B&W FUEL COMPANY
An American Company with Worldwide Resources

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January 28, 1993

Mr. John Hickey
Uranium Fuel Section
Fuel Cycle Safety Branch
Division of Industrial and
Medical Safety, NMSS
Nuclear Regulatory Commission
Washington, D.C. 20555

REFERENCE: SNM-1168 License, Docket 70-1201

Dear Mr. Hickey:

Condition 17 of B&W Fuel Company's (BWFC) SNM License required us to evaluate our license against the Branch Technical Positions (BTP) and propose license conditions for compliance. Our revisions were submitted to you on March 16, 1992. NRC requested additional information on September 23, 1992. We then committed in correspondence dated November 4, 1992 to include additional revisions by February 1, 1993. These revisions have been made and identified by a side bar. Attachment I provides details of each revision and follows the format of your request for additional information. The changes effected chapters 2, 6 and 10 of our SNM license. Please replace the former chapters in their entirety with the ones provided. As required, six copies are provided.

If you should have any questions regarding this matter, please feel free to call me at (804) 522-6202.

Sincerely,

B&W FUEL COMPANY
COMMERCIAL NUCLEAR FUEL PLANT

Kathryn S. Knapp

Kathryn S. Knapp
Manager, Safety & Licensing

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ATTACHMENT I

I. MANAGEMENT CONTROLS

A. Section 2.6 should include commitments for establishing the following:

1. Operational procedures which include measures for controlling chemical and fire hazards.

Section 2.3.1 was added to address pre-operational evaluations. It commits to conducting an evaluation prior to initial operations on new operations and facilities and major operational changes. The evaluation is performed to ensure that adequate protection is established for radiation, nuclear, fire, and chemical safety is established. Section 2.6 "Operating Procedures" was expanded to state that changes which require revisions to procedures or local safety rules that the modifications must be in place prior to implementation.

2. Written procedures for specified standards or criteria and detailed testing for safety-related equipment.

See November 4, 1992 correspondence.

3. Managerial control for monitoring the effectiveness of the Requirements for Operation programs. The Requirements for Operation are defined in the BTP.

See November 4, 1992 correspondence.

B. In Part I, the licensee should commit to conducting a safety analysis of the facility's operations to identify potential hazards, operational parameters, and specifications for these parameters. Based on the safety analysis results, establish and document the basis for Requirements for Operation.

See November 4, 1992 correspondence.

II. CHEMICAL SAFETY

A. Identification of Chemical Risks

1. Part II of the license application should include a list of chemical risks identified as type B (posed by radioactive materials) and type C (plant conditions which may directly or indirectly affect radiation risk), as defined in the BTP on Chemical Safety.

Section 10.6 "Chemical Safety" was added to provide general information on our chemical usage, quantities involved, storage of chemicals and associated risks.

2. Part II should also include the amounts of the above identified chemicals that are stored at the facility.

Section 10.5.2 describes the implementation of our fire protection program. It illustrates that our pre-fire plan contains pertinent information on chemicals stored at the CNFP and associated fire hazards. Section 10.6.2 also discusses the quantities of chemicals at the CNFP.

B. Safe Storage and handling of Hazardous Chemicals

1. Section 6.5 should include a statement that the Hazardous Communications Program (or other appropriate documents) defines the proper facilities, equipment, and procedures for the safe handling and storage of the chemicals identified in A.1 above.

Section 6.5.1 was revised to include the appropriate statement.

2. Part II should include a description of the facilities, equipment, and procedures for the safe handling and storage of hazardous chemicals as defined in the Hazardous Communications Program or other documents referenced in the above statement.

As discussed in A.1. above, Section 10.6 "Chemical Safety" was added to provide information on our chemical safety program.

C. Accidental Release of Hazardous Chemicals

1. The Radiological Contingency Plan (RCP) should include a description of the facilities, equipment, and procedures for measuring the extent of and mitigating consequences from a release of hazardous chemicals.

After further review, it was determined that due to the low quantities of chemicals on site a spill would not warrant being included in the RCP as it would not be classified as a Site Area Emergency or as an Alert. An appropriate spill control and clean-up internal procedure will be used to ensure compliance.

2. The RCP should specifically list the organizations to be contacted in case of a release of hazardous chemicals.

See November 4, 1992 correspondence.

3. The RCP should describe the operator training provided for responding to a release of hazardous chemicals.

See November 4, 1992 correspondence.

II. FIRE PROTECTION

A. Fire Protection Program

1. A statement should be made indicating that a Fire Protection Program is established and implemented. The documents describing this program should be identified.

Section 6.2 has been expanded to describe the implementation of our fire protection program and the supporting documents.

2. The position title of the senior level management official directing the program should be stated.

The Manager, Safety and Licensing has been identified in section 6.2 as the director of the program.

3. A statement should be made regarding the frequency of audits of the program. (Monthly walk-down audits and annual review by a safety review committee are acceptable.)

See November 4, 1992 correspondence.

B. Fire Protection Equipment

1. Section 6.2.2, 4.7, and 8 describe the fire protection equipment. Please identify other facility areas protected by sprinkler or other systems, such as halon.

See November 4, 1992 correspondence.

2. In Section 6.2.5, please state whether or not the fire protection equipment will be inspected, tested, and maintained according to prevalent industry standards, such as those of the National Fire Protection Association.

Section 6.2.5 has added "in accordance with NFPA standards."

C. Fire Hazard Analysis

1. A statement should be made that a fire hazard analysis has been performed, deficiencies (if any) revealed by the analysis have been corrected, and that the fire protection systems are adequate for all credible fire scenarios. The date of the last analysis should be stated.

See November 4, 1992 correspondence.

2. The licensee should commit to reviewing and updating fire hazard analyses at regular intervals (2 years is acceptable), unless there are substantial modifications of the facility buildings or processes, in which case the analysis should be reviewed and updated as frequently as needed.

See November 4, 1992 correspondence.

D. Fire Emergency Plan (Pre-Fire Plan)

1. Your Pre-Fire Plan may serve as the Fire Emergency Plan, if it has the elements stated in the attached Technical Position. If this is the case, than the opening paragraph of Section 6.2 can be considered adequate.

See November 4, 1992 correspondence.

2. If any of the required information is contained in the Radiological Contingency Plan, then clear reference should be made in the Pre-Fire plan.

See November 4, 1992 correspondence.

E. Training

1. Section 6.2.3, which describes training commitments, would be complete with the inclusion of a statement that the training program shall include fire drill performed at least annually.

See November 4, 1992 correspondence.

F. Administrative Controls

1. The licensee should propose to control welding and other hot working in the facility.

A commitment to control such operations was added to Section 10.5.2.

2. The licensee should propose to control plant or process modification that may impact fire safety, e.g., increase of fire load, introduction of flammable substances, and disabling of fire protection systems

As stated in response to A.1., Section 2.3.1 was added to address pre-operational evaluations. It commits to conducting an evaluation prior to initial operations on new operations and facilities and major operational changes. The evaluation is performed to ensure that adequate protection is established for radiation, nuclear, fire, and chemical safety is established.

2.1 Organizational Responsibilities and Authority

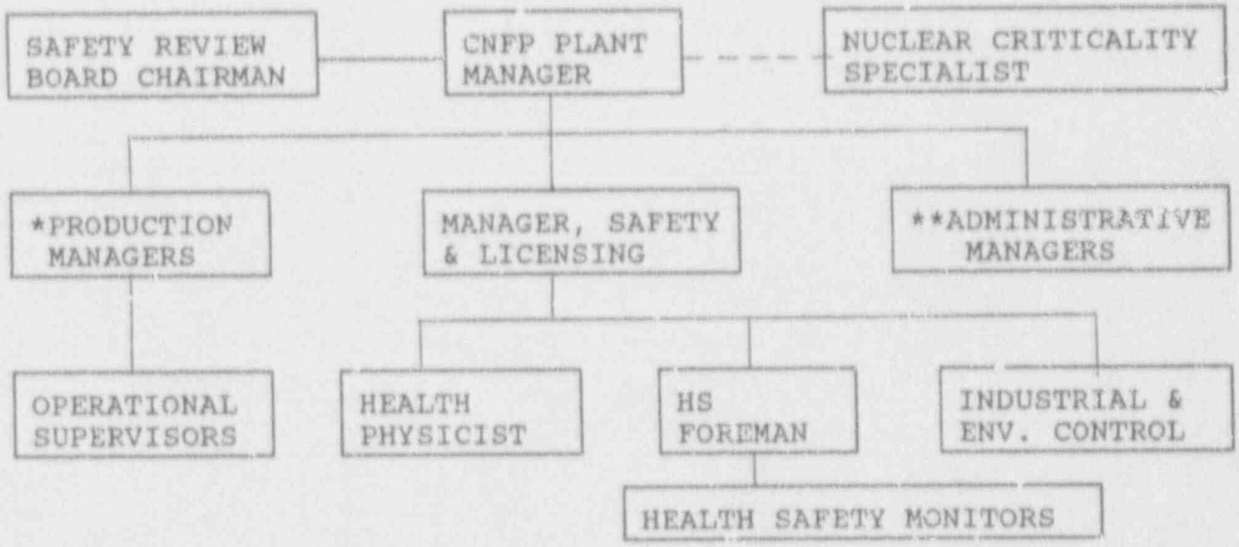
2.1.1 Management

It is the responsibility of the Plant Manager to assure the safety of the operation and compliance with license conditions. Control shall be established by:

- designation of responsibility to qualified personnel
- review and approval of Health-Safety procedures
- review of program effectiveness
- prompt correction of nonconforming conditions

The CNFP management structure is as shown in Figure 2.1.

Figure 2.1



* (e.g., Mfg. Eng., Fuel Manufacturing & Field Operations)
** (e.g., Accounting, Personnel, Purchasing, Info. Services, Production and Inventory Control - not directly responsible for production functions)

2.1.2 Production Managers

Production Managers report directly to the plant manager with except for the Manager, Field Operations who reports to the President of the Company. They are responsible for managing operational area supervisors and are responsible for production functions. The Managers of Manufacturing Engineering, Fuel Manufacturing and Field Operations are production managers.

2.1 Organizational Responsibilities and Authority

2.1.2 Production Managers

The Production Managers shall have, at a minimum, a bachelor's degree in science or engineering, followed by two years experience in the nuclear industry.

2.1.3 Operational Area Supervision

Operational area supervision is that supervision directly responsible for the control of materials, personnel, equipment, and activities in specific areas. Those responsibilities include assuring that approved control procedures developed by Health-Safety shall be available in writing to operators and other concerned personnel and shall be adhered to.

Minimum qualification of operational area supervision shall include:

(a) A high school education and a minimum of 2 years experience in the nuclear industry. Experience shall include the practical application of criticality control techniques and a familiarity with the applicable specific limitations imposed on CNFP operations.

2.1.4 The Health-Safety Section

The Health-Safety Section shall be responsible to interpret the license conditions, provide monitoring facilities, develop safe operation guidelines, maintain training programs, and review and approve operating procedures to assure safe operation and license compliance. These responsibilities include maintenance of nuclear safety and radiation safety with the approval authority limited to authorized specific or general license conditions. The Health-Safety section shall not be directly responsible for the performance of manufacturing operations.

2.1.4 The Health-Safety Section

The Manager, Safety and Licensing or their qualified designee shall be responsible to provide management with assurance of the effectiveness of the safety program by maintaining an audit program that includes periodic inspection of controls and operations, reports to management, follow-up or nonconforming conditions and necessary documentation (see Audits, Section 2.7).

2.2 Personnel Education and Experience Requirements

2.2.1 Plant Manager

The Plant Manager shall have a Bachelor's Degree in Science or Engineering, a minimum of 10 years experience in the nuclear industry, and 5 years experience in management.

2.2.2 Manager, Safety & Licensing

The manager to whom the section reports shall have a Bachelor's Degree and a minimum of five years experience, which would develop an understanding of nuclear and radiation safety. Such experience shall be of a nature which demonstrates to the Plant Manager sufficient judgment and capability to establish and maintain an effective nuclear criticality and radiation safety program for the activities authorized by license.

2.2.3 Health Physicist

The Health-Safety Section shall include a person who shall act as the plant Health Physicist. This person shall have a Bachelor's Degree in Science or Engineering.

A minimum of 2 years experience in applied health physics is required along with sufficient formal training that provides an understanding of the health physics and nuclear safety hazards involved at the CNFP.

2.2.4 Health-Safety Foreman

The Health-Safety Foreman shall have a high school education and three years experience in radiation safety which would develop an understanding of nuclear and radiation safety.

2.2.5 Health-Safety Monitors

Health-Safety Monitors set up and conduct routine monitoring, sample collection and analytical tests in the plant to determine whether the amount of radioactivity is within acceptable limits and assists in verifying the radiological and industrial safety of employees.

2.2 Personnel Education and Experience Requirements

2.2.5 Health-Safety Monitors

The Health-Safety Monitors shall have, as a minimum, a high school diploma or GED equivalent with six months of experience as a radiation monitor. They may fulfill the experience requirements on the job as a Health-Safety Monitor trainee.

2.2.6 Nuclear Criticality Safety Specialist

The Nuclear Criticality Safety Specialist is a separate component within the corporate structure and thus is organizationally independent of the CNFP, with no interest in plant operations, other than the nuclear criticality safety aspects. The Nuclear Criticality Safety Specialist is responsible for evaluating the basic nuclear criticality safety limitations upon which plant safety was originally assessed, potential changes, validity of assumption, and accuracy of results.

The minimum qualifications for the Nuclear Criticality Safety Specialist shall be a Bachelor's Degree in Science or Engineering and a minimum of two years experience in nuclear reactor physics and one year experience in nuclear criticality analysis or two years experience performing nuclear criticality safety analyses.

2.3 Safety Review Board

The Safety Review Board reviews the following as a minimum on a quarterly basis:

- New or revised facilities
- Analysis of equipment and processes involving hazardous materials
- Maintenance of fire safety
- The continuing effectiveness of established controls and safeguards
- Maintenance of ALARA criteria (review of quarterly air sample averages, review of surface contamination surveys)
- Safety-related audit and inspection findings
- Other items (such as abnormal occurrences) that Safety Review Board members wish to discuss.

2.3 Safety Review Board

The Safety Review Board Chairman shall have a Bachelor's Degree in Science or Engineering and a minimum of five years experience in responsible positions which would develop an understanding of nuclear and radiation safety.

The Safety Review Board Chairman shall be directly responsible to the Plant Manager for the proper conduct of the Safety Review Board. The Plant Manager shall be kept informed in writing of Safety Review Board action. The permanent membership of the Board shall consist of representatives from production management (section 2.1.2), Manager, Safety and Licensing and others as deemed necessary by the Chairman. Technical representatives of outside consulting organizations shall be included as necessary.

Board meetings may be convened at the discretion of the Safety Review Board Chairman, but shall be held at least quarterly. The Safety Review Board Chairman shall decide whether or not the necessary disciplines are present during a board meeting to evaluate the item(s) under consideration. There shall be a minimum of 4 Safety Review Board members present during a board meeting.

Records of Safety Review Board proceedings, including supporting calculations and approvals, shall be retained for 2 years minimum after the completion or termination of the subject activity.

An annual ALARA report shall be prepared under the direction of the Manager, Safety and Licensing. The report shall be submitted to the Safety Review Board in which they will review to determine: 1) if there are any upward trends developing in personnel exposures (internal and external) for identifiable categories of workers, types of operations, or effluent releases; 2) if exposures and releases might be lowered in accordance with the ALARA concept; and 3) if equipment for effluent and exposure controls is being properly used, maintained, and inspected. A copy of the report shall be sent to the Plant Manager along with the results of the review and recommendations.

At least every two years, the Safety Review Board shall evaluate the effectiveness of the radiation/nuclear safety training program.

2.3.1 Pre-operational Evaluations

New operations and facilities and major operational changes require Health Safety to perform an evaluation prior to initial operation to ensure that adequate radiation, nuclear, fire, and chemical protection is established.

The Safety Review Board Chairman reviews all pre-operational evaluations which involve hazardous materials and determines if Board review is necessary. In the case of minor changes where existing safety practice remains the same, the Safety Review Board Chairman may determine that Board review is not necessary. Safety Review Board members shall be kept appraised of actions taken by the Safety Review Board Chairman on such minor changes. Where other than minor changes are involved, the Safety Review Board review and approval process shall be conducted in accord with procedures approved by the Plant Manager.

2.4 Approval Authority for Personnel Selection

Personnel selection for those CNFP staff level positions shall be approved by the Plant Manager.

2.5 Training

Initial indoctrination of employees to nuclear and radiological safety shall be the responsibility of Health-Safety and shall conform with 10 CFR 19. Initial indoctrination training shall, as a minimum, include the following topics:

- license conditions
- federal regulations
- operating procedures
- radiation safety
- nuclear safety
- emergency procedure
- chemical and fire safety

The extent and depth of the training, relative to the detailed aspects of the radiation, chemical, firs and nuclear safety programs, is dependent on the employee's job assignment and potential exposure to radioactive materials as determined by Health-Safety.

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The initial indoctrination training shall be reinforced (as appropriate to the individual's job assignment) by the employee's immediate supervisor or his designee with respect The initial indoctrination training shall be reinforced (as appropriate to the individual's job assignment) by the employee's immediate supervisor or his designee with respect to individual unit safety requirements, location of emergency exits, contamination control techniques, specific local controls, and operating procedures, prior to the employee being released to operate independently. The employee's immediate supervisor shall complete a new employee training verification form prior to allowing the employee to operate independently.

A continuing safety training program shall be conducted by Health-Safety to the extent necessary to assure the maintenance of acceptable safety practices. Such training may be conducted on an individual or group basis. The content of retraining programs may be varied by Health-Safety but will include radiological and nuclear safety as a minimum. Empnasis is placed on new or revised safety criteria or areas in need of reinforcement. A formal retraining of radiation workers shall be conducted at least annually. Documentation of formal training and retraining shall be maintained by Health-Safety and retained for at least two years.

2.5 Training

The Manager, Safety and Licensing shall be responsible to assure that personnel assigned to Health-Safety are properly trained. The extent and depth of the training is based on the specific job assignment involved. Health-Safety monitoring personnel shall receive a combination of formal and "on-the-job" training such that they can successfully demonstrate their proficiency in basic nuclear and radiation physics monitoring and control techniques and regulatory requirements before being allowed to function without direct oversight.

2.6 Operating Procedures

Written procedures for the conduct of specific operations including maintenance and development of work within the plant are prepared by the functional component responsible for that activity and shall be reviewed and approved by appropriate production management and Manager, Safety and Licensing. Operating procedures which involve SNM shall be reviewed at least every two years by the appropriate production manager and Manager, Safety and Licensing. Applicable procedures shall be available in the work area and adherence to procedure shall be required of all personnel. Procedures for operations where nuclear and radiological safety are involved shall include specific reference to applicable safety requirements. Procedure and format shall be such that operations are clearly detailed and specific directions are provided for operation under both normal and abnormal conditions. Deviation from written procedures for the handling of radioactive materials shall be approved by the Manager, Safety and Licensing, or their qualified designee. In addition, administrative procedures shall supplement operating procedures to ensure proper procedural implementation. Procedural control of activities at the CNFP are categorized as follows:

- Health-Safety

  Procedures developed by Health-Safety specify the method by which safety related functions are to be accomplished. The procedures shall encompass all health physics activities required by the license. Such procedures may be for internal Health-Safety use or may be intended for general distribution to affected individuals within other components. As a minimum, Health-Safety procedures shall be approved in writing by the Manager, Safety and Licensing as well as approved by affected members of plant management.

2.6 Operating Procedures

- SNM Accountability

  Nuclear Materials Control procedures provide techniques for the accountability and measurement of SNM. As a minimum, such procedures shall be approved in writing by the Manager, Safety and Licensing and the Manager, Production and Materials Control.

- Other Plant Groups

  Procedures from other plant groups (i.e., Manufacturing, Quality Assurance) where nuclear chemical, fire or radiological safety, license conditions, or regulatory requirements are involved require prior approval by the Manager, Safety and Licensing as well as approval by affected members of plant management.

New operations and major operational changes shall require the written recommendation of the Safety Review Board Chairman prior to implementation. If the change requires revisions to procedures or the local safety rules, these modifications shall be in place prior to implementation.

Revised procedures shall be subject to approval in the same manner as new procedures. Health-Safety procedures shall be reviewed at least annually for technical correctness and applicability. The Manager, Safety and Licensing shall use their discretion to assure that the appropriate personnel of Section 2.2 performs the procedure review.

Procedure distribution and control shall be in accord with procedures approved by plant management.

2.7 Audits and Inspections

An internal Health-Safety inspection program shall be maintained to provide assurance that plant activities are conducted safely and in accord with license specifications. The Manager, Safety and Licensing shall be responsible to assure that the inspection program is conducted effectively.

The internal Health-Safety inspection program at the CNFP is structured as follows:

2.7 Audits and Inspections

- Monthly Safety Inspections

  Health-Safety personnel shall conduct, at least monthly, a formal inspection of plant status relative to safety related functions to include fire safety, except during plant shutdown of a week or longer. Inspection results shall be documented, reported to plant management and supervision as appropriate, and will be maintained on file by Health-Safety for at least 2 years.

  The monthly safety inspections shall be conducted by personnel technically qualified to perform this function and in the application of license specifications.

- Informal Daily Inspections

  Health-Safety personnel shall, as part of their routine duties, conduct informal daily inspections of plant activities. These inspections are not formally documented unless adverse findings are identified.

- Other Inspections

  Ventilation, containment, and air cleaning equipment shall be routinely inspected at least annually by Health-Safety personnel to assure continued effectiveness and compliance with license specifications.

- Independent Audits

  Independent auditors shall conduct, as a minimum, semi-annually nuclear safety, fire safety and health physics inspections at the CNFP. These audits shall be conducted in accordance with written instructions or procedures. The audit scope shall consist of physical inspections and records reviews for the industrial, nuclear, and radiological safety elements of plant activities including:

  - effectiveness of procedural controls impacting on operational safety parameters.

  - audit of operating records, where such records provide a means of verifying procedural compliance with safety specifications.

  - review and evaluation of contamination survey data.

2.7 Audits and Inspections

- Independent Audits

  - ascertaining the overall performance of the plant functions in providing adequate controls, surveillance, and follow-up to assure safety and license compliance.

Independent auditor's reports shall be submitted to the Plant Manager for his review. He will ensure that the proper management reviews the report. The audit report shall include any audit finding or recommendations. Actions taken as a result of audit findings shall be documented.

Qualifications of the independent auditors shall include competence in the areas of health physics or nuclear physics as appropriate at a level at least equivalent to Paragraph 2.2.3 or 2.2.6 respectively. Designation of the independent auditors shall be the responsibility of the CNFP Plant Manager.

2.8 Investigations and Reporting

Unusual events requiring reporting under NRC regulations shall be investigated as appropriate, with results reported to plant management and NRC. Events not otherwise requiring a report may be reported to NRC based on potential public or media involvement, etc., in order to keep NRC appraised of the situation.

2.9 Records

Plant alterations or additions, abnormal occurrences, events associated with radioactive releases, criticality analyses, audits, inspections, instrument calibration, ALARA findings, employee training and retaining, personnel exposures, routine radiation surveys, and environmental surveys shall be maintained on file for a minimum of 2 years or as otherwise required by federal regulation or other license condition, for review by CNFP management and regulatory agencies.

6.1 Nonexempt Sealed Source Control

6.1.1 Use of nonexempt sources for training and instrument calibration shall be limited to, or under the direct control of, the Health-Safety Section.

6.1.2 Sources utilized as a functional component of devices designated for manufacturing and quality control purposes shall be operated only by approved personnel who have been instructed in safe practice by Health-Safety. Health-Safety shall provide appropriate monitoring support during maintenance or other operations that may entail increased exposure levels. A register of approved operators shall be maintained in the Health-Safety Office.

6.1.3 Maximum whole body exposure rates in any constantly occupied area in the vicinity of operating manufacturing or quality control units utilizing by-product material sources shall not exceed 2 mrem/hr.

6.1.4 In addition to dosimetric devices routinely worn by designated CNFP employees, appropriate self-reading dosimeters shall be utilized by personnel involved in source manipulation in cases where the exposure may exceed 2 mrem/hr.

6.1.5 Each sealed source shall be tested for leakage at intervals not to exceed six (6) months. In the absence of a certificate from a transferor indicating that a test has been made within six (6) months prior to the transfer, the sealed source shall not be put into use until tested.

6.1.5.1 The test shall be capable of detecting the presence of 0.005 microcurie of contamination on the test sample. The test sample shall be taken from the source or from appropriate accessible surfaces of the device in which the sealed source is permanently or semi-permanently mounted or stored. Records of leak test results shall be kept in units of microcuries and maintained for inspection by the Commission.

6.1.5.2 If the test reveals the presence of 0.005 microcurie or more of removable contamination, the source shall be withdrawn from use and shall be decontaminated and repaired by a person appropriately licensed to make such repairs or disposed of in accordance with

6.1 Nonexempt Sealed Source Control

Commission regulations. Within five (5) days after determining that any source has leaked, a report shall be filed with the U.S. Nuclear Regulatory Commission describing the source, the test results, the extent of contamination, the apparent or suspected cause of source failure, and the corrective action taken. A copy of the report shall be sent to the Director the nearest NRC Regional Compliance Office listed in Appendix D of Title 10, Code of Federal Regulations, Part 20.

6.1.5.3 The periodic leak test required by this condition does not apply to sealed sources that are stored and not being used. The sources excerpted from this test shall be tested for leakage prior to any use or transfer to another person unless they have been leak tested within six (6) months prior to the date of use or transfer.

6.1.6 Adequate records shall be maintained to insure effective source documentation, including leak test results.

6.1.7 When not in use, sources shall be stored in approved secured containers in a manner selected to prevent unauthorized removal or use. Adequate posting of the source container and storage/operation area shall be maintained to insure compliance with appropriate regulations.

6.2 Fire Protection

The CNFP fire protection program is administered by the Health Safety Section with the Manager, Safety and Licensing overseeing the program. CNFP utilizes internal Health Safety procedures to ensure adequate fire protection is established, inspected and maintained for new facilities, equipment and/or operations. Internal procedures also provide instruction for our emergency rescue team in the event of a minor or major fire. Our pre-fire plan provides a hazard analysis associated with separate plant areas, fire emergency plans, and training. The Plan shall be reviewed by all fire fighting support agencies and updated accordingly.

6.2 Fire Protection

Accumulations of combustible materials within the CNFP shall be limited to the greatest extent practicable, consistent with operational requirements. Supervision is responsible for assuring that areas under their cognizance are maintained in accord with good housekeeping and fire prevention practice.

6.2.1 Flammable liquids shall be stored in approved containers.

6.2.2 Fire extinguisher systems compatible with area nuclear safety requirements shall be installed or provided in accord with insurance and federal regulations. The above systems shall include portable extinguisher of a type (pressurized water, CO_2 and dry chemical) and size based on the potential hazard. Agents such as "Met1-X" are available in areas where metal fires may occur. Sprinkler systems and other water-type extinguishing systems are not installed in moderation controlled areas.

6.2.3 As part of its emergency program, the CNFP organization shall include a "fire brigade" staffed by qualified personnel, familiar with basic fire fighting techniques, the equipment available for their immediate use onsite, and the nuclear safety and health physics considerations that are involved. Fire Brigade members shall be retrained at least annually. The Manager, Safety & Licensing shall have oversight of the fire brigade.

6.2.4 Fire protection water shall be available at all times. There shall be a low pressure detection and alarm device and annual waterflow/pressure tests shall be conducted routinely.

6.2.5 Fire protection equipment shall be inspected routinely in accordance with NFPA standards to ensure reliability.

6.2.6 Areas under moderation controls shall be prominently posted and approved fire fighting techniques defined. Deviations from the posted techniques can be approved only by one of the following members of the CNFP Emergency Team:

- Plant Manager, Emergency Officer, Health-Safety Officer

6.2 Fire Protection

During periods when the plant is not in operation, at least two tours per shift shall be made by a representative of the security force or a CNFP employee.

6.2.7 An early warning fire detection/alarm system shall be installed in the S-1 storage facility. The system shall alarm at the continuously manned guard house. Further precautions, detailed in 10.5 of this document, will also be implemented.

6.2.8 A sprinkler system shall be installed and maintained in the SERF-3 in accord with NFPA codes. Further precautions, outlined in 10.5 of this document, will also be implemented.

6.3 Emergency Utilities

Backup battery power is provided for the criticality alarm, fire alarm, public address system and for emergency lighting. The nature of our operations is such that a loss of utilities simply results in a totally safe halt in operations.

6.4 Radioactive Waste Control

The "Guideline for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for By-Product, Source or Special Nuclear Material", USNRC August 1987, Exhibit A of Chapter 1 shall be used for disposal control of materials or equipment.

Additionally, these guidelines will be followed regarding radioactive waste control:

a. Any item which cannot be thoroughly surveyed due to physical construction, painting, or other reason shall be assumed to be in excess of the above limits and shall be disposed of in a controlled manner, unless indirect methods such as acid etching verify the absence of significant contamination as defined in a-d above.

b. When possible and practicable, reasonable attempts shall be made to decontaminate all items with "detectable contamination" to a non-detectable level.

6.5 Chemical Safety

6.5.1 Written procedures shall be used for the implementation of the criteria set forth in 29 CFR and 40 CFR for chemical safety. This is to include the implementation of a Hazardous Communications Program that defines the proper storage facility, equipment, and chemical handling procedures.

6.5.2 Storage of chemicals in tanks and/or buildings shall be incorporate a pressure relief system. Storage shall be maintained an adequate distance from the main plant.

10.1 Plant Layout and Operations

Figure 10.1 is a layout of the CNFP illustrating the various production areas on site. The plant's primary function is the manufacture of nuclear fuel assemblies for use in commercial power reactors. These operations may be subdivided into three production phases: (unclad SNM Handling, Fuel Rod Processing and Inspection, and Fuel Bundle Assembly). There are occasions when the fuel has to be downloaded. For downloading operations, the phases are reversed. The numbers in parenthesis are taken from Figure 10.1.

The CNFP also supports the Field Operations Department for the refurbishment of contaminated equipment. The majority of the operations are performed in the south bay of the main plant, known as the Service Equipment Refurbishment Facility (SERF-1). Refurbishment operations for the liquid volume reduction and chemical cleaning processes are performed in the SERF-3.

10.1.1 Unclad SNM Handling

Unclad SNM receiving, storage, and rod loading are located at the south end of the plant, as shown in Figure 10.1. The area includes pellet receiving (#1), the pellet vault (#4), and the pellet loading room (#6). Other than the laboratory (#10), this is the only part of the process in which unclad special nuclear material (SNM) is handled. The entire pellet vault/rod loading area is separated from the remainder of the plant by means of concrete block and metal walls. A slight negative pressure is maintained in this area with respect to the rest of the plant to prevent contamination spread.

10.1.2 Fuel Rod Processing and Inspection

Loading fuel rods are processed and stored in the central portion of the plant (#7). Processing includes end cap welding, quality control inspection, cleaning (#14), helium leak testing, and accumulation of rods into groups of the number required for a fuel assembly. Rods are then stored until needed for assembly production. Individual unclad fuel pellets are processed in the laboratory (#10) which is located in this portion of the plant.

10.1.3 Fuel Bundle Assembly

Fuel rods are assembled into their final configuration (#11), checked for quality, and shipped to the customer from the north end of the plant (#12).

10.1.3 Fuel Bundle Assembly

Ancillary production activities conducted within the plant consist of non-nuclear component fabrication which may be characterized as light machining and fabrication. Examples of this type of activity include grid and end cap production, incore detectors, and dimensional adjustment on vendor-supplied components.

10.2 Utilities and Support Systems

10.2.1 Electric Power

Electric power to the Mt. Athos site is provided by Appalachian Power Company. This power is supplied via a nearby electrical substation and is stepped down to 480V 3-phase, 3-wire service. A further step down to 240V, 120V, and 277V is made for lighting and general convenience power.

Backup battery power is provided for the criticality alarm, fire alarm and public address in addition to emergency lighting. The nature of our operations is such that a loss of utilities simply results in a totally safe halt in operations.

10.2.2 Compressed Air

Compressed air is utilized primarily for routine industrial purposes. We do not use any protective masks or clothing that require compressed air to maintain their effectiveness. We have a main compressor located at the north end of the CNFP that provides the compressed air for plant use. A desiccant is used to dry all plant compressed air.

10.2.3 Water

The Mt. Athos site utilized several wells on site to obtain groundwater. The groundwater supply is stored in two 150,000 gallon tanks. Additionally, 2 - one million gallon storage tanks are maintained for service water. Typically, the CNFP uses approximately 2500 gallons per day.

A loss of water supply would not lead to any degradation of our safety systems or contribute to an accident that could release uranium to the plant or the environment.

10.3 Ventilation Systems

10.3.1 General

Airborne contamination will be maintained as far below 10 CFR 20 Appendix B limits as is practicable. Containment and isolation of areas where unclad SNM is processed in significant quantities is assured by enforcing pressure differential criteria so that such areas are negative with respect to the remainder of the plant. Air circulation within controlled areas is maintained by the use of a combination of fresh "makeup" and filtered air. The relative percentages of fresh and recycled air will be determined by air handling and tempering requirements, for example, air conditioning. Recycled air is routed through a pre-filter and is HEPA filtered before return to the operating area. Determination on the necessary number of air changes per given period of time will be based on design criteria and health physics operational experience.

10.3.2 Overall System Design

Figure 10.2 is a schematic which illustrates the configuration of the controlled area ventilation system including the relative location of sampling points, pre-filters, HEPA filters and the effluent release point. Certain design criteria have been established and maintained for this system as follows:

1. Individual HEPA filter units are installed at the rate of 1 filter/1000 CFM of air flow, or more if allowed by filter specifications (typical HEPA filter specifications are shown in Table 10.1).

2. Effluents exhausted to the environment shall be HEPA filtered.

3. Self-closing louvers are installed at outside air intake points to the south bay.

4. HEPA filter banks are contained in metal units specifically designed to allow:

10.3.2 Overall System Design

- Access to space between filter banks to allow in-place monitoring for defects.
- Removal and replacement of filters from outside the housing structures with the use of "bag-out" techniques for contamination control.
- Measurement of pressure drop.

5. Pre-filters will be used to limit duct contamination and to provide protection to the HEPA filters if necessary. Selection of single or dual prefiltration is based on filter loading potential.

6. Duck construction will be metal with sealed mechanical joints where practicable. Connections to containment units may be fabricated of flexible or semi-flexible material with joints bolted or fastened by an equally effective technique.

7. Recirculated air is first passed through pre-filters and is then HEPA filtered before reentering the area.

8. Provision for DOP testing and sampling is incorporated in the ventilation system design.

TABLE 10.1

TYPICAL FILTER SPECIFICATIONS

Manu. & Model	Filter Media	Frame Material	Rated Effic.	Capacity CFM	Max. Temp.
HEPA Cambridge ET-1000-1 24" x 24" x 11.5"	Glass	Steel or Wood	99.97 0.3 uDOP	1100	250°F
Pre-filters Cambridge (AEROPAC) 3CP-60-24246 23 3/8" x 23 3/8" x 5 7/8"	Glass	Galvanized Steel or Wood	60% ASHRAE Std. 5268	1000	250°F
Flanders (Econocel) 2424F, 23 3/8" x 23 3/8" x 11 1/2"	Glass	Pressed Board	95% NBS "Dust Spot" Test	2000	-----

10.3.3 Overall System Maintenance and Control

Pressure drop across pre-filter systems will be monitored and the filter replaced when the pressure differential reaches 4 inches of water. Calculations by a consultant indicate that, for the purposes of nuclear safety, pressure drop measurements will provide effective control over the quantity of SNM that may accumulate in a filter. Calculations show a "worst case" P of 2 inches of water for a 2.72 kg UO_2 filter load, assuming a P of .5 inches H_2O for a new filter, a UO_2 density of 5 g/cc, and for conservatism, a linear function between P and load.

Further scaling indicates that for a P of 4" H_2O, the total accumulation of UO_2 would be 5.44 kg. This is equivalent to 200 grams of ^{235}U or approximately 25% of the 850 g safe mass limit. The pre-filters are therefore inherently safe and may be handled for maintenance and cleaning, etc., within the handling limits imposed for nuclear safety purposes.

Typical pre-filter and HEPA filter housings are designed by the manufacturer to accommodate safe bag-out techniques for contaminated filters. in order to accomplish the above, air flow through the filter is shutoff and the housing coverplate removed. A plastic bag may then be attached to the filter housing port, the filter housing release handles loosened, and the filter withdrawn into the bag which can be sealed and removed from the housing. The bag-out technique, applied as needed, effectively precludes significant airborne and surface contamination spread.

Flow sensing elements are installed within ductwork at appropriate locations to provide an audible and visual alarm if flow is interrupted. If flow loss is other than a momentary disruption, operations will be terminated if necessary until proper ventilation is restored.

Pressure sensing devices are routinely monitored to assure that the controlled area remains negative with respect to the remainder of the plant.

Air recirculated back into the controlled area is samples on a continuous basis to verify filter effectiveness and will not be recirculated if the levels are above 25% MPC of 10 CFR 20 Appendix B.

10.3.3 Overall System Maintenance and Control

Procedures required notification of Health-Safety prior to servicing or maintenance on those portions of the fans or HEPA systems that may be contaminated.

10.3.4 Individual Operations Containment

The degree and type of containment required for individual operations is determined based on the dust generation potential of the activity being conducted. Three generalized categories of containment have been utilized in developing the airborne exposure control systems as follows:

1. Gloveboxes, locally fabricated or commercially available, for use in areas of high potential contamination spread including:

2. Containment hoods are designed to accommodate specific equipment or operations and incorporate specific measures to minimize the potential for contamination spread including:

   a. Minimization of normally open penetrations to those necessary for routine operation. (NOTE: In some cases no "normally open" access will be required.)
   b. Penetrations that may be required for infrequent non-routine activities will be sealed by "normally closed" covers at all times when not in use.

3. Standard fume or "chemical type" (open face) hoods for use in operations with minimal potential for dust generation and to accommodate analytical activities if needed. As appropriate, measures, such as blocking of doors, will be utilized to minimize open face areas.

10.3.5 Individual Containment - Design Criteria

The following criteria have been established for the design and construction of individual containment devices:

a. Design face velocity shall be 100 LFM with all ports open. The air handling system incorporates the capability to adjust face velocity as necessary in order to satisfy exposure control needs.

10.3.5 Individual Containment - Design Criteria

b. In-line pre-filter units will be instailed in the downstream air flow path and as near to the contamination source as is practicable based on design and operating criteria.

c. A negative pressure of approximately 0.25 inches of water relative to room ambient, be maintained in glovebox units.

d. Materials of construction will be nonflammable or flame retardant. Structural members and those portions of the containment device not requiring visibility will be fabricated of metal. Where visibility is needed, plexiglas, satisfying at a minim, the "self-extinguishing" criteria of ASTM D635 ("Flammability of Self-Supporting Plastics") or equivalent will be used. Tempered glass, such as is normally used in standard fume hoods is also acceptable. Flammable materials such as polyethylene are not authorized.

10.3.6 Individual Containment - Maintenance and Control

The adequacy of installed systems is verified by an air sampling program during the startup phase of the operations and necessary modifications or design changes made to assure that operator exposure is as low as reasonably achievable. In addition to the above, local capture devices ("elephant trunks") could be used to provide added support as necessary.

10.4 Radioactive Waste Handling

10.4.1 Liquid Wastes

Potentially contaminated liquids generated at the CNFP are controlled by means of a dedicated evaporation system. The liquid effluent is collected and allowed to evaporate (with heat if necessary) into the existing airborne effluent control system where it is HEPA filtered prior to release. The HEPA system and HEPA filtered prior to release. The HEPA system and 10 CFR 20 airborne effluent release limits used are as described in 8.1.1. Vessels used to collect/evaporate the liquid effluent shall be inspected monthly for sludge accumulation. Any dried sludge or other solids collected from the holding/evaporation vessels will be disposed of as LSA waste.

10.4.1 Liquid Wastes

Small quantities of contaminated liquids will be generated in the SERF-3 facility. The liquids will be solidified and packaged to meet 10 CFR 61 and transferred to a licensed low-level radioactive burial site.

As a backup to the evaporation system, we will maintain a liquid retention tank system that will collect the contaminated liquid if necessary. The accumulated liquids in these retention tanks would be sampled, radiometrically analyzed, and treated as necessary, prior to release. The retention tank system incorporates capacity alarms, and air agitation capability. Analytical sensitivity is 1% of the applicable 10 CFR 20, Appendix B, Table II limit. The sampling program is under the control of Health-Safety and no releases are made without the prior approval of Health-Safety. The retention tanks are housed in the Rad Waste Retention Buildings shown in Figure 10.1. Figure 10.3 is a schematic of our contaminated liquid waste system.

10.4.2 Solid Wastes

Uncontrolled disposal of solid wastes or equipment is authorized when contamination levels do not exceed the levels defined in section 1.7.4 and under the concept of ALARA.

Establishment of the above contamination limits to permit disposal in accord with routine industrial practice does not present a hazard to the general public. The limits are generally accepted within the nuclear industry, as not presenting any significant radiological or nuclear safety hazards.

Routine monitoring programs are conducted by Health-Safety to assure that material, contaminated in excess of specification limits, is not released for uncontrolled disposal and to detect and alleviate increasing contamination trends.

Non-contaminated solid wastes are disposed of through a contract hauler. Contaminated solid wastes consist primarily of low specific activity material and are disposed of by a licensed contractor by land burial on

10.4.2 Solid Wastes

an NRC or state licensed site. LSA wastes are packaged in appropriate containers as required by 10 CFR and 49 CFR. SNM content for each package is estimated using gamma scan or by gross alpha count.

10.5 Fire Protection

10.5.1 General

All CNFP buildings are of steel and/or masonry construction and the roofs of all main buildings are Class I construction. Class I construction requires that the vapor barrier be non-combustible. Plant operations are typical of metal working type facilities; therefore, very few Class A type combustibles are present. Accumulations of combustible materials within the CNFP shall be limited to the greatest extent practicable, consistent with operational requirements. Supervision is responsible for assuring that areas under their cognizance are maintained in accord with good housekeeping and fire prevention practice. Plant operating procedures coupled with frequent inspections deter sloppy housekeeping which would allow the accumulation of combustibles in the work area. Health-Safety personnel are responsible for inspecting and maintaining fire protection equipment.

10.5.2 Implementation of the Fire Protection Program

CNFP has several documents that implement our fire protection program. Internal Health Safety procedures are used to ensure employees are properly trained on fire safety, to outline training for the CNFP fire brigade, to require routine inspection of fire protection and emergency equipment to meet NFPA standards, to control welding and other "hot" work, to provide emergency response in the event of a fire, and to mandate independent audits of our fire protection program. Our pre-fire plan is an extensive document that provides a hazard analysis for all areas of the plant. Each area includes an assessment of the occupancy, access and egress, lighting and communication, fixed fire systems and manual suppression systems, ventilation system, and guidelines for the attack and special precautions. Hazards

10.5.2 Implementation of the Fire Protection Program

associated with each area are also identified which include hazardous substances with material safety data sheets, NFA rating and quantities, physical hazards, electrical hazards, and compressed gases.

10.5.3 Fire Extinguishing Systems

Fire extinguishing systems compatible with area nuclear safety requirements shall be installed or provided in accord with insurance and federal regulations. The above systems shall include portable extinguisher of a type (pressurized water, CO_2 and dry chemical) and size based on the potential hazard. Agents such as "Met1-X" are available in areas where metal fires may occur.

Automatic sprinkler systems are installed in accord with standard industrial practice when compatible with nuclear safety and operational requirements.

Sprinkler systems and other water-type extinguishing systems are not installed in moderation controlled areas. Only approved fire fighting techniques are to be used in moderation control areas. These approved methods shall be prominently posted in the affected areas.

10.5.4 Flammable Liquids

Flammable liquids shall be stored in containers that are approved by FM or UL or are otherwise acceptable to the insurance carrier.

10.5.5 Fire Brigade

As part of its fire protection program, the CNFP organization shall include a "fire brigade" staffed by qualified personnel, familiar with basic fire fighting techniques, the equipment available for the immediate use onsite, and the nuclear safety and health physics considerations that are involved. Fire Brigade members shall be retained at least annually.

10.5.6 Offsite Support

Arrangements have been made for assistance from local area fire departments. They have been informed of B&W's operations, materials, and characteristics of potential fires and have toured the facilities.

10.5.7 S-1 Storage Facility

The storage of flammable, combustible, or reactive liquids in the S-1 building will be strictly prohibited. No burning, welding or other ignition will be permitted. If welding or such other hot working operations are mandated, a pre-operational evaluation shall be performed under the direction of the SRB chairman and shall be monitored for compliance until the operation has been officially terminated. Smoking will be prohibited at all times.

10.5.8 SERF-3

The building denoted as SERF-3 incorporates a sprinkler system installed throughout the facility to NFPA 13 code. The alarm for the sprinkler system is audible locally and at the guard house which is manned continuously.

Portable fire extinguisher are available throughout the building in accord with NFPA 10. Fire watches shall be conducted while performing hot working operations and controlled by the use of the local safety rules.

All systems shall be maintained in accord with NFPA codes.

10.6 Chemical Safety

10.6.1 General

CNFP differs from other fuel fabricators as it is not licensed to perform any chemical operations which involve special nuclear material such as the conversion of UF_6 to UO_2 and scrap recovery. Chemical usage at CNFP is for cleaning purposes. Acetone, TCE, hydrofluoric and nitric acid compromise the majority of the chemicals used at CNFP. With the exception of acetone, the chemicals are used in our cleaning room which is located within the main plant. Acetone is used throughout the plant.

10.6.2 Chemical Usage and Quantity

Acetone is used as a cleaning agent. All the containers are fire proof and the largest one has a 2 gallon capacity. Several of these containers are located in each area. Designated locations are set up to ensure proper disposition of the waste. The cleaning room has five sinks that contain acid solution

10.6.2 Chemical Usage and Quantity

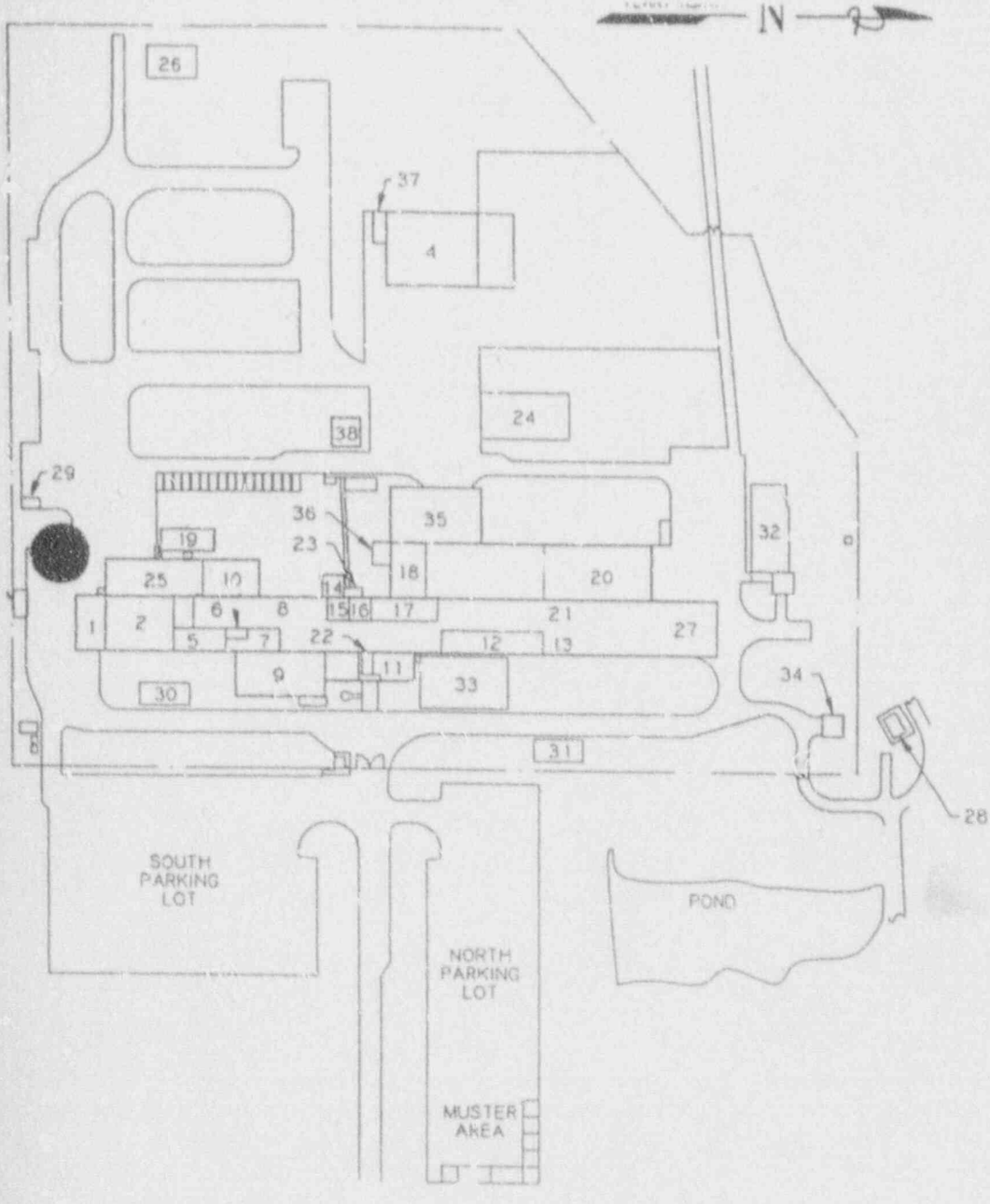
for a total volume of about 70 gallons. A 120 gallon dispensing tank located in a room adjacent feeds the sinks. There is also a 400 gallon tank that collects the spent acid. Both tanks are constructed in accordance with vendor specifications for the contents it retains. They also meet the VA Department of Waste Management Regulations which mandates that they be constructed to detect leaks and requires daily inspections. A chemical storage building is located fifty feet away from the main plant. It houses about 500 gallons of acetone and/or alcohol and about 300 gallons of acid. The acid is stored separately in an area that is diked and has an explosion proof wall. The CNFP is licensed to store UF6 cylinders. Since the UF6 is strictly for storage, there is no chemical hazards associated with the material.

10.6.3 Chemical Accident

At worst, the chemicals stored at CNFP could spill. As illustrated above, this would result in a minor spill of minute quantities. Due to the low quantities of chemicals involved and the fact that the chemicals are located adequate distance from SNM, a spill would not pose a threat to cause spread of contamination.

CNFP does have several employees trained in hazmat and NNFD has agreed to provide back up services. Health Safety has an internal procedure to respond to chemical spills.

FIGURE 10.1



1. PELLET RECEIVING
2. SERF-1
3. SERF-2
4. SERF-3
5. PELLET VAULT
6. PELLET LOADING CHANGE RM
7. PELLET LOADING RM
8. FUEL ROD FAB.
9. EAST OFFICES
10. WEST OFFICES
11. METALLURGICAL LAB.
12. FUEL BUNDLE ASSEMBLY
13. FUEL BUNDLE STORAGE
14. ION EXCHANGE/ GRID GRINDING
15. CLEANING ROOM
16. FINAL FUEL INSPECTION
17. GRID AREA
18. MAINTENANCE/ELECTRICAL SHOP
19. FIELD OPERATIONS TRAILER
20. MACHINE SHOP
21. INCORE DETECTORS
22. HEALTH SAFETY OFFICE
23. ACID WASTE STORAGE
24. S1 BUILDING
25. S2 BUILDING
26. S3 BUILDING
27. FUEL ASSEMBLY SHIPPING
28. RETENTION TANKS
29. LSA SCAN BUILDING
30. TRAINING CENTER
31. RECORDS STORAGE
32. GARAGE
33. NORTH OFFICES
34. EMERGENCY EQUIP. BUILDING
35. RECEIVING/STOCKROOM BUILDING
36. MAIN COMPRESSOR BUILDING
37. SERF-3 COMPRESSOR BUILDING
38. CHEMICAL STORAGE BUILDING

FIGURE 10.2

FLOW DIAGRAM OF AIR HANDLING SYSTEM

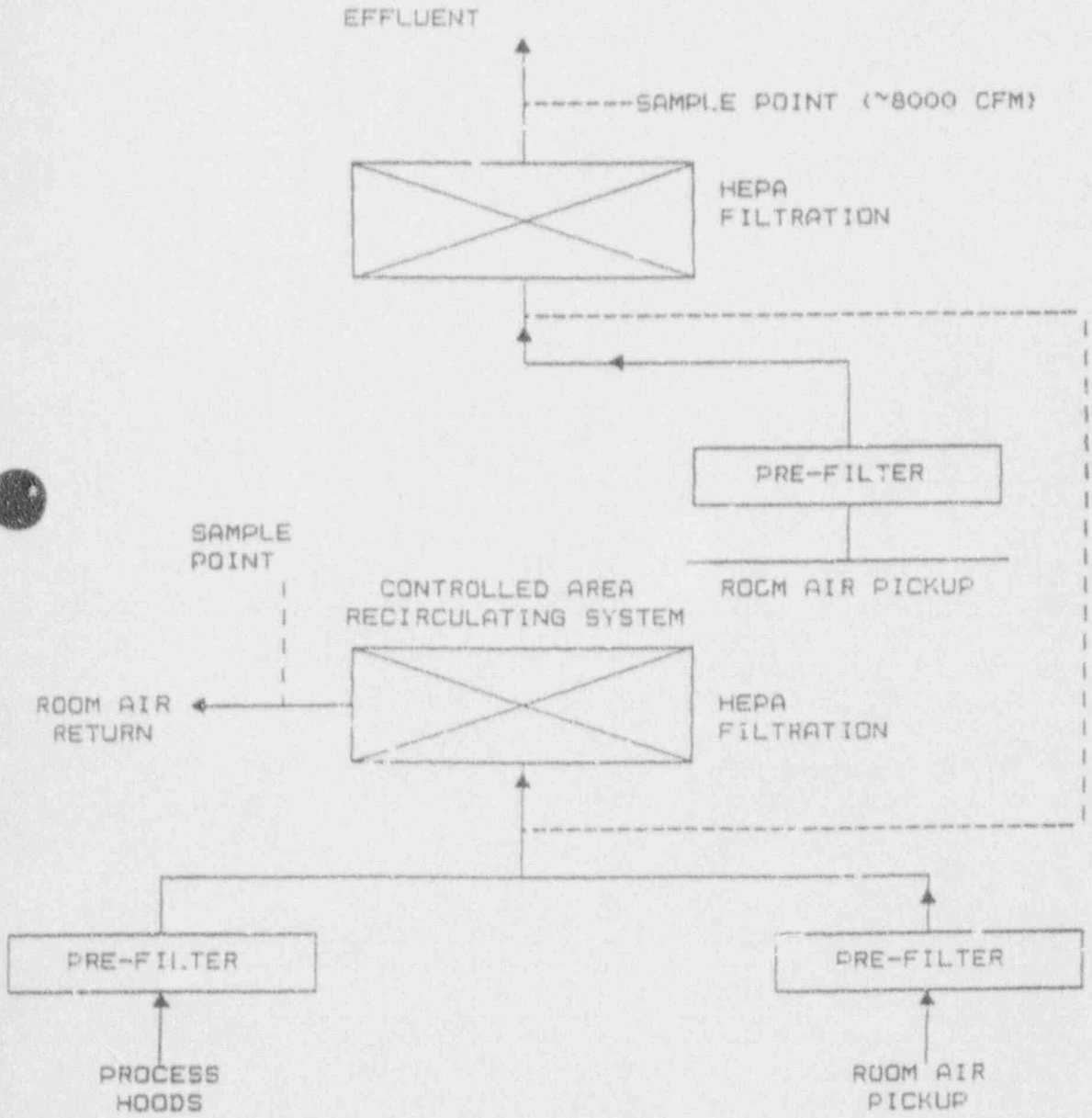
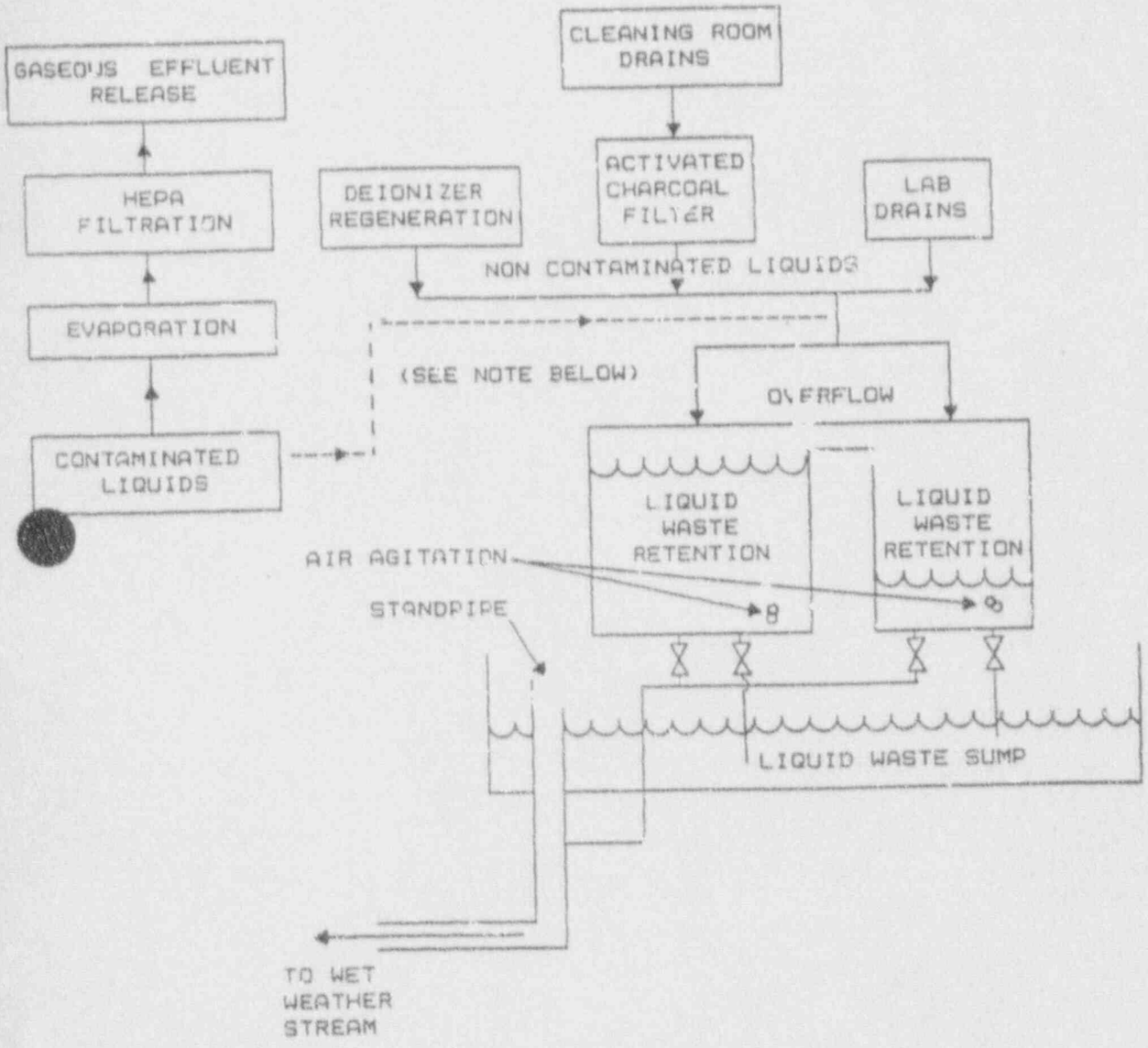


FIGURE 10.3

FLOW CHART OF LIQUID WASTE DISPOSAL SYSTEM



NOTE: NORMAL PROCESSING FOR CONTAMINATED LIQUIDS IS THROUGH THE EVAPORATOR / HEPA SYSTEM. THE RETENTION TANK / WET WEATHER STREAM SYSTEM WILL ONLY BE USED AS A BACKUP FOR CONTAMINATED LIQUIDS PROCESSING.