May 26, 2004

Mr. Bradley A. Okoniewski, Manager
Safety, Health, and Environmental Programs
Cabot Corporation
P.O. Box 1608
County Line Road
Boyertown, PA, 19512

SUBJECT: RENEWAL OF SOURCE MATERIALS LICENSE NO. SMB-920 FOR CABOT CORPORATION'S BOYERTOWN, PENNSYLVANIA FACILITY, (TAC L52515)

Dear Mr. Okoniewski:

By letter dated April 3, 2002, Cabot Performance Metals, later known as Cabot Supermetals (CSM), provided an application and requested renewal of Source Materials License No. SMB-920 for the Boyertown facility. CSM owns and operates the facility as a subsidiary of the licensee, Cabot Corporation. The license authorizes possession of natural uranium and thorium in any chemical or physical form in an amount that will not exceed 360 metric tons (400 tons) at the facility on County Line Road, Boyertown, Pennsylvania. The U.S. Nuclear Regulatory Commission (NRC) staff's review of the application resulted in a request for additional information (RAI) dated June 25, 2002. Information was provided October 11 and 17, 2002, and another staff RAI was sent January 14, 2003. CSM responded with revised portions of the application and additional information dated March 27, April 30, June 30, July 15, and October 28, 2003. After discussions with staff, CSM provided draft page changes for discussion on September 26, October 7 and 28, November 3 and 12, and December 30, 2003, as well as January 16 and February 24, 2004. CSM submitted a revised application dated March 23, 2004, incorporating all related components, and the transmittal letter was dated March 29, 2004. Revised pages, to correct errors or provide clarification, were submitted May 24, 2004.

The NRC staff has completed its review of the revised license renewal application, and determined that it provides reasonable assurance that operation of the Boyertown facility does, and should continue to, comply with NRC regulations. Based on the information provided by the application, inspections, site visit, and discussions with CSM staff and stakeholders, we have completed the safety evaluation report (Enclosure 1). The report contains a recommendation that the next inspection confirm that the emergency information has been consolidated, and is available to appropriate CSM staff.

License SMB-920 will be renewed for a period of 10 years, but several license conditions have been modified and others added in order to comply with the requirements under 10 CFR Part 40, to be consistent with regulatory guidance, and to ensure key program components are followed (Enclosure 2). These changes were discussed with Mr. Timothy Knapp of your staff on December 17, 2003, and April 15, 2004. The renewed license is enclosed (Enclosure 3).

The NRC staff prepared an Environmental Assessment (EA) for the license renewal, in accordance with the National Environmental Policy Act and NRC regulations in 10 CFR Part 51.

The draft EA was sent to stakeholders for comment on August 14, 2003. The final EA was issued April 12, 2004. The assessment concluded that renewal of License SMB-920, to continue operation at the Boyertown facility, will have no significant impact on the environment. The Finding of No Significant Impact (FONSI) was published in the Federal Register on May 7, 2004 (69FR25616).

If you have any questions regarding this letter or the enclosures, please contact Ms. Elaine Brummett of my staff at (301) 415-660, electronic mail esb@nrc.gov, fax (301) 415-5390, or by mail c/o NRC Document Control Desk, Ms. Brummett, Mail Stop T-8A33, 11555 Rockville Pike, Rockville, MD 20852-2738.

In accordance with 10 CFR 2.390 of the NRC's Rules of Practice, a copy of this letter will be available electronically from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Sincerely,

/RA/

Gary S. Janosko, Chief
Fuel Cycle Facilities Branch
Division of Fuel Cycle Safety
and Safeguards
Office of Nuclear Material Safety
and Safeguards

Docket No. 40-6940
License No. SMB-920

Enclosures: 1. Safety Evaluation Report
2. Recommended License Condition Changes
3. Renewed License

cc: Timothy Knapp, Cabot Supermetals
Loren Setlow, EPA

The NRC staff prepared an Environmental Assessment (EA) for the license renewal, in accordance with the National Environmental Policy Act and NRC regulations in 10 CFR Part 51. The draft EA was sent to stakeholders for comment on August 14, 2003. The final EA was issued April 12, 2004. The assessment concluded that renewal of License SMB-920, to continue operation at the Boyertown facility, will have no significant impact on the environment. The Finding of No Significant Impact (FONSI) was published in the Federal Register on May 7, 2004 (69FR25616).

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cc: Timothy Knapp, Cabot Supermetals
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SAFETY EVALUATION REPORT
LICENSE RENEWAL APPLICATION
CABOT SUPERMETALS, CABOT CORPORATION
BOYERTOWN, PENNSYLVANIA

DATE: May 25**,** 2004

DOCKET NO.: 40-6940

LICENSE NO.: SMB-920

FACILITY: Cabot Supermetals
County Line Road
Boyertown, Pennsylvania

TECHNICAL REVIEWERS: Elaine Brummett, John McGrath, Christopher McKenney, Michael Layton, Merritt N. Baker, Julie Olivier

PROJECT MANAGER: Elaine Brummett

SUMMARY AND CONCLUSIONS

Cabot Performance Metals (CPM) (known as Cabot Supermetals (CSM) after February 2003) submitted, by letter dated April 3, 2002, a license renewal application for Source Material License No. SMB-920 at the Boyertown, Pennsylvania (PA) facility. The U.S. Nuclear Regulatory Commission (NRC) staff conducted an initial review and requested additional information on June 25, 2002. CPM responded by letter dated October 11, 2002, addressing most of the staff's concerns. Information to support the staff's Safety Evaluation Report (SER) was submitted by CPM on October 17, 2002. The NRC staff visited the site for a meeting and a site tour on November 18, 2002. By letter dated January 14, 2003, NRC requested additional information, mostly addressing groundwater protection and the decommissioning cost estimate. CSM responded to the request with draft portions of the application that were discussed with staff. A revised application dated March 23, 2004, was submitted with a letter dated March 29, 2004. Revised pages, to correct errors or provide clarification, were submitted May 24, 2004.

The NRC staff has performed an evaluation of the safety and environmental aspects for the license renewal application following the applicable portions of NUREG-1520. The decommissioning funding plan was reviewed according to NUREG-1575, volume 3. This Safety Evaluation Report describes the basis for the approval of the license renewal for continued operation. The staff recommends approval of the license renewal request, because the current and proposed activities are protective of the health and safety of the workers, the public, and environment. The 10-year renewal period is appropriate because of the past performance of the licensee and recent improvements to safety and monitoring programs.

DISCUSSION

1.0 General Information

1.1 License History and Background

NRC Source Material License No. SMB-920 was first issued on March 17, 1967. The license also authorized a site in Reading, PA, as a place of use. The Revere site in PA was included as a place of use in a license amendment dated June 25, 1969. The license was renewed on October 24, 1972, and again on December 20, 1983. In December 1993, another license was created (SMC-1562) for the Revere and Reading sites, which were undergoing decommissioning. License No. SMB-920 was last renewed in December 1996 and since March 29, 2002, the Boyertown facility license has been in timely renewal.

1.2 Corporate Identity and Financial Qualifications

CSM is a subsidiary of the licensee, Cabot Corporation (Cabot). Cabot is a global specialty chemicals and material company headquartered in Boston, MA, with operations in 21 countries. The company makes carbon black, a powder made from oil that is used in tires, printing inks, and industrial rubber products. Cabot also produces thermoplastic concentrates, tantalum-based electrical capacitor materials, and fumed metal oxides. Cabot has approximately 4,400 employees and CSM has 400 employees at Boyertown. As of March 3, 2004, Cabot is considered one of the strongest performers in its industry, and has a fairly standard debt load (www.morningstar.com). Its revenues for 2003 were $1.8 billion (Cabot Corporation 2003 Annual Report).

1.3 License Application

Cabot is authorized to possess natural uranium and thorium in any chemical or physical form in an amount that will not exceed 360 metric tons (400 tons) of elemental uranium and thorium. It is authorized to receive, possess and process this material at the County Line Road facility, Boyertown, PA. By letter dated April 3, 2002, CPM requested the renewal of NRC Source Materials License Number SMB-920 for the maximum length of time (10 years).

The NRC staff reviewed the application and additional information submitted by letters dated October 11 and October 17, 2002, March 27, April 30, June 30, July 15, and October 28, 2003. After discussions with staff, CSM provided draft page changes for comment on September 26, October 7 and 28, November 3 and 12, and December 30, 2003, as well as January 16 and February 24, 2004. The revised application, incorporating information previously reviewed by NRC staff (except for several pages of the decommissioning cost estimate), was dated March 23, 2004. In the application, changes to the existing environmental monitoring program were proposed (discussed in Section 6.2). Also incorporated in the application was information required for the environmental report.

1.4 Facility and Process Description

The Boyertown facility is located in southeastern PA, on the border of Berks and Montgomery Counties, approximately 2.4 kilometers (1.5 miles) northeast of the borough of Boyertown. The site is fenced and the two primary access gates are staffed with security guards. Secondary gates are equipped with automatic security card readers. Access to work areas where radioactive material is handled, is controlled administratively by signs and training.

The southwestern portion of the site is bordered by West Swamp Creek. The facility is located in a valley consisting of woods, hills, and farmlands. Forested areas are located north of the operating areas, and along West Swamp Creek on the southwest part of the site. Primary land use is agricultural. However, construction has started on a new residential development within 3.2 kilometers (2 miles) southeast of the plant. It is estimated that it will consist of 30 houses. Additional information related to the site (demographics, hydrology, geology, and meteorology) is provided in the Environmental Assessment issued April 12, 2004.

CSM processes tantalite, and columbite ores to extract tantalum (Ta) and niobium (Nb). The ores contain source material (uranium and thorium up to 4 percent by weight in combination) averaging 0.22 percent. The ore generally arrives in 55-gallon drums and has a sandy consistency. The plant has an ore feed rate of approximately 9,600 pounds per day, five days per week, or 1,200 tons per year. The ore is transferred for grinding and classification then sized material is dissolved in hydrofluoric acid (HF) in heated digesters. The resulting acid slurry is separated in two streams. The filtrate contains the soluble Ta and Nb compounds, while the pressed solids (presscake or ore residue) contain the insoluble uranium and thorium compounds and other insoluble impurities. The presscake is currently processed so it is 20 percent water by weight.

Ta and Nb are recovered using a two-stage extraction process. The first stage uses methyl isobutyl ketone (MIBK) to extract the Ta and Nb from the aqueous phase. During the second stage Ta and Nb are extracted from the organic phase, and separated using HF and sulfuric acid (H_2SO_4). Ta is separated by a crystallization process using potassium ions. The Ta compound is reduced by contact with metallic sodium, and heated in an electric furnace to produce Ta powder. Nb is precipitated and ammonia-washed (NH_3) to produce an oxide, which then is calcined.

In addition to the extraction of Ta and Nb from the ores, the other main operations include fabrication of products, treatment of liquid waste (prior to release to the environment), and storage of the presscake. The presscake is classified as source material because it contains uranium and thorium (in combination) in excess of 0.05 percent by weight. It also contains significant concentrations of Ta, Nb, and other rare earth elements.

CSM processes and stores source material in the following buildings and facilities. Building 73 (houses the ore digestion process), drum storage areas, presscake storage area, and the wastewater treatment area. The on-site lagoons are used to collect storm water, non-contact cooling water, and steam condensate prior to release to West Swamp Creek. Site scaled drawings were provided showing licensed and hazardous material storage and processing areas.

1.5 Findings

The staff reviewed the corporate information and the general facility and detailed process descriptions for the Boyertown plant. The financial information is sufficient to indicate the resources available to Cabot. The applicant has adequately described the site location and summarized the processes for the staff to understand the plant operation and material handling (ore, product, and waste) procedures. The reviewers verified the facility information provided in the application during a site visit November 20, 2002, and an inspection February 28, 2003.

2.0 Organization and Administration

2.1 Management Program

Section 10.2 of the license renewal application details the management organization including the responsibility and authority of the CSM staff. The Vice President/General Manager of the Boyertown facility has the overall responsibilities for the activities involving the health, safety and protection of the employees, general public, and environment. Additional corporate managers are responsible for the implementation of the radiation safety program, such as the Director of Safety, Health, and Environment (SH&E), responsible for the technical quality and adequacy of the radiation safety program. The other managers include the Director of Operations, the Director of Research and Development, and the Director of Raw Materials. These individuals are responsible for the company's compliance with policies and procedures. The Chemical Operations (CO) manager reports to the Director of Operations. The Radiation Safety Officer (RSO) reports directly to the Director of SH&E. The RSO's responsibilities include ensuring and monitoring compliance with local, state, and federal regulations; and health, safety and protection of the public and environment. The RSO has the authority to stop production or other operations in order to protect the health and safety of workers, the public, or the environment.

2.2 Audits and Assessments

An annual audit is conducted by an outside expert health physics consultant to survey the proper handling of the radiation safety and environmental monitoring programs. A written report is prepared for the RSO, who is responsible for follow-up action. Other internal inspections and audits are performed by the committee tasked to monitor efforts to maintain radiation exposures "As Low As Is Reasonably Achievable" (ALARA) .

2.3 Incident Investigations

The RSO is responsible for investigating, recording, reporting, and tracking any actions of reportable incidents. An incident investigation program is in place with procedures addressing training, reporting, communication of the investigation results, and follow-up corrective actions.

2.4 Quality Assurance

The radiation instruments are checked and calibrated on an appropriate schedule. The laboratory quality assurance provisions are in procedures that can be examined during NRC inspections. Management overview provides another quality check. Also, administrative

measures for safe facility operations, staffing, training, performance, assessing findings, and implementing corrective actions are in place.

2.5 Records Management

The RSO is responsible for maintaining radiological health and safety records. The application commits CSM to maintain such records for at least 5 years. Also, the new process safety information document control system was completed and operational as of June 30, 2003.

2.6 Findings

The licensee has described its organization, management, audit, investigation, and record keeping programs to provide adequate safety management. The NRC staff has reviewed the organization and administration of the Boyertown facility, and has concluded that the programs in place provide for the safe operation of the facility, considering the hazard level of the NRC licensed material.

3.0 Radiation Protection and Monitoring

3.1 Radiation Protection and ALARA Programs

As required under 10 CFR 20.1101, CSM has both a radiation protection program and a program to ensure that exposures are ALARA. The radiation protection program includes monitoring of radiation exposure (internal and external) and environmental monitoring, as well as effluent control, as described in Sections 3.5 and 6.1 of this document.

CSM has an ALARA Committee that is required to meet at least quarterly to addresses radiation safety, occupational safety, and health of workers and the public. The Committee conducts reviews to address the radiation monitoring results and makes recommendations to achieve ALARA levels in radiation protection. Also, the Committee will conduct reviews of any employee submittal addressing the implementation of processes, procedures, or programs that may impact compliance with ALARA. CSM is required, by License Condition 11, to ensure that the Committee's recommendations are presented to CSM management.

3.2 Procedures and Controls

CSM maintains current and accurate written procedures of the activities for the radiation safety program in a Radiation Safety Officer's Operations Manual. The procedures are reviewed annually, revised as necessary, and are kept available for NRC review. Past inspections have noted no deficiencies in these written procedures.

Administrative controls at the facility include: required training for workers; inventory tracking, restricting access to the area of airborne radioactivity; investigation if monitoring results exceed 30 percent of the limit; and prohibiting eating, drinking, and smoking or chewing in the plant process areas. In addition, protective clothing may be utilized to minimize staff contamination.

Engineering controls in the process building include: ventilation designed, installed, and tested by a qualified engineer; and enclosure of the ore grinding equipment to contain the radioactive dust. Other controls are the redundant power supply, valves in the wastewater discharge

system to prevent uncontrolled releases, and the design of the bulk storage bins to control source material in adverse weather.

3.3 Radiation Safety Training and Qualifications

CSM has a radiation safety and emergency personnel training program to ensure appropriate training to employees working with or around licensed materials. The RSO is responsible for training all employees, including appropriate training for visitors and new employees (monthly and quarterly). The program was designed to meet requirements of 10 CFR Parts 19 and 20. The program includes refresher training. The radiological protection training program includes general plant safety rules plus fire and chemical safety. Also, the CSM safety and emergency training program follows procedures in accordance with the State regulations.

3.4 Ventilation and Respiratory Protection

Ore in 55-gallon drums is transferred to a grinding and classifying circuit in Building 73. The ore grinding and sizing equipment are within a closed system under negative pressure with the effluent air filtered before being released to the atmosphere. Improvements that reduced the amount of material re-suspended after cleaning Building 73 were completed in the spring of 2003. The upgrades include addition of roof ports at each classifier, side ports at the Hapman drive unit and torrit baghouse, and additional pickup points inside the building. Also, several vacuum attachments were purchased to aid in vacuuming the work areas and avoid clogging the system.

Vapors escaping from the digesters are passed to a packed-bed scrubber to remove fluorides prior to release to the atmosphere. Acids captured in the scrubber are condensed and recycled into the ore digestion process. Particulate materials from the dust collector and baghouse are recycled into the process. The performance of the scrubber system is monitored through the condenser chiller coolant high-temperature indicator and measurement of the scrubber liquid fluorine content each shift. Performance of the dust collector and baghouse are monitored through measurements of the maximum pressure drops across the filters.

The respiratory protection program is used when airborne radionuclide concentrations may exceed the administrative limits. The program is maintained in accordance with requirements in 10 CFR Part 20, Subpart H, and the Occupational Safety and Health Administration (OSHA).

3.5 Radiation Surveys and Occupational Monitoring

CSM performs surveys as part of its radiation control and personnel monitoring programs. External exposures are monitored and evaluated using personnel dosimeters, processed by an accredited vendor. Also, the ore shipments are surveyed and typically present a reading less than 2 mR/hr.

CSM takes various measurements to monitor and assess internal radioactive material in the workers. The programs include air monitoring, respiratory protection, bioassay, and surface contamination monitoring. The airborne radiological constituents of most concern in the plant are ore dust and radon gas. The air monitoring program for particulates includes grab samples and, if administrative limits of radionuclides might be exceeded, personnel lapel samplers to measure airborne concentrations. CSM requested NRC approval to use dust cyclones as air

sampling devices on October 11, 2002, but withdrew that request in a document submitted July 15, 2003. Radon gas (in the uranium decay chain) is monitored inside buildings where the ores, residues, or ore dust are located. Monitoring locations are adjusted as necessary by the RSO to include areas where workers could be exposed to higher levels of radioactivity.

The bioassay program is used to detect and assess individual intakes of radioactive material, and verify the adequacy of the air sampling and respiratory protection programs. The bioassay program includes whole body counts, and urine or fecal sample analysis for individuals suspected of having an intake of radioactive material greater than 10 percent of the applicable Annual Limit on Intake (Part 20, Appendix B). This would usually be based on air sample data that exceeded administrative/investigation levels. CSM indicated that no whole body counts have indicated internal deposition of radioactive material in staff.

The surface contamination monitoring program includes alpha surveys and the collection and analysis of swipe samples from surfaces likely to be contaminated. CSM established a limit for alpha contamination at 200 dpm/100 cm^2, consistent with regulatory guidance.

3.6 NRC Inspections

Since the last renewal in 1996, the NRC staff has performed radiation safety inspections of the Boyertown facility on November 10, 13, 14, 1997; December 5, 1997; April 8 and 13, 1998; December 14 and 15, 1998; August 15 and 16, 2001; and April 20-21, 2004. A chemical safety inspection was done February 28, 2003. While several Severity Level IV violations were found at earlier inspections, the last two inspections found no violations.

3.7 Findings

The staff has reviewed the licensee's radiation control and occupational monitoring programs and the results of NRC inspections. CSM has adequate administrative and engineering controls in place designed to minimize exposure of employees and members of the public to radioactive material. The staff determined that these programs meet the regulations, are consistent with regulatory guidance, and are adequate to protect the health and safety of the workers.

4.0 Chemical Process and Fire Safety

The chemical hazards related to the NRC licensed storage, handling, and processing operations are of concern when they could affect the control on licensed material or the health and safety of the workers and the public during normal operations. The NRC guidance on chemical safety issues is provided in NUREG-1601. It is referenced in NRC Inspection Manual Chapter 2603 for chemical process safety programs inspection at a fuel cycle facility. Both documents reference the Memorandum of Understanding between OSHA and NRC (October 21, 1988) as their regulatory basis. Accordingly, the NRC examined the licensee's chemical and safety practices with respect to the OSHA PSM Rule, 29 CFR 1910.119, Process Safety Management of Highly Hazardous Chemicals. The NRC staff conducted a chemical safety inspection as part of the license renewal review process on February 28, 2003, described in the inspection report dated March 20, 2003 (IR 40-6940/2003-201). The information in this section is based primarily on the results of that inspection.

Various acids, bases, and other potentially hazardous chemicals are used in industrial operations at the CSM facility. Chemicals stored in large quantities include HF, sulfuric acid, nitric acid, anhydrous ammonia, and methyl isobutyl ketone. Chemicals that pose the most significant hazards are HF and hydrogen.

4.1 Hazards Identification and Assessment

The licensee typically uses a Hazards and Operability or "What-If" study to evaluate the risks of operations in the buildings of concern. The facilitator is usually a consultant. The licensee staff includes a qualified hazards analysis team leader. The team comprises safety, operations, maintenance, and engineering personnel. The licensee's method in conducting hazards assessments is appropriate based upon the complexity of the process and the level of hazards involved. Material Safety Data Sheets are available throughout the facility.

Numerous recommendations result from process safety reviews and operations. The licensee gave consideration to each recommendation and proposed appropriate actions. The actions are prioritized based on safety significance, responsibility assigned, and the items are scheduled and tracked to completion. Also, the licensee uses a "Why Tree" or "Taproot" methodology as part of the incident investigation program. Critical equipment and safety functions were identified by the safety reviews for the HF tank, digester, vapor condensers, and fume scrubbers. Monitors have been installed at the digesters.

The licensee uses written procedures (work instructions) for facility operations. The observed procedures contained clearly written safety instructions. The program to create and modify work instructions is documented, and "hot work" permits were described during the inspection. CSM has a training program in place and functioning to ensure that subcontracted workers comply with the site safety practices. Subcontractors are monitored by a construction coordinator. It was noted that there was very little subcontracted work being scheduled as of February 28, 2003. CSM has several internal auditing programs in place and functioning to ensure that management measures perform their safety functions.

The licensee has an organized emergency response team trained in hazardous materials response, as well as medical and fire emergency response. They can request assistance from the fire department in several nearby communities. The facility provides fire extinguisher training for the workforce on an annual basis. This training was observed during the chemical safety inspection. Also, the emergency response is coordinated by the security department (also see Section 5.0).

The licensee has an adequate hazards identification (includes chemicals and fire) and assessment program in place and has the necessary organization and management controls in place to implement and maintain the program. CSM's chemical process safety program includes adequate operating procedures, training, audits, and "hot work" permits to ensure safety to workers, public, and the environment.

4.2 Detection and Monitoring

Activities involving hydrogen and HF pose the most significant chemical hazards in Building 73. Hydrogen is sometimes generated during ore digestion due to the carry-over of metallic iron from the ball milling operation. To detect the presence of hydrogen, each digester tank is

equipped with a hydrogen monitor. Continuous area HF monitors are installed in the digestion areas of Building 73. Also, the licensee has added instrumentation to the condenser chilled water supply.

The NRC staff has reviewed the detection and monitoring program and determined that CSM's efforts are sufficient to help ensure that operations in Building 73 are conducted in a safe manner. In addition, the licensee's emergency planning and response program appears sufficient to handle any chemical emergencies that may occur at the plant.

4.3 Maintenance and Inspection

CSM has a maintenance and inspection program designed to minimize the potential for accidental release of hazardous materials, ensure the reliability of safety devices, and maintain the operational integrity of critical pieces of process equipment. Some maintenance activities include: fume scrubbers inspection, relief valve tests, weekly inspections of safety shower and eyewash stations, monthly fire extinguisher inspections, and annual inspections of bulk chemical storage tanks. Also, the licensee performs pre-startup safety reviews prior to initiating any modified process system.

The licensee has addressed the corrosive characteristics of HF and other materials used in the process. Various corrosion resistant materials are used in the digesters, piping, condensers, scrubbers, and ductwork. The NRC inspector verified that the piping was recently replaced with polypropylene-lined piping during the inspection of February 28, 2003.

The licensee has applied a "Management of Change" program to ensure that compatible materials of construction are used when new or replacement components are installed. A process hazards assessment is performed whenever equipment is replaced with anything other than a "like kind" component. The NRC staff reviewed the Management of Change program and determined that it is appropriate.

4.4 Findings

Based upon on a vertical-slice inspection of the most risk significant accident scenarios and the primary safety controls (February 28, 2003), CSM has provided reasonable assurance that controls are maintained, available, and reliable when required to perform their safety functions. The NRC staff has reviewed the safety controls and the CSM's plan for managing chemical process safety and finds them acceptable.

5.0 Emergency Management

The Cabot staff indicated that the site has a Preparedness, Prevention, and Contingency Plan with procedures to prevent spills and to respond to unplanned releases of hazardous materials. The NRC Project Manager for the site reviewed the facility emergency plan during the site visit on November 20, 2002. Several topics appeared missing from the plan and these were itemized in the request for additional information dated January 14, 2003. CSM responded on July 15, 2003, that the requested information existed in other documents but that all applicable information required by Regulatory Guide 3.67 would be in the emergency plan and in use by

September 30, 2003. The RSO indicated during the November meeting that the plan is reviewed annually. The NRC project manager verified that the plan reviews had been signed and dated.

CSM maintains a fire truck and trained staff to perform as a fire fighting and emergency response team. An emergency response vehicle is also on site to respond to emergencies. Valves that control wastewater discharges are designed to shut off when power is interrupted to prevent the uncontrolled releases of radioactive materials or chemicals in the event of an emergency.

5.1 Findings

CSM appears to have appropriate staff, procedures, and equipment in place to effectively deal with various types of emergencies. The next inspection should confirm that the emergency information has been consolidated, that it meets NRC guidance, and is available to appropriate CSM staff.

6.0 Environmental Protection

CSM is required to measure concentrations and quantities of both radioactive and hazardous materials released to and in the environment around the facility as described in 10 CFR Part 20, Subparts D and F. Also, CSM is subject to the Clean Air Act requirements of 40 CFR Part 61, Subpart I. The CSM facility conducts effluent and environmental monitoring programs to provide a basis for evaluating potential public health and safety impacts, for compliance with the NRC license and environmental regulations, and for development of mitigation measures as appropriate. Liquid and solid waste streams are monitored as part of the effluent monitoring program. Air, surface water, sediment and groundwater are monitored as part of the environmental monitoring program. The effluent and environmental monitoring programs are also discussed in the Environmental Assessment issued by NRC on April 12, 2004.

6.1 Effluent Controls

CSM generates gaseous, liquid, and solid effluents. CSM provides controls of these effluents to reduce the amount of radioactive materials released to the environment, and monitors them to assure the effectiveness of the controls. Gaseous effluents containing source material and other potentially hazardous chemicals are generated by feed storage and transfer, feed grinding and digestion, and by presscake transfer and storage. Potentially hazardous constituents which may be released to the atmosphere include uranium and thorium, their decay products, and HF.

Liquid from the digestion and filtration process is pumped to the wastewater treatment process area where it is neutralized with lime and the solids are separated by a filter press. Solid wastes are discussed in Section 6.3. The liquid is then pumped to Lagoon 5 for settlement. Later the liquid is pumped to Lagoon 6 and neutralized to meet National Pollutant Discharge Elimination System (NPDES) requirements in the form of a water quality permit issued by the PA Department of Natural Resources, Bureau of Water Quality Management, to discharge the liquid effluent to West Swamp Creek from Outfall 001. The water flow rate through the outfall is monitored continuously under the NPDES program administered by the State.

Atmospheric releases from the ore digestion process are controlled with a wet scrubber. Acids captured in the scrubber are condensed and recycled into the ore digestion process. Particulate releases from the ore grinding area are captured in a dust collector and a baghouse and the particulates are also recycled into the ore digestion process. Operating procedures are in place for the ventilation and scrubber system, the baghouse, and the dust collector. Operators are required to follow these procedures.

Scrubbers are inspected and have preventive maintenance performed three times per year. Dust collectors are checked by operations and are serviced by maintenance. The scrubber operating procedure specifies a maximum fluorine content in the scrubber liquids, and specifies the procedure to be followed to keep the fluorine content below this limit. If the pressure drops across the baghouse or dust collector are greater than the maximum specified in the operating procedures, the device is inspected and repaired.

6.2 Environmental Monitoring

The CSM environmental monitoring program includes air, surface water, stream sediment, and groundwater. With NRC approval, dated August 29, 1996, CSM no longer performs forage crop sampling for fluoride analysis. CSM is required to perform perimeter monitoring for ambient air fluoride under State regulations. Fluoride concentration data between the period of January 1999 and November 2003, have been within regulatory limits.

Ambient air is sampled continuously at seven locations, either downwind of the plant or at or near the site boundary. Four of these locations are monitored semi-monthly for ambient fluoride, and the other three locations are monitored weekly for gross alpha activity. In addition, passive radon monitors are placed at the site boundaries to measure the radon gas. The concentrations of fluoride monitored are compared against the PA Department of Environmental Protection (DEP) standard of $5 \mu g/m^3$. The gross alpha activity is compared to the effective concentration limits established by the "Constraint Rule." These concentrations comply with 10 CFR 20.1101(d) which requires that licensees keep doses low enough so that the individual member of the public likely to receive the highest dose would not receive an annual dose greater than 10 mrem from airborne effluents. CSM data indicates that the air sample results are well within the dose constraint limit of 10 mrem/yr (potential exposure estimated at 0.6 to 1.1 mrem/yr). CSM has established action levels and corrective actions including investigation, modifications to the processes or equipment if appropriate, and if necessary, suspension of operations.

CSM also monitors water quality in West Swamp Creek under the NPDES permit. The surface water at Outfall 001 is monitored quarterly and analyzed for isotopic U and Th and gross beta activity. Action levels for uranium and thorium are 15 and 1.5 pCi/L, respectively. Actions may include re-analysis, investigation and correction of cause, and verification of correction. Current minimum detection levels are reported as 1.0 pCi/L or better for isotopic uranium and thorium.

Two locations in West Swamp Creek are sampled for surface water and sediment. One is located 3.6 meters (12 feet) downstream of Outfall 001, and the second is located about 76 meters (260 feet) upstream from Outfall 001. The water samples are collected quarterly and analyzed for gross alpha and beta emitters. Also, individual radioactive constituents will be identified if the gross beta particle activity exceeds 50 pCi/L. Surface water sample data indicate that alpha emitters are usually not detectable. The beta levels have varied but are

within acceptable limits (10 CFR Part 20, Appendix B, Table 2). The water samples are also analyzed for several non-radioactive constituents under NPDES permit requirements.

The sediment samples are collected quarterly from upstream and downstream locations, and analyzed for gross alpha and beta emitters. The results for sediment monitoring at the CSM facility are not significantly different from background values.

CSM proposed changes to the monitoring program that include replacing measurement of gross alpha and beta with specific analysis for uranium and radium (Ra-226 and Ra-228). In addition, CSM established two administrative/action levels for the air and water and sediment sampling data. If the radioactive measurements exceeds 30 percent of the limit from 10 CFR Part 20, Appendix B, Table 2, appropriate actions will be taken. These actions include the investigation of potential causes and, if appropriate, modifications to the processes or equipment. If results exceed 80 percent of the concentration limits, corrective action options include ceasing the process until levels have been reduced. The NRC staff has determined that these changes are an improvement because the analysis provides specific data on the licensed material.

The current NRC approved groundwater monitoring program (Amendment 1, License Condition 14, June 25, 1997) consists of analyzing samples from four wells near the bulk storage bins. CSM also monitors other wells for substances regulated by the PA DEP. To improve the NRC licensed program, CSM has proposed using seven other wells instead of the current wells that may not be optimally placed to detect potential effects on groundwater quality in the vicinity of the bins. The staff has evaluated the data and intends to modify License Condition 14 to incorporate the proposed groundwater monitoring program, as it will provide water samples that would indicate a potential problem so that actions could be taken before any contamination migrates from the storage area. In addition, the drains under Lagoons 5 and 6 collect groundwater which is tested to determine if there is a failure in the liners of either of the storage lagoons. No failures have been detected.

6.3 Waste Management

Wastewater Filtercake

The wastewater filtercake/sludge is generated at the wastewater treatment plant, where the liquid waste streams from the ore digestion process and other plant activities is neutralized with lime. CPM produces approximately 19,000 tons of filtercake per year which is shipped daily to a landfill. The filtercake was composite sampled at least 3 weeks a quarter, but under the revised application and a license condition, composite samples will be analyzed for uranium and thorium at least monthly to ensure that the average concentration remains below CPM's license condition limits. Sample results will be obtained before the material is released.

The average concentrations of uranium and thorium in the filtercake have historically been 4.1 and 0.1 ppm (2.85 and 0.015 pCi/g), and from 1999 to 2003 averaged 3.0 pCi/g and 0.2 pCi/g, respectively. Most quarterly values were below 4.0 pCi/g total. The maximum values are controlled as CSM has a limit on the source material content of the ore it accepts. Also, surveys are performed on some of the loaded trucks before leaving the site to ensure background readings on the released material.

CSM had been disposing the sludge at local landfills under the NRC approved 10 pCi/g limit for uranium plus thorium. The dose modeling was for the critical group, using the resident farmer scenario, on a closed landfill. The staff determined that the disposal dose analyses performed by the licensee either quantitatively or qualitatively addressed all of the important scenarios and adequately described the source term that included Pb-210 as well as U-238 and Th-232 and their progeny. Adequate sensitivity and ALARA analyses were performed. CSM selected the most restrictive single nuclide limits corresponding to a total effective dose equivalent of 0.05 mSv/y (5 mrem/yr) for any scenario and applied the sum of fractions to the release limit which will overestimate the total dose. To be even more conservative, NRC staff has recommended that a license condition limit the release of this material to 10 pCi/g uranium and 3 pCi/g thorium, applied as the sum of fractions so that the total source material activity will not exceed 10 pCi/g on average. Therefore, the potential dose, if members of the public are exposed, is less than 3 mrem/yr above background and would not impact health, safety, or the environment.

In the event of a release or spill of the wastewater filtercake during transportation, the licensee has adequate procedures to address the clean-up. Other low-level radioactive waste such as clothing and filters are stored on site until they are disposed of at an appropriate facility.

Ore Residue Presscake

Less than 1,000 tons of ore residue presscake are produced annually. It is stored in covered concrete bins (one structure) surrounded by a fence and locked gate. As of February 2004, about 4,000 tons of presscake were in the storage bins. The surface water is diverted from the bins and other measures have been taken to prevent contamination of the surrounding area.

As done in the past, CSM is shipping the presscake to a uranium mill for reprocessing. CSM indicated that a contract had recently been finalized and some presscake was shipped in March and April this year. By June 2004, all the stored presscake will be removed. CSM committed in the decommissioning cost estimate, to store no more than 4,000 tons of presscake at any one time.

6.4 Environmental Assessment

The NRC staff prepared a draft environmental assessment (EA) for the renewal license amendment request. That document was sent to various agencies and local governments for comment on August 14, 2003. Some comments were received from PADEP and addressed in the final EA issued April 12, 2004. The Finding of No Significant Impact was published in the Federal Register on May 7, 2004 (69FR25616).

6.5 Findings

The staff has reviewed the effluent and environmental monitoring program information provided by CSM. The staff determined that the programs are acceptable and in accordance with the regulatory requirements. The programs adequately protect the public health and environment from exposure to licensed material. Also, the NRC staff has determined that the management of radioactive waste is appropriate and would not significantly impact the human environment.

7.0 Decommissioning Funding Plan

The existing surety instrument is a letter of credit for $5,954,000 that was evaluated by NRC staff in 2002. A larger surety than estimated by the licensee was required in 1996 because of the large amount of stored presscake on site. The NRC staff reviewed the new CSM decommissioning cost estimate, part of the funding plan required by 10 CFR 40.36(c)(2), in the revised application according to the financial assurance guidance in NUREG-1757, volume 3.

The funding plan indicates a total decommissioning cost estimate of $5,740,722. This amount includes a 15 percent contingency which is acceptable primarily because of the degree of conservatism in the major cost assumptions. As in the 1996 plan, the main cost, at $3,695,468, is the disposal (including packaging and transportation) of presscake. According to CSM, this value is overestimated by $730,840 based on current contract rates, correcting a previous error, and the current re-use of shipping containers. In addition, according to the new CSM policy, presscake will not be allowed to accumulate for years as done in the past. In fact, shipping began in March 2004, and all the stored presscake will be removed by June. The cost estimate is based on 3628 metric tons of presscake being on site at any one time (level existing about the end of March 2004), but the maximum amount that should accumulate in the future will be much less. Using the recommended 25 percent contingency value on the realistic total cost (with lower disposal cost) would still result in a surety amount smaller than the proposed amount.

The detailed site description is in Section 9.1 and Appendix H of the renewal application. The 1993 preliminary site characterization was updated by building surface surveys and soil sampling (10 background and 50 other samples, including subsurface) in 2003. CSM studied the chain equilibrium in soil contaminated with ore and presscake and compared the data to that for ore and presscake. For remediation, the assumption was made that both the uranium and thorium chains were in equilibrium with their gamma emitting progeny. CSM conservatively assumed removal of 12 inches of soil in the contaminated areas and dose modeling was performed to provide the derived concentration guideline levels (DCGL) to meet the site 25 mrem/yr release limit. The DandD dose modeling code was used, but parameters were modified to represent the realistic suburban-residential land use. The model (residential scenario) assumed that 50 percent of the fruit and vegetables consumed on site was homegrown in contaminated soil. The model also assumed that no agricultural animals or products were grown on site. The resulting DCGLs were 2.9 pCi/g for the thorium chain and 3.5 pCi/g for the uranium chain, above background, to be used as a sum of the ratios. For a typical soil mixture, this would be 1.6 pCi/g uranium and 1.1 pCi/g thorium in equilibrium with their progeny. The building occupancy scenario was used to obtain DCGLs for surface contamination. The calculated gross alpha DCGL was 656 dpm/100 cm^2. This is conservative compared to previous guidance for gross alpha limits of 5000 dpm for the uranium chain and 1000 dpm for the thorium chain radionuclides.

An ALARA analysis following NUREG-1757, volume 2, was also performed by CSM to demonstrate how decommissioning costs would vary with changes in cleanup levels for soil and surface contamination. The results indicated that it is not ALARA to reduce doses below 33 mrem/yr, but CSM committed to meet the 25 mrem/yr standard.

The estimated third party labor (fully loaded cost per hour), equipment rental, contaminated material volume or surface area, disposal, and planning costs were presented in 14 tables. CSM indicated that cost estimates were derived from 2003 published rates and current contract prices for Weston Solutions, Inc or CSM. No credit was taken for any salvage value of the ore or equipment.

The staff review concentrated on the major cost items, and the tables were spot checked for math and continuity of numbers. Table 15 of Appendix H lists the major task categories including state tax, laboratory costs, equipment and supplies, packing material, waste transportation and disposal costs, restoration, and final status surveys. CSM explained that surveillance and maintenance costs were not itemized because the limited controls needed during decommissioning of the small areas are included in the health physics costs.

Since filtercake is removed from the site each day of operation, CSM provided just the cost for one day of loading, transporting, and disposal of filtercake at a landfill. For other types of waste disposal, CSM contends that equipment and tanks can be compacted to 5 percent of their original volume. Because this reduction is based on information from a consultant in the field of volume reduction, the staff accepts this value.

Proposed License Condition 15 requires that CSM submit, every 2 years for NRC approval, the current estimated decommissioning and closure costs, if accomplished by a third party, for all existing licensed operations and any planned licensed operational changes for the upcoming year. Such costs include all cited activities and groundwater restoration, as well as off-site disposal of all material. Along with each proposed revision or update of the surety, the licensee shall submit supporting documentation showing a breakdown of the costs and the basis for the cost estimates (adjusted for inflation, if not current estimates), maintenance of a minimum 15 percent contingency (if justified, otherwise 25 percent), changes in engineering plans, activities performed, and any other conditions affecting estimated costs for site closure. According to current policy, itemized costs can be ascertained or the consumer price index can be used to adjust the total cost for inflation for up to 5 years.

7.1 Findings

The licensee's scope of decommissioning activities reflects known and likely contamination, under routine facility conditions. Activities include planning and preparation (mobilization); decontamination and dismantling; packaging, shipping, and disposal of wastes; final radiation survey; and site restoration. The unit cost factors are reasonable, and the level of detail, accuracy, and magnitude of estimated costs are adequate. Also, the justification for a contingency value lower than recommended is acceptable. The historical site assessment was limited because the process has not changed significantly over the years, however, the former tin slag storage areas were mentioned as needing soil removal. The characterization survey was adequate to identify the scope of work and amounts of material for removal.

A letter of credit for at least the NRC approved amount of $5,740,722 is required by proposed License Condition 15, to be submitted by the licensee within 60 days of the issuance of the renewed license. The condition also requires that an updated cost estimate be submitted to the NRC every two years which complies with the recently revised requirement in 40.36(d).

8.0 Conclusion

The review of the renewal application and results of recent inspections has led staff to determined that there is reasonable assurance that CSM's current operation of the Boyertown facility meets the applicable criteria in Part 20 and Part 40, for the safety of workers, the public, and the environment. Based on the monitoring programs, procedures, and management directives, CSM should continue operations in a safe manner.

9.0 References

Cabot Supermetals via Weston Solutions, Inc., "Page Changes to License Renewal Application dated March 23, 2004," dated May 24, 2004. ADAMS Accession Number ML041460211.

Cabot Supermetals, "Cabot Corporation 2003 Annual Report," dated March 8, 2004. ADAMS Accession Number ML040780294.

Cabot Supermetals and Weston Solutions, Inc., "Application for Renewal of Source Material License No. SMB-920," dated March 23, 2004. ADAMS Accession Number ML040860628 (Weston Solutions, Inc. letter), ML040860633 (application and form 313), ML040930203 (CSM transmittal letter dated March 29, 2004).

U.S. Nuclear Regulatory Commission, Regulatory Guide 3.67, "Standard Format and Content for Emergency Plans for Fuel Cycle and Materials Facilities," January 1992.

U.S. Nuclear Regulatory Commission, Inspection Manual Chapter 2603, "Inspection of the Nuclear Chemical Process Safety Program at Fuel Cycle Facilities," January 16, 1996.

U.S. Nuclear Regulatory Commission, Regulatory Guide 4.20, "Constraint on the Release of Airborne Radioactive Material to the Environment for Licensees Other Than Production Reactors," December 1996.

U.S. Nuclear Regulatory Commission, NUREG-1601, "Chemical Process Safety at Fuel Cycle Facilities," August 1997.

U.S. Nuclear Regulatory Commission, NUREG-1727, "NMSS Decommissioning Standard Review Plan," September 2000.

U.S. Nuclear Regulatory Commission, NUREG-1520, "Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility," March 2002.

U.S. Nuclear Regulatory Commission, NUREG-1757, volumes 1-3, "Consolidated NMSS Decommissioning Guidance," September 2003.

U.S. Nuclear Regulatory Commission, letter to CSM conveying the final Environmental Assessment for the Cabot license renewal, dated April 12, 2004. ADAMS Accession Number ML041030379.

LICENSE CONDITION CHANGES
CABOT CORPORATION LICENSE RENEWAL

These proposed license condition changes were discussed with the licensee's representative, Tim Knapp, Radiation Safety Officer for the Boyertown facility, on December 17, 2003, and April 15, 2004. Only the license conditions that have been modified or added are described below.

CONDITION 4

The new expiration date for this 10-year license is based on the date the renewed license is signed. The 10-year license is justified because of licensee performance and recent improvements to the facility programs and procedures, and because it is in accordance with the Office of Nuclear Material Safety and Safeguards (NMSS) policy.

CONDITION 6

The list of sealed sources has been added to this condition per the NMSS/Division of Fuel Cycle Safety and Safeguards policy to list sources that are required to be leak tested or are in Nuclear Regulatory Commission (NRC) -licensed devices.

CONDITION 10

The date of the license renewal application has been changed to reflect the date of the 2004 application.

CONDITION 13

Instead of requiring release of equipment in accordance with guidelines dated April 1993, such releases will be in accordance with applicable NRC guidance such as guidelines dated April 1993. This allows for a transition without an immediate license change when NRC changes to dose-based release limits.

CONDITION 14

The environmental monitoring program summary has been updated to reflect what is in the 2004 renewal application.

CONDITION 15

The decommissioning funding plan review requirements were updated to reflect the October 3, 2003, changes to 10 CFR 40.36(d) and the guidance in NUREG-1757, Volume 3 on financial assurance. Instead of the licensee determining every two years if current costs exceed the existing surety amount by 10 percent before changing the surety amount, the licensee will now submit the updated surety estimate to NRC for approval every two years after the funding submittal date for this renewal. In addition, a minimum 15 percent contingency is allowed, if

justified. The guidance recommends a 25 percent contingency due to the usual underestimating of contaminated material to be removed. However, currently the major decommissioning cost at the Boyertown facility is the disposal of the ore residue (presscake) for which CSM has a contract. Comparing these known costs to the cost estimate in the plan, the surety is overestimated by an amount greater than a 25 percent contingency factor would provide. Since the disposal cost was based on 3628 metric tons of presscake, the condition also includes the requirement to adjust the surety if the amount of presscake at any one time exceeds 3628 metric tons.

CONDITION 17

The condition was added to require a Radiation Safety Officer (RSO) during plant operation because of past performance. In 1999, some environmental samples were not taken because an RSO was not on staff.

CONDITION 19

The uranium recovery standard condition for reporting spills and leaks was added to supplement and clarify the regulations.

CONDITION 20

The source material activity concentration limits for wastewater filtercake disposal in landfills is delineated. The licensee provided dose modeling to support activity levels to limit potential radiation exposure to 5 mrem/yr above background. The staff recommended a lower activity level to be consistent with the current NRC/NMSS policy for solid material releases of a few mrem/yr. Instead of using an annual radioactivity average to limit annual exposure, staff recommended the month average meet the limit to allow sufficient lead time for corrective action and to be conservative.