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EXECUTIVE SUMMARY

The U.S. Nuclear Regulatory Commission (NRC) requested that Oak Ridge Associated Universities (ORAU) perform a radiation survey of the property at 7240 West KL Avenue in Kalamazoo, Michigan. This property is occupied by Precision Dial Company, an aircraft refurbishment and repair provider specializing in aviation dials, pointers, and panels, which possibly serviced devices with luminous radium. The objective of this survey was to locate possible discrete sources of radium, if any, that would be associated with the Precision Dial Company current or historical operations.

ORAU performed the radiation survey on March 30, 2017, and identified no areas of elevated radiation attributed to radium contamination in either the structure or grounds of the property. ORAU concluded that discrete sources of radium contamination were likely not present in the building structure or surrounding surface soil. Based on these results, it is recommended that the NRC not pursue additional action at the 7240 West KL Avenue property.

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SITE STATUS REPORT

Property: Precision Dial Company
7240 West KL Avenue
Kalamazoo, MI 49009

Docket Number: 03038973

Current Property Name: R&R Precision Dial Company

Current Property Owner: Myrna (Randy) Babuska

Inspection Dates: March 30, 2017

Inspector(s): Jack Giessner/NRC, and Matthew Learn/NRC, supported by Kaitlin Engel/Oak Ridge Associated Universities (ORAU)

1.0 INTRODUCTION

The Energy Policy Act of 2005 amended section 11e.(3) of the Atomic Energy Act of 1954 to place discrete sources of radium-226 (Ra-226) under U.S. Nuclear Regulatory Commission (NRC) regulatory authority as byproduct material. The NRC is evaluating properties where Oak Ridge National Laboratory's (ORNL) review of historical information has identified Ra-226 use. The property at 7240 West KL Avenue in Kalamazoo, Michigan (MI) was identified as Precision Dial Company, an aircraft refurbishment and repair provider specializing in aviation dials, pointers, and panels, which began operations in 1989 (ORNL 2015). The objectives of the initial site visit were to determine if discrete sources of Ra-226 are present, to identify the areas of highest contamination, to determine if there are any current health and safety concerns, and to determine if a scoping survey is needed. Surveys were performed as described within NRC's procedure, Temporary Instruction (TI) 2800/043, "Inspection of Facilities Potentially Contaminated with Discrete Radium-226 Sources" (NRC 2016).

Data collected during the March 30, 2017, site visit, which includes gamma radiation scans and exposure rate measurements, are used to plan future actions that may be needed to reduce Ra-226 exposure to current or future site occupants to levels that do not exceed the applicable regulatory requirements. It is important to note that destructive testing is not generally performed as described within TI 2800/043.

2.0 PROPERTY DESCRIPTION AND INITIAL SITE VISIT CONSIDERATIONS

2.1 Property Description and History

The site summary included in the "Historical Non-Military Radium Sites Research Effort Addendum" report (ORNL 2015) provides known site details about the type, form, history, potential locations, and other information related to discrete sources of Ra-226 used at the site. The Precision Dial Company was established in 1989 in Kalamazoo, MI and is still providing aviation clients with aircraft refurbishment and repair services including: metal dials and pointers, backlighted dials and pointers, curved dials and surfaces, refinishing of internally lighted and electro-luminescent panels, repair of internally lighted panels, etc. In order to support start-up operations, Precision Dial purchased assets associated with Sooner Dial Company, an aircraft/military dial refinishing shop operating from 1950 to 1985. Sooner Dial

was required to remediate radium contamination at their Clinton, Oklahoma facility in 1996, but it is also known that Precision Dial received some of these assets prior to the 1996 cleanup effort. Based on this information, it was suspected that a portion of the assets acquired from Sooner Dial may have been contaminated with luminous radium paint. The historical record does not include information describing the location and magnitude of Ra-226 activity, if any, at the Kalamazoo property (ORNL 2015).

The Precision Dial Company is located in a single-storied building and consists of metal walls (garage-type structure) with painted concrete floors. Roughly 75% of the floor space was accessible for the survey. Access to areas was limited by work equipment (i.e., work desks, filing cabinets, printers, ovens, etc.). The land area consists mostly of grass with an asphalt parking lot located to the east of the building. A shed is located to the north of the building. Liquid waste from the stripping process is stored in the shed until pickup by a disposal service. Figure 1 presents an aerial view of the property. Figure 2 presents the layout of the building.



Figure 1. Aerial View of Precision Dial Company

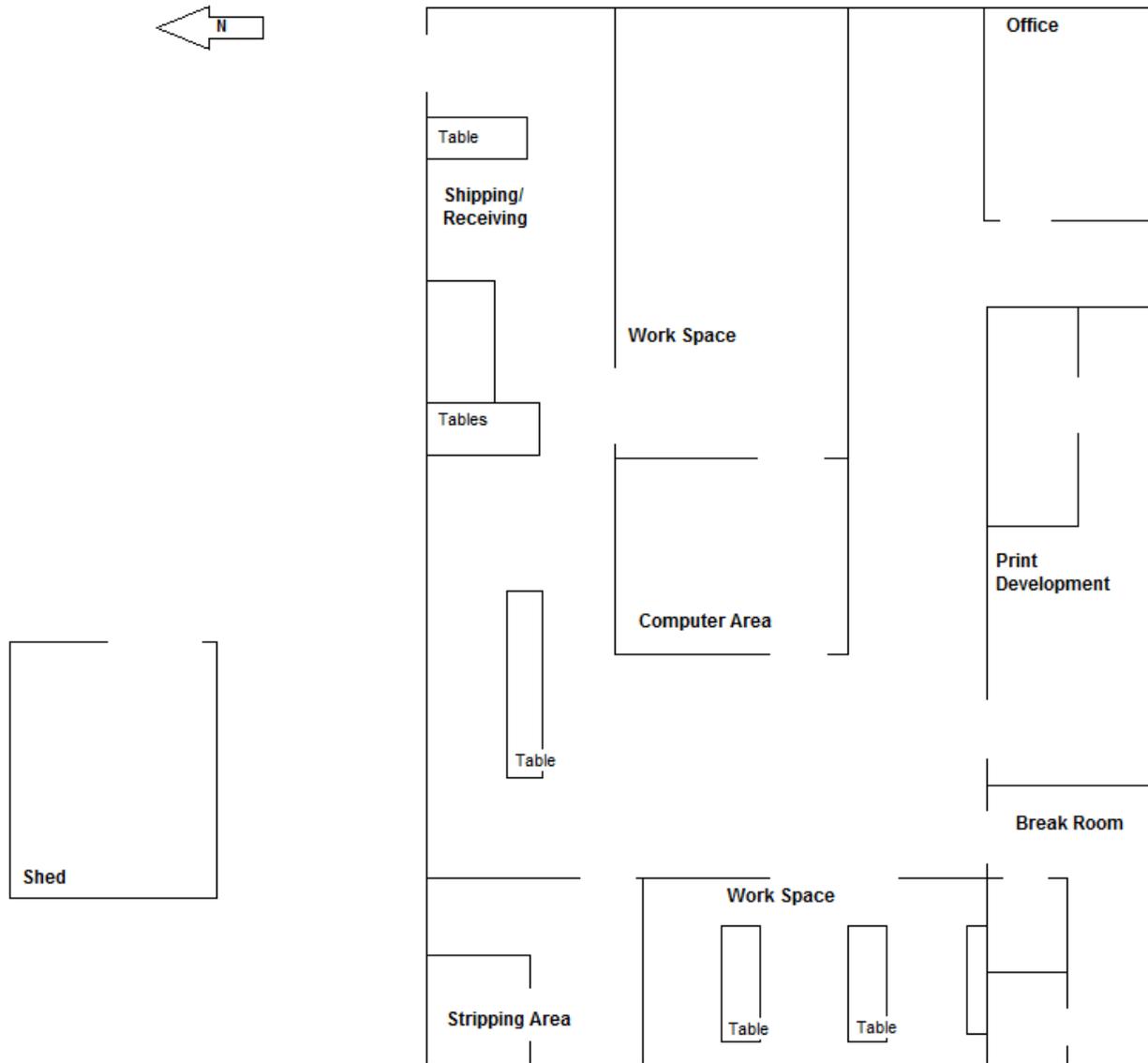


Figure 2. Layout of Precision Dial Building

2.2 Initial Site Visit Considerations

Prior to commencing survey activities, the general building layout was examined for consistency with historical information and to identify impediments to conducting the survey and/or health and safety considerations. Based on the history of the property and current operating procedures, if Ra-226 contamination is present it would most likely be in areas where the faceplates and dials are resurfaced or in liquid storage containers where the rinse from the stripping process is stored. Therefore, the initial site visit focused on areas inside the building structure and shed.

3.0 SITE OBSERVATIONS AND FINDINGS

3.1 Summary of Activities

The inspection team conducted an initial site visit at the 7240 West KL Avenue property on March 30, 2017. During the site visit, a pre-inspection meeting was held with Jack Giessner/NRC, Matthew Learn/NRC, Kaitlin Engel/ORAU, and Randy Babuska/Precision Dial. Participants discussed the inspection team's intention to perform general area surveys of the property, as time allowed.

Radiological surveys performed by the inspection team consisted of gamma radiation scans within the building using a Ludlum model 44-10 2-inch by 2-inch (2x2) sodium iodide detector connected to a Ludlum model 2221 ratemeter/scaler and radiation exposure rate measurements using a Ludlum model 192 NaI-based microRoentgen (μR) ratemeter¹. A Ludlum model 44-142 plastic scintillator connected to a Ludlum model 2221 ratemeter/scaler was available for direct surface activity measurements, if required. A SAM-940 gamma spectrum analyzer was available to perform field gamma spectrum measurements. Table 1 presents the specific instruments used.

Radiation Type (units)	Detector Type	Detector Model (Number)	Ratemeter (Number)
Alpha-plus-beta (cpm)	Plastic Scintillator ^a	44-142 (690)	2221 (602)
Gross gamma (cpm)	Sodium Iodide	44-10 (1151)	2221 (693)
Gross gamma exposure ratemeter ($\mu\text{R}/\text{h}$)	Sodium Iodide	192 (1128)	N/A
Gamma Spectrum Analyzer (SAM-940)	Lanthanum Bromide	940 (40272) ^b	N/A

N/A = not applicable

Number = ORAU equipment barcode

cpm = counts per minute

$\mu\text{R}/\text{h}$ = microRoentgen per hour

^aThough traditionally used for beta radiation detection, ORAU has calibrated the detector for quantifying the detector response to both alpha and beta radiation.

^bDevice performs automatic calibration upon startup and is source checked before use.

The inspection team was informed that when packages arrive at the facility, site employees perform a scan with an SE International Radiation Alert Monitor 5, which has a Geiger Muller (GM) detector. If the item is identified with elevated levels of radiation, it is bagged and returned to the owner. A package waiting to be shipped to a customer was found to have elevated levels of radiation. The property owner opened the package, and a single faceplate that had been shipped to Precision Dial from a company in New Jersey was found to be a source of elevated levels of radiation, likely from Ra-226. The faceplate, pictured in Appendix A, had been sent to Precision Dial to use as a reference for the new faceplate being created. The package was not

¹Roentgen is a unit of exposure (energy absorbed in air), whereas a rem is a unit of dose delivered to a person (resulting from the radiation energy absorbed in that person). While Roentgen and rem are related, these are different units. Because they are similar for gamma ray energies from Ra-226, NRC makes the simplifying assumption in this case that these units are equivalent (1 Roentgen = 1 rem).

identified as having elevated levels of radiation during the site's scan of the package upon receipt. During the site visit, however, the site owner re-checked the package with her meter, and it indicated elevated levels of radiation. The faceplate was placed in a plastic bag. The rest of the package's contents, including the cardboard box itself, were surveyed and found not to have elevated levels of radiation. The table the package was sitting on, the worker's hands, and the worker's benchtop, where the item was used and packaged, were surveyed and found not to have elevated levels of radiation. No other areas of elevated levels of radiation were found inside of the building. All accessible floors, benchtop work spaces, drawers, and liquid storage containers were surveyed, covering an estimated 75 percent of the inside area.

A survey of the shed was also performed. No areas of elevated radiation were identified in the shed. Surveys were performed around the entire building perimeter (a single pass width of approximately 1 meter) and the shed, for an estimated 10 percent land area coverage. No discrete areas of elevated levels of radiation were identified.

3.2 Summary of Results

Appendix B presents maps and tables containing the radiological survey data generated during the site visit. In the building and shed, the background 2x2 sodium iodide detector responses ranged from 4,500 to 6,000 cpm, excluding the faceplate and a floor mat. Background exposure rates ranged from 4 to 6 $\mu\text{R}/\text{h}$ at 1 meter above the ground surface. No locations were selected for direct (alpha-plus-beta) measurements or smears.

The faceplate waiting to be shipped had a 2x2 sodium iodide detector response of 700,000 cpm, an exposure rate of 750 $\mu\text{R}/\text{h}$ on contact, and an exposure rate of 5 $\mu\text{R}/\text{h}$ at 1 meter from the item. A direct measurement and smear were not collected to avoid damaging the faceplate. It should be noted that the faceplate, pictured in Appendix A, is not considered to be contaminated because it is a viable consumer product that contains radioactive material as part of its manufacturing.

In the owner's office, a floor mat was found to have 2x2 responses up to 8,000 cpm, compared to a background of up to 6,000 cpm. The source of elevated radiation is limited to one small (less than 100 cm^2) area that the inspection team could easily delineate using the 2x2 sodium iodide detector. The floor under the mat was scanned and no elevated radiation levels were detected. Exposure rate measurements were at background levels at 1 meter above the mat. Because the floor mat was not a significant source of radiation, posed no public health risk in the team's opinion, and can be easily discarded, no action was taken. The owner was informed of this finding.

In the outside area, the background 2x2 sodium iodide detector responses ranged from 5,300 to 6,000 cpm, and the background exposure rate was 5 $\mu\text{R}/\text{h}$ at 1 meter above the ground surface.

3.3 Summary of Dose Assessment Results

Because no radiation levels were detected above background and no discrete sources of radium were encountered, with the exception of the faceplate, which is not considered to be contaminated, and the floor mat, which was not determined to be from Ra-226, a dose attributed to discrete sources of Ra-226 could not be calculated.

4.0 OBSERVATIONS AND RECOMMENDATIONS

There was no indication from the areas surveyed that the Precision Dial Company contains discrete sources of Ra-226 contamination as determined by the following observations:

- Gamma radiation levels were generally consistent with background, as discussed above.
- The absence of observable gamma radiation anomalies, with the exception of that associated with the faceplate and floor mat, is indicative that there are no discrete sources of Ra-226 present.

Based on the above observations, it is recommended that the NRC not perform a more detailed scoping survey at the Precision Dial property. The initial site visit generated a robust dataset that meets the purpose of a scoping survey. Additionally, the recommendation is that the NRC staff should not pursue additional action at the Precision Dial property because no significant elevated radiation levels (relative to background) were identified.

5.0 REFERENCES

NRC 2016. *Inspection of Facilities Potentially Contaminated with Discrete Radium-226 Sources*, Temporary Instruction 2800/043, U.S. Nuclear Regulatory Commission, Office of Nuclear Material Safety and Safeguards, Washington, D.C., October. (Agencywide Documents Access and Management System [ADAMS] Accession No. ML16035A053).

ORNL 2015. *Historical Non-Military Radium Sites Research Effort Addendum*, "Precision Dial Company: Site Summary," Pgs. 110-113, Oak Ridge National Laboratory, Oak Ridge, Tennessee, November 24. (ADAMS Accession No. ML16291A488).

APPENDIX A
PHOTO OF FACEPLATE FROM THE PRECISION DIAL COMPANY SITE VISIT

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A-1. Faceplate with Elevated Levels of Radiation

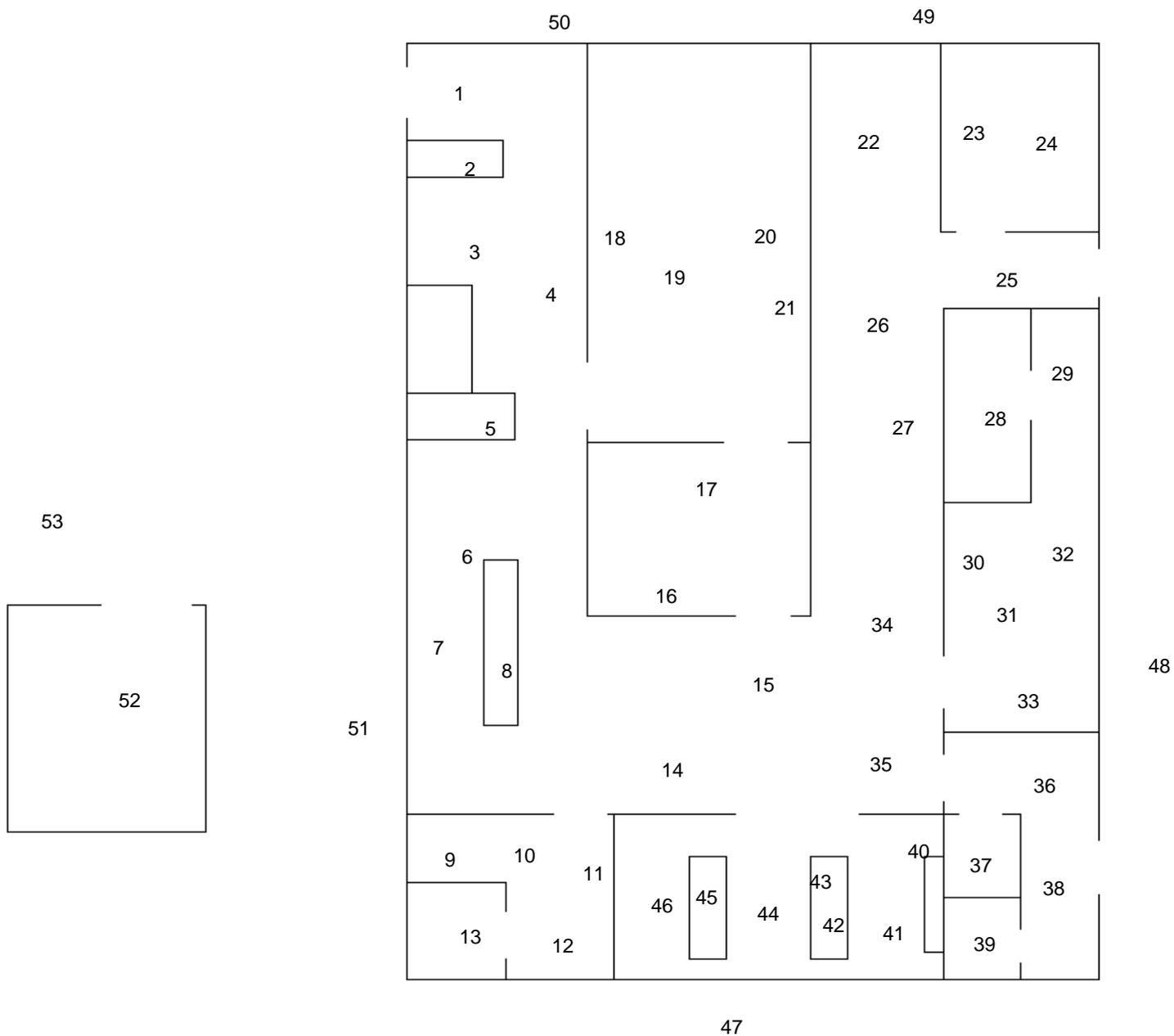
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**APPENDIX B
SURVEY MAPS AND DATA TABLES**

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Site: Precision Dial	Area: Building/Land	Date(s): 03/30/2017	Time: 10:00/11:20
Surveyor(s): KME		Purpose: Site Visit	
Radiation Type	Instrument	Detector	Background
Gamma	2221 No.693	44-10 No.1151	4 - 6 kcpm ^a
Gamma	192 No.1128	NA	4 - 6 μR/h ^a

^aBackground varied depending on naturally occurring radioactive material in the area.



= measurement location number
 See attached table for measurement results ← N

Table B-1. Precision Dial Survey Results				
Location No.	Gamma ^a			Comments
	Contact		1 m	
	cpm	μR/hr	μR/hr	
1	6,000	—	6	
2	700,000	750	5	Faceplate being returned to owner
3	5,500	—	5	
4	5,000	—	4	
5	5,500	—	5	
6	5,500	—	5	
7	5,000	—	5	
8	4,800	—	4	
9	4,500	—	4	
10	5,500	—	4	
11	4,000	—	4	
12	5,000	—	5	
13	5,000	—	4	
14	4,500	—	5	
15	5,300	—	4	
16	5,000	—	5	
17	5,500	—	4	
18	4,500	—	4	
19	5,300	—	4	
20	5,000	—	4	
21	4,500	—	5	
22	5,500	—	5	
23	5,500	—	4	
24	8,000	—	5	Floor mat
25	5,300	—	5	
26	5,500	—	5	
27	5,000	—	4	
28	5,500	—	5	
29	6,000	—	4	
30	6,000	—	5	
31	5,000	—	5	
32	5,000	—	4	
33	5,000	—	4	
34	5,500	—	5	
35	4,500	—	4	
36	5,000	—	4	
37	6,000	—	5	
38	5,000	—	5	
39	5,000	—	5	
40	4,800	—	4	
41	5,000	—	5	
42	4,500	—	5	
43	5,500	—	5	
44	5,500	—	5	
45	4,500	—	4	
46	5,000	—	4	
47	5,500	—	5	
48	5,300	—	5	
49	5,500	—	5	

Table B-1. Precision Dial Survey Results				
Location No.	Gamma ^a			Comments
	Contact		1 m	
	cpm	μR/hr	μR/hr	
50	5,500	—	5	
51	6,000	—	5	
52	4,500	—	5	
53	5,500	—	5	
a) Ludlum 44-10 NaI with Ludlum 2221 rate meter; Ludlum 192 NaI — indicates measurement not collected at this location				