ENVIRONMENTAL ASSESSMENT
OF SITE DECOMMISSIONING PLAN AND RADIOLOGICAL ASSESSMENT
FOR CABOT PERFORMANCE MATERIALS, REVERE, PA

LICENSE NUMBER SMC-1562
DOCKET NUMBER 40-9027

CABOT PERFORMANCE MATERIALS

FOREWORD

This Environmental Assessment (EA) reviews the environmental impacts of releasing the Cabot Performance Materials site, contaminated with uranium and thorium slag, for unrestricted use. In connection with the review of the proposed action, the U.S. Nuclear Regulatory Commission (NRC) staff is also preparing a Safety Evaluation Report (SER) which evaluates conformance of the proposed action with NRC regulations and guidance. The SER may conclude that Cabot's proposed action should be modified in one or more respects to fully comply with NRC regulations and guidance. Such modifications to the proposed plan, should they come about and be implemented, would have no significant bearing on the overall environmental impact of the proposed decommissioning and would not change the conclusions of this EA. On issuance, the SER will be available for inspection and copying at the NRC Public Document Room, in NRC's One White Flint North Headquarters building, located at 11555 Rockville Pike (first floor) in Rockville, Maryland; and in the Agency-wide Documents Access and Management System (ADAMS) Public Electronic Reading Room at Web address <http://www.nrc.gov/NRC/ADAMS/index.html>.

TABLE OF CONTENTS

SUMMARY AND CONCLUSIONS

The Cabot Performance Materials site near Revere, Pennsylvania, processed approximately 23,000 kilograms (50,000 pounds) of thorium- and uranium-bearing ores beginning in 1970. The resulting slag from metals-removing processing is currently located in four distinct areas on the 400,000-square meter (100-acre) site. A site-specific dose analysis was conducted using RESRAD version 6.0 dose-modeling software. Based on the total amount of radioactive material available at the Revere site, and the physical characteristics of the slag material, Cabot has demonstrated that the annual total effective dose equivalent to the average member of the critical group within the first 1000 years after decommissioning is less than 0.25 millisieverts (mSv) [25 millirem (25 mrem)], and the dose is as low as is reasonably achievable (ALARA). As discussed in the Generic Environmental Impact Statement (NUREG-1496), the 0.25 mSv (25 mrem) plus ALARA dose limit provides an ample margin to ensure protection of public health and safety, as well as protection of the environment. Therefore, the site is acceptable for unrestricted release and may be removed from License SMC-1562.

ENVIRONMENTAL ASSESSMENT OF SITE DECOMMISSIONING PLAN FOR CABOT PERFORMANCE MATERIALS FACILITY IN REVERE, PENNSYLVANIA

1.0 Introduction

1.1 Background

Cabot Performance Materials holds Nuclear Regulatory Commission License SMC-1562, covering activities occurring at both its Revere and Reading sites in Pennsylvania. Former ore processing at the Revere facility generated waste slag contaminated with uranium and thorium. Beginning in July 1970, approximately 23,000 kilograms (kg) (50,000 pounds) of columbium-tantalum ore were processed at the Revere site [Cabot (b), 2001]. A 1975 radiological safety study conducted by Applied Health Physics, Inc. identified radiologically contaminated areas and a slag burial site [Gallaghar, 1975].

In late 1988, Cabot initiated decommissioning activities at the Revere facility. A radiological survey was conducted from February to March 1990 by Bullinger's Mills, Inc., [Appendices A.6 and A.7 of RA, 2001] which included a site characterization, determination of slag leach rates, surface gamma measurements, and radiological analysis of surface and subsurface samples. This survey indicated high readings in four areas on site. Contaminated slag was removed and shipped to the Cabot facility in Boyertown, PA.

Cabot submitted a Final Decontamination and Decommissioning Survey to NRC in January 1991 [Cabot, 1991], using decommissioning criteria established in the NRC's October 5, 1981, Branch Technical Position (BTP) [NRC, 1981]. NRC contracted the Oak Ridge Institute for Science and Education (ORISE) to conduct a confirmatory radiological survey of the four identified areas of the Revere site. The July 1991 ORISE [Berger and Smith, 1991] survey results found that the average soil concentrations of natural uranium and thorium met NRC limits, but noted discrete pieces of slag with concentrations exceeding the BTP guidelines. Further site evaluation was initiated.

A site characterization report and a subsurface sampling report were completed by Cabot contractors (Enserch, and NES, respectively) in April and August 1994 [Cabot, 1994 and Craig 1994]. A Decommissioning Plan (DP) and Risk Assessment were submitted to NRC in April 1996 [Cabot and Cabot (b), 1996], which analyzed the site using the October 1981 BTP methodology. Cabot subsequently replaced this DP by a new DP and Radiological Assessment (RA) in November 1997 [Cabot and Cabot (b), 1997], which analyzed the site in accordance with the July 1997 License Termination Rule (LTR) [NRC, 1997].

In response to a December 2000 request for additional information [NRC, 2000], Cabot issued a revised DP and RA in March 2001 [Cabot and Cabot (b), 2001], and provided additional information in an April 27, 2001 letter [Knapp, 2001].

This environmental assessment has been prepared to support NRC's evaluation of Cabot's March 2001 DP and RA submission and April 27 letter. Approval of this plan and supporting materials would support removal of the Revere site from License SMC-1562 and release of the site for unrestricted use.

1.2 The Proposed Action

Cabot requests approval of its DP and removal of the Revere, Pennsylvania, site from its source materials license. In its DP, Cabot proposes to release the site for unrestricted use, with no further onsite decommissioning or survey.

1.3 Purpose and Need for the Proposed Action

The purpose of this action is to remove the site, which no longer uses source materials, from a source material license. Furthermore, the intent is to allow unrestricted release of the site, thereby removing limitations on the future use of the property. This action is required by the Decommissioning Timeliness Rule (10 CFR 40.42).

2.0 Facility Description/Operating History

2.1 Site Locale and Physical Description

The Cabot facility is located in Revere, Bucks County, Pennsylvania about 60 kilometers (36 miles) north of Philadelphia and about 26 kilometers (16 miles) southeast of Allentown. Slag materials containing uranium and thorium were generated from columbium/tantalum processing that occurred in the 1970s. These materials were deposited in four areas on the site: the parking area near the Sandblasting building, the former container storage area, the buildings 4 and 5 area, and the old pit area. Additionally, two pieces of slag were located and removed from the area next to warehouse building 25 in the early 1990s.

As reported by the licensee, these four areas vary in size from 1400 to 3200 square meters (m^2) [15,070 to 34,450 square feet (ft^2)], with at least 122 meters (m) [400 feet (ft)] separating them. The total property area is 405,000 m^2 (4.4 million ft^2).

2.2 Facility Operating History

The Kawecki Chemical Company - Penn Rare Division (Cabot's predecessor), was first licensed to store uranium and thorium at the Revere site in October 1969, by NRC's predecessor, the Atomic Energy Commission. The license was amended in June 1970, authorizing the licensee [then known as Kawecki Berylium Industries (KBI)] to process up to 1,800 kilograms (4,000 pounds) of ore concentrates containing up to 2 percent natural thorium and 1.5 percent natural uranium.

The uranium and thorium were contained in pyrochlore-bearing ores purchased for production of columbium and tantalum. The end product from the licensee's process was purified columbium and tantalum used for manufacturing high-strength metals and electronic components. At the Revere site, columbite and pyrochlore ores were blended with aluminum and iron powder. The mixture was ignited in a crucible wherein the aluminum reduced the columbium oxide in the ore by a thermite process. The iron alloyed to form ferrocolumbium, whereas the spent aluminum and other oxides, and the uranium and thorium from the ore, were melted into process slag. The thorium- and uranium-bearing slag was stored on site in four different locations. Processing of source material-bearing ores ceased in 1978, although the license was not changed until December 1983, when it was amended to authorize only

possession of uranium and thorium at Revere. KBI maintained the Revere site for source material possession-only, with no activity until 1987, at which time Cabot Corporation became the licensee of record through acquisition of KBI.

In 1988, Cabot began onsite decommissioning activities for Revere, including site characterization, determination of slag leach rates, surface gamma measurements, and radiological analysis of surface and subsurface samples. Contaminated areas were remediated in a series of clean-up actions and site surveys in the early 1990's. The first site DP and RA submitted to NRC in April 1996 [Cabot and Cabot (b), 1996], was replaced in November 1997 by a DP and RA that analyzed the site in accordance with current license termination requirements. This DP and RA were amended in March 2001, in response to additional questions from NRC staff.

The DP (as amended in April 2001) and accompanying RA assert that residual radioactivity distinguishable from background at Revere meets the release criteria established in 10 CFR 20.1402 of the LTR. The LTR requires that the total effective dose equivalent (TEDE) to an average member of the critical group does not exceed 0.25 millisieverts per year (mSv/yr) [25 millirem (mrem/yr)], from all exposure pathways, and that the residual radioactivity has been reduced to levels that are as low as is reasonably achievable (ALARA). Although Cabot's Revere site is a Site Decommissioning Management Plan (SDMP) site, Cabot decided to demonstrate compliance with the newer LTR requirements and not the SDMP action criteria.

Currently, there are no source materials being used on site and no activities occurring in the four areas where the slag was deposited.

Cabot now holds license SMC-1562, allowing the company to possess the slag material produced by Kawecki Chemical Company from 1970 to 1978.

3.0 Radiological Status of the Facility

3.1 Radiological Status of Uranium-/Thorium-Contaminated Slag

As previously stated, in 1988, Cabot began performing decommissioning activities at the site. ORISE performed a confirmatory survey in July 1991 [Berger and Smith, 1991], and found that although the average concentrations of natural uranium and thorium met NRC limits, individual fragments of slag exceeded NRC guidelines.

Radionuclide concentrations for slag are estimated by calculating a mass balance of the remaining activity on the site from process records and information on the amount of material removed during prior decommissioning activities. Based on inventory records, it is estimated that a maximum of 240 megaBecquerel (Mbq) [0.0065 curies (Ci)] of thorium and 590 MBq (0.016 Ci) of uranium remain on the site. The thorium and uranium are contained in slag fragments that are distributed with building debris and uncontaminated slag in the four areas. Assuming a density of 2.0 grams per cubic centimeter (g/cm^3) for the slag/debris and a total volume of 23,000 cubic meters (m^3) [820,000 cubic feet (ft^3)], a total mass of 46.4×10^6 kg (102 million pounds) of affected material remains at the four locations on the site. [Cabot (b), 2001]. Using a more conservative estimate of the volume of contaminated material results in a 35 percent decrease in the total volume and approximately a 50 percent increase in radionuclide

concentrations and dose. [Knapp, 2001] These estimates are considered to be conservative estimates of the total activity remaining at the site, as a low average concentration was assumed for all material removed during earlier decommissioning work.

The licensee's derived average radionuclide concentrations for natural uranium and thorium in equilibrium are shown in Table 1.

Table 1. Radionuclide concentrations used in the February 2001 Cabot assessment

Radionuclide	**Concentration** Bq/g (pCi/g)
Actinium-227	0.00028 (0.0077)
Protactinium-231	0.00028 (0.0077)
Lead -210	0.0063 (0.17)
Radium-226	0.0063 (0.17)
Radium-228	0.0031 (0.083)
Thorium-228	0.0031 (0.083)
Thorium-230	0.0063 (0.17)
Thorium-232	0.0031 (0.083)
Uranium-234	0.0063 (0.17)
Uranium-235	0.00028 (0.0077)
Uranium-238	0.0063 (0.17)

Note: Bq/g = Bequerels per gram, pCi/g = picocuries per gram

For the base scenarios, Cabot estimates that the TEDE for a worker from all the affected material is 0.00015 mSv/yr (0.015 mrem/yr) and for a resident is 0.0029 mSv/yr (0.29 mrem/yr). Using the minimum volume, and the resulting 50 percent increase in radionuclide concentrations and dose received, results in the estimate of a TEDE to a worker from all the affected material, of 0.00023 mSv/yr (0.023 mrem/yr) and to a resident at 0.0044 mSv/yr (0.44 mrem/yr).

However, NRC considers Cabot's Resident Gardener scenario, described in the RA as a sensitivity analysis, to be a more appropriate dose calculation model. This analysis differs from the base-case scenario in that it assumes no soil cover over the slag and includes the ingestion of vegetables in the analysis, resulting in a TEDE for a resident gardener of 0.017 mSv/yr (1.7 mrem/yr), which would be 0.026 mSv/yr (2.6 mrem/yr) when adjusted for the minimum volume. NRC staff independently calculated the TEDE, using the same scenario with different parameters, to be no greater than 0.2 mSv/yr (20 mrem/yr). The NRC "Radiological Criteria for License Termination: Final Rule" (10 CFR Part 20, Subpart E) limit for unrestricted release is 0.25 mSv/yr (25 mrem/yr) from all pathways.

3.2 Radiological Status of Soils

Cabot reports there is little soil in the slag areas; it is mostly clean slag and rubble. Furthermore, the "Radiological Subsurface Sampling Report" submitted in 1994 [Craig, 1994] determined that radioactivity is limited to the slag and no detectable concentrations had leached into the soil. The ORISE report [Berger and Smith, 1993] indicated that other than two soil samples that may have contained small pieces of slag, the average concentrations of total uranium and thorium in the soil were well below the guideline levels and less than twice

background levels. The elevated direct readings in the four areas were from slag fragments deposited in the area.

3.3 Radiological Status of Surface Water and Ground Water

Monitoring of ground water and surface water is not required by License SMC-1562. However, 90 percent of the wells in the Brunswick Group Formation are deeper than 3.69 m (12 ft) and the median depth to ground water is 22.52 m (74 ft) [Sloto, 1994]. In addition, the licensee conducted leach rate tests to demonstrate that contamination would not extend to surface and ground water. Cabot reports total available uranium to be 0.824 microgram total available uranium, per g of slag. A distribution coefficient (K_d) value of 137,500 cubic centimeters per gram (cm^3/g) [3.8 million cubic inches per pound (in^3/lb)] was used to calculate the leach rate constant of radionuclides from the source zone (i.e., slag). The same K_d value was also used for the uranium-238 progenies and thorium-232 and its progenies, consistent with the approach described in Appendix A of the DP, since thorium and radium (the other key radionuclides) have been shown to leach at a slower rate. The leach rate constant assumed in Cabot's assessment is on the order of $1x10^{-6}$ to $1x10^{-5}$ yr^{-1}.

Water sampling and analysis for the Revere site are contained in the "Radiological Subsurface Sampling Report" submitted in August 1994. [Craig, 1994] Analysis of water flowing through the container storage area showed total uranium and thorium concentrations in the range of typical background values.

4.0 Decommissioning Alternatives

4.1 Alternative 1: No-Action

The no-action alternative would leave NRC License SMC-1562 unmodified, and allow the Revere facility to continue to operate with the contaminated slag piles on site. The Cabot Revere site would remain on the SDMP list.

4.2 Alternative 2: Proposed Action

The licensee-proposed action involves removal of the Revere site from NRC License SMC-1562. It proposes no further onsite decommissioning activities, removal of the site from the SDMP list, and unrestricted release of the site.

4.3 Alternative 3: Further Remediation of the Site

The licensee examined the possibility of conducting further remediation of the site. The approach proposed was to separate the slag containing elevated concentrations, for shipment to a licensed disposal facility, and to store the remaining materials on site.

4.4 Decision Rationale for Alternatives

Alternative 1 is undesirable because the Revere site is on the SDMP list and should be proceeding toward cleanup, and restricted, or unrestricted release. The licensee's proposed action suggests unrestricted release and claims no further source materials are going to be used or generated on site. Alternative 3 includes further remediation of the site. However, after conducting a cost benefit analysis, the licensee concludes that the cost of Alternative 3 exceeds the value of the dose expected to be saved, that the ALARA condition has been met, and that no further dose reduction is necessary.

5.0 Radiation Protection Program

As the licensee proposes to release the site for unrestricted use, no radiation protection program is delineated in the site decommissioning plan. The licensee reports no known radiological operating occurrences that would affect the safety of its personnel during decommissioning.

6.0 Environmental Impacts

6.1 No-Action Alternative

Not pursuing decommissioning of the site would be in violation of NRC's requirements for "Timeliness in Decommissioning of Material Facilities" (10 CFR 40.42). The purpose of the Decommissioning Timeliness Rule is to reduce the potential risk to the public and environment that may result from delayed decommissioning of inactive facilities and sites. Specific concerns addressed by the Timeliness Rule include the potential risk of safety practices becoming lax because of attrition of key personnel, and lack of management interest at facilities after operations cease, as well as the potential for bankruptcy, corporate takeover, or other unforeseen changes, in a company's financial status, that may complicate or delay decommissioning.

The No-Action Alternative would be in violation of the Timeliness Rule, and therefore counter to established NRC environmental regulations, policy, and practice.

6.2 Licensee's Proposed Action

6.2.1 Radiological impacts on workers and the public

Cabot considered two scenarios in its RA; a worker and a resident scenario. In addition, hybrids of these scenarios were considered as a sensitivity analysis.

6.2.1.1 Radiological impacts on workers

For the worker dose analysis scenario, Cabot assumed that the site would continue to be used for industrial purposes. The industrial worker is assumed to be exposed to external gamma radiation and inhalation of re-suspended dust. The hypothetical worker is assumed to spend very limited time in the contaminated area (40 hr/yr). No indoor exposure is assumed to occur because there are currently no buildings in the contaminated areas. In the November 1997 RA, Cabot considered two additional scenarios. In the first, Cabot

considered a worker spending 1920 hr/yr in a building constructed in the contaminated area, along with 80 hr/yr outdoors. In the second scenario, Cabot considered a worker spending 1600 hr/yr in a building along with 400 hr/yr outdoors as part of its sensitivity analysis. Although both of these scenarios increased the dose by slightly more than an order of magnitude, the analysis still demonstrated that the dose limit of 0.25 mSv/yr (25 mrem/yr) would not be exceeded. Although the base scenario (40 hr/yr in the contaminated area, with no indoor exposure) is less realistic, NRC staff believes that the two additional worker scenarios demonstrate that the potential dose to workers is acceptable. As the source term used in the November 1997 RA exceeded the February 2001 source term for every isotope (see Tables 1 and 2), there are no significant radiological impacts on workers as a result of Alternative 2.

Table 2. Radionuclide concentrations used in the November 1997 Cabot assessment

Radionuclide	**Concentration** Bq/g (pCi/g)
Actinium-227	0.015 (0.41)
Protactinium-231	0.015 (0.41)
Lead -210	0.33 (9.0)
Radium-226	0.33 (9.0)
Radium-228	0.037 (1.0)
Thorium-228	0.037 (1.0)
Thorium-230	0.33 (9.0)
Thorium-232	0.037 (1.0)
Uranium-234	0.33 (9.0)
Uranium-235	0.015 (0.41)
Uranium-238	0.33 (9.0)

Note: Bq/g = Bequerels per gram, pCi/g = picocuries per gram

6.2.1.2 Radiological impacts to the public

To estimate radiological exposure to the general public, Cabot assumed the residence is constructed entirely in a contaminated area and the resident spends 78 percent of his/her time in the area (85 percent outdoors and 15 percent indoors). Exposure is assumed to occur through direct gamma radiation, inhalation, soil ingestion, and ingestion of drinking water. A 15 centimeter (cm) [6 inch (in)] layer of topsoil is assumed to be permanently maintained over the slag to support grass, but would not be deep enough to support growing edible vegetables. Given that the current land use around the site includes residences and agriculture, future residential use of the site is highly credible. However, NRC staff concludes that it is not appropriate to assume that a cover will be permanently maintained over the slag without active maintenance.

As a variation of the resident scenario, Cabot also looked at a resident scenario assuming that there is no 15 cm (6 in) soil layer. The results of this sensitivity

analysis give a calculated dose significantly below the release limit, but roughly 6 times higher than the dose calculated for the base-case resident scenario.

As another variation of the resident scenario, Cabot assumed that the resident maintains a garden in the contaminated area and thus is exposed through ingestion of plant foods grown in the contaminated slag. For this assessment, Cabot conservatively assumed that the plant foods are grown directly in the slag without an intervening soil layer. Again, the calculated dose was significantly below the release limit.

NRC considers that the resident garden scenario appropriately bounds the potential exposure pathways for future use of the site. Cabot also evaluated an excavation scenario, where it is assumed that some of the slag is excavated and used as foundation fill in the construction of a house. However, NRC considers that the resident gardener scenario appropriately bounds the excavation scenario.

Because the surficial layer of the contaminated areas is composed principally of slag that does not readily support the growth of vegetation (as evident by current site conditions), staff believes that it is unlikely that the contaminated areas will be used for growing commodity crops or raising livestock. Because of the cost, it is difficult to envision someone purchasing enough topsoil to cover an area large enough to grow commodity crops or raise livestock. Further, because soil-less gardening requires more management than more traditional gardening methods and given that the presence of slag in the area would not lend itself to mechanized agriculture, staff believes that it is unlikely that the contaminated areas will be used to grow commodity items such as grains or livestock fodder. Therefore, staff believes that it is appropriate to exclude these pathways in the assessment. In addition, the relative small size of the container storage and former buildings 4 and 5 areas, which are both less than the default area assumed in NRC's screening approach for the residential farmer scenario [i.e., 2400 m^2 (2900 square yards, or 0.59 acres)], would also tend to support an argument that these areas will not be used for growing commodity items.

The most bounding scenario analyzed by staff is of the buildings 4 and 5 area containing one-half of the total volume of contaminated slag in a residential gardener scenario, with no cover. This scenario conservatively models the average member of the critical group, which must be evaluated, for maximum annual TEDE, over 1000 years. The maximum calculated annual dose in this scenario is 0.2 mSv/yr (20 mrem/yr).

6.2.2 Impacts on surface waters and ground waters

The area surrounding the site is generally rural, with land uses including industrial, commercial, residential, and agricultural. Rapp Creek flows through the northwest portion of the site, originating near Lake Warren, 3.2 kilometers (km) (2 miles) north of the site, and flowing southward to the confluence with Beaver Creek, where it becomes

Tinicum Creek. The Delaware River is 5.6 km (3.5 miles) north of the site, flowing eastward and eventually southward.

Bucks County has a temperate, humid, maritime climate. The average annual precipitation is approximately 114 cm (45 in). Bedrock beneath the site is mapped as the Triassic age Lockatong Formation in the eastern portion of the site and the Triassic age Brunswick formation in the western portion of the site. The Lockatong Formation is generally a poor source of water and its ability to transmit water is low, with reported yields of wells ranging from 0.00013 - 0.0016 cubic meters/second (m^3/s) [2- 25 gallons per minute (gpm)]. The range of water yielded from the Brunswick Formation is 0.00013 -0.16 m^3/s (2-260 gpm), with an average of 0.0025 m^3/s (40 gpm).

Because of the relatively immobile nature of the radionuclides, it is unlikely that any contaminants will reach nearby surface waters. Further, the depth of the ground water [approximately 20 m (66 ft)] would likely make it rather expensive to maintain a fish pond. Consequently, aquatic pathways have been excluded from the dose analyses.

6.2.2.1 Ground water leaching

To estimate releases of radioactivity from the slag[1], Cabot calculated a distribution coefficient (K_d) using the readily available uranium concentration measured in a leach test performed on a slag sample. A K_d value of 137,500 cm^3/g (3.8 million in^3/lb) was used to calculate the leach rate of radionuclides from the source zone (i.e., slag). The same K_d value was also used for the uranium-238 progenies and thorium-232 and its progenies. Although radionuclides are believed to leach incongruently from the slag, it is reasoned that using the uranium K_d value is appropriate because, based on available literature, thorium and radium (the other key radionuclides) are believed to leach at a slower rate.

Because of the glass-like structure of the slag and its low weathering rate [estimated to be on the order of $2x10^{-6}$ to $1.5x10^{-5}$ millimeters per year ($2.2x10^{-10}$ to $1.6x10^{-9}$ in/day)], the leach rate of radionuclides from the source zone should be low (i.e., radionuclides should be fairly immobile). Based on the range of leach rates reported for uranium and thorium for slag [Felmy, et al., 1999], the leach rate for uranium and thorium at the Cabot site would be expected to be on the order of $1x10^{-12}$ to $1x10^{-10}$ yr^{-1} for thorium and $1x10^{-11}$ to $4x10^{-9}$ yr^{-1} for uranium. The leach rate assumed in the Cabot assessment is on the order of $1x10^{-6}$ to $1x10^{-5}$ yr^{-1}.

6.2.2.2 Monitoring of ground water and surface water

Periodic monitoring is not required by the license for either ground or surface water. Analysis of surface water flowing through the container storage area showed total uranium and thorium concentrations in the range of typical background values.

[1]In its radiological assessment, Cabot assumed that only slag is radioactively contaminated.

6.2.3 Non-radiological impacts

Since the proposed action does not involve any onsite activity, no further impacts are anticipated from this decision. The cognizant regulatory entities, the Pennsylvania Department of Environmental Protection (PADEP), and the U. S. Environmental Protection Agency (EPA) are aware of the site and have or are in the process of conducting their own evaluations.

Cabot indicates (DP, 2001) that there are no known historic areas or endangered species in the area of the Revere site. Under the proposed alternative, no impacts would be expected, as no further remediation activity will be done at the site.

6.3 Further Remediation of the Site

6.3.1 Impacts on workers, the public, and the environment

Since no further remediation is anticipated in the proposed alternative, there are no remediation impacts on workers, the general public, or the environment.

6.3.2 Cost

Based on 1996 dollars, if remediation were to be done on the site, the cost would total about $8.8 million dollars (RA, 2001). Approximately one-half of the total cost is estimated for the disposal fee.

7.0 Agencies and Individuals Consulted

PADEP

8.0 References

Berger, J. D. and Smith, B. M., “Confirmatory Radiological Survey for Portions of the Cabot Corporation Revere Plant,” Oak Ridge Institute for Science and Education, Oak Ridge, TN, April 1993.

Cabot Performance Materials Inc., “Final Decontamination and Decommissioning Survey - 1990 for NRC License SMB-920, Docket 40-6940,” Cabot Corporation, Revere Pennsylvania Plant, January 1991.

Cabot Performance Materials Inc., “Radiological Characterization Survey Report for the Cabot Performance Materials Revere Plant,” Revere, PA, April 1994.

Cabot Performance Materials Inc., “Decommissioning Plan for Cabot Performance Materials, Revere, Pennsylvania - Revision 1," Boyertown, PA, April 1996.

Cabot Performance Materials Inc. (b), “Risk Assessment for the Decommissioning of the Revere, Pennsylvania Site,” Cabot Corporation, Boyertown, PA, April 1996.

Cabot Performance Materials Inc., “Decommissioning Plan for Revere, Pennsylvania Site - Revision 0," Boyertown, PA, November 17, 1997.

Cabot Performance Materials Inc. (b), “Radiological Assessment for Revere, Pennsylvania Site - Revision 0,” Boyertown, PA, November 17, 1997.

Cabot Performance Materials Inc., “Decommissioning Plan for Revere, Pennsylvania Site - Revision 1," Boyertown, PA, February 28, 2001.

Cabot Performance Materials Inc. (b), “Radiological Assessment for Revere, Pennsylvania Site - Revision 1,” Boyertown, PA, February 28, 2001.

Craig, K., “Radiological Subsurface Sampling Report for Cabot Performance Materials Revere, Pennsylvania,” NES, Danbury, CT, August 1994.

Felmy, A.R., D. Raj, and V.L. LeGore, “Solubility and Leaching Controls on Radionuclides in SDMP Wastes: Data Summary,” PNNL, 1999.

Gallaghar, R. G., Applied Health Physics, Inc., Bethel Park, PA, May 1975.

Knapp, T., “Area of Slag Areas,” Cabot Corporation, Boyertown, PA, April 27, 2001.

Sloto, R.A. and C. Schreffler, “Hydrogeology and Groundwater Quality of Northern Bucks County, Pennsylvania,” U.S. Geological Survey Water-Resource Investigations Report 94-4109, 1994.

U.S. Nuclear Regulatory Commission, “Disposal or On-site Storage of Residual Thorium or Uranium from Past Operations, SECY-81-576,” Washington, DC, October 1981.

U.S. Nuclear Regulatory Commission, “Radiological Criteria for License Termination; Final Rule,” Washington, DC, July 1997.

U.S. Nuclear Regulatory Commission, “Request for Additional Information Regarding the Cabot-Revere Site Decommissioning Plan and Radiological Assessment,” Washington, DC, December 27, 2000.

8.1 Additional Documents Considered (Bibliography)

U.S. Nuclear Regulatory Commission, “Generic Environmental Impact Statement in Support of Rulemaking on Radiological Criteria for License Termination of NRC-Licensed Nuclear Facilities, NUREG-1496,” Washington, DC, July 1997.

U.S. Nuclear Regulatory Commission, “Probabilistic Dose Analysis Using Parameter Distributions Developed for RESRAD and RESRAD-BUILD Codes, NUREG/CR-6676,” Washington, DC, July 2000.

U.S. Nuclear Regulatory Commission, “Probabilistic Modules for the RESRAD and RESRAD-BUILD Computer Codes-User Guide, NUREG/CR-6692,” U.S. Nuclear Regulatory Commission, Washington, DC, November 2000.

U.S. Nuclear Regulatory Commission, “Timeliness in Decommissioning of Material Facilities,” U.S. Federal Register, Washington, DC, 59 FR 36026 - 36040, July 15, 1994.