

Enclosure

**OAK RIDGE ASSOCIATED UNIVERSITIES:
SITE STATUS REPORT FOR THE FORMER HART AND HEGEMAN MANUFACTURING
COMPANY AT
340-342 CAPITOL AVENUE, HARTFORD, CONNECTICUT**

SEPTEMBER 18, 2017

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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 340-342 Capitol Avenue in Hartford, Connecticut. This property covers part of the footprint once occupied by the former Hart and Hegeman Manufacturing Company, which manufactured luminous radium flush switches and pull-chain pendants in the early 1900s. The original factory was demolished in 2002, but soil from the site may be contaminated with radium. The objective of this survey was to locate possible discrete sources of radium, if any, that would be associated with former Hart and Hegeman Manufacturing Company operations.

ORAU performed the radiation survey on June 23, 2017, and did not identify elevated levels of radiation. Because no elevated levels of radiation were identified, ORAU concludes that discrete sources of radium are not present in surface soils. Based on these results, it is recommended that the NRC not pursue additional action at the 340-342 Capitol Avenue property.

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SITE STATUS REPORT

Property: Former Hart and Hegeman Manufacturing Company
340-342 Capitol Avenue
Hartford, CT 06106

Docket Number: 03039017

Current Property Name(s): Connecticut Department of Public Works

Current Property Owner(s): Connecticut Department of Public Works

Inspection Dates: June 23, 2017

Inspector(s): Todd Jackson/U.S. Nuclear Regulatory Commission (NRC),
supported by Kaitlin Engel and Stephen Pittman/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 NRC regulatory authority as byproduct material. The property at 340-342 Capitol Avenue in Hartford, Connecticut, was identified as the former Hart and Hegeman Manufacturing Company, a manufacturing facility that used luminous radium in the early 1900s (ORNL 2015). The objectives of the initial site visit were to determine if discrete sources of Ra-226 and/or distributed Ra-226 contamination 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.

Data collected during the initial site visit are used to plan future actions that may be needed to reduce the exposure of Ra-226 to current or future site occupants to levels that do not exceed the applicable regulatory requirement. It is important to note that destructive testing is not generally performed as described within NRC's procedures, Temporary Instruction 2800/043, Revision 1, "Inspection of Facilities Potentially Contaminated with Discrete Radium-226 Sources" (NRC 2017) (Agencywide Documents Access and Management System [ADAMS] Accession number ML16330A678).

2.0 PROPERTY DESCRIPTION AND INITIAL SITE VISIT CONSIDERATIONS

2.1 Property Description and History

The original brick factory, pictured in the upper right-hand corner of Figure 1, was built sometime between 1906 and 1909 and was updated in the 1960s with a crushed-stone façade. The facility was used by Hart and Hegeman Manufacturing Company, later known as Arrow-Hart & Hegeman, to make electric switches and wiring devices until as late as 1979. The Capitol Avenue facility may have been used by the Department of Corrections and the Castle Park Fun Center until the year 2000, when the building was abandoned due to hazardous conditions (not related to Ra-226) (Hartford Courant 2002; ORNL 2015). Generally known as a

producer of switches and wiring devices, an advertisement from 1922 listed the Hart and Hegeman Manufacturing Company as manufacturing luminous flush-type switches and pull-chain pendants (McGraw-Hill 1922). It is unknown how long the Hart and Hegeman Manufacturing Company used luminous radium or when it ceased operations. The structure was demolished in 2002, though underground drain pipes were not removed (ORNL 2015).

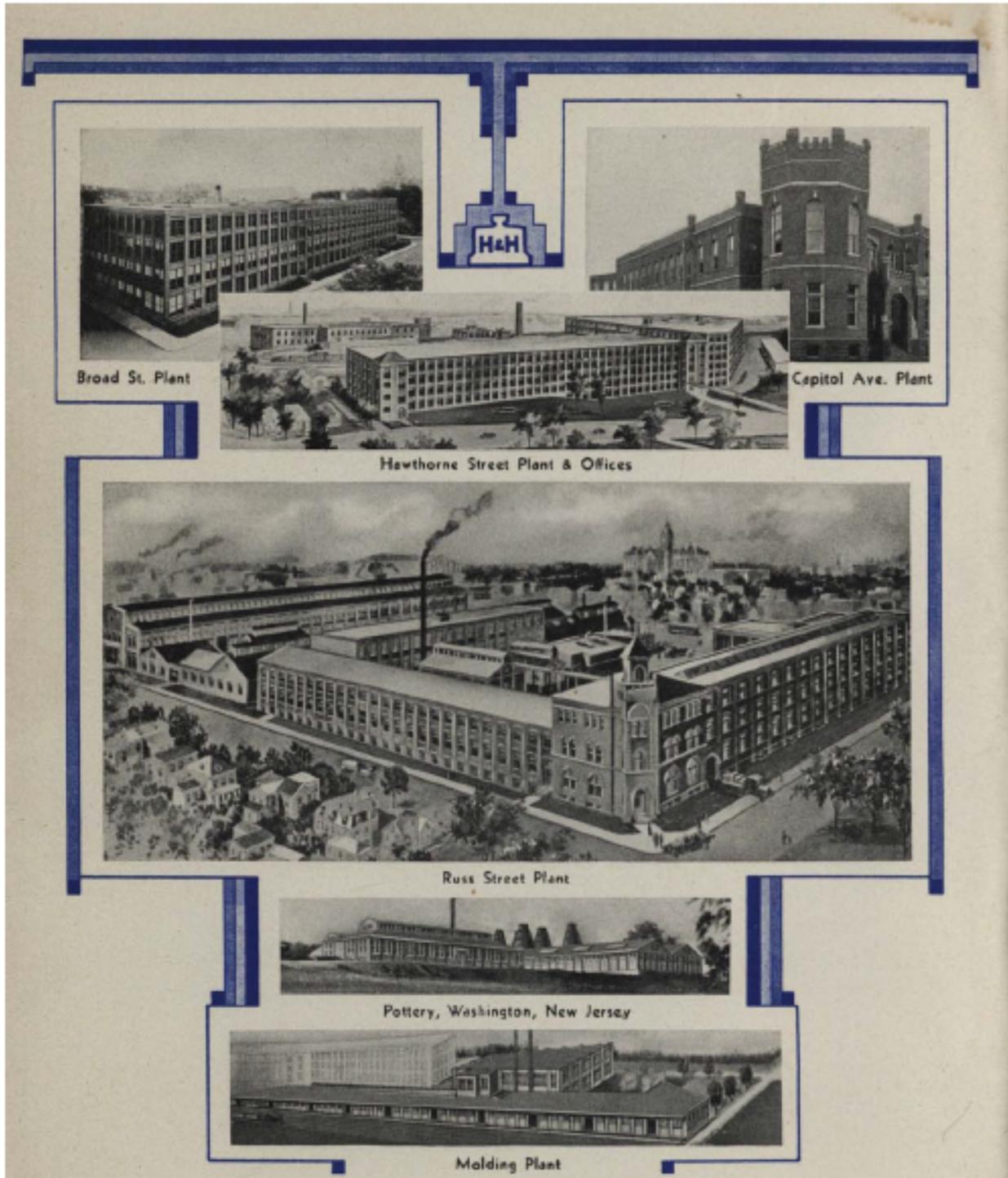


Figure 1. Hart and Hegeman Facilities (H & H 1929)

The 1.6-acre property is now comprised of an asphalt parking lot with flowerbed areas and sidewalks along the perimeter, as illustrated in Figure 2. Although the original building was demolished, radium contamination from historical operations may be present in surface soils, subsurface soils, and original piping that is currently covered by the asphalt parking lot. An extensive internet search of public records did not reveal any information about radium cleanup of the facility, if present (ORNL 2015).



Figure 2. Aerial View of Former Hart and Hegeman Property (Google Maps, June 2017)
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.

2.2 Initial Site Visit Considerations

Prior to commencing survey activities, the general site layout was examined for consistency with historical information and to identify impediments to conducting the survey and/or health and safety considerations. No health or safety concerns were identified, and approximately 30 percent of the asphalt covered area was inaccessible due to parked cars during the survey period.

3.0 SITE OBSERVATIONS AND FINDINGS

3.1 Summary of Activities

The inspection team conducted an initial site visit at the 340-342 Capitol Avenue property on June 23, 2017. A pre-inspection meeting was held with Kaitlin Engel and Stephen Pittman (ORAU), Todd Jackson (NRC), and Kerri Versteeg (Bureau of Properties and Facilities Management). Participants discussed the inspection team's intention to perform general area surveys around the property.

Radiological surveys performed by the inspection team consisted of gamma radiation scans using a Ludlum model 44-10 2-inch by 2-inch (2×2) sodium iodide detector connected to a Ludlum model 2221 ratemeter/scaler and radiation exposure rate measurements using a Ludlum model 192 sodium iodide-based microRoentgen (μR) ratemeter¹. Table 1 presents the specific instruments used during the site visit.

Radiation Type (units)	Detector Type	Detector Model (Number)	Ratemeter (Number)
Gross gamma (cpm)	Sodium Iodide	44-10 (639) Calibrated 04/13/2017	2221 (395) Calibrated 04/11/2017
		44-10 (1151) Calibrated 04/13/2017	2221 (505) Calibrated 03/16/2017
Gross gamma (μR/h)	Exposure Meter	192 (1127, 1128) Calibrated 06/02/2017	N/A

N/A = not applicable
Number = ORAU equipment barcode
cpm = counts per minute
μR/h = microRoentgen per hour

The inspection team arrived on-site at 8:00 a.m. and began surveying the property after a brief pre-inspection meeting. The inspection team used 2×2 sodium iodide detectors connected to global positioning system (GPS) equipment and model 192 exposure ratemeters to acquire gamma radiation data. A minimum of 50 percent of the accessible area was surveyed. No discrete locations of elevated responses were identified during the survey. The inspection team departed the site at 11:15 a.m. Photographs taken during the initial site visit are presented in Appendix A.

¹ NOTE: Roentgen 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).

3.2 Summary of Results

In general, detector responses were lower over parking lot areas and higher in the flowerbed areas containing soil. These results are not unexpected given the differences in naturally occurring radioactive materials (NORM) associated with these media. Table 2 presents summary statistics of survey data collected during the initial site visit. For the 2×2 sodium iodide detector measurements, the mean is close to the median; there are no anomalies; and over 99 percent of the data points fall within three standard deviations of the mean. Likewise, exposure rate measurement data exhibited similar statistical characteristics with 100 percent of the data points falling within three standard deviations of the mean. These results are consistent with survey data from an un-impacted (background) property. Gamma radiation measurements using the 2×2 sodium iodide detectors, and exposure rate data using the model 192, are mapped in Appendix B, noting asphalt and soil area results are shown separately due to dissimilar detector responses from NORM.

Detector	No. of Meas.	Units	Min. Value	Max. Value	Mean	Median	St. Dev.
2×2	10,593	cpm	2,986	9,811	5,423	5,136	1,197
Exposure Rate Meter	93	μR/h	3.5	8.0	5.4	5.0	1.0

3.3 Summary of Dose Assessment Results

To date, a site-specific dose assessment has not been performed for the Hart and Hegeman Manufacturing Company site. Because no elevated radiation levels were detected above background and no contamination was encountered, a dose assessment attributed to discrete sources of Ra-226 was not necessary.

4.0 OBSERVATIONS AND RECOMMENDATIONS

Based on the data collected, the former Hart and Hegeman Manufacturing Company property at 340-342 Capitol Avenue does not contain discrete sources of Ra-226 in excess of regulatory requirements, as determined by the following observations:

- Gamma radiation levels across the site were consistent with background; the absence of gamma radiation anomalies suggests there are no sources of Ra-226 present.
- Risk of potential contamination on the site is low and, if present, would most likely be found at a significant depth in the subsurface soil.

Based on the above observations, it is recommended that the NRC not perform a more detailed scoping survey. The rationale behind this recommendation is that the initial site visit generated a robust dataset that already meets the scoping survey purpose. Furthermore, it is also recommended that the NRC staff should not pursue additional action at the former Hart and Hegeman Manufacturing Company property given no elevated radiation levels (relative to background) were identified in the surface soils.

5.0 REFERENCES

Hartford Courant 2002. In Memoriam, April 24, 2002, Available at: http://articles.courant.com/2002-04-24/news/0204240331_1_building-parking-lot-manufacturing-innovation.

H & H 1929. *H & H Fine Switches and Wiring Devices—Catalogue U*, Arrow-Hart & Hegeman Electric Company, Hart & Hegeman Division, Hartford, Connecticut.

McGraw-Hill 1922. *Electrical Merchandising—The Monthly Magazine of the Electrical Trade*, Vol. 27, No. 1, p. 106, New York, January.

NRC 2017. *Inspection of Facilities Potentially Contaminated with Discrete Radium-226 Sources*, Temporary Instruction 2800/043, Revision 1, 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. ML16330A678).

ORNL 2015. *Historical Non-Military Radium Sites Research Effort Addendum*, “Hart and Hegeman Manufacturing Company: Site Summary,” pp. 60-63, Oak Ridge National Laboratory, Oak Ridge, Tennessee, November 24. (ADAMS Accession No. ML16291A488).

APPENDIX A
PHOTOS FROM THE HART AND HEGEMAN MANUFACTURING COMPANY SITE VISIT

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**A-1. Hart and Hegeman Site
Looking West**



**A-2. Hart and Hegeman Site
Looking Southeast**



**A-3. Hart and Hegeman Site
Looking Northeast**



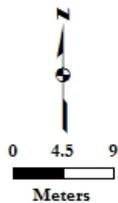
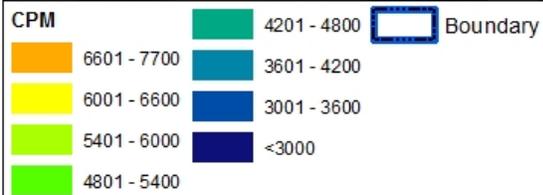
**A-4. Hart and Hegeman Site
Looking Southwest**



**A-5. Hart and Hegeman Site
Looking Northwest**

APPENDIX B
SURVEY RESULTS FROM THE HART AND HEGEMAN MANUFACTURING COMPANY
SITE VISIT

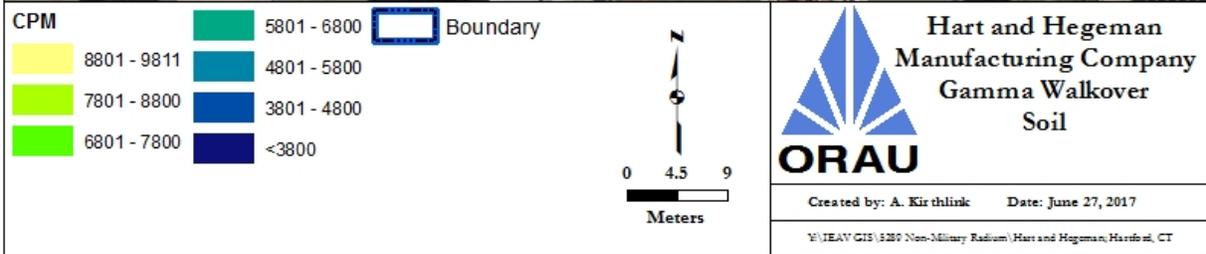
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Hart and Hegeman
Manufacturing Company
Gamma Walkover
Asphalt

Created by: A. Kir thlink Date: June 27, 2017

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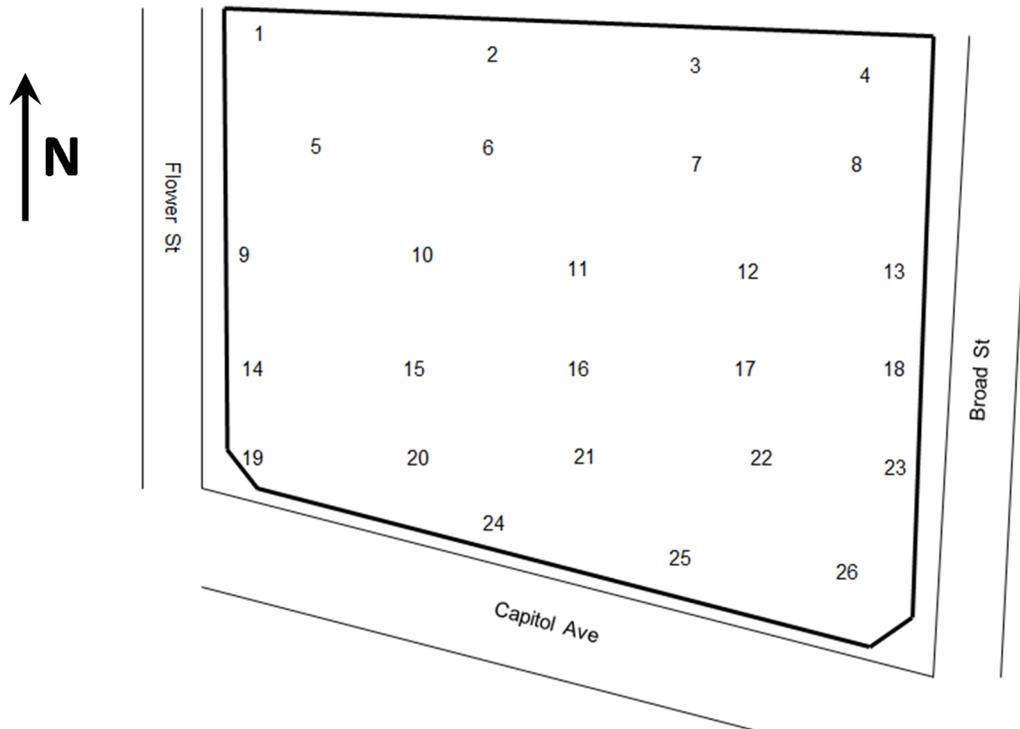


Site: Hart & Hegeman	Area: Land	Date(s): 6/23/17	Time: 09:10 - 11:00
Surveyor(s): KME/STP		Purpose: Site Visit	

Radiation Type	Instrument	Detector	Background
Gamma	192 No.1127, No.1128	NA	4.5 µR/h ^a

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

Location	µR/h @ 1 m	Comment	Location	µR/h @ 1 m	Comment
1	6.0 - 7.0		14	5.0 - 7.0	Slightly higher in grass
2	5.0 - 6.0		15	3.5 - 5.0	
3	4.0 - 7.0	Slightly higher in grass	16	4.0 - 5.0	
4	5.0 - 7.0		17	4.0 - 5.0	
5	5.0 - 7.0	Slightly higher in grass	18	4.0 - 7.0	Slightly higher in grass
6	4.0 - 5.0		19	8.0	
7	4.0 - 5.0		20	4.0 - 5.0	
8	5.0 - 6.0		21	4.0 - 6.0	
9	5.0 - 6.0		22	5.0 - 6.0	
10	4.0 - 5.0		23	5.0 - 7.0	
11	5.0		24	5.0 - 7.0	
12	5.0		25	6.0 - 7.0	
13	5.0		26	5.0 - 6.0	



= General area measurement ranges provided in attached table