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ARGONNE NATIONAL LABORATORY
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Argonne, Illinois 60439

ANNUAL MONITORING AND SURVEILLANCE REPORT FOR PIQUA NUCLEAR POWER FACILITY, PIQUA, OHIO

December 1991

Prepared by

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Annual Monitoring and Surveillance Report

for

Piqua Nuclear Power Facility

Piqua, Ohio

December 1991

ABSTRACT

The decommissioned Piqua Nuclear Power Facility is located in Piqua, Ohio near the Greater Miami River. The Facility was built by the U.S. Atomic Energy Commission (now U. S. Department of Energy) and was operated from 1963 to 1966. The reactor was retired prior to 1970 and the facility was leased to the city of Piqua for use as offices and equipment storage.

In December 1991, a radiological survey was done of the facility to document its radiological condition. The data show that all radiological parameters measured were essentially the same as that found in the natural environment. The only exception was that low levels of radioactive contamination were detected in one drain on the 56.5 ft elevation, but the radiation exposure rate in that area was also typical of natural background.

INTRODUCTION

The purpose of this report is to document the survey of the former site of the Piqua Nuclear Power Facility (PNPF) (Photo. 1 - 7) which was conducted by Argonne National Laboratory (ANL) personnel in December 1991. This survey was performed to provide radiological and nonradiological analytical and surveillance data and interpretation of those data with particular emphasis on possible residual radiological contaminants.

SURVEY OBJECTIVE

The objective of this survey was to construct a radiological characterization of the buildings at the PNPF site, which consists of the reactor building, an auxiliary building, a steel warehouse building, and a wooden shed, and to collect radiological and non-radiological data on the two facility sumps: P-17 and P-18, located in the reactor building and the auxiliary building respectively. In addition, visual inspections of the physical condition of the facility, and sub-contracted (by the city of Piqua, Ohio) inspections of the in-place safety systems, supplement the survey for a more complete view of the status of the PNPF (Fig. 1; 2).

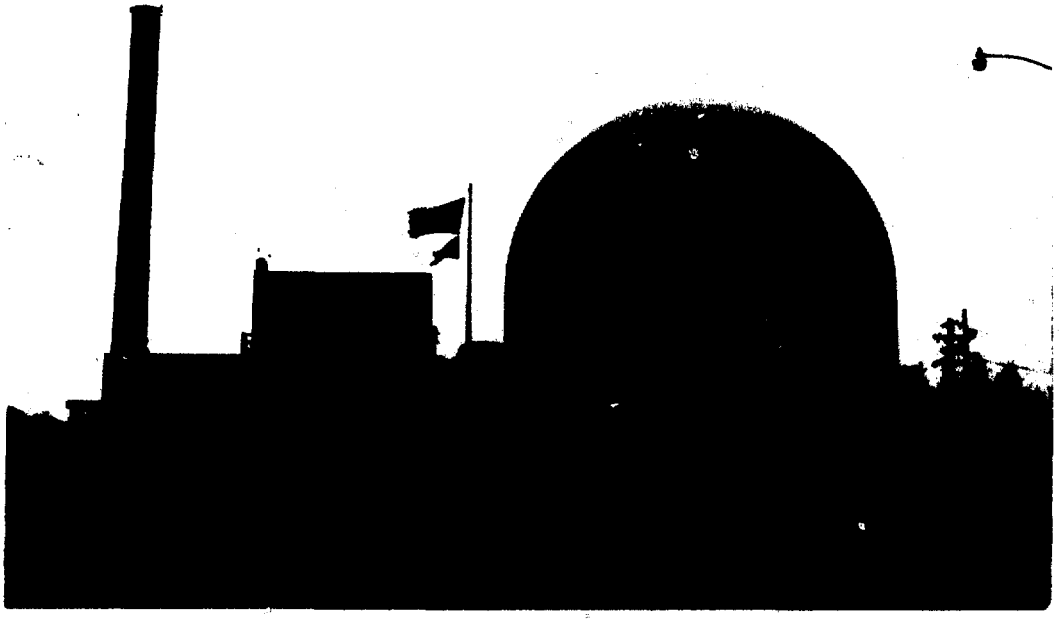


Photo. 1. "Plant North" Side of PNPF

Photo. 2. "Plant South-East" Side of PNPF

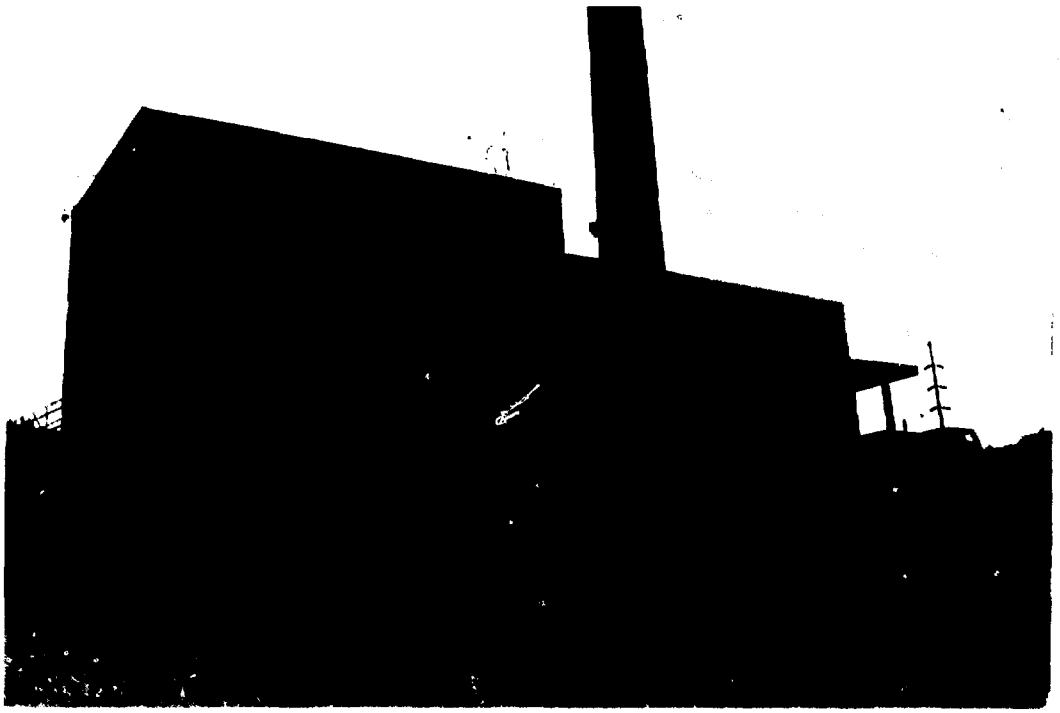


Photo. 3. "Plant East" Side of PNPF

Photo 4. "Plant South-East" Side of Steel Building

Photo 5. "Plant North-East" Side of Steel Building

Photo 6. "Plant West" Side of Wooden Shed

Photo 7. "Plant South-West" Side of Wooden Shed

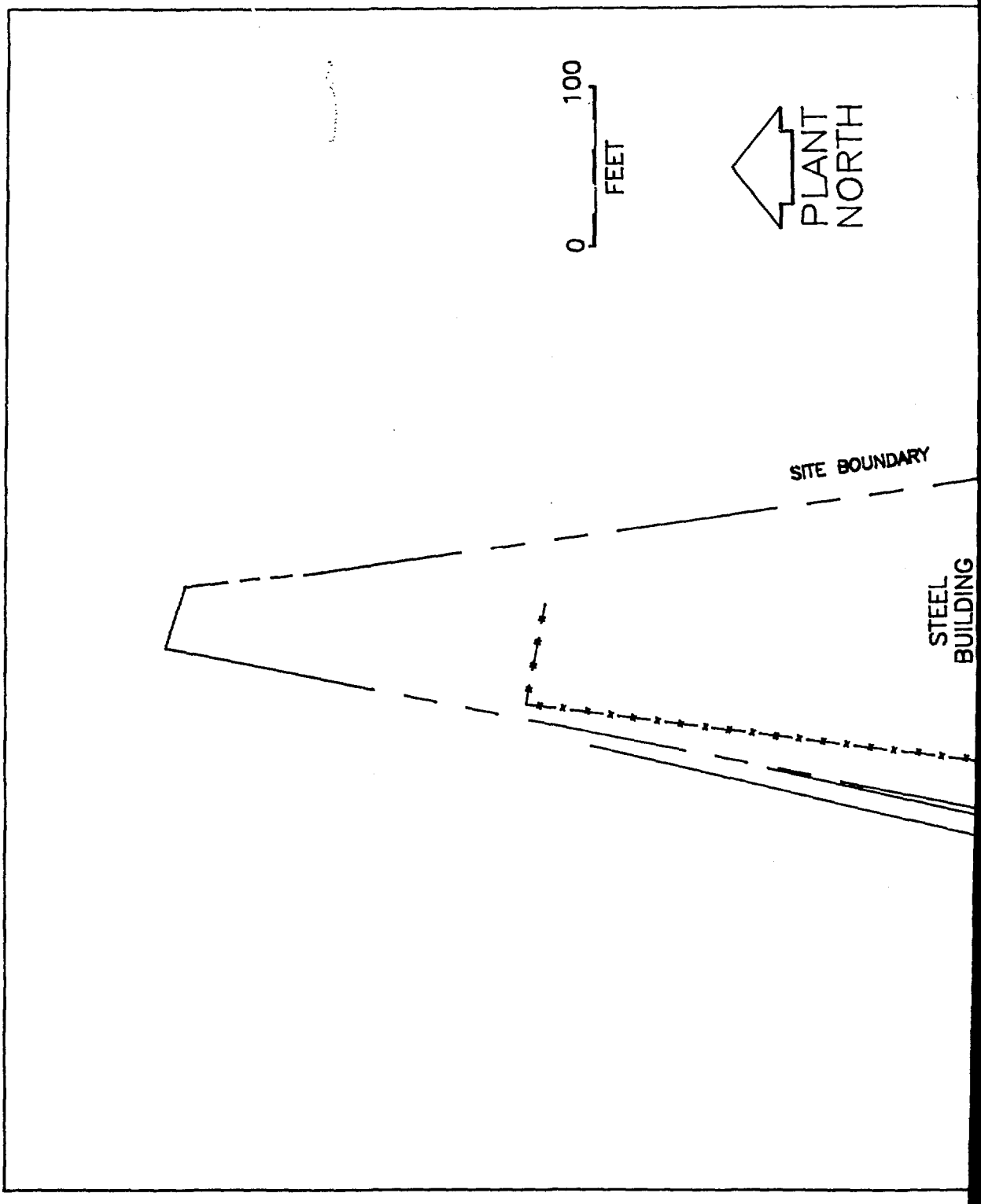
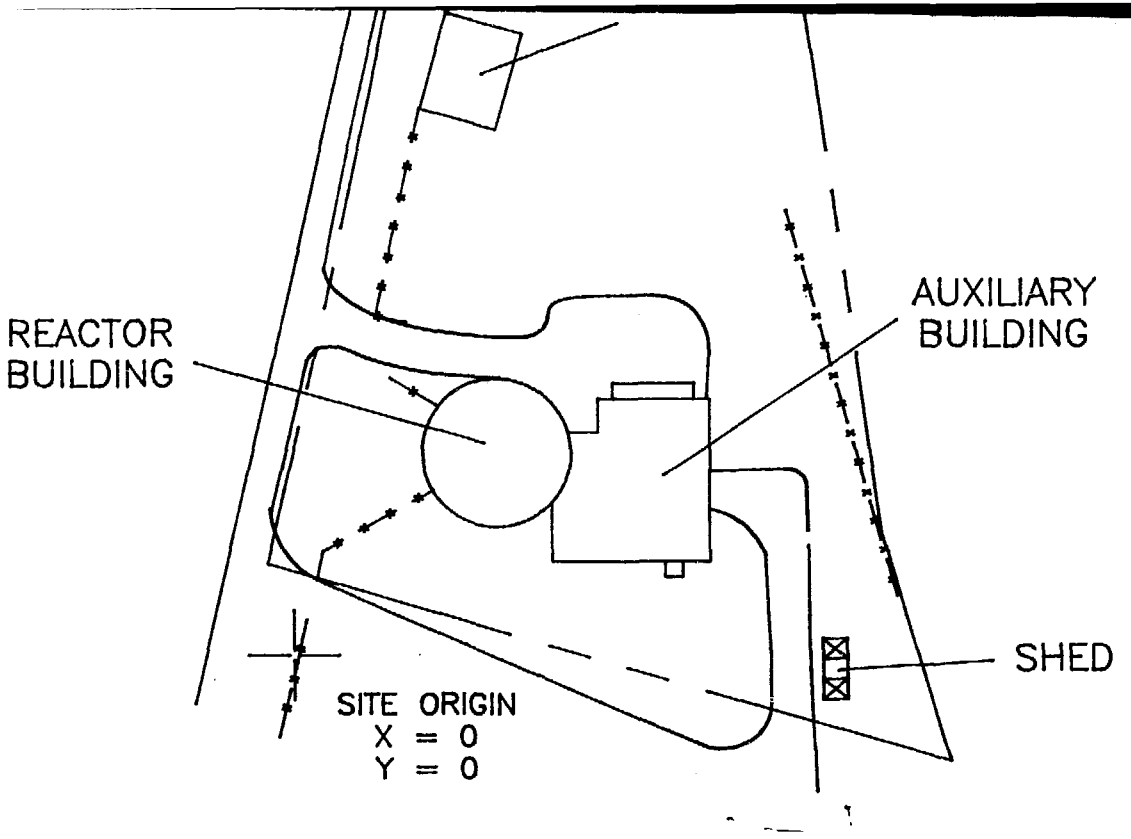


Figure 1.

PNPF Site Plan



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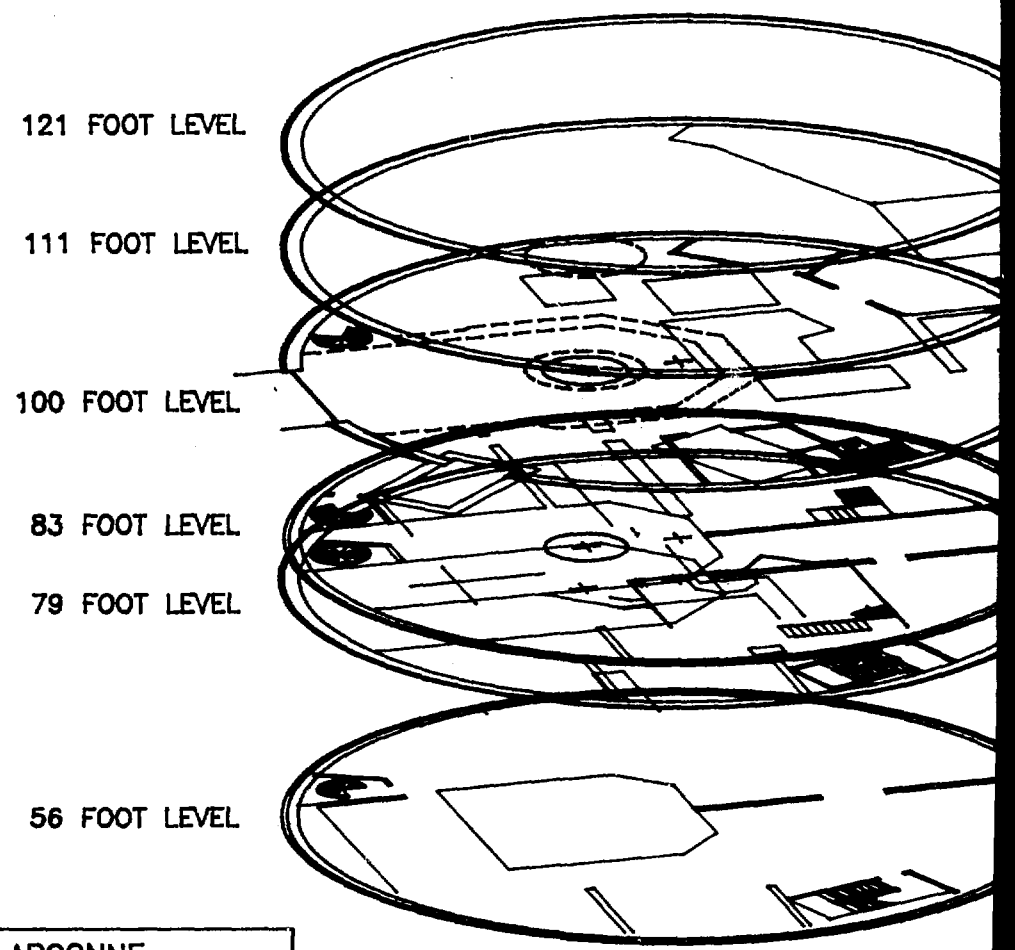
TITLE: PIQUA NUCLEAR POWER FACILITY PIQUA, OHIO SITE PLAN	DRAWN BY: D.W.REILLY	DATE 1/14/92	SCALE AS NOTED
FILE: ACADDWG\PIQUAP.DWG	PROJECT MGR.: G.D.MOSHO	DATE 1/14/92	SHEET 1/9



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TITLE:
PIQUA NUCLEAR POWER FACILITY
PIQUA, OHIO

MULTI–SECTION VIEW

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PROJECT MGR.: G.D.MOSHO	DATE 6/16/92	SHEET 2/9

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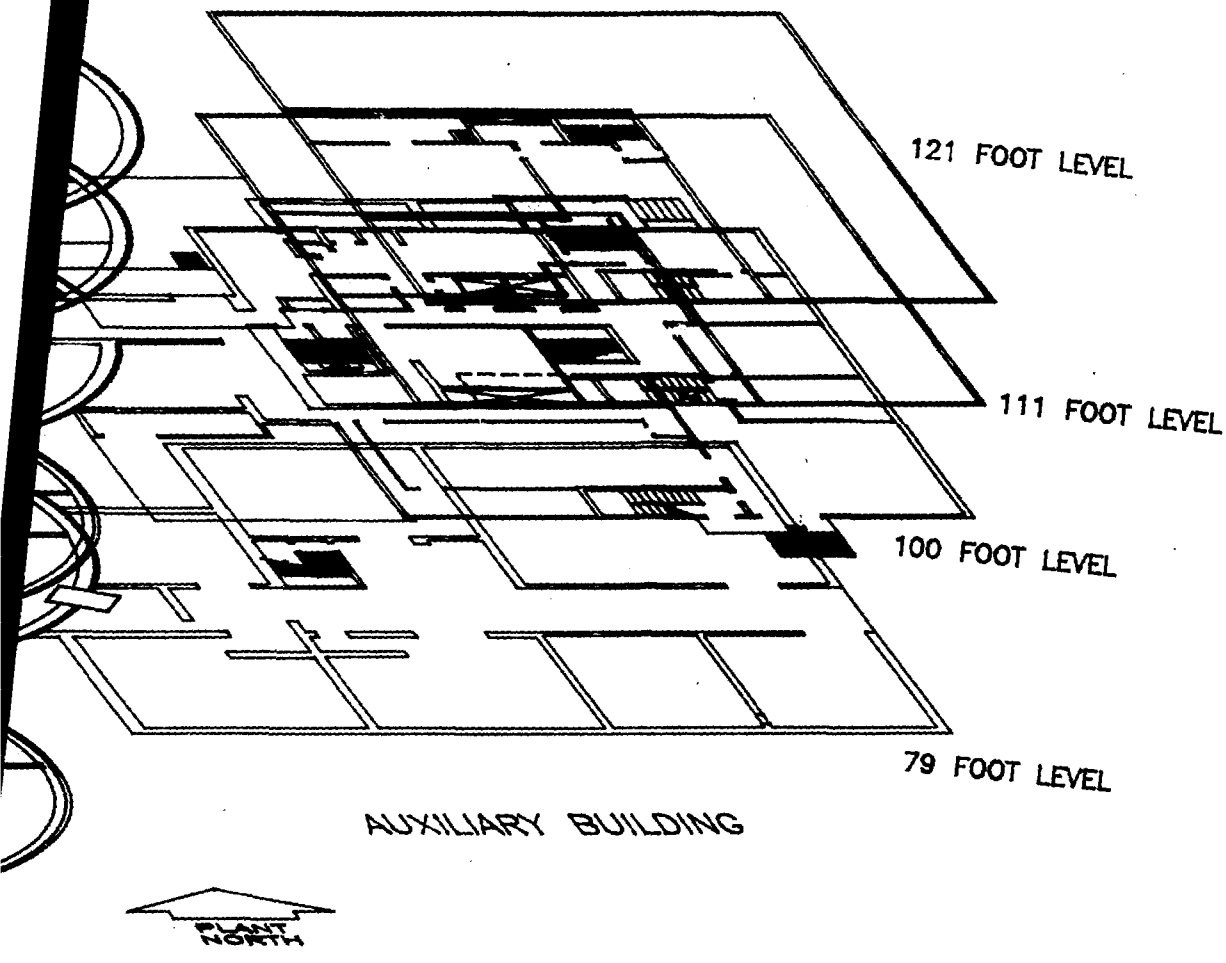
Figure 2. Multi–Se



DING

ned View of the PNPF

SITE HISTORY

The decommissioned Piqua Nuclear Power Facility (PNPF) is located in Piqua, Ohio. The site is bounded on the west by the Greater Miami River, on the south by the Piqua Sewage Treatment Plant, and the north and east by an Armco Steel Company limestone quarry.

The PNPF, a 45.5 megawatt (thermal) reactor, was constructed by the U.S. Atomic Energy Commission (AEC) [now U. S. Department of Energy (DOE)] and operated from 1963 until 1966. Operations were halted in 1966 due to significant technical problems. The facility was decommissioned and retired prior to 1970. The reactor and approximately 260,000 curies (9620 TBq) of radioactive material were left at the site encased in the reactor shielding, sand, and concrete.

The PNPF is currently occupied by the city of Piqua as an electrical power systems facility (mailing address: City of Piqua, Ohio, 123 Bridge Street, Piqua, Oh 45356). The auxiliary building is used mainly as an administrative building, whereas the reactor building is used for equipment storage and heavy mobile equipment parking.

The standing agreement on the use of the PNPF property by the city of Piqua was made in 1968. That agreement between the city and the AEC specified the following items:

- The city would lease the property from the AEC for its use until such time that the radioactive material left onsite

would have achieved (through natural decay) criteria values suitable for release to the general public. After that time, the title to the property would be transferred from the AEC to the city of Piqua.

- A lease restriction was imposed prohibiting the breach of the concrete reactor containment.
- The city of Piqua is responsible for non-nuclear maintenance of the structures and facilities. The Government is responsible for periodic radiological monitoring and for alleviating unsafe radiological conditions.

In addition to the above agreement, the PNPF was placed in the DOE Surplus Facilities Management Program (SFMP). This program included responsibilities for periodic radiological monitoring, such as described in this report.

The PNPF has been listed by the DOE Chicago Field Office Environmental Restoration Division (ERD) in DOE's Environmental Restoration and Waste Management 5-Year Plan, and a site specific plan (DOE91) has been developed and is updated annually.

SURVEY STRATEGY

The general strategy for this survey was simply to continue the periodic radiological and visual survey protocol formerly conducted by Battelle Memorial Laboratory, to collect samples from the PNPF sumps (P-17 and P-18) for appropriate non-radiological analyses, to provide interpretations of that data,

and to enhance the knowledge of the physical layout of the PNPF through the development of a computer-aided drafting (CAD) database, files and printouts.

Characterization Tasks

The following list was used to delineate the individual tasks that were performed during the characterization survey.

- Locate, retrieve, and submit for analysis all radon (alpha-track) detectors placed by Battelle,
- Install new radon (alpha-track) detectors at the same locations used previously by Battelle,
- Scan the entire PNPF to locate above background gamma (γ) activity,
- Measure γ exposure rates throughout the entire PNPF,
- Measure neutron exposure rates throughout the entire PNPF,
- Scan all accessible floor areas for both alpha (α) and beta-gamma (β-γ) contamination,
- Smear/wipe building surfaces (floors, walls, drains, etc.) and analyze those samples for removable α and β-γ contamination,
- Collect and analyze high volume air samples for α and β-γ particulates;
- Collect liquid/sludge samples from the reactor building and the auxiliary building sumps and submit those samples for γ spectrometric, and gross α and gross β analyses.
- Collect liquid/sludge samples from the reactor building and the auxiliary building sumps and submit those samples

for volatile organic compounds (VOCs), Polychlorobiphenyls (PCBs)/pesticides, total hexane extractable material (oil and grease), inorganics/metals, and pH analysis.

Radiation Detection Equipment

All radiation detection equipment (portable and mobile lab) was calibrated with National Institute of Standards and Technology (NIST) - traceable radioactive sources and used for surveys and analysis according to protocol established at ANL by the Health Physics Section of the Environment, Safety and Health (ESH) Division (ANL92). Radiological instrumentation used at the ANL Analytical Chemistry Laboratory (ACL) are similarly calibrated and operated under their internal protocol.

A collimated NaI(Tl) detector (Eberline PG-2) was used with a single channel analyzer/ratemeter (Eberline PRM 5-3) to detect above background gamma radiation (Photo. 8). Upon finding an anomaly, a measurement of the radiation exposure rate was made at that location and of the general area. These exposure rate measurements were made with a hand-held "μR" meter (Bicron Microrem) which used a 1" x 1" organic scintillator. Certain locations were later chosen as representative (with respect to γ exposure rate) of that general area. A computer driven high precision pressurized ion chamber (Reuter-Stokes RSS-112, shown in Photo 10) was used to supplement (and quality check) the other exposure rate measurements at a few representative locations.

A rem ball (Eberline ESP-2 with a NRD detector) was used to look for any neutron (0.025 eV - 10 MeV) flux fields around the entombed reactor.

A 300 cm^2 (active area) gas-proportional detector, floor monitor system (Eberline FM-4G) was the chosen instrument for scanning all available floor areas for both α and β-γ contamination (Photo. 9). All floor areas were smeared for removable contamination with special attention given to any area that indicated above ambient background values during the floor monitoring scan.

High volume air samplers (Hi Q CF-902) collected particulate samples on type FP-5211 filter media (Photo. 11). An acceptable air sample was established as having a minimum sampling volume of 20 m^3 (with an initial flow rate for sampling of 0.25 m^3/min). This equated to a minimum sampling collection time of 80 minutes. All air and smear/wipe samples were counted for gross α and gross β-γ contamination with a mobile laboratory system consisting of shielded gas-proportional detectors connected to an Eberline MS-2 mini-scaler unit.

Smear/wipe samples were taken using 2" diameter type FP-5211 filter paper that were wiped, with moderate pressure, across an area of approximately 100 cm^2 for analysis of potential removable contaminates. The wipe samples give an indication of how much activity was removable at the time the wipe was taken. It should also be noted that all smear/wipe samples were collected using

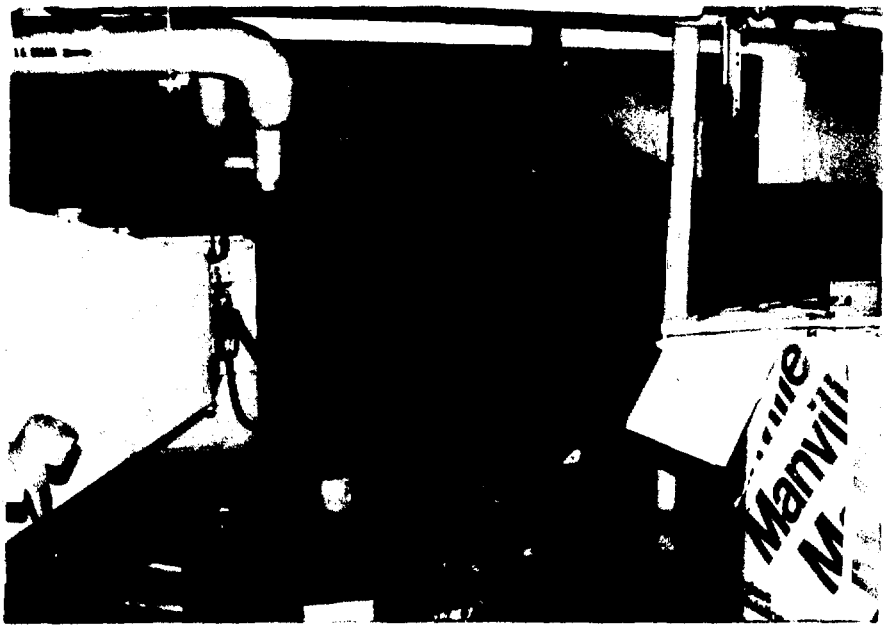


Photo 8. Gross Gamma (γ) Surveying

Photo 9. Floor Monitoring With Eberline FM-4G

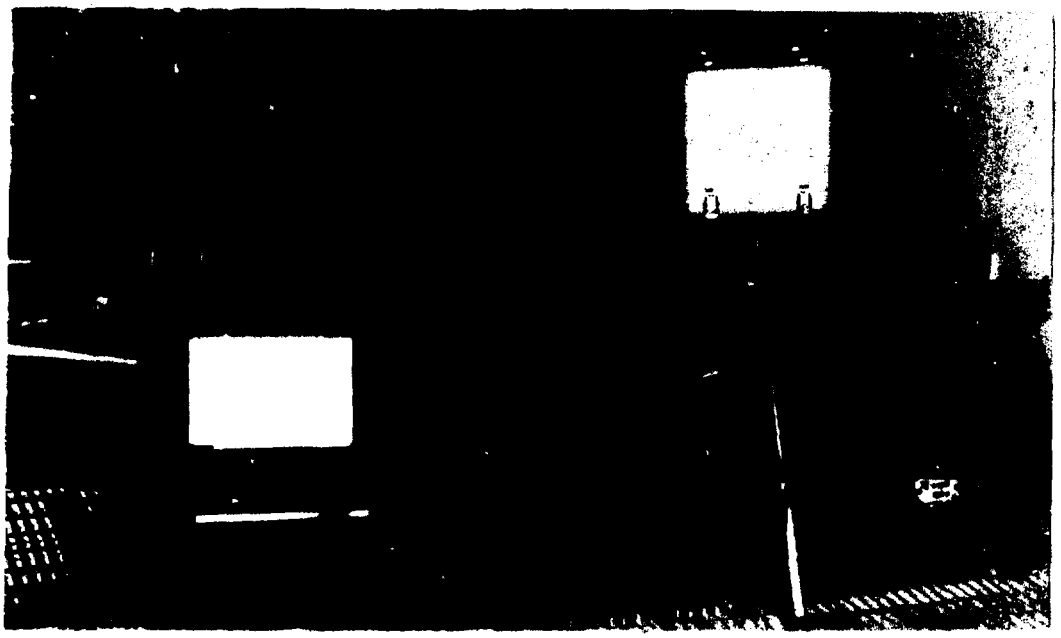


Photo 10. Reuter-Stokes (RSS-112) Pressurized Ion Chamber

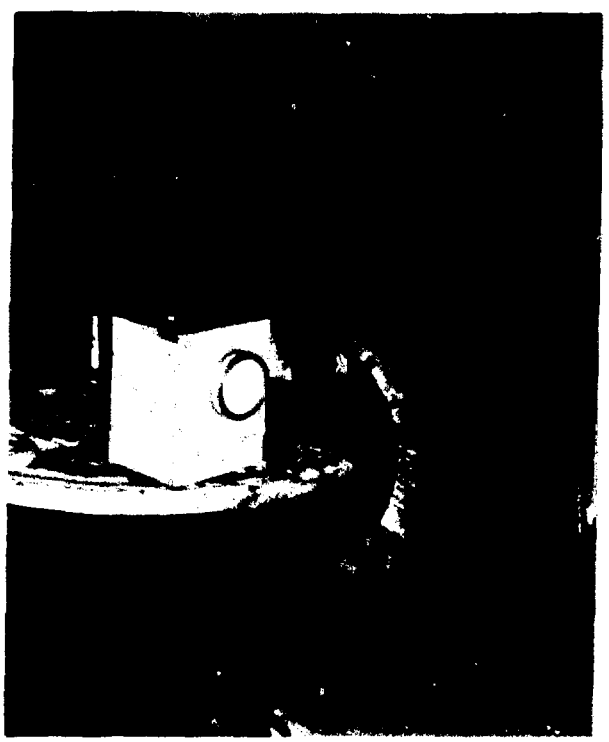


Photo 11. High Volume Air Sampler

the judgement sampling method (GIL87). This method of sampling permits the sampler to inspect the site and choose samples from areas that appear to be representative of the greater area. This can be done with some confidence since previous data has provided the general radiological conditions of the site, but no statistical significance can be applied to the (smear/wipe) sample data.

Sampling Protocol

The Environmental Survey Manual (DOE87) was used as one of the general protocol standards for sampling at the PNPF. The sample type, and the sampling protocol are listed in Table 1.

Table 1. Sample Protocol

Sample	Protocol(s)
Smears/Wipes	Surface Contamination Surveys (ANL91, Chp. 5-9)
Air (particulates)	Radioactive Particles by High-Volume Sample Techniques (DOE87, E6.3.1) [Sample flow rate reduced from 0.57 m^3/min to 0.25 m^3/min]
Radon (Terradex)	According to manufacturer's instructions
Liquid/Sludge (mixture)	Pond Sampler; Volatile Organic Compounds by Dipper (DOE87, E4.2.5; E4.2.3B)

Sample Analyses

Radiological:

The samples were radiologically analyzed under several protocols. Smears/wipes and air (particulates) samples were tested using mobile laboratory protocol for gross α and gross β-γ. Radon (Terradex) detectors were returned to the manufacturer, Landauer, Inc., for Trach-Etch® analysis. Landauer has attained an EPA approval (EPA RMP ID# 1606000) for their analytical services. Liquid/sludge (mixture) samples were sent for analysis to the Analytical Chemistry Lab (ACL) at ANL for gross α, gross β-γ, and γ spectroscopy. Internal ACL procedures for these analyses were used.

Non-Radiological:

The liquid/sludge samples were also analyzed by the Argonne Analytical Chemistry Laboratory for non-radiological parameters: volatile organic compounds (VOCs), Polychlorobiphenyls (PCBs)/pesticides, total hexane extractable material (oil and grease), inorganics/metals, and pH. All analyses were done using approved EPA methods, including Contract Laboratory Program (CLP) protocol (SOW 2/88, including Rev. 9/88 and 4/89; Contract No. WA-87K236). The tests for total hexane extractable material and pH were conducted according to Environmental Protection Agency (EPA) protocol (EPA SW-846: Methods 9070 and 9040 respectively).

SAMPLING/MONITORING LOCATIONS

Sampling/monitoring locations are noted on the CAD drawings (Fig. 1; 3 - 8). A total of 154 samples were collected during this characterization. Specifically, there were 130 smear/wipe samples, 4 air samples; 20 liquid/sludge (4 tap water and 16 sump) samples (Photo. 12). Radon (alpha-track) detectors were collected from 20 stations; and γ exposure rates were measured (with the RSS-112) at 12 locations. All these sampling points are noted in the figures for easy reference.

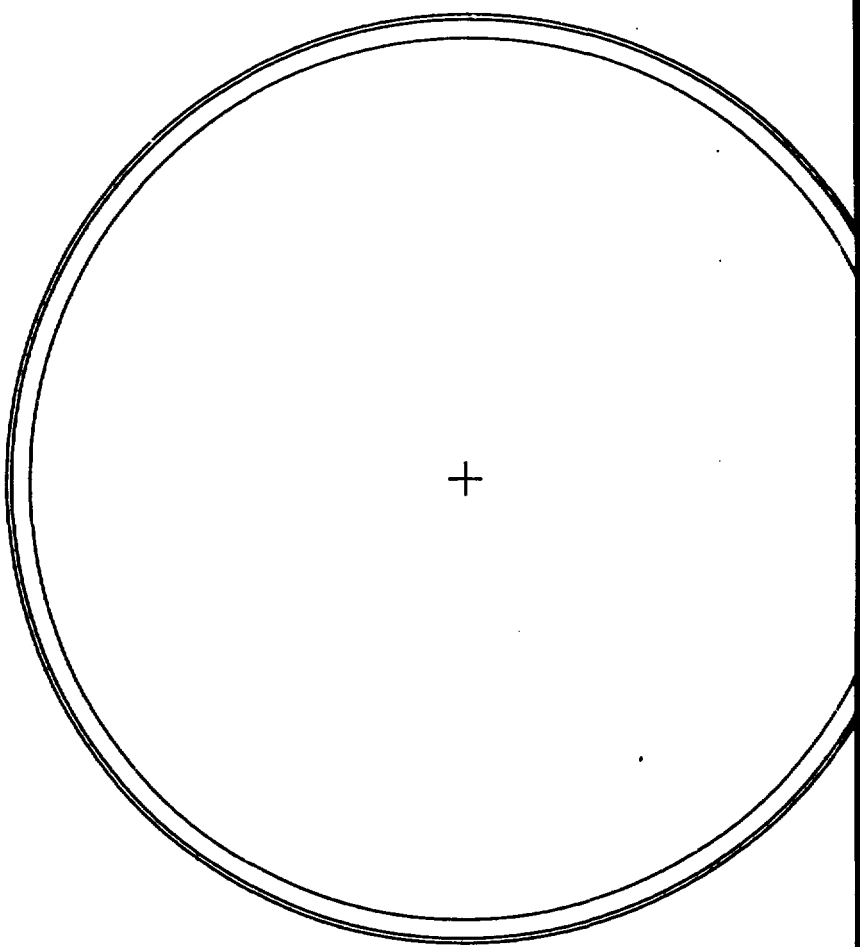
SURVEY RESULTS/DISCUSSION

Radon (Alpha-Track) Detector Data

The radon (alpha-track) detectors were submitted for processing and interpretation to Landauer, Inc., Glenwood, Illinois. The samples were collected over the period 23 October 1989 - 2 December 1991, (a total of 770 days). Table 2 lists the average radon concentrations in those areas sampled. Figures 3 - 8 inclusive depict the locations sampled.

The U.S. Environmental Protection Agency (EPA) has established the radon concentration value of 4.0 pCi/l (averaged over a year) as a guideline value for remedial action. Only one monitored station (Battelle station "Q", ANL station #17) had a concentration value above this criteria. The 4.4 pCi/l measurement in the auxiliary building storage room (B-1, 79 Ft. Level) is not unexpected. This room is fairly isolated and is

not ventilated. As indicated by its current title, the function of the room is for storage only. It should be noted that the EPA approval for radon detection/analysis services is given when the vendor can demonstrate an accuracy of analyzing their detectors and interpreting their data within 20% of an actual radon concentration in a controlled test environment. This would indicate that the actual radon concentration averaged over a year could range from 3.5 to 5.3 pCi/l in room B-1. ANL has designated both control and spiked samples in the long-term radon study (Table 3) for quality assurance in future data interpretation.



NOTE: FLOOR PLAN BASED
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PLANT
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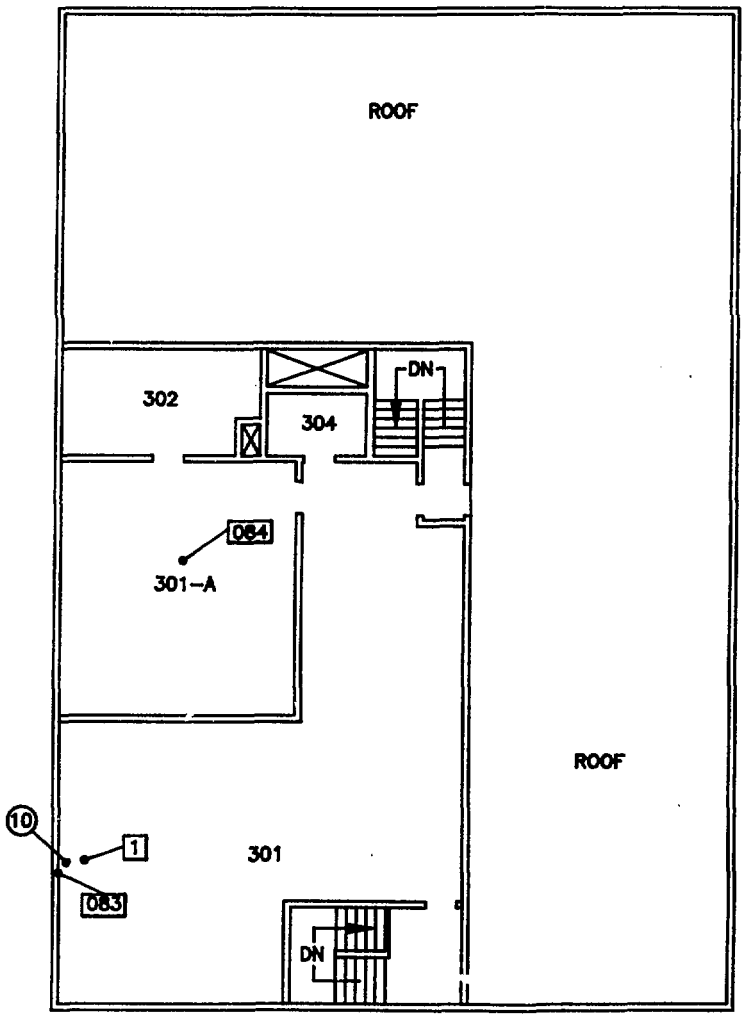
TITLE:
PIQUA NUCLEAR POWER FACILITY
PIQUA, OHIO

121 FOOT LEVEL

DRAWN BY: D.W.REILLY		DATE 6/16/92	SCALE AS NOTED
PROJECT MGR.: G.D.MOSHO		DATE 6/16/92	SHEET 8/9
FILE:	ACADDWG\PIQUA121.DWG		

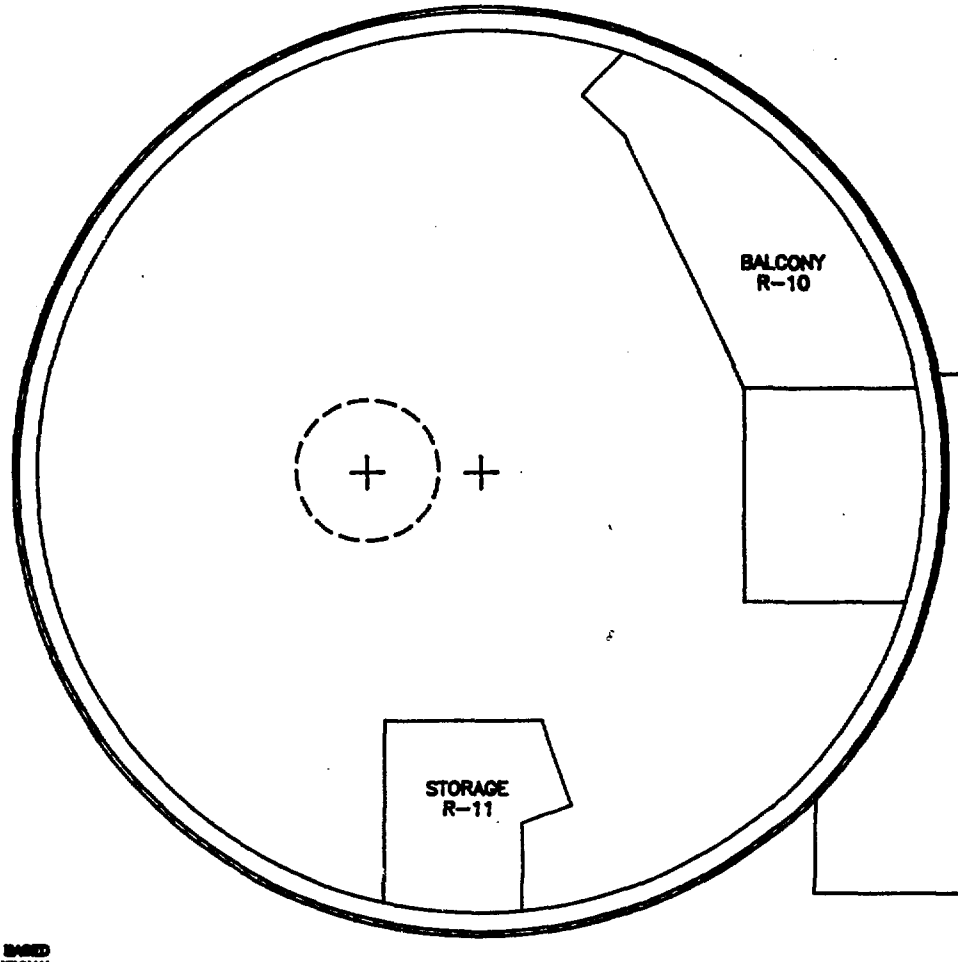
Figure 3. PNPF



NUMBER IN SYMBOL
DENOTES SAMPLE NUMBER

SMEAR
GAMMA
RADON
AIR SAMPLE

121 Foot Level



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PLANT
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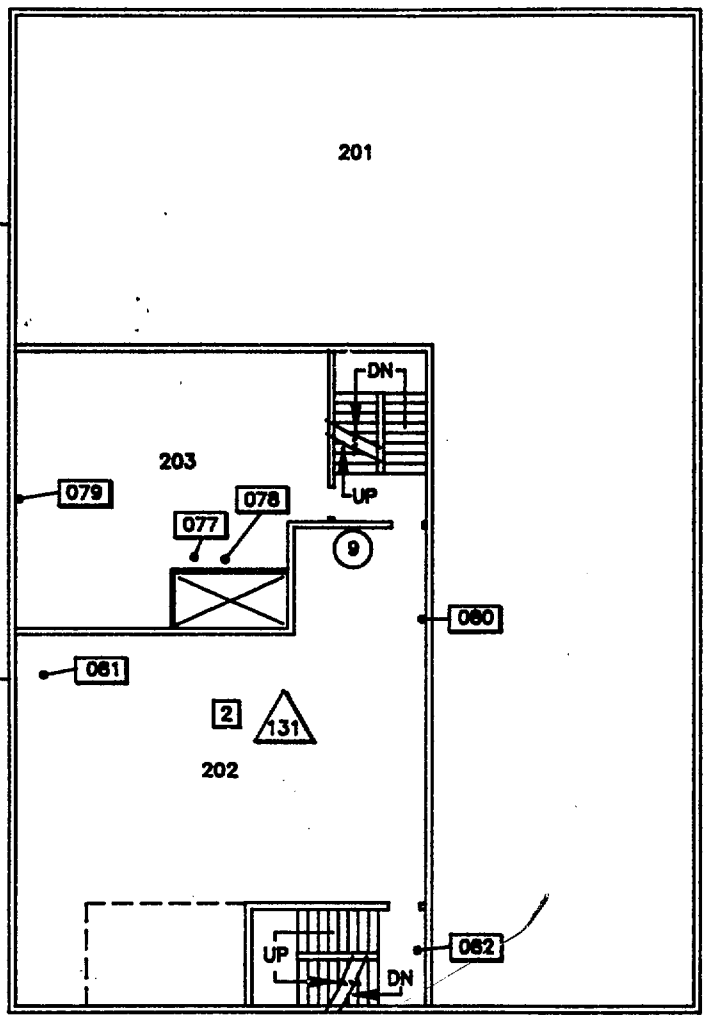
ESH – HEALTH PHYSICS

TITLE:
PIQUA NUCLEAR POWER FACILITY
PIQUA, OHIO

111 FOOT LEVEL

DRAWN BY: D.W.REILLY		DATE 6/16/92	SCALE AS NOTED
PROJECT MGR.: G.D.MOSHO		DATE 6/16/92	SHEET 7/9
FILE:	ACADDWG\PIQUA111.DWG		

Figure 4. PNPF



NUMBER IN SYMBOL
DENOTES SAMPLE NUMBER

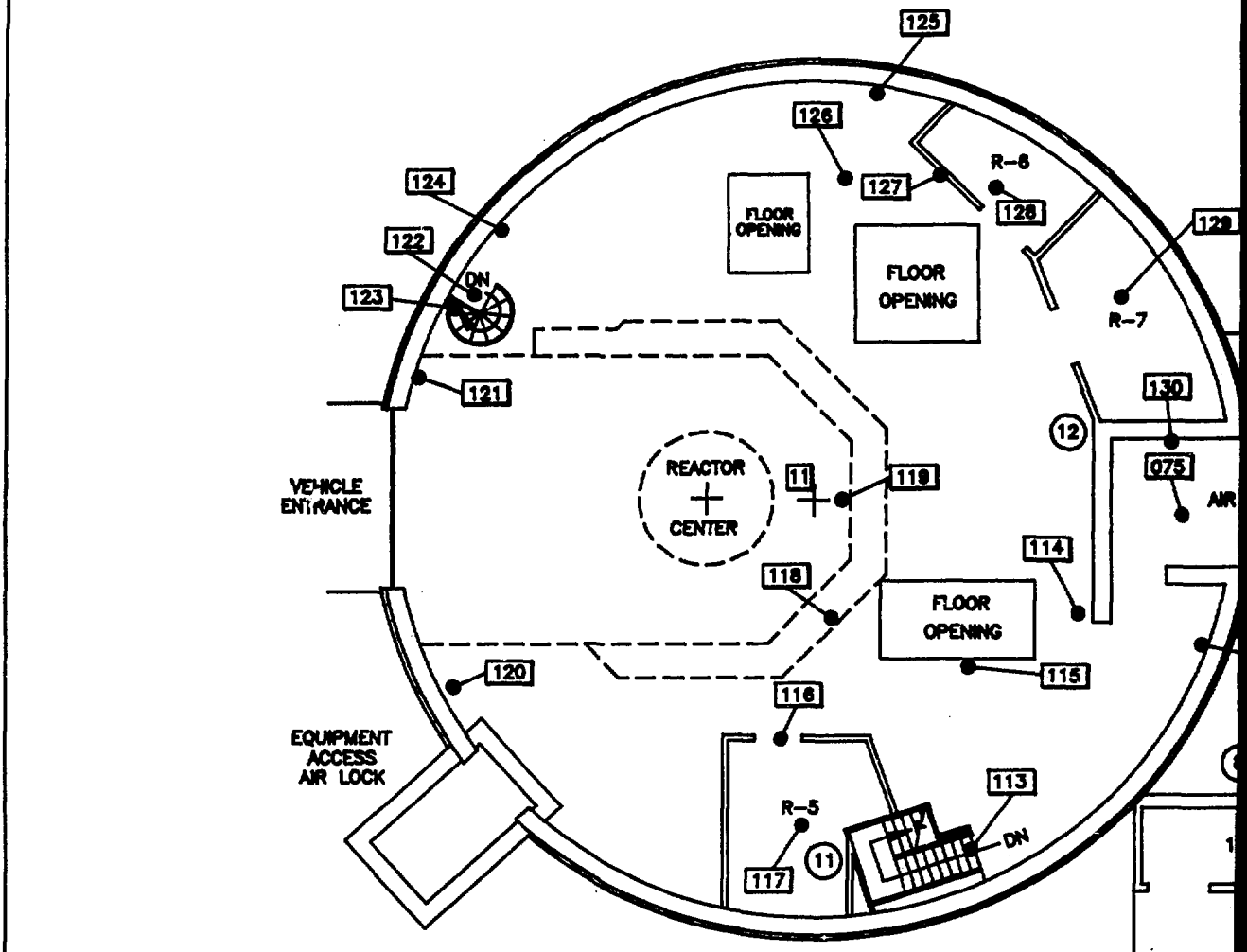
SMEAR

GAMMA

RADON

AIR SAMPLE

111 Foot Level



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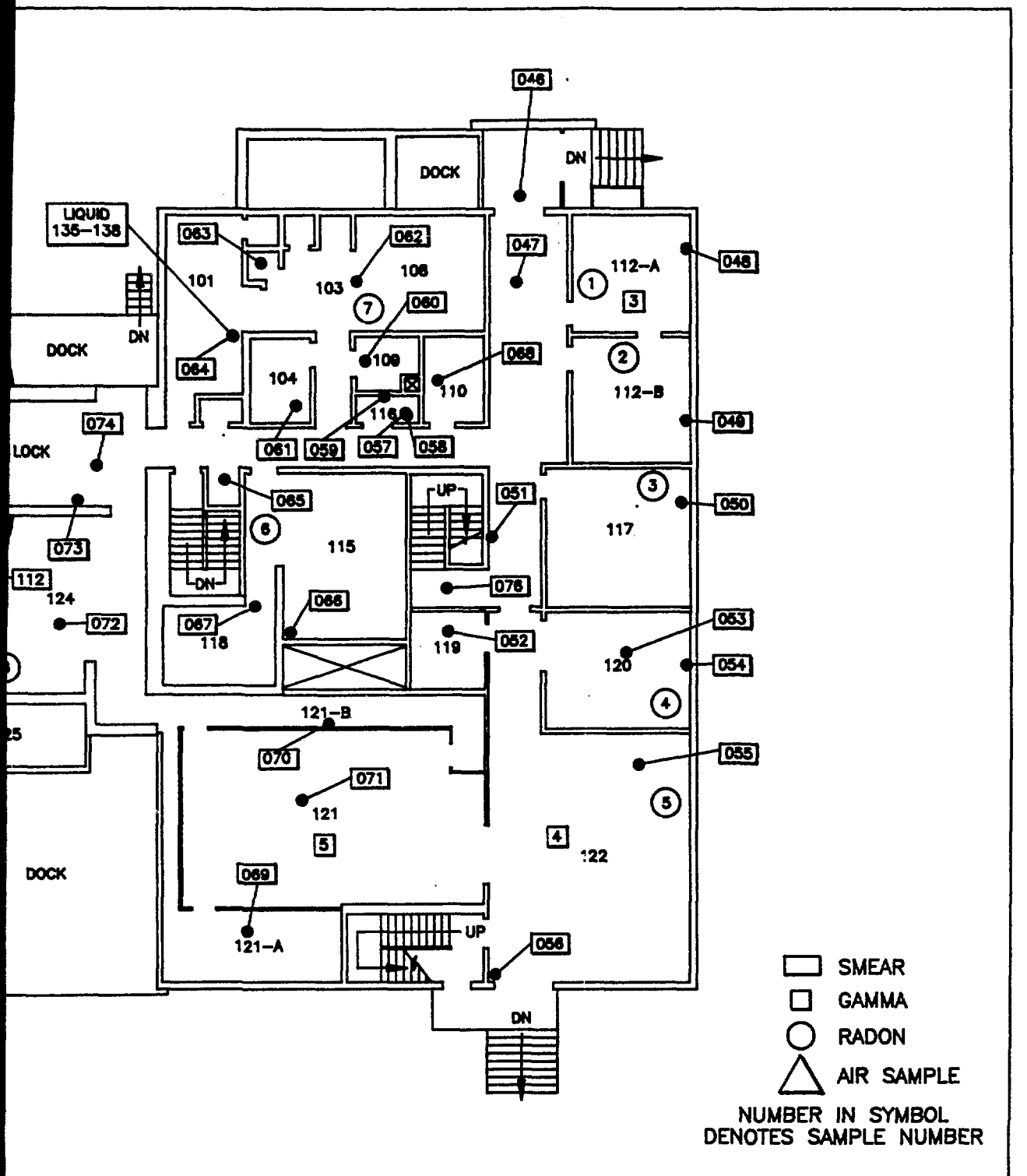
FILE: ACADDWG\PIQUA100.DWG	PROJECT MGR.: G.D.MOSHO	DATE 6/16/92	SHEET 6/9

Figure 5. PNPF



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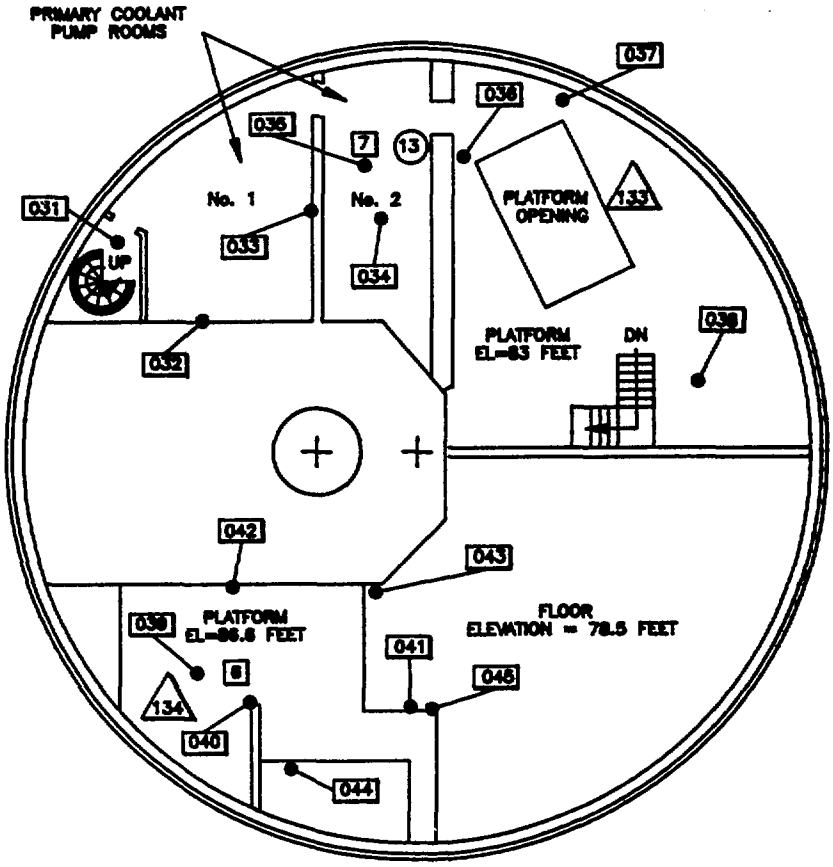

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PLANT NORTH

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TITLE:
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PIQUA, OHIO

83 FOOT LEVEL

DRAWN BY: D.W.REILLY	DATE 6/16/92	SCALE AS NOTED
PROJECT MGR.: G.D.MOSHO	DATE 6/16/92	SHEET 5/9

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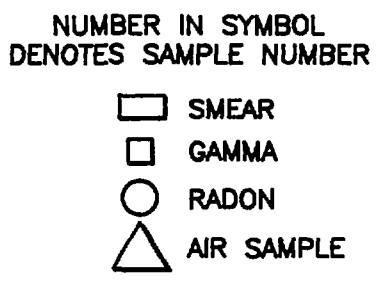
Figure 6. PNPF



83 Foot Level

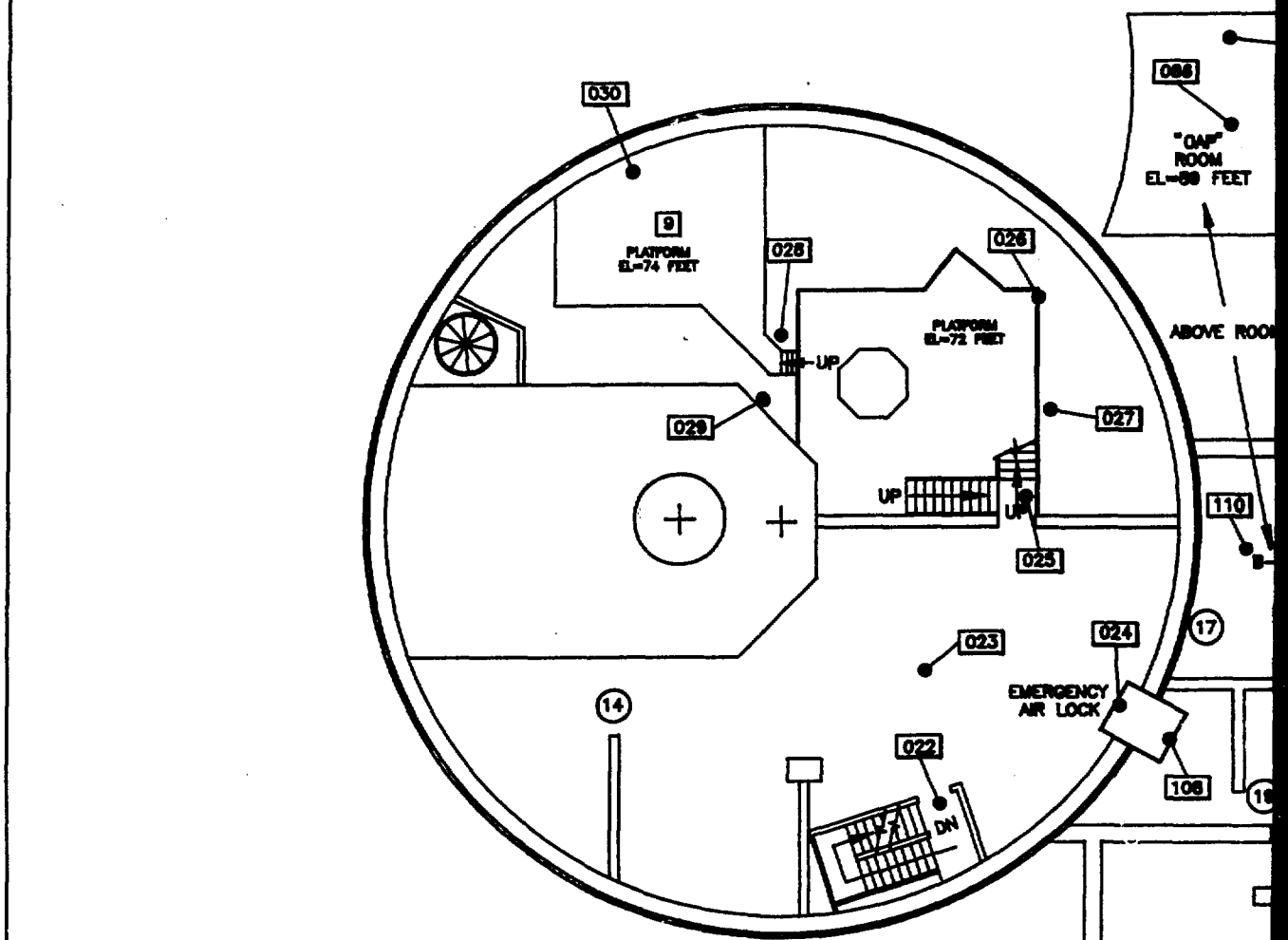


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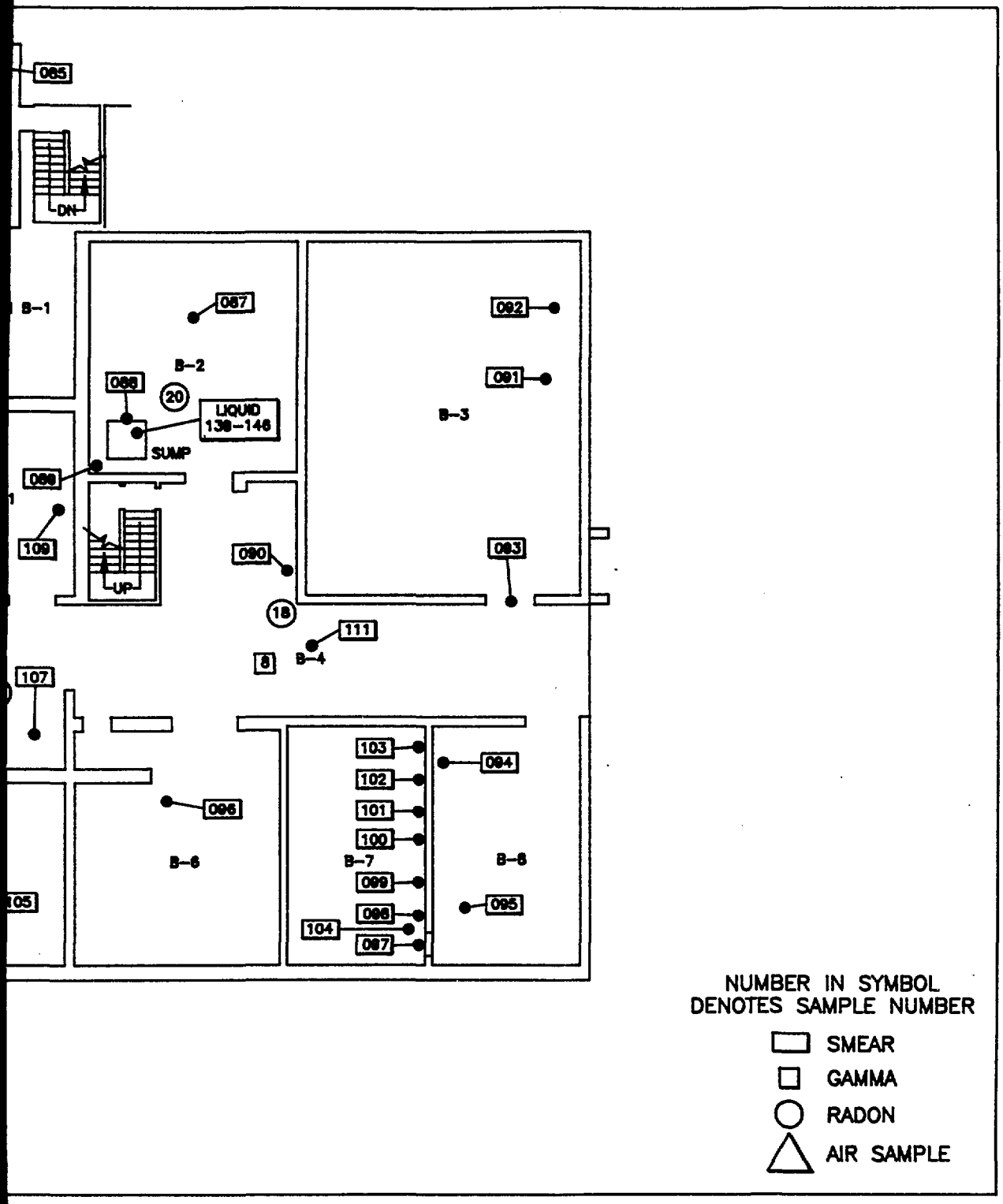
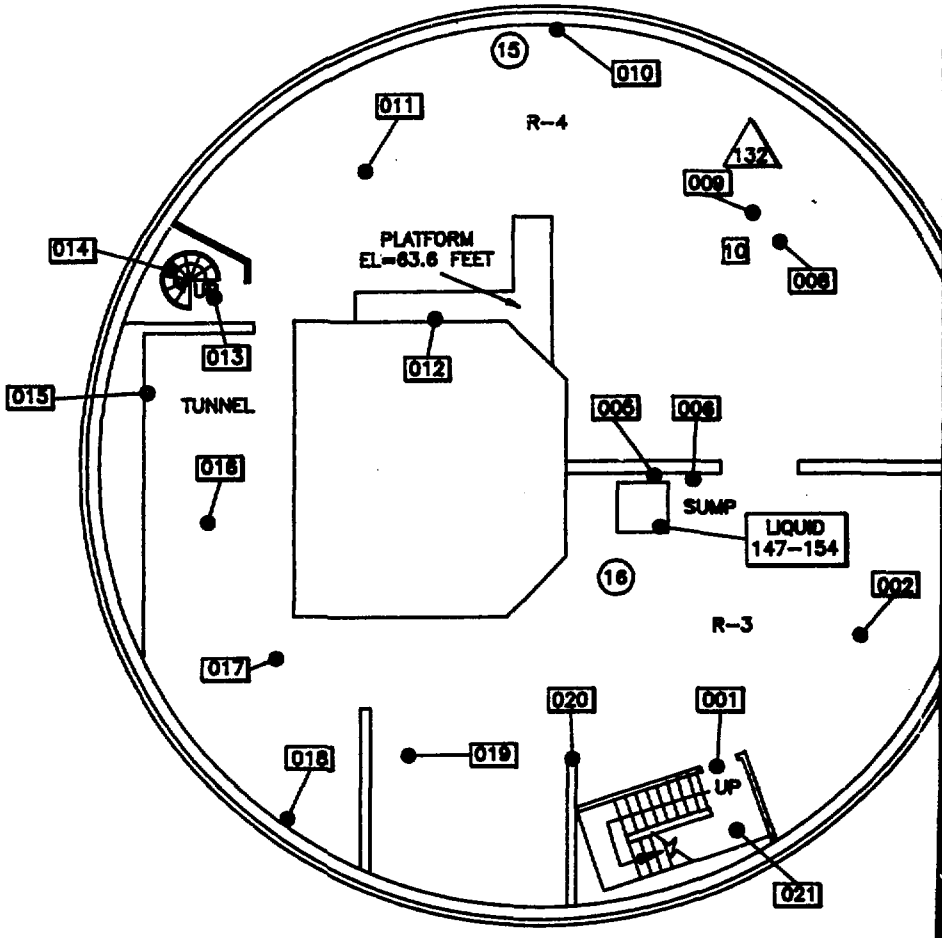
Figure 7. PNPF



79 Foot Level



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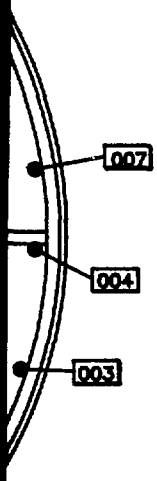
ESH – HEALTH PHYSICS

TITLE:
PIQUA NUCLEAR POWER FACILITY
PIQUA, OHIO

56 FOOT LEVEL

DRAWN BY: D.W.REILLY		DATE 6/16/92	SCALE AS NOTED
FILE: ACADDWG\PIQUA56.DWG	PROJECT MGR.: G.D.MOSHO	DATE 6/16/92	SHEET 3/9

Figure 8. 56



NUMBER IN SYMBOL
DENOTES SAMPLE NUMBER

SMEAR

GAMMA

RADON

AIR SAMPLE

Foot Level

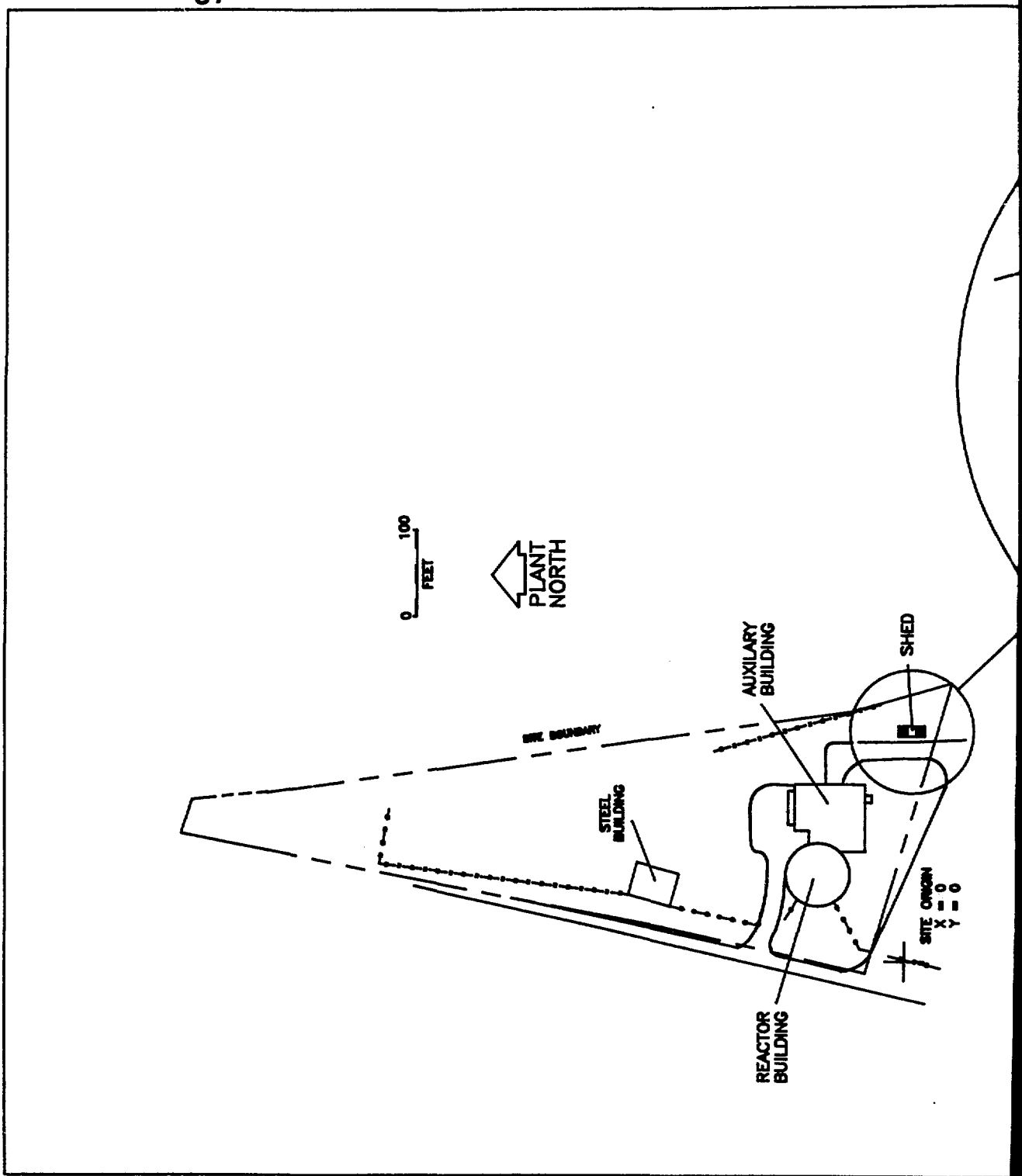
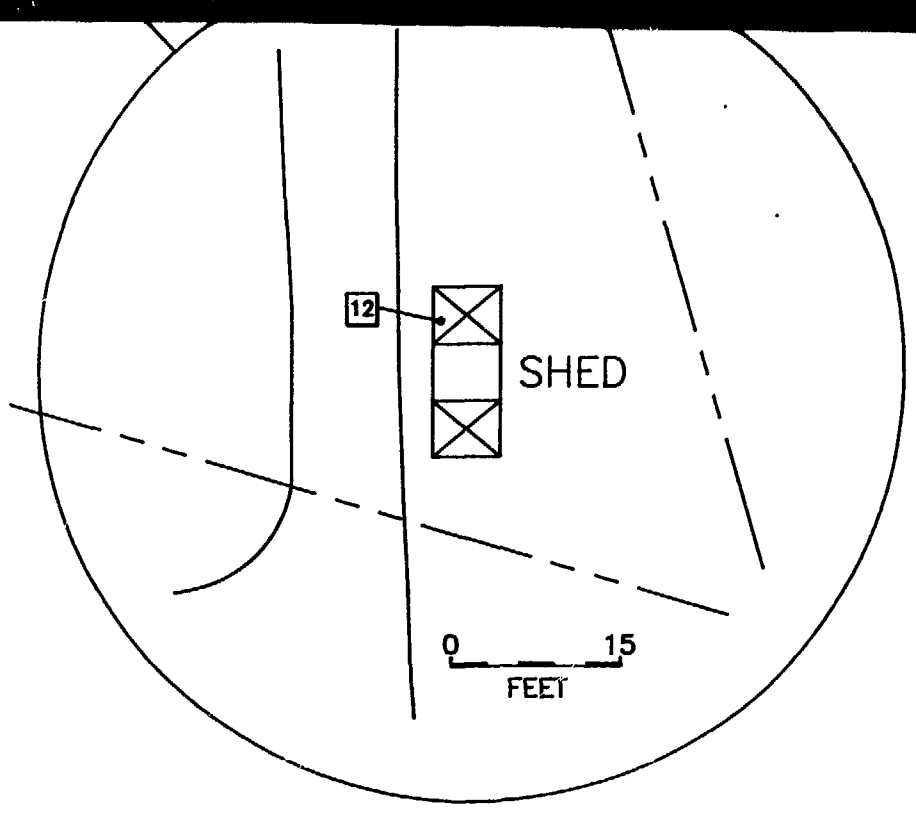


Figure 9. PNPF E

st (Wooden) Shed



NUMBER IN SYMBOL
DENOTES SAMPLE NUMBER

☐ GAMMA

ARGONNE
NATIONAL LABORATORY
ESH – HEALTH PHYSICS

TITLE: PIQUA NUCLEAR POWER FACILITY
PIQUA, OHIO

EAST SHED

FILE: ACADDWG\EASTSHED.DWG

DRAWN BY:	DATE	SCALE
D.W.REILLY	1/14/92	AS NOTED
PROJECT MGR.:	DATE	SHEET
G.D.MOSHO	1/14/92	9/9

Photo 12. Liquid/Sludge Sampling from the Auxiliary Building Sump

Photo 13. Incinerator Room (B-3)

Table 2. "BATTELLE" Long-Term Radon Sampling Locations and Data

Station	Battelle Detector	Room No.	Location	Avg. Radon Conc. pCi/ℓ
1	1650915	Office	South Wall	**
2	1640905	Office	Bulletin Board	**
3	1650906	Conference Room	East End of Bookcase	0.5
4	1652429	Radio Room	East Wall	0.3
5	1650892	Break Room	West Wall Bulletin Board	0.4
6	1650907	Office	West Wall	0.7
7	1652430	Men's Locker Room	Side of P.A. Speaker	0.7
8	1650900	Break Room by Air Lock	South Wall	0.5
9	1650904	Room 202	North Wall on Electric Box	0.5
10	1650903	Room 301	West Wall on Electric Box	0.4
11	1650901	100' Office	East Wall Bulletin Board	0.6
12	1652431	100' Level	East Wall Behind Storage	0.5
13	1650916	78'6" Level N	Pump Room East Wall Electric Conduit	1.1
14	1650902	78'6" Level S	Beam Center	1.1
15	1652141	56'6" Level N	4' Drain Pipe	0.9
16	1652178	56'6" Level S	4' from Sump on Beam	1.0
17	1650910	Auxiliary Bldg. Storage Room	Center	4.4
18	1650913	Auxiliary Bldg. Hall E	On Corner	0.8
19	1650909	Auxiliary Bldg. Hall W	Above Workbench	1.0
20	1650908	Auxiliary Bldg. Sump P18	Above Sump	0.7

** Not recovered.

START DATE: 10/23/89
END DATE: 12/02/91
TOTAL: 770 Days

Table 3. "ANL" Long-Term Radon Sampling Locations* and Detector ID Numbers

Station	ANL Detector**	Room No.	Location
1	164021	Office	South Wall
2	164003	Office	Bulletin Board
3	164022	Conference Room	East End of Bookcase
4	164001	Radio Room	East Wall
5	1645973	Break Room	West Wall Bulletin Board
6	1646017	Office	West Wall
7	1646023	Men's Locker Room	Side of P.A. Speaker
8	164002	Break Room by Air Lock	South Wall
9	1645991	Room 202	North Wall on Electric Box
10	164016	Room 301	West Wall on Electric Box
11	1646000	100' Office	East Wall Bulletin Board
12	1645992	100' Level	East Wall Behind Storage
13	1646004	78'6" Level N	Pump Room East Wall Electric Conduit
14	1645990	78'6" Level S	Beam Center
15	1645988	56'6" Level N	4' Drain Pipe
16	1645979	56'6" Level S	4' from Sump on Beam
17	1646019	Auxiliary Bldg. Storage Room	Center
18	1646008	Auxiliary Bldg. Hall E	On Corner
19	1646013	Auxiliary Bldg. Hall W	Above Workbench
20	1646014	Auxiliary Bldg. Sump P18	Above Sump
21	1646024	N/A	Control
22	1646006	N/A	Control
23	1646007	N/A	Spike
24	1646015	N/A	Spike

* Sampling locations identical to those used by Battelle.
** ANL Detector now in place.

Gamma (γ) Exposure Rate Measurements

A sweep of the PNPF for γ exposure rate anomalies (gross γ) was performed followed by both a general and a specific area measurement of the γ exposure rate field. The gross γ sweep did not detect any unknown anomalies, however, it did confirm Battelle's finding (BAT89) of low-level contamination in the floor drain (F4) on the 56.5 Ft. level. Using the collimated NaI (Tℓ) detector (Eberline PG-2 with PRM-5), the localized gross gamma count rate directly above drain F4 was 1600 counts/min or approximately 3 times ambient count rate. However, the ambient count rate of the facility was significantly lower than the rest of the facility due to the presence f all the shielding material (i.e., concrete). Consequently, this isolated spot was easy to detect but of no significance in the overall exposure rate. Consequently, all γ exposure measurements in the overall facility were typical of natural background values.

Twelve locations through out the facility were measured for γ exposure rate levels using a high precision pressurized ion chamber (RSS-112). The exposure rate (Table 4) ranged from a minimum of 3.7 to a maximum of 12.1 μR/h (including standard deviation) These values are typical of natural background. The two highest exposure rate levels were found in the auxiliary building on the second (7.1 ± 2.2 μR/h) and third (8.1 ± 4.0 μR/h) floors.

Table 4. Gamma Exposure Rate Data (Reuter-Stokes Model RSS-112)

Map ID	Location	Start	Stop	Exposure Rate (in μR/h)	Exposure (in μR)[1]
1	Center of West Wall [121', 301]	1340:40	1449:40	8.1 ± 4.0	9.3
2	Center of Weight Room [111', 202]	1513:05	1654:50	7.1 ± 2.2	12
3	Reception Office [100', 112-A]	0759:40	0918:45	6.4 ± 0.8	8.4
4	Office Area [100',122]	1433:45	1535:25	6.6 ± 1.5	6.8
5	Lunchroom [100', 121]	1200:05	1428:45	6.3 ± 0.7	15.8
6	Platform [83']	0858:50	1144:05	6.0 ± 2.3	15.6
7	Primary Coolant Pump No. 2 [83']	0824:55	0852:40	6.6 ± 0.7	3
8	Over Floor Drain Aux. Bldg. [79', B-4]	1156:50	1332:45	6.5 ± 2.0	10.4
9	74' Platform [79']	0711:35	0818:15	4.6 ± 0.9	5.2
10	Centered thru Floor Opening [56', R-4]	1704:25	1822:25	5.1 ± 1.6	6.8
11	Center of Reactor Bldg. Floor [100']	1100:00	1150:00	6.6 ± 2.2	5.5
12	Small Shed	1543:20	1813:50	6.9 ± 1.7	17.5

NOTE[1] Exposure is integrated over the total elapsed time for the measurement.

Neutron Exposure Rate Measurements

The PNPF was also surveyed around the entombed reactor for neutrons. The instrument used is capable of detecting neutrons from 0.025 eV - 10 MeV. The survey detected no neutron fields surrounding the retired reactor.

Floor Monitoring

All accessible floor surfaces were monitored for β-γ contamination with the Eberline FM-4G Floor Monitor. Monitoring for α contamination was not practical in most areas because of debris on the floor. Typical β-γ background values for the FM-4G range from 500 - 1000 counts/min with a 330 cm^2 floor probe. Monitoring results depicted no above background values on accessible floor surfaces.

Smear/Wipe Sample Data

Smears/wipes were taken at random throughout the PNPF, including the area of the F4 floor drain where there were elevated external gamma radiation, (Fig. 3 - 8). Results are provided in Table 5. Samples were analyzed for gross α and gross β-γ in the ANL mobile lab onsite. All smear samples were found to be below the Lower Limit of Detection (LLD) of the counting system for both gross α and gross β-γ analysis (see Appendix A).

Table 5. Smear/Wipe Sample Data

SMEAR NO.	ELEVATION	COMMENTS	REMOVABLE ALPHA dpm/100 cm^2	REMOVABLE BETA-GAMMA dpm/100 cm^2
001	56'-6"	Stairwell Base	< LLD	< LLD
002	56'-6"	Scrabbled Area	< LLD	< LLD
003	61'	Below 44', Mark on Wall	< LLD	< LLD
004	58'	Hole in Wall	< LLD	< LLD
005	56'-6"	Metal Grating by Sump	< LLD	< LLD
006	62'	Post in Wall	< LLD	< LLD
007	61'	Air Filter	< LLD	< LLD
008	56'-6"	Tar Spot on Floor 18" Across	< LLD	< LLD
009	56'-6"	Where the RSS-112 Was	< LLD	< LLD
010	58'	Clean Out on Wall	< LLD	< LLD
011	56'-6"	Drain Lid	< LLD	< LLD
012	62'	Plaque (Attached) Sign On Containment Wall	< LLD	< LLD
013	56'-6"	Floor of Spiral Stairwell	< LLD	< LLD
014	62'	8th Step From Bottom of Spiral Stair	< LLD	< LLD
015	63'-6"	Air Exhaust Duct	< LLD	< LLD
016	56'-6"	Tunnel Center of Floor	< LLD	< LLD
017	56'	Drain F4	< LLD	< LLD
018	62'-6"	Top of Duct Work	< LLD	< LLD
019	59'	Drain Tank, Block Foundation	< LLD	< LLD
020	61'-6"	Face of Wall Flush Pillar	< LLD	< LLD

Table 5. Smear/Wipe Sample Data (Continued)

SMEAR NO.	ELEVATION	COMMENTS	REMOVABLE ALPHA dpm/100 cm^2	REMOVABLE BETA-GAMMA dpm/100 cm^2
021	67'-6"	Stair Landing, 2nd Floor From Bottom	< LLD	< LLD
022	78'-6"	Stair Landing 4th From Bottom	< LLD	< LLD
023	78'-6"	Center of Floor Blocks, 2nd Floor	< LLD	< LLD
024	80'	Possible Escape Hatch Inner Lip	< LLD	< LLD
025	78'-6"	Metal Landing	< LLD	< LLD
026	77'-6"	Motor Housing	< LLD	< LLD
027	76'	Metal Grating Landing	< LLD	< LLD
028	72'	Top of I Beam	< LLD	< LLD
029	77'	Wall	< LLD	< LLD
030	76'	Air Duct Intake and Screen	< LLD	< LLD
031	83'	Spiral Stair Floor	< LLD	< LLD
032	86'	Peeling Paint Wall	< LLD	< LLD
033	83'	Near Concrete Block	< LLD	< LLD
034	85'	Concrete Block Middle	< LLD	< LLD
035	83'-6"	Drain	< LLD	< LLD
036	83'	I Beam	< LLD	< LLD
037	87'	Air Filter	< LLD	< LLD
038	88'	Air Duct Panel	< LLD	< LLD
039	90'	I Beam Overhead Under Mezzanine	< LLD	< LLD
040	89'-6"	Under Rhst. 14	< LLD	< LLD

Table 5. Smear/Wipe Sample Data (Continued)

SMEAR NO.	ELEVATION	COMMENTS	REMOVABLE ALPHA dpm/100 cm^2	REMOVABLE BETA-GAMMA dpm/100 cm^2
041	83'	Under Ladder	< LLD	< LLD
042	95'	Center of Wall	< LLD	< LLD
043	97'	Top of Electric Power Box	< LLD	< LLD
044	91'	Top of I Beam	< LLD	< LLD
045	95'	Overhead I Beam with Light	< LLD	< LLD
046	100'	Rm111 Outside Lobby (Vestibule)	< LLD	< LLD
047	100'	Hallway	< LLD	< LLD
048	102'	Main Office Air Heater Duct	< LLD	< LLD
049	103'	Rm112B Window Ledge	< LLD	< LLD
050	103'	Rm117 Air Heating Duct	< LLD	< LLD
051	100'	Hallway	< LLD	< LLD
052	100'	Rm119 Storage Room	< LLD	< LLD
053	99'-6"	Rm120 Inside Floor Drain	< LLD	< LLD
054	100'	Area Behind RM120	< LLD	< LLD
055	107'-8"	Air Exhaust (Overhead) near RN #5	< LLD	< LLD
056	100'	Near SW Corner of Exit Door	< LLD	< LLD
057	100'	Janitor's Closet Under Sink	< LLD	< LLD
058	102'-6"	Janitor's Closet Sink Right Lip	< LLD	< LLD
059	105'	Janitor's Closet Wall	< LLD	< LLD
060	100'	Rm109 Clean Issue	< LLD	< LLD

Table 5. Smear/Wipe Sample Data (Continued)

SMEAR NO.	ELEVATION	COMMENTS	REMOVABLE ALPHA dpm/100 cm^2	REMOVABLE BETA-GAMMA dpm/100 cm^2
061	108'	Rm104 Intake Air Duct (Men's Toilet)	< LLD	< LLD
062	100'	Rm108 Men's Locker (Top of Drain)	< LLD	< LLD
063	100'-6"	Rm102 Floor Drain Shower Stall	< LLD	< LLD
064	100'	Rm101 Hot Changer Under Sink	< LLD	< LLD
065	100'	Hand and Foot Counters	< LLD	< LLD
066	103'	Rm115 Lab Corner of Counter Surface	< LLD	< LLD
067	105'	Rm118 Counting Room	< LLD	< LLD
068	100'	Rm110 Woman's Restroom Under Sink	< LLD	< LLD
069	100'	Rm121A	< LLD	< LLD
070	100'	Rm121B, I Beam	< LLD	< LLD
071	100'	Conference Rm121	< LLD	< LLD
072	100'	Rm124 Lunch Room	< LLD	< LLD
073	106'	Air Lock Left Side Beam	< LLD	< LLD
074	100'	Air Lock Steel Pad Threshold	< LLD	< LLD
075	100'	Air Lock Concrete Threshold	< LLD	< LLD
076	100'	Stairwell	< LLD	< LLD
077	115'-6"	Rm203 Heating Vent Room, Top of Duct Work	< LLD	< LLD
078	115'-6"	H&V Room203 Inside Duct Work	< LLD	< LLD

Table 5. Smear/Wipe Sample Data (Continued)

SMEAR NO.	ELEVATION	COMMENTS	REMOVABLE ALPHA dpm/100 cm^2	REMOVABLE BETA-GAMMA dpm/100 cm^2
079	111'-6"	Rm208 Under Electric Panel	< LLD	< LLD
080	115'-6"	Rm202 Ledge On Wall Beam	< LLD	< LLD
081	118'	Rm202 Raceway	< LLD	< LLD
082	111'-6"	Stairway Landing	< LLD	< LLD
083	125'	Rm301 Crossbeam Center	< LLD	< LLD
084	121'	Rm301A Center	< LLD	< LLD
085	89'-4"	OAP Room Inside Duct	< LLD	< LLD
086	89'-4"	OAP Room Center of Floor	< LLD	< LLD
087	83'-6"	Side of Tank Holdup Aqueous	< LLD	< LLD
088	79'-6"	RmB2 AO Waste Room Sump Pump Housing	< LLD	< LLD
089	78'-6"	AO Waste Room B2 Corner	< LLD	< LLD
090	78'	Service Passageway Drain Inside	< LLD	< LLD
091	83'	RmB3 Blower Housing Exhaust/Filter	< LLD	< LLD
092	78'	RmB3 Exhaust Filter	< LLD	< LLD
093	78'-6"	Exhaust/Filter Threshold Door	< LLD	< LLD
094	81'-6"	RmB8	< LLD	< LLD
095	78'-6"	RmB8 Under Ladder	< LLD	< LLD
096	78'-6"	RmB6 Floor Drain Cover	< LLD	< LLD
097		Tank A South	< LLD	< LLD
098		Tank B	< LLD	< LLD

Table 5. Smear/Wipe Sample Data (Continued)

SMEAR NO.	ELEVATION	COMMENTS	REMOVABLE ALPHA dpm/100 cm^2	REMOVABLE BETA-GAMMA dpm/100 cm^2
099		Tank C	< LLD	< LLD
100		Tank D	< LLD	< LLD
101		Tank E	< LLD	< LLD
102		Tank F	< LLD	< LLD
103		Tank G	< LLD	< LLD
104		Tank B Inside Lid	< LLD	< LLD
105	78'	RmB5 Drain Tank Room (Inside Drain)	< LLD	< LLD
106	78'-6"	RmB5 Drain Tank Room	< LLD	< LLD
107	78'-6"	RmB5 Drain Tank Room	< LLD	< LLD
108	83'-6"	Top of Escape Hatch	< LLD	< LLD
109	81'-6"	RmB4 Sink/Counter	< LLD	< LLD
110	78'-6"	Floor Drain Cover RmB4	< LLD	< LLD
111	78'-6"	Service Passageway	< LLD	< LLD
112	100'	Electrical Panel	< LLD	< LLD
113	100'	Top of Staircase	< LLD	< LLD
114	107'	Duct Work	< LLD	< LLD
115	100'	Floor Drain Cover	< LLD	< LLD
116	108'	Air Conditioner Filter	< LLD	< LLD
117	100'	R5	< LLD	< LLD
118	98'-6"	Inside Ledge of □ Opening in Floor	< LLD	< LLD
119	100'	Center of Reactor	< LLD	< LLD

Table 5. Smear/Wipe Sample Data (Continued)

SMEAR NO.	ELEVATION	COMMENTS	REMOVABLE ALPHA dpm/100 cm^2	REMOVABLE BETA-GAMMA dpm/100 cm^2
120	103'-6"	Inside of Broken Duct Work	< LLD	< LLD
121	105'	Plaque (AEC)	< LLD	< LLD
122	99'-6"	Top of Spiral Staircase Landing	< LLD	< LLD
123	106'	Support Beam for Spiral Staircase	< LLD	< LLD
124	105'	Well N.E. of Spiral Staircase	< LLD	< LLD
125	104'	Shielded Heating System Concrete Block	< LLD	< LLD
126	98'-6"	Inside Edge of a 2nd □ opening in Floor	< LLD	< LLD
127	106'	PA Horn	< LLD	< LLD
128	100'	R6	< LLD	< LLD
129	100'	RF Floor Drain Cover	< LLD	< LLD
130	110'-6"	Inside Air Duct	< LLD	< LLD

Lower Limit of Detection (LLD)

LLD_{α} = 6 dpm/100 cm^2

$LLD_{\beta-\gamma}$ = 38 dpm/100 cm^2
(See Appendix A)

High Volume Particulate Air Sample Data

Four high volume air samples (Fig. 4; 6 - 8) were also analyzed using the same equipment and protocol as the smear/wipe samples noted above. Again, all air samples were below the LLD for each type (gross α; gross β-γ) of analysis (Table 6).

Liquid/Sludge Sample Data

Radiological:

The resultant data from the radiological analyses of the liquid/sludge samples are given in Table 7. Tap water (No. 135) was collected from onsite and analyzed to produce a site specific indicator matrix. This matrix was used to make relative comparisons with data obtained from both sumps. Gamma spectrometric analysis of these samples (No. 139 and 147) depicted no significant difference from the tap water values. In addition, the reactor sump (P-17) sample (No. 147) was similar to the tap water with respect to gross α and gross β characteristics.

Analyses of two portions of a composite liquid-sludge sample (No. 139) from sump P-18 in the auxillary building indicated contradictory gross α and gross β results. One portion showed background values while the other portion was about 10 times above background values. Since the analyses of both portions of the sample were confirmed to be valid, a plausible explanation is that the activity in the sample was not homogeneous. Additional

Table 6. Air Sample Data

AIR SAMPLE NO.	ELEVATION	TOTAL ELAPSED SAMPLING TIME (in min)	TOTAL VOLUME SAMPLED (in m^3)	ALPHA dis/min-m^3	BETA-GAMMA dis/min-m^3
131	111'-6"	1035	25.9	< LLD	< LLD
132	56'-6"	98	24.5	< LLD	< LLD
133	83'	172	43.0	< LLD	< LLD
134	78'-6"	103	25.8	< LLD	< LLD

Lower Limit of Detection (LLD)

LLD_{α} - 6 dpm/Air Sample [regardless of volume sampled]

$LLD_{\beta-\gamma}$ - 38 dpm/Air Sample [regardless of volume sampled]
(See Appendix A)

Table 7. Radiological Analyses of Liquid/Sludge Samples

Sample No.	Location	Gamma Spec picoCurie/g					Gross α\β Screening pCi/g[1]	
		^{137}Cs	^{226}Ra	^{214}Bi	^{228}Th	^{232}Th	Gross Alpha±SD[2] α	Gross Beta±SD[2] β
135	Tap Water	< 0.07	< 0.1	< 0.2	0.20±0.02	< 0.3	0.009±0.002	0.015±0.002
139	Aux.Bldg. Sump	< 0.03	< 0.1	< 0.2	< 0.2	< 0.1	0.004±0.001	0.013±0.002
139 Duplicate	Aux.Bldg. Sump						0.056±0.016	0.144±0.012
147	Reactor Building Sump	< 0.03	< 0.1	< 0.1	< 0.1	< 0.2	0.000±0.001	0.012±0.002

[1] Concentration limits for water discharged into the environment: U. S. NRC Regulations 10 CFR 20 (1991), Appendix B, "Concentrations in Air and Water Above Natural Background," Table 2, Col. 2: Sr-90 3 x 10^{-7} μCi\ml (0.3 pCi/ml, most restrictive beta emitter). Gross Alpha: 3 x 10^{-8} μCi/ml (0.03 pCi/ml).

[2] Standard deviation based on counting statistics.

samples would have to be taken from sump P-18 to determine whether it does or does not have any radioactive contamination.

Non-Radiological:

The liquid/sludge samples were also analyzed for various non-radiological contaminants. The tap water (No. 137) contained only commonly occurring nontoxic metals, calcium, sodium, iron, magnesium, and potassium, in concentrations found in most water supply systems. The auxiliary building sump sample (No. 141) was found to contain relatively high concentrations of numerous metals, some of which are considered as heavy metals. None of these levels exceed regulatory limits under the Resource Conservation and Recovery Act (RCRA) and thus are not considered RCRA hazardous. Cadmium (134 μg/l), chromium (212 μg/l), copper (3060 μg/l), lead (1770 μg/l), and zinc (5820 μg/l) were detected in this sample. The reactor sump sample (No. 149) contained the same metals/inorganics as the domestic water supply, although in slightly higher concentrations.

An auxiliary building sump sample (No. 144) was the only sample that positively exhibited any detectable organics. Several VOCs were found, including acetone, 1,1 dichloroethane, trichloroethene, toluene and xylene. These are all common industrial solvents used for many purposes, including surface cleaning. In addition, a number of hydrocarbons and unknown organics were found in the sample and listed as tentatively identified compounds (TICs). The second sample (No. 142) taken

at this location did not contain measurable amounts of the PCBs and pesticides included in the analysis. This sample also was found to contain large amounts of hexane extractable materials.

The results from the oil/grease analysis were negative for reactor sump samples (No. 148). However, the auxiliary sump sample (No. 140) had oil and grease as a considerable portion of its composition (Table 8).

The amounts of VOCs present in the reactor sump were below the Toxicity Charactertistic Leaching Procedures (TCLP) limits for VOCs, and thus the material is not a RCRA hazardous waste. In the auxiliary building, the presence of VOCs as well as the other hydrocarbons and hexane extractable materials, indicates that the building sump was subject to discharge of waste materials and possibly contains other hazardous materials besides VOCs and PCB/pesticides.

None of the samples from the reactor sump contained measurable amounts of the organic constituents which were analyzed. In addition, all liquid samples from the reactor and auxiliary building sumps exhibited a neutral pH value (Table 9).

VISUAL INSPECTION

An inspection of the physical condition of the PNPF was performed by the ANL team. Several findings of importance are noted below.

Table 8. Oil and Grease Data for Liquid/Sludge Samples

Sample No.	Location	Oil and Grease (mg/L)[a]
136	Tap Water	< 5.0
140	Auxiliary Building Sump	33920.0[b]
148	Reactor Building Sump	< 5.0
N/A	Blank	< 5.0
N/A	Laboratory Control Sample	27.4 mg/L added - 92.7% Recovery

[a] Samples were analyzed to determine total recoverable oil and grease per EPA SW-846 Method 9070 (Gravimetric Separatory Funnel Extraction). Method detection limit is 5.0 mg/L.

[b] Extracted sample could not be brought to constant weight due to the presence of extractable compounds which vaporized at ambient temperature. The first weight obtained following Method 9070 procedures was used to compute total oil and grease in the sample. This weight exceeds the range of the procedure, which is 5 to 1000 mg/L of extractable material, as stated in Method 9070.

Table 9. pH Data for Liquid Samples

Sample No.	Location	pH[a]
141	Auxiliary Bldg. Sump	7.40 7.46 7.36
149	Reactor Bldg. Sump	7.71 7.63 7.67
149 Duplicate	Reactor Bldg. Sump	7.66 7.61 7.65

[a] pH was determined per EPA SW-846 Method 9040 (pH Electrometric Measurement).

Instrument Calibration Verification Results:

Standard Buffer, pH 7.00:

7.02, 7.01, 7.01;
7.04, 7.06, 7.04

Standard Buffer, pH 10.00:

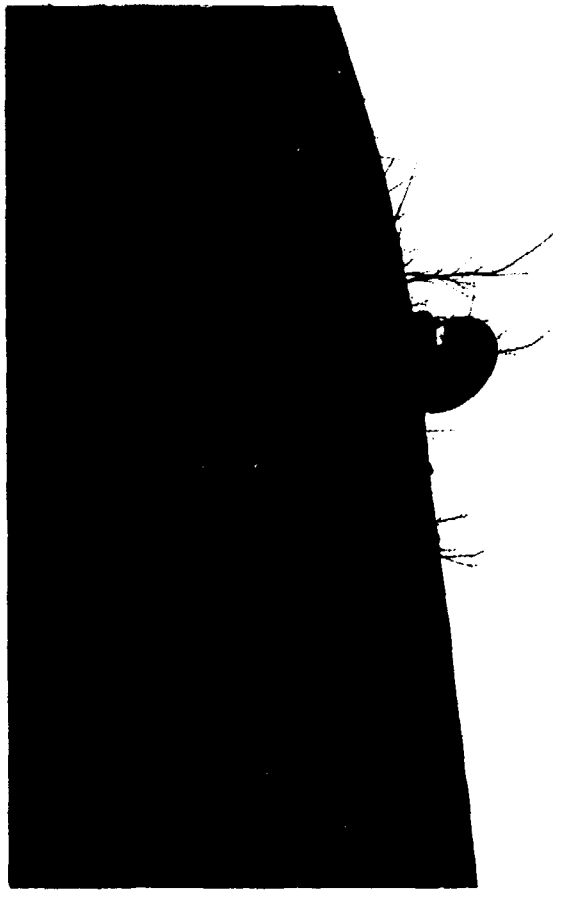
9.97, 10.01, 10.03;

The reactor shielding and concrete structure that entombs the remaining radioactive material appears to be in good physical condition. No degradation of this structure was visually evident. Radiological exposure rates (γ) in the vicinity of the structure (~ 6 μR/h) did not differ from background values. The exterior of the reactor building shell appears to be in poor condition (Photo. 14 - 17). Despite its appearance, however, the shell does not leak in inclement weather.

In the incinerator room (B-3) there are several 55 gallon drums of what appears to be solvents. Although no evidence suggests that radiologically contaminated wastes were incinerated, future sampling and subsequent analysis of ash and other incinerator residue may be in order as documented negative data.

There are storage tanks in B-7 (Photo. 18; 19) that are above the basement grade but covered by a pea gravel/dust mixture. A survey for radiological contaminants was conducted by lowering the collimated NaI(Tl) detector into the tanks and each tank lid was smear/wipe sampled for possible removable activity. No radiation levels above ambient background or removable activity were detected. The tanks were empty but their interior appeared to covered with a creosote-like substance. It is unclear what liquids, if any, these tanks may have contained.

Photos 14 and 15. Vegetation on Reactor Shell Exterior



Photos 16 and 17. Vegetation on Reactor Shell Exterior

Photos 18 and 19. Top of Tanks in B-7

FACILITY CONTRACTED INSPECTIONS

In 1969, the city of Piqua and the AEC (now DOE) mutually accepted various specific responsibilities during the lease of the PNPF to the city. One of the responsibilities of the city was to maintain the facility. The Government provided the city of Piqua $30,000 for the cathodic protection system, and $20,000 for the water level alarm system.

Fire Protection System

The fire protection system is annually checked by the Grinnel Fire Protection Systems Co., Inc. (Pittsburgh, Pa.). A monthly fire alarm inspection is also conducted for the reactor building area. The most recent (27 August 1991) fire protection system inspection is provided as Appendix B. In that report it is stated that there are three deficiencies noted...

A. the fire department connection was blocked by weeds and trash, and was missing a cap,
B. the post indicator valve target glasses are broken out;
C. and the alarm company does not receive the valve supervisory signals.

In addition, the report noted that the old multitrol system is out of service. A previous inspection (Appendix C, from BAT89), states that there are unspecified areas that are not covered by a sprinkler system due to the inoperative status of the multitrol system.

Cathodic Protection System

A cathodic protection system services the containment shell (or dome). This system, like the fire protection system, is routinely inspected. This service had, in the past, been contracted to Cathodic Protection Services Company (Medina, Oh.). At the time of the survey, there was no updated information on the inspection.

Asbestos Testing

Samples from the "oil room" tank and the basement hall were analyzed for asbestos. The results (Appendix D) indicated that none of the samples contained asbestos.

CONCLUSIONS

The data collected during this survey supports the following statements:

- With the exception of one sampling location, all radon concentrations in the PNPF were well below the U. S. EPA guideline of 4 pCi/l.
- The floor drain F4 on the 56 ft level was the only location where elevated gamma radiation was detected.
- No neutron dose rates above natural background levels were detected.
- No fixed or removable radioactive contamination was detected.

- High volume particulate air sampling did not indicate any airborne radiological contamination.
- The liquid/sludge samples from the reactor building sump did not differ significantly from background values for the specified radiological parameters.
- The liquid/sludge samples from the auxiliary building sump did not differ significantly from background values for the specified γ spectrometric parameters. (Uncertainty about results for sample No. 139 can be resolved only by analysis of additional samples from sump P-18.)
- The radiological data collecting during this survey suggests that the status of the facility meets the criteria and objective of DOE 5400.5, "Radiation Protection of the Public and the Environment."
- The reactor building sump samples did not differ significantly from the domestic water supply for the specified non-radiological parameters.
- No PCBs or pesticides were detected in the samples taken.
- Auxiliary building sump samples tested for the specified non-radiological parameters did indicate that the sump has a relatively high concentration of inorganics, some of which are heavy metals, but do not exceed any regulatory limit.
- The reactor shell, although poor in appearance, displays adequate weathertight capability.

- Original electrical wiring has been modified to accommodate current operations.
- The fire protection system that is emplaced throughout the PNPF does not effectively provide alarm and fire suppression as designed.

RECOMMENDATIONS

The following items are recommendations derived from conducting the site survey.

- The long-term radon monitoring program need not continue. Data collected and documented in this report and BAT89 demonstrate that no radon problem exists at the PNPF. This program can be terminated after the collection, analysis and interpretation of the currently installed radon (alpha-track) detectors.
- Attention should be directed to improve the appearance of the exterior of the reactor shell. Casual visual inspection by the public of the exterior of the PNPF could promote the impression of neglect and disinterest.
- Corrective actions specified in both fire protection system inspection reports (from this survey and BAT89) should be effected as soon as possible. A follow up inspection by the contracted service should then be conducted to document the repaired system's capability.

- Prior to any disposal, both the reactor building and auxiliary building sump sludge should be RCRA characterized (including semivolatile organics).
- A review of any available documentation on the original drainage system should be done to identify where drain F4 empties. If possible, a gamma logging survey of the drain should be conducted.

REFERENCES

ANL91 ANL ESHD, Environment, Safety & Health Manual, Argonne National Laboratory-East, Environment, Safety and Health Division, Argonne, IL. (April 1991; Revised May 1992)

ANL92 ANL ESH-Health Physics, Health Physics Procedures, Argonne National Laboratory (East), Environment, Safety and Health Division, Health Physics Section, Argonne, IL. (Revised January 1992)

BAT89 Kirsch, G.E.; Tomlin, P.E., Report for the Annular Survey of the Retired Piqua Nuclear Power Facility to the Department of Energy, Battelle Columbus Division, 505 King Avenue, Columbus, OH. (December 1989)

DOE87 U.S. Department of Energy, The Environmental Survey Manual, DOE/EH-0053, DOE/HQ, Washington, DC. (August 1987)

DOE91 U.S. Department of Energy, Chicago Field Office, Environmental Restoration and Waste Management Site Specific Plan: Volume IX, Piqua Nuclear Power Facility, DOE/CH-9111, DOE/CH, Argonne, IL. (August 1991)

REFERENCES (cont.)

GIL87 Gilbert, R.O., Statistical Methods for Environmental Pollution Monitoring, Van Nostrand Reinhold Company, Inc., New York, NY. (1987)

APPENDIX A

LOWER LIMIT OF DETECTION FOR GROSS α AND GROSS $\beta\gamma$ FIELD ANALYSIS

The lower limit of detection* (LLD) is defined as the smallest concentration of radioactive material sampled that has a 95% probability of being validly detected.

$$LLD = \frac{4.66\ S_b}{2.22 \times E \times S}$$

where 4.66 = $2\sqrt{2}$ k, where k is the value for the upper percentile of the standardized normal variate corresponding to the pre-selected risk for concluding falsely that activity is present (α) = .05

S_b = standard deviation of the background

2.22 = dpm/pCi [Factor not used, all data reported in dpm]

E = fractional counting efficiency

S = sample size

Using this formula, the LLDs for gross α and gross β-γ analysis using the mobile laboratory field counting system is computed as...

LLD_α = 6 dpm/100 cm^2 (smear/wipe)

= 6 dpm/air sample [regardless of volume sampled]

$LLD_{\beta-\gamma}$ = 38 dpm/100 cm^2 (smear/wipe)

= 38 dpm/air sample [regardless of volume sampled]

*HASL Procedures Manual, J. H. Harley, editor, pages D-08-01/12, August 1977.

APPENDIX B

FIRE PROTECTION SYSTEM INSPECTION REPORT, DATED AUGUST 27, 1991

GRINNELL FIRE PROTECTION SYSTEMS COMPANY

TION REPORT

REPORT OF INSPECTION

INSPECTION CONTRACT NO. 61-165394

BUREAU FILE NO.

SET 1 OF 2

FERRED WITH Debbie Higgins 513-778-2077

PORT TO City of Piqua (Elec. Dist. Facility) BUILDING OR LOCATION INSPECTED Same

EET 123 Bridge St. (Old Steele Plant) INSPECTOR Larry V. Hill

CITY & STATE Piqua, Ohio ZIP 45356 GRINNELL OFFICE Dayt PHONE NO. 771-2080

ATT. DATE Aug. 27, 1991

	Yes	N.A.‡	No*
1. GENERAL			
A. (To be answered by the Owner or Owner's representative)			
a. Have there been any changes in the occupancy classification, machinery or operations since the last inspection?			/
b. Have there been any changes or repairs to the fire protection systems since the last inspection?			/
c. If a fire has occurred since the last inspection, have all damaged sprinkler system components been replaced?			/
d. Has the piping in all dry systems been checked for proper pitch within the past five years? Date last checked ____ (checking is recommended at least every 5 years)			/
e. Has the piping in all systems been checked for obstructive materials? Unknown Date last checked ____ (checking is recommended at least every 5 years)			/
f. Have all fire pumps been tested to their full capacity through the use of hose streams or flow meters within the past 12 months?			/
g. Are gravity, surface or pressure tanks protected from freezing?			/
h. Are any of the sprinklers 50 years old or older? (testing and/or replacement is recommended for such sprinklers)			/
i. Are any extra high temperature solder sprinklers regularly exposed to temperatures near 300°F?			/
B. (To be answered by the inspector)			
a. Have the sprinkler systems been extended to all visible areas of the building?			/
b. Does there appear to be proper clearance between the top of all storage and the sprinkler deflector?	/		
c. Are the building areas protected by a wet system, heated, including its blind attics and perimeter areas, where accessible?	/		
d. Are all visible exterior openings protected against the entrance of cold air?	/		
2. CONTROL VALVES			
a. Are all sprinkler system main control valves and all other valves in the appropriate open or closed position?	/		
b. Are all control valves sealed or supervised in the open position?	/		

L. Control Valves	No. of Valves	Type	Easily Accessible Yes	Easily Accessible No	Signs Yes	Signs No	Valve Open Yes	Valve Open No	Secured! If yes, how! Yes	Secured! If yes, how! No	(Sealed?) (Locked?) (Supvd.?)	Supervision Operational Yes	Supervision Operational No
CITY CONNECTION	2	OS&Y/PIV		/		/	/		/		SUPV		
TANK													
PUMP													
SECTIONAL													
SYSTEM	2	OS&Y	/			/	/		/		SUPV		
ALARM LINE													

3. WATER SUPPLIES

a. Water supply source? City 20 Gravity Tank —

Pressure Fire Pump & Tank —

Pressure Fire Pump & City —

Pressure Fire Pump & Pond —

Waterflow Test Results Made During This Inspection

Test Pipe Located	Size Test Pipe	Static Pressure Before	Flow Pressure	Static Pressure After	Test Pipe Location	Size Test Pipe	Static Pressure Before	Flow Pressure	Static Pressure After
ASR Main	2"	20	80 *	20 *					
2	2"	95	50	95					

* Not full flow

	Yes	N.A.‡	No*
4. TANKS, PUMPS, FIRE DEPT. CONNECTIONS			
a. Do fire pumps, gravity, surface or pressure tanks appear to be in good external condition?		/	
b. Are gravity, surface and pressure tanks at the proper pressure and/or water levels?		/	
c. Are fire dept. connections in satisfactory condition, couplings free, caps or plugs in place and check valves tight? Leaking/missing			/
d. Are fire dept. connections visible and accessible?			/
5. WET SYSTEMS			
a. No. of systems 2 Make & Model 6" Automatic 153			
b. Are cold weather valves in the appropriate open or closed position?		/	
c. If closed, has piping been drained?		/	
d. Has the owner or owner's representative been advised that cold weather valves are not recommended by NFPA?		/	
e. Have all the antifreeze systems been tested?		/	
f. Date antifreeze systems were tested			
g. The antifreeze tests indicate protection to: system 1 ____ 2 ____ 3 ____ 4 ____ 5 ____ temperature			
h. Did alarm valves, waterflow alarm indicators and retards test satisfactorily?		/	

‡Not Applicable

*Explain (No) Answers on

G4550-1

GRINNELL FIRE PROTECTION SYSTEMS COMPANY

INSPECTION REPORT No. 1/2

REPORT OF INSPECTION

INSPECTION CONTRACT NO. G-1053-F

BUREAU FILE NO.

SET 2 OF 2

	Yes	N.A.‡	No*
6. DRY SYSTEMS			
a. No. of systems ____ Make & Model ____			
Date last trip tested ____			
b. Is the air pressure and priming water levels normal?			
c. Did the air compressor operate satisfactorily?			
d. Were all low points drained during this inspection?			
e. Did all quick opening devices operate satisfactorily?		N/A	
f. Did all the dry valves operate satisfactorily during this inspection?			
g. Do dry valves appear to be protected from freezing?			
h. Is the dry valve house heated?			
7. SPECIAL SYSTEMS			
a. No. of systems ____ Make & Model Old Multiplex System Out of Service			
Type ____			
b. Were valves tested as required?			
c. Did all heat responsive systems operate satisfactorily?		N/A	
d. Did the supervisory features operate during testing?			

Heat Responsive Devices: Type ____ Type of test ____

Valve No. ____ 1.... 2.... 3.... 4.... 5.... 6.... Valve No. ____ 1.... 2.... 3.... 4.... 5.... 6....

Valve No. ____ 1.... 2.... 3.... 4.... 5.... 6.... Valve No. ____ 1.... 2.... 3.... 4.... 5.... 6....

Valve No. ____ 1.... 2.... 3.... 4.... 5.... 6.... Valve No. ____ 1.... 2.... 3.... 4.... 5.... 6....

Valve No. ____ 1.... 2.... 3.... 4.... 5.... 6.... Valve No. ____ 1.... 2.... 3.... 4.... 5.... 6....

Auxiliary equipment: No. ____ Type ____

Location ____

Test results ____

	Yes	N.A.‡	No*
8. ALARMS			
a. Did the water motors and gong operate during testing?	✓		
b. Did the electric alarms operate during testing?		✓	
c. Did the supervisory alarms operate during testing?		✓	
SPRINKLERS — PIPING			
a. Do sprinklers generally appear to be in good external condition?	✓		
b. Do sprinklers generally appear to be free of corrosion, paint, or loading and visible obstructions?	✓		
c. Are extra sprinklers available on the premises?	✓		
d. Does the exterior condition of piping, drain valves, check valves, hangers, pressure gauges, open sprinklers and strainers appear to be satisfactory?	✓		
e. Does the hand hose on the sprinkler system appear to be in satisfactory condition?		✓	✓

10. EXPLANATION OF "NO" ANSWERS (For Sections 10 thru 9):
Fire Department Conn. blocked by weeds and bush - Leaf missing
Post Indicator Valve - target glasses broken out
Valve supervisory signals not received by Alarm company

11. THE INSPECTOR SUGGESTS THE FOLLOWING NECESSARY IMPROVEMENTS, HOWEVER, THESE SUGGESTIONS ARE NOT THE RESULT OF AN ENGINEERING SURVEY:
Correct Above

12. ADJUSTMENTS OR CORRECTIONS MADE:

13. LIST CHANGES IN THE OCCUPANCY HAZARD OR FIRE PROTECTION EQUIPMENT, AS ADVISED BY THE OWNER IN SECTION 1A:

INSPECTION AND SUGGESTED IMPROVEMENTS WERE DISCUSSED WITH THE UNDERSIGNED OWNER OR OWNER'S REPRESENTATIVE.

Signature of owner or owner's representative Diane Rugino Date 9/27/13

DUPLICATE TO: ____

STREET ____

CITY & STATE ____ ZIP ____

ATT. ____

G4550-2

‡Not Applicable
*Explain (No) Answers on Back of Sheet

SUBSCRIBER'S COPY

FINANCE DEPARTMENT
124 N. WAYNE STREET
PIQUA, OHIO 45356
MAIL ALL INVOICES TO ABOVE ADDRESS

SJM

No. I-5371

P.O. NUMBER MUST APPEAR ON ALL INVOICES

SHIP TO:
ELECTRIC DISTRIBUTION DEPARTMENT
123 Bridge Street
Piqua, OH 45356

CONDITIONS - READ CAREFULLY

1. ACCEPTANCE OF THIS ORDER INCLUDES ACCEPTANCE OF ALL TERMS, PRICES, DELIVERY INSTRUCTIONS, SPECIFICATIONS AND CONDITIONS STATED.
2. EACH SHIPMENT SHOULD BE COVERED BY A SEPARATE INVOICE IN DUPLICATE.
3. THE RIGHT IS RESERVED TO CANCEL THIS ORDER IF IT IS NOT FILLED WITHIN CONTRACT TIME.
4. ALL DISCOUNTS WILL BE TAKEN FROM DATE OF RECEIVING INVOICE.

TO: Wells Fargo Alarm Services
P.O. Box 272
North Dayton Station
Dayton, OH 45404

DATE ISSUED	REQUISITIONER	DATE REQUIRED	SHIP VIA
01-02-91	Debbie Higgins	Year 1991	N/A

	DESCRIPTION	ACCT. NO.	QUANTITY	UNIT PRICE	EXTENSION
1	Monthly fire alarm inspections				
	at the Dome for the year 1991.			$47.08	$564.96
	774592 1-1-91 to 3-31-91 146.24 Debbie 2-8-91				
	887489 4-1-91 to 6-30-91 146.89 Debbie 4-2-91				
	986111 7-1-91 to 9-30-91 146.89 Mary 7-1-91				
	92174 10-01-91 to 12-31-91 146.89 Debbie 10-7-91				

THERE IS A BALANCE TO THE CREDIT OF THE PROPER APPROPRIATION OR FUND, OR FUNDS ARE IN THE PROCESS OF COLLECTION TO MEET THE EXPENDITURE COVERED BY THIS PURCHASE

Frank Patrizio Jr
PURCHASING AGENT

Robert N. Sh
DIRECTOR OF FINANCE

PLEASE ACKNOWLEDGE RECEIPT OF THIS ORDER IMMEDIATELY, ADVISING WHEN SHIPMENT WILL BE MADE

RECEIVER

APPENDIX C

FIRE PROTECTION SYSTEM INSPECTION REPORT, DATED AUGUST 2, 1989

GRINNELL FIRE PROTECTION SYSTEMS COMPANY

INSPECTION REPORT No. 1-17-90

CONFERRED WITH PAULA STEINKE

REPORT OF INSPECTION

INSPECTION CONTRACT NO. 86-10-336

BUREAU FILE NO.

REPORT TO CITY OF HIGUA

STREET 130 BRIDGE ST

CITY & STATE HIGUA ID ZIP 83535

ATT.

BUILDING OR LOCATION INSPECTED OLD ATOMIC PL

INSPECTOR D. FISHER

GRINNELL OFFICE BOISE PHONE NO 771-1010

DATE 2-6-90

	YES	NO	N/A
1. GENERAL			
A. (To be answered by the Owner or Owner's representative)			
a. Have there been any changes in the occupancy classification, machinery or processes since the last inspection?			
b. Have there been any changes or repairs to the fire protection system since the last inspection?			
c. If a fire has occurred since the last inspection, have all damaged sprinkler system components been replaced?			
d. Has the pump or all dry systems been checked for proper quick within the past five years? Date last checked ____ (checking is recommended at least every 5 years)			
e. Has the pump on all systems been checked for satisfactory operation? DIESEL ELECTRIC Date last checked ____ (checking is recommended at least every 5 years)			
f. Have all fire pumps been tested to their full capacity through the use of hose streams or flow meters within the past 12 months?			
g. Are gravity, suction or pressure tanks protected from freezing?			
h. Are any of the sprinklers 50 years old or older? ____ (Testing and/or replacement is recommended for such sprinklers)			
i. Are any quick response solder sprinklers regularly exposed to temperatures over 100°F?			
B. (To be answered by the inspector)			
a. Have the sprinkler systems been extended to all visible areas of the buildings?			
b. Does there appear to be proper clearance between the top of all storage and the sprinkler deflectors?			
c. Are the building areas protected by a wet system, heated, including all attic and basement areas, where necessary?			
d. Are all visible exterior openings protected against the entrance of cold air?			
2. CONTROL VALVES			
a. Are all sprinkler system main control valves and all other valves in the appropriate open or closed position?			
b. Are all control valves sealed or supervised in the open position?			

Control Valves	No. of Valves	Type	Easily Accessible Yes	Easily Accessible No	Seen Yes	Seen No	Valve Open Yes	Valve Open No	Secured If yes, how? Yes	Secured If yes, how? No	Secured (Locked) (Locked) (Sealed) (Supervised)	Supervised Electronically Yes	Supervised Electronically No
CITY CONNECTION	1	POST IND	—		—		—		—		LOCKED	—	
TANK		/									/		
PUMP													
SECTIONAL											/		
SYSTEM	1	OS&Y	—		—		—		—		LOCKED	—	
ALARM LINE		/									/		

3. WATER SUPPLIES

a. Water supply sources: City X Cranny Tank ____

Pressure Fire Pump & Tank ____

Pressure Fire Pump & City ____

Pressure Fire Pump & Pond ____

Water Flow Test Results Made During This Inspection

Test Flow Located	Size Test Pipe	Static Pressure Before	Flow Pressure	Static Pressure After	Test Flow Located	Size Test Pipe	Static Pressure Before	Flow Pressure	Static Pressure After
OUTSIDE	2"	70	10	15					
MAIN DRAIN	2"	60	10	60					

	YES	NO	N/A
4. TANKS, PUMPS, FIRE DEPT. CONNECTIONS			
a. Do fire pumps, gravity, suction or pressure tanks appear to be in good external condition?			
b. Are gravity, suction and pressure tanks at the proper pressure and/or water levels?			
c. Are fire dept. connections in satisfactory condition, couplings free, caps or plugs in place and check valves right?			
d. Are fire dept. connections visible and accessible?			
5. WET SYSTEMS			
a. No. of systems 2 Make & Model 6" AUTOMATIC 153			
b. Are said weather valves in the appropriate open or closed position? If closed, has proper been obtained?			
c. Has the owner or owner's representative been advised that said weather valves are not recommended by NFPA?			
d. Have all the antifreeze systems been tested?			
e. Does antifreeze system were tested?			
f. The antifreeze tank indicate protection for system ? ____ ? ____ ? ____ ? ____ temperature			
g. Did alarm valves, waterflow alarm indicators and retards test satisfactorily?			

GRINNELL FIRE PROTECTION SYSTEMS COMPANY

INSPECTION REPORT No. 1-27/80

REPORT OF INSPECTION

INSPECTION CONTRACT NO. [illegible]
BUREAU FILE NO.

6. DRY SYSTEMS None
a. No. of systems ______ Make & Model ______
Date last trip tested ______
b. Is the air pressure and priming water level normal? ______
c. Did the air compressor operate satisfactorily? ______
d. Were all low point drains drained during this inspection? ______
e. Did all quick opening devices operate satisfactorily? ______
f. Did all the dry valves operate satisfactorily during this inspection? ______
g. Do dry valves appear to be protected from freezing? ______
h. Is the dry valve house heated? ______

7. SPECIAL SYSTEMS None
a. No. of systems ______ Make & Model ______
Type ______
b. Were valves tested as required? ______
c. Did all heat responsive systems operate satisfactorily? ______
d. Did the supervisory features operate during testing? ______
Heat Responsive Devices: Type ______ Type of test ______
Valve No. ______ 1...... 2...... 3...... 4...... 5...... 6...... Valve No. ______ 1...... 2...... 3...... 4...... 5...... 6......
Valve No. ______ 1...... 2...... 3...... 4...... 5...... 6...... Valve No. ______ 1...... 2...... 3...... 4...... 5...... 6......
Valve No. ______ 1...... 2...... 3...... 4...... 5...... 6...... Valve No. ______ 1...... 2...... 3...... 4...... 5...... 6......
Valve No. ______ 1...... 2...... 3...... 4...... 5...... 6...... Valve No. ______ 1...... 2...... 3...... 4...... 5...... 6......
Auxiliary equipment: No. ______ Type ______
Location ______
Test results ______

8. ALARMS
a. Did the water motor and gong operate during testing? ______
b. Did the electric alarms operate during testing? ______
c. Did the supervisory alarms operate during testing? ______

9. SPRINKLERS — PIPING
a. Do sprinklers generally appear to be in good external condition? ______
b. Do sprinklers generally appear to be free of corrosion, paint, or loading and visible obstructions? ______
c. Are extra sprinklers available on the premises? ______
d. Does the exterior condition of piping, drain valves, check valves, hangers, pressure gauges, open sprinklers and strainers appear to be satisfactory? ______
e. Does the hand hose on the sprinkler system appear to be in satisfactory condition? ______

10. EXPLANATION OF "NO" ANSWERS (For Sections 1E thru 9):
[illegible handwriting: "The old multi... system out of service – some ... sprinklers"]

11. THE INSPECTOR SUGGESTS THE FOLLOWING NECESSARY IMPROVEMENTS, HOWEVER, THESE SUGGESTIONS ARE NOT THE RESULT OF AN ENGINEERING SURVEY:
[illegible handwriting: "... upright head in pendant position ... office ... have ..."]

12. ADJUSTMENTS OR CORRECTIONS MADE:
[illegible handwriting: "... control valve ..."]

13. LIST CHANGES IN THE OCCUPANCY HAZARD OR FIRE PROTECTION EQUIPMENT, AS ADVISED BY THE OWNER IN SECTION 1A:

14. INSPECTION AND SUGGESTED IMPROVEMENTS WERE DISCUSSED WITH THE UNDERSIGNED OWNER OR OWNER'S REPRESENTATIVE:
Signature of owner or owner's representative [signature] Date [illegible]

DUPLICATE TO: ______
STREET ______
CITY & STATE ______ ZIP ______
ATT. ______
G4130-2

APPENDIX D

ASBESTOS ANALYSIS REPORT

PAGE 1 HOWARD LABS INC REPORT LAB # 89-01-790

RECEIVED: 01/18/89 01/26/89 20:15:59

CLIENT PQC LIGHT SAMPLES 2
COMPANY Piqua Municipal Light
FACILITY City of Piqua

REPORT Piqua Municipal Light
TO 919 South Main
Piqua, Ohio 45356

ATTEN Mr. Gene Staton

WORK ID 2 Samples for Asbestos
TAKEN Not Indicated
TRANS U. S. Mail
TYPE Metal
P.O. # H-4649
INVOICE under separate cover

PREPARED BY HOWARD LABORATORIES, INC.
3601 South Dixie Drive
P.O. Box 369
Dayton, OH 45449
PHONE 513-294-6856 FAX # 294-7816

Jackie H Webster
CERTIFIED BY

CONTACT J ANDREJCIO

Results of samples submitted for analysis are enclosed. When inquiring, please reference "LAB #". Samples will be discarded 30 days following report unless advised otherwise.
OHIO EPA CERTIFICATION: CHEMICAL 4074 BACTERIOLOGICAL 857

SAMPLE IDENTIFICATION

01 Sample #1 - Old Room Tank
02 Sample #2 - Basement Hall

HOWARD LABS INC TEST CODES and NAMES used on this report

ASB BK Asbestos: Bulk Sample

Elect Dist Dept.
Old Atomic Bldg.
Okay
8/28/89

RECEIVED
PIQUA POWER PLANT

JAN 30 1989

85

SAMPLE ID Sample #1 - Oil Room Tank SAMPLE # 01 FRACTIONS: A
Date & Time Collected not specified Category

ASB_BK N
Asbestos See

SAMPLE ID Sample #2 - Basement Hall SAMPLE # 02 FRACTIONS: A
Date & Time Collected not specified Category

ASB_BK N
Asbestos See

Piqua Municipal .ight

NOTES AND COMMENTS

The meth··d for bulk samples submitted for asbestos content analysis is done by PLM (Polarized Light Microscopy) with Dispersi··n Staining Method. Refer to 40 CFR, part 763.

NOTE – B.th samples were metal plates. Substances analyzed were materials coating the plates.

Lab #	Identifi:ation	Asbestos Present	%	Other Fibers Present	%
01A	Oil Room Tank Fibrous acking	[redacted]		Cellulose	100%
02A	Basement Hall Fibrous ›acking	[redacted]		Cellulose	100%
	Basement Hall Black ma erial	[redacted]		Nonfibrous material	100%

87