WRD-LA-276

Westinghouse Electric Corporation

Water Reactor Divisions

Box 355
Pittsburgh Pennsylvania 15230

January 9, 1981

U. S. Nuclear Regulatory Commission
Office of Nuclear Material Safety & Safeguards
Division of Fuel Cycle & Material Safety
Washington, D.C. 20555

Attn: Mr. R. G. Page, Chief
Uranium Process Licensing Branch

Subject: Transmittal of Application for Amendment to Upgrade Facility, License SNM-1107, Docket 70-1151

Gentlemen:

The Westinghouse Electric Corporation hereby requests an amendment to License SNM-1107 to authorize operations with special nuclear material in an upgraded section of our Columbia Facility, in accordance with the attached application.

The information included with this transmittal consists of ten (10) copies of environmental information and altered license conditions (submitted as changed pages, in accordance with applicable license specifications). We will appreciate your timely review of this information such that the installation schedule for the proposed line can be maintained.

Please find enclosed a check payable to the U. S. Nuclear Regulatory Commission, in the amount of $34,600, in accordance with the amendment fee schedule of 10 CFR 170.31.

If you have any questions regarding this matter, please write me at the above address or telephone me on 412/373-4652.

Very truly yours,

Andy Sabo

A. T. Sabo, Director
Licensing, Safeguards & Safety

ATS/dc

LICENSE CONDITIONS

Proposal For Improvement And Upgrading Of Operations

at the

Westinghouse Columbia Nuclear Fuel Fabrication Plant

SNM-1107

Docket 70-1151

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Minimum Specifications and Capabilities

2.1 Scope of Licensed Activities

2.1.1 Definitions

Clean Area - an area where radioactive material, if present, is completely contained and there is negligible contamination on the floors or accessible surfaces. (e.g. Machining Area, Grid Assembly Area, Final Assembly Area, Office Areas, Cafeteria, etc.)

Component - when used administratively, an organization unit, distinguishable by its assigned responsibilities, e.g., the line management component, the radiation protection component, etc.

Controlled Area - an area where uncontained radioactive materials are processed and probability of contamination on floors and accessible surfaces is high. Protective clothing is required. (e.g., Conversion Area, Pelleting Area, Rod Loading Area, UF_6 Bay, etc.)

Dry - When used to describe special nuclear material (SNM), having a moderation ratio (H/U = hydrogen to uranium atomic ratio) less than, or equal to, 0.5 for uranium enriched up to 4.15 weight percent in U-235, and less than or equal to 0.3 for uranium enriched between 4.15 and 5.0 weight percent.

Equivalent Diameter - when evaluating the adequacy, for purposes of nuclear criticality safety, of the geometry control of a subcrit unit having a non-circular cross section, the diameter of that circle that has the same area as the area of the cross section of the subcrit unit. $d_{equiv.} = 2\sqrt{\frac{Area}{\pi}}$, where Area is the cross sectional area of the subcrit unit under review.

2.1.2 Summary Description

The objective of the licensed activity will be the ADU or IDR process conversion of uranium hexafluoride to uranium dioxide and the manufacture of fuel-bearing components for nuclear reactor cores. The licensed material will be composed of unirradiated special nuclear materials received principally as uranium hexafluoride containing uranium enriched up to 5.0 w/o in the isotope ^{235}U.

2.1.2 (continued)

Other chemical forms that may be received are uranium oxides and uranyl nitrate. Operations may include the fabrication of fuel assemblies that contain uranium enriched from 4.15 to 5 w/o in the ^{235}U isotope. The material for such assemblies will be processed through IDR conversion or will be received as uranium dioxide powder (only), and, will not be subject to ADU conversion, scrap preparation, or other wet chemical processes (unless properly approved and documented evaluations demonstrate the nuclear criticality safety of the utilized wet processing systems.) Another similar, limited activity will involve the fabrication of fuel assemblies containing mixed oxide fuel material. This material will be a mixture of PuO_2 in natural or depleted UO_2. It will be received and handled only as sealed fuel rods that have been fabricated by another Westinghouse NFD facility. Such rods will be surveyed on receipt on a sample basis to the limits specified for sealed Pu sources. No authorization to possess or use exposed plutonium is intended.

Scrap or waste licensed material ($\leq$ 4.15 w/o ^{235}U) resulting from site operations may be processed for concentration, recovery and/or reuse. These operations may involve chemical separation (e.g., acid treatment and dissolution or acid leaching, followed by chemical precipitation), mechanical separation and thermal decomposition.

Scrap and wastes resulting from processing operations that involve uranium enriched >4.15 w/o will be collected and segregated to assure that no materials at such higher enrichment are introduced into any area unless properly approved and documented evaluations demonstrate the nuclear criticality safety of the subject area at the higher enrichments.

2.1.2 (continued)

The licensed activity will perform work for other Westinghouse Divisions or outside customers which is adapted to the capabilities of the facility. The work may consist of uranium oxide fuel fabrication and quality assurance testing operations and laboratory analyses of uranium or byproduct material.

2.1.3 Material

Special Nuclear Material

Listed below are the maximum quantities of special nuclear materials which will be possessed by the licensed activity at any one time.

Material	Form	Quantity
^{235}U	Unirradiated, any chemical or or physical form at any enrichment	350 grams
^{235}U	Unirradiated, any chemical or physical form at any enrichment $\leq$ 5.00 w/o	50,000 kilograms
^{233}U	Any chemical or physical form, for laboratory uses only	5 grams
^{238}Pu	Sealed Sources	1.5 grams
Mixed Oxides	Unirradiated plutonium oxides, mixed with oxides of natural or depleted uranium, as sealed fuel rods. The fissile $PuO2$ $[(^{239}Pu + ^{241}Pu)O_2]$ will constitute a maximum of 6.6 w/o of the total oxide weight.	750 kilograms contained Pu. Natural or depleted U to suit.

2.2.11 Chemical Equipment

The equipment specified below will be provided as part of the UF_6 vaporization system.

A UF_6 detection method in the steam condensate system, with an alarm to alert operating personnel to a leak in steam-type vaporizers, and with an interlock and an alarm to alert operating personnel to a leak in hot-water-type vaporizers.

A pressure relief valve and a liquid level detector in the steam-type UF_6 vaporizers; or, with favorable geometry/overflow-type sumps in the hot-water-type UF_6 vaporizers.

Provisions to permit the leak testing of the UF_6-cylinder-to-conversion-system connections prior to heating each time a cylinder is connected.

A means for cooling the UF_6 cylinder.

A means to prevent the backflow of water from the hydrolysis tank to the UF_6 cylinder, in ADU process systems.

2.2.12 Incinerator Equipment

The equipment, controls and safety interlocks specified below will be provided as part of the incinerator system:

Temperature sensor/controllers in the primary combustion chamber, breech and scrubber exhaust.

Safety interlocks to inhibit feeding additional wastes if an overtemperature occurs in the primary combustion chamber.

A means for automatic shut - down of the incinerator in case of overtemperature in the scrubber exhaust.

An auxiliary means for cooling the incinerator exhaust gases.

2.2.12 (continued)

Cooling water flow monitoring devices.

Pressure monitoring devices in the breech and scrubber exhaust

A means for automatic shutdown of the incinerator in case of insufficient negative pressure in the breech and scrubber exhaust.

Continuous, representative gaseous effluent sampler.

HEPA filtered exhaust and ash removal systems.

A means for monitoring and adjustment of the pH of scrubber solutions.

Maintenance of a log indicating the mass of ^{235}U charged and removed for each burn cycle, and the cumulative total of the net, assumed to remain in the incinerator.

2.2.13 Moderation Control Areas

Fire control in areas of the SNM Building where uranium is processed, handled, or stored under hydrogeneous material criticality control criteria shall receive particular attention, as follows:

- Special consideration shall be given to use of fire-resistive or noncombustible building components, equipment, and materials.
- Special consideration shall be given to the prompt disposal of combustible waste. Such waste that is collected during work activities shall be stored in metal containers having fire protection covers.
- A readily available supply of portable fire extinguishers suitable for use on the specific hazards encountered shall be provided.
- Such areas shall be subject to administrative controls, including specific personnel training, to assure that only permissible firefighting means and materials are used.

2.2.14 Interlocks

IDR and moderation controlled blending and storage equipment, and its associated control instrumentation, shall be evaluated for conditions requiring automatically operating interlocks to safeguard facilities, workers, and environs against failures of equipment and instruments signficant to safety.

Equipment and instruments requiring such interlocks shall be identified and documented by the regulatory compliance component.

Identified interlocks shall be installed, maintained, and operable as a minimum condition of applicable equipment or system operation.

.3 Safety Limits

2.3.1 Chemical Reaction Safety

Each anion-type ion exchange column will be equipped with a rupture disc. The concentration of the nitric acid regenerant will be controlled at or below 5.0 normal. The columns will be maintained under routine surveillance during regeneration. When the ion exchange columns are not in routine use, the bottom of the column shall be opened to atmosphere by removing the spool piece.

2.3.2.2 Nuclear Criticality Safety Values

Maximum Permissible Values

a. Maximum Permissible Values for subcrits with a maximum ^{235}U enrichment of 5.0 w/o are established in tabular form as follows:

Figure 2.3.2.1 Batch or Mass Controlled Subcrits
Figure 2.3.2.2 Volume Controlled Subcrits
Figure 2.3.2.3 Cylinder Diameter or Equal Cross Sectional Area Controlled Subcrits
Figure 2.3.2.4 Slab Thickness Controlled Subcrits

b. Subcrits containing uranium enriched to greater than 5.0 w/o will be limited to 350 grams of contained ^{235}U.

c. Moderation Controlled Subcrits - Systems shall be considered under moderation control for nuclear criticality safety when the following conditions are met:

The contained special nuclear material is "dry" under normal operating conditions.

The containment precludes introduction of moderator; or, system controls, procedures, and interlocks preclude introduction of sufficient moderator to compromise the nuclear criticality safety of the system.

Moderation controlled UF_6 in approved shipping cylinders will constitute a specific MPV.

d. Uranium concentration controlled subcrits will be limited to a maximum allowable concentration of 5 grams ^{235}U per liter. This MPV will not be applied unless it can be demonstrated that the precipitation of the SNM and higher concentrations due to process failures are not credible.

2.3.2.2 (continued)

e. Subcrits which are safe by concentration control and which are part of a continuous processing line, will be filled with Raschig rings which are maintained in accordance with the current edition of the standard N16.4, "Use of Borosilicate - Glass Raschig Rings as a Neutron Absorber in Solutions of Fissile Material."

f. Fixed poisons may be used in nonliquid special nuclear material systems when the following restrictions are both met: The poison shall be physically protected from abrasive action by the special nuclear material; and, Nuclear Criticality safety of such poisoned systems shall be verified by validated computer calculations.

g. Subcrits composed of fuel assemblies will be limited by reactivity. The computed k_{eff}, including allowances for computational error, will not exceed 0.95. These computations will be performed by the NFD, Nuclear Design Department using procedures such as MUFT, SOFOCAT, LEOPARD, and/or PDQ-03. The results of these computations will be independently reviewed within the department and approved by the department manager before being transmitted to the NFD Manufacturing Department.

h. Maximum permissible values for subcrits containing plutonium will be those established in Figure 2.3.2.5. Subcrits containing plutonium will be restricted to encapsulated components containing PuO_2 mixed with natural or depleted UO_2.

2.3.2.2 (continued)

d. Moderation controlled subcrits ("dry"*) of 5 w/o or less enriched uranium, when limited as follows will not be considered to contribute to interacting arrays: (1) Maximum Permissible Values, (2) in closed containers or configurations which would not retain water, (3) located outside of areas assigned to interacting subcrits, (4) no sprinkler system in the area, (5) no use of water or other hydrogenous agents for fire fighting purposes and (6) appropriate nuclear criticality safety signs posted in the controlled area.

e. Concentration controlled subcrits (with or without borosilicate glass Raschig rings) are not considered to contribute to nuclear interaction provided that they are outside of areas assigned to interacting subcrits.

f. Notwithstanding other spacing requirements, any subcrit will be separated by at least 12 inches from any other subcrit.

g. All subcrits containing plutonium will be spaced such that the "smeared" slab thickness will not exceed 25% of the minimum critical slab thickness.

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* As defined in paragraph 2.1.1

2.4 Minimum Conditions of Operation

Processing operations involving SNM will be performed routinely only when appropriate equipment having the capabilities specified in paragraphs 2.2.3 through 2.2.14 has been provided and is operative and when qualified line management personnel are present.

Non-routine and emergency operations involving SNM will be performed only after the particular operation has been approved by the appropriate line management function and the radiation protection function. The line manager will be responsible to obtain the evaluation and approval of the operation by the radiation protection function, consistent with the urgency of the situation in the event of an emergency. All equipment specified as necessary to the operation by the line management function and radiation protection function will be provided and operative.

The equipment specified in paragraph 2.2.2 will be maintained available at all times. The necessary trained personnel will be available as specified in the emergency procedures.

A continuing program of surveillance, air sampling and smear sampling which will be adquate to detect ventilation deficiencies and assure compliance with 10 CFR 20 limits, will be conducted.

2.5 Emergency Procedures

Written emergency procedures which comply with the requirements of 10 CFR 70.22(i) will be maintained and communicated to all employees and unescorted personnel working in the affected areas of the licensed activity. Selected personnel will be organized and trained to cope with various credible emergency situations.

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4.7 Transfer of Special Nuclear Material

The licensed activity shall be authorized to sell, or otherwise transfer, hydrofluoric acid containing trace quantities of uranium (enriched up to five weight percent in U-235) to nonlicensed persons, provided that:

- The concentration of uranium in the acid does not exceed 10 parts per million.
- Each such sale or transfer shall be accompanied by a written instruction that the acid is not to be used for any purpose involving human consumption.

ENVIRONMENTAL INFORMATION

Proposal For Improvement And Upgrading Of Operations

at the

Westinghouse Columbia Nuclear Fuel Fabrication Plant

SNM-1107

Docket 70-1151

January 9, 1981

SECTION 1

DESCRIPTION OF PLANT CHANGES

To best meet the established need for increased productivity at the Columbia Plant, a fully developed and proven dry conversion process - the Integrated Dry Route (IDR) method developed and commercially utilized by British Nuclear Fuels Limited (BNFL) - is proposed as a supplement to the plant's existing ADU (wet conversion) process production lines. The planned IDR process line will replace an experimental dry process line - the Direct Conversion Fluidized Bed (DCFB) system - which, although it has been shown to provide some of the desired environmental advantages of the IDR process, it has not provided the superior fuel product anticipated in the new process. The IDR process line will provide opportunity for productivity improvement, while generating much lower quantities of regulated constituents in liquid effluents, and, while also providing enhanced control of regulated airborne constituents (when both are compared to equivalent ADU fuel production capacity). Details of the proposed IDR system, and plant changes to accommodate installation of the total Manufacturing Automation Project (MAP), are described in the following discussion.

1.1 OVERALL PLANT OPERATIONS

The fabrication of nuclear fuel assemblies requires both chemical and mechanical operations; and, as a result, some (low level radioactive) solid, liquid, and gaseous wastes are generated. The plant process equipment and ventilation systems are designed and operated to maintain regulated chemical and radioactivity discharges to the environment well within established limits, and as low as reasonably achievable. Figure 1 presents a general flow diagram of proposed total plant operations, including the new process line. (This figure also schematically identifies the sources, treatment, and anticipated effluent concentrations in releases to the environs, from new system installation). Figure 2 presents a plan view and Figure 3 shows a cross-sectional view of the proposed process area.

1.2 SYSTEM DESCRIPTION

1.2.1 Conversion

The planned conversion process will utilize dry methods to convert solid uranium hexafluoride (UF_6) to uranium dioxide (UO_2) powder. [This process involves UF_6 vaporization, gas phase hydrolysis, and gas-solid phase reduction to produce UO_2. The process is well established, has been commercially utilized in two countries, and provides opportunity for significant environmental advantages over alternate processes (by substanitally reducing liquid waste generation).]

UF_6 feed material, received in type 30A/30B cylinders, is vaporized within the cylinders by heating with hot water spray. The resulting UF_6 vapor is reacted with superheated steam at the head-end of a conversion kiln to form uranyl fluoride (UO_2F_2) powder and hydrogen fluoride (HF) gas. The UO_2F_2 is further contacted within the kiln - with a countercurrent flow of hydrogen, nitrogen, and superheated steam - to strip residual fluoride, and to reduce the uranium powder to uranium dioxide. The UO_2 is discharged from the product end of the kiln into check hoppers, and is then pneumatically conveyed (or otherwise transported) to the powder processing area. Process off-gases [hydrogen (H_2), hydrogen fluoride (HF), nitrogen (N_2), and steam (H_2O)] are removed continuously from the top of the head-end of the kiln, through process filtration (periodically reverse-purged) for retention of uranium-bearing solids prior to recovery of hydrofluoric acid.

The conversion process is shown schematically in Figure 4; details of the conversion process follow:

- Vaporization

UF_6 cylinders are transported from the UF_6 storage area to the Manufacturing Building UF_6 bay via lift truck. The cylinders are then installed in a vaporizer, using an overhead crane. A cylinder is connected to its process header by flexible copper tubing. When the cylinder under hot water spray has reached process operating temperature (∿ 180°F) and pressure (> 5 psig), the UF_6 is delivered to the process (kiln) by remotely opening the cylinder valve.

[Normally (during steady-state operations), two cylinders will be hot simultaneously, but during changeover periods (some 50 percent of the time), three cylinders will be hot simultaneously.]

When a cylinder which is supplying the conversion system is sufficiently depleted of UF_6 (so as to no longer maintain a supply pressure above 5 psig), it is disconnected from the supply line and valved into a cold trap evacuation system for removal of residual UF_6 (to an acceptable final heel of less than 25 pounds). Heel removal is accomplished by evacuating the cylinder (with a vacuum pump) through an exhaust train, consisting of a cold trap system with self-contained (-65°F) refrigeration (to condense UF_6 vapor) and two final series chemical absorber (Al_2O_3) traps (for the capture of any final traces of UF_6). Upon completion of the evacuation process, the cylinder is removed from the vaporizer, and transferred by crane to the cylinder scales for weighing to assure that the residual heel is equal to (or less than) 25 pounds.

In the vaporization area, UF_6 vapor or liquid containing lines and vessels are normally enclosed within a pipe chase (or other containment), maintained at a negative pressure with respect to the operating area and vented through the HF Vent Scrubber.

- UO_2 Powder Production and Handling

UF_6 supplied by vaporization is converted to UO_2 powder product in an IDR kiln. Converted powder product from a kiln is held in discharge check hoppers pending analysis and subsequent processing. Composited UO_2 samples are used to establish the physical composition of the contents of each check hopper. Acceptable product powder is discharged to a pneumatic transfer line which conveys the material directly to powder preparation. (Bulk powder containers are also to be provided as an alternate transport system.) Powder in a check hopper found to be unacceptable (with respect to fluoride and/or moisture) is transferred to a powder rework area for further treatment.

- Powder Rework

Rework is necessary when powder properties (primarily fluoride and moisture content) are out of specification. Powder which does not meet specifications is discharged from the check hoppers into (geometrically-controlled) containers, then is campaign processed through auxiliary drying and fluoride stripping equipment.

Reworked powder, which upon analysis is found to meet specifications, is returned to the regular process stream by one of two methods: When the pneumatic conveying system is used, a pre-wieghed amount of reworked powder will be metered into a transfer line after a receiving blender has been charged with the designated amount of virgin powder. When the bulk transport containers are used, the reworked powder will be accumulated in a (moderation-controlled) container until it is full. The container will then be elevated to the blender charging floor through the container lift and used as needed to supply addback to each blender charge.

- Hydrofluoric Acid Recovery

The conversion kiln off-gas is cooled to recover byproduct hydrofluoric acid by condensation. The recovered acid solution is collected in an HF quarantine tank (Q-Tank) and held for uranium analysis before release (if it meets uranium specification) to a bulk storage tank (for subsequent sale as a byproduct).

Out-of-specification (excess uranium) HF solution is transferred to a safe-geometry precipitator system, located in the acid recovery area, where uranium values are recovered by (advanced treatment) precipitation and filtration. The filtrate is transferred to the liquid waste treatment system.

Based on the current HF condenser design, some 95% of the HF will be recovered as (nominally) 55 w/o hydrofluoric acid. The remainder of the HF will be cleaned by NaOH in the Condenser Off-Gas Scrubber. The annual HF transfer to the scrubber liquor is estimated at some 4400 Kg (approximately 10,000 pounds).

[It is planned that the recovered HF be licensed for recycle (e.g., sale); otherwise, it would have to be neutralized with $Ca(OH)_2$ with the product (CaF_2) dried and buried. Licensing for recycle will allow the reuse of the recovered acid in an economic manner which would also conserve resources - rather than requiring the otherwise unnecessary controlled disposal of the material, as radioactive waste, in valuable space at a licensed burial site.]

- Off-Gas Scrubbing

Caustic scrubbing is provided to remove residual HF and UF_6 from gaseous exhaust streams - from either the normal process (and vent exhausts) of the acid recovery system, or from an inadvertent leak in UF_6 cylinders or transfer lines. Two basic scrubber systems are provided for this purpose:

The Condenser-Off-Gas Scrubber is provided to cleanse condenser effluent from the kiln system (which contains traces of hydrogen in addition to acidic off-gas). Uncondensed HF gas carryover is treated with caustic (NaOH) in this scrubber. The resultant scrubber solution (containing traces of uranium) is quarantined and analyzed prior to release to liquid waste treatment, or to the precipitation tanks (if established uranium levels are exceeded). Residual hydrogen (already below the lower limt of flammability) is further diluted with plant air prior to discharge of the gaseous stream to the outside atmosphere (through the confinement and ventilation system described in paragraph 1.3).

The HF Vent Scrubber is utilized to cleanse the normal off-gas from vents on HF storage vessels. In addition, this scrubber can be made available to cleanse air in the vaporizer room, and vaporizer room process enclosures, which might become necessary due to inadvertent leakage of UF_6 process piping or vessels. HF Vent Scrubber solutions and gaseous streams are routed in a similar manner to that previously described for Condenser Off-Gas Scrubbing, except that there is no need for hydrogen treatment.

- Uranium Recovery from Solutions

Uranium will be recovered from spent scrubber solutions (as well as from uranium-containing by-product HF filtrate) via Columbia's existing Advanced Waste Treatment system.

1.2.2 Fabrication

Details of the fabrication process follow:

- Powder Processing and Pellet Fabrication

UO_2 powder from the dry conversion process is transferred to the powder processing area where it is blended with additives - including uranium oxide (U_3O_8)

recycled from scrap recovery processes. After blending, the homogenized powder is compacted, granulated and pressed into pellets. There are no liquid effluents from these operations; airborne effluents are treated by the confinement and ventilation system described in paragraph 1.3.

- Sintering

Pressed pellets are loaded into boats and charged to electrically heated furnaces for transformation to high-density pellets by sintering in a reducing atmosphere. There are no liquid effluents from this operation; airborne effluents are treated by the described confinement and ventilation system.

- Pellet Grinding and Rod Loading

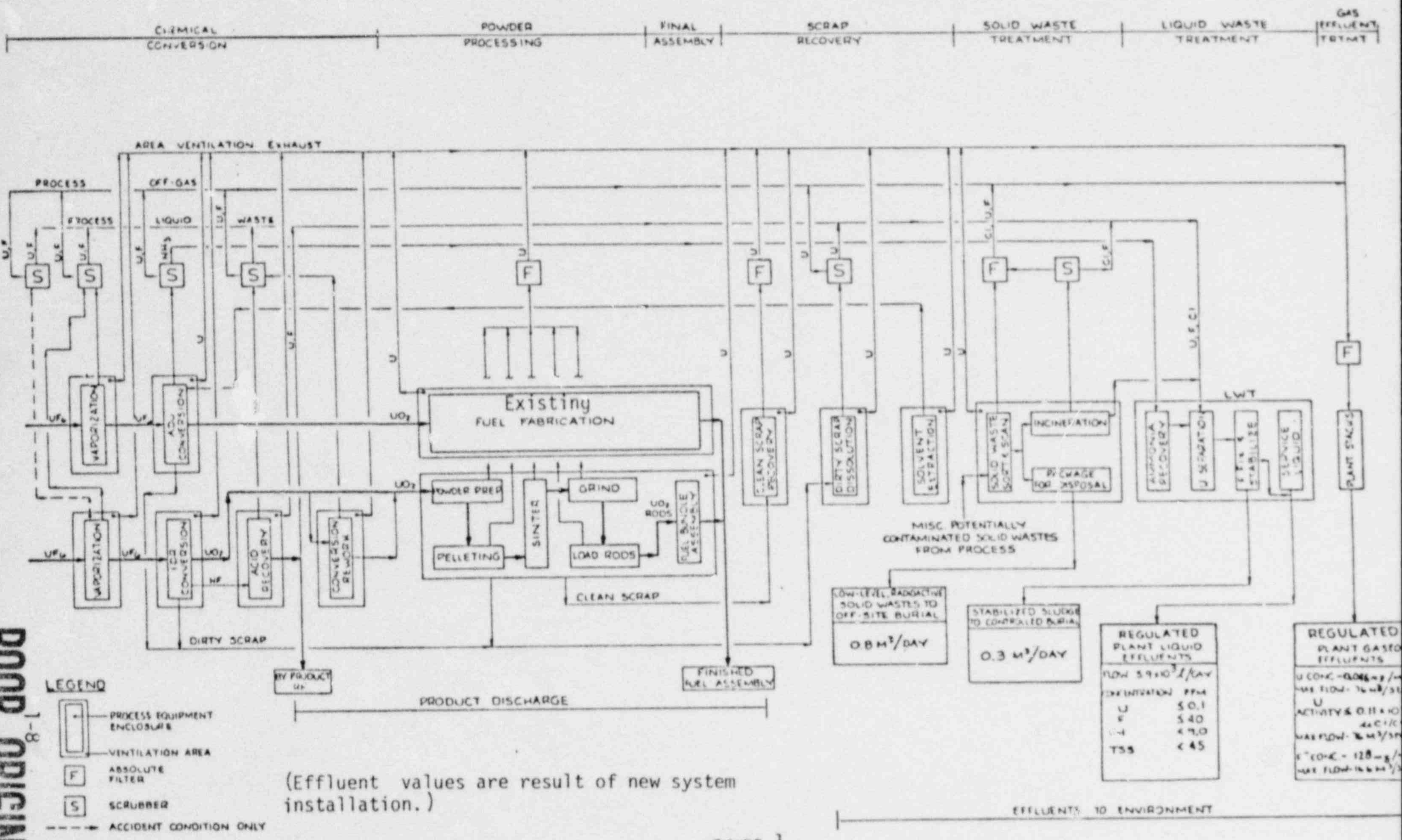
Sintered pellets are processed through a grinding operation to obtain specified dimensions. Ground pellets are loaded into prepared metal tubes (from the Tube Prep Area) and the tubes are sealed by welding. Finished rods are inspected and tested, then transferred for final assembly. There are no liquid effluents from these operations; airborne effluents are treated by the described confinement and ventilation system.

- Final Assembly

In the IDR portion of the Final Fuel Assembly Area, the fuel rods are loaded into designated positions in a prefabricated support structure consisting of a bottom nozzle, thimble tubes, and structural grids. A top nozzle is then attached to complete the final assembly. There are no liquid or airborne effluents from these operations.

1.3 Confinement and Process Ventilation

As noted in the introduction to this Section (and reiterated in several other paragraphs), the dry process provides the opportunity of enhanced control of airborne effluents, through improvements in containment and processing. The MAP Confinement and Ventilation System (within the controlled area of the Manufacturing Building) functions to enhance limitation of plant personnel exposure potential, and to enhance protection of the general public by strict control of airborne effluents discharged to the environment. A generic ventilation schematic is depicted in Figure 5.



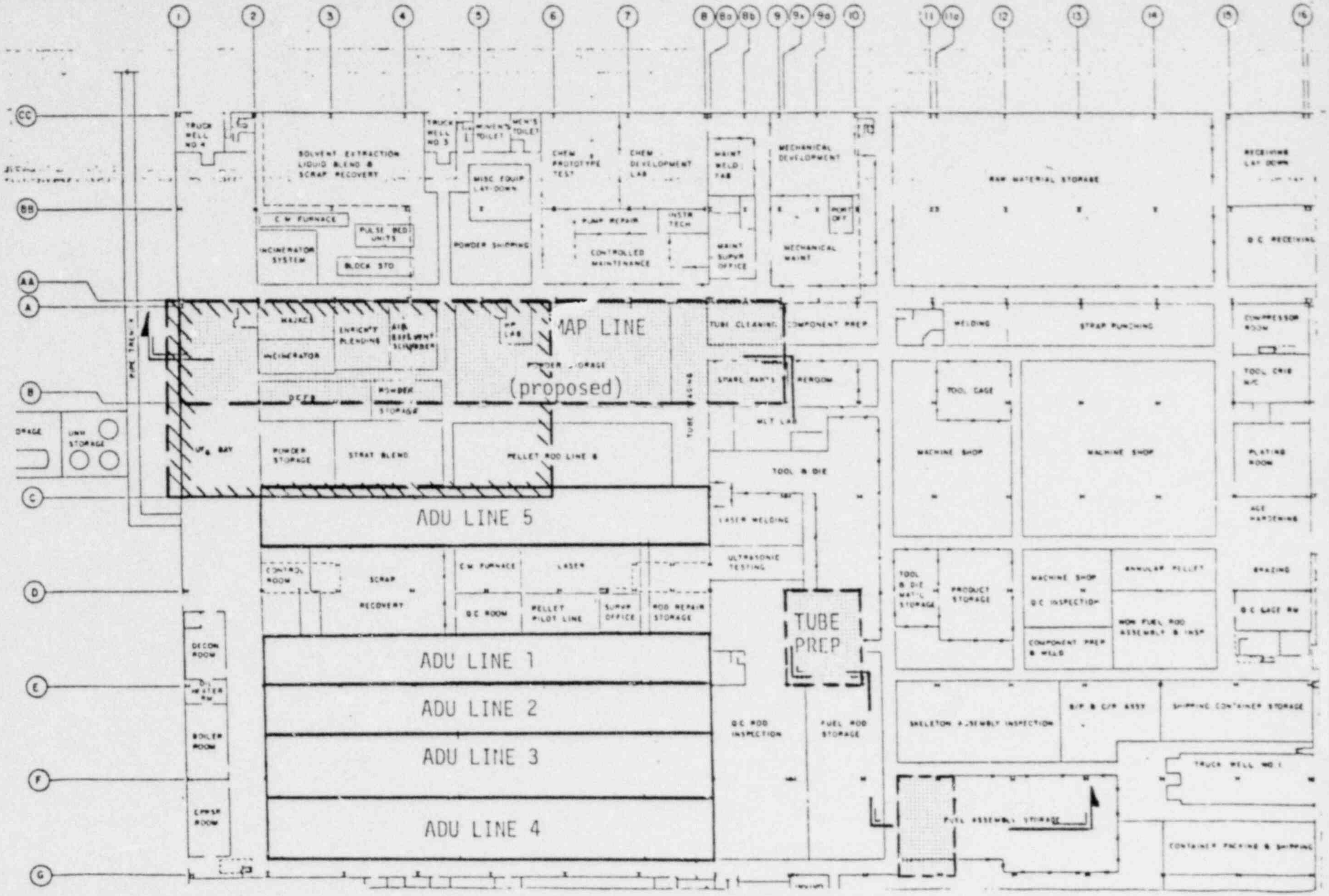
(Effluent values are result of new system installation.)

FIGURE 1

GENERAL FLOW DIAGRAM OF PROPOSED COLUMBIA PLANT OPERATIONS INCLUDING MAP LINE

POOR ORIGINAL

POOR ORIGINAL



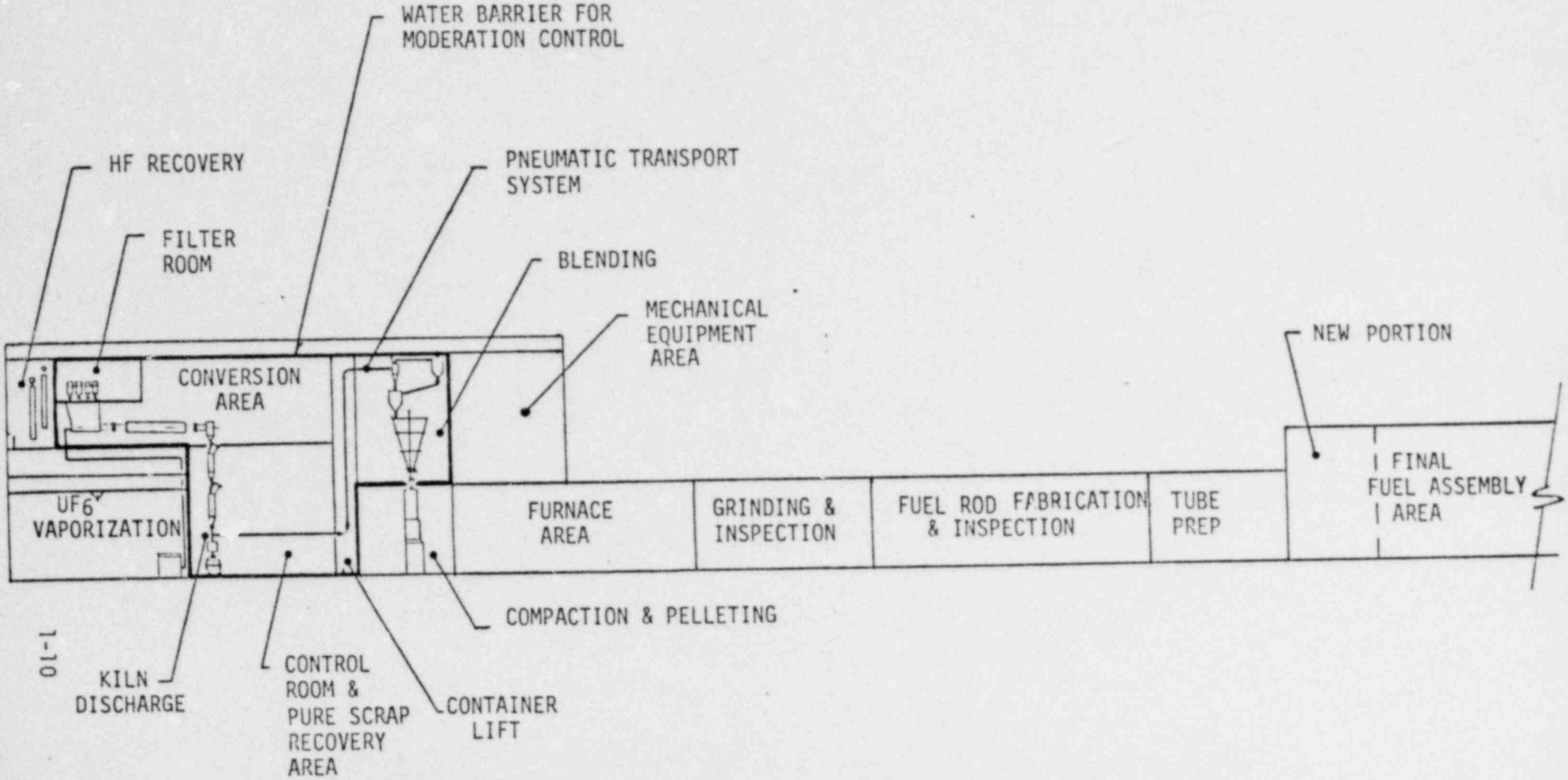
Indicates Area where roof would be elevated.

MAP Line Boundary

Figure 2

Manufacturing Building Floor Plan
Showing Changes to Accommodate MAP System

SECTIONAL VIEW
MAP PROCESS AREAS*



* SEE FIGURE 2 FOR SECTION LOCATION

FIGURE 3

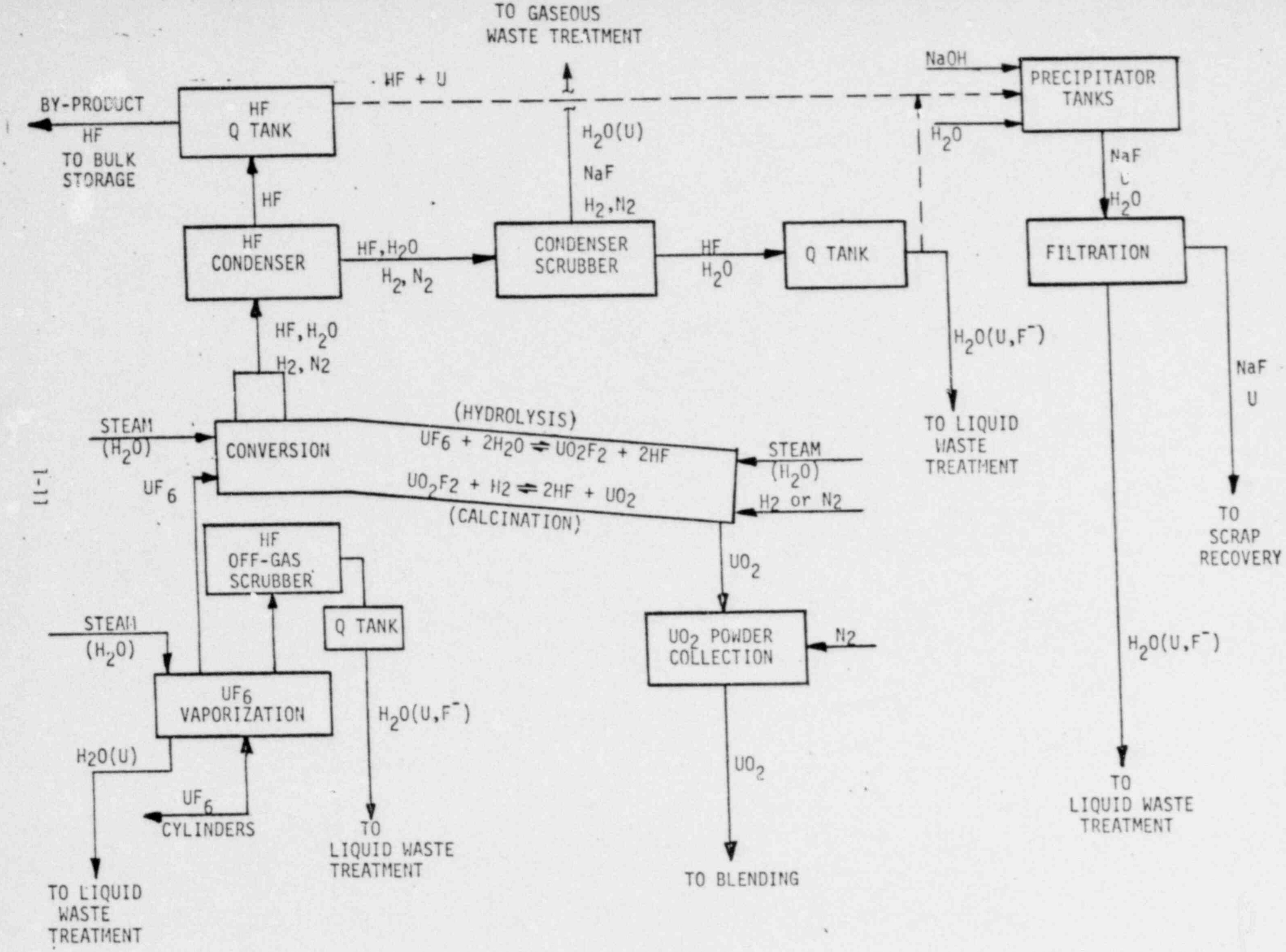


FIGURE 4 DRY CONVERSION PROCESS FLOW DIAGRAM

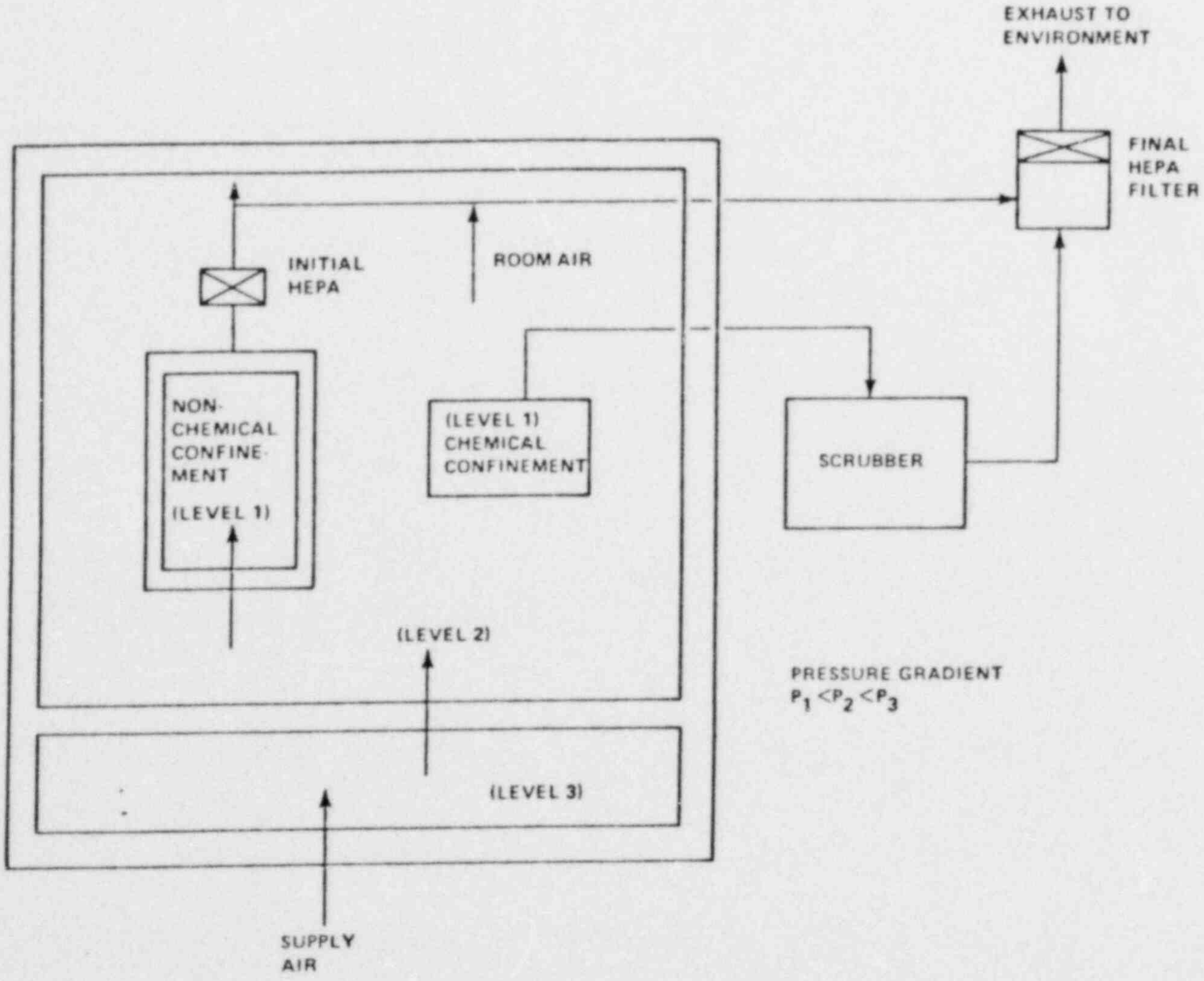


Figure 5 Confinement and Ventilation Schematic for MAP Area

SECTION 2

ENVIRONMENTAL ANALYSIS

The proposed installation of an Integrated Dry Route (IDR) process line at the Nuclear Fuel Division's Columbia Plant requires minor modifications to the existing licensed facility and will result in minor incremental releases of radioactivity and chemicals to the environment. However, expected emissions are much less than those estimated in the 1975 Environmental Evaluation, less than the existing ADU emissions, and less than an equivalent addition of ADU capacity. The purpose of this Environmental Analysis is to compare these effects with those previously approved by the NRC in the 1975 Environmental Evaluation.

A. Area Preparation

1. Existing Equipment Removal

The proposed IDR line will replace the existing Direct Conversion Fluidized Bed (DCFB) line and the obsolescent incinerator which are described in the existing license. The disassembly, decontamination and dispositioning of the DCFB line and obsolescent incinerator are part of an on going program at the Columbia Plant to remove and replace non-productive equipment. Consequently, these plans had been developed and are being implemented independent of the proposed IDR installation. Presently, instrumentation is being removed for possible reuse in other areas of the facility. Future efforts will involve dissassembly and dispositioning of the remaining portions of the DCFB line and obsolescent incinerator.

Dismantling existing equipment to make room for the IDR system is being performed according to existing license conditions. Existing procedures and administrative controls are being used to contain airborne radioactivity and minimize traffic through the affected areas. For example, where necessary, temporary enclosures will be constructed to minimize releases of airborne uranium; and a negative pressure (below atmospheric) ventilation and exhaust system is being maintained in the construction area.

Previous similar experience with equipment removal, decontamination and dispositioning has shown that these activities can be performed with negligible impact on the environment. Examples include: (1) replacement of the pellet line feed ends with improved equipment to facilitate uranium processing and minimize airborne radioactivity, (2) removal of obsolete exhaust ventilation equipment on the facility roof and replacement with state-of-the-art equipment, and (3) construction of an approximately 100,000 square foot addition to the Columbia Plant.

2. Building Modifications

The proposed line will be installed between columns A1-B1 through A9-B9 of the existing Manufacturing Building (as shown in Figure 2). Changes in plant facilities will include elevating the roof in the area between columns A1-C1 to A6-C6 (Figure 2), and modifying existing structures to support the additional load - as required by the equipment and the roof superstructure.

The facility changes required for the installation of the MAP system include: (1) removing part of the concrete floor in the area designated for the IDR line (Figure 2) - as necessary to provide the additional structural support for equipment and the roof superstructure, (2) extending the roof line upward approximately 20-30 feet above existing roof line in the designated area, (3) installing structural steel necessary for IDR equipment and building support, (4) modifying the heating, ventilation and air conditioning (HVAC) system located in the steel trusses in the ceiling above the installation area, (5) replacing filter-exhaust systems located on the piping and conduit systems within the installation area to meet moderation water barrier requirements.

Inside the designated area, some of the concrete floor will be broken up and removed (and some dirt underneath might be removed) to permit installation of support structures.

Exhaust filter systems located on the existing roof of the designated area will be scrapped according to existing licensed procedures. Equipment to be removed will include the DCFB exhaust, the emergency UF_6-DCFB exhaust, and the obsolescent incinerator exhaust. Roof penetrations will be temporarily covered during construction so that there will be no release of airborne constituents, nor leakage of rain or snow into the production areas. The required openings will be promptly covered and sealed in a permanent manner. Continuous air monitoring of existing roof exhaust stacks will be conducted; negative pressure within the manufacturing building will be maintained at all times.

Penetrations through the existing roof will also be required for the new roof superstructure installation, and for new equipment installation. These temporary open penetrations will be handled the same as those required for removal of existing equipment.

3. Relocation of Existing Plant Services

Certain plant services within the planned installation area will have to be relocated. These include the Health Physics Laboratory on the operating floor, and the Machine Shop, which will be moved to another area within the existing building.

4. Summary

For the proposed activity, there will be no significant construction impact. The floor area affected by the IDR system installation will amount to approximately 22,000 square feet, or only about six percent of the existing manufacturing building floor area; and, the roof superstructure will also enclose approximately 22,000 square feet, or only about six percent of the existing plant roof area. Thus the incremental plant area which will be temporarily affected by the dismantling, construction and installation activities is a relatively minor percentage of the total plant area, and planned activities would most certainly be expected to cause much less effect than the approximately 30 percent floor area addition accomplished in 1978 (Amendment #2 to SNM-1107).

B. Effluents

Minor effects on the environment resulting from normal operations might be expected to occur as a result of the addition of the automated IDR process line. There are, however, no changes in the types of effluents from the IDR process when compared to the existing ADU lines. The magnitude of such plant radiological and chemical impacts are evaluated in this section.

The pathways for potential dispersion of radioactive or chemical discharges to the environment are the same for the new IDR line as for the previously evaluated ADU and DCFB processes, differing only in relative magnitude for the respective airborne and liquidborne releases. Thus, there are no unforeseen or unevaluated effects introduced by addition of the IDR line.

The relatively small effects for liquid and air waste discharges are evaluated below.

Table 1 shows the airborne and liquidborne releases from the proposed IDR line and compares them with the 1975 Environmental Evaluation, recent ADU performance and effluents from the existing DCFB line and obsolescent incinerator. This Table shows that: (1) proposed IDR releases are much less than those previously evaluated in the 1975 Environmental Evaluation, (2) except for airborne fluoride releases, IDR effluents are expected to be below the release of the combined DCFB and obsolescent incinerator which are being replaced by the IDR system (the expected airborne fluoride levels are well below the 1975 Environmental Evaluation estimates) and (3) except for airborne fluoride releases, IDR effluents are expected to be below existing ADU performance levels.

All IDR liquid effluents are expected to be well within EPA limits for the existing Columbia Plant National Pollutant Discharge Elimination System Permit (NPDES). Consequently, no changes in this permit will be required.

Estimated stack release rates of uranium and fluoride in micrograms per second are summarized below:

	Fluoride Micrograms/sec	Uranium Micrograms/sec
Previously Estimated (1600 MTU/year)	24,000	75
Existing ADU (700 MTU/year)	660	31
Estimated IDR (500 MTU/year)	2,125	3.5

These data (and Table 1 data) show that fluoride emissions will be considerably less than those previously estimated but somewhat greater than existing ADU emissions. Estimated airborne fluoride concentrations at the site boundary, however, are much less than the most restrictive State limit for fluorides (0.5 micrograms per cubic meter).

During initial operation of the IDR line, representative state-of-the-art stack sampling of fluorides will be performed to verify the expected low effluent concentrations.

Note that the existing ADU fluoride emissions are much less than the 1975 previous estimates. This is attributed to the fact that fluoride scrubbing converts the fluoride to a particulate form which is collected with a high efficiency by the following stage of HEPA filtration. A similar effect is expected with the IDR Scrubber/HEPA filtration system, with actual effluents being less than those estimated.

C. Production Throughput

The 1975 Environmental Evaluation estimated environmental impacts based upon an annual uranium throughput of 1600 MTU. The expected throughput of the Columbia Plant with the addition of the IDR process will continue to be less than 1600 MTU per year.

D. Effects of Accidents

The Westinghouse Columbia Plant License documents have previously evaluated a spectrum of hypothetical plant accidents (ranging in severity of consequences from trivial to significant, and ranging in probability of occurrence from credible to incredible). In considering the addition of an automated IDR process line at the Columbia plant, this spectrum of accidents was reviewed, and an evaluation has been performed for additional postulated accidents which could potentially occur as a result of proposed plant improvements.

Sets of hypothetical accidents for the IDR line shows that (1) the types and severity of postulated accidents are similar to those evaluated in the 1975 Environmental Evaluation, (2) the effects of hypothetical accidents are well within those evaluated in the 1975 Environmental Evaluation, and (3) the probability of occurrence and severity of Category 3 accidents (Maximum Credible Accidents) as defined in the 1975 Environmental Evaluation are not changed with the addition of the IDR line.

E. Conclusion

The proposed installation of the IDR process will result in a significantly improved method of uranium conversion and fabrication, when compated with an equivalent addition of ADU capacity, while guaranteeing minimal environmental impact. The following benefits will be achieved with the IDR process:

1. Increased automation will result in fewer individuals required to operate the lines and thus lower occupational exposures.

2. The IDR process represents an improvement in process control and containment when compared with the ADU process which should result in reduced in-plant airborne radioactivity concentrations and thus reduced personnel exposures.

3. The reduction in the aqueous fluoride emissions will minimize the solid calcium fluoride wastes now generated in the ADU process.

4. Ammonia releases are not a factor as they are in the ADU process since ammonia is not used in the IDR process.

5. The removal of waste fluorides as hydrofluoric acid will result in the potential recycle of this material.

TABLE 1

Comparison of Airborne and Liquidborne Constituent Releases from Proposed IDR Line, with 1979-1980 ADU Performance, and Previously Evaluated Releases

Media	Type of Effluent That May Be Released Offsite	1975 Westinghouse (1600 MTU) Environmental Evaluation	IDR Increment	DCFB + OI Increment (1)	1979-80 ADU Performance	Units
Liquid	Uranium (U)	1.500	0.020	0.023	0.91	Pounds Per Day
Air	U	0.00096	0.00005	0.00005	0.0004	Micrograms Per Cubic Meters(2)
Liquid	Fluoride (F^-)	25.0	0.5	0.1	19.6	Pounds Per Day
Air	F^-	0.3100	0.0275	0.0110 (DCFB only)	0.0084	Micrograms Per Cubic Meters(2)
Liquid	Total Suspended Solids	25.0	0.5	0.2	11.7	Pounds Per Day
Liquid	pH	6.0-9.0	8.5	7.0	8.9	pH Units

(1) DCFB Line plus Obsolescent Incinerator

(2) Calculated concentrations at the site boundary (1800 ft NNW of the plant)