
15.0	28.0	46.8
15.0	28.5	48.3
15 0	29.0	49.9
15.0	29.5	51.5
15.0	30.0	53.1
15.0	30.5	54.7
15.0	31.0	56.3
15.0	31.5	58.0
15.0	32.0	59.7
15.0	32.5	61.4
15.0	33.0	63.1
15.0	33.5	64.9
15.0	34.0	66.7
15.0	34.5	68.5

DETERMINING THE VALUE OF d(3)

(d1)	(d2)	(d3)
500 uR/hr	20 uR/hr	0.4 uR/hr
15.5	16.0	16.4
15.5	16.5	17.4
15.5	17.0	18.3
15.5	17.5	19.3
15.5	18.0	20.4
15.5	18.5	21.4
15.5	19.0	22.5
15.5	19.5	23.6
15.5	20.0	24.7
15.5	20.5	25.8
15.5	21.0	27.0
15.5	21.5	28.1
15.5	22.0	29.3
15.5	22.5	30.6
15.5	23.0	31.8
15.5	23.5	33.1
15.5	24.0	34.4
15.5	24.5	35.7
15.5	25.0	37.0
15 5	25.5	38.4
15.5	26.0	39.8
15.5	26.5	41.2
15.5	27.0	42.6
15.5	27.5	44.1
15.5	28.0	45.5
15.5	28.5	47.0
15.5	29.0	48.6
15.5	29.5	50.1
15.5	30.0	51.7
15.5	30.5	53 2
15.5	31.0	54 8
15.5	31.5	56.5
15.5	32.0	58.1
15.5	32.5	59.8
15.5	33.0	61.5
15.5	33.5	63.2
15.5	34.0	64.9
15.5	34.5	66.6
15.5	35.0	68.4

(d1)	(d2)	(d3)
500 uR/hr	20 uR/hr	0.4 uR/hr
16.0	16.5	16.9
16.0	17.0	17.9
16.0	17.5	18.8
16.0	18.0	19.8
16.0	18.5	20.8
16.0	19.0	21.9
16.0	19.5	22.9
16.0	20.0	24.0
16.0	20.5	25.1
16.0	21.0	26.3
16.0	21.5	27.4
16.0	22.0	28.6
16.0	22.5	29.8
16.0	23.0	31.0
16.0	23.5	32.2
16.0	24.0	33.5
16.0	24.5	34.8
16.0	25.0	36.1
16.0	25.5	37.4
16.0	26.0	38.8
16.0	26.5	40.1
16.0	27.0	41.5
16.0	27.5	42.9
16.0	28 0	44.4
16.0	28 5	45.8
16.0	29.0	47.3
16.0	29.5	48 8
16.0	30.0	50 3
16.0	30.5	51 9
16.0	31.0	53 4
16.0	31.5	55.0
16.0	32 0	56.6
16.0	32.5	58.2
16.0	33 0	59.9
16.0	33 5	61.5
16.0	34.0	63.2
16.0	34.5	64.9
16.0	35.0	66.6
16.0	35.5	68.4

(d1)	(d2)	(d3)
500 uR/hr	20 uR/hr	0.4 uR/hr
16.5	17.0	17.4
16.5	17.5	18.4
16.5	18.0	19.3
16.5	18.5	20.3
16.5	19.0	21.3
16.5	19.5	22.4
16.5	20.0	23.4
16.5	20.5	24.5
16.5	21.0	25.6
16.5	21.5	26.7
16.5	22.0	27.9
16.5	22.5	29.0
16.5	23.0	30.2
16.5	23.5	31.4
16.5	24.0	32.7
16.5	24.5	33.9
16.5	25.0	35.2
16.5	25.5	36.5
16.5	26.0	37.8
16.5	26.5	39.1
16.5	27.0	40.5
16.5	27.5	41.9
16.5	28.0	43.3
16.5	28.5	44.7
16.5	29.0	46.1
16.5	29.5	47.6
16.5	30.0	49.1
16.5	30.5	50.6
16.5	31.0	52.1
16.5	31.5	53.6
16.5	32.0	55.2
16.5	32.5	56.8
16.5	33.0	58.4
16.5	33.5	60.0
16.5	34.0	61.6
16.5	34.5	63.3
16.5	35.0	65.0
16.5	35.5	66.7
16.5	36.0	68.4

DETERMINING THE VALUE OF d(3)

(d1)	(d2)	(d3)
500 uR/hr	20 uR/hr	0.4 uR/hr
17.0	17.5	17.9
17.0	18.0	18.9
17.0	18.5	19.8
17.0	19.0	20.8
17.0	19.5	21.8
17.0	20.0	22.9
17.0	20.5	23.9
17.0	21.0	25.0
17.0	21.5	26.1
17.0	22.0	27.2
17.0	22.5	28.3
17.0	23.0	29.5
17.0	23.5	30.7
17.0	24.0	31.9
17.0	24.5	33.1
17.0	25.0	34.3
17.0	25.5	35.6
17.0	26.0	36.9
17.0	26.5	38.2
17.0	27.0	39.5
17.0	27.5	40.9
17.0	28.0	42.2
17.0	28.5	43.6
17.0	29.0	45.0
17.0	29.5	46.4
17.0	30.0	47.9
17.0	30.5	49.3
17.0	31.0	50.8
17.0	31.5	52.3
17.0	32.0	53.8
17.0	32.5	55.4
17.0	33.0	57.0
17.0	33 5	58.5
17.0	34.0	60.1
17.0	34.5	61.8
17.0	35.0	63 4
17.0	35.5	65.1
17.0	36.0	66.7
17.0	36.5	68.4

(d1)	(d2)	(d3)
500 uR/hr	20 uR/hr	0.4 uR/hr
17.5	18.0	18.4
17.5	18.5	19.4
17.5	19.0	20.3
17.5	19.5	21.3
17.5	20.0	22.3
17.5	20.5	23.4
17.5	21.0	24.4
17.5	21.5	25.5
17.5	22.0	26.6
17.5	22.5	27.7
17.5	23.0	28.8
17.5	23.5	30.0
17.5	24.0	31.1
17.5	24.5	32.3
17.5	25.0	33.5
17.5	25.5	34.8
17.5	26.0	36.0
17.5	26.5	37.3
17.5	27.0	38 6
17.5	27.5	39.9
17.5	28 0	41.2
17.5	28 5	42 6
17.5	29 0	43.9
17.5	29 5	45 3
17.5	30 0	46.7
17.5	30 5	48.2
17.5	31 0	49.6
17.5	31 5	51.1
17 5	32 0	52 6
17 5	32 5	54 1
17 5	33 0	55 6
17.5	33 5	57 2
17 5	34 0	58 7
17 5	34 5	60 3
17.5	35 0	61.9
17.5	35 5	63 5
17.5	36 0	65.2
17 5	36 5	66.8
17.5	37 0	68.5

(d1)	(d2)	(d3)
500 uR/hr	20 uR/hr	0.4 uR/hr
18.0	18.5	18.9
18.0	19.0	19.9
18.0	19.5	20.8
18.0	20.0	21.8
18.0	20.5	22.8
18.0	21.0	23.8
18.0	21.5	24.9
18.0	22.0	25.9
18.0	22.5	27.0
18.0	23.0	28.1
18.0	23.5	29.3
18.0	24.0	30.4
18.0	24.5	31.6
18.0	25.0	32.8
18.0	25.5	34.0
18.0	26.0	35.2
18.0	26.5	36.4
18.0	27.0	37.7
18.0	27.5	39.0
18.0	28.0	40.3
18.0	28.5	41.6
18.0	29.0	42.9
18.0	29.5	44.3
18.0	30.0	45.7
18.0	30.5	47.1
18.0	31.0	48.5
18.0	31.5	49.9
18.0	32.0	51.4
18.0	32.5	52.8
18.0	33.0	54.3
18.0	33.5	55.8
18.0	34.0	57.4
18.0	34.5	58.9
18.0	35.0	60.5
18.0	35.5	62.1
18.0	36.0	63.7
18.0	36.5	65.3
18.0	37.0	66.9
18.0	37.5	68.6

DETERMINING THE VALUE OF d(3)

(d1)	(d2)	(d3)
500 uR/hr	20 uR/hr	0.4 uR/hr
18.5	19.0	19.4
18.5	19.5	20.4
18.5	20.0	21.3
18.5	20.5	22.3
18.5	21.0	23.3
18.5	21.5	24.3
18.5	22.0	25.4
18.5	22.5	26.4
18.5	23.0	27.5
18.5	23.5	28.6
18.5	24.0	29.7
18.5	24.5	30.9
18.5	25.0	32.0
18.5	25.5	33.2
18.5	26.0	34.4
18.5	26.5	35.6
18.5	27.0	36.9
18.5	27.5	38.1
18.5	28.0	39.4
18.5	28.5	40.7
18.5	29.0	42.0
18.5	29.5	43.3
18.5	30.0	44.7
18.5	30.5	46.0
18.5	31 0	47.4
18 5	31.5	48.8
18 5	32.0	50.2
18.5	32.5	51.7
18.5	33.0	53.1
18.5	33.5	54.6
18 5	34.0	56.1
18.5	34.5	57.6
18.5	35.0	59.1
18.5	35.5	60.7
18.5	36.0	62.3
18.5	36.5	63.8
18.5	37.0	65.4
18.5	37.5	67.1
18.5	38.0	68.7

(d1)	(d2)	(d3)
500 uR/hr	20 uR/hr	0.4 uR/hr
19.0	19.5	19.9
19.0	20.0	20.9
19.0	20.5	21.8
19.0	21.0	22.8
19.0	21.5	23.8
19.0	22.0	24.8
19.0	22.5	25.9
19.0	23.0	26.9
19.0	23.5	28.0
19.0	24.0	29.1
19.0	24.5	30.2
19.0	25.0	31.3
19.0	25.5	32.5
19.0	26.0	33.7
19.0	26.5	34.8
19.0	27.0	36.1
19.0	27.5	37.3
19.0	28.0	38.5
19.0	28.5	39.8
19.0	29.0	41.1
19.0	29.5	42.4
19.0	30.0	43.7
19.0	30.5	45.0
19.0	31.0	46.4
19.0	31.5	47.7
19.0	32.0	49.1
19.0	32.5	50.5
19.0	33.0	52.0
19.0	33.5	53.4
19.0	34 0	54.9
19.0	34 5	56.4
19.0	35.0	57.9
19.0	35 5	59.4
19.0	36 0	60.9
19.0	36.5	62.5
19.0	37.0	64.0
19.0	37.5	65.6
19.0	38.0	67.2
19.0	38.5	68.8

(d1)	(d2)	(d3)
500 uR/hr	20 uR/hr	0.4 uR/hr
19.5	20.0	20.4
19.5	20.5	21.4
19.5	21.0	22.3
19.5	21.5	23.3
19.5	22.0	24.3
19.5	22.5	25.3
19.5	23.0	26.3
19.5	23.5	27.4
19.5	24.0	28.5
19.5	24.5	29.6
19.5	25.0	30.7
19.5	25.5	31.8
19.5	26.0	32.9
19.5	26.5	34.1
19.5	27.0	35.3
19.5	27.5	36.5
19.5	28.0	37.7
19.5	28.5	38.9
19.5	29.0	40.2
19.5	29.5	41.5
19.5	30.0	42.8
19.5	30.5	44.1
19.5	31.0	45.4
19.5	31.5	46.7
19.5	32.0	48.1
19.5	32.5	49.5
19.5	33.0	50.9
19.5	33.5	52.3
19.5	34.0	53.7
19.5	34.5	55.2
19.5	35.0	56.6
19.5	35.5	58.1
19.5	36.0	59.6
19.5	36.5	61.1
19.5	37.0	62.7
19.5	37.5	64.2
19.5	38.0	65.8
19.5	38.5	67.4
19.5	39.0	69.0

DETERMINING THE VALUE OF d(3)

(d1)	(d2)	(d3)
500 uR/hr	20 uR/hr	0.4 uR/hr
20.0	20.5	20.9
20.0	21.0	21.9
20.0	21.5	22.8
20.0	22.0	23.8
20.0	22.5	24.8
20.0	23.0	25.8
20.0	23.5	26.8
20.0	24.0	27.9
20.0	24.5	29.0
20.0	25.0	30.0
20.0	25.5	31.1
20.0	26.0	32.3
20.0	26.5	33.4
20.0	27.0	34.6
20.0	27.5	35.7
20.0	28.0	36.9
20.0	28.5	38.1
20.0	29.0	39.4
20.0	29.5	40.6
20.0	30.0	41.9
20.0	30.5	43.2
20.0	31.0	44.5
20.0	31.5	45.8
20.0	32.0	47.1
20.0	32.5	48.5
20.0	33.0	49.8
20.0	33.5	51.2
20.0	34.0	52.6
20.0	34.5	54.0
20.0	35.0	55.5
20.0	35.5	56.9
20.0	36.0	58.4
20.0	36.5	59.9
20.0	37.0	61.4
20.0	37.5	62.9
20.0	38.0	64.4
20.0	38.5	66.0
20.0	39.0	67.6
20.0	39.5	69.2

(d1)	(d2)	(d3)
500 uR/hr	20 uR/hr	0.4 uR/hr
20.5	21.0	21.4
20.5	21.5	22.4
20.5	22.0	23.3
20.5	22.5	24.3
20.5	23.0	25.3
20.5	23.5	26.3
20.5	24.0	27.3
20.5	24.5	28.4
20.5	25.0	29.4
20.5	25.5	30.5
20.5	26.0	31.6
20.5	26.5	32.7
20.5	27.0	33.9
20.5	27.5	35.0
20.5	28.0	36.2
20.5	28.5	37.4
20.5	29.0	38.6
20.5	29.5	39.8
20.5	30.0	41.0
20 5	30.5	42.3
20.5	31.0	43.6
20.5	31.5	44.9
20.5	32.0	46.2
20.5	32.5	47.5
20.5	33.0	48.8
20.5	33.5	50.2
20.5	34.0	51.6
20.5	34.5	52 9
20.5	35 0	54 4
20.5	35.5	55.8
20.5	36.0	57.2
20.5	36.5	58.7
20.5	37.0	60.1
20.5	37.5	61.6
20.5	38.0	63.1
20.5	38.5	64.7
20.5	39.0	66.2
20.5	39.5	67.8
20.5	40.0	69.3

(d1)	(d2)	(d3)
500 uR/hr	20 uR/hr	0.4 uR/hr
21.0	21.5	21.9
21.0	22.0	22.9
21.0	22.5	23.8
21.0	23.0	24.8
21.0	23.5	25.8
21.0	24.0	26.8
21.0	24.5	27.8
21.0	25.0	28.9
21.0	25.5	29.9
21.0	26.0	31.0
21.0	26.5	32.1
21.0	27.0	33.2
21.0	27.5	34.3
21.0	28.0	35.5
21.0	28.5	36.6
21.0	29.0	37.8
21.0	29.5	39.0
21.0	30.0	40.2
21.0	30.5	41.5
21.0	31.0	42.7
21.0	31.5	44.0
21.0	32.0	45.3
21.0	32.5	46.6
21.0	33.0	47.9
21.0	33.5	49.2
21.0	34.0	50.5
21.0	34.5	51.9
21.0	35 0	53.3
21.0	35.5	54.7
21.0	36.0	56.1
21.0	36.5	57.5
21.0	37.0	59.0
21.0	37.5	60.4
21.0	38.0	61.9
21.0	38.5	63.4
21.0	39.0	64.9
21.0	39.5	66.4
21.0	40.0	68.0
21.0	40.5	69.5

ISOPLETH SURVEY LOG

Page ____ of ____

PROCEDURE NUMBER	REVISION	PAGE
13.13.3	15	41 of 56

Attachment 8.6

LOCATION (Grid coordinates/Landmarks)		TIME 24 hr clock	LAT/LONG		μR/hr @ 1 meter	REMARKS Indicate environmental, special conditions, or other pertinent data
Field Team Number	Location					

Field Team Dispatcher Date_____

FOOD CONTROL AREA
PROTECTIVE ACTION RECOMMENDATION

☐ Washington ☐ Oregon

☐ Establish or reduce the Food Control Area boundary in accordance with the attached map.

☐ Establish or modify food control points around the Food Control Area.

☐ Restrict Agricultural products from leaving the food control boundary until they are sampled and determined to be below protective action guidelines.

☐ Advise farms and dairies to place or maintain all milk producing animals and livestock on stored feed and covered water.

☐ Advise residents within the food control boundary to:

☐ 1. Drink only bottled water or water from covered sources.

☐ 2. Not consume milk or produce from their family farm or garden until monitoring can be done.

☐ Rescind the Food Control PAR.

Other:

_____

_____

_____

_____

Approved by: PADG Chairperson/Dose Assessment Coordinator _____

Concurred by: WA State Health Liaison _____

Concurred by: OR Senior State Official _____
(only if Oregon box above is checked)

Attachment 8.7

REOPENING OF THE TRANSPORTATION CORRIDOR RECOMMENDATION

Date _____ Time _____

The following modifications to the existing Transportation Corridor PAR are recommended to the State of Washington:

Airspace

☐ Reopen all airspace to unrestricted use, if applicable. Confer with the REM for this information, as needed.

Columbia River

☐ Reopen the Columbia River to unrestricted use.

☐ Reopen the Columbia River to restricted use, as follows:

☐ Commercial or private boats moored within the relocation zone are surveyed prior to leaving and any contamination found is less than 1,000 dpm/100cm^2, if applicable.

☐ Commercial ships and private boats are advised to navigate the river through the relocation area without docking or disembarking.

☐ Other:_____
_____
_____
_____

Highways

☐ Reopen the following highways to unrestricted use:

☐ Reopen the following highways to restricted use:_____
_____
_____
_____

☐ Barricade and post all exits within the relocation area to prohibit stopping or exiting to secondary roads.

Approved by: PADG Chairperson/Dose Assessment Coordinator _____

Concurred by: WA State Health Liaison _____

Attachment 8.8

INTERIM SAMPLING PLAN

Date:Time:Date _____ Time _____

Field Team Name	GENERAL LOCATION: Grid Coordinates geographical landmarks Latitude & Longitude	Sampling Instructions
		General: General Area dose rates, general deposition readings, deposition in soil, deposition on pasture grass, re-suspension, hot spots and other areas of concern.

Dispatched:_____ _____/_____
Field Team Coordinator Date / Time

Attachment 8.9

Revision #:_____ DETAILED SAMPLING PLAN

Date:_____ Time:_____ Page _____ of _____

Field Team Name	SPECIFIC LOCATION: (Street Address, Grid Coordinates, landmarks, Latitude & Longitude)	Sample Types						Priority
		Grass	Soil	Water	Milk	Air	Other	

Approved:_____ PADG Chairperson

Dispatched:_____ Field Team Coordinator _____ / _____ Date / Time

Concurred by:_____ WA State Health Liaison

Concurred by:_____ OR Senior State Official (If Oregon locations included)

Attachment 8.10

SAMPLE DATA AND ANALYSIS SUMMARY

DATE:_____ Page ___ of ___

Map* disk #	Sample ID#	Field Team Name	LOCATION Grid/landmarks Latitude & Longitude	Sample Types					TIME (Military) Sample Collected	General Area γ Dose Rate (μR/hr)	β,γ Ground Deposition (cpm) (optional)	Ingestion Dose Analysis Limiting DIL Ratio		Relocation Dose Analysis "Groundshine" (REM)		
				Grass	Soil	Water	Milk	Other				Nuclide	DIL Ratio	1st yr	2nd yr	50 yrs

* EOF use only

SDAS.FORM(6/94)

UPDATE BRIEFING GUIDE

A. FREQUENCY

If at all possible, the briefings should be conducted at least every 30 minutes by the Washington State PADG Representative, especially during the most active stages of the event. Then regular briefing intervals should be established and announced.

B. ATTENDANCE

The MUDAC staff members listed below should be requested to provide a short status report on their activities or pertinent events in their areas of responsibility, as applicable.

C. ATTENDEES

- Washington State PADG Representative
- Energy Northwest PADG Representative
- Dept of Energy PADG Representative
- Oregon PADG Representative
- Dose Projection Health Physicist
- Field Team Coordinator

HOT SPOT MANAGEMENT AND CONTROL

If after defining the Relocation Area (RA) boundary and/or the Food Control Area (FCA) boundary, radioactively contaminated areas meeting the definition in 4.9 of this document will be controlled as RA or FCA hot spots. Modification of the 500 microR/hr or FCA isopleth boundaries to incorporate hot spots is the preferred control method. Controlled areas do not have to be gaussian footprints and should evolve and be modified in a strictly empirical manner by grid surveys/samples.

During the Intermediate Phase, the normal field team survey procedure is to monitor readings continuously, at no less than one-half mile increments.

It is recommended that location of all hot spots be completed before beginning individual hot spot area reductions.

For each hot spot, overlay a one mile grid centered on the hot spot:

a. Transfer a 16 by 16 grid (for each square mile) to an appropriate scale map
b. Have the field teams post the area for RA or FCA, as appropriate.
c. Posting density and control should be determined by ease of access by the public.
d. Develop a field control system to manage the elimination of clean areas of approximately 100 meters square by detailed survey.
e. Concentrate hot spot reduction priorities to developed or easily accessible areas. Consider transportation corridors a high priority.

For each hot spot, develop short and long term recommendations for return to use:

a. Perform a detailed sample analysis of each hot spot.
b. Consider whether removal, decay in place, or burial is recommended for the area

For hot spots less than one mile apart, develop the grid pattern to avoid duplicate surveys to eliminate clean areas.

PLOTTING AND TRANSMITTING INGESTION DATA POINTS AND ISOPLETHS

1.0 Start MUDAC 1 computer.

2.0 Log onto the LAN using your own user ID & password.

3.0 Go to "Start" then "Programs" then "Microsoft Office" and select "Excel".

4.0 On a blank spread sheet, type in the latitude, longitude and the radiation readings as they are received from the environmental field teams.

The readings should be in microR.

EXAMPLE:

46 27.673N	119 20.574W	500 microR
46 27.113N	119 20.02W	20 microR
46 26.55N	119 21.553W	20 microR
46 23.1N	119 10.5W	500 microR
46 34.1N	119 22.75W	20 microR

Note the latitude and longitude is written as the field teams transmit it to you; i.e., degrees, then a space, then minutes followed by direction.

5.0 When finished typing in the data from the field team:

1) Save the Excel file:

a. Go to "File", select "Save As"

b. In "FILE NAME" type the date and the sequence number of the data. Example: 1-23-991

c. In "SAVE AS TYPE:" select "TEXT (TAB DELIMITED)"

d. Save the file to the "\INGEST" local subdirectory

2) Close Excel.

6.0 Open the mapping program by double clicking "Street Atlas USA 6.0" on the desktop.

7.0 Overlay the Excel file on the map.

1) Go to "FILE" and select "IMPORT LAT/LON FILE"

2) Select the text file you saved above in the "\INGEST" local subdirectory

3) The Field Team LAT/LON data will appear on the map as blue flags. The radiation data will be printed on the map next to the flags.

8.0 Draw the 500 microR isopleth

1) Click on the pencil symbol in the tool bar at the top of the page. A toolbar will appear on the screen.

2) Click and hold the left mouse button down on the symbol in the drawing toolbar that looks like an open triangle.

3) Move the mouse to the first point on the outer boundary 500 microR points and release the left mouse button.

4) Move the mouse to each of the other 500 microR outer boundary points (in sequence) and click once.

5) When finished clicking on each of the outer boundary points, double click, using the left mouse button.

6) Label each isopleth by clicking once on the "Draw Map Note" icon in the drawing toolbox (the icon is a small document with a tail on the lower left side). In the "Map Note Properties" box; type in the name of the isopleth; i.e., 500 microR Isopleth. Set the text to "Very Small" and click on "OK".

7) With the left mouse button, click and hold on the icon, drag the icon to the desired location on the map and release the mouse button.

9.0 Construct the relocation isopleth

1) Draw an appropriate buffer zone around the 500 microR zone considering wind, stability class, quality of Field Team data, etc., to form the relocation area.

10.0 Print the relocation isopleth

1) Go to "FILE" then select "PRINT CURRENT MAP".

2) Type in the map name; e.g., February 23, 1999 RELOCATION ISOPLETH.

3) Set the scale to approximately 1 inch = 13 miles.

4) Click on "Low Detail".

5) Click on "Print".

6) Give the map to the Dose Assessment Coordinator. The PADG will determine if the isopleth needs to be adjusted.

11.0 Save the relocation isopleth drawing

1) Go to "FILE" and select "SAVE AS"

2) In "FILE NAME" type "LOC" then the month and year.
Example: LOCFEB99

3) The "SAVE AS TYPE" will be "STREET ATLAS USA 6.0 (*.sa6)"

12.0 Minimize the Street Atlas USA program

NOTE: the Dose Assessment Coordinator will prepare the Revised Return PAR and the Relocation Area PAR. When the Coordinator faxes the PARs and the map you provide, email the map to Benton and Franklin County EOCs.

13.0 Call the Benton County EOC (628-0303 or 628-2600) and the Franklin County EOC (545-3546). Let the EOCs know you are sending the isopleth information via email.

14.0 OPEN Outlook

15.0 If you have an existing profile in Outlook, enter your user name. Otherwise, create a new profile:

Close Outlook.
Access the V:\Exchange folder in My Computer.
Double click the "makeprof.bat" file.
Close My Computer.
Open Outlook.
Select OK on the "name cannot be matched" window.
Verify that the Microsoft Exchange server is Server97.

Type your last name ONLY.
Select "check name".
Select the correct name.
Verify that the name and server are both underlined.
Select Apply, and then OK.

16.0 Mail the STREET ATLAS file you created above (*.sa6) to the Benton County EOC and Franklin County EOC.

Benton County:

ops@bces.wa.gov
ag@bces.wa.gov
facility@bces.wa.gov

Franklin County:

eoc@co.franklin.wa.us

Attach the *.sa6 file with the isopleth data.

Write a short note in the email explaining what the file is, who sent it, and a phone number you can be reached at. Include your Energy Northwest email address in the note.

17.0 Construct the food control isopleth

1) If the Relocation Isopleth is still on the map, go to "FILE" and select "NEW". Answer "OK" if the question "Do you want to clear your draw objects" appears on screen.

18.0 Overlay the Excel file on the map

1) Go to "FILE" and select "IMPORT LAT/LON FILE"

2) Select the text file you saved in the "\INGEST" local subdirectory

3) The Field Team LAT/LON data will appear on the map as blue flags. The radiation data will be printed on the map next to the flags.

4) Click on the pencil symbol in the tool bar at the top of the page. A toolbar will appear on the screen.

5) Click and hold the left mouse button down on the symbol in the drawing toolbar that looks like an open triangle.

6) Move the mouse to the first point on the outer boundary 20 mircoR points and release the left mouse button.

7) Move the mouse to each of the other 20 microR outer boundary points (in sequence) and click once.

8) When finished clicking on each of the outer boundary points, double click, using the left mouse button.

19.0 Calculate the Food Control Isopleth

1) Draw a line from Columbia Generating Station to the farthest point on the 20 microR footprint.

2) Click and hold the left mouse button down on the symbol in the drawing toolbar that looks like an open triangle.

3) Move the mouse to the plant and release the left mouse button.

4) Move the mouse to the farthest point on the footprint and click the left button.

5) Draw two additional lines, one to each side of the first line, to the edge of the footprint.

6) Determine the distance of the three lines by placing the mouse on each line and clicking the right mouse button. From the menu that appears, select "Properties". That selection will indicate the distance in miles the radial lines extend from the plant.

7) Refer to Attachment 8.5 to determine d3. Note that this applies only to the initial calculations using default values.

8) Extend the radial lines drawn previously to the d3 distances.

9) Draw the Food Control Isopleth using the d3 distances.

WASHINGTON STATE DERIVED INTERVENTION LEVELS (DILs)

Radionuclide	FOOD/MILK DILs[A] (pCi/Kg, pCi/l)	Bq/Kg, Bq/l)
I-131	4,600	170
Cs group (sum) (Cs-134 + 137)	32,000	1,200
Sr-90	4,300	160
Ru-103	180,000*	6,800*
Ru-106	12,000*	450*
Pu-Am group (sum) (Pu-238 + Pu-239 + AM-241)	54	2
Sr-89	38,000	1,400
Y-91	32,000	1.200
Zr-95	110,000	4,000
Nb-95	320,000	12,000
Te-132	120,000	4,400
I-129	1,500	56
I-133	190,000	7,200
Ba-140	186,000	6,900
Ce-141	194,000	7,200
Ce-144	13,500	500
Np-237	110	4
Np-239	750,000	28,000
Pu-241	3,200	120
Cm-242	510	19
CM-244	54	2

[A] Values from "Accidental Radioactive Contamination of Human Food and Animal Feeds: Recommendations for State and Local Agencies," FDA, August 13, 1998 unless otherwise indicated.

* partition and sum

WASHINGTON STATE DERIVED INTERVENTION LEVELS (DILs)

Radionuclide	DRINKING WATER DILs[B] (pCi/l)	Bq/l
I-131	100	4
Cs 134	80	3
Cs-137	120	4
Sr-90	40	1
Ru-103	1800	67
Ru-106	200	7.4
U (all)	13	0.5
All alpha emitters (excluding Rn & U)	15	0.55
Sr-89	580	21
Y-91	570	21
Zr-95	1400	52
Nb-95	2100	78
Te-132	580	21
I-133	550	20
Ba-140	580	21
Ce-141	1800	67
Ce-144	260	9.6
Ra-226 + Ra-228	5	0.18

[B] 40 CFR 141, "National Primary Drinking Water Regulations," EPA, 7/1/99

REVISED RELOCATION AREA DATA WORKSHEET

		mr/hr value
Sample Number	Location	Exposure Rate for 2 Rem, restricted (G-56)
	Most restrictive values from above:	

Attachment 8.16