NUCLEAR SUPPORT SERVICES DEPT.

PATHFINDER GENERATING PLANT

FINAL STATUS REPORT

ATTACHMENT TO AMENDMENT NO. 52
LICENSE NO. DPR-11

b

NORTHERN STATES POWER COMPANY

August 15, 1972

Mr Donald J Skovholt
Assistant Director
for Operating Reactors
Directorate of Licensing
U S Atomic Energy Commission
Washington, DC 20545

Dear Mr Skovholt:

PATHFINDER GENERATING PLANT
License DPR-11 Docket 50-130

Enclosed are three signed originals and 25 conformed copies of an application for Amendment No. 52 to the Pathfinder License. The enclosed application confirms the original TWX transmittal of August 11, 1972, requesting termination of Provisional Facility License No. DPR-11.

The dismantling activities, authorized by a Dismantling Order issued on April 8, 1971, are complete. In compliance with your directive dated April 8, 1971, copies of a Final Status Report describing the remaining structures and systems are enclosed.

An application for Amendment No. 4 to Byproduct Material License No. 22-08799-02 is concurrently being filed with the Division of Materials Licensing by letter dated August 15, 1972. This will incorporate, in a single Part 30 license, all of the radioactive material authorization required for the Pathfinder Generating Plant. It is our understanding that termination of the existing Part 50 license pends approval of this Part 30 Amendment request.

Yours very truly,

E C Ward

E C Ward, Director
Engineering Vice Presidential Staff

Enclosures

Cc: G Charnoff
D E Nelson

UNITED STATES ATOMIC ENERGY COMMISSION

NORTHERN STATES POWER COMPANY

Pathfinder Generating Plant Docket No. 50-130

APPLICATION FOR AMENDMENT
TO
PROVISIONAL FACILITY LICENSE NO. DPR-11

Northern States Power Company, a corporation organized under the laws of the State of Minnesota, requests an amendment to its Provisional Facility License No. DPR-11 to terminate the said license.

Dismantling of the nuclear portion of the Pathfinder Generating Plant as authorized by a Dismantling Order dated April 8, 1971, is complete. A safety analysis made and included in the Pathfinder Final Status Report concludes that the remaining structures do not constitute a significant hazard to the health and safety of the public.

In view of the foregoing, it is requested that Provisional Facility License No. DPR-11 be terminated.

NORTHERN STATES POWER COMPANY

By /s/ Arthur V Dienhart
Arthur V Dienhart
Vice President - Engineering

On this 15th day of August, 1972, before me a notary public in and for said County, personally appeared Arthur V Dienhart, Vice President - Engineering, and being first duly sworn acknowledged that he is authorized to execute this document in behalf of Northern States Power Company, that he knows the contents thereof, and that to the best of his knowledge, information and belief, the statements made in it are true and that it is not interposed for delay.

/s/ John J Smith
John J Smith
Notary Public, Hennepin County, Minnesota

PATHFINDER GENERATING PLANT

FINAL STATUS REPORT

ATTACHMENT TO AMENDMENT NO. 52
LICENSE NO. DPR-11

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PATHFINDER GENERATING PLANT
FINAL STATUS REPORT

I. SUMMARY

The nuclear portion of the Pathfinder Generating Plant was dismantled in accordance with the Dismantling Plan and Technical Specifications submitted to and approved by the AEC. The Dismantling Order was issued on April 8, 1971.

The dismantling consisted of sealing the reactor building and the lower levels of the fuel handling building, removal of unused contaminated systems within the fossil plant and decontamination of accessible fossil plant systems and areas, and sealing all penetrations and access to the isolated areas.

The reactor was deactivated by removing all control rod drives and cutting them in half, installing blind flanges on the control rod drive nozzles, filling the reactor vessel with gravel, and securing the vessel head by welding the bolts. All electrical cables to the drives were cut.

Radioactive wastes were shipped off site for burial; equipment and piping scrap were stored in the sealed buildings.

A surveillance program has been established to define the monitoring requirements of the isolated volumes.

Presently, NSP has a Part 50 "Possession-Only" license for the reactor and associated systems and a Part 30 license for the byproduct materials

in the fossil system. This report accompanies a request for the termination of the Part 50 license and an application to amend the Part 30 license to include reactor byproduct materials in the reactor and associated systems.

II. INTRODUCTION

The Pathfinder Generating Plant is located approximately 5.5 miles northeast of the center of Sioux Falls, South Dakota. It is owned and was operated as a nuclear facility by the Northern States Power Company (NSP) of Minneapolis, Minnesota.

The reactor was designed and constructed by Allis-Chalmers Manufacturing Company of Milwaukee, Wisconsin. Initial criticality occurred in March 1964. In September 1967, the plant was shut down due to the failure of steam separators. Due to economic and other considerations NSP terminated nuclear operations.

In 1968 three package boilers were installed to convert the plant for fossil fuel operation. Modifications included replacement of No. 13 feedwater heater with a deaerator, replacement of No. 14 feedwater heater with a higher pressure heater, and removal of the startup heater and off-gas recombiner.

The AEC authorized the modifications and issued both a Part 30 license for the radioactivity in the converted fossil system and a Part 50 "Possession-Only" license for the special nuclear materials, reactor, and associated systems not used in the converted facility.

In January 1970, NSP contracted with Black & Veatch Consulting Engineers of Kansas City, Missouri, to develop the plans for the dismantling of the idle nuclear portion of the plant. NSP submitted Amendment No. 50 to License DPR-11 in January 1971. The AEC approved the dismantling plan and issued a dismantling order on April 8, 1971. Dismantling activities began in May 1971, and were completed in November 1971.

As a final step of dismantling, radiation surveys were made throughout the Pathfinder Generating Plant including those areas comprising the dismantled facility, namely the reactor building, the lower levels of the fuel handling building, the fuel transfer tube vault and the fuel storeage pool; all accessible periphery areas about the exterior of the dismantled facility and all areas exterior to the dismantled facility comprising the Pathfinder Fossil Generating Plant. A thorough documentation of the results of these surveys is on file at the plant site. The more significant results of these surveys are summarized in Appendix B and C and will be used as a base line with which to compare future surveys.

A surveillance program has been established to define the monitoring requirements of the isolated structures for as long as required. The program is described in Appendix D.

III. OBJECTIVES

The primary objective of this report is to describe the structures and facilities of the Pathfinder Generating Plant remaining after the dismantling activities.

The report includes the following:

1. A summary of the revisions made during the dismantling and a description of the radiological conditions of the remaining structures and facilities.

2. A summary of the surveillance program for monitoring the condition and maintaining the integrity of the dismantled facility.

3. A safety analysis to show that the remaining structures will not constitute a significant hazard to the health and safety of the general public.

IV. RADIOLOGICAL SAFETY DURING DISMANTLING

During the dismantling of the reactor, steps were taken to insure that the dismantling was accomplished in a manner which would not be inimical to the health and safety of the public or plant personnel.

A. Responsibilities

1. NSP. Adequate review of all dismantling activities was undertaken by NSP management to assure compliance of the activities with all license requirements.

2. Black & Veatch. Black & Veatch Consulting Engineers established the scope of the work and provided the specifications, drawings and other documents necessary for its accomplishment. Through field management they assisted the contractors in the interpretation and application of the specifications and documents. They oversaw fulfillment of the various tasks and provided liaison between NSP and its contractors.

3. Contractors. NSP, serving as its own general contractor, was responsible for the proper performance of the various dismantling tasks in accordance with plans and specifications.

4. Pathfinder Operating Staff. The operating staff at the Pathfinder Generating Plant participated directly in the dismantling. The NSP Pathfinder Operations Committee continued to function and the Committee reviewed any safety questions that arose. The project radiation monitoring was supplied by NSP. Additional qualified radiation technicians were obtained from Eberline Instrument Corporation.

B. Personnel

1. Plant Superintendent. The NSP Plant Superintendent was responsible for the overall supervision and direction of the plant operation and its personnel. He coordinated all phases of the dismantling with normal plant operation.

2. Field Manager. The Black and Veatch Project Field Manager was directly responsible for overall supervison and direction of the dismantling operation.

3. Health Physics Supervisor. The NSP health physics supervisor was responsible for the radiation safety of all personnel working on the dismantling. He coordinated all health physics activities with the NSP health physics staff. He supervised all monitoring, and he kept legally acceptable records of these items. He was responsible for approving the discharge of all radioactive materials from the plant and advised on decontamination and maintenance procedures throughout the facility.

C. Regulations

All work on the dismantling of the reactor was performed in accordance with the requirements contained in Title 10, Code of Federal Regulations, Part 20, "Standards for Protection Against Radiation", the Technical Specifications, and the conditions of the Dismantling Order. The Black & Veatch Field Manager, who is thoroughly familiar with these regulations, was able to implement them in fulfilling every task.

During the dismantling, radiation exposure and radiation survey and monitoring records were maintained. The requirements for special radiation monitoring equipment, exposure time limits and protective clothing and devices were established by the radiation monitoring group. Criteria were established to identify radiation areas and procedures and equipment required for work in such areas. The Technical Specifications required that the dismantling of the nuclear portion of the plant be performed in accordance with approved written procedures.

D. Procedures

It was necessary to establish and publish procedures for accomplishing the dismantling. These procedures expedited the dismantling and instructed the contractor's personnel in the radiological safety aspects of the dismantling.

1. Radiation Work Procedures. Radiation Work Procedures (RWP) covered the health physics procedures which were followed in

the dismantling. The RWP established the specific radiological safety requirements which were met in performance of each specific task based on a survey of the individual work site.

2. Standard Work Specifications. Standard Work Specifications (SWS) provided guidelines for the performance of repetitive tasks, such as pipe cutting and pipe sealing, and for critical procedures, such as reactor vessel layup. The SWS included a step-by-step method for accomplishing the task to insure that proper radiation safety practices were followed.

3. Work Permits. Work Permits (WP) were issued by the Field Manager for each task of the dismantling. The WP assured NSP control of the dismantling and insured that adequate records of the work were maintained.

The SWS, RWP, and WP included radiation protection and emergency procedures as well as procedures for control of contaminated material and equipment. Included in the procedures were adequate instructions in handling the problems of dismantling. Contractor personnel were instructed in radiation safety procedures. A log of the location of all contaminated equipment is retained on site. Movement of contaminated equipment required a Work Permit and a Radiation Work Procedure and was under the supervision of radiation monitoring personnel.

E. Emergency Plans

The existing plant emergency plans were continued in effect during the dismantling.

F. Summary

The dismantling of the nuclear plant was performed in accordance with detailed specifications prepared and administered by persons experienced in nuclear plant work. The work scheduling and procedures were subject to prior approval of the plant staff. The radiation safety aspects of each item of work were evaluated, and the performance of the work was monitored by experienced health physics personnel.

V. DESCRIPTION OF THE REMAINING STRUCTURES

A. Reactor Building

Dismantling in the reactor building consisted of deactivating the nuclear reactor, removal of external penetrant piping and sealing of the penetrations, draining of piping systems and pools, deactivation of power circuits and isolation of the building from the rest of the plant in accordance with Amendment No. 50 to DPR-11 as approved by the AEC.

1. Nuclear Reactor. The reactor was dismantled by the following significant actions:

   a. Control rod drives. The control rod drives were removed, cut in half, and stored in the fuel storage pool under a slab of reinforced concrete. Blind flanges were installed on the control rod drive nozzles (Figure 1*) and the bolts

*Figures are located in Appendix A.

welded to secure. The electrical cables to the drives were cut outside the reactor building.

b. Reactor vessel. The reactor vessel was filled with gravel for the purposes of shielding and security. The vessel head was bolted in place and the bolts were welded to secure the head. After the head was secured and the reactor system drained, a vacuum was drawn on the vessel to remove the remaining water.

c. Pool bridges and cranes. The reactor pool bridges were welded in the raised position. The reactor building polar crane and traveling bridge crane power was disconnected and the carriages were welded in fixed positions.

d. Air locks. The equipment door and emergency personnel lock in the reactor building were welded closed. The personnel air lock was secured with a special combination lock. Radiation signs were also posted.

e. Other systems. Mechanical penetrations into the reactor building were cut and then sealed by welding caps over all the pipes or penetrations. All equipment and piping systems were drained. The two ventilation ducts were welded shut. A 1/2 inch pressure equalization line containing a filter was routed from the reactor building to the stack. The fire protection system was disconnected.

All power to the reactor building was disconnected. Lighting was left in a standby condition so that it can be

reconnected if required for future inspections. All control and instrumentation systems were disconnected.

B. Fuel Handling Building

1. The Lower Levels. The fuel handling building below the operating floor serves as the storage area for the activity in the piping and equipment in that building.

a. Sealing the area. Modification to the structure included sealing all entrances into the lower levels of the building (Figure 2). Entrances into the lower levels from the operating floor include two stairways and one crane hatch. The stairwells were sealed with concrete (Figures 3 and 4). A personnel hatch was left in the north stairway seal (Figure 4) to allow personnel to enter the basement area for inspection if necessary. The inspection entrance hatch was locked with a special combination lock to prevent unauthorized entrance. Signs were posted at all exclusion area entrances in accordance with 10CFR20.

Penetrations and access ways were sealed to prevent air from within the isolated areas from entering the turbine building or upper level of the fuel handling building (Figure 5).

Doors at the mezzanine floor and at the basement floor leading to the turbine building (Figure 6) and pipe chases in that area were sealed with concrete.

b. Radioactivity control. Activated corrosion products in the fuel handling building basement were contained within piping and equipment systems. Contaminated systems were closed to prevent the spread of radioactive material within the storage area. The major portions of the piping systems were left in their present locations. All wall-penetrant pipes containing activated corrosion products were cut and welded closed inside the fuel handling building lower levels. Piping was removed from the pipe chases to allow complete chase closure. The building basement itself was sealed as completely as practical. A pressure equalization line containing a filter was routed to the stack.

c. Other systems. The radioactive waste disposal system was sealed to prevent the spread of contamination. The ventilation penetrations were welded closed. The electrical systems were disconnected. The lighting system was left in a standby condition so that it can be reconnected if an inspection of the area is required. Instrumentation systems located in the area were deactivated and the service systems (instrument air, service water, fire, etc.) were disconnected. All equipment and piping systems were completely drained.

The fuel transfer tube, connecting the fuel storage pool and the reactor pool, was closed by removing the fuel transfer tube valve and by welding plates on both tube ends. The manhole used for access to the fuel transfer valve was locked closed. Radiation signs were also posted.

2. The Upper Levels. The upper levels of the fuel handling building were decontaminated to comply with the AEC levels for unmonitored access to qualify them for use as storage areas. All pipes and conduit leading to the fuel handling building lower level were cut and sealed. Piping and electrical systems that were required in the upper portion of the building were rerouted outside the lower levels of the fuel handling building. A thick reinforced concrete cover was placed over the fuel storage pool (Figures 7, 8, and 9). The crane hatch was sealed.

C. Turbine Building

All contaminated material and equipment not being salvaged for use in the fossil system was removed from the turbine building and was stored in the reactor building or the lower levels of the fuel handling building or was shipped off site.

The turbine building is being used in the operation of the fossil system and was decontaminated to the extent practical.

D. Exceptions

The following are a few minor items not done in accordance with the dismantling plan. Reasons for so doing are given. All exceptions were reviewed by the Pathfinder Operations Committee and found allowable under the provisions of Paragraph 50.59(a) of 10CFR50.

1. Sealing of the fuel transfer tube called for the use of blind flanges welded on both ends. Instead of blind flanges, plates

were fitted into the inside diameter of the tube ends and welded. This accomplishes the same purpose of effectively sealing the tube ends and is of no safety concern.

2. The stairwell in the operating and equipment floor and steam chase were covered with polyvinyl sheeting which was not called for in the approved dismantling plan. This was installed as an added protection to minimize the possibility of radioactive contamination.

3. The use of the fuel storage pool for storage of removed components or piping was not indicated in the dismantling plan. It was used for storage to minimize the movement of removed contaminated items.

4. Floor seals for pipe penetrations of 4 inches and under were made by welding a 1/4 inch thick steel plate as shown in Detail 2A, Figure 5A instead of as shown in Detail 2, Figure 5. This was done because for 4 inch and under penetrations, welding the closure is a more effective method of sealing than grouting with epoxy.

5. Because electrical conduits are either made of galvanized steel or aluminum, both of which do not lend very well to welding, floor seals for electrical penetrations were made by screw capping or plugging after filling the penetration with electrical potting compound as shown in Detail 2B, Figure 5A. Lighting system conduit has the conductors potted therein and the conduit runs to normal termination instead of being cut and capped.

6. Wall seals for pipe penetrations were made by placing non-shrinking grout plug into the penetration and then welding a retaining plate over it, as shown in Detail 3A, Figure 5A.

7. Sections 4 and 5 in Figure 7 were actually completed as shown in Section 4A and 5A in Figure 7A. This was done because of dimensional limitations. The results do not in any way affect the strength or effectiveness of the item involved.

VI. RADIOLOGICAL CONDITIONS

A. Radiation Levels

1. General. Prior to the closing of the reactor building and the lower levels of the fuel handling building, the fuel transfer tube vault and the fuel storage pool radiation surveys were

made for the records and for future reference. All areas of the Pathfinder Generating Plant, including the exterior surfaces of the dismantled facility and the fossil generating plant, were surveyed. A photographic mapping of the internal storage areas of the dismantled facility was also made.

2. Internal Radiation Surveys. The results of the radiation surveys of the internal storage areas of the sealed buildings are kept on file at the plant site. A summary of the surveys made in the reactor building and lower levels of the fuel handling building is presented in Appendix C.

3. Photographic Mapping. Photographic mapping of the internal storage areas consisted of taking pictures from different points in the area to show the relative locations of different equipment and piping. This will be useful in the future if internal inspections are necessary and the persons who will do the inspection are not familiar with the sealed areas.

4. External Radiation Surveys. A summary of the results of the radiation surveys of the areas external to the sealed storage areas is shown in Appendix B. The significance of these radiation levels will be discussed in Section VII - Safety Analysis, of this report.

B. Radioactive Materials

1. Reactor Building. The reactor building contains the major portion of the radioactivity stored in the plant. Aside from the contaminated piping and equipment within the building, the reactor building serves as a storage area for contaminated

piping and equipment removed from the fuel handling building and the turbine building.

Contaminated piping and equipment from other buildings contains small amounts of activated corrosion products consisting of Zn-65, Co-60, and trace amounts of other isotopes such as Mn-54. The amount of radioactivity contained in the contaminated piping and equipment is small compared to that contained in the reactor internals. The latter consists of induced activity broken down as follows: 15,000 curies of Co-60, 3,100 curies of Ni-63, and 49,600 curies of Fe-55 as of January 1972.

2. Fuel Handling Building. As of January 1972, about one curie of radioactivity resided within the fuel handling building. Essentially all this activity is induced corrosion products contained within piping systems left within the sealed areas of the building. Its composition is approximately 48 per cent Co-60 and 52 per cent Zn-65.

   About 10 curies of activity due to the demineralizer and spent resins was removed from the building and shipped off site for burial. This is discussed in more detail in the section on radioactive waste disposal in Section D.

3. Turbine Building and Boiler Building. After decontamination of equipment and systems in the turbine building, the radioactivity in the fossil plant, which includes the boiler

building, is approximately 1/4 curie of corrosion products consisting of approximately 35 per cent Co-60 and 65 per cent Zn-65 as of January 1972. All of this activity is contained within the piping systems and the steam cycle equipment.

Past experience has shown that discharges from the steam cycle system to the environment have consistently been below a few per cent of limits specified in 10CFR20.

C. Other Radioactive Materials

1. Special Nuclear Materials. All special nuclear material has been shipped off site.

2. Sources. Three sets of irradiated antimony, Sb-124, rods are also covered by the Provisional Facility License. These virtually decayed source rods were removed from the beryllium annuli and were hung in the reactor vessel in a stainless steel basket. Sources for instrument calibrations are covered by the Byproduct Material License No. 22-08799-02.

D. Radioactive Waste Storage and Disposal

Radioactive wastes produced during the dismantling activities consisted of contaminated equipment and piping; spent resins, filter cartridges; contaminated liquid wastes; contaminated construction equipment, tools, and debris; and miscellaneous decontamination materials.

The equipment and piping came from nuclear related systems no longer used in the fossil plant as well as service piping no longer required in the isolated structures.

Filter cartridges were removed from the reactor building seal water and control rod drive filling water filters, pools clean-up filters, purification after-filter, and feed water filters.

Resins from the pool demineralizers, purification demineralizers, purification filter precoat system, waste demineralizer, and waste filter precoat system were transferred to the spent resin tank from which the resins were removed.

Contaminated liquid wastes were generated from the flushing and draining of various systems in the plant as well as from decontamination of equipment.

Construction debris consisted of parts of equipment and piping small enough to be drummed, piping insulation, and other miscellaneous materials. Decontamination materials consisted of miscellaneous materials used in health physics work such as paper towels, gloves, plastic bags, etc. They were drummed and shipped off site for burial.

1. Storage. The reactor building and the lower levels of the fuel handling building are being used as the storage areas. Equipment and piping not small enough to be drummed were stored in the lower levels of the reactor building. The lower levels of the fuel handling building serve as the storage area for

contaminated equipment and piping originally present in the lower levels.

2. Inventory. Each piece of equipment or piping stored in the reactor building was tagged. The tag contains an inventory number, identification of the pipe and a radiation level reading. A log of the inventory is being kept at the Pathfinder site.

3. Disposal. Solid wastes not stored in the storage volumes were drummed and shipped off site for disposal. They consisted of construction debris, filter cartridges, spent resins, small pieces of equipment and piping, and other miscellaneous contaminated materials. These materials were packaged in steel drums and shipped off site for burial by Chem-Nuclear Services, Incorporated. A total of 285 drums of solids and 114 drums of spent resins were shipped.

Liquid radioactive effluents were at first disposed of by dilution only. When it appeared that the proposed annual average discharge guideline of 2×10^{-8} uci/ml might be exceeded the liquid wastes were demineralized to the extent practical before being discharged to the environment at levels below the limits set forth in 10CFR20.

E. Surveillance Program

A surveillance program has been established to monitor the physical and radiological conditions of the dismantled facility. The

surveillance program is given in Appendix D. The following subsections summarize the significant provisions of the program.

1. Classification of Inspection. Inspections of the dismantled facility are classified into two categories: normal and special. A normal inspection is any semiannual external inspection regularly scheduled in the surveillance program. A special inspection is any off-schedule inspection deemed necessary by NSP management and may include an inspection of the inside of the isolated structures.

2. Surveillance Requirements. The surveillance program requires that NSP provide qualified personnel, the necessary equipment, and required materials for the performance of any survey. NSP shall also be responsible for maintaining the integrity of the radioactive material storage areas and repairing any faulty condition that may be discovered. NSP shall ensure that the isolated structures do not become a hazard to the health and safety of the public.

3. Program Provisions. The following are the significant provisions of the surveillance program:

   a. Normal inspections will be held approximately every 6 months.

   b. Special or internal inspections will be conducted whenever there is valid reason to believe that one is required.

   c. Areas to be surveyed are designated in plan drawings of the isolated buildings.

d. Inspection procedures will be written and updated as appropriate before the inspections. This will take consideration of actual conditions prior to each inspection.

e. Records of every inspection will be made and kept for as long as required.

f. NSP will act on the recommendation made after each inspection and will keep a record of all action taken on the recommendation.

VII. SAFETY ANALYSIS

The Pathfinder Generating Plant is presently in operation using fossil fired boilers to supply the steam. The nuclear steam supply system has been dismantled and no nuclear fuels are present on the site. Considerations of criticality, fuel failure, or a nuclear plant operations accident is therefore not necessary.

The only major safety consideration is associated with the possible release of radioactive materials from the exclusion areas of the dismantled facility.

A. Evaluation of Activity Release

The radioactivity contained in the lower levels of the fuel handling building and the reactor building consists of corrosion products plated out or activity induced in the large piping or equipment components. In the lower levels of the fuel handling building less than one curie of activity is contained in the equipment and piping. The corrosion products consist mainly of Zn-65, Co-60 and traces of Mn-54.

Within the reactor building are stored contaminated equipment and piping removed from the fuel handling building and the turbine building as well as the equipment originally present in the building. The activity contributed by the equipment and piping from the other buildings is insignificant compared to about 67,000 curies present in the reactor building. Nearly all of this activity is in the form of induced activity in the reactor internal components.

Since virtually all radioactivity is contained within the piping systems or forms an integral part of the components themselves, it would require complete deterioration of the piping and equipment in order to release the activity. It would take decades to deteriorate the piping and equipment because only atmospheric corrosion can cause this. Because of the inherent nature of radioactivity, by the time the piping and equipment were completely deteriorated, the activity would have decayed to a small fraction of its original level. The probability of activity release is therefore practically eliminated.

With all potentially explosive or combustible materials removed from the exclusion areas before closures, the possibility of fires which could release the radioactivity to the environment is also minimized.

Except for the personnel entrances provided for inspection entries, all other possible entrances were sealed by welding or concrete filling. Personnel entrances were made airtight, secured, and padlocked. This provides a reasonable assurance that no one will enter the exclusion areas without authorization.

A surveillance program is established to monitor the condition of the dismantled facility by periodically checking for water intrusion into the buildings; and by measuring the radiation levels, air particulate activity levels and surface contamination levels about the accessible portion of its exterior. This provides reasonable assurance that the integrity of the isolated structures will be maintained.

It is concluded that there is no undue risk to the public health and safety which will result from the decommissioned plant.

B. Evaluation of Radiation Levels

1. General. Areas to be released for unrestricted access were decontaminated to the extent practical in order to achieve the limits specified in the AEC "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use of Termination of License for Byproduct, Source, or Special Nuclear Material," hereafter referred to as the Guide.

Except for the reactor building, the fuel handling building, the boiler building and the turbine building, the other buildings in the plant contain radiation levels considerably lower than those specified in the Guide.

The entire reactor building and the lower levels of the fuel handling building have been isolated and sealed. Except for possible future internal inspection, no areas within these sealed buildings are open to normal personnel access.

The discussions in the following sections will therefore consider only the radiation levels in the boiler building, turbine building and the upper levels of the fuel handling building. These are the only places with significant radiation levels that are open to normal access.

All survey records referred to in the following sections are filed at the Pathfinder site. Composite radiation mappings based on these surveys are shown in Appendix B. The values in the third row of Tables 1 and 2 of the Guide were used since the isotopes contained in the equipment are beta-gamma emitters.

2. Fuel Handling Building Upper Levels. Radiation surveys of the upper levels (operating floor and above) indicate that smearables in these areas are all less than 100 dpm/100 cm^2. Radiation levels were less than 0.1 mr/hr in all areas except for four isolated spots on the periphery of the dismantled structures. These four spots have maximum radiation level readings of 0.2, 0.2, 0.3, and 0.7 mr/hr. The 0.7 mr/hr reading is a spot reading and does meet the 0.2 mr/hr averaged radiation level limit specified in the Guide.

All the radiation levels in the upper levels of the fuel handling building, above the operating floor, are below the limits set forth in the Guide. These areas therefore qualify for unrestricted access.

3. Boiler Building. Radiation surveys of the boiler building found all radiation levels below 0.1 mr/hr with two exceptions. The radiation levels at contact with the mud drums on the boilers were found to be between less than 0.1 mr/hr and 0.2 mr/hr and on the bottom side of the boiler blowdown cooler as spot reading of 1 mr/hr was detected. Radiation contamination levels throughout the boiler building, exterior to the fossil system, were all less than 100 dpm/100 cm^2.

Except for the one spot on the bottom side of the boiler blowdown cooler, all the radiation levels in the boiler building are below the limits set forth in the Guide. Consequently, all areas of the boiler building, except the boiler blowdown pit which contains the boiler blowdown cooler, qualify for unrestricted access.

4. Turbine Building Operating Floor. Surveys of the turbine building operating floor indicate that radiation levels are all below 0.1 mr/hr and smearable levels are less than 100 dpm/100 cm^2. These radiation levels are below the limits specified in the Guide. The turbine building operating floor therefore qualifies for unrestricted access.

5. Turbine Building Mezzanine and Basement Floors. A number of pieces of equipment and piping located in the turbine building mezzanine and basement floors have radiation levels in excess

of the limit specified in the Guide. All these radiation levels are due to hot spots in the equipment and piping presently being used in the operation of the fossil plant. Of particular concern are the condenser expansion joints, the condensate pump suction wells and other areas near and around the condenser.

Radiation levels on the condenser expansion joints range from a low of less than 0.4 mr/hr to as high as 15 mr/hr at contact with specific spots under the expansion joints.

Readings at contact with the condensate pump suction wells are found as high as 25 mr/hr. On the cold side of the hot-well, on the tube sheet conductivity probe drain line, a contact reading of 20 mr/hr is found.

The readings mentioned above represent the higher radiation levels in the turbine building mezzanine and basement areas near and around the condenser. More comprehensive data is presented in radiation survey records found in Appendix B of this report.

Reasonable efforts have been expended to decontaminate this equipment and piping, but a point has been reached where further decontamination efforts would be economically burden-some.

Although the radiation levels on this equipment and piping are above the Guide limits, smearable or removable

contamination is less than 100 dpm/100 cm^2 in all cases for all accessible areas in the mezzanine and basement floors of the turbine building and the boiler blowdown pit in the boiler building.

Evidently, the turbine building mezzanine and basement floor and the boiler blowdown pit in the boiler building will not qualify for unrestricted access as outlined by the Guide.

It should be pointed out, however, that general surveys of the three areas under discussion have shown that the general background radiation in these areas did not exceed 0.3 mr/hr.

It should also be noted that this contaminated equipment and piping does not require routine access during plant operations. This in itself is a built-in restriction for access into the area. Further, all this equipment and piping has been marked with radiation warning signs to caution the operating personnel. At the steam piping penetrations between the turbine building and the reactor building, where an operator may absentmindedly "drift" into a radiation area while checking instrument readings, an expanded metal fence was erected to enclose the said area for added protection.

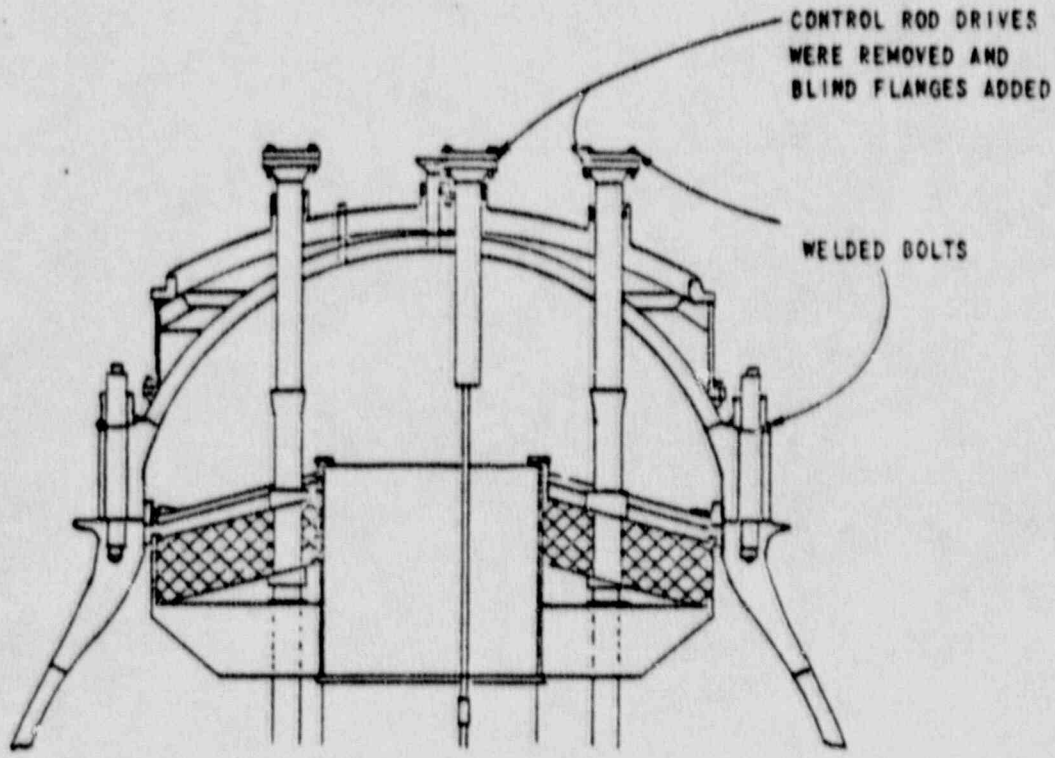
Considering the low general background radiation levels in the above areas and the limited access due to nonroutine functions performed by the operators therein, it is concluded

that these areas do not constitute a significant hazard to the health and safety of the public.

APPENDICES

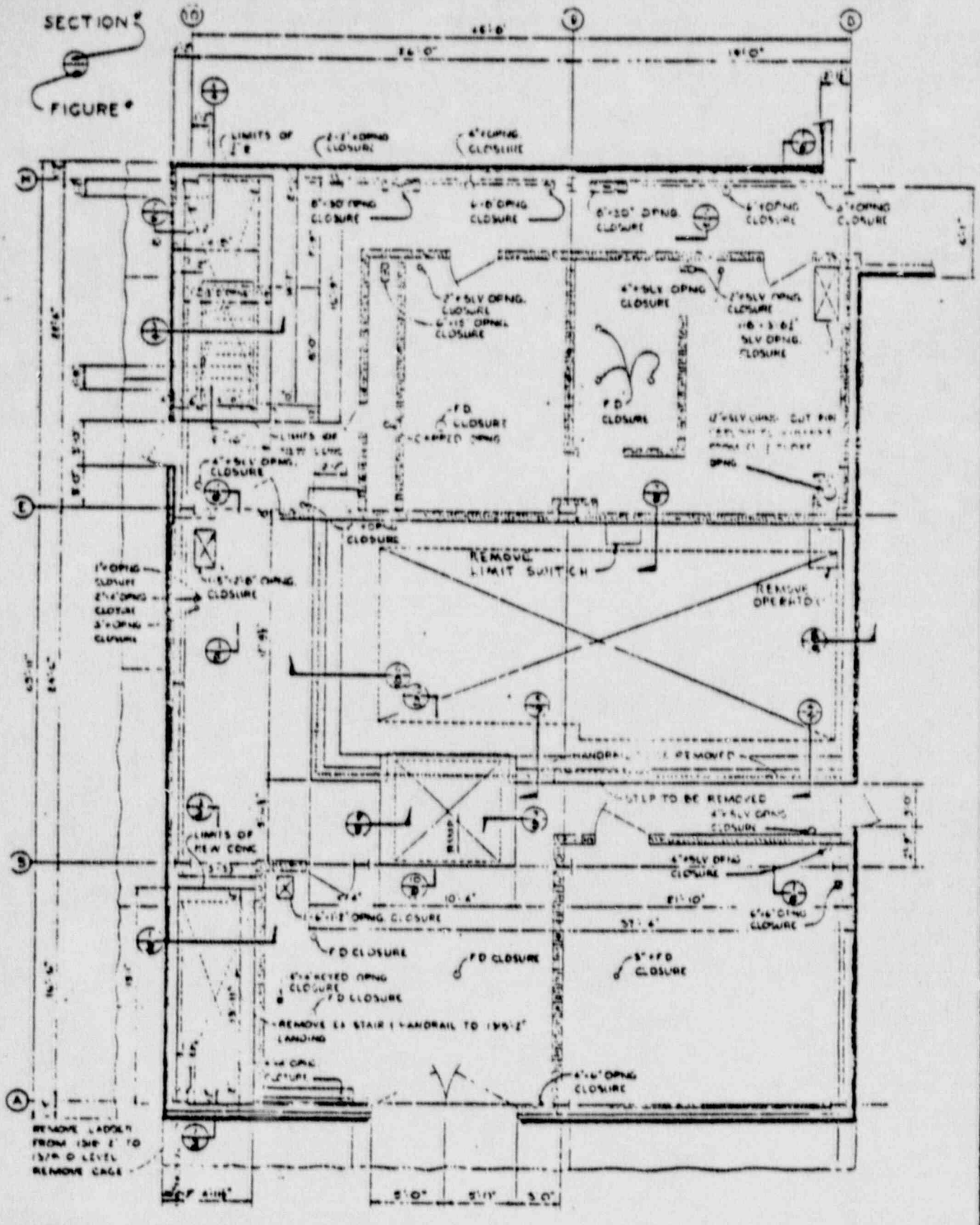
APPENDIX A

DRAWINGS AND FIGURES



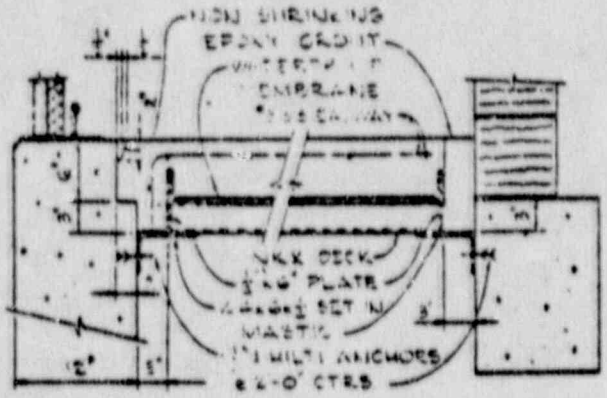
REACTOR VESSEL HEAD ALTERATION

BLACK & VEATCH CONSULTING ENGINEERS KANSAS CITY, MISSOURI	NORTHERN STATES POWER COMPANY PATHFINDER FINAL STATUS REPORT	FIGURE 1

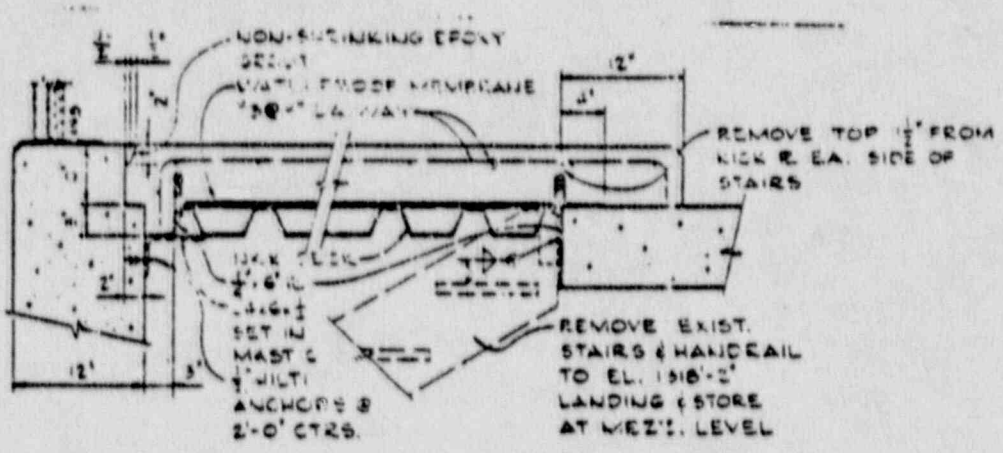


PLAN - FUEL HANDLING BUILDING - OPERATING FLOOR

BLACK & VEATCH CONSULTING ENGINEERS KANSAS CITY, MISSOURI	NORTHERN STATES POWER COMPANY PATHFINDER FINAL STATUS REPORT	FIGURE 2



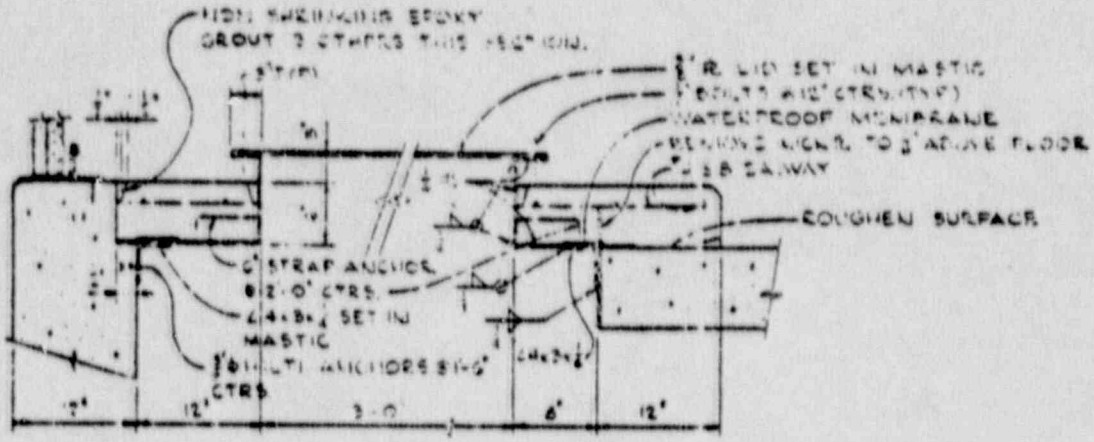
SECTION 1



SECTION 2

STAIRWELL SECTIONS

BLACK & VEATCH CONSULTING ENGINEERS KANSAS CITY, MISSOURI	NORTHERN STATES POWER COMPANY PATHFINDER FINAL STATUS REPORT	FIGURE 3



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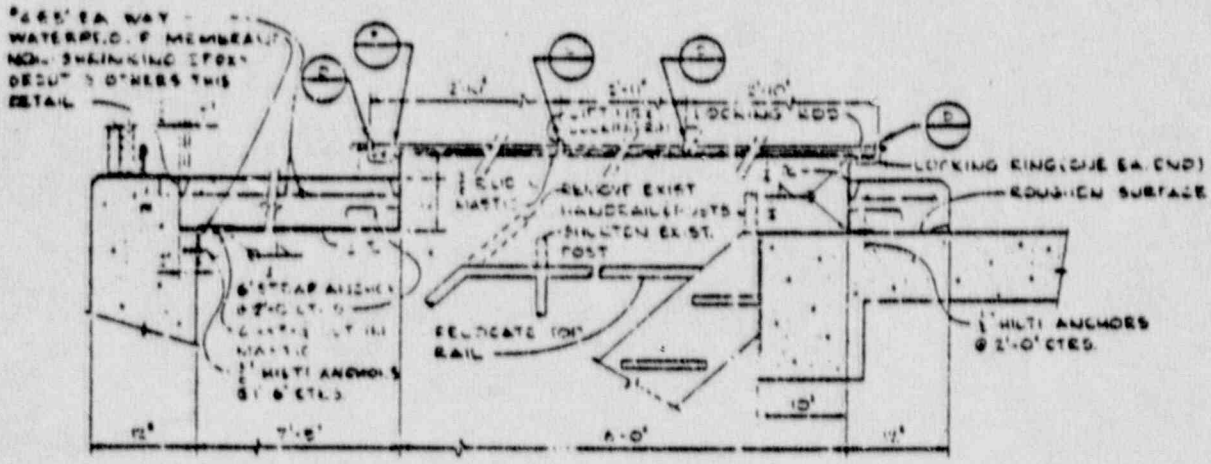
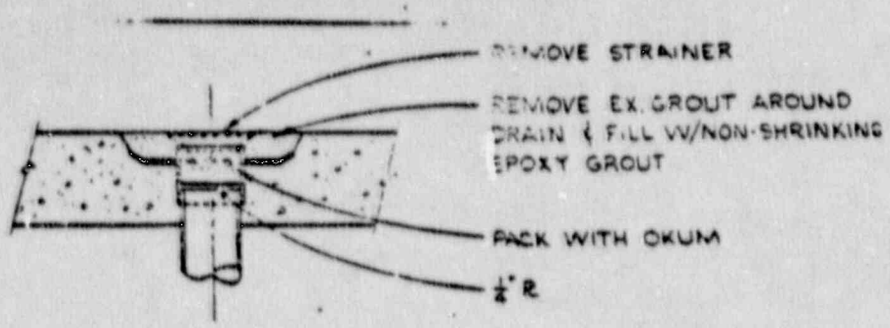


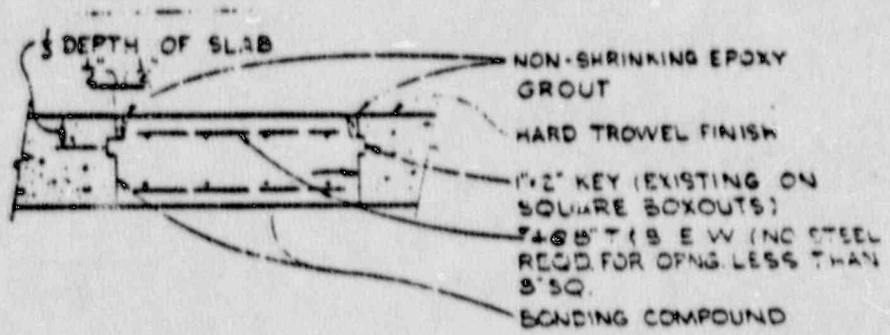
SECTION 4

STAIRWELL SECTIONS

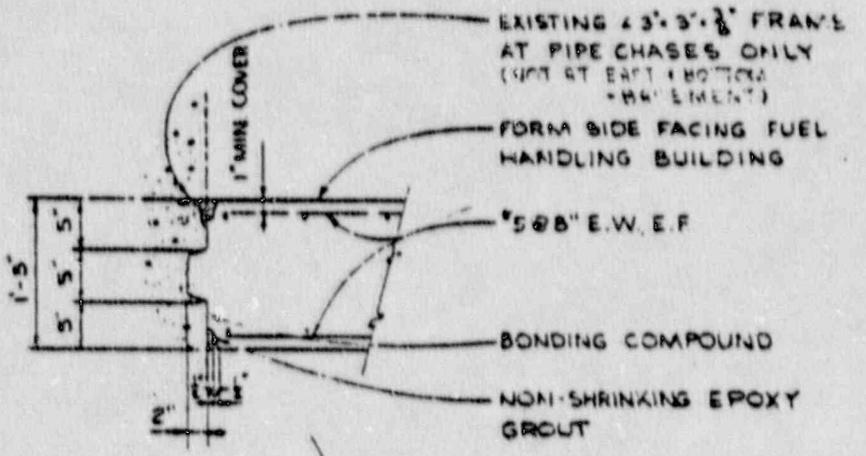
BLACK & VEATCH CONSULTING ENGINEERS KANSAS CITY, MISSOURI	NORTHERN STATES POWER COMPANY PATHFINDER FINAL STATUS REPORT	FIGURE 4



DETAIL 1
DRAIN SEAL



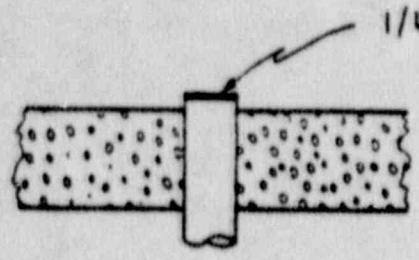
DETAIL 2
FLOOR SEAL



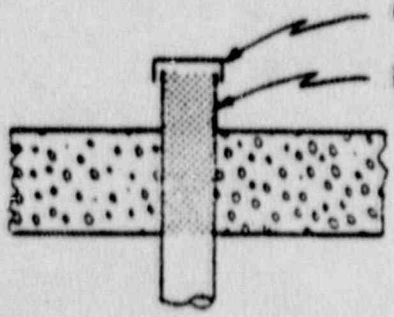
DETAIL 3
WALL AND DOOR SEAL

TYPICAL SEAL DETAILS

BLACK & VEATCH CONSULTING ENGINEERS KANSAS CITY, MISSOURI	NORTHERN STATES POWER COMPANY PATHFINDER Final STATUS REPORT	FIGURE 5

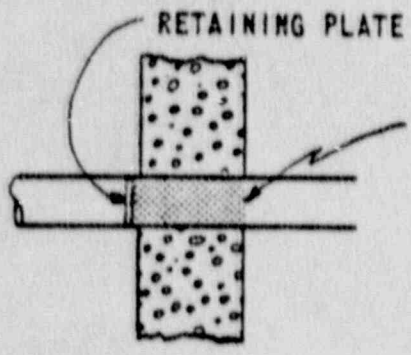


DETAIL 2A
TYPICAL FLOOR SEAL FOR PIPE PENETRATIONS 4" IPS AND UNDER



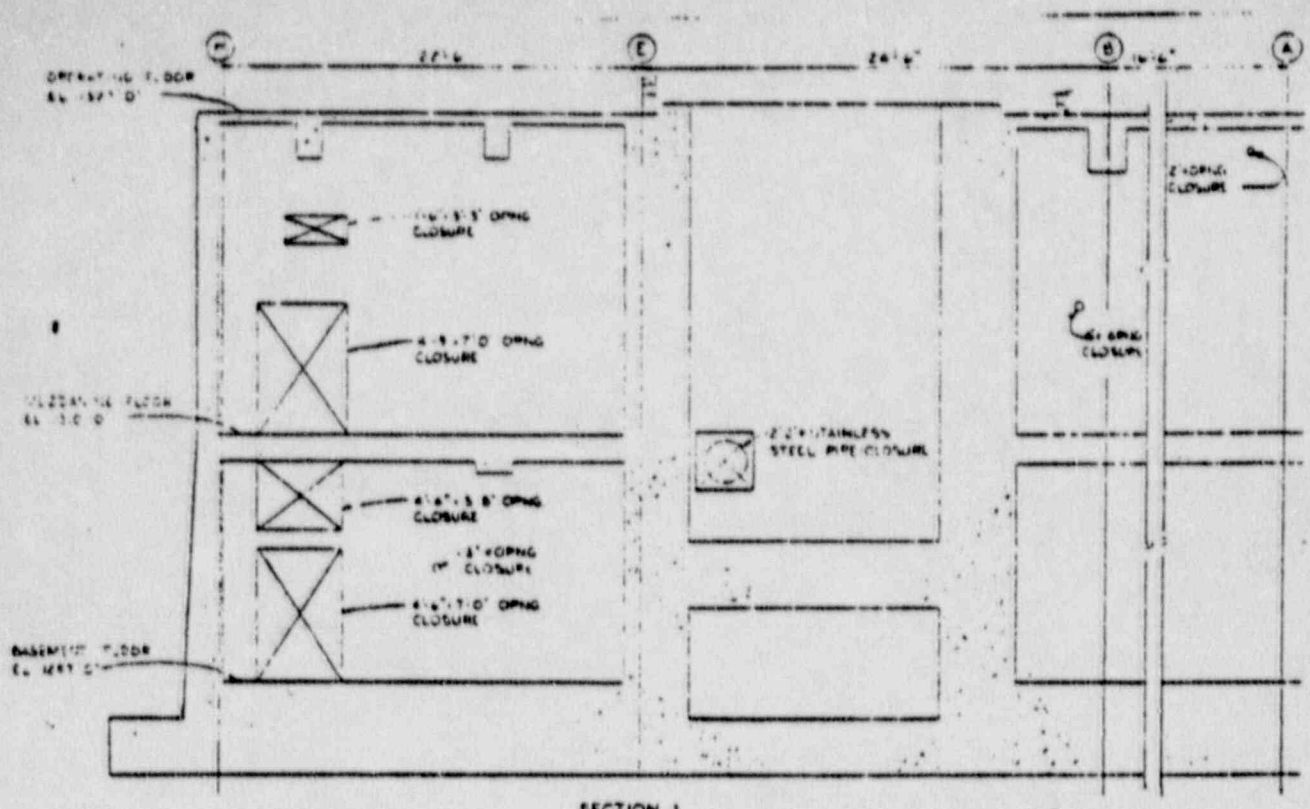
NOTE: LIGHTING SYSTEM CONDUIT HAS THE CONDUCTORS POTTED THEREIN AND THE CONDUIT RUNS TO ITS NORMAL TERMINATION INSTEAD OF BEING CUT AND CAPPED.

DETAIL 2B
TYPICAL FLOOR SEAL FOR CONDUIT PENETRATIONS

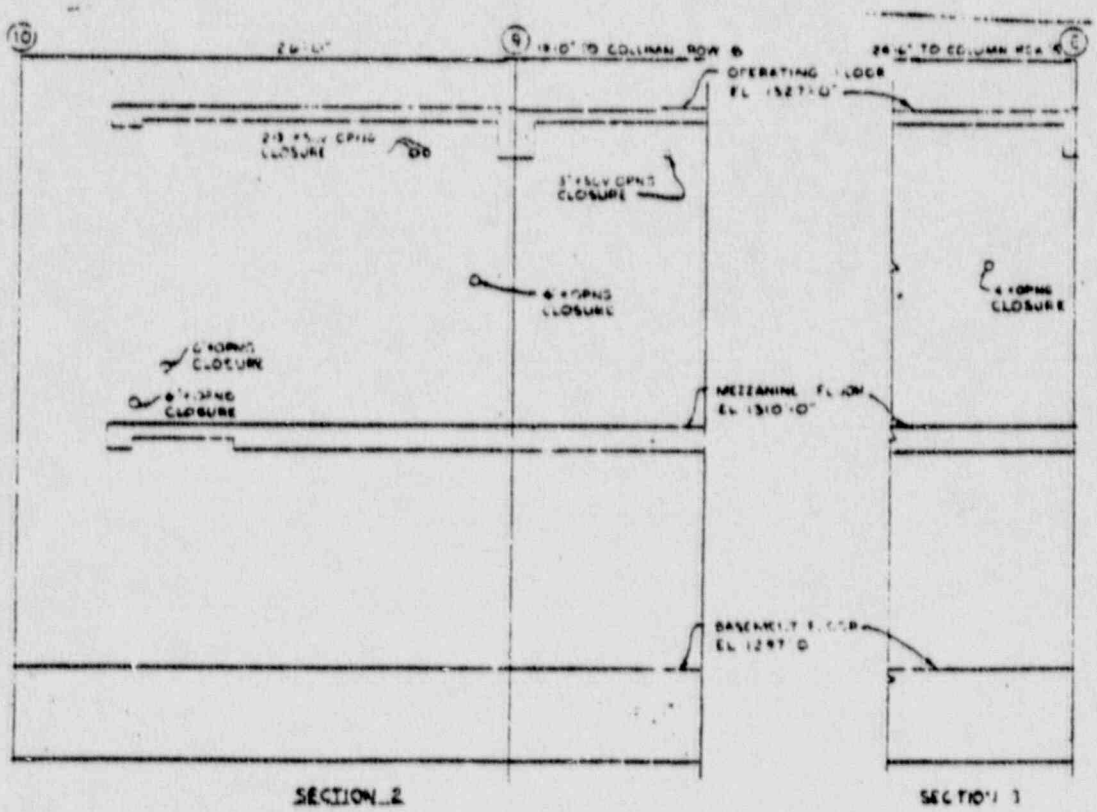


DETAIL 3A
TYPICAL WALL SEAL FOR PIPE AND SLEEVE PENETRATIONS

BLACK & VEATCH CONSULTING ENGINEERS KANSAS CITY, MISSOURI	NORTHERN STATES POWER COMPANY PATHFINDER FINAL STATUS REPORT	FIGURE 5A



SECTION 1

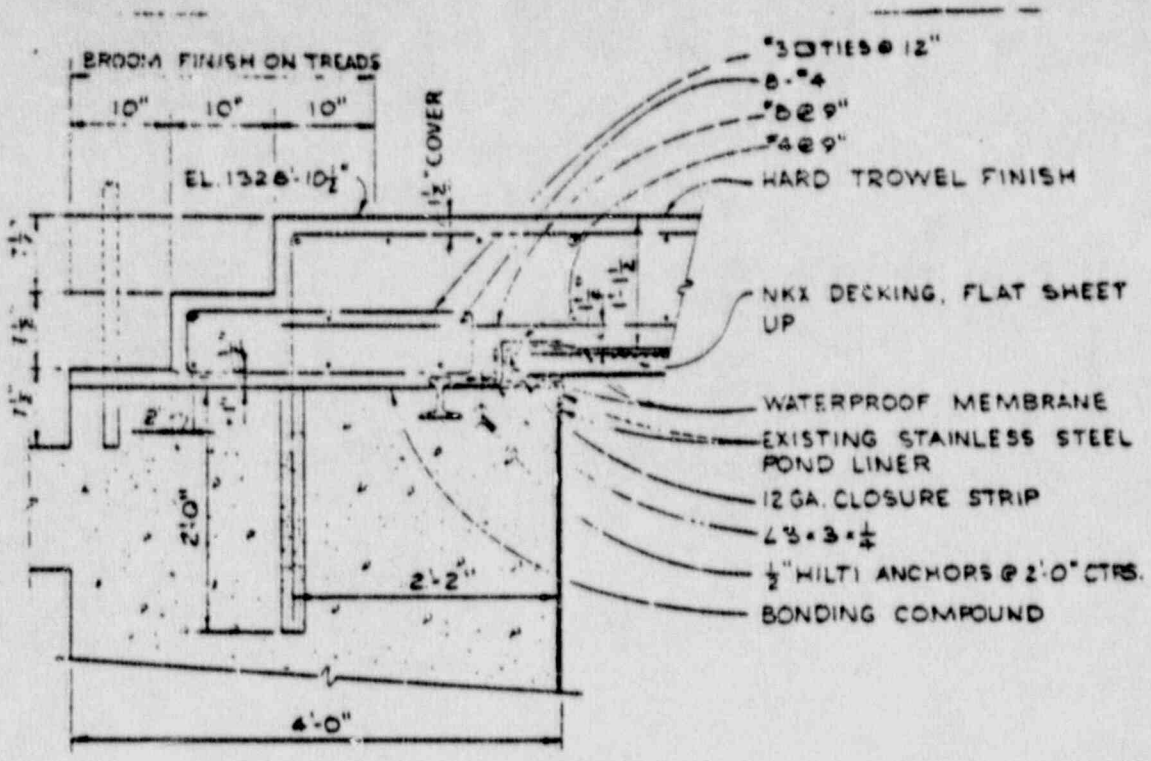


SECTION 2

SECTION 3

WALL SECTIONS SHOWING PENETRATIONS

BLACK & VEATCH CONSULTING ENGINEERS KANSAS CITY, MISSOURI	NORTHERN STATES POWER COMPANY PATHFINDER FINAL STATUS REPORT	FIGURE 6



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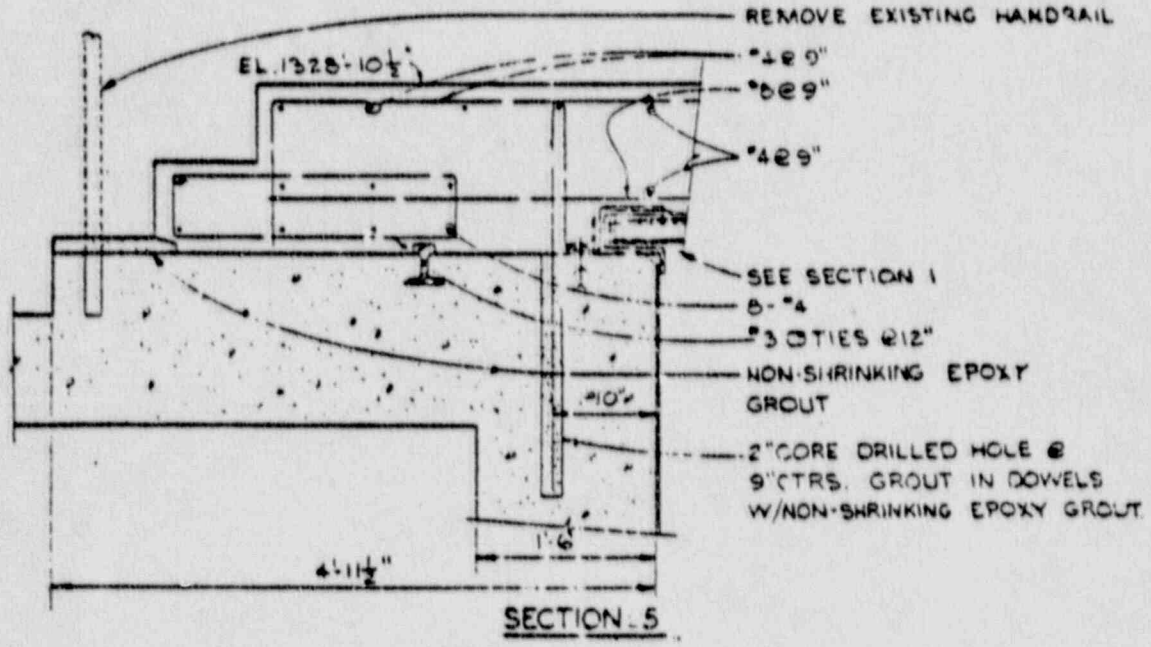
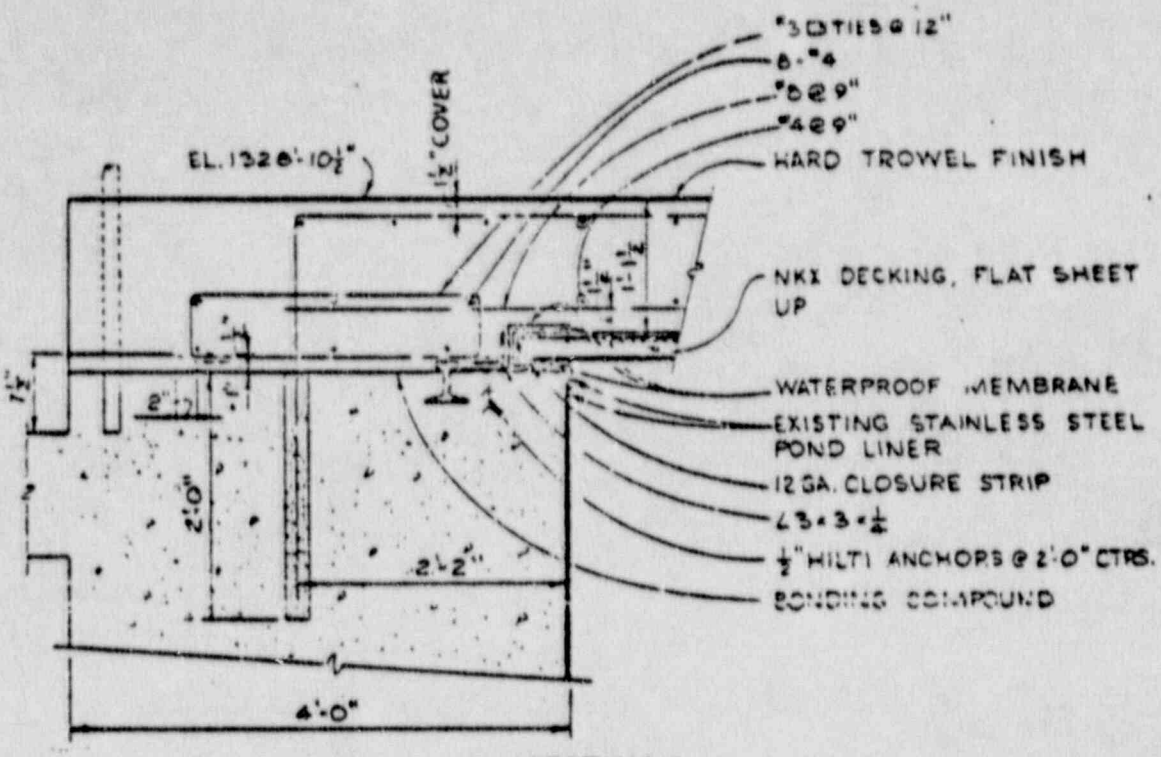


SECTION 5

FUEL POOL SECTIONS

BLACK & VEATCH CONSULTING ENGINEERS KANSAS CITY, MISSOURI	NORTHERN STATES POWER COMPANY PATHFINDER FINAL STATUS REPORT	FIGURE 7



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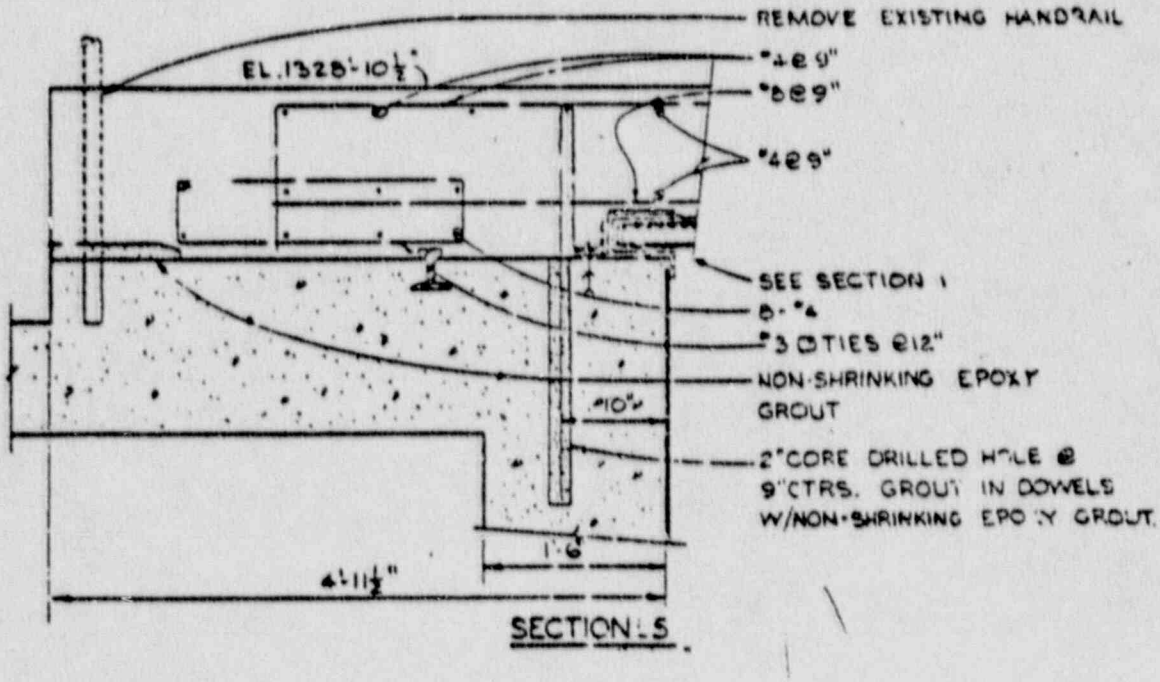
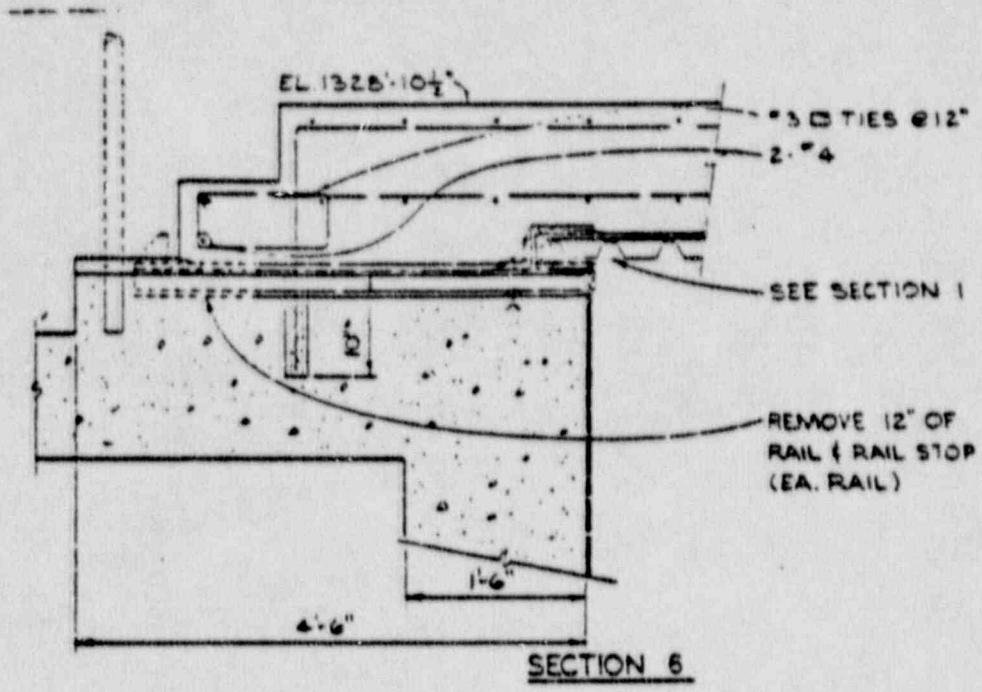


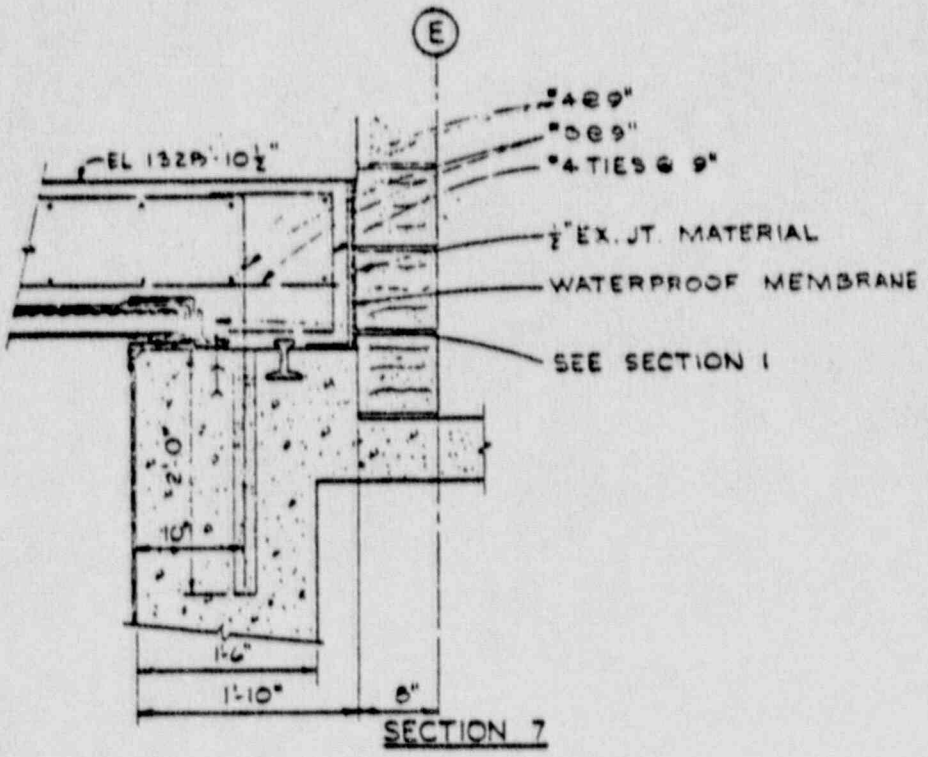
SECTION 5

FUEL POOL SECTIONS

BLACK & VEATCH CONSULTING ENGINEERS KANSAS CITY, MISSOURI	NORTHERN STATES POWER COMPANY PATHFINDER FINAL STATUS REPORT	FIGURE 7A



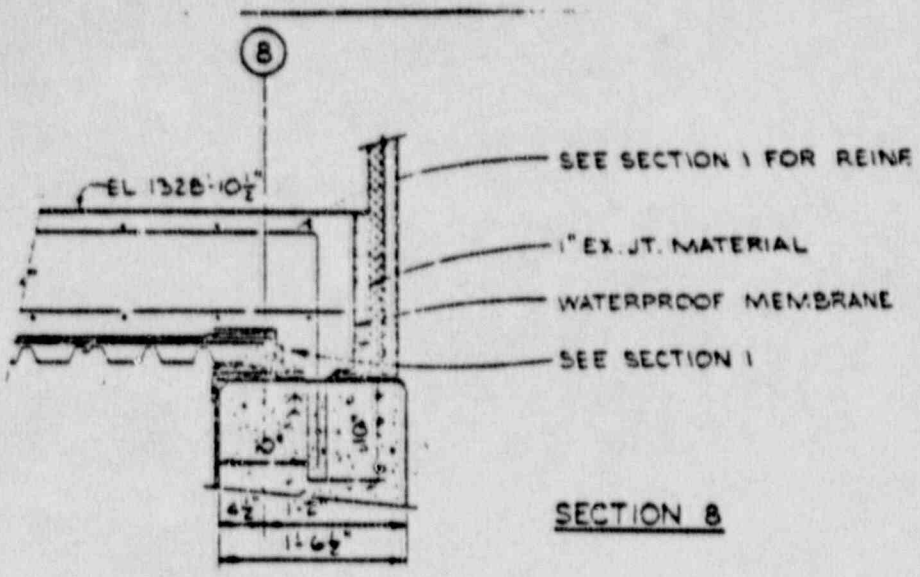
SECTION 6



SECTION 7

FUEL POOL SECTIONS

BLACK & VEATCH CONSULTING ENGINEERS KANSAS CITY, MISSOURI	NORTHERN STATES POWER COMPANY PATHFINDER FINAL STATUS REPORT	FIGURE 8



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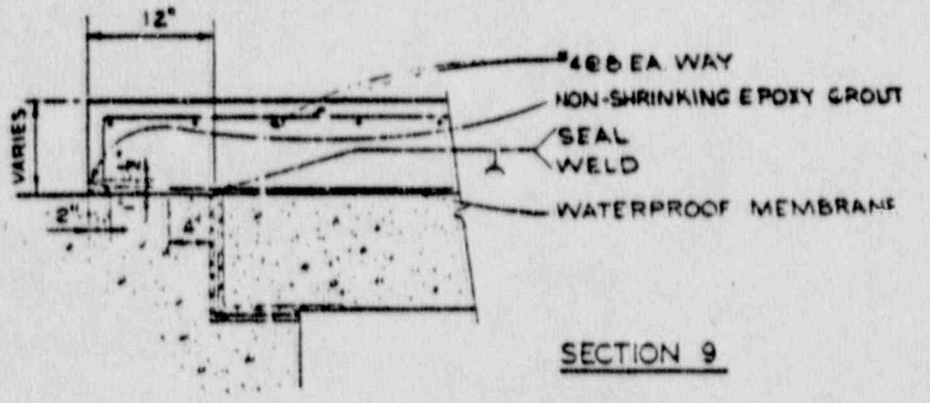

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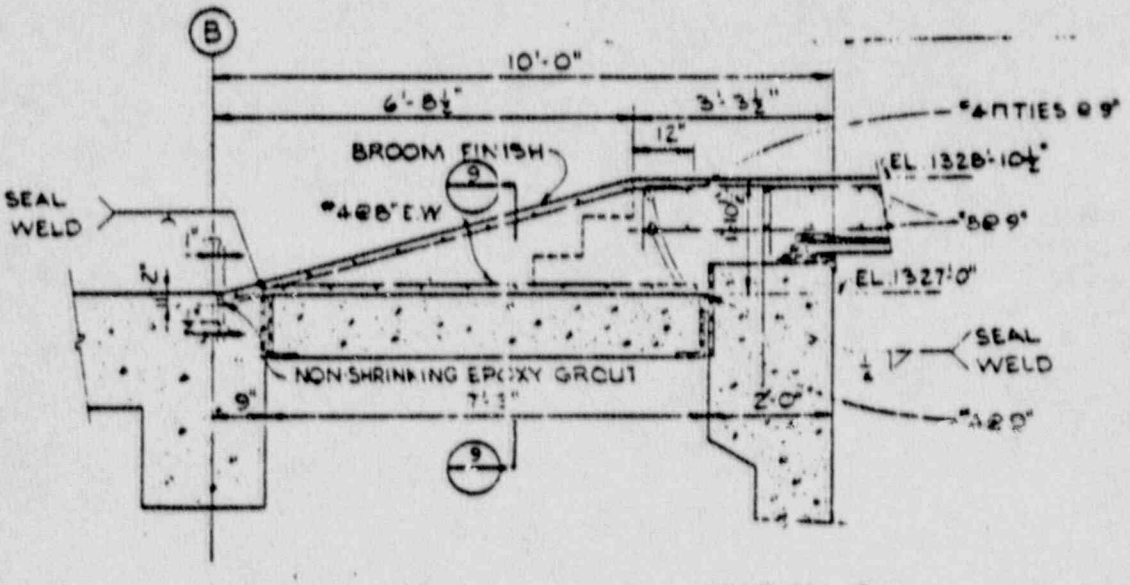


SECTION 10

FUEL POOL SECTIONS

BLACK & VEATCH CONSULTING ENGINEERS KANSAS CITY, MISSOURI	NORTHERN STATES POWER COMPANY PATHFINDER FINAL STATUS REPORT	FIGURE 9

APPENDIX B

EXTERNAL RADIATION SURVEYS

TABLE OF CONTENTS

INTRODUCTION

This document represents the status of the Pathfinder Generating Plant with respect to radioactive contamination, airborne particulate activity, general background radiation and specific radiation levels on the equipment comprising the fossil steam generating system, as of April 3, 1972. The survey was conducted after completion of all activities required to dismantle the nuclear portion of the plant as authorized in the Dismantling Order issued on April 8, 1970 by the Atomic Energy Commission.

Figures 10 and 11 preceding the Post Dismantling Radiation Level Surveillance Report summarize the radiation levels in the turbine building basement floor and mezzanine floor areas.

Results obtained from surveys about the outside perimeters of the dismantled facility are given in Exhibit B of Appendix D as listed and described in the proposed surveillance report. These levels are the "Base Levels" to which future survey results can be compared.

I. LEGEND

FIGURE 10 - BASEMENT FLOOR

1. Reactor building piping penetrations

   Hot spots range from 1.5 - 6.0 mr/hr

2. Condensate pumps area

   Hot spots range from less than 0.4 - 20 mr/hr

3. Hot side general areas

   Hot spots range from 0.6 - 23 mr/hr

4. Condenser

   Hot spots in areas near and around the condenser range from less than 0.4 to 25 mr/hr

NOTE: Much of the piping in the basement and mezzanine floors in the turbine building contains hot spots.

FIGURE 11 - MEZZANINE FLOOR

1. Drain cooler

   Hot spots range from 0.8 - 1.6 mr/hr

2. No. 14 heater

   Hot spots range from 1.0 - 1.7 mr/hr

3. Air ejector bottom tank

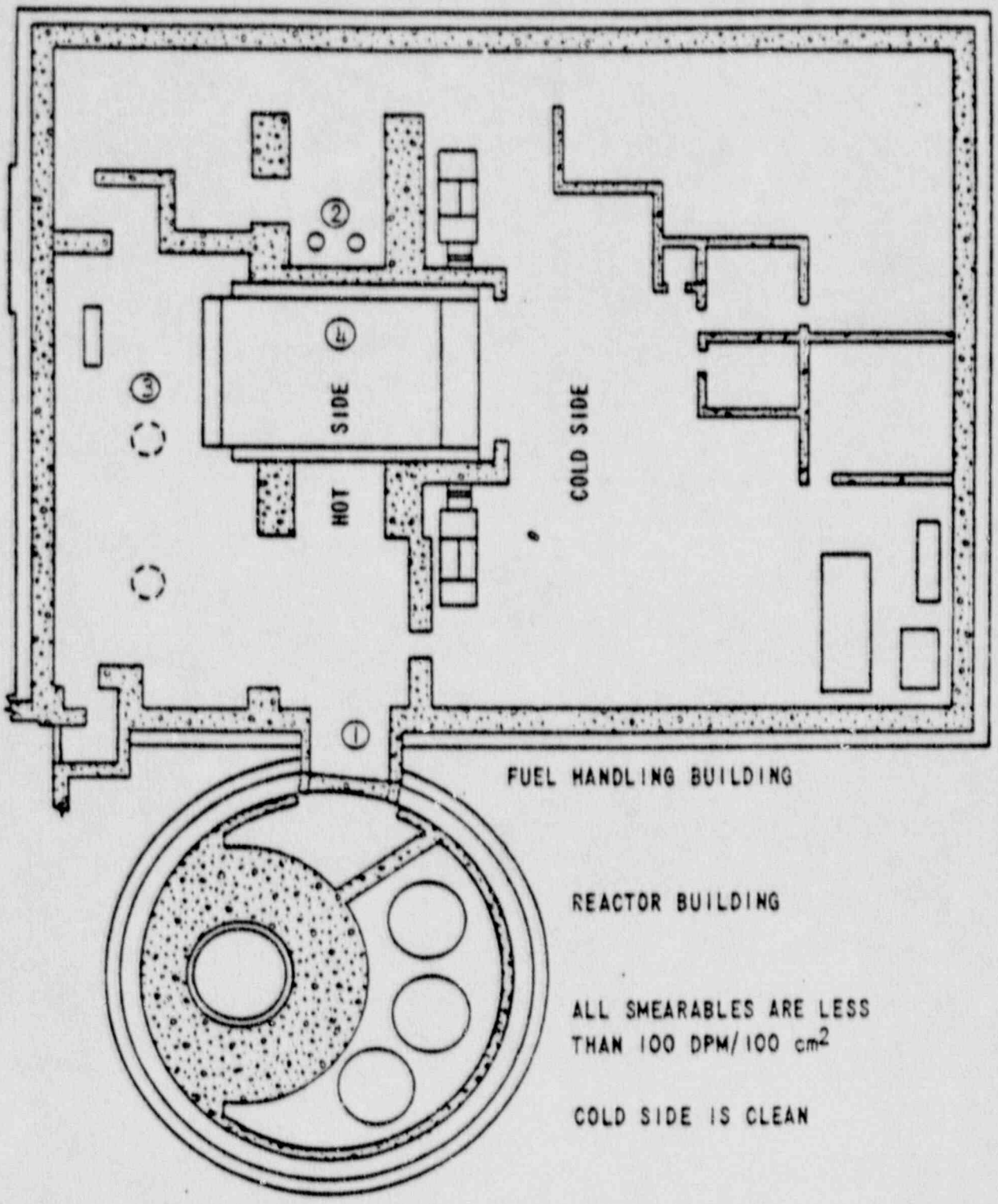
   Radiation level - 0.6 mr/hr

4. Bottom of No. 12 heater

   Radiation level - 0.6 mr/hr

5. Hydrogen cooler manifold area

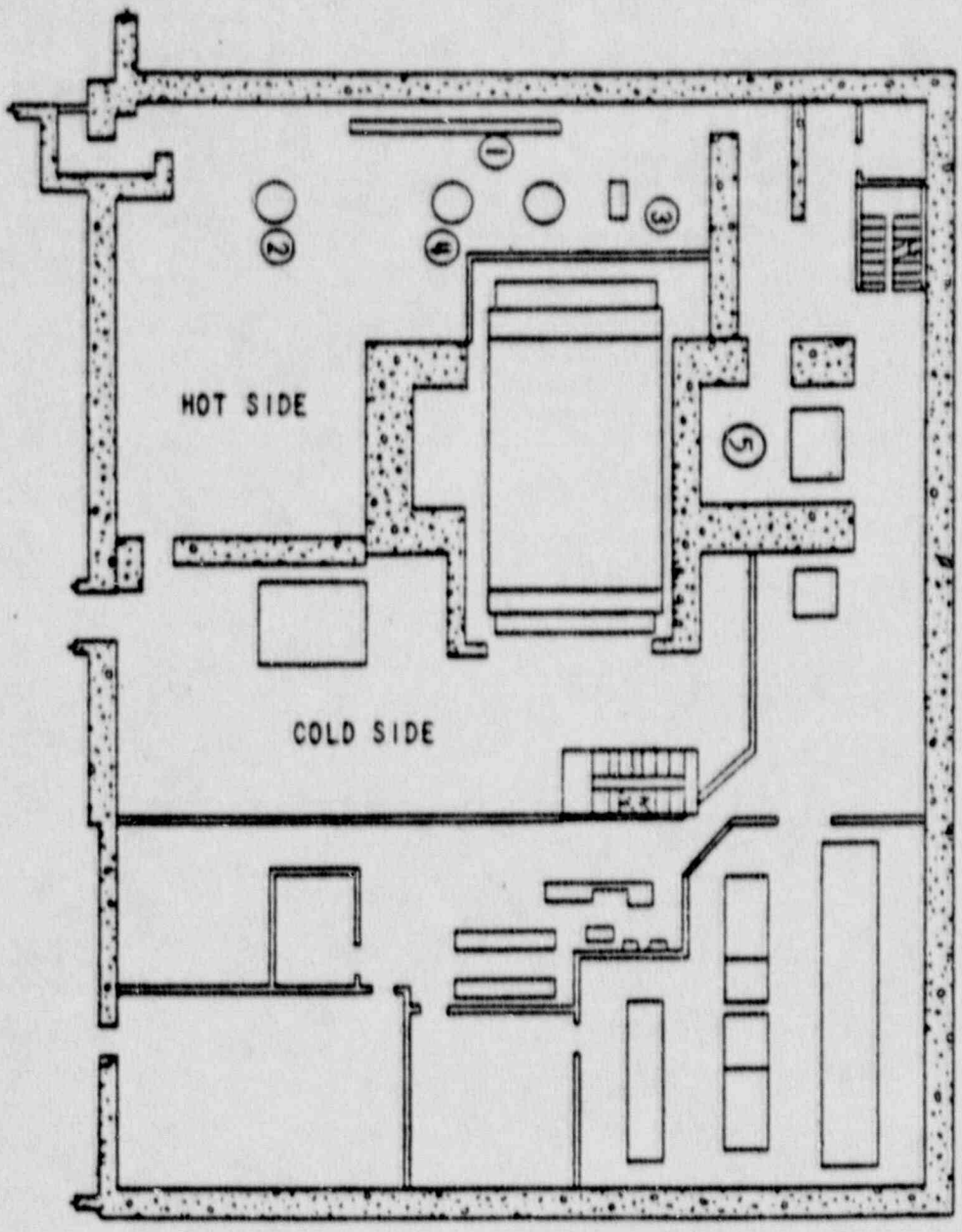
   Hot spots range from less than 0.4 mr/hr to 3 mr/hr



BASEMENT FLOOR

BLACK & VEATCH CONSULTING ENGINEERS KANSAS CITY, MISSOURI	NORTHERN STATES POWER COMPANY PATHFINDER FINAL STATUS REPORT	A. FIGURE 10

ALL SMEARABLES ARE LESS THAN 100 DPM/100 cm^2 COLD SIDE IS CLEAN



MEZZANINE FLOOR, TURBINE BUILDING

BLACK & VEATCH CONSULTING ENGINEERS KANSAS CITY, MISSOURI	NORTHERN STATES POWER COMPANY PATHFINDER FINAL STATUS REPORT	B. FIGURE 11

II. PATHFINDER GENERATING PLANT

POST DISMANTLING

RADIATION LEVEL SURVEY REPORT

A. FOSSIL PLANT RADIOACTIVE CONTAMINATION LEVEL ANALYSIS

A complete contamination check was made of all accessible areas within the Pathfinder Fossil Plant exterior to the Pathfinder fossil system for smearable radioactive contamination. The results of this check is summarized below.

GENERAL SUMMARY OF RESULTS

Total Number Smears taken	% Under 100 dpm/smear	% Under 500 dpm/smear	% Under 1000 dpm/smear
320	100%	100%	100%

RESULTS BY AREAS

Location	Total Number Smears	Three Highest Smears Found (dpm/smear)			Number Smears <100 dpm
Administration Building	55	<100	<100	<100	55
Water Treatment Building	24	<100	<100	<100	24
Turbine Building Operating Level	31	<100	<100	<100	31
Turbine Building Mezzanine Level	38	<100	<100	<100	38
Turbine Building Basement Level	87	<100	<100	<100	87
Fuel Handling Building	39	<100	<100	<100	39
Boiler Building	46	<100	<100	<100	46

B. FOSSIL PLANT AIR PARTICULATE ACTIVITY LEVEL ANALYSIS

Air particulate samples were collected from four locations within the Pathfinder fossil plant and analyzed for gross beta radioactivity. The results of the analysis are as follows:

SAMPLE LOCATIONS

LOCATION 1: Turbine building operating floor.

LOCATION 2: Turbine building hot side mezzanine level directly below the SW ventilation duct riser to the ID plenum.

LOCATION 3: Boiler building ground floor at front of #12 boiler.

LOCATION 4: Boiler building second floor on north side of deaerator below the deaerator vent line discharge.

SAMPLE COLLECTION DATA

	LOCATION 1	LOCATION 2	LOCATION 3	LOCATION 4
Generation Load (Mwe)	30	30	30	30
Date and Time of Sampling	4/3/72 @ 0838	4/3/72 @ 0820	4/3/72 @ 0854	4/3/72 @ 0914
Sample Flow (cfm)	30	30	30	30
Length of Sampling Period (min)	10	10	10	10

SAMPLE EVALUATION

LOCATION	DECAY PERIOD	ACTIVITY
1	24 Hrs	3.26×10^{-13} uci/cc
2	24 Hrs	4.14×10^{-13} uci/cc
3	24 Hrs	3.42×10^{-13} uci/cc
4	24 Hrs	1.33×10^{-12} uci/cc

C. FOSSIL PLANT GENERAL RADIATION BACKGROUND LEVEL ANALYSIS

Radiation level readings were taken throughout all the normally accessible walk areas within the Pathfinder fossil plant. The results of this "general areas" radiation level check are summarized below.

Area	Total Number Of Readings	Sum Of All Readings	Sum of Readings Greater Than 0.2 mr/hr	Sum of Readings Greater Than 0.4 mr/hr	Average Radiation Level (mr/hr)
Administration Building	242	5.18	0	0	0.021
Operation Floor	139	3.03	0	0	0.022
2nd Floor	103	2.15	0	0	0.021
Water Treatment Building	137	2.55	0	0	0.018
2nd Floor	45	0.86	0	0	0.019
Operating Floor	77	1.42	0	0	0.018
Basement	15	0.27	0	0	0.018
Turbine Building	1618	87.66	23	2	0.054
Operating Floor	335	8.52	0	0	0.025
Mezzanine Floor	586	39.76	14	0	0.068
Cold Side	295	7.05	0	0	0.023
Hot Side	291	32.71	14	0	0.112
Basement	697	39.38	9	2	0.056
Cold Side	340	7.90	0	0	0.023
Hot Side	357	31.48	9	2	0.088
Fuel Building	246	8.08	0	0	0.033
Operating Floor	167	6.39	0	0	0.038
2nd Floor	46	0.98	0	0	0.021
3rd Floor	33	0.71	0	0	0.021
Boiler Building	364	8.43	0	0	0.023
Operating Floor	155	2.95	0	0	0.019
2nd Floor	209	5.48	0	0	0.026
Entire Fossil Plant	2607	116.23	23	2	0.045

D. FOSSIL SYSTEM RADIATION LEVEL SURVEY RESULTS

A thorough radiation survey of the exterior surfaces of the Pathfinder fossil system was made. From the survey 107 areas were detected which emitted a radiation level of 1 mr/hr or over. These 107 locations were marked as Hot Spots (HS's) and their locations and specific radiation levels are described on the following pages.

In addition to the above 107 Hot Spots 100 Survey Points (SP's) were marked and surveyed for future reference. The current radiation levels and locations of these SP's are also described in the following pages.

1. INDIVIDUAL HOT SPOT RADIATION LEVELS

Hot Spot Number	Location	Radiation Level Contact mr/hr	Radiation Level 1 Foot mr/hr
HS-1	TBCS Basement SE corner condenser hotwell	3.2	0.5
HS-2	TBCS Basement Emergency hotwell makeup line	1.8	0.4
HS-3	TBCS Basement Tube sheet conductivity check line	20	0.7
HS-4	TBCS Basement #12 condensate pump casing	1.6	0.3
HS-5	TBCS Basement #12 condensate pump suction line	1.3	0.3
HS-6	TBCS Basement Condensate pump pit floor drain	1.0	0.3
HS-7	TBCS Basement #12 condensate pump discharge line	20	0.4
HS-8	TBCS Basement #11 condensate pump discharge line	7.0	0.4
HS-9	TBCS Basement #11 condensate pump discharge line	8.0	0.4
HS-10	TBCS Basement #11 condensate pump discharge line	9.0	0.4
HS-11	TBCS Basement Feed pump gland seal supply line	1.2	0.3
HS-12	TBCS Basement Feed pump gland seal supply line	1.7	0.3
HS-13	TBCS Mezzanine #12 hydrogen cooler supply line	1.3	0.3
HS-14	TBCS Mezzanine #11 hydrogen cooler supply line	1.5	0.3
HS-15	TBCS Mezzanine #11 hydrogen cooler supply line	2.1	0.4
HS-16	TBCS Mezzanine #13 hydrogen cooler supply line	1.4	0.4

INDIVIDUAL HOT SPOT RADIATION LEVELS (Cont.)

Hot Spot Number	Location	Radiation Level Contact mr/hr	Radiation Level 1 Foot mr/hr
HS-17	TBCS Mezzanine #14 hydrogen cooler return line	1.8	0.3
HS-18	TBCS Mezzanine #14 hydrogen cooler supply line	3.0	0.6
HS-19	TBCS Mezzanine #14 hydrogen cooler supply line	1.7	0.4
HS-20	TBCS Mezzanine #14 hydrogen cooler supply line	2.5	0.4
HS-21	TBCS Mezzanine hydrogen cooler supply header	1.0	0.3
HS-22	TBCS Mezzanine hydrogen cooler supply header	1.1	0.3
HS-23	TBCS Mezzanine #11 and #12 heaters bypass line	1.2	0.3
HS-24	TBCS Mezzanine #11 and #12 heaters bypass line	1.0	0.2
HS-25	TBCS Mezzanine #11 and #12 heaters bypass line	1.6	0.3
HS-26	TBCS Mezzanine #11 and #12 heaters bypass line	4.0	0.3
HS-27	TBCS Mezzanine #11 and #12 heaters bypass line	1.0	0.2
HS-28	TBHS Mezzanine #11 heater bypass line	4.0	0.4
HS-29	TBHS Mezzanine #11 heater bypass line	2.6	0.3
HS-30	TBHS Mezzanine #11 heater bypass line	11	0.4
HS-31	TBHS Mezzanine #11 heater bypass line	13	0.3
HS-32	TBHS Mezzanine #11 heater bypass line	2.1	0.4

INDIVIDUAL HOT SPOT RADIATION LEVELS (Cont.)

Hot Spot Number	Location	Radiation Level Contact mr/hr	Radiation Level 1 Foot mr/hr
HS-33	TBHS Mezzanine #12 heater bypass line	1.0	0.3
HS-34	TBHS Mezzanine #11 heater condensate supply line	1.0	0.2
HS-35	TBHS Mezzanine #12 heater bypass line	1.2	0.2
HS-36	TBHS Mezzanine #12 heater bypass line	1.0	0.2
HS-37	TBHS Mezzanine heater drain cooler shell	1.6	0.4
HS-38	TBHS Mezzanine heater drain cooler shell	1.0	0.3
HS-39	TBHS Mezzanine heater drain cooler shell	1.1	0.3
HS-40	TBHS Mezzanine heater drain cooler shell	1.2	0.3
HS-41	TBHS Mezzanine #14 heater steam supply line	1.0	0.3
HS-42	TBHS Mezzanine #14 heater shell supply line	1.0	0.3
HS-43	TBHS Mezzanine #14 heater condensate discharge line	1.2	0.6
HS-44	TBHS Mezzanine #14 heater condensate discharge line	1.0	0.3
HS-45	TBHS Mezzanine #14 heater condensate discharge line	1.0	0.2
HS-46	TBHS Mezzanine #14 heater bypass line	1.5	0.6
HS-47	TBHS Mezzanine #14 heater bypass line	1.8	0.6
HS-48	TBHS Mezzanine #14 heater condensate discharge line	1.0	0.2

INDIVIDUAL HOT SPOT RADIATION LEVELS (Cont.)

Hot Spot Number	Location	Radiation Level Contact mr/hr	Radiation Level 1 Foot mr/hr
HS-49	TBHS Mezzanine #14 heater steam supply line	1.0	0.2
HS-50	TBHS Basement #11 and #12 heater bypass line	1.1	0.2
HS-51	TBHS Basement #11 and #13 heater bypass line	7	0.3
HS-52	TBHS Basement #11 and #12 heater bypass line	1.6	0.3
HS-53	TBHS Basement #11 and #12 heater bypass line	2.0	0.2
HS-54	TBHS Basement #11 and #12 heater bypass line	2.7	0.2
HS-55	TBHS Basement #11 and #12 heater bypass line	3.3	0.2
HS-56	TBHS Basement #11 and #12 heater bypass line	3.4	0.2
HS-57	TBHS Basement #11 and #12 heater bypass line	10	0.3
HS-58	TBHS Basement #11 and #12 heater bypass line	3.8	0.3
HS-59	TBHS Basement #11 and #12 heater bypass line	23	0.5
HS-60	TBHS Basement heater drain cooler to condenser line	3.7	0.2
HS-61	TBHS Basement heater drain cooler to condenser line	4.2	0.3
HS-62	TBHS Basement feedwater pump gland seal supply line	1.0	0.2
HS-63	TBHS Basement feedwater pump gland seal supply line	1.0	0.2
HS-64	TBHS Basement feedwater pump gland seal supply line	1.1	0.2
HS-65	TBHS Basement feedwater pump gland seal supply line	2.4	0.2

INDIVIDUAL HOT SPOT RADIATION LEVELS (Cont.)

Hot Spot Number	Location=	Radiation Level Contact mr/hr	Radiation Level 1 Foot mr/hr
HS-66	TBHS Basement feedwater pump gland seal supply line	1.0	0.2
HS-67	TBHS Basement bottom valve #1017	2.8	0.2
HS-68	TBHS Basement heater shells to condenser header	1.5	0.2
HS-69	TBHS Basement #14 heat shell	1.7	0.2
HS-70	TBHS Basement #14 heat level alarm tap	1.3	0.2
HS-71	TBHS Basement abandoned #13 heater shell relief line	1.0	0.2
HS-72	TBHS Basement #4 turbine inlet bend drain line	1.6	0.4
HS-73	TBHS Basement #2 turbine inlet bend drain line	1.4	0.2
HS-74	TBHS Basement main steam dump line	1.0	0.2
HS-75	TBHS Basement main steam dump line	2.5	0.2
HS-76	TBHS Basement main steam dump line	1.0	0.4
HS-77	TBHS Basement W tube sheet conductivity check line	2.7	0.4
HS-78	TBHS Basement W tube sheet conductivity check line	4.6	0.4
HS-79	TBHS Basement W tube sheet conductivity check line	4.0	0.5
HS-80	TBHS Basement W tube sheet conductivity check line	8.0	0.4
HS-81	TBHS Basement W tube sheet conductivity check line	15	0.6
HS-82	TBHS Basement W tube sheet conductivity check line	2.6	0.3

INDIVIDUAL HOT SPOT RADIATION LEVELS (Cont.)

Hot Spot Number	Location	Radiation Level Contact mr/hr	Radiation Level 1 Foot mr/hr
HS-83	TBHS Basement W tube sheet conductivity check line	2.8	0.4
HS-84	TBHS Basement #12 condensate pump suction well	12	1.6
HS-85	TBHS Basement #12 condensate pump suction line	25	2.4
HS-86	TBHS Basement #11 condensate pump suction well	13	1.4
HS-87	TBHS Basement #12 condensate pump suction line	22	2.0
HS-88	TBHS Basement N bottom edge hotwell	2.7	0.3
HS-89	TBHS Basement W bottom edge hotwell	9.0	0.3
HS-90	TBHS Basement W bottom edge hotwell	1.2	0.2
HS-91	TBHS Basement W bottom edge hotwell	7	0.3
HS-92	TBHS Basement horizontal run of condenser expansion joint	13	0.6
HS-93	TBHS Basement horizontal run of condenser expansion joint	15	0.5
HS-94	TBHS Basement horizontal run of condenser expansion joint	1.0	0.3
HS-95	TBHS Basement horizontal run of condenser expansion joint	8	0.4
HS-96	TBHS Basement horizontal run of condenser expansion joint	12	0.6
HS-97	TBHS Basement horizontal run of condenser expansion joint	13	0.7
HS-98	TBHS Basement horizontal run of condenser expansion joint	4	0.5

INDIVIDUAL HOT SPOT RADIATION LEVELS (Cont.)

Hot Spot Number	Location	Radiation Level Contact mr/hr	Radiation Level 1 Foot mr/hr
HS-99	TBHS Basement horizontal run of condenser expansion joint	2.4	0.4
HS-100	TBHS Basement horizontal run of condenser expansion joint	7	0.7
HS-101	TBHS Basement horizontal run of condenser expansion joint	3.7	0.6
HS-102	TBHS Basement horizontal run of condenser expansion joint	2.6	0.5
HS-103	TBHS Basement S bottom edge hotwell	1.7	0.3
HS-104	TBHS Basement S bottom edge hotwell	1.6	0.3
HS-105	TBHS Basement S bottom edge hotwell	1.4	0.3
HS-106	TBHS Basement S bottom edge hotwell	4.9	0.4
HS-107	BB Operating Floor Boiler blowdown discharge cooler	1.0	0.2

2. INDIVIDUAL HOT SPOT LOCATIONS

The location of all found hot spots on the Pathfinder Fossil System is marked on the following four floor plans. The darkened dot indicates the approximate hot spot location. The number of each hot spot corresponds to the number ahead of its description in the preceeding section. The geometric shape framing the hot spot number is a reference to its approximate level. The code is as follows:

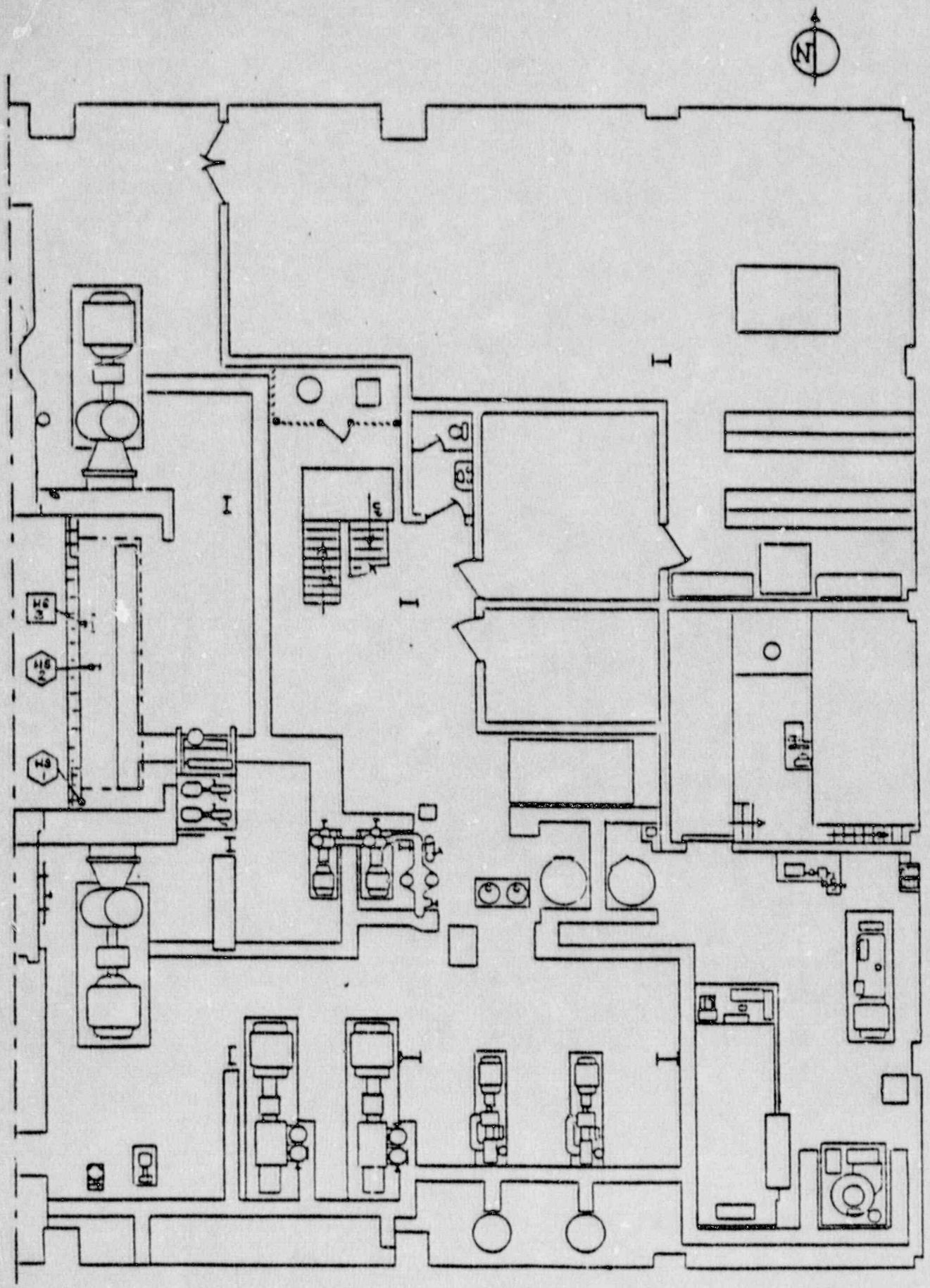
Low location, usually below the knees

Location approximately between knees and shoulders

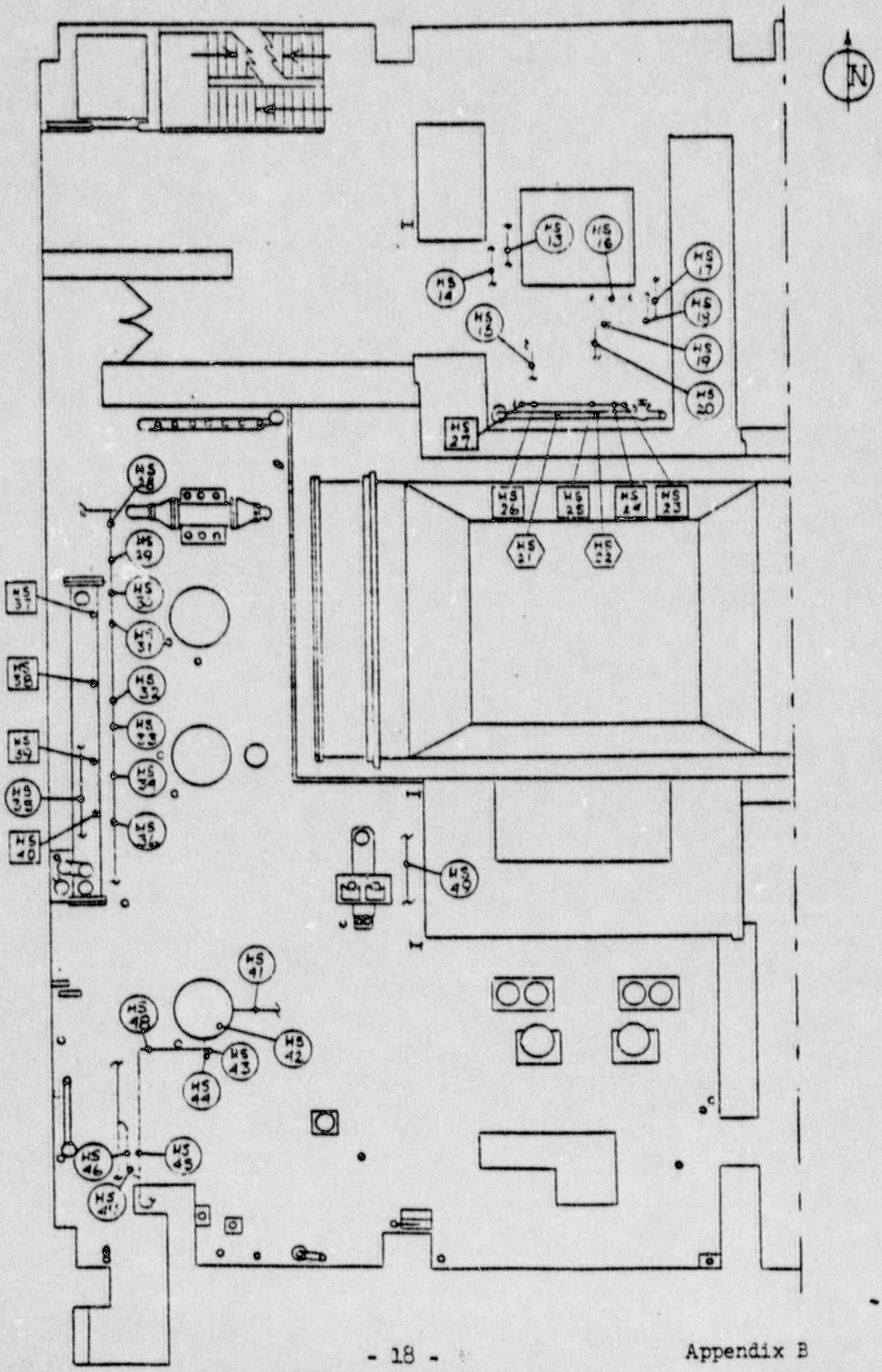
Location from shoulder to arms reach

Location above normal reach, need ladder or stool for survey

TURBINE BUILDING
COLD SIDE - BASEMENT LEVEL
(TBCS)

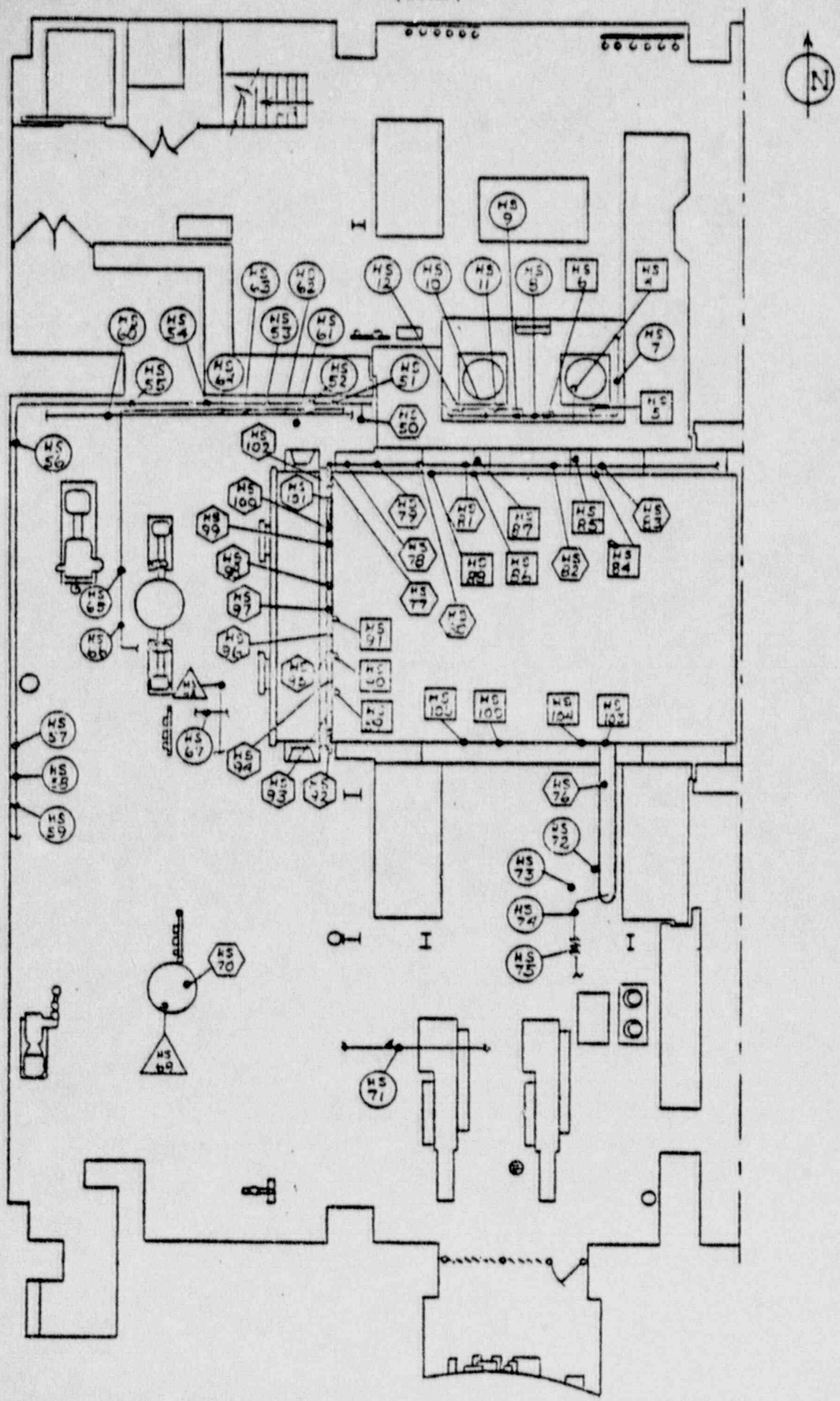


TURBINE BUILDING
HOT SIDE - MEZZANINE LEVEL
(TBHS)

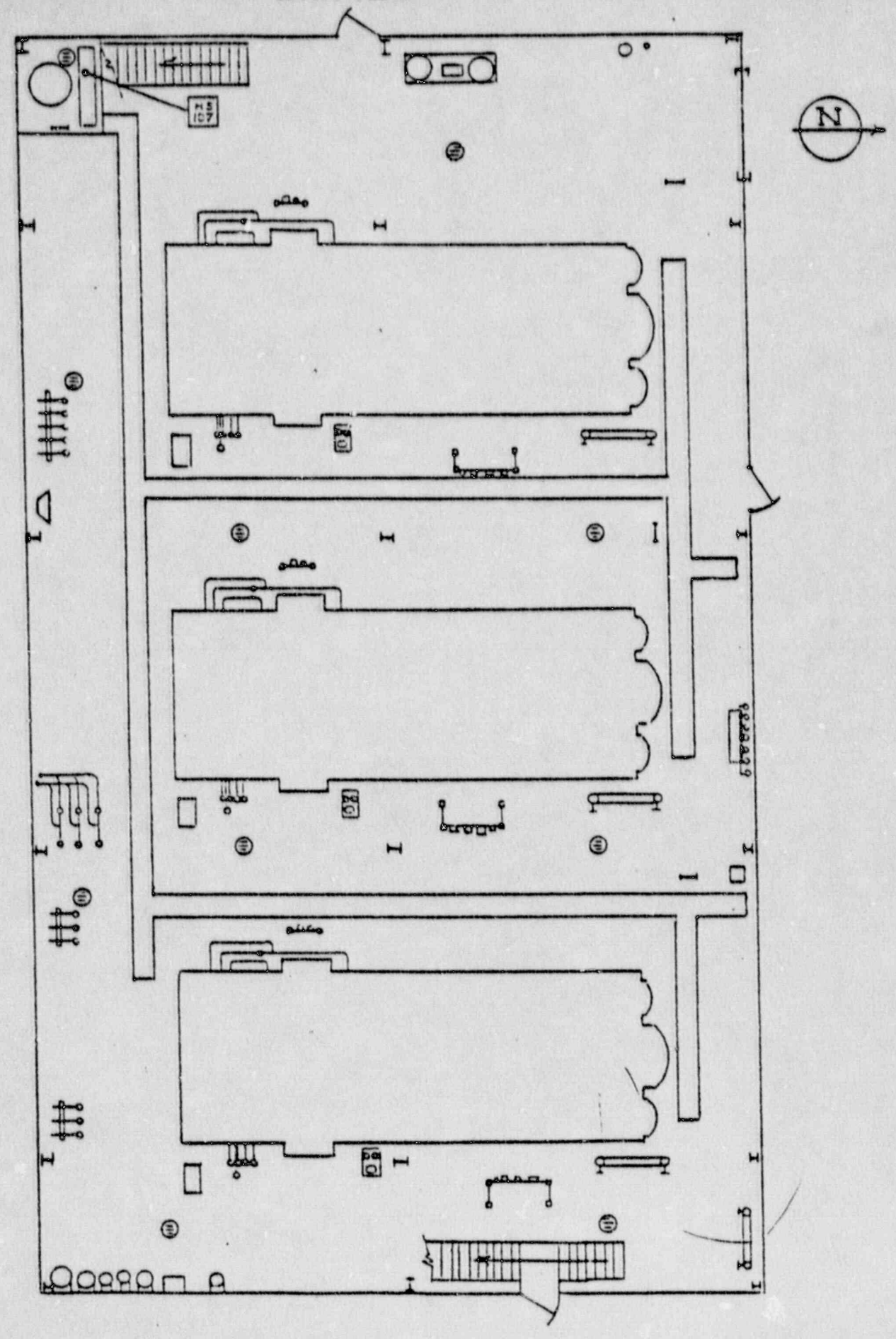


Appendix B

TURBINE BUILDING
HOT SIDE - BASEMENT LEVEL
(TBHS)



BOILER BUILDING
GROUND FLOOR



3. INDIVIDUAL SURVEY POINT RADIATION LEVELS

Survey Point Number	Location	Radiation Level Contact mr/hr
SP-1	TB Operating Floor E side high pressure turbine	0.04
SP-2	TB Operating Floor E side low pressure turbine	0.14
SP-3	BB Second Floor deaerator S side E end bottom	0.04
SP-4	BB Second Floor deaerator S side E quarter bottom	0.04
SP-5	BB Second Floor deaerator S side middle bottom	0.06
SP-6	BB Second Floor deaerator S side W end bottom	0.06
SP-7	BB Second Floor deaerator N side W quarter bottom	0.05
SP-8	BB Ground Floor aux steam line to deaerator	0.05
SP-9	BB Ground Floor feedwater line	0.06
SP-10	BB Ground Floor feed pump suction line	0.05
SP-11	BB Ground Floor condensate to deaerator line	0.03
SP-12	BB Ground Floor main steam line	0.04
SP-13	BB Ground Floor aux steam line to deaerator	0.04
SP-14	BB Ground Floor condensate to deaerator line	0.04
SP-15	BB Ground Floor boiler blowdown flash tank W side bottom	0.07
SP-16	BB Ground Floor boiler blowdown cooler S side E end	0.32

INDIVIDUAL SURVEY POINT RADIATION LEVELS (Cont.)

Survey Point Number	Location	Radiation Level Contact mr/hr
SP-17	BB Ground Floor feedwater to #11 boiler before control valve	0.04
SP-18	BB Ground Floor feed water to #12 boiler before control valve	0.06
SP-19	BB Ground Floor feedwater to #13 boiler before control valve	0.04
SP-20	#11 boiler mud drum manhole covers N end E side	0.10
SP-21	#11 boiler mud drum manhole covers N end W side	0.12
SP-22	#12 boiler mud drum manhole covers N end E side	0.18
SP-23	#12 boiler mud drum manhole covers N end W side	0.12
SP-24	#13 boiler mud drum manhole covers N end E side	0.07
SP-25	#13 boiler mud drum manhole covers N end W side	0.10
SP-26	#11 main steam drum manhole covers N end	0.07
SP-27	#12 main steam drum manhole covers N end	0.06
SP-28	#13 main steam drum manhole covers N end	0.07
SP-29	#11 boiler mud drum E side N end	0.13
SP-30	#11 boiler mud drum E side S end	0.04
SP-31	#12 boiler mud drum E side N end	0.04
SP-32	#12 boiler mud drum E side S end	0.05
SP-33	#13 boiler mud drum E side N end	0.06

INDIVIDUAL SURVEY POINT RADIATION LEVELS (Cont.)

Survey Point Number	Location	Radiation Level Contact mr/hr
SP-34	#13 boiler mud drum E side S end	0.10
SP-35	#11 boiler mud drums W side N end	0.05
SP-36	#11 boiler mud drums W side S end	0.08
SP-37	#12 boiler mud drums W side N end	0.09
SP-38	#12 boiler mud drums W side S end	0.06
SP-39	#13 boiler mud drums W side N end	0.09
SP-40	#13 boiler mud drums W side S end	0.07
SP-41	TBHS Mezzanine top condenser below LP turbine above manhole	0.15
SP-42	TBHS Mezzanine top condenser below LP turbine S end	0.26
SP-43	TBHS Mezzanine air ejector aftercooler S side bottom	0.42
SP-44	TBHS Mezzanine air ejector intercooler S side bottom	0.50
SP-45	TBHS Mezzanine air ejector aftercooler W end bottom	0.29
SP-46	TBHS Mezzanine air ejector aftercooler E end bottom	0.15
SP-47	TBHS Mezzanine air ejector aftercooler E end bottom	0.20
SP-48	TBHS Mezzanine air ejector intercooler W end bottom	0.12
SP-49	TBHS Mezzanine #11 heater S side top	0.27

INDIVIDUAL SURVEY POINT RADIATION LEVELS (Cont.)

Survey Point Number	Location	Radiation Level Contact mr/hr
SP-50	TBHS Mezzanine #11 heater W side mid-shell	0.23
SP-51	TBHS Mezzanine #12 heater S side top	0.40
SP-52	TBHS Mezzanine #12 heater W side mid-shell	0.50
SP-53	TBHS Mezzanine #14 heater W side top	0.35
SP-54	TBHS Mezzanine #14 heater W side mid-shell	0.16
SP-55	TBHS Mezzanine heater drain cooler E side S end	0.50
SP-56	TBHS Mezzanine heater drain cooler E side middle	0.45
SP-57	TBHS Mezzanine heater drain cooler E side N end	0.50
SP-58	TBHS Mezzanine #14 heater condensate discharge valve	0.30
SP-59	TBHS Mezzanine main steam line W section bottom	0.32
SP-60	TBHS Mezzanine main steam line middle section bottom	0.50
SP-61	TBHS Mezzanine main steam line E section bottom	0.50
SP-62	TBHS Mezzanine feedwater line where come through deck	0.17
SP-63	TBHS Mezzanine MS extraction gland seal line E side	0.32
SP-64	TBHS Mezzanine inlet valve to #11 heater line by valves	0.28
SP-65	TBHS Mezzanine gland seal steam from stop valves by valves	0.17

INDIVIDUAL SURVEY POINT RADIATION LEVELS (Cont.)

Survey Point Number	Location	Radiation Level Contact mr/hr
SP-66	TBHS Mezzanine gland seal steam from inlet valves by valves	0.17
SP-67	TBHS Mezzanine #3 inlet valve W side	0.22
SP-68	TBHS Mezzanine #1 inlet valve SW side	0.16
SP-69	TBHS Mezzanine #2 inlet valve W side	0.08
SP-70	TBHS Mezzanine #4 inlet valve SE side	0.10
SP-71	TBHS Mezzanine #12 stop valve SE side	0.26
SP-72	TBHS Mezzanine #11 stop valve SW side	0.40
SP-73	TBHS Basement #4 turbine inlet bend bottom	0.30
SP-74	TBHS Basement #1 turbine inlet bend bottom	0.32
SP-75	TBHS Basement #2 turbine inlet bend bottom	0.50
SP-76	TBHS Basement #3 turbine inlet bend bottom	0.60
SP-77	TBHS Basement #3 and #4 turbine inlet bend drain line	0.32
SP-78	TBHS Basement #1 and #2 turbine inlet bend drain line	0.37
SP-79	TBHS Basement steam dump line to condenser vertical section	0.50
SP-80	TBHS Basement steam dump line to condenser south end	0.26
SP-81	TBHS Basement reactor penetration cage fence E side	0.20

INDIVIDUAL SURVEY POINT RADIATION LEVELS (Cont.)

Survey Point Number	Location	Radiation Level Contact mr/hr
SP-82	TBHS Basement reactor penetration cage fence middle	0.24
SP-83	TBHS Basement reactor penetration cage fence W side	0.20
SP-84	TBHS Basement gland seal supply valve bottom	0.30
SP-85	TBHS Basement #14 heater bottom	0.16
SP-86	TBHS Basement #12 heater bottom	0.26
SP-87	TBHS Basement #11 heater shell bottom W side	0.17
SP-88	TBHS Basement #11 heater shell drain bottom W side	0.15
SP-89	TBHS Basement #12 drain pump discharge W side	0.28
SP-90	TBHS Basement #11 drain pump discharge E side	0.12
SP-91	TBHS Basement Hotwell W side N half	0.60
SP-92	TBHS Basement Hotwell W side S half	0.50
SP-93	TBHS Basement Hotwell S side middle	0.16
SP-94	TBCS Basement #12 feedwater pump discharge valve	0.05
SP-95	TBCS Basement #11 feedwater pump discharge valve	0.07
SP-96	TBCS Basement hotwell E side middle	0.42
SP-97	TBCS Basement #12 condensate pump casing NW side	0.22
SP-98	TBCS Basement #12 condensate pump suction valve W side	0.25

INDIVIDUAL SURVEY POINT RADIATION LEVELS (Cont.)

Survey Point Number	Location	Radiation Level Contact mr/hr
SP-99	TBCS Basement #11 condensate pump suction valve E side	0.22
SP-100	TBCS Basement #11 condensate pump casing NE side	0.28

4. INDIVIDUAL SURVEY POINT LOCATIONS

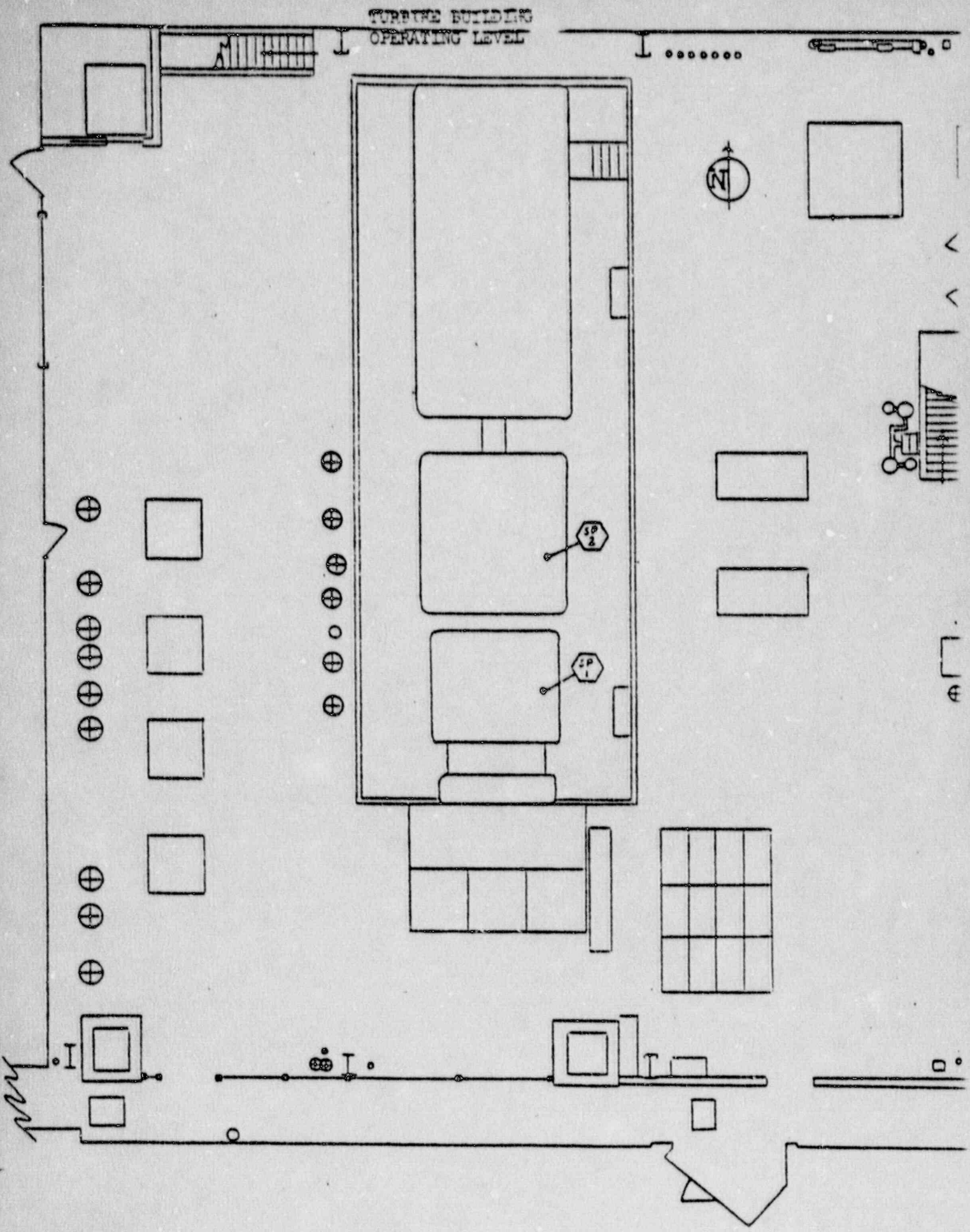
Indicated on the following six floor plans are the approximate locations of each of the 100 fossil system survey points. The number of each point corresponds to the number ahead of its description in the preceeding section. The geometric shape framing the survey point number is a reference to its approximate height. The code is as follows:

Low location, usually below knees.

Location approximately between knees and shoulders.

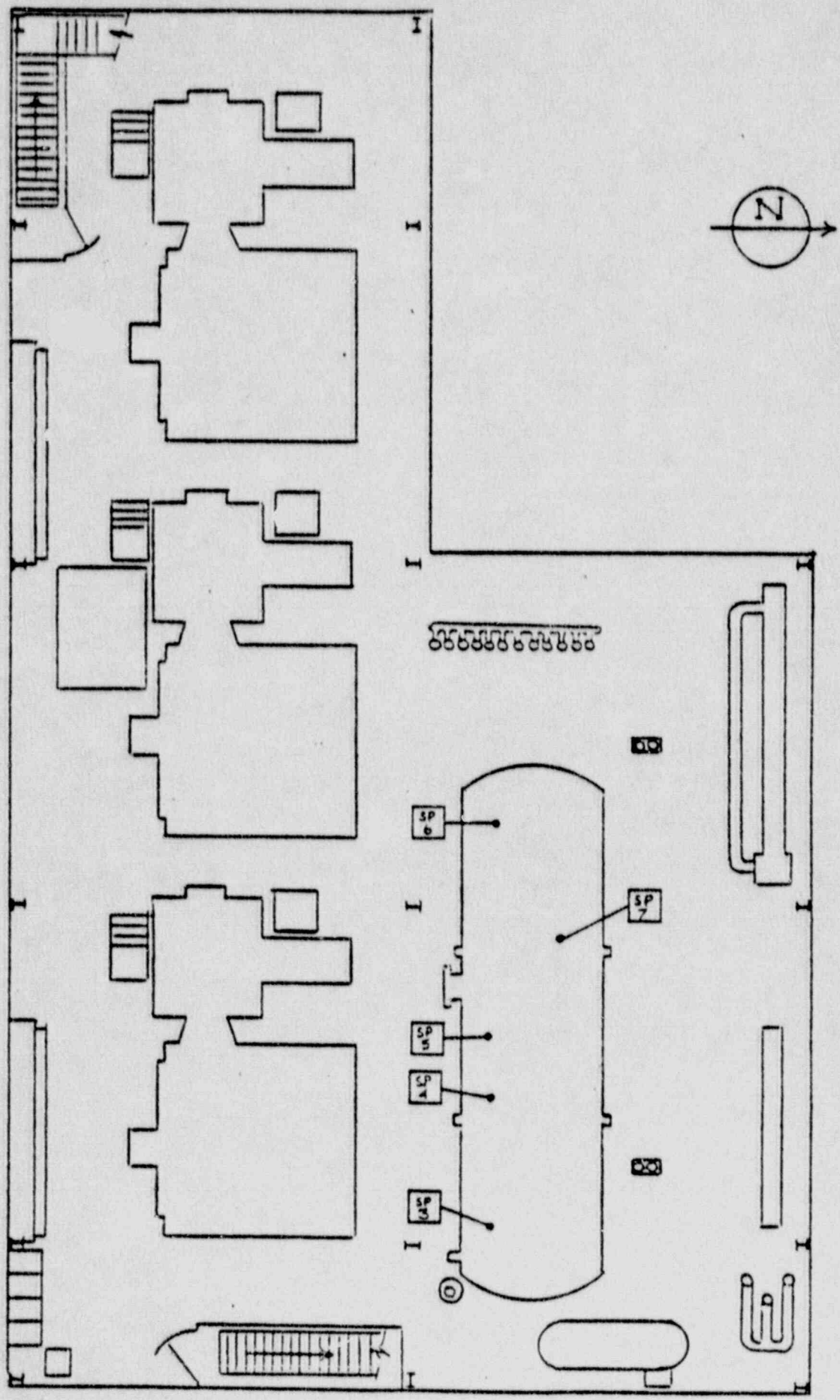
Location from shoulders to arms reach.

Location above normal reach, need ladder or stool for survey.

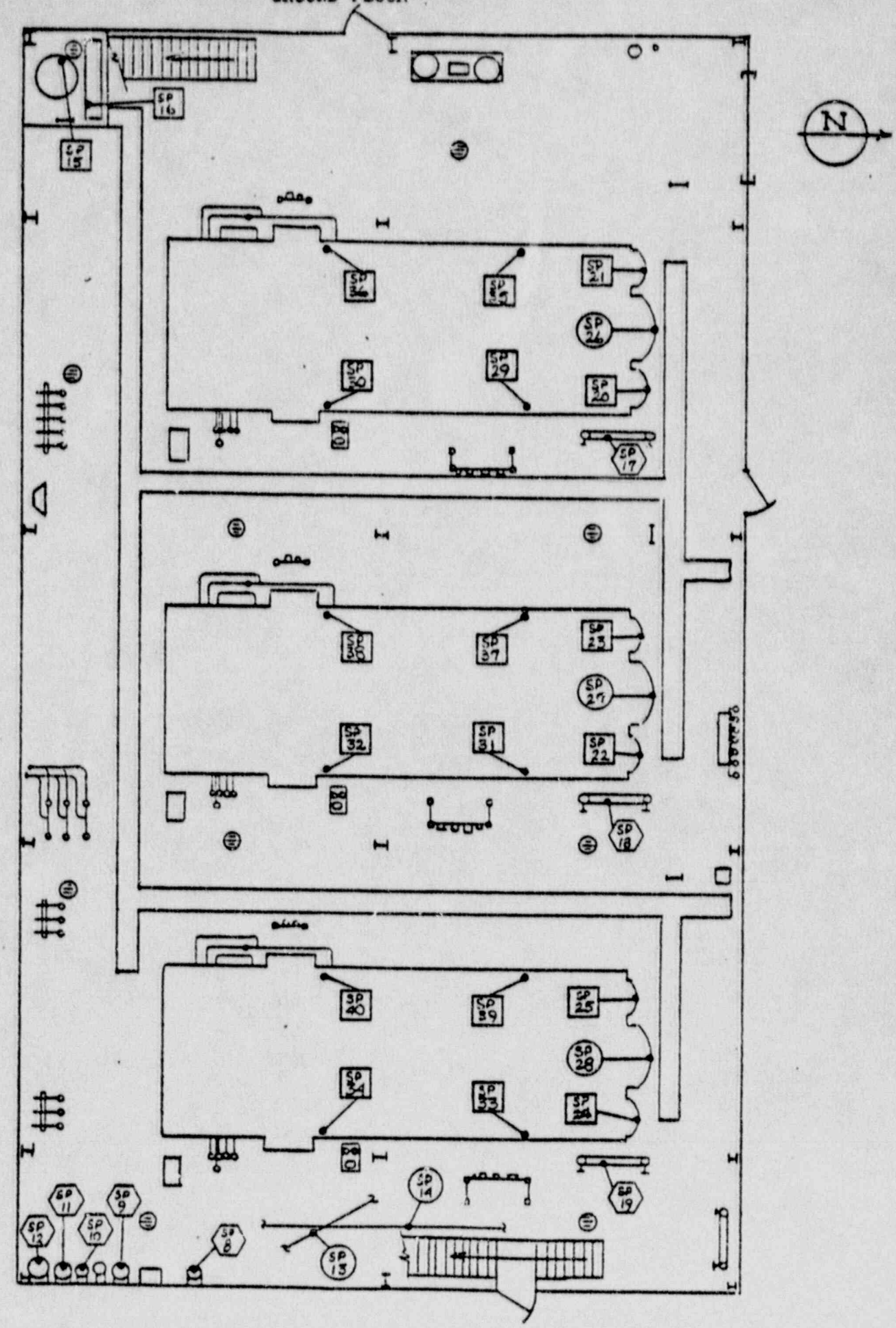


Appendix B

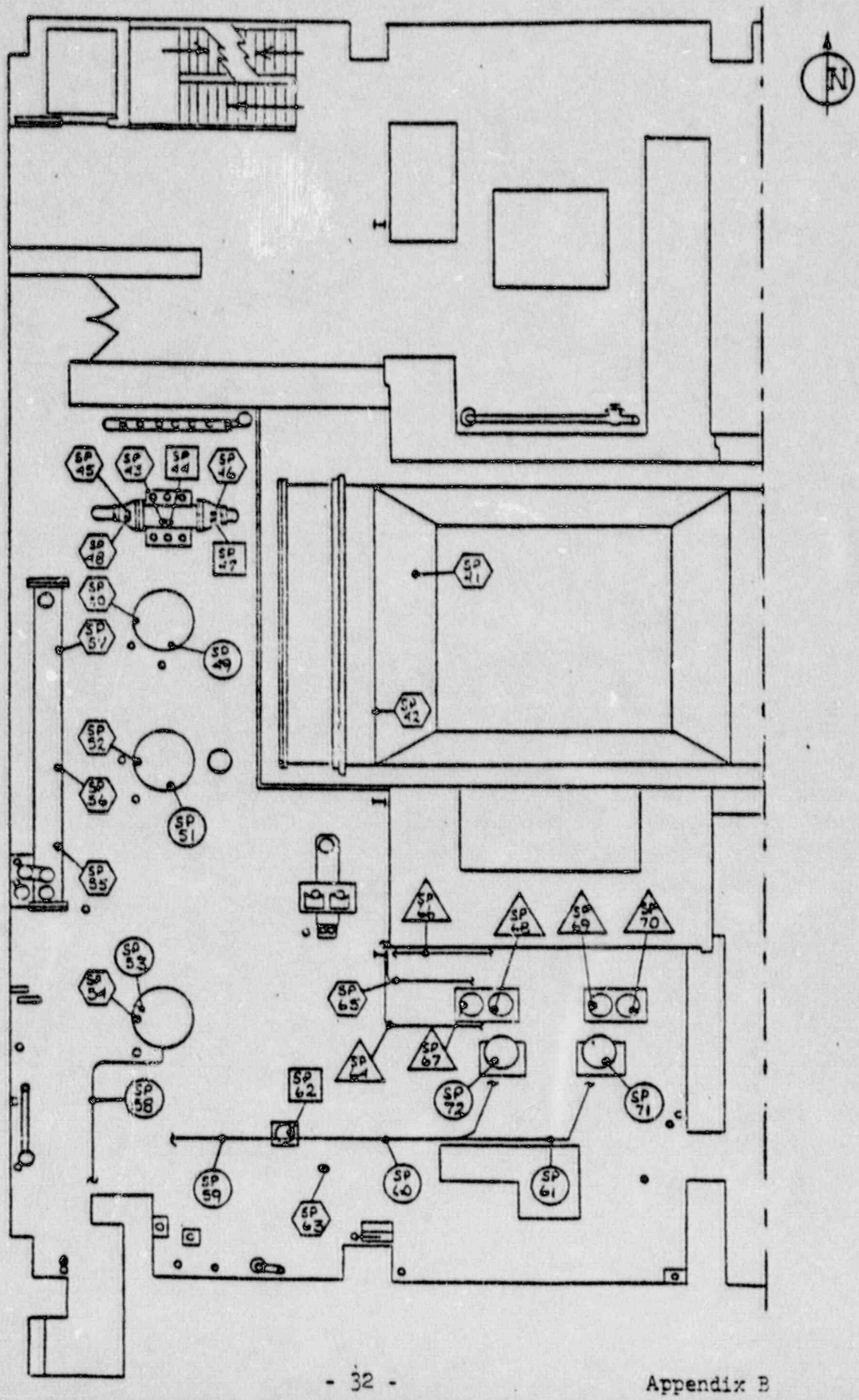
BOILER BUILDING
2ND FLOOR



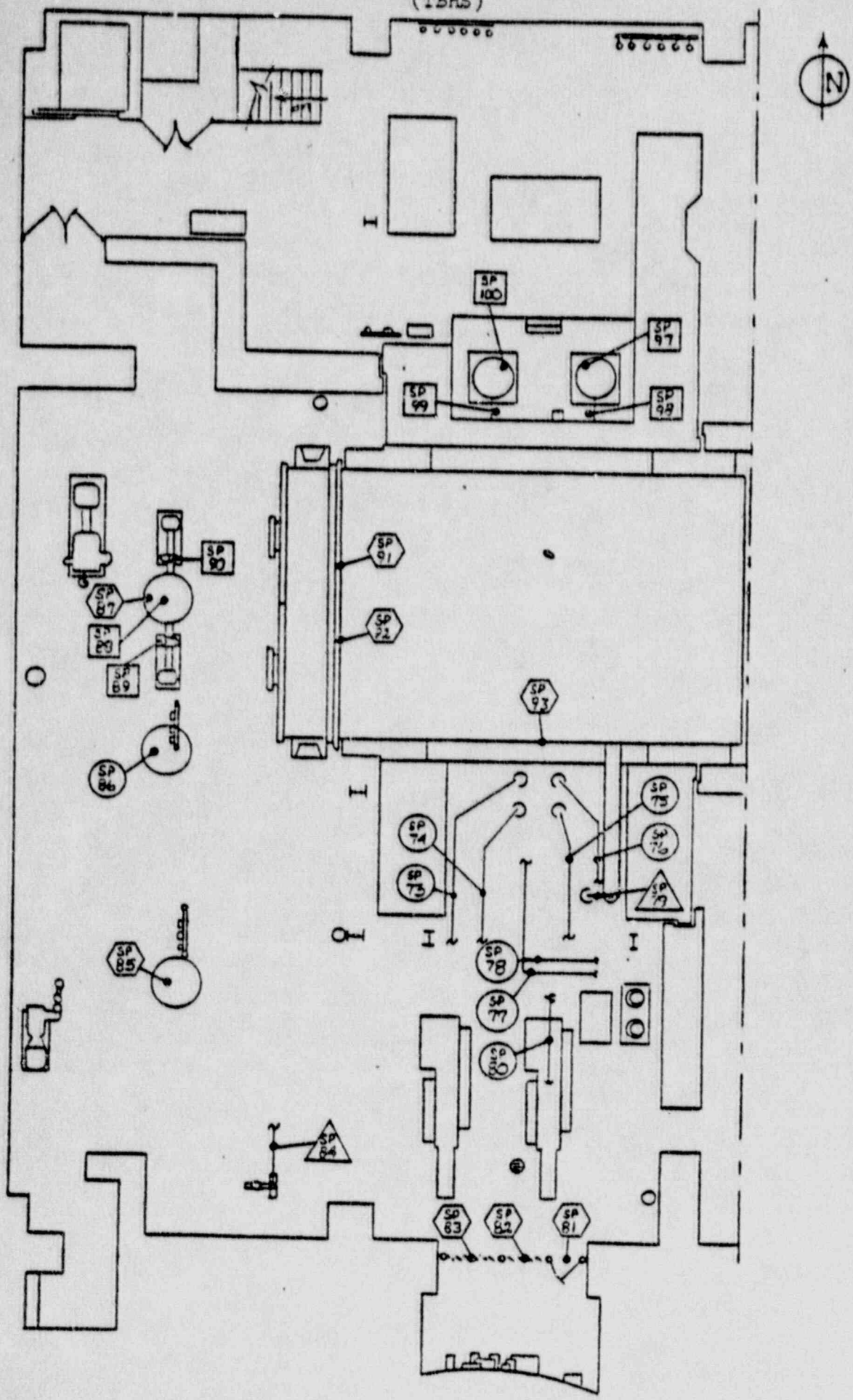
BOILER BUILDING
GROUND FLOOR



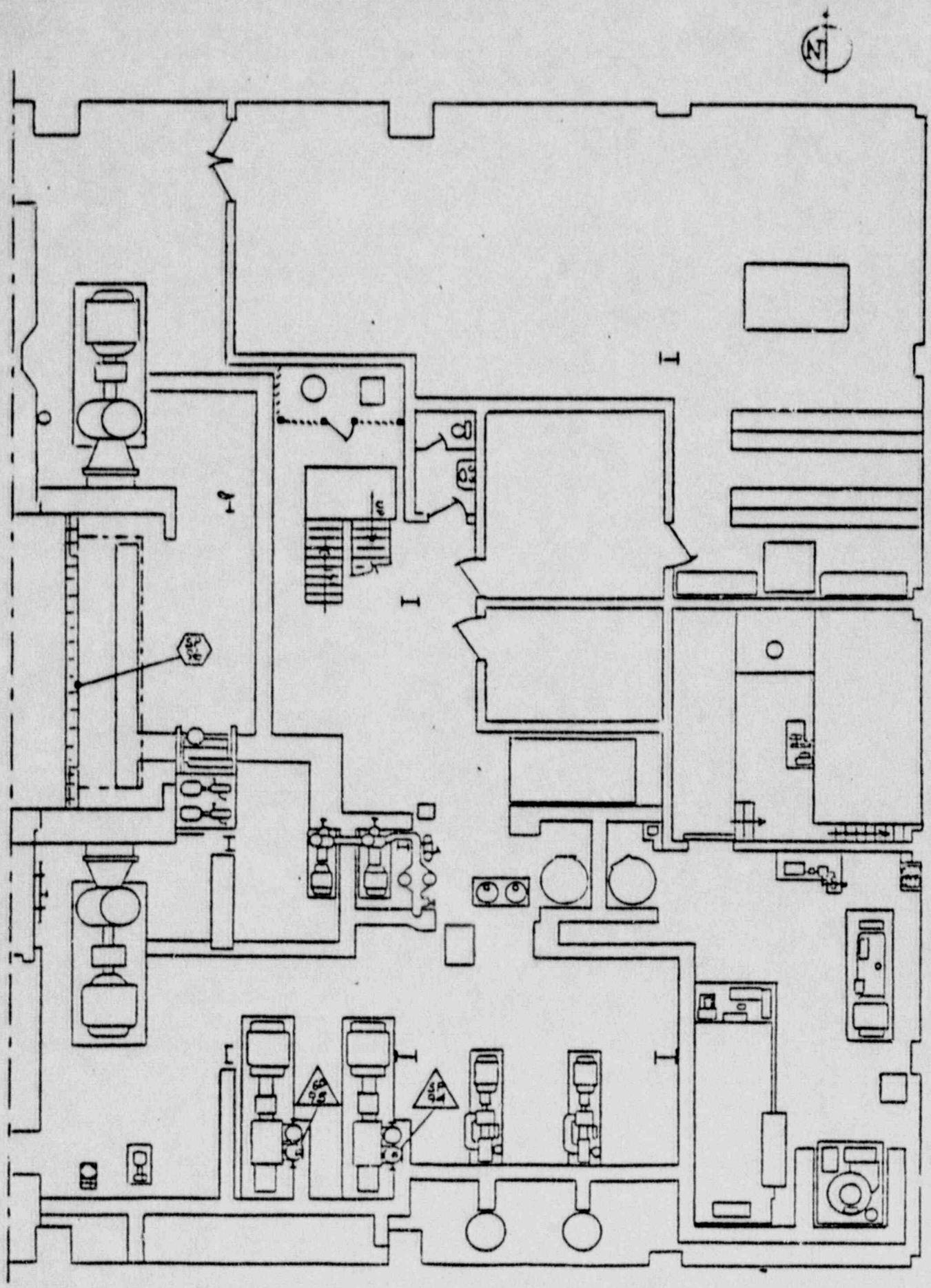
TURBINE BUILDING
HOT SIDE - MEZZANINE LEVEL
(TBHS)



TURBINE BUILDING
HOT SIDE - BASEMENT LEVEL
(TBHS)



TURBINE BUILDING
COLD SIDE - BASEMENT LEVEL
TBCS)



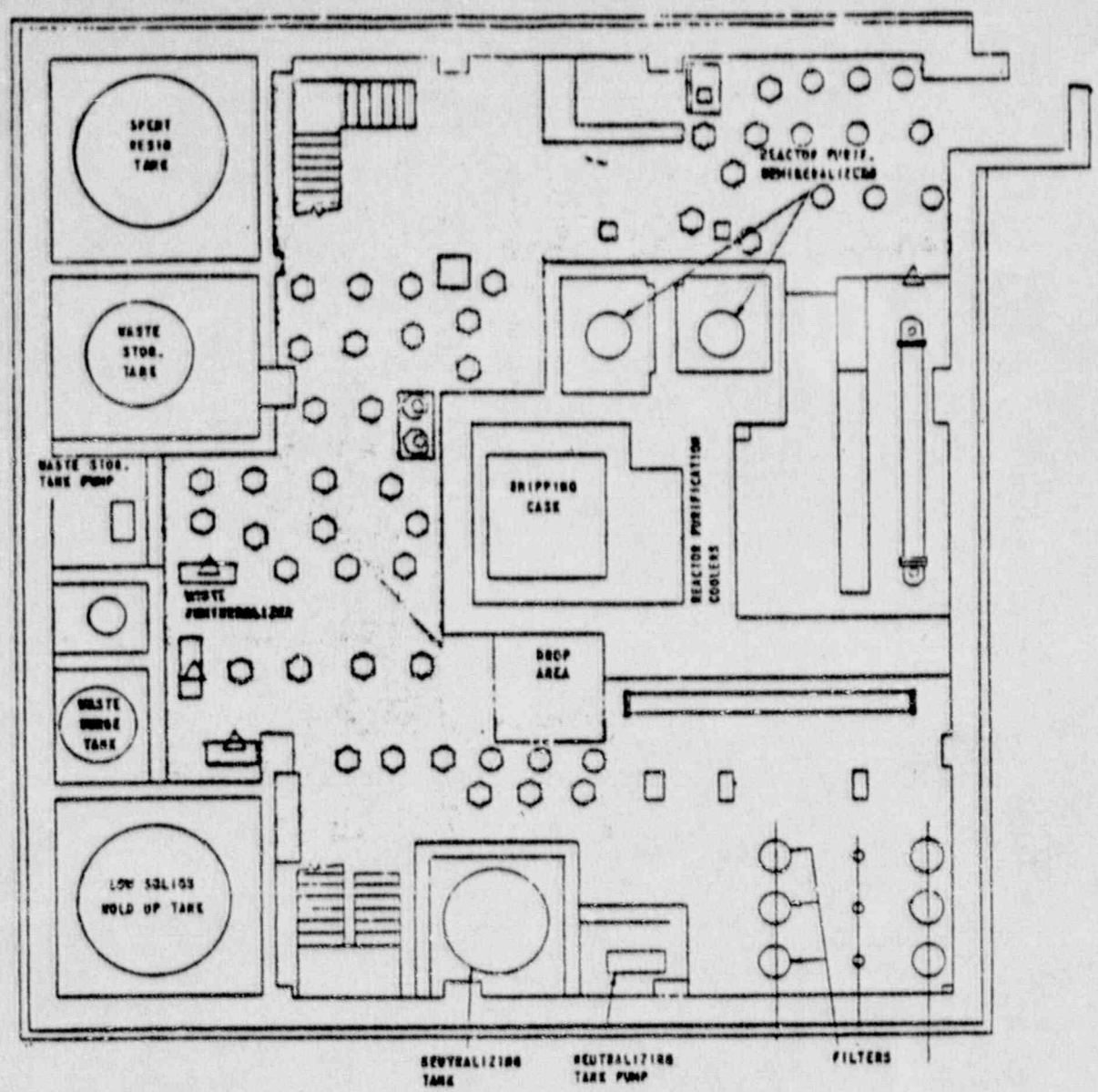
E. FOSSIL SYSTEM WATER SAMPLE ANALYSIS

Samples were taken from 10 sample locations about the Pathfinder fossil system and analyzed for gross beta radioactivity. The results of these analysis are as follows:

Sample Source	Gross Beta Activity Levels (Units = uci/ml)
#11 Boiler Water	1.44×10^{-8} uci/ml
#12 Boiler Water	$< 1 \times 10^{-8}$ uci/ml
#13 Boiler Water	4.72×10^{-8} uci/ml
#11 Main Steam	$< 1 \times 10^{-8}$ uci/ml
#12 Main Steam	$< 1 \times 10^{-8}$ uci/ml
#13 Main Steam	$< 1 \times 10^{-8}$ uci/ml
Feedwater	$< 1 \times 10^{-8}$ uci/ml
Condensate	$< 1 \times 10^{-8}$ uci/ml
Hot Sump	$< 1 \times 10^{-8}$ uci/ml
Cold Sump	$< 1 \times 10^{-8}$ uci/ml

APPENDIX C

INTERNAL RADIATION SURVEYS



LEGEND:

○ 0.5 - 1.5 MR/HR

⊗ 1.5 - 40 MR/HR

△ 14 - 40 MR/HR

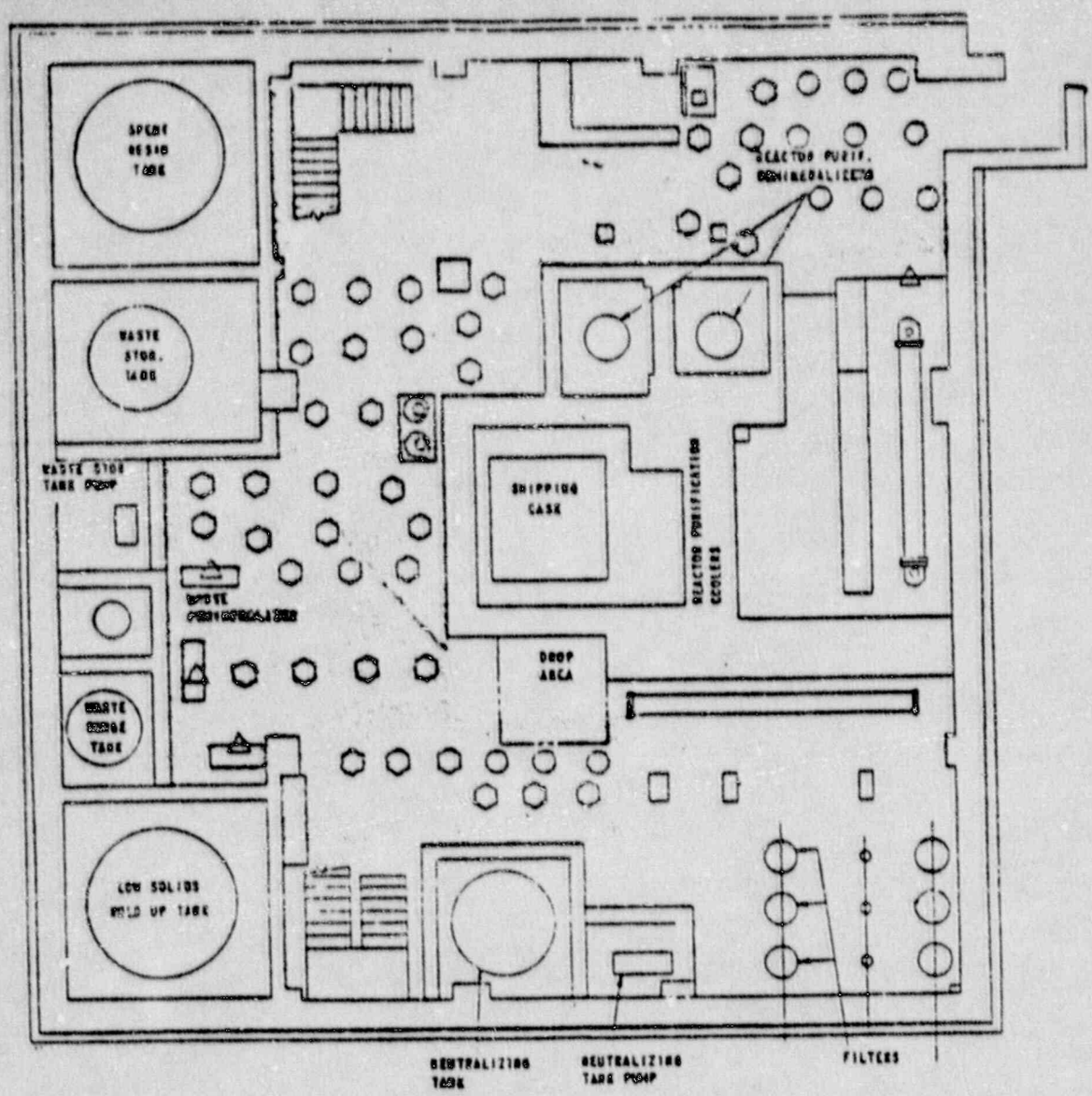
AREA SMEARED AND SURVEYED

ALL SMEARABLES LESS THAN 100DPM/100CM^2

NOTE: RADIATION LEVELS LESS THAN 0.5 MR/HR NOT SHOWN

BASEMENT FLOOR, FUEL HANDLING BUILDING

BLACK & VEATCH CONSULTING ENGINEERS KANSAS CITY, MISSOURI	NORTHERN STATES POWER COMPANY - PATHFINDER FINAL STATUS REPORT	FIGURE 12



LEGEND:

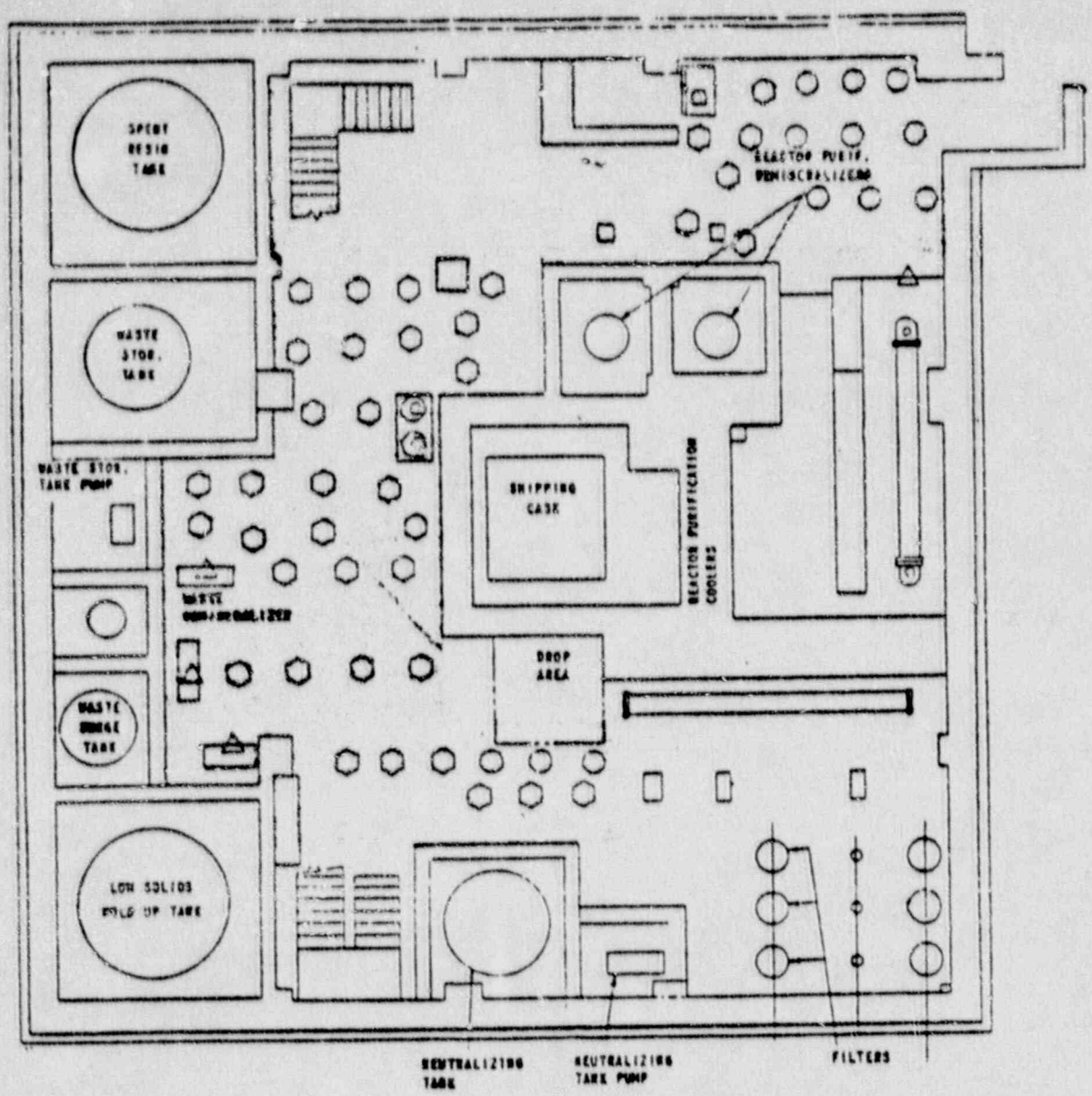
- ⬡ 0.5 - 1.5 MR/HR
- ⊗ 1.5 - 4.0 MR/HR
- △ 14 - 40 MR/HR
- AREA SMEARED AND SURVEYED

ALL SMEARABLES LESS THAN 100DPM/100CM^2

NOTE: RADIATION LEVELS LESS THAN 0.5 MR/HR NOT SHOWN

BASEMENT FLOOR, FUEL HANDLING BUILDING

BLACK & VEATCH CONSULTING ENGINEERS KANSAS CITY, MISSOURI	NORTHERN STATES POWER COMPANY PATHFINDER FINAL STATUS REPORT	FIGURE 12



LEGEND:

○ 0.5 - 1.5 MR/HR

⊗ 1.5 - 40 MR/HR

△ 14 - 40 MR/HR

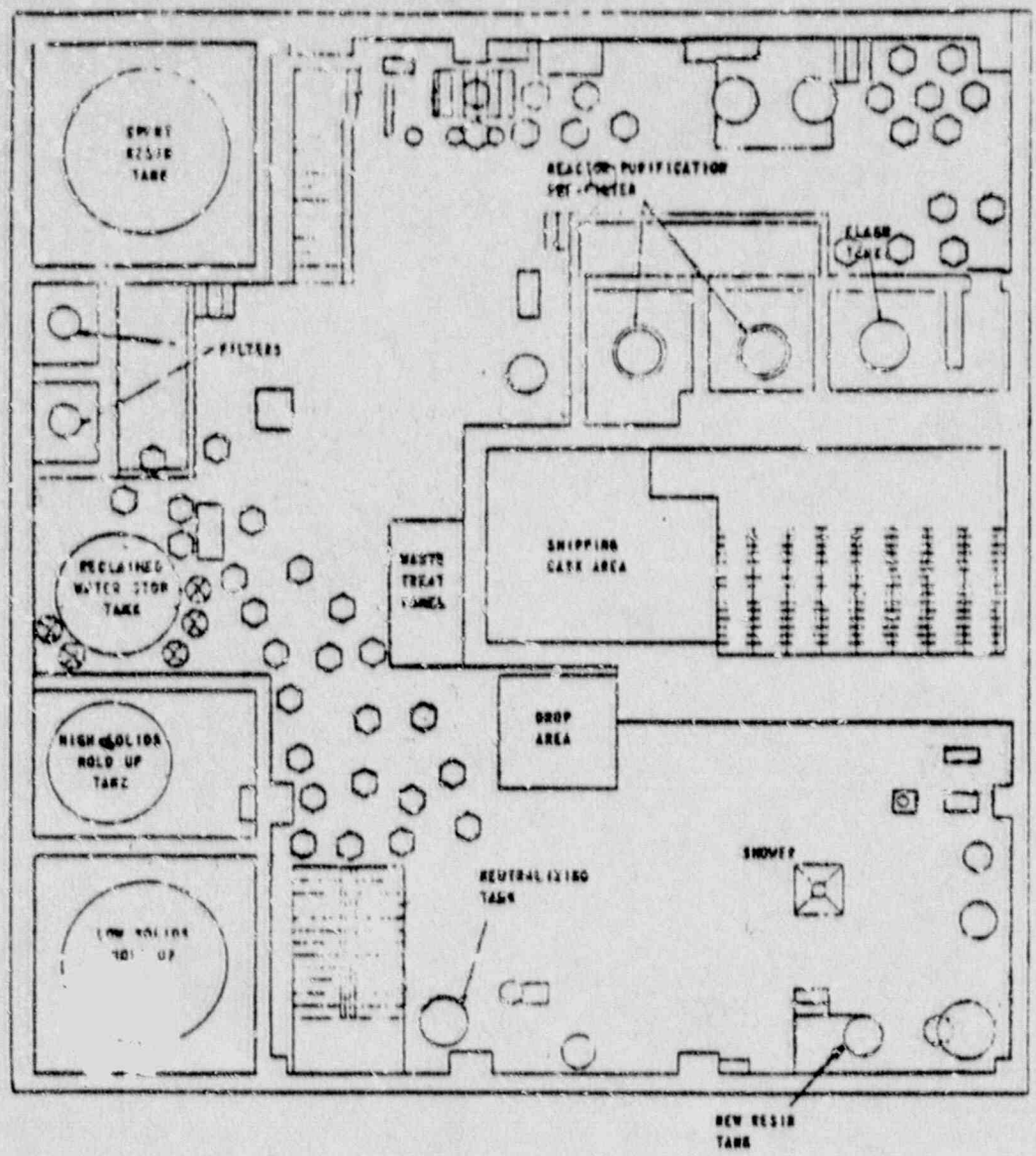
AREA SMEARED AND SURVEYED

ALL SMEARABLES LESS THAN 100DPM/100CM^2

NOTE: RADIATION LEVELS LESS THAN 0.5 MR/HR NOT SHOWN

BASEMENT FLOOR, FUEL HANDLING BUILDING

BLACK & VEATCH CONSULTING ENGINEERS KANSAS CITY, MISSOURI	NORTHERN STATES POWER COMPANY PATHFINDER FINAL STATUS REPORT	FIGURE 12



LEGEND:

ALL SMEARABLES LESS THAN 100 DPM/100 CM^2

○ 0.5-1.5 MR/HR

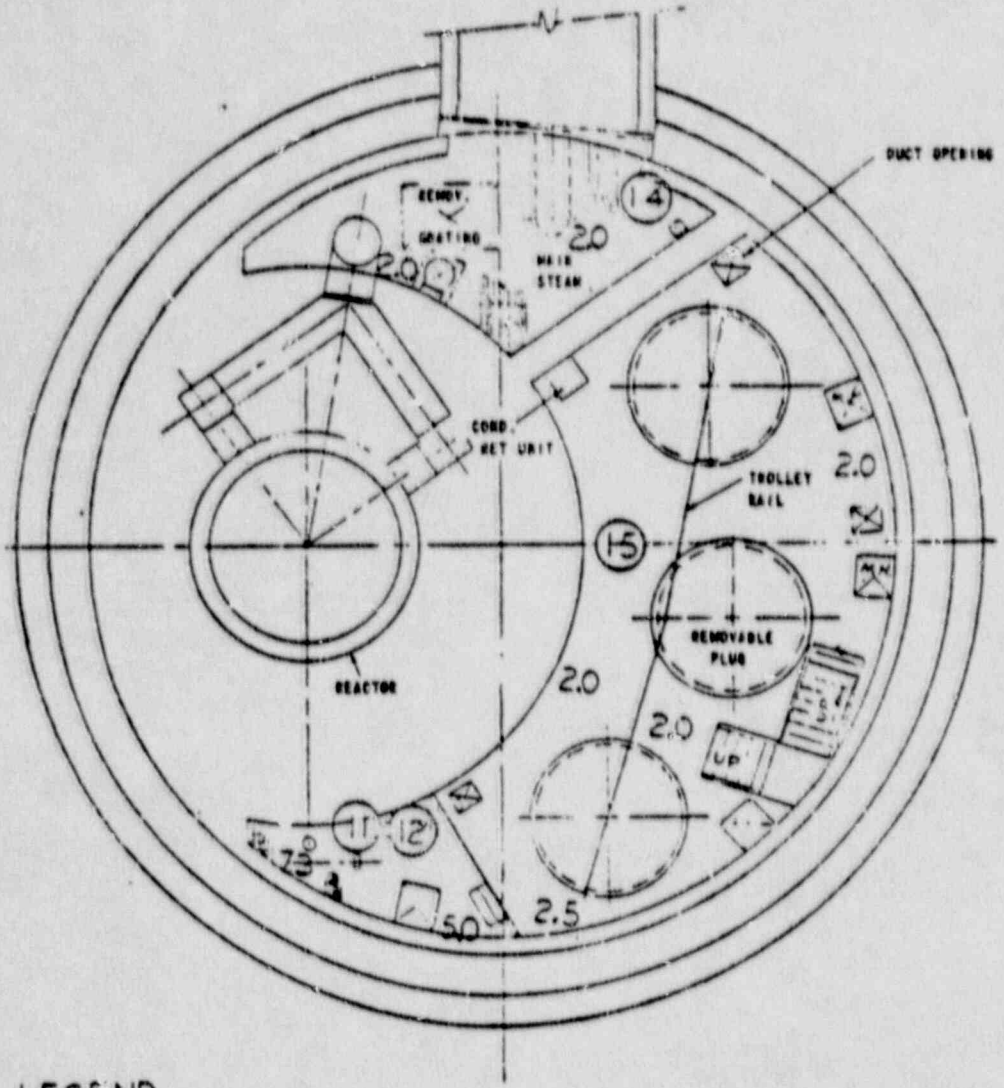
⊗ 1.5 - 5.0 MR/HR

AREA SMEARED AND SURVEYED

NOTE: RADIATION LEVELS LESS THAN 0.5 MR/HR NOT SHOWN

MEZZANINE FLOOR, FUEL HANDLING BUILDING

BLACK & VEATCH CONSULTING ENGINEERS KANSAS CITY, MISSOURI	NORTHERN STATES POWER COMPANY PATHFINDER FINAL STATUS REPORT	FIGURE 13



LEGEND

SMEARABLES DPM/100 CM^2

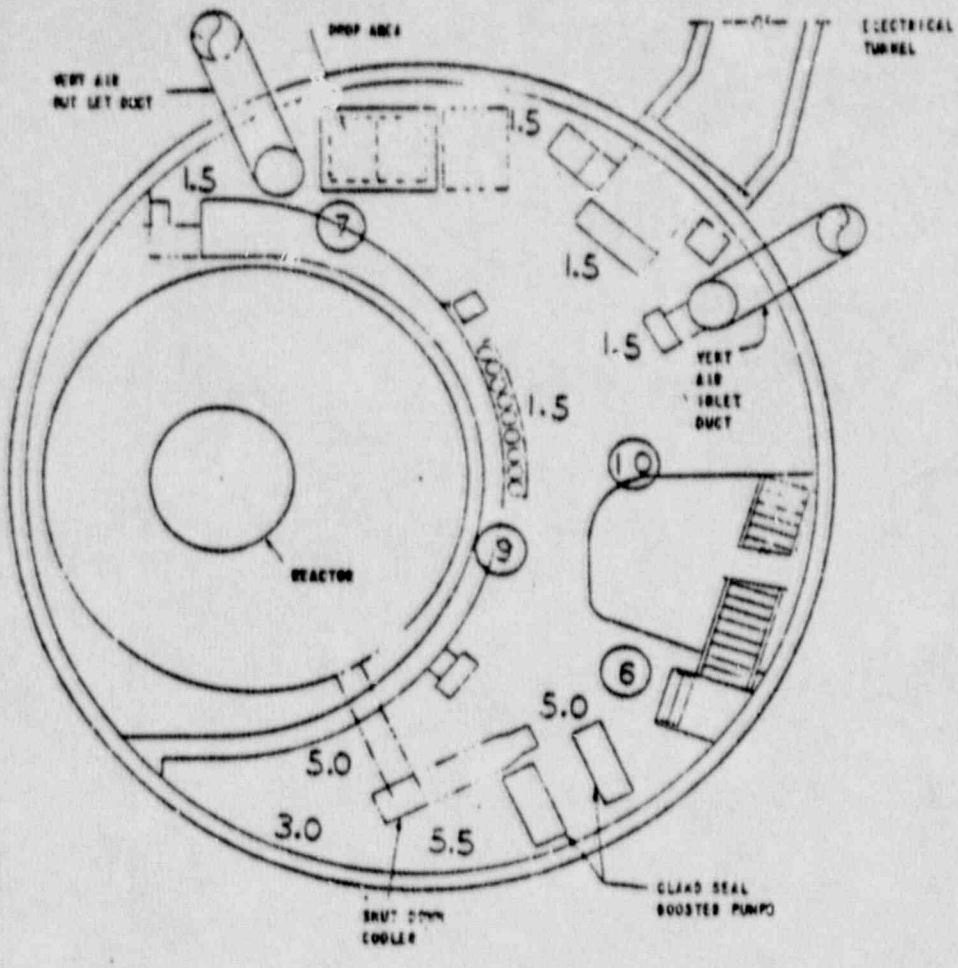
(11)	60
(12)	267
(14)	282
(15)	374

(NO) INDICATES WHERE SMEARS WERE TAKEN

RADIATION LEVELS IN MR/HR INDICATED BY UNCIRCLED NUMBERS IN THE DRAWING.

BASEMENT FLOOR, REACTOR BUILDING

BLACK & VEATCH CONSULTING ENGINEERS KANSAS CITY, MISSOURI	NORTHERN STATES POWER COMPANY PATHFINDER FINAL STATUS REPORT	FIGURE 14



LEGEND

SMEARABLES DPM/100CM^2

⑥	70
⑦	33
⑨	30
⑩	396

RADIATION LEVELS IN MR/HR INDICATED BY UNCIRCLED NUMBERS IN THE DRAWING

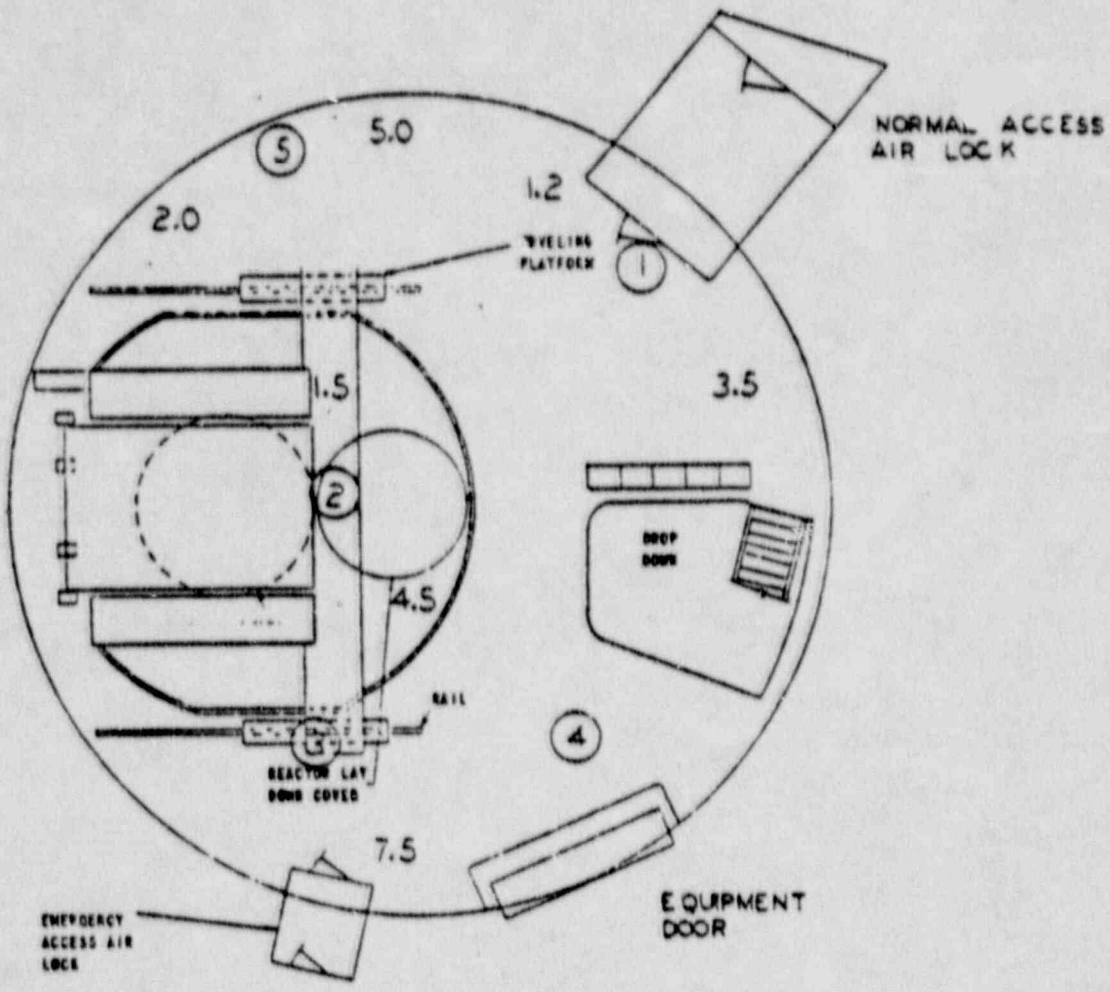
(NC) INDICATES WHERE SMEARS WERE TAKEN

MEZZANINE FLOOR, REACTOR BUILDING

BLACK & VEATCH
CONSULTING ENGINEERS
KANSAS CITY, MISSOURI

NORTHERN STATES POWER COMPANY

FIGURE 15



LEGEND

SMEARABLES DPM/100CM^2

①	126
②	1050
③	210
④	18
⑤	405

RADIATION LEVELS IN MR/HR INDICATED BY UNCIRCLED NUMBERS IN THE DRAWING

(NO) INDICATES WHERE SMEARS WERE TAKEN

OPERATING FLOOR, REACTOR BUILDING

BLACK & VEATCH
CONSULTING ENGINEERS

NORTHERN STATES POWER COMPANY
PATHFINDER FINAL STATUS REPORT

FIGURE 16

APPENDIX D

SURVEILLANCE PROGRAM

TABLE OF CONTENTS

Pathfinder Generating Plant
Northern States Power Company
Sioux Falls, South Dakota

SURVEILLANCE PROGRAM

Appendix D

PATHFINDER GENERATING PLANT DISMANTLED FACILITY SURVEILLANCE PROGRAM

INTRODUCTION

This document defines the surveillance program that will be in effect after the dismantling has been completed. The procedures to be used for both external and internal inspections are also included.

I. OBJECTIVE

The objective of this surveillance program is to determine the integrity of the reactor and fuel handling buildings to assure compliance with applicable federal and state regulations and licenses and to avoid, minimize or correct conditions which may endanger the health and safety of the public.

II. REQUIREMENTS

Northern States Power Company (NSP) shall make normal and special inspections of the dismantled facility at the Pathfinder site including providing of qualified personnel and the necessary equipment and materials for making such inspections. The Company shall provide proper maintenance and correction of any fault or condition that may endanger the health and safety of the public.

III. SURVEILLANCE PROGRAM

A. Definitions

1. The dismantled facility includes the reactor building closed areas, the fuel handling building lower levels closed areas, the fuel transfer tube closed areas and the fuel storage pool entombed areas.

2. A normal inspection is an external inspection conducted at approximately 6-month intervals to visually determine the integrity of the dismantled facility, to test for water intrusion and to survey the peripheral areas for radiation and possible radioactive contamination or leakage.

3. A special inspection is an inspection conducted due to serious water intrusion into the storage areas or due to natural incidents such as earthquake, fire, tornado, etc., which may cause the integrity of the storage volumes to be questioned. A special inspection will also be conducted when a security breach is detected or whenever deemed necessary by NSP management.

4. A serious or significant water intrusion is defined as a water intrusion of 20 inches or more as detected by the sump level monitors.

5. A security breach or security break is an unauthorized entry into any area comprising the dismantled facility.

6. A survey determine the radiation level and smearable contamination in an area. Surveys shall be conducted during both normal and special inspections.

7. An internal inspection is an inspection conducted inside the dismantled facility.

8. An external inspection is an inspection conducted about the accessible external periphery of the dismantled facility.

B. Areas to be Inspected

The areas to be inspected are the outside accessible perimeters of the dismantled facility, and when determined appropriate, the storage volumes within the dismantled facility. Drawings RS-001, RS-002 and RS-003 of Exhibit A show the external locations to be periodically inspected. The following list also identifies the locations to be inspected.

Drawing RS-001 Basement Level

1. Pipe penetrations from reactor building
2. Basement door closure near Column H-8
3. Basement pipe chase closure near Column H-8

Drawing RS-002 Mezzanine Level

4. Mezzanine door closure near Column H-8

5. Mezzanine pipe chase closure near Column H-8

6. Electrical penetrations tunnel from the reactor building

Drawing RS-003 Operating Level

7. Reactor building personnel air lock

8. Reactor building outside perimeter

9. Fuel handling building outside perimeter

10. Northwest stairwell seal

11. Southwest stairwell seal

12. Fuel storage pool cover

13. Fuel transfer tube vault hatch

14. Reactor building frieght door

15. Reactor building emergency air lock

16. Reactor building vent duct closures

17. Fuel handling building vent duct closures

18. Floor drain closures in change room

(not shown on map) Miscellaneous pipe and conduit pentration seals in the fuel handling building operating floor.

Specific spots at each location shall be used as a reference for future inspections.

C. Inspection Requirements

1. Frequency of Inspection. A normal inspection will be

conduct approximately once every 6 months plus or minus one month. A special inspection would be conducted as soon as practical after each occurrence of events like earthquakes, fires, tornadoes and the like if there is indication that damage may have occurred. A special inspection would also be conducted whenever water intrusion within the reactor of fuel handling building is found to exceed 20 inches of water, or upon discovery of a security break.

2. Normal Inspection. Normal inspections shall be conducted in accordance with the requirements contained in Section IV of this report. A report shall be made for each inspection as described in Section V. The results of the normal inspection shall be compared with those of the immediately preceeding inspections, including the inspection made at the completion of the dismantling activities.

3. Special Inspections. The Pathfinder Generating Plant Superintendent shall make recommendations to the Manager of Power Production when special inspections should be conducted based on the above requirements. NSP will inform the AEC and other regulatory authorities as appropriate, of the results of the inspection.

The minimum precautions and procedures to be used during the conduction of a special inspection are described in

Section IV of this report. These may be augmented as required to suit the actual conditions.

NSP will take whatever action is required to prevent and/or contain any incident that might endanger the health and safety of the public or operating personnel. Special inspections will normally be conducted only if obvious or suspected breach of the radioactive material storage areas has occurred, if serous incidents such as earthquake or fire might have breached or damaged the storage volumes, or otherwise deemed appropriate by NSP management.

D. Records

Records for each inspection shall be filed and kept for as long as necessary for future reference and comparison. The records shall indicate the date, survey locations and radiation levels, equipment used for the surveys, persons making the inspections, recommendations and resulting actions taken, if any.

E. Action

Northern States Power Company shall act upon the recommendations made by the inspection team. The company shall ensure that any condition requiring corrective action shall be accomplished as soon as practical.

External areas with contaminated smearables greater than 1000 dpm/100 cm^2 shall be decontaminated and the sources of activity sealed or removed.

In case of serious water intrusion accompanied by water contamination, the water shall be collected and disposed of according to AEC regulations. Intrusion sources shall be sealed.

In case of breach or fractures, proper actions shall be taken to avoid or minimize recurrence of the incident to maintain the integrity of the storage volumes.

In case of natural calamities, proper action shall be taken according to the nature of the calamity, extent of damage and the degree of radioactive contamination.

IV. PROCEDURES

A. General

1. Detailed procedures will be used for all inspections and will include the requirements of this Appendix.

2. All inspections both internal and external will be conducted in accordance with all applicable license requirement and the regulations set forth in CFR Title 10 Part 20 - Standards for protection against radiation.

3. All instruments will be checked for proper operation and calibration before making any surveys.

4. Previous inspection reports will be reviewed before making surveys.

5. The inspection team and/or any plant personnel shall

immediately report through their supervisor to NSP management if one or more of the following is observed:

a. Security break.

b. Cracks or fractures of a suspect nature.

c. Significantly higher than normal background radiation levels including the detection of any radiation levels on the exterior perifery of the dismantled facility in excess of 1 mr/hr.

d. Contamination levels equal to or in excess of 1000 dpm/100 cm^2.

e. Water level in either sump equal to or greater than 20 inches.

6. An internal inspection shall be required upon discovery of one or more of the following in the dismantled facility:

a. Building cracks or fractures accompanied by a leakage of contamination in excess of or equal to 1000 dpm/100 cm^2.

b. A sump water level exceeding or equaling 20 inches.

c. A security breach.

7. The Manager of Power Production shall be responsible for the initiation and completion of any action necessary to correct any hazardous condition that may be found.

B. <u>External Inspection Procedures</u>

1. Visually inspect and record physical conditions and/or deterioration of pipe stubs, caps and welds and the overall exterior surfaces of the reactor building and the fuel handling building.

2. Inspect for evidence of security breach or fracture.

3. Survey and take smear samples at the reference locations and other potential sources of radiation leakage.

4. Inspect carefully any areas with radiation readings or smearables greater than those of previous surveys.

5. Replace missing or deteriorated radiation warning signs.

6. Inspect the reactor and fuel handling buildings for water intrusion.

7. Equipment

   a. Portable multi-range G-M survey instrument

   b. Manometer and associated connections to check for water intrusion

   c. Dosimeters or other personal radiation monitoring device

   d. Portable lighting

   e. Measuring tape

   f. Air sampling equipment

8. Materials

   a. Filter papers for smear samples

   b. Smear sample containers

   c. Radiation warning labels

   d. Report forms

C. Internal Inspection Procedures

1. Personnel Requirements. At least two persons are required to make an internal inspection. Under no circumstances will any exception be made. Two persons will make the actual inspection and shall have the proper equipment and protective devices before entering the buildings. Both shall be in direct communciation with the control room or designated persons.

2. Minimum Equipment Requirements

2 Gas masks and 2 self contained breathing apparatus
2 Portable 2-way communication sets
2 Portable multi-range ionization chambers
2 Portable lights
2 Pocket dosimeters
2 Film badges (beta-gamma)
1 Combustible gas monitor
1 Camera with strobe, film, and batteries (availability)
1 Gas flow proportional counter (availability)
2 Grab sample flasks

3. Material Requirements

Circular paper filters for smear samples
Anti-contamination clothing
Contaminated waste containers
Poly sheeting, barricade material and radiation warning signs to be used to establish an entrance control area

4. Procedure. An initial entry survey procedure will be used for all internal inspections. Requirements for performing the internal inspections will be determined from this initial entry survey. Specific inspection considerations for the

internal surveys will be based on the reason for initiating the survey.

The initial entry survey procedure will include the following requirements:

a. The establishment of an entrance control area immediately outside the entrance point.

b. Complete suit up of anti-contamination clothing with self-contained breathing apparatus and personnel dosimetry.

c. Explosive level of inside air will be determined before energizing internal lighting.

d. Samples to determine airborne activity levels will be obtained.

e. Background radiation levels of the initial entry area will be obtained.

V. REPORTS AND REPORTING

A. Requirements

A report shall be made each time an inspection is made. The report shall consist mainly of properly completed inspection forms and any comments or recommendations of the inspection team. The reports shall be prepared timely after the inspection. Proposed formats for the inspection reports are included as Exhibit B and C of this Appendix.

B. Persons Responsible

The inspection team shall be responsible for making the inspection report to the Manager of Power Production or his representative.

The Manager of Power Production or his representative shall be responsible for filing reports into the records as well as acting on the recommendations of the report. He or his representative shall record any actions taken on the recommendations. When appropriate, the Manager of Power Production shall file a report with the AEC and/or other regulatory agencies in accordance with 10CFR30, 10CFR20 and/or other applicable regulations.

EXHIBIT A

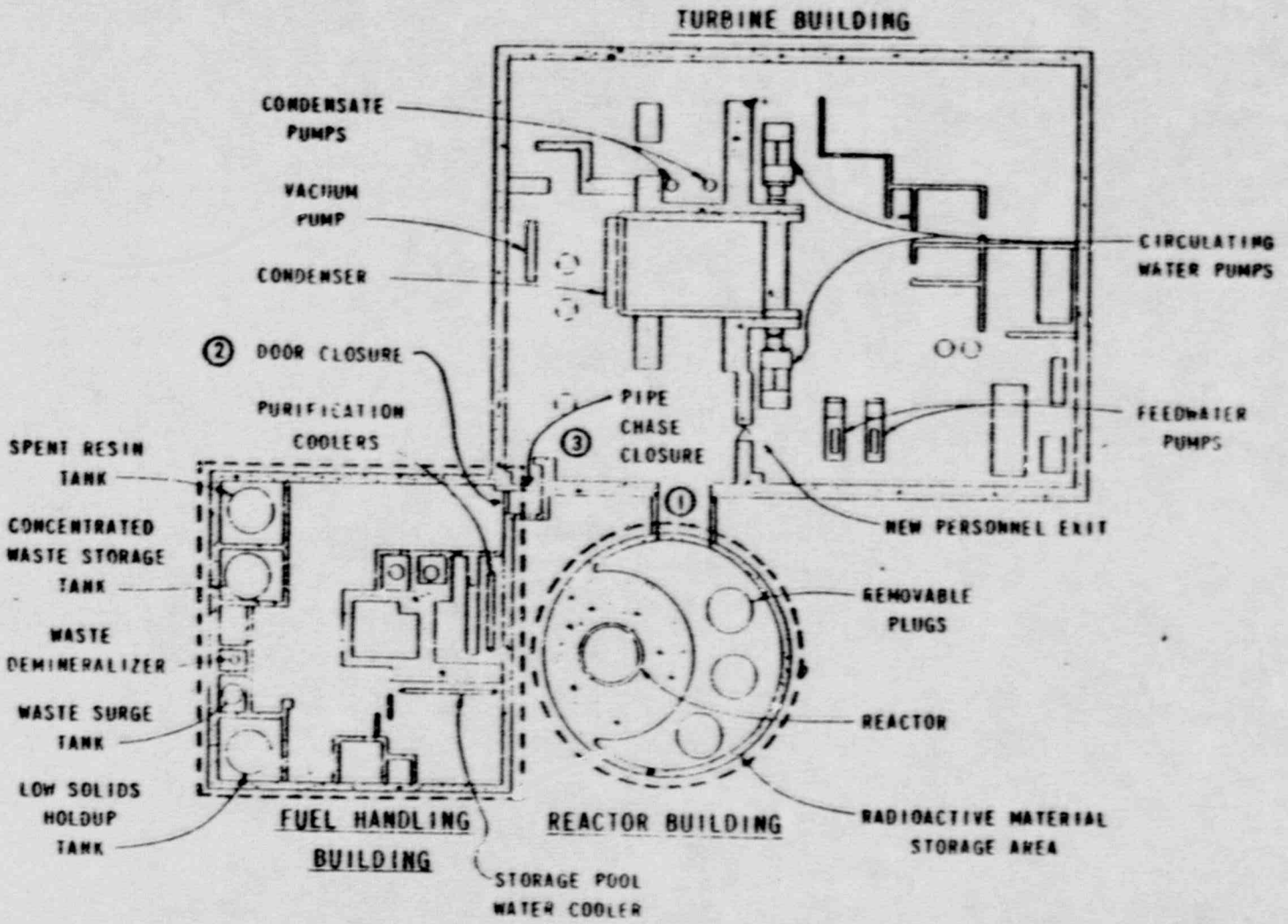
PLANT PLAN DRAWINGS

BLACK & VEATCH
CONSULTING ENGINEERS
KANSAS CITY, MISSOURI

NORTHERN STATES POWER COMPANY

PATHFINDER SURVEILLANCE PROGRAM

RS-001



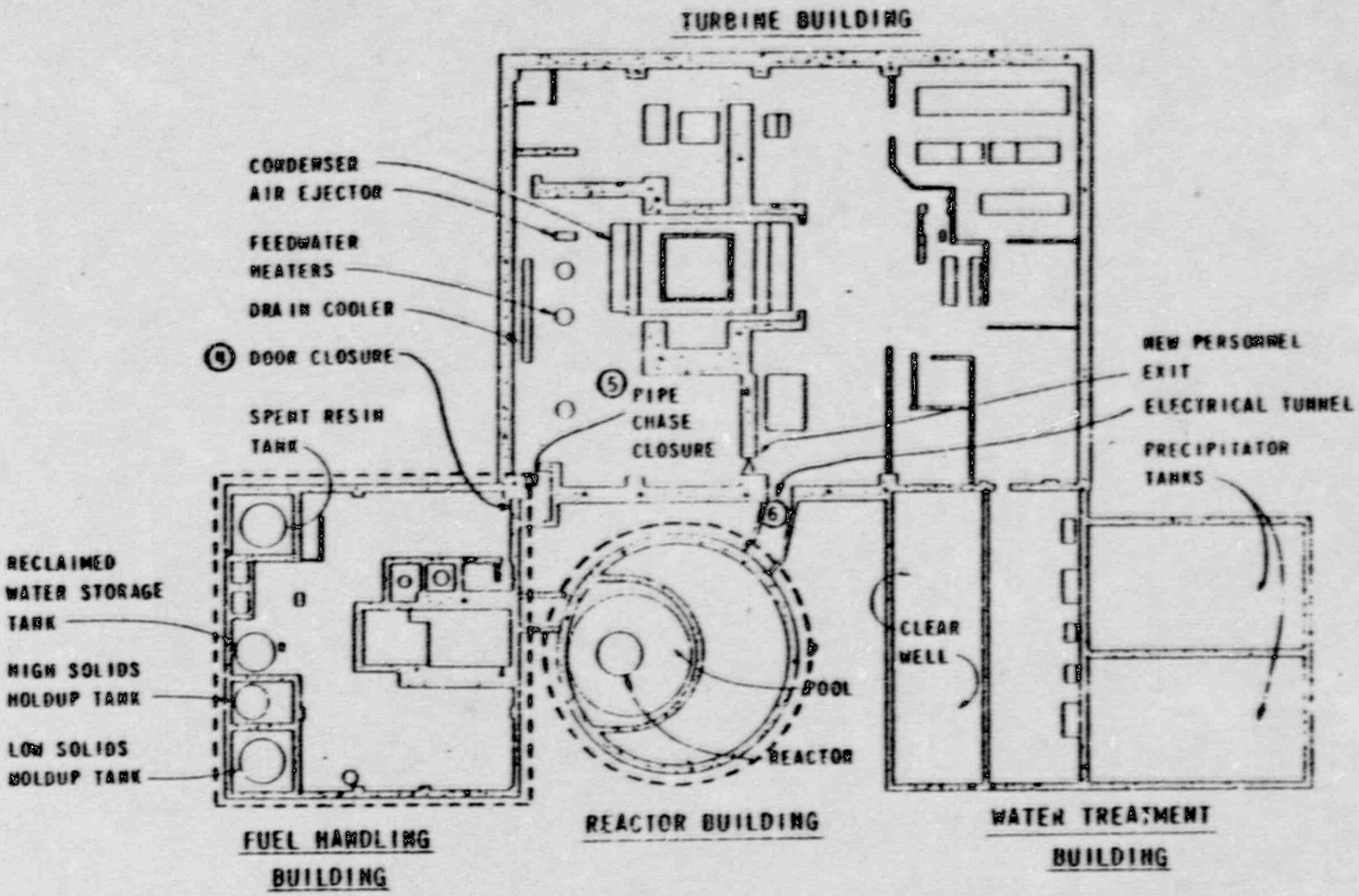
BASEMENT FLOOR

P-1-01A

BLACK & VEATCH
CONSULTING ENGINEERS
KANSAS CITY, MISSOURI

NORTHERN STATES POWER COMPANY
PATHFINDER SURVEILLANCE PROGRAM

RS-002



MEZZANINE FLOOR

P-1.0-1A

BLACK & VEATCH
CONSULTING ENGINEERS
KANSAS CITY, MISSOURI

NORTHERN STATES POWER COMPANY
PATHFINDER SURVEILLANCE PROGRAM

RS-003

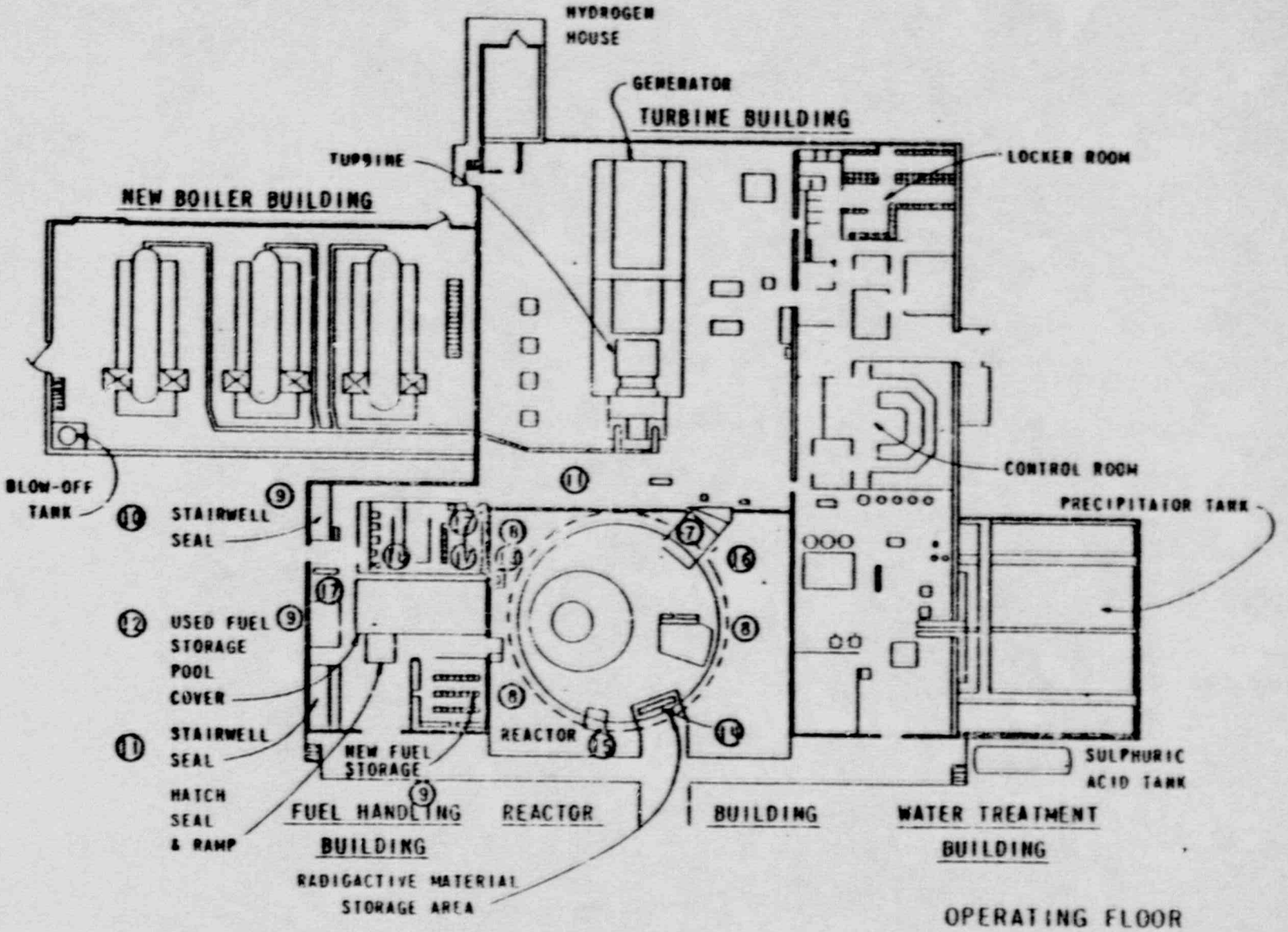


EXHIBIT B

PATHFINDER DISMANTLED FACILITY

SURVEILLANCE REPORT

NUMBER ____

SURVEY DATE _____

SURVEY BY _____

_____

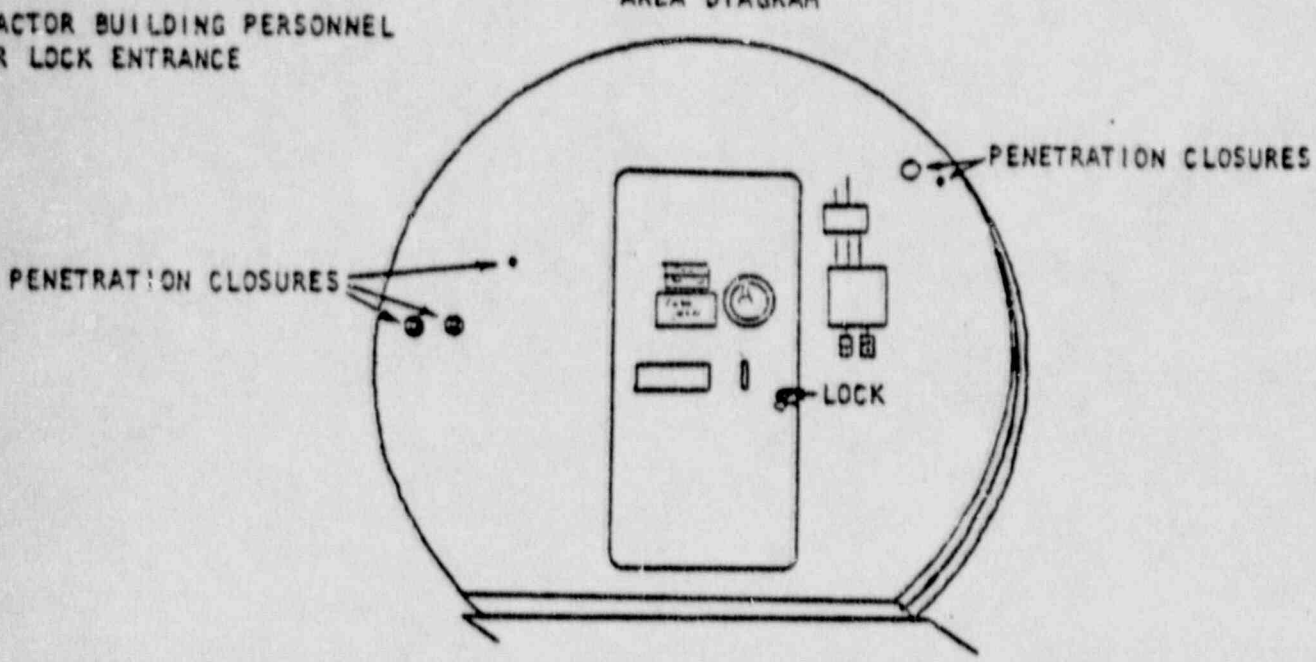
ACTION ITEMS

CONDITIONS DETECTED DURING THE SURVEY REQUIRING FURTHER INVESTIGATION

ITEM NO.	LOCATION	DESCRIPTION
1		
2		
3		
4		
5		
6		
7		
8		

RADIATION SURVEY AREA NO. 1

AREA DIAGRAM



PHYSICAL CONDITIONS
(Check One)

( ) No abnormal physical conditions can be detected.

( ) Abnormal conditions have developed as illustrated above.

RADIATION SURVEY

Type Survey	Location and Comments	Report Units	Base Level	Previous Level	Current Level
RAD LEVEL	over general area	mR/hr	<0.1		
RAD LEVEL	(A) on window above	mR/hr	<0.1		
SMEAR	at penetration closures	dpm/smear	<100		
SMEAR	around door seal	dpm/smear	<100		
SMEAR	floor area by door	dpm/smear	<100		
AIR	at entrance area	uCi/cc	———		

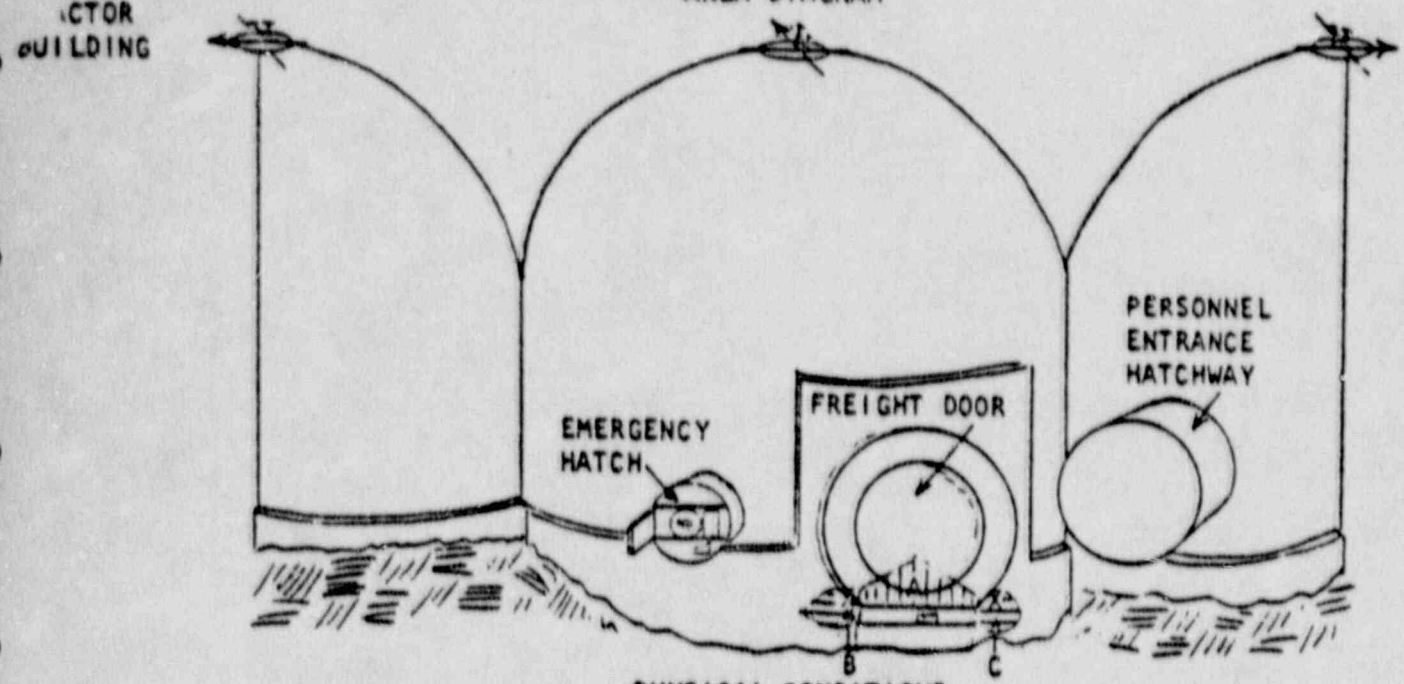
RESULTS
(Check One)

( ) The survey has found the area in acceptable condition.

( ) The survey has found conditions requiring further investigation and these conditions are listed as action item no.____

RADIATION SURVEY AREA NO. 2

AREA DIAGRAM



PHYSICAL CONDITIONS
(Check One)

( ) No abnormal physical conditions can be detected.

( ) Abnormal conditions have developed as illustrated above.

RADIATION SURVEY

Type Survey	Location and Comments	Report Units	Base Level	Previous Level	Current Level
RAD LEVEL	over general perimeter	mR/hr	<0.1		
RAD LEVEL	at emergency hatch	mR/hr	<0.1		
RAD LEVEL	freight door area (A)	mR/hr	0.1 - 0.3		
RAD LEVEL	freight door spot (B)	mR/hr	0.6 max		
RAD LEVEL	freight door spot (C)	mR/hr	0.8 max		
SMEAR	emergency hatch area	dpm/smear	<100		
SMEAR	freight door area	dpm/smear	<100		

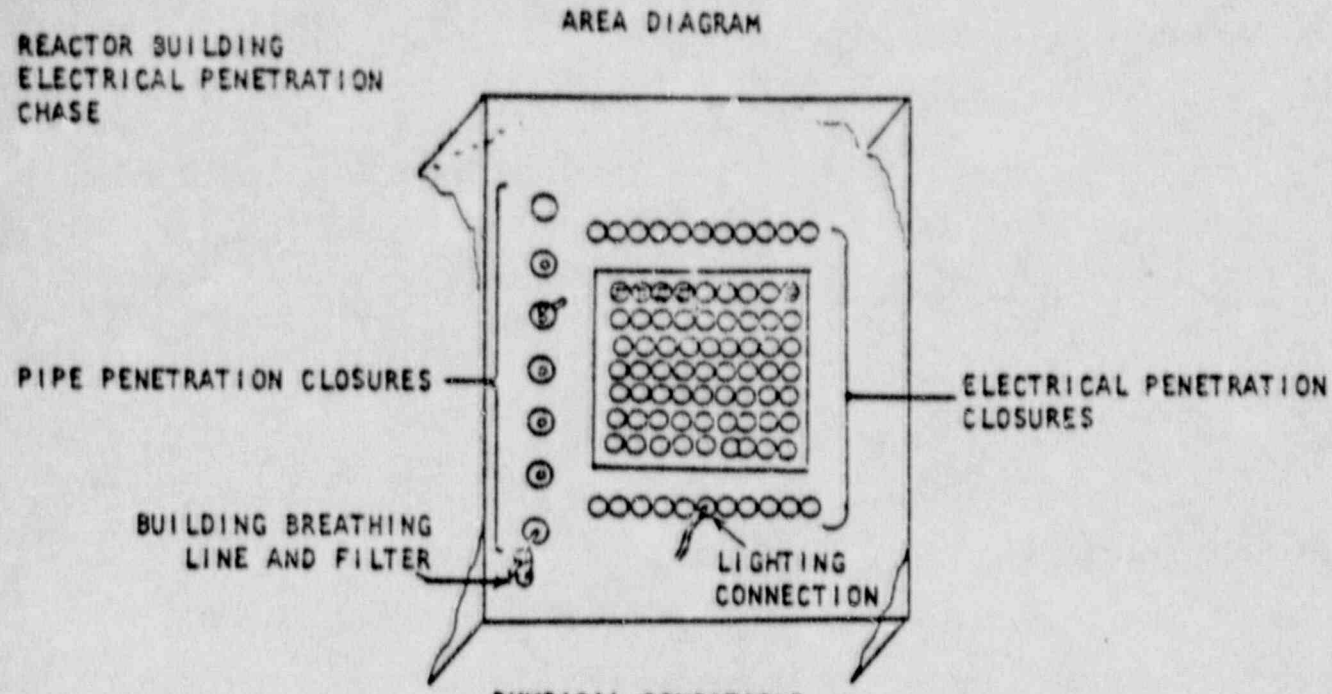
RESULTS
(Check One)

( ) The survey has found the area in acceptable condition.

( ) The survey has found conditions requiring further investigation and these conditions are listed as action item no._____

RADIATION SURVEY AREA NO. 3

AREA DIAGRAM



PHYSICAL CONDITIONS
(Check One)

( ) No abnormal physical conditions can be detected.

( ) Abnormal conditions have developed as illustrated above.

RADIATION SURVEY

Type Survey	Location and Comments	Report Units	Base Level	Previous Level	Current Level
RAD LEVEL	over general areas	mR/hr	<0.1		
RAD LEVEL	at breather filter	mR/hr	<0.1		
SMEARS	at pipe penetration	dpm/smear	<100		
SMEAR	at electrical penetrations	dpm/smear	<100		
SMEAR	of breather filter	dpm/smear	<100		
SMEAR	floor areas in chase	dpm/smear	<100		

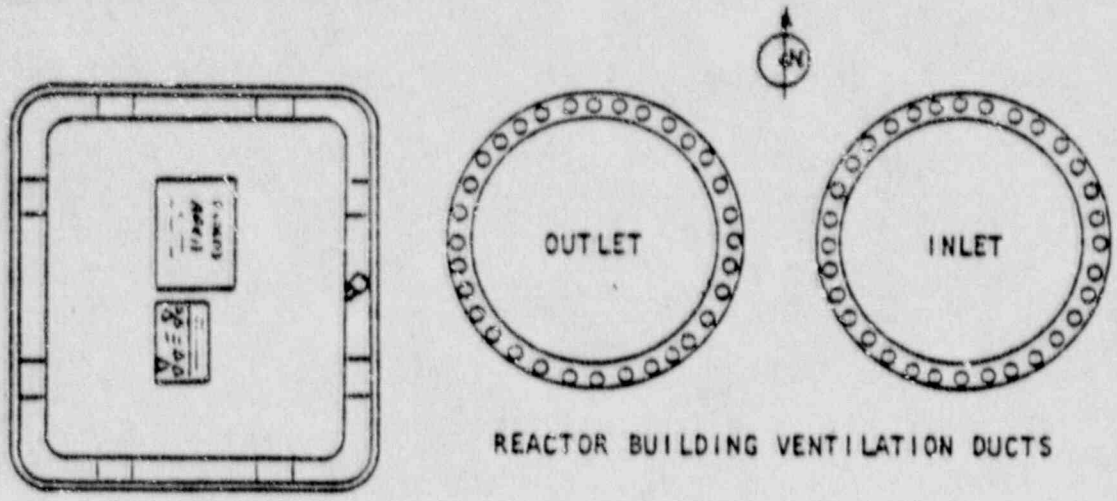
RESULTS
(Check One)

( ) The survey has found the area in acceptable condition.

( ) The survey has found conditions requiring further investigation and these conditions are listed as action item no.____

RADIATION SURVEY AREA NO. 4

AREA DIAGRAM



PHYSICAL CONDITIONS
(Check One)

( ) No abnormal physical conditions can be detected.

( ) Abnormal conditions have developed as illustrated above.

RADIATION SURVEY

Type Survey	Location and Comments	Report Units	Base Level	Previous Level	Current Level
RAD LEVEL	over vault hatch area	mR/hr	<0.1		
RAD LEVEL	RB vent inlet areas	mR/hr	<0.1		
RAD LEVEL	RB vent outlet areas	mR/hr	<0.1		
SMEAR	at vault hatch closure	dpm/smear	<100		
SMEAR	at vent inlet closure	dpm/smear	<100		
SMEAR	at vent outlet closure	dpm/smear	<100		

RESULTS
(Check One)

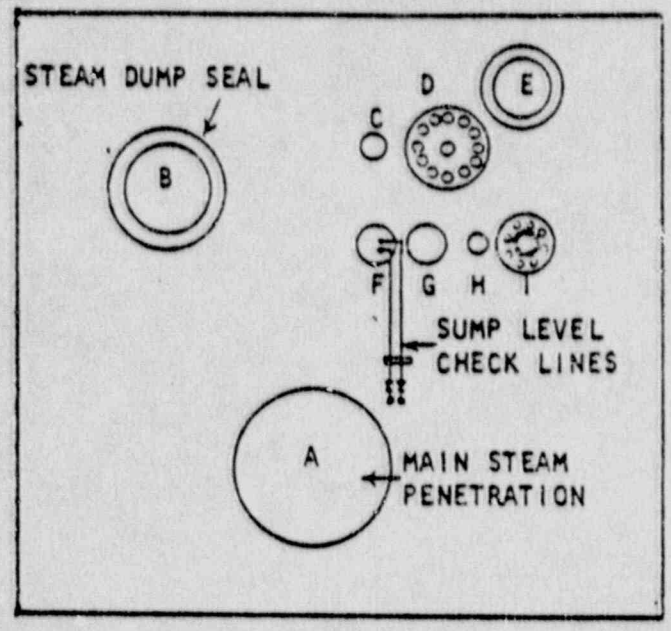
( ) The survey has found the area in acceptable condition.

( ) The survey has found conditions requiring further investigation and these conditions are listed as action item no._____

RADIATION SURVEY AREA NO. 5

AREA DIAGRAM

REACTOR PENETRATION CAGE AREA



PHYSICAL CONDITIONS
(Check One)

( ) No abnormal physical conditions can be detected.

( ) Abnormal conditions have developed as illustrated above.

RADIATION SURVEY

Type Survey	Location and Comments	Report Units	Base Level	Previous Level	Current Level
RAD LEVEL	penetration (A) above	mR/hr	1.3 max		
RAD LEVEL	penetration (E) above	mR/hr	6.0 max		
RAD LEVEL	penetration (I) above	mR/hr	4.8 max		
RAD LEVEL	penetrations (BCDFG&H)	mR/hr	0.2 - 1.2		
RAD LEVEL	general walk areas	mR/hr	0.1 - 0.8		
RAD LEVEL	at restriction fence	mR/hr	0.1 - 0.2		
SMEAR	from penetrations and floor	dpm/smear	<100		

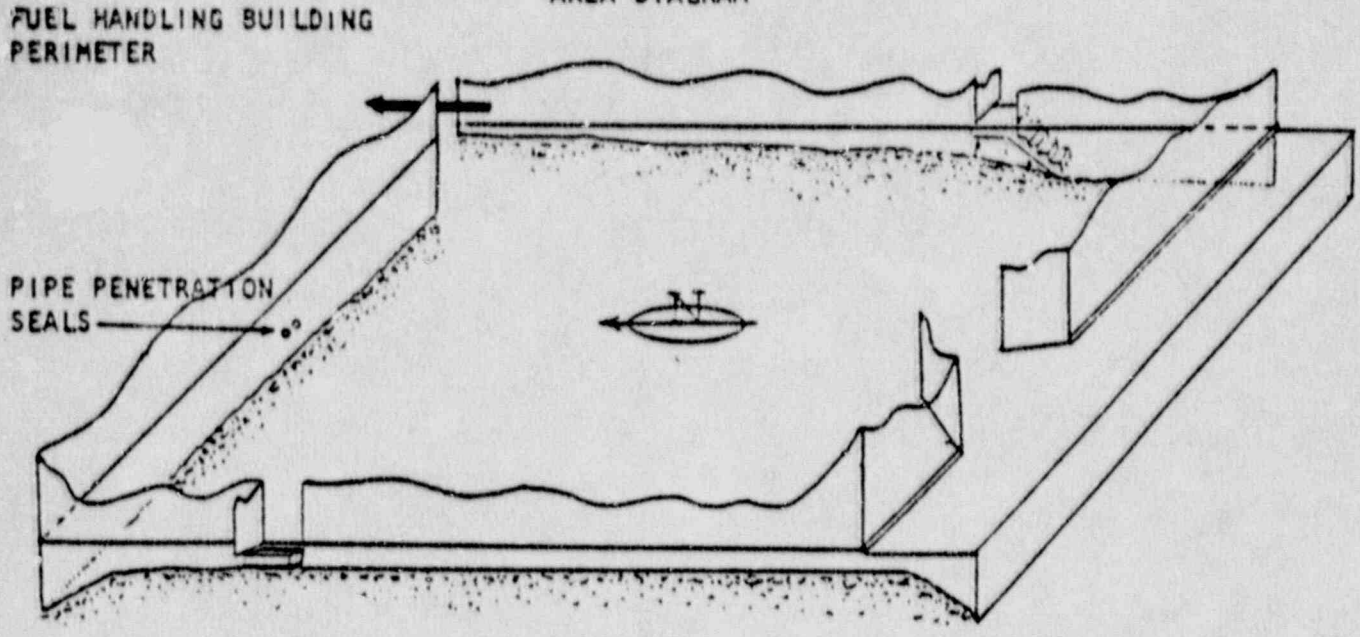
RESULTS
(Check One)

( ) The survey has found the area in acceptable condition

( ) The survey has found conditions requiring further investigation and these conditions are listed as action item no._____

RADIATION SURVEY AREA NO. 6

AREA DIAGRAM



PHYSICAL CONDITIONS
(Check One)

( ) No abnormal physical conditions can be detected.

( ) Abnormal conditions have developed as illustrated above.

RADIATION SURVEY

Type Survey	Location and Comments	Report Units	Base Level	Previous Level	Current Level
RAD LEVEL	around general perimeter	mR/hr	<0.1		
RAD LEVEL	at pipe penetrations	mR/hr	<0.1		
SMEARS	at pipe penetrations	dpm/smear	< 100		

RESULTS
(Check One)

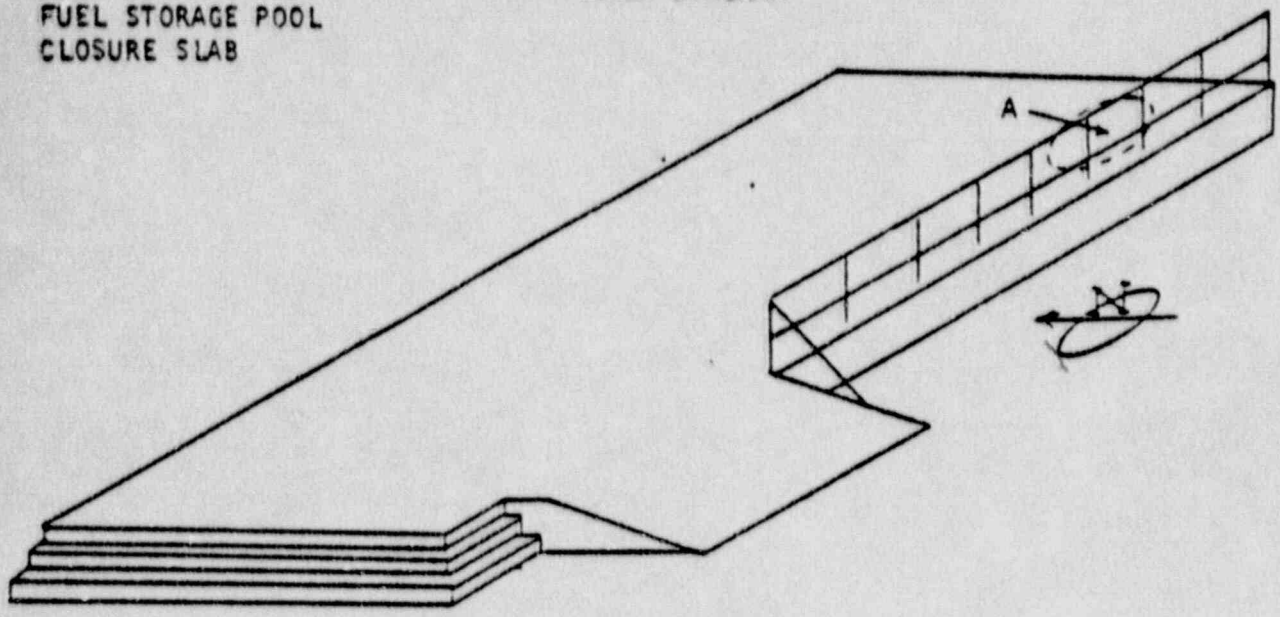
( ) The survey has found the area in acceptable condition

( ) The survey has found conditions requiring further investigation and these conditions are listed as action item no._____

RADIATION SURVEY AREA NO. 7

AREA DIAGRAM

FUEL STORAGE POOL
CLOSURE SLAB



PHYSICAL CONDITIONS
(Check One)

( ) No abnormal physical conditions can be detected.

( ) Abnormal conditions have developed as illustrated above.

RADIATION SURVEY

Type Survey	Location and Comments	Report Units	Base Level	Previous Level	Current Level
RAD LEVEL	over general slab area	mR/hr	< 0.1		
RAD LEVEL	area (A) above	mR/hr	0.1 - 0.2		
SMEAR	along north edge seam	dpm/smear	< 100		
SMEAR	along east edge seam	dpm/smear	< 100		
SMEAR	along south base seam	dpm/smear	< 100		
SMEAR	along west base seam	dpm/smear	< 100		
AIR	above slab	uCi/cc	———		

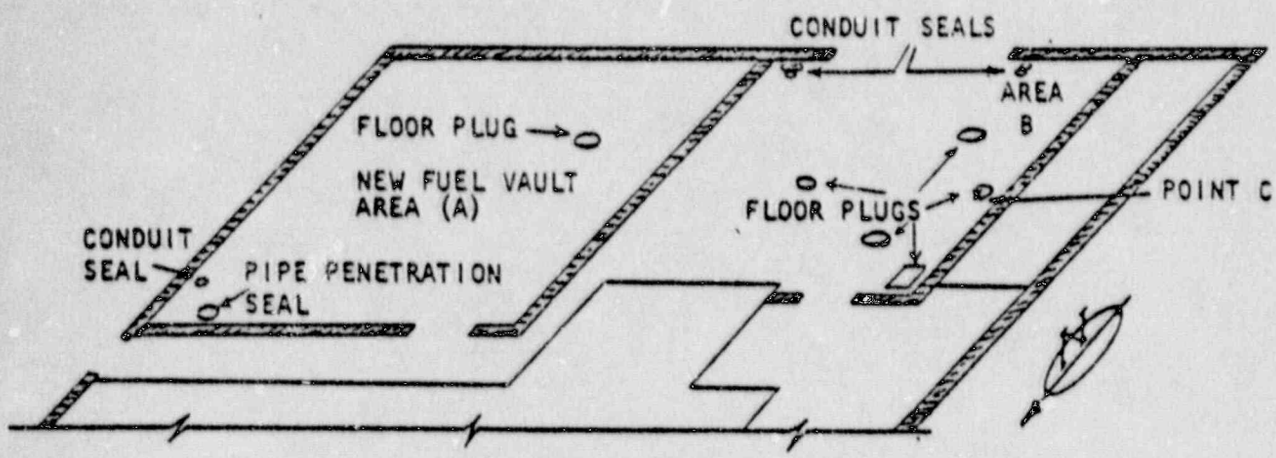
RESULTS
(Check One)

( ) The survey has found the area in acceptable condition.

( ) The survey has found conditions requiring further investigation and these conditions are listed as action item no.____

RADIATION SURVEY AREA NO. 8

AREA DIAGRAM



PHYSICAL CONDITIONS
(Check One)

( ) No abnormal physical conditions can be detected.

( ) Abnormal conditions have developed as illustrated above.

RADIATION SURVEY

Type Survey	Location and Comments	Report Units	Base Level	Previous Level	Current Level
RAD LEVELS	general floor areas (A)	mR/hr	< 0.1		
RAD LEVELS	general decon floor area (B)	mR/hr	< 0.1 - 0.1		
RAD LEVELS	decon sink drain spot (C)	mR/hr	0.7		
SMEAR	at floor plug areas	dpm/smear	< 100		
SMEAR	at pipe and conduit seals	dpm/smear	< 100		

RESULTS
(Check One)

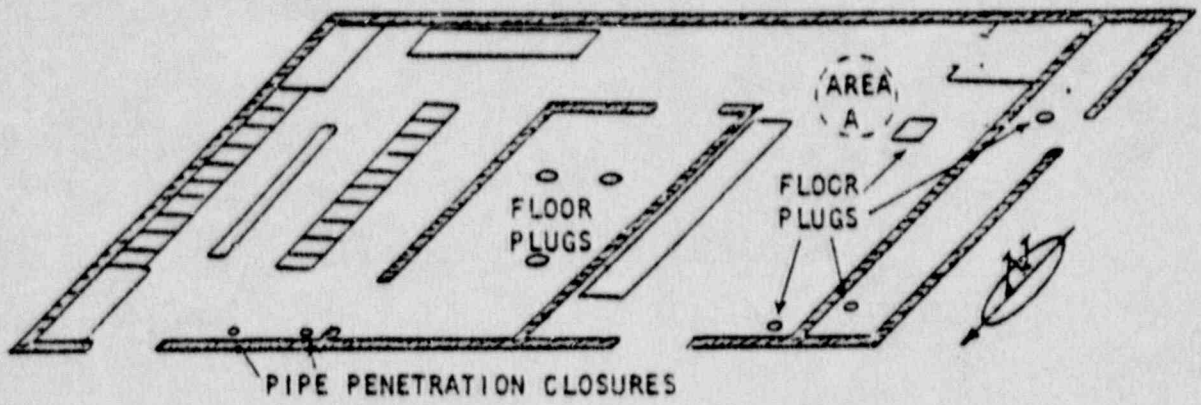
( ) The survey has found the area in acceptable condition.

( ) The survey has found conditions requiring further investigation and these conditions are listed as action item no.____

RADIATION SURVEY AREA NO. 9

AREA DIAGRAM

CHANGE ROOM
AREA



PHYSICAL CONDITIONS
(Check One)

( ) No abnormal physical conditions can be detected.

( ) Abnormal conditions have developed as illustrated above.

RADIATION SURVEY

Type Survey	Location and Comments	Report Units	Base Level	Previous Level	Current Level
RAD LEVEL	along south wall	mR/hr	< 0.1 - 0.2		
RAD LEVEL	at penetration closures	mR/hr	< 0.1		
RAD LEVELS	area (A) above	mR/hr	0.1 - 0.3		
SMEAR	at pipe penetrations	dpm/smear	< 100		
SMEAR	at floor plug areas	dpm/smear	< 100		

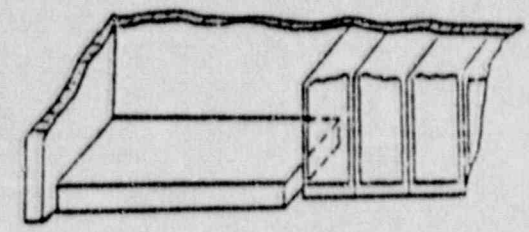
RESULTS
(Check One)

( ) The survey has found the area in acceptable condition.

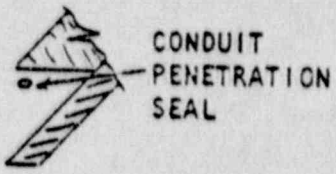
( ) The survey has found conditions requiring further investigation and these conditions are listed as action item no._____

RADIATION SURVEY AREA NO. 10

AREA DIAGRAM



FUEL BUILDING LOWER LEVEL
VENTILATION EXHAUST CLOSURE



FUEL BUILDING LOWER LEVEL
VENTILATION SUPPLY CLOSURE

PHYSICAL CONDITIONS
(Check One)

( ) No abnormal physical conditions can be detected.

( ) Abnormal conditions have developed as illustrated above.

RADIATION SURVEY

Type Survey	Location and Comments	Report Units	Base Level	Previous Level	Current Level
RAD LEVEL	at vent exhaust closure	mR/hr	<0.1		
RAD LEVEL	at vent supply closure	mR/hr	<0.1		
SMEAR	of vent exhaust closure	dpm/smear	<100		
SMEAR	pipe and conduit seals	dpm/smear	<100		
SMEAR	floor plug areas	dpm/smear	<100		

RESULTS
(Check One)

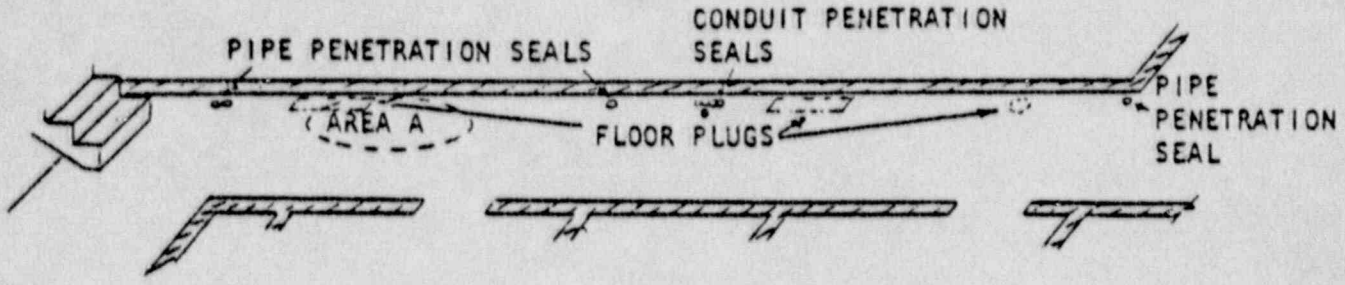
( ) The survey has found the area in acceptable condition.

( ) The survey has found conditions requiring further investigation and these conditions are listed as action item no.____

RADIATION SURVEY AREA NO. 11

AREA DIAGRAM

TURBINE TO
FUEL BUILDING HALLWAY



PHYSICAL CONDITIONS
(Check One)

( ) No abnormal physical conditions can be detected.

( ) Abnormal conditions have developed as illustrated above.

RADIATION SURVEY

Type Survey	Location and Comments	Report Units	Base Level	Previous Level	Current Level
RAD LEVEL	general hallway areas	mR/hr	< 0.1		
RAD LEVEL	area (A) above	mR/hr	0.1 - 0.2		
SMEAR	at pipe penetrations	dpm/smear	< 100		
SMEAR	at floor plug areas	dpm/smear	< 100		
SMEAR	at conduit penetrations	dpm/smear	< 100		

RESULTS
(Check One)

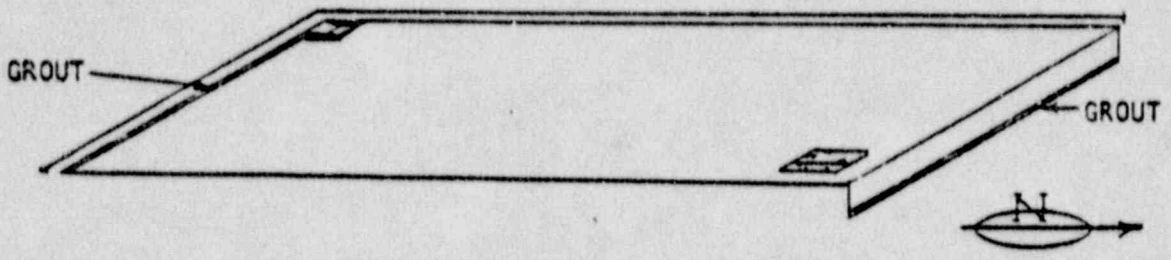
( ) The survey has found the area in acceptable condition.

( ) The survey has found conditions requiring further investigation and these conditions are listed as action item no._____

RADIATION SURVEY AREA NO. 12

AREA DIAGRAM

SOUTH-WEST STAIRWELL
CLOSURE



PHYSICAL CONDITIONS
(Check One)

( ) No abnormal physical conditions can be detected.

( ) Abnormal conditions have developed as illustrated above.

RADIATION SURVEY

Type Survey	Location and Comments	Report Units	Base Level	Previous Level	Current Level
RAD LEVEL	over entire area	mR/hr	< 0.1		
SMEAR	along cement seams	dpm/smear	< 100		

RESULTS
(Check One)

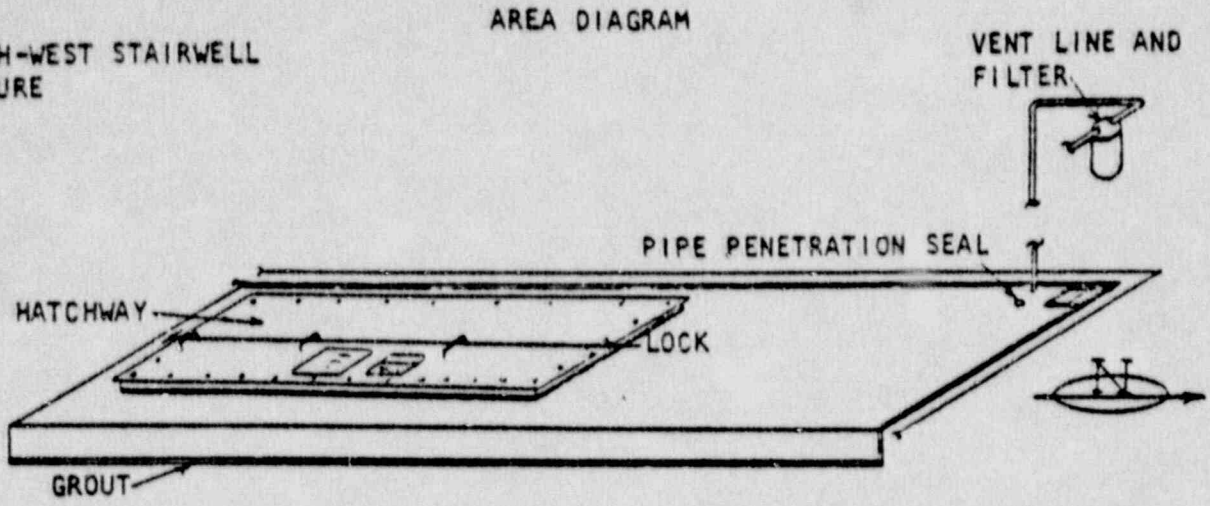
( ) The survey has found the area in acceptable condition.

( ) The survey has found conditions requiring further investigation and these conditions are listed as action item no._____

RADIATION SURVEY AREA NO. 13

AREA DIAGRAM

NORTH-WEST STAIRWELL CLOSURE



PHYSICAL CONDITIONS
(Check One)

( ) No abnormal physical conditions can be detected.

( ) Abnormal conditions have developed as illustrated above.

RADIATION SURVEY

Type Survey	Location and Comments	Report Units	Base Level	Previous Level	Current Level
RAD LEVEL	over entire area	mR/hr	< 0.1		
RAD LEVEL	of vent line filter	mR/hr	< 0.1		
SMEAR	from cement seams	dpm/smear	< 100		
SMEAR	from hatchway seal	dpm/smear	< 100		
SMEAR	pipe vent penetrations	dpm/smear	< 100		

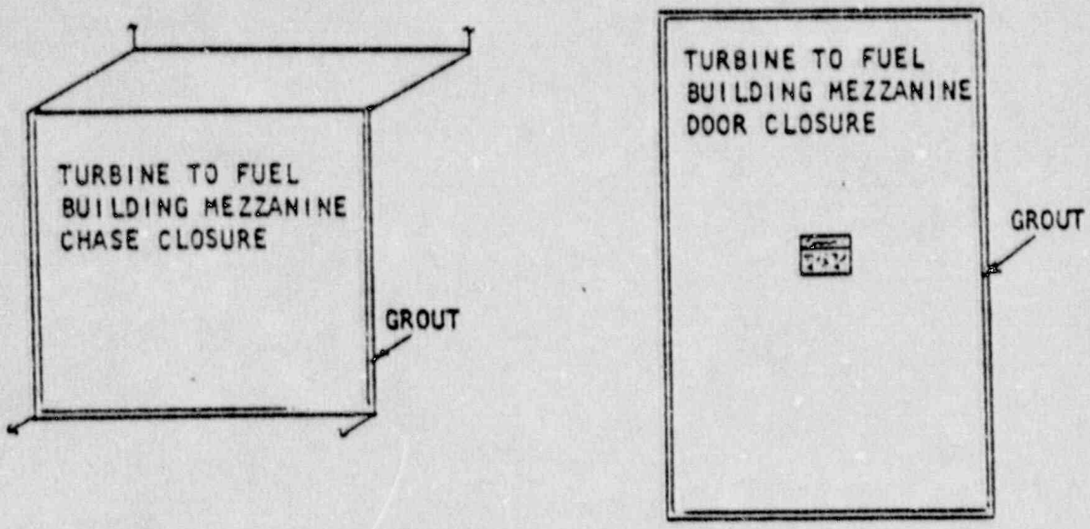
RESULTS
(Check One)

( ) The survey has found the area in acceptable condition.

( ) The survey has found conditions requiring further investigation and these conditions are listed as action item no._____

RADIATION SURVEY AREA NO. 14

AREA DIAGRAM



PHYSICAL CONDITIONS
(Check One)

( ) No abnormal physical conditions can be detected.

( ) Abnormal conditions have developed as illustrated above.

RADIATION SURVEY

Type Survey	Location and Comments	Report Units	Base Level	Previous Level	Current Level
RAD LEVEL	at chase closure	mR/hr	< 0.1		
RAD LEVEL	at door closure	mR/hr	< 0.1		
SMEAR	along chase seams	dpm/smear	< 100		
SMEAR	along door seams	dpm/smear	< 100		
AIR	by door closure	uCi/cc	——		

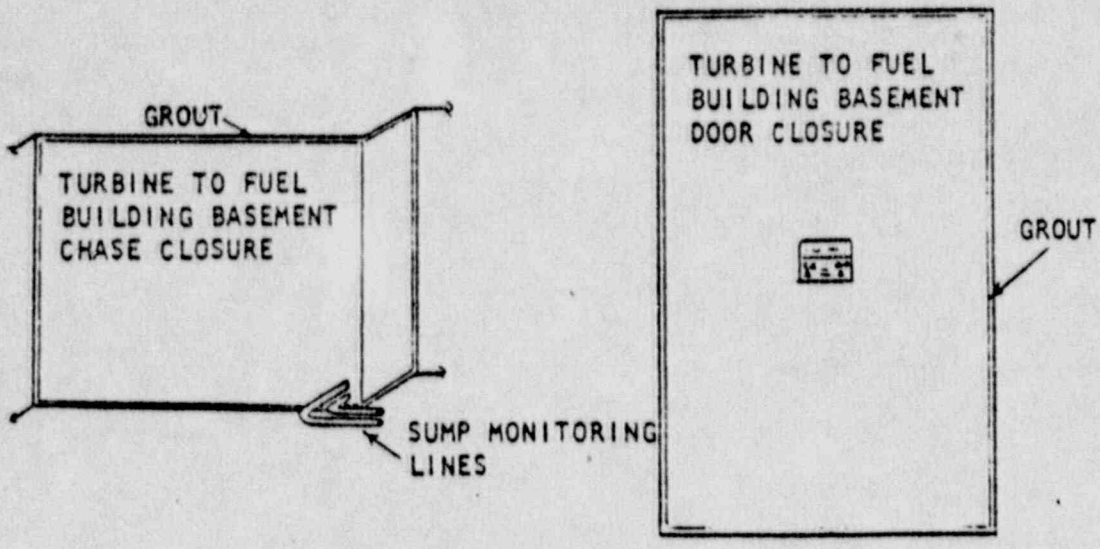
RESULTS
(Check One)

( ) The survey has found the area in acceptable condition.

( ) The survey has found conditions requiring further investigation and these conditions are listed as action item no.____

RADIATION SURVEY AREA NO. 15

AREA DIAGRAM



PHYSICAL CONDITIONS
(Check One)

( ) No abnormal physical conditions can be detected.

( ) Abnormal conditions have developed as illustrated above.

RADIATION SURVEY

Type Survey	Location and Comments	Report Units	Base Level	Previous Level	Current Level
RAD LEVEL	at chase closure	mR/hr	<0.1		
RAD LEVEL	at door closure	mR/hr	<0.1		
SMEAR	along chase seams	dpm/smear	<100		
SMEAR	along door seams	dpm/smear	<100		
AIR	by door closure	uCi/cc	—		

RESULTS
(Check One)

( ) The survey has found the area in acceptable condition.

( ) The survey has found conditions requiring further investigation and these conditions are listed as action item no._____

SUMP WATER LEVEL CHECK

INSTRUCTIONS

1. Remove plugs from connections A and B of the system.
2. Attach flexible hose from bottom connection of manometer to connection A.
3. Attach flexible hose from top connection of manometer to connection B.
4. Attach air supply to valve connection before the air bubbler. Watch for leakage through the valve.
5. Take initial reading before opening air supply valve.
6. Open air supply valve and wait for a few minutes.
7. Take manometer reading when water level in manometer is stabilized.
8. Compute water level in sump by the formula:

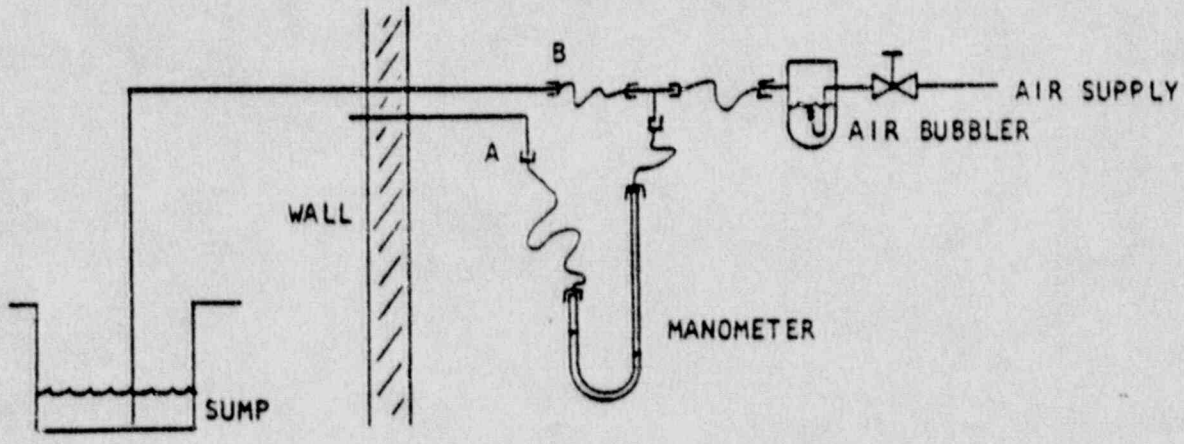
$$hw = (R_f - R_i)$$

where:

hw = height of water, inch
R_f = final manometer reading, inch
R_i = initial manometer reading, inch

9. Close air supply. Remove manometer connections and replace plugs.

DIAGRAM



DATA

Sump	hw last report	R_f (inches)	R_i (inches)	hw (inches)
Reactor				
Fuel Bldg				

RESULTS
(Check One)

( ) No significant water intrusion was detected in either sump.

( ) Significant water intrusion or equipment failure was detected and are reported as action item no.____

SURVEY EQUIPMENT INFORMATION

SURVEY INSTRUMENT DATA

MANUFACTURER _____

TYPE _____

MODEL _____

SERIAL NUMBER _____

WINDOW THICKNESS (mg/cm^2) _____

CALIBRATION DATE _____

SMEAR COUNTER DATA

MANUFACTURER _____

TYPE _____

MODEL _____

WINDOW THICKNESS (mg/cm^2) _____

BETA EFFICIENCY (%) _____

AIR SAMPLE COLLECTION DATA

SAMPLER TYPE _____

FILTER MATERIAL TYPE _____

COLLECTION EFFICIENCY (%) _____

TOTAL SAMPLING TIME (min) _____

SAMPLE VOLUME (ft^3) _____

COUNTER MANUFACTURER _____

COUNTER TYPE _____

COUNTER MODEL _____

WINDOW THICKNESS (mg/cm^2) _____

COUNTER BETA EFFICIENCY (%) _____

EXHIBIT C

PATHFINDER DISMANTLED FACILITY

ENTRANCE REPORT

NUMBER _____

AREA ENTERED
(Check One)

( ) Reactor Building

( ) Fuel Handling Building

( ) Fuel Transfer Tube Vault

REPORT DATE _____

REPORT BY _____

_____

ACTION ITEMS

CONDITIONS DETECTED DURING THE ENTRANCE REQUIRING FURTHER INVESTIGATION

Item No.	Location	Description
1		
2		
3		
4		
5		
6		
7		
8		

ENTRY RECORD

DATE OF ENTRY _____

PERSON AUTHORIZING ENTRY _____

PERSONS MAKING ENTRY _____

_____

_____

ENTRY OBJECTIVE

_____

_____

_____

PRE-ENTRY SURVEY RESULTS

Radiation Levels at Entry Point (mR/hr) _____

Contamination Levels at Entry Point (dpm/smear) _____

Interior Explosive Levels (% Hydrogen) _____

Interior Airborne Radioactivity Levels (uCi/cc) _____

PERSONNEL PROTECTIVE MEASURES REQUIRED
(Check Appropriate Items)

( )	Film Badge	( )	Water Proof Outer Covering
( )	Pocket Dosimeter	( )	Self-contained Breathing Equipment
( )	Shoe Covers	( )	Full Face Masks
( )	Gloves	( )	Half Face Respirators
( )	Coveralls	( )	GM Survey Instrument
( )	Hood	( )	Ion Chamber Survey Instrument
( )	Hard Hat	( )	Continuous Air Sampling
( )	High Boots	( )	Intermittent Air Sampling
( )	6 Volt Lighting	( )	Two-way Communcation Gear
( )	_____	( )	_____
( )	_____	( )	_____

* Item used for initial entry only

Check and Complete if Appropriate

( ) Further descriptions of the radiation protective measures used during the entry are attached as attachment numbers_____.

RADIATION EXPOSURE DATA

Name	Estimated Exposure (mR)	Basis for Estimation	Assigned Exposure (mR)	Basis for Assigned Exposure

Check and Complete If Appropriate

( ) Additional exposure information attached as attachment no._____

INSPECTION FINDINGS

_____

_____

_____

_____

_____

_____

_____

_____

_____RECLOSURE DATE_____

ADDITIONAL INFORMATION ATTACHMENTS
(Check and Complete Appropriate Items)

( ) Internal radiation surveys were performed during the entrance and are attached as attachment no_____.
( ) Special procedures used during the entrance are attached as attachment no_____.
( ) Other additional information is attached as attachment no_____.

RESULTS
(Check One)

( ) The entrance was completed satisfactorily. The objectives were accomplished. No further action necessary.

( ) Conditions were detected requiring further action as listed on the action item report sheet.