

ENCLOSURE 3

Historical Non-Military Radium Sites Research Effort Addendum – Publicly Available

Historical Non-Military Radium Sites Research Effort Addendum

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Aerospace Innovations: Site Summary

The following information was extracted from public records.

Address

28919 Seven Mile Road, Livonia, MI

Site Description/History

Public records indicate Aerospace Innovations was established in 2007, with an address of 28919 Seven Mile Road, Livonia, MI. The company specialized in manufacturing aircraft gauges and aircraft flight instruments as well as performing repairs on aircraft gauges and flight instruments (Manta, 2015). Radium may have been present at this facility, if gauges with luminous radium dials were repaired at the site. It is unknown when the company went out of business. One Tax Solutions, a Tax Return Preparation and Filing company established in 2010, currently occupies the building.

The amount/extent of radium contamination at these sites (including historical information and/or informed assumptions about the radium facilities' structures/areas, processes, and activities)

It is unknown if radium was or is present at this site; however, it is suspected that radium may have been present in some of the aircraft instruments repaired at this facility, due to documentation of general historic use of luminous radium in vintage gauges.

Summary of Current Radium Levels:

As of November 2015, current levels of radium are unknown based on information reviewed for this report.

Location and population near the sites

The former Aerospace Innovations facility is located in an industrial part of town; however, there are nearby residences, as seen in Figure 1.

Livonia is a city in the northwest part of Wayne County. It is located approximately 15 miles northwest of downtown Detroit and less than two miles from the western city limits. According to the 2010 U.S. Census, the population of Livonia was 96,942; the 2014 population estimate for the city was 94,958 (United States Census Bureau, 2015).

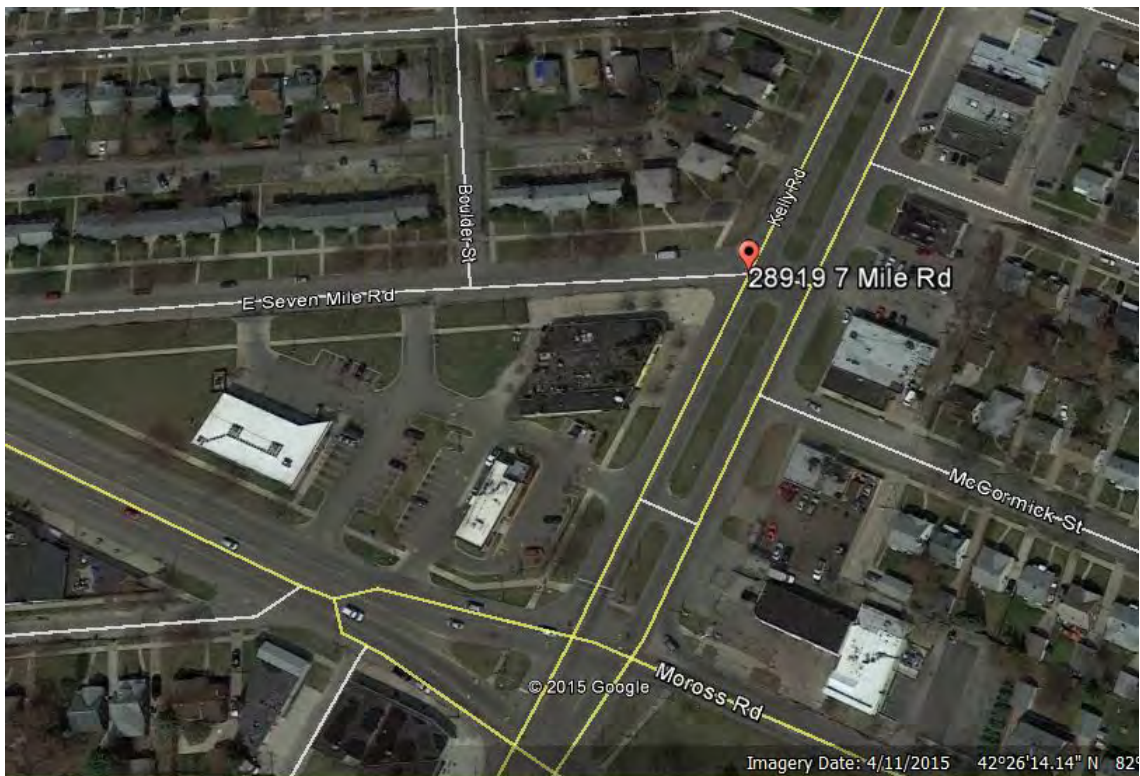


Figure 1. Former Aerospace Innovations site (28919 Seven Mile Road, Livonia, MI) (Google, Earth 2015)

Current State/other Federal involvement

An extensive internet search of public records did not reveal any information about radium cleanup of the facility.

Current access, activities, and uses at the site

One Tax Solutions currently occupies the 28919 Seven Mile Road site (see Figure 2).



Figure 2. Former location of Aerospace Innovations, 28919 Seven Mile Road in Livonia, MI (now One Tax Solutions) (Google Earth, 2015)

Existing Engineering Controls

According to Figure 2, no engineering controls exist at the site.

Prioritization Ranking

It is suspected that radium is present at the site because Aerospace Innovations repaired aircraft gauges and flight instruments, which may have included vintage instruments that contained luminous radium. Therefore, the site is classified as Tier 4.

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Manta Media Inc. 2015. Accessed May 13, 2015. http://www.manta.com/mb_45_B32BB1P5_23/aircraft_flight_instrument_repair/michigan.

United States Census Bureau. Accessed October 2015. <http://quickfacts.census.gov/qfd/states/26/2649000.html>.

Aerospace Innovations, Livonia, MI
November 24, 2015

Ansonia Electrical Company: Site Summary

The following information was extracted from public records.

Address

63 Main Street, Ansonia, CT

Site Description/History

This company was listed in a 1922 advertisement (Journal of Electricity and Western Industry, 1922) as manufacturing radium luminous front door bell pushes. In a 1921 Ansonia directory (World Maps Online, 2014), the address for the Ansonia Electrical Company was 63 Main Street. Based on the historical information, it is assumed that radium front door bell pushes were manufactured in a building located at 63 Main Street. The building was subsequently removed; however, the soil at the site may be contaminated with radium. The approximate location of 63 Main Street is a parking lot shown in Figure 1.

Further searches focused on the address (63 Main Street) revealed that the location of the property at 31-91 Main Street was recently owned by the Farrel Company, a company based in Ansonia that currently manufactures process equipment for the plastics industry. In 2013, the city of Ansonia purchased this property and intends to create retail/office space with apartments above (Valley Independent Sentinel, 2013). The area identified for redevelopment is indicated in Figure 2.



Figure 1. Approximate location of 63 Main Street (Google Earth, 2012)



Figure 2. Redevelopment areas of Farrel Company (around 31-91 Main Street, Ansonia) (Valley Independent Sentinel, 2013)

The amount/extent of radium contamination at these sites (including historical information and/or informed assumptions about the radium facilities' structures/areas, processes, and activities)

It is known that the facility manufactured radium front door bell pushes. The original building is gone and an asphalt covered parking lot remains. The remaining soil under the asphalt parking lot could be contaminated along with any drain pipes from the original building and any soil surrounding the pipes below the surface that was not removed when the building was removed. Therefore, the site consists of soil that is potentially contaminated by radium.

Summary of Current Radium Levels:

As of November 2015, current levels of radium are unknown based on information reviewed for this report.

Location and population near the sites

The assumed site is located in a commercial area of Ansonia; however, there are residences and a river close by, as seen in Figure 3. Ansonia is a city in New Haven County on the Naugatuck River, immediately north of Derby, and about 12 miles northwest of New Haven. According to the 2010 U.S. Census, the population of Ansonia was 19,249; the 2014 population estimate for the city was 18,959 (United States Census Bureau, 2015).

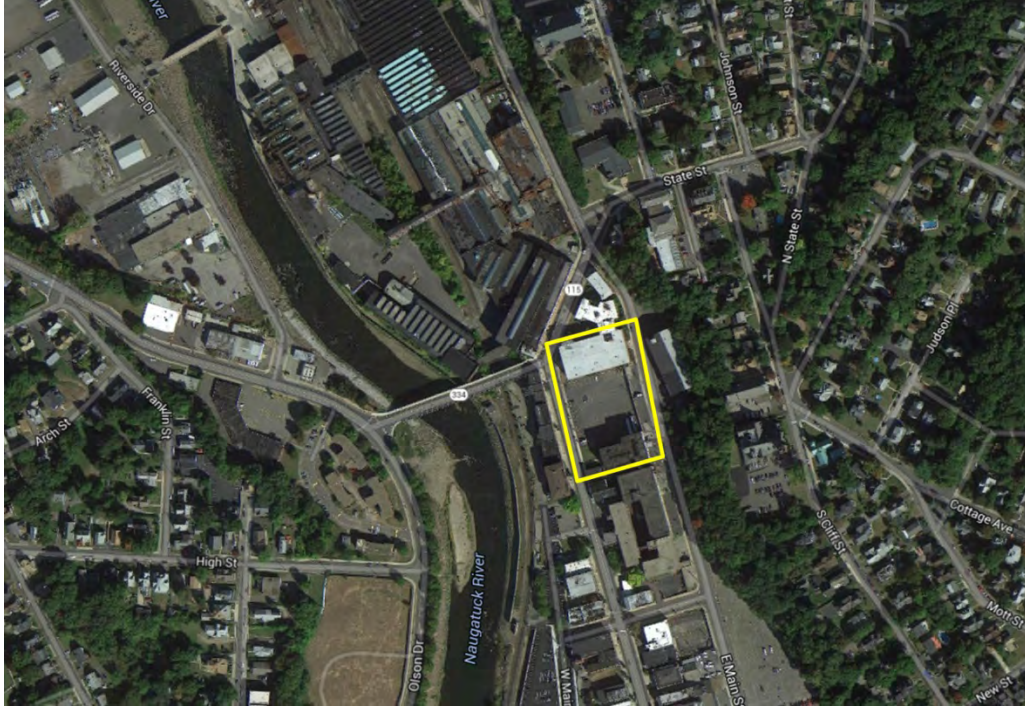


Figure 3. Aerial view of approximate location of Ansonia Electrical Company (GoogleEarth, 2012)

Current State/other Federal involvement

An extensive internet search of public records did not reveal any information about contamination/cleanup of the facility, especially involving radium.

Current access, activities, and uses at the site

The soil site appears to now be a parking lot.

Existing Engineering Controls

The parking lot is covered with asphalt. It is unknown whether any cleanup occurred before the asphalt was laid.

Prioritization Ranking

Radium is confirmed to have been present at the site based on historical documentation of radium use at the facility. The original building is gone and an asphalt covered parking lot remains. The site consists of soil that is potentially contaminated by radium. The site is occupied or frequented by visitors. Therefore, the soil site is classified as Tier 1.

References

Google Earth. 2012. Accessed April 2015. <https://www.google.com/maps/>.

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Arrow Electric Company: Site Summary

The following information was extracted from public records.

Address

103 Hawthorn Street and 630 Capitol Avenue, Hartford, CT

Site Description/History

This company was listed in a 1922 advertisement (Journal of Electricity and Western Industry, 1922) as manufacturing radium luminous flush switches and pull-chain pendants. There were 2 factory locations for this company in Hartford: 103 Hawthorn Street (Electrical Review and Western Electrician, 1915) and 630 Capitol Avenue (Journal of Electricity, Power and Gas, 1910).

In 1927, Arrow Electric Company merged with Hart and Hegeman to form Arrow-Hart and Hegeman Incorporated. The merged company operated the facilities on Hawthorn Street and Capitol Avenue mentioned here as well as the original Hart and Hegeman plant at 340-342 Capitol Avenue until 1979 (Hartford Courant, 2002).

Based on the historical information, it is assumed that radium luminous flush switches and pull-chain pendants were manufactured at the facility located at 630 Capitol Avenue and in a building located at 103 Hawthorn Street. The building on Hawthorn Street burned in June 1999 and was subsequently removed; however, the soil at the site may be contaminated with radium. The Hawthorn Street site is currently a parking lot for the Aetna Life Insurance Company (see Figure 1). The facility located at 630 Capitol Avenue appears to still be standing today. Most of the facility is vacant (see Figure 2).



Figure 1. Approximate location of 103 Hawthorn Street (Google Earth, 2011)



Figure 2. 630 Capitol Avenue (Google Earth, 2011)

The amount/extent of radium contamination at these sites (including historical information and/or informed assumptions about the radium facilities' structures/areas, processes, and activities)

It is known that the facility manufactured radium flush switches and pull-chain pendants. The parking lot at 103 Hawthorn Street is covered with asphalt. It is unknown whether any cleanup occurred before the asphalt was laid. The remaining soil under the asphalt parking lot could be contaminated along with any drain pipes from the original building and any soil surrounding the pipes below the surface that was not removed when the building burned down. Therefore, the site consists of soil that is potentially contaminated by radium.

The facility at 630 Capitol Avenue is mostly vacant. It is unknown whether there currently is radium contamination in this building or whether any cleanup has occurred.

Summary of Current Radium Levels:

As of November 2015, current levels of radium are unknown based on information reviewed for this report.

Location and population near the sites

Both sites are located in an industrial area of Hartford; however, there are some residences and the Hartford Public High School is nearby. Hartford is located in Hartford County and has a total area of 18

square miles. According to the 2010 U.S. Census, the population of Hartford was 124,775; the 2014 population estimate for the city was 124,705 (United States Census Bureau, 2015). See Figure 3.



Figure 3. Aerial View of approximate locations of 103 Hawthorn Street (A) and 630 Capitol Avenue (B) (Google Earth, 2011)

Current State/other Federal involvement

An extensive internet search of public records did not reveal any information about contamination/cleanup of the facility, especially involving radium.

Current access, activities, and uses at the site

The 103 Hawthorn Street facility, which burned down in 1999, is currently a parking lot for the Aetna Life Insurance Company.

The 630 Capitol Avenue facility is mostly vacant; however, Capitol Archives & Record Storage occupies part of the building at the corner of Capitol Avenue and Laurel Street (see Figure 4).



Figure 4. Capitol Archives and Record Storage in former Arrow Electric Company facility (Google Earth, 2011)

Existing Engineering Controls

The parking lot at 103 Hawthorn Street is covered with asphalt. It is unknown whether any cleanup occurred before the asphalt was laid.

The facility at 630 Capitol Avenue is mostly vacant. Windows are boarded up on the side that faces Capitol Avenue and on the 3rd floor on the Laurel Street side. Part of the building is in use, however, and there is no fencing or other engineering controls around the vacant parts of the building.

Prioritization Ranking

Radium is confirmed to have been present at the site based on historical documentation of radium use at the facility. The original building at the Hawthorn Street facility is gone and an asphalt covered parking lot remains. This soil site is potentially contaminated by radium. The site is occupied or frequented by visitors. The original building at the Capitol Avenue facility is still standing and is potentially contaminated by radium. The building is partially occupied. Therefore, this site is classified as Tier 1.

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Journal of Electricity, Power and Gas. 1910. Vol. 25, p. 263.

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United States Census Bureau. Accessed October 2015. <http://quickfacts.census.gov/qfd/states/09/0937000.html>.

Battle Creek Sanitarium: Site Summary

The following information was extracted from public records.

Address

74 N. Washington Avenue, Battle Creek, MI (and other buildings as part of the historic Battle Creek Sanitarium with the historical use of radium)

Site Description/History

Fresh out of medical school, Dr. John Harvey Kellogg became chief physician at the Western Health Reform Institute of Battle Creek, a home for healthy diet and lifestyle that had been founded by Seventh Day Adventist leader Ellen G. White in 1866. Kellogg changed the name to the Battle Creek Sanitarium; he came up with the word “sanitarium” to reflect his idea of a sanitary retreat for health restoration and training (“a place where people learn to stay well”) rather than “sanitorium,” which meant a hospital for disabled individuals or for treatment of tuberculosis (asylumprojects.org, 2011).

Kellogg emphasized the importance of fresh air, exercise, rest, and a restricted diet in maintaining physical health. He experimented in other pioneering medical and scientific techniques. While he may be memorable for his work with his brother developing cereals, Kellogg reportedly was one of the first physicians to treat cancer with radium (U.S. GSA, 2015).

After a fire in 1902 destroyed the latest addition to the property, a new structure on the site was built in 1903 and named the Battle Creek Sanitarium (sees Figure 1 and 2) (NNDB, 2015).



Figure 1. Battle Creek Sanitarium, 1903 (asylumprojects.org, 2011)



Figure 2. Battle Creek Sanitarium, 1915 (looking south on N. Washington Ave.) (Wikipedia, 2015)

In 1911, the Radium Institute of the Battle Creek Sanitarium was established (see Figure 3). This department provided: a large and complete equipment of radium and all accessory appliances for radium-therapy, including both superficial and deep-seated lesions; an adequate supply of radium needles for direct contact treatment of deep-seated malignancies by actual introduction of radium into the tumor area; and Radium loans to responsible physicians at moderate rental fees (JMSMS, 1921).

THE RADIUM INSTITUTE
Of the Battle Creek Sanitarium
BATTLE CREEK, MICHIGAN

This department of the Battle Creek Sanitarium, established in 1911, has a large and complete equipment of radium and all accessory appliances for radium-therapy, including both superficial and deep-seated lesions. An adequate supply of radium needles for direct contact treatment of deep-seated malignancies by actual introduction of radium into the tumor area.

X-ray therapy is used in conjunction with radium treatment whenever such combination is indicated.

All cases are thoroughly studied and detailed records kept. The benefits to be derived from this form of treatment are available to every one requiring such treatment. A fee is charged consistent with the financial conditions of the patient.

The treatment of all cases is under the direct supervision of the surgeon in charge of the radium department in association with competent pathologists, roentgenologists and other helpers. Special attention given to the pre- and post-operative treatment of cases where surgery is indicated for the removal of malignancy.

Radium loaned to responsible physicians at moderate rental fees. Full particulars concerning the loan service will be given on application.

Address, Surgeon in charge of Radium Department
BATTLE CREEK SANITARIUM
BATTLE CREEK, MICHIGAN

Figure 3. Advertisement for the Radium Institute at Battle Creek Sanitarium (JMSMS, 1921)

In 1928, Battle Creek Sanitarium expanded with a fourteen story tower, built adjacent to the main sanitarium and facing Champion Street (see Figures 4 and 5).



Figures 4 and 5. Battle Creek Tower Addition, 1929 (left) and 1940s (right) (Willard Library, 2015)

In 1942, the U. S. Army purchased the entire facility and established the Percy Jones General Hospital. The hospital closed permanently in 1953 and one year later became the Battle Creek Federal Center (Wikipedia, 2015).

Kellogg died in 1943, and the Battle Creek Sanitarium, now known as the “San” and once again owned by the Seventh Day Adventist church, moved to the Fieldstone Building nearby at 165 North Washington Avenue. It continued to operate as a psychiatric facility through the 1970s but closed its doors by the end of the decade. It is unknown if this facility performed radium treatments. Medical records have since been microfiched and are still kept at the facility (now the Bronson Hospital Fieldstone Center, 165 N. Washington Ave) (see Figure 6).



Figure 6. 165 N. Washington Avenue (last address of the “San”, now Bronson Hospital Fieldstone Center) (asylumprojects.org, 2011)

In April 1997, a three-year \$25 million renovation of the Federal Center was completed. Major improvements to the 480,000 square-foot building included fire safety upgrades, a new heating-ventilation air conditioning system, new electrical work, removal of asbestos, enhanced telecommunications and power supplies, installation of sprinkler systems, new roofing and improvements to the building’s mechanical infrastructure (asylumprojects.org, 2011). While the extensive renovation removed material and infrastructure that might have been contaminated by radium, there is no evidence to confirm this assumption. No further information could be obtained in the public records to further describe the renovation and if radium was remediated.

In 2003, the original Battle Creek facility, owned by the U.S. General Services Administration, became the Hart-Dole-Inouye Federal Center. The main 1903 sanitarium building has a rectangular footprint with three wings radiating out from the main block. It is now referred to as Building 2, with the wings designated as Buildings 2A, 2B, and 2C (see Figure 7). Despite the changes in use, the building's exterior has not been altered substantially. Some of the interior has retained the original features while others have changed dramatically. The solarium, gymnasium, and swimming pool have been removed (U.S. GSA, 2015).

The most prominent feature of the complex is the 15-story tower that was added to the south side of Building 2 in 1928. The tower, currently designated as Building 1 (see Figure 7), was designed to complement the existing main sanitarium building. The exterior remains unchanged. The tower originally contained more than 265 hotel-like guest rooms and suites, most of which had private bathrooms. Today, these spaces have been altered to accommodate government offices. Building 1A was originally the sanitarium's dining room. It retains many original features including large chandeliers and murals of Oriental scenes. Draperies, doors, and decorative moldings have been restored. The room retains much of its original character and serves as a cafeteria today (U. S. GSA, 2015).

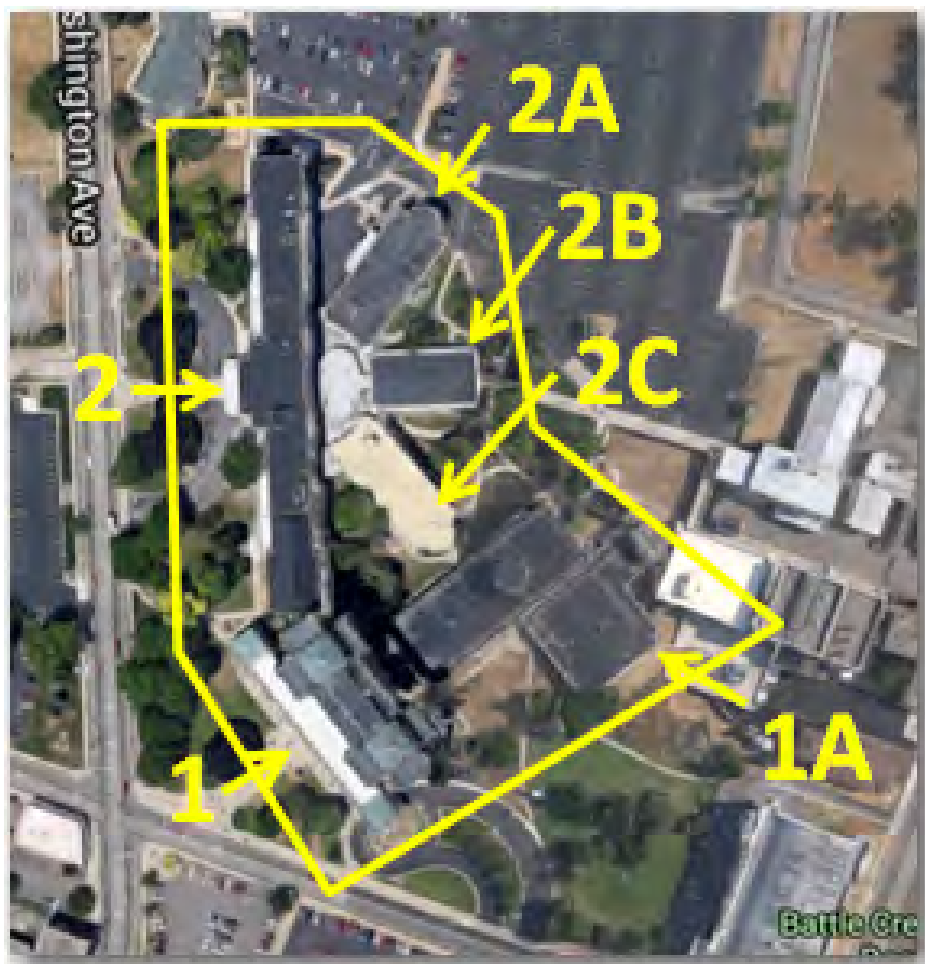


Figure 7. Former Battle Creek Sanitarium Facilities (2 – original Battle Creek Sanitarium with 3 wings, 2A, 2B, and 2C; 1 – original Towers addition with 1A wing) (Google Earth, 2014)

The amount/extent of radium contamination at these sites (including historical information and/or informed assumptions about the radium facilities’ structures/areas, processes, and activities)

The 1997 renovation effort did not mention if any radium cleanup was performed or if there were any surveys conducted to determine existing radium contamination. The renovation documentation is not available for review. While it is clear from available documentation that radium treatments were conducted at the original facility (Figure 1), it is unknown if radium treatments occurred in the tower addition added in 1928 (Figure 4) or the N. Washington Avenue location (Figure 6).

Summary of Current Radium Levels:

As of November 2015, current levels of radium are unknown based on information reviewed for this report.

Location and population near the sites

Battle Creek is a city in northwest Calhoun County, at the confluence of the Kalamazoo and Battle Creek Rivers. According to the 2010 U.S. Census, the population of Battle Creek was 52,347; the 2014 population estimate for the city was 51,833 (United States Census Bureau, 2015). The city is surrounded by rural townships, making the county population approximately 136,900 people (militaryinstallations.dod.mil, 2015).

Although the Battle Creek Sanitarium site appears to be in an industrial area of Battle Creek, MI (see Figure 8), there is a preschool/kindergarten/daycare facility next door to the original structure on Washington Avenue (Stars and Stripes Learning Station) and a high school just east of the Towers addition on Champion Street.

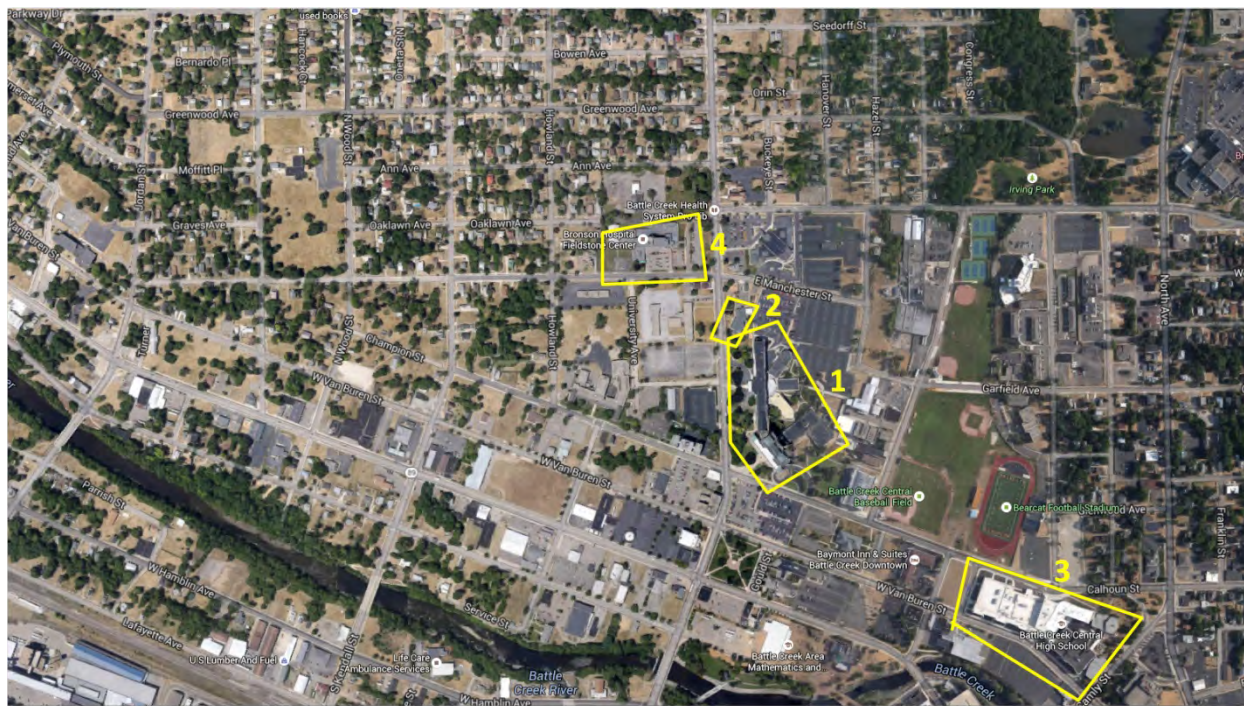


Figure 8. Battle Creek, IN. 1 – original Battle Creek Sanitarium (now Hart-Doyle-Inouye Federal Building) at 74 N. Washington Ave.; 2 – Stars and Stripes Learning Station; 3 – Battle Creek Central High School; 4 – the “San” (now Bronson Hospital Fieldstone Center) at 165 N. Washington Ave. (Google Earth, 2014)

Current State/other Federal involvement

There are no ongoing state or federal cleanup activities at this site. The last cleanup conducted was in April 1997.

Current access, activities, and uses at the site

The Battle Creek Sanitarium site is currently owned by the U.S. General Services Administration as the Hart-Doyle-Inouye Federal Building. Early tenants of the then called Battle Creek Federal Center included the U.S. Department of Agriculture’s Processed Products Branch of the Fruit and Vegetable Division and offices of the Social Security Administration, the Federal Bureau of Investigation, the U.S. Post Office, the Internal Revenue Service, and a local congressman. By 1962, 28 different organizations were housed here, ranging in size from one to hundreds of employees (asylumproject.org, 2011).

Today, the Hart-Dole-Inouye Federal Center serves about 1,800 Department of Defense (DoD) civilian and military personnel, families, civilians, and contractors (militaryinstallations.dod.mil, 2015). The Defense Logistics Information Service (DLIS) is the largest operational unit within the Hart-Dole-Inouye Federal Center, with about 1,000 employees. DLIS employees manage logistics information for supply items used by the U.S. government, the North Atlantic Treaty Organization (NATO), and other foreign governments. Defense Reutilization and Marketing Service (DRMS) employs about 350 people at its headquarters in the Federal Center. DRMS is responsible for the disposal of excess property generated by the military services. The rest of the Hart-Dole-Inouye Federal Center is home to over 20 other government and non-government organizations (asylumproject.org, 2011).

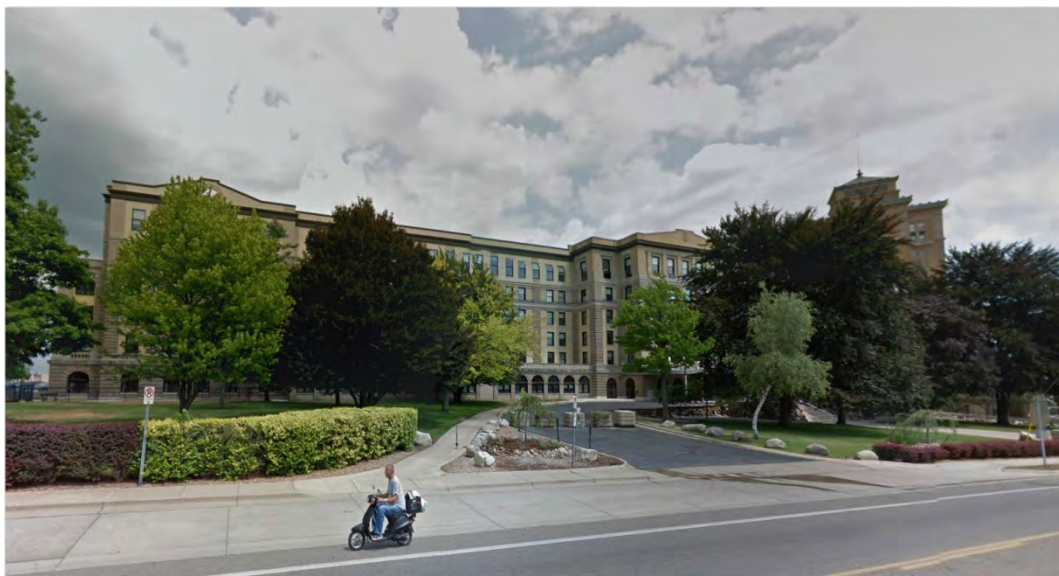


Figure 9. Hart-Dole-Inouye Federal Center (N. Washington Ave. view) (Google Earth, 2014)



Figure 10. Hart-Dole-Inouye Federal Center (Champion St. entrance) (Google Earth, 2014)

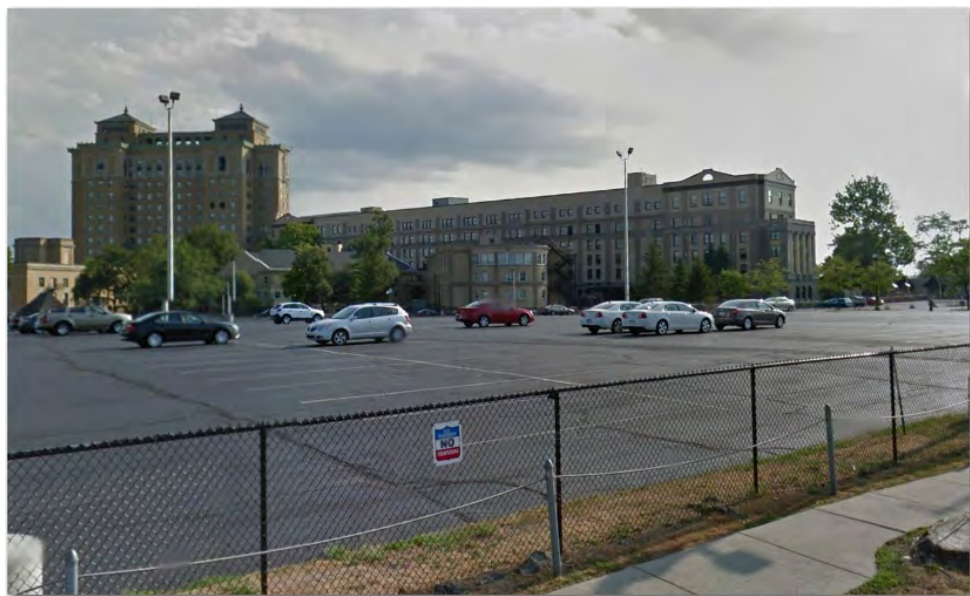


Figure 11. Hart-Dole-Inouye Federal Center (rear of facility and parking lot) (Google Earth, 2014)

Existing Engineering Controls

The only engineering controls are 1) barricades to the N Washington and Champion street entrances (see Figures 9 and 10) and 2) the Federal Protective Service (FPS), a part of the Department of Homeland Security, Bureau of Immigration Customs Enforcement provides law enforcement and overall security for the Federal Center, including screening of employees and visitors as well as patrolling the Center 24

hours a day. This historic, national landmark is available to the public via scheduled tours (asylumprojects.org, 2011).

Prioritization Ranking

Radium is confirmed to have been present based on historical documentation that radium needles were used at the site. The site consists of buildings that are potentially contaminated by radium. The buildings are occupied by around 1,800 federal, civilian, and contractor employees. Therefore, the site is classified as Tier 1.

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Benrus Clock Company: Site Summary

The following information was extracted from public records and the "CT File.PDF" (CT-DEP, 2009).

Address

145 Cherry Avenue, Waterbury, CT

Site Description/History

The company was founded in New York City in 1921. Benrus also had a factory in Waterbury CT, which was once the Movement Factory for the Waterbury Clock Company, where they made the cases for Benrus watches. The Benrus Clock Company in Waterbury, CT historically produced watches with radium-luminous dials.

The original building is currently owned and occupied by Bender Plumbing. According to ATSDR (1999), Bender Plumbing had extensive testing done at the Benrus factory during the purchase of the property; however, routine testing for radium was not normally part of a pre-sale environmental study.

The amount/extent of radium contamination at these sites (including historical information and/or informed assumptions about the radium facilities' structures/areas, processes, and activities)

In 1998, the US EPA contacted the Agency for Toxic Substances and Disease Registry (ATSDR) to assist in conducting a public health assessment of structures that once housed clock factories in four Connecticut municipalities. The purpose of the health assessment was to evaluate the radiological survey data previously collected by the Connecticut Department of Environmental Protection (CT-DEP) at structures that once housed clock factories and to determine whether a public health hazard exists at any of these sites from the radiological contamination. The CT DEP requested assistance from the US Department of Energy (DOE) in conducting radiological surveys of the structures that once housed clock factories. The surveys were completed in April of 1998.

For the former Benrus Clock building (occupied by Bender Plumbing at the time of the 1998 survey), the 1999 ATSDR Public Health Assessment reported isolated areas of radium contamination on the 4th, 5th, and 7th floors (Table 1). ATSDR concluded that radiation levels were above the EPA risk-based cleanup level (15 mrem/yr) in isolated areas of the fourth, fifth, and seventh floors. ATSDR concluded that radiological contamination was detected at levels that may pose a public health hazard to occupants of the former Benrus Clock Company building; however, ATSDR stated that none of the radiation levels detected pose an immediate health problem. The Connecticut Department of Public Health recommended that individuals be disassociated from areas with radiation at levels exceeding 15 mrem/year.

Table 1. 1998 Radiological Survey Results for the former Benrus Clock Building (ATSDR 1999)

Town: Waterbury Clock Company Name: Benrus Clock Company Current Occupant(s): Bender Plumbing

Radiological Parameters (units)	Location	Measurement Description	Maximum Level	Background	CL
Gamma radiation (uR/hr)	1st floor	Direct contact	0	10	15
		Measured at Waist level	0		
	2nd floor	Direct contact	0		
		Measured at Waist level	0		
	3rd floor	Direct contact	0		
		Measured at Waist level	0		
	4th floor	Direct contact	120		
		Measured at Waist level	26		
	5th floor	Direct contact	40		
		Measured at Waist level	15		
	6th floor	Direct contact	0		
		Measured at Waist level	0		
	7th floor	Direct contact	600		
		Measured at Waist level	100		
Radon-222 (pCi/L)	4th floor	Not applicable	1.0	NR	4

EPA cleanup level = 15; Source = ATSDR, 1999

In 2003, the Valley Council of Governments (in Derby CT) contracted with Scientech Inc. to provide radiological surveys in former clock factory buildings in the townships of Waterbury, Bristol and Thomaston as part of the Connecticut Radium Decontamination and Decommissioning Project. Surveys in the former Benrus Clock Company building conducted by Scientech Inc. identified radiological contaminated areas on the 4th, 5th, and 7th floors. Bender Plumbing was identified as the occupant of the building at the time of the survey in 2003. Isolated discrete areas of contamination were found on walls and floors of the 4th and 5th levels. Numerous discrete areas were identified on the walls, around windows, and on floors of the 7th level. Radiological survey data consisted of background counts per minute and maximum gross contact counts per minute and are presented in Table 2. (Note: Additional details of the 2003 Scientech radiological surveys are not known.)

Table 2. 2003 Radiological Survey Results for the former Benrus Clock Building (Sciencetech, 2003)

Photo Page	Town	Building	Location	Contamination Area	Surface	Approximate Area Size	Background Counts	Maximum Gross Counts (on contact)	Estimated 18" Count
BP-2	Waterbury	Bender	Seventh Floor	Floor along East wall and by windows	Wood flooring	48 ft x 5 ft	8,000	25,000	
BP-3	Waterbury	Bender	Seventh Floor	Circular hole on floor	Epoxy or concrete on wood	6 in diameter hole	8,000	50,000	
BP-3	Waterbury	Bender	Seventh Floor	Floor along North wall and by windows	Epoxy or concrete on wood	30 ft x 5 ft	8,000	60,000	
BP-4	Waterbury	Bender	Seventh Floor	Pillar 708	Painted brick	4 ft x 2 ft	10,000	105,000	
BP-5	Waterbury	Bender	Seventh Floor	Base of Pillar 707	Painted brick	Spot	10,000	57,000	
BP-6	Waterbury	Bender	Seventh Floor	North Corner by stairs	Wood flooring	2 ft x 3 ft	8,000	165,000-290,000	
BP-7	Waterbury	Bender	Seventh Floor	Floor area by center of duct	Wood flooring	General area (too many items to see clearly)	8,000	160,000	
BP-8	Waterbury	Bender	Seventh Floor	Pillar 717 piping	Painted brick	Pipe	10,000	570,000	
BP-9	Waterbury	Bender	Seventh Floor	Wall by window	Painted brick	Possibly behind heater	10,000		
BP-10	Waterbury	Bender	Seventh Floor	Floor along West wall	Wood flooring	8 ft x 70 ft (less contamination as you go south)	8,000	60,000-80,000	
BP-11	Waterbury	Bender	Seventh Floor	Floor aisle by Southeast	Wood flooring	5 ft x 2 ft	8,000	16,000	
BP-12	Waterbury	Bender	Fifth Floor	Floor by East windows	Wood flooring	15 ft x 5 ft (proposal says 4 spots)	8,000	16,000-38,000	
	Waterbury	Bender	Fifth Floor	Floor by West windows	Wood flooring	2 ft x 1 ft	8,000	16,000	
BP-13	Waterbury	Bender	Fourth Floor	Floor by East windows	Wood flooring	25 ft x 5 ft (proposal says 6 spots)	8,000	16,000-80,000	
	Waterbury	Bender	Fourth Floor	Floor by East windows (further south)	Wood flooring	15 ft x 3 ft	8,000	13,000-18,000	

Summary of Current Radium Levels:

As of November 2015, current levels of radium are unknown based on information reviewed for this report.

Location and population near the sites

This facility now houses Bender Plumbing, which employs a staff of approximately 50-99. It should be noted that there are residential areas (Figure 1) within close proximity to the former clock company.

Waterbury, a city in New Haven County, CT, is on the Naugatuck River, 33 miles southwest of Hartford and 77 miles northeast of New York City. According to the 2010 U.S. Census, the population of Waterbury was 110,366; the 2014 population estimate for the city was 109,307 (United States Census Bureau, 2015).

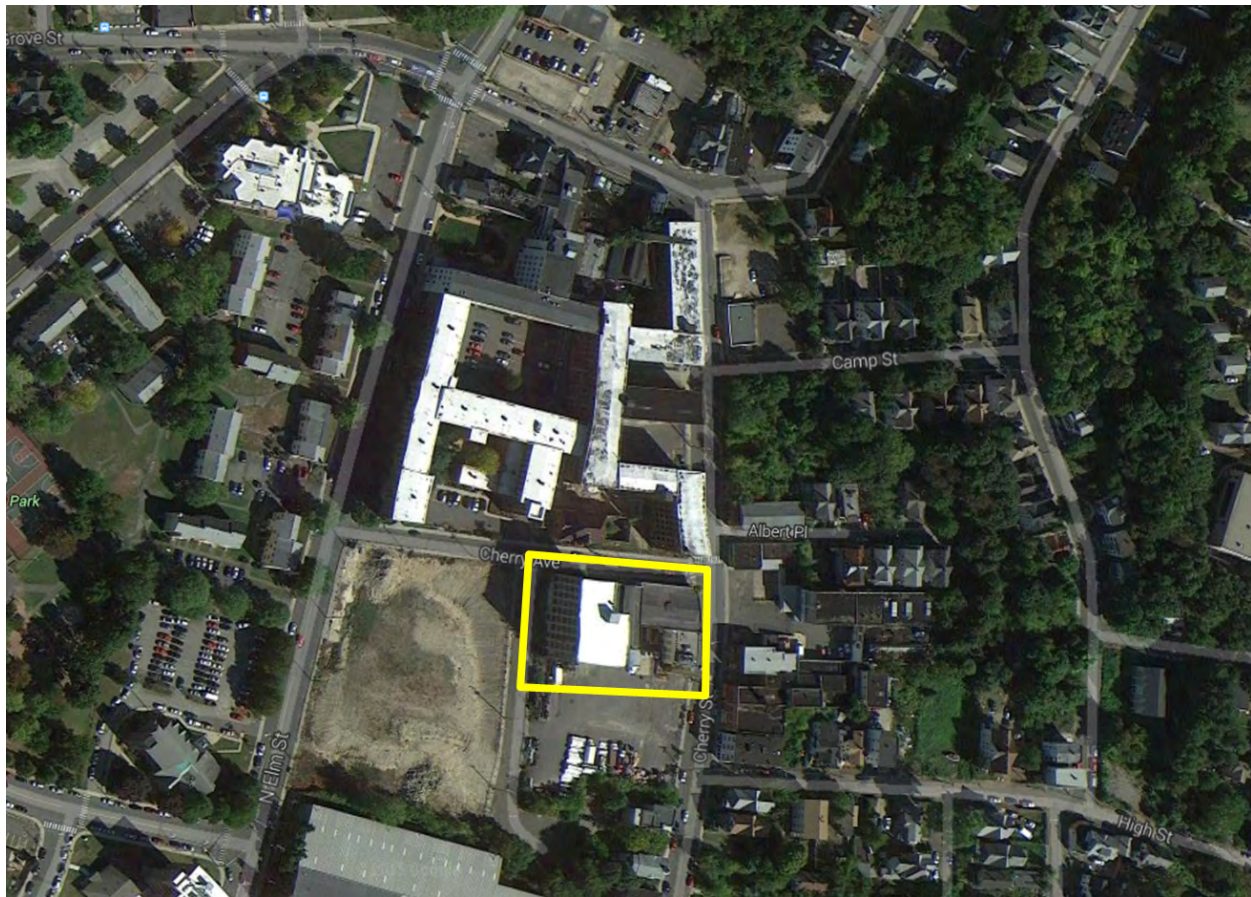


Figure 1. Location of Benrus Clock Company (Waterbury Clock Company is the large facility just to the North) (Google Earth, 2015)

Current State/other Federal involvement

In 2001, the CT State Bond Commission approved \$750,000 to support cleanup of radioactive material found at old clock factory sites in Bristol, New Haven, Thomaston and Waterbury. It is unknown if any of these clean-up funds were allocated to the former Benrus Clock Company site.

Current access, activities, and uses at the site

This seven story building is being used as a warehouse for plumbing supplies. The exterior of the building has not been renovated, as it appears to be in similar conditions to that of the original watch factory. The only exception to this is the addition put on the first floor for offices. From the images (see figures 2 and 3), it appears that the parts of the factory directly on Cherry Avenue and at the Corner of Cherry Street and Cherry Avenue are vacant and that Bender Plumbing is using the southern-most part of the facility (Figure 4). It is unclear, however, if Bender is using the vacated sections of the Benrus facility for storage.



Figure 2. Benrus Clock Company (corner of Cherry Street and Cherry Avenue) (Google Earth, 2015)



Figure 3. Entrance to old Benrus Clock Factory on Cherry Avenue (Google Earth, 2015)



Figure 4. Southeast section of Benrus Clock Company, occupied by Bender Plumbing (Google Earth, 2015)

Existing Engineering Controls

Based on Figure 3 (2015 Google Earth), the door to the old Clock Factory (on the opposite side of the building from the Bender Plumbing entrance) has been covered with metal and there is fencing around the facility. Access to the vacated parts of the building may be possible through Bender Plumbing, however.

Prioritization Ranking

Radium is confirmed to have been present at the site based on historical documentation that radium was present and confirmed by radiological survey data. The site consists of a building potentially contaminated by radium. The building is occupied. Therefore, the site is classified as Tier 1.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1999. Public Health Implications of Radiation Contamination at Former Clock Factories Located in Bristol (Hartford County), New Haven (New Haven County), Thomaston (Litchfield County), and Waterbury (New Haven County) Connecticut. January 29, 1999. <http://www.atsdr.cdc.gov/HAC/pha/PHA.asp?docid=959&pg=0>

CT-Department of Environmental Protection (DEP). 2009. Correspondence from CT-DEP to NRC NMSS. Collection of pdf documents about Connecticut Clock Companies. Document dates range from 1998-2004. CT File.pdf, 1806 pages.

CT Department of Public Health (DPH). 1998. Former Clock Factory Sites in Waterbury: Update. September 1998.

http://www.ct.gov/dph/lib/dph/environmental_health/eoha/atsdr/waterbury_clock_update.pdf

Google Earth. Accessed February 2015. <https://www.google.com/maps/>.

Scientech 2003. Connecticut Radium Sites Verification Survey for the Valley Council of Governments, Connecticut Radium Decontamination and Decommissioning Project. Scientech, Inc. 143 West Street, New Milford, CT 06776. October 24, 2003.

United States Census Bureau. Accessed October 2015.

<http://quickfacts.census.gov/qfd/states/09/0980000.html>.

Summary of Benrus Clock Company Information in "CTfile.pdf" (CT-DEP, 2009)

Site_Name	Source_date	Title	Pages
Benrus Clock Company	unknown	Bender Plumbing Information	226-234
Benrus Clock Company	April 21, 1998	Department of Energy (DOE) Radiological Assistance Report cover letter and Radiological Assistance Call notes	744-747
Benrus Clock Company	1999	Document number 82A9499	511-514
Benrus Clock Company	January 29, 1999	PUBLIC HEALTH ASSESSMENT; PUBLIC HEALTH IMPLICATIONS OF RADIATION CONTAMINATION AT FORMER CLOCK FACTORIES LOCATED IN BRISTOL (HARTFORD COUNTY), NEW HAVEN (NEW HAVEN COUNTY), THOMASTON (LITCHFIELD COUNTY), AND WATERBURY (NEW HAVEN COUNTY) CONNECTICUT	1578-1619
Benrus Clock Company	April 4, 1998	Radium Contamination at Former Watch Manufacturers in Waterbury, CT	3-33
Benrus Clock Company	unknown	Update for the Old Waterbury Clock Factory Complex	1481-1484

Billings Army Navy: Site Summary

The following information was extracted from public records.

Addresses

10 N. 29th Street, Billings, MT 59101 (current location, 2012-present)

15 N. 29th Street, Billings, MT 59101 (previous location, 1980-2012)

Site Description/History

Billings Army Navy Surplus has been in business at two locations in Billings, MT since 1980 (10 N. 29th Street and 15 N. 29th Street). It is one of the largest Army Navy Surplus stores in the northwest and carries genuine military surplus and collectibles dating back to the early 1900s. They have a large collection of Vintage Aero Parts including WWI and WWII airplane gauges, switches, meters, indicators, controls, compasses, and more that are known to contain luminous radium material (Billings Army Navy, 2015).

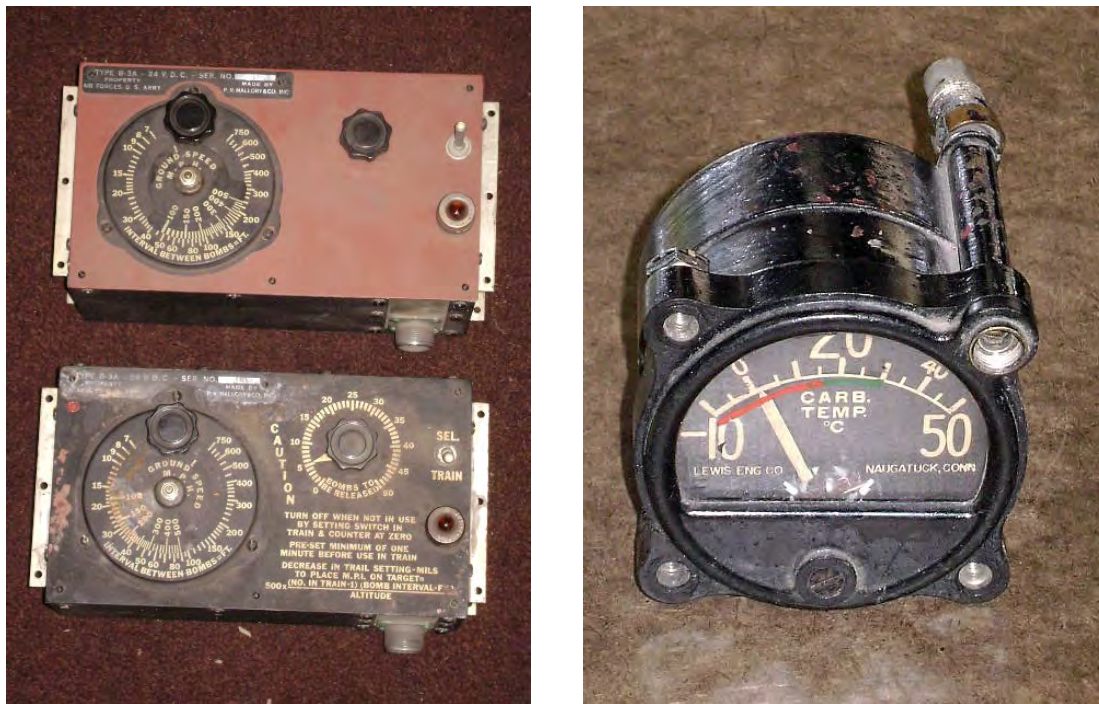


Figure 1. WWII era gauges available for sale (Billings Army Navy, 2015)
(<http://go-armynavy.com/military-surplus/vintage-aero-parts.html>)



Figure 2. Billings Army Navy (10 N. 29th Street) current location since 2012 (Google Earth, 2015)



Figure 3. Billings Army Navy (15 N. 29th Street) previous site, located across the street from current location prior to 2012 (Google Earth, 2015, image captured Sept 2011)

The amount/extent of radium contamination at these sites (including historical information and/or informed assumptions about the radium facilities' structures/areas, processes, and activities)

It is known that luminous radium containing aircraft dials and gauges are housed in the current operating building site at 10 N. 29th Street, and it is assumed these items were also present at the former location at 15 N. 29th Street.

Summary of Current Radium Levels:

As of November 2015, current levels of radium are unknown based on information reviewed for this report.

Location and population near the sites

Billings is located in Yellowstone County and is the largest city in MT. According to the 2010 U.S. Census, the population of Billings was 104,170; the 2014 population estimate for the city was 108,869 (United States Census Bureau, 2015). The Billings Army Navy stores are located in an area surrounded by businesses and residences (Figure 4).

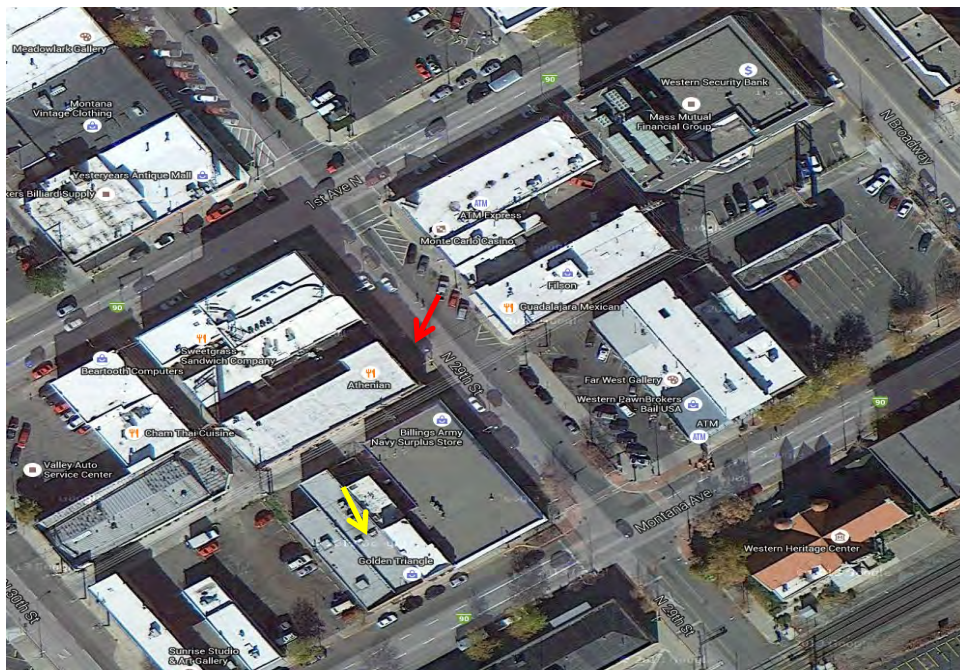


Figure 4. Location of current 10 N. 29th Street (yellow) and previous 15 N. 29th Street (red) sites and surrounding areas (Google Earth, 2015)

Current State/other Federal involvement

An extensive internet search of public records did not reveal any information about contamination/cleanup of the facility, especially involving radium.

Current access, activities, and uses at the site

As of November 2015, Billings Army Navy of Billings, MT is open and operating at the location of 10 N. 29th Street. The current contact is listed as Eddie Schmidt (800) 653-8528. Current occupancy/use of the previous business location (prior to 2012) of 15 N. 29th St. is unknown.

Existing Engineering Controls

No engineering controls exist at either location.

Prioritization Ranking

Radium is confirmed to have been present at the site based on historical documentation that luminous radium containing military items are located at the current store. This site is occupied or frequented by visitors. It is assumed luminous radium containing military items were also present at the former location of Billings Army Navy. Therefore, the site classified as Tier 1.

References

Billings Army Navy. 2015. <http://go-armynavy.com>.

Google Earth. Accessed May 2015. <https://www.google.com/maps/>.

United States Census Bureau. Accessed October 2015.
<http://quickfacts.census.gov/qfd/states/30/3006550.html>.

Bryant Electric Company: Site Summary

The following information was extracted from public records.

Address

1421 State Street, Bridgeport, CT (and other adjacent properties in historical site footprint)

Site Description/History

The Bryant Electric Company opened this site as a manufacturing facility for electronic devices in 1888. According to an advertisement in the 1922 Journal of Electricity and Western Industry, Bryant Electric Company produced radium switches and pendants (Journal of Electricity and Western Industry, 1922).

In 1988, after Bryant Electric ceased operations in the century old 500,000 square foot facility, Westinghouse explored adaptive reuse scenarios for the factory buildings without success until 1992. Spurred by a demand for industrial land for new construction, a partnership was formed that allowed Westinghouse to dispose of the property while simplifying the company's compliance with RCRA and the Connecticut Property Transfer Act (U.S. Conference of Mayors, 1999). The facility ultimately became a subsidiary and later a division of the Westinghouse Electric Corporation, now CBS Corp/Viacom. The buildings remained unoccupied from 1988 until demolition (Figure 1). In 1996, demolition of all facility buildings was complete (U.S. EPA, 2008).

The City of Bridgeport acquired the title to the site from Viacom in 2000 with hopes of expanding Bridgeport's West End Redevelopment Project. The new commercial property construction was complete at the site in 2007. Although the original building was removed, some of the soil at the site may still be contaminated with radium from the radium switch and pendant production.



Figure 1. Photos of the abandoned Bryant Electric Company from 1995.

The amount/extent of radium contamination at these sites (including historical information and/or informed assumptions about the radium facilities' structures/areas, processes, and activities)

CT DEP clean-up of the site under RCRA began in 1988 (EPA, 2008). The article mentions that decontamination and demolition of all facilities was completed in 1996. CBS Corporation then installed a soil vapor extraction system and groundwater treatment system to clean up VOCs from the soil site. The article never mentioned testing for or cleaning up radium.

Summary of Current Radium Levels:

As of November 2015, current levels of radium are unknown based on information reviewed for this report.

Location and population near the sites

The area is now commercial. AKDO, a business in the West End Industrial Park, has around 90 employees. Chaves Bakery employs around 5-9 people. The area is surrounded by residences and just to the east of the area is a school (See Figure 2).

Bridgeport is the most populous city in CT. It is located in Fairfield County on the Pequonnock River and Long Island Sound. According to the 2010 U.S. Census, the population of Bridgeport was 144,229; the 2014 population estimate for the city was 147,612 (United States Census Bureau, 2015).



Figure 2. Former footprint of Bryant Electric Company, Bridgeport CT. 1 – West End Industrial Park; 2 – Chaves Bakery; 3 – possibly ASAP Bedliners (Google Earth, 2015)

Current State/other Federal involvement

Cleanup of VOCs was completed in 2005. There is no mention in the public records about cleanup of radium.

Current access, activities, and uses at the site

Today the site holds the city’s largest industrial facility, West End Industrial Park, built in the past 30 years. AKDO, a natural stone, slabs, tiles and handcrafted mosaic distributor, officially opened the doors to the new building in 2006. The property also contains a bakery and potentially a facility that services truck parts. See Figures 3-5.



Figure 3. West End Industrial Park, Entrance to AKDO (Google Earth, 2015)



Figure 4. Chaves Bakery (Google Earth, 2015)



Figure 5. Unknown Building (potentially ASAP Bedliners) (Google Earth, 2015)

Existing Engineering Controls

The original buildings were demolished in 1996 and over the years have been replaced with active commercial properties that provide full access for employees/customers.

Prioritization Ranking

Radium is confirmed to have been present at the site based on historical documentation that radium was used in the manufacturing facility. The original buildings are gone and the site has been redeveloped. The site consists of soil that is potentially contaminated by radium. The site is occupied or frequented by visitors. Therefore, this soil site is classified as Tier 1.

References

Google Earth. Accessed February 2015. <https://www.google.com/maps/>.

Journal of Electricity and Western Industry. 1922. Published by McGraw Hill, San Francisco, CA. Vol. 49, Issue 3, August 1, 1922.

United States Census Bureau. Accessed October 2015.
<http://quickfacts.census.gov/qfd/states/09/0908000.html>.

U.S. Conference of Mayors. Recycling America's Land, A National Report of Brownfields Redevelopment, Volume II. April 1999. <http://www.usmayors.org/brownfields/descriptions.htm>.

U.S. EPA. 2008. CBS Corp./Viacom, Bridgeport Connecticut, Resource Conservation and Recovery Act (RCRA) Corrective Action Reuse Success Stories. EPA 901-F-08-014. December 2008. <http://www3.epa.gov/region1/cleanup/rcra/107554.pdf>.

Burton Aviation: Site Summary

The following information was extracted from public records.

Address

6727 Airport Road, Marlette, MI

Site Description/History

Public records indicate that Burton Aviation was established in 2000 in Marlette, MI. The company specializes in aircraft flight instrument repair and employs approximately 1-4 workers (Manta, 2015). Radium may have been present at this facility if gauges with luminous radium dials were repaired at the site.

The amount/extent of radium contamination at these sites (including historical information and/or informed assumptions about the radium facilities' structures/areas, processes, and activities)

It is unknown if radium was or is present at this site; however, it is suspected that radium may have been present in some of the aircraft instruments repaired at this facility, due to documentation of general historic use of luminous radium in vintage gauges.

Summary of Current Radium Levels:

As of November 2015, current levels of radium are unknown based on information review for this report.

Location and population near the sites

Burton Aviation is located near the Marlette airport, in a rural area. According to Figure 1, however, there appear to be houses nearby the facility.

Marlette is a city in Sanilac County. The city is located within Marlette Township. According to the 2010 U.S. Census, the population of Marlette was 1,875 (United States Census Bureau, 2015).



Figure 1. Location of Burton Aviation (6727 Airport Road, Marlette, MI) (Google, Earth 2015)

Current State/other Federal involvement

Information about cleanup activities at the site is unknown.

Current access, activities, and uses at the site

The company specializes in aircraft flight instrument repair and employs approximately 1-4 workers.

Existing Engineering Controls

No engineering controls appear to exist (see Figure 1).

Prioritization Ranking

It is suspected that radium is present at the site because Burton Aviation specializes in aircraft instrument repairs. These services may include repairing historic gauges and instruments that contained luminous radium. Therefore, the site is classified as Tier 4.

References

Manta Media Inc. 2015. Accessed May 21, 2015.

http://www.manta.com/mb_45_B32BB1P5_23/aircraft_flight_instrument_repair/michigan.

Google Earth. 2015. Accessed May 2015. <https://www.google.com/maps/>.

United States Census Bureau. Accessed October 2015.
<http://quickfacts.census.gov/qfd/states/26/26151.html>.

CT Dump Site: Site Summary

The following information was extracted from public records and the “CTfile.pdf” (CT-DEP, 2009).

Address

330 Queen Street, Bristol, CT

Site Description/History

According to information in the CTfile.pdf (1998), on April 14, 1998, an anonymous witness reported radium dumping that occurred approximately 40 years earlier. He stated that when he was a boy, he found a pile of watch hands and dials in a field near his house. He said there was the equivalent of 2-3 wheelbarrows loads of glow in the dark hands and dials plus other watch parts. He drew a map showing the location, which was 330 Queen Street.

When CT-DEP arrived at the location, they discovered Riverside Apartments. It is unknown when the apartments were built.

The amount/extent of radium contamination at these sites (including historical information and/or informed assumptions about the radium facilities’ structures/areas, processes, and activities)

In a preliminary scan of the outside areas in 1998, CT-DEP measured 50 $\mu\text{R/hr}$ radium on the front lawn and found an animal hole with 4-5 times background radium levels 3 feet into the hole. They mentioned in the report (CTfile.pdf, 1998) that they would need to return with permission from the property owner, Middleton Associates LLC, to take additional samples. There is no further information on whether the radium contamination was removed. Therefore, it is currently unknown if radium remains at the site.

Summary of Current Radium Levels:

As of November 2015, current levels of radium are unknown based on information reviewed for this report.

Location and population near the sites

The current site contains an apartment complex of four buildings, each with eight apartments. The area is surrounded by other residences (see Figure 1). Bristol is a suburban city located in Hartford County, CT. According to the 2010 U.S. Census, the population of Bristol was 60,477; the 2014 population estimate for the city was 60,570 (United States Census Bureau, 2015).

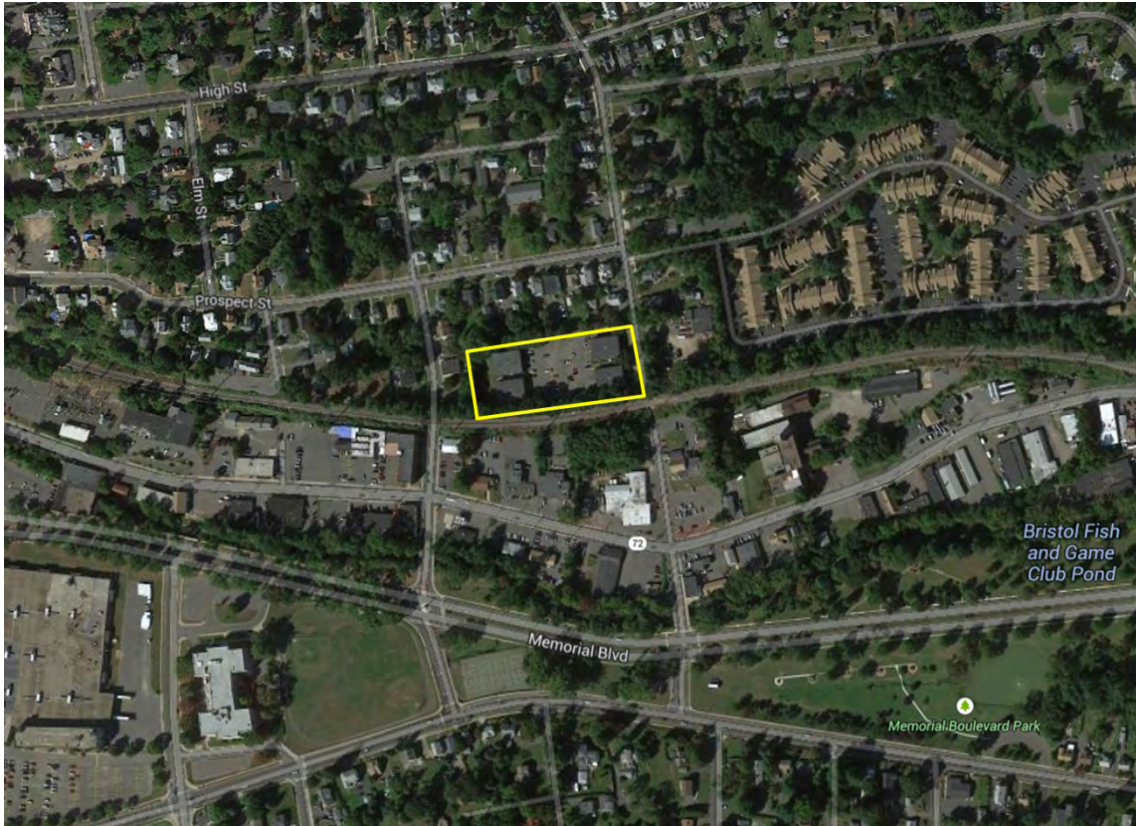


Figure 1. Riverside Apartments, Bristol CT. Exact location of wheelbarrows is unknown. (Google Earth, 2015)

Current State/other Federal involvement

An extensive internet search of public records did not reveal any information about contamination/cleanup of the facility, especially involving radium.

Current access, activities, and uses at the site

The area is residential. Riverside Apartments contains four buildings, each with eight apartments.

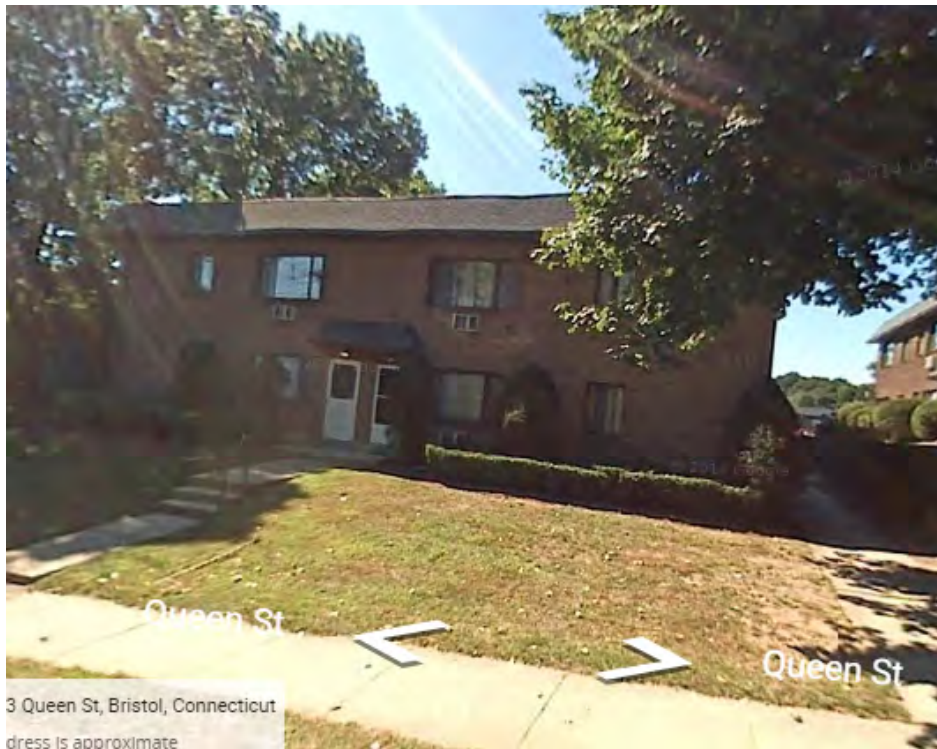


Figure 2. Riverside Apartments, 330 Queen St, Bristol CT (Google Earth, 2015)

Existing Engineering Controls

It is unknown where exactly the wheelbarrow-sized piles were discovered. Therefore, it is unknown if the site was cleaned, covered, etc.

Prioritization Ranking

Radium is confirmed to have been present at the site based on historical documentation and radiological survey data from 1998. The site consists of soil that is potentially contaminated by radium. The site is occupied or frequented by visitors. Therefore, this soil site is classified as Tier 1.

References

CT-Department of Environmental Protection (DEP). 2009. Correspondence from CT-DEP to NRC NMSS. Collection of pdf documents about Connecticut Clock Companies. Document dates range from 1998-2004. CT File.pdf, 1806 pages.

Google Earth. Accessed February 2015. <https://www.google.com/maps/>.

United State Census Bureau. Accessed October 2015.
<http://quickfacts.census.gov/qfd/states/09/0908420.html>.

CT Radium Drums Site: Site Summary

The following information was extracted from the "CTfile.pdf" that was provided to the NRC from the State of Connecticut (CT-DEP, 2009).

Address

Unknown. It is assumed to be somewhere in Connecticut, as a Connecticut based company performed the cleanup of radium-containing waste and notified the Connecticut Department of Environmental Protection via a letter in 2001.

Site Description/History

Radiation Safety Associates, Inc. made arrangements to transfer radium-contaminated waste in four 55-gallon steel barrels to US Ecology for land burial in Richland, Washington in mid-November 2001. The site in question is where the waste originated from. The contractor documented removal of radium contamination, but the available records do not document the cleanup level. It is also unknown if the removal met the federal or Connecticut cleanup criteria. It is currently unknown if radium remains at the site.

The amount/extent of radium contamination at these sites (including historical information and/or informed assumptions about the radium facilities' structures/areas, processes, and activities)

Unknown. The following table displays radium waste information for the drums that was attached to the letter sent to the Connecticut Department of Environmental Protection.

Drum #	Weight pounds (grams)	Ra-226 Activity Concentration (μCi/g) (Pb/Bi-214)	Total Activity Concentration (μCi/g)	Total Ra-226 Activity (μCi)	Total Activity (μCi)
1	790 (3.583E+5)	0.000696	0.00247	249.38	884.8
2	825 (3.742E+5)	0.000742	0.00258	277.66	966.1
3	805 (3.651E+5)	0.000785	0.00271	286.60	990.2
4	800 (3.629E+5)	0.000769	0.00262	279.07	951.2
TOTAL	3,220 (1.461E+6)	---	---	1,092.71	3,792.3

Summary of Current Radium Levels:

As of November 2015, current levels of radium are unknown based on information reviewed for this report.

Location and population near the sites

Unknown

Current State/other Federal involvement

The letter from the "CTfile.pdf" (CT-DEP, 2009) provides the following information:

- Docket number 067-0683/0101-1300
- Letter addressed to Edward L. Wilds, Jr., Ph.D., Director, State of Connecticut DEP, 79 Elm Street, Hartford, CT 06106-5127
- Letter addressed from K. Paul Steinmeyer, RRPT, Senior Health Physicist, President, Radiation Safety Associates, Inc., 19 Pendleton Drive, P.O. Box 107, Hebron, CT 06248
- Date of letter: October 8, 2001

Current access, activities, and uses at the site

Unknown

Existing Engineering Controls

Unknown

Prioritization Ranking

The location of the suspected site (i.e., original building and/or contaminated soil) is unknown but may be found by additional search activities. The contractor documented removal of radium contamination, but the available records do not document the cleanup level. It is also unknown if the removal met the federal or CT cleanup criteria. It is currently unknown if radium remains at the site. Therefore, the site is classified as Tier 1.

References

Letter from K. Paul Steinmeyer, President, Radiation Safety Associates, Inc., to Edward L. Wilds, Jr., Director, State of Connecticut DEP. October 8, 2001. From "CTfile.pdf".

CT-Department of Environmental Protection (DEP). 2009. Correspondence from CT-DEP to NRC NMSS. Collection of pdf documents about Connecticut Clock Companies. Document dates range from 1998-2004. CT File.pdf, 1806 pages.

Evansville Radium Institute: Site Summary

The following information was extracted from public records.

Address

412 SE 4th Street, Evansville, IN (historic address for this location is 710-712 South/Upper Fourth Street)

Site Description/History

A 1921 advertisement states "For the treatment of malignant and benign growths, the post-operative prophylactic treatment of malignant conditions, and the treatment of certain skin condition. An adequate quantity of radium for the proper treatment of the conditions indicated is guaranteed" (Journal of Indiana State Medical Association, 1921).

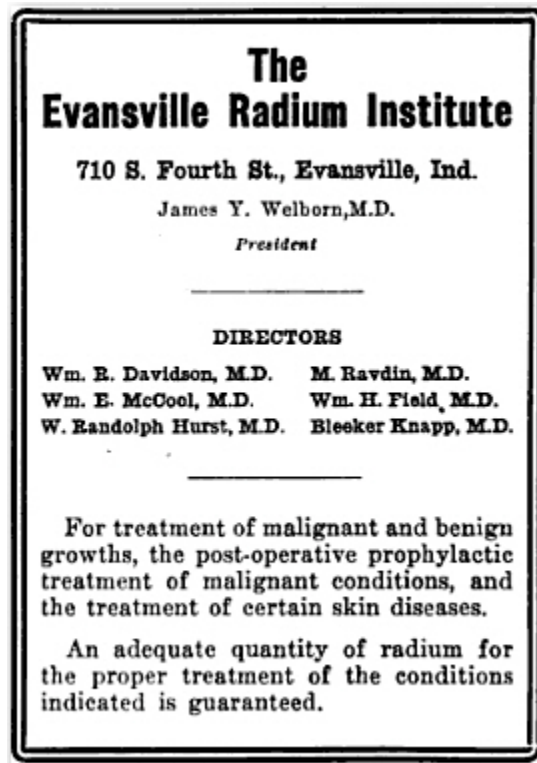


Figure 1. Advertisement from Journal of Indiana State Medical Association (1921)

It is assumed, in this site summary, that the Evansville Radium Institute was part of the Evansville Sanitarium, which was located at 712 Upper Fourth Street and advertised the same doctor, James Welborn practicing at both the Institute and Sanitarium.

According to Historic Evansville (2015), the Evansville Sanitarium was founded in 1894 by Edwin Walker. By 1917, Dr. Walker bought the entire block of Upper Fourth Street between Cherry and Oak and the Sanitarium was known as the Walker Hospital. Dr. James Welborn was an associate of Dr. Walker; therefore, in 1933, the facility was renamed the Walker-Welborn Hospital. The original 3-story sanitarium was torn down in 1957 for additions to the hospital. The Walker-Welborn Hospital closed in the 1990s and is today the Select Specialty Hospital.

According to Historic Evansville (2015), the streets in downtown Evansville were renumbered in 1925 due to rapid city growth. As a result, the former address of 710-712 South/Upper 4th is now 412 SE 4th Street.

Based on the advertisement in Figure 1, it is assumed that radium was present at the original facility. The original facility was demolished in 1957, but the soil may be contaminated with radium.

The amount/extent of radium contamination at these sites (including historical information and/or informed assumptions about the radium facilities' structures/areas, processes, and activities)

According to Dr. Paul Frame, a consultant retained to peer-review the results of this work, this facility almost certainly employed purified radium sources; however, these would have been sealed sources. The potential for contamination due to source leakage exists, but considering the source was sealed, the level of concern would be low to moderate (Frame, 2015).

Summary of Current Radium Levels:

As of November 2015, current levels of radium are unknown based on information reviewed for this report.

Location and population near the sites

In order to locate the exact location of the former facility, a 1910 Sanborn Fire Insurance map (Historic Evansville, 2015) was overlaid on a high resolution aerial photo from 2006. The resulting image is Figure 2. The map shows the location of the Evansville Sanitarium at 712 South (Upper) Fourth Street. (It is assumed in this site summary that the Evansville Radium Institute at 710 South Fourth Street was part of the Evansville Sanitarium based on the adjacent addresses and identical advertised doctor.)

When Evansville streets were renumbered in 1925 (Historic Evansville, 2015), 710-712 Upper Fourth Street became 412 SE 4th Street. This address is currently located in an industrial area of Evansville, IN; however, the location is only 1 block away from residences to the west and 2 blocks away from residences to the south (see Figure 4).

Evansville is the commercial, medical, and cultural hub of Southwestern Indiana and the Illinois-Indiana-Kentucky tristate area. It is the third-largest city in the state of Indiana and the largest city in Southern

Indiana. According to the 2010 U.S. census, the population of Evansville was 117,429; the 2014 population estimate for the city was 120,346 (United States Census Bureau, 2015).



Figure 2. Location of the Evansville Radium Institute (710 Upper Fourth St, see red arrow) and the Evansville Sanitarium (712 Upper Fourth St). The current address is now 412 SE 4th Street. Image created by overlaying a Sanborn Fire Insurance map from 1910 (yellow and pink buildings) onto a 2006 aerial photo.

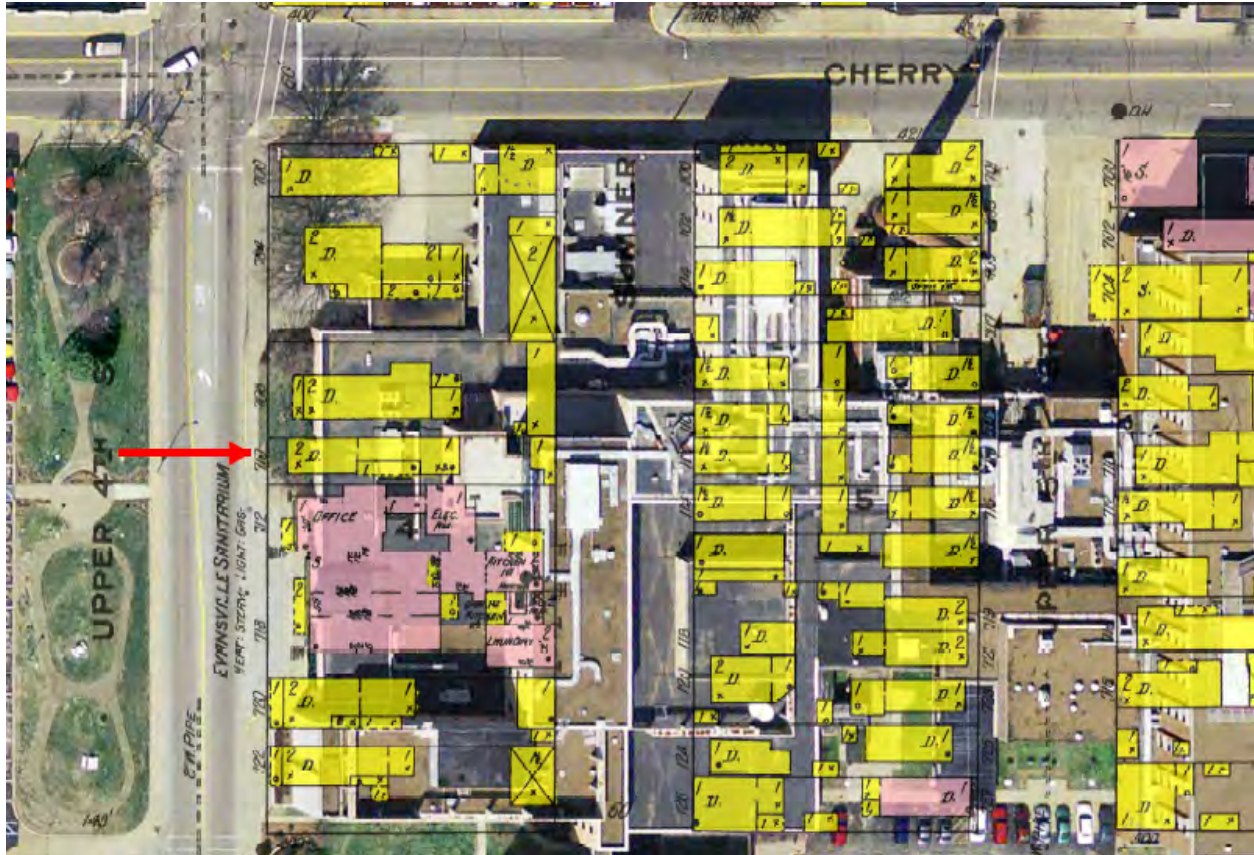


Figure 3. Enlargement of Figure 2, showing the location of Evansville Radium Institute (red arrow) and Evansville Sanitarium in 1910.

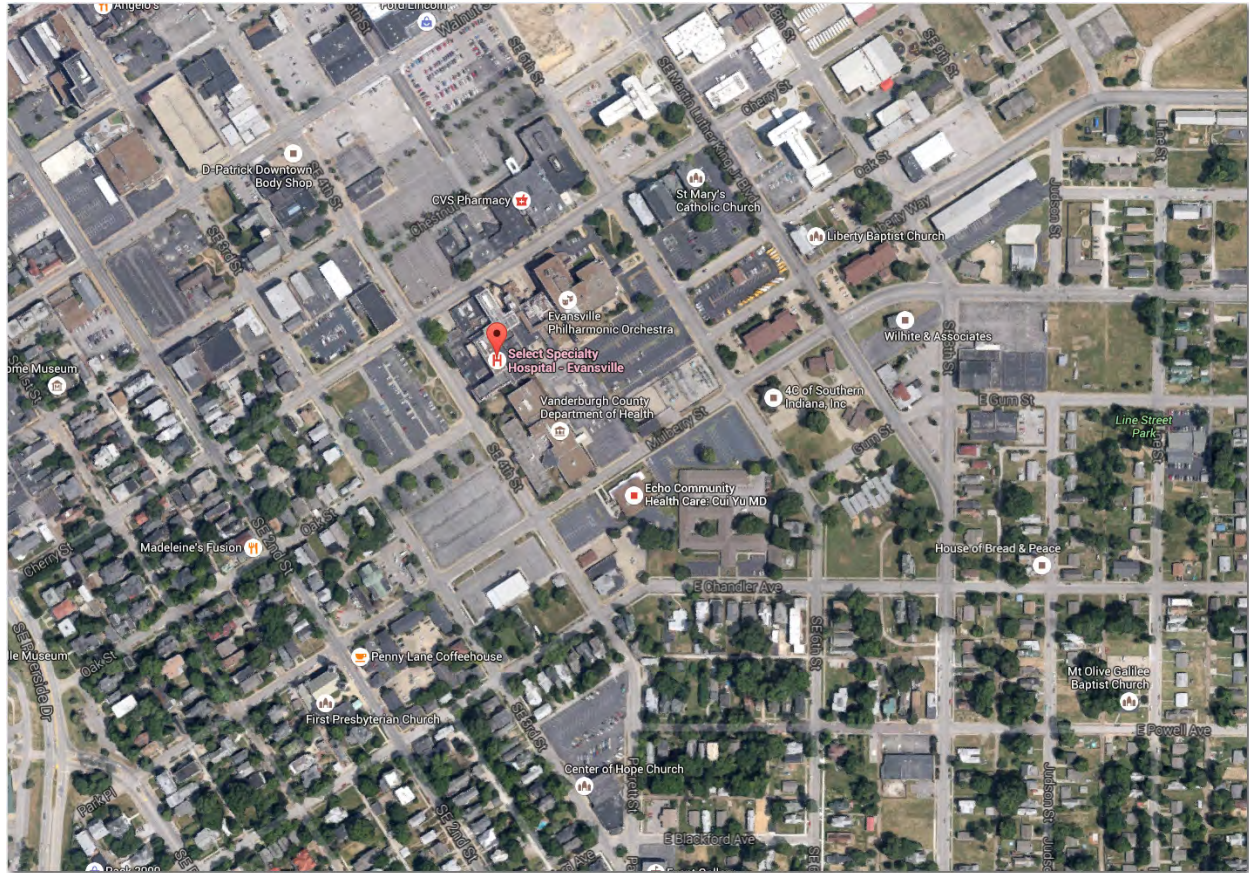


Figure 4. Location of former Evansville Radium Institute (710 Upper Fourth St) and Evansville Sanitarium (712 Upper Fourth Street), now location of Select Specialty Hospital (412 SE Fourth Street) (Google Earth, 2015)

Current State/other Federal involvement

As of November 2015, no information about radium contamination or radium cleanup was located in the public records.

Current access, activities, and uses at the site

The original facility, at 710/712 Upper Fourth Street (which became 412 SE 4th Street in 1925) was demolished in 1957. Currently, the site is occupied by the Select Specialty Hospital, known for providing specialty inpatient acute care.

Existing Engineering Controls

There are no engineering controls in place.

Prioritization Ranking

Radium is confirmed to have been present at the site based on historical documentation that radium was used at the facility. The original building has been demolished. The site consists of soil that is potentially contaminated by radium. The site is occupied or frequented by visitors. Therefore, the site is classified as Tier 1.

References

Frame, Paul. 2015. Types of Radium Sources Used in Medicine. May 14, 2015.

Google Earth. 2012. Accessed June 4, 2015. <https://www.google.com/maps/>.

Historic Evansville. 2015. Accessed October 2015. 1910 Sanborn Map, Volume II.
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United States Census Bureau. Accessed October 2015.

<http://quickfacts.census.gov/qfd/states/18/1822000.html>.

Hangermates LLC: Site Summary

The following information was extracted from public records.

Address

2300 N Grand River Avenue, Lansing, MI

Site Description/History

Hangermates, which also operated under the name Greggs White Air Craft Services, was founded in 1996, primarily for aircraft flight instrument repair (FindTheData, 2015). Due to historic documentation of luminous radium usage in vintage gauges, it is suspected that radium was present in some of the aircraft instruments repaired at this facility. It is unknown when this business closed, as another company (Geodetic Designs) currently resides at this location.

The amount/extent of radium contamination at these sites (including historical information and/or informed assumptions about the radium facilities' structures/areas, processes, and activities)

It is unknown if radium was or is present at this site; however, it is suspected that radium may have been present in some of the aircraft instruments repaired at this facility, due to documentation of general historic use of luminous radium in vintage gauges.

Summary of Current Radium Levels:

As of November 2015, current levels of radium are unknown based on information reviewed for this report.

Location and population near the sites

The site is located in an industrial area of Lansing in North West Michigan. There are, however, residences close by, as seen in Figure 1 (Google Earth, 2015).

Lansing is the capital of MI, and is located mostly in Ingham County. According to the 2010 U.S. Census, the population of Lansing was 114,297; the 2014 population estimate for the city was 114,620 (United States Census Bureau, 2015).



Figure 1. Approximate location of former Hangermates LLC at 2300 North Grand River Avenue (see red placemark) (Google Earth, 2015)

Current State/other Federal involvement

As of November 2015, no information about radium contamination or radium cleanup was located in the public records.

Current access, activities, and uses at the site

As of November 2015, Geodetic Designs Inc., a design surveying consulting firm founded in 2004, was located at this site (Geodetic Designs, 2015). See Figures 2-4.



Figure 2. 2300 North Grand River Avenue (Google Earth, 2015)



Figure 3. 2300 North Grand River Avenue -September 2012 (Google Earth, 2015)



Figure 4. 2300 N. Grand River Avenue (Google Earth, 2015)

Existing Engineering Controls

No engineering controls exist, as Geodetic Designs (Figures 2-4) currently occupies the site.

Prioritization Ranking

It is suspected that radium is present at the site because Hangermates repaired aircraft flight instruments, which may include historic instruments that contain luminous radium. Therefore, the site is classified as Tier 4.

References

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United States Census Bureau. Accessed October 2015. <http://quickfacts.census.gov/qfd/states/26/2646000.html>.

Hart and Hegeman Manufacturing Company: Site Summary

The following information was extracted from public records.

Address

340-342 Capitol Avenue, Hartford, CT

Site Description/History

This company was listed in a 1922 advertisement as manufacturing luminous radium flush switches and pull-chain pendants (Journal of Electricity and Western Industry, 1922). According to a 2002 online news article (Hartford Courant, 2002), the factory was built around 1906/1909. In the 1960s, the Connecticut Department of Information Technology was built around the turn of the century original brick building, and the entire structure (including the original building) was torn down in 2002. Other records indicate that the location may have been used for the Department of Corrections and the Castle Park Fun Center before the demolition in 2002. Based on the historical information, it is assumed that luminous radium flush switches and pull-chain pendants were manufactured in a building located at the site. The building was subsequently demolished; however, the soil at the site may be contaminated with radium.

According to Google Earth (2011), it appears to currently be a parking lot (see Figure 1).



Figure 1. 340-342 Capitol Avenue (Google Earth, 2011)

The amount/extent of radium contamination at these sites (including historical information and/or informed assumptions about the radium facilities' structures/areas, processes, and activities)

It is known that the facility manufactured luminous radium flush switches and pull-chain pendants. The original building is gone and an asphalt covered parking lot remains. The remaining soil under the asphalt parking lot could be contaminated along with any drain pipes from the original building and any soil surrounding the pipes below the surface that was not removed when the building was removed. Therefore, the site consists of soil that is potentially contaminated by radium.

Summary of Current Radium Levels:

As of November 2015, current levels of radium are unknown based on information reviewed for this report.

Location and population near the sites

The site is located in a commercial area of Hartford; however, there are residences close by, as seen in Figure 2. Hartford is located in Hartford County and is the capital of CT. According to the 2010 U.S. Census, the population of Hartford was 124,775; the 2014 population estimate for the city was 124,705 (United States Census Bureau, 2015).

As seen in Figure 2, the site is located just a few blocks away from the Connecticut State Capital building and the State Library; the State Capital Park is right across the street.



Figure 2. Ariel View of 340-342 Capitol Avenue (Google Earth, 2011)

Current State/other Federal involvement

An extensive internet search of public records did not reveal any information about radium cleanup of the facility.

Current access, activities, and uses at the site

The former facility appears to now be the parking lot for the Hartford Courant newspaper.

Existing Engineering Controls

The parking lot is covered with asphalt. It is unknown whether any cleanup occurred before the asphalt was laid.

Prioritization Ranking

Radium is confirmed to have been present at the site based on historical documentation of radium use at the facility. The original building is gone and an asphalt covered parking lot remains. The site consists

of soil that is potentially contaminated by radium. The site is occupied or frequented by visitors. Therefore, the soil site is classified as Tier 1.

References

Google Earth. 2011. Accessed February 2015. <https://www.google.com/maps/>.

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United States Census Bureau. Accessed October 2015.
<http://quickfacts.census.gov/qfd/states/09/0937000.html>.

Harvey-Hubbell: Site Summary

The following information was extracted from public records.

Address

1575 State Street, Bridgeport, CT

Site Description/History

Harvey Hubbell was established in 1888, by Harvey Hubbell II. The four story U-shaped structure was built in 1909 at 1575 State Street, at the corner of Bostwick Avenue. The building structure was designed to increase manufacturing efficiency (Witkowski, 2011). The facility manufactured electric wiring and lighting devices. In an advertisement from 1922, Harvey Hubbell was listed as manufacturing luminous radium flush switches, flip switches, and pull-chain pendants (Journal of Electricity and Western Industry, 1922). They are known mostly for manufacturing the pull-socket light switch. The large electric sign on the roof displayed a light bulb turning on and off when the chain was pulled (Pehanick, 2005; Figure 1).

Manufacturing ceased at this plant in 1990. In 2008, Hubbell Industries demolished the original plant; however, the soil at the site may be contaminated with radium (Witkowski, 2011).



Figure 1. Harvey Hubbell (Pehanick, 2005)

The amount/extent of radium contamination at these sites (including historical information and/or informed assumptions about the radium facilities' structures/areas, processes, and activities)

It is known that the facility manufactured luminous radium flush switches, flip switches, and pull-chain pendants.

Summary of Current Radium Levels:

As of November 2015, current levels of radium are unknown based on information reviewed for this report.

Location and population near the sites

The site is located in a commercial area of Bridgeport; however, there are residences close by, as seen in Figure 2.

Bridgeport is the most populous city in CT. It is located in Fairfield County on the Pequonnock River and Long Island Sound. According to the 2010 U.S. Census, the population of Bridgeport was 144,229; the 2014 population estimate for the city was 147,612 (United States Census Bureau, 2015).

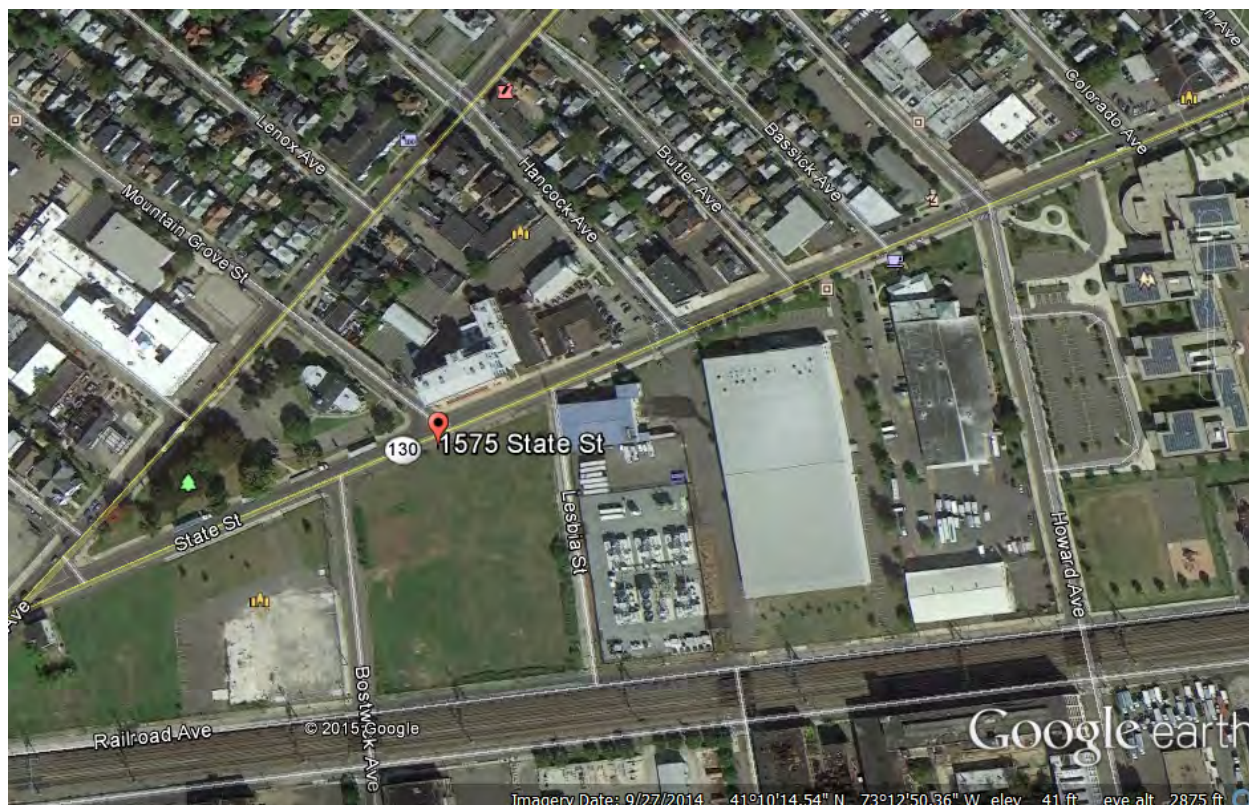


Figure 2. Former location of Harvey Hubbell facility at 1575 State Street (Google Earth, 2015)

Current State/other Federal involvement

An extensive internet search of public records did not reveal any information about radium cleanup of the facility.

Current access, activities, and uses at the site

The building was demolished in 2008 and the lot appears to be vacant (see Figures 2 and 3).



Figure 3. Corner of State Street and Bostwick Avenue (former location of Harvey Hubbell, 1575 State Street) (Google Earth, 2015)

Existing Engineering Controls

As of November 2015, a fence surrounds a vacant lot, which is the former location of the Hubbell Industries facility at 1575 State Street (Figure 3).

Prioritization Ranking

Radium is confirmed to have been present at the site based on historical documentation of radium use. The original building is gone and a vacant lot remains. The site consists of soil that is potentially contaminated by radium. The site is neither occupied nor frequented by visitors. Site access is weakly controlled. Therefore, the soil site is classified as Tier 2.

References

Google Earth. Accessed April 2015. <https://www.google.com/maps/>.

Journal of Electricity and Western Industry. 1922. Advertisement – Sell Luminous Specialties – Cash in on the Popular Interest in Radium.

Pehanick, A. 2005. Postcard History Series: Bridgeport. 2005. Accessed April 2014.

<https://books.google.com/books?id=vGAOsQORxq0C&pg=PA96&lpg=PA96&dq=bridgeport+factory+on+bostwick+avenue+state+street&source=bl&ots=NH-AYKL9jK&sig=hbxB4Wo8g1YDflldbtN6zqcWz0&hl=en&sa=X&ei=W0wvVdC3FcamggS27IP4BA&ved=0CDcQ6AEwBA#v=onepage&q=bridgeport%20factory%20on%20bostwick%20avenue%20state%20street&f=false>

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Witkowski, M. Bridgeport Library. January 04, 2011. <http://bportlibrary.org/hc/west-end/harvey-hubbell/>.

Indiana Radium Institute: Site Summary

The following information was extracted from public records.

Address

[]

Site Description/History

According to early 1920s advertisements, the Indiana Radium Institute contained “ample laboratory facilities and consulting staff for accurate and scientific application of radium” (JAMA, 1921) and provided “radium for renting purposes” (JMSMS, 1921). Also, the advertisements referenced the use of radium in solution for emanation and suggested a relatively high activity of radium in their possession.

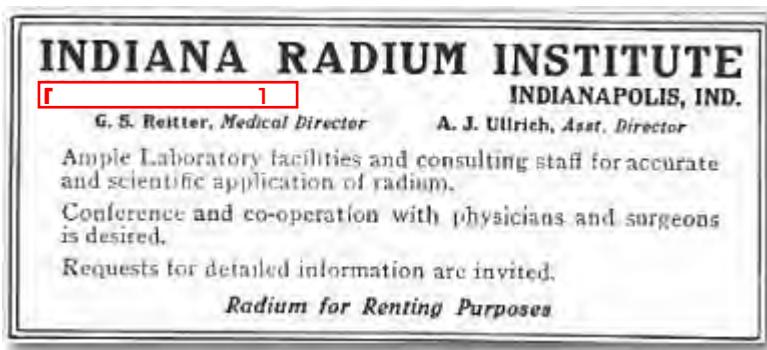


Figure 1. Advertisement from JAMA (1921)

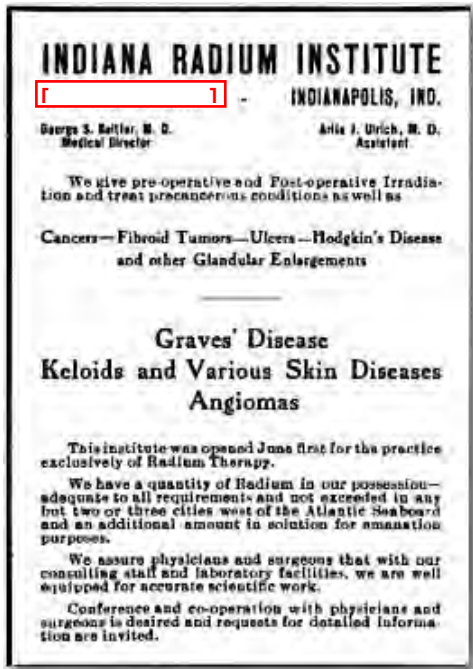


Figure 2. Advertisement from JMSMS (1921)

According to 1940 Census results found on ancestry.com (2015), the address appeared to be a residence for several women. There is no information in the public records about this address post 1940.

The amount/extent of radium contamination at these sites (including historical information and/or informed assumptions about the radium facilities' structures/areas, processes, and activities)

It is unknown the exact amount of radium that was available at this facility. According to advertisements, the Indiana Radium Institute performed accurate and scientific application of radium, rented radium, and used radium in solution for emanation.

Summary of Current Levels of Radium:

As of November 2015, current levels of radium are unknown based on information reviewed for this report.

Location and population near the sites

In order to identify the exact location of the former facility, a 1915 Sanborn Fire Insurance map (Indiana University, 2015) was overlaid on a high resolution aerial photo from 2006. The resulting image is Figure 3. The map shows the location of the former Indiana Radium Institute (sanitarium) on [redacted]. The location is currently within a parking lot for apartments to the south and the [redacted] easement to the north (see Figure 4). This area appears to be mostly residential.

A close-up of this location (Figure 4) shows that the Institute is no longer there. It is unknown when the building was demolished. The site may contain soil that is contaminated with radium.

Indianapolis is the capital of the U.S. state of Indiana and the county seat of Marion County. Indianapolis is the largest city in Indiana, second largest in the American Midwest, and 14th largest in the U.S. According to the 2010 U.S. census, the population of Indianapolis was 820,445; the 2014 population estimate for the city was 848,788 (United States Census Bureau, 2015).

[

]

Figure 3. Location of Indiana Radium Institute ([], see red arrow). Image created by overlaying a Sanborn Fire Insurance map from 1915 (yellow and pink buildings) onto a 2006 aerial photo

[

]

Figure 4. Enlargement of Figure 3 showing the location of Indiana Radium Institute in 1915.

Current State/other Federal involvement

As of November 2015, no information about radium cleanup was located in the public records.

Current access, activities, and uses at the site

There are apartments adjacent to the site location and other residences nearby. The rest of the area is part of the [] easement.

Existing Engineering Controls

There are no engineering controls.

Prioritization Ranking

Radium is confirmed to have been present at the site based on historical documentation that radium was used at the facility. The original building has been demolished. The site consists of soil that is potentially contaminated by radium. The site is occupied or frequented by visitors. Therefore, the site is classified as Tier 1.

References

Ancestry.com. 1940. Accessed June 3, 2015. 1940 Census. [

]

Google Earth. 2014. Accessed June 3, 2015. <https://www.google.com/maps/>.

Indiana University. 2015. Accessed October 2015. Spatial Data Portal. Map number 02371_04_1915-0359.pdf.

<https://spatialdata.iu.edu/DOQQS/state/sanborn/public/pdf/1915/>

Journal of the American Medical Association (JAMA). 1921. Advertisement for Indiana Radium Institute. Vol. 76: p 52. February 26, 1921.

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United States Census Bureau. Accessed October 2015.

<http://www.census.gov/quickfacts/table/PST045214/1836003,00>.

Ingraham Clock Company: Site Summary

The following information was extracted from public records and the “CT File.PDF” (CT-DEP, 2009).

Address

284 N. Main Street
400 N. Main Street
420 N. Main Street
430 N. Main Street
210 Redstone Hill Road (Ingraham Company was at this location from 1958-1967)
Bristol, CT

Site Description/History

According to CT DPH (1998), the Ingraham Clock Factory used radium in their clock production. Luminous radium was used in painting dials on clocks because it makes them glow in the dark. It was believed to be used from the early 1900’s through the 1940’s in the production of clocks.

The Ingraham Clock Company was founded in 1884 and occupied several buildings on North Main Street (Russell, 2010). With increased sales by improving manufacturing machinery by 1904, Ingraham’s new/renovated building was constructed by replacing the wooden buildings with brick ones. Clocks and watches with luminous radium paint were manufactured in these buildings (Russell, 2010).

Clock production ceased in 1942 during the war and resumed again in 1946. In 1958, the company name was changed to the Ingraham Company along with a move from North Main Street to Bristol’s Redstone Hill Industrial Park (210 Redstone Hill Road). It is unknown if luminous radium materials were moved to this new manufacturing location (Russell, 2010). In 1967, Ingraham was bought by McGraw-Edison and renamed Bussmann Division (Russell, 2010). The building at 210 Redstone Hill Road is currently owned by Rowley Spring and Stamping Corporation (CT-DEP, 2009).

During the 1960’s, the abandoned buildings at the North Main Street location were torn down in a redevelopment project (CT-DEP, 2009). Information from the CT file.PDF (CT-DEP, 2009) states “Extensive testing took place pre-1980 but exact dates are unknown. Test wells were drilled and still exist. Soil was cleared for use as cover material at a Bristol landfill. A river running through the site was piped underground”. It is unknown exactly what was tested and if radium was included in the testing. As part of the redevelopment, residential and commercial properties were developed in the 1980’s and early 1990’s at the North Main Street locations. New construction took place at: 1) 430 N. Main St. in the early 1980’s; 2) 284 N. Main St. in 1987, 3) 400 N. Main St. in 1989-90, and 4) 420 N. Main St. in 1990-91 (CT-DEP, 2009). It is unknown if soil at the North Main St. location of the former Ingraham Company was tested for radium. Therefore, potential radium contamination may still exist in the soil.

The amount/extent of radium contamination at these sites (including historical information and/or informed assumptions about the radium facilities' structures/areas, processes, and activities)

It is known that the Ingraham Clock Company painted clocks and watches with luminous radium at the buildings located on North Main Street in Bristol CT. It is unknown what type of testing took place. No survey data was located.

It is unknown whether the use of luminous radium materials continued after Ingraham Company moved to Bristol's Redstone Hill Industrial Park at 210 Redstone Hill Road in 1958.

Summary of Current Radium Levels:

As of November 2015, current levels of radium are unknown based on information reviewed for this report.

Location and population near the sites

There are residential and commercial areas (Figure 1) within close proximity to where the former clock factory buildings on North Main Street were originally located. Redevelopment of the former Ingraham Clock Company facilities on North Main Street has resulted in mixed use facilities and multiple occupancy facilities. For instance, DeLorenzo Towers consists of 90 units with a full occupancy of approximately 120 residents. Also, Ingraham Manor on average houses 126 residents.

Bristol is a suburban city located in Hartford County, Connecticut, 20 miles southwest of Hartford. According to the 2010 U.S. Census, the population of Bristol was 60,477; the 2014 population estimate for the city was 60,570 (United States Census Bureau, 2015).



Figure 1. Locations of Ingraham Clock Company facilities
(1- 400 N. Main St. (now Ingraham Manor), 2- 420 N. Main St. (now medical offices), 3- 430 N. Main St.
(now a strip mall), 4- 284 N. Main St. (now DeLorenzo Towers) (Google Earth, 2015)

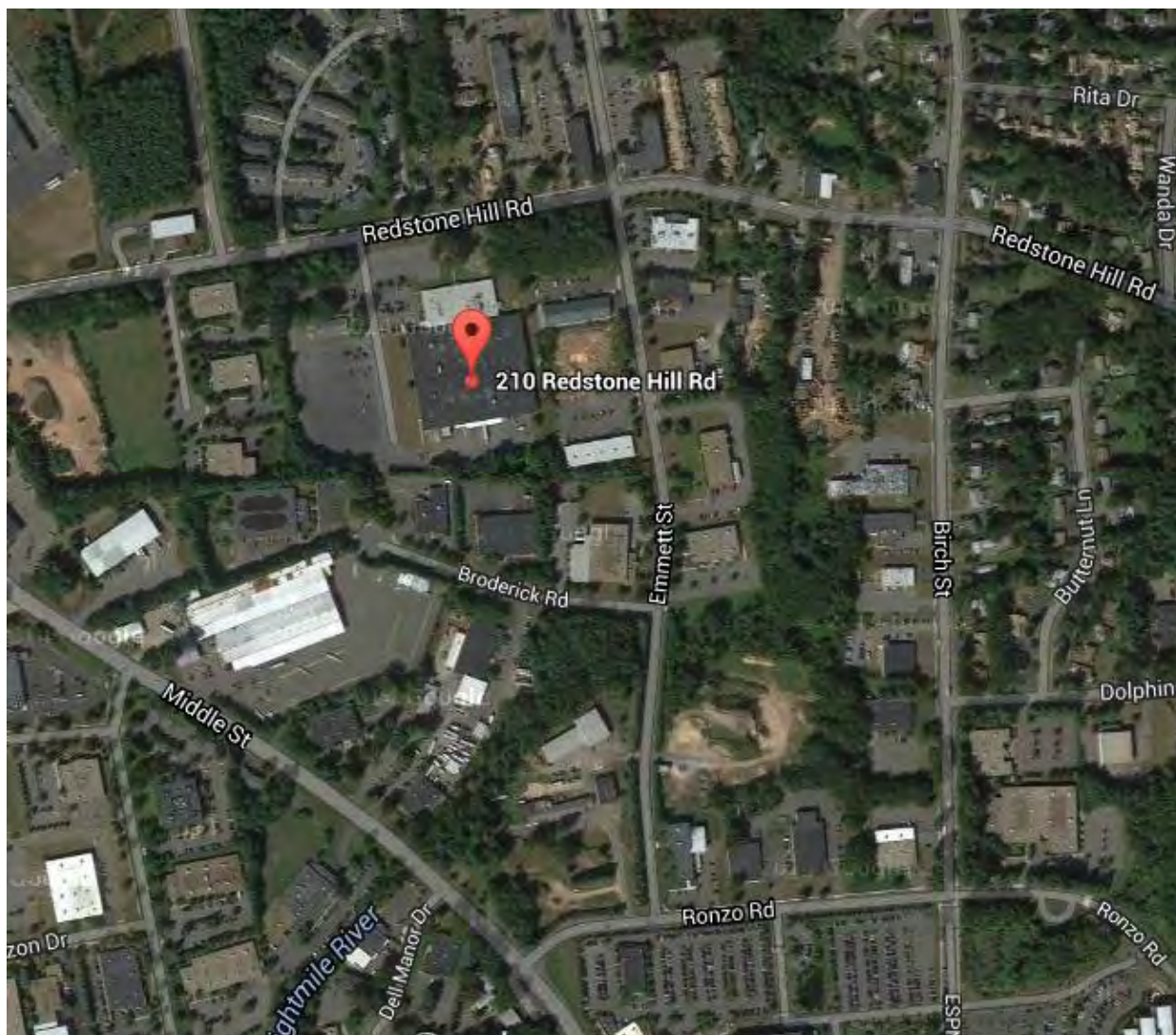


Figure 2. 210 Redstone Hill Rd. (Google Earth, 2015)

Current State/other Federal involvement

In 2001, the CT State Bond Commission approved \$750,000 to support cleanup of radioactive material found at old clock factory sites in Bristol, New Haven, Thomaston and Waterbury. It is unknown if any of these clean-up funds were allocated to the former Ingraham Clock Company sites at North Main Street.

Current access, activities, and uses at the site

Today the properties located on North Main Street include; 1) Ingraham Manor (Figure 3), a short- and long-term rehabilitation for patients recovering from orthopedic injuries, neurological disorders, cardiac-related illnesses, or surgical procedures, 2) Medical offices, such as specialty doctors, and hospice care (Figure 4), 4) A strip mall that includes a pharmacy and a supermarket (Figure 5), and 5) DeLorenzo Towers (Figure 6), an elderly low-income housing development.

Ingraham Clock Company, Bristol, CT
November 24, 2015



Figure 3. 400 N. Main St. (Ingraham Manor) (Google, 2015)



Figure 4. 420 N. Main St. (medical offices) (Imagery Date 11/2008) (Google, 2015)



Figure 5. 430 N. Main St. (Strip mall) (Google, 2015)



Figure 6. 284 N. Main St. (DeLorenzo Towers) (Imagery Date 11/2008) (Google, 2015)

The former location of Ingraham Clock Company (from 1958 to 1967) at 210 Redstone Hill Road is currently occupied by Rowley Spring and Stamping (Figure 7).



Figure 7. 210 Redstone Hill Road (Rowley Spring and Stamping) (Imagery Date October 2012) (Google, 2015)

Existing Engineering Controls

The original buildings at the North Main Street location have been demolished and replaced with active commercial properties and residential living. The areas are currently in use for commercial and residential activities.

The 210 Redstone Hill Road location is currently occupied by Rowley Spring and Stamping.

Prioritization Ranking

Radium is confirmed to have been present at the North Main Street site based on historical documentation that radium was used in the manufacturing facility on North Main Street. The original buildings are gone and the site has been redeveloped. The North Main Street site consists of soil that is potentially contaminated with radium. The site is occupied or frequented by visitors. Therefore, the site is classified as Tier 1.

When the Ingraham Company moved to Bristol's Redstone Hill Industrial Park at 210 Redstone Hill Road in 1958, it is unknown whether the use of luminous radium materials continued at this location. Additional information is needed to determine whether radium was present at the 210 Redstone Hill Road location.

References

CT-Department of Environmental Protection (DEP). 2009. Correspondence from CT-DEP to NRC NMSS. Collection of pdf documents about Connecticut Clock Companies. Document dates range from 1998-2004. CT File.pdf, 1806 pages.

CT Department of Public Health (DPH). 1998. Former Clock Factory Sites in Bristol: Q & A About Radium. October 1998.

http://www.ct.gov/dph/lib/dph/environmental_health/eoha/atsdr/bristolradiumfactsheet.pdf.

Google Earth. Accessed February 2015. <http://www.google.com/maps/>.

Russell, Lynda J. Bristol Business and Industry. 2010. Pages 18-22.

https://books.google.com/books?id=jxpUi-wgCRkC&pg=PA22&lpg=PA22&dq=rowley+spring+210+redstone+hill+ingraham&source=bl&ots=8BXczW0dct&sig=0tTfY1UaUKa_6h-X6MCA6CZ5Cjk&hl=en&sa=X&ei=0H3nVPOGKsSpgwTv6IDoCw&ved=0CB4Q6AEwAA%20-%20v=onepage&q&f=false#v=onepage&q&f=false.

United States Census Bureau. Accessed October 2015.

<http://quickfacts.census.gov/qfd/states/09/0908420.html>.

Summary of Ingraham Clock Company Information in "CTfile.pdf" (CT-DEP, 2009).

Site_Name	Source_date	Title	Pages
Ingraham Clock Company	April 6, 1998/October 1998	Ingraham information	112-113

Lux Clock Company: Site Summary

The following information was extracted from public records and the "CT File.PDF" (CT-DEP, 2009).

Address

95 Johnson Street, Waterbury, CT

Site Description/History

The Lux Manufacturing Company, formerly known as the Lux Clock Company, began manufacturing in 1914. The company produced clocks with luminous radium dials until 1941, at which time they made war related products.

In recent history, the building was occupied by the Lakewood Metals Division of Anchor Advanced Products, Inc., which manufactured aluminum and brass cosmetic packaging products (shells for lipstick tubes and bottle caps used on cologne and perfume containers). The building is currently vacant.

The amount/extent of radium contamination at these sites (including historical information and/or informed assumptions about the radium facilities' structures/areas, processes, and activities)

In 1998, the US EPA contacted the Agency for Toxic Substances and Disease Registry (ATSDR) to assist in conducting a public health assessment of structures that once housed clock factories in four Connecticut municipalities. The purpose of the health assessment was to evaluate the radiological survey data previously collected by the Connecticut Department of Environmental Protection (CT-DEP) at structures that once housed clock factories and to determine whether a public health hazard exists at any of these sites from the radiological contamination. The CT DEP requested assistance from the US Department of Energy (DOE) in conducting radiological surveys of the structures that once housed clock factories and the surveys were completed in April of 1998 (ATSDR, 1999).

For the former Lux Clock building, the 1999 ATSDR Public Health Assessment indicated isolated areas of radiological contamination on the first, second, and third floors. Scattered contamination on the fourth floor was detected with fixed and loose material containing elevated levels of radiation (Table 1; at the time of the 1998 survey Anchor Advanced Products occupied the building). ATSDR concluded that radiological contamination was detected at levels that may pose a public health hazard to occupants of the former Lux Clock Company building; however, ATSDR stated that none of the radiation levels detected pose an immediate health problem. The Connecticut Department of Public Health recommended that individuals be disassociated from areas with radiation at levels exceeding 15 mrem/year.

Table 1. 1998 Radiological Survey Results for the former Lux Clock Company Building (ATSDR, 1999)

Town: Waterbury Clock Company Name: Lux Clock Company Current Occupant(s): Anchor Advanced Products

Radiological Parameters (units)	Location	Measurement Description	Maximum Level	Background	CL
Gamma radiation (uR/hr)	1st floor	Direct contact	20	10	15
	2nd floor	Direct contact	20		
	3rd floor	Direct contact	30		
	4th floor	Direct contact	140		
Alpha Beta activity(dpm)	1st floor	Measurement of Loose Material (Smear)	not measured	NR	20
	2nd floor	Measurement of Loose Material (Smear)	not measured	NR	
	3rd floor	Measurement of Loose Material (Smear)	not measured	NR	
	4th floor	Measurement of Loose Material (Smear)	150	NR	

Summary of Current Radium Levels:

As of November 2015, current levels of radium are unknown based on information reviewed for this report.

Location and population near the sites

This original facility is currently vacant. It should be noted that there are residential areas (Figure 1) within close proximity to the former clock company.

Waterbury, a city in New Haven County, CT, is on the Naugatuck River, 33 miles southwest of Hartford and 77 miles northeast of New York City. According to the 2010 U.S. Census, the population of Waterbury was 110,366; the 2014 population estimate for the city was 109,307 (United States Census Bureau, 2015).



Figure 1. Location of Lux Clock Company (Google Earth, 2015)

Current State/other Federal involvement

In 2001, the CT State Bond Commission approved \$750,000 to support cleanup of radioactive material found at old clock factory sites in Bristol, New Haven, Thomaston and Waterbury. It is unknown if any money was used for cleanup at the former Lux Clock Company site.

Current access, activities, and uses at the site

The building is currently vacant and for sale.



Figure 2. Lux Clock Company (95 Johnson Street) (Google Earth, 2015)

Existing Engineering Controls

Based on Figures 2-4 (2015 Google Earth), the former Lux Clock building is surrounded by fencing. There are areas, however, where the fence is missing, and Figure 4 shows a car and truck in the parking lot, indicating that the fence may not be keeping people out of the building.



Figure 3. Entrance to old Lux Clock Company (Google Earth, 2015)



Figure 4. Shipping entrance to former Lux Clock Company (Google Earth, 2015)

Lux Clock Company, Waterbury, CT
November 24, 2015

Prioritization Ranking

Radium is confirmed to have been present at the site based on historical documentation and radiological surveys. The site consists of a building that is potentially contaminated by radium. The building is not occupied. Site access is weakly controlled. Therefore, the site is classified as Tier 2.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1999. Public Health Implications of Radiation Contamination at Former Clock Factories Located in Bristol (Hartford County), New Haven (New Haven County), Thomaston (Litchfield County), and Waterbury (New Haven County) Connecticut. January 29, 1999. <http://www.atsdr.cdc.gov/HAC/pha/PHA.asp?docid=959&pg=0>

CT-Department of Environmental Protection (DEP). 2009. Correspondence from CT-DEP to NRC NMSS. Collection of pdf documents about Connecticut Clock Companies. Document dates range from 1998-2004. CT File.pdf, 1806 pages.

CT Department of Public Health. 1998. Former Clock Factory Sites in Waterbury: Update. September 1998. http://www.ct.gov/dph/lib/dph/environmental_health/eoha/atsdr/waterbury_clock_update.pdf

Google Earth. Accessed February 2015. <https://www.google.com/maps/>.

United States Census Bureau. Accessed October 2015.
<http://quickfacts.census.gov/qfd/states/09/0980000.html>.

Summary of Lux Clock Company Information in "CTfile.pdf" (CT-DEP, 2009)

Site_Name	Source_date	Title	Pages
Lux Clock Company	April 21, 1998	Department of Energy (DOE) Radiological Assistance Report cover letter and Radiological Assistance Call notes	744-747
Lux Clock Company	January 29, 1999	PUBLIC HEALTH ASSESSMENT; PUBLIC HEALTH IMPLICATIONS OF RADIATION CONTAMINATION AT FORMER CLOCK FACTORIES LOCATED IN BRISTOL (HARTFORD COUNTY), NEW HAVEN (NEW HAVEN COUNTY), THOMASTON (LITCHFIELD COUNTY), AND WATERBURY (NEW HAVEN COUNTY) CONNECTICUT	1578-1619
Lux Clock Company	May 1 - June 25, 1999	Scope of Work, Remediation of Radium Impacted Areas Third and Fourth Floors of Site Building 95 Johnson Street, Waterbury, CT	1491-1500, 1518-1521, 1526-1544

Metro Aircraft Instruments: Site Summary

The following information was extracted from public records.

Address

2135 Airport Road, Waterford, MI (and other adjacent properties as described in site summary)

Site Description/History

Public records indicate that Metro Aircraft Instruments was established in 1967 in Waterford, MI. The company is the Great Lakes Region's largest aviation instrument repair and overhaul station. They are a Class 1, 2, 3, & 4 FAA Certified Instrument Repair Facility (Metro Aircraft Instruments, 2014).

Due to historic documentation of luminous radium usage in vintage aircraft gauges, it is suspected that radium was present in some of the aircraft instruments repaired at this facility.



Figure 1. Approximate location of Metro Aircraft Instruments (Google Earth, 2015)



Figure 2. Approximate location of Metro Aircraft Instruments (Google Earth, 2015)

The amount/extent of radium contamination at these sites (including historical information and/or informed assumptions about the radium facilities’ structures/areas, processes, and activities)

It is unknown if radium was or is present at this site; however, it is suspected that radium may have been present in some of the aircraft instruments repaired at this facility, due to documentation of general historic use of luminous radium in vintage gauges.

Summary of Current Radium Levels:

As of November 2015, current levels of radium are unknown based on information reviewed for this report.

Location and population near the sites

Metro Aircraft Instruments is located on the Northeast corner of Oakland County International Airport in Waterford, Michigan (Figure 3). It is unclear which of the buildings contains the exact location of Metro Aircraft Instruments. Most likely, instrument repairs could have occurred in several of the buildings over the previous ~ 40 years.

Waterford Township is a charter township in the center of Oakland County, Michigan. According to the 2010 U.S. Census, the population of Waterford Township was 71,707; the 2014 population estimate for the city was 73,139 (United States Census Bureau, 2015).



Figure 3. Approximate Location of Metro Aircraft Instruments (2135 Airport Road, Waterford, MI) (Google, Earth 2015)

Current State/other Federal involvement

As of November 2015, no information about radium contamination or radium cleanup was located in the public records.

Current access, activities, and uses at the site

According to Metro Aircraft Instruments website (last updated 2014), the facility covers a wide-range of services, from repairing instruments in modern corporate jets, light general aviation aircraft, and heavy cargo aircraft to those in much older aircraft including warbirds and museum restorations (Metro Aircraft Instruments, 2014). Many older aircraft are known to have luminous radium gauges.

The current owner is listed as Russell Schulte, (248) 666-3670 (Whereorg, 2015).

Existing Engineering Controls

No engineering controls appear to exist (see Figures 1 and 2).

Prioritization Ranking

It is suspected that radium is present at the site because Metro Aircraft Instruments specializes in aircraft instrument repairs. These services may include repairing historic gauges and instruments that contained luminous radium. Therefore, the site is classified as Tier 4.

References

Google Earth. 2015. Accessed June 2015. <https://www.google.com/maps/>.

Metro Aircraft Instruments. 2014. Metro Aircraft Instruments. Overhaul, Repair & Sales. Accessed June 2015. <http://www.metroaircraft.com/>.

United States Census Bureau. Accessed October 2015.
<http://quickfacts.census.gov/qfd/states/26/26125.html>.

Whereorg. 2015. Accessed June 2015. <http://www.whereorg.com/metro-aircraft-instrument-7526701>.

Military Truck Salvage Yard: Site Summary

The following information was extracted from public records.

Address

5700 Boundary Avenue, Anchorage, AK

Site Description/History

E.A. Patson Parts and Equipment was in operation from 1954 until 2013 at 5700 Boundary Avenue (Figure 1). A vast number of military vehicles were collected over the 59 year period as well as thousands of New Old Stock (NOS) vehicle parts. Records indicate vehicles and parts were stored in the open, in storage units, and in antiquated buildings. Most of the vehicles and spare parts were purchased through Government Surplus Auctions (GSA) sales held at Elmendorf AFB and Fort Richardson, also known as Joint Base Elmendorf Richardson (JBER) (YouTube, 2013).

It is suspected that radium may have been present at the site in WWII-era vehicles and parts as luminous radium dials, gauges, and instruments.



Figure 1. E.A. Patson Parts & Equipment (5700 Boundary Avenue) in July 2011 (Google Earth, 2015)

The amount/extent of radium contamination at these sites (including historical information and/or informed assumptions about the radium facilities' structures/areas, processes, and activities)

It is unknown if radium was or is present at the site; however, it is suspected that luminous radium may have been present in some of the vintage vehicles and parts stored at the site.

Summary of Current Radium Levels:

As of November 2015, current levels of radium are unknown based on information reviewed for this report.

Location and population near the sites

The area is surrounded by businesses and residences (Figure 2).

Anchorage is Alaska’s most populous city and contains more than 40 percent of the state’s total population. According to the 2010 U.S. Census, the population of Anchorage was 291,826; the 2014 population estimate for the city was 301,010 (United States Census Bureau, 2015).

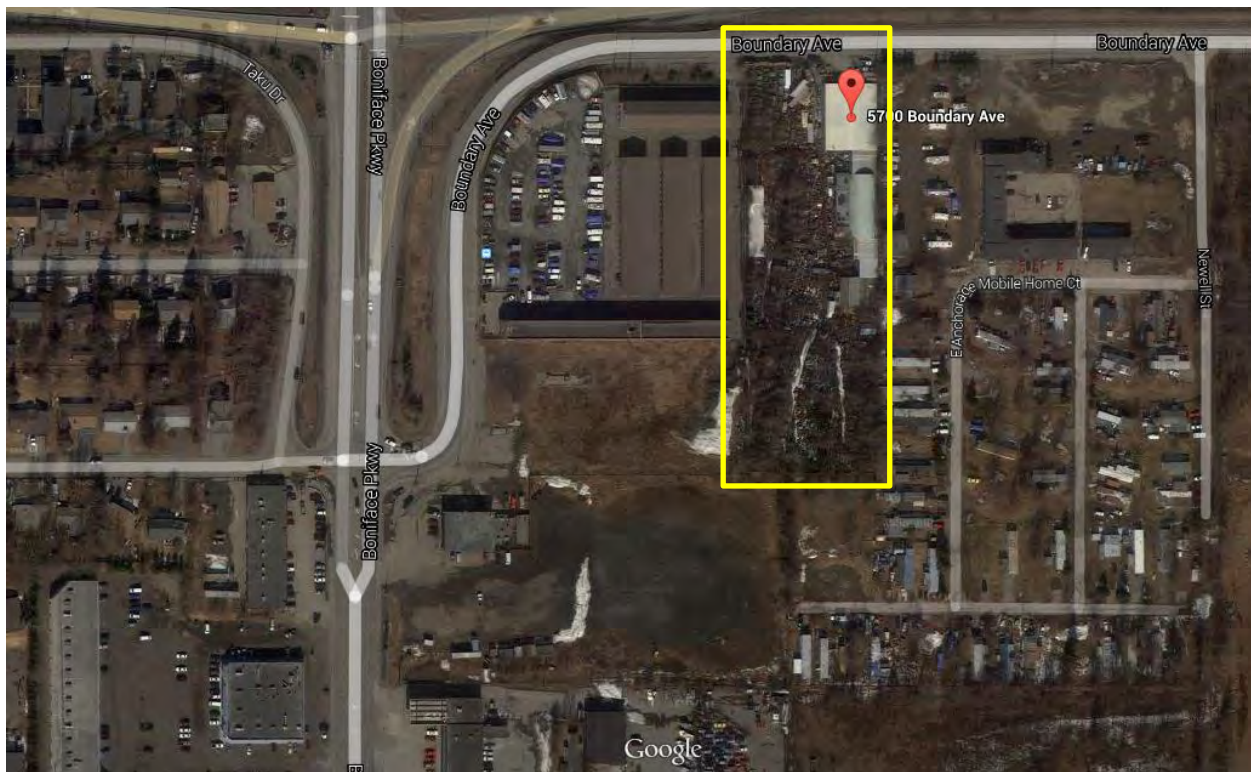


Figure 2. Location of E.A. Patson Parts & Equipment (5700 Boundary Avenue) and surrounding areas (Google Earth, 2015)

Current State/other Federal involvement

As of November 2015, no information about radium contamination or radium cleanup was located in the public records.

Current access, activities, and uses at the site

As of November 2015, U-Haul Moving & Storage of North Anchorage is located at the former Military Truck Salvage Yard (Figure 3).



Figure 3. U-Haul Moving & Storage of North Anchorage (5700 Boundary Avenue) (Google Earth, 2015)

Existing Engineering Controls

No engineering controls exist, as the site is currently occupied by U-Haul Moving & Storage of North Anchorage (Figure 3).

Prioritization Ranking

It is suspected that radium is present at the site because historical military vehicles typically contained luminous radium dials, gauges, and instruments. The site is currently occupied or frequented by visitors. Therefore, the site is classified as Tier 4.

References

U-Haul.com. 2015. U-Haul locations in or near Anchorage, AK 99504. U-Haul Virtual Tour 2015 <http://www.uhaul.com/Locations/photos-for-826028?default=Equipment>.

YouTube. 2013. <https://www.youtube.com/watch?v=6WUvFwri44w>.

Google Earth. Accessed March 2015. <https://www.google.com/maps/>.

United States Census Bureau. Accessed October 2015.
<http://quickfacts.census.gov/qfd/states/02/02020.html>.

New Haven Clock Company: Site Summary

The following information was extracted from public records and the “CT File.PDF” (CT-DEP, 2009).

Address

133-135 Hamilton St., New Haven, CT

Site Description/History

In 1853, the New Haven Clock Company was incorporated as a supplier of brass clock movements. This facility produced many types of clocks, including pocket versions (started in 1880) and wrist watches (started in 1917). This facility produced over 40 million watches between 1880 and 1959 (ATSDR, 1999), many with radium painted dials.

After 107 years in business, the New Haven Clock Company's facilities and products were sold at public auction in March of 1960, due to financial woes. The company's demise may have been due to its tremendous overproduction of products, which made it impossible to earn a profit.

According to ATSDR (1999), the building occupants of the former New Haven Clock Company in 1999 included: Club International, Goodies Repairs, and St. John's Restaurant. Most of the total building space was unoccupied or abandoned. Club International was housed in the first two floors of the four story building. There was little information about the third and fourth floors of that building. Goodies Repairs was located in the first floor of the small two story section of the building. St. John's Restaurant was located in the first floor of the larger four story section of the building (see Figure 2).

Almost all of the original building is unoccupied, as of November 2015. The only current occupant of the original facility is Primo Gentleman's Club, located at 133 Hamilton Street.

The amount/extent of radium contamination at these sites (including historical information and/or informed assumptions about the radium facilities' structures/areas, processes, and activities)

In 1998, the US EPA contacted the Agency for Toxic Substances and Disease Registry (ATSDR) to assist in conducting a public health assessment of structures that once housed clock factories in four Connecticut municipalities. The purpose of the health assessment was to evaluate the radiological survey data previously collected by the Connecticut Department of Environmental Protection (CT-DEP) at structures that once housed clock factories and to determine whether a public health hazard exists at any of these sites from the radiological contamination. The CT DEP requested assistance from the US Department of Energy (DOE) in conducting radiological surveys of the structures that once housed clock factories. The surveys were completed in April of 1998.

For the former New Haven Clock building (occupied by Club International, Goodies Repairs, and St. John's Restaurant at the time of the 1998 survey), the 1999 ATSDR Public Health Assessment reported

no radiological contamination in the surveyed areas of Club International or St. Johns Restaurant. In the two story portion of the old clock factory, only a small area on the first floor was identified with a positive reading (35 μ R/hr). At the time of the survey, this area was occupied by the Goodies Small Engine Repair (Table 1). Surveys of other areas of the building that were abandoned were still pending in 1998. The ATSDR (1999) Public Health Assessment (PHA) concluded that radiological contamination was detected at levels that may pose a public health hazard to occupants of the former New Haven Clock Company building; however, ATSDR stated that none of the radiation levels detected pose an immediate health problem. The Connecticut Department of Public Health recommended that individuals be disassociated from areas with radiation at levels exceeding 15 mrem/year.

Table 1. 1998 Radiological Survey Results for the former New Haven Clock Company Building (Goodies Small Engine Repair) (ATSDR 1999).

Radiological Parameter (units)	Location	Measurement Description	Maximum Level	Background	CL
Gamma radiation (μ R/hr)	1st floor	Direct contact	35	10	15
		Measured at Waist level	13		
Alpha, Beta gamma activity		not measured			

EPA cleanup level = 15; Source = ATSDR, 1999

Summary of Current Radium Levels:

As of November 2015, current levels of radium are unknown based on information reviewed for this report.

Location and population near the sites

The former New Haven Clock Company facility is located in an industrial part of New Haven, CT (see Figure 1). New Haven is located on New Haven Harbor on the northern shore of the Long Island Sound in New Haven County, which in turn comprises the outer limits of the New York metropolitan area. It is the second-largest city in Connecticut. According to the 2010 U.S. Census, the population of New Haven was 129,890; the 2014 population estimate for the city was 130,282 (United States Census Bureau, 2015).



Figure 1. Location of New Haven Clock Company (Google Earth, 2014)

Current State/other Federal involvement

In 2001, the CT State Bond Commission approved \$750,000 to support cleanup of radioactive material found at old clock factory sites in Bristol, New Haven, Thomaston and Waterbury. It is unknown if any of these clean-up funds were allocated to the former New Haven Clock Company site.

Current access, activities, and uses at the site

Images from Google Earth (September 2014) indicate that most of the 2 and 4 story sections of the building are boarded and do not appear to be in use (see Figures 2 and 3). The only current occupant of the site is Primo Gentlemen’s Club, at 133 Hamilton Street (see Figure 4)



Figure 2. Former New Haven Clock Company Building (Google Earth, 2014)



Figure 3. Former New Haven Clock Company Building (Google Earth, 2014)



Figure 4. Primo Gentlemen’s Club, at the corner of Hamilton Street and St John Street (Google Earth, 2014)

Existing Engineering Controls

Most of the windows have been covered, but there doesn’t appear to be any signs, fences, or restrictions on use (Figs. 2 and 3). A couple of the boarded windows appear to be cut out (Figure 3).

Prioritization Ranking

Radium is confirmed to have been present at the site based on historical documentation of radium use and radiological surveys. The site consists of buildings that are potentially contaminated by radium. Portions of the buildings are occupied. Therefore, the site is classified as Tier 1.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1999. Public Health Implications of Radiation Contamination at Former Clock Factories Located in Bristol (Hartford County), New Haven (New Haven County), Thomaston (Litchfield County), and Waterbury (New Haven County) Connecticut , January 29, 1999. <http://www.atsdr.cdc.gov/HAC/pha/PHA.asp?docid=959&pg=0>.

CT-Department of Environmental Protection (DEP). 2009. Correspondence from CT-DEP to NRC NMSS. Collection of pdf documents about Connecticut Clock Companies. Document dates range from 1998-2004. CT File.pdf, 1806 pages.

CT Department of Public Health (DPH). 1998. The Former New Haven Clock Factory: Questions and Answers About Radium. November 1998.

http://www.ct.gov/dph/lib/dph/environmental_health/eoha/atsdr/newhavenclock1198.pdf.

Google Earth. 2014. Accessed August 2015: <http://www.google.com/maps/>.

United States Census Bureau. Accessed October 2015.

<http://quickfacts.census.gov/qfd/states/09/0952000.html>.

Summary of New Haven Clock Company Information in "CTfile.pdf" (CT-DEP, 2009).

Site_Name	Source_date	Title	Pages
New Haven Clock Company	unknown	Clock Factory Contacts	
New Haven Clock Company	April 21, 1998	Department of Energy (DOE) Radiological Assistance Report cover letter and Radiological Assistance Call notes	744-747
New Haven Clock Company	unknown	New Haven Information	241-242
New Haven Clock Company	January 29, 1999	PUBLIC HEALTH ASSESSMENT; PUBLIC HEALTH IMPLICATIONS OF RADIATION CONTAMINATION AT FORMER CLOCK FACTORIES LOCATED IN BRISTOL (HARTFORD COUNTY), NEW HAVEN (NEW HAVEN COUNTY), THOMASTON (LITCHFIELD COUNTY), AND WATERBURY (NEW HAVEN COUNTY) CONNECTICUT	1578-1619

Novelty Manufacturing Company: Site Summary

The following information was extracted from public records.

Address

528 N. Mechanic Street, Jackson, MI

Site Description/History

The Novelty Manufacturing Company advertised its “X-Radium” heater as the best and latest heating technology. An advertisement boasted that “one of its chief advantages is the fact that it requires no fuel. . . . the heating pad consists of a stamped steel receptacle filled with a substance which will attract heat rays itself and retain the heat attracted for several hours. The substance they used was radium (Smithsonian National Postal Museum, 2014).



Figure 1. Novelty Manufacturing Company Advertisement (Smithsonian National Postal Museum website, 2014)

Another advertisement in Review of Reviews and World’s Work (1903) listed an address for the company at 528 North Mechanic Street (see Figure 2).



Figure 2. Novelty Manufacturing Company Advertisement (Review of Reviews and World's Work, 1903)

According to Hardware Review (1920), the Novelty Manufacturing Company discontinued business sometime before January 1920 and was succeeded by the Jackson Stove and Stamping Company.

No other information can be located in the public records about the Novelty Manufacturing Company or the Jackson Stove and Stamping Company.

The amount/extent of radium contamination at these sites (including historical information and/or informed assumptions about the radium facilities' structures/areas, processes, and activities)

An advertisement (Smithsonian National Postal Museum, 2014) stated that radium was used in the heaters; however, it is unknown how much radium the heaters contained.

The parcel of land containing the former Novelty Manufacturing Company (see Figure 3) now contains the Michner Plating Company facility which began operations in the late 1930s. While the original Novelty building is gone, it is unknown whether the Michner Plating plant used any part of the original Novelty Manufacturing facility or if the Novelty Manufacturing facility was completely demolished and remediated before Michner Plating began their business. The site could consist of soil contaminated with radium.

Summary of Current Radium Levels:

As of November 2015, current levels of radium are unknown based on information reviewed for this report.

Location and population near the sites

Jackson is a city in the south central area of Michigan, about 40 miles west of Ann Arbor and 35 miles south of Lansing. It is the county seat of Jackson County. According to the 2010 U.S. Census, the population of Jackson was 160,248; the 2014 population estimate for the city was 159,741 (United States Census Bureau, 2015).

There is no current property listing for 528 N. Mechanic Street in the public records. Figure 3 shows Jackson County tax parcel ID 1-014800000 in yellow on a Google Earth map image of Jackson MI (Google Earth, 2015). It is unknown how much of the parcel was used by Novelty Manufacturing Company; most likely, it was the northern part of the parcel (see the arrow in Figure 3). Michner Plating Company took over the parcel in the late 1930s. Figure 4 provides a close-up view of the location for the former Novelty Manufacturing Company.



Figure 3. Location of former Novelty Manufacturing Company in Jackson, MI (Google Earth, 2015)



Figure 4. Close-up location of former Novelty Manufacturing Company (seen here as the main office for Michner Plating, at 520 N. Mechanic) (Google Earth, 2015; image from October 2012)

Current State/other Federal involvement

As of November 2015, no information about radium contamination or radium cleanup was located in the public records.

Current access, activities, and uses at the site

Michner Plating foreclosed due to not paying property taxes (Forgrave, 2015) and improper chemical cleanup. The parcel in Figure 3 (once the location of the Novelty Manufacturing Company) is now owned by the Jackson County Treasury Department and will be up for auction.

Existing Engineering Controls

According to figures 3 and 4, there are no engineering controls at the site.

Prioritization Ranking

Radium is confirmed to have been present at the site based on historical documentation that radium was used at the facility. The original building has been demolished. The site consists of soil that is potentially contaminated by radium. A new facility has been built on the soil site. The site is occupied or frequented by visitors. Therefore, the site is classified as Tier 1.

References

Google Earth. 2012. Accessed June 4, 2015. <https://www.google.com/maps/>.

Novelty Manufacturing Company, Jackson, MI
November 24, 2015

Hardware Review. 1920. Pioneers of Oil Stove Industry Succeeded by Jackson Stove and Stamping Company. Vol 25, p. 58. January 1920.

Forgrave, Will. 2015. Michner Plating foreclosed on with \$1.6 million in back taxes, properties deemed unsafe by EPA. June 15, 2015.

http://www.mlive.com/news/jackson/index.ssf/2015/06/michner_plating_foreclosed_on.html.

Review of Reviews and World's Work. 1903. Advertising Section. Vol. 28, p. 106.

Smithsonian National Postal Museum. 2014. RFD Carriage Heater.

<http://postalmuseum.si.edu/collections/object-spotlight/rfd-carriage-heater.html>.

United States Census Bureau. Accessed October 2015.

<http://quickfacts.census.gov/qfd/states/09/0901150.html>

Precision Dial Company: Site Summary

The following information was extracted from public records.

Address

7240 West KL Avenue, Kalamazoo, MI

Site Description/History

Public records indicate that Precision Dial Company was established in 1989 in Kalamazoo, MI. Precision Dial purchased the assets of Sooner Dial Co. (located in Clinton OK), which was an aircraft/military dial refinishing shop from 1950 to 1985, and was subject to cleanup due to radium contamination (Oklahoma DEQ, 2012). Precision Dial Company states they are now a premier dial supplier to the aerospace industry and are devoted entirely to aviation, producing the highest quality products available (including several Oshkosh champions) (AIHIT, 2015).

Precision Dial Company provides comprehensive refurbishment and repair services for aviation clients in the following areas: 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. (Precision Dial Company, 2013). Therefore, it is suspected that luminous radium is present at this site.



Figure 1. Location of Precision Dial Company (7240 West KL Avenue, Kalamazoo, MI)
(Google Earth, 2015) (Image from June 2012)

The amount/extent of radium contamination at these sites (including historical information and/or informed assumptions about the radium facilities' structures/areas, processes, and activities)

It is unknown if radium was or is present at this location. Precision Dial purchased the assets of Sooner Dial Company (in Clinton, OK) in 1989. The Sooner Dial Company had radium contamination at their location in Clinton, OK, which was remediated to meet radium standards in 1996 (Oklahoma DEQ, 2012). It is known that Precision Dial Company received some assets from Sooner Dial before the cleanup occurred at the Clinton, OK facility. Some of these assets may have been contaminated with radium. It is unknown if there is radium contamination at the current Precision Dial facility in Kalamazoo, MI.

Summary of Current Radium Levels:

As of November 2015, current levels of radium are unknown based on information reviewed for this report.

Location and population near the sites

The site is located in a semi-rural area with farmland, light industrial facilities, and residences within a 2-mile radius (Figure 2).

Kalamazoo, located in the southwest region of MI, is the county seat of Kalamazoo County. According to the 2010 U.S. Census, the population was 74,262; the 2014 population estimate for the city was 75,922 (United States Census Bureau, 2015).

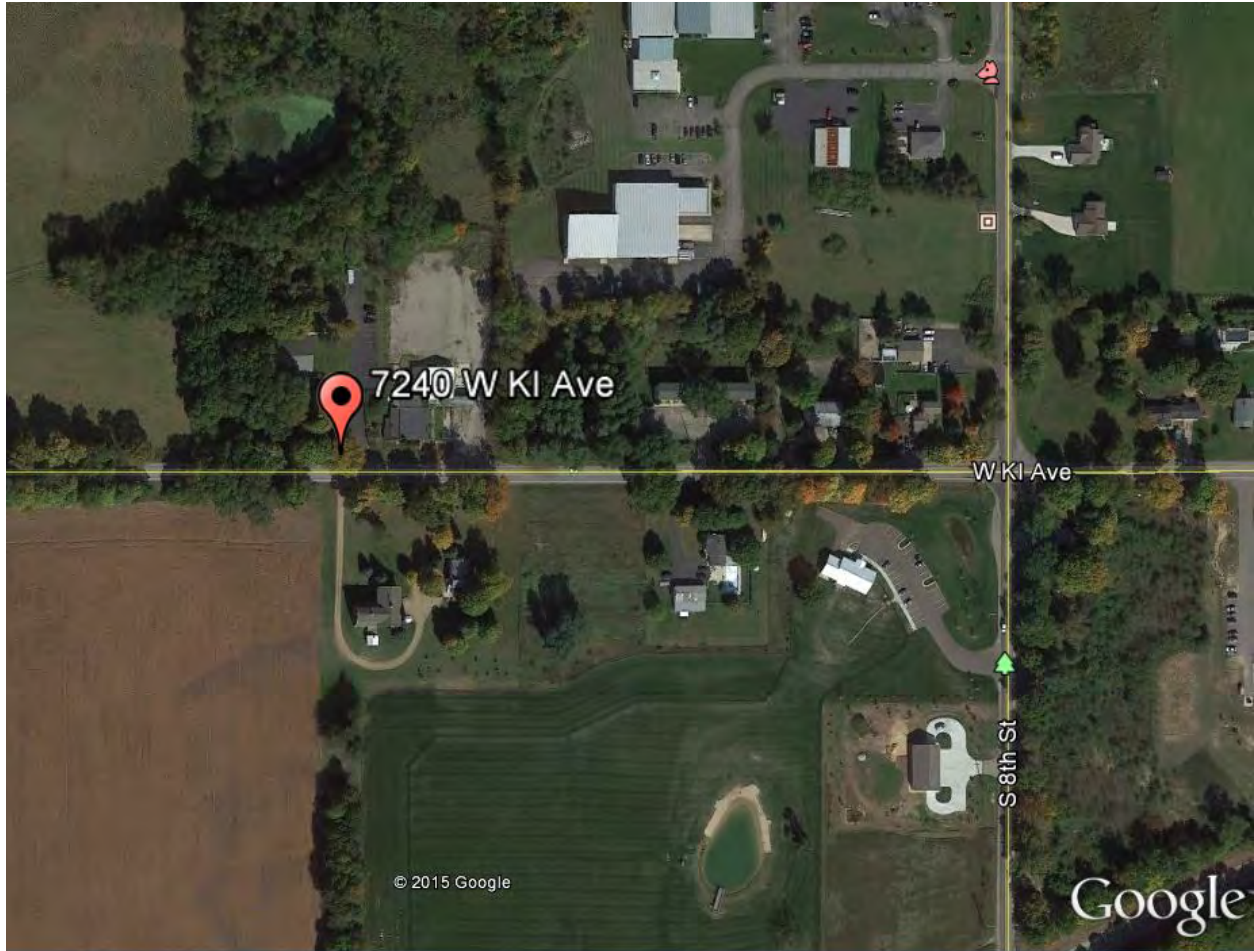


Figure 2. Location of Precision Dial Company (7240 W KI Avenue, Kalamazoo, MI)

Current State/other Federal involvement

As of November 2015, no information about radium contamination or radium cleanup at the Kalamazoo facility was located in the public records.

Current access, activities, and uses at the site

Precision Dial Company refinishes, repairs and manufacturers dials, data-plates, instrument panels and other close tolerance printed items. They also provide comprehensive refurbishment and repair services for aviation clients in the following areas: 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. (Precision Dial Company, 2013).

Existing Engineering Controls

No engineering controls appear to exist (Figure 1).

Precision Dial Company, Kalamazoo, MI
November 24, 2015

Prioritization Ranking

It is suspected that radium is present at the site because it is unknown what equipment (possible luminous radium dials, gauges, and instruments) was received from Sooner Dial Company (Clinton, OK). In addition, it is suspected that Precision Dial Company repairs historical aircraft dials and gauges that may contain luminous radium. Therefore, the site is classified as Tier 4.

References

AIHIT. 2015. By Precision Dial. Accessed June 2015.

<https://www.aihitdata.com/company/007E01C0/BY-PRECISION-DIAL/overview>.

Google Earth 2015. Accessed June 2015. <https://www.google.com/maps/>.

Oklahoma Department of Environmental Quality. 2012. Targeted Brownfield Assessment for Oklahoma Army National Guard, Clinton Armory, Clinton OK. ASTM E 1527-05. Phase 1, Environmental Assessment.

<http://www.deq.state.ok.us/lpdnew/scap/SCAP%20Webpage/Clinton%20Armory/TARGETED%20BROWNFIELD%20ASSESSMENT-%20Clinton%20Armory-%20final.pdf>

PrecisionDial Company. 2013. Accessed August 24, 2015. <http://www.precisiondial.com/index.asp>.

United States Census Bureau. Accessed October 2015.

<http://quickfacts.census.gov/qfd/states/26/2642160.html>.

Radium Dye Company: Site Summary

The following information was extracted from public records.

Address

318 West 10th St., Kansas City, MO (historic address)

Site Description/History

An advertisement in Business (1914) listed the address for the Radium Dye Company of Kansas City at 318 W. 10th Street (see Figure 1). Other information located in the public records about the Radium Dye Company is an advertisement in the 1918 Boot and Shoe Recorder (see Figure 2). Additional advertisements (not pictured in this summary) mention Radium Soap and Radium Gas Settler.

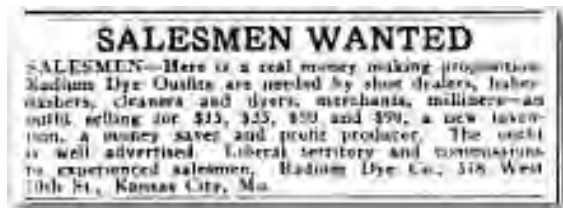


Figure 1. Help Wanted Advertisement (Business, 1914)

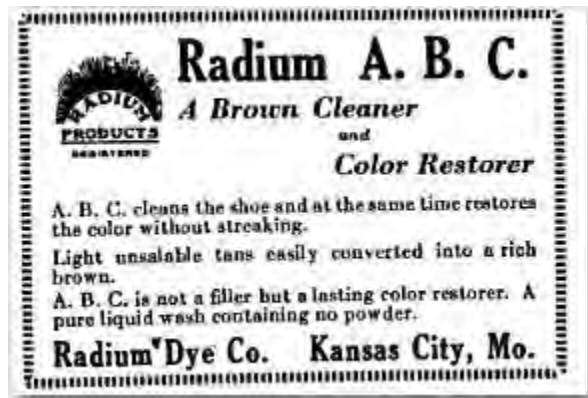


Figure 2. Radium Dye Company Advertisement (Boot and Shoe Recorder, 1918)

A picture of a glass bottle from Radium Dye Company is shown in Figure 3 (ORAU 2012). It is suspected that radium was used by the Radium Dye Company due to the name of the company and the advertisements about various radium consumer products.

According to the U.S. Department of the Interior National Register of Historic Places (undated), 318 W. 10th Street in Kansas City, MO, is known today as the Adler Building, which was built in 1908.

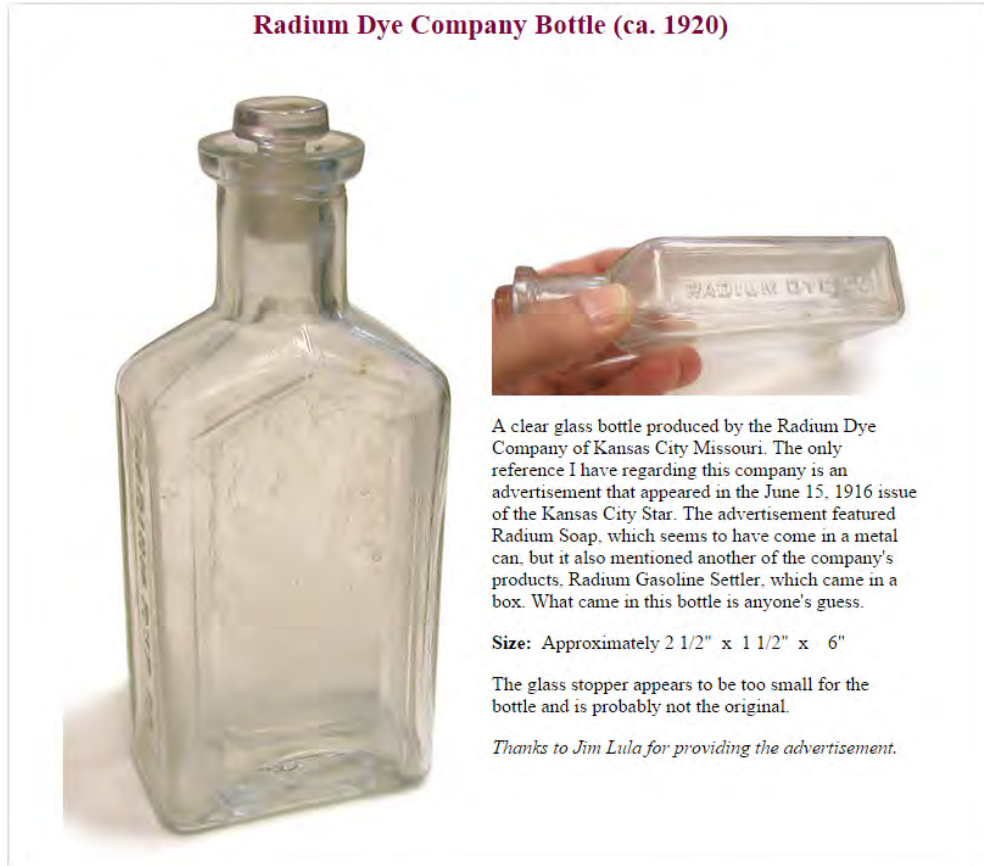


Figure 3. Radium Dye Company Bottle (ORAU, 2012)

The amount/extent of radium contamination at these sites (including historical information and/or informed assumptions about the radium facilities' structures/areas, processes, and activities)

It is suspected but unknown if radium was present at this site.

Summary of Current Radium Levels:

As of November 2015, current levels of radium are unknown based on information reviewed for this report.

Location and population near the sites

The Adler Building is located in the wholesale (garment) district of Kansas City, Mo at 318 W 10th Street. Although this area is an industrial part of Kansas City, many of the historical buildings downtown have been converted to lofts and apartments (see Figures 4-5).

Kansas City is the largest city in the state of MO. According to the 2010 U.S. Census, the population was 459,787; the 2014 population estimate for the city was 470,800 (United States Census Bureau, 2015).

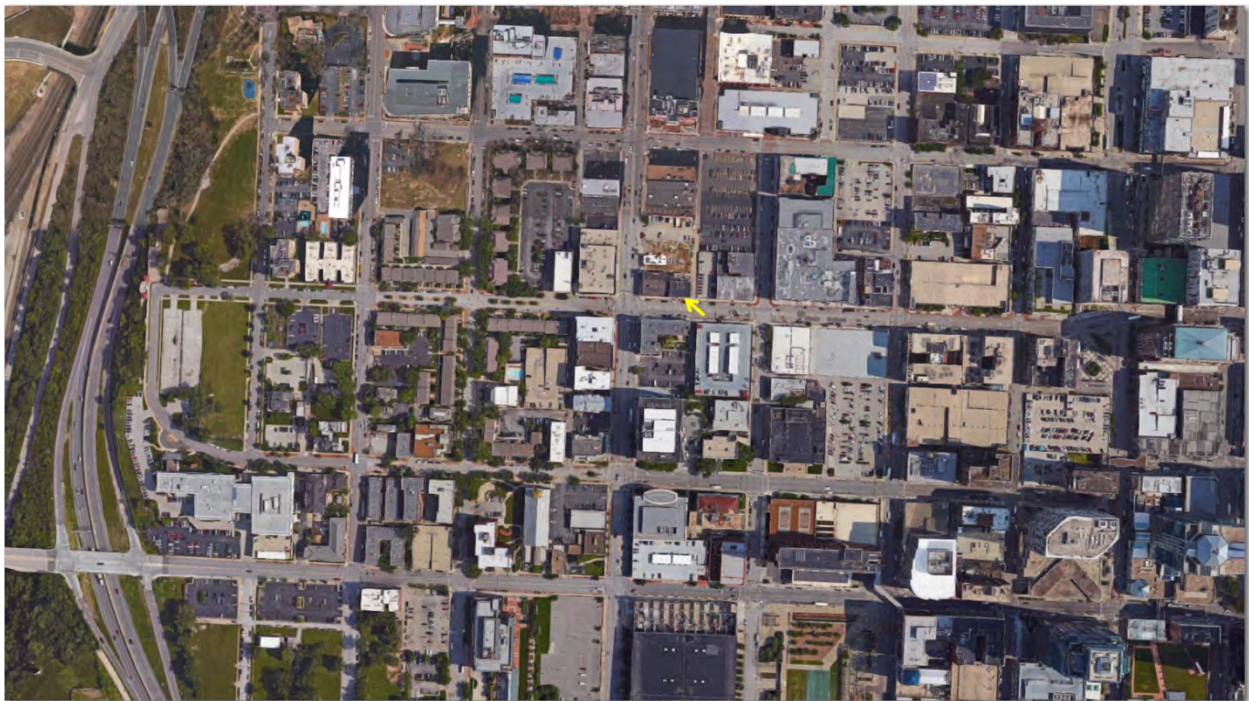


Figure 4. Location of 318 W. 10th Street in Kansas City (Google Earth, 2014)



Figure 5. Adler Building, 318 West 10th St., Kansas City, MO (Google Earth, 2012)

Radium Dye Company, Kansas City, MO
November 24 2015

Current State/other Federal involvement

As of November 2015, no information about radium contamination or radium cleanup was located in the public records.

Current access, activities, and uses at the site

The Adler Building is currently occupied by the International Association of Assessing Officers (IAAO) world headquarters (see Figure 6). IAAO is a professional membership organization of government assessment officials and others interested in the administration of the property tax (IAAO, 2013). The IAAO moved their headquarters office from Chicago to this location in 2005. Prior to 2005, the building served as loft apartments. There are 25 members listed as staff on the IAAO website. Since the facility also provides training, population at this facility may fluctuate.



Figure 6. Side of Adler Building with sign for IAAO World Headquarters (Google Earth, 2014)

Existing Engineering Controls

According to Figures 5 and 6, there are no engineering controls at the site.

Prioritization Ranking

It is suspected that radium is present at this site based on the name of the company, The Radium Dye Company, as well as several advertisements that indicate radium was used in various consumer products associated with the company. Therefore, the site is classified as Tier 4.

References

Boot and Shoe Recorder. 1918. Advertisement Vol. 74;p. 15. Dec 7, 1918.

Business. 1914. A Magazine for Office, Store and Factory. Vol32;p. 220. April, 2014.

Google Earth. 2014. Accessed June 5, 2015. <https://www.google.com/maps/>.

International Association of Assessing Officers (IAAO). 2013. <https://www.iaao.org/>.

Oak Ridge Associated Universities (ORAU). 2012. Health Physics Historical Instrumentation Collection. <http://www.ornl.gov/ptp/museumdirectory.htm>.

United States Census Bureau. Accessed October 2015. <http://quickfacts.census.gov/qfd/states/29/2938000.html>.

U.S. Department of the Interior. (undated) National Park Service, National Register of Historic Places, Inventory – Nomination Form. p. 7. <http://dnr.mo.gov/shpo/nps-nr/79001375.pdf>.

Sessions Clock Company: Site Summary

The following information was extracted from public records and the "CT File.PDF" (CT-DEP, 2009).

Address

61 East Main St., Bristol, CT

Site Description/History

According to CT DPH (1998), the former Sessions Clock Factory used radium in their clock production. Radium was used in painting dials on clocks because it makes paint glow in the dark. It was believed to be used from the early 1900's through the 1940's in the production of clocks.

The former Sessions Clock Factory complex consists of the seven factory buildings still standing, the original two story office building, a boiler building, and a two bay truck garage. Construction of this complex was begun in 1899 and completed by April of 1890. In 1903, the Sessions Clock Company began operation and produced mantle and kitchen clocks. In 1958, the company was sold and the new company continued to produce clocks until 1968 (ATSDR, 1999).

In 1960, one of the buildings was sold to the Bristol Instrument Gears Company. In 1970, the remaining buildings were sold to Dabko Industries, a machine parts manufacturer. The following companies were housed in the Sessions Clock Company buildings in 1999: Bristol Instrument Gears, Dabko CO., NuTECH (first floor of Building A and second floor of Building B), CT Graphics (first floor of Building D), and C&R Printing (second floor of Building X). One floor in each of buildings 'A', 'B', 'D', and 'X' was rented to other businesses. In all seven factory buildings, the top floor was used for long term storage. The lower two or three floors in each building that were not rented out were mostly used as machine shops (see Figures 1-5).

Currently, Building J is occupied by two certified public accountants. While the other buildings appear vacant and many windows are boarded, there are several cars parked by some of the entrances. Also, there are many thriving plants on a porch at building A, indicating that some of the buildings may be occupied.



Figure 1. Sessions Clock Company-Buildings J and D (Google Earth, 2015) (Image from October 2012)



Figure 2. Sessions Clock Company-Building X (Google Earth, 2015) (Image from October 2012)

Sessions Clock Company, Bristol, CT
November 24, 2015



Figure 3. Sessions Clock Company-Buildings C and V (Google Earth, 2015) (Image from October 2012)

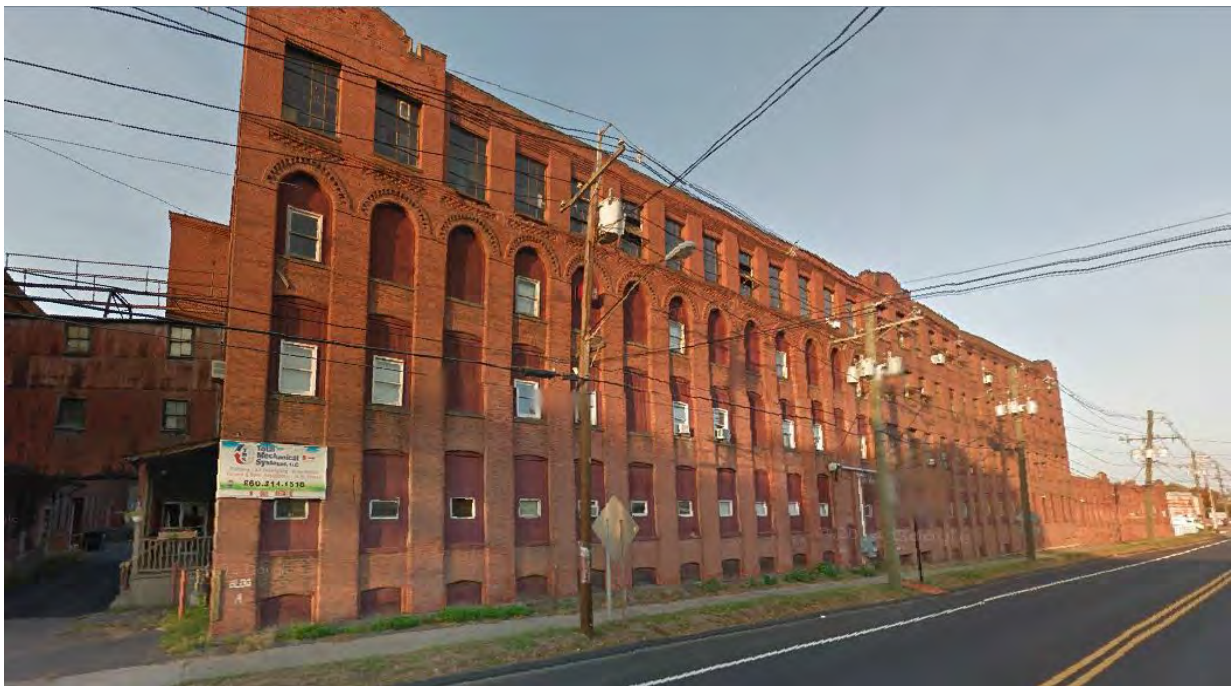


Figure 4. Sessions Clock Company-Buildings A and B (Google Earth, 2015) (Image from October 2012)

The amount/extent of radium contamination at these sites (including historical information and/or informed assumptions about the radium facilities' structures/areas, processes, and activities)

In 1998, the US EPA contacted the Agency for Toxic Substances and Disease Registry (ATSDR) to assist in conducting a public health assessment of structures that once housed clock factories in four Connecticut municipalities. The purpose of the health assessment was to evaluate the radiological survey data previously collected by the Connecticut Department of Environmental Protection (CT-DEP) at structures that once housed clock factories and to determine whether a public health hazard exists at any of these sites from the radiological contamination. The CT DEP requested assistance from the US Department of

Energy (DOE) in conducting radiological surveys of the structures that once housed clock factories. The surveys were completed in April of 1998.

For the former Sessions Clock Company buildings (occupied by Bristol Instrument Gears, Dabko CO., NuTECH, CT Graphics, and C&R Printing at the time of the 1998 survey), the 1999 ATSDR Public Health Assessment reported radiation in two locations above the EPA risk-based cleanup level in two buildings (Table 1). The locations included: a storage area on the fourth floor of building A (Dabko) and an area designated as an old storage area on the third floor of building D (Dabko). One area of the first floor of the Bristol Instrument Gears building had radiation levels at the EPA risk level (ATSDR, 1999).

Table 1. 1998 Radiological Survey Results at former Sessions Clock Company Buildings (ATSDR, 1999)

Current Occupant	Location	Floor	Direct Contact ($\mu\text{R/hr}$)	Highest Exposure ($\mu\text{R/hr}$)	Waist Level ($\mu\text{R/hr}$)	Background Level ($\mu\text{R/hr}$)	EPA Cleanup Level
Bristol Instrument Gears	n/a	1	15		12	5	15
Dabko	Building A	2		0		NR	15
Dabko	Building D	2		0		NR	NR
Dabko	Building A	3		0		NR	15
Dabko	Building D	3		40		NR	NR
Dabko	Building A	4		120		NR	15

The ATSDR (1999) Public Health Assessment (PHA) concluded that radiological contamination was detected at levels that may pose a public health hazard to occupants of the former Sessions Clock Company buildings; however, ATSDR stated that none of the radiation levels detected pose an immediate health problem. The Connecticut Department of Public Health recommended that individuals be disassociated from areas with radiation at levels exceeding 15 mrem/year.

In 2003, the Valley Council of Governments (in Derby CT) contracted with Sciencetech Inc. to provide radiological surveys in former clock factory buildings in the townships of Waterbury, Bristol and Thomaston as part of the Connecticut Radium Decontamination and Decommissioning Project. Surveys in the former Sessions Clock buildings conducted by Sciencetech identified radiologically contaminated areas in the fourth floor of Building A, the fourth floor of Building B, and on the third floor of Building D. Dabko was identified as the occupant of the buildings at the time of the 2003 radiological survey. Radiological survey data consisted of background counts per minute and maximum gross contact counts per minute and are presented in Table 2. (Note: Additional details of the 2003 Sciencetech radiological surveys are not known. Only data for the fourth floor of building D, Dabko, was provided in a tabular format.)

Table 2. 2003 Radiological Survey Results for the former Sessions Clock Building (Sciencetech, 2003)

Photo Page	Town	Building	Location	Contamination Area	Surface	Approximate Area Size	Background Counts	Maximum Gross Counts (on contact)	Estimated 18" Count
	Bristol	Dabko, Building B	Fourth Floor	Chicken coop- U-shaped area around cage and into cage	Carpet over lay subflooring	69 ft x 5 ft, 35 ft x 10 ft, 57 ft x 5 ft	8,000	30,000	

Summary of Current Radium Levels:

As of November 2015, current levels of radium are unknown based on information reviewed for this report.

Location and population near the sites

The location of the former Sessions Clock Company is seen in Figure 6. While the facility is located in an industrial area, there are residential areas (Figure 6) within close proximity to the former clock company.

Bristol is a suburban city located in Hartford County, Connecticut, 20 miles southwest of Hartford. According to the 2010 U.S. Census, the population of Bristol was 60,477; the 2014 population estimate for the city was 60,570 (United States Census Bureau, 2015).



Figure 5. Location of Sessions Clock Company Buildings (1 – Building J; 2 – Building X; 3 – Building D; 4 – Building A; 5 – Building W; 6 – Building B; 7 – Building C; 8 – Building V; 9 – Bristol Instrument Gears) (Google Earth, 2015)

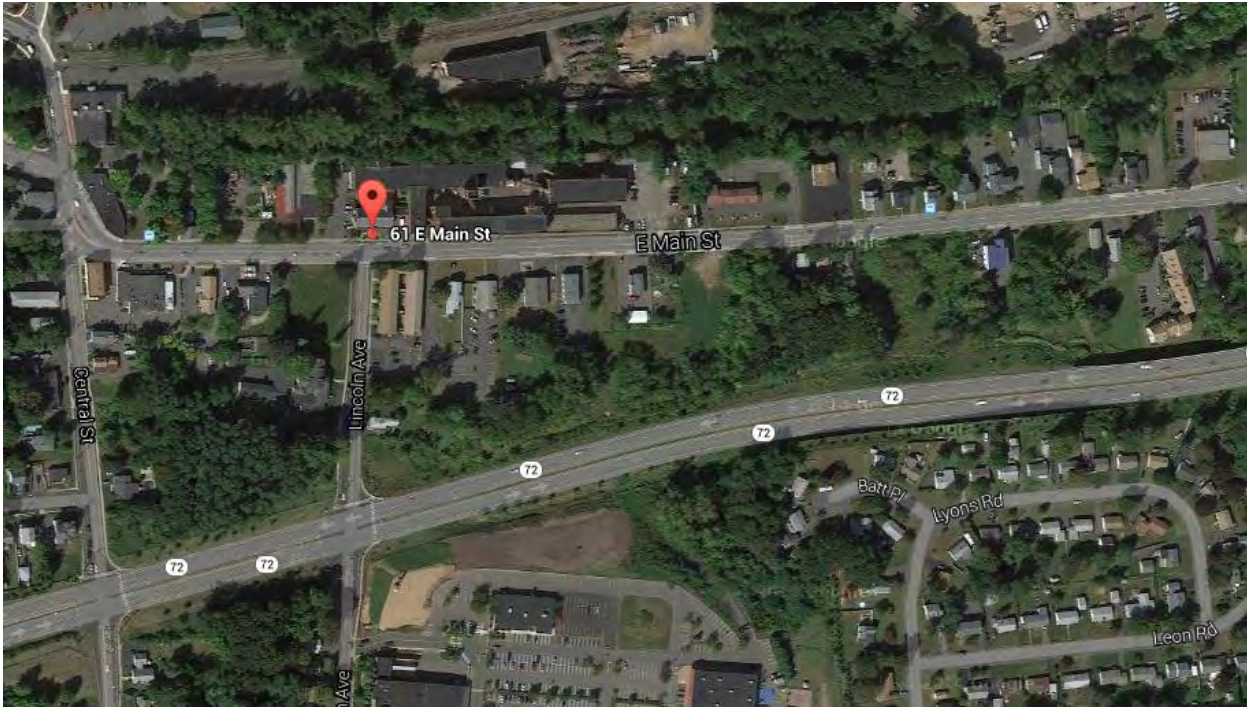


Figure 6. Location of Sessions Clock Company and the surrounding population (Google Earth, 2015)

Current State/other Federal involvement

In 2001, the CT State Bond Commission approved \$750,000 to support cleanup of radioactive material found at old clock factory sites in Bristol, New Haven, Thomaston and Waterbury. It is unknown if any of these clean-up funds were allocated to the former Sessions Clock Company site.

Current access, activities, and uses at the site

Building J is occupied by two certified public accountants and therefore will have regular employees and visitors in the building.

As of 2015, it is unclear whether Dabko Industries and Bristol Instrument Gears still own the other buildings. The three businesses (CT Graphics, NuTECH, and C & R Printing) that were renting office space in 1999 at Buildings 'A', 'B', 'D', and 'X', however, appear to no longer be present. While it is assumed that these buildings are now vacant, there are several cars and plants in the photo that may indicate otherwise.

Existing Engineering Controls

Images from Google Earth (October 2012) indicate that there no existing controls, such as signs, fences, and/or restrictions, at the site (Figures 1-4).

Prioritization Ranking

Radium is confirmed to have been present at the site based on historical documentation and radiological surveys. The site consists of buildings that are potentially contaminated by radium. The buildings are occupied or occupancy is unknown. Site access is not controlled. Therefore, the site is classified as Tier 1.

References

ATSDR. Public Health Assessment, Public Health Implications of Radiations Contamination at Former Clock Factories Located in Bristol (Hartford County), New Haven (New Haven County), Thomaston (Litchfield County), and Waterbury (New Haven County) Connecticut. January 29, 1999. Available at: <http://www.atsdr.cdc.gov/HAC/pha/PHA.asp?docid=959&pg=0>.

CT-Department of Environmental Protection (DEP). 2009. Correspondence from CT-DEP to NRC NMSS. Collection of pdf documents about Connecticut Clock Companies. Document dates range from 1998-2004. CT File.pdf, 1806 pages.

CT Department of Public Health (DPH). 1998. Former Clock Factory Sites in Bristol: Q & A About Radium. October 1998. http://www.ct.gov/dph/lib/dph/environmental_health/eoha/atsdr/bristolradiumfactsheet.pdf.

Google Earth. Accessed February 2015. <https://www.google.com/maps/>.

Scientech 2003. Connecticut Radium Sites Verification Survey for the Valley Council of Governments, Connecticut Radium Decontamination and Decommissioning Project. Scientech, Inc. 143 West Street, New Milford, CT 06776. October 24, 2003.

United States Census Bureau. Accessed October 2015. <http://quickfacts.census.gov/qfd/states/09/0908420.html>.

Summary of Sessions Clock Company Information in "CTfile.pdf" (CT-DEP, 2009).

Site_Name	Source_date	Title	Pages
Sessions Clock Company	unknown	C&R Printing information	238
Sessions Clock Company	unknown	Clock Factory Contacts	
Sessions Clock Company	unknown	Dabko Co.	235
Sessions Clock Company	1999	Document number 82A9499	511-514
Sessions Clock Company	January 29, 1999	PUBLIC HEALTH ASSESSMENT; PUBLIC HEALTH IMPLICATIONS OF RADIATION CONTAMINATION AT FORMER CLOCK FACTORIES LOCATED IN BRISTOL (HARTFORD COUNTY), NEW HAVEN (NEW HAVEN COUNTY), THOMASTON (LITCHFIELD COUNTY), AND WATERBURY (NEW HAVEN COUNTY) CONNECTICUT	1578-1619
Sessions Clock Company	unknown	Session information	236-237; 1378

Seth Thomas Clock Company: Site Summary

The following information was extracted from public records and the "CT File.PDF" (CT-DEP, 2009).

Address

135 S. Main St., Thomaston, CT

Site Description/History

According to CT DPH (1998), the former Seth Thomas Clock Company used radium in their clock production. Radium was used in painting dials on clocks because it makes paint glow in the dark. It was believed to be used from the early 1900's through the 1940's in the production of clocks.

According to historicbuildingsct.com (2014), the main Seth Thomas Clock Company building was built in 1915. Located on South Main Street in Thomaston, it is a sprawling complex that was expanded over the years. In 1931, the company became a division of General Time Instruments Corporation, later known as General Time Corporation. From World War II until 1967, the factory also made marine timing and navigational devices for the military. The factory was severely damaged in the Flood of 1955, but reopened the following year. In 1970, the company was taken over by Talley Industries of Seattle, Washington, which closed the Thomaston plant and moved all operations to Norcross, Georgia in 1979-1982. The old factory soon reopened as an industrial park for various small manufacturers.

As of November 2015, the building has 19 tenants and is advertising to lease additional space.



Figure 1. Former Seth Thomas Clock Company Building (Google Earth, 2015; Image dated September 2009).

The amount/extent of radium contamination at these sites (including historical information and/or informed assumptions about the radium facilities' structures/areas, processes, and activities)

In 1998, the US EPA contacted the Agency for Toxic Substances and Disease Registry (ATSDR) to assist in conducting a public health assessment of structures that once housed clock factories in four Connecticut municipalities. The purpose of the health assessment was to evaluate the radiological survey data previously collected by the Connecticut Department of Environmental Protection (CT-DEP) at structures that once housed clock factories and to determine whether a public health hazard exists at any of these sites from the radiological contamination. The CT DEP requested assistance from the US Department of Energy (DOE) in conducting radiological surveys of the structures that once housed clock factories and the surveys were completed in April of 1998.

For the former Seth Thomas Clock building, the 1999 ATSDR Public Health Assessment reported seven areas of concern in the building complex. Contamination was identified in isolated areas on the first through fourth floors (Table 1). The basement of this structure contains areas that were not characterized. The first floor was only affected in one facility, Vereka Enterprise. The second floor was affected in two locations, which include the Gaynor Electric facility and WTM. The affected locations on the third floor included the Power Trans facility, the Global Spice Company, and J. McGowan facility. The storage area on the fourth floor contained radiation levels above the EPA risk-based cleanup level of 15 mrem/yr (ATSDR 1999).

The ATSDR (1999) Public Health Assessment (PHA) concluded that radiological contamination was detected at levels that may pose a public health hazard to occupants of the former Seth Thomas Clock Company building; however, ATSDR stated that none of the radiation levels detected pose an immediate health problem. The Connecticut Department of Public Health recommended that individuals be disassociated from areas with radiation at levels exceeding 15 mrem/year.

Table 1. 1998 Radiological Survey Results for the former Seth Thomas Clock Building (ATSDR, 1999)

Floor	Direct Contact (µR/hr)	General Area (µR/hr)	Smear - Alpha	Smear - Beta	Fixed Alpha (dpm)	Fixed Beta (dpm)
1	100	40	0	0	0	6000
2	80	25	0	0	n/a	500
3	650	80	10	30	100	3000
4	45	12	50	30	550	1300

Gamma Radiation Background = 12. EPA cleanup level = 15.

Alpha Background = 0. Beta/Gamma Background = 50. Smear EPA cleanup level = 20. Fixed EPA cleanup level = 300.

Source = ATSDR, 1999

In 2003, the Valley Council of Governments (in Derby CT) contracted with Sciencetech Inc. to provide radiological surveys in former clock factory buildings in the townships of Waterbury, Bristol and

Thomaston as part of the Connecticut Radium Decontamination and Decommissioning Project. Surveys in the former Seth Thomas clock building conducted by Scientech Inc. identified radiological contaminated areas in Vereka Enterprises (1st floor- by west window, 3 small spots); Gaynor Electric (2nd floor areas I and H, five isolated spots); Global Spices (3rd floor in west corner by AC unit, small spots); J McGowan (3rd floor by wire shaping machine, 10'x10' area); ECI Printing (3rd floor in main office area behind the receptionist, 2 spots); Power Trans (3rd floor five feet from wall by overhead storage rack, 1 small spot); and 4th floor storage area (3'x3' middle of floor on NW side of building, 1 small spot on window ledge and 1 small spot 2' away on the floor). Radiological survey data consisted of background counts per minute and maximum gross contact counts per minute and are presented in Table 2. (Note: Additional details of the 2003 Scientech radiological surveys are not known.)

Table 2. 2003 Radiological Survey Results for the former Seth Thomas Clock Building (Scientech, 2003)

Photo Page	Town	Designation	Location	Contamination Area	Surface	Approximate Area Size	Background Counts	Maximum Gross Counts (on contact)	Estimated 18" Count
T-5	Thomaston	A	Fourth Floor	Window Sill by Italian American Club	Wood	6 in x 1 ft	6,000	12,000	
T-6	Thomaston	B	Fourth Floor	Floor by bin	Wood flooring	Spot	6,000	37,000	
T-7	Thomaston	M	Fourth Floor	Floor 35 ft from Italian American Club	Wood flooring	Spot	6,000	34,000	
T-8	Thomaston	C	Third Floor	Floor by caged area	Wood flooring	Spot	6,000	90,000	
T-10	Thomaston	N	Third Floor	Hallway Pillar (in front of Power Trans)	Wood flooring	Spot	6,000	15,000	
T-11	Thomaston	E	Third Floor	Floor in Global Spice Co. Storage Room	Wood flooring	2 ft x 2 ft	6,000	30,000	
T-12	Thomaston	R	Third Floor	Floor corner in Power Trans	Wood flooring	Area	6,000	115,000	
T-13	Thomaston	D	Third Floor	Area under air conditioner	Wood flooring	5 ft x 9 ft	6,000	270,000	
T-13	Thomaston	D	Third Floor	Power Trans floor	Wood flooring	41 ft x 5 ft	6,000	20,000	
T-14	Thomaston	O	Third Floor	Floor of Ladies Bathroom	Carpet over lay subflooring	10 ft x 10 ft	6,000	60,000	
T-15	Thomaston	P	Third Floor	Floor by closet entrance	Carpet over lay subflooring	2 ft x 2 ft	6,000	150,000	
T-16	Thomaston	G	Third Floor	Floor in ECI office	Carpet over lay subflooring	Various spots	6,000	48,000	
T-17	Thomaston	F	Third Floor	Floor in Outreach Office	Carpet over lay subflooring	1 ft x 2 ft	6,000		
T-18	Thomaston	H	Second Floor	Floor spots in Gaynor Electric	FINISHED wood flooring	Various spots	10,000	56,000	
T-19	Thomaston	Q	Second Floor	Floor area in Gaynor Electric (further up from spots)	FINISHED wood flooring	40 ft x 4 ft	10,000	25,000	
T-20	Thomaston	K (L?)	First Floor	Floor by plywood wall	Wood flooring	4 ft by 10 ft	6,000	56,000	
T-21	Thomaston	I	Second Floor	Floor spots by window	Wood flooring	Various spots	6,000	15,000	

Summary of Current Radium Levels:

As of November 2015, current levels of radium are unknown based on information reviewed for this report.

Location and population near the sites

The location of the former Seth Thomas Clock Factory can be seen in Figure 2.

The town of Thomaston, CT is located at the confluence of the Naugatuck River, Northfield Brook and Black Rock Brook in Litchfield County. According to the 2010 U.S. Census, the population of Thomaston was 7,887; the 2014 population estimate for the city was 7,683 (United States Census Bureau, 2015).



Figure 2. General location of the former Seth Thomas Clock Company (Google Earth, 2015)

Current State/other Federal involvement

In 2001, the CT State Bond Commission approved \$750,000 to support cleanup of radioactive material found at old clock factory sites in Bristol, New Haven, Thomaston and Waterbury. It is unknown if any of these clean-up funds were allocated to the former Seth Thomas Clock Company site.

Current access, activities, and uses at the site

This building is currently rented to 19 different tenants, including retail, industry, a health club, and an art school. The remainder of the site is advertised as available to lease.

Existing Engineering Controls

There are no engineering controls at the site.

Prioritization Ranking

Radium is confirmed to have been present at the site based on historical documentation of radium use and radiological surveys. The site consists of a building potentially contaminated by radium. The building is occupied. Therefore, the site is classified as Tier 1.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1999. Public Health Implications of Radiation Contamination at Former Clock Factories Located in Bristol (Hartford County), New Haven (New Haven County), Thomaston (Litchfield County), and Waterbury (New Haven County) Connecticut , January 29, 1999. <http://www.atsdr.cdc.gov/HAC/pha/PHA.asp?docid=959&pg=0>.

CT-Department of Environmental Protection (DEP). 2009. Correspondence from CT-DEP to NRC NMSS. Collection of pdf documents about Connecticut Clock Companies. Document dates range from 1998-2004. CT File.pdf, 1806 pages.

CT Department of Public Health (DPH). 1998. Former Seth Thomas Clock Factory: Questions and Answers. October 1998. http://www.ct.gov/dph/lib/dph/environmental_health/eoha/atsdr/thomastonradiumfactsheet.pdf.

Google Earth. Accessed February 2015. <http://www.google.com/maps/>.

Historic Building of Connecticut. 2014. <http://historicbuildingsct.com/?cat=279>.

Scientech 2003. Connecticut Radium Sites Verification Survey for the Valley Council of Governments, Connecticut Radium Decontamination and Decommissioning Project. Scientech, Inc. 143 West Street, New Milford, CT 06776. October 24, 2003.

United States Census Bureau. Accessed October 2015. <http://quickfacts.census.gov/qfd/states/09000.html>.

Summary of Seth Thomas Clock Company Information in "CT file.pdf" (CT-DEP, 2009).

Site_Name	Source_date	Title	Pages
Seth Thomas Clock Company	unknown	Clock Factory Contacts	
Seth Thomas Clock Company	October 9, 2003	Connecticut Radium Sites Verification Survey by Scientech	1090-1097
Seth Thomas Clock Company	April 21, 1998	Department of Energy (DOE) Radiological Assistance Report cover letter and Radiological Assistance Call notes	744-747
Seth Thomas Clock Company	1999	Document number 82A9499	511-514
Seth Thomas Clock Company	January 29, 1999	PUBLIC HEALTH ASSESSMENT; PUBLIC HEALTH IMPLICATIONS OF RADIATION CONTAMINATION AT FORMER CLOCK FACTORIES LOCATED IN BRISTOL (HARTFORD COUNTY), NEW HAVEN (NEW HAVEN COUNTY), THOMASTON (LITCHFIELD COUNTY), AND WATERBURY (NEW HAVEN COUNTY) CONNECTICUT	1578-1619
Seth Thomas Clock Company	April 9, 1998	RAP-1 (KAPL Team) - Survey Technique and Results Summary	212-221; 265-268; 272-303

South Bend Watch Company: Site Summary

The following information was extracted from public records.

Address

1720-1730 Mishawaka Avenue, South Bend, IN

Site Description/History

The South Bend Watch Company used the Luma radium compound for luminous dials in watch production (Saturday Evening Post, 1919), which began in 1905. During its peak years of production, the company produced 60,000 watches annually and employed nearly 600 employees. On November 27, 1929, the plant was closed. Employees were told it would remain closed until January 1, 1930. The plant never reopened (The History Museum for South Bend, 2015).

In later years, the old factory building was used for a warehouse, a soft drink bottling plant, an Army reserve center and various other businesses. On July 8, 1957, a fire started and the factory was burned and subsequently removed (Renaissance Watch Repair, 2014).

The land was then sold to the Associates Investment Company. They built a new building on the site for their national headquarters. When Associates decided to leave South Bend in 1975, they sold the new building to Indiana University at South Bend for the administration building (Palmer, 2005). Even though the original facility is gone, the soil under and around the new building may be contaminated with radium.



Figure 1. South Bend Watch Company in 1912 (Palmer, 2005)

The amount/extent of radium contamination at these sites (including historical information and/or informed assumptions about the radium facilities' structures/areas, processes, and activities)

It is known that the South Bend Watch Company painted watches with luminous radium at the original building located on Mishawaka Avenue in South Bend Indiana. The original facility has been removed, but the remaining soil may be contaminated with radium. It is unknown if any radium testing took place before the new building was constructed. No survey data was located.

Summary of Current Radium Levels:

As of November 2015, current levels of radium are unknown based on information reviewed for this report.

Location and population near the sites

The soil site is currently part of the University of Indiana at South Bend campus and is across the street from a high school (see Figure 2). The University sits on 80 acres and has around 8,300 students.

South Bend is the county seat of St. Joseph County and is located on the St. Joseph River near its southernmost bend. According to the 2010 U.S. Census, the population of South Bend was 101,168; the population estimate for 2014 was 101,190 (United States Census Bureau, 2015).



Figure 2. Location of 1720-1730 Mishawaka Avenue (Google Earth, 2011)

Current State/other Federal involvement

An extensive internet search of public records did not reveal any information about contamination/cleanup of the facility, especially involving radium.

Current access, activities, and uses at the site

The soil site is currently occupied by Indiana University at South Bend as the Office of Administrative and Fiscal Affairs.



Figure 3. 1700 Mishawaka Avenue (Indiana University Administration Building) (IU, 2015)

Existing Engineering Controls

There are no existing engineering controls at the site. The original watch facility burned down and was replaced by the structure seen today.

Prioritization Ranking

Radium is confirmed to have been present at the site based on historical documentation that radium luminous dials in watches were produced at the site. The original building no longer exists. The site has been redeveloped and is occupied. The site consists of soil that is potentially contaminated by radium. The site is occupied or frequented by visitors. Therefore, the site is classified as Tier 1.

References

Google Earth. 2011. Accessed April 15, 2015. <https://www.google.com/maps/>.

Indiana University South Bend (IU). 2015. <https://www.iusb.edu/>.

Palmer, John. 2005. South Bend in Vintage Postcards. P. 63. Arcadia Printing.

Renaissance Watch Repair. 2014. Brief History: South Bend Watch Company. Accessed April 15, 2015.
<http://www.pocketwatchrepair.com/histories/southbend.html>.

Saturday Evening Post. 1919. LUMA: The Radium LUMAnous Compound. Vol.191, Issue 43. P. 40. April 26.

The History Museum for South Bend. 2015. Accessed April 15, 2015.
<http://historymuseumsb.org/south-bend-watch-company>.

United States Census Bureau. Accessed October 2015.
<http://quickfacts.census.gov/qfd/states/18/1871000.html>.

War Dog Militaria: Site Summary

The following information was extracted from public records.

Address

P.O. Box 1177, Florence, MT

Site Description/History

War Dog Militaria has been in business for more than 40 years. This is an online supplier, and the actual physical address for the storage of the merchandise before purchase or shipment is unknown. It is suspected that the owner, [REDACTED], stores and ships the products from his home address in Florence, MT.

This supplier carries genuine military surplus and collectibles dating back to pre-WWI. Some of the items for sale include WWII Aircraft dials, gauges, clocks and more (War Dog Militaria, 2015) (Figure 1). Due to historic documentation of luminous radium usage in vintage gauges, dials, and military instrumentation, it is suspected that radium was present in some of the items available for sale.



Figure 1. Waltham WWII CDIA 8 Day USN Aircraft Clock available for sale at War Dog Militaria (War Dog Militaria, 2015) (Image from May 2015)

The amount/extent of radium contamination at these sites (including historical information and/or informed assumptions about the radium facilities' structures/areas, processes, and activities)

It is unknown if radium was or is present at this site; however, it is suspected that radium may have been present in some of the aircraft instruments for sale at this facility, due to documentation of general historic luminous radium usage in vintage gauges.

Summary of Current Radium Levels:

As of November 2015, current levels of radium are unknown based on information reviewed for this report.

Location and population near the sites

The exact location where the merchandise is stored is unknown. It is suspected that the owner[], stores and ships the products from his home address, []. This potential location is rural, about 15 miles east of downtown Florence, MT.

Florence is a census-designated place in Ravalli County, MT. According to the 2010 U.S. Census, the population of Florence was 765 (United States Census Bureau, 2015).

[

Figure 2. Potential location of War Dog Militaria ([], Florence, MT) (Google Earth, 2015)

Current State/other Federal involvement

As of November 2015, no information about radium contamination or radium cleanup was located in the public records.

Current access, activities, and uses at the site

As of November 2015, War Dog Militaria is operating as an on-line supplier of genuine issue military surplus and collectibles, which includes vintage military gauges, dials, and instrumentation that are known to contain luminous radium. The current owner is listed as []. There is no retail store, and the physical address is suspected to be the owner's residence.

Existing Engineering Controls

If the potential address is correct, no engineering controls exist (Figure 2).

Prioritization Ranking

It is suspected that radium is present at the site because vintage military items, such as aircraft dials, gauges, and instruments that are known to contain luminous radium, have been available for sale. Therefore, the site is classified as Tier 4.

References

United States Census Bureau. Accessed October 2015.
<http://quickfacts.census.gov/qfd/states/30/30081.html>.

War Dog Militaria. 2015. <https://wardogmilitaria.com>

Waterbury Clock Company: Site Summary

The following information was extracted from public records and the “CT File.PDF” (CT-DEP, 2009).

Addresses

0 Cherry Avenue (Building #7) (vacant)
13 Cherry Avenue (Buildings A, B, C, D, F, and M) (Enterprise Apartments)
39 Cherry Avenue (Building G) (formerly Belco; vacant and currently owned
by New Opportunities of Waterbury Inc., NOW)
177 Cherry Street (Buildings K and L) (vacant)
205 Cherry Street (Building O) (Ville Swiss Automatics)
215 Cherry Street (Buildings R and T) (vacant)
232 N. Elm Street (Buildings I and J) (NOW)
Waterbury, CT

Site Description/History

Waterbury first began as a department of Benedict and Burnham Manufacturing Company, which manufactured brass. Benedict and Burnham began manufacturing brass clocks in 1850. In 1857, the Waterbury Clock Company was formed from the original Benedict and Burnham department. By 1873, the company needed its own plant and moved to a building at the corner of Cherry Avenue and N. Elm Street (Building A in Figure 1) (U.S. Department of the Interior, 1982).

Between 1873 and 1910, Waterbury added multiple five-story buildings in the same area. As the company consumed its available land, it became necessary to add a 6th floor to many of the buildings. In 1919, radium dial painting was started at the Waterbury Clock Company. Until 1944, the entire industrial complex, on the corner of Cherry Avenue and Cherry Street in Waterbury, CT, was utilized by the former Waterbury Clock Company to manufacture time pieces painted with ²²⁶Ra.

In 1944, the name of the company was changed to the U.S. Time Corporation. Several months later, manufacturing was relocated to plants in Middlebury, CT; Little Rock, AR; and Dundee, Scotland. Benrus Clock Company purchased the complete plant in late 1944, and in 1949, the plant was subdivided into parcels and subsequently acquired by small manufacturing firms or individuals for use as storage or light industrial use (U.S. Department of the Interior, 1982).

This site summary is organized around the different parcels of the original facility. For a detailed map of the parcels and the individual buildings, see Figure 1.

0 Cherry Avenue (Building #7) (vacant)

This facility was built in 1893. The property was initially a residence and office for the Waterbury Clock Company from 1893 until 1921. The one-story annex on the east side was

built after 1893 to expand the office and create laboratory space (U.S. Department of the Interior, 1982). It is unclear if there is radium contamination in this building.

13 Cherry Avenue (Buildings A, B, C, D, F, and M) (Enterprise Apartments)

The original building (Building A) for the Waterbury Clock Company was built in 1850. The other buildings were added from 1887-1900 as the company expanded. Building A formed the nucleus of what was to become an extensive, contiguous complex of mill buildings bounded by Cherry Street, Cherry Avenue and North Elm Street. Functionally, this entire complex (Buildings A, B, C, and M) evolved as the Movement Shop where internal clock components were cast or rolled, punched, machined, finished and assembled. Building D housed the foundry and blacksmith shop; building D-1 was the boiler house (U.S. Department of the Interior, 1982). Building D-1 has been demolished and most likely did not contain radium based on its use as a boiler house. Therefore, building D-1 will not be discussed in this site summary. Radium contamination is confirmed in the other buildings by the ATSDR 1999 Public Health Assessment (PHA) [see the section in this summary titled *1998 Radiological Survey Results for the former Waterbury Clock Buildings (ATSDR PHA, 1999)*].

Radium cleanup was initiated in 2004 by the State of Connecticut. The State of Connecticut has indicated that remediation of these apartments is complete (CT-DEP, 2004); however, NRC staff will confirm this in further discussions with the State of Connecticut.

39 Cherry Avenue (Buildings G) (formerly Belco, currently vacant and owned by NOW)

Building G was built in 1894 and used by the Waterbury Clock factory for machining, finishing, packing, and shipping. Buildings P and Q (also referred to as the “Garage”, located at the northeastern end of Building G) were constructed in 1904 and historically used as an engine room, boiler room, and pump house (Haley and Aldrich, 2013). Buildings P and Q have been demolished and most likely did not contain radium based on their uses. Therefore, buildings P and Q are not included in this site summary. Radium contamination is confirmed in building G by the ATSDR 1999 Public Health Assessment (PHA) [see the section in this summary titled *1998 Radiological Survey Results for the former Waterbury Clock Buildings (ATSDR PHA, 1999)*].

177 Cherry Street (Buildings K and L) (vacant)

Prior to approximately 1900, 177 Cherry Street was occupied by several residences. The existing masonry structures were constructed in 1900, and until approximately the 1940s/50s, the subject site was used by the Waterbury Clock factory for shipping and storage as well as operations including gears, modeling, machinery, watch repair, and clock repair (Haley and Aldrich, 2013). It is unclear if there is radium contamination in these buildings.

205 Cherry Street (Building O) (Ville Swiss Automatics)

This building was built in 1903 (U.S. Department of the Interior, 1982). It is unknown what activities were conducted by the Waterbury Clock Company in this building. Radium contamination is confirmed in this building by the ATSDR 1999 Public Health Assessment (PHA)

[see the section in this summary titled *1998 Radiological Survey Results for the former Waterbury Clock Buildings (ATSDR PHA, 1999)*].

215 Cherry Street (Buildings R and T) (vacant)

Prior to about 1900, 215 Cherry Street was occupied by several residences. Building R was built in 1904, while building T was built in 1910. From this time through 1944 the buildings were used by the Waterbury Clock factory (Haley and Aldrich, 2013). Radium contamination is confirmed in these buildings by the ATSDR 1999 Public Health Assessment (PHA) [see the section in this summary titled *1998 Radiological Survey Results for the former Waterbury Clock Buildings (ATSDR PHA, 1999)*].

232 N. Elm Street (Buildings I and J) (NOW)

It is unknown when buildings I and J were built. Due to the interior design of Building J, it is suspected that the Waterbury Clock Company used it as a machine shop (U.S. Department of the Interior, 1982). Radium contamination is confirmed in these buildings by the ATSDR 1999 Public Health Assessment (PHA) [see the section in this summary titled *1998 Radiological Survey Results for the former Waterbury Clock Buildings (ATSDR PHA, 1999)*].

By 1917, approximately 3000 people worked at the Waterbury factory (newoppinc.org, 2012). The last watchmaker moved out in 1948, and the buildings were later used to make lingerie, neckties and belts. Currently, uses of the complex include residential apartments, industrial manufacturing, storage, and office activities.

The amount/extent of radium contamination at these sites (including historical information and/or informed assumptions about the radium facilities' structures/areas, processes, and activities)

The following is a high level summary of activities that have taken place at the former Waterbury Clock Company to address radium and other contamination.

In 1998, the US EPA contacted the Agency for Toxic Substances and Disease Registry (ATSDR) to assist in conducting a public health assessment of structures that once housed clock factories in four Connecticut municipalities. The purpose of the health assessment was to evaluate the radiological survey data previously collected by the Connecticut Department of Environmental Protection (CT-DEP) at structures that once housed clock factories and to determine whether a public health hazard exists at any of these sites from the radiological contamination. The CT DEP requested assistance from the US Department of Energy (DOE) in conducting radiological surveys of the structures that once housed clock factories and the surveys were completed in April of 1998 (ATSDR, 1999).

The ATSDR (1999) Public Health Assessment (PHA) concluded that radiological contamination was detected at levels that may pose a public health hazard to occupants of the former Waterbury Clock Company buildings; however, ATSDR stated that none of the radiation levels detected pose an

immediate health problem. The Connecticut Department of Public Health recommended that individuals be disassociated from areas with radiation at levels exceeding 15 mrem/year.

Radiological survey results (measured in April 1998) reported in the ATSDR PHA (1999) for the former Waterbury Clock Company buildings are in the following tables. It is unclear if the vacant buildings were tested during the survey or if they have radium contamination.

1998 Radiological Survey Results for the former Waterbury Clock Buildings (ATSDR PHA, 1999)

0 Cherry Avenue (Building #7) (vacant)

It is unclear if there is radium contamination in this vacant building. This building is not mentioned in the ATSDR PHA (1999). It is included in this summary for completeness.

13 Cherry Avenue (Buildings A, B, C, D, F, and M) (Enterprise Apartments)

Town: Waterbury Clock Company Name: Waterbury Clock Company Current Occupant(s): Enterprise Apartments

Radiological Parameters (units)	Location	Measurement Description	Maximum Level	Background	CL	
Gamma radiation (uR/hr)	1st floor	Direct contact	0	10	15	
		Measured at Waist level	0			
	2nd floor	Direct contact	0			
		Measured at Waist level	0			
	3rd floor	Direct contact	0			
		Measured at Waist level	0			
	4th floor Apt 417	Direct contact	240			
		Measured at Waist level	15			
	5th floor Apt 505	Direct contact	30			7
		Measured at Waist level	12			
	5th floor Apt 507	Direct contact	90			10
		Measured at Waist level	30			
	5th floor Apt 508	Direct contact	28			8
		Measured at Waist level	12			
	5th floor Apt 512	Direct contact	30			7
		Measured at Waist level	15			
	5th floor Apt 513	Direct contact	45			8
		Measured at Waist level	15			
	5th floor Apt 514	Direct contact	100			10
		Measured at Waist level	30			
	5th floor Apt 515	Direct contact	110			8
		Measured at Waist level	20			
	5th floor Apt 516	Direct contact	25			12
Measured at Waist level		15				
5th floor Apt 517	Direct contact	120	10			
	Measured at Waist level	18				
5th floor Apt 520	Direct contact	30	10			
	Measured at Waist level	15				
5th floor Apt 525	Direct contact	70	8			
	Measured at Waist level	12				
5th floor Hall	Direct contact	800	8			
	Measured at Waist level	80				
Radon-222 (pCi/L)	4th floor	Not applicable	1.5	NR	4	

39 Cherry Avenue (Buildings G) (formerly Belco, currently vacant and owned by NOW)

Town: Waterbury Clock Company Name: Waterbury Clock Company Current Occupant(s): Belco 2nd floor

Radiological Parameter (units)	Location	Measurement Description	Maximum Level	Background	CL
Gamma radiation (uR/hr)	Cutting Room	Direct contact	55	10	15
		Measured at Waist level	55		
	Machine Room	Direct contact	140		
		Measured at Waist level	140		
Alpha activity(dpm/100 cm ²)	Cutting Room	Measurement of Loose Material (Smear)	<MDA	NR	20
	Machine Room	Measurement of Loose Material (Smear)	150	NR	
Beta Gamma activity(dpm/100 cm ²)	Cutting Room	Measurement of Loose Material (Smear)	<MDA	NR	20
	Machine Room	Measurement of Loose Material (Smear)	232	NR	

Town: Waterbury Clock Company Name: Waterbury Clock Company Current Occupant(s): Belco 3rd floor Highest radiation level detected

Radiological Parameter (units)	Location	Measurement Description	Maximum Level	Background	CL
Gamma radiation (uR/hr)	Hallway	Direct contact	5,000	10	15
		Measured at Waist level	1,500		
	Store room	Direct contact	3,200		
		Measured at Waist level	250		
	Liba room	Direct contact	300		
		Measured at Waist level	52		
Alpha activity (dpm/100 cm ²)	Hallway	Measurement of Loose Material (Smear)	7,985	NR	20
	Store room	Measurement of Loose Material (Smear)	4,438	NR	
	Liba room	Measurement of Loose Material (Smear)	328	NR	
Beta Gamma activity (dpm/100 cm ²)	Hallway	Measurement of Loose Material (Smear)	16,636	NR	20
	Store room	Measurement of Loose Material (Smear)	9,242	NR	
	Liba room	Measurement of Loose Material (Smear)	695	NR	

Town: Waterbury Clock Company Name: Waterbury Clock Company Current Occupant(s): Belco 4th floor

Radiological Parameter (units)	Location	Measurement Description	Maximum Level	Background	CL
Gamma radiation (uR/hr)	Store room	Direct contact	120	10	15
		Measured at Waist level	70		
Radon-222 (pCi/L)	4th floor	not applicable	6.5	NR	4
Alpha activity (dpm/100 cm ²)	Store room	Measurement of Loose Material (Smear)	19	NR	20
Beta Gamma activity (dpm/100cm ²)	Store room	Measurement of Loose Material (Smear)	<MDA	NR	20

Town: Waterbury Clock Company Name: Waterbury Clock Company Current Occupant(s): Belco 5th floor

Radiological Parameter (units)	Location	Measurement Description	Maximum Level	Background	CL
Gamma radiation (uR/hr)	Rental area	Direct contact	800	10	15
		Measured at Waist level	800		
Alpha activity (dpm/100 cm ²)	Rental area	Measurement of Loose Material (Smear)	247	NR	20
Beta Gamma activity(dpm/100 cm ²)	Rental area	Measurement of Loose Material (Smear)	516	NR	20

177 Cherry Street (Buildings K and L) (vacant)

It is unclear if there is radium contamination in these vacant buildings. These buildings are not mentioned in the ATSDR PHA (1999). They are included in this summary for completeness.

205 Cherry Street (Building O) (Ville Swiss Automatics)

Town: Waterbury Clock Company Name: Waterbury Clock Company Current Occupant(s): Ville Swiss Automatics Automotive 3rd through 5th Floors

Radiological Parameters (units)	Location	Measurement Description	Maximum Level	Background	CL	
Gamma radiation (uR/hr)	1st floor	Direct contact	Nd	20	15	
		Measured at Waist level	Nd			
	2nd floor	Direct contact	Nd			
		Measured at Waist level	Nd			
	3rd floor	Direct contact	100			
		Measured at Waist level	20			
	4th floor	Direct contact	40			20
		Measured at Waist level	20			
5th floor	Direct contact	40	13			
	Measured at Waist level	13				
Radon-222 (pCi/L)	4th floor	Not applicable	0.3		4	

215 Cherry Street (Buildings R and T) (vacant)

This address and buildings are not mentioned in the ATSDR PHA (1999); however, Haley & Aldrich (2013) mention radium contamination at 215 Cherry Street.

232 N. Elm Street (Buildings I and J) (NOW)

Town: Waterbury Clock Company Name: Waterbury Clock Company Current Occupant(s): NOW 3rd through 5th Floors

Radiological Parameters (units)	Location	Measurement Description	Maximum Level	Background	CL	
Gamma radiation (uR/hr)	3rd floor	Direct contact	60	10	15	
		Measured at Waist level	18			
	4th floor	Direct contact	180			12
		Measured at Waist level	35			
	5th floor	Direct contact	4,000			12
		Measured at Waist level	125			
Radon-222 (pCi/L)	3rd floor	Not applicable	0.8	NR	4	
	4th floor	Not applicable	8.5			

In 2001, the CT State Bond Commission approved \$750,000 to support cleanup of radioactive material found at old clock factory sites in Bristol, New Haven, Thomaston and Waterbury. It is unknown if these clean-up funds were allocated to the former Waterbury Clock Company site (Musante, 2001).

In 2003, the Valley Council of Governments (in Derby CT) contracted with Sciencetech Inc. to provide radiological surveys in former clock factory buildings in the townships of Waterbury, Bristol and Thomaston as part of the Connecticut Radium Decontamination and Decommissioning Project. Surveys in the former Waterbury Clock Company building conducted by Sciencetech Inc. identified radiological

contaminated areas in Belco, Ville Automatics, NOW, and Enterprise Apartments). Radiological survey data consisted of background counts per minute and maximum gross contact counts per minute and are presented below. (Note: Additional details of the 2003 Scientech radiological surveys are not known.)

2003 Radiological Survey Results for the former Waterbury Clock Buildings (Scientech, 2003)

Only addresses mentioned in the Scientech 2003 report are included here.

13 Cherry Avenue (Buildings A, B, C, D, F, and M) (Enterprise Apartments)

Photo Page	Town	Building	Location	Contamination Area	Surface	Approximate Area Size	Background Counts	Maximum Gross Counts (on contact)	18" Gross Count	Comments
	<p><u>Enterprise Apartments</u></p> <p>12 apartments are considered to be affected in The Enterprise Apartments. Apt. 507, 514 and 525 are vacant and all others are occupied. All spots are small and discrete either in the bedrooms or Living Rooms, except for #525 where the bathroom is shined from an area in the hallway on the 5th floor. There is a small spot by the baseboard that requires remediation. All apartments are carpeted over lay subflooring.</p>									
EA-2	Waterbury	Enterprise	Apt 507 (Vacant)	Corner of Living Room floor	Carpet over lay subflooring	1 ft x 1 ft	8,000	80,000		✓
EA-2	Waterbury	Enterprise	Apt 507 (Vacant)	Corner of Bedroom floor	Carpet over lay subflooring	1 ft x 1 ft	8,000	100,000		✓
EA-3	Waterbury	Enterprise	513-514 Hallway	Hallway floor	Carpet over lay subflooring	Spot	7,500	45,000		
EA-3	Waterbury	Enterprise	513-514 Hallway	Floor area inside waste storage room.	Tile	Spot	7,500	27,000		
EA-4	Waterbury	Enterprise	Apt 514 (Vacant)	Living Room floor	Carpet over lay subflooring	4 ft x 3 ft	8,000	70,000		✓
EA-4	Waterbury	Enterprise	Apt 514 (Vacant)	Bedroom 2 floor	Carpet over lay subflooring	3 ft x 3 ft	8,000	75,000		✓
EA-5	Waterbury	Enterprise	Apt 514 (Vacant)	Hallway floor by kitchen	Carpet over lay subflooring	Spot	7,500	10,000		✓
EA-6	Waterbury	Enterprise	514 Hallway	Floor area along window	Carpet over lay subflooring	Series of floor studs	7,500	28,000 - 38,000		
EA-7	Waterbury	Enterprise	Apt 515 (Occupied)	Living Room floor along windows	Carpet over lay subflooring	Spots	8,000	28,000 - 58,000		✓
EA-8	Waterbury	Enterprise	525 Hallway	Hallway floor	Carpet over lay subflooring	Spot (source)	8,000	980,000		
EA-9	Waterbury	Enterprise	Apt 520 (Occupied)	Bedroom floor corner	Carpet over lay subflooring	Spot	8,000	22,000		✓
EA-10	Waterbury	Enterprise	Apt 417 (Occupied)	Living Room pillar	Carpet over lay subflooring	Spot	8,000	225,000		✓

39 Cherry Avenue (Buildings G) (formerly Belco, currently vacant and owned by NOW)

BELCO

2nd Floor, machine shop & belt cutting area - Several areas along the North Wall and by workbenches.
 3rd Floor, hallway - 7 small spots around pillars and by windows. Loose contamination at 75,000 CPM. It is assumed that the readings on the outside of building are shine from this hallway area. Area is about 8' long, 6" wide that will be remediated.
 3rd Floor store room area - 6 spots around pillars.
 3rd Floor Libe Room, Many spots on walls and around pillars.
 4th Floor Stoveroom - widespread contamination.
 5th Floor - rental area - 7 spots by windows and one discrete spot on floor.

Photo Page	Town	Building	Location	Contamination Area	Surface	Approximate Area Size	Background Counts	Maximum Gross Counts (on contact)	Estimated 15' Count	Comments
	Waterbury	Belco	6th Floor	Entry Floor Needs Cleanup (uncontaminated throughout)	Wood flooring	251 ft x 41 ft				877 (4th floor is unaffected)
B-4	Waterbury	Belco	6th Floor	Floor in Lift Machines	Wood flooring	1 ft x 7 ft	8,000	38,000		
B-5	Waterbury	Belco	6th Floor	Floor in Lift Machines	Wood flooring	Spot	8,000	40,000		
B-6	Waterbury	Belco	6th Floor	Floor in Lift Machines	Wood flooring	Spot	8,000	58,000		
B-7	Waterbury	Belco	6th Floor	Floor in Lift Machines by south pillar	Wood flooring	Spot (below background in surrounding 2 ft x 2 ft area)	8,000	700,000		
B-8	Waterbury	Belco	6th Floor	Floor in NB	Wood flooring	Behind Hiding Door	8,000	40,000		
B-9, B-10	Waterbury	Belco	6th Floor	NB floor along ceiling door wall	Wood flooring	3 ft x 8 ft (30 ft x 12 ft Area in "ceiling")	8,000	28,000	115,000	21 uSv/h
B-10	Waterbury	Belco	6th Floor	NB Floor by pillar	Wood flooring	Spot	8,000	42,000		
B-11	Waterbury	Belco	6th Floor	NB floor by flag	Wood flooring	Various spots (area needs to be cleaned)	8,000	40,000		
B-12	Waterbury	Belco	6th Floor	NB Floor	Wood flooring	Various spots	8,000	15,000		
B-13	Waterbury	Belco	6th Floor	NB wall by window	Plaster tiles	Spot	10,000	330,000	37,000	402 uSv/h
B-13	Waterbury	Belco	6th Floor	NB floor by window	Wood flooring	Spot	10,000	285,000	33,000	
B-14	Waterbury	Belco	6th Floor	Leatherwells floor	Wood flooring	Spot	8,000	188,000		
B-15	Waterbury	Belco	6th Floor	Leatherwells floor	Wood flooring	5 ft x 12 ft	8,000	30,000		
B-16	Waterbury	Belco	6th Floor	Leatherwells floor around most pillars	Wood flooring	Around most pillars	8,000	25,000		Most pillars were 20 uSv/h
B-17, 18, 19	Waterbury	Belco	6th Floor	Throughout entire floor	Wood flooring	Various spots	8,000	80,000		Stopped - too many spots and too little time to find them all
B-21	Waterbury	Belco	7th Floor	Belt Storage floor by desk	Wood flooring	Spot	8,000	80,000		
B-22	Waterbury	Belco	7th Floor	Belt Storage floor by window	Wood flooring	Spot	8,000	30,000		
B-23	Waterbury	Belco	7th Floor	Belt Storage floor by wall	Wood flooring	Spot	10,000			
B-24	Waterbury	Belco	7th Floor	Storage 2 floor by pipe	Wood flooring	Spot	8,000	28,000		
B-26	Waterbury	Belco	7th Floor	Storage 2 floor along window	Wood flooring	20 ft x 2 ft	8,000		24,000	
B-27	Waterbury	Belco	7th Floor	Storage 2 floor by fan	Wood flooring	Spot	8,000			
B-28, 29	Waterbury	Belco	7th Floor	Storage 2 by window	Wood flooring	Various spots	8,000			
B-31	Waterbury	Belco	7th Floor	Rental Area floor spot	Wood flooring	Various spots	8,000	70,000		
B-32	Waterbury	Belco	7th Floor	Rental Area floor spot by Area 40	Wood flooring	Various spots	8,000	80,000		
B-33	Waterbury	Belco	Third Floor	Libe Room A floor area under desk by ceiling door	Wood flooring	3 ft x 3 ft	8,000	130,000		
B-38	Waterbury	Belco	Third Floor	Libe Room A floor area along window	Wood flooring	50 ft x 2 ft	8,000	20,000		
B-42	Waterbury	Belco	Third Floor	Libe Room A around most pillars	Wood flooring	Around most pillars	8,000	40,000		
B-43	Waterbury	Belco	Third Floor	Libe Room A floor	Wood flooring	Spot	8,000			
B-42	Waterbury	Belco	Third Floor	Libe Closet floor	2 in. deep concrete poured over wood	Libe storage across room	8,000	120,000-300,000	66,000	80 uSv/h
B-42	Waterbury	Belco	Third Floor	Libe Closet floor by door	2 in. deep concrete poured over wood	1 ft x 12 ft	8,000	80,000	38,000	
B-43	Waterbury	Belco	Third Floor	Floor between Libe Rooms A and B	Wood flooring	Spot	8,000	80,000		
B-44	Waterbury	Belco	Third Floor	Libe Room B floor, walls and ceiling	Wood flooring	Kidney Corporation Contamination	8,000		400,000	380 uSv/h; Extensive contamination. The size of the spots and ceiling. Area identified by Belco is not to exceed 350 uSv/h
	Waterbury	Belco	Third Floor	Libe Room B hallway	Wood flooring	Kidney Corporation Contamination	8,000		480,000	

232 N. Elm Street (Buildings I and J) (NOW)

NOW

3rd, 4th and 5th floors are affected, with a total of 13 areas. This is where NOW houses a number of small offices for a variety of businesses. All of these contaminated areas are small in size and require minimal remediation, except for the Project Read Room on the 5th floor where an area approximately 2 meters x 2 meters in the corner by the window requires remediation.

Photo Page	Town	Building	Location	Contamination Area	Surface	Approximate Area Size	Background Counts	Maximum Gross Counts (on contact)	Estimated 18" Count	Comments
N-4	Waterbury	NOW	Reading Room (Rec Area) Store Room Floor 5	Corner under files	Unable to see under boxes	Spot?	8,000	28,000		
N-3	Waterbury	NOW	Reading Room (Rec Area) Floor 5	Along windows	Carpet over lay subflooring	3 ft x 6 ft (Proposal says 2 ft x 2 ft)	8,000	> 1,000,000		30,000 in middle by wall, may need to investigate office along wall- locked and have high probability of being contaminated as they connect Reading room to Waiting room which both have contamination in the same area (along windows)
N-5	Waterbury	NOW	Fourth Floor Hallway	Floor by pillar	Carpet over lay subflooring	Spot	8,000	34,000		
N-6	Waterbury	NOW	Office (Computer Room) Floor 4	Floor	Carpet over lay subflooring	Spot	8,000	100,000		
N-7	Waterbury	NOW	Waiting Room Floor 4	Floor area along windows	Carpet over lay subflooring	4 ft x 6 ft (Proposal says "small" areas)	8,000	160,000		W2C
N-8	Waterbury	NOW	Front Office Floor 4	Floor under desk	Carpet over lay subflooring	Spot	8,000	80,000		
N-9	Waterbury	NOW	Kitchen Floor 4	Floor behind stove	Tile	Spot	8,000	26,000		"warm" by window
N-10	Waterbury	NOW	Family Preser Floor 4	Spotty contamination	Carpet over lay subflooring	Difficult to tall (needs more survey)	9,000	30,000		W2C General area is 24,000
N-11	Waterbury	NOW	Family Preser Manager's Office Floor 4	Floor by chairs and behind bin	Carpet over lay subflooring	Various Spots	9,000	20,000		W2C General area is 24,001
N-12, 13	Waterbury	NOW	Headstart (Law Office) Floor 4	Corner by wall	Carpet over lay subflooring	1 ft x 6 in	8,500	44,000		W2C
N-14	Waterbury	NOW	Headstart (Law Office) Floor 4	Middle pillar- up to 5 ft	Concrete	Up length of pillar up to 5 ft	8,500	83,000		
N-14	Waterbury	NOW	Headstart (Law Office) Floor 4	Floor by window and pillars	Carpet over lay subflooring	Various Spots	8,500	130,000		W2C
N-14	Waterbury	NOW	Headstart (Law Office) Floor 4	Front Left Window	Carpet over lay subflooring	Various Spots	8,500	250,000		W2C
N-15	Waterbury	NOW	RSVP Office Floor 3	By window and outlet	Carpet over lay subflooring	Spot	8,000	13,000		"warm" by window

According to the CT-DEP (2009), hand-written notes (author unknown) were provided for the Scientech cleanup in 2004. In the former Belco facility (39 Cherry Avenue, building G), workers removed flooring materials on the 5th and 6th floors and determined that about 50% was cleared for disposal. For Enterprise Apartments (13 Cherry Avenue, buildings A, B, C, D, F, and M), cleanup began by removing flooring in apartments 507, 514, and 525. For NOW (232 N. Elm, buildings I and J) and the rest of Enterprise Apartments, cleanup began but was stopped due to discovery of asbestos. It is unclear if the remediation by Scientech was completed at all 3 of the facilities (Belco, Enterprise Apartments, and NOW).

In 2011, EPA awarded New Opportunities of Waterbury, Inc. (NOW) a series of three \$200,000 grants to clean up Waterbury Clock Company and other sites under the Brownfields Program. The "Analysis of Brownfields Cleanup Alternatives, Cherry Street Project: 0 Cherry Avenue, 39 Cherry Avenue, 177 Cherry Street, 215 Cherry Street, Waterbury, Connecticut" was produced by Haley & Aldrich, Inc. (September, 2013). The funding and analysis indicate contamination issues persist; however, the report does not mention recent radiation surveys or specific information on extent of contamination. It is unknown if the remediation occurred and what exactly was remediated with this funding.

In conclusion, it is unclear from the public records if remediation of radium was completed for the facilities where remediation was initiated (13 Cherry Avenue, Enterprise Apartments; 39 Cherry Avenue, Belco; and 232 N. Elm, NOW). It is unclear if remediation of radium was ever initiated in the other

contaminated facilities (205 Cherry Street, Ville Swiss Automatics; 215 Cherry Street, vacant). Specifically, the State of Connecticut has indicated that remediation of Enterprise Apartments is complete (CT-DEP, 2004); however, NRC staff will confirm this in further discussions with the State of Connecticut, as it is unclear from the June 9, 2004 letter that all affected areas were cleaned up. It is important to note that even though radiation was detected in some areas of Enterprise Apartments, all of these areas may not merit cleanup. If the calculated doses were within the State's release criteria in place at that time, cleanup would not have been needed.

Summary of Current Radium Levels:

As of November 2015, current levels of radium are unknown based on information reviewed for this report.

Location and population near the sites

Ville Swiss Automatics (205 Cherry Street, building O) has around 12 employees; NOW (232 N. Elm Street, buildings I and J) has 500 employees spread across 14 different U.S. locations (unknown how many work in the Waterbury office); and Enterprise Apartments (13 Cherry Avenue, buildings A, B, C, D, F, and M) has 134 apartments with 1-4 people per apartment, ranging in ages from newborn through elderly. It also should be noted that there are residential areas within close proximity to the former Waterbury clock company.

Waterbury, a city in New Haven County, CT, is on the Naugatuck River, 33 miles southwest of Hartford and 77 miles northeast of New York City. According to the 2010 U.S. Census, the population of Waterbury was 110,366; the 2014 population estimate for the city was 109,307 (United States Census Bureau, 2015).



Figure 1. Location of Waterbury Clock Company Facilities and surrounding Affected Facilities (1 – 13 Cherry Ave, buildings A, B, C, D, F, and M, Enterprise Apartments; 2 – 0 Cherry Ave, building #7, vacant; 3 – 177 Cherry St, buildings K and L, vacant; 4 – 205 Cherry St, building O, Ville Swiss Automatics; 5 – 215 Cherry St, buildings R and T, vacant; 6 – 232 N Elm St, buildings I and J, NOW; 7 – 39 Cherry Ave, building G, formerly Belco, now vacant and owned by NOW) (Google Earth, 2015)

Current State/other Federal involvement

In 2001, the CT State Bond Commission approved \$750,000 to support cleanup of radioactive material found at old clock factory sites in Bristol, New Haven, Thomaston and Waterbury. It is unknown how much of these clean-up funds were allocated to the former Waterbury Clock Company site and how much cleanup was completed with these funds.

In 2013, Haley & Aldrich (2013) prepared an Analysis of Brownfields Cleanup Alternatives that detailed proposed cleanup strategies for the following Waterbury addresses: 0 Cherry Avenue, 39 Cherry

Avenue, 177 Cherry Street, and 215 Cherry Street. Grant fund was limited to \$200,000 per property. It is unknown how much cleanup was completed with these funds.

Current access, activities, and uses at the site

0 Cherry Avenue (Building #7) (vacant)

After the Waterbury Clock Company closed, this building was used as a social club from 1950 to 1956 and then as a bakery from 1959 to 1977. The building has been vacant since 1977 (Haley & Aldrich, 2013).



Figure 2. 0 Cherry Avenue (Building #7, vacant) (Google Earth, 2015)

13 Cherry Avenue (Buildings A, B, C, D, F, and M) (Enterprise Apartments)

These buildings are currently occupied by Enterprise Apartments. Enterprise Apartments are designed for people aged 62 or older or for younger people with disabilities. There are 134 apartments.



Figure 3. 13 Cherry Avenue (Buildings A, B, C, D, F, and M; Enterprise Apartments) (Google Earth, 2015)

39 Cherry Avenue (Building G) (formerly Belco, currently vacant and owned by NOW)

After Waterbury Clock Company closed, operations at this building included the manufacture and distribution of leather belts, handbags, and neckties by the Belco Company. The 39 Cherry Avenue building has been vacant since 2004 (Haley & Aldrich, 2013). NOW currently owns this building and has plans to redevelop it in the future.



Figure 4. 39 Cherry Avenue (Building G; formerly Belco, now vacant and owned by NOW)
(Google Earth, 2015)

177 Cherry Street (Buildings K and L) (vacant)

177 Cherry Street was used as a clothing manufacturer and manufacturer of metal products from the 1960s through the 1970s. There is limited information on site use since the 1980s. The building is currently vacant (Haley & Aldrich, 2013).



Figure 5. 177 Cherry Street (Buildings K and L, vacant) (Google Earth, 2015)

205 Cherry Street (Building O) (Ville Swiss Automatics)

205 Cherry Street was used as an office and storage space after Waterbury Clock Company closed (Haley & Aldrich, 2013). It is currently occupied by Ville Swiss Automatics, a CNC, Swiss and Escomatic Screw machine company.



Figure 6. 205 Cherry Street (Building O, Ville Swiss Automatics) (Google Earth, 2015)

215 Cherry Street (Buildings R and T) (vacant)

From 1953 through 1958, the building was occupied by a manufacturer of underwear, surgical instruments, and metal products. From 1960s through 2002, the building's use fluctuated from being vacant to a clothing and leather products manufacturer. The 215 Cherry Street building has been vacant since around 2004 (Haley & Aldrich, 2013).



Figure 7. 215 Cherry Street (Buildings R and T, vacant) (Google Earth, 2015)

232 N. Elm Street (Buildings I and J) (NOW)

New Opportunities of Waterbury, Inc., (NOW) owns this former clock factory building. All original windows have been replaced, the outside has been resurfaced, and the interior has been refinished for office use (Haley & Aldrich, 2013). NOW also plans to turn other vacant parts of the clock factory into a hydroponic farm, while another agency hopes to move a plumbing company onto the century-old industrial campus.



Figure 8. 232 N. Elm Street (Buildings I and J, NOW) (Google Earth, 2015)

Existing Engineering Controls

According to figures 2-7 (Google Earth, 2015), the areas around the vacant building are fenced; however, it appears to be a deterrent not a preventative measure to access. In addition, there is mention by Haley & Aldrich (2013) of vandalism inside some of the buildings, indicating that existing controls are not sufficient to prevent trespassing.

Prioritization Ranking

Radium is confirmed to have been present at the site based on historical documentation of radium use and radiological surveys. The site consists of buildings that are potentially contaminated by radium. Some of the buildings are occupied. The extent of previous remediation at all locations is unknown. Therefore, the site is classified as Tier 1.

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Summary of Waterbury Clock Company Information in "CTfile.pdf"(CT DEP, 2009)

Site_Name	Source_date	Title	Pages
Waterbury Clock Company	March 2004	Belco factory hand written notes	1371-1372
Waterbury Clock Company	Jan 1998- Jan 1999	Chronology of Events of Radium Dial Clock Factories	1-2
Waterbury Clock Company	unknown	Clock Factory Contacts	
Waterbury Clock Company	April 21, 1998	Department of Energy (DOE) Radiological Assistance Report cover letter and Radiological Assistance Call notes	744-747
Waterbury Clock Company	1999	Document number 82A9499	511-514
Waterbury Clock Company	unknown	Information about Belco from CT file	1626-1631; 1654-1671
Waterbury Clock Company	Jan 12 - Apr 16, 2004	Notes for Enterprise Apartment 507	1359-1363, 1369
Waterbury Clock Company	Jan 20 - Apr 16, 2004	Notes for Enterprise Apartment 514 cleanup	1359-1363, 1369
Waterbury Clock Company	Apr 1 - Apr 16, 2004	Notes for Enterprise Apartment 525 (hall) cleanup	1359-1363, 1369
Waterbury Clock Company	January 29, 1999	PUBLIC HEALTH ASSESSMENT; PUBLIC HEALTH IMPLICATIONS OF RADIATION CONTAMINATION AT FORMER CLOCK FACTORIES LOCATED IN BRISTOL (HARTFORD COUNTY), NEW HAVEN (NEW HAVEN COUNTY), THOMASTON (LITCHFIELD COUNTY), AND WATERBURY (NEW HAVEN COUNTY) CONNECTICUT	1578-1619
Waterbury Clock Company	April 4, 1998	Radium Contamination at Former Watch Manufacturers in Waterbury, CT	3-33
Waterbury Clock Company	April 4, 1998	Radium Contamination at Former Watch Manufacturers in Waterbury, CT	3-33
Waterbury Clock Company	April 4, 1998	Radium Contamination at Former Watch Manufacturers in Waterbury, CT	3-33
Waterbury Clock Company	April 4, 1998	Radium Contamination at Former Watch Manufacturers in Waterbury, CT	3-33
Waterbury Clock Company	unknown	Update for the Old Waterbury Clock Factory Complex	1481-1484
Waterbury Clock Company	unknown	Update for the Old Waterbury Clock Factory Complex	1481-1484
Waterbury Clock Company	unknown	Update for the Old Waterbury Clock Factory Complex	1481-1484

William L. Gilbert Clock Company: Site Summary

The following information was extracted from public records.

Address

13 Wallens Street, Winsted, CT

Site Description/History

The William L. Gilbert Clock Company at one time was one of the largest clock-makers in the world. Originally, a gristmill built by Elias Balcomb in 1776 occupied the site. The clock factory employed 500 workers and produced two thousand clocks per day. One of Gilbert's products was "Night and Day Radium Dial Clocks." The "LUMA-nous" dial was developed by the Gilbert Engineering Department. Gilbert's concentration of radium upon hands and hour-markings means a stronger radiance at the points where light is needed, according to an advertisement in Literary Digest in 1920 (Funk and Wagnalls, 1920).

The Gilbert Manufacturing Company was founded in 1866 at the corner of Wallens St and N. Main in Winsted, CT. After a fire in 1871 destroyed the first building, Gilbert constructed two new brick factory buildings at the same location and changed the name to the William L. Gilbert Clock Company. In 1934, the company's name changed again to the Gilbert Clock Corporation (Macey S, 2013).

In 1955, the clock business began to suffer; the building was heavily damaged by a flood and it was gutted (Hartford Courant, 1997). General Computing Machines took ownership of the clock company's buildings in 1957 and changed the name to General-Gilbert Corporation (Macey S, 2013). General-Gilbert Corporation ceased operations and the facility was sold in 1964 (Hartford Courant, 1997).

In 1975 most of the facility was destroyed by fire, leaving only two of the original Gilbert Clock Factory brick buildings (Hartford Courant, 1997). The buildings were empty for about 20 years when they were converted into about 70 apartments in 1997 (Hartford Courant, 1997). The buildings were gutted and rebuilt, except for the existing exterior walls and the heavy floor beams (F. Mustante, 2001).

According to historical documentation, radium is confirmed to have been present at the site. The site consists of buildings that are potentially contaminated with radium. The original clock manufacturing buildings were gutted and remodeled, except for the existing exterior walls and the heavy floor beams. The extent of previous remediation is unknown. Soil at the site is potentially contaminated with radium.



Figure 1. 13 Wallens Street (1907-1915) (Geocaching, 2015).

The amount/extent of radium contamination at these sites (including historical information and/or informed assumptions about the radium facilities’ structures/areas, processes, and activities)

A preliminary survey of clock factories by the CT DEP in the late 1990s indicated there was no radium contamination at the Gilbert Clock Company (as reported by F. Mustante, 2001 from D. A. Galloway at CT DEP). The survey data was not located.

Summary of Current Radium Levels:

As of November 2015, current levels of radium are unknown based on information reviewed for this report.

Location and population near the sites

The site is located in a residential area of Winsted (Figure 2). Winsted is an incorporated city in Litchfield County, Connecticut. It is part of the town of Winchester and has a total area of 4.8 square miles. According to the 2010 U.S. Census, the population of Winsted was 7,712; the 2014 population estimate for the city was not provided (United States Census Bureau, 2015).

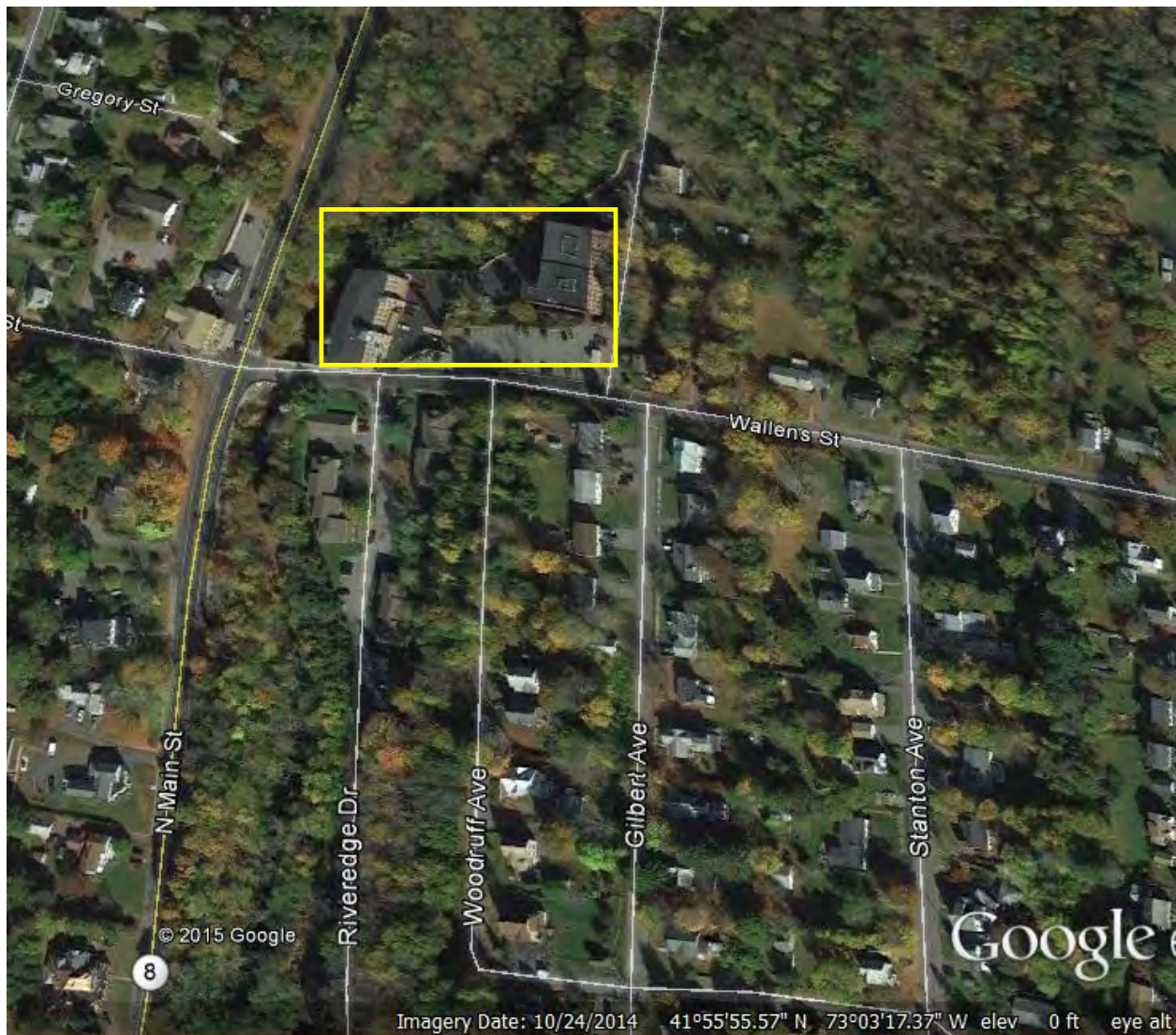


Figure 2. Approximate location of 13 Wallens Street (2014) (Google Earth, 2015)

Current State/other Federal involvement

An extensive internet search of public records did not reveal any information about contamination/cleanup of the facility, especially involving radium.

Current access, activities, and uses at the site

As of November 2015, Gilbert Clock Shop Apartments are located at the Wallens Street address (Figure 3).



Figure 3. 13 Wallens Street (Gilbert Clock Shop Apartments in 2009) (Google Earth, 2015)

Existing Engineering Controls

No engineering controls exist, as the site is currently residential apartments (Gilbert Clock Shop Apartments, Figure 3).

Prioritization Ranking

Radium is confirmed to have been present at the site based on historical documentation that radium was applied to “LUMA-nous” dials. The site consists of buildings that are potentially contaminated with radium. The original clock manufacturing buildings were gutted and remodeled, except for the existing exterior walls and the heavy floor beams. The extent of previous remediation is unknown. Soil at the site is potentially contaminated with radium. The site is occupied or frequented by visitors. Therefore, the site is classified as Tier 1.

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November 24, 2015

[YNYXSE_k8&hl=en&sa=X&ei=a5NOVNWklbeOsQSdhIGIAw&ved=0CCQQ6AEwAQ#v=onepage&q=william%20%20gilbert%20clock%20radium&f=false.](https://www.nytimes.com/2015/11/24/us/local/winsted-ct-clock-complex.html)

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