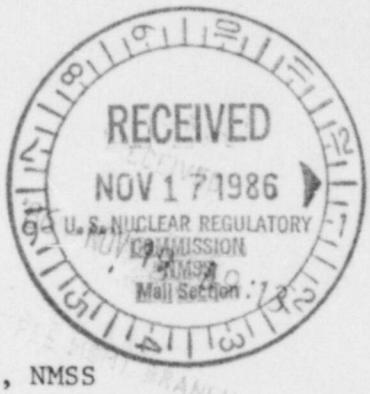
70-1100

RETURN TO 396-SS

COMBUSTION ENGINEERING

License SNM-1067
Docket 70-1100



November 6, 1986

U. S. Nuclear Regulatory Commission
Washington, DC 20555

Attention: Mr. W. T. Crowe, Acting Chief
Uranium Fuel License Branch
Division of Fuel Cycle and Material Safety, NMSS

Subject: SNM-1067

Dear Mr. Crowe:

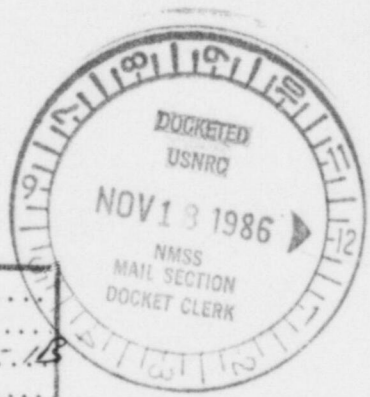
Certain responsibilities for the nuclear laboratories have been transferred to the nuclear fuel organization. Accordingly, the license pages shown in Appendix 1, copy attached, have been changed and the revised pages are hereby submitted for your review and approval.

Please note that the amendment request is considered to be an administrative typechange and the license fee, as required by 10 CFR 170.31, has been sent directly to the License Fee Management Branch under separate cover.

Very truly yours,

H V Lichtenberger

H. V. Lichtenberger
Vice President, Nuclear Fuel



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Attachment

Applicant.....
Check No. 042346
Amount/Fee Category $150.-1B
Type of Fee AMD
Date Check Rec'd. 12/10/86
Received By.....

Power Systems
Combustion Engineering, Inc.

1000 Prospect Hill Road
Post Office Box 500
Windsor, Connecticut 06095-0500

(203) 688-1911
Telex: 99297

27610

DOCKET NO. 70-1100
CONTROL NO. 27610
DATE OF DOC. 11/06/86
DATE RCVD. 11/17/86
FCUF ✓ PDR ✓
FCAF LPDR
I&E REF. ✓
SAFEGUARDS ✓
FCTC OTHER
DATE 11/18/86 INITIAL CEC

October 22, 1986
License SNM-1067
Docket 70-1100

APPENDIX I

DELETED PAGES			ADDED PAGES		
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I.1-3	3	11/30/84	I.1-3	4	10/22/86
I.1-4	2	4/06/82	I.1-4	3	10/22/86
I.2-1	2	4/06/82	I.2-1	3	10/22/86
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APPENDIX I

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*

PART I. LICENSE CONDITIONS

1.0 Standard Conditions and Special Authorizations

1.1 Name

Combustion Engineering, Inc., is incorporated in the State of Delaware with its corporate offices at 900 Long Ridge Road in Stamford, CT. The location where licensed activities will be conducted is at 1000 Prospect Hill Road in Windsor, CT.

1.2 Location

The mailing address for all license correspondence is:

Combustion Engineering, Inc.
1000 Prospect Hill Road
Windsor, CT 06095

Licensed activities shall be conducted primarily at the Nuclear Fuel Manufacturing facility (Building #17) and an adjacent warehouse and shipping dock (Building #21).

* Additional activities shall be conducted in Buildings 1, 1A, 2, 2A, 5, 6, 16, and 18.

1.3 License Number

* Activities are covered by the License SNM-1067; Docket 70-1100.

1.4 Possession Limits & Location

Combustion Engineering, Inc., requests authorization to receive, use, possess, store and transfer at its Windsor site, the following quantities of radioactive materials.

	Isotope	Form	Quantity	Location
1.) *	Uranium enriched to $\leq$4.1% weight percent U^{235}	Uranium Oxides	500,000 Kg U	Manufacturing-Bldgs. #17 & #21 & storage in trailers adjacent to Bldgs. #17 & #21. Bldgs 1, 1A, 2, 2A, 5, 6, 16 and 18.
*2.)	Uranium enriched to less than 20 weight percent U^{235}	Any	4800 gms U^{235}	Bldg. 1, 1A, 2, 2A, 5, 6, 16, 17, 18 & 21 (Bldg. 17 & 21 limited to 350 gm U^{235} each for enrichments exceeding 4.1 weight percent U^{235}).
*3.)	Natural and/or Depleted Uranium	Any	10,000 KgU	Bldg. 1, 1A, 2, 2A, 5, 6, 16, 17, 18, & 21.
4.)	Pu^{238}	Encapsulated Neutron Sources	5 sources, each containing less than 2.0 gm Pu^{238}	Building #17
5.)	Pu	Any Form	160 micrograms as analytical samples	Bldg. 1, 1A, 2, 2A, 5, 6, 16, 17, 18 & 21
6.)	Encapsulated Neutron Sources	U_3O_8	20 sources, each containing 1.7 gm U^{235}	Bldg. 1, 1A, 2, 2A, 5, 6, 16, 17, 18 & 21
7.)	Uranium enriched to or greater than 20 weight percent U^{235}	Residue	1000 gms U^{235}	Windsor Site

1.5 Definitions

Any definitions which are not defined in standard references (e.g., ANSI-N-1.1-1976, "American Standard Glossary of Terms in Nuclear Science and Technology" or Title 10 of the Code of Federal Regulations) or that are unique to activities described in this license applications shall be defined where first used in the application.

1.6 Authorized Activities

The primary activities carried out in buildings at the Windsor site include, but are not limited to the following:

* Bldg. #1 & 1A - Storage and use of small quantities of Radioactive
* Material (<350 Gms U235)
* Bldg. #2 & 2A - Product Development Activities.
*

* Bldg. 5 - Product Development Activities.

* Bldg. 6 - Waste water processing from manufacturing and product development activities.
* Bldg. 16 -Same as Building #5.
* Bldg. 17 -Manufacture of fuel assemblies utilizing low enriched uranium (up to 4.1 weight percent U^{235}) in the form of uranium oxide powder, pellets, rods, and in assemblies.
* Bldg. 18 -Product Development Activiies

Bldg. 21 -Storage of SNM in shipping containers.

Windsor Site - Residue from prior operations, not to exceed 350 gms U^{235} in any one location. Additional locations to be separated from one another by a minimum of 12 feet.

1.7 Exemptions and Special Authorizations

* Licensed activities in Bldgs. 1, 1A, 2, 2A, 5, 6, 16 and 18 shall

*be of a product development nature and the material may ultimately be returned to the Nuclear Fuel Manufacturing facility. These transfers shall not require the issuance of applicable NRC transfer documents, but shall be transferred in accordance with the provisions of this license, and shall be handled as a departmental transfer and shall be controlled by the Fundamental Nuclear Material Control Plan (FNMC) referenced in Section 9.0 of this application.

2.0 GENERAL ORGANIZATIONAL AND ADMINISTRATIVE REQUIREMENTS

2.1 Licensee's Policy

Combustion Engineering's long standing commitment to safety of the work place is evidenced by corporate management's continued emphasis and support of all aspects of Health and Safety throughout the corporation. An integral part of the overall corporate Health and Safety program specifically in the Nuclear Power Systems Division, is management's commitment to keep radiation exposures to employees and the general public as low as reasonably achievable (ALARA). (See Section 3.1.2 for detail). It is management's intent to be in compliance at all times with all applicable federal and state regulations and the license requirements stated herein.

2.2 Administrative Responsibilities and Controls

The lines of authority for the control of Special Nuclear Material in the possession of the Nuclear Power Systems Division follow the same paths of authority as all other operations with several modifications dictated by the problems associated with handling Special Nuclear and
* Source Material. Operations covered by this license are: Buildings
* 17/21, nuclear fuel manufacturing (NFM-W) which is a low enrichment UO2 fuel fabrication operation where powder is pelletized, pellets are loaded into rods which are then assembled into fuel bundles, and
* buildings 1, 1A, 2, 2A, 5, 6, 16, & 18 where product development
* activities are carried out.

* The Senior Vice President, Nuclear Power Systems is responsible for all
* activities carried out in both Nuclear Fuel Manufacturing and
* Product Development. He has delegated the responsibility for all activities carried out under License SNM-1067 to the Vice President, Nuclear Fuel.

* 2.1.1 Product Development

* The Director of Product Development is responsible through
* the Vice President, Nuclear Fuel for the accountability,
* nuclear criticality safety, and radiological safety related
* to all Special Nuclear and Source Materials received
* and used in product development.

He assures compliance with federal and state regulations and
* the requirements and limitations set forth in the license.
* In this position, the Director of Product Development
* assures that all operations involving nuclear materials have been analyzed to establish the required safety limits and controls.

In addition to providing the above safety restrictions the
* Director of Product Development is responsible for the surveillance of all activities in which radioactivity is involved to ensure that the health and safety standards set forth in the license application are met. He has the necessary authority to halt any operation which falls

outside those limits, and he is responsible for indicating what remedial action is necessary to bring the operation within acceptable limits. The basic organization structure is shown in Figure 2.2.1.

2.2.2 Nuclear Fuel Manufacturing

The Plant Manager reports to the Vice President, Nuclear Fuel and is responsible for the accountability, nuclear criticality safety and radiological safety related to all Special Nuclear and Source material received by Nuclear Fuel Manufacturing and used in any manufacturing process. He assures compliance with federal and state regulations and the requirements and limitations set forth in the license during all phases of manufacturing.

In this position, the Plant Manager has delegated to the Production Manager and the Engineering Manager responsibility to assure that all operations involving nuclear materials have been analyzed to establish the required safety limits and controls. The Manager, NLSA&S or Nuclear Criticality Specialist shall assist the Engineering Manager and Production Manager by actually performing the analysis required and establishing the appropriate controls. In addition, the Supervisor, Health Physics and Safety shall assure that the required safety limits and controls are being followed by the use of

daily internal audits.

The Health Physics and Safety Supervisor is responsible for the surveillance of all Nuclear Fuel Manufacturing activities in which radioactivity is involved to ensure that the health and safety, as well as criticality standards set forth in the license, are met. He has the necessary authority to halt any operation which falls outside those limits, and is responsible for indicating what remedial action is necessary to bring the operation within acceptable limits. However, if the operation is halted because of criticality safety considerations, the Health Physics & Safety Supervisor will contact the Manager, NLSA&S, the Nuclear Criticality Specialist, or the Nuclear Safety Committee who shall determine necessary corrective actions to be taken. The basic organizational structure for Nuclear Fuel Manufacturing

* is shown in Figure 2.2.1.

2.2.3 Independence of Safety Personnel

* The Director of Product Development reports to the Vice

* President Nuclear Fuel.

The Manager, Nuclear Licensing, Safety, Accountability, and Security, the Nuclear Criticality Specialist, the Engineering

* Manager, and the Production Manager all report to the Plant Manager, Nuclear Fuel Manufacturing.

* The Production Manager will enforce all safety related rules and procedures; He will interact as necessary to ensure uniform compliance.

Conflicts of interest are thus minimized and independence of safety personnel is assured.

2.3 Nuclear Safety Committee

A Nuclear Safety Committee comprised of engineers and scientists, representing all areas of the Nuclear Power Systems Division nuclear and scientific community, has been organized and assigned as one of its responsibilities the function of providing assurance to management that nuclear manufacturing operations are carried out in a safe manner. The

* Committee acts in a staff capacity reporting to the Senior Vice President, Nuclear Power Systems.

The functions of the Committee are to:

- Assure an independent review and approval of all Nuclear Criticality Safety aspects of process and equipment changes not covered by Tables 4.2.5 and 4.2.6 related to nuclear safety. A qualified person designated by the Chairman of the Committee performs the independent criticality safety reviews. The independent reviewer shall meet the minimum qualifications of a nuclear criticality specialist. The two years' experience in outside-of-reactor nuclear criticality safety shall be with methods relevant to the nuclear safety analysis of the operation under review.
- Audit all manufacturing operations involving SNM annually, with no more than 13 months between audits. This audit must include as a minimum, a review of the nuclear criticality and radiological safety programs and their application and to assure that management policies are consistent with the

objective of maintaining occupational radiation exposures as low as reasonably achieveable. The Committee member who reviews the criticality safety program shall be a person other than the one who is authorized to perform the monthly criticality safety audit.

* The audit reports shall be sent to the Vice President, Nuclear
* Fuel with copies to the Senior Vice President Nuclear Power Systems and operational supervision.
\- Reviews and approves applications for SNM license renewals and amendments affecting nuclear criticality safety prior to submittal to NRC.

2.4 Personnel Selection (Approval Authority) for Key Positions

* 2.4.1 Product Development - The Director of Product Development has approval authority for the following key positions:
* Manager-Core Materials Development, Manager-New Product
* Development, and Health Physics Technician.
*
*
* 2.4.2 Nuclear Fuel Manufacturing - The Plant Manager, Nuclear Fuel Manufacturing has approval authority for the following key positions: Engineering Manager, Production
* Manager, Production Superintendent, Manager-Nuclear Licensing, Safety, Accountability, & Security, Nuclear Criticality Specialist, and Health Physics & Safety

Supervisor.

* 2.4.3 Nuclear Safety Committee - The Senior Vice President, Nuclear Power Systems has the approval authority for members of this committee.

2.5 Education and Experience Requirements for All Key Safety and Operations Personnel

*

* 2.5.1 Plant Manager, Nuclear Fuel Manufacturing - The qualifications for this position shall be a Bachelors Degree in one of the sciences or engineering and five years experience in nuclear fuel fabrication facilities. In addition, at least three years supervisory experience is

* required as well as an understanding of nuclear criticality safety, health physics, and industrial safety aspects of fuel handling and knowledge of administrative controls imposed on nuclear fuel handling operations.

* 2.5.2 Manager-Nuclear Licensing, Safety, Accountability, & Security (NLSA&S)

The minimum qualification for this position shall be a Bachelors Degree in one of the sciences or engineering and a minimum of three years experience in positions which demonstrate sufficient judgement and analytical capability

to establish and maintain technically sound and effective health physics, industrial safety, nuclear material accountability and security programs; and to establish and maintain an effective nuclear criticality and radiation program.

* 2.5.3 Supervisor-Health Physics and Safety - The minimum qualifications for this position shall be a Bachelors Degree in one of the sciences, engineering, or equivalent. A minimum of two years experience in radiation safety protection in positions which demonstrate sufficient judgement and capability to establish and maintain an effective nuclear criticality and radiation safety program for the types of activities authorized by License SNM-1067.

* 2.5.4 Radiation Specialist - The minimum qualifications for this position shall be a Bachelors Degree in one of the sciences, engineering or equivalent and a minimum of two years experience in Radiation Safety Protection.

* 2.5.5 Nuclear Criticality Specialist - The minimum qualifications for this position shall be a Bachelors Degree in one of the

* sciences, engineering or equivalent and three years experience in outside-of-reactor nuclear criticality safety

* or nuclear fuel manufacturing facility criticality safety. Experience in outside-of-reactor nuclear criticality safety

* or nuclear fuel manufacturing criticality safety shall be with methods of analysis similar to those required for analyzing the types of activities authorized by License SNM-1067.

* 2.5.6 Nuclear Materials Manager - The minimum qualifications for this position shall be a Bachelors Degree in one of the sciences or engineering, and two years experience in nuclear materials management.

* 2.5.7 Production, Quality Control, or Engineering Managers - The minimum qualifications for these positions are a bachelors degree in one of the sciences or engineering and three years experience in nuclear fuel fabrication facilities. He must have an understanding of the criticality and health physics aspects of fuel handling and a knowledge of administrative controls imposed on fuel handling operations.

* 2.5.8 Production Superintendent, Supervisors - The minimum qualifications for all Supervisors are a High School diploma (or equivalent) and two years of manufacturing experience. The Production Superintendent will have a High School diploma (or equivalent) and at least two years of manufacturing experience in radioactive materials handling.

* 2.5.9 Nuclear Safety Committee Membership - The minimum qualifications required for the Committee as a whole shall be as follows:

- Committee members must be highly competent senior staff members.
- Committee members must be capable of evaluating radiological and/or nuclear safety and must have had at least seven (7) years experience in the nuclear industry and a Bachelor of Science degree in Engineering or one

of the sciences.

Committee members must not be directly involved in the
* production or product development facilities utilizing the nuclear material.

- An individual must disqualify himself if there is a
* conflict of interest with the production or product development groups.

- The Committee member or the Consultant to the Committee who performs the independent criticality safety review shall meet the minimum qualifications for a Nuclear Criticality Specialist and shall not be the person who is authorized to conduct the monthly criticality audits and shall not be the initial reviewer.

- The Committee member or the Consultant to the Committee who performs the independent radiological safety review shall meet the minimum qualifications for the
* Manager-Nuclear Licensing, Safety, Accountability & Security and shall not be the person who is authorized to conduct the monthly radiological safety audit and shall not be the initial reviewer.

* 2.5.10 Radiological Engineer/Senior Radiological Engineer - These personnel shall meet the qualifications for a Radiation Specialist.

* 2.5.11 HP Technicians - The minimum qualifications for HP
* Technicians to approve RWP'S shall be 1 year experience in the Health Physics aspect of working with unclad Uranium.

2.6 Training

2.6.1 Initial Training

All new employees (whether they are new hires or transferred from within the company) shall attend a formal training session prior to working in restricted areas. This will cover principles of radiation safety (including ALARA practices), nuclear criticality safety, industrial safety, emergency procedures, applicable state & federal regulations (i.e., 10 CFR Parts 19 & 20), and additional information pertaining to their job. Specialized training for radiation protection and nuclear criticality safety shall be commensurate with the extent of the employees contact with radioactive materials. All personnel who will be working with radioactive materials must complete a test to ascertain the effectiveness of the training. All trainees shall satisfactorily complete the test in accordance with established criteria before being allowed to handle radioactive materials without direct supervision. All training will be conducted under the direction of the Health Physics & Safety Supervisor for manufacturing

* and Product Development. Records of all formal training sessions shall be kept and will include the date held, subject matter covered, attendees, instructor, and the results of the method used to ascertain the effectiveness of the training.

2.6.2 Periodic Retraining - All production personnel who work

with radioactive materials shall attend a formal annual safety training session, with no more than 13 months between training sessions. This training session will include as a minimum the topics covered in the initial training sessions. In addition this session shall emphasize problem or potential problem areas, involving the topics covered, or any other safety related areas.

NFM-W also maintains a comprehensive system of operating procedures which include the appropriate safety precautions. Informal training (not documented with lesson plans, etc.) is conducted by production Supervisors on a continual basis as needed to assure that personnel are properly following approved procedures. The ultimate responsibility to follow the operating procedure lies with the employee. Any change which alters the employees responsibility or actions in regards to safety (criticality, radiation, or industrial) must be approved by the Supervisor,

* Health Physics and Safety, or the Manager NLSA&S who will assure the appropriate training is conducted prior to implementation. This also includes changes to the emergency procedures which affect employee actions in an emergency situation. All maintenance personnel shall attend formal training sessions annually, not to exceed 13 months between sessions. If they have not attended this training, they may enter the restricted area only with a trained escort. Maintenance training sessions will cover the same topics as the production personnel session.

Special emphasis will be given to the internal contamination of equipment.

Salaried personnel who enter restricted areas shall attend a formal training session annually not to exceed 13 months between sessions. These sessions will be directed toward observation and supervision in restricted areas rather than actual handling of radioactive material. The topics listed in the initial training shall be discussed with emphasis on the supervisory aspects of these topics.

* Product Development Personnel shall conduct formal retraining of all personnel who handle radioactive material at least every 2 years not to exceed 25 months. All work in the laboratory which involves radioactive material requires an RWP. This system allows for continual control of personnel handling radioactive material.

The effectiveness of all retraining is determined by the instructor questioning the personnel on an individual basis to determine their understanding of each topic.

Records of all formal training sessions shall be kept and will include the date held, subject matter covered, attendees, instructor and the results of the method used to ascertain the effectiveness of the training.

2.6.3 Specialized Training

Health Physics Technicians - Health Physics Technicians for

* Nuclear Manufacturing, or Product Development shall receive the initial training (see 2.6.1), and will be instructed by the Supervisor, Health Physics and Safety

* as appropriate, in the use of instruments, the evaluation of contamination, environmental sampling, and other aspects relevant to their assignments. Health Physics Technicians will also receive sufficient training in criticality control to enable them to carry out their auditing functions. The training in criticality control shall be, as a minimum, a review of all limits and controls set forth in this license. Specific details of the H.P. Technician training are outlined in the Nuclear Licensing & Safety Procedures Manual.
Formal annual retraining (not to exceed 13 months) of the
* H.P. Technicians for manufacturing and product development shall be conducted by the Supervisor, Health Physics & Safety and shall include a review of the topics described above.

*

*

* In addition, specific problem areas and changes in federal regulations, or license requirements are emphasized. The effectiveness of this training is determined by the instructor questioning the H.P. Technicians to determine their understanding of each topic.
Records of all formal training sessions shall be kept and will include the date held, subject matter covered, attendees, instructor, and the results of the method used

to ascertain the effectiveness of the training.

2.7 Operating Procedures

* 2.7.1 Product Development

* Product Development, because of the nature of the work to
* be performed, does not utilize standard operating procedures. The use of Radiation Work Permits (RWP's) for all work with *
* radioactive materials assures that appropriate safety procedures are followed.

Written health and safety restrictions for all operations on radioactive materials shall be provided in the form of approved Radiation Work Permits or approved detailed procedures, and appropriate operational limits are posted in
* the vicinity of work stations. The supervisor, Health
* Physics or the H.P. Technician, will approve RWP's based on
* the personnel doses which are involved with the work to be performed.

* All RWP's shall be reviewed monthly by an individual having
* the minimum qualifications of The supervisor-Health Physics
* and Safety. Product Development has simple mass limited areas separated by a minimum of 12 feet, making criticality
* safety an easily managed program. Changes in criticality
* areas by Product Development personnel shall be formally
* described and submitted to the Manager, Nuclear Licensing,
* Safety, Accountability & Security in writing for review and approval. He also determines whether the proposed changes in these areas can be approved

internally or whether a license amendment is required. All approval documents and records of evaluations are maintained in sufficient detail to permit independent review of the analyses and that such records are maintained for at least six months after termination of the operation evaluated.

* 2.7.2 Nuclear Fuel Manufacturing - It shall be the

* responsibility of the Plant Manager (NFM) to assure that all operations involving radioactive materials have written procedures which include the appropriate safety requirements and are followed.

Written operating procedures are provided by the cognizant engineering supervisor for all operations, including equipment clean-up during enrichment changes. These include all criticality and radiological safety restrictions, and limits, and must be approved by the Manager, NLSA&S, the Nuclear Criticality Specialist, or the Supervisor, Health Physics and Safety prior to the start of any operation. To assure all operating procedures are maintained current and all superseded documents are removed from circulation, all procedures must be processed through the central document control system. This system also assures that appropriate approvals are on all procedures prior to issuance. All approved operating procedures shall be available in the related work area.

Before the cognizant engineering supervisor may initiate

criticality safety which fall within the criteria of Section 4.2 provided that an independent review is performed by the Nuclear Safety Committee or persons designated by that Committee.

The Manager NLSA&S, Nuclear Criticality Specialist or, the Supervisor Health Physics & Safety determine whether a change can be made within the framework of the license or whether an NRC amendment is required for the proposed change.

2.8 Audits

All audits shall be performed in accordance with a written plan.

* 2.8.1 Product Development - Operations in
* the Product Development will be formally audited as follows:
* - Operations will be audited on a quarterly and *
* annual basis by an individual, independent of Product
* Development, who meets the minimum qualifications of the Health Physics & Safety Supervisor. For the quarterly audit, he will verify the adequacy of the Radiation Protection Program and that all designated limits and controls are being followed. One of the four quarterly audits performed shall be used to fulfill the requirements for the annual audit.

For the annual audit, with no more than 13 months between audits, he will review records of radiation exposure, contamination levels and airborne concentrations for trends and abnormalities. His review will determine whether the appropriate corrective actions have been implemented to assure all exposures are maintained as low as reasonably achievable (ALARA). The findings of the quarterly and annual audits shall be documented and copies submitted to

* operational supervision, to the Vice President - Nuclear Fuel

* and to the Senior Vice President - Nuclear Power Systems. The reports shall include items for correction, if necessary, and the action taken on items from previous audits.

2.8.2 Nuclear Fuel Manufacturing Operations - Operations at the Nuclear Fuel Manufacturing facility will be formally audited as follows:

- Once each working day by a Health Physics Technician for Health Physics compliance and criticality compliance. He shall submit his findings in writing to the Supervisor Health Physics and Safety.
- Once each month for radiological safety by an individual who meets the minimum qualifications of a Radiation

Specialist. He shall audit for compliance with all regulations and operational procedures and shall assess the adequacy of the radiological safety program. His findings shall be documented and submitted to the

* Plant Manager - Nuclear Fuel Manufacturing.

- Once each month for nuclear criticality safety by an individual who meets the minimum qualifications of: The Manager of Nuclear Licensing, Safety, Accountability and Security; or the Nuclear Criticality Specialist. The Manager NLSA&S or the Nuclear Criticality Specialist shall audit for compliance with all regulations and operating procedures, and shall assess the adequacy of the established criticality safety program. Audit

* findings shall be documented and reported to the Plant Manager-Nuclear Fuel Manufacturing.

- Once each year by the Nuclear Safety Committee. The committee will review all aspects of the criticality and radiological safety programs and will transmit their report in writing to the Vice President-Nuclear Fuel

* with copies to the Senior Vice President, Nuclear Power Systems and operational supervision.

* Follow-up actions on audits of Product Development will be
* the responsibility of the Director, Product Development and
* for audits of the manufacturing facility, it will be the
* responsibility of the Plant Manager, Nuclear Fuel Manufacturing. All audits shall include a section for previously identified items requiring corrective action and the action taken to correct such items.

2.9 Investigations and Reporting of Off-Normal Occurrences

Any unusual events that could lead to radiation health and safety
* problems shall be reported to the Plant Manager, Fuel Fabrication, or
* to the Director, Product Development as appropriate. The NRC shall be notified of such occurrences. It is the intent of Combustion Engineering, Inc. to be in compliance with the reporting requirements of 10 CFR Part 21 for reporting of defects and noncompliance and 10 CFR 73.71 for events that significantly threaten or lessen the effectiveness of safeguards.

2.10 Records

Records relating to health and safety shall be retained indefinitely. Such records shall include plant alterations or additions, abnormal, and off-normal occurrences and events associated with radioactivity releases, criticality analyses, audits and inspections, instrument calibration, ALARA findings, employee training and retraining, personnel exposures, routine radiation surveys, and environmental surveys.

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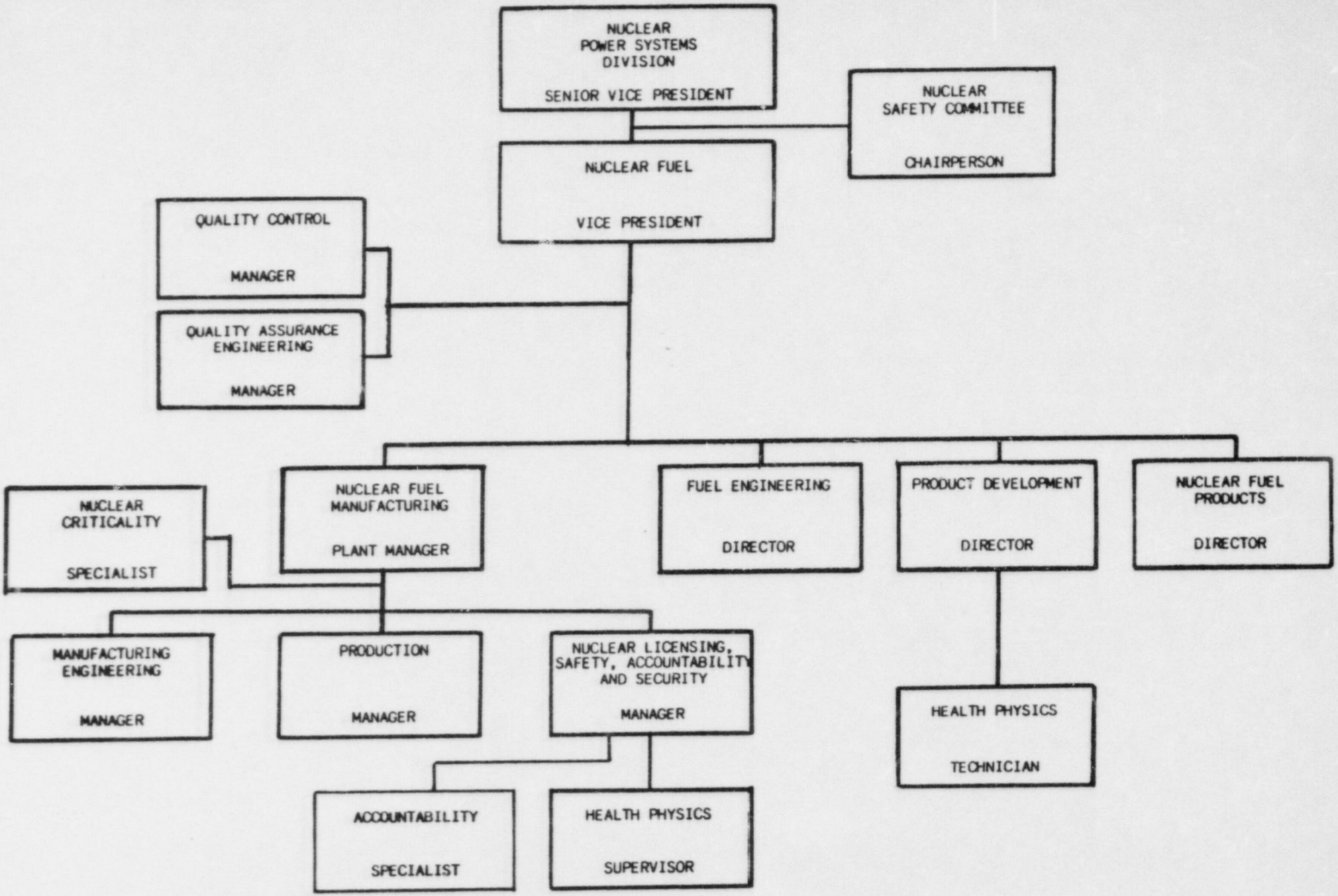
FIGURE 2.2.1


NUCLEAR POWER SYSTEMS DIVISION
SENIOR VICE PRESIDENT
NUCLEAR SAFETY COMMITTEE
CHAIRPERSON
NUCLEAR FUEL
VICE PRESIDENT
QUALITY CONTROL
MANAGER
QUALITY ASSURANCE ENGINEERING
MANAGER
NUCLEAR CRITICALITY
SPECIALIST
NUCLEAR FUEL MANUFACTURING
PLANT MANAGER
FUEL ENGINEERING
DIRECTOR
PRODUCT DEVELOPMENT
DIRECTOR
NUCLEAR FUEL PRODUCTS
DIRECTOR
MANUFACTURING ENGINEERING
MANAGER
PRODUCTION
MANAGER
NUCLEAR LICENSING, SAFETY, ACCOUNTABILITY AND SECURITY
MANAGER
HEALTH PHYSICS
TECHNICIAN
ACCOUNTABILITY
SPECIALIST
HEALTH PHYSICS
SUPERVISOR

3.0 Radiation Protection

3.1 Administrative Requirements

3.1.1 Radiation Work Permit Procedures

Product Development - All work with radioactive materials in the Product Development will require a radiation work permit (RWP).

The Health Physics technician or the Supervisor, Health Physics and Safety shall establish radiological requirements and set individual exposure limits.

Nuclear Fuel Manufacturing

All non-routine maintenance or repair operations on equipment in contaminated areas must be covered by a Radiation Work Permit (RWP), including those non-routine maintenance operations in which the ventilated containment is compromised. The RWP shall be requested by the cognizant supervisor or engineer. The RWP will be issued by the Nuclear Licensing, Safety, Accountability, & Security (NLSA&S) group. It will include all safety requirements, protective clothing and equipment, and health physics monitoring requirements necessary to assure that the proposed operation is conducted in a safe manner. RWP's shall be reviewed for their need every 30 days as a minimum. A member of the NLSA&S group must also close out on RWP's to assure that

the work was completed in a satisfactory manner prior to restart of the related operation.

Written operating procedures for the Health and Safety group are provided and followed in the manufacturing facility and
* in Product Development. Any changes in or new operating procedures for the Health Physics and Safety group are approved by the Manager, NLSA&S, the Nuclear Criticality
* Specialist, or the Plant Manager, Fuel Fabrication in the
* manufacturing facility, and by the Director, Product
* Development for those in Product Development.

3.1.2 ALARA Commitment

C-E management is committed to maintaining radiation exposures to personnel as low as reasonably achievable
* (ALARA). Product Development
assures that the ALARA concept is met by the following:

- A Radiation Work Permit (RWP) program that controls all operations involving the handling of radioactive material is utilized with approvals required at various exposure levels to assure all exposures are kept at ALARA.
* - An audit of the Product Development with emphasis on the ALARA goals is performed annually as stated in Section 2.8.1. The major emphasis of this audit will be to review all changes implemented by management to achieve ALARA and to make recommendations to assure continued adherence to the ALARA concept. Trends in radiation exposure, contamination levels, and airborne concentrations will be reviewed and recommendations made where necessary.

* - The quarterly audit of Product Development includes a review of the radiation safety program to assure the ALARA concept is being followed.

* Nuclear Products Manufacturing - assures that the ALARA concept is met by the following:

- Trends in personnel exposures, radiation levels, airborne activity levels, surface contamination, effluent releases, and bioassay results are reviewed during the monthly radiological safety audit. The person performing this audit is responsible for determining any required action necessary to assure
* adherence to the ALARA concept. The Plant Manager is responsible to assure that these recommendations are implemented.
- The Nuclear Safety Committee is responsible for a comprehensive review of the radiological safety program on an annual basis. This includes a review of all changes implemented by management to achieve ALARA. The Committee is responsible for recommending any additional changes which are necessary to assure continued adherence to the ALARA concept in all areas of the radiological safety program.

3.2 Technical Requirements

3.2.1 Access Controls

All personnel entering the unclad fuel handling contaminated areas must do so through the change areas provided for this purpose. Protective clothing shall be worn as follows:

- Coverall or Lab Coat
- Special shoes or shoe covers
- Safety glasses

Additional protective clothing shall be worn as prescribed by
* the Health Physics personnel both in Product Development and in the Manufacturing facility.

3.2.2 Monitoring Requirements (Personnel)

- All personnel must wash their hands before exiting the contaminated area and monitor as a minimum their hands, exposed areas of the body and personal clothing with the alpha personnel monitor located at the change line.
- The frequency and control levels of personal clothing and body surfaces shall be as follows:

PERSONAL CLOTHING AND BODY SURFACE ALPHA ACTIVITY CONTROL LEVELS

Surface	Alpha dpm/100cm2	Min. Survey Frequency
* Personal Clothing, Body Surfaces (Hair, Face, Hands)	Indistinguishable from twice background	Before leaving contaminated area and when contamination is observed on body surfaces.

- If levels are greater than the control levels, the individual shall promptly notify a member of the Health Physics staff and shall not leave the contaminated area until they respond.

3.2.3 Ventilation Requirements

Nuclear Fuel Manufacturing

Ventilation in the Manufacturing facility (Building #17) is provided by four separate exhaust systems as described herein:

FA-1 Powder Preparation and Pressing - This system has a capacity of 12,100 CFM and incorporates prefilters and a double bank of 12 absolute filters, each 99.97% efficient at 0.3 microns. The air exhaust from this system which is either returned to the unclad fuel area or released from the plant is sampled 100% of the time and analyzed each day.

FA-2 Furnace H2 Burnoff - This system has a capacity of 1340 CFM and incorporates prefilters and a single bank of 4 absolute filters, each 99.97% efficient at 0.3 microns. The air exhaust from this system is released from the plant and sampled 100% of the time and analyzed each day.

FA-3 Pellet Grinding and Rod Loading - This system has a
* capacity of 17,500 CFM and incorporates prefilters and a
* double bank of 16 absolute filters, each 99.97% efficient at 0.3 microns. The air exhaust from this system is released from the plant and sampled 100% of the time and analyzed each day.

FA-4 Recycle Powder Area - This system has a capacity of 6000 CFM and incorporates prefilters and a double bank of 6 absolute filters, each 99.97% efficient at 0.3 microns. The air exhaust from this system is released from the plant and sampled 100% of the time and analyzed each
* day.

The capacity of the ventilation systems have been matched to provide a negative pressure differential between the Pellet Processing Facility and all surrounding work areas. The direction of air flow shall be checked monthly and documented. If airborne activity results, averaged over a two week period, exceed 25% of the applicable concentration listed in Table II, Column I of 10 CFR 20 Appendix B for air being discharged to an unrestricted area (from manufacturing

* or Product Development Operations), an investigation will be conducted and corrective action taken. In addition, to assure our releases remain as low as reasonably achievable, a quarterly limit of 18 uCi in gross alpha activity of total uranium in plant gaseous effluents shall be maintained. If the radioactivity in plant gaseous effluents exceeds 18 uCi, a report which identifies the cause for exceeding the limit and the corrective actions to be taken to reduce release rates shall be submitted to the NRC within 30 days. Also, if the parameters important to a dose assessment change a report shall be submitted within 30 days which describes the changes in parameters and includes an estimate of the resultant change in dose commitment. The 18 uCi/qtr. limit would result in a lung dose to an individual at the nearest residence of (conservatively) less than 0.10% of the 25 mrem/year standard as specified in 40 CFR 190.

Ventilation system filters and/or prefilters will be changed, rotated, or knocked down whenever a pressure drop of 4 inches of water is measured across the combination of the prefilter and first bank of absolute filters. The pressure drop for all 4

systems shall be checked weekly and documented. When the face velocity at a ventilated hood drops below 100 fpm, the hood filters or ventilation system filter will be changed, brushed, or knocked down to increase the air flow to 100 fpm minimum or the hood will not be used to handle radioactive material. Face velocities will be checked weekly in the
* manufacturing facility and monthly in Product Development.
Any work on filter change involving any of the four fixed air
* systems in manufacturing shall be performed under an RWP.
following all filter changes or other movement of filters, both the Supervisor and H.P. Technician shall inspect the placement of the absolute filters for proper sealing. In addition, air samples will be taken and counted immediately after 1/2, 2, and 8 hours of operation to assure the absolute filters are adequately filtering the exhaust air.
The adequacy of the sampling techniques to obtain representative samples will be verified quarterly in the
* Manufacturing facility and annually in Product Development.
* Product Development
* Airborne wastes are released from Product Development as a result of airborne activity during handling and transfer of UO2 powder for chemical analysis purposes, production of special R&D test fuel, and metallographic examination of production fuel and special test fuel. All airborne waste is
* exhausted from Product Development (Building #5) via seven individual stacks. The exhaust is continuously monitored whenever operations involving dusting or release of radioactive material are in

progress. All stacks used for the exhausting of radioactive effluents are equipped with sampling connections. All but one of the stacks has absolute filters. The one exception is the environmental test laboratory stack (Stack #7).

Product Development (Building #5) exhaust stacks typically have the following flows:

Stack No.	Area Monitored	Flow (ft3/min.)
1	Chemistry (No longer in use)	6200
2	Hot Chemistry Lab	3100
3	Emission Spectroscopy Lab	2000
5	Radiochemistry Lab, Environmental Labs & Vault	2610
6	Ceramics Lab (Rm 222), Metallographic Lab	2125
7	Environmental Test labs (No longer in use)	2000
8	Ceramics Lab (Rms. 224 A & B)	4500

Air from systems Nos. 2,3,5,6 and 8 pass through single banks of absolute filters (99.97 percent efficient for >0.3 micron particles), and are vented to the atmosphere. Continuous sampling is provided immediately upstream from the discharge point.

The environmental test lab is connected to System No. 7. However, the system is not presently being used. Ventilation system filters and/or prefilters will be changed, rotated, or knocked down whenever a pressure drop of 4 inches of water is measured across the combination of the prefilter and

first bank of absolute filters. The pressure drop for all systems shall be checked monthly and documented. When the face velocity at a ventilated hood drops below 100 fpm, the hood filters or ventilation system filters will be changed, brushed, or knocked down to increase the air flow to 100 fpm minimum or the hood will not be used to handle radioactive material. Face velocities will be checked monthly in

* Product Development.

The filters in these stacks shall be tested either by 1) counting samples immediately after 1/2 hour of operation or 2) DOP testing the filters in accordance with ANSI standards. Such testing shall be done after all filter changes or movement of the filters to assure they are adequately filtering the exhaust air. The results of these tests shall be documented. Each ventilating filter system described in Section 3.2.3 shall be equipped with an instrument that measures the pressure drop continuously.

3.2. Instrumentation

Capabilities of radiation detection and measurement instrumentation shall be as follows:

*

Alpha Counting System	10 - 10,000 dpm
Alpha Survey Meters	0 - 50,000 counts per minute
Beta-Gamma Survey Instruments	.05 mR/hr - 200 mR/hr
Neutron Survey Instruments	.5 - 5,000 mrem/hr

A sufficient number of the instruments, meters and systems listed above shall be maintained operational to adequately conduct our Health Physics program. Additional instrumentation is maintained for emergency use as outlined in Part I Section 8. The detectors for the criticality alarm system are calibrated quarterly and following any repair that affects the accuracy of the measurements. All other instruments are calibrated twice per year and following any repair that affects the accuracy of the measurements. The calibration of the survey instruments shall meet the specifications described in Section 1.11 of Regulatory Guide 8.24, "Health Physics Survey During Enriched

individuals and equipment. The pellet shop is the only place in the manufacturing facility that handles unclad UO2. This portion of the facility is kept at a negative pressure as described in Section 3.2.3. Therefore, continuous air sampling shall be conducted in this area only.

* Product Development

* All operations in Product Developments which involve UO2 powder or the potential for worker exposure to airborne uranium exceeding the limits specified in 10 CFR 20.103, shall be sampled with breathing zone samplers 100% of the time.

Samples shall be analyzed within 24 hours after each operating shift. A one MPC action level and a minimum flow

* rate of 1400 cc/min. shall be used for Product Development operations.

3.2.6 External Exposure (Dosimetry Requirements)

Each individual who enters a restricted area under such circumstances that he is likely to receive a dose in any calendar quarter of 25 percent of the applicable value specified in 10 CFR 20.101(a) shall be supplied with a TLD badge and indium foil for purposes of personnel dosimetry. Badges will be processed monthly. When a high exposure is suspected, the individual's badge will be sent out for immediate processing. All visitors will be supplied with indium foil badges. Area TLD badges and neutron foils are also strategically placed throughout the facility for the purpose of recording background radiation levels as well as

* radiation resulting from a criticality accident. The TLD badges will also be processed monthly during normal operations and immediately following a criticality accident. Procedures to determine high radiation

2)	Lung Burden>200ug U235	Take above corrective action, and in addition, remove the individual from further exposure to airborne radioactivity.

3.2.8 Contamination Surveys

3.2.8.1 Contaminated Areas (Pellet Shop Building #17 & Contaminated Areas of Product Development) *

Removable Alpha Contamination	Action to be Taken
10,000 dpm/100 cm2	Immediate Clean-Up
5,000 dpm/100 cm2	24-hour Clean-Up

Contaminated areas shall be surveyed on a weekly basis. Material fixed on processing equipment or on surfaces shall be limited as required to control airborne radioactivity and external radiation exposures.

3.2.8.2 Clean Areas (Other plant areas, office areas, lunch areas)

Removable Alpha Contamination Alpha Level	Action to be Taken
100 dpm/100 cm2	Immediate Clean-Up
50 dpm/100 cm2	24-hour Clean-Up
*10 dpm/100 cm2	Immediate Clean-up
*(lunch rooms only)	

Other manufacturing areas, office areas, and the warehouse (Bldg. 21) shall be surveyed on a monthly basis. The lunch rooms shall be surveyed once a day, as a minimum.

Fixed Alpha Contamination

Monthly fixed alpha contamination levels in the non-contaminated areas (and for release of equipment from contaminated areas) shall be less * than 500 dpm/100 cm2 average.

Committee. He shall meet the minimum qualifications for a Nuclear Criticality Specialist and shall not be the initial reviewer.

As stated in section 4.1.3, all such approvals shall be recorded in a log maintained under the supervision of the Supervisor, Health Physics & Safety.

4.1.6 Marking and Labeling of SNM - All mass-limited containers shall be labeled as to enrichment and content. All geometry limited containers and processes are safe up to the maximum allowable enrichment of 4.1% U^{235}. An exception to this would be the 11" dia. x 40" lg. cylindrical hopper which is limited to 3.5 wt.% U^{235}.

4.1.7 Audits

* 4.1.7.1 Product Development - Nuclear criticality safety for
* all Product Development operations shall be limited to quantities smaller than a minimum critical mass with the exception of one slab limited storage area in Both Buildings 2 and 5. Each such mass limited area shall be isolated from all other fissile material by at least 12 feet. Criticality control by any other means (volume, slab, geometry, etc.) shall not be permitted. Thus, the nuclear
* criticality safety program in Product Development consists of simple mass limits. The quarterly radiological safety audit of laboratory operations required by section 2.8 shall include verifications to assure that all nuclear safety limits are being
* adhered to. An annual audit of

* Product Development shall be conducted in accordance with the requirements of section 2.8.

4.1.7.2 Nuclear Fuel Manufacturing Operations - Operations at the Nuclear Fuel Manufacturing facility shall be formally audited for nuclear criticality safety as required by the audit schedule in section 2.8.

4.1.8 Training and Retraining - All training and retraining with respect to nuclear criticality safety shall be conducted in accordance with the requirements of section 2.6.

4.2 Technical Requirements

4.2.1 Preferred Approach to Design - It is the intent of Combustion Engineering to use physical controls and permanently engineered safeguards on processes and equipment in the establishment of nuclear safety limits wherever practical. Use of administrative controls in the establishment of safety limits will be minimized.

4.2.2 Basic Assumptions and Analytical Methods - Written health and safety restrictions for all operations on radioactive material shall be provided in the form of approved Radiation Work Permits or approved detailed procedures, and appropriate operational limits shall be posted in the vicinity of work stations in both the manufacturing facility and Product

* Development. Each operation on fissile material in the

* Product Development shall be limited to 350 gm U^{235} for uranium enriched to more than 5% U^{235}, and to 740 gms U^{235} for uranium enriched to $\leq$5% U^{235}, and

shall be separated from any other fissile material by 12 feet.

Rods containing sintered UO2 pellets enriched to a maximum of
* 4.1% U235 shall be stored in Buildings #2 or #5. Storage of
* material in Building #2 shall be limited to a single slab less
* than 3.7 inches thick.
*

A continuous log shall be maintained for each mass limited
* work station or storage area in Product Development to assure that the limit is maintained and that the enrichment of all material is recorded. No additional criticality controls are
* required for Product Development.

Criticality safety of the less complex manufacturing operations is based on the use of limiting parameters which are applied to simple geometries. Safe Individual Units (SIU) shall be selected from Table 4.2.5. These units shall be spaced using the surface density method.

The remaining manufacturing operations are evaluated using two dimensional transport and/or 3 dimensional Monte Carlo Codes. The sixteen group Hansen-Roach cross section library is used for homogeneous systems while the CEPAK Code is used to generate multigroup cross sections for heterogeneous systems. All calculational methods involving computer codes shall be validated in accordance with the criteria established in Regulatory Guide 3.41 "Validation of Calculational Methods for Nuclear Criticality Safety". Specific validations are provided in Part II of this application.

shall be indicated with a colored line. The line may be crossed by carts only to permit an operator to transfer that SIU to an available storage position.

4.2.7 Structural Integrity Policy - All storage racks, furnaces, containment, and processing equipment which provide nuclear safety limiting parameters shall be designed to assure against failure under normal and reasonable overload conditions and under conditions of shock or collision foreseeable in the plant area. All equipment designed shall incorporate a minimum safety factor of 3.0. All equipment design shall conform to standard design practices, thereby assuring adequate structural integrity. Materials of construction shall be selected to assure, as far as possible, resistance to fire and corrosion. The individual engineer responsible for the purchasing or design of the new equipment shall assure that the minimum safety factor of 3 has been incorporated into the design of the equipment. The minimum qualifications for engineers shall be a bachelors degree in engineering or related fields.

4.2.8 Zoning for Fire Protection - An overhead sprinkler system as well as portable extinguishers are located throughout the fuel
* manufacturing facilities and Product Development. Onsite and Offsite fire protection service personnel have been instructed to use only portable dry chemical extinguishers in the Bldg. #17, to maintain the highest possible margin of nuclear criticality safety. Fire hoses shall not be permitted in Bldg. #17.

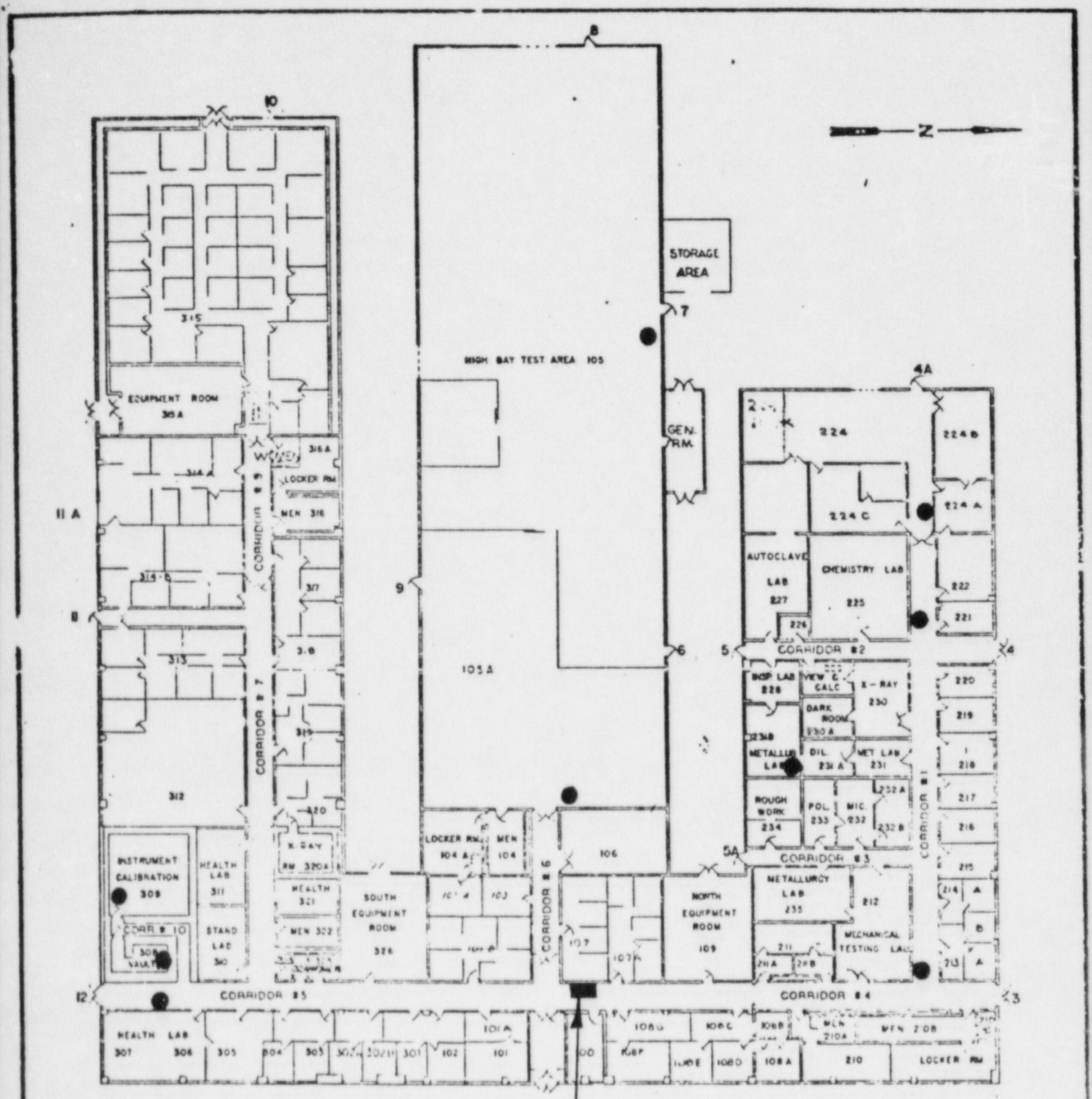
4.2.9 Criticality Alarm System - A criticality alarm system which meets the requirements of 10 CFR 70.24 (a) (1), Regulatory Guide

8.12, "Criticality Accident Alarm System" shall be maintained
* in Product Development areas and the manufacturing facility.
* The detectors operate in the range of 1-10,000 mR/hr. The locations of the detectors within the manufacturing facility are shown in Figure 4.2.1 and within the laboratories in Figure 4.2.2. The radiation intensity is shown on a central panel located in the Health Physics office for the manufacturing facility (Bldg. #17), and in the main hallway
* in Bldg. #5 of Product Development and in the HP office in
* Building #2. There is an alarm which serves as a local and general audible radiation evacuation alarm. When the alarm is sounded, the Emergency Plan is immediately put into effect. The monitors are connected to the emergency power system, which is supplied to all emergency lights and alarms in the event of a general power failure within the facility. This electrical system renders the alarm system operative at all times. This system is tested for operability quarterly. Operation is further enhanced by visual observation by Health Physics personnel. Alarm operational tests of the radiation monitors are performed monthly by Health Physics personnel. A radioactive source is used to perform these tests. The entire system is calibrated quarterly and following any repair that affects the accuracy of the measurement.

4.3 Specific Criticality Safety Criteria

Specific criticality safety criteria in addition to the general criteria described in Section 4.2 are necessary to assure nuclear safety for several process operations, as described below:

FIGURE 4.2.2



KEY PLAN

PRODUCT DEVELOPMENT

COMBUSTION ENGINEERING INC.

WINDSOR CONN

SCALE: 1" = 1'-0" DRAWN BY: DATE: DRAWING NUMBER PEM—5

6.0 INDUSTRIAL SAFETY

* The Director, Product Development shall be responsible for compliance with all applicable industrial safety (OSHA) regulations for all
* activities in Product Development covered by License No. SNM-1067. The Supervisor, Health Physics and Safety shall be responsible for compliance in the manufacturing facility.

7.0 DECOMMISSIONING PLAN

Combustion Engineering's Decommissioning Plan dated 1/12/79 was submitted previously is included as Appendix A to this renewal application.

8.0 RADIOLOGICAL CONTINGENCY PLAN

Combustion Engineering's Emergency Plan dated 7/30/79 and approved 3/26/82 should be considered part of this renewal application. This will be superceded by the "Radiological Contingency Planning Information" which shall be submitted under separate cover in accordance with an NRC Order dated 2/11/81.

9.0 FUNDAMENTAL NUCLEAR MATERIAL CONTROL PLAN (FNMC)

Combustion Engineering's FNMC dated February 1980 was submitted June 11, 1980 and should be considered part of this renewal application.

PART II. SAFETY DEMONSTRATION

1.0 OVERVIEW OF OPERATIONS

1.1 Corporate Information and Financial Qualifications

1.1.1 Name and Address of Licensee:

COMBUSTION ENGINEERING, INC.
1000 PROSPECT HILL ROAD
WINDSOR, CONNECTICUT 06095

Combustion Engineering is incorporated in the State of Delaware.

Location of Principal Office: Windsor, Connecticut

1.1.2 Names, Addresses and Citizenship of Principal Officers

	Name	Position	Address	Citizenship
	SANTRY, A. J., Jr.	Chairman and Chief Executive Officer	900 Long Ridge Road Stamford, Conn.	U.S.
	HUGEL, Charles E.	President and Chief Operating Officer	900 Long Ridge Road Stamford, Conn.	U.S.
	ENNIS, T. A.	Vice President Administration	900 Long Ridge Road Stamford, Conn.	U.S.
	KIMMEL, G. S.	Vice President Finance	900 Long Ridge Road Stamford, Conn.	U.S.
*	KELLY, JAMES	Vice President Power Systems	1000 Prospect Hill Road Windsor, Conn.	U.S.
	HALLINAN, R. J.	Vice President & General Counsel	900 Long Ridge Road Stamford, Conn.	U.S.
	KIAMIE, Mitchell	Vice President & Controller	900 Long Ridge Road Stamford, Conn.	U.S.

C-E has organized four service divisions (Finance, Research, International and Administration) and the following operating divisions:

Engineering and Construction Group - This group has a broad international involvement in the design, engineering, and construction supervision of projects in the chemical, petrochemical, petroleum, metallurgical and other process industries.

Process Equipment Group - This group manufactures and markets a wide range of energy-related products including oil and gas production processing equipment, heat exchangers, and pollution control equipment.

Industrial Products Group - This group provides a full range of services in the architectural, engineering, and planning disciplines with recognized special competency in environmental engineering, resource recovery and disposal of solid waste, transportation systems and the production of high temperature industrial ceramic materials for lining furnaces and other heat processing auxiliary equipment.

*

*

Power Systems Group - C-E Power Systems provides fossil and nuclear fueled steam generating equipment, nuclear fuel and components, and air quality control systems for the electric utility industry, and steel transmission structures. This group also provides industrial steam generating equipment, fuel burning and auxiliary equipment, and chemical recovery systems and boilers for pulp and paper mills as well as heavy

thick-walled pressure vessels for the chemical, petrochemical and petroleum processing industry.

The Nuclear Power Systems Division of the Power Systems Group has approximately 1200 (as of January 31, 1980) employees, of whom approximately 70% are scientists and engineers. More than two-thirds of the professional staff have at least five years experience in the nuclear field and approximately 50% have continued their education beyond the Bachelors Degree level. This staffing provides competence in the field of nuclear science and technology and extensive experience in the following specific areas: theoretical and experimental physics, mathematics, reactor analysis, chemistry, metallurgy, instrumentation controls, mechanical design, thermal sciences and nuclear and radiological safety.

Nuclear Products Manufacturing

Nuclear Products Manufacturing (NPM) is equipped to provide a variety of services necessary in the development and manufacture of precision reactor components such as fuel rods and assemblies containing low enriched UO_2 and control rods.

Equipment is also available to fabricate certain alloys of metals used for control rods and other special components.

Product Development

Product Development maintains complete facilities for the development, design, analysis and testing of nuclear components and systems. Product Development

* consists of two functional sections:

New Product Development - Establishes experimental basis
* for fuel design systems, specifies materials for proto-
type fuel fabrication; reviews drawings, specification
* and other documents for prototype fuel performs dynamic
* and structural testing of reactor components; evaluates
* test data, and test results; provides in-service
* inspection and field inspections for fuel.

* Core Materials Development - Reviews material
specifications; analyzes material problems, recommends
materials for specific applications and environments;
reviews fabrication and test procedures; develops and
maintains chemistry specifications; performs metal-
* lurgical and chemical testing;
* analyzes chemistry
* related problems;
* predicts the effects of irradiation
on material properties; performs irradiated materials
testing.
* The Product Development staff is comprised of
* metallurgists, chemists, engineers, and technicians.
* Product Development occupies a 14,000 square foot

* area in Building #5.

* Product Development maintains equipment for mechanical testing, X-ray diffraction, vacuum and inert atmosphere heat treating, radiography, powder processing, and ceramics processing.

1.1.4 Information Known to Applicant Regarding Foreign Control

There is no information known to Combustion Engineering, Inc. of any control exercised over it by any alien, foreign corporation, or foreign government. The stock of Combustion Engineering is traded on the New York Stock Exchange. According to the stock records of Combustion Engineering maintained by its Transfer Agent, The Chase Manhattan Bank, as of December 31, 1979, there were approximately 26,742 stockholders of record, holding 16,337,119 shares of Combustion capital stock issued and outstanding. Of this number, (See Appendix A) less than 1 percent of all stockholders gave foreign addresses.

1.1.5 Financial Qualifications

Combustion Engineering's most recent published financial position is as of December 31, 1979 and is attached as Appendix B.

1.2 Operating Objective and Process - Summary

The process at the manufacturing facility begins with receipt of UO2 powder enriched to a maximum of 4.1% U235 from Combustion Engineering's

oxide conversion plant in Hematite, Missouri. This powder is then made up into batches with various additives and pressed into pellets. The pellets are dewaxed in a furnace where volatile additives are removed. The pellets then pass through a sintering furnace where they densify and attain the desired characteristics. Final sizing is accomplished through the use of a centerless grinder. The finished pellets are then loaded into zirconium tubes which are sealed and combined into finished PWR fuel assemblies. The assemblies are finally loaded into approved shipping containers and delivered to a carrier for transport to their final destination.

* Analytical operations are carried out by Product

* Development. These operations may require uranium in any form and enriched to <20% U235.

1.3 Site Description

1.3.1 Population

The area surrounding Combustion Engineering's 1200-acre site is sparsely populated. Windsor, Connecticut is the nearest town of significant size, approximately five miles away, with a population of 22,502 and a population density of 760.2 per square mile. East Granby, Connecticut is the nearest town to the site, approximately three miles away, with a population of 3,532 and a population density of 198.4 per square mile. The distribution of population in the area is shown in Table 1.3. Figure 1.3.1 is a map of the general area showing the location of the towns listed in Table 1.3.

Hills to the west and northwest are a source of summer thunderstorms which, when accompanied by wind and hail, sometimes do condsiderable damage to the crops in the Connecticut Valley. Frequently during the winter, when rain falls through the cold air trapped in the Valley, the resultant icing creates hazardous conditions for transportation and utility installations. On clear nights in the late summer or early autumn, cool air drainage into the Valley, plus Connecticut River moisture, produce ground fog which sometimes becomes quite dense through the Valley and hampers ground and air transportation.

1.3.4 Geology

The surrounding area has been subjected to the actions of glacial ice. All dominant geological features are a result of

* erosion and depositions caused during the Pleistocene era. The State of Connecticut has favorable earthquake history. Ten earthquakes are listed, the first recorded in 1791 and the last in 1925. All of these, with the exception of the first, were local in nature and of moderate intensity.

1.3.5 Hydrology

The surface drainage in the surrounding area is excellent. The predominantly sandy nature of the soil and heavy forest cover results in very moderate run-off even after heavy prolonged precipitation.

The site creek, into which all site effluents are discharged, flows into the Farmington River which flows along the northwest corner of the Combustion site, shown in Figure 1.3.2. Two and

1.5 History of License

Combustion Engineering first applied for a license to process low enriched uranium by the methods described in section 1.2 in 1968. License SNM-1067 was then issued for a period of 5 years by the U.S.

* Atomic Energy Commission (AEC).

*

*

then connected to the low voltage metal clad switch gear for distribution throught the building. A further step-down to 208/120 volt is made for lighting and general convenience power.

Emergency Power System

A diesel generator serves as a back-up emergency power system for both the manufacturing and laboratory facilities. The generator produces 3-phase, 480 volts, and 200 KW. The described generator feeds a rated distribution panelboard which has several 100 ampere, 3-phase 480 volt circuit breakers. The panelboard is switched from normal power to generator (emergency) power by an Asco transfer switch. Diesel start-up and transfer takes approximately ten to twelve seconds. A circuit breaker within this panelboard is used to supply emergency

* power to the manufacturing and product development facilities.

The principal site water supply is provided by the Metropolitan District, the source of city water for the greater Hartford area. Chemical and radiological analyses for both raw and treated well water have been made, and any changes in composition or activity from any cause will be discovered rapidly.

2.3 Heating, Ventilation, and Air Conditioning (HVAC)

The Building #17 office area, consisting of 4800 square feet is heated and cooled by hot and chilled water respectively supplied by the Windsor site central boiler house. Office areas have built-in convectors which heat and cool the areas depending on the time of year. Each office has an exhaust system which ventilates the area and allows fresh air to be brought in.

The main shop area of Building #17 consists of approximately 36,000

3.0 Organization and Personnel

Functions of key positions, specifics on education and experience required for key personnel, organization procedures, and unit functions (including safety committees) are described in Part I, sections 2.2, 2.3, 2.4, and 2.5 of this renewal application.

3.1 Organiztion Charts

Current Organizational charts and structure are provided in Figure

* 3.1.1.

3.2 Resumes of Key Personnel

Resumes of key personnel are provided in this section on the pages following the above described organizational charts.

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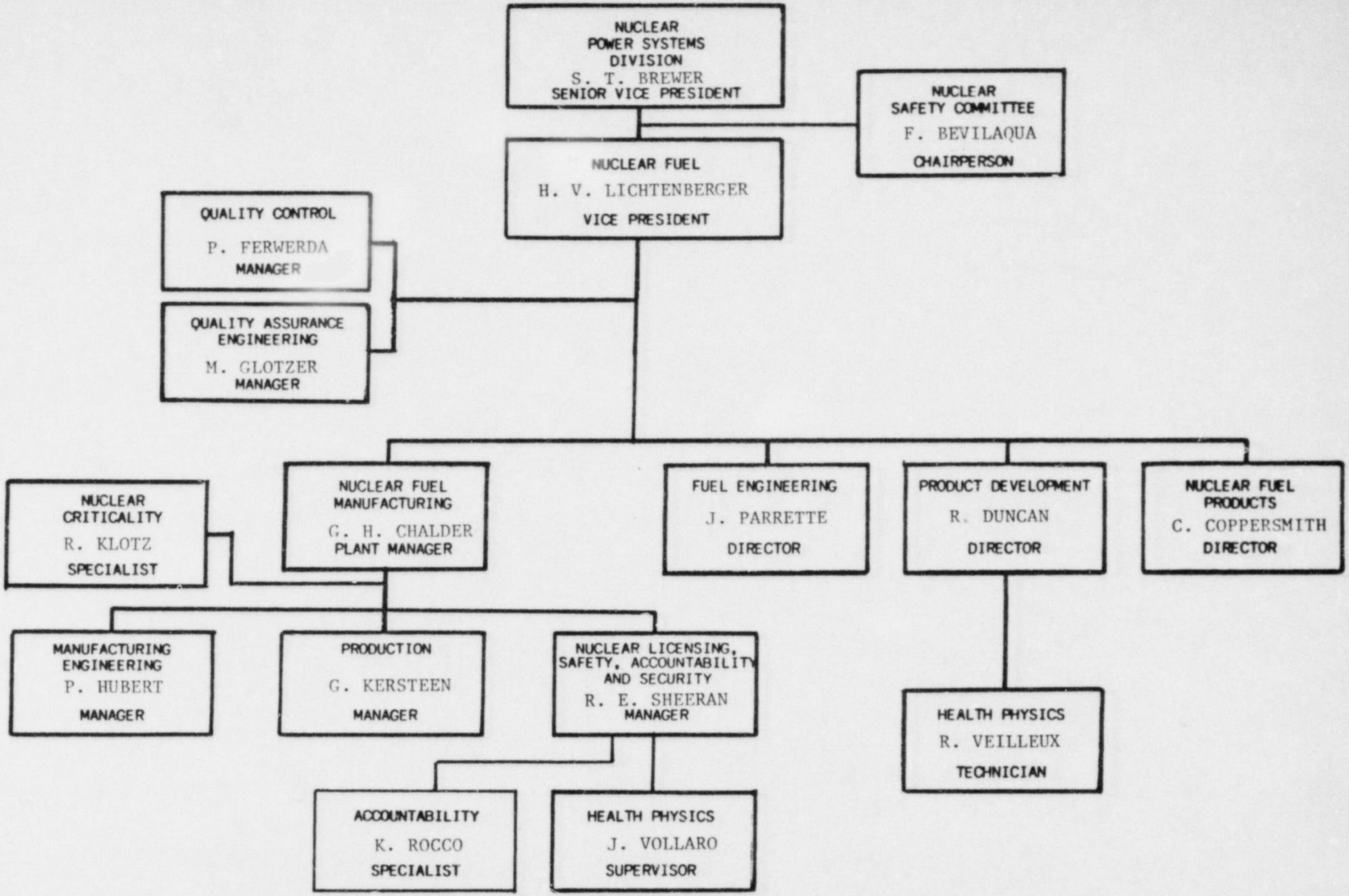
FIGURE 3.1.1


NUCLEAR
POWER SYSTEMS
DIVISION
S. T. BREWER
SENIOR VICE PRESIDENT
NUCLEAR
SAFETY COMMITTEE
F. BEVILAQUA
CHAIRPERSON
NUCLEAR FUEL
H. V. LICHTENBERGER
VICE PRESIDENT
QUALITY CONTROL
P. FERWERDA
MANAGER
QUALITY ASSURANCE
ENGINEERING
M. GLOTZER
MANAGER
NUCLEAR
CRITICALITY
R. KLOTZ
SPECIALIST
NUCLEAR FUEL
MANUFACTURING
G. H. CHALDER
PLANT MANAGER
FUEL ENGINEERING
J. PARRETTE
DIRECTOR
PRODUCT DEVELOPMENT
R. DUNCAN
DIRECTOR
NUCLEAR FUEL
PRODUCTS
C. COPPERSMITH
DIRECTOR
MANUFACTURING
ENGINEERING
P. HUBERT
MANAGER
PRODUCTION
G. KERSTEEN
MANAGER
NUCLEAR LICENSING,
SAFETY, ACCOUNTABILITY
AND SECURITY
R. E. SHEERAN
MANAGER
HEALTH PHYSICS
R. VEILLEUX
TECHNICIAN
ACCOUNTABILITY
K. ROCCO
SPECIALIST
HEALTH PHYSICS
J. VOLLARO
SUPERVISOR

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