LMS/PIQ/S14427

2016 Annual Inspection and Radiological Survey Results for the Piqua, Ohio, Decommissioned Reactor Site

July 2016

U.S. DEPARTMENT OF ENERGY | Legacy Management

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Abbreviations

cm^2	square centimeters
CPM	counts per minute
DOE	U.S. Department of Energy
dpm	disintegrations per minute
HVAC	heating, ventilation, and air conditioning
LM	Office of Legacy Management
µrem/h	microrems per hour
MDA	minimum detectable activity
NA	not applicable or accessible
OAP	Operating Air Pressure
PL	photograph location

Summary

This report presents the findings of the annual inspection and radiological survey of the Piqua, Ohio, Decommissioned Reactor Site (site). The decommissioned nuclear power demonstration facility was inspected and surveyed on April 15, 2016. The site, located on the east bank of the Great Miami River in Piqua, Ohio, was in fair physical condition. There is no requirement for a follow-up inspection, partly because City of Piqua (City) personnel participated in a March 2016 meeting to address reoccurring safety concerns.

Radiological survey results from 104 locations revealed no removable contamination. One direct beta activity reading in a floor drain on the 56-foot level (1674 disintegrations per minute [dpm]/100 square centimeters [cm^2]) exceeded the minimum detectable activity (MDA). Beta activity has been detected in the past at this floor drain. The reading was well below the action level of 5000 dpm/100 cm^2.

Background

The site consists of a Containment Building and an associated Auxiliary Building. Both facilities are used by the City for storage space, shops, and offices. The City Underground Utilities Department (approximately 10 people) occupies the site.

U.S. Department of Energy (DOE) took the initiative in 2015 to prepare a Maintenance Assistance Plan for the site. The objective of the plan is to assist the City in (1) maintaining the site in light of reoccurring inspection findings and (2) addressing the potential threat of lead-based paint and asbestos within the facilities. Furthermore, DOE conducted a utility assessment (water and electric) of the facilities in November 2015 to obtain information needed to provide current-condition site drawings. The plan also establishes a long-term maintenance schedule for continued maintenance of key items within the facilities until the site can be free-released back to the City (estimated to be in 2106).

In March of 2016, DOE met with City personnel to discuss the results of the utilities assessment and the objectives contained within the Maintenance Assistance Plan. Several of the inspection findings from previous inspections are addressed in the Maintenance Assistance Plan.

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1.0 Introduction

This report presents the findings of the annual DOE inspection of the Piqua site, which is assigned to the DOE Office of Legacy Management (LM) for long-term custody and care.

The inspection on April 15, 2016, was conducted by M. Miller (Chief Inspector), K. Broberg (Assistant Inspector), and R. Mowen (Radiological Technician), all of Navarro Research and Engineering, Inc., the contractor for LM. G. Hooten (LM) and S. Dettner (Ohio Department of Health) accompanied the inspection team.

S. Johnson and J. Jamison (City Underground Utilities Department) met with inspectors during the inspection. A copy of this report will be forwarded to Mr. Johnson.

The purpose of the inspection was to confirm the integrity of the visible features at the facility and to determine if radiological or non-radiological hazards were present.

2.0 Inspection Results

Features discussed in this report are shown on the attached drawings (Appendix A). Photographs to support specific observations are identified in the text and on the drawings by photograph location (PL) numbers.

2.1 Exterior of the Containment Building

The Containment Building exterior was refurbished around 1995. The exterior surface of the Containment Building was in good condition. Items identified in the 2015 Inspection Report (i.e., exposed exterior electric wiring, broken conduits, and dismantled outlets) are listed in the Maintenance Assistance Plan.

A new minor maintenance need was observed on the exterior north wall of the Containment Building. The screen covering an exterior vent was damaged (PL-1). Unless the screen is repaired, birds could enter the building through the vent. DOE requests that the City repair the screen prior to the next annual inspection.

Vegetation around the outer base of the Containment Building continues to be a problem (PL-2 through PL-4). One area in particular has a tree growing out of the base of the building. If this vegetation is allowed to grow, it could compromise the building by enlarging cracks in the concrete, allowing water to possibly seep down into the entombment area. DOE requests that the City spray, kill, and remove this vegetation from the base of the Containment Building and properly seal the remaining cracks with a caulking compound prior to the next annual inspection.

2.2 Surrounding Area

A visual inspection was made of the area surrounding the site. No changes that could impact the integrity of the site were observed. It should be noted that in 2012 a new property survey was conducted at the site and a new survey plat of the property boundaries was produced for Facilities Information Management System purposes.

2.3 Interior

Inspectors looked for evidence of structural deterioration and entombment degradation. Concerns noted in previous inspections remain unchanged (i.e., peeling lead-based paint, falling plaster, and deteriorating pipe insulation.) These concerns are listed in the Maintenance Assistance Plan.

56-foot level: The 56-foot level is the lowest level of the Containment Building. The level is currently empty. The condition of peeling paint on the interior walls of the Containment Building remains unchanged from previous inspections (PL-5). Peeling paint (that is falling onto the floors) was analyzed in 2006 and found to contain 0.35 percent lead. The paint will probably continue to peel and fall to the floor. City personnel are aware of the presence of the lead-based paint. Abatement of the lead-based paint is being addressed in the Maintenance Assistance Plan.

A vertical drain pipe, located on the northwest wall of the 56-foot level of the Containment Building, has developed a crack and split open (PL-6 and PL-7). Inspectors traced the pipe up to the 100-foot level where it is believed to be connected to a floor drain. DOE requests that the City assess the cracked drain line and repair it if necessary prior to the next annual inspection to keep water from entering the Containment Building on the 56-foot level.

79-foot level: Interior conditions noted in previous inspections (i.e., broken plaster, peeling paint, and water damage) are unchanged. In 2013 the City cleaned out several of the rooms on this level of the Auxiliary Building and they are now being used for storage.

Evidence for water seepage (peeling paint and rust stains) along the ceiling seam of the Operating Air Pressure (OAP) room remains unchanged from previous inspections. This room is located directly above Room B-1. Evidence for water seepage from the ceiling seam of Room B-1 also remains unchanged from previous inspections. The southwest wall of both rooms is the curved wall of the Containment Building. Both rooms show evidence of water seepage along the same wall of the Containment Building. The condition is noted on the 79-foot level site inspection map and will continue to be monitored in future inspections.

Fresh moisture was present in the room next to Room B-1. Moisture at this location was also noted in the 2014 and 2015 inspections. The cause for this moisture is believed to be a crack along the base of the outer wall of the Containment Building. DOE requests that the City properly seal this crack with caulking compound prior to the next annual inspection to prevent additional moisture from seeping into the room.

83-foot level: No Concerns.

100-foot level: It was noted in 2015 and again this year that the concrete around the southwest airlock of the Containment Building needs to be repaired. Numerous cracks are present and some small pieces of concrete are falling off. DOE requests that the City evaluate the situation and make minor concrete repairs prior to next year's inspection.

111-foot level: No Concerns.

121-foot level (Roof Top of the Auxiliary Building): Inspectors this year observed that several roof issues noted in 2015 had not been addressed. Repair of the roof fabric is identified in the Maintenance Assistance plan.

One small hole in the roof fabric was observed by inspectors this year. First identified in 2015 and again this year, if this hole is not repaired soon, it could get worse and lead to more costly repairs. DOE requests that the City repair this small hole in the roof fabric prior to next year's inspection.

Roof drains were observed to be in much better condition this year than they were in 2015, but additional attention is needed. Vegetation is still growing around some of the drains (PL-8 and PL-9). Vegetation is also establishing itself in uncleaned corners of the roof (PL-10). DOE requests that the roof drains and roof areas be cleaned prior to next year's inspection and kept clean so that the roof can properly drain.

2.4 Cathodic Protection System

A cathodic protection system is installed on the Containment Building to protect the steel shell. The system consists of 10 carbon (graphite) electrodes, buried radially approximately 10 feet to 20 feet from the building foundation, and a rectifier unit that provides direct-current electrical power. The rectifier unit is mounted in the break room south of and outside the airlock on the 100-foot level. Each carbon electrode is 3 inches in diameter and 60 inches long. The electrodes are connected to the rectifier unit by a header cable; splices are protected in flush-mounted boxes. A structure contact point for monitoring potential can be found on the shell associated with each electrode; some of the contact points also have cables remaining from an abandoned zinc anode protection system. The system also includes reference electrodes and test holes.

Maintenance of the cathodic protection system is specifically addressed in Contract AT(11–1)–1798, dated May 10, 1968, between the U.S. Atomic Energy Commission and the City. The City agrees to maintain the system in an operational condition as long as required to preserve the integrity of the entombment until radiological decay renders the contents safe, estimated to be approximately 50 years (2018). Maintenance requirements are not specified but include monthly inspections of the rectifier unit, recording the current and voltage output, and periodic (estimated to be every 5 years) inspections of the entire system by a qualified service provider. Operating and maintenance costs are borne by the City.

The entire system was checked by a qualified service provider in April 2010, resulting in the replacement of one of the header cables. According to the maintenance log kept with the unit, the system is being checked by plant personnel. The system is due for service by a qualified service provider. DOE requests that the City have the system serviced as soon as possible.

2.5 High-Water Alarm System

An alarm system is installed in the sump on the 56-foot level of the Containment Building to detect high water levels before they rise to the bottom of the entombed pressure vessel (PL-11). This system is designed to prevent immersion and accelerated corrosion of the pressure vessel. The alarm triggers when the sump fills to near overflow, alerting personnel to both high water and possible sump pump failure. The alarm registers in the Auxiliary Building on the Supervisory Control and Data Acquisition system, which is monitored 24 hours a day by an operator. The alarm system is included in the monthly building inspection. The Containment Building sump alarm test log indicates that the alarm is being tested monthly.

2.6 Radiological Survey

Navarro staff performed the annual radiological survey inside the Containment Building, inside the Auxiliary Building, and in exterior areas. A total of 104 sample locations were checked for both removable and surface contamination using direct measurements and smears for the detection of alpha and beta-gamma activity. Gamma exposure rates also were measured. Prior to 2008, 111 sample locations were surveyed.

In 2009, Rooms R-6 and R-7 were modified by the City. Modifications included the elimination of a connecting air duct between the two rooms. Smear sample #46 was collected from this air duct prior to 2009. Survey location #46 is now located on the floor of Room R-7 in front of the former air duct.

The highest gamma exposure rate measured throughout the facility in 2016 was 11.6 microrems per hour (µrem/h), which was 0.7 µrem/h above the outside background measurement of 10.9 µrem/h. Table 1 presents information on the instrumentation used to perform the survey.

Table 1. Instrumentation for Radiological Survey

Type of Measurement	Radiation	Detector	Meter	Background	Efficiency Factor	Minimum Detectable Activity
Surface Activity	Alpha	Ludlum 43-89 #5785	Ludlum 2360 #5751	2.0 cpm/ 100 cm²	19.74% Efficient	34 dpm/ 100 cm²
Surface Activity	Beta	Ludlum 43-89 #5785	Ludlum 2360 #5751	148 cpm/ 100 cm²	23.06% Efficient	352 dpm/ 100 cm²
Exposure Rate	Gamma	N/A	Eberline FH40 GL #016191	10.9 µrem/h	N/A	1 µrem/h
Removable Activity	Alpha	N/A	Ludlum 3030/ #5899	0.0 cpm	30.1% Efficient	6.6 dpm/ 100 cm²
Removable Activity	Beta	N/A	Ludlum 3030/ #5899	32.0 cpm	41.1% Efficient	95.9 dpm/ 100 cm²

Table 2 presents direct surface and removable activity results. Direct surface measurement results indicate that there was one location with direct readings that exceeded the MDA:

- **Direct/Smear Number 16:** In the floor drain at the 56-foot level (1674 dpm/100 cm^2),

The smear from this location indicated that no removable activity was present. The reading was well below the action level of 5000 dpm/100 cm^2. All other direct measurements were below the MDA.

No removable contamination was found at any of the 104 sampling points. Attached are the survey maps that indicate the location of each direct measurement and smear sample. The maps also indicate the results of the gamma exposure rate survey conducted at the Piqua site.

Table 2. Direct/Surface Reading and Removable Activity Radiological Survey Results at the Piqua Site

Location/ Building	Elevation[a]	Direct/ Smear #	Direct Surface Reading Activity dpm/100 cm^2 Alpha/Beta		Removable Activity dpm/100 cm^2 Alpha/Beta		Remarks
Outside	111 ft	1	NA	NA	NA	NA	HVAC Equip. Removed
Outside	111 ft	2	NA	NA	NA	NA	HVAC Equip. Removed
Outside	111 ft	3	NA	NA	NA	NA	HVAC Equip. Removed
Outside	111 ft	4	NA	NA	NA	NA	HVAC Equip. Removed
Outside	111 ft	5	NA	NA	NA	NA	HVAC Equip. Removed
Outside	111 ft	6	<MDA	<MDA	<MDA	<MDA	On concrete platform
Outside	111 ft	7	<MDA	<MDA	<MDA	<MDA	On concrete platform
Outside	111 ft	8	<MDA	<MDA	<MDA	<MDA	On concrete platform
Outside	100 ft	9	<MDA	<MDA	<MDA	<MDA	On concrete platform
Containment	56 ft	10	<MDA	<MDA	<MDA	<MDA	Floor
Containment	56 ft	11	<MDA	<MDA	<MDA	<MDA	Floor
Containment	56 ft	12	<MDA	<MDA	<MDA	<MDA	Floor
Containment	56 ft	13	<MDA	<MDA	<MDA	<MDA	Floor
Containment	56 ft	14	<MDA	<MDA	<MDA	<MDA	Floor
Containment	56 ft	15	<MDA	<MDA	<MDA	<MDA	Floor
Containment	56 ft	**16**	<MDA	**1674**	<MDA	<MDA	In floor drain
Containment	56 ft	17	<MDA	<MDA	<MDA	<MDA	Floor
Containment	56 ft	18	<MDA	<MDA	<MDA	<MDA	On pedestal
Containment	56 ft	19	<MDA	<MDA	<MDA	<MDA	On drain
Containment	56 ft	20	<MDA	<MDA	<MDA	<MDA	Sump grating
Containment	56 ft	21	<MDA	<MDA	<MDA	<MDA	On vent by stairwell
Containment	56 ft	22	<MDA	<MDA	<MDA	<MDA	On drain
Containment	56 ft	23	<MDA	<MDA	<MDA	<MDA	On drain
Containment	79 ft	24	<MDA	<MDA	<MDA	<MDA	Floor
Containment	79 ft	25	<MDA	<MDA	<MDA	<MDA	Floor
Containment	79 ft	26	<MDA	<MDA	<MDA	<MDA	Floor
Containment	79 ft	27	<MDA	<MDA	<MDA	<MDA	Floor
Containment	83 ft	28	<MDA	<MDA	<MDA	<MDA	On top of HVAC duct
Containment	83 ft	29	<MDA	<MDA	<MDA	<MDA	Grating on platform
Containment	83 ft	30	<MDA	<MDA	<MDA	<MDA	Pipe adjacent to plenum
Containment	83 ft	31	<MDA	<MDA	<MDA	<MDA	In duct
Containment	83 ft	32	<MDA	<MDA	<MDA	<MDA	Floor grating
Containment	83 ft	33	<MDA	<MDA	<MDA	<MDA	Pump pedestal
Containment	83 ft	34	<MDA	<MDA	<MDA	<MDA	In drain
Containment	83 ft	35	<MDA	<MDA	<MDA	<MDA	In drain
Containment	83 ft	36	<MDA	<MDA	<MDA	<MDA	Pump pedestal
Containment	83 ft	37	<MDA	<MDA	<MDA	<MDA	Stairwell
Containment	100 ft	38	<MDA	<MDA	<MDA	<MDA	Floor
Containment	100 ft	39	<MDA	<MDA	<MDA	<MDA	Floor

Table 2 (continued). Direct/Surface Reading and Removable Activity Radiological Survey Results at the Piqua Site

Location/ Building	Elevation[a]	Direct/ Smear #	Direct Surface Reading Activity dpm/100 cm^2 Alpha/Beta		Removable Activity dpm/100 cm^2 Alpha/Beta		Remarks
Containment	100 ft	40	<MDA	<MDA	<MDA	<MDA	Floor
Containment	100 ft	41	<MDA	<MDA	<MDA	<MDA	Floor
Containment	100 ft	42	<MDA	<MDA	<MDA	<MDA	Floor
Containment	100 ft	43	<MDA	<MDA	<MDA	<MDA	Floor
Containment	100 ft	44	<MDA	<MDA	<MDA	<MDA	Floor
Containment	100 ft	45	<MDA	<MDA	<MDA	<MDA	On drain
Containment	100 ft	46	<MDA	<MDA	<MDA	<MDA	On floor of Room R-7
Containment	111 ft	47	<MDA	<MDA	<MDA	<MDA	Floor
Containment	111 ft	48	<MDA	<MDA	<MDA	<MDA	Floor
Containment	111 ft	49	<MDA	<MDA	<MDA	<MDA	Floor
Containment	100 ft	50	<MDA	<MDA	<MDA	<MDA	Airlock floor
Aux. Bldg.	79 ft	51	<MDA	<MDA	<MDA	<MDA	Floor
Aux. Bldg.	79 ft	52	<MDA	<MDA	<MDA	<MDA	Floor
Aux. Bldg.	79 ft	53	<MDA	<MDA	<MDA	<MDA	Floor
Aux. Bldg.	79 ft	54	<MDA	<MDA	<MDA	<MDA	On drain
Aux. Bldg.	79 ft	55	<MDA	<MDA	<MDA	<MDA	Floor
Aux. Bldg.	79 ft	56	<MDA	<MDA	<MDA	<MDA	Floor
Aux. Bldg.	79 ft	57	<MDA	<MDA	<MDA	<MDA	Floor
Aux. Bldg.	79 ft	58	<MDA	<MDA	<MDA	<MDA	On drain
Aux. Bldg.	79 ft	59	<MDA	<MDA	<MDA	<MDA	Floor
Aux. Bldg.	79 ft	60	<MDA	<MDA	<MDA	<MDA	Floor
Aux. Bldg.	79 ft	61	<MDA	<MDA	<MDA	<MDA	On drain
Aux. Bldg.	79 ft	62	<MDA	<MDA	<MDA	<MDA	On sump cover
Aux. Bldg.	79 ft	63	<MDA	<MDA	<MDA	<MDA	Pump
Aux. Bldg.	79 ft	64	<MDA	<MDA	<MDA	<MDA	Floor under tank
Aux. Bldg.	79 ft	65	<MDA	<MDA	<MDA	<MDA	Floor
Aux. Bldg.	79 ft	66	<MDA	<MDA	<MDA	<MDA	Floor
Aux. Bldg.	79 ft	67	<MDA	<MDA	<MDA	<MDA	Inside HVAC on floor
Aux. Bldg.	79 ft	68	<MDA	<MDA	<MDA	<MDA	Floor
Aux. Bldg.	89 ft	69	<MDA	<MDA	<MDA	<MDA	Floor
Aux. Bldg.	121 ft	70	<MDA	<MDA	<MDA	<MDA	Floor
Aux. Bldg.	121 ft	71	<MDA	<MDA	<MDA	<MDA	Floor
Aux. Bldg.	121 ft	72	<MDA	<MDA	<MDA	<MDA	Floor
Aux. Bldg.	121 ft	73	<MDA	<MDA	<MDA	<MDA	Floor
Aux. Bldg.	121 ft	74	<MDA	<MDA	<MDA	<MDA	Floor
Aux. Bldg.	121 ft	75	<MDA	<MDA	<MDA	<MDA	Floor
Aux. Bldg.	111 ft	76	<MDA	<MDA	<MDA	<MDA	Floor
Aux. Bldg.	111 ft	77	<MDA	<MDA	<MDA	<MDA	Floor
Aux. Bldg.	111 ft	78	<MDA	<MDA	<MDA	<MDA	Floor
Aux. Bldg.	111 ft	79	<MDA	<MDA	<MDA	<MDA	Floor

Table 2 (continued). Direct/Surface Reading and Removable Activity Radiological Survey Results at the Piqua Site

Location/ Building	Elevation[a]	Direct/ Smear #	Direct Surface Reading Activity dpm/100 cm^2 Alpha/Beta		Removable Activity dpm/100 cm^2 Alpha/Beta		Remarks
Aux. Bldg.	111 ft	80	<MDA	<MDA	<MDA	<MDA	On vent duct
Aux. Bldg.	111 ft	81	<MDA	<MDA	<MDA	<MDA	Floor
Aux. Bldg.	100 ft	82	<MDA	<MDA	<MDA	<MDA	Floor
Aux. Bldg.	100 ft	83	<MDA	<MDA	<MDA	<MDA	Floor
Aux. Bldg.	100 ft	84	<MDA	<MDA	<MDA	<MDA	Floor
Aux. Bldg.	100 ft	85	<MDA	<MDA	<MDA	<MDA	Floor
Aux. Bldg.	100 ft	86	<MDA	<MDA	<MDA	<MDA	On floor drain
Aux. Bldg.	100 ft	87	<MDA	<MDA	<MDA	<MDA	Floor
Aux. Bldg.	100 ft	88	<MDA	<MDA	<MDA	<MDA	On floor drain
Aux. Bldg.	100 ft	89	<MDA	<MDA	<MDA	<MDA	Floor
Aux. Bldg.	100 ft	90	<MDA	<MDA	<MDA	<MDA	Floor
Aux. Bldg.	100 ft	91	<MDA	<MDA	<MDA	<MDA	Floor
Aux. Bldg.	100 ft	92	<MDA	<MDA	<MDA	<MDA	Floor
Aux. Bldg.	100 ft	93	<MDA	<MDA	<MDA	<MDA	Floor
Aux. Bldg.	100 ft	94	<MDA	<MDA	<MDA	<MDA	Floor
Aux. Bldg.	100 ft	95	<MDA	<MDA	<MDA	<MDA	Floor
Aux. Bldg.	100 ft	96	<MDA	<MDA	<MDA	<MDA	Floor
Aux. Bldg.	100 ft	97	<MDA	<MDA	<MDA	<MDA	Floor
Aux. Bldg.	100 ft	98	<MDA	<MDA	<MDA	<MDA	Floor
Aux. Bldg.	100 ft	99	<MDA	<MDA	<MDA	<MDA	Floor
Aux. Bldg.	100 ft	100	<MDA	<MDA	<MDA	<MDA	Floor
Aux. Bldg.	100 ft	101	<MDA	<MDA	<MDA	<MDA	Floor
Aux. Bldg.	100 ft	102	<MDA	<MDA	<MDA	<MDA	Floor
Aux. Bldg.	100 ft	103	<MDA	<MDA	<MDA	<MDA	Floor
Containment	56 ft	104	<MDA	<MDA	<MDA	<MDA	On drain
Containment	100 ft	105	<MDA	<MDA	<MDA	<MDA	On drain
Outside	100 ft	106	<MDA	<MDA	<MDA	<MDA	Concrete floor
Outside	100 ft	107	<MDA	<MDA	<MDA	<MDA	Concrete wall
Outside	100 ft	108	<MDA	<MDA	<MDA	<MDA	Floor under flange
Outside	100 ft	109	<MDA	<MDA	<MDA	<MDA	Concrete floor
Outside	100 ft	110	<MDA	<MDA	<MDA	<MDA	Concrete floor
Containment	79 ft	111	<MDA	<MDA	<MDA	<MDA	In HVAC duct

Notes:
[a] Elevations are designated as feet above the lowest floor of the original plant.

3.0 Maintenance Action Requests

1) A screen covering a vent on the exterior wall of the Containment Building is damaged (PL-1). Unless the screen is repaired, birds could enter the building through the vent.

   Action Request: DOE requests that the City repair the screen prior to the next annual inspection.

2) Vegetation around the outer base of the Containment Building continues to be a problem (PL-2 through PL-4). One area in particular has a tree growing out of the base of the building. If this vegetation is allowed to grow, it will act to compromise the building by enlarging cracks in the concrete, allowing water to possibly seep down into the entombment area of the building.

   Action Request: DOE requests that the City kills and remove vegetation from the base of the Containment Building and properly seal the remaining cracks with a caulking compound prior to the next annual inspection.

3) A vertical drain pipe on the NW wall of the Containment Building on the 56-foot level has developed a crack and split open (PL-6 and PL-7). Inspectors traced the pipe up to the 100-foot level where it is believed to be connected to a floor drain.

   Action Request: DOE requests that the City assess the cracked drain line and repair it if necessary prior to the next annual inspection to keep water from entering the 56-foot level.

4) Fresh moisture was present in the room next to Room B-1. Moisture at this location was also noted in the 2014 and 2015 inspections. The cause for this moisture is believed to be a crack along the base of the outer wall of the Containment Building.

   Action Request: DOE requests that the City properly seal this crack with caulking compound prior to the next annual inspection to prevent additional moisture from seeping into the room.

5) One small hole in the roof fabric of the Auxiliary Building was observed by inspectors this year. First identified in 2015 and again this year, if this hole is not repaired soon, it could get worse and lead to more costly repairs.

   Action Request: DOE requests that the City repair this small hole in the roof fabric prior to next year's inspection.

6) The concrete around the south west airlock of the Containment Building is in need of repair. Numerous cracks are present and some small pieces of concrete are falling off.

   Action Request: DOE requests that the City evaluate the situation and make minor concrete repairs prior to next year's inspection.

7) Roof drains on the Auxiliary Building were in much better condition this year than they were in 2015, but additional attention is needed. Vegetation is still growing around some of the

drains (PL-8 and PL-9). Vegetation is also establishing itself in uncleaned corners of the roof (PL-10).

Action Request: DOE requests that the roof drains and roof areas be cleaned prior to next year's inspection and kept clean so that the roof can properly drain.

8) The cathodic protection system should be serviced by a qualified service provider approximately every 5 years. It was last serviced in 2010, so the system is due for service by a qualified service provider.

Action Request: DOE requests that the City have the system serviced as soon as possible.

4.0 Photographs

Photograph Location Number	Azimuth	Elevation Level	Photograph Description
PL-1	NA	Ground Level	Missing vent screen.
PL-2	45	Ground Level	Small tree – base of containment building.
PL-3	220	Ground Level	Vegetation – base of containment building.
PL-4	180	Ground Level	Weeds – base of containment building.
PL-5	140	56 ft.	Peeling paint.
PL-6	338	56 ft.	Cracked drain pipe.
PL-7	338	56 ft.	Cracked drain pipe.
PL-8	338	121 ft.	Roof drain.
PL-9	60	121 ft.	Roof drain.
PL-10	180	121 ft.	Corner of roof.
PL-11	338	56 ft.	Sump pump area.

PIQ 4/2016. PL-1. Missing vent screen.

PIQ 4/2016. PL-2. Small tree – base of Containment Building.

PIQ 4/2016. PL-3. Vegetation – base of Containment Building.

PIQ 4/2016. PL-4. Weeds – base of Containment Building.

PIQ 4/2016. PL-5. Peeling paint.

PIQ 4/2016. PL-6. Cracked drain pipe.

PIQ 4/2016. PL-7. Cracked drain pipe.

PIQ 4/2016. PL-8. Roof drain.

PIQ 4/2016. PL-9. Roof drain.

PIQ 4/2016. PL-10. Corner of roof.

PIQ 4/2016. PL-11. Sump pump area.

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Appendix A

Site Drawings

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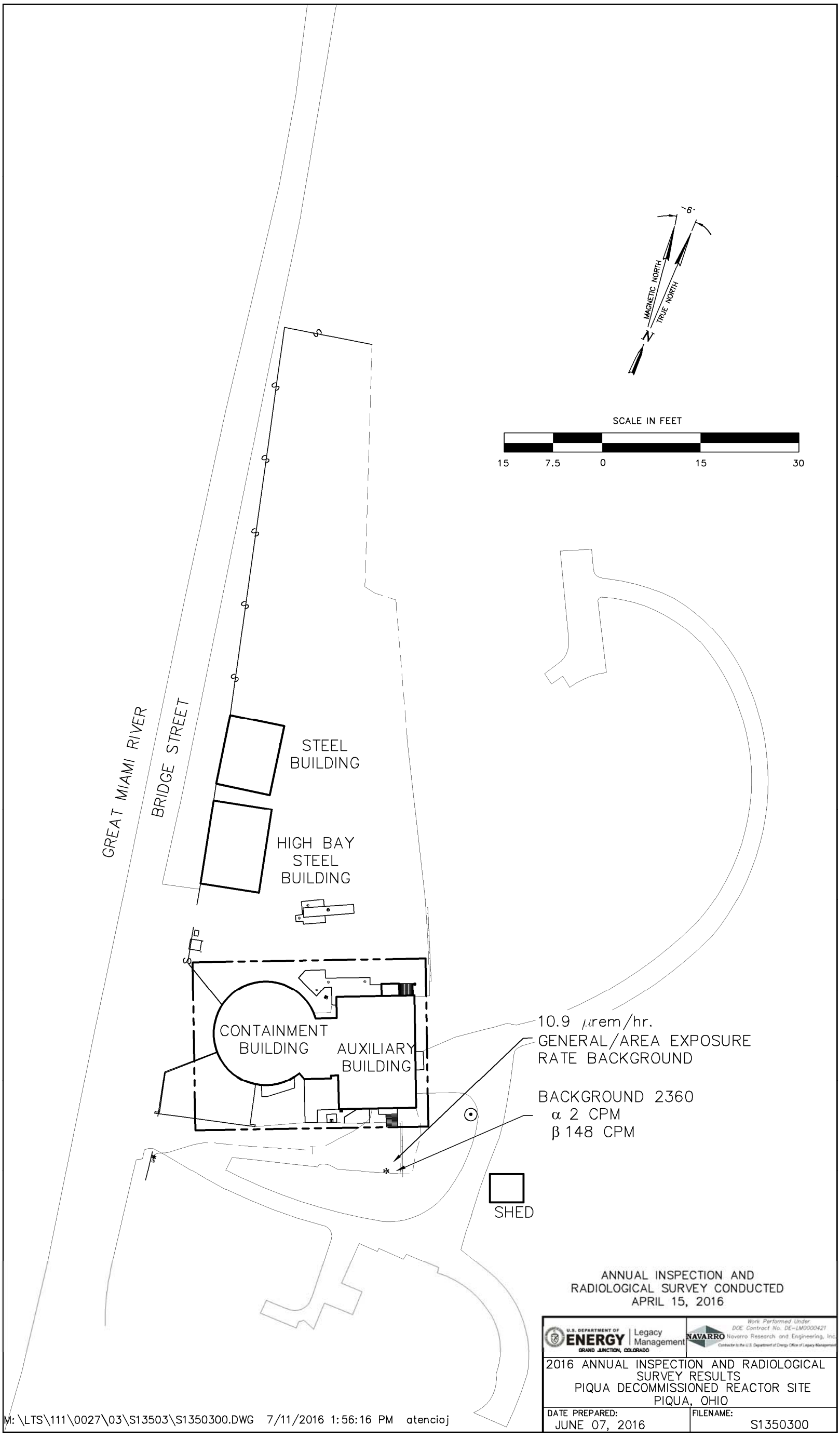
6°
MAGNETIC NORTH
TRUE NORTH
N
SCALE IN FEET
15
7.5
0
15
30
GREAT MIAMI RIVER
BRIDGE STREET
STEEL BUILDING
HIGH BAY STEEL BUILDING
CONTAINMENT BUILDING
AUXILIARY BUILDING
10.9 μrem/hr.
GENERAL/AREA EXPOSURE RATE BACKGROUND
BACKGROUND 2360
α 2 CPM
β 148 CPM
SHED
ANNUAL INSPECTION AND RADIOLOGICAL SURVEY CONDUCTED APRIL 15, 2016
U.S. DEPARTMENT OF ENERGY | Legacy Management
GRAND JUNCTION, COLORADO
Work Performed Under DOE Contract No. DE-LM0000421
NAVARRO Navarro Research and Engineering, Inc.
Contractor to the U.S. Department of Energy Office of Legacy Management
2016 ANNUAL INSPECTION AND RADIOLOGICAL SURVEY RESULTS
PIQUA DECOMMISSIONED REACTOR SITE
PIQUA, OHIO
DATE PREPARED:
JUNE 07, 2016
FILENAME:
S1350300
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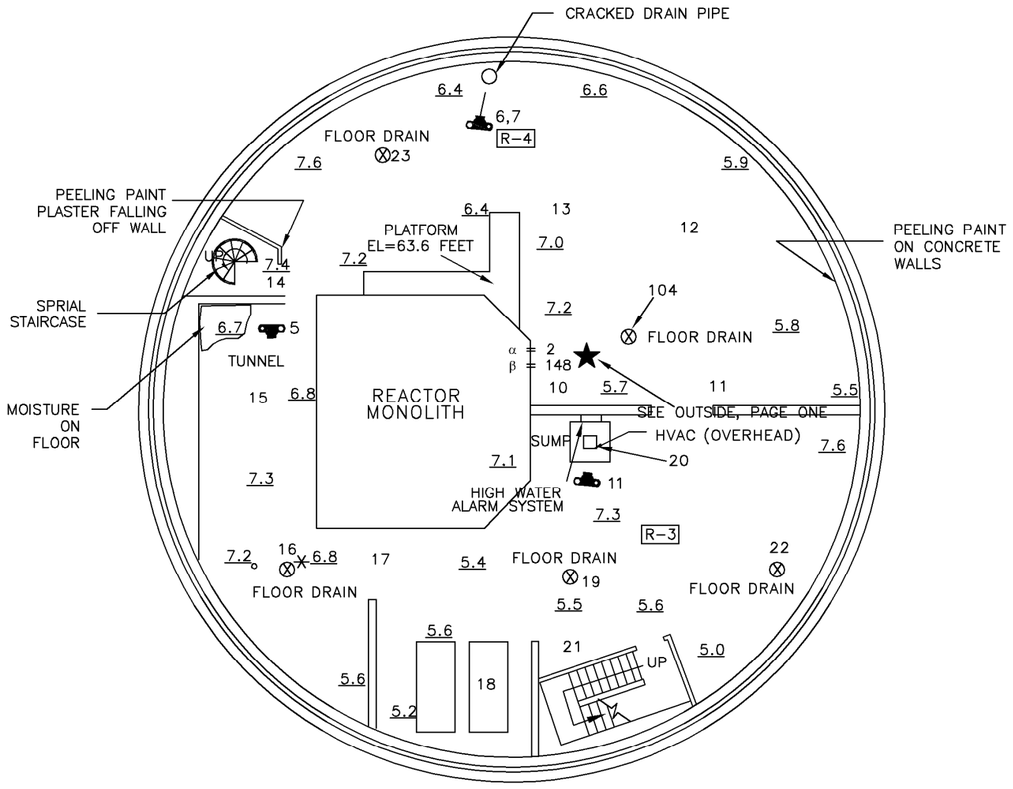
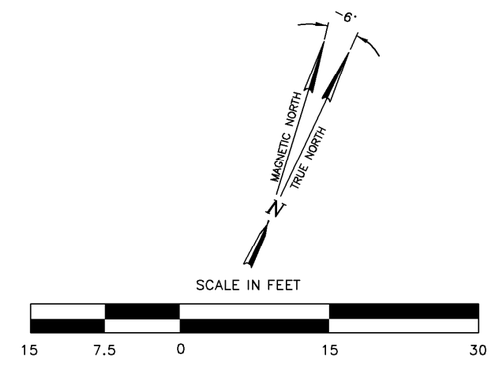


PLAN – 56 FOOT LEVEL

SMEAR/DIRECT LOCATIONS ON THE 56-FOOT LEVEL

10-FLOOR
11-FLOOR
12-FLOOR
13-FLOOR
14-FLOOR
15-FLOOR
16-IN FLOOR DRAIN
17-FLOOR
18-ON PEDESTAL
19-ON FLOOR DRAIN
20-SUMP GRATING
21-ON VENT BY STAIRWELL
22-ON FLOOR DRAIN
23-ON FLOOR DRAIN
104-ON FLOOR DRAIN



INSTRUMENT	LUDLUM 2360	LUDLUM 3030	Eberline FH40G-L
SERIAL #	5751/5785	5899	016191
CAL. DUE	3-15-17	3-14-2017	3-18-2017
EFFICIENCIES	α EFF. 19.74% β EFF. 23.06%	α EFF. 30.1% β EFF. 41.1%	N/A
BACKGROUND	α 2 CPM β 148 CPM	α 0.0 CPM β 32.0 CPM	10.9 μrem/hr

KEY:

NO. =GENERAL AREA EXPOSURE RATE (μrem/hr)

~~NO.~~ =CONTACT EXPOSURE RATE (μrem/hr)

NO. =SMEAR/DIRECT LOCATION

R-4 = ROOM NUMBER

SURVEYED BY: ROY L. MOWEN DATE: 4/15/16

REVIEWED BY: DATE:

1 PHOTO LOCATION, ROTATION, AND NUMBER

NOTE: ALL 2016 GAMMA READINGS WERE < BKGD ON THIS LEVEL.

ANNUAL INSPECTION AND RADIOLOGICAL SURVEY CONDUCTED APRIL 15, 2016

U.S. DEPARTMENT OF ENERGY | Legacy Management — GRAND JUNCTION, COLORADO

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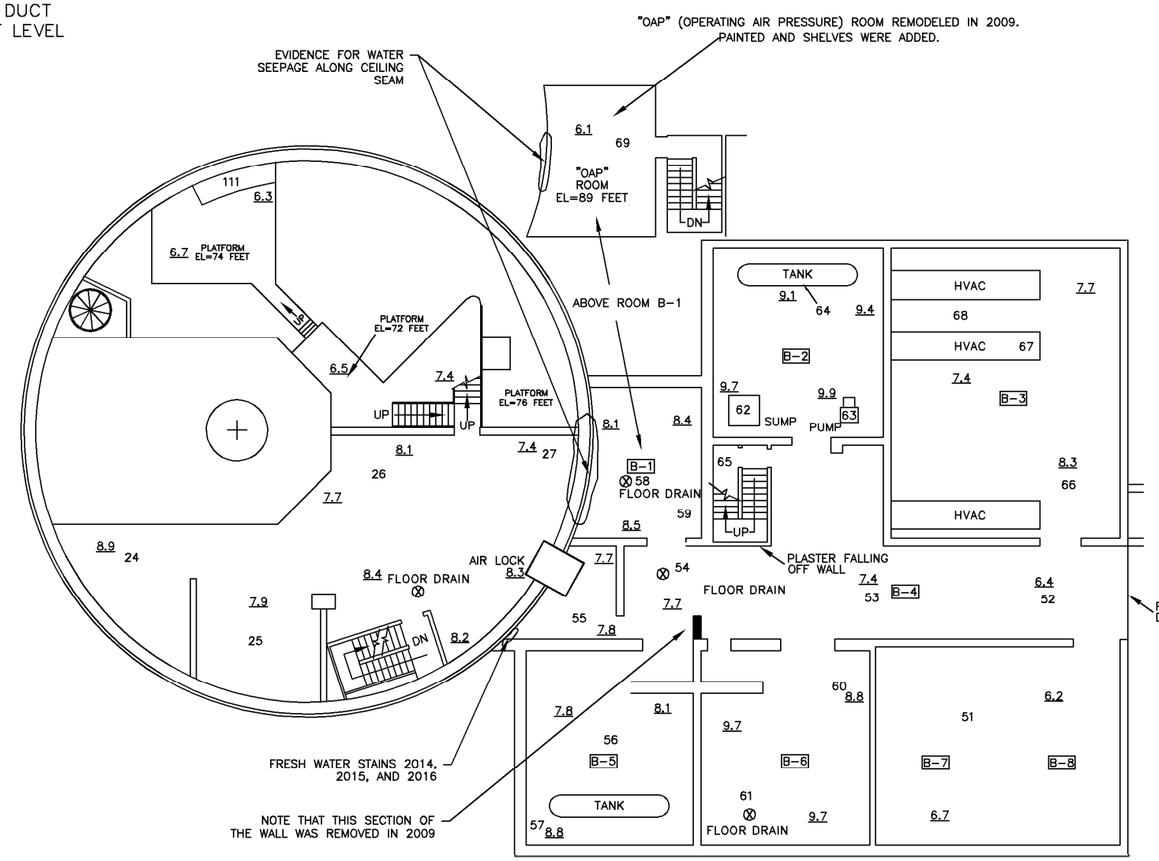
SMEAR/DIRECT LOCATIONS ON THE
79–FOOT LEVEL IN CONTAINMENT STRUCTURE

24–FLOOR
25–FLOOR
26–FLOOR
27–FLOOR
111–IN HVAC DUCT
74–FOOT LEVEL



PLAN – 79 FOOT LEVEL

INSTRUMENT	LUDLUM 2360	LUDLUM 3030	Eberline FH40G–L
SERIAL #	5751/5785	5899	016191
CAL. DUE	3–15–17	3–14–2017	3–18–2017
EFFICIENCIES	α EFF. 19.74% β EFF. 23.06%	α EFF. 30.1% β EFF. 41.1%	N/A
BACKGROUND	α 2 CPM β 148 CPM	α 0.0 CPM β 32.0 CPM	10.9 μrem/hr

KEY:

NO. =GENERAL AREA EXPOSURE RATE (μrem/hr)

~~NO.~~ =CONTACT EXPOSURE RATE (μrem/hr)

NO. =SMEAR/DIRECT LOCATION

R–4 = ROOM NUMBER

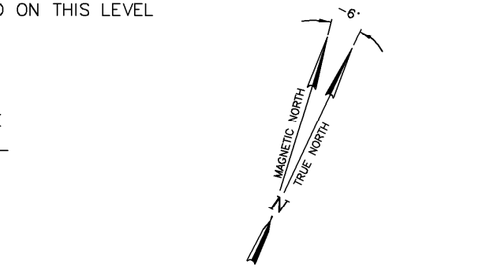
SURVEYED BY:	DATE:
ROY L. MOWEN	4/15/16
REVIEWED BY:	DATE:

1 PHOTO LOCATION, ROTATION, AND NUMBER

NOTE: ALL 2016 GAMMA READINGS < BKGD ON THIS LEVEL

SMEAR/DIRECT LOCATIONS ON THE
79–FOOT LEVEL IN AUX. BLDG.

51–FLOOR
52–FLOOR
53–FLOOR
54–ON DRAIN
55–FLOOR
56–FLOOR
57–FLOOR
58–ON DRAIN
59–FLOOR
60–FLOOR
61–ON DRAIN
62–ON SUMP COVER
63–PUMP
64–FLOOR UNDER TANK
65–FLOOR
66–FLOOR
67–INSIDE HVAC ON FLOOR
68–FLOOR
69–FLOOR–89' LEVEL OAP ROOM



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PIQUA, OHIO

DATE PREPARED:	FILENAME:
JUNE 07, 2016	S1350300

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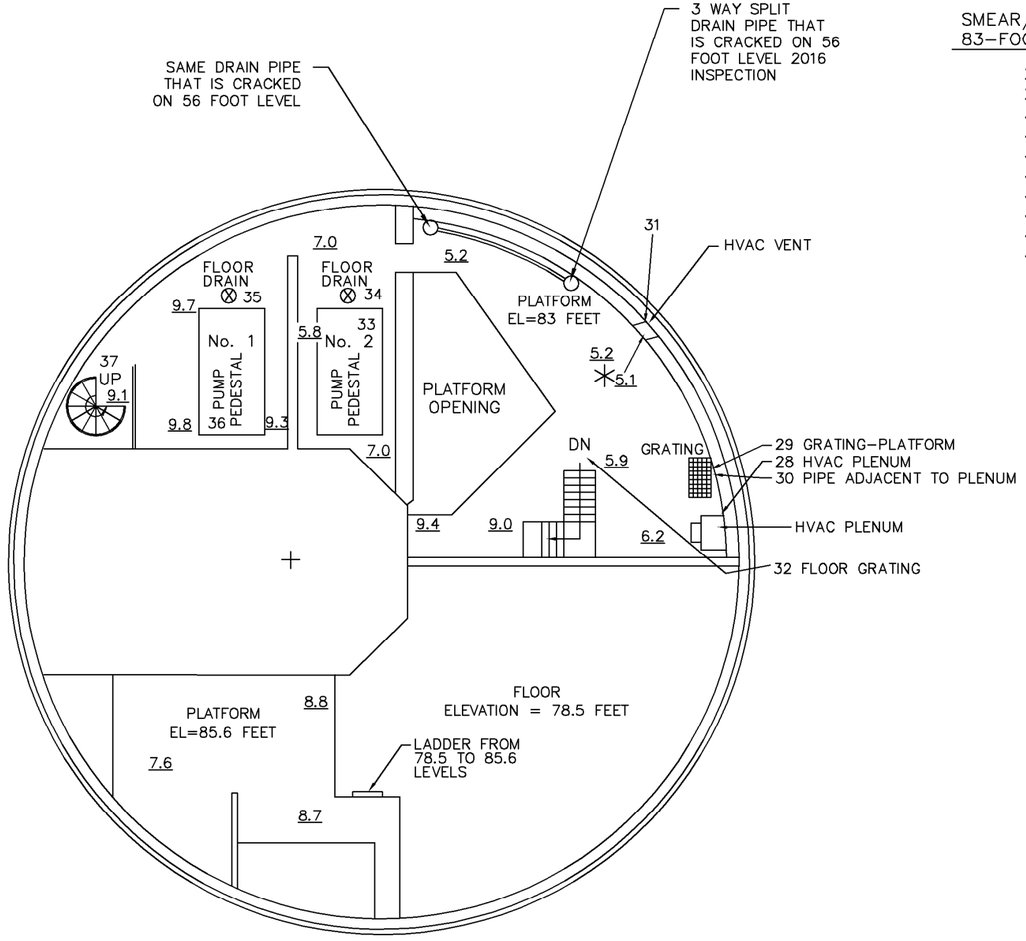


PLAN – 83 FOOT LEVEL

SMEAR/DIRECT LOCATIONS ON THE 83-FOOT LEVEL

28-ON TOP OF HVAC UNIT
29-GRATING ON PLATFORM
30-PIPE ADJACENT TO PLENUM
31-IN DUCT
32-FLOOR GRATING
33-PUMP PEDESTAL
34-IN DRAIN
35-IN DRAIN
36-PUMP PEDESTAL
37-STAIRWELL

INSTRUMENT	LUDLUM 2360	LUDLUM 3030	Eberline FH40G-L
SERIAL #	5751/5785	5899	016191
CAL. DUE	3-15-17	3-14-2017	3-18-2017
EFFICIENCIES	α EFF. 19.74% β EFF. 23.06%	α EFF. 30.1% β EFF. 41.1%	N/A
BACKGROUND	α 2 CPM β 148 CPM	α 0.0 CPM β 32.0 CPM	10.9 μrem/hr

KEY:

NO. =GENERAL AREA EXPOSURE RATE (μrem/hr)

~~NO.~~ =CONTACT EXPOSURE RATE (μrem/hr)

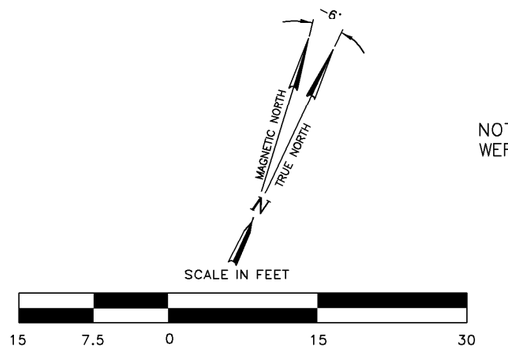
NO. =SMEAR/DIRECT LOCATION

R-4 = ROOM NUMBER

SURVEYED BY: ROY L. MOWEN DATE: 4/15/16

REVIEWED BY: DATE:

1 PHOTO LOCATION, ROTATION, AND NUMBER



NOTE: ALL 2016 GAMMA READINGS WERE < BKGD. ON THIS LEVEL

ANNUAL INSPECTION AND RADIOLOGICAL SURVEY CONDUCTED APRIL 15, 2016

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SMEAR/DIRECT LOCATIONS ON THE
100–FOOT LEVEL IN CONTAINMENT STRUCTURE

38–FLOOR
39–FLOOR
40–FLOOR
41–FLOOR
42–FLOOR
43–FLOOR
44–FLOOR
45–ON DRAIN
46–ON FLOOR
50–AIRLOCK FLOOR
105–ON DRAIN

SMEAR/DIRECT LOCATIONS OUTSIDE

106–CONCRETE FLOOR
107–CONCRETE WALL
108–FLOOR UNDER FLANGE
109–CONCRETE FLOOR
110–CONCRETE FLOOR
9–FLOOR

FLOOR DRAIN BELIEVED TO BE ASSOCIATED WITH CRACKED DRAIN PIPE ON 56 FOOT LEVEL

ROOMS R–6 AND R–7 WERE REMODELED IN 2009. WALLS WERE PAINTED, SHELVES ADDED, AND THE AIR DUCT BETWEEN THE TWO ROOMS WAS REMOVED.

BROKEN SCREEN

INSTRUMENT	LUDLUM 2360	LUDLUM 3030	Eberline FH40G–L
SERIAL #	5751/5785	5899	016191
CAL. DUE	3–15–17	3–14–2017	3–18–2017
EFFICIENCIES	α EFF. 19.74% β EFF. 23.06%	α EFF. 30.1% β EFF. 41.1%	N/A
BACKGROUND	α 2 CPM β 148 CPM	α 0.0 CPM β 32.0 CPM	10.9 μrem/hr

KEY:

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NO. =SMEAR/DIRECT LOCATION

R–4 = ROOM NUMBER

SURVEYED BY: ROY L. MOWEN DATE: 4/15/16

REVIEWED BY: DATE:

HIGHEST GAMMA READING ON THIS LEVEL WAS 0.1 μrem/hr ABOVE BKGD IN ROOM 115

NEW EPOXY FLOORS INSTALLED IN ROOMS 115 AND 121–A IN 2009.

NEW A/C UNIT INSTALLED IN ROOM 121–A IN 2009.

EXPLANATION

- GRAPHITE ANODES
- PHOTO LOCATION, ROTATION, AND NUMBER

MAGNETIC NORTH
TRUE NORTH

SCALE IN FEET
15 7.5 0 15 30

SMEAR/DIRECT LOCATIONS ON THE
100–FOOT LEVEL IN AUX. BLDG.

82–FLOOR
83–FLOOR
84–FLOOR
85–FLOOR
86–ON FLOOR DRAIN
87–FLOOR
88–ON FLOOR DRAIN
89–FLOOR
90–FLOOR
91–FLOOR
92–FLOOR
93–FLOOR
94–FLOOR
95–FLOOR
96–FLOOR
97–FLOOR
98–FLOOR
99–FLOOR
100–FLOOR
101–FLOOR
102–FLOOR
103–FLOOR

PLAN – 100 FOOT LEVEL

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SMEAR/DIRECT LOCATIONS ON THE
111-FOOT LEVEL IN CONTAINMENT STRUCTURE

47-FLOOR
48-FLOOR
49-FLOOR

SMEAR/DIRECT LOCATIONS ON THE
111-FOOT LEVEL IN THE AUX. BLDG.

76-FLOOR
77-FLOOR
78-FLOOR
79-FLOOR
80-ON VENT DUCT
81-FLOOR

SMEAR/DIRECT LOCATIONS ON THE
OUTSIDE ON ROOF

6-ON CONCRETE PLATFORM
7-ON CONCRETE PLATFORM
8-ON CONCRETE PLATFORM

INSTRUMENT	LUDLUM 2360	LUDLUM 3030	Eberline FH40G-L
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KEY:

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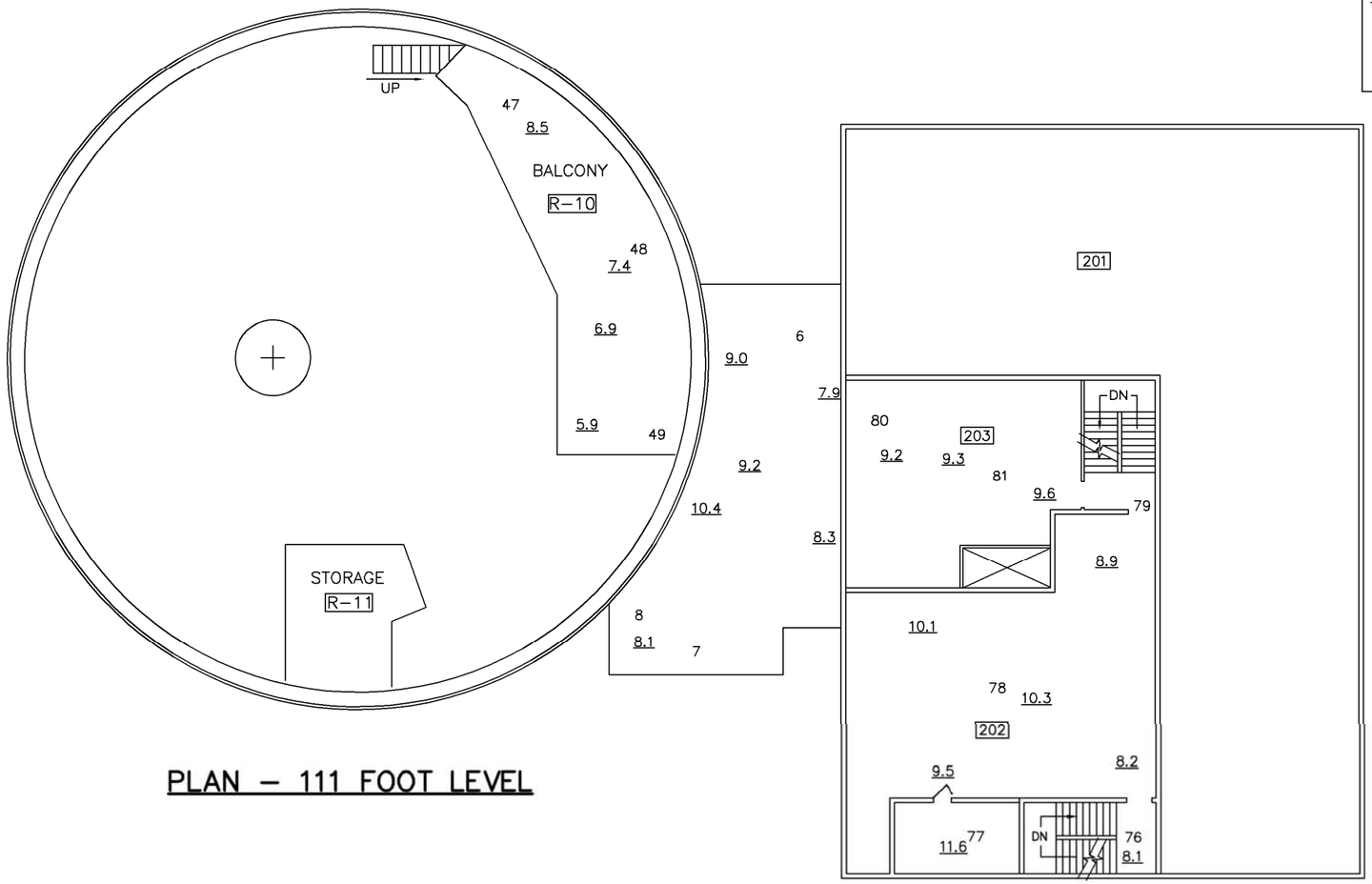
R-4 = ROOM NUMBER

SURVEYED BY:	DATE:
ROY L. MOWEN	4/15/16
REVIEWED BY:	DATE:

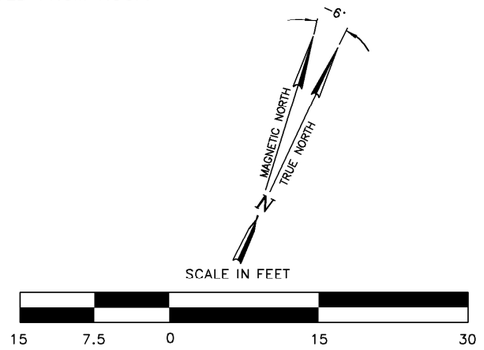


PLAN - 111 FOOT LEVEL

1 PHOTO LOCATION, ROTATION, AND NUMBER

HIGHEST GAMMA READING ON THIS LEVEL WAS 0.7 μrem/hr ABOVE BKGD.

NOTE: SAMPLE 1-5 WERE DELETED BECAUSE HVAC EQUIPMENT HAS BEEN REMOVED FROM ROOF.



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PIQUA, OHIO

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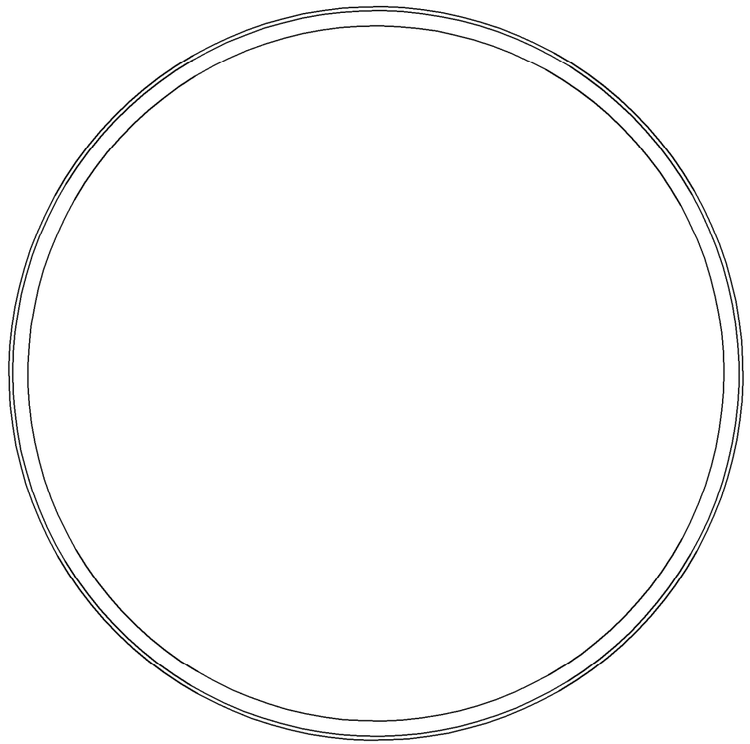
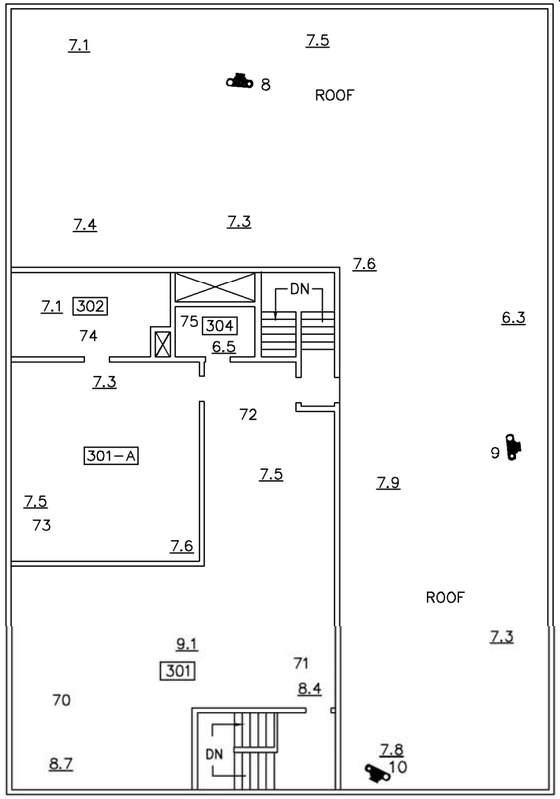
SMEAR/DIRECT LOCATIONS ON THE
121–FOOT LEVEL IN THE AUX. BLDG.

70–FLOOR
71–FLOOR
72–FLOOR
73–FLOOR
74–FLOOR
75–FLOOR



PLAN – 121 FOOT LEVEL



INSTRUMENT	LUDLUM 2360	LUDLUM 3030	Eberline FH40G–L
SERIAL #	5751/5785	5899	016191
CAL. DUE	3–15–17	3–14–2017	3–18–2017
EFFICIENCIES	α EFF. 19.74% β EFF. 23.06%	α EFF. 30.1% β EFF. 41.1%	N/A
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KEY:

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~~X~~NO. =CONTACT EXPOSURE RATE (μrem/hr)

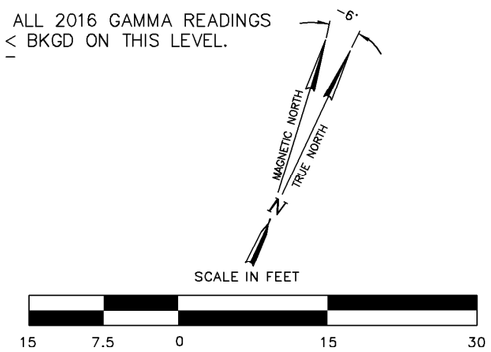
NO. =SMEAR/DIRECT LOCATION

R–4 = ROOM NUMBER

SURVEYED BY:	DATE:
ROY L. MOWEN	4/15/16
REVIEWED BY:	DATE:

1 PHOTO LOCATION, ROTATION, AND NUMBER

NOTE: ALL 2016 GAMMA READINGS WERE < BKGD ON THIS LEVEL.



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