
U.S. Army Corps of Engineers
Formerly Utilized Sites Remedial Action Program

**Preliminary Assessment
of the Wolff-Alport Chemical
Company as Related to the Nation's
Early Atomic Energy Program**

Queens, NY

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**US Army Corps
of Engineers®**

ACRONYMS

AEC	Atomic Energy Commission
ATSDR	Agency for Toxic Substance and Disease Registry
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
ER	Engineering Regulation
FUSRAP	Formerly Utilized Sites Remedial Action Program
HRS	Hazard Ranking System
NPL	National Priorities List
PA	Preliminary Assessment
pCi/g	picocuries per gram
ROPC	Radionuclides of Potential Concern
USACE	United States Army Corps of Engineers
USDOE	United States Department of Energy
USEPA	United State Environmental Protection Agency
WACC	Wolff-Alport Chemical Company

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Executive Summary

The purpose of a Preliminary Assessment (PA) at eligible Formerly Utilized Sites Remedial Action Program (FUSRAP) sites is to determine if there is an unpermitted release or threat of release, as those terms are defined in Section 101 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), of a hazardous substance, pollutant, or contaminant related to the Nation's early atomic energy program at the site that may present a threat to the public health or to the environment and to determine the extent to which response action under CERCLA is required to address FUSRAP related contamination at the site. The Wolff-Alport Chemical Company (WACC) (the Site) is an atypical situation in that the Site is already on the United States Environmental Protection Agency's (USEPA) National Priorities List (NPL) due to radiological contamination that potentially has FUSRAP eligible contributions in addition to known non-FUSRAP eligible contributions. The USEPA added the WACC to the NPL on May 12, 2014. So as to not duplicate efforts, the USACE PA is written as a memorandum and is intended to summarize the findings of USEPA and serve as USACE documentation of a release or threat of release (which results in a threat to the public health or the environment) and to discuss information related to determining if this release is related to the nations early atomic energy program.

Evidence of a release into the environment of a hazardous substance, pollutant, or contaminant from the former Wolff-Alport Site potentially resulting in an unacceptable risk has already been documented by the USEPA. Identifying if this release was related to the Nation's early atomic energy program cannot be definitively determined at this time with the available information. Rare earths analysis of samples could possibly be helpful in understanding what, if any, of the contamination at the Site is related to the post rare earth processing material.

The potential risks from FUSRAP related contamination, if proven to exist, at the Site would likely be very small due to the timing of the AECs material purchase. The Government was not involved in operations of the former WACC for most of their commercial business and only purchased what was originally a waste material from the operations. Thus any potential contamination related to the nation's early atomic energy program is likely to be an extremely small portion of the overall contamination at the site.

Contamination at the former WACC is currently being addressed by the USEPA as a NPL site, therefore, the USACE does not recommend this site for inclusion in the FUSRAP.

Introduction

The purpose of a Preliminary Assessment (PA) at eligible Formerly Utilized Sites Remedial Action Program (FUSRAP) sites is to determine if there is an unpermitted release or threat of release, as those terms are defined in Section 101 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), of a hazardous substance, pollutant, or contaminant related to the Nation's early atomic energy program at the site that may present a threat to the public health or to the environment and to determine the extent to which response action under CERCLA is required to address FUSRAP related contamination at the site. The scope of the United States Army Corps of Engineers' (USACE) review during performance of this PA included review of readily available information and historical documentation research. The Wolff-Alport Chemical Company (WACC) (the Site) is an atypical situation in that the Site is already on the United States Environmental Protection Agency's (USEPA) National Priorities List (NPL) due to radiological contamination that potentially has FUSRAP eligible contributions in addition to known non-FUSRAP eligible contributions. For a site to be listed on the NPL, the USEPA must determine that a release of a hazardous substance has or threatens to occur at the site. The USEPA's Hazard Ranking System (HRS) Package for the WACC reported an assigned value equal to the maximum value for an observed release, thus indicating a release of a hazardous substance has occurred. The overall HRS score of 50 is one indication the Site may need to be addressed by CERCLA (USEPA 2013). Accordingly, the USEPA added the WACC to the NPL on May 12, 2014. So as to not duplicate efforts, and work efficiently, this USACE PA is written as a memorandum and is intended to summarize the findings of USEPA and serve as USACE documentation of a release or threat of release (which results in a threat to the public health or the environment) and to discuss information related to determining if this release is related to the nations early atomic energy program.

Key Documents

A large amount of information that would typically be detailed in a traditional CERCLA PA can be found in a few key documents. Those documents are referenced throughout this PA and a brief summary of each is listed below. A complete list of cited references is included in the References section.

Wolff-Alport Chemical Corporation Elimination Report. This 1987 USDOE report focuses on site operations and potential Government liability and authority at the site. For contamination to be considered under FUSRAP it must be associated with the nation's early atomic energy program or otherwise be included in FUSRAP by Congress. This document serves to eliminate the site from consideration under the FUSRAP. The document does however suggest further investigations may be warranted to address non-FUSRAP contamination (USDOE 1987).

Health Consultation Former Wolff-Alport Chemical Corporate Site. This report from 29 February 2012 and completed by the U.S. Department of Health and Human Services Agency for Toxic Substance and Disease Registry (ATSDR) was at the request of USEPA that ATSDR evaluate current potential health threats through all potential exposure pathways to near-by residents, on-site workers, and persons that visit the buildings at the former site and/or pass through the block where the current businesses are located. This report included minimal documentation about site history and recommended a more thorough characterization of the contamination as well as measures to reduce exposure to contamination. This report did however evaluate theoretical risks from estimated doses and found that the workers from the auto body shop may have an elevated risk of concern from exposure to ionizing radiation and their exposures may exceed the ATSDR Minimal Risk Level for Ionizing Radiation (USDHHS 2012). Using the values and theoretical approach in this ATSDR report, the USACE calculated the site risk from the external pathway to be 5.7E-4 to 1.4E-2 for workers who are onsite for 25 years.

Hazard Ranking System (HRS) Package, Wolff-Alport Chemical Company. This report from December 2013 summarizes that “Thorium-232 concentrations up to 1,133 picocuries per gram (pCi/g) were reported for the soil samples containing waste, while background was reported to be 0.5 pCi/g to 1.0 pCi/g. The soil screening concentration for cancer corresponding to that concentration that corresponds to the 10^{-6} individual cancer risk for oral (ingestions) exposures of thorium-232 is 3.4 pCi/g” (USEPA 2013). *Multi-Agency Former Wolff Alport Chemical Company Neighborhood Radiological Assessment.* This report from 12 March 2014 documents the assessment conducted 29 July-05 August 2013 by New York State Department of Health, New York City Department of Health and Mental Hygiene, and the United States Environmental Protection Agency. The report details walk-over gamma surveys, radionuclide analysis of soil, thoron in air measurements, and mobile detector surveys. The conclusion of this assessment was that there is no off-site exposure to the surrounding community from radiological contaminants located at the former WACC. The one small area of off-site contamination located below the curb at 1103 Irving Avenue does not provide a significant source of exposure. (USEPA 2016). The focus of this report is the assessment itself and has limited site history or details.

Final Work Plan, Wolff-Alport Chemical Company Site Remedial Investigation/Feasibility Study. This document from November 2014 details the work to be performed by the USEPA to gather soil, groundwater, sediment, and building materials data appropriate to complete a Remedial Investigation, Human Health Risk Assessment, and a Focused Feasibility Study (USEPA 2014b). Until USEPA documents the outcome of this work, contaminant distribution and associated risk are not fully known.

Site Information

Location and Description

The former WACC operated at 1127 Irving Avenue in the Ridgewood section of Queens, NY. The Site is on the border of Brooklyn and Queens and is on a relatively short 73 meter block. The area of the Site (which includes the abandoned rail spur) is bordered to the south by Irving Avenue, to the west by Cooper Avenue, and to the north and east by a former cabinet manufacturing facility. This area is a densely industrial area, with this block specifically occupied currently by a delicatessen, auto-body repair shop, and ice machine repair/rental shop. The structures on the property are essentially contiguous. The entire area of the Site, not including the sewer, sits on a triangular property covering approximately 0.75 acres (USEPA 2014b).

Background

The former WACC operated a commercial chemical operation as early as the 1920's until 1954, including extraction of rare earth elements from monazite sand. (USEPA 2012) Waste by-products of this process include thorium and to a lesser degree uranium and their daughter products. (USEPA 2016). One of the commonly accepted waste practices of the time included disposing of the residues in the sewer, which is how the WACC disposed of the liquor waste that was a by-product of their operations. The Government had no involvement in WACC operations until the fall of 1947 when the recently created Atomic Energy Commission (AEC) ordered the WACC to halt the practice of disposing of their waste in the sewer, and this material was subsequently precipitated as an oxalate sludge and sold to the AEC (USDOE 1987). The actual processes used at WACC are unknown. The contract between the AEC and the WACC, AT-30-1-GEN-287 has not been located (USDOE 2013). Documentation indicates the AEC procured approximately 360,017 pounds of thorium oxalate sludge from WACC between 1948 and 1954 (USDOE 1966). This material was repackaged at the Middlesex Sampling Plant and comprised 839 drums. In addition, the Government purchased 1 drum of thorium nitrate in 1954 which WACC reportedly had in storage for 15 years. (USDOE 1987)

The Wolff-Alport Chemical Company is CERCLIS ID NYC200400810 and is located at 1125-1139 Irving Avenue, Ridgewood, NY. On May 12, 2014, the Federal Register listing added the Wolff-Alport Chemical Company in Ridgewood, NY to the General Superfund Section of the NPL. This was based on an HRS score of 28.50 or above. USEPA has since been addressing this site as part of the NPL and is currently in the Remedial Investigation and Feasibility Study phase. (USEPA 2014a) Between 2012 and 2014, prior to the Site being listed on the NPL, the USEPA conducted a short-term, time-critical response action at the Site.

Isotopes of Concern

Radiological contamination at the Site exists under buildings, on the former railroad property behind the buildings, and in the sewer. Contamination comes from thorium-232, uranium-238, and their associated daughter products.

Thorium-232 (Th-232) and its daughters are the primary radiological contaminants at the Site. Thorium-232 is a naturally occurring, radioactive isotope, decaying primarily by alpha emission with accompanying gamma radiation. Thorium produces several Radionuclides of Potential Concern (ROPC), including gamma emitting actinium-228 (Ac-228), lead-212 (Pb-212), bismuth-212 (Bi-212), radium-224 (Ra-224) and the gas radon-220 (Rn-220). Uranium-238 is a naturally-occurring, radioactive isotope, decaying primarily by alpha emission with accompanying gamma radiation. Uranium produces several ROPCs including radium-226 (Ra-226), lead-210 (Pb-210) and the gas radon-222 (Rn-222) (USEPA 2016).

Summary of Physical conditions

Geology

The sediments underlying the site consist of a roughly 250 foot thick layer of Upper Pleistocene deposits followed by a roughly 50 foot thick Gardiners Clay Unit, followed by 2 members of the Raritan Formation. Depth to bedrock is 450 feet (NYCDDC 2010).

Hydrogeology

Groundwater at the site is expected to be approximately 50 to 60 feet below ground surface and flow generally south to southwest before reaching Jamaica Bay which is approximately 2.5 miles away from the site. Historic industrial pumping may have caused a shift from what was previously a westerly to northwesterly flow. The site is situated within the upper glacial aquifer, which is among the highest yielding aquifers in Kings County (NYCDDC 2010).

Animals, vegetation, sensitive environments

Limited ecological receptors exist in the vicinity of the site. The USEPA chose not to conduct any ecological characterization as part of their RI/FS for this reason. (USEPA 2014b).

Climate

Queens, New York is considered a Koppen Climate Classification subtype (humid subtropical climate), characterized by relatively high temperatures and evenly distributed precipitation throughout the year. The average temperature for the year is 54.1 degrees Fahrenheit. The average precipitation for the year is 42 inches. Climate data was obtained from <http://www.weatherbase.com>.

Exposure Setting

Primary Concern

A requirement of a PA is to review information about exposure targets, which are essentially the groups that could be impacted by an exposure. The neighborhood where the site is located consists of a mix of light industry businesses, private homes, multi-apartment residencies, schools, day care centers, stores, and art workshops in a dense urban setting. About 1.8 million people live within 6.4 km (4 mile) distance the site; 24,724 people live within 0.8 km (0.5 mile) distance (USEPA 2012b). Commercial and light industrial operations currently exist on the former WACC Site.

Secondary Concerns

The WACC Site and the surrounding community are heavily developed dense urban settings. There are no known sensitive habitats and any that may have existed near the Site are highly disturbed by past activities and the industrial nature of the area around the Site. There is limited viable habitat for sensitive ecological receptors under the current conditions. Therefore, there is no potential for releases attributable to the Nation's early atomic energy program to sensitive environments as defined in 40 CFR 300, Appendix A, Table 4-23.

Pathways Summary

Soil

Soils around the area of the former WACC are known to be contaminated by thorium-232, uranium-238 and their associated daughter products. The Site is in an industrial area, therefore much of this contamination is under sidewalks or pavement. The current site conditions provide minimal contact through the potential soil pathway. Should construction activities occur in the future that expose the soils, the soil pathway could be completed. Soils do contribute to the external exposure pathway.

Air

Radon (Rn-220 and Rn-222) are the primary contributors to the air migration pathway. The USEPA used only the radon-220 air migration pathway for their Hazardous Ranking System score as it was sufficient by itself to list the site on the NPL (USEPA 2013). Recent documentation suggests that radon-220 exposures are less of an issue, however, radon mitigation systems were installed in at least one onsite building (USEPA 2016).

External Radiation Pathway

The primary contributors to the external pathway are thorium-232, uranium-238 and specifically, their associated daughter products. The ATSDR Health Consultation estimated unacceptable radiation exposure doses and excess risk from the external radiation pathway. Their calculated population lifetime cancer risk ranged from 1.1×10^{-3} to 2.6×10^{-2} (USDHHS 2012).

Groundwater

The groundwater pathway is unknown as groundwater is expected to be present at approximately 50-60 feet below ground surface at the site (USEPA 2013).

Contamination that was discharged to the sewer could potentially impact groundwater but this may be mitigated due to the depth of groundwater. Further, no receptors are expected to be drinking the groundwater without treatment, so this pathway is therefore not considered a likely exposure pathway.

Surface Water

The industrial setting that the Site is in does not lend itself to exposure to surface water. However, contamination consisting of thorium-232, uranium-238 and their associated daughter products was disposed from the Site into sewers during operations prior to 1947. Residual contamination in these sewers may be discharged to the surface water nearby Newtown Creek during times of combined sewer overflow (USEPA 2013).

Combined Pathway Conclusion

The potential for a hazard to human health and the environment is predominantly through the external pathway (thorium-232, uranium-238, and their associated daughter products) and to a lesser extent through the air pathway (radon-220 and radon-222) currently at the Site.

Although data gaps limit the assessment of exposures from contamination resulting from the Nation's early atomic energy program (see below), the potential does exist for exposure to current and future occupants of the Site and persons offsite to Site contaminants. The completion of groundwater, soil, and/or air exposure pathways would present a hazard to human health and the environment.

Nation's Early Atomic Energy Program Considerations

In 1987 the United States Department of Energy (USDOE) issued a finding of non-eligibility for the Site because no documentation could be found that would provide the USDOE the authority to include the Site in the FUSRAP (USDOE 1987). The USDOE later reconsidered the Site and, in 2013, recommended the site to USACE for inclusion in the FUSRAP. The 2013 USDOE referral letter states that the original elimination was based on the operations being commercial in nature, but that the 2012 ATSDR raised the possibility that contamination may have resulted from the transfer of the thorium containing materials from the site.

The USDOE, by means of a 26 Feb 2013 letter from David Geiser, recommended to the USACE that portions of the WACC site be considered for inclusion in FUSRAP (USDOE 2013). Per the FUSRAP MOU Article III3D2, USACE has prepared this PA in accordance with CERCLA and the National Contingency Plan (NCP). It is aimed at determining the extent of FUSRAP related contamination at the site, determining if the

contamination is a threat to human health or the environment, and determine the extent to which response action under CERCLA is required to address FUSRAP related contamination at the site. (USDOE 1999)

The USACE does not have information documenting the content of the specific monazite sand that came onto the site for rare earth processing, however monazite sands in general contain 6-8% thorium, 60% rare earths, 30% phosphates, and the balance in silica (USDOE 1984). Although the rare earth extraction was likely not 100% efficient, rare earths would have been significantly depleted in the waste by-product later purchased by the Government. At the time of WACC operations, cerium, didymium, and lanthanum were in demand. Documentation indicates that WACC sold rare earths in compounds containing all the rare earths (DOE 1984) (rather than separating out individual rare earths) thus, if rare earths were 60% of the incoming monazite sands, the wastes would be roughly 40% of the incoming sand's mass. Regardless, the Government would not have been involved in any operations or possession of the materials up to the point it purchased the rare earth depleted thorium bearing sludge.

The AEC contracted for the thorium content of the waste after telling WACC to halt the sewer disposal practice, therefore, no materials in the sewer nor would material from any operations prior to the contract, be Government material. Although the actual contract documentation has not been located, other documentation indicates that the Government purchased the precipitated rare earth processing waste sludge (USDOE 1987). The government purchased the entire waste sludge, however, based on USACE calculations approximately 7% of the original thorium content in the monazite sands was lost as part of the rare earth processing with the remaining 93% being sold to the Government in the sludge.

Since the WACC was in business for roughly 25 years prior to the AEC involvement and the thorium sludge was a by-product of the commercial rare earth operation, the contribution to the contamination, and thus the risk, that would potentially come from the nation's early atomic energy program would be minimal compared to the contamination from other site operations.

Conclusions

Evidence of a release into the environment of a hazardous substance, pollutant, or contaminant from the former Wolff-Alport Site potentially resulting in an unacceptable risk has already been documented by the USEPA. Identifying if this release was related to the Nation's early atomic energy program cannot be definitively determined at this time with the available information. Contractual documents that could explain when the Government took possession of materials have not been located. Rare earths analysis of samples could possibly be helpful in understanding what, if any, of the contamination at the Site is related to the post rare earth processing material. Since this material was

also generated prior to the AEC purchasing the thorium sludge it may not be possible to distinguish contamination from the AEC purchased material versus material related to the commercial operations before the AEC would have become involved. Even with this information, however, the lack of contractual documentation may prohibit us from being able to identify when the Government took possession of the material. Additionally, the single drum of thorium nitrate purchased by the Government in 1954 (reportedly in storage for 15 years) suggests that WACC may have had some commercial interest in thorium production.

The potential risks from FUSRAP related contamination, if proven to exist, at the Site would likely be very small due to the timing of the AECs material purchase. The Government was not involved in operations of the former WACC for most of their commercial business and only purchased what was originally a waste material from the operations. Thus any potential contamination related to the nation's early atomic energy program is likely to be an extremely small portion of the overall contamination at the site.

Recommendations

Sites where the material is being addressed under another remedial action program are not eligible for the FUSRAP per the FUSRAP Engineering Regulation (ER). The ER is based on the 1986 USDOE Designation/Elimination Protocol document and the 1997 FUSRAP Management Requirements and Policies Manual (USACE 2014).

Contamination at the former WACC is currently being addressed by the USEPA as a NPL site, therefore, the USACE does not recommend this site for inclusion in the FUSRAP.

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