

40-6940

**From:** "Schoenfelder, Robert P." <R.Schoenfelder@WestonSolutions.com>  
**To:** "NRC-HQ, Elaine" <esb@nrc.gov>  
**Date:** 1/16/04 5:51PM  
**Subject:** Revised application and org chart

<<Cabot2002LicRnwSMB920\_FNLtk.doc>> <<CabotOrgChart2002fig10-1rev1.ppt>> <<CSM SITE PLAN-adjusted3.pdf>>

Elaine;

Revised documents for your preview. The site plan shows the areas for soil excavation included in the DFP cost estimate.

**CC:** "Tim Knapp" <Timothy\_Knapp@cabot-corp.com>, "Schoenfelder, Robert P." <R.Schoenfelder@WestonSolutions.com>

Supplemental Information for Renewal Application for License Number SMB-920

~~Cabot Supermetals~~, Boyertown, PA

Submitted March 29, 2002 by WESTON Solutions, Inc.

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Items 1 – 4 See Form 313

Item 5 Radioactive Materials

- a. Element and mass number: Natural uranium and thorium.
- b. Physical form: Any, but primarily solid feed materials for plant operations.
- c. Maximum amount possessed at any time: 400 tons, as elemental uranium and thorium.

Item 6 Purposes For Which Radioactive Material Will Be Used

Renewal of License number SMB-920 is requested by Cabot ~~Supermetals~~ (CSM), formerly Cabot Performance Materials. The company changed its name in 2002, but made no changes in its location, operations, or corporate management personnel.

CSM is a business unit of:

Cabot Corporation  
75 State St.  
Boston, MA 02109-1806

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The parent corporation under which CSM operates is a \$1.5 billion specialty chemical company. CSM is one of 14 business entities that compose Cabot Corporation. Each of those 14 businesses has responsibility for individual performance of operations.

Neither CSM, nor Cabot Corporation is a foreign owned business.

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The facility covered under this license and the headquarters for CSM are located at the following address:

~~Cabot Supermetals~~  
County Line Road  
Boyertown, PA 19512

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Authorized uses include receipt, possession, and processing by CSM at the Boyertown, Pennsylvania facility in accordance with the statements, representations, and conditions specified in this application for license renewal and attached supplements. Statements, representations, and conditions specified in this application replace in whole and supersede all prior submittals.

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This license allows the receipt and possession of feed material containing uranium and thorium to be processed for tantalum and niobium, two non-radioactive products that are used in the electronics industry. CSM expects these operations to remain economically viable for the foreseeable future and requests this license to be issued for the maximum period of time allowed by the regulations. Although CSM is licensed to

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handle source material under the NRC category that is typically used for uranium mills, CSM's operations are not like uranium operations and are of a much smaller scale than most uranium mills. The majority of the Boyertown plant is dedicated to chemical processing, so radioactive materials are handled in a very limited number of buildings and work areas. The quantities of licensed material that are received as feed material and processed or stored at the site are minimal compared to the massive quantities that are handled at uranium mills. Incoming ores are contained in drums until they are fed into the process, not exposed to the elements in large quantities while stored on open pad sites. None of the radioactive constituents of the ore are concentrated, unlike uranium mills that concentrate uranium as an end product. CSM's tantalum and niobium products do not contain any of the licensed radionuclides. Virtually all of the radionuclides in the feed material are retained in the presscake that is transferred to the bulk storage bins until it is ultimately disposed off-site.

Item 7 Individual(s) Responsible For Radiation Safety Program And Their Training Experience

The individual responsible for the execution of the radiation safety program at the Boyertown facility is the Radiation Safety Officer (RSO). Duties and responsibilities of the Radiation Safety Officer are described in section 10 of this application. CSM requires that the RSO will have the following training and experience as a minimum:

- BS degree in biological or a physical science
- Completion of a basic radiation safety course
- At least two years experience in the safe use and handling of radioactive material

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The Radiation Safety Officer for this license is Timothy Knapp. CSM will notify the NRC in writing in the event that Mr. Knapp vacates the RSO position. CSM will ensure that the duties of the RSO are assigned to and carried out by a responsible, qualified individual at all times during plant operation, and will implement a system to provide back-up, on-call support for the RSO to ensure that lapses do not occur.

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Item 8 Training For Individuals Working In Or Frequenting Restricted Areas

Training for individuals working with radioactive material is described in section 10.5 as part of the Radiation Safety Program. Training for individuals working in or frequenting restricted areas will be commensurate with the individuals' duties and with the requirements of 10 CFR 19

Item 9 Facilities And Equipment

The description of facilities and equipment provided herein is accurate and current as of the date of this application. ~~CSM may change facilities and equipment as required to meet its business needs with the stipulation that any changes expected to impact the handling, control, or monitoring of licensed radioactive material will be made in accordance with the conditions of this license and all applicable federal, state, and local rules and regulations. The U.S. Nuclear Regulatory Commission (NRC) will be informed in writing of any significant changes in facilities and operations.~~

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### 9.1. Plant Facilities and Process Description

The Boyertown facility is sited on approximately 200 acres located along both sides of County Line Road about 1.5 miles (2.4 km) northeast of Boyertown, Pennsylvania. The population of Boyertown was determined to be 3759 during the 1990 census and has remained relatively constant since that time. The site resides in two counties, Berks and Montgomery, with County Line Road marking the boundary between the two. The topography is relatively flat with a slightly elevated knoll just northeast of the main plant area. There is a stream running along the western site boundary, and site drainage is generally south and west. There has been no significant change in the residential areas nearest to the site since the last license renewal. Figure 9-1 presents the layout of the operations, and includes a legend to identify pertinent features such as site buildings and structures, on-site roadways, points of vehicular and pedestrian access, and locations where licensed materials are present. The areas where radioactive materials are received, handled, stored, and processed represent a small fraction of the overall plant site. It is also important to note that ore is typically received and stored in containers such as drums, not in exposed bulk quantities as is common practice at uranium mills. The ore is emptied from the containers under controlled and monitored conditions in Building 73.

The facility processes ores to extract non-radioactive tantalum and niobium. Feed materials qualify as uranium and thorium ore, but those source materials are not processed by ~~CSM~~. ~~The uranium and thorium constituents of the ores would be contaminants in the product and remain in the residual ore materials stored on-site or transported and transferred to another licensee. Several differences exist between typical uranium mills and the Boyertown plant operations, including the following:~~

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- Ores are generally received in drums, not in bulk shipments such as train cars or large capacity haul trucks
- The Boyertown facility processes much smaller quantities of material than a uranium mill
- ~~CSM does not stockpile its ore in exposed piles that are susceptible to wind and rain erosion. Rather the ores are retained in their shipping drums until they are placed inside a building and fed into the process.~~
- ~~The ores received by CSM are typically sand-like and require far less grinding and crushing than uranium ores.~~
- ~~Uranium and thorium are not concentrated in the CSM process, and residual ore materials are stored inside buildings so they are not susceptible to wind erosion~~

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and do not require engineered cover materials, unlike typical uranium tailings piles.

### 9.2 Site Access and Restricted Areas

The perimeters of the Boyertown plant site are fenced into the two areas separated by County Line Road. The two primary access gates (pedestrian and vehicle access) are staffed with security guards to prevent inadvertent or unauthorized access. Secondary access gates are equipped with automatic identification card readers that release the magnetic locks when an authorized card is presented.

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Controlled work areas include the buildings in which radioactive materials are handled and processed (Building 73), and where *pre and ore residues are stored temporarily in the Bulk Storage Bins on the northeast end of the site.* Access to those areas is controlled administratively through general site access procedures, as described above, signs posted in accordance with regulations, and training provided to employees, visitors, and contractors.

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The *Bulk Storage Bins* are constructed to prevent erosion, migration, or dispersal of the residues. They are located in an area surrounded by a chain-link security fence with a single point of access that is controlled by a locked gate. The key to the gate is retained at security, and authorized individuals must sign a logbook in order to receive a key. Plant security guards patrol the access road to the bulk storage bins periodically.

The flow of licensed material is as follows. Ores contained in closed drums are received on trucks at the receiving area. They are assayed and transported to the process staging area while still in their containers. Individual drums are moved into the ore feed area in Building 73, as needed. The ore is fed through a grinding circuit into the plant processing tanks where acid is used to separate the tantalum and niobium from the ore. Ore residues are separated from the process as sludge or moist solids and transported to the *Bulk Storage Bins*. *Solid materials from an on-site acidic wastewater neutralization plant are analyzed to ensure they contain concentrations of uranium and thorium that are below the release limits established in this license, and shipped off-site for disposal at a nearby landfill.*

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### Item 10 Radiation Safety Program

*CSM has conducted operations at the Boyertown facility under license SMB-920 for more than 20 years, and has successfully completed renewals and amendments to that license on several occasions. The processes and facilities have not significantly changed other than to add capacity or improve the efficiency of the plant operations. In addition, license inspections have been completed at the facility on several occasions and the most recent inspection was conducted in September / October 2001 and resulted in only minor (Severity Level IV) violations. This application for renewal of the license summarizes the current conditions and ongoing programs at the facility,*

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including the latest improvements that have been designed to address input from the on-site inspection.

### 10.1 Commitment to Radiation Safety Program Implementation

CSM is committed to establishing, implementing, and maintaining a Radiation Safety Program that meets or exceeds the regulatory requirements, including 10 CFR 20 Subpart B, and complies with accepted industry practices. It shall be the objective of the program to ensure that exposures to employees and members of the general public from radioactive materials used by CSM are kept as low as reasonably achievable (ALARA). The Radiation Safety Program is currently maintained by CSM at the Boyertown facility in accordance with the conditions defined in source material license SMB-920. *It is worth noting that, beginning in calendar year 2000, CSM initiated changes in the organizational structure and management personnel in the Safety, Health, and Environment (SH&E) Department into which the RSO reports.* The radiation safety programs have been improved *under this revised structure* and the following subsections describe the current programs. Changes from past programs are specifically identified throughout these subsections.

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### 10.2 Organization and Personnel Qualifications

This section describes the organizational structure of the Boyertown facility and the roles and responsibilities of managers and staff that are relevant to the radiation safety programs at the site. An organizational chart showing the individuals whose responsibilities may directly impact the success of the radiation safety programs is presented in figure 10-1. Additional information regarding those individuals is provided in the following subparts of section 10.2.

#### 10.2.1 Corporate Management

CSM corporate management is lead by the Vice President and General Manager (VP/GM) of the Boyertown facility. He has overall responsibility for the activities at the site, and profitability of the operations. He is ultimately responsible for the health and safety of the site employees, and protection of the environment and members of the general public.

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Additional corporate managers include the directors *and managers* who report to the VP/GM. As represented in figure 10-1, there are four *individuals reporting to the VP/GM* who have responsibilities that may directly impact the *license or the implementation of the radiation safety programs.* *The managers responsible for SH&E functions and Manufacturing operations report to the General Manager, North America (GM/NA).* *Those managers have the authority to halt operations that appear to be unsafe, and may be called upon to approve the restart of operations after such a shutdown.* The *Manager, SH&E and Facility Services* is responsible for the development and implementation of the SH&E programs and is the direct supervisor of the Radiation Safety Officer (RSO). The *Manager,*

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SH&E and Facility Services has overall responsibility for the technical quality and adequacy of the radiation safety program. He ensures that the RSO has the support and resources necessary to conduct his work activities. He also provides routine feedback to corporate management regarding the status of his programs and interacts with the other directors as necessary to ensure they understand and implement the radiation safety programs. The SH&E functions and operations functions report independently to the GM/NA to provide objective audit, review, and control activities for the SH&E programs. In this independent role, the SH&E staff and managers provide a mechanism by which any employee can report potentially unsafe conditions or safety concerns. The SH&E managers promptly assess and resolve any reported concerns.

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The remaining three key individuals that report to the VP/GM are the Chief Financial Officer, the Director, Tantalum Research and Development and ACM, and the Director, Raw Material Acquisition. They are responsible for individual aspects of the day-to-day operations of various CSM facilities. They ensure that the plant operations comply with the company's policies and procedures.

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### 10.2.2 Site Management

The Chemicals Manufacturing (CM) Manager reports to the Director, Boyertown Manufacturing and has responsibility on a day-to-day basis for ensuring that the Boyertown plant complies with the company's policies and procedures, including the site radiation safety programs. The CM Manager has the authority to immediately terminate any activity that is found to be an imminent threat to health, safety, or property and must approve startup of operations after any such shutdown.

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The Radiation Safety Officer reports directly to CSM's Manager, SH&E and Facility Services and is responsible for monitoring compliance with the conditions of the radioactive materials license and relevant local, state and federal regulations. The RSO has access to all levels of operational management as necessary for the execution of his/her duties. The RSO has the authority to immediately terminate any activity that is found to be an imminent threat to health, safety, or property, or that is likely to violate the license conditions or radiation safety program requirements, and this authority cannot be revoked. A full-time employee fills the RSO position and the Manager, SH&E and Facility Services provides staff as necessary to support the position. Specific qualifications and training for the RSO are described above in Section 7 of this document.

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Specific duties of the RSO include, but are not limited to the following:

- Membership on the ALARA committee
- Monitoring activities involving radioactive material, including conducting routine measurements and special surveys of areas where radioactive material is used.

- Determining compliance with rules and regulations and license conditions.
- Providing guidance on the proper shipping of all radioactive material from the CSM facility and ensuring compliance with applicable regulations of the U.S. Department of Transportation (DOT) and other appropriate agencies.
- Assuring that an accurate inventory of source material is maintained.
- Managing the radioactive waste program.
- Monitoring the storage of source material not in use.
- Performing and arranging for calibration of instruments.
- Assuring leak tests are performed on generally licensed gauging devices.
- Coordinating the radiation safety training of personnel before they are allowed to work independently in restricted areas, and ensuring that class information is current, correct, and appropriate.
- Training and supervising radiological technicians who conduct radiation monitoring program activities to ensure that procedures are followed and results are correct.
- Offering timely feedback on aspects of radiation safety to employees, management, and to the Director of Safety, Health, and Environment.
- Maintaining files of information relevant to future site decommissioning and managing radiological decontamination efforts.
- Maintaining files for records related to the Radiation Safety Program.
- Maintaining radiological contingency plans and overseeing and coordinating the response to any radiological emergency related to the Boyertown operations.

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Detailed position descriptions for any of the positions listed above may be acquired from CSM upon request.

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### 10.3 ALARA Committee

CSM maintains an ALARA Committee to ensure that its operations are conducted in a manner that meets the ALARA commitment. The primary responsibility for oversight and continuous improvement of the radiation safety program is assigned to the ALARA Committee. The objective of the committee is to ensure that exposures to, and releases of licensed radioactive materials are maintained at levels that are as low as reasonably achievable, that operations comply with license conditions, and that unexpected circumstances or changed conditions are appropriately considered and addressed. The members of the committee are selected according to their positions at the facility and are as follows:

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- Chemicals Manufacturing Manager – Chairman
- Radiation Safety Officer – Senior Technical Support
- Maintenance Manager – Member
- Safety and Health Manager – Member
- Production Supervisor – alternating member, annually
- Manager, SH&E and Facility Services – invitee

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- Director, *Bovertown Manufacturing* – invitee
- One representative from each of the union locals with workers at the plant

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The committee membership and leadership have been modified to better develop interaction between operational management and radiation safety staff. Each year the committee will establish goals for the radiation safety program in support of the ALARA objectives.

The ALARA Committee shall meet at least quarterly to review the radiation monitoring results. Previously, the committee met only once each year. In addition, the Chairman shall call special meetings of the committee whenever a new process or procedure in production is initiated that he determines should be reviewed for ALARA considerations. Any employee at the site may submit to the Chairman a request for a special meeting to address processes, procedures, or program implementation that may impact compliance with the ALARA philosophy. The committee will conduct annual reviews of the radiation safety programs and monitoring results, and may commission independent third party reviews to meet this requirement. Written documentation of meetings and activities of the ALARA Committee are maintained by the Chairman.

Previous applications for license renewal have described additional safety-related committees, including the Preparedness, Prevention, and Contingency Plan Committee, the Health and Safety Committee, the Labor-Management Health and Safety Committee, the Safety Council, the Plant Safety Committee, and the Laboratory Safety Committee. Those committees will no longer have any direct role in the radiation safety programs. The members of the ALARA Committee will coordinate their actions with the other committees by contacting appropriate committee participants as necessary.

#### 10.4 Written Procedures

CSM establishes and maintains written procedures to address the routine activities of its radiation safety program. The current list of written procedures includes, but is not limited to, the following topics:

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- Source material inventory
- Personal dosimetry
- Air sampling
- Sludge sampling and storage
- Filter cake sampling
- Ground water sampling
- Surface water sampling
- Sediment sampling
- Incoming ore surveys
- Contamination surveys using wipe samples
- Radiation surveys of roll mil thickness gauges
- Instrument calibration and use

- Radiation safety orientation.

Existing procedures are revised as necessary to keep them current and accurate, and new procedures are developed, reviewed, authorized, and implemented as necessary to document new processes. *Procedures are tracked and maintained in compliance with ISO-9000 requirements. Official copies of procedures are maintained in electronic format and the RSO keeps a current set of procedures for the radiation safety programs available for review during on-site inspections by the NRC.*

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#### 10.5 Training in the Use of Radioactive Material

*CSM has developed and implemented a radiation protection-training program for its employees and visitors to the facility. This program was designed to meet the requirements of Parts 19 and 20 of Title 10 of the Code of Federal Regulations. Training classes serve as part of the indoctrination for new workers and incorporate topics such as the following:*

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- Basic principles of radioactivity and characteristics of radioactive material
- Radiation hazards and potential health impacts from overexposure / prenatal exposure
- Proper methods for safely working with radioactive materials
- Methods for reducing radiation doses and controlling contamination
- Regulatory limits and ALARA philosophy
- Monitoring methods and instruments
- Employees' rights and access to records
- Personal protective equipment
- Cabot's radiation safety programs, roles and responsibilities

The information imparted during radiation safety training is reviewed and revised during the annual review of the radiation safety programs conducted by the ALARA Committee. Cabot includes radiation safety topics and training on new or revised radiation safety procedures and protocols on an on-going, as needed basis as part of its continuing safety training and employee meetings. Restricted area workers are required to attend a refresher course at least once every three years. Training requirements are established for three categories of individuals, as indicated below.

##### o Restricted Area Workers

All employees whose work activities are expected to require access to restricted areas will complete general radiation worker training prior to working without supervision in those areas. Class agendas and sign-up sheets are maintained as records of training. Agendas and materials used for this training are subject to minor changes in content without prior notification of the regulatory agencies. Topics that are typically covered in the class are listed below.

- 1) Fundamentals of radiation safety including--

-Characteristics of radiation and contamination;

-Units of radiation dose and quantity of radioactivity;

-Hazards of exposure to radiation, including internal, external, and acute, and chronic exposures, and stochastic and non-stochastic effects;

-Levels of radiation from licensed material;

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-Methods of controlling radiation dose (time, distance, and shielding); *and*

-Reporting responsibilities and procedures, and proper responses to incidents and releases.

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2) Locations and physical forms of licensed material;

3) Locations and markings of restricted areas and airborne radioactivity areas;

4) Radiation detection instruments including use of personnel monitoring equipment; and operation, and limitations of radiation survey instruments

5) Storage, control, and disposal of licensed material; and

6) The requirements of pertinent Federal regulations.

o Ancillary Personnel

Ancillary personnel such as clerical, security, and administrative staff whose routine work activities at the Boyertown plant do not require their presence in restricted areas will not normally have access to the areas where radioactive materials are stored and handled. However, they will be provided basic hazard recognition and emergency notification training that addresses the radiological hazards at the site. Topics that are typically covered in the class include hazard recognition, locations of radioactive materials, and procedures to follow in case a radiological release is encountered.

o Non-employees

Appropriately trained Cabot employees will accompany non-employees such as visitors and subcontracted workers who are expected to require access to restricted areas while on-site. The plant is enclosed by a security fence and staffed by full-time guards who ensure that visitors are logged in, provided safety equipment, and accompanied by a Cabot escort prior to accessing the plant site. The Cabot escort provides basic hazard recognition information, determines if the visitor will need to access restricted areas, and is responsible for the safety of the non-employee while on-site. If non-employees need to access restricted areas of the site without a Cabot escort they will first receive the training required for Cabot employees.

## 10.6 Methods of Exposure Control

~~CSM~~ has established routine work practices and procedures designed to minimize exposures to radioactive materials for employees and members of the general public. Detailed procedures are available for review as described in Section 10.4, and a general description of methods used at the site is provided in the following subsections.

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### 10.6.1 Administrative Controls

~~CSM~~ employs administrative controls such as designating restricted access areas, requiring training courses for workers, prohibiting undesirable activities in designated work areas, and displaying signs, postings, and labeling as required. Work areas in Building 73 where ore containers are opened and fed into the circuit, and the highest potential exists for airborne radioactive particulates are restricted from access by employees whose duties do not involve the grinding process. Workers are prohibited from eating, drinking, smoking, or chewing in the plant processing areas, and they are informed of these restrictions during training sessions and by signs in the work areas. Work areas are posted with signs and informational postings as required by the regulations and consistent with their conditions.

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### 10.6.2 Engineering Controls

~~CSM~~ incorporates engineering controls such as general and local ventilation in enclosed work areas to control radioactive contaminant levels at their sources and reduce the need for respirators in work areas where levels may approach or exceed occupational derived air concentrations specified in 10 CFR Part 20, Appendix B. Ore grinding equipment is enclosed within rooms to isolate potential releases from the general work areas in Building 73. Ventilation systems are designed, installed and tested by a qualified engineer, and included in routine plant maintenance plans. Concentrations of contaminants in exhaust are controlled to ensure that occupational and environmental releases do not exceed regulatory limits. Atmospheric releases from the ore handling area are controlled with scrubbers and a baghouse. Particles collected in the baghouse are recycled into the process. The performance of these systems is monitored as described in the section titled "Environmental Monitoring".

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Liquid effluents are retained in on-site lagoons to control their release from the site. They are only discharged when stream flow conditions are ~~adequate~~ to ensure compliance with regulatory limits. No additional control of the effluent is required at this time; however, ~~CSM~~ monitors the effluent to detect conditions that might indicate a need for additional control. Alternate methods of disposal in compliance with regulatory requirements may be implemented in the event that stream flow is inadequate to keep up with site effluent requirements. ~~CSM~~

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will ensure that liquid effluents are released from the site only in a manner that complies with regulatory release limits.

### 10.6.3 Personal Protective Equipment

Respirators are used in work areas where airborne concentrations are expected to exceed the occupational derived air concentration specified in 10 CFR Part 20, Appendix B for the radionuclides of concern. The SHE Department maintains a respiratory protection program in compliance with OSHA and NRC requirements that incorporates the following components to ensure that respirators are properly fitted, used, and maintained to prevent excessive employee exposures:

- Employee training
- Medical evaluations, including pulmonary function tests prior to respirator use and annually for routine respirator users
- Fit-tests to ensure adequate face to facepiece seal
- Air monitoring to determine when conditions warrant respirator use and to ensure that respirator protection factors are not exceeded

Protective clothing, such as disposable or washable coveralls, gloves, and shoe covers may also be used to minimize the potential for surface contamination of clothing and skin surfaces where transferable contamination may be present.

### 10.7 Radiation Monitoring Instruments

The RSO maintains various radiation-monitoring instruments for conducting surveys and measurements and analyzing samples. A qualified, licensed contractor calibrates the instruments on at least an annual frequency. The following types of instruments, or their functional equivalents, are maintained at the site, at a minimum.

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<u>TYPE</u>	<u>PURPOSE</u>
Micro-R meter (NaI)	General area surveys
Geiger-Mueller tube	General area surveys Dose assessment, area monitoring
Geiger – Mueller pancake probe	Contamination surveys Fixed and removable
Dual scaler (alpha – beta)	Sample counting (air particulate, smears)
Alpha/beta surface probe	Contamination surveys

(100 sq. cm.)

Instruments used to show compliance with applicable regulations are calibrated before first use and after repair. Each instrument that is available for use is calibrated at least annually thereafter. Records of each calibration are kept for two years.

Hand-held survey instruments used for the estimation of contamination will be calibrated by determining the detection efficiency of the system using a reference source appropriate to the use of the instrument. The efficiency and reference radionuclide will be noted on the calibration label.

The RSO maintains on-site offices and facilities to support the radiation safety programs. These facilities are used to maintain and source-check the radiation-monitoring instruments, count samples such as airborne particulate filters that are analyzed on-site, provide office space for the RSO and his staff, and maintain files for the records that document compliance with the conditions of the radioactive materials license.

The RSO's office is located in an area that is not significantly affected by elevated levels of radiation from site operations and is separate from other work areas associated with daily site operations. Records are kept in lockable file cabinets.

The sample counting area is cleaned and monitored at least *monthly* to ensure that contaminated material does not accumulate and negatively impact the work environment or the sample counting statistics.

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## 10.8 Radiation Surveys and Monitoring Programs

### 10.8.1 Occupational Monitoring

Occupational monitoring programs are designed in compliance with the requirements of 10 CFR 20 to measure concentrations of radioactive material and radiation levels in the work environment, and evaluate personnel dose equivalents when those concentrations or levels exceed administrative limits. The RSO is responsible for the technical oversight and implementation of the monitoring programs. He oversees activities *performed* by technicians, reviews the data, evaluates potential changes in the programs or procedures, determines if follow-up actions are required, and maintains files of the results.

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The following subsections describe, in general, the types of measurements that are performed. Monitoring program details are provided in site-specific procedures and documents that are maintained by the RSO at the plant and have been reviewed by NRC personnel during past inspections.

#### Exposure to External Radiation

Personal or area dosimeters are used to track levels of radiation exposure in the work areas where ores and residues are handled. Area dosimeters are considered an acceptable alternative to personal dosimeters in some areas of the plant because of the low levels of radioactivity in the materials, the small quantities of materials that are handled, and the short periods of time that workers are close to the material. Area dosimeters are placed in locations where highest dose rates are found as determined by the RSO.

#### Monitoring Airborne Radionuclides

There are two primary airborne radiological contaminants of concern in the plant. They are radon gas, of concern inside buildings where the ores or residues are located, and ore dust, found wherever dry ores are ground or disturbed. Passive radon monitors are located at designated places selected by the RSO inside structures where large quantities of ore or residues are stored or handled. Locations for these monitors are selected indoors, at or near ground level because radon gas is heavier than air, where ventilation is limited. Locations are adjusted as necessary by the RSO.

Work area air particulate samples or personal lapel samples are used to collect air particulate samples. Those samples are collected at a frequency that is determined by work activities that may generate airborne radioactive particulates, such as feeding ore into the grinding circuit. Filters are counted for alpha and beta activity to determine if workers are exposed to concentrations that exceed administrative limits. Air particulate sampling results are also used to determine if employees are likely to have inhaled or ingested quantities of radioactive material that would require further evaluation using bioassay methods. Bioassay measurements are not required unless air sample results indicate that an individual is likely to have received in one year an intake in excess of 10% of the applicable Annual Limit on Intake. *CSM has developed a technical basis document, "Review of the Occupational Air Sampling Program at the Cabot Supermetals, Incorporated Boyertown, Pennsylvania Plant" (June 9, 2003), that describes and justifies the air particulate program and the process for evaluating and implementing follow-up measurements. In addition, CSM reviewed the bioassay requirements and site conditions that could result in internal deposition of radioactive materials. The results are reported in a document titled "Review of the Bioassay Program at the Cabot Supermetals, Incorporated Boyertown, Pennsylvania Plant" (June 9, 2003). CSM is committed to maintaining its air sampling and bioassay programs while incorporating all of the recommendations and program revisions contained in those two documents.*

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#### Surface Contamination Surveys

Ores and residues are not handled in a manner or in quantities that are likely to result in significant surface contamination. However, wipe samples are routinely collected monthly from locations where surface contamination

would be most likely to accumulate or would present the greatest potential for transfer to personnel. Samples are counted for alpha activity and corrective actions are implemented to clean surfaces if levels are increasing or above administrative limits.

Miscellaneous Surveys

Additional instrument surveys are performed as directed by the RSO to check incoming ore shipments or other site conditions to ensure that radiological conditions are not significantly changed. Ore shipments typically present external dose rates of less than 2 mR/hr. Any shipment that exceeds that dose rate will be segregated in a fenced or barricaded area and labeled as appropriate. Instrument surveys and leak tests are also performed as required for several sealed sources maintained at the site under general license.

10.8.2 Environmental Monitoring

The Environmental Monitoring Program measures radiological conditions in air, water, and wastes at the Boyertown facility or near its site boundaries. Surface waters, sediments, ground water, and air samples are collected on a regular frequency not less than quarterly. Samples are analyzed for pertinent radionuclide concentrations and the results compared to administrative and regulatory limits, as well as past results to identify potential trends. Sampling locations have been selected to monitor background conditions near the facility and conditions at points of expected maximum potential releases to the environment, such as downwind, down gradient, and downstream from the plant. Other significant locations, such as the nearest occupied residence, may also be designated for sampling if there is potential impact from the site. Sampling frequency and analyses have been selected to determine if CSM is in compliance with license or permit conditions, and to identify trends that could eventually result in non-compliance if not corrected.

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Specific monitoring parameters are described in the following text and summarized in the following table.

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- Passive radon monitoring devices measure concentrations in air at the site boundaries.
- Air particulate samples collected at background and downwind site boundary locations.
- Surface water and sediment samples collected at upstream, and downstream locations.
- Ground water samples collected at locations that are up gradient from the site (background), and down gradient from site locations where the largest quantities of radioactive material are stored.

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*Summary Table of Environmental Monitoring Programs, 2003 License Renewal*

Sample Medium	No. of Stations	Analytical Frequency	Sample Type	Type of Analysis
Air	4	Semi-monthly	Continuous	fluoride
Air	3	Weekly	Continuous	gross alpha
Air	4	Quarterly	Continuous	radon (track-etch)
Sediment	2	Quarterly	Grab	natural uranium, radium-226, and radium-228
Surface Water	2	Quarterly	Grab	natural uranium, radium-226, and radium-228
Ground Water	7	Quarterly	Grab	natural uranium, radium-226, and radium-228

*The data in the summary table do not concur with information in the last license renewal application of the associated Environmental Assessment (EA) for two reasons. First, the analytical parameters represented in this table address only the requirements that apply to this license, and they include only the measurements that were recommended during the most recent annual ALARA Review of the site radiological programs. CSM acquired concurrence from the NRC that the types of analyses listed in the table are adequate to track and document license conditions at the site. Second, the EA for the last license renewal application (1993) erroneously included the outfall at West Swamp Creek as a surface water sampling location. Thus, the three surface-water sampling locations that were indicated in the last license renewal application are correctly identified as only two in this update.*

*CSM reviewed its groundwater-monitoring program and developed a report of the findings titled "Technical Basis for the Location and Screen Interval of Groundwater Monitor Wells at Cabot Performance Materials Corporation Boyertown, Pennsylvania Plant" (August 9, 2002). CSM is committed to maintaining its groundwater-monitoring program while incorporating the recommendations and revisions contained in that document.*

## 10.9 Additional Program Commitments

### Inventory Tracking and Documentation

A continuous inventory tracking system is currently in place using ore receipts, assay results, and calculations on spreadsheets to ensure the license limit of 400 tons of elemental uranium is not exceeded. In addition, the sealed sources that are maintained under a general license are inventoried at the time of each required leak test.

### Emergency Procedures

*CSM maintains redundant power supply systems including on-site generators to ensure that the plant is never without the power necessary to continue operations. An emergency response vehicle is maintained to respond to site emergencies. Valves that control wastewater discharges are designed to close when power is interrupted to prevent uncontrolled releases of radioactive materials or chemicals in the event of an emergency. CSM also maintains a fire truck and trained staff to perform as a fire fighting and emergency response team.*

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**Item 11 Waste Management**

*The extraction process results in one principal radioactive waste stream, the presscake that is stored in the Bulk Storage Bins, and a minor secondary waste stream, the wastewater filtercake. After processing, nearly all the uranium and thorium in the ore remain in the presscake that has historically been stored on-site in the Bulk Storage Bins. The presscake was not considered as a waste, because it contained economically recoverable quantities of CSM's product materials or other valuable minerals and metals. The following waste management alternatives are described as disposal options for the presscake.*

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- Deleted: However, the residues may not be reprocessed and may need to be disposed as radioactive waste, making them the principal radioactive waste from the site.
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*There are currently four feasible alternatives for handling the ore residues and any radiological wastes from the process. First, CSM could continue to store the material on-site until operations ceased, additional tantalum recovery processes were employed, storage capacity at the site was exceeded, or the possession limits of this license were approached. The plant could proceed for many years in this manner at the current rate of processing. Second, the material could be disposed at a licensed disposal site for radioactive wastes. The material would be characterized, packaged, and transported to an acceptable disposal facility in accordance with applicable regulations of the U.S. Department of Transportation and the U.S. NRC.*

*Third, the material could be transferred to another operation that was licensed to receive uranium and thorium. For instance, the presscake could be packaged and transported in accordance with applicable regulations for transfer to another licensee as alternate feed material. The recipient would take ownership of the material to process and dispose of it as appropriate for their operation. The fourth alternative involves the possible qualification of all or part of the material as unimportant quantities of radioactive material under the exemptions given in 10 CFR 40.13. CSM may pursue any of these alternatives in the future.*

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*The minor waste stream is the filtercake that is generated from the onsite treatment of acidic wastewaters and has historically been released for disposal at nearby landfills as non-radioactive material. The filtercake has been routinely sampled and analyzed to ensure that it does not exceed the limits established in the license for annual average concentration of specified radionuclides. At the request of the NRC, doses were assessed for disposal of the filtercake, and used to establish an acceptable release limit. In addition, minimum sampling and analysis requirements have been established and are provided with the results of the dose estimates in a supplemental document titled*

"Dose Assessment for Disposal of Wastewater Treatment Sludge from the Cabot Supermetals Facility in Boyertown, Pennsylvania", April 22 2003.

CSM developed an additional dose assessment report submitted with this application to support release of the wastewater filtercake to various recycling scenarios. CSM will employ such other disposal options as are approved by the NRC. In the event that analytical results someday indicate that the sludge does not meet the annual average activity limit, CSM will consider the same alternatives described above for the presscake.

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If at any point, CSM generates mixed wastes they will be managed in accordance with the most recent regulatory guidance.

#### Decommissioning Funding Plan

CSM continues to maintain a mechanism designed to provide assurances that funds will be available for decommissioning the Boyertown facility. The estimated cost to close and remediate the plant and the value of the "Irrevocable Standby Letter of Credit" are reviewed by the RSO every two years in accordance with the requirements of 10 CFR 40.36. The expiration date of the letter of credit is extended annually for a term of one year unless CSM and the NRC are notified at least 90 days prior to the expiration date. The next biennial review will be performed within 24 months of the license renewal date, and the bond will be adjusted as appropriate at that time.

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CSM has adequate financial resources to continue operating and ultimately decommission the facilities covered by this license. *The Cabot Supermetals, Inc. 2003 Decommissioning Cost Estimate for the Boyertown, Pennsylvania Site, December 11, 2003, which is submitted with this application provides the supporting basis for the value of the current funding mechanism.*

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#### Item 12 License Fees

- a. Fee category: 2.a.1
- b. Amount assessed: Full cost, payable upon notification from the NRC.

Figure 9-1. Site Plan showing access points, restricted areas, occupational monitoring locations, and environmental monitoring locations

| Figure 10-1. *Cabot Supermetals* Boyertown Facility Organizational Structure

**Deleted:** Cabot Performance Materials

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### Cabot Supermetals Boyertown Facility Organizational Structure

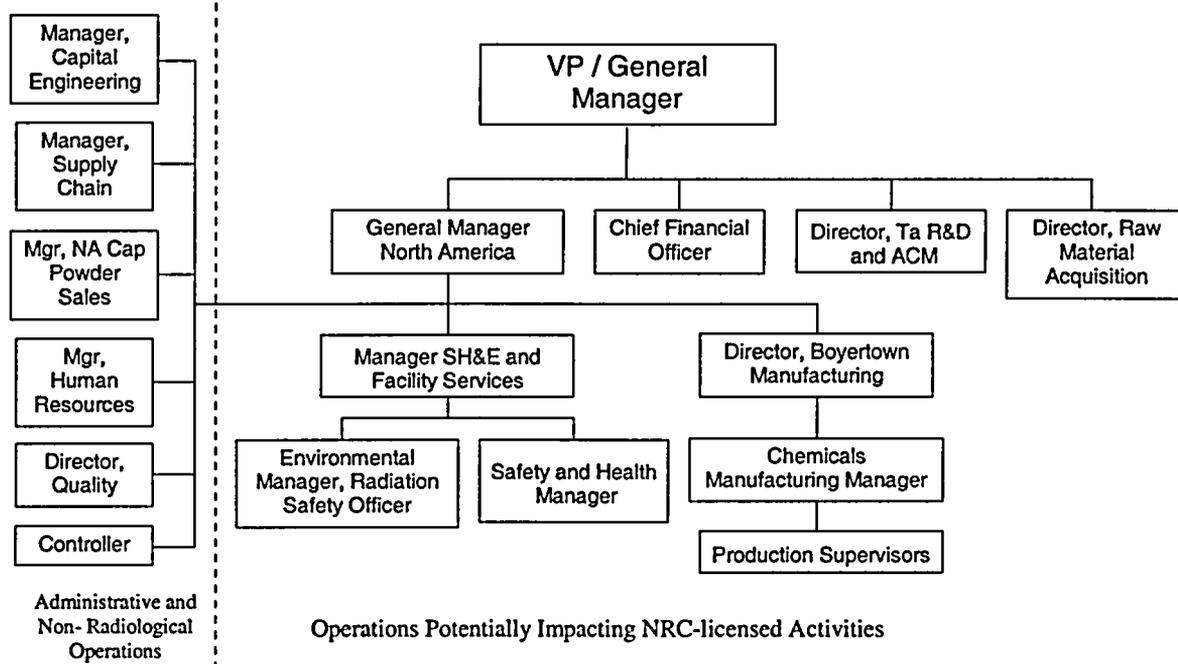
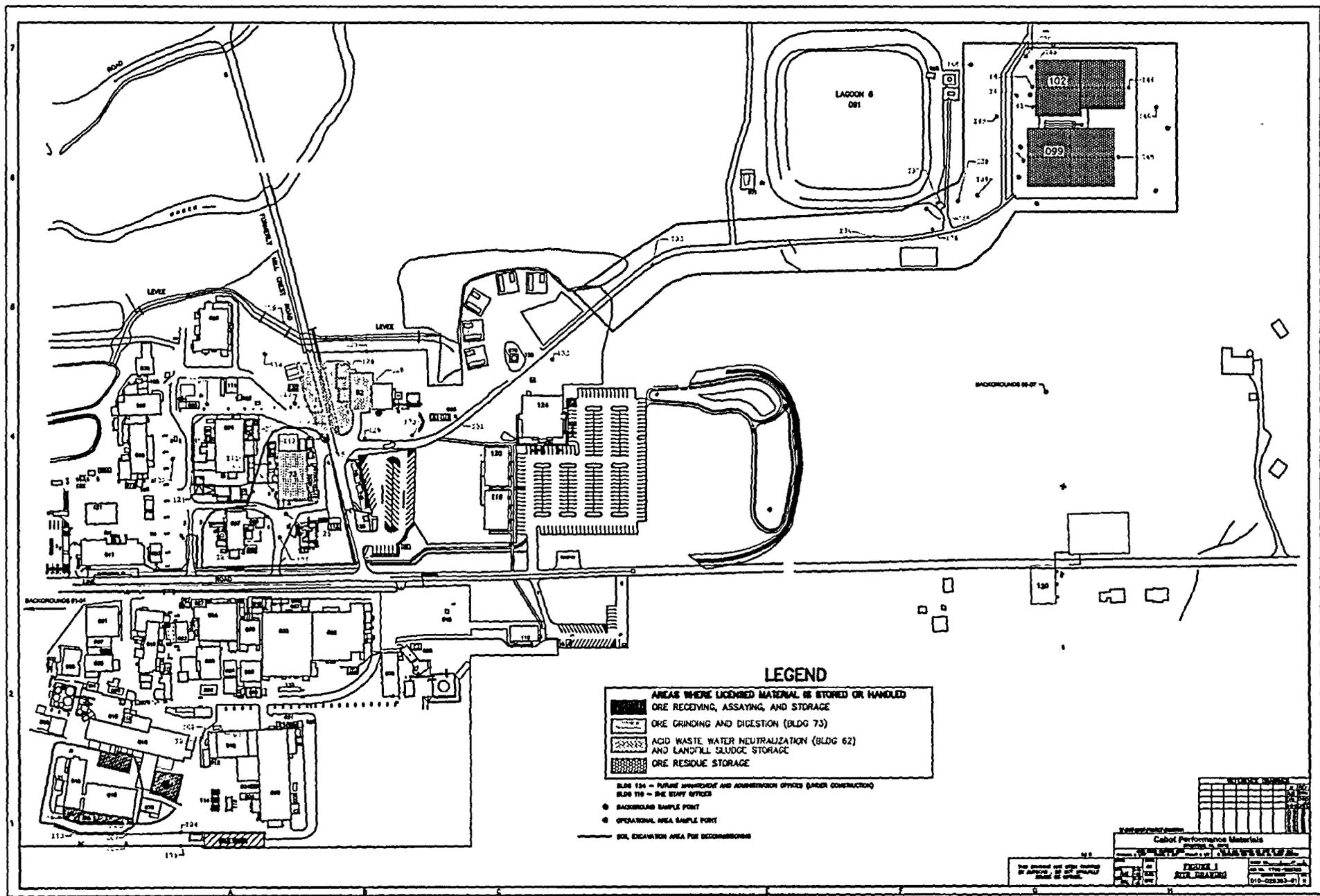


Figure 10-1



**LEGEND**

-  AREAS WHERE LICENSED MATERIAL IS STORED OR HANDLED
-  ORE RECEIVING, ASSAYING, AND STORAGE
-  ORE GRINDING AND DIGESTION (BLDG 73)
-  ACID WASTE WATER NEUTRALIZATION (BLDG 62) AND LANDFILL SLUDGE STORAGE
-  ORE RESIDUE STORAGE

-  BLDG 104 - FUTURE MANAGEMENT AND ADMINISTRATION OFFICES (UNDER CONSTRUCTION)
-  BLDG 110 - THE STAFF OFFICES
-  BACKGROUND SAMPLE POINT
-  OPERATIONAL AREA SAMPLE POINT
-  SOIL EXCAVATION AREA FOR DECONTAMINATION

<p>FIGURE 1 SITE DRAWING</p>		<p>DATE: 11/11/83 BY: [Signature] CHECKED: [Signature]</p>
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**Subject:** Fwd: Revised application and org chart  
**Creation Date:** 2/5/04 1:22PM  
**From:** Elaine Brummett

**Created By:** ESB@nrc.gov

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BSG (Betty Garrett)

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nrc.gov

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**Return Notification:** None

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**Security:** Standard