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Revision 6

APPLICATION FOR RENEWAL OF SPECIAL NUCLEAR MATERIALS LICENSE SNM-942

Compiled by the

Staff of Battelle, Pacific Northwest Laboratories

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BATTELLE

PACIFIC NORTHWEST LABORATORIES

RICHLAND, WASHINGTON 99352

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CONTENTS

CONTENTS (continued)

CONTENTS (continued)

APPLICATION FOR RENEWAL OF SPECIAL
NUCLEAR MATERIALS LICENSE SNM-942

(Revision 6, July 2, 1979

1.0 CRITERIA AND ADMINISTRATIVE PROCEDURES

1.1 GENERAL

This is an application to the Nuclear Regulatory Commission (NRC) for the renewal of Special Nuclear Materials License, SNM-942, covering the receipt, possession and use of special nuclear material for broad research and development.

Applicant

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All of the above officers are United States citizens. No control or ownership is exercised over the applicant by any alien, foreign corporation, or foreign government.

Organization of the License Application

This total application is divided into Part I and Part II.

Part I contains the criteria and administrative procedures set up to assure the maintenance of high quality health and safety conditions for all Battelle-Northwest work performed under this special nuclear materials license. The criteria and administrative procedures in Part I may not be changed without prior approval from the Nuclear Regulatory Commission.

Part II presents additional descriptive material as evidence of the technical competence, management control procedures and philosophy at Battelle-Northwest. This competence, control, and philosophy assure adequate nuclear health and safety performance in all of the Laboratories' acitivities.

Location Where Licensed Material Will be Used

The primary work location is the Battelle-Northwest controlled buildings and facilities located on or adjacent to the Department of Energy's Hanford Site at Richland, Washington. These facilities include those of the Pacific Northwest Laboratory (PNL) operated for the Department of Energy (DOE) by Battelle-Northwest (BNW) and those privately owned by BNW. Additional temporary work locations include sponsor's laboratories and facilities except in Agreement States.

Battelle-Northwest has entered into two contracts with DOE involving these facilities: 1) a Prime Operating Contract, EY-76-C-06-1830, to operate both the government owned and certain of the Battelle-Northwest-owned laboratory facilities in carrying out assigned DOE research and development programs, and 2) a Use Permit Contract, EY-76-C-06-1831, permitting the use of certain government-owned laboratory facilities in conducting contract research for industry, for government agencies, and for its own account. Battelle-Northwest also conducts contract research for its own account in privately owned facilities in the BNW Richland Research Complex located immediately south of the Hanford 300 Area. This license is intended to cover the work conducted under the Use Permit Contract, EY-76-C-06-1831, plus any other work conducted by Battelle-Northwest (predominately in the above location) which requires a special nuclear materials license.

A map and description of the Hanford Site and environs with plot plans showing the locations of Battelle-Northwest controlled buildings and facilities, are in Part II of this application.

Special Nuclear Materials to be Handled in Battelle-Northwest Controlled Facilities

License coverage is sought for enriched uranium and all isotopes of plutonium. These materials may be handled in any physical and chemical form for all research and development purposes except for administration to humans. The maximum quantity of licensed materials which will be in inventory under the control of Battelle-Northwest at any time will be less than one effective kilogram, as defined in subparagraph 70.4(t) of 10 CFR Part 70, of uranium 233, uranium 235 and plutonium except that the quantity of plutonium shall be no greater than 200 g.

Since the maximum quantity of licensed material is relatively small compared with normal inventories in use by Battelle-Northwest for DOE programs under Operating Contract EY-76-C-06-1830, the potential risks to the health and safety of onsite and offsite personnel will not be significantly increased by addition of the licensed work.

Radioactive Materials to be Handled Temporarily in Sponsor's Facilities Except in Agreement States

License coverage is also sought for the temporary use of special nuclear material for research and development purposes in a sponsor's facility except in Agreement States. Temporary work under the terms of this license will in each case be limited to a quantity less than a minimum critical mass.

The use of the licensed materials in sponsor's facilities will be limited as necessary to assure a high degree of safety using engineered and administrative safeguards which are entirely under control of Battelle-Northwest and therefore do not create a situation of dual responsibility between Battelle-Northwest and sponsor personnel. Alternatively, where the sponsor is licensed by the NRC, it may be preferable in some cases to transfer the material entirely to the sponsor's control. In either case, responsibility will be clearly delineated.

Examples of Work to be Performed Under the License

Battelle-Northwest will perform contract research and development activities for its own account and for many sponsors, both government and industrial, in practically all areas of the physical and life sciences except human medicine. Much of this contract research work will be nonnuclear in character. However, it is proposed to include the laboratory's broad and competent nuclear research capabilities in the spectrum of research services offered.

Research activities may involve handling quantities approaching one effective kilogram of fissile materials in both nonmetallic and metallic forms. Small amounts of special nuclear materials are used in support of research and development work related to the production and processing of nuclear fuels and fuel material. In addition, special nuclear materials are used in a wide variety of non-fuel research and development programs, including the following areas:

- Research in radiobiology
- Development of improved means for the dosimetry of ionizing radiation
- Measuring, minimizing, and controlling radioactivity released to the environment

- Reactor system development, as well as reactor materials and component development
- Study of irradiation effects
- Development of improved activation analysis techniques
- Reprocessing of irradiated fuels and neutron target materials for recovery of products and radionuclides
- Development of radioactive waste processing procedures.

No special nuclear materials will be produced under this license since it does not cover the operation of a nuclear reactor nor insertion of any licensed material into a nuclear reactor.

Financial Qualifications

The net worth of the Battelle Memorial Institute (BMI) is approximately $155 million. The BMI annual business volume for 1978 exceeded $294 million.

Previous License Numbers

No license numbers prior to SNM-942 have been issued to Pacific Northwest Laboratories of the Pacific Northwest Division of Battelle Memorial Institute by the Nuclear Regulatory Commission.

1.2 REQUEST FOR APPROVAL OF ALTERNATE METHODS

The major portion of the work with radioactive materials performed by Battelle-Northwest is under the Operating Contract EY-76-C-06-1830 with DOE. That portion of the work with radioactive materials performed by BNW under the license represents a small amount both in dollars and in amount of radioactive material involved. The work under the Operating Contract is closely related to activities of other Hanford contractors, including Rockwell International's Rockwell Hanford Operations, the Westinghouse Hanford Company, and the Hanford Environmental Health Foundation. Because of the close relationship among the Hanford contractors, both geographically and programmatically, it is very important that radiation protection standards be maintained uniformly among the various Hanford contractors. In order to achieve and maintain this uniformity the Richland Operations Office of DOE has issued directives in the form of DOE-RL Manual Chapters and the Hanford Services and Facilities Catalog.

The Hanford Services and Facilities Catalog requires that all Hanford contractors utilize certain Hanford-wide services provided by a specified contractor; for example:

- All maintenance, repair and calibration of radiation survey instrumentation is performed for all contractors by Battelle-Northwest.
- All bioassay samples and personnel dosimeters for employees of all Hanford contractors, and all samples obtained for the Hanford Environmental Surveillance Program are processed by one contractor - U. S. Testing Company.
- One Battelle-Northwest component makes all in-vivo determinations, evaluates the results of all personnel exposure measurements, compiles the data obtained using one common data processing program, routinely reports the results to the concerned contractors, maintains the exposure record files, and makes all necessary reports, again for all Hanford contractors to meet the requirements established by DOE-RL.
- Another Battelle-Northwest component conducts the Environmental Surveillance Program, by scheduling, obtaining (but not processing), evaluating and reporting the results of samples taken and measurements made throughout the Hanford environs.

All of these programs are established and performed to meet the specific requirements of DOE-RL. Notwithstanding the fact that Battelle-Northwest may conduct a specific plant-wide radiation protection service program, Battelle-Northwest cannot unilaterally change that program without the concurrence of all involved contractors and DOE-RL.

The Richland Operations Office issues supplements to certain DOE Manual Chapters to provide specific guidance for Hanford contractors in interpretation of the requirements of the basic DOE Manual Chapters. These Manual Chapters are transmitted to the contractors for compliance; Battelle-Northwest and the other Hanford contractors have little latitude in the application of the contained limits and methods.

Work performed by Battelle-Northwest that requires a Special Nuclear Materials license is carried out in the same facilities at the same time and by the same people as work performed for DOE under the Operating Contract. It is neither technically or administratively feasible to apply two different exposure measurement and control programs simultaneously to the same employees. The exposure which an employee may receive from licensed materials cannot be distinguished from that which he may receive from materials used under the Operating Contract.

Because the Battelle-Northwest Radiation Protection Program is designed to comply with requirements in DOE Manual Chapters, certain radiation protection standards or practices differ from those specified in Title 10 Parts 20 and 70 of the Code of Federal Regulations. Those radiation protection standards or practices that differ from particular paragraphs are described here.

Occupational Exposure Limits

The annual and long-term exposure limits applied by Battelle-Northwest for work under the Operating Contract are based on those contained in DOE Manual Chapter 0524. The BNW exposure limits are as follows:

	Annual	Calendar Quarter
Whole Body, Head and Trunk, Gonads, Lens of Eye, Red Blood Marrow, Active Blood Forming Organs	5 rem	3 rem
Unlimited areas of the skin (except hands, forearms and feet) Other organs, tissues, and organ systems (except bone)	15 rem	8 rem
Bone, Hands, Forearms, Feet[a]	30 rem	10 rem

(a) All reasonable effort shall be made to keep exposures to forearms and hands to the general limit for the skin.

DOE requires the total dose to include dose received both from external sources and internally deposited radioactive materials.

The 10 CFR 20 quarterly permissible dose limits appear to have been established as one-fourth of the desired annual exposure in order to eliminate the need for separately stating the appropriate annual limit. In contrast, the DOE quarterly limits are presented to demonstrate the degree of nonuniformity of accumulation of exposure through the year which is permissible as established by the Federal Radiation Council (FRC) and the International Commission of Radiological Protection (ICRP). Since Battelle-Northwest personnel rarely exceed the quarterly limits specified in 10 CFR 20, seldom is it necessary or desirable to expose personnel as nonuniformly as the DOE quarterly limits permit. The few cases where such exposure has been necessary have been related to whole body exposure rather than exposure to the skin or extremity. In those cases, the 3 rem/q DOE limit is applied [same as permitted by paragraph 20.101 (b)] except that the combined annual whole body exposure from external and internal sources is limited to 5 rem in the year.

The Battelle-Northwest quarterly exposure limits described above are submitted as an alternate to the quarterly limits contained in paragraph 20.101(a). The purpose in requesting approval of the quarterly limits in DOE Manual Chapter 0524 as an alternate to the 10 CFR 20 quarterly limits is to avoid possible confusion, misunderstanding, or concern on the part of

Battelle-Northwest or other Hanford employees. This could result from the change itself or from the resulting inconsistency between contractors rather than the need for additional exposure.

Every new employee is required to complete an exposure history questionnaire to aid in the evaluation of internal dose and to assure that the new employee does not exceed a quarterly or annual limit as a result of his/her combined exposure for the year (both onsite and offsite exposure). In the event that the new employee has been occupationally exposed prior to employment at Battelle-Northwest, administrative controls will be imposed to restrict exposure for the remainder of the year until such time that the prior exposure record is obtained. These controls include the assumption that he/she has received 1.25 rem for each quarter or fraction thereof in the current year prior to employment with Battelle-Northwest. Additionally, if the accrued or assumed exposure exceeds any quarterly or annual limit, the employee will not be permitted to receive additional exposure while working for Battelle-Northwest until his/her exposure is within the appropriate limits. Any special exposure controls deemed necessary because of either real or assumed exposure will be provided in writing to the employee's supervisor, to Radiation Monitoring and to the employee's exposure records file.

This exposure history satisfied all requirements for NRC Form 4 with the exception of Item 9 (insertion of calculated dose) and Item 13 (permissible dose remaining). Previously, exemptions were requested for these two items; however, since annual exposure in excess of 5 rem is not permitted, it is not believed necessary to maintain an NRC Form 4.

Pursuant to paragraph 20.501, it is requested that Battelle-Northwest be granted an exemption from the numerical values contained in paragraph 20.101(a) and to substitute the Battelle-Northwest occupational exposure limits described on page 1.2-5.

Calendar Quarter

The calandar quarter used in the Hanford-wide program is not as defined in paragraph 20.3. The exposure year at Hanford consists of four quarters ending on the last Friday of March, June, September and December. No quarter is less than 12 weeks nor more than 14 weeks in length in accord with a portion of the definition presented in paragraph 20.3. However, the remaining days in December, if any, become a part of the new exposure year.

A change of the calendar quarter to meet one of the definitions presented in paragraph 20.3 would impact heavily across the plant. The DOE-RL contract with U.S. Testing Company specified that dosimeter change shall be on the last Friday of each month and that the calendar year will end on the last Friday of December. The U.S. Testing Company dosimeter processing schedules and the exposure records data processing program schedules are based on this definition. The last Friday of each month was chosen since Friday is the only day of the week that all Hanford contractor employees other than firemen are at work, regardless of shift schedule.

Pursuant to paragraph 20.501, it is requested that the calendar quarter as defined above be accepted in lieu of the definition of calendar quarter contained in paragraph 20.3(a)(4).

Reports to Prior Employees

Exposure reports are provided to prior employees as required by DOE Manual Chapter 0525 and paragraph 20.401(a), within 30 days of the request. These reports include the accumulated exposures to beta particles, photons, and neutrons for the entire period of employment together with information regarding deposition of radioactive material, if appropriate. The reports also include a summary by calendar quarters of the whole body skin, whole body penetrating, and extremity exposures for the current calendar year. Since exposures by calendar quarter are not maintained in the data processing file, and in some cases the employee's exposure may span a period in excess of 30 years at the plant, the normal procedure does not include the reconstruction of data to provide exposures by quarters or lesser periods as required by paragraph 20-401(a), other than for the current year. Additionally, if the employee is on a quarterly dosimeter exchange frequency, it is physically impossible to provide exposures for the current year by lesser periods than quarterly. On an individual case, if there is a necessity to report these data on a quarterly frequency, it would be possible to do this for the entire employment period. This would be accomplished by obtaining data which is currently maintained on microfilm for each employee.

Pursuant to paragraph 20.501, it is requested that the requirements for providing exposure by calendar quarter for other than the current calendar year and for lesser periods than quarterly as required in paragraph 20.401(a) be waived.

Reports of Exposure on Termination

DOE Manual Chapter 0525 requires the reporting of exposure for terminated employees to the System Safety Development Center (SSDC) in Idaho Falls, Idaho within 30 days after the terminated employee's exposure has been determined or within 30 days after the individual's termination date, whichever is later. A copy is also provided to the employee upon request. This report contains the same information which is to be submitted to the Director of Management and Program Analysis, USNRC, as required in paragraph 20.408. The past organization of the Federal Agencies dealing with nuclear energy presented the situation in which two identical reports could have been sent to the same agency by two different routes which could possibly result in an apparent doubling of an employee's exposure to radiation. This situation was alleviated with an exemption in license SNM-942. Although Federal Agency reorganization has occurred, the possibility still remains that the compilation of the same exposure records by two separate records centers for whatever purposes presents the possibility of doubling an employee's apparent exposure.

Pursant to paragraph 20.501, it is requested the requirements of DOE Manual Chapter 0525 be deemed to satisy the parallel of requirements of paragraph 20.408 and that the requirements of paragraph 20.408 continue to be waived.

Exposure Records and Reports for Current Exposure Year

All Hanford contractor employee's exposure records are compiled using automatic data processing methods. Each month, reports reflecting any action in the employee's exposure data file are reported in the form of computer printout reports. For employees who are monitored persuant to paragraph 20.202 or DOE Manual Chapters, a summary report provides the dose for the current period, calendar year to date, and extrapolated dose to the end of the year, and is issued at least quarterly to management and Radiation Monitoring.

The thermoluminescent multipurpose dosimeter uses LiF chips to measure beta, photon and neutron radiation. The dosimeter is constructed to provide a measure of the skin dose and a one centimeter tissue depth dose to the whole body. Quality factors of 10 and 3 are used to determine dose equivalents to body organs for fast and thermal neutrons, respectively.

For employees who are provided extremity dosimeters, another data processing report is also provided on a monthly frequency. The sum of the employee's accumulated derma dose plus any special measurements made for the extremity is considered the employee's extremity exposure.

Annual summations are provided for each employee's exposure record file, and in the form of an annual exposure report card to the employee.

The exposure records and reports for the current exposure year include all of the information required on Form NRC 5 with the exception of Item 13 (running total for calendar quarter) and Item 18 [additional exposure allowable under 5(N-18) rems] as required in paragraph 20.401. The various data on the monthly exposure reports have permitted management to effectively maintain BNW employees' exposure below 3 rem per quarter. The addition of the quarterly total to these reports would not change the exposure control program but would increase the cost of the Hanford plant exposure records program since any change would necessarily affect the entire plant. No accounting is made of the amount of exposure remaining within the formula since an employee's annual exposure is limited to 5 rem.

Pursuant to paragraph 20.501, it is requested that exemption to the requirements of paragraph 20.401(a) be granted to the extent that Items 13 and 18 of Form NRC 5 need not be completed.

Caution Signs, Labels and Signals

The methods used by Battelle-Northwest in identifying those locations where radiation protection controls are required, differ in detail from those specified in paragraph 20.203. All locations where significant radiation exposure can be received, whether externally or internally, are posted with signs bearing the standard radiation symbol together with the words "Radiation Zone". Radiation Zones are established to limit casual (non-Radiation Zone) exposure to less than one-tenth of the occupational radiation exposure limits. All areas which would be required to be posted by paragraph 20.203 (as a radiation area, high radiation area, airborne radioactivity area or radioactive material area) are included within the Battelle-Northwest requirement for posting as a Radiation Zone. All significant quantities of radioactive materials or radiation generating machines are stored and used in Radiation Zones in conformance with established Radiation Protection Procedures.

The placement of signs denoting Radiation Zones is such that at least one sign is visible from any avenue of approach. These signs normally make no

reference to either the nature of existing radiation conditions or the radiation protection measures required within the Radiation Zone. Such information is contained on the Radiation Work Procedure which applies to that specific work location and to the personnel authorized to enter the area. Tight control is exercised over all visitors by means of local building security for buildings outside of the exclusion area and by security patrol for buildings or areas within the Hanford Site exclusion area. Visitors are not permitted to enter any Radiation Zone unless escorted by an employee thoroughly familiar with the radiological status and radiation protection requirements.

Radiation Work Procedures detail the requirements for protective clothing, personnel monitoring devices, surveillance of work by Radiation Monitoring, the locking out of process equipment, and other such requirements which can best be defined by the local groups actually performing the work. Although normally prepared for use over an extended period, occasionally a Radiation Work Procedure will authorize work for only a short period. Radiation Work Procedures require approvals of operating management, building management and Radiation Monitoring supervision.

The radiation protection requirements on the Radiation Work Procedures are established by Radiation Monitoring based on either the exposure potential associated with the work planned or on the radiological status of the area as determined from frequent area surveys of locations accessible to personnel. Results of all such measurements are preserved in the radiation protection records.

This practice of 1) uniformly posting all areas where significant exposure may be received as "Radiation Zones" and 2) specifying the existent radiological conditions and radiation protection requirements on the Radiation Work Procedure required to be prepared for every Radiation Zone has been used for many years within the laboratories and is consistent with the procedures of other Hanford contractors.

The DOE facilities operated by Battelle-Northwest are designed in accordance with Radiological Design Criteria (currently documented as BNWL-MA-3) which have been in effect for a number of years. These criteria include a requirement to provide locks or interlocks for areas where dose rates in excess of 1 rem/hr or airborne concentrations in excess of 1000 MPCs may be encountered. Since much of the work for DOE involves kilocurie or megacurie quantities of fission products, transuranium elements, etc., it is not practical to provide

physical access controls below these levels. As described earlier, all work in Radiation Zones, including areas where high dose rates or airborne concentrations may be encountered, is controlled by RWP provisions.

Pursuant to paragraph 20.501, it is requested that the requirements in paragraphs 20.203(b) (use of the words - "Caution Radiation Area"), 20.203(c)(1) (use of the words - "Caution High Radioactive Area"), 20.203(d) (use of the words - "Caution Airborne Radioactivity Area"), and 20.203(e) (use of the words - "Caution Radioactive Material") be waived in lieu of the use of the standard Hanford Radiation Zone sign described above together with the associated Radiation Work Procedure. All areas that would be required to be posted by paragraph 20.203 will be included within areas posted as Radiation Zones. Additionally, it is requested that the level of 1 rem/hr be accepted as the dose rate at which physical safeguards including locks or interlocks shall be required rather than the levels specified in paragraph 20.203(c)(2).

Records of Liquid Waste Disposals

Most of the buildings in the 300 area where Battelle-Northwest performs work under the license are connected to liquid radioactive waste systems operated by the Hanford Engineering Development Laboratory (HEDL) contractor. It is not possible to distinguish liquid wastes generated in licensed activities from those wastes generated in DOE contract activities, and in some cases, it is not possible to identify the contributions to the system from a given building or those arising from the activities of a given contractor. Measurements are made and records are kept by the HEDL contractor of the total radioactivity disposed to these systems.

Pursuant to paragraph 20.501 it is requested that an exemption be granted relative to the requirement in paragraph 20.401(b) for maintaining records of disposal of licensed materials to the 300 area Liquid Waste systems.

Criticality Detection System

Paragraph 70.24(a)(1) of 10 CFR 70 requires that a criticality detector system be maintained "...in each area in which special nuclear material subject to such license is handled, used or stored"... In those buildings where BNW works with substantial quantities of fissile materials (e.g., 306-W, 325, 308) and the fissile material storage building (303-C), criticality detector systems are provided. Those buildings where lesser quantities of fissile materials are used are established as isolated facilities as described in BNWL-MA-25,

"Criticality Safety Procedures", Procedure 1, part III.B. An isolated facility is any facility where the inventory of fissile material is limited to less than 45% of a minimum critical mass (MCM). An exception to this definition of an isolated facility has been made, with the concurrence of DOE-RL Manual Chapter 0530, for the Calibration Facility (3745 Building). Although the combined fissile inventory in the 3745 Building isolated facility exceeds a MCM, the bulk of the material is in the form of encapsulated calibration sources having a combined mass that is less than 10% of the critical mass of the material in that form. Non-encapsulated fissile material within the facility is limited to a total of 15 grams. Buildings currently established as isolated facilities in which work with licensed materials may be performed include the 3720, 3708, and Life Sciences Laboratory I (LSL I) buildings in the 300 Area of the Hanford Site. Criticality detection systems are not provided in these buildings. Typical current uses of fissile materials in these buildings are performance of various chemical and physical analyses and measurements on samples or specimens and studies of the deposition, uptake or biological effects of these materials on animals and plants.

Pursuant to paragraph 70.14 it is requested that conditions of installing criticality detection systems only in facilities containing more than 45% of a minimum critical mass be accepted as an alternate to the criteria described in paragraph 70.24(a).

1.3 MINIMUM TECHNICAL SPECIFICATIONS AND CAPABILITIES

Organization and Personnel Competence

Organization

(1) Battelle-Northwest will maintain a unique department responsible for the establishment and conduct of all radiation protection and nuclear safety programs. This department will be separate from the operating departments of Battelle-Northwest. This department for radiation protection and nuclear safety will serve as the Battelle-Northwest Official contact with the Nuclear Regulatory Commission for all matters concerning radiation protection, nuclear safety and criticality safety as they pertain to this license renewal application. Specific responsibilities of the department will include:

- Establishing the policies, standards and limits to be applied throughout Battelle Northwest in Nuclear Safety, Radiation Protection and Criticality Safety.
- Providing review and approval on the design, modification or development of facilities, equipment, and methods to be used in all work. Included in these approvals are Project Proposals, Facility Design Criteria, Facility Modification Permits, Safety Analysis Reports, Safety Assessment Documents, Radiation Work Procedures and Criticality Safety Specifications.
- Performing inspections, audits, and reviews of facilities and procedures and initiating changes necessary to assure a high level of personnel radiation protection and compliance with all Battelle-Northwest and State and Federal requirements.
- Evaluating, recording, and reporting radiation exposure received by personnel within Battelle-Northwest controlled facilities and by all Battelle-Northwest employees.
- Measuring and recording radiological conditions in all work locations where sources of radiation are present and prescribing the protection methods to be employed in performing the work.
- Conducting a surveillance program to define the geographical and biological distribution of radioactive materials in the plant environs, determining the status of the plant environs with respect to applicable limits and guides, and establishing appropriate guides for

the controlled release of radioactive materials from Battelle-Northwest controlled facilities.

- Establishing procedures and maintaining records of the shipment of radioactive materials from Battelle-Northwest to other locations either on or off the Hanford Site.
- Performing nuclear safety analyses for reactors, critical facilities, and laboratories containing fissile materials or large inventories of radionuclides.
- Planning and coordinating programs designed to cope with serious accidents within Battelle-Northwest facilities.
- Participating in formal investigations or radiological incidents involving Battelle-Northwest personnel or Battelle-Northwest controlled facilities.
- Maintaining records and providing necessary reports to meet all Battelle-Northwest as well as State and Federal requirements in the areas described above.

(2) Battelle-Northwest will maintain a unique department responsible for security and safeguards for nuclear materials. This department will be separate from the operating departments of Battelle-Northwest. This department will serve as the Battelle Northwest official contact for all matters concerning security, safeguards and management of special nuclear materials as they pertain to this license renewal application. Responsibilities of the department will include:

- Establishing the policies, standards and limits for security and nuclear material safeguards to be applied throughout Battelle-Northwest.
- Maintaining a system of control and management of nuclear materials which will optimize procurement cost, use and recovery.
- Providing the custodial care and special procedures to prevent diversion or unauthorized use.
- Providing audits to assure compliance with appropriate security and safeguard procedures.
- Establishing and maintaining an inventory, material transfer and forecast system for special nuclear materials.

(3) Battelle-Northwest will maintain a Safety Review Council as established in Management Guide 12.7 of the Battelle, Pacific Northwest Division Management Guide to review program designs and safety analyses where the direct or indirect consequences of a credible accident are deemed to be of substantial magnitude. Matters may be submitted to the Safety Review Council for consideration by any Department Manager, higher authority, or a member of the Safety Review Council. The Safety Review Council or council chairman can determine whether a formal review is required in each case. Copies of the prepared procedure and analysis are provided to all members of the Council for review and comment. A formal review by the Council as a group is held if requested by any member. The Council has access to all information and facilities required in the discharge of its responsibilities.

Review by this Council provides the Battelle-Northwest safety system with an additional authoritative step which is intended to assure that necessary engineering and administrative capabilities are incorporated to minimize the likelihood and consequences of a serious accident. Results of reviews performed by the Council are reported to the Director, Battelle-Northwest.

Examples of important matters to be considered for review by the Safety Review Council include:

- Nuclear safety criteria for the design and operation of facilities and equipment.
- Proposals for conducting safety analyses or research programs involving significant risks for sponsors.
- Safety Analysis Reports or Operating Safety Analysis Reports.
- Plans for implementing operating safety limits, audit and inspection programs, and operator training programs.
- Departmental plans for response and recovery from major accidents in facilities requiring safety analysis reports.
- Proposed changes in the mode of operation of facilities modification that increase either the probability or consequences of a significant accident.
- Evaluations of potentially significant safety interactions within Battelle facilities or with other Hanford contractors.

- Proposed nuclear safety policies and programs and other selected policies and programs of the Pacific Northwest Laboratories.
- Any activity not covered above that could have substantial safety implications.

Members of the Council are selected by the Director of Battelle-Northwest from persons recognized as authorities in specific fields such as atmospheric dispersion, biological effects of radiation, chemistry, containment, critical mass physics, fluid flow, heat transfer, legal liabilities, metallurgy, pressure vessels, reactor physics, operation and engineering, risk evaluation, and industrial safety. The Council may be supplemented by other resources or specialists within Battelle.

Qualifications and Responsibilities

(1) The manager of the organization responsible for administering the radiation protection and nuclear safety program will be a college graduate (preferably also a Certified Health Physicist) with recognized substantial experience in the field of radiation protection and nuclear safety. A minimum of seven years experience, including at least three years in the general area of nuclear safety and/or health physics, will be required for this position. This organization will be staffed with at least five people collectively experienced in nuclear safety and radiation protection.

(2) The manager of the organization responsible for approving Criticality Safety Specifications for technical adequacy and for performing technical reviews of Battelle-Northwest facilities and operations from a criticality safety standpoint will be a college graduate with a minimum of seven years experience, including at least five years in criticality safety work.

(3) The Senior Engineer, Nuclear Safety, who is responsible for directing independent audits will have at least five years of technical experience with at least three years in criticality safety work.

(4) The Safety Review Council will be appointed by the Director of Battelle-Northwest. Members of this group will be selected from persons recognized as authorities in specific fields related to safety.

(5) The manager of each Battelle-Northwest program will be technically trained in the field of endeavor (or an associated field of endeavor) which is the basis of the work to be performed. He/she will have experience required to operate in accordance with Battelle-Northwest policy and the contractual

obligations established by DOE-RL that may affect the program. He/she will be responsible for operating safety and insuring that personnel follow established rules.

(6) A Criticality Safety Representative is appointed for each facility by operations management. The representative is responsible for auditing, approving Criticality Safety Specifications and providing liason with Nuclear Safety.

(7) The manager of the organization responsible for security and safeguards will be an individual with substantial experience in the field of security, safeguards and/or nuclear material management. This organization will be staffed with a number of people sufficient to fulfill the organization's responsibilities.

Procedures

Radiation Protection

Formal administrative procedures for radiation protection are maintained by Battelle-Northwest. Periodic reviews are made of these procedures by trained health physicists to assure their adequacy. These procedures are changed only with the approval of the manager, radiation protection department, or qualified higher authority. Radiation Protection Procedures and specific Radiation Work Procedures are reviewed periodically with employees and are kept readily available to them.

Comprehensive dosimeter, monitoring, survey, bioassay, and whole body counting programs are maintained by Battelle-Northwest. The evaluating, recording, and reporting of radiation exposure, as determined by these programs for all Battelle-Northwest employees and visitors, meet high professional standards and will continue to reflect the contractual requirements. Any changes in the programs or the exposure evaluation and recording procedures will require the review and approval of the manager responsible for radiation protection.

A high quality environmental surveillance program is maintained for DOE-RL to permit a continuing evaluation of the status of the environs with respect to applicable limits and the impact of environmental contamination on the surrounding population.

Radiation protection training is a continuing program under Battelle-Northwest. The formal training programs range from those for the professional in radiation protection to programs for individuals whose knowledge of radiation is incidental to their work. An initial general radiation protection orientation is presented to new employees of Battelle-Northwest. This program is supplemented throughout the service of the employee to assure sufficient knowledge of radiation protection practices and procedures and changes in these practices and procedures. Specific training is presented to radiation monitoring personnel, and others who require special skills in the conduct of safe work. This program of training will be continued at a level to assure that radiation protection requirements are met and that the work with radiation or radioactive materials is conducted safely.

Criticality Safety

For work that involves fissionable materials, Battelle-Northwest follows the Two-Contingency Policy. A sufficient number of limits and controls are exercised to assure that before a criticality accident is possible, at least two unlikely, independent and concurrent errors or accidents must occur in one or more of the conditions specified as essential to nuclear safety. To implement this Two-Contingency Policy, formal procedures for the control of fissionable materials are maintained.

The principal procedure for control of fissionable materials is the Criticality Safety Specification (CSS). Criticality Safety Specifications are written procedures which give limits that, when followed, will ensure criticality safety in facilities processing, storing, or otherwise handling significant quantities of fissionable material. Any work involving more than 45% of the minimum critical mass of fissionable materials is conducted in a nuclear facility under an approved Criticality Safety Specification. An approved Criticality Safety Specification is required for any work involving fissionable materials, with the following exceptions:

- Natural and depleted uranium, and thorium.
- Work in a facility where only exempt quantities, less than about 3% of the minimum critical mass assuming spherical geometry and optimum water reflection and moderation, are present.
- Work in an isolated facility where the amount of fissionable material does not exceed one of the limits in Table 1.3-1 or Table 1.3-2. If more than one type of controlled materials are involved in an isolated

TABLE 1.3-1

Weight Percent ^{235}U	Allowable Weight kg U	g ^{235}U
1.0	900	9000
1.5	168.8	2532
1.7	121.4	2065
2.0	81.1	1622
2.5	49.1	1228
3.0	35.1	1053
3.5	27.9	977
4.0	22.0	880
4.5	18.3	823
5.0	15.6	783
8.0	7.9	632
10.0	5.85	585
20.0	2.48	496
25.0	1.88	472
30.0	1.5	450
40.0	1.07	428
50.0	0.826	413
75.0	0.501	376
93.0	0.396	369
96.0	0.384	369
97.0	0.380	369
100.0	0.369	369

TABLE 1.3-2

Isotope	Limit
Np-237	18,900 g
Am-241	32,400 g
Cm-244	6,345 g
Pu (Fuel)	
- Less than 50% Pu-238	230 g (total Pu)
- More than 50% Pu-238	1957 g (total Pu)
Uranium (any enrichment)	(see Table 1.3-1)
U-233	256 g
Cm-243	67 g
Cm-247	67 g
Am-242	9 g
Cm-245	9 g
Cf-249	9 g

facility, the sum of the fractions of the allowed masses shall not exceed one. Also, fissionable material in the form of encapsulated sources containing more than Table 1.3-1 or Table 1.3-2 values may be handled under isolation control upon written agreement with DOE-RL.

An isolated facility is defined as one which may contain more than 3% but less than 45% of the minimum critical mass, assuming spherical geometry and optimum water reflection and moderation. Fissionable material in the form of encapsulated sources containing more than 45% of a minimum critical mass may be handled under isolation control upon agreement between Battelle-Northwest and DOE-RL. An isolated facility shall be physcially separated by at least 6 feet from any other work involving fissionable materials. Each isolated facility is established by mutual agreement between the nuclear safety group and the responsible manager of the operating component.

The mandatory criticality safety limits are identified through a technical analysis of the specified work involving fissionable material. The analysis will be made by a competent criticality safety specialist and will be documented by issuance of a Basis Letter. These technical bases will be reviewed and approved by the Senior Specialist, Criticality Safety. The Basis Letters will be maintained in a permanent file by the nuclear safety group.

Facility Criticality Safety Rrepresentatives or their appointed delegates will be responsible for obtaining new or revised Criticality Safety Specifications. Assistance of the Senior Specialist, Criticality Safety is available to provide technical bases for establishing criticality safety limits. The nuclear safety group will provide assistance in preparing and distributing the Criticality Safety Specifications.

Each Criticality Safety Specification shall be approved or concurred to by the following or their authorized representatives:

- Criticality Safety Specialist
- Senior Specialist, Criticality Safety
- Senior Engineer, Nuclear Safety
- Technical Leader, Nuclear Safety
- Building Manager of the building in which the CSS will be used
- Criticality Safety Representative of the building
- Manager of the Operating Component in the affected facility.

Approval by the responsible manager formally establishes the specification as a written instruction to all members of the organization. Approval by the manager of the nuclear safety group shows that the specification is consistent

with DOE and Battelle-Northwest policies and regulations and with good safety practices. The signature of the Senior Specialist, Criticality Safety, establishes that the technical bases for the specification are correct. The steps to be followed in obtaining a CSS are outlined in Table 1.3-3.

In establishing Criciality Safety Specifications, fissionable material is defined as material which will support a neutron chain reaction with fast and/or thermal neutrons. This means ^{239}Pu, ^{241}Pu, ^{233}U, ^{235}U, ^{242}Am, ^{243}Cm, ^{245}Cm. ^{247}Cm, ^{249}Cf, and ^{251}Cf, in any form (metal, alloy, solution or compound). ^{238}Pu, ^{240}Pu, ^{242}Pu, ^{237}Np, ^{244}Cm and ^{241}Am are fissionable for these nuclides are expected to support a chain reaction, but only with fast neutrons. Criticality is not possible with these nuclides in aqueous solution. Any other fissionable transuranium nuclides will be considered that may be specifically identified in the future. Natural uranium, although fissionable, is excluded due to its large minimum critical mass.

Before a building can be designated as a nuclear facility in which greater than 45% of a minimum critical mass of fissionable material may be handled, a Safety Analysis Report (SAR) is required. Also, any significant modification or additional work not previously covered in an SAR requires a safety analysis in a supplemental SAR. A Safety Analysis Report is the result of a thorough study and analysis that is performed to assure that potential major nuclear hazards have been incorporated to reduce the probability of major accidents and to minimize the consequences in the unlikely event of their occurrence. The safety analysis considers foreseeable nuclear accidents that would substantially threaten 1) the safety of personnel or the public, 2) the use of or damage to property and 3) the continuity of operation of facilities.

Each SAR, and each revision, requires the approval of the responsible Department Manager and the Safety Review Council. Additionally, review by the Richland Operations Office of DOE is required by Manual Chapter 0530 if the facility is allowed to contain more than one minimum critical mass of fissionable materials.

Safety Factors and Assumptions. Criticality safety limits used in establishing Criticality Safety Specifications will be based on data from experimental measurements or, if direct experimental data are not available, on limits obtained from a calculational method that can be shown to be accurate or conservative when compared to experimental measurements. Safe limits will be obtained by reducing the critical value of a safe margin commensurate with interpolations and extrapolations to measurements and calculations. The maximum fractions that independently satisfy the two

CRITICALITY SAFETY SPECIFICATIONS

TABLE 1.3-3

Step	Operating Organization	Criticality Safety	Nuclear Safety
1	Determines that a new or revised CSS is needed. Inform Nuclear Safety of need. Submits request for a Basis Letter to Criticality Safety.		
2		Reviews operation, evaluates criticality potential and contingencies. Prepares technical basis in form of a Basis Letter to Operating Organization with copy to Nuclear Safety.	
3	Prepares CSS on standard master forms.		Places Basis Letter in "Basis Letter File" kept by Nuclear Safety. Assists in preparation of CSS as requested by originator.
4		Reviews and approves CSS. Signatures: Senior Specialist, Criticality Safety.	
5			Reviews and approves CSS. Signatures: Sr. Eng. and Technical Leader, Nuclear Safety.
6	Reviews and approves CSS. Signatures: Bldg. Manager; Criticality Safety Representative; Operating Manager.		
7			Dates, duplicates, and distributes approved CSS.

contingency criteria for criticality safety are:

- 0.45 of critical mass
- 0.75 of critical volume
- 0.75 of critical mass per unit area
- 0.85 of critical slab thickness
- 0.85 of critical cylinder diameter
- 0.95 k_{eff}

Neutron Reflection. Safe limits will be based on full water reflection except when less reflection can be assured by the Two-Contingency Policy. Instances in which less than full water reflection may be assumed are:

- Fixed, unreflected process vessels in a sealed hood or cell into which access is controlled.
- Unreflected containers of vessels wrapped with sufficient cadmium of other nuclear poison sheeting to assure nominal reflection.
- Individual storage units in a storage array (less than full water reflection may be assumed for some arrays in the interaction calculations).

Neutron Moderation. Safe limits will be based on optimum water moderation, unless other than optimum moderation can be assured by the Two-Contingency Policy. Instances in which nonoptimum water moderation may be assumed are:

- Fissionable material in watertight containers.
- Fissionable material in watertight glove boxes in which the amount of moderating material introduced into the glove box is limited and controlled. (Automatic overhead room fire sprinklers are permitted if the glove boxes are critically safe by geometry under flood conditions. Under the situation where a glove box is not safe by geometry under flooded conditions, the mass limit is reduced such that criticality would not be possible.)
- Fissionable material stored in a vault or room which specifically excludes water flooding or significant moderation by other materials.

- Fuel rods securely bundled (close packed).
- Systems in which the moderator is solid, thus fixing a H/X ratio to a certain value or range of values as in the case of fissionable materials in polystyrene or other compact substance.
- Fuel rods or groups of fuel rods separated by sufficient water or equivalent material to prevent neutron interaction.
- Systems in which the concentration of fissionable material is other than optimum and the concentration can be limited within a safe range by the Two-Contingency Policy.

For vessels or units in arrays in which neutron interaction contributes to reactivity, allowance factors to obtain safety margins depend on the method used to calculate the critical number of units in the array and on how well the method predicts criticality for arrays that have been measured experimentally. For those arrays that can be accurately computed, the maximum allowable k_{eff} will be 0.95 at a 95% confidence level; and for arrays that compare less favorably with experimental measurements, k_{eff} for the array will be less than 0.95, depending on comparisons to measurements.

Special Reflectors and Moderators. The above limits are based on reflection and moderation of light water. For instances where fissionable material processing or handling involves special reflectors or moderators, such as D_2O, carbon, beryllium or heavy metal reflectors, criticality safety will be assessed on an individual basis.

Emphasis is placed on moderation control in glove boxes in which unmoderated special nuclear material is processed. Controls employed are as follows:

- Whenever the supply of water or oil is unlimited, potential flooding due to the rupture of a water or oil line is controlled by means of continuous operator surveillance, quick acting shut-off valves, or water detectors located on the floor of the glove box.

- A limited quantity of hydrogenous liquid is permitted in a glove box for cleaning purposes, provided that the liquid is not mixed with the special nuclear material. As an added margin of safety, the amount of liquid permitted is limited to an amount that would be safe, even if mixed with the fissionable material.

Other Administrative and Technical Controls. Geometry control of fissionable material is the preferred means of criticality safety control and is used wherever feasible. When processing fuel elements of more than one plutonium or uranium enrichment, at least two positive means of identifying each enrichment are required (e.g., fuel dimensions, color coding, labeling, etc.).

Prior to blending PuO_2 with UO_2, criticality safety is based entirely on the critical parameters for PuO_2, with no credit for reduced reactivity due to UO_2. After blending, allowance in the limits may be given for UO_2 content if the correctness of the blend is confirmed by a sample analysis.

Plutonium polymer is assumed present in plutonium solution systems unless absence of such polymer is assured by acid concentration control and routine cleanouts of equipment.

Criticality safety dimensions are attributed to spherical geometry, unless equipment design assures a geometry less favorable to criticality than spherical (e.g., cylinder or slab).

Safe cylinder and slab dimensions for process vessels are based on the most reactive form of the fissionable material that can reach the vessels.

The structural integrity of safety related items such as shelving for fissile material storage is at least three times the load capacity permitted by Criticality Safety Specifications.

Sumps are required to be safe in the event of a credible leakage and accidental spillage from vessels and piping linked to the sump.

Vacuum headers, vent headers, and similar header systems are reviewed in detail for potential criticality hazards.

Pipe connections are not permitted between a fissionable solution system controlled by safe geometry and a system controlled by safe mass.

In processes conducted behind massive shielding, soluble and fixed neutron poisons such as boron in solution, Pyrex Raschig rings, and steel plates containing boron or gadolinium may be used as a primary means of criticality safety control. When a soluble neutron poison is used as a primary means of criticality control in a solution system, at least two independent administrative controls must be used against omission of the poison (e.g., combinations of attenuation instrument, chemical analysis, double check of addition, etc.).

In processes not conducted behind massive shielding, fixed poisons may be used as a primary means of criticality control, if the positive design measures and maintenance controls assure that the poison is always present, and that leaching of the poison away from the matrix does not occur.

Soluble poisons may not be used as a primary criticality control in unshielded facilities.

Applicable Criticality Safety Specifications are available in all processing and storage areas.

Criticality Safety Specifications and other procedures for the control of fissionable material are reviewed periodically for compliance with DOE and Battelle-Northwest policies and regulations and good safety practice. Also, the contents of Criticality Safety Specifications and other procedures are periodically reviewed with employees to assure their familiarity. Audits are performed monthly by a member of the facility operating staff to assure that the operation of a facility complies with the appropriate procedures and Criticality Safety Specifications.

Audits will be conducted to assure that a facility is being operated within the proper category of criticality safety control; that the handling of fissionable material is adequately covered by a CSS; that the limits and controls of applicable CSS are being met; and that good safety practices are in effect. The Chairman of the Safety Review Council will be provided a copy of each audit report. A summary report of these audit activities will be made to the Battelle-Northwest Director at monthly intervals.

Criticality Safety Training

Criticality safety training is required to acquaint all personnel with the criticality alarm signal and emergency response, and to inform personnel handling or using fissionable material of the basic Battelle-Northwest criticality safety rules. Periodic training (minimum annual frequency) in emergency action required for an accidental nuclear criticality shall be conducted for all nonreactor nuclear facility personnel.

The minimum training program requirements for all personnel involved in working with fissionable materials at nonreactor nuclear facilities (those performing work and those providing supervisory guidance) consist of:

(1) Three of four quarterly training sessions which may be primarily work oriented criticality safety topics such as new procedures or specifications, unusual occurrences involving criticality safety, discussion of selected criticality safety specifications for clarity and understanding, and discussion of audit and appraisal results. The following topics shall be covered in at least one training meeting each 24 month period:

- basic criticality principles;
- methods of criticality safety control; and
- company policy and procedures for maintaining criticality safety.

(2) Each individual shall demonstrate a satisfactory knowledge of the requirements and procedures pertinent to the individual job assignment. The demonstration may be oral, written, operational, or all three. Reexamination is required:

- at least annually on emergency procedures; and
- at least once every two years on all other subjects in which the examinee is expected to be proficient.

(3) A file record of the training, including an auditable record of the testing, shall be maintained for each individual. The training records shall be maintained for a minimum of two years. Records shall be sufficient to show the following:

- Training material covered and its relevancy to criticality safety.
- Clear indication of the presence or absence of those individuals required to receive the training.
- Demonstrates that each individual has a satisfactory knowledge of the subjects and procedures pertinent to his job assignment.

Criticality Detection System

A criticality detection and alarm system is required in any facility containing greater than exempt quantities of fissile materials except those facilities administratively controlled as isolated facilities. The criticality detection and alarm system consists of detectors, comparator panel, howler circuit, audible alarms, power-loss annunciator, a central annunciator and the necessary wiring and controls. Audit and trip signals are fed to an annunciator and comparator unit which provides 2-out-of-n coincidence operation and signals any malfunction or loss of power to the system. When two or more detectors in one location are tripped, cycling klaxon howlers, which are provided throughout the building, are activated. A detailed description of the system design criteria, performance tests, detector placement, calibration and maintenance instructions, and operating experience is available in Criticality Detection and Alarm System, edited by C. R. Richey and T. W. Jeffs, Battelle, Pacific Northwest Laboratories, December 1977. A description of the system follows.

Detector

Neutron sensitive detectors are located where at least two detectors will trip with a minimum foreseeable criticality burst from either a liquid or metal system. This burst produces 20 rads in soft tissue of combined neutron and gamma radiation at an unshielded distance of two meters from the reacting material within one minute. The neutron to gamma ratio is taken to be 0.3 with an average neutron energy of 1 MeV. At least three detectors shall be located within 300 feet of any fissionable material. Lesser detectors shall be used to compensate for intervening shielding and to ensure the alarm system will trip following the minimum foreseeable burst.

Comparator

The comparator panel annunciates both visually and audibly any failure or alarm condition of any detector in the building. The comparator will activate the alarm when two-out-of-n ($n \geq 3$) detectors trip the alarm circuit. Redundant trip circuits shall be included in the comparator.

All circuitry and controls associated with the comparator unit shall be protected against unauthorized tampering by the use of key lock doors and switches or key lock switches.

Howler Control Circuit

The howler control circuit shall be fail-safe.

The fail-safe solid-state electronic timing device should be used for the howler timer.

Calibration and Testing

Each criticality detector contains an internal audit circuit which will function at least once per minute to detect failure of the detectors. To further assure optimal operation of the criticality detectors, the detectors shall be replaced annually with others newly tested and calibrated by personnel of the plant radiation instrument calibration and repair facility. The electronics of the comparator unit shall be tested annually. The criticality alarm system in each building shall be tested quarterly by tripping the system with a neutron source.

Emergency Power

The criticality alarm system in all buildings will be connected to emergency power if it is available. For those buildings, where emergency power is not available, in the event of an emergency or planned power outage, all work with radioactive materials including fissible materials will be terminated immediately. Process areas in which activities with fissionable materials continue during a power outage will have emergency power supplied to all portions of the criticality alarm system.

An annunciator of signal power loss to the criticality alarm system will be installed in each building at a location which is occupied during normal building use.

Criticality Alarm Signal

The criticality alarm signal (ah-oo-gah) is unique and will not be used for any purposes other than to signal immediate evacuation in the event of accidental criticality. The alarm signal will be audible throughout the building and at any location along the outside of the building.

Radiation Emergencies

Battelle-Northwest emergency procedures are maintained in conformance with DOE-RL directives which require that each separate facility emergency procedure conform to the plan for that plant area in which the facility is located regardless of which of the several Hanford contractors may operate the facility.

The objectives of these procedures are to minimize the risk to employees and members of the public in the vicinity of the Hanford Site, and secondarily to minimize damage to or loss to use of valuable facilities and equipment in the event of an accidental criticality, fire, explosion, or release of radioactive materials.

Procedures applying to Battelle-Northwest and Pacific Northwest Laboratory (PNL) facilities are reviewed periodically by trained radiation protection and safety personnel to assure both their adequacy and their conformance to DOE-RL directives. These procedures contain specific information regarding the sound of the various emergency signals, their meaning, the appropriate action to be taken, the location of the staging area to which employees are to evacuate, and the specific plan of accountability for personnel.

The criticality alarm signals and the appropriate personnel response to these signals will remain uniform in accordance with the established Hanford Standards throughout Battelle-Northwest and PNL facilities. The response to other alarm signals such as fire alarms is maintained uniform throughout the laboratories. However, the signals in Battelle-Northwest owned facilities may be different from those in the DOE owned facilities. The fire alarm system for the Battelle-Northwest facilities is connected to the Richland fire department; the fire alarm system for DOE facilities is connected to the DOE fire department. The criticality alarm signals will be tested quar-

terly, and the fire alarm signals will be tested semiannually.

Facility emergency procedures will be reviewed annually with the involved personnel. Evacuation drills will be performed in all Battelle-Northwest facilities at least annually to assure that employees know the meaning of emergency signals, and know the immediate action response appropriate to each.

The systems established by DOE-RL, whereby DOE-RL, management of Hanford contractors and members of established emergency and technical support teams are notified, will be used in emergency situations.

The authorities and responsbilities of the emergency director and the members of the radiological emergency staff are defined in writing.

Specialized plans for Battelle-Northwest groups who have special responsibilities in emergencies (viz., environmental monitoring, radiation monitoring, and the radiological emergency staff) are maintained together with special training programs by Battelle-Northwest. These plans will be reviewed at least annually.

Medical, firefighting, and access control personnel are employees of contractors other than Battelle-Northwest. Emergency plans and training programs for these groups are established by management of the contractor organizations involved to meet DOE-RL requirements.

Kits containing instruments capable of measuring dose rates that might be encountered during rescue entries following a nuclear excursion or similarly serious accident and self-reading pocket ionization dosimeters capable of measuring gamma doses up to 600 R are maintained at locations near but not in Battelle-Northwest or PNL facilities where radioactive and/or fissionable materials are used. These kits also contain respiratory protective equipment and protective clothing necessary for building re-entry.

Facilities and Equipment

Plans for new facilities or significant modification of existing facilities will be reviewed by radiation protection, safety, and operating organization personnel for adequacy of shielding, interlocks, alarms, ventilation, containment, and Radiation Zone posting. In addition, new facilities, major modifications of

facilities, or the establishment of alternate uses for existing facilities may be reviewed by the Safety Review Council. This review will cover the adequacy of engineered safety features and the administrative controls to be provided. The suitability of a facility for performance of licensed work will be judged by the same standards which are used when similar decisions are made for work under the Operating Contract.

The work performed under this license will be so planned and controlled as to not materially increase radiation or criticality safety hazards over those encountered in the performance of work under the Operating Contract with DOE.

Gaseous effluent treatment systems are installed on the exhaust system of any building where a potential exists for the evolution of airborne radioactive contamination. The gaseous effluent systems are designed to maintain effluent releases as far below the limits specified in 10 CFR 20 as practicable. Except for certain filters installed directly in or on the hood or glove box in such a way that periodic testing is not feasible, all HEPA filters are tested upon installation to assure that they meet design objective of 99.95% efficiency test for cold DOP smoke with particle sizes between 0.3 and 0.8 um. All HEPA filters, with the exception of those identified above, are tested at least annually thereafter to assure continued proper function. Failure to meet the requirements result in replacement and testing as soon as practicable. If continued generation of effluents prior to replacement is deemed unadvisable, the operation is terminated pending replacement of the treatment system.

Protective clothing, respiratory protective equipment, radiation detection and measurement instruments, and dose rate measurement systems and equipment are intended to be uniform for license and Operating Contract work. The services, equipment, and procedures used will be in accordance with DOE contractual requirements established by DOE-RL.

Materials

Special nuclear materials used in Battelle-Northwest controlled facilities under this license will be identified as such and maintained separately from materials used under the Operating Contract.

Special nuclear materials handled temporarily in a sponsor's facility, except in Agreement States, under the terms of this license, will be retained in Battelle-Northwest custody at all times while in the sponsor's facility and will be identified and maintained separately from any other radioactive materials. If fissionable, the material will be kept at least ten feet from other fissionable materials.

Shipment of special nuclear materials other than those specified in 10 CFR 71 paragraphs 71.11 and 71.12 will not be made until proposed procedures have been approved by NRC.

1.4 CERTIFICATE

The applicant and the official executing this certificate on behalf of the applicant named in Part 1.1 above, certify that all information contained in this application, including any supplements attached hereto, is true and correct to the best of our knowledge and belief.

Pacific Northwest Laboratories of
Pacific Northwest Division of
Battelle Memorial Institute

Applicant

By: A. E. Alexander

Director, Pacific Northwest Laboratories
Pacific Northwest Division
Battelle Memorial Institute

Date: July 2, 1979