OUTLINE OF JAMES R. VAN LAERE'S TESTIMONY
ON
CONTENTIONS 43, 111 AND 112

I. James Van Laere is the Radiation Chemistry Supervisor and the Radiation Protection Manager at Commonwealth Edison Company's Byron Nuclear Generating Station.

II. Mr. Van Laere will discuss:

A. Byron's ALARA program;
B. Byron's health physics department staff; and
C. Byron's in-plant monitoring program.

III. Byron's ALARA program:

A. Byron's ALARA program is part of Edison's entire ALARA program.

B. Byron's ALARA Review Committee formulates the station's ALARA goals and reviews the progress towards these goals. Byron's ALARA review committee is made up of the following people:

1. Station superintendent;

2. Assistant superintendent of operation;

3. Assistant superintendent for maintenance;

4. Assistant superintendent for administrative and support services;

5. Radiation-chemistry supervisor (radiation protection manager); and

6. Station ALARA coordinator.

C. Byron's ALARA program will be implemented by the use of Byron station procedures.

D. Byron will use Edison's Radiation Evaluation Program and Edison's benefit/cost evaluation program as described in Mr. Rescek's testimony.

IV. Byron's health physics department:

A. The health physics staff will consist of approximately 43 employees, either full or part time, which is a sufficient number to enable the department to carry out its duties.

B. The health physics staff will have sufficient training to enable them to carry out their duties.

V. Byron station's in-plant monitoring program:

A. Byron will adopt all of the procedures of Edison's corporate dosimetry program as described in Mr. Rescek's testimony.

B. Byron will issue, when needed, monitors that emit a sound which increases in intensity as the level of radiation increases.

C. Byron has in-house facilities to clean protective clothing, decontaminate equipment, and take sample counts and perform chemical analysis as needed.

D. Byron will monitor beta doses, noble gases and radioiodines in the plant.

E. Byron has more than 200 in-plant area and air monitors that will be state of the art instruments and calibrated to ensure their accuracy.

F. Byron has area monitors with alarms that will annunciate in the control room if the radiation level exceeds a certain point.

VI. Byron has taken steps to keep any radiation exposure that results from maintenance work on the steam generators ALARA.

VII. Byron will follow Edison's N-GET program for training station workers.

VIII. Byron station will follow Edison's policies on contract workers and on pregnant women.

IX. The program outlined above is sufficient to keep radiation doses as low as is reasonably achievable at Byron station.

TESTIMONY OF JAMES R. VAN LAERE

1. Q. State your name, occupation, and present position.

A. My name is James R. Van Laere. I am the Radiation Chemistry Supervisor and the Radiation Protection Manager at Commonwealth Edison Company's ("Edison") Byron Nuclear Generating Station.

2. Q. Briefly describe your education, professional experience, and professional societies.

A. In 1975, I received a Bachelor of Science degree in environmental health from Purdue University. From May of 1975 until May of 1976, I was a Health Physicist at Edison's Corporate offices. From May of 1976 until June of 1978, I was a Health Physicist at Edison's Zion Nuclear Station. Since June of 1978, I have held my present position. I am a member of the National Health Physics Society, the Midwest Health Physics Society, and the American Nuclear Society.

3. Q. What is the scope and purpose of your testimony?

A. The scope and purpose of my testimony is to respond to those portions of Contentions 42, 111, and 112 of the Rockford League of Women Voters that involve Byron station's program to keep radiation exposure levels as low as is reasonably achievable ("ALARA") and Byron's in-plant monitoring program. In general, Contention 42 and Contention 112 assert that Byron cannot be operated in a manner that will maintain proper radiation exposure levels to the station's workers and that Edison has not accurately assessed the potential effects of radiation exposure to those workers. Contention 111 claims that Byron's in-plant monitoring program is inadequate and that Byron's design basis will not keep exposure levels ALARA. In my testimony, I will address these contentions by discussing Byron's ALARA program, Byron's health physics department staff, and Byron's in-plant monitoring program.

4. Q. Does Byron station have a program to maintain radiation exposure to personnel ALARA?

A. Yes. Byron plant management is committed and responsibile for maintaining personnel exposure to radiation ALARA. It is expected that this goal will be achieved through the implementation of the ALARA program. The Byron Station commitment to ALARA is stated in Byron Administrative Procedure (BAP) 700-1 attached to my testimony as Exhibit 1. This procedure describes the individual and departmental responsibilities for maintaining personnel exposure as low as is reasonably achieveable. BAP 700-2, attached as Exhibit 2, describes the methods used to review job assignment for exposure control.

5. Q. Does the Byron station have sole responsibility for the ALARA program that will be put into effect at Byron?

A. No. Byron's ALARA program is one aspect of Edison's entire ALARA program. Edison's corporate ALARA program provides for the establishment of Corporate and nuclear station ALARA review committees. The Corporate Committee has the responsibility to direct corporate ALARA activities, review overall performance, and report on the effectiveness of the program to the Vice President of Nuclear Operations. Each nuclear station, including Byron, has, or will have, a committee which is responsible for developing and monitoring the progress of the station's ALARA goals. Edison's Corporate ALARA program is discussed in greater detail in Mr. Frank Rescek's testimony.

6. Q. In general, what are station ALARA goals?

A. Every year, Byron's ALARA Review Committee will formulate goals to be achieved by the ALARA program during that year. These goals are used to give the ALARA program current overall direction and guidance. The review committee will determine and set these goals according to the present needs of the ALARA program.

7. Q. What will be the committee's primary responsibilities after that time?

A. After the initial formulation of the ALARA goals, the committee will meet at least quarterly to revise previous ALARA goals because of changes in anticipated work load and to review station progress toward ALARA goals. In addition, special committee meetings will be called to review plant modifications and unanticipated maintenance work.

8. Q. Who are the members of the Byron ALARA Review Committee?

A. Byron station's ALARA Review Committee is made up of the following individuals: the Station Superintendent, the Assistant Superintendent of Operation, the Assistant Superintendent for Maintenance, the Assistant Superintendent for Administrative and Support Services, the Radiation-Chemistry Supervisor (Radiation Protection Manager), and the Station ALARA Coordinator. The Station Superintendent will act as chairman of the committee, and the Station ALARA Coordinator will be its secretary.

9. Q. What are the Station Superintendent's responsibilities in connection with Byron's ALARA program?

A. In part, the Station Superintendent will have the responsibility to: make sure that all station personnel support Byron's ALARA program; budget the station's resources so that adequate funding exists to carry out the ALARA program; participate in the committee's development of specific goals and objectives for Byron; support Byron's radiation protection manager in formulating and implementing Byron's program to maintain radiation exposure ALARA; and expedite the collection of the data and information on the program and send this information to the corporate management.

10. Q. What are the ALARA program responsibilities of the Radiation Protection Manager?

A. The Radiation Protection Manager at Byron is responsible for: participating in design reviews for facilities and equipment that can affect potential radiation exposure; identifying locations, operations, and conditions that potentially can cause exposures to radiation; initiating and implementing an exposure control program; developing plans, procedures, and methods for maintaining radiation exposures of station personnel ALARA; reviewing job procedures so that exposures can be maintained ALARA; participating in the development of training programs related to work in potential areas of radiation exposure of which involve radioactive materials; supervising the radiation surveillance program which maintains data on exposure of the doses to station personnel by specific job function and type of work; supervising the collection, analysis, and evaluation of data obtained from radiological surveys and monitoring activities; supervising, training, and qualifying the radiation protection staff at Byron; ensuring that adequate radiation protection coverage is provided to Byron's personnel; and supervising the budget for activities to reduce doses to ALARA.

11. Q. What are the ALARA program responsibilities of the ALARA Coordinator at Byron?

A. Byron's ALARA Coordinator has the following responsibilities: ensuring that Edison's corporate ALARA program is followed; ensuring that an effective system is established to determine the degree of success achieved by station operations with regard to the program's goals and objectives; ensuring that the measurement system results are prepared and reviewed on a periodic basis; ensuring that corrective actions are taken when the possibility exists that specific objectives will not be met; delegating the authority for providing procedures and practices by which the specific goals and objectives of the ALARA program will be achieved; ensuring that the resources needed to achieve those goals and objectives are available; and providing data to station personnel from the cost/benefit dose assessment computer program.

12. Q. What are the ALARA program responsibilities of the Assistant Superintendent of Administrative and Support Services?

A. The Assistant Superintendent of Administrative and Support Services has the responsibility to: implement and support the ALARA program at Byron; provide the Byron ALARA Review Committee with information from his department on radiation exposure reduction goals, plans, actions, and results; and assist in the periodic review of the ALARA program.

13. Q. What are the ALARA program responsibilities of the Training Department?

A. The Training Department has the responsibility to: provide sufficient instructions to all workers who may be exposed to radiation on the biological effects of exposure to radiation so that those individuals receiving the instructions understand and can evaluate the significance of radiation doses in terms of potential risk; ensure that sufficient radiation protection training occurs so that personnel can carry out their duties and responsibilities; and review and revise training programs on a periodic basis to reflect current technology and to make adjustments based on experience at the station.

14. Q. What are the ALARA program responsibilities of the Maintenance Department?

A. The Maintenance Department has the responsibility to: review and write specifications for equipment so that radiation exposures are kept ALARA; review and write maintenance procedures so that doses are kept ALARA; evaluate jobs which will be routinely performed and to provide training to enhance worker performance at those jobs; evaluate job sites to determine if equipment needs to be installed so that the area can be easily serviced and doses are maintained ALARA; evaluate and provide auxiliary ventilation systems that can provide local control of any contaminants that may become airborne; and provide Byron's ALARA Review Committee with information regarding radiation exposure reduction goals, plans, actions, and results.

15. Q. What are the ALARA program responsibilities of the Operating Department?

A. The Operating Department has the responsibility to: write and review operating procedures so that radiation exposures are kept ALARA; maintain and use communication systems between personnel in high radiation zones and the personnel who are monitoring those operations; provide post-operation debriefing sessions to discuss various factors that contributed to the cause of the dose received during the operation; implement and support the ALARA program; assist in periodic reviews of Byron station's performance in achieving ALARA goals; and provide the ALARA Review Committee at Byron with information regarding radiation exposure reduction goals, plans, actions, and results.

16. Q. What are the ALARA program responsibilities of the Chemistry Group?

A. The Chemistry Group has the responsibility to: make recommendations to maintain radioactive systems chemistry within the applicable limits; and ensure that radioanalytical instrumentation is available for timely measurements of radioactivity.

17. Q. How will Byron's ALARA program be implemented?

A. Byron's ALARA program will be implemented by the use of Byron Station Procedures, Edison's Radiation Evaluation Program, and Edison's benefit/cost evaluation program.

18. Q. What are the Byron Station Procedures?

A. Radiation protection procedures have been written which provide the necessary guidance to maintain radiation doses ALARA. Each person who works at Byron has the responsibility to follow those procedures. There are specific procedures written that specifically address ALARA considerations and that go into great detail to provide formal ALARA review. The titles of these procedures are "ALARA Review", "ALARA Review Requirements", "Guide for Dose Reduction Effort", "ALARA Review Form", "ALARA Review Log", and "ALARA Action Review Followup". These procedures are attached to my testimony as Exhibits 2 through 7.

19. Q. What is the Radiation Evaluation Program?

A. The Radiation Evaluation Program ("REP") is a computerized radiation dose accounting system that will be maintained at Byron. The REP retains data on radiation dose resulting from work performed on Byron's systems and components and will document a worker's radiation exposure by job and component. Maintaining that information helps Byron keep radiation exposure ALARA by: 1) identifying specific jobs and work areas whose contribution to the total plant occupational radiation doses are significant; 2) allowing radiation protection personnel to compare exposures from specific components and jobs at similar Edison plants; and 3) provides occupational radiation exposure feedback to engineering groups who are responsible for preparing design modifications or for designing future plants. Thus, the REP is a valuable system for maintaining occupation radiation doses ALARA in both operating and future nuclear generating stations. A more detailed explanation of REP can be found in Mr. Rescek's testimony.

20. Q. What is the benefit/cost evaluation program?

A. The benefit/cost evaluation program is a computer program that will generate information which will allow Byron personnel to evaluate the potential benefits of dose reduction actions. Mr. Rescek provides a more detailed explanation of this program in his testimony.

21. Q. How will Byron use this computer program?

A. The computer program will be used to prepare an analyses of a potential dose reduction technique which is under consideration. An analysis of a generic dose reduction technique will contain a range of potential benefits that might be achieved by using that technique. The analyses thus provides an overview of the potential usefulness of the technique evaluated. Byron personnel can review those results to determine the relationship between the level of improvement and the potential dose and dollar savings. The printed report provides a permanent record of the evaluation performed. This record provides a starting point for future reviews of the job and helps avoid unnecessary and repetitive evaluations.

22. Q. What is the planned composition of Byron's health physics department?

A. Edison anticipates that Byron's health physics department will consist of 43 employees assigned in whole or in part to that department. The head of the department will be the Radiation Chemistry Supervisor who will supervise both the health physics and the chemistry programs. Byron also plans to have one station health physicist, three health physicists, four health physics engineering assistants or engineering technicians, six health physics foremen, and twenty-eight radiation chemistry technicians. The radiation chemistry technicians will perform both chemistry and health physics functions, but Edison estimates that seventy percent of their total time will be spent on responsibilities related to health physics.

23. Q. In general, what training will the health physics staff receive?

A. All members of the health physics staff will receive sufficient training to ensure that each person is able to adequately implement his job's responsibilities and to satisfy any regulatory training requirements for that position. When a person first begins working a particular health physics job at Byron, the radiation-chemistry supervisor will evaluate that person's experience and previous training. The supervisor will then outline a training program which will ensure that the person is capable of performing his job responsibilities. These training programs may require the person to attend offsite training courses or seminars, selected training sessions offered for radiation-chemistry technicians, other Edison or Byron training courses, or to be temporarily assigned to another position where he can receive appropriate on-the-job experience.

24. Q. In your opinion, will the health physics staff at Byron be able to provide all the necessary radiation protection services?

A. Yes. Byron's health physics staff will consist of enough people and will have sufficient training to enable it to carry out all of the radiation protection services which are required or which will be needed.

25. Q. Does the Byron station plan to follow Edison's corporate dosimetry program?

A. Yes. Byron station will adopt all procedures and practices set forth in Edison's dosimetry program and as discussed in Mr. Rescek's testimony.

26. Q. Does this dosimetry program include the use of CR-39 personnel neutron dosimeters?

A. Yes. Byron will use CR-39 personal neutron dosimeters rather than NTA thick emulsion film monitoring. In addition, Byron will use all of the neutron monitoring devices described in Edison's corporate dosimetry program.

27. Q. Does Byron plan to use any TLD monitoring devices?

A. Yes. Byron will have finger ring TLDs for monitoring extremity dose.

28. Q. How will Byron process and read those dosimeters?

A. As outlined in Edison's dosimetry program, an independent vendor will process the film badges and the TLD finger rings. This will be done on a biweekly basis or more often as necessary. Pocket ionization chambers, which monitor gamma dose will be read routinely at the Byron plant.

29. Q. Will Byron use dosimeters that emit a sound which increases in intensity as the level of radiation increases?

A. Yes. The Byron station has such monitors and will provide them to workers who must perform a job which may expose them to higher radiation levels than normally expected. Although no worker will hav such monitors on a permanent basis, the monitors will be provided to the workers as necessary.

30. Q. Does Byron have the facilities to clean protective clothing, decontaminate equipment, take sample counts, and perform chemical analysis?

A. Byron station has the facilities to clean its protective clothing and decontaminate its equipment, and Byron will perform those activities on-site. Most of Byron's sample counting will be done by the station's radiation-chemistry department, and most of the station's chemical analyses will be done in Byron's laboratories. Some of these latter two activities, however, will be done by an independent contractor.

31. Q. How does Byron station plan to analyze urine and fecal samples?

A. Byron station will have in-house facilities to collect urine and fecal samples, as needed, and will then send those samples to an independent contractor to be analyzed.

32. Q. How often will analyses of fecal and urine samples by performed?

A. Fecal and urine sample analysis will be performed if a reason exists to suspect that a worker may have taken an appreciable quantity of radia-active material into his body.

33. Q. Does Byron have the facilities to perform its own monitoring for internal radioactive contamination?

A. Yes. Byron will perform its own whole-body counts on-site, and it will be part of the radiation-chemistry department's responsibilities to perform these counts. Byron will, however, have an independent contractor comment on and evaluate the data collected.

34. Q. How often are these whole-body counts performed?

A. Byron station will follow the procedures outlined in BRP 1340-1, "Personnel Monitoring for Internal Radioactive Contamination." Those procedures will be implemented to evaluate internal radioactive contamination and include guidelines for fecal and unine analysis. At a minimum, all personnel will receive at least one whole-body count each year. BRP 1340-1, which describes Byron's procedures for internal radioactive contamination, is attached to my testimony as Exhibit 8.

35. Q. What procedures will Byron station use to notify employees and workers that a certain area is a radiation controlled area?

A. All potential areas of radiation exposure at Byron are marked by very obvious signs which contain warnings that the area is restricted. In addition, signs exist that prohibit employees from eating or smoking in areas that may become radioactively contaminated. Byron employees will receive instructions in their training programs to watch for and to obey such signs.

36. Q. What procedures will Byron use to protect workers who must enter potential radioactive contaminated areas?

A. Byron has a variety of procedures designed to keep radiation exposures ALARA. Among other things, these procedures include using local shielding around hot objects and providing workers with protective clothing whenever necessary. In addition, Byron follows Edison's N-GET training program which carefully instructs personnel in how to keep their radiation exposure doses ALARA. A more detailed description of the N-GET program is given in Mr. Rescek's testimony.

37. Q. Does the Byron station plan to measure beta doses?

A. Yes. Byron will measure beta doses two different ways. The first will be through the use of film badges which all workers who could be potentially exposed to radiation are required to wear. Byron's second method of monitoring beta dose is through the use of portable survey instruments. These instruments will be used to take readings in a specific area prior to the start of a job in that area. In addition, these instruments are used routinely to measure doses in various parts of the plant.

38. Q. Does Byron have the ability to monitor noble gases within the plant?

A. Yes. Byron has counting room procedures for measurement and quantification of noble gas from samples taken in the station.

39. Q. Will Byron be able to measure the isotopic composition of the radioiodines in the station?

A. Yes. Byron will monitor radioiodines by taking periodic grab samples of the air inside the plant. These grab samples are then taken to the counting room and an isotopic analysis is performed which provides a listing and quantification of the radioiodines detected in the samples.

40. Q. How does Byron station plan to distinguish between airborne gases and particulates?

A. Normally, airborne gases will be sampled by using a glass air sample collection device and a radionuclide analysis would be performed identifying the noble gases collected in the sampler. In addition, normal particulate samples will be collected by utilizing a particulate filter paper and a radionuclide analysis or gross beta analysis would be performed on the particulate filter paper. Thus, airborne gases and particulates would be distinguished by utilizing two different sample collection devices and analyzing each for radionuclide identification.

41. Q. How many stationary monitors will be located within the plant area?

A. Byron will have more than 200 in-plant area and air monitoring instruments. In general, area monitors will measure the radiation exposure rate and air monitors will measure the radioactivity in the air of the area being sampled. A detailed description of the number of in-plant monitors at Byron can be found in Tables 11.5-1 and 12.3-3 of the FSAR. These tables are attached to my testimony as Exhibits 9 and 10, respectively.

42. Q. Will the monitoring instruments at Byron be reliable?

A. Yes. Byron will have state-of-the-art instruments that will provide the most accurate and reliable information obtainable.

43. Q. How often will these monitoring instruments be calibrated?

A. All monitoring devices at Byron will be calibrated periodically by Byron personnel to ensure their reliability, but the frequency of calibration depends on the type of instrument involved.

44. Q. Will any of these monitors have alarms that are activated if radiation levels exceed a certain amount?

A. Yes. Area monitors will have alarms that will annunciate in the control room if the radiation level in the area is greater than twice the normal background radiation for that area. In addition, certain area monitors are set up to sound an audible alarm in that area if radiation levels exceed a certain point. These latter monitors generally are located in areas where a large number of people may frequently travel through or work. For both types of alarming monitors, a member of the radiation-chemistry department would be sent to the area as soon as possible to evaluate the situation.

45. Q. Will Byron personnel ever delay hot operations until after the short-lived radionuclides have primarily decayed?

A. Yes, but such a decision has to be weighed against a variety of factors, including the amount of potential radiation exposure, the length of time it would be necessary to wait, and the operational importance of the job to be performed in relation to the health and safety of the public.

46. Q. What steps have been taken at Byron station to keep any radiation exposure that results from maintenance work on the steam generators ALARA?

A. Among other things, Byron has provided for: 1) the installation of a manway handling device which will be used to remove and instal the manways that are located at the bottom of each steam generator; 2) the use of remote control inservice inspection equipment; and 3) the filtering of the air from inside the steam generator manways to remove radioactive contaminants before releasing the air into the containment.

47. Q. Will the Byron station follow Edison's N-GET training program procedures?

A. Yes. Byron will completely comply with all aspects of the N-GET program.

48. Q. Will Byron follow Edison's corporate policies and practices regarding transient workers and the assignment of pregnant women to jobs where the possibility exists that the worker could be exposed to radiation?

A. Yes. Byron will not deviate from any such corporate policies or practices.

49. Q. In your opinion, do the procedures and policies previously mentioned and attached to your testimony sufficiently allow Edison to keep radiation exposures ALARA at the Byron plant?

A. Yes. All of the procedures I have outlined interact with each other to form a comprehensive program that will keep radiation doses as low as is reasonably achievable.

ALARA PROGRAM

A. PURPOSE

The purpose of this procedure is to provide a means for maintaining radiation exposures as low as reasonably achievable (ALARA) at Byron Station.

ALARA considerations as described in this procedure shall be applicable whenever any activities are to be performed on any pieces of equipment and/or systems within the station that are radioactive, potentially radioactive, or are located in a radioactive materials area.

B. REFERENCES

1. U. S. NRC Regulatory Guide 8.8, "Information Relevant to Ensuring that Occupational Radiation Exposures at Nuclear Power Stations will be As Low As is Reasonably Achievable." Revision 3, June 1978.

2. U. S. NRC Regulatory Guide 8.10, "Operating Philosophy for Maintaining Occupational Radiation Exposures As Low As Is Reasonably Achievable." Revision 1, May 1977.

3. BRP 1000-1, "Commonwealth Edision Company Radiation Protection Standards."

4. Commonwealth Edison Company "ALARA Manual," dated November 1, 1981.

5. Commonwealth Edison Company Production Instruction No. 1-3-B-2, "Radiation Protection Practices at Nuclear Station," June 1977.

6. Code of Federal Regulations, Title 10, Part 20, "Standards for Protection Against Radiation."

7. BAP 700-2, "ALARA Review."

C. PREREQUISITES

1. None.

D. PRECAUTIONS

1. None.

E. LIMITATIONS AND ACTIONS

1. None.

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EXHIBIT 1

F. PROCEDURE

1. The ALARA Program responsibilities of the Station Superintendent are:

   a. Ensuring support from all station personnel.

   b. Budgeting station's resources to support ALARA Program.

   c. Participating in the selection of specific goals and objectives for the station.

   d. Supporting the onsite Radiation Protection Manager in formulating and implementing a station program in maintaining radiation exposure ALARA.

   e. Expediting the collection and dissemination of data and information concerning the program to corporate management.

   f. Acting as chairman of the station's ALARA Review Committee.

2. The ALARA Program responsibilities of the Radiation Protection Manager are:

   a. Participating in design reviews for facilities and equipment that can affect potential radiation exposures.

   b. Identifying locations, operations, and conditions that have the potential for causing significant exposures to radiation.

   c. Initiating and implementing an exposure control program.

   d. Developing plans, procedures, and methods for keeping radiation exposures of station personnel ALARA.

   e. Reviewing, commenting on, and recommending changes in job procedures to maintain exposures ALARA.

   f. Participating in the development and approval of training programs related to work in radiation areas or involving radioactive materials.

   g. Supervising the radiation surveillance program to maintain data on exposures of and doses to station personnel by specific job functions and type of work.

   h. Supervising the collection, analysis, and evaluation of data and information attained from radiological surveys and monitoring activities.

   i. Supervising, training, and qualifying the radiation protection staff of the station.

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j. Ensuring that adequate radiation protection coverage is provided for station personnel during all working hours.

k. Supervising the budget for activities to reduce doses to ALARA.

3. The ALARA Program responsibilities of the ALARA Coordinator are:

a. Ensuring the corporate program that integrates management philosophy and regulatory requirements is followed, with specific goals and objectives for implementation included.

b. Ensuring that an effective measurement system is established and used to determine the degree of success achieved by station operations with regard to the program goals and objectives.

c. Ensuring that the measurement system results are prepared and reviewed on a periodic basis and that corrective actions are taken when attainment of the specific objectives appears to be jeopardized.

d. Ensuring that the authority for providing procedures and practices by which the specific goals and objectives will be achieved is delegated.

e. Ensuring that the resources needed to achieve goals and objectives to maintain occupational radiation exposures ALARA are made available.

f. Ensuring that the minutes of the ALARA Committee meetings are documented for future reference.

g. Providing data to station personnel from the cost/benefit dose assessment computer program.

4. The ALARA Program responsibilities of the Assistant Superintendent of Administrative and Support Services are:

a. Implement and support the ALARA Program.

b. Provide the station ALARA Review Committee with information from his department regarding radiation exposure reduction goals, plans, actions, and results.

c. Assist in the periodic review of performance toward ALARA goals.

5. The ALARA Program responsibilitis of the Training Dept. are:

a. Provide sufficient instruction in the biological effects of exposures to radiation to permit the individuals receiving the instruction to understand and evaluate the significance of radiation doses in terms of the potential risks.

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b. Ensure that radiation protection training is commensurate with the duties and responsibilites of those receiving the instructions, as well as with the magnitude of the potential doses and dose rates that can be anticipated.

c. Review and revise training programs periodically to reflect contemporary techniques and adjustments based on experience in station operation to reduce radiation exposure.

6. The ALARA Program responsiilities of the Maintenance Department are:

a. Rev'.w and write specifications for equipment that consider reliability, serviceability and limitations of internal accumulations of radioactive material.

b. Write and review maintenance procedures which take into consideration time that a job requires, distance from radiation sources at the specific job site and the reduction in radiation exposure that could be achieved by shielding in the job area.

c. Evaluate jobs which will be routinely (quarterly, semi-annually or annually) performed and provide training and build "mock-ups" to be used to enhance worker performance.

d. Evaluate job sites for features such as platforms, walkways, stairs or ladders that permit prompt accessibility for servicing or inspection of equipment.

e. Evaluate and provide auxiliary ventilation systems that can provide local control of airborne contaminants when equipment containing potential airborne sources is opened to the atmosphere.

f. Consider the following for contaminated systems wherever practical:

1). R uce the length of pipe runs

2). Use large diameter pipe

3). Reduce the number of pipe fittings

4). Avoid low points and dead legs

5). Use full-ported values

6). Avoid cavities in values

7). Use pipe bends of at least five pipe diameters in radius

8). Use butt welds instead of socket welds

9). Provide back flushing capabilities

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10). Use live-loaded value packings and bellow seals

11). Use stainless steel components

g. Provide the station ALARA Review Committee with information from his departments regarding radiation exposure reduction goals, plans, actions, and results.

7. The ALARA Program responsibilites of the Operating Department are:

a. Write and review operating procedures which take into consideration time that a job requires, distance from radiation sources at the specific job site and the reduction in radiation exposure that could be achieved by shielding in the job area.

b. Use communication systems between personnel in high radiation zones and personnel who are monitoring the operations from other locations.

c. Provide a formal or informal postoperation debriefing to discuss shortcomings in preoperational briefings, planning, procedures, special tools, and other factors that contributed to the cause of dose received during the operation.

d. Implement and support the ALARA Program.

e. Assist in periodic review of performance toward ALARA goals.

f. Provide the station ALARA Review committee with information from his departments regarding radiation exposure reduction goals, plans, actions, and results.

8. The ALARA Program responsibilites of the Chemistry Group are:

a. Make recommendations to maintain radioactive systems chemistry within the applicable limits in order to minimize crud build-up and radioactivity.

b. Ensure that radioanalytical instrumentation is available for timely measurement of radioactivity.

9. Station ALARA Review Committee

a. The committee will consist of the following:

1). Station Superintendent - Chairman

2). Assistant Superintendent for Operations

3). Assistant Superintendent for Maintenance

4). Assistant Superintendent for Administrative and Support Services

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5). Radiation Chemistry Supervisor

6). ALARA Coordinator - Secretary

b. The responsibility of the ALARA Review Committee is to function as the executive body for ALARA reviews, decisions, audits, and post job reviews. The committee is responsible for developing the ALARA goals for the station and submitting the goals and periodic progress reports to the Corporate ALARA Review Committee.

c. The rules of operation for the station ALARA Reviw Committee are:

1). The Committee will meet quarterly to: (a) formulate ALARA goals for the station, (b) revise previous ALARA goals because of changes in anticipated workload, or (c) review station progress toward ALARA goals. Additional meetings may be called by the Chairman as required to review plant modifications or unanticipated maintenance work.

2). Meetings will be conducted by the Chairman of the Committee. The ALARA Coordinator will act as Committee Secretary. A meeting notice with agenda will be distributed by the Committee Secretary approximately two weeks before a meeting.

3). Attendance by the appointed Committee memebers or designated alternate is mandatory. Alternate members who attend meetings will be prepared to address the agenda items and will be authorized to make commitments. Attendees will be listed in the minutes prepared by the Secretary.

4). Decisions made by the Committee are expected to reflect a consensus of opinion* of the members. However, the Chairman has the authority to decide an issue when a general agreement of all members cannot be reached.

G. CHECKLISTS/DATA SHEETS

1. None

H. TECHNICAL SPECIFICATION REFERENCES

1. None

*In the sense of general agreement, concord, or harmony---the first definition in The Random House Dictionary of the English Language. See also the note on usage in the same reference.

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ALARA Review

A. PURPOSE

The purpose of this procedure is to describe the action levels and the methods used for an ALARA review.

B. REFERENCES

1. U. S. NRC Regulatory Guide 8.8, "Information Relevant to Ensuring that Occupational Radiation Exposures at Nuclear Power Stations will be As Low As is Reasonably Achievable." Revision 3, June 1978.

2. U. S. NRC Regulatory Guide 8.10, "Operating Philosophy for Maintaining Occupational Radiation Exposures As Low As Is Reasonably Achievable." Revision 1, May 1977.

3. BRP 1000-1, "Commonwealth Edision Company Radiation Protection Standards."

4. Commonwealth Edison Company "ALARA Manual," dated November 1, 1981.

5. Commonwealth Edison Company Production Instruction No. 1-3-B-2, "Radiation Protection Practices at Nuclear Station," June 1977.

6. Code of Federal Regulations, Title 10, Part 20, "Standards for Protection Against Radiation."

7. BAP 700-2, "ALARA Review."

C. PREREQUISITES

1. None.

D. PRECAUTIONS

1. None.

E. LIMITATIONS AND ACTIONS

1. An ALARA review shall be required for the following:

   a. The work will involve welding, flame cutting, grinding, sawing, or heating of radioactive materials.

   b. The total dose equivalent for a planned job is expected to equal or exceed one (1) Man-Rem.

   c. Work will involve planned entry into a High Radiation Area.

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d. Planned work will involve prolonged (greater than one (1) hour) occupancy in an Airborne Radioactivity Area.

e. A planned job is to be performed which will involve smearable contamination levels in excess of 250,000 dpm/100 cm^2.

2. A blanket ALARA Review may be isued for up to 12 months for certain routine activities approved by the Rad/Chem Supervisor or ALARA Coordinator, provided base conditions are not significantly changed.

3. Unplanned or emergency jobs should be reviewed by health physics supervision and/or the ALARA Coordinator, as soon as possible, in accordance with this procedure.

4. An ALARA review may be required at the discretion of either Health Physics Supervision or ALARA Coordinator.

F. PROCEDURE

1. If any of the conditions outlined in steps E.1.a, b, c, d or e above are expected, the Rad/Chem Supervisor or his designated alternate will indicate on the work request (if applicable) that an ALARA review is required.

2. Before work can be authorized to begin, the following questions must be addressed and answered as appropriate by a health physicist or the ALARA Coordinator on Form BAP 700-T1, "ALARA Review."

a. Can source strength and contamination levels be minimized by flushing tanks, lines, etc., prior to performing the operation?

b. Can permanent and/or movable shielding be employed in order to minimize radiation levels in the work area?

c. Can airborne contamination be minimized by proper use of the ventilation system, including purging the area before entering, temporary ducts into the work area, and other modifications as appropriate?

d. Can remote handling equipment and other special tools be used to aid in reducing external dose?

e. Can special personnel monitoring equipment such as self reading dosimeters or pocket alarm meters that will permit early evaluation of individual doses and the association of personnel exposure with specific operations be used?

f. Can special tools or jigs that could reduce radiation exposure through simplification, reduction in time, or reduction of mistakes be used?

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g. Should a special procedure be written for this job?

h. Can special training sessions or briefings be utilized to reduce exposure time through increased efficiency?

3. After the appropriate questions have been considered, the health physicist or ALARA Coordinator will indicate (on Form BAP 700-T1, "ALARA Reviews") his estimate of the expected total Man-Rem to be expended on the job along with what he considers to be a reasonably achievable (low) total Man-Rem goal for the job.

4. Fill in on Form BAP 700-T2, "ALARA Review Log" the next sequential ALARA Review number and all other appropriate information.

5. Review BAP 700-A1, "ALARA Review Requirements" and BAP 700-A2, "Guidelines for Dose Reduction Effort" and assure the proper actions and reviews are performed.

6. Upon completion of steps F.1, 2, 3, 4 and 5, the health physicist or ALARA Coordinator will route a copy of Form BAP 700-T1 "ALARA Review" to the Maintenance planner or the supervisors of any other work groups involved in the work.

7. When the job has been completed, a health physicist or ALARA Coordinator will complete Form BAP 700-T3 "ALARA REVIEW - FOLLOW UP" and file it along with the previously completed Form BAP 700-T1 in the ALARA review file.

G. CHECKLISTS/DATA SHEETS

1. BAP 700-T1, "ALARA Review."

2. BAP 700-T2, "ALARA Review Log."

3. BAP 700-T3, "ALARA Review Followup."

H. TECHNICAL SPECIFICATION REFERENCES

1. None.

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ALARA REVIEW REQUIREMENTS

Collective Dose for Job	Dose Category	ALARA Review Required[a]
1 man-rem	I	RWP
1--10 man-rem	II	RWP, AAR
10--30 man-rem	III	RWP, AAR, B/C
30 man-rem	IV	RWP, AAR, B/C, SARC

---

[a] Codes for review requirements.

AAR - ALARA Reivew Form BAP 700-T1

B/C - Benefit/Cost Evaluation of Alternatives, BAP 700-T1.

TWP - Review of Radiation Work Permit, CECo Form 2582 (latest revision)

SARC - Station ALARA Review Committee

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EXHIBIT 3

GUIDE FOR DOSE REDUCTION EFFORT

Level	Range of Collective Dose for Job	Dose Reduction Considerations for Job[a]
I	1 man-rem	AT, RS, WC, WT
II	1 - 10 man-rem	Level I plus DB, LD, SS, ST, MT
III	10 - 30 man-rem	Level II plus CC, DA, DR, MT
IV	30 man-rem	Level III plus ES, PR

[a] Codes for Actions to be Considered

AT - Adequate tools and parts
CC - Contamination containment using glove bags
DA - Documentation of dose reduction alternatives considered
DB - Detailed briefing prior to beginning work
DR - Detailed review of previous performance on job
ES - Extensive shielding
LD - Local decontamination or flushing to reduce dose rate
MT - Mock-up training
PR - Post-mortem review and documentation
RS - Adequate radiation survey
SS - Simple shielding
ST - Special tools
WC - Working conditions (lighting, ventilation, access)
WT - Worker training or retraining

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EXHIBIT 4

ALARA REVIEW

ALARA Review Number

____ - ____ - ____
Stn - Year - Sequence

Work Request (WR) #__________ Permit (RWP) #__________ Dose Category _______

If Job Was Done Before: WR#_______ RWP#_______ Total Dose (man-rem) _______

Job Description ____

____

Exact Location ____

Radiation Survey Results (attach Survey Sheet for location)

For each of the following, circle Yes or No and provide an explanation.

1. Can source strength and contamination levels be minimized by flushing tanks, lines, etc., prior to performing the operation?

   Yes No Explain:

2. Can permanent and/or movable shielding be employed in order to minimize radiation levels in the work area?

   Yes No Explain:

3. Can airborne contamination be minimized by proper use of the ventilation system, including purging the area before entering temporary ducts into the work area, and other modifications as appropriate?

   Yes No Expain:

4. Can remote handling equipment and other special tools be used to aid in reducing external dose?

   Yes No Explain:

5. Can special personnel monitoring devices such as self reading dosimeters or pocket alarm meters that will permit early evaluation of individual doses and the association of personnel exposure with specific operations be used?

   Yes No Explain:

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6. Can special tools or jigs that could reduce radiation exposure through simplification, reduction in time, or reduction of mistakes be used?

Yes No Explain:

7. Should a special procedure be written for this job?

Yes No Explain:

8. Can special training sessions or briefings be utilized to reduce exposure time through increased efficiency?

Yes No Explain:

List those items applicable from BAP 700-A1, "ALARA Review Requirements" and from BAP 700-A2, "Guidelines for Dose Reduction Effort."

____

____

____

____

____

____

Key Individuals Involved in Review and Implementaion (indicate individual responsible for implementation):

Estimated Costs of Action:

Radiation Exposure: ____________ man-rem Material $____________

Capital Expenditure $____________ Labor $____________

Annual Operation & Maintenance $__________

ATTACH Results of benefit/cost comparison for specific dose reduction action.

ALARA Review Performed By ____________________ Date __________

ALARA Action Form Completed By ____________________

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ALARA REVIEW LOG

ALARA Review Number	Job Description	Responsible Individual	Date Completed

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EXHIBIT 6

ALARA ACTION REVIEW FOLLOW-UP

ALARA Review # ___ - ___ - ___
Work Request # ________

Job Description: ____

Dates	WORK GROUP	Work Effort Estimated	(man-hours) Actual	Collective Dose Estimated	(man-rem) Actual
TOTALS:					

	Total Effort (man-hours)	Total Collective Dose (man-rem)
Estimated (E)		
Actual (A)		
Ratio (E/A)		

If Ratio (E/A) for man-hours or man-rem is Less Than 1.0 or Greater Than 1.1, Explain Below:

____

Suggestions for Improving Job Performance: ________________________

Problems Encounter During Job: ______________________________

Discussions on Ways to Reduce Exposure Other That Above: ______________

Follow Up By: ____________________________ Date ________

Reviewed By: ____________________________ Date ________

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EXHIBIT 7

PERSONNEL MONITORING FOR INTERNAL RADIOACTIVE CONTAMINATION

A. PURPOSE

The purpose of this procedure is to describe the bioassay(s) necessary to determine personnel internal radioactive contamination.

B. REFERENCES

1. BRP 1000-1, Commonwealth Edison Company Radiation Protection Standards."
2. BRP 1210-4, "Radiation Chemistry Exit Interview."
3. BRP 1340-2, "Whole Body Counter Routine Operation."
4. BRP 1300-A12, "Pulmonary Clearance Classification of Inorganic Compounds."
5. BRP 1470-1, "Personnel Decontamination."
6. BRP 1480-1, "Contamination Surveys."
7. 10 CFR 20.103, "Exposure of individuals to concentrations of radioactive materials in air in restricted areas."
8. NRC Regulatory Guide 8.26, "Applications of Bioassays for Fission and Activation Products," September, 1980.
9. ANSI N343-1978, "American National Standard for Internal Dosimetry for Mixed Fission and Activation Products."

C. PREREQUISITES

1. None.

D. PRECAUTIONS

1. None.

E. LIMITATIONS AND ACTIONS

1. The principal bioassay technique used at this station is whole body counting. If the whole body counter is not available, other bioassay techniques may be substituted.
2. Minimum bioassay sampling frequencies are defined in Reference 1. Appropriate additional bioassays (whole body counting, urine samples, fecal samples, and/or nasal smears, etc.,) should be performed if, on the basis of air sampling data, accident, equipment failure, etc., there is reason to suspect that an individual may have taken into his body an appreciable quantity of radioactive material.

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3. All facility personnel who enter controlled areas qualify for the minimum bioassay program of at least one direct bioassay per year. (Reference 9).

4. If bioassay data indicate internal depositions exceeding 25% of a maximum permissible organ burden (MPOB), work restrictions should be imposed.

F. PROCEDURE

1. The bioassay program is administered by the Station Health Physicist. Bioassays are conducted as necessary to aid in determining the extent of an individual's internal exposure to concentrations of radioactive material.

2. Bioassay Sampling Frequencies

   a. Minimum bioassay sampling frequencies for all personnel are defined in Reference 1. Any individual or work group may be bioassayed more frequently than required by Reference 1 if deemed necessary. During the preoperational phase of Unit-1 plant construction, bioassay frequencies may be limited as described in Step F.2.b below at the discretion of the Station Health Physicist.

   b. Company employees newly assigned to the station and incoming contractor personnel will normally be scheduled for a whole body count prior to being issued a film badge.

NOTE

If the whole body counter is unavailable, other appropriate bioassay techniques may be substituted.

   c. For CECo personnel: At the start of each dosimetry quarter, a list of individuals requiring whole body counts during the quarter will be issued to each department for scheduling purposes. Specific scheduling (time of day) for whole body counting of individuals will be the responsibility of each department with specific notification given to health physics supervision at least seven (7) days prior to the date of counting. Rad/Chem will resolve any scheduling conflicts.

   d. For contractor personnel: Scheduling of required whole body counts for contractors will be mutually agreed upon by health physics supervision and the contractor's general foreman or supervisor.

   e. If an individual's work assignment at Byron Station is terminated and that individual worked in a radioactive materials area and/or airborne radioactivity area, that individual will receive a whole body count during the radiation chemistry exit interview (Reference 2).

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f. Personnel such as vendors, visitors, nonpermanently assigned CECo personnel, etc., will receive bioassays as appropriate to their duties or in-plant areas visited.

NOTE

Additional bioassays should be performed when in the judgment of the Station Health Physicist, conditions during a job were such that significant internal exposure may have occurred. Such conditions include:

1) Nasal-swab results indicating facial contamination in excess of 10,000 dpm.

2) An internal exposure in excess of 40 MPC-Hr in any seven consecutive days. (Reference 9).

3) Any accidental internal exposure, whether real or suspected.

3. Whole Body Counting

a. Conduct a whole body count in accordance with Reference 3, BRP 1340-2, "Whole Body Counter Routine Operation."

b. If the results of the whole body count indicate greater than 10% of the MPOB, follow-up measures shall be conducted, such as external contamination surveys and decontamination. (Reference 9).

c. If, after implementing the follow-up measures, the result is greater than 10% of the MPOB, internal deposition shall be assumed.

d. Remeasure the person to determine the effective half-life of the contaminant.

e. After initial counts, continue counting at a frequency established in Table I until:

1) the organ burden decreases to less than 5% MPOB, or

2) effective half-life has been established.

TABLE I

T_{eff}	Frequency
1-24 hours	hourly or daily
1-7 days	daily to weekly
1-2 weeks	weekly to biweekly
greater than 2 weeks	biweekly to monthly

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NOTE

If bioassay data indicate internal depositions exceeding 25% of a maximum permissible organ burden (MPOB), work restrictions should be imposed.

4. Urinalysis

   a. The individual to be tested will pick up a urine sample container at the Radiation Chemistry Office.

   b. The individual should provide a sample consisting of 250 ml, preferably a morning void.

NOTE

The individual is to collect the sample in an area where the sample will not become contaminated.

   c. The individual will return the sample to the Radiation Chemistry Office or to some other designated area.

   d. Radiation Chemistry will wrap the bottle with tape or some other suitable material to prevent leakage.

   e. Label each sample with a "Bioassay Label." The label must be marked with the individual's name, social security number, and date and time of sample collection.

   f. Ship the sample to the contractor laboratory for processing within five days of collection.

NOTE

In the event sample results are required quickly, mark the sample as "NONROUTINE." This sample will be processed within 24 hours after receipt by the contractor. All other samples will be processed within 2 weeks of receipt.

   g. If levels equal to or greater than 0.1 dpm/ml mixed fission products or equal to or greater than 5.0×10^{-5} uCi/ml tritium are found, the following steps should be taken:

      1) Resample excreta from individual to confirm the presence of internal radioactivity and to establish elimination rate.

      2) Review analytical data to make sure that no error has been made.

      3) Investigate the potential for cross contamination of the excreta at the time of sampling, during sample storage, and within the analytical laboratory.

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h. If levels greater than 0.2 dpm/ml mixed fission products or greater than 1×10^{-4} uCi/ml tritium are found, the following steps should be taken:

1) A whole body count will be performed as soon as practicable.

2) Continue bioassay sampling to better specify retention and excretion rates.

3) Perform specific isotopic analysis.

4) The frequency of excreta sample collection shall be adjusted in proportion to the effective half-life and shall continue at least until the effective half-life is established.

5. Fecal Sample

a. The individual to be tested will pick up sample containers at the Radiation Chemistry Office.

b. The individual will collect a sample at each stool for a period of 48 hours following the request.

c. The individual will cover each sample container and seal it with tape.

d. The individual will return each sample to the Radiation Chemistry Office or to some other designated area.

e. Label each sample with a "Bioassay Label." The label must be marked with the individual's name, social security number, and date and time of sample collection.

f. Ship the sample to the contractor laboratory for processing within five days of collection.

NOTE

In the event sample results are required quickly, mark the sample as "NONROUTINE." This sample will be processed within 24 hours after receipt by the contractor. All other samples will be processed within 2 weeks of receipt.

g. If levels equal to or greater than 150 dpm/sample are found, follow the steps outlines in F.4.g. of this procedure.

h. If levels greater than 300 dpm/sample are found, follow the steps outlined in F.4.h. of this procedure.

6. Nasal Contamination Survey

a. Perform an initial direct contamination survey of the nasal area with portable GM survey instrument to determine the extent of the contamination.

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b. Using a clean cotton swab, <u>gently</u> take a nasal smear. Take one smear for each nostril. Count nasal smears in a proportional counter.

c. Record the survey results on BRP 1400-T1, "Personnel Contamination Report."

d. Perform decontamination of the individual's nostrils in accordance with Reference 5 if the smear results are greater than 100 dpm above background for either nostril.

e. Schedule a whole body count for an individual whose nasal smear results exceed 10,000 dpm.

7. Skin Smears

a. Personnel who receive a skin injury in a radioactive materials area will be required to provide a smear of the injury and the object causing the injury if practicable. Smears should be taken without creating additional discomfort to the individual.

b. Sterile smears should be beta and/or alpha counted as appropriate, utilizing sensitive instrumentation.

c. If the smear results are positive, the injury should be cleaned in accordance with approved procedures, and additional smears taken and analyzed as necessary.

d. Record the skin smear results on BRP 1400-T1 "Personnel Contamination Report."

e. Refer to Reference 6 for a description of survey techniques.

8. Action Points for Nuclides Having Short Effective Half-Lives

a. When results of bioassays are less than 10% of MPOB, continually evaluate the respiratory protection program to maintain exposure at a level that is ALARA.

b. When results of bioassays range between 10% and 100% of the MPOB, for an individual, additional training of the individual is indicated.

c. If range of 10% to 100% is found in several members of a work group at the same time, check for facility contamination, or check air sampling capabilities for adequacy.

d. If a result in the range 10% to 100% of the MPOB was expected due to past experience or due to a known incident:

1) Confirm results.

2) Identify the probable cause of the result and correct or initiate additional control measures.

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3) Determine whether other individuals could have been exposed and schedule bioassays for them.

4) If exposure could have been to Class-W or Class-Y compounds (see BRP 1300-A12), perform whole body counts where applicable.

5) Review the air sampling program if applicable; determine if air samples were representative and make necessary corrections.

6) Perform additional bioassays as necessary to make a preliminary estimate of the critical organ burden.

NOTE

If bioassay data indicate internal depositions exceeding 25% of an MPOB, work restrictions should be imposed.

e. If results are greater than 100% of the MPOB, this may indicate that facility contamination confinement or air sampling capabilities, or both, are inadequate.

f. If results greater than 100% MPOB are found, perform steps 1 through 6 of F.8.d and the following steps:

1) If exposure could have been to Class-Y compounds (see BRP 1300-A12), a health physicist should determine the cause of exposure and should limit exposure or operating conditions so that NRC exposure limits will not be exceeded in any individual, provided that such an action is still possible (Reference 9).

2) Consider and, if necessary, implement work limitations if medical evidence so indicates, particularly with regard to minimizing the likelihood of large intakes of long-lived radioactive nuclides.

3) Perform diagnostic bioassays for affected individuals and, if necessary, refer individuals to a physician.

9. Interpretation of Results for Diagnostic Purposes

For purposes of diagnostic evaluation, results of bioassay procedures shall be interpreted in terms of:

a. the identity and quantity of radioactivity in the organ of reference.

b. the rate of elimination.

c. the magnitude of the original deposition.

d. the organ burden observed as a function of time.

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NOTE

Health physics supervision will estimate dose equivalents from body burden data on a case basis if deemed necessary.

10. Records

a. A dosimetry record shall be maintained for each individual who is monitored.

b. The minimum internal dosimetry record shall include data on:

1) Current employees who participate in the bioassay program.

2) Terminated employees who have in the past participated in the bioassay program.

3) Visitors or contractors who participate in the bioassay program.

c. Records for whole body counts, urine analysis and fecal analysis shall contain:

1) Individual's name

2) Work group

3) Social security number

4) Date and time of count

5) Analytical results (reported in nanocuries)

6) Nuclides detected

7) % MPOB ± associated error in % MPOB at 95% confidence level.

8) Organ of reference

9) A notation, when appropriate which states: "Repeat Bioassay - External Contamination Suspected on Previous Analysis."

10) Comment section to report any unusual or noteworthy information.

G. CHECKLISTS/DATA SHEETS

1. BRP 1400-T1, "Personnel Contamination Report."

H. TECHNICAL SPECIFICATION REFERENCES

1. None.

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TABLE 11.5-1

AIRBORNE PROCESS AND EFFLUENT MONITORS

RADIATION DETECTOR NO.	SERVICE	TYPE OF CHANNEL	TYPE OF DETECTOR	TYPE OF MEAS.	SENSITIVITY (μc/cc)	RANGE (cpm)	DETECTOR PANEL NO.	PANEL LOCATION DWG. NO.	SEISMIC CAT. OF DETECTORS	SETPOINT*	REMARKS
0RE-PR011A,B	Radwaste Evap. Cubicle	Air Part.	B Scint.	Gross B	10^{-11}-10^{-5}	10^{0}-10^{7}	0PR11J	M-831-6	II	≤2x background	
		Gas	B Scint.	Gross B	10^{-6}-10^{-2}	10^{0}-10^{7}					
0RE-PR012	Recycle Evap. Cub.	Air Part.	B Scint.	Gross B	10^{-11}-10^{-5}	10^{0}-10^{7}	0PR12J	M-827-2	II	≤2x background	
0RE-PR014	Drum Station	Air Part.	B Scint.	Gross B	10^{-11}-10^{-5}	10^{0}-10^{7}	0PR14J	M-829-13	II	≤2x background	
0RE-PR015	Laundry Room	Air Part.	B Scint.	Gross B	10^{-11}-10^{-5}	10^{0}-10^{7}	0PR15J	M-831-9	II	≤2x background	
0RE-PR013A,B	Gas Decay Tank Cubicle	Air Part.	B Scint.	Gross B	10^{-11}-10^{-5}	10^{0}-10^{7}	0PR13J	M-827-2	II	≤2x background	
		Gas	B Scint.	Gross B	10^{-6}-10^{-2}	10^{0}-10^{7}					
1RE-PR013A,B	RHR/CS Pump 1A Cubicle	Air Part.	B Scint.	Gross B	10^{-11}-10^{-5}	10^{0}-10^{7}	1PR13J	M-827-7	I	≤2x background	
		Gas	B Scint.	Gross B	10^{-6}-10^{-2}	10^{0}-10^{7}					
2RE-PR013A,B	RHR/CS Pump 2A Cubicle	Air Part.	B Scint.	Gross B	10^{-11}-10^{-5}	10^{0}-10^{7}	2PR13J	M-827-7	I	≤2x background	
		Gas	B Scint.	Gross B	10^{-6}-10^{-2}	10^{0}-10^{7}					
1RE-PR014A,B	RHR/CS Pump 1B Cubicle	Air Part.	B Scint.	Gross B	10^{-11}-10^{-5}	10^{0}-10^{7}	1PR14J	M-827-7	I	≤2x background	
		Gas	B Scint.	Gross B	10^{-6}-10^{-2}	10^{0}-10^{7}					
2RE-PR014A,B	RHR/CS Pump 2B Cubicle	Air Part.	B Scint.	Gross B	10^{-11}-10^{-5}	10^{0}-10^{7}	2PR14J	M-827-7	I	≤2x background	
		Gas	B Scint.	Gross B	10^{-6}-10^{-2}	10^{0}-10^{7}					
1RE-PR015A,B	RHR Ht. Exch. 1A Cubicle	Air Part.	B Scint.	Gross B	10^{-11}-10^{-5}	10^{0}-10^{7}	1PR15J	M-829-5	I	≤2x background	
		Gas	B Scint.	Gross B	10^{-6}-10^{-2}	10^{0}-10^{7}					
2RE-PR015A,B	RHR Ht. Exch. 2A Cubicle	Air Part.	B Scint.	Gross B	10^{-11}-10^{-5}	10^{0}-10^{7}	2PR15J	M-829-5	I	≤2x background	
		Gas	B Scint.	Gross B	10^{-6}-10^{-2}	10^{0}-10^{7}					
1RE-PR016A,B	RHR Ht. Exch. 1B Cubicle	Air Part.	B Scint.	Gross B	10^{-11}-10^{-5}	10^{0}-10^{7}	1PR16J	M-829-3	I	≤2x background	
		Gas	B Scint.	Gross B	10^{-6}-10^{-2}	10^{0}-10^{7}					
2RE-PR016A,B	RHR Ht. Exch. 2B Cubicle	Air Part.	B Scint.	Gross B	10^{-11}-10^{-5}	10^{0}-10^{7}	2PR16J	M-829-3	I	≤2x background	
		Gas	B Scint.	Gross B	10^{-6}-10^{-2}	10^{0}-10^{7}					
1RE-PR017A,B	Centrifugal Charging Pump 1A Cub.	Air Part.	B Scint.	Gross B	10^{-11}-10^{-5}	10^{0}-10^{7}	1PR17J	M-828-7	I	≤2x background	
		Gas	B Scint.	Gross B	10^{-6}-10^{-2}	10^{0}-10^{7}					
2RE-PR017A,B	Centrifugal Charging Pump 2A Cub.	Air Part.	B Scint.	Gross B	10^{-11}-10^{-5}	10^{0}-10^{7}	2PR17J	M-828-7	I	≤2x background	
		Gas	B Scint.	Gross B	10^{-6}-10^{-2}	10^{0}-10^{7}					

* Alarm setpoints will be appropriately adjusted as operating experience is gained.

TABLE 11.5-1 (Cont'd)

RADIATION DETECTOR NO.	SERVICE	TYPE OF CHANNEL	TYPE OF DETECTOR	TYPE OF MEAS.	SENSITIVITY (μc/cc)	RANGE (cpm)	DETECTOR PANEL NO.	PANEL LOCATION DWG. NO.	SEISMIC CAT. OF DETECTORS	SETPOINT	REMARKS
1RE-PR018A,B	Centrifugal Charging Pump 1B Cub.	Air Part.	B Scint.	Gross B	$10^{-11}-10^{-5}$	$10^{0}-10^{7}$	1PR18J	M-827-7	I	≤2x background	
		Gas	B Scint.	Gross B	$10^{-6}-10^{-2}$	$10^{0}-10^{7}$					
2RE-PR018A,B	Centrifugal Charging Pump 2B Cub.	Air Part.	B Scint.	Gross B	$10^{-11}-10^{-5}$	$10^{0}-10^{7}$	2PR18J	M-827-7	I	≤2x background	
		Gas	B Scint.	Gross B	$10^{-6}-10^{-2}$	$10^{0}-10^{7}$					
0RE-PR002A	Gas Decay Tank Effluent	Gas	B Scint.	Gross B	$10^{-6}-10^{-2}$	$10^{0}-10^{7}$	0PR02J	M-827-2	II	≤2x background	Interlock ref. 11.5.2.2.14
0RE-PR002B	Gas Decay Tank Effluent	Gas	B Scint.	Gross B	$10^{-2}-10^{2}$	$10^{0}-10^{7}$					
0RE-PR003 A,B,C	Lab. Fume Hood Exhaust	Air Part.	B Scint.	Gross B	$10^{-11}-10^{-5}$	$10^{0}-10^{7}$	0PR03J	M-831-8	II	≤2x background	
		Gas	B Scint	Gross B	$10^{-6}-10^{-2}$	$10^{0}-10^{7}$					
		Iodine	NaI	γ(I-131)	$10^{-11}-10^{-5}$	$10^{0}-10^{7}$					
0RE-PR025 A,B,C	Misc. Tank Filter Vent Effluent	Air Part.	B Scint.	Gross B	$10^{-11}-10^{-5}$	$10^{0}-10^{7}$	0PR25J	M-848-1	I	≤2x background	
		Gas	B Scint.	Gross B	$10^{-6}-10^{-2}$	$10^{0}-10^{7}$					
		Iodine	NaI	γ(I-131)	$10^{-11}-10^{-5}$	$10^{0}-10^{7}$					
0RE-PR026 A,B,C	Radwaste Area Vent Exhaust	Air Part.	B Scint.	Gross B	$10^{-11}-10^{-5}$	$10^{0}-10^{7}$	0PR26J	M-831-6	I	≤2x background	
		Gas	B Scint.	Gross B	$10^{-6}-10^{-2}$	$10^{0}-10^{7}$					
		Iodine	NaI	γ(I-131)	$10^{-11}-10^{-5}$	$10^{0}-10^{7}$					
1RE-PR001 A,B,C	Containment Purge Effluent	Air Part.	B Scint.	Gross B	$10^{-11}-10^{-5}$	$10^{0}-10^{7}$	1PR01J	M-832-26	I	≤2x background	
		Gas	B Scint.	Gross B	$10^{-6}-10^{-2}$	$10^{0}-10^{7}$					
		Iodine	NaI	γ(I-131)	$10^{-11}-10^{-5}$	$10^{0}-10^{7}$					
2RE-PR001 A,B,C	Containment Purge Effluent	Air Part.	B Scint.	Gross B	$10^{-11}-10^{-5}$	$10^{0}-10^{7}$	2PR01J	M-332-26	I	≤2x background	
		Gas	B Scint.	Gross B	$10^{-6}-10^{-2}$	$10^{0}-10^{7}$					
		Iodine	NaI	γ(I-131)	$10^{-11}-10^{-5}$	$10^{0}-10^{7}$					

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TABLE 11.5-1 (Cont'd)

RADIATION DETECTOR NO.	SERVICE	TYPE OF CHANNEL	TYPE OF DETECTOR	TYPE OF MEAS.	SENSITIVITY (μc/cc)	RANGE (cpm)	DETECTOR PANEL NO.	PANEL LOCATION DWG. NO.	SEISMIC CAT. OF DETECTORS	SETPOINT	REMARKS
1RE-PR011A, B,C,D,E	Containment Atmosphere	Air Part.	B. Scint.	Gross B	10^{-11}-10^{-5}	10^{0}-10^{7}	1PR11J	M-828-7	I	$\leq$2x background	
		Iodine	NaI	γ(I-131)	10^{-11}-10^{-5}	10^{0}-10^{7}					
		Gas (low)	B Scint.	Gross B	10^{-6}-10^{-2}	10^{0}-10^{7}					
		Gas (high)	B Scint.	Gross B	10^{-2}-10^{+2}	10^{0}-10^{7}					
		Gas (back-ground)	B Scint.	Gross B	10^{-6}-10^{-2}	10^{0}-10^{7}					
2RE-PR011A, B,C,D,E	Containment Atmosphere	Air Part.	B. Scint.	Gross B	10^{-11}-10^{-5}	10^{0}-10^{7}	2PR11J	M-828-7	I	$\leq$2x background	
		Iodine	NaI	γ(I-131)	10^{-11}-10^{-5}	10^{0}-10^{7}					
		Gas (low)	B Scint.	Gross B	10^{-6}-10^{-2}	10^{0}-10^{7}					
		Gas (high)	B Scint.	Gross B	10^{-2}-10^{+2}	10^{0}-10^{7}					
		Gas (back-ground)	B Scint.	Gross B	10^{-6}-10^{-2}	10^{0}-10^{7}					
1RE-PR028 A,B,C,D,E	Aux. Bldg. Vent Stack Effluent	Air Part.	B Scint.	Gross B	10^{-11}-10^{-5}	10^{0}-10^{7}	1PR28J	M-848-1	I	$\leq$2x background	
		Gas (low)	B Scint.	Gross B	10^{-6}-10^{2}	10^{0}-10^{7}					
		Gas (high)	B Scint.	Gross B	10^{-2}-10^{2}	10^{0}-10^{7}					
		Gas (back ground)	B Scint.	Gross B	10^{-6}-10^{-2}	10^{0}-10^{7}					
		Iodine	NaI	γ(I-131)	10^{-11}-10^{-5}	10^{0}-10^{7}					
2RE-PR028 A,B,C	Aux. Bldg. Vent Stack Effluent	Air Part.	B Scint.	Gross B	10^{-11}-10^{-5}	10^{0}-10^{7}	PR28J	M-848-1	I	$\leq$2x background	
		Gas (low)	B Scint.	Gross B	10^{-6}-10^{2}	10^{0}-10^{7}					
		Gas (high)	B Scint.	Gross B	10^{-2}-10^{2}	10^{0}-10^{7}					
		Gas (back ground)	B Scint.	Gross B	10^{-6}-10^{-2}	10^{0}-10^{7}					
		Iodine	NaI	γ(I-131)	10^{-11}-10^{-5}	10^{0}-10^{7}					

TABLE 11.5-1 (Cont'd)

RADIATION DETECTOR NO.	SERVICE	TYPE OF CHANNEL	TYPE OF DETECTOR	TYPE OF MEAS.	SENSITIVITY (μc/cc)	RANGE (cpm)	DETECTOR PANEL NO.	PANEL LOCATION DWG. NO.	SEISMIC CAT. OF DETECTORS	SETPOINT	REMARKS
0RE-PR021 A,B,C	Aux. Bldg. Vent Exhaust 0A	Air Part.	B Scint.	Gross B	10^{-11}-10^{-5}	10^{0}-10^{7}	0PR21J	M-831-6	I	≤2x background	
		Gas	B Scint.	Gross B	10^{-6}-10^{2}	10^{0}-10^{7}					
		Iodine	NaI	γ(I-131)	10^{-11}-10^{-5}	10^{0}-10^{7}					
0RE-PR022 A,B,C	Aux. Bldg. Vent Exhaust 0B	Air Part.	B Scint.	Gross B	10^{-11}-10^{-5}	10^{0}-10^{7}	0PR22J	M-831-6	I	≤2x background	
		Gas	B Scint.	Gross B	10^{-6}-10^{2}	10^{0}-10^{7}					
		Iodine	NaI	γ(I-131)	10^{-11}-10^{-5}	10^{0}-10^{7}					
0RE-PR024 A,B,C	Fuel Handling Bldg. Exh.	Air Part.	B Scint.	Gross B	10^{-11}-10^{-5}	10^{0}-10^{7}	0PR24J	M-831-6	I	≤2x background	
		Gas	B Scint.	Gross B	10^{-6}-10^{-5}	10^{0}-10^{7}					
		Iodine	NaI	γ(I-131)	10^{-11}-10^{-5}	10^{0}-10^{7}					

TABLE 11.5-1 (Cont'd)

RADIATION DETECTOR NO.	SERVICE	TYPE OF CHANNEL	TYPE OF DETECTOR	TYPE OF MEAS.	SENSITIVITY (μc/cc)	RANGE (cpm)	DETECTOR PANEL NO.	PANEL LOCATION DWG. NO.	SEISMIC CAT. OF DETECTORS	SETPOINT	REMARKS
0RE-PR031A,B,C	Control Room Outside Air Intake A	Air Part. Gas Iodine	B Scint. B Scint. NaI	Gross B Gross B γ(I-131)	10^{-11}-10^{-5} 10^{-6}-10^{-2} 10^{-11}-10^{-5}	10^0-10^7 10^0-10^7 10^0-10^7	0PR31J	M-832-12	I	$\leq$2x background	Redundant with ORE-PRO32A,B Interlock ref. 11.5.2.2.8
0RE-PR032A,B,C	Control Room Outside Air Intake A	Air Part. Gas Iodine	B Scint. B Scint. NaI	Gross B Gross B γ(I-131)	10^{-11}-10^{-5} 10^{-6}-10^{-2} 10^{-11}-10^{-5}	10^0-10^7 10^0-10^7 10^0-10^7	0PR32J	M-832-12	I	$\leq$2x background	Interlock ref. 11.5.2.2.8
0RE-PR033A,B,C	Control Room Outside Air Intake B	Air Part. Gas Iodine	B Scint. B Scint. NaI	Gross B Gross B γ(I-131)	10^{-11}-10^{-5} 10^{-6}-10^{-2} 10^{-11}-10^{-5}	10^0-10^7 10^0-10^7 10^0-10^7	0PR33J	M-832-19	I	$\leq$2x background	Redundant with ORE-PRO34A,B Interlock ref. 11.5.2.2.8
0RE-PR034A,B,C	Control Room Outside Air Intake B	Air Part. Gas Iodine	B Scint. B Scint. NaI	Gross B Gross B γ(I-131)	10^{-11}-10^{-5} 10^{-6}-10^{-2} 10^{-11}-10^{-5}	10^0-10^7 10^0-10^7 10^0-10^7	0PR34J	M-832-19	I	$\leq$2x background	Interlock ref. 11.5.2.2.8
0RE-PR035A,B,C	Control Rm Turb. Bldg. Air Intake A	Air Part. Gas Iodine	B Scint. B Scint. NaI	Gross B Gross B γ(I-131)	10^{-11}-10^{-5} 10^{-6}-10^{-2} 10^{-11}-10^{-5}	10^0-10^7 10^0-10^7 10^0-10^7	0PR35J	M-832-12	I	$\leq$2x background	Redundant with ORE-PRO36A,B
0RE-PR036A,B,C	Control Rm Turb. Bldg. Air Intake A	Air Part. Gas Iodine	B Scint. B Scint. NaI	Gross B Gross B γ(I-131)	10^{-11}-10^{-5} 10^{-6}-10^{-2} 10^{-11}-10^{-5}	10^0-10^7 10^0-10^7 10^0-10^7	0PR36J	M-832-12	I	$\leq$2x background	
0RE-PR037A,B,C	Control Rm. Turb. Bldg. Air Intake B	Air Part. Gas Iodine	B Scint. B Scint. NaI	Gross B Gross B γ(I-131)	10^{-11}-10^{-5} 10^{-6}-10^{-2} 10^{-11}-10^{-5}	10^0-10^7 10^0-10^7 10^0-10^7	0PR37J	M-832-14	I	$\leq$2x background	Redundant with ORE-PRO38A,B
0RE-PR038A,B,C	Control Rm. Turb. Bldg. Air Intake B	Air Part. Gas Iodine	B Scint. B Scint. NaI	Gross B Gross B γ(I-131)	10^{-11}-10^{-5} 10^{-6}-10^{-2} 10^{-11}-10^{-5}	10^0-10^7 10^0-10^7 10^0-10^7	0PR38J	M-832-14	I	$\leq$2x background	
1RE-PR021 A,B,C	Pipe Tunnel	Air Part. Gas Iodine	B Scint. B Scint. NaI	Gross B Gross B γ(I-131)	10^{-11}-10^{-5} 10^{-6}-10^{-2} 10^{-11}-10^{-5}	10^0-10^7 10^0-10^7 10^0-10^7	1PR21J	M-831-10	I	$\leq$2x background	
2RE-PR021 A,B,C	Pipe Tunnel	Air Part. Gas Iodine	B Scint. B Scint. NaI	Gross B Gross B γ(I-131)	10^{-11}-10^{-5} 10^{-6}-10^{-2} 10^{-11}-10^{-5}	10^0-10^7 10^0-10^7 10^0-10^7	2PR21J	M-831-3	I	$\leq$2x background	
0RE-PR040 A,B,C	VR System Areas & Cub. Ventilation Exhaust	Air Part. Gas Iodine	B Scint. B Scint. NaI	Gross B Gross B γ(I-131)	10^{-11}-10^{-5} 10^{-6}-10^{-2} 10^{-11}-10^{-5}	10^0-10^7 10^0-10^7 10^0-10^7	0PR40J		II	$\leq$2x background	Interlock ref. 11.5.2.2.15

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TABLE 12.3-3

AREA RADIATION MONITORS

RADIATION DETECTOR NO.	SERVICE	RANGE	TYPE OF DETECTOR	ENERGY RANGE	SETPOINT*	REMARKS
ORE-AR001	Aux. Bldg. El. 346	0.1-100 mR/hr	GM	0.08-3 MeV	≤ 2 x background	
ORE-AR002	Aux. Bldg. El. 346	0.1-100 mR/hr	GM	0.08-3 MeV	≤ 2 x background	
ORE-AR003	Aux. Bldg. El. 346	0.1-100 mR/hr	GM	0.08-3 MeV	≤ 2 x background	
ORE-AR004	Aux. Bldg. El. 364	0.1-100 mR/hr	GM	0.08-3 MeV	≤ 2 x background	
ORE-AR005	Aux. Bldg. El. 364	0.1-100 mR/hr	GM	0.08-3 MeV	≤ 2 x background	
ORE-AR006	Aux. Bldg. El. 364	0.1-100 mR/hr	GM	0.08-3 MeV	≤ 2 x background	
ORE-AR007	Aux. Bldg. El. 383	0.1-100 mR/hr	GM	0.08-3 MeV	≤ 2 x background	
ORE-AR008	Aux. Bldg. El. 383	0.1-100 mR/hr	GM	0.08-3 MeV	≤ 2 x background	
ORE-AR009	Aux. Bldg. El. 383	0.1-100 mR/hr	GM	0.08-3 MeV	≤ 2 x background	
ORE-AR010	Aux. Bldg. El. 401	0.1-100 mR/hr	GM	0.08-3 MeV	≤ 2 x background	
ORE-AR011	Aux. Bldg. El. 401	0.1-100 mR/hr	GM	0.08-3 MeV	≤ 2 x background	
ORE-AR012	Aux. Bldg. El. 401	0.1-100 mR/hr	GM	0.08-3 MeV	≤ 2 x background	
ORE-AR013	Aux. Bldg. El. 401	0.1-100 mR/hr	GM	0.08-3 MeV	≤ 2 x background	
ORE-AR014	Aux. Bldg. El. 426	0.1-100 mR/hr	GM	0.08-3 MeV	≤ 2 x background	
ORE-AR015	Aux. Bldg. El. 426	0.1-100 mR/hr	GM	0.08-3 MeV	≤ 2 x background**	
ORE-AR016	Aux. Bldg. El. 426	0.1-100 mR/hr	GM	0.08-3 MeV	≤ 2 x background	
ORE-AR017	Aux. Bldg. El. 451	0.1-100 mR/hr	GM	0.08-3 MeV	≤ 2 x background	
ORE-AR031	Primary Sample Room	0.1-100 mR/hr	GM	0.08-3 MeV	≤ 2 x background**	
ORE-AR032	High Level Lab	0.1-100 mR/hr	GM	0.08-3 MeV	≤ 2 x background**	
ORE-AR035	Drumming Station	1-1,000 mR/hr	GM	0.08-3 MeV	≤ 2 x background**	

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TABLE 12.3-3 (Cont'd)

RADIATION DETECTOR NO.	SERVICE	RANGE	TYPE OF DETECTOR	ENERGY RANGE	SETPOINT*	REMARKS
ORE-AR037	Fuel Handling Bldg. El. 426	0.1-100 mR/hr	GM	0.08-3 MeV	≤ 2 x background**	
ORE-AR038	Fuel Handling Bldg. El. 401	0.1-100 mR/hr	GM	0.08-3 MeV	≤ 2 x background**	
ORE-AR039	Fuel Handling Bldg. Crane Trolley	0.1-10,000 mR/hr	GM	0.08-3 MeV	≤ 2 x background**	Interlock Crane Raise Circuit
ORE-AR041	Radwaste Bldg. Dry Waste Storage	0.1-100 mR/hr	GM	0.08-3 MeV	≤ 2 x background**	
ORE-AR042	Radwaste Bldg. El. 401	0.1-100 mR/hr	GM	0.08-3 MeV	≤ 2 x background**	
ORE-AR043	Radwaste Bldg. Truck Bay	1-1,000 mR/hr	GM	0.08-3 MeV	≤ 2 x background**	
ORE-AR044	Radwaste Bldg. Low Level Storage	1-100,000 mR/hr	GM	0.08-3 MeV	≤ 2 x background**	
ORE-AR047	Volume Reduction Area	1-100,000 mR/hr	GM	0.08-3 MeV	≤ 2 x background**	
ORE-AR048	Volume Reduction Area	1-100,000 mR/hr	GM	0.08-3 MeV	≤ 2 x background**	
ORE-AR045	Radwaste Bldg. High Level Storage	1-100,000 mR/hr	GM	0.08-3 MeV	≤ 2 x background**	
ORE-AR046	Volume Reduction Area	1-1,000 mR/hr	GM	0.08-3 MeV	≤ 2 x background**	
ORE-AR049	Volume Reduction Area	1-1,000 mR/hr	GM	0.08-3 MeV	≤ 2 x background**	
ORE-AR050	Volume Reduction Area	1-100,000 mR/hr	GM	0.08-3 MeV	≤ 2 x background**	
ORE-AR051	Gate House Portal Monitor	10-10,000 cpm	GM	0.08-3 MeV	≤ 2 x background	
ORE-AR052	Gate House Portal Monitor	10-10,000 cpm	GM	0.08-3 MeV	≤ 2 x background	
1RE-AR001	Containment El. 426	1-1,000 mR/hr	GM	0.08-3 MeV	≤ 2 x background**	
2RE-AR001	Containment El. 426	1-1,000 mR/hr	GM	0.08-3 MeV	≤ 2 x background**	
1RE-AR002	Containment El. 401	1-1,000 mR/hr	GM	0.08-3 MeV	≤ 2 x background**	
ORE-AR069	Gate House Portal Monitor	10-10,000 cpm	GM	0.08-3 Mev	≤ 2 x background	
ORE-AR070	Gate House	10-10,000 cpm	GM	0.08-3 MeV	≤ 2 x background	

TABLE 12.3-3 (Cont'd)

RADIATION DETECTOR NO.	SERVICE	RANGE	TYPE OF DETECTOR	ENERGY RANGE	SETPOINT*	REMARKS
2RE-AR002	Containment El. 401	1-1,000 mR/hr	GM	0.08-3 MeV	≤ 2 x background**	
1RE-AR003	Incore Seal Table	1-1,000 mR/hr	GM	0.08-3 MeV	≤ 2 x background**	
2RE-AR003	Incore Seal Table	1-1,000 mR/hr	GM	0.08-3 MeV	≤ 2 x background**	
1RE-AR010	Main Control Room	0.1-100 mR/hr	GM	0.08-3 MeV	≤ 2 x background	
2RE-AR010	Main Control Room	0.1-100 mR/hr	GM	0.08-3 MeV	≤ 2 x background	
1RE-AR011	Containment Fuel Handling Incident	0.1-10,000 mR/hr	GM	0.08-3 MeV	≤ 2 x background	Redundant with 1RE-AR012
1RE-AR012	Containment Fuel Handling Incident	0.1-10,000 mR/hr	GM	0.08-3 MeV	≤ 2 x background	
2RE-AR011	Containment Fuel Handling Incident	0.1-10,000 mR/hr	GM	0.08-3 MeV	≤ 2 x background	Redundant with 2RE-AR012
2RE-AR012	Containment Fuel Handling Incident	0.1-10,000 mR/hr	GM	0.08-3 MeV	≤ 2 x background	
0RE-AR055	Fuel Building Fuel Handling Incident	0.1-10,000 mR/hr	GM	0.08-3 MeV	≤ 2 x background**	Redundant with 0RE-AR056
0RE-AR056	Fuel Building Fuel Handling Incident	0.1-10,000 mR/hr	GM	0.08-3 MeV	≤ 2 x background**	
1RE-AR013	Volume Control Tank Cubicle	0.1-1000 R/hr	IC	0.08-3 MeV	≤ 2 x background**	
2RE-AR013	Volume Control Tank Cubicle	0.1-1000 R/hr	IC	0.08-3 MeV	≤ 2 x background**	
1RE-AR020	High Range Containment	$10^{0}-10^{8}$ R/hr	IC			
1RE-AR021	High Range Containment	$10^{0}-10^{8}$ R/hr	IC			
2RE-AR020	High Range Containment	$10^{0}-10^{8}$ R/hr	IC			
2RE-AR021	High Range Containment	$10^{0}-10^{8}$ R/hr	IC			
0RE-AR073	TSC Monitor Room	$10^{-1}-10^{4}$ mR/hr	GM	0.08-3 MeV	≤ 2 x background	
0RE-AR074	TSC Health Physics Office	$10^{-1}-10^{4}$ mR/hr	GM	0.08-3 MeV	≤ 2 x background	

*Alarm setpoints will be appropriately adjusted as operating experience is gained.
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