CABOT PERFORMANCE MATERIALS

CABOT CORPORATION

RENEWAL APPLICATIONS

LICENSE SMB-920

AND

LICENSE SMC-1562

MARCH 1994

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CHAPTER 1
STANDARD CONDITIONS AND SPECIAL AUTHORIZATIONS

1.1 Name, Address, and Corporate Information

Cabot Performance Materials
County Line Road
Boyertown, Pennsylvania 19512

Cabot Corporation (Cabot) is incorporated in the State of Delaware.
The principal office is located at 75 State Street, Boston, Massachusetts 02254-9073

1.2 Site Locations

Cabot Performance Materials (CPM) has two NRC licenses (SMB-920 and SMC-1562) which authorize activities at three facilities which have used, or currently use, radioactive material. These facilities are located in Boyertown, Reading, and Revere, Pennsylvania. See Figure 1-1.

Boyertown Facility

Current operations involving the handling of source material occur at a 175 acre site located along County Line Road, about 2.4 km (1.5 miles) northeast of Boyertown, Pennsylvania. County Line Road is the border between Berks and Montgomery Counties and divides the Cabot property in two. See Figure 1-2. The facility processes tin slags, tantalite and columbite ores to extract tantalum and niobium.

Reading Facility

The Tulpehocken Street plant is located in a central industrial area of Reading, Pennsylvania, east of Route 422 and north of the Route 422-Route 422 Business interchange. The property is located on the north bank of the Schuylkill River at an approximate elevation of 225 feet above sea level (USGS, Reading Quadrangle, 1956). The facility received raw material in the form of tin slag for processing by a smelting operation to concentrate the rare metals. See Figure 1-3. The property is not owned by Cabot, but by Robert Stavins.

Revere Facility

The Revere facility is located in eastern Pennsylvania, between Philadelphia and Allentown, in Revere. See Figure 1-4.

1.3 License Number and Period of License

The original License in use by CPM is SMB-920, which was for a period of five years and expired on December 31, 1988. This license was administratively split into active and nonactive licenses by the NRC in December 1993. This application is an updated revision to CPM's November 23, 1988 application for continuation of activities for another five year period. This revised application provides updated information for both licenses and describes a revision to the present digestion process proposed for use by CPM at the Boyertown facility.

1.4 Possession Limits

SMB-920 authorizes CPM possess a maximum amount of 400 tons of elemental uranium and thorium. As of June 1993, CPM's inventory of source material totaled 162 tons of uranium (112 tons) plus thorium (50 tons). See Attachment A. CPM proposes to keep the 400 ton limit for the new license.

The proposed revised digestion process to be covered by the renewed license SMB-920 would enable CPM to lower its inventory of digestion sludge by-product. This process revision will use the sludge as feed material for a source of tantalum (and niobium). No more sludges will be produced after the revised process is on line. The residue from the revised process is a sintered pelletized material, which does not exhibit any of the characteristics of hazardous wastes under the Resource Conservation and Recovery Act. However, it is still source material and will have to be disposed of as radioactive waste unless a recycling alternative can be developed, e.g., transfer to a uranium mill for recovery of the approximately 1% uranium content.

SMC-1562 authorizes possession of 100 tons of elemental uranium and thorium.

1.5 Authorized Activities

1.5.1 SMB-920 -- Current CPM operations involving the handling of source material occur at a 175 acre site located along County Line Road dividing Berks and Montgomery Counties about 2.4 km (1.5 miles) northeast of Boyertown, Pennsylvania. CPM wishes to continue to recover tantalum and niobium from ore and slags that contain unwanted concentrations of uranium and thorium (the combination of uranium and thorium at up to 2%).

Principal operations in the Boyertown Facility include extraction of tantalum and niobium from ores, fabrication of products, treatment of industrial liquid waste for release to the environment, and storage of by-product sludge containing valuable rare earth components from the processed ores. (See NUREG 1027, Section 1.2.) No radioactive source material is used at any other Cabot site.

1.5.2 SMC-1562 -- CPM performed thermite reduction of pyrochlore ores containing columbium (niobium) to make an iron-columbium alloy at the Revere, PA site. Operations occurred briefly during 1973 and 1974. CPM believed that all radioactive material had been removed from the site in 1990. CPM has requested that NRC grant a Release for Unrestricted Use of the site. A final confirmatory survey by Oak Ridge Associated Universities (ORAU) was conducted and the request was denied. Continuing decontamination and decommissioning work is being conducted at the site.

The former operation, at Reading, PA, Tulpehocken Street, is in the process of being decommissioned. Dirt and ore residues have been removed from the buildings and parking lot and brought to Boyertown for storage in the sludge storage buildings. CPM requested that NRC grant a Release for Unrestricted Use of the buildings and parking lot area at the Reading site. This request was denied and continuing decontamination and decommissioning activities are being conducted. Additionally, CPM is authorized to possess and maintain the slag disposal area at the Reading site.

1.6 Exemptions and Special Authorizations

The Boyertown facility's sole licensed activity involving source material is its generation and temporary storage on-site of by-product sludges, which result from the processing of raw ores to extract columbium and tantalum. These by-product sludges constitute source material because they contain in excess of 0.05% uranium and thorium, in combination, by weight. In addition to potentially commercially valuable uranium and thorium concentrations, the by-product sludges also contain significant concentrations of columbium, tantalum and other rare earth elements.

CPM has been storing these by-product sludges on-site in secure concrete and cinderblock vaults at the Boyertown facility while it investigates various possibilities for recycling or other commercial uses of the sludges. The proposed revised extraction process would use the sludges as a supplemental feedstock in addition to new ores and ore concentrates. The revised process would recover the hydrofluoric acid from the sludges, and extract the remaining concentrations of commercially valuable columbium and tantalum. The company's ultimate goal is to reprocess its entire inventory of stored by-product sludges in this fashion, and to ship the reprocessed residues off-site for further reclamation or disposal before the eventual decontamination and decommissioning of the facility.

SMC-1562 authorizes CPM to possess potentially contaminated facilities at the Revere site. CPM wishes to retain this authority until NRC grants a Release for Unrestricted Use of the Revere site.

SMC-1562 also authorizes CPM to possess potentially contaminated materials and facilities at the Reading site. CPM wishes to retain the authority to possess potentially contaminated facilities until NRC grants the Release for Unrestricted Use of the buildings and yards at the Reading site. CPM also wishes to retain the authority to possess potentially contaminated materials in the Reading dump until final disposition of this material is resolved.

CHAPTER 2
ORGANIZATION AND ADMINISTRATION

2.1 Organizational Responsibilities and Authority

It is CPM's philosophy is that radiologic and non-radiologic safety is the responsibility of all employees. As illustrated on Figure 2-1, several key employees have additional responsibilities to ensure that factors important to safety are identified, reported to the appropriate level of management, and addressed. Attachment B provides detailed descriptions of the following key positions:

Radiation Safety Officer (RSO) - The RSO is the highest level radiation safety position at the Boyertown facility. The RSO has the authority to stop production or other operations to protect the health and safety of workers, the public, or the environment. Suspended operations may only be restarted by the General Manager. The RSO provides training to the personnel and supervises the health surveillance program. The RSO is also responsible for obtaining all needed permits licenses, and registrations related to the handling of radioactive materials. The Radiation Safety Procedures (Attachment C) describe the responsibilities of the RSO. Mr. William C. Gannon is the current RSO for Cabot Performance Materials.

General Manager - The General Manager is responsible for managing the Boyertown facility. His primary safety function is to review operations suspended by the RSO for safety reasons and authorize their restart after the safety issue has been resolved. The current General Manager is Robert S. Barron.

Director of Operations - The Director of Operations reports to the General Manager and is responsible for all operational activities at the Boyertown plant. His primary safety function is to ensure that operational activities adhere to approved radiation protection procedures. The current Director of Operations is John S. Lindell.

Manager Safety and Industrial Hygiene -The Manager of Safety and Industrial Hygiene reports to the Director of Operations and is responsible for ensuring that the Boyertown plant is operated such that the health and safety of the employees and the public is protected. The current Manager of Safety and Industrial Hygiene is Ms. Suzan A. Frey.

The Manager, Safety and Industrial Hygiene also serves as the Emergency Response Coordinator (ERC). As such, he is also responsible for coordinating all emergency response measures and for establishing and maintaining a training program for the purposes of timely and proper responses to emergency and spill events. The ERC must notify the General Manager when an incident occurs. The CPM Preparedness, Prevention and Contingency Plan (Attachment D) describes the duties and responsibilities of the ERC. CPM procedures require that the ERC or his alternates

be on the premises or on call at all times. First alternate to the ERC is Mr. Randall J. Kresge.

Plant Safety Engineer - The Plant Safety Engineer is responsible for monitoring operations to ensure that safety policies are being followed, reviewing operations, and recommending safety related changes to the Manager Safety and Industrial Hygiene. The current Plant Safety Engineer is Mr. Randall J. Kresge.

Manufacturing Manager - The Manufacturing Manager oversees the manufacturing of tantalum and niobium metals after they are extracted from the ore. He is responsible for ensuring that manufacturing operations are carried out in accordance with CPM safety policies. The current Manufacturing Manager is Mr. Nicholas C. Feola.

Consultant Health Physicist - The Consultant Health Physicist is an outside expert who conducts a quarterly survey with the RSO to audit the proper handling of radiation safety and environmental monitoring programs. The audit results are submitted to the RSO. The current Consultant Health Physicist used by CPM is Rich Dubiel, ARC.

2.2 Personnel Education and Experience Requirements

Cabot Performance Materials has established the following educational and experience requirements for key positions important to safety:

Radiation Safety Officer (RSO) - The minimum technical qualifications shall be a Bachelor's degree, completion of a basic 40-hour course in radiation safety, and two years experience in the handling of radioactive materials.

General Manager, Director of Operations, Manager Safety and Industrial Hygiene, Environmental Manager, and Plant Safety Engineer - These management positions do not have any radiation safety-related education and experience requirements beyond those qualifications needed to perform their production responsibilities.

Consultant Health Physicist - The Consultant Health Physicist must have demonstrated experience in providing health physics services to industrial facilities and be a C.H.P.

Radiation Personnel - All CPM Personnel who work near, or handle, radioactive materials must take and pass a written Radiation Safety Test based on their understanding of a radiation safety pamphlet distributed by the RSO.

Safety Committee Members - There are no special safety-related qualification requirements for members of Safety Committees. Resumes of key personnel important to safety are contained in Attachment E.

2.3 ALARA Policy

With the continuing revisions to NRC regulations, As Low As Reasonably Achievable (ALARA) must be regarded as a cornerstone of the radiation protection program. Cabot Performance Materials is in possession of two NRC licenses which require that an ALARA Review committee meet a minimum of one time a year in order to review the program and make recommendations aimed at achieving ALARA in radiation exposure, effluents, and contamination of property.

The ALARA Policy at Cabot Performance Materials is centered on three areas of radiation protection, namely Analysis, Control, and Evaluation and Tracking. These areas represent the essence of the radiation protection program. Detail of these three areas is as follows:

1) Analysis

   Monitoring and Surveys
   Instrumentation and Calibration

2) Control

   Postings and Access
   Radioactive Material Control
   Exposure Control
   Contamination Controls
   Airborne Radioactivity
   Training and Qualification

3) Evaluation and Tracking

   External Dosimetry
   Internal Dosimetry
   Administrative Control Levels and Dose Limits
   Reporting and Record Keeping

2.4 Safety Committees

CPM uses different committees to address radiation safety as well as occupational safety and health of workers and the public. The committees are: PPC Committee and ALARA committee

2.4.1 Radiation Safety Committees

Two of CPM's safety committees have functions that are important to radiation safety. Due to common personnel on both committees, they interact with the positions important to radiation safety.

PPC Plan Committee - The PPC Plan Committee has the responsibility and the authority for developing, implementing and maintaining the PPC Plan. The Committee reviews the PPC Plan on an annual, or as needed, basis. Evaluations of the PPC Plan include, but are not necessarily limited to, a review of new materials, processes and wastes handled and identification of potential spill sources. Proposed changes in the PPC Plan, as well as proposed changes in existing processes or new construction relative to the plan, must be reviewed and approved by the PPC Plan Committee before implementation. The PPC Plan Committee reports to the Manager of Safety and Health.

The PPC Plan Committee consists of the following personnel:

Emergency Response Coordinator & Safety & Health Manager	S. A. Frey
Plant Safety Engineer	R. J. Kresge
Plant Engineering Representative	E. J. Keenan
Director of Operations	J. S. Lindell
Manager, Environmental Affairs	A. T. Campitelli

ALARA Committee - CPM uses an ALARA Committee to help ensure that radioactive exposure is kept as low as reasonable achievable. The ALARA Committee consists of:

Radiation Safety Officer	W. C. Gannon
Director of Operations	J. S. Lindell
Manager of Manufacturing	N. C. Feola
Manager of Chemicals	M. J. Engel
Manager of Safety	S. A. Frey
Supervisor of Waste Plant	H. G. Carter
Manager, Environmental Affairs	A. T. Campitelli

The ALARA Committee meets at least once a year to look over the results of radiation monitoring and testing information. The RSO calls special meetings of the ALARA Committee whenever a new process or procedure in production is initiated that he determines should be reviewed for ALARA. Copies of the ALARA Committee meeting minutes are sent to the Consultant Health Physicist and the General Manager.

2.4.2 Other Safety Committees

Other operating safety committees are primarily used for non-radiological safety. However, these committees may identify or address issues related to radiation protection. These other committees are:

Health and Safety Committee - CPM Performance Materials and the International Chemical Workers Union Local 959 established a Health and Safety Committee consisting of at least three representatives of CPM Performance Materials Management, including a safety official, and three representatives of the Union. The Committee conducts monthly meetings and inspections of work areas. Unresolved Committee issues are referred to the CPM Performance Materials Director of Technology, or designated representative, at the Boyertown facility and the Chief Shop Steward. A full description of the Committee activities is included in Section 6:06 of the Articles of Agreement between CPM Performance Materials and International Chemical Workers Local 959 (Attachment F).

Labor-Management Health and Safety Committee - CPM Performance Materials and the International Chemical Workers Union Local 619 established a Joint Labor-Management Health and Safety Committee consisting of at least four representatives of CPM Performance Materials Management, including a safety official, and four representatives of the Union. The Committee conducts monthly meetings and inspections of work areas. Unresolved Committee issues are referred to the Cabot Performance Materials Boyertown Plant Manager, or designated representative, and the Chief Shop Steward. A full description of the Committee activities is included in Section 6:07 of the Articles of Agreement between Cabot Performance Materials and International Chemical Workers Local 619 (Attachment G).

2.4.3 Approval Authority for Personnel Selection

2.4.3.1 Selection of Key Safety Personnel

Personnel filling key positions important to safety are selected by the next higher level of authority in consultation with the Radiation Safety Officer if required. These positions and the management level responsible for their selection are:

- Radiation Safety Officer (RSO) - The General Manager is responsible for selecting the Radiation Safety Officer.
- General Manager - The Cabot Corporation Board of Directors is responsible for selecting the General Manager.
- Director of Operations - The General Manager is responsible for selecting the Director of Operations.
- Manager, Environmental Affairs - The Director of Operations is responsible for selecting the Manager of Environmental Affairs.

- Manager, Safety and Industrial Hygiene - The Director of Operations is responsible for selecting the Manager of Safety and Industrial Hygiene.

- Plant Safety Engineer - The Manager of Safety and Industrial Hygiene is responsible for selecting the Plant Safety Engineer.

- Consultant Health Physicist - The RSO is responsible for selecting the Consultant Health Physicist.

2.4.3.2 Selection of Committee Members

- Preparedness, Prevention and Contingency Plan (PPC Plan) Committee - The Manager of Safety and Industrial Hygiene is responsible for selecting the PPC Plan Committee members.

- ALARA Committee - The RSO is responsible for selecting the ALARA Committee members based on their involvement with radioactive materials.

- Safety Council - Personnel filling the six CPM Management positions and two International Chemical Workers Union positions specified in the Safety Council Charter are automatically members of the Council. The Plant Supervision Representative is selected by the Health and Safety Manager.

- Plant Safety Committee and Laboratory Safety Committee - Members of these subcommittees are selected by the Safety Council.

- Health and Safety Committee - The Manager of Safety and Industrial Hygiene selects the Cabot Performance Materials management representatives on the Committee. Union representatives are selected by the Union.

- Labor-Management Health and Safety Committee - The Manager of Safety and Industrial Hygiene selects CPM management representatives on the Committee. Union representatives are selected by the Union.

2.5 Training

Radiological

The facility is committed to insuring that all radiation safety and emergency personnel and all other personnel whose duties involve working with or around a licensed materials, receive timely and appropriate training in the potential hazards involved, and corresponding safety and health rules, and procedures. Cabot Performance Materials is also committed to providing refresher training as needed. The Radiation Safety Officer has the responsibility to train all employees who may be near radiation sources.

Section IV of the Respirator Program Policy, Requirements & Guidelines (Attachment H) describe the training provided to employees assigned to respirator use areas such as the Ore Processing Area.

Upon beginning work in the Ore Processing Area of the plant, employees are to receive a radiation safety indoctrination talk by the Radiation Safety Officer (Figure 2-2). Annually thereafter, these employees are given a Radiation Review Sheet and, after studying it, are quizzed for the record in their permanent file for radiation safety competence. See Attachment I, "Written Qualification for Radiation Worker Safety". The RSO checks the number of men working in the Ore Processing Area monthly for a record of the Bioassay requirement.

Non-Radiological

Cabot Performance Materials satisfies its commitment to safety training with a safety indoctrination for all new employees followed by monthly and quarterly safety training programs.

New employees receive a multi-media safety indoctrination that covers general plant safety rules, fire safety, chemical safety, proper lifting techniques, eye safety, respiratory protection, hearing conservation and other topics related to the machinery and processes that they will operate.

The monthly training program emphasizes the various subjects on a rotating basis. Among the subjects reviewed are:

Fire! What Would You Do?
Material Handling Hazards
Safety Programs and Procedures
Slips, Trips and Falls Can Be Prevented
Hand Protection
Lockout Safety
Housekeeping
Hearing Conservation
Hazard Communication

Eye/Face Protection
Emergency Procedures
Reaching Elevations Safely

In addition to monthly department safety training provided within departments, a program of quarterly safety training is provided to all employees. Topics are of a general plant nature and include the same topics as the indoctrination course. Safety training is also provided when new equipment is installed or a change in operations is instituted.

2.6 Procedures

2.6.1 Operating Procedures

Cabot Performance Materials standard procedures at the Boyertown facility provide that the RSO is to be involved in a timely manner in matters involving licensed materials and radiation safety. Those procedures and the scope of the RSO's authority are described in the Safety Procedures Manual (Attachment C, Radiological RAD-012, and the other 22 department procedures RAD- 001-022).

2.6.2 Changes in Procedures

Any employee or safety committee may request that an operating procedure be changed. The RSO is responsible for reviewing and approving changes to operating procedures related to radiation protection. The RSO is also responsible for modifying written procedures to cover the changes. Beginning in 1991, CPM began scheduling periodic reviews of the written procedures to ensure that they are kept current with regulations and the radiation needs of the employees. The Quality Systems Document Change Notice form is required for changes (Attachment C-1).

Proposed changes in facilities and equipment are reviewed by: the managers responsible for the facility or equipment to be changed; their managers; the RSO if radiation protection is an issue; and the appropriate safety committees (see Section 2.3). Major changes are approved by the General Manager. The RSO is responsible for verifying that approved changes affecting radiation protection are implemented. CPM uses a computerized tracking system to monitor the progress of capital improvement projects.

2.6.3 For emergency conditions, CPM maintains an emergency response vehicle equipped with protective clothing as listed in Section 17 of the PPC Plan (Attachment D). For cleanup of spills of licensed material, CPM maintains the equipment listed in Table 22-1 of the PPC Plan. This equipment includes disposable coveralls, disposable overshoes, dust masks, and gloves. Cleanup procedures are also described in the PPC Plan.

2.7 Internal Audits and Inspections

Cabot Performance Materials conducts the following types of routine inspections and audits:

1. Quarterly Radiation Survey and Audit - The RSO and the Consultant Health Physicist conduct a quarterly survey, consisting of a plant tour and review of records, to audit the radiation safety and monitoring program. The Consultant Health Physicist prepares a written report to the RSO who is responsible for follow up action and maintaining records of the surveys. Attachment J shows the quarterly survey form used by the RSO to record data obtained.

2. Routine Materials Surveys - Shipments of source materials into and out of the plant are surveyed by the RSO to assure compliance with regulations at 10 CFR 20.200 and 49 CFR Part 199. In addition, the RSO routinely surveys areas and equipment where radioactive materials are managed as per regulations at 10 CFR Sections 20.201, 40.63 and 40.65. Results of these surveys are maintained in the RSO's files.

3. Inventory of Radiation Sources - The RSO prepares an inventory of radiation sources (ore) on at least an annual basis, although the inventories are frequently conducted semi-annually. (see Attachment D, Section 8.3) Results of the inventories are maintained in the RSO's files.

4. Non-routine Investigations - Cabot Performance Materials procedures (Attachment D) require the RSO to investigate and document any incidents or situations with the potential for unacc ptable radiation risk or violations of regulations or procedures. Investigations may be initiated based on information from audits, surveys, committees or any plant personnel. The RSO reports the results of these investigations to regulatory authorities or to CPM Management as appropriate, and maintains records of the investigations. The RSO has the authority to shut down operations if his investigation identifies unacceptable hazards. (Attachment K)

5. Respirator Program Surveillance - Cabot Performance Materials performs a complete evaluation of the respirator program at least annually (see Attachment H, Section VII). This evaluation process includes frequent audits of job areas to determine compliance, an audit of the respirator handling process (cleaning, disinfection, inventory, training, and record-keeping), and an annual respirator audit.

6. Health and Safety Committee Inspections - The Health and Safety Committee conducts monthly inspections as per the Agreement between CPM and International Chemical Workers Local 619 and 959 (Attachments G-H). The Committee also investigates safety concerns raised by employees. The Committee may report the results of inspections to the CPM Director of Technology and the Chief Shop Steward of the Union.

2.7.1 Investigations and Reporting

The RSO is responsible for investigating, recording, reporting, and following up on any actions of reportable incidents, as stated in Section 1.0 of the Radiation Safety Procedures Manual (Attachment C). Cabot Performance Materials would take the following steps if an incident occurs:

- receive verbal report,
- contact appropriate officials, (NRC, state regulators or emergency crews, depending upon the severity of the incident),
- visit site,
- secure area,
- assess immediate hazards and take appropriate action,
- interview witnesses,
- determine causes,
- take corrective action, and
- notify NRC in accordance with 10 CFR 20.403.

2.8 Records

The RSO is responsible for maintaining Cabot Performance Materials health and safety records in accordance with 10 CFR 20.40 (Attachment C). In accordance with instructions from the General Manager (Attachment L), the RSO is currently retaining these files indefinitely. Files maintained by the RSO (and the time frame covered) include:

a. Personnel Radiation Monitoring - Film badge (1960 - Present), TLD(1978 - Present), Urinalysis (1975 - Present)

b. Radioisotope Inventory (1989 - Present)

c. Radiation Surveys (Quarterly Reports) (1983 - Present)

d. Instrument Calibrations (1965 - Present)

e. Training Records (1978 - Present)

f. Inspection Records (1978 - Present)

g. Licenses and Registration (1967 - Present)

h. Analysis Reports (air, water, smears) (1967 - Present)

CHAPTER 3
RADIATION PROTECTION

3.1 Restricted Areas - Personnel Contamination Control

3.1.1 The only permanently restricted area at Cabot Performance Materials Boyertown Plant is the sludge storage buildings. The acid nature of the sludge residues, along with the radiation and dust hazard, are the main reason for restricting this area. Restrictions on access to the Ore Handling Areas are imposed when dusty conditions occur. The revised process will use different types of handling equipment than the current facility. However, similar restrictions will be placed on the ore handling areas for the revised process when dusty conditions occur.

3.1.2 Access to ore handling areas is restricted to personnel wearing respiratory protection devices when dusty conditions exist, such as when ore is loaded into the grinding circuit. Selection of respiratory protection devices is governed by the Cabot Performance Materials Boyertown Plant Respirator Program, Policy, Requirements, and Guidelines (Attachment H).

3.1.3 The sludge storage buildings are large concrete vaults with one entrance containing a locked chain, link gate. The mausoleums are located on an access road secured by a locked, chain link fence. The plant area is policed periodically by plant security. Persons desiring entry must sign a log book at the guard station to obtain a key.

3.1.4 The RSO monitors the time personnel work in the Ore Handling Areas and time they spend in the sludge storage area. This enables the RSO to determine exposure levels and identify personnel that need to be tested under the bioassay program.

3.1.5 "Radioactive Material" signs are posted at the entrance to the sludge storage buildings, the ore processing and ore digestion buildings, and the ore storage areas. Any stored ores or sludges with activities greater the 2 mR/hr. are roped off and posted with signs to warn the workers to keep a safe distance. NRC Form 3 is posted at various locations throughout the plant.

3.2 Radiation Work Permit Procedures

Cabot Performance Materials does not issue radiation work permits (RWPs). Should a condition arise where a RWP would be needed, the RSO would be responsible for issuing and terminating the RWP if a new procedure could not be prepared and approved in a timely manner.

3.3 Written Procedures

Cabot Performance Materials conducts its activities related to radiation protection according to written procedures. These procedures are discussed in Section 2.6. These procedures are distributed to the RSO, Environmental Affairs Manager, the ALARA Committee, and the Consultant Health Physicist. The RSO is responsible for verifying that the procedures are followed.

3.4 Instruments

The RSO maintains various Radiation Survey Instruments for measuring beta-gamma and X-ray activities. These instruments are calibrated by a licensed contractor at six month intervals. The range of these instruments is from micro-R to high mille-R, related to the type of activities involved in this industry. Cabot has selected the following radiation measurement instruments based on the recommendation of the consultant Health Physicist:

MINIMUM SURVEY METER	S/N	RADIATION SENSITIVITY	
Ludlum - M19	L37373	gamma	0-25 uR
Victoreeen Tyac III	V2448	gamma	0.2 mR/H
Monitor -4	M1271	beta gamma	0-0.5 mR/H
Monitor -4	M102	beta gamma	0-0.5 mR/H

Instruments are calibrated by:

RMC CORPORATION
1207 North Harrison Avenue
Wilmington, DE 19809

3.5 Occupational Exposure Analysis Program

Cabot Performance Material's program for conducting radiation surveys to ensure that occupational radiation exposures are ALARA is described in Sections 2.6, 2.7, 2.8, and 3.1, as well as in Attachments C, H, I, and J. Cabot's monitoring of personnel and equipment and surfaces is described in Section 3.1 and Attachment C.

3.5.1 Posting and Labeling

All areas where radioactive materials (ore and sludges) are stored or handled are marked with "Radioactive Material" signs. If the material exhibits external radiation greater that 2mR/hr, the area is roped and marked with a sign indicating that radiation levels exceed 2mR/hr. The maximum permissible alpha radiation in the samples is 200 dpm/100 cm^2. NRC Form 3 is posted at

various locations throughout the plant.

3.5.2 External radiation - Personnel Monitoring

Personnel monitoring systems have not been needed for materials handled under license SMB-920. Cabot Performance Materials does use badges for employees that work around sealed sources covered under NRC License 37-06580-01 Byproduct. Personnel monitoring equipment available are TLD 3-chips badges. TLD processing is presently, and will continue to be, processed by a laboratory accredited under the National Voluntary Laboratory Accreditation Program. TLD's are presently processed by Tech/Ops Landauer, Inc. of Glennwood, Illinois. Cabot Performance Materials policy on personnel monitoring is that monitoring is not needed for this license, but personnel monitoring will be provided to any worker requesting it with RSO approval.

3.5.3 Radiation Surveys

Section 2.7 describes the types of audits and inspections conducted by Cabot Performance Materials. The first four types listed in section 2.7 are radiation surveys.

3.5.4 Protective Clothing

Cabot Performance Materials provides all protective clothing required by the National Institute of Occupational Safety and Health (NIOSH), for normal and maintenance conditions, including work clothes (coveralls, gloves, etc.), hard hats, respirators, safety glasses, ear plugs and other hearing protection, and safety shoes. Since the radiation hazard to workers at the plant is primarily from the transportation of dust.

Cabot Performance Materials provides a changing room for employees to wash and to change clothes and shoes before they leave the plant. All employees have access to the same changing room. The RSO takes smear samples in the changing room to determine if any contamination has occurred. To date, the samples have not indicated a need to provide separate changing rooms for workers in the ore handling areas. Cabot Performance Materials provides protective clothing to all employees. The company clothing is picked up by an industrial laundry for washing.

3.5.5 Respiratory Protection

Cabot Performance Materials respiratory protection program is described in the Cabot Boyertown Plant Respiratory Policy, Requirements & Guidelines (Attachment H). Access to the ore grinding area is restricted to personnel wearing respirators when dusty conditions are present.

High Volume Air Samples are collected in the operations area where ore is ground to confirm that the ventilation systems and other controls are maintaining airborne dust at levels that are "as low as reasonably achievable" and below the levels identified in 10 CFR 20. Workers in the Ore Handling Area receive radiation safety indoctrination and following safety training and testing.

3.5.6 Exposure Analysis

Bioassay monitoring and exposure analysis conducted by Cabot indicates that worker exposure are well within allowable levels. No adverse trends have been identified.

The only unusual operational incident occurred during the third quarter of 1990 when the air filtering system in Building 073 malfunctioned and dust levels exceeded the action level. The grinding operations were halted until the equipment could be repaired. Employees in the are wore respirators during the incident and exposure levels were maintained within allowable levels.

3.6 Ventilation

The ore handling equipment in Building 073 is a closed system, once the drum of ore has been loaded into the conveyer processor. Minimal dirt is generated externally to the closed ventilator, scrubber and bagger system. Equipment used to prevent the release of radioactive material through the ventilation system are:

Scrubber - Heil #739 Packed Tower Fume Scrubber with fan rated @ 30,000 CFM and 3" static pressure.

Baghouse - Industrial Clean Air Modular Pulse-Clean Fabric Collector, size 500-3, rated 12,000 CFM @ 6" static pressure.

Dust Collector - Torit/Day Division, Model 4DF32, rated @ 12,000 cfm @ 5" static pressure.

Cabot Performance Materials is designing the ventilation system requirements for the revised process based on the same ventilation requirements as the existing process buildings.

3.7 Work-Area Air Sampling

Cabot Performance Materials's ore digestion and grinding areas are sampled quarterly with air samples and radon samplers.

High volume air samples are taken in Building 073 in the Ore Digestion and the Ore Grinding areas. One set of samples per quarter have been taken except when a process failure has occurred or another abnormal situation arises that suggests the need for a check of the air quality (refer to SMB-920). A similar sampling protocol is planned for the new process area.

CPM maintains two integrating Track Etch radon samplers in the grinding and digestion part of Building 073 to monitor radon progeny. These levels have been in the range of 1-2 pCi/l. CPM will also monitor the digestion area of the revised process facilities with radon samplers.

3.8 Surface Contamination

Cabot Performance Materials controls access to the Boyertown plant to prevent the spread of contamination away from the site. All visitors must sign-in at the Guard House before being escorted into the plant. Access to the ore grinding area during operations is limited to personnel with proper authorization and training.

Smear samples are taken in the Ore Handling Areas of the plant quarterly. Smear samples are taken in other parts of the plant to see that no materials are tracked about. The maximum permissible level for smear samples is 200 dpm/100 cm^2 with an action level of 50 dpm/100 cm^2. In addition, one of the issues that the RSO and Consulting Health Physicist consider in their quarterly inspection of the facilities is whether additional periodic surface or personnel sampling may be needed in any area.

3.9 Bioassay Program

Radiation Exposures

Radiation exposures are checked with air samples, urinalysis and time-in-area checks. This information is reviewed by the Consultant Health Physicist to determine if exposures are within acceptable limits.

For urinalysis, the maximum permissible level is 30 ug/l and the action level is 15 ug/l. Attachment M presents actions taken for different urinalysis results.

Urinalysis Program

Operating personnel, in the ore handling area, are tested once a year with a 24 hour urine specimen. (A 24-hour specimen is all of the urine a worker passes for one 24-hour period.) These samples are scheduled for late in the week, usually Thursdays. The volume sampled is usually between 900 and 1500 milliliters.

When a new employee begins operations, the RSO records his name on a monthly radiation employee list and, after being in the area for three months, his urine is

sampled. A sample bioassay and a description of action levels and corresponding corrective actions are presented in Attachments M and Figure 3-1.

Recent results for uranium in urine samples have all indicated < 5 ug/l (detection limit). Cabot Performance Materials has set the action level of 15 ug/l uranium.

3.10 Radioactive Waste Management

The only "radioactive waste" from the current processing operations is the ore residue, which are stored on site in concrete bins. These bins are secured with locked chain link gates and posted as containing radioactive material. Currently, there are seven (7) bins containing approximately 36 million pounds of ore residue. These residues have been stored for metals recovery as they contain about 2.5% tantalum and as such are a valuable source material, not a waste. However, this tantalum was not recoverable until the development of the Cabot process for increasing the yields from the ore dissolution facility. This process revision is discussed in Attachment N, with additional detail in Figure 8-1, Figure 8-2, and Figure 7-1.

The projected time table for processing the existing inventory of ore residues is approximately 5 years at 250 operating days a year, once the modifications are installed. It will take this long because during the same period, the modified process will also be serving as a final-stage digestor of new ores and ore concentrates, rather than being dedicated solely to redigestion of previously accumulated residues.

The only radioactive component from the modified process will be a dry, sintered solid. This material will be classed as low level radioactive waste unless it can be employed as a feedstock for an uranium mill. Additional detail on this material is in Section 5.4.

The groundwater in the area of the storage bins is monitored per SMB-920 by means of dedicated monitoring wells which are sampled quarterly. The results of this sampling are in Figure 3-2.

CHAPTER 4
ENVIRONMENTAL PROTECTION

Cabot Performance Material's Environmental Protection program requirements are described in Sections 15, 18 (a, b, c), 19 (a, b, c, d, e) and 21 of SMB-920.

4.1 Effluent Control Systems

Effluents from the lagoons are only discharged when stream flow conditions are conducive to providing adequate dilution. No additional control of the effluent is provided at this time; however, Cabot monitors the effluent to detect conditions that might indicate a need for control.

Atmospheric releases from the ore handling area are controlled with scrubbers and a baghouse. Particles collected in the baghouse are recycled into the ore. Section 3.4 provides more details on the ventilation system and its controls.

4.2 Environmental Monitoring

Cabot Performance Material's Environmental Monitoring program is described in Chapter 4, Environmental Consequences of Proposed License Renewal, of NUREG-1027. The program monitors water, air, forage crops and wastes at and near the Boyertown facility and the Reading facility. Figure 4-1 shows the locations of water, forage crop, and ambient air monitoring locations. Attachment S provides monitoring data obtained during the last few years.

Table 4-1 lists Cabot Performance Material's Water Monitoring Activities. Sampling locations were selected to monitor releases to the environment. Sampling frequency and analyses were selected to enable Cabot Performance Materials to determine if it is in compliance with license or permit conditions, and to identify trends that could eventually result in a non-compliance situation if not corrected.

Cabot Performance Materials monitors the performance of all wet air cleaning equipment (packed tower scrubbers) three times a day (once per 8-hour shift). The data recorded includes the fluorine concentrations in the recycle water and the flow rate of the recycle water.

Outside the plant, Ambient Air Quality sampling is conducted on a semi-monthly basis at four locations surrounding the plant (Figure 4-1). The State of Pennsylvania has established an ambient air standard of 5 ug HF/m^3.

Cabot Performance Materials also monitors radon concentrations within the Boyertown plant. "Radon Track Etch Monitors" were placed at different locations until radon levels at the location could be determined.

Cabot Performance Materials also monitors fluoride concentration in field corn and grass during the harvest time, in accordance with License SMB-90. Corn is sampled at up to six locations, primarily to the east of County Line Road. Similarly, grass is sampled at four locations east of County Line Road. Results are reported to the Nuclear Regulatory Commission and the Pennsylvania Department of Environmental Resources if the average fluoride concentration exceeds 40 ppm. Figure 4-1 shows the general locations from which the crops are sampled.

CPM monitors, on a quarterly basis, the wastes that it sends to the Pottstown Landfill. Three samples of the waste are taken over a three or four week period at the beginning of each quarter. Each sample is analyzed for moisture, uranium and thorium. Wastes are sent to the landfill only if the concentration of natural uranium and natural thorium is less than 10 pCi/g by analysis (Attachment T).

Cabot Performance Materials also monitors the Reading disposal site on a quarterly basis as required by license SMB-920. Each quarter, the site is inspected for erosion, groundwater is sampled for gross alpha concentration and conductivity, and radiation is measured at the site boundaries.

CHAPTER 5
DECOMMISSIONING PLAN

5.1 Statement of Purpose and Background

Cabot Performance Materials is committed to the clean-up and final decommissioning of its facilities after licensed activities cease. The Boyertown plant is in full operation and a decommission funding plan of detail appropriate for an operating plant has been developed for the facility.

A significant breakthrough for the Boyertown facility is the recent development of a revised extraction process that will recycle the tons of by-product sludge stored in the seven concrete vaults on site over a period of about 5 years and facilitate the disposal of the resultant low-level radioactive waste. The revised process also would serve as a final-stage digestor for all new ores and ore concentrates and obviate the need for sludge storage in the vaults. Cabot Performance Materials will either decommission the vaults or use some for temporary storage of the low-level radioactive waste resulting from the new process before disposal of that material.

5.2 Revere, Pennsylvania Decommissioning

Orise 93/D-13 confirmatory rad survey of Revere April 1993, indicated that there are still areas of elevated radioactivity at the site. As a result, Cabot Performance Materials has contracted with EBASCO Environmental to characterize the site and develop a decontamination plan to submit to NRC for approval. When accepted, EBASCO will manage the decontamination and decommissioning project and submit a final report to NRC. Cabot Performance Materials proposes to continue its authority to possess potentially contaminated facilities at the Revere, Pennsylvania site (see SMC-1562) only until NRC issues an amendment to release the site for unrestricted use. The site decommissioning chronology is presented in Table 5-1.

5.3 Reading (Tulpehocken Street), Pennsylvania Decommissioning

Decommissioning of the Reading site is being done in two phases. The buildings and yard are being decommissioned first, followed by decommissioning of the slag dump.

5.3.1 Buildings and Yard

Decommissioning activities have been underway at the Reading facility for many years as indicated on Table 5-2. Although Cabot Performance Materials conducted cleanup activities from 1967 until 1985, the first major clean-up activities were conducted in 1977 and 1978. Subsequently, a confirmatory survey in December

1985 by the NRC contractor indicated areas with unacceptable contamination levels in and outside of the buildings. Those areas were thoroughly cleaned by Cabot Performance Materials between July 1988 and June 1989. Details of the decontamination work undertaken by Cabot to clean and survey the buildings and yard at the Reading site were provided to NRC in a February 16, 1990 report entitled "Final Decontamination and Decommissioning Survey 1988 - 1989". A final field survey for release of the buildings and the yard area was completed by the NRC contractor in June 1993.

However, unacceptable beta levels inside the building were discovered in the final field survey. As a result Cabot Performance Materials will contract with one of five (5) potential contractors who are preparing proposals for a site D & D plan.

Cabot Performance Materials proposes to continue its authority to possess the potentially contaminated facilities at the Reading Site (SMC-1562) until the NRC issues an amendment to release the buildings and yard for unrestricted use.

5.3.2 Slag Dump

Cabot Performance Materials proposes to retain authority to possess contaminated materials in the Reading site slag dump until decommissioning of the dump is complete. As NRC is aware, the Reading dump is not an area that has become contaminated by incidental releases, but a legal low-level waste disposal facility with valid state and federal permits authorizing permanent slag disposal. The dump was stabilized and closed in a manner consistent with the requirements of 10 CFR 20.304 in 1979. The closure was subsequently improved to mitigate an erosion problem that was identified by CPM in 1987. In order to demonstrate that the disposal poses no radiological threat to public health and safety, monitoring of the dump has been conducted quarterly since 1968.

CPM has committed to develop a site assessment of the dump area in order to better understand the nature of the area and to identify a range of conceptual alternatives for the ultimate disposition of the materials in the dump, including the alternative of leaving the materials in place.

5.4 Boyertown, Pennsylvania Facility Decommissioning

Cabot Performance Materials plans on operating the Boyertown Tantalum Chemical Separation Plant for the foreseeable future. Current operations must therefore be considered in the development of any decommissioning plan. That means that any areas or buildings where activities involving licensed material have been terminated should be surveyed and decontaminated if necessary, any processes that can be eliminated should be eliminated, and the process area and equipment involved should be decontaminated and released, and finally, any areas that are contaminated or used for storage of radioactive materials covered under the license should be inventoried and if possible the material should

be used, consolidated, or sold.

Currently, the minimum necessary amount of space in buildings and outside is used for storage and processing of ore. The sludge stored in the concrete vaults will be used as feed to the revised process which was developed to increase the recovery of tantalum, niobium, and hydrofluoric acid from the current process stream. Residues from the revised process will be disposed of as low-level radioactive waste or sold as feed for a uranium recovery process. The vaults will be emptied and decontaminated to levels acceptable for unrestricted release for use or for disposal as construction rubble. The rest will be disposed of as low-level radioactive waste. Below, the plan for reclamation of the stored by-product sludges will be discussed followed by the general plan for decommissioning the facility.

5.5 Reclamation Alternatives

SMB-920 required CPM to investigate alternatives to on-site accumulation of its by-product sludges so that, if possible, all such sludges will have been removed from the site by the date of ultimate decommissioning.

The alternatives to on-site accumulation are off-site recycling or disposal or development of an economical process for processing the sludges for their valuable tantalum and niobium. Off-site disposal alternatives are nonexistent at present because the stored material would be "mixed waste" if disposed. Off-site recycling alternatives are slightly more promising, but no definitive arrangements have been made to date. Since 1982, however, the Cabot emphasis has been on development of an on-site reclamation alternative and Cabot has investigated various possibilities and spent considerable sums on research.

Cabot has also conducted extensive laboratory and pilot scale tests on a process to recover tantalum and columbium from the stored by-product sludges and in addition recover residual hydrofluoric acid for reuse. Cabot recently filed for a patent for proprietary processing technology based on these tests. Details of the process are provided in Attachment N.

Important aspects of the process:

- The new proprietary process produces a sintered product waste that is stable and suitable for disposal in a low-level radioactive waste disposal facility or which could be a raw material for a uranium mill.

- The process is profitable in that it recovers tantalum, niobium, and hydrofluoric acid. The tantalum and niobium can be sold and the hydrofluoric acid can be reused in the tantalum recovery process--replacing "lost" hydrofluoric acid is a major expense in the current process. Given the average amounts of these materials in the stored by-product sludges, Cabot expects revenues from sales of tantalum and niobium, and saving on hydrofluoric acid, purchase to generate net revenues of approximately $13 million (at current market prices) over and above the costs of

operating the process.

- Finally, the material in the vaults will be emptied at a rate of about 39,000 pounds of sludge per day. In addition the 5,000 pounds of sludge produced each day by the current process will be fed directly into the revised process. At this rate, the stored material should be depleted in about 5 years. Not only will the vaults be gradually emptied for decontamination and decommissioning but the production of sludge will cease and storage of sludge will no longer be necessary.

One or more of the vaults may be required for temporary storage of the sintered sludge, which is the residual product of the new process. The number of vaults needed will depend on the availability of disposal capacity and/or the potential for finding a buyer for the residual material. The residue contains more uranium than most ore currently being processed by uranium producers.

After determining the needed number of vaults for temporary storage of the sintered residue from the new process, the extra vaults will be decontaminated, demolished and the resulting rubble disposed of as construction rubble or as low-level radioactive waste. For the areas where the vaults stood, a preliminary close-out survey would be conducted following NRC guidelines. The site would be resurveyed as part of the final decommissioning activities for the site.

5.6 Final Decommissioning Activities

The November 23, 1988 license renewal submittal contained a decommissioning plan for the Boyertown Facility. Certain basic assumptions underlie the decommissioning plan as follows:

1) Materials stored in the mausoleums will be processed and the residue will be disposed of in a licensed low-level radioactive waste disposal facility, or sold for recovery of the residual uranium. See discussion in Section 6.3.2, infra.

2) Uncontaminated equipment or usable decontaminated equipment will be sold. It is assumed that about fifty percent (50%) of the equipment can be sold. The remaining contaminated equipment will be cut up, packaged and disposed of in a licensed low-level radioactive waste disposal facility.

3) During the time of decommissioning and decontamination of the chemical plant, other portions of the plant, which are not related to the source material operations, may continue to function and generate revenues.

With these assumptions in mind, Cabot Performance Materials has developed a conceptual decommissioning plan. That plan only applies to those areas of the facility known to be involved with operations using radioactive materials. For each area of concern, specific actions are indicated.

5.6.1 Conceptual Decommissioning Plan

1. General Decommissioning Activities

Decommissioning will require the following activities:

1) Submit a detailed decommissioning plan to the NRC for review and approval.

2) Removal of all marketable ores, residues, and non-contaminated equipment prior to the decontamination effort.

3) Survey of the ground, buildings and equipment prior to beginning the decontamination process to determine the extent of radioactive contamination.

4) Equipment that can be decontaminated will be cleaned and sold. Contaminated equipment will be prepared for burial. This may involve cutting into small pieces for compaction and drumming.

5) If surfaces of buildings, floors, tanks, etc., can be decontaminated by the best method available at that time, efforts will be made to save the building. However, if floors remain radioactive, they may have to be jack-hammered into removable waste and buried. Certain buildings may be demolished for burial also.

6) Liquid handling pipes and tanks, floor drains and sumps, that cannot be decontaminated, will be dug up and prepared for burial.

7) The ventilation system, baghouse, scrubber systems will be decontaminated or buried.

8) Decontamination of the other areas of the plant, where small amounts of residue may be found, will be undertaken such as in ore storage buildings, laboratories and the outdoor ground around the ore process areas.

9) The empty sludge storage buildings will be decontaminated if possible but we will assume, for now, that the concrete floors have been etched by acid and that radioactivity cannot be removed except by digging up these floors. Therefore, the buildings will be demolished. The roof and some of the wall members will probably not be very contaminated and can be decontaminated and sold.

5.6.2 Area Action Requirements

1) Ore Grinding and Ore Digestion - Building 073
Remove Machines; decontaminate, scrap or dispose
Remove Tanks; decontaminate, scrap or dispose
Remove Pipes; decontaminate, scrap or dispose
Remove Roof, Walls, Floor; dispose

Conduct survey

2) Sludge Storage Buildings (seven at present)
Remove Roof; decontaminate and sell
Remove/Demolish Walls and Floors; prepare for disposal

Conduct survey

3) Remove approximately (7000) cubic meters of soil from around buildings, roads, field storage areas, and prepare for disposal. Then replace excavated dirt with purchased stone.

Conduct survey

4) Survey and decontaminate the remaining buildings and grounds around the plant.

Conduct survey

5) Provide results of survey to NRC and request that license be terminated and facility release for unrestricted use.

5.7 Decommissioning Reports

Following decontamination activities for a site or area, Cabot Performance Materials will submit a report detailing decontamination activities accomplished and the results of Cabot Performance Material's survey of the facilities. This information will be prepared in accordance with NRC's "Guidelines for Decontamination of Facilities and Equipment" (NUREG/CR-5849). Cabot Performance Materials will transmit this information to the NRC with a request that the facilities be released for unrestricted use. Cabot could also request that the license be terminated at that time if all work with radioactive materials covered by the license has ceased.

Attachments O and P summarize the decommissioning cost estimate for the Boyertown Plant as developed by SEG Inc. Additional detail is available at the Boyertown facility concerning these attachments.

5.8 Financial Qualification

Cabot's Financial Qualifications are presented in Section 7.2 and Attachments R and Q. Cabot has adequate financial resources to decommission the facilities. The proposed new process will enable Cabot to decommission the sludge storage buildings over time while the faciity is still active and while revenue generating operations continue.

CHAPTER 6
RADIOLOGICAL CONTINGENCY PLAN

The elements of a Radiological Contingency Plan are subsumed within Cabot Performance Material's Preparedness, Prevention and Contingency Plan (PPC Plan), presented in Attachment D. Cabot Performance Materials has not prepared a separate Radiological Contingency Plan because a nuclear criticality accident is impossible with the nonvolatile, relatively low-radioactivity source materials at the site. (See NUREG 1027 Section 4.3.2) In the event of an accident involving radioactive material, Cabot would follow these clean-up procedures:

1) Determine area exposed to spill using G.M. survey instrument and visual checking. Quarantine site with rope, string, warning signs, etc. Adjacent, uncontaminated area should be checked for background reading.

2) Minimize movement to prevent scattering of spill and tramping into ground. No equipment should be moved from area until certified clean and identified in writing by type and description.

3) Area should be checkerboarded with chalk dust squares, numbered and lettered to facilitate methodical cleaning.

4) Work should be done from upwind side by properly equipped crews working in designated areas from outside in. Air sampling will be done during clean-up operations. Respirators will be fit tested and worn by all persons where required.

5) Charts shall be maintained to identify each enumerated square as it is cleared.

6) Following initial clean-up, all personnel, equipment, entire area adjacent perimeter shall be surveyed with G.M. instruments, visually checked and the results documented by the RSO or his designee.

The PPC Plan describes the emergency responses that Cabot would employ in the event of an Emergency. The bases for the emergency response is that it would be important that all personnel responding to the emergency be aware of these relative risks and react accordingly. Cabot's activities in an emergency will be aimed at saving lives and controlling the extent of damage or risk to health and property. A few commor sense rules will govern emergency measures that may involve radioactive materials at this location:

1) Perform necessary rescue and first aid without delay.

2) Prevent unnecessary risks to personnel and property by:

   a. Prompt evacuation of affected area.

   b. Confine and control spread of fire and/or explosion risks; remain upwind as much as is practical.

   c. Caution other fire/emergency support personnel that chemical and/or electrical risks far outweigh radiological exposure risks.

3) Notify the Radiation Safety Officer (RSO) and others named on Emergency Call Roster.

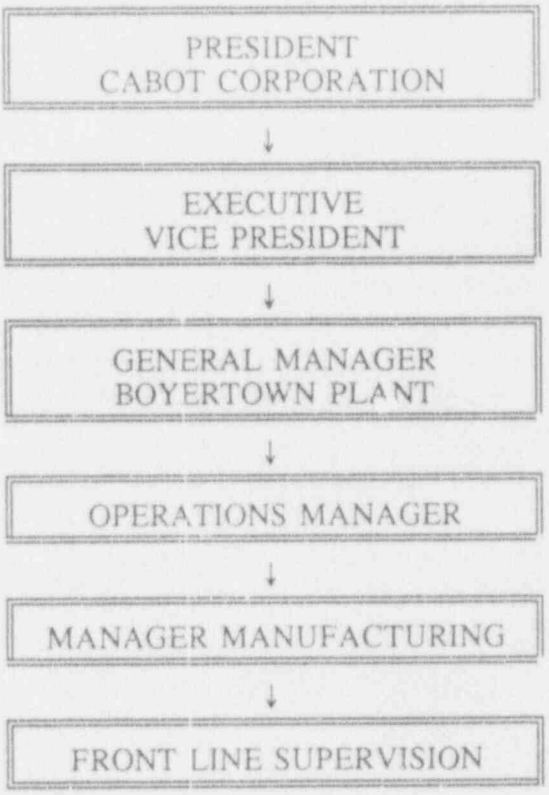
4) Under the supervision of the RSO, follow the clean-up procedures described above.

CHAPTER 7
GENERAL INFORMATION

7.1 Corporate Information

The Boyertown facility, Cabot Performance Materials, is a wholly owned asset of the Cabot Corporation. Cabot is a large (FY 1990 revenues of $1.7 billion), publicly traded (NYSE) Corporation with its headquarters located in Boston, Massachusetts. A copy of Cabot Corporation's 1993 annual report is attached (Attachment Q).

The organization chart of the key positions and personnel of the Boyertown facility is as follows:



See Cabot Annual Report 1993 (Attachment Q) for the corporate organization.

7.2 Financial Qualification

Pursuant to NRC regulations at 10 CFR Part 40, Cabot has obtained an "Irrevocable Standby Letter of Credit" for up to the amount of $750,000.00 in the favor of the U.S. Nuclear Regulatory Commission Region 1. The letter of credit was obtained on July 16, 1990 with a listed expiration date of July 31, 1991. The expiration date is automatically extended for one year terms each year unless Cabot and the NRC are notified at least 90 days prior to the current expiration date. A copy of the Letter of Credit is included as Attachment R.

Cabot has adequate financial resources to operate and decommission the facilities and operations covered by this license application. As explained in the 1993 Annual Report (Attachment Q), Cabot has over $1.5 billion in assets and a 1993 pre-tax income of over $67 million on revenues of nearly $1.7 billion.

It should be noted that the revised process will reduce the financial burden for decontamination and decommissioning should the Boyertown facility be closed in the future. The revised process will use the accumulated inventory of by-product sludge as a source of tantalum and niobium and enable Cabot to decontaminate and decommission the sludge storage buildings while operations continue elsewhere at the Boyertown site. This approach will allow Cabot to pay for the decommissioning of the storage buildings from revenues rather than from assets.

7.3 Summary of Operating Objective and Process

7.3.1 Current Process

Cabot Boyertown facility recovers strategically valuable tantalum and niobium from ores and slags. These metal products have a broad range of industrial applications, some of which are related to national defense. Section 2.2.1 of NUREG-1027 describes the current operations process.

7.3.2 Improved Process

Cabot plans to implement a revised ore beneficiation process during the term of the renewed license. This process would use the sludges stored in the concrete vaults to supplement the ores and slags presently used. This will enable Cabot to reduce the volume of sludge stored on site. Once all of the sludge is used, the vaults will be decontaminated and decommissioned. The following is a summary of the revised process. A more detailed description is contained in Attachment N.

The process change proposed for reextracting the by-product sludges entails a high temperature sulfuric acid and hydrofluoric acid digestion, followed by filtration of the slurry. The resulting filtrate will be routed to a methylisobutyl ketone (MIBK) extraction for recovery of tantalum. After processing, the raffinate will be combined with aqueous blowdowns from the hydrofluoric/sulfuric acid (HF/H_2SO_4) recovery system and the two scrubbers for process vents. This combined waste stream will be routed to the lime treatment system for the plant's process wastewaters. Following treatment with the other plant process waste streams, the effluent will be discharged to West Swamp Creek under the terms of an NPDES permit.

The projected amount of LLW waste generated from this operation is 25,000 pounds per day (lb/day), assuming a by-product sludge input to the process of 39,000 lb/day.

7.4 Boyertown Site Description

Chapter 3 of NUREG-1027 provides a description of the Boyertown site and its environment. Figure 1-2 includes maps that show the general location of the Boyertown plant site, a site map and plot plan.

Figure 7-1 shows the location of the buildings at the Boyertown plant. Buildings where radioactive material is managed are: the ore storage building, the ore grinding buildings, and the sludge storage buildings (see map). The area marked on Figure 7-1 will house the new process. Attachment N summarizes the new process.

7.5 Reading Site Description

The Reading site is in an urban environment located in a central industrial area of Reading Pennsylvania, east of Route 422 and north of the Route 422-Route 422 Business interchange (see Figure 1-3). The property is located on the north bank of the Schuylkill River at an approximate elevation of 225 feet above sea level. The industrial area bordered by houses to the northeast and by rail lines to the north, west and south. The disposal area is a hillside covered with trees and underbrush.

Figure 1-3 shows the locations of the buildings formerly used by Cabot and the disposal site.

7.6 Revere Site Description

The Revere Pennsylvania site is in a rural village in eastern Pennsylvania about 35 miles north of Philadelphia, Pennsylvania and about 10 miles southeast of Bethlehem, Pennsylvania. The area surrounding Revere is dominated by farmland.

Figure 1-4 shows the locations of the facilities at the Revere site.

7.7 License History

Cabot Performance Material's source handling operations were first licensed under License No. STC-681, which was issued on January 20, 1963. Current operations are conducted under NRC license SMB-920, which was first issued on March 17, 1967. Disposal of slags at the Reading dump site occurred from 1968 through 1979 in accordance with license SMB-920. On December 2, 1993, SMB-920 was split into two licenses. New license SMC-1562 covers the nonoperational areas at Reading and Revere, while SMB-920 is for on-going activities in Boyertown. Table 7-1 provides a chronology of the license.

CHAPTER 8
SAFETY DEMONSTRATION

The source material managed by Cabot Corporation is a solid, nonvolatile material with a very low radiation level. Section 4.3.2 of NUREG-1027 discusses the potential accidents that could occur during different steps at the Boyertown plant, the potential consequences of these accidents, and the safety features used to minimize their occurrence. Development of the new process will not affect the types of potential accidents that could happen at the Boyertown plant. The revised process is basically the same as the existing process and the procedures for handling radioactive ores and wastes will not change. As is the case with the existing process, any loss of material from the new process units will be contained within the building in which they are housed. The PPC Plan (Attachment D) also describes potential accidents related to the management of hazardous materials.

Development and operation of the revised process at the Boyertown plant will not change the types of potential accidents.

8.1 Education & Experience of Key Personnel

The education and experience of key personnel in safety related matters is demonstrated in Attachment T. The key individuals are:

William C. Gannon	RSO
Suzan A. Frey	Manager, Safety & Health
Randall J. Kresge	Senior Safety Engineer
John M. Franey	Senior Environmental Control Associate

8.2 Process Description

The current Boyertown plant layout is shown on Figure 1-2. The flow diagram for the current process is shown on Figure 8-1, and described in Section 2.2.1 of NUREG-1027.

CPM plans to implement a revised digestion process at the Boyertown plant, as summarized in Attachment N. The anticipated layout for the units is shown on Figure 8-2. These units will be located in the area marked on Figure 7-1. Figures 8-1-1 and 8-1-2 show how the revised process will fit in with the current process.

Section 4.3.2 of NUREG-1027 discusses the potential accidents that could occur during different steps of the Boyertown plant, the potential consequences of these accidents, and the safety features used to minimize their occurrence. Implementation of the revised process will not affect the types of potential accidents that could happen at the Boyertown plant. The revised process is basically the same as the existing process and the

procedures for handling radioactive ores and wastes will not change. As is the case with the existing process, any loss of material from the revised process units will be contained within the building in which they are housed.

8.3 Radiation Protection

Table 8-1 describes the action levels for events involving radioactive or hazardous chemicals that could affect safety.

8.4 Shipping and Receiving

The purchasing and receipt of source materials (Ta/Nb bearing ores) is outlined in Figure 8-3. From this figure it can be seen that all ores are stored in a limited access area, as a result of the ALARA policy. In addition, ore lots greater than 2 mr/hr are further segregated by being stored in a roped area.

8.5 Emergency Utilities

The Boyertown facility is served by three separate auxiliary power systems that provides emergency power to the plant in the event that electric power service is interrupted. Building 073, where ore grinding and digestion occurs, is served by a 75 KW emergency power system dedicated to emergency lighting in several buildings and the plant water feed pump. An emergency response vehicle, described in section 22 of the PPC Plan (Attachment D) contains a portable electric generator. The public address system is connected to an emergency power source to facilitate communications in an emergency.

An automatic valve shuts off waste water discharges in the event that electric power is interrupted. This prevents the uncontrolled releases of radioactive or hazardous chemicals in the event of an emergency.

8.5.1 Utilities and Support System

Utilities important to radiation safety at the Boyertown Plant are electricity to the ore grinding area and water for fire-fighting equipment. In the event of an electric power failure, ore grinding equipment and associated ventilation systems would not be able to operate. This would shut off the source of the major radiation hazard. An auxiliary power source provides power to emergency lights in the ore grinding area.

Cabot provides its own water for the Boyertown Plant from an intake on Swamp Creek. Cabot also maintains a 250,000 gallon water tower, supplied by a well. One half of the water in the tower is dedicated for fire emergencies. The other half supplies the filter plant in Building 062.

8.6 Fire Protection

All plant employees receive annual training in the use of hand held fire extinguishers. The plant's Emergency Response Team (ERT) is trained as an incipient fire fighting team. Training includes use of personal protective equipment, fire suppression systems, miscellaneous equipment use, strategy discussions, first aid and CPR, etc. Several members have attended a three-day industrial fire fighter course at the Pennsylvania State Fire Academy. The Safety and Health Manager is responsible for the ERT. Qualifications include Pennsylvania State Fire Academy Course, ten years industrial safety and industrial hygiene practice and completion of several hazardous materials seminars and course.

Fire detection and suppression devices:

Kidde Co. photoelectric detection heads with Halon extinguishing media installed in Buildings 042 and 060; inspected annually.

8.7 Ventilation Systems

Ventilation Systems in the Building 073 grinding area includes the following filtering and scrubbing equipment:

Baghouse	-	Minimum Flow Velocity - 3000 FPM Maximum P across filter - 2" Static Pressure
Scrubber	-	Minimum Flow Velocity - 3500 FPM Maximum P across scrubber - 1.5" Static Pressure
Dust Collector	-	Torit/Day Division - 1.2K FPM Maximum P across filter - 5" static pressure

CHAPTER 9
PERFORMANCE DEMONSTRATION

9.1 Exposure History

Cabot Performance Materials has, and continues to monitor exposures both internally and externally of the operating plant areas. With the exception of the fluoride levels in forage crops, there is no history of elevated exposures to employees or to the public.

Exposure monitoring program information and results of monitoring are available in Attachments M and S, Figures 2-2, 3-1, 3-2, 4-1, 8-3, and Table 8-1.

9.2 Survey History

Cabot has contracted with Radiation Management Consultants of Philadelphia for Quarterly Radiation Surveys. Recently, RMC has relocated their office to 2107 N. Harrison Avenue, Wilmington, DE 19809. Quarterly reports are copied to the Plant Manager, Ore Process Manager, Other Affected Managers, and Environmental Affairs Manager. Attachment J is an example of the consultant quarterly report.

9.3 Environmental Monitoring Program and History

CPM's environmental monitoring program is described in Chapter 4, infra, and Chapter 4 of NUREG-1027. Monitoring data is presented in Attachment S.

Release of radiological and nonradiological materials from the facility in air and water are being controlled at safe levels for health and environmental concerns. The data shows no indication that releases are causing environmental impact at or near this facility.

9.4 Inspection History

Quarterly sampling monitoring data is supplied in Attachment S.

CHAPTER 10
WASTE HANDLING

Cabot's Radioactive Waste Management activities are described in NUREG-1027 Section 2.2.2. Cabot's proposed process modification will use the sludges stored in the mausoleums as a raw material. This will reduce the volume of sludge managed at the Boyertown facility, as well as converting a potential mixed waste material to a solid radioactive waste.

Radioactive Waste Handling

10.1 Liquid Wastes

NUREG 1027, Subsection 2.2.2.1, describes how Cabot handles liquid wastes. Attachment S contains the monitoring data for the Boyertown plant for the last two (2) years.

10.2 Solid Wastes

10.2.1 NUREG-1027, Subsection 2.2.2.2, describes how Cabot handles solid radioactive wastes. Cabot considers its radioactive sludges as a valuable resource. The process proposed at the Boyertown facility will use the sludge as a raw material to supplement the ore. The process will extract hydrofluoric acid from the sludge and recover significant amounts of residual tantalum.

10.2.2 Air samples taken in the grinding and digestion parts of Building 073, over the past license term, have indicated (0.104 to 12.6 pCi/m^3) that the ventilation system works well within the prescribed action limit of 40 pCi/m^3. Materials collected by the filters and scrubbing equipment are returned to the process.

10.2.3 For nonradioactive waste solids to be sent off-site for disposal, License SMB-920, item 17, requires quarterly monitoring and that the materials shall not be released if the concentration of natural uranium and natural thorium exceed 10 pCi/g. For the quarterly test, Cabot takes three samples of waste over a three to four week period at the beginning of a quarter. Each sample is analyzed for moisture, uranium, and thorium. The average value for uranium and thorium on the three samples is calculated and entered into the following equation for limiting the combination to 10 pCi/g:

Σ = ppm uranium/14 + ppm thorium/46 $\leq$ 1

(10 pCi uranium = 14 ppm and 10pCi thorium = 46 ppm

If the average concentration of uranium and thorium used in the equation comes out greater than 1, then 10 pCi/g limit has been exceeded and the wastes are retained on-site. First step in control is re-sampling and analysis to verify the out of control condition (see Attachment T).

CHAPTER 11
DECOMMISSIONING PLAN

11.1 Statement of Purpose

Cabot Corporation, at the cessation of activities at the Boyertown Tantalum Chemical Separation Plant, shall decontaminate and decommission the ground, buildings and equipment that have been used over the years as production facilities. To the extent feasible, decommissioning will be accomplished sooner in the case of facilities no longer neded to handle or store radioactive material, such as the by-product sludge storage buildings once their contents have been reprocessed.

11.2 Conceptual Decommissioning Plan

11.2.1 Procedure

1) Removal of all saleable ores, residues, non-contaminated equipment prior to the decontamination effort.

2) Survey of the ground, buildings and equipment prior to beginning the decontamination process to determine the extent of radioactive contamination.

3) Equipment that can be decontaminated will be cleaned and sold. Contaminated equipment will be prepared for burial. This may involve cutting into small pieces for compaction and drumming.

4) If surfaces of buildings, floors, tanks, etc., can be decontaminated by the best method available at that time, efforts will be made to save the building. However, if floors remain radioactive, they may have to be jackhammered into removable waste and buried. Certain buildings may be demolished for burial also.

5) Liquid handling pipes and tanks, floor drains and sumps, that cannot be decontaminated, will be dug up and prepared for burial.

6) The ventilation system, baghouse, scrubber systems will be decontaminated or buried.

7) Decontamination of the other areas of the plant, where small amounts of residue may be found, will be undertaken such as in ore storage buildings, laboratories and the outdoor ground around the ore process areas.

8) The empty sludge storage buildings will be decontaminated if possible but we will assume, for now, that the concrete floors have been etched by acid and radioactivity that cannot be removed except by digging up these floors. Therefore, the buildings will be demolished. The roof members will probably not be very contaminated and can be decontaminated and sold.

9) At the time of decommissioning, an environmental assessment will be performed to determine the relative merits of on-site burial of the remaining radioactive materials versus transportation of the materials for disposal in a licensed LLW disposal site. Depending on the results of this assessment, the facility may seek approval to bury some or all of the materials on site.

11.2.2 Final Report to NRC Requesting Release

Prior to any decontamination,a detailed decommissioning plan and closeout survey will be submitted to the NRC for review and approval.

11.3 Estimate Costs for Decontamination

11.3.1 Assumption

1) Materials stored in the storage buildings will be reprocessed on site as supplemental feedstocks along with new ores and concentrates. The remaining residues may be stored on site for a brief period, but will ultimately be shipped off site for recovery of their Rare Earth, uranium, or other mineral values. Off-site disposal without such further recycling is a least favored, "default" alternative. See discussion in Section 11.5, infra.

2) Uncontaminated equipment or usable decontaminated equipment will be sold (50%), the remaining contaminated equipment will be cut up, packaged and buried.

3) During the time of decommissioning and decontamination of the chemical plant, other portions of the plant, which are not related to the source material operations, may continue to function and generate revenues.

11.3.2 **Plan**

1) Ore Grinding and Ore Digestion - Building 073
Remove Machines; decontaminate, scrap or bury
Remove Tanks; decontaminate, scrap or bury
Remove Pipes; decontaminate, scrap or bury
Remove Roof, Walls, Floor; prepare for burial

2) Sludge Storage Buildings (seven at present)
Remove Roof; decontaminate and sell
Remove/Demolish Walls and Floors; prepare for burial

3) Remove approximately (7000) cu meters of soil from around buildings, roads, field storage areas, and prepare for burial. Then replace excavated dirt with purchased stone.

4) Survey and decontaminate the remaining buildings and grounds around the plant.

11.4 The Financial Assurance

Reference Chapter 5, Paragraph 9 and Chapter 7, Paragraph 2. See Attachments Q and R.

11.5 Reclamation Alternatives

SMB-920 required the facility to investigate alternatives to on-site accumulation of its by-product sludges so that if possible, all such sludges will have been removed from the site by the date of ultimate facility closure and decommissioning.

The alternatives to on-site accumulation include off-site disposal and development of an economical process to recycle or reclaim the sludges for their valuable tantalum, niobium, thorium, uranium, and rare earth components. Off-site disposal alternatives are limited at present; eventually, it is assumed that a LLW site will be developed in Pennsylvania as a "default alternative," our emphasis has been on development of a reclamation alternative.

CPM has investigated various possibilities and spent considerable sums on research since 1982 to investigate reclamation alternatives. CPM has recently filed a patent application for a proprietary operation which will increase the yield of the existing ore digestions while processing the stored ore residues for tantalum and niobium recovery.

This process is in final engineering design and is scheduled to begin operating in 1995. This process is described in Attachment N.

Table 4-1
Plant Water Sampling Plan
(page 1 of 2)

ENVIRONMENTAL DEPARTMENT SAMPLING
(IN-HOUSE ANALYSIS)

#	SAMPLE ID	SAMPLE TYPE	SAMPLING FREQUENCY	CONTAINER TYPE	SIZE	UNITS	CHEMICAL ANALYSIS
1.	LAGOON #6	WASTEWATER	WEEKLY	PLASTIC BOTTLE	2000	ml	pH, Cl, F, NH4, TDS, TSS
2.	"	"	"	"	1000	ml	Al, Mg, Mn, Zn
3.	"	"	"	"	250	ml	PO4, SO4
4.	"	"	MONTHLY	"	2000	ml	Al, Mg, Mn, Zn, Pb, Cs, Rb, Li, Ca,
5.	"	"	QUARTERLY	"	2000	ml	Al, Mg, Mn, Zn Pb, Cs, Rb, Li, Ca, Cd, Sb
6.	"	"	QUARTERLY	"	250	ml	B
7.	DITCH 7	STORMWATER	WEEKLY	"	1000	ml	pH, Cl, F, NH4, TDS, TSS
8.	"	"	"	"	250	ml	PO4
9.	"	"	QUARTERLY	"	2000	ml	Al, Mg, Mn, Zn, Pb, Cd, Sb
10.	"	"	QUARTERLY	"	250	ml	B
11.	"	"	"	"	250	ml	PO4, SO4
12.	CREEK @ 6-1	CREEK WATER	WEEKLY	"	1000	ml	pH, Cl, F, NH4, TDS
13.	CREEK @ 4-A	"	"	"	"	"	pH, Cl, F, NH4, TDS
14.	HICKORY VALLEY	"	"	"	"	"	pH, Cl, F, NH4, TDS
15.	BLDG. 062 FILTRATE	WASTEWATER	"	"	"	"	pH, Cl, F, NH4, TDS
16.	SANDFILTER BACKWASH	" & RO REJECT	"	"	"	"	pH, TSS
17.	"	" "	"	"	250	ml	PO4
18.	"	" "	QUARTERLY	"	250	ml	PO4, SO4

Table 4-1
Plant Water Sampling Plan
(page 2 of 2)

ENVIRONMENTAL DEPARTMENT SAMPLING
(IN-HOUSE ANALYSIS)

#	SAMPLE ID	SAMPLE TYPE	SAMPLING FREQUENCY	CONTAINER TYPE	CONTAINER SIZE	UNITS	CHEMICAL ANALYSIS
19.	LAGOON #5 UNDERDRAIN	GROUND WATER	MONTHLY	"	1000	ml	pH, Cl, F, NH4, TDS
20.	LAGOON #6 UNDERDRAIN	"	MONTHLY	"	1000	ml	pH, Cl, F, NH4, TDS
21.	MW-1A	"	QUARTERLY	"	"	"	pH, Cl, F, NH4, TDS
22.	MW-2	"	"	"	"	"	pH, Cl, F, NH4, TDS
23.	MW-3	"	"	"	"	"	pH, Cl, F, NH4, TDS
24.	MW-4	"	"	"	"	"	pH, Cl, F, NH4, TDS
25.	MMW-1	"	"	"	250	ml	pH, F- (ISE)
26.	MMW-2	"	"	"	"	"	"
27.	MMW-3	"	"	"	"	"	"
28.	MMW-4	"	"	"	"	"	"
29.	MMW-5	"	"	"	"	"	"
30.	MMW-6	"	"	"	"	"	"
31.	BLDG. 082 FILTERCAKE	SLUDGE	"	PLASTIC BAG			U, Th, % MOISTURE
32.	SW	AIR SAMPLE & FILTER	TWICE MONTHLY	BOTTLE PLASTIC BAG	1000	ml	F- (ISE) "
33.	BH	"	"	"	"	"	"
34.	EN	"	"	"	"	"	"
35.	PT	"	"	"	"	"	"

Table 5-1
Revere, Pennsylvania Site Decommissioning Chronology

Date	Action
28 May 1970	NRC amended License SMB-920 to authorize activities at the Revere site.
02 July 1970 (also 29 July 1970)	KBI conducted initial experimental processing of niobium-tantalum ore at the Revere site.
14 May 1975	Applied Health Physics, Inc. conducted a gamma survey of the Revere site.
13 February 1990	To Bullinger's Mill, Inc. (BMI) conducted initial
14 March 1990	survey of the site.
16 April 1990	BMI completed a resurvey of the operating areas of the plant, noting that radioactive material remained buried at the site.
04 - 26 September 1990	BMI conducted cleanup of the site and removed radioactive material to the Boyertown plant.
17 October 1990	BMI conducted a final survey of the site and found no elevated radiation levels.
January 1991	Cabot Corporation sent the Revere Final Decontamination and Decommissioning Survey-1990 to NRC.
04 February 1991	Cabot Corporation notified NRC that they had completed a survey, cleanup, and resurvey of the site.
05 March 1991	Cabot Corporation sent supplemental data to the NRC for the Revere Final D&D survey.
27 March 1991	Cabot Corporation confirmed its desire to obtain Release for Unrestricted Use and removal from License SMB-920.
22 July 1991	Oak Ridge Associated Universities (ORAU), the NRC Contractor, conducted a final confirmatory survey.
05 April 1993	Cabot Performance Materials orise 93/D-13 indicating some hot spots.
July 1993	Proposals from five (5) contractors for site characterizations and decommissioning plan.
August 1993	Contract with EBASCO for decommissioning plan.
22 December 1993	EBASCO Proposal

Table 5-2
Reading (Tulpehocken Street), Pennsylvania Site Decommissioning Chronology

Date	Action
April 1967 - May 1969	KBI conducted operations at the site. Wastes were disposed in an existing foundry slag dump as authorized by Amendment No. 1 to License SMB-920.
1967 - 1985	KBI conducted a cleanup campaign at the site.
May 1969	KBI terminated activities at the site.
1977 - 1978	Cabot Corporation decontaminated the buildings at the Reading site. Waste soil and debris was disposed in the slag dump.
March 1979	KBI closed and covered the dump in accordance with 10 CFR 20.304 and submitted an Unrestricted Use Request for the Reading site to the NRC.
03 May 1979	Applied Health Physics, Inc. completed its Close-out Survey of the Reading plant.
03 - 13 December 1985	Oak Ridge Associated Universities (ORAU), the NRC Contractor, conducted a Confirmatory Survey of the Reading site.
10 March 1986	ORAU provided its preliminary results to the NRC.
6 April 1987	NRC notified Cabot Corporation of the Preliminary results of the ORAU Confirmatory Survey, and requested additional decontamination and surveys of the site.
12 May 1987	NRC requested a decontamination plan for the Reading site.
4th Quarter 1987	Cabot monitoring indicated an erosion problem on the dump and took corrective action.
17 June 1988	Cabot submitted its decontamination plan for the final cleanup of the plant.
July 1988 - June 1989	Cabot Corporation contractor J. Bullinger performed decontamination activities at the Reading plant.
16 February 1990	Cabot Corporation completed its report to the NRC entitled "Final Decontamination and Decommissioning Survey 1988 - 1989".

Table 5-2
Reading (Tulpehocken Street), Pennsylvania Site Decommissioning Chronology
(continued)

Date	Action
9 August 1990	Cabot Corporation transmitted the Reading Plant final D&D survey to the NRC.
26 July 1991	ORAU conducted a final confirmatory survey of the buildings and yard.
June 1993	Orise 93/F-39 report received from NRC indicating extensive residual radioactivity.
December 1993	Cabot Performance Materials asked five (5) contractors to bid on characterization and preparation of D&D plan.

Cabot proposes to continue its authority to possess the potentially contaminated facilities at the Reading, Pennsylvania site (see SMB-920 item 9.C) until NRC issues an amendment to release the buildings and yard for unrestricted use under SMC-1562.

Table 7-1
LICENSE SMB-920 HISTORY

21 January 1963	License No. STC-681 was issued to Kawecki Berylco Industries (KBI) Division of Cabot Corporation by the Atomic Energy Commission (AEC, now NRC).
10 March 1967	KBI filed an application for an exemption to the waste disposal regulations.
17 March 1967	License SMB-920 was issued to KBI by the AEC.
25 September 1968	KBI requested Amendment #1 to the license application.
31 October 1968	KBI submitted an additional amendment request.
01 December 1968	NRC issued Amendment #1 to SMB-920, authorizing disposal of tin slag at the Reading site.
28 May 1970	NRC amended License SMB-920 to authorize activities at the Revere, Pennsylvania site.
24 October 1972	License SMB-920 was renewed by the Nuclear Regulatory Commission (NRC).
15 September 1977	KBI submitted a license renewal request to NRC.
11 October 1977	NRC acknowledged receipt of the application for renewal of the license.
03 or 05 March 1979	KBI submitted an Unrestricted Use Request for the Reading site to the NRC.
03 May 1979	Applied Health Physics, Inc. Close-out Survey of the Reading, PA site was completed.
18 June 1982	KBI requested Amendment #2 to the license application.
20 December 1983	NRC renewed License SMB-920 with a new expiration date of 31 December 1988.
19 June 1986	NRC granted Amendment #2 to the license.

24 March 1987	NRC granted Amendment #3 to the license, which incorporated KBI's Air Monitoring Program.
13 May 1987	KBI requested an amendment (#4) to change the name on the license from Kawecki Berylco Industries to Cabot Corporation.
03 June 1987	NRC granted Amendment #4 to the license.
17 June 1988	Cabot corporation submitted an amendment request including the plan for the final cleanup.
23 November 1988	Cabot Corporation submitted a license application to NRC to renew License SMB-920.
17 October 1990	Bullinger's Mill, Inc. conducted a final survey of the Revere site and found no elevated levels of radioactivity.
06 April 1992	SDMP action plan affects three (3) Cabot sites.
03 December 1993	License split into SMB 900 active and SMC 1562.

Table 8-1
OCCUPATIONAL SAFETY ACTION LEVELS

Events	Maximum Permissible	Action Level	Action Taken
Urinalysis results (uranium content)	30 ug/L	>15 ug/L >35 ug/L	Identify/correct problem. Stop work in area
Air Samples	1 pCi/m^3	0.1 pCi/m^3	Identify/correct problem.
Sludge Samples (uranium and thorium concentration)	10 pCi/g	<10 pCi/g 10 pCi/g	Send sludge to landfill. Retain sludge on site.
Forage Crop Samples (fluoride concentration)		40 ppm	Notify NRC as per license SMB-920.
Smear Samples (alpha)	200 dpm/100 cm^2	50/100 cm^2	Identify/correct problem.
Water Samples	3 x 10^{-4} uCi/ml	3 x 10^{-7} uCi/ml	Identify/correct problem.

Sources: Radiological Safety Procedures Manual
NRC License SMB-920
10 CFR 20

Figure 1-1
Site Locations

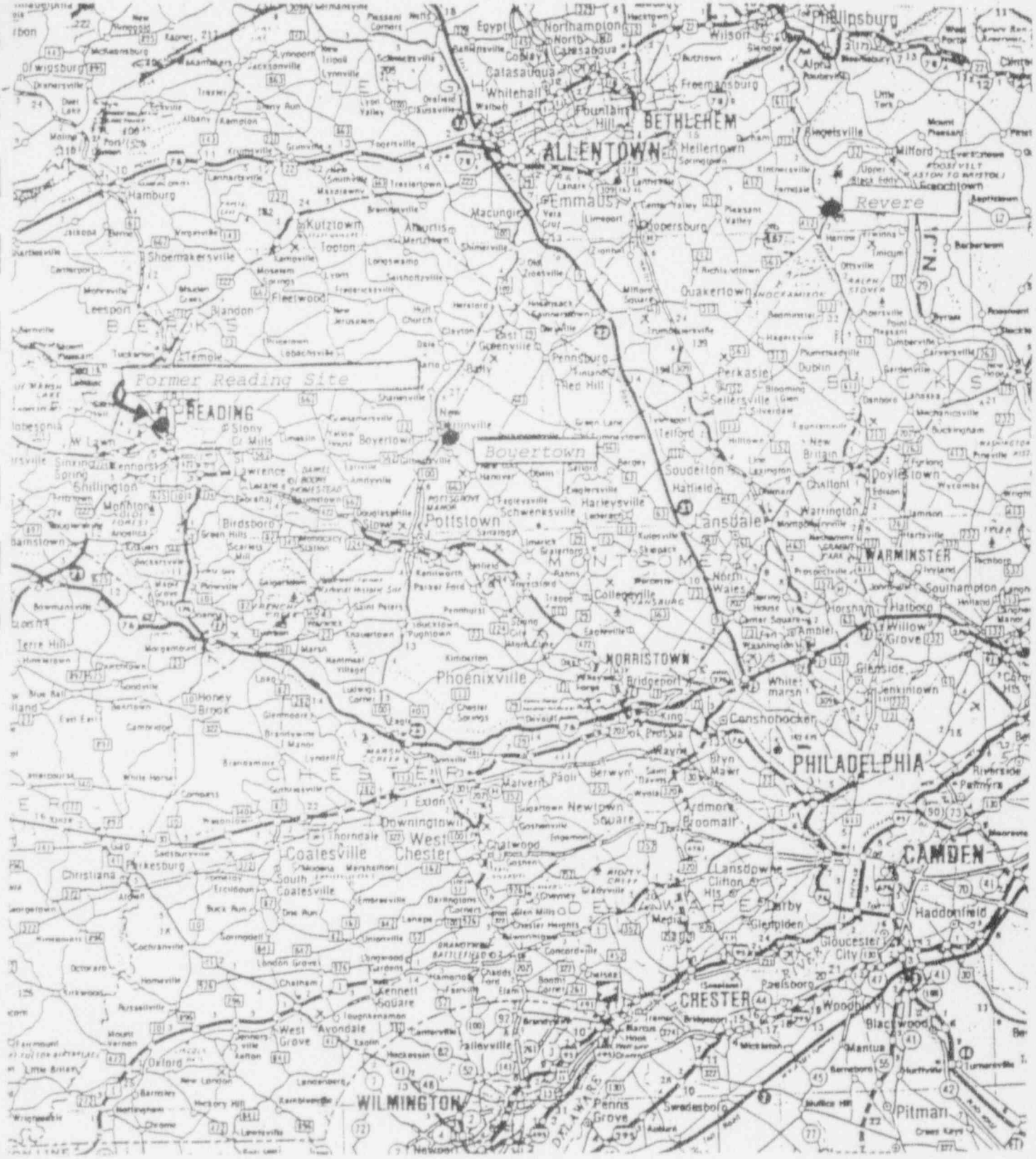
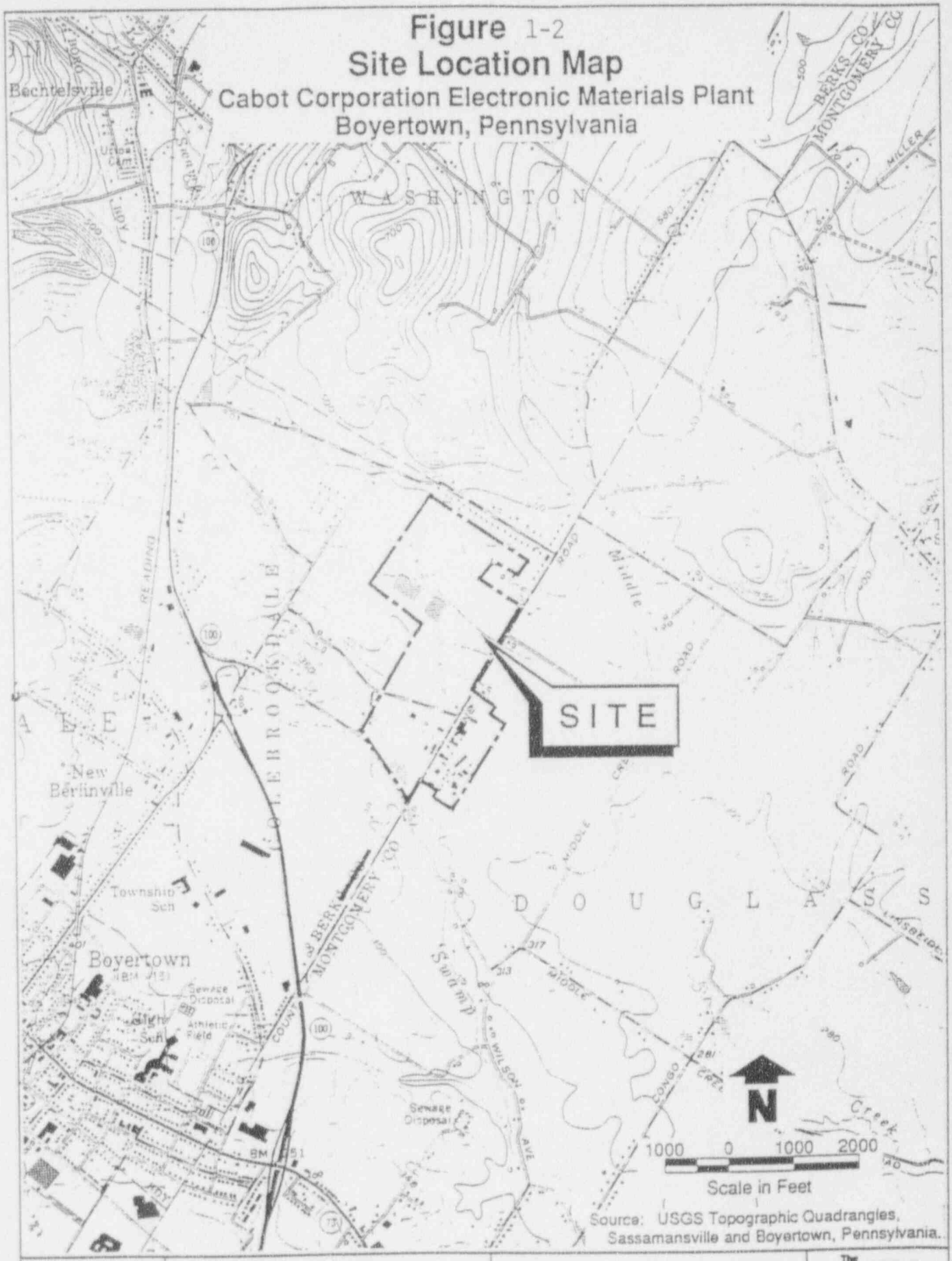


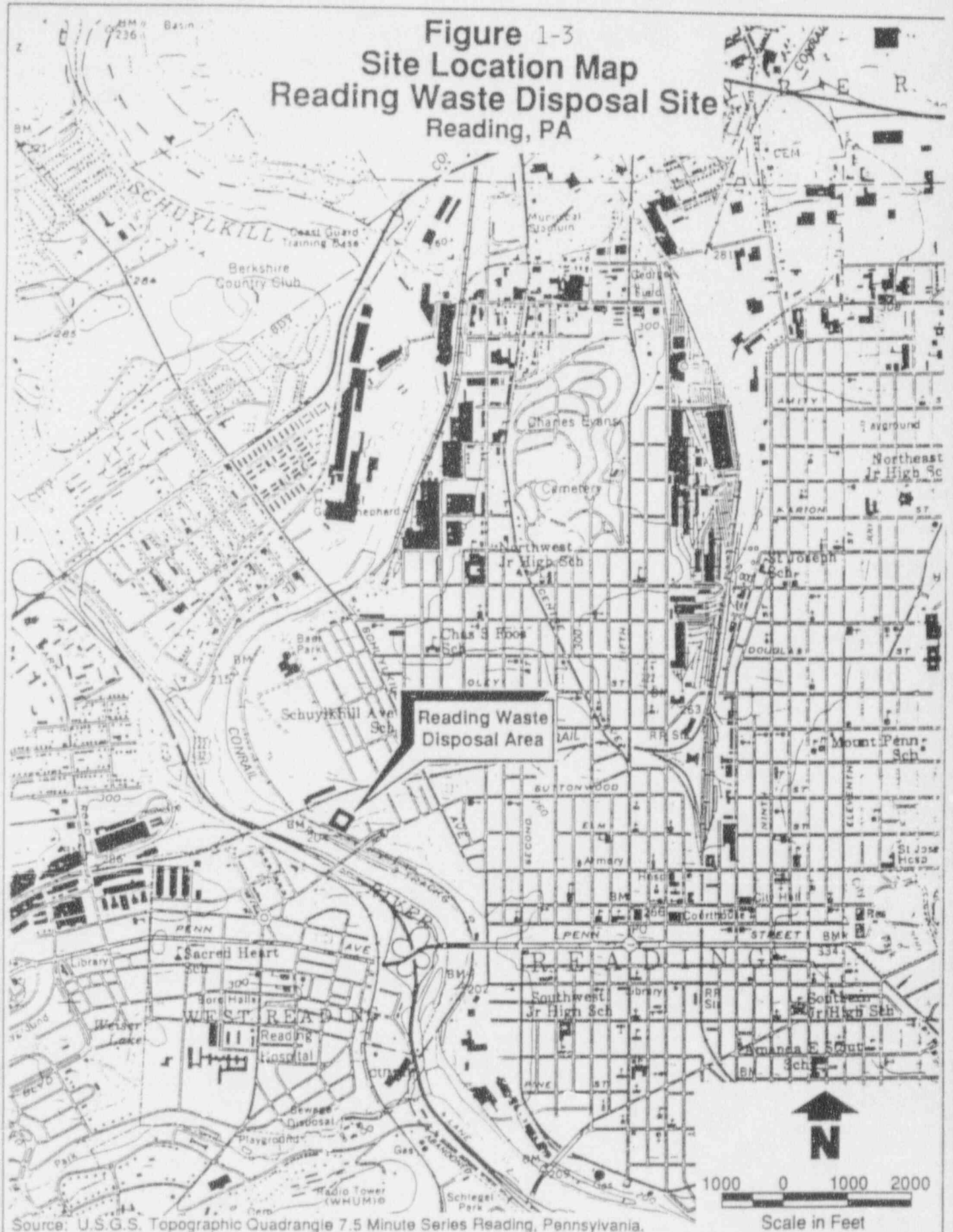
Figure 1-2
Site Location Map
Cabot Corporation Electronic Materials Plant
Boyertown, Pennsylvania



Source: USGS Topographic Quadrangles, Sassamansville and Boyertown, Pennsylvania.

W0# 57806	Drawn by / Date: EKnopfle 6/27/90	Checked by / Date: E. Borbely 6/27/90	The ERM Group
	Revised by / Date:	Checked by / Date:	

Figure 1-3
Site Location Map
Reading Waste Disposal Site
Reading, PA



Source: U.S.G.S. Topographic Quadrangle 7.5 Minute Series Reading, Pennsylvania.

WO#	Drawn by / Date:	Checked by / Date:	
00906.00.01	M.S. Smith 11.6.91	G. Kirkpatrick 11.6.91	The ERM Group
	Revised by / Date:	Checked by / Date:	

Figure 1-4
Revere Site

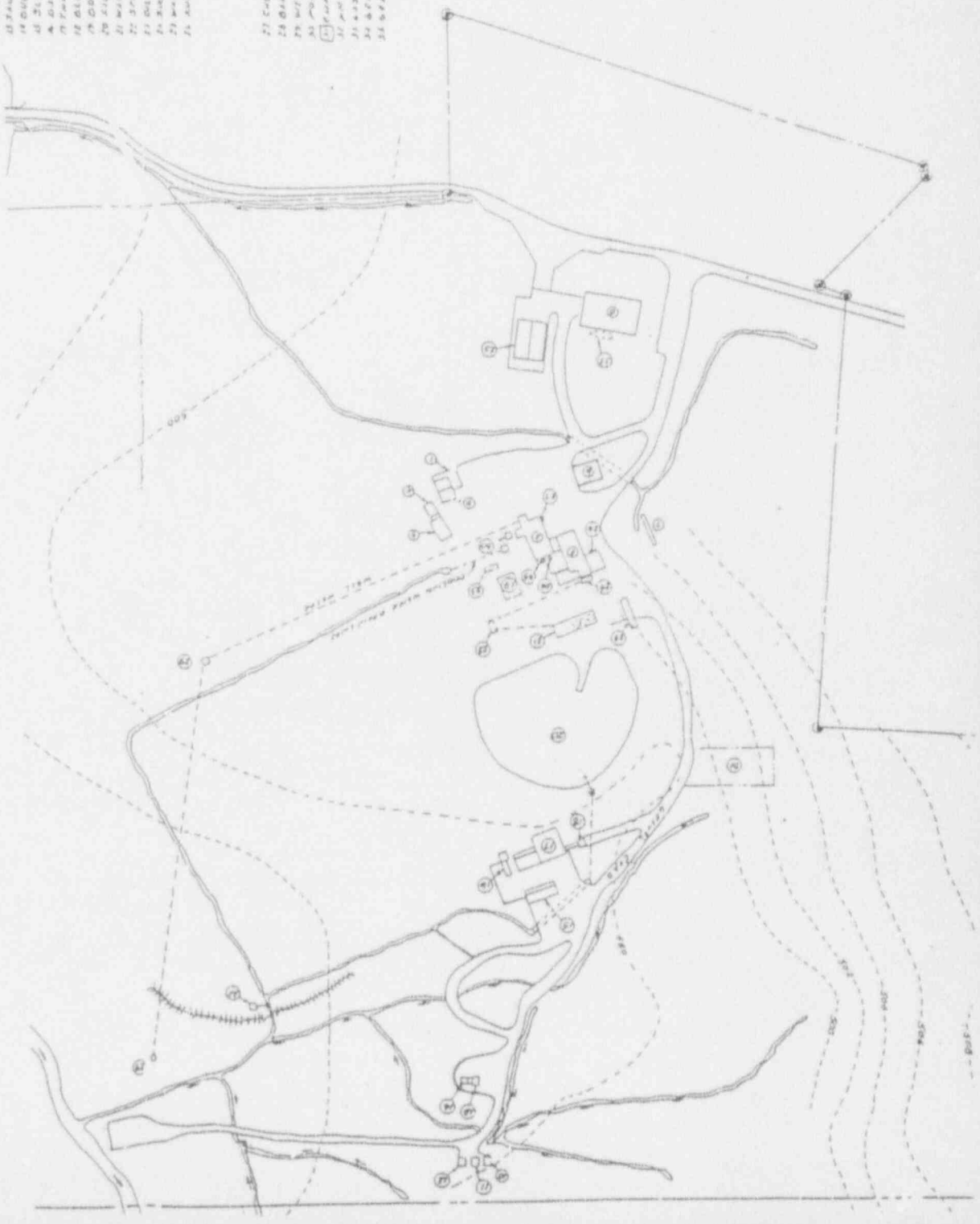


Figure 2-1
Organization Chart

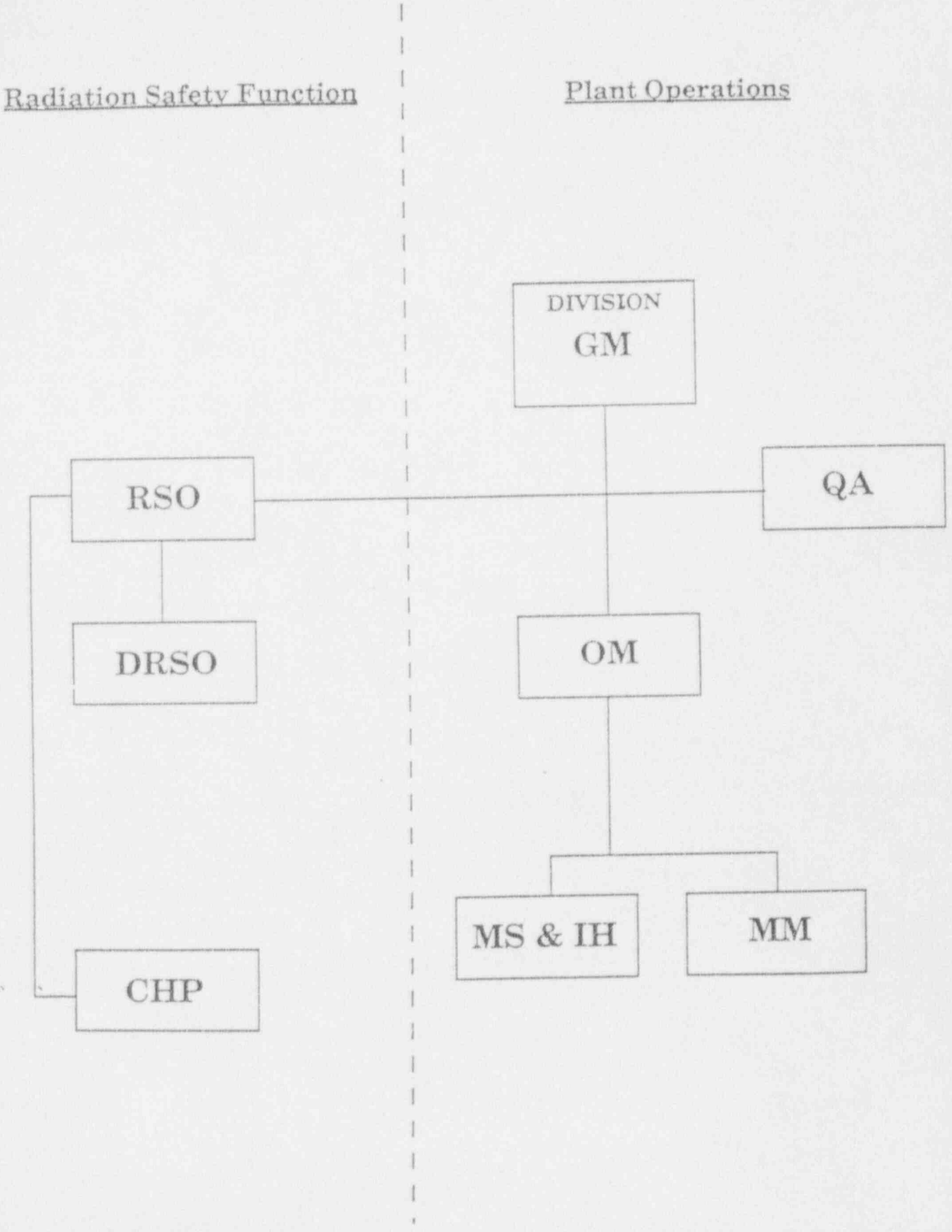


FIGURE 2-2
CABOT PERFORMANCE MATERIALS
BOYERTOWN, PENNSYLVANIA
RADIATION PROTECTION INFORMATION
FOR WORKERS AT NRC LICENSED FACILITIES

Training

Human nature makes everyone concerned about the radiation in their environment. We all hear about the nuclear industry on the news at least once a week these days. we know about some of the problems and we know how controversial some of the issues have become. The United States Nuclear Regulatory Commission (NRC) has, as part of its rules, set up a regulation that your employer, CPM, inform you of the facts on any hazard that might exist to your place of employment. The CPM plant in Boyertown has little or no radiation hazard to the human body if certain basic rules for safety and cleanliness are followed.

Ore contains tantalum and niobium, which is processed at Boyertown. The ore also contains thorium and uranium minerals that occur naturally in ore. CPM has not proprietary use for the thorium or uranium at this time and these elements are only contaminants in our ores. However, the NRC classes ores which contain greater that 1/20th of 1% or 0.05% thorium plus uranium as *Source Material*. This is empowered by the US government to control these elements and has sole authority for their disposition. Cabot Corporation must, therefore, have a license to use the ores for processing out the tantalum and columbium or niobium and keep an inventory of thorium and uranium remaining in our press cake solids. These solids are stored in concrete buildings called mausoleums.

Thorium and uranium occur in our ores and slags as basically insoluble residues. The only hazard with handling alpha emitters like thorium and uranium, is by accumulation of dust particles in the body through the lungs or digestive tract. A deposit of insoluble particles in the lungs is a major hazard since it is extremely difficult to see or measure the accumulation until large amounts have built up. Once radioactive material has entered the body, and been deposited there, it is difficult to eliminate by natural means. It is, therefore, essential to avoid all ingestion or inhalation of radioactive material and to test potentially exposed personnel for such accumulation.

Analysis of the radioactivity of the urine is a desired test. However, normal urine contains potassium, which occurs in our daily food and natural radioisotope of this potassium is potassium forty (K^{40}). Because of this unavoidable material and to test potentially exposed personnel for such accumulation.

January 1993, 10.CFR20.1502 requires licensees to monitor workers for intake of radioactive material if they are likely to receive in excess of 10% of the applicable Annual Limit Intake (ALI).

10CFR20.1204 says that physical measurements are required, specifically air sampling, bioassay, or a combination.

If it is determined that the licensee must monitor under 20.1502, then the requirement is to sum both internal and external dose to demonstrate compliance.

Cabot Performance Materials is, at this time, evaluating these dose levels with the aid of Halibration NUS at Savannah River.

Recent tests done on our employees and contractors have indicated less than (<) 5 micrograms per liter which is the limit of detection or uranium. CPM recommends, for your protection, that you use a respirator anywhere dust is generated. The purple canister (Wilson R12 or MSA 86431) is for radioactive dust. Wash your hands before you eat or smoke and use all other general cleanliness. Wipe out your respirator occasionally where it makes contact with your face and do not lay it down where he inside is exposed to fall out dust. Keep it in a plastic bag or just dangling from your neck with the inside against your clothing when not in use.

In many areas of the world, people live a life time where the natural radiation is higher than what is give off by our ores. However, during the processing, some elements can be concentrated into various liquids or solids where the radiation could increase to higher levels. That is why we must keep checking to see if the background radiation is increasing anywhere in the plant. Four times a year CPM pays radiation safety consultant to come in and do a survey to make sure everything is safe and sound.

Radiation is a disintegration process. As radiation is given off as alpha particles, beta particles, and gamma rays from the thorium and uranium, these elements disintegrate into other isotopes and elements. Unfortunately, Radon 222 and Radon 220 are some of these byproducts or "daughters". Radon is a gas, like argon and helium, which means that it is inert, or does not react with other things like oxygen does. The major difference with radon is that it has what is called a "short half-life". This means that it continues to disintegrate by giving off radiation in the air and the dust becomes radioactive. We send out samples every three months, which measures the level of radon in our most used areas where ore is ground, digested and stored. The thing to remember about radon is not to confine it in a closed building or the radiation level can concentrate. We must get rid of the gas by ventilation. This is why we have good ventilation in the mausoleums and ore handling parts of the plant.

The NRC requires that Form NRC-3 be read by everyone working in this area so that they know their rights. The company requests you sign your name and provide your social security number and birth date to indicate you have received this safety orientation.

_____

William C. Gannon
Radiation Safety Officer

cc: R. S. Barron
A. T. Campitelli
J. S. Lindell

Figure 2-2

Figure 3-1

BIOASSAY URINALYSIS ACTIONS

Concentration		Action
< 15 ug/L U	-	no action
< 15 ug/L U	-	1) Confirm Results 2) Identify Problems
< 15 ug/L U	-	1) Confirm Results 2) Identify Problems 3) Screen Other Worker 4) Limit Exposed Worker 5) Improve Engineering
< 35 ug/L U	-	1) All of the Above 2) Obtain in Vivo count 3) Urine Albuminuria 4) Stop work in area until evaluation of Engineering and Safety.

Figure 3-2
MAUSOLEUM MONITORING WELLS

pH

MAUSOLEUM WELLS
pH

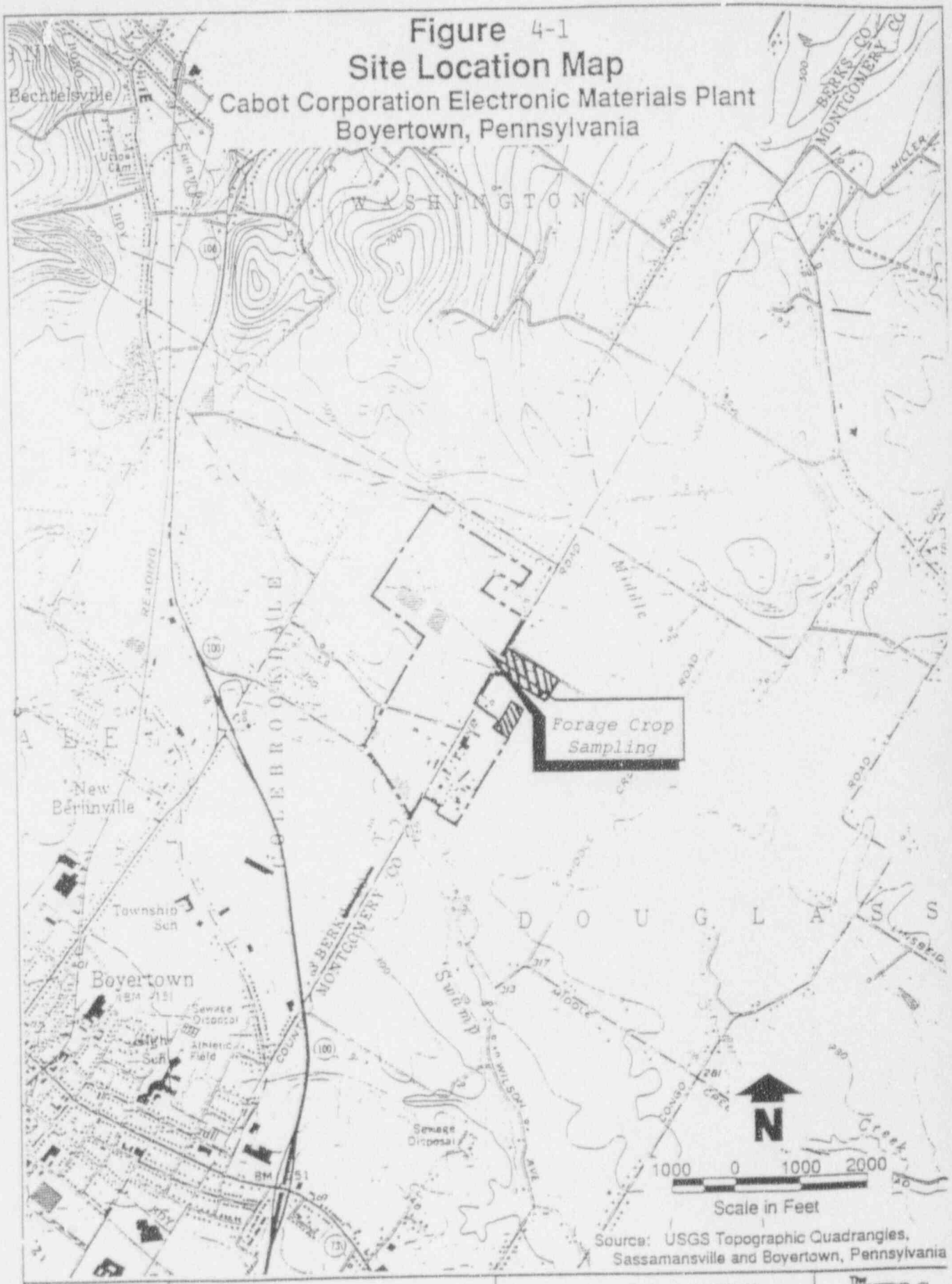
YEAR-QUARTER	MMW-1	MMW-2	MMW-3	MMW-4	MMW-5
1988-1	7.80	7.90	7.60	7.80	8.15
1988-2	8.10	7.80	7.20	7.50	7.60
1988-3	7.90	7.70	7.10	7.40	7.80
1988-4	8.25	7.85	7.30	7.80	8.05
1989-1	8.10	8.22	7.85	8.20	8.15
1989-2	8.10	8.15	7.45	7.80	7.85
1989-3	8.23	8.30	8.45	8.20	8.15
1989-4	8.20	8.15	7.75	8.00	8.05
1990-1	8.10	8.30	8.30	8.30	8.20
1990-2	7.95	8.13	7.55	7.79	7.91
1990-3					
1990-4	7.80	8.05	7.30	7.60	7.70
1991-1	7.95	8.10	7.56	7.80	7.90
1991-2	8.25	8.10	7.80	7.90	8.40
1991-3	8.15	8.05	8.00	8.30	8.30
1991-4					
1992-1	8.05	8.00	7.80	7.95	7.85
1992-2	7.90	7.95	7.45	8.05	8.05
1992-3					
1992-4	7.80	7.85	7.45	7.90	7.90
1993-1	7.88	7.83	7.32	7.85	7.72
1993-2	7.80	7.70	7.18	7.60	7.60
1993-3	7.78	7.52	6.72	7.40	7.37
1993-4	7.85	7.80	7.05	7.50	7.50

F- (PPM)

MAUSOLEUM WELLS
F-

YEAR-QUARTER	MMW-1	MMW-2	MMW-3	MMW-4	MMW-5
1988-1	0.210	0.290	0.240	0.550	0.270
1988-2	0.200	0.260	0.220	0.440	0.250
1988-3	0.210	0.290	0.230	0.520	0.230
1988-4	0.200	0.280	0.270	0.330	0.280
1989-1	0.150	0.250	0.240	0.330	0.250
1989-2	0.230	0.280	0.360	0.560	0.320
1989-3	0.200	0.280	0.370	0.610	0.390
1989-4	0.300	0.260	0.410	0.490	0.350
1990-1	0.150	0.250	0.280	0.520	0.270
1990-2	0.130	0.240	0.370	0.390	0.420
1990-3	0.140	0.260	0.340	0.430	0.400
1990-4	0.180	0.310	0.300	0.320	0.400
1991-1	0.140	0.250	0.330	0.440	0.400
1991-2	0.130	0.250	0.360	0.420	0.450
1991-3	0.150	0.260	0.780	0.540	0.460
1991-4					
1992-1	0.130	0.350	0.270	0.270	0.650
1992-2	0.150	0.360	0.360	0.290	0.710
1992-3					
1992-4	0.170	0.420	0.410	0.330	0.780
1993-1	0.134	0.406	0.412	0.282	0.997
1993-2	0.142	0.366	0.448	0.280	1.020
1993-3	0.156	0.383	0.409	0.238	0.871
1993-4	0.160	0.390	0.390	0.260	1.000

Figure 4-1
Site Location Map
Cabot Corporation Electronic Materials Plant
Boyertown, Pennsylvania



Source: USGS Topographic Quadrangles, Sassamansville and Boyertown, Pennsylvania

WO# 57806	Drawn by / Date: EKnopfle 6/27/90	Checked by / Date: E. Borbely 6/27/90	The ERM Group
	Revised by / Date:	Checked by / Date:	

FIGURE 8-1

TANTALUM AND NIODIUM PROCESS FLOW AT BOYERTOWN, PA.

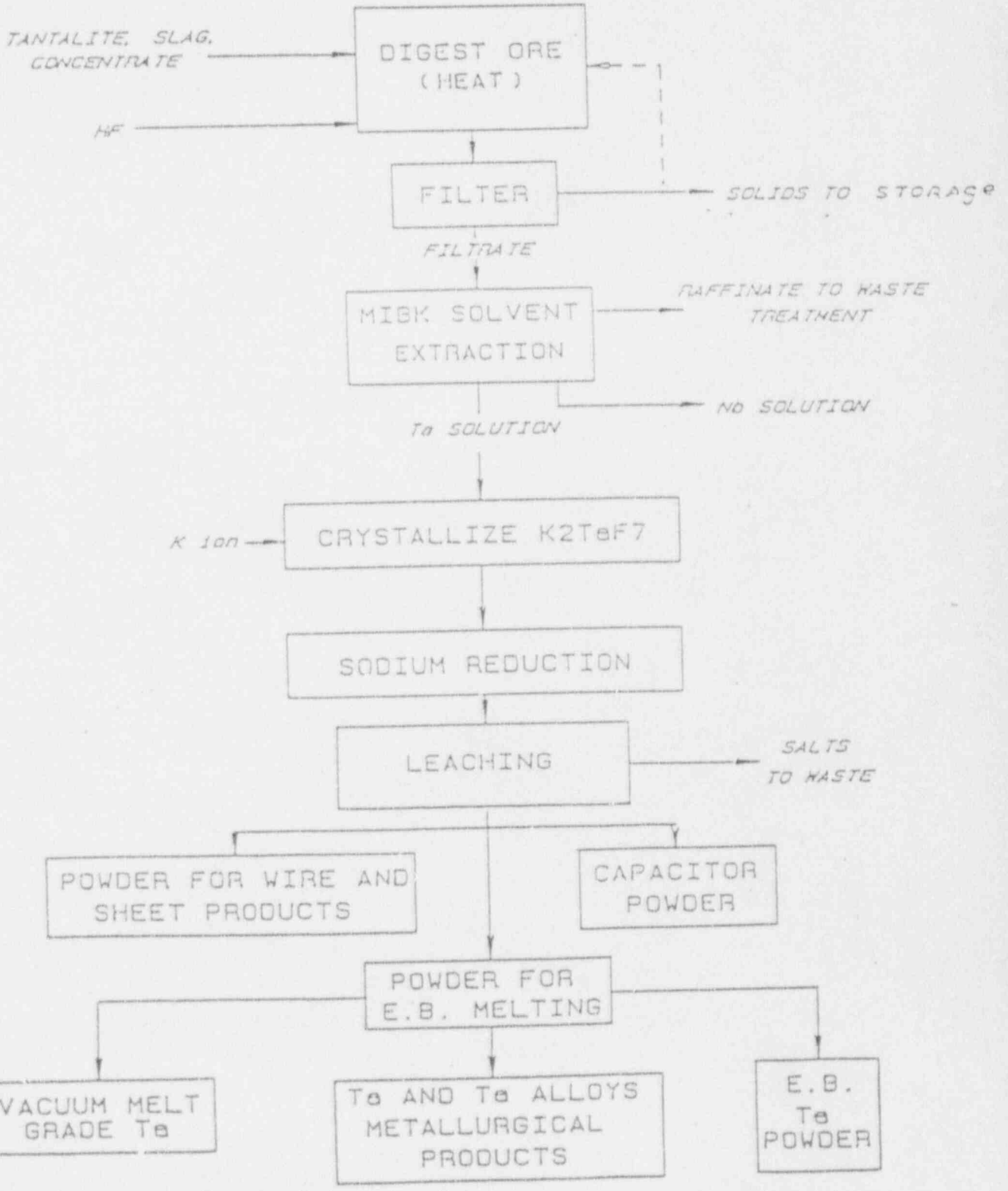
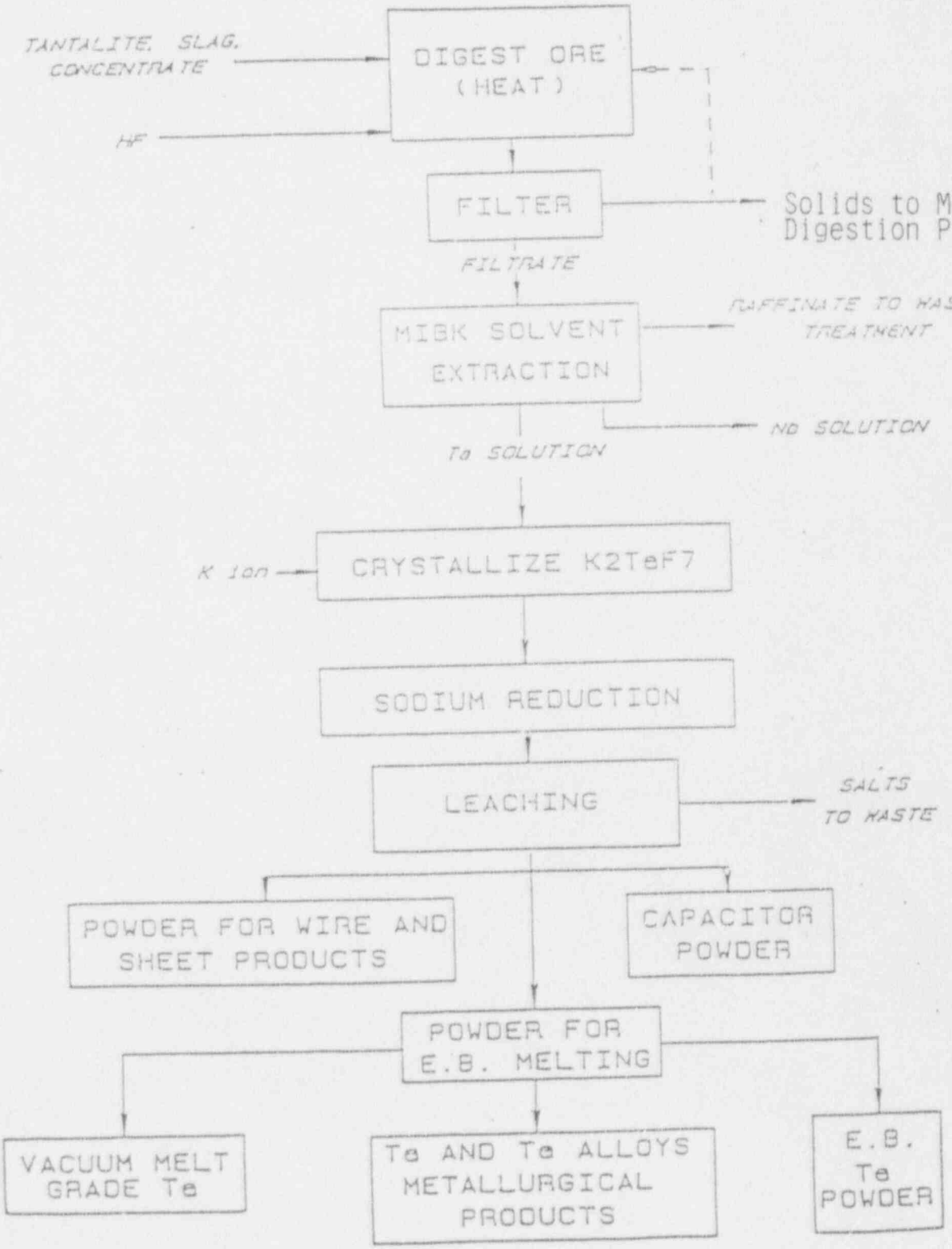


FIGURE 8-1-1

TANTALUM AND NIOBIUM
PROCESS FLOW AT BOYERTOWN, PA.



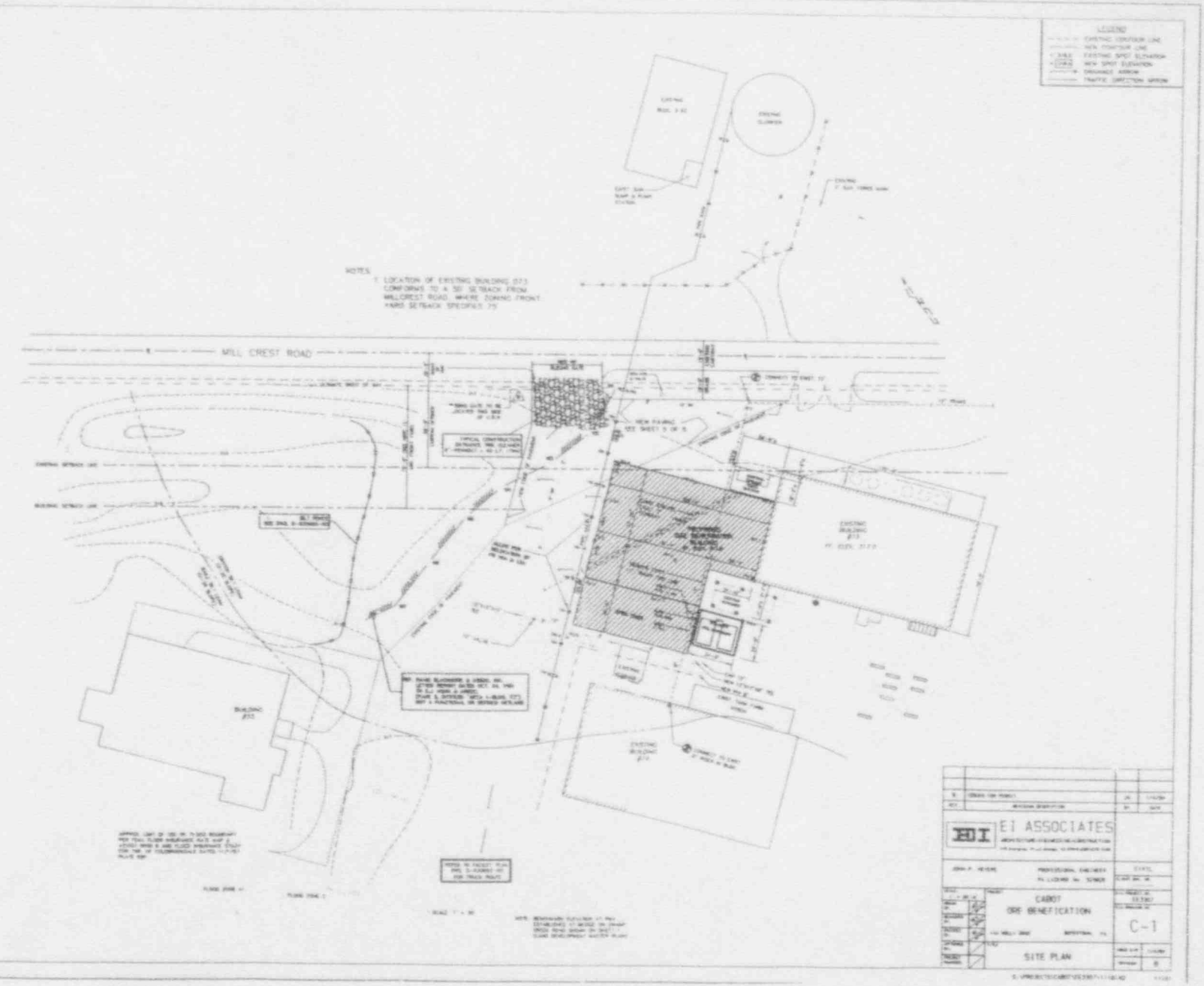


Figure 7-1
Process
Locations

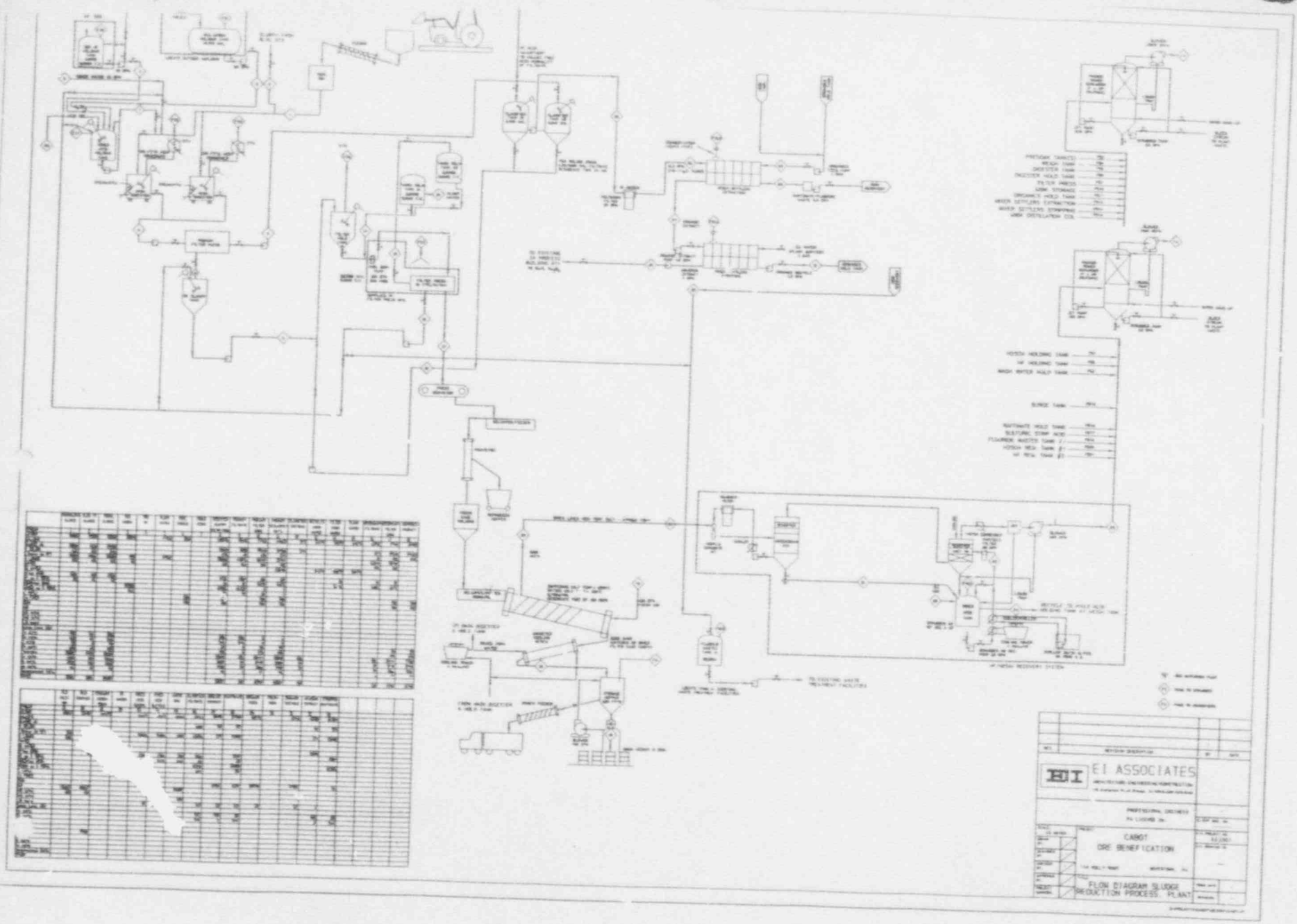
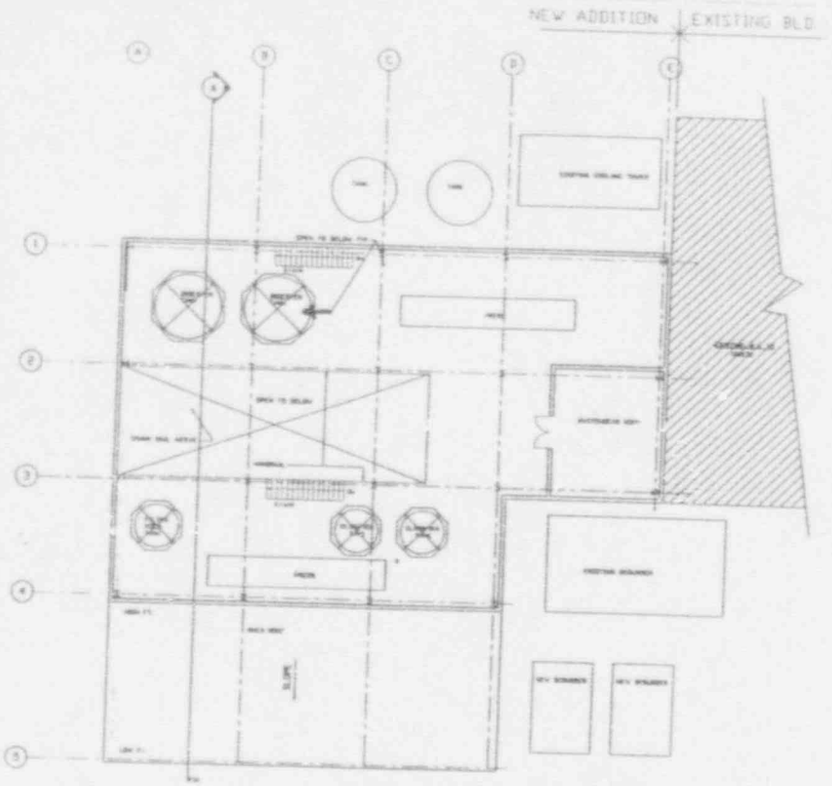
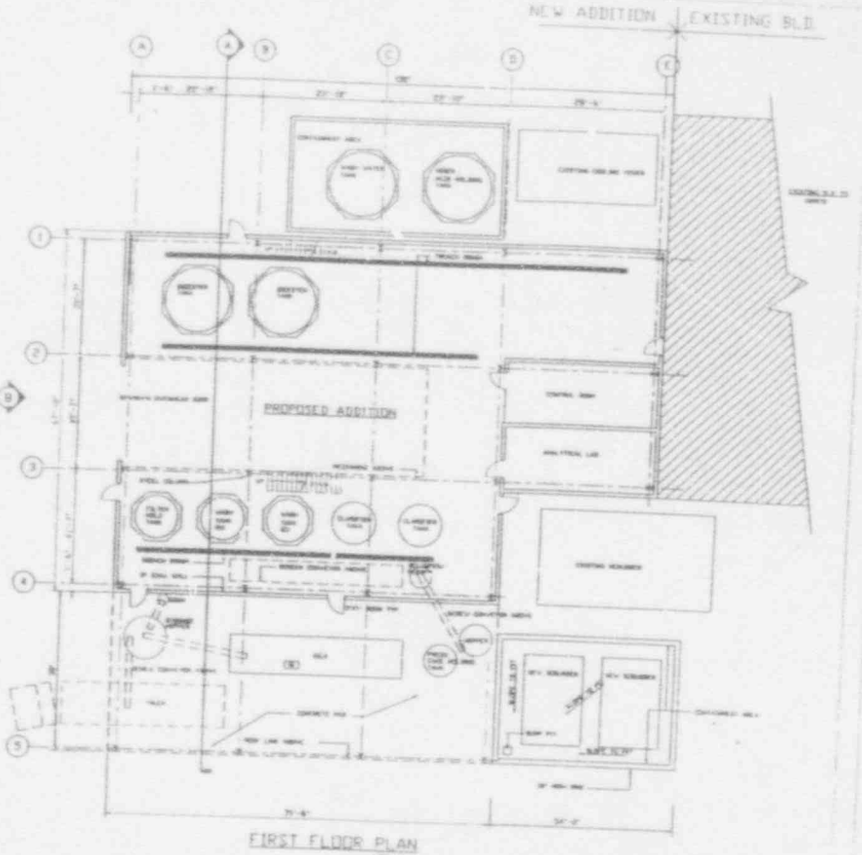


Figure 8-1-2
Revised Process
Flow Diagram



SECOND FLOOR/MEZZ PLAN



FIRST FLOOR PLAN

Figure 8-2
Revised Proce
Layout

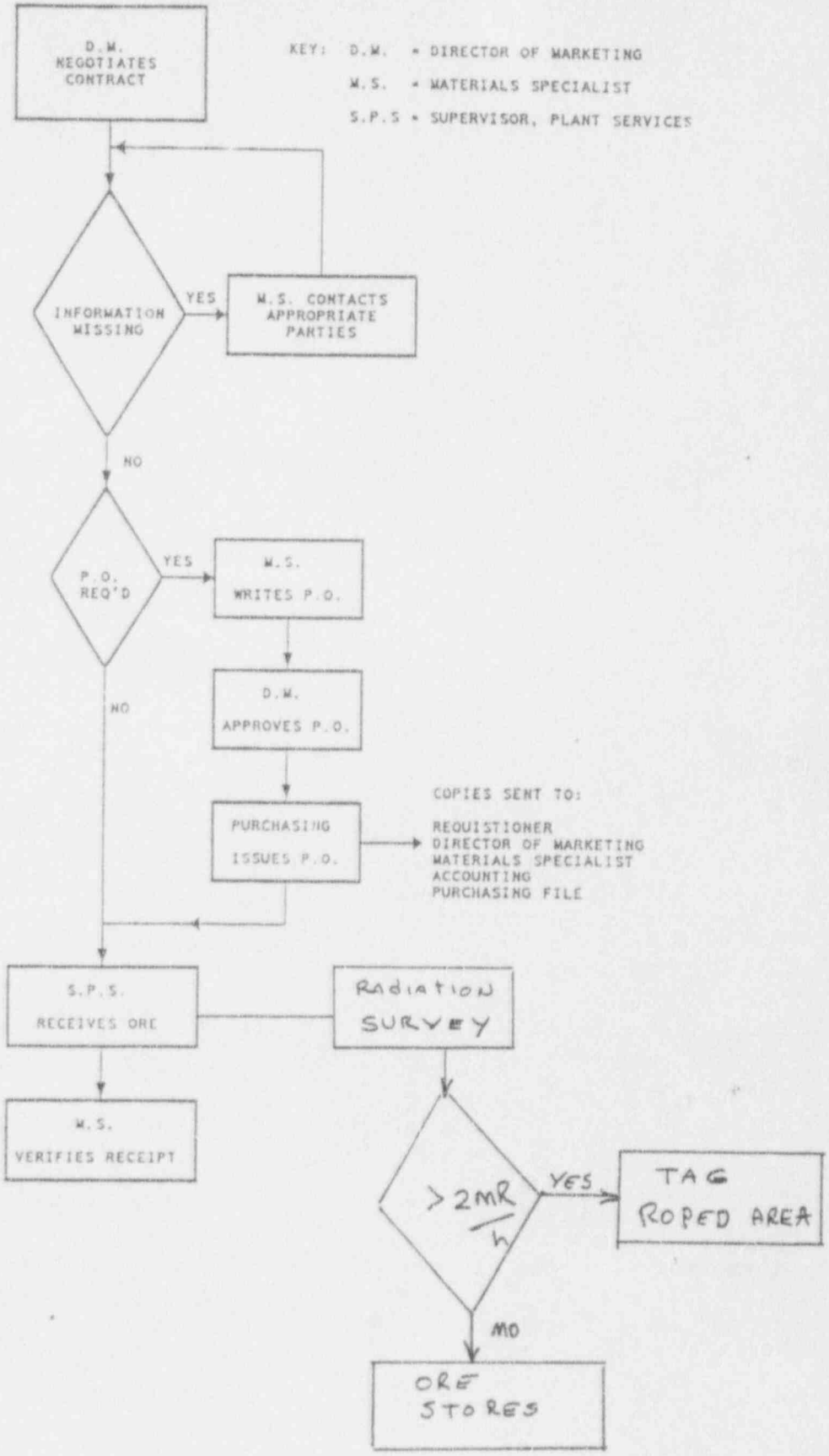
EI ASSOCIATES

CABOT
ORE BENEFICATION

A-1

FIRST & MEZZ. FLOOR PLANS

Figure 8-3
Purchase and Receiving of Ore



ATTACHMENT A

ORE RESIDUE INVENTORY LIST

CABOT PERFORMANCE MATERIALS - BOYERTOWN PLANT

ORE CONSUMPTION

THROUGH JUNE 1993

DATE	POUNDS TANTALITE	POUNDS COLUMBITE	POUNDS TIN SLAG
JAN 1993	89,302	131,580	--
FEB 1993	252,532	7,608	--
MARCH 1993	277,200	- 0 -	--
APRIL 1993	249,234	68,362	--
MAY 1993	121,760	183,091	--
JUNE 1993	259,471	116,949	--
TOTALS	1,249,499	507,590	--

SLUDGE CONVERSION	0.57	0.20	
NEW SLUDGE	712,214	101,518	
TOTAL NEW SLUDGE	813,732		
LAST INVENTORY 12/92	35,312,166		
TOTAL SLUDGE	36,125,898		

William C Gannon

William C. Gannon
Radiation Safety Officer

CC: NCFeola
RJBechtel
ATCampitelli
JRShope
RSBarron

WCG/[illegible].wp
July 14, 1993

CABOT PERFORMANCE MATERIALS - BOYERTOWN PLANT

INVENTORY ORES

THROUGH JUNE 1993

TANTALITE	POUNDS DRY	Th#	U#
Inventory 12/92	884,539	3,538	1,769
Inventory 6/93	1,249,499	4,998	2,499
Sludge Produced	712,214	4,985	1,424

COLUMBITE	POUNDS DRY	Th#	U#
Inventory 12/92	706,071	1,765	706
Inventory 6/93	507,590	144	507
Sludge Produced	101,518	1,269	102

SLUDGE	POUNDS DRY	LBS Th	LBS U
Inventory 12/93	35,312,166	216,275	96,945
Inventory 6/93	36,125,898	222,439	98,471

William C Gannon

William C. Gannon
Radiation Safety Officer

CC: NCFeola
RJBechtel
ATCampitelli
JRShope
RSBarron

WCG/jlo/xxxxxx.wp
July 14, 1993

CABOT PERFORMANCE MATERIALS - BOYERTOWN PLANT

INVENTORY OF SOURCE MATERIAL

THROUGH JUNE 1993

MATERIAL	POUNDS	LBS Th	LBS U
TANTALITE	158,649	635	317
TIN SLAG	N/A	N/A	N/A
COLUMBITE	587,446	1,469	587
SLUDGE	36,125,898	222,439	98,471
TOTALS		224,543	99,375

# Th & U	323,918
TONS	162
LIMIT	500

William C Gannon

William C. Gannon
Radiation Safety Officer

CC: NCFeola
RJBechtel
ATCampitelli
JRShope
RSBarron

WCG/[illegible].wp
July 15, 1993

ATTACHMENT B

DESCRIPTION OF KEY SAFETY RELATED POSITIONS

RADIATION SAFETY OFFICER'S OPERATIONS MANUAL
CABOT CORPORATION
OCTOBER 19, 1988

A. PERSONNEL

1. All personnel who work with radiation producing equipment and/or radioactive materials, and personnel who frequent the areas where these materials or equipment are used, will receive Radiation Safety orientation (refer to Form NRC 3, 10 CFR, Section 20.206, Pennsylvania Department of Environmental Resources, Title 25).

2. Personnel monitoring will be assigned by the Radiation Safety Officer (RSO) to all persons who work with radiation producing equipment (x-ray diffraction) where exposure may be greater than 10 mR per week (refer to 10 CFR, Section 20.202).

3. Records of results of personnel monitoring will be kept on file indefinitely or until the NRC determines a need and time for disposal. The reports will be reviewed, initialed and dated upon receipt by the RSO (refer to 10 CFR, Section 20.401).

4. The RSO will immediately attempt to find cause for any unusual exposure to personnel as indicated on TLD, film badge or other monitoring device. Document the incident with an employee's written report and review with the supervisor. Recommendations will then be made to avoid reoccurrence (refer to 10 CFR, Section 20).

5. Notice to Employees, Form NRC 3, shall be posted by the RSO at locations throughout the plant where radiation could be a hazard. The operators in the ore processing areas will be required each year, along with the other safety orientation, to read and sign that they have read NRC 3 and other pertinent safety data. A test to confirm a reasonable knowledge of the radiation safety information will be given annually to each person working in the ore processing area of this plant as per SMB-920 license requirement (Item 13, dated 12/20/83; refer to 10 CFR, Section 20.206).

B. CONTROL OF RADIOACTIVE MATERIAL AND RADIATION PRODUCING EQUIPMENT

1. The RSO shall monitor all shipments of source materials in and out of the plant to assure compliance with NRC and DOT regulations relating to proper handling, labeling, posting and packaging (refer to 10 CFR, Section 20.202 and 49 CFR 199).

2. The RSO will routinely make radiological surveys of areas where radiation equipment and radioactive materials are received, stored, used, etc. (refer to 10 CFR, Sections 20.201, 30.44 and 40.63).

3. The RSO shall make certain that exposure to employees and the public shall not exceed current permissible levels and that licensed radioactive materials are transferred or disposed of in accordance with applicable regulations and the conditions of the existing licenses (refer to 10 CFR, Sections 20.105, 20.101, 20.103 and 20.106).

4. The RSO shall monitor, without delay, an area or container suspected of causing, or threatening to cause, a radiation risk. Results of such surveys shall be recorded, and official notification made, in accordance with NRC regulation (refer to 10 CFR, Section 20.403).

C. INVENTORY OF RADIATION SOURCES

1. The RSO shall make a physical inventory of all by-product radioisotopes (gages, instruments) on, at least, an annual basis.

2. The Plant Engineer shall submit an inventory of raw materials containing source materials such as ores, concentrates and residues to the RSO which will be updated at least annually. Analysis of uranium and thorium will be provided as needed. The waste residues will be analyzed by lot for uranium and thorium along with loss of weight on drying before transfer to the mausoleums for storage. A running average of the uranium and thorium contained in the residues will be used to monitor accumulation of source materials in these mausoleums (refer to 10 CFR, Sections 20 and 40).

D. HEALTH PHYSICS INSTRUMENT MAINTENANCE AND CALIBRATION

1. The RSO will maintain a sufficient number of portable radiation survey instruments in good working condition to monitor Alpha, Beta and Gamma radiation and air sampling equipment to collect particulate samples in general work areas and environment at the property limits.

2. Portable survey meters shall be calibrated at six (6) month intervals, or before use, following any repairs. Air sampling equipment shall be calibrated at six (6) month intervals, or before use, following any repairs or modifications Records of these calibrations shall be kept at least two years.

E. TRAINING

1. The RSO shall provide radiation safety orientation for all employees who jobs may be in any way near material containing natural uranium, natural thorium, other licensed radioactive isotopes or radiation producing equipment. He will present factual and up-to-date information concerning the nature of the radiation risks and methods of assuring that the control of radiation is effective. The RSO will also inform employees of the availability of sources of additional pertinent information.

F. RECORDS

1. The RSO will maintain an accurate, up-to-date, readily available set of records and files which are open to any authorized Federal, State and Corporate official. Among the files will be the following:

   a. Personnel Radiation Monitoring - Film badge, TLD, Urinalysis

   b. Radioisotope Inventory

   c. Radiation Surveys (Quarterly Reports)

   d. Instrument Calibrations

   e. Training Records

   f. Inspection Records

   g. Licenses and Registration

   h. Analysis Reports (air, water, smears)

WCG/jle
RSOMANL

CABOT CORPORATION

JOB DESCRIPTION

NAME OF INCUMBENT: Suzan A. Frey DEPARTMENT: Safety & Health

POSITION TITLE: Manager, Safety & Health

REPORTS TO: John S. Lindell, Director of Operations

DATE COMPLETED: 03/01/94 SUPERSEDES: 02/10/92

FLSA STATUS: X EXEMPT _____ NONEXEMPT

A. BASIC FUNCTION

Manage the emergency response, medical, and safety and health programs and personnel for the Boyertown site.

Major focuses of this management effort include providing guidance to S&H Department employees, assuring needed safety/medical support is provided to management, providing policy guidance to management, and establishing a basic safety training framework for plant personnel.

B. ESSENTIAL JOB FUNCTIONS/MAJOR TASKS — TIME SPENT

Chair the Plant and Lab Safety Committees.	5%
Provide guidance to Emergency Response Team.	14%
Provide monthly reports to management (various).	4%
Provide monthly safety meeting guides to supervisors.	3%
Participate in loss investigation and follow-up.	10%
Assure Material Safety Data Sheets (MSDS) are evergreen.	6%
Complete Superfund Amendment and Reauthorization Act (SARA) Tier Two and Right-To-Know annual updates.	2%

Maintain awareness of current safety and health practices in industry and suggest new approaches for the Divison.
5%

Develop new safety programs to reduce recordable incidents and severity of incidents.
5%

Provide guidance and support to S&H Department personnel.
13%

Conduct semimonthly S&H staff meetings.
3%

Act as coordinator for fire/liability insurance.
1%

C. OTHER JOB FUNCTIONS

Participate on Emergency Response Team.
6%

Provide back-up for S&H Department personnel.
5%

Provide technical support to address day-to-day concerns.
20%

D. PHYSICAL DEMANDS

The position will require normal unrestricted physical movement. Position will require time be spent in production areas, traveling to/from meetings held in different buildings, and will require air travel from time to time. Good speech, reading, writing, hearing, seeing.

E. QUALIFICATIONS

Specific Skills

Ability to organize and conduct safety training presentations to individuals and groups using various media.
Working knowledge of OSHA standards.
Competent at reading, writing, and public speaking.
Ability to communicate with and relate to others.

Experience (kind and amount)

Minimum 5 years in a safety and health supervisory or managerial role with experience applying OSHA standards in an industrial setting. Several years experience developing and performing safety training for employees. Other helpful experience includes insurances, accident investigation, personal exposure monitoring and data interpretation, chemical spill response, and work in a union shop.

Education (general level required or specific courses)

Minimum 4 year degree in a safety/health, physical science, or related field. Courses in safety, industrial hygiene, safety management, occupational health, radiation safety, fire safety, and emergency response helpful.

Certificates, licenses, etc.

None required, however, certificates indicating successful completion of courses mentioned in "Education" helpful.

F. SUPERVISORY DATA

1. Total number of employees supervised		5
Exempt Salaried	1	
Non-Exempt Salaried	1	
Union and Hourly	0	
Part-Time Professional	3	

* * * * * * * * *

Supervisor Review/Approval: John S. Lindell Date: 3/1/94

John S. Lindell

Human Resources Review/Approval: Leslyn F. Zajdowicz Date: 3/4/94

Leslyn F. Zajdowicz

SAFrey/cas
03/01/94
job_desc.saf

CABOT CORPORATION

JOB DESCRIPTION

NAME OF INCUMBENT: Randall J. Kresge DEPARTMENT: Safety & Health

POSITION TITLE: Senior Safety Engineer

REPORTS TO: Suzan A. Frey, Safety & Health Manager

DATE COMPLETED: 03/01/94 SUPERSEDES: 01/27/92

FLSA STATUS: X EXEMPT _____ NONEXEMPT

A. BASIC FUNCTION

Conduct safety and health activities designed to minimize unsafe acts and conditions in the workplace, advise management and employees of policies and standards, and compile pertinent information for reporting.

B. ESSENTIAL JOB FUNCTIONS/MAJOR TASKS — TIME SPENT

Safety Committee inspections, meetings, and follow-up.	13%
Participate in accident investigations.	6%
Address daily safety concerns.	30%
Communicate with plant personnel.	20%
Participate in Emergency Response development.	16%
Conduct workplace exposure monitoring.	5%
Maintain OSHA log of Occupational Injuries/Illnesses.	2%
Personal training and education.	3%
Employee training.	5%

C. OTHER JOB FUNCTIONS

Evaluate training videos and programs.	0.5%
Attend staff meetings.	2%
Attend insurance company loss control inspections.	0.5%
Revere plant safety and health inspections.	2%
Maintain respirator program coverage (back-up).	2.5%
Perform confined space entry work (back-up).	1%
Evaluate exposure monitoring equipment for purchase.	2%

D. PHYSICAL DEMANDS

Normal vision, hearing, and speaking.
Climbing ladders - 2 times/day.
Climbing stairs - several times/day.
Bending - 20 times/day.
Walking - 3 miles/day.
Standing - 1 to 2 hours/day.
Sitting - 1 to 2 hours/day.

E. QUALIFICATIONS

Specific Skills

Above average reading, writing, and speaking skills required. An understanding of the OSHA Safety & Health Regulations and their application required.

Experience (kind and amount)

At least 5 years progressive experience in application of safety skills and regulations to the industrial workplace. Development and application of specific employee/management training programs necessary.

Education (general level required or specific courses)

4 year degree in Safety Management/Safety Engineering. Specific courses in First Aid, CPR, Hearing Conservation, Accident Investigation, Exposure Monitoring, etc are beneficial.

Certificates, licenses, etc.

None.

F. SUPERVISORY DATA

1. Total number of employees supervised		N/A
Exempt Salaried	N/A	
Non-Exempt Salaried	N/A	
Union and Hourly	N/A	

* * * * * * * * *

Supervisor Review/Approval: Suzan A Frey Date: 3/2/94
Suzan A. Frey

Human Resources Review/Approval: Leslyn F. Zajdowicz Date: 3/4/94
Leslyn F. Zajdowicz

RJKresge/cas
03/01/94
job_desc.jss

ATTACHMENT C

RADIATION SAFETY PROCEDURES

CABOT PERFORMANCE MATERIALS WORK/EQUIPMENT INSTRUCTION			
PERSONAL DOSIMETRY MAINTENANCE AND REPORTING			
RAD-002	**REVISION NO. 0**	**DATE: AUGUST 1993**	**PAGE 1 OF 3**

WRITTEN BY: William Gannon 8/3/93 Radiation Safety Officer
William C. Gannon [date]

ISSUED BY: Joanne L. Erb 8/3/93 Quality Systems Assistant
Joanne L. Erb [date]

APPROVED BY: Anthony T. Campitelli Manager, Environmental Affairs
Anthony T. Campitelli [date]

RJ Kresge 8/2/93 Manager, Safety & Health
Randall J. Kresge [date]

REVISION INDEX

REVISION NO.	REVISION DATE	REVISION DESCRIPTION
0	08/93	Original Issue.

SCOPE

Government regulations require that personnel using or working in the vicinity of radioactive sources or machine generated x-rays be monitored by personal dosimeters.

1 REFERENCE DOCUMENTS

PA Code Title 25 Chapter 220, Notices, Instructions, and Reports to Workers.2
10 CFR 20.202, Personnel Monitoring.
10 CFR 20.401, Records of Surveys, Radiation Monitoring, and Disposal.

2 SAFETY AND HEALTH Radiation Exposure Guide*

Type of Exposure	Guide Value
Whole body; head and trunk; blood forming organs; lens of eye; or gonads.	1250 millirems per quarter; 5000 millirems per year; up to 3000 millirems is permitted in a calendar quarter as long as the accumulated occupational dose to the whole body does not exceed 5000 millirems X (age - 18).
Skin of whole body.	7500 millirems per quarter.
Hand, forearms, feet, and ankles.	18,750 millirems per quarter.

* USNRC regulations, Title 10, Part 20, Code of Federal Regulations (9-1-78); from Landauer Dosimetry Services.

3 EQUIPMENT Radiation Dosimetry Badge, Type K (3 chips)

3.1 Radiation areas:

X-Ray Laboratory (Philips)
X-Ray Bldg 060 (Kevex)
Cs^{137} Ammonia Strip
Am^{241} Tantalum Rolling Mill gauges
Electron Beam furnaces and welder

4 PROCEDURE

4.1 The Radiation Safety Officer (RSO) will increase or decrease the number of employees required to wear dosimetry badges as the need arises.

4.2 Dosimetry records are the responsibility of the RSO and shall be protected from misuse and maintained in his or her custody.

4.3 Individuals may request data from their personal dosimetry file at any time. Other employers may want historical data for one of Cabot's former employees. This information can be obtained from these dosimetry records and is legally owned by the individual.

4.4 Once a year, an Occupational External Radiation Exposure Report is sent to personnel who had used a dosimeter. A copy of these (Landauer) reports is kept in RPO3 file Pennsylvania Code Title 25, Chapter 200, Section 220.4 (Notification and Reports to Individuals).

5 QUALITY CHECKS

The RSO monitors Cumulative Total Millirems. If any high reading is noted (>50) in one month, an investigation of probable cause is required.

CABOT PERFORMANCE MATERIALS WORK/EQUIPMENT INSTRUCTION			
FLUORIDE IN FORAGE CROPS			
RAD-005	REVISION NO. 0	DATE: MAY 1993	PAGE 1 OF 5

WRITTEN BY: William C. Gannon 5/11/93, Radiation Safety Officer
William C. Gannon [date]

ISSUED BY: Joanne L. Erb 5/11/93, Quality Systems Assistant
Joanne L. Erb [date]

APPROVED BY: Anthony J. Campitelli [date], Manager, Environmental Affairs
Anthony J. Campitelli [date]

R J Kresge 5/23/93, Manager, Safety & Health
Randall J. Kresge [date]

UNCONTROLLED COPY

REVISION INDEX

REVISION NO.	REVISION DATE	REVISION DESCRIPTION
0	05/93	Original Issue.

QUALITY DEPARTMENT REVIEW DATE: MAY 1995

SCOPE

Each year during the growing season grass and corn samples are collected and sent out for fluoride analysis.

REQUIREMENT

Cabot Boyertown uses large volumes of hydrofluoric acid (HF). Sampling of forage crops NE of the Digestion Building 073 along the County Line Road and beyond the water tower are required. The decision to send samples to an outside lab was made in 1983 to prevent cross-contamination from analysis in our own laboratories.

1 REFERENCE DOCUMENTS

USNRC Source Material License No. SMB 920, Section 21, dated 12/20/83.

2 EQUIPMENT

8" x 11" envelopes.
Scissors or knife.
Sample labels.

3 PROCEDURE

3.1 Sampling

3.1.1 Corn Sampling

This sampling should be done mid to late August.

Contact property owner to obtain permission for sampling on chosen date.

With a scissors or knife, at each location cut 8 to 10 leaves from a few different corn stalks and cut into small pieces. Place in an 8" x 11" paper envelope. Collect at 6 different locations and mark approximate sample areas on a map. (See attached sample location sketch map.)

3.1.2 Grass Sampling

This sampling should be performed in late spring (May or June). Use a scissors or knife to cut sufficient grass to fill an 8" x 11" paper envelope at each sample location. Label the envelope and mark the location on a map for traceability. Collect 4 samples as described above. See attached sample location on plan sketch map.

3.2 Drying

3.2.1 Place the open ended envelopes into a forced air drying oven located in Lab 10 Building 025. Adjust the drying oven setting from 110°C down to 80°C. Dry for at least 20 hours. Remove envelopes from the oven. Seal the sample into the envelopes with scotch tape and place all the envelopes into a large plastic bag. Return oven setting to 110°C.

3.3 Preparation for Shipment

3.3.1 Receiving Shipment Paperwork:

Prepare a Purchase Requisition Order to Environmental Strategies, 309 The Parkway, Ithaca, NY, 14850. Request fluoride analysis. Ask purchasing to send shipping papers to you.

NOTE: Charge number 6119 (Digestion)

3.3.2 Shipping the Samples:

Purchasing will supply three copies of shipping papers (yellow, blue and gold.) Take the bag of samples along with the yellow and blue copies to the shipping dock. Retain the gold copy in the Environmental Strategies folder.

3.4 Results

3.4.1 Upon receipt of the fluoride values from Environmental Strategies, evaluate the test.

3.4.1.1 Sample ≤40 ppm F - copy production and environmental departments.

3.4.1.2 Sample >40 ppm F - copy production and environmental departments. Write a letter to two agencies below for their information:

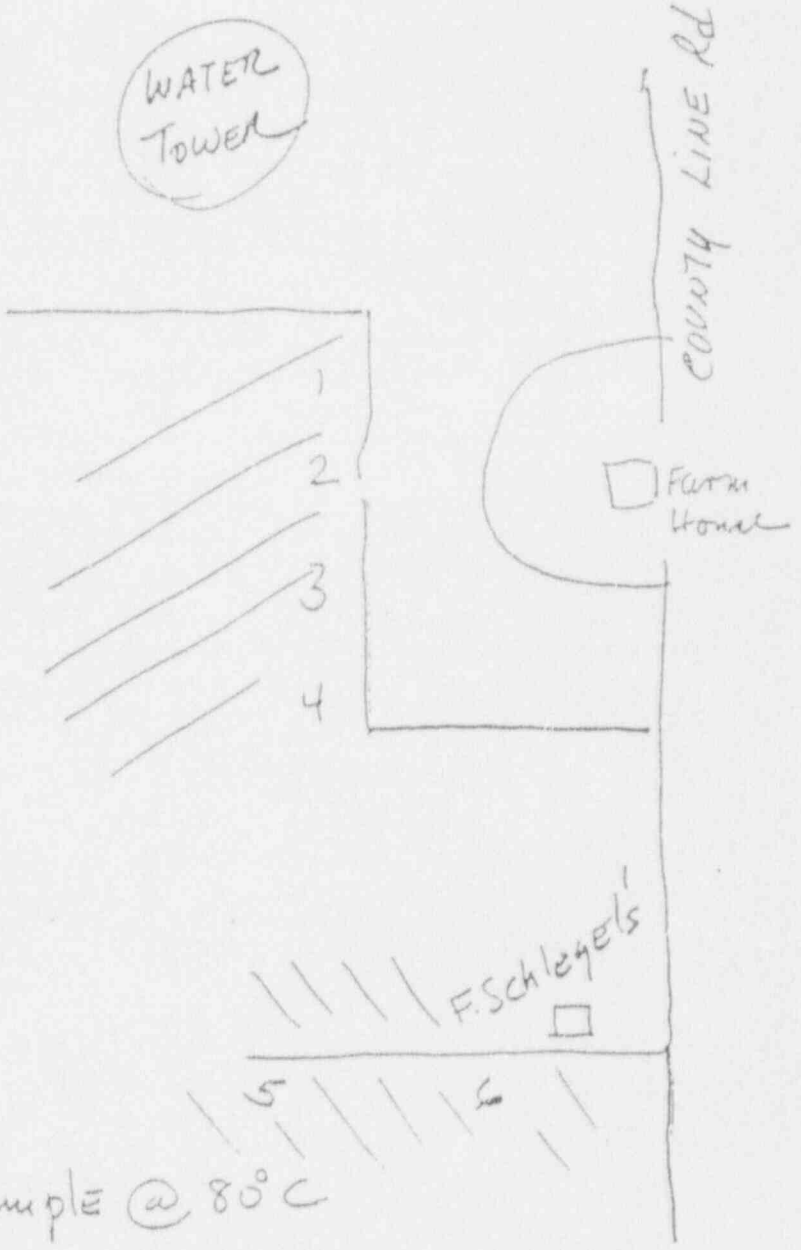
USNRC
Uranium Fuel Licensing Branch NMSS
Washington, DC 20555

(and)

Pollution Control Engineer PADER
Suite 6010 Lee Park
555 North Lane
Conshohocken, PA 19428

SAMPLE LOCATION SKETCH PLAN FOR FORAGE CROP SAMPLING

Forage Crop Corn Leaves 8/8/91
WC & N.F.



dry corn sample @ 80°C

send sample to ESI for F⁻ analysis

CABOT PERFORMANCE MATERIALS WORK/EQUIPMENT INSTRUCTION			
BUILDING 062 FILTER CAKE QUARTERLY SAMPLING PROGRAM			
RAD-006	REVISION NO. 0	DATE: MAY 1993	PAGE 1 OF 3

WRITTEN BY: William C Gannon 5/11/93 Radiation Safety Officer
William C. Gannon [date]

ISSUED BY: Joanne L. Erb 5/11/93 Quality Systems Assistant
Joanne L. Erb [date]

APPROVED BY: Anthony T. Campitelli Manager, Environmental Affairs
Anthony T. Campitelli [date]

R.J. Kresge 5/24/93 Manager, Safety & Health
Randall J. Kresge [date]

REVISION INDEX

REVISION NO.	REVISION DATE	REVISION DESCRIPTION
0	05/93	Original Issue.

QUALITY DEPARTMENT REVIEW DATE: MAY 1995

SCOPE

License requirement for non-radioactive waste solids by EPA/NRC. Cabot landfill contractor Pottstown Waste Management cannot accept greater than 10 pCi/gram of combined radio isotopes.

1 REFERENCE DOCUMENTS

1.1 SMB-920-17, source Material License No. SMB-920, Section 17, dated 12/20/83.

1.2 SEC'Y-81-576 NRC document, USNCR Policy Issue (Information), October 5 1981, SECY-81-576, "Disposal or Onsite Storage of Residual Thorium or Uranium (either as natural ores or without daughters present) from Past Operations", by William Dircks, Executive Director for Operations.

1.3 10 CFR 71, August 1983, Table A-4, Specific activity for natural U and natural Th. Code of Federal Regulations Title 10, Chapter 1, Part 71, August 1983, Table A-4, Specific Activities of Natural Uranium and Thorium.

2 EQUIPMENT

Trowel or plastic scoop.
Plastic bags.
Labels (contact).

Personal Protective Equipment (P.P.E.):

Gloves.
Hard hat.
Safety glasses.
Long sleeve shirt.

3 PROCEDURE

3.1 Sampling Program

3.1.1 Collect a single representative sample each week for three (3) consecutive weeks during the first month of each quarter (January, April, July, October).

3.2 Wearing the PPE as listed in Section 2, use a clean trowel or plastic scoop to collect 5 or 6 representative scoops of filter cake from pile outside Bldg. 062 Filter House.

3.3 Place material into a plastic bag (about 1/2 pound). Close and seal the bag to minimize moisture loss.

3.4 Fill out a sample label with the sample name (Building 062 Filter House), sample number (quarter, week, date), the analysis requested and your name. Most samples are for uranium, thorium and percentage moisture.

3.5 Deliver the sample and paperwork to the Cabot Industrial Hygiene Laboratory.

3.6 Analysis

3.6.1 After receiving the % uranium, % thorium, and % moisture, calculate back to the as is basis. The reason for this operation is to get a more uniform sample from dried cake.

3.6.2 If the average pCi/gram approaches the limit continue to sample each week for three more weeks as a re-check. Occasionally a batch has given high readings due to cross-contamination.

3.6.3 Chemical analysis has proven to be the only way to determine uranium and thorium at these low levels with acceptable accuracy. For continued ≥ 1 ratio notify Plant Manager, Radiation Safety Officer, and Environmental Manager.

4 CALCULATION

4.1 $$\frac{\text{ppm U}}{14} + \frac{\text{ppm Th}}{46} = \leq 1$$

4.2 14 ppm U = 10pCi/gram (7.06×10^{-7} Ci/g)

4.3 46 ppm Th = 10pCi gram (2.2×10^{-7} Ci/g)

CABOT PERFORMANCE MATERIALS WORK/EQUIPMENT INSTRUCTION			
SAMPLING MAUSOLEUM MONITORING WELLS (MMW), MMW-1-MMW-5			
RAD-007	REVISION NO. 0	DATE: MAY 1993	PAGE 1 OF 7

WRITTEN BY: William Gannon 5/14/93 Radiation Safety Officer
William C. Gannon [date]

ISSUED BY: Joanne L Erb 5/14/93 Quality Systems Assistant
Joanne L. Erb [date]

APPROVED BY: Anthony T Campitelli Manager, Environmental Affairs
Anthony T. Campitelli [date]

R J Kriege 5/23/93 Manager, Safety & Health
Randall J. Kriege [date]

UNCONTROLLED COPY

REVISION INDEX

REVISION NO.	REVISION DATE	REVISION DESCRIPTION
0	05/93	Original Issue.

SCOPE

An accurate method for sampling surface water to monitor for loss of control in residue storage.

1 REFERENCE DOCUMENTS

Quality Assurance Manual - Groundwater Sampling at KBI.
Rogers-Golden-Halpern, Chapter V, "Sampling Methodology", Project 222.01.
License Number SMB-920, Source Material License from NRC.
Material Safety Data Sheet for gasoline.

2 SAFETY AND HEALTH

2.1 Motor operation - Gasoline engine used to operate air pump.

Caution: Moving parts - Heat generation - Gasoline.

2.2 Compressor - Moving parts - High pressure air.

Caution: Face and eye protection.

2.3 Safety Procedures

2.3.1 Performance of this procedure is absolutely limited to qualified operators, helpers, and trainees under the direct observation and with assistance of a qualified operator.

3 EQUIPMENT AND MATERIALS

Depth gauge.
Motor Compressor.
QED Pneumatic pump system.
Twelve (12) plastic bottles, 2,000 ml.
Six (6) plastic bottles, 250 ml.
Labels.
Gas can (safety can).
Various hoses (pressure and water).
Drum to receive water (50 gal).
Well location plan.
Field parameter/Well purging data sheets.
Approximately 3 liters DI water for field blank.

4 PROCEDURE

NOTE: **If, at any time, the operator cannot follow the steps of this Work Instruction, or the material or equipment reacts in an unusual manner, the operation must be stopped and the supervisor informed of the unusual condition.**

4.1 Remove orange plastic cap from top of inner PVC well casing and insert depth indicator probe (be sure probe is turned on).

4.2 Determine the depth to water level in the well with the depth gauge and record on field parameter data sheet.

4.3 Determine height of water in the well by subtracting depth reading from 79 feet 12 inches (total well depth = 80.0').

Example:
79' 12"
(-) 3' 7" Gauge Reading
76' 5" Height of Water

4.4 Calculate the volume of water to be purged from the well before sampling by multiplying the height of water by 0.5.

Example: 76' 5" x 0.5 = 38.2 gallons

A minimum of three (3) well volumes are to be purged from well prior to sample collection. $V = \pi r^2 h$

4.5 Set up the pumping system:

4.5.1 Attach the black hose from the gas compressor to the high pressure side of the well-wizzard control box.

4.5.2 Attach the red hose from the well-wizzard compressor control to the top of the well using a metal nipple (quick connect hose).

4.5.3 Fill gasoline reservoir on engine. Be sure the engine has cooled before adding gasoline. NO SMOKING.

4.5.4 Activate Choke (if unit is cold). Check throttle.

4.5.5 Attach water outlet to plastic tube and connect to 55 gal. drum reservoir.

4.5.6 Start the engine.

4.5.7 Record start time for beginning of well purging.

4.5.8 Calculate flow rate by timing the interval required to fill a spare 2,000 liter bottle.

4.5.9 Divide the required purge volume by the flow rate to determine required time interval for well purging.

4.5.10 While the well is being purged pour the field blank. Take the ~3 liters of DI water and pour into a 2,000 ml bottle and a 250 ml bottle. Label the samples MMW-6 for the field blank. Record sample time on the label.

4.5.11 Prepare labels for the sample containers. For MMW-1, MMW-2, MMW-3, MMW-4, and MMW-5, one label for each 2,000 ml bottle and one for each 250 ml bottle (10 labels).

4.5.12 Prepare duplicate sample labels for the 2,000 ml bottles: MMW-1(DUP), MMW-2(DUP), MMW-3(DUP), MMW-4(DUP), and MMW-5(DUP).

4.6 Be sure that sufficient time has elapsed to insure you have achieved the required 3 well volumes purged as determined from the initial flow rate calculations. Collect the approximate gallons of purge water, which takes roughly one hour.

4.7 Collect the samples from the well -- two (2) 2000 ml and (1) one 250 ml plastic bottles.

4.8 Label the samples.

4.9 Stop the motor/air compressor.

4.10 Disconnect all hoses.

4.11 Empty 55 gal purge water drum to a container for transfer to waste treatment.

4.12 Move the equipment to the next test well and reassemble.

4.13 Fill the gas tank. Be sure the engine has cooled before adding gasoline. NO SMOKING.

4.14 Repeat the procedure from para 4.1 until all five wells have been sampled. Try to proceed from least to highest contaminant levels to avoid cross contamination of samples. Check the previous quarter analytical results for direction in determining sampling sequence.

4.15 Fill out a chain of custody form to go with each sample bottle.

4.16 Each sample of one well is contained in three bottles:

2,000 ml	1	To Teledyne Isotope Gross, $\propto \beta$
2,000 ml	2	To reserve (label with date and #)
250 ml	3	To A Lab pH, F

4.17 Monitor action levels to address developing problems.

5 QUALITY CHECKS

5.1 Action level - 2 ppm F-, 15 pCi/L alpha, 50 pCi/L beta -
If action levels are exceeded:

5.1.1 Send duplicate reserved 2,000 ml sample for re-check.

5.1.2 Set up and re-sample the well in question being careful to use new bottles, etc.

5.1.3 Send 2,000 ml re-sample for re-check.

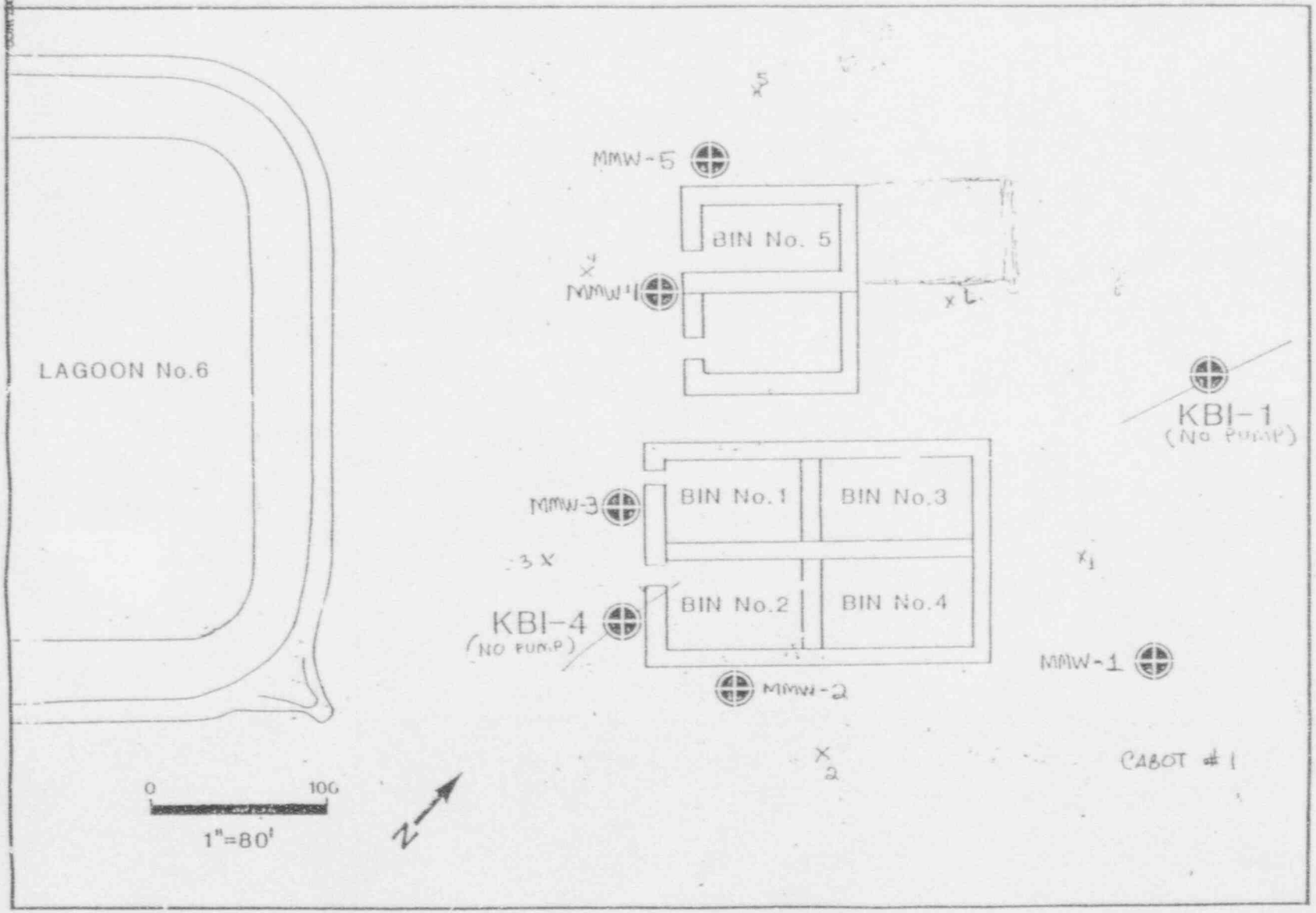
5.1.4 Investigate area, people, operations to see if there is a known reason for the change.

5.1.5 Report to plant manager for assistance.

5.1.6 If F- concentration exceeds 2 ppm notify Region I NRC.

FIGURE 1:
KBI Test Wells

MMW = MAUSOLEUM MONITORING WELL



RAD-007	REVISION NO. 0	DATE: MAY 1993	PAGE 6 OF 7

KBI TEST WELLS

DOW/RAD007.WOD

CHAIN-OF-CUSTODY RECORD

Location | Name of Client | Invoice #

Item Number	Time	Description	Transfer Number (check items transferred) 1	2	3	4	5	6	7	8

Analysis to be performed:

Transfer No.	Item Number	Relinquished By	Accepted By	Date	Time
1					
2					
3					
4					
5					
6					
7					
8					

CHAIN-OF-CUSTODY RECORD Form

RAD-007	REVISION NO. 0	DATE: MAY 1993	PAGE 7 OF 7

CABOT PERFORMANCE MATERIALS WORK/EQUIPMENT INSTRUCTION			
RADIATION SURVEY OF INCOMING TANTALUM-NIOBIUM ORES			
RAD-010	**REVISION NO. 0**	**DATE: AUGUST 1993**	**PAGE 1 OF 4**

WRITTEN BY: William C Gannon 8/9/93 Radiation Safety Officer
William C. Gannon [date]

ISSUED BY: Joanne L Erb 8/10/93 Quality Systems Assistant
Joanne L. Erb [date]

APPROVED BY: Anthony T. Campitelli Manager, Environmental Affairs
Anthony T. Campitelli [date]

R J Kresge 8/22/93 Manager, Safety & Health
Randall J. Kresge [date]

REVISION INDEX

REVISION NO.	REVISION DATE	REVISION DESCRIPTION
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SCOPE

Identify the level of radioactivity of incoming ores for safe handling by Operations.

1 REFERENCE DOCUMENTS

SMB 920 License.
MS-1040, Tanco Ores.
MS-1020, Tantalum-Niobium Concentrates.
MS-1000, Tantalite-Niobite Ores.

2 SAFETY AND HEALTH

Caution: Radioactive Material.

Caution: Radioactive Material >2 mR/hour segregate from personnel.

Radiation workers will receive instruction on radiation safety and the introduction to NRC Form 3.

3 EQUIPMENT

Calibrated radiaton survey meter.
Sign "Roped Area >2 mR/hour".

4 PROCEDURE

4.1 Survey each lot of incoming ore using a calibrated survey meter.

4.2 Record mR/H on Receiving Report form.

4.3 Give the Receiving Report form to the RSO for entry into Ore Receipt log.

4.3.1 If ore survey is <2 mR/hour, trained operator handles in regular manner.

4.3.2 If ore survey is >2 mR/hour, label with a special sign "Roped Area >2 mR/hour". These lots shall be segregated from personnel and reported to production supervision for early consumption.

4.3.3 If ore survey is >5 mR/hour, report to Production Management and the Environmental Manager. Best disposition is resale.

5 QUALITY CHECKS

A calibrated survey meter is required for radioactivity measurement.

ORE RECEIPTS (sample)

ORE RECEIPTS

DATE	TYPE	LOT #	VENDOR	QUANTITY	mR/H
4/28/93	Tantalite AMM 2390	3271	A&M	11,305 8D	0.2
4/28/93	Tantalite, AMM 2390/S	3272	A&M	27,594 20D	0.15
4/29/93	Tantalite 428(07/92	3273	SOGEM	13,557 12D	0.4
4/30/93	Tantalite 1060-1114	3274	P&N West	25,147 55D	0.5
4/30/93	Tantalite 1101,*1229	3275	Gold Rim	24,707 54D	0.5
5/4/93	Tantalite 80-96	3276	SOGEM	19,318 16D	0.5
5/4/93	Tantalite 62-79	3277	SOGEM	20,434 18D	0.5
5/5/93	Tantalite 46-61	3278	SOGEM	19,603 16D	0.4
5/4/93	Tantalite 31-45	3279	SOGEM	19,935 15D	0.8
5/4/93	Tantalite 16-30	3280	SOGEM	19,500 15D	0.4
5/4/93	Tantalite 01-15	3281	SOGEM	18,378 15D	0.5
5/14/93	Tantalite 073	3282	SOGEM	2238 8D	0.8
5/14/93	Tantalite March	3283	A&M	10325 7D	0.2
5/14/93	Tantalite	3284	A M	530 1D	0.3

CABOT PERFORMANCE MATERIALS WORK/EQUIPMENT INSTRUCTION			
SAMPLING AND SURVEY OF THE READING SITE			
RAD-012	REVISION NO. 0	DATE: AUGUST 1993	PAGE 1 OF 4

WRITTEN BY: William C. Gannon 8/19/93 Radiation Safety Officer
William C. Gannon [date]

ISSUED BY: Joanne L. Erb 8/16/93 Quality Systems Assistant
Joanne L. Erb [date]

APPROVED BY: Anthony T. Campitelli Manager, Environmental Affairs
Anthony T. Campitelli [date]

R.J. Kresge 5/29/93 Manager, Safety & Health
Randall J. Kresge [date]

REVISION INDEX

REVISION NO.	REVISION DATE	REVISION DESCRIPTION
0	08/93	Original Issue.

SCOPE

To do a walk around survey with a calibrated micro R meter looking for unearthed hot spots. Collect a water sample at the base of the dump and evaluate any activities which threaten to invade the radioactive dump area.

1 REFERENCE DOCUMENTS

SMB 920 License.

2 SAFETY AND HEALTH

Always inform Reading operations you are coming for the inspection. Follow all safety regulations of that Reading operation.

Calls: 1) Fire Engine Company 376-3185
2) Conam Inspection 376-9500; Randy Jacobs

These people need to know you are on the property.

3 EQUIPMENT

Calibrated survey meter (Model 19 Micro R Ludlum or equivalent).
1 liter plastic water bottle.
1 map of Tulpehocken parking lot and dump.
Labels and note pad.

4 PROCEDURE

4.1 Take a background reading with the Micro R Meter at the substation NW corner.

4.2 Survev 8-10 spots circling the parking lot area and record the μR readings on the map blank.

4.2.1 Check limit 2 X background.

4.2.2 Critical limit 4 X background.

4.3 If 4.2.1, notify Cabot Performance Materials RSO to sample, resurvey, and evaluate.

4.4 If 4.2.2, notify Cabot Performance Materials RSO and Manager of Environmental Affairs. Schedule clean-up of hot spot by NUREG 5849 criteria.

4.5 Obtain a water sample from the base of the dump site at the railroad track siding using the 1 liter plastic bottle. Send sample to a qualified lab for gross alpha and gross beta analysis.

4.5.1	Check Limit:	Gross alpha	7 pCi/L
		Gross beta	25 pCi/L
4.5.2	Critical Limit:	Gross alpha	15 pCi/L
		Gross beta	50 pCi/L

4.6 If 4.5.1, notify Cabot Performance Materials RSO. Resample as soon as possible, making sure no solids are retained in the water sample. Use all new, clean plastic bottles.

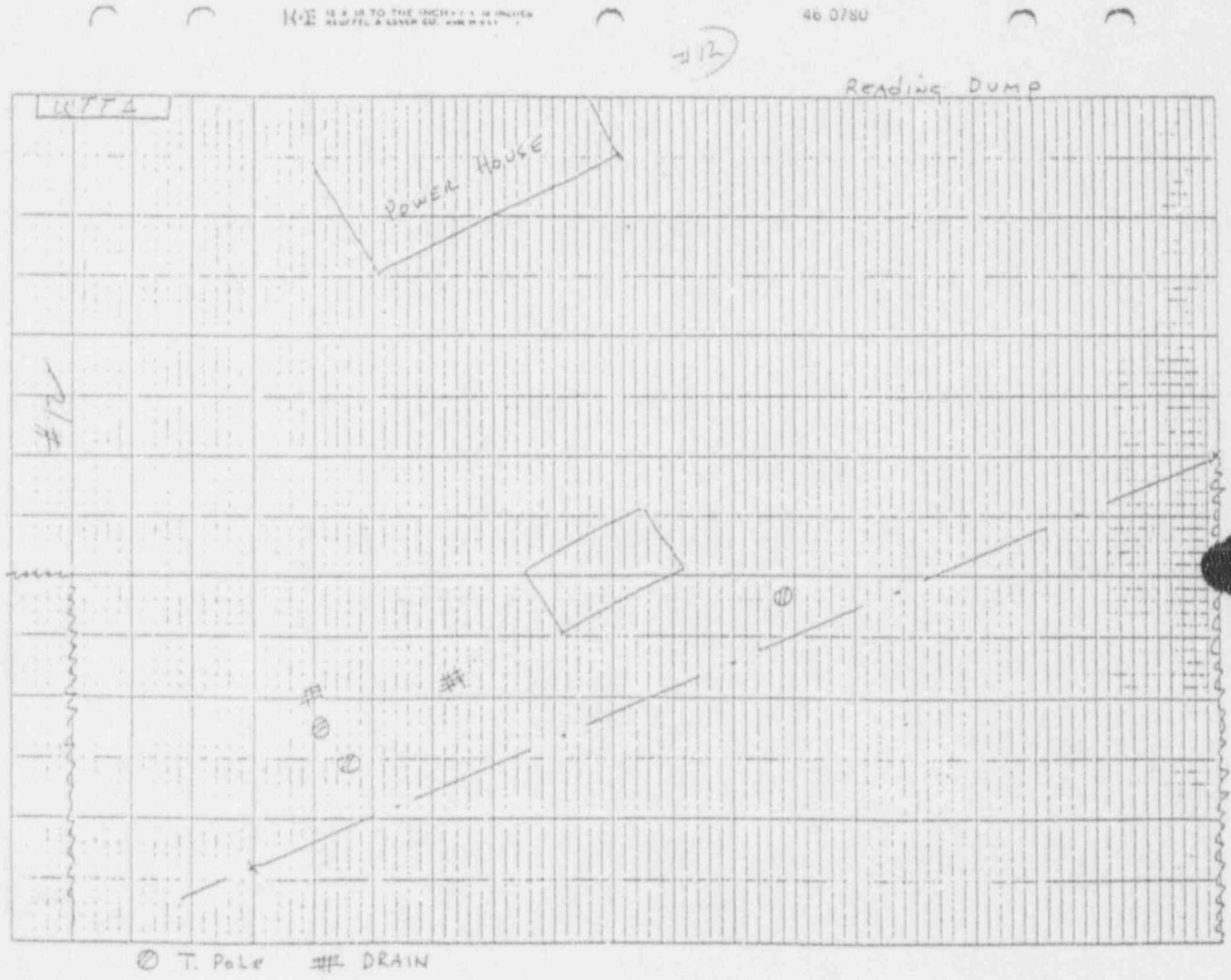
4.7 If 4.5.2, notify Cabot Performance Materials RSO. Resample as soon as possible making sure no solids are retained in the water sample. The CPM RSO shall initiate an investigation of the cause of the high readings.

5 QUALITY CHECKS

5.1 Always read a blank at the designated spot to set your baseline.

5.2 Always use a calibrated survey meter.

MAP OF SAMPLING LOCATIONS FOR READING SITE



CABOT PERFORMANCE MATERIALS WORK/EQUIPMENT INSTRUCTION			
URINE BIOASSAY TESTING			
RAD-016	REVISION NO. 0	DATE: AUGUST 1993	PAGE 1 OF 6

WRITTEN BY: William C. Gannon 8/19/93, Radiation Safety Officer
William C. Gannon [date]

ISSUED BY: Joanne L. Erb 8/19/93, Quality Systems Assistant
Joanne L. Erb [date]

APPROVED BY: Anthony T. Campitelli, Manager, Environmental Affairs
Anthony T. Campitelli [date]

R J Kresge 8/24/93, Manager, Safety & Health
Randall J. Kresge [date]

REVISION INDEX

REVISION NO.	REVISION DATE	REVISION DESCRIPTION
0	08/93	Original Issue.

SCOPE

Each radiation worker will be sampled for soluble uranium accumulation by urinanalysis annually (SMB 920).

1 REFERENCE DOCUMENTS

SMB 920 Section 14; Draft Reg. Guide 8.22 Rev. 1, Bioassay at Uranium Mills, Jan 1987; Reg Guide 8.11 Applications of Bioassay for Uranium; June 1974.

2 SAFETY AND HEALTH

2.1 Possible Safety Hazards

2.1.1 Air particulate in ore grinding and ore digestion areas of the plant could be ingested by operations personnel by respiratory and/or digestion tract.

2.1.2 During dusty conditions, operator shall wear respirator Hepa Filter (North N7500-8; Wilson R12; Racal 451-00-01R01; or equivalent) when mechanical ventilation/filtration fails to clear the surrounding air.

2.1.3 Quarterly checks of the grinding and digestion areas for total alpha and gravimetric solids will indicate loss of control of ventilation equipment.

2.1.4 Operations shall ask for air sampling whenever excess dusting persists to maintain ALARA condition for work operations.

3 EQUIPMENT

2 liter plastic bottle.
Permanent label with name and social security number.

4 PROCEDURE

4.1 To prevent soluble uranium compounds from increasing dose to the body, baseline samples are taken of each new ore processing worker after he or she has been working in the (air surrounding) Bldg 073, the ore grinding and digestion area. A procedure has been developed where once a month, the area supervisor is questioned as to who are working in that area. A comparison list shows changes in personnel on the monthly basis (see attached Rad Worker Log).

The month when a new person starts work is placed in the attendance block and then each month a new number is added until 3 is reached. At that time, a urine bioassay sample is ordered by the RSO.

Once a year, bioassay urine samples are ordered for every employee working in Bldg 073 area including any permanent maintenance workers in that area.

4.2 Sample Shipping Procedure

4.2.1 Obtain a new worker social security number from Human Resources Department. Prepare a purchase order for Teledyene Isotope (our contract laboratory) to determine total uranium in 24 hour urine sample. Include the name and social security number of each worker. Ask to have the shipping papers returned to you. Deliver the papers and empty plastic (2000 ml bottle) to the supervisor of Bldg 073. Verify that the worker is instructed and the sample goes with the paperwork to the Shipping Department within a 4 week time period.

4.3 Dosimetry

4.3.1 Dosimetry records are the responsibility of the RSO and shall be protected from misuse and maintained in his or her custody.

4.3.2 Individuals may request data from their personal bioassay file at any time. This information is legally owned by the individual.

5 QUALITY CHECKS

N/A

RAD WORKER LOG (sample)

3 send Urine
T written test
X Urine

Sample of Rad Worker Log

Ron Moyer	7-92	8-92	9-92	10-92	11-92	12-92	1-93	2-93
Otto Schmee	7-92	8-92	9-92	10-92	11-92	—	—	—
R. Pendelton	7-92	8-92	—	—	—	—	—	—
Paul Saylor	7-92	8-92	9-92	10-92	11-92	12-92	1-93	2-93
Fred Maurer	7-92	8-92	9-92	10-92	11-92	12-92	1-93	2-93
Larry Stoudt	7-92	8-92	9-92	10-92	11-92	12-92	1-93	2-93
Lucille Hess	7-92	8-92	9-92	10-92	11-92	12-92	1-93	2-93
Wm. Breslin	7-92	8-92	9-92	10-92	11-92	12-92	1-93	2-93
Wanda White	7-92	8-92	9-92	—	—	—	—	—
Jim Sarla	7-92	8-92	9-92	10-92	11-92	12-92	1-93	2-93
Eugene Herr	7-92	8-92	9-92	—	—	—	—	—
Ron Kretzman	—	—	9-92[1]	10-92[2]	11-92[3]	12-92	1-93	2-93
Rodney Wagner	—	—	—	—	11-92[1]	12-92[2]	1-93[3]	2-93
Brian Waylan	—	—	—	—	11-92[1]	12-92[2]	1-93[3]	2-93
David Cameron	—	—	—	—	11-92[1]	12-92[2]	1-93[3]	2-93
Kenneth Houpt	—	—	—	—	11-92[1]	12-92[2]	1-93[3]	2-93
Bob Johnson	—	—	—	—	—	12-92[1]	1-93[3]	2-93[3]

AIR SAMPLING DATA
(from Reg Guide 8.1, June 1974)

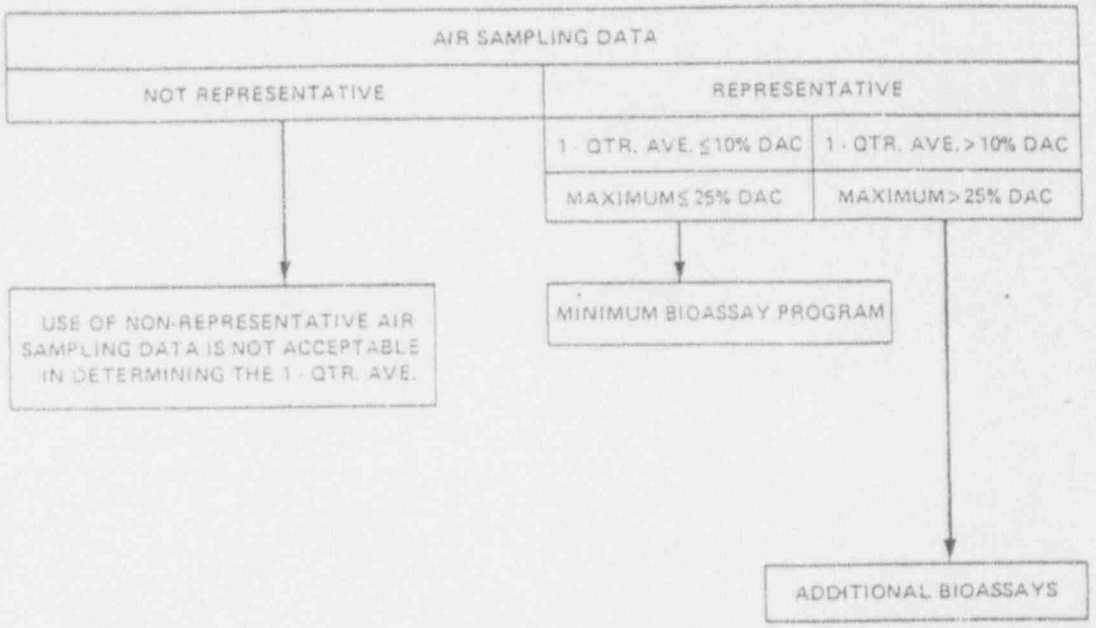


Figure 1 Criteria for Initiating Additional Bioassays, Routine Conditions

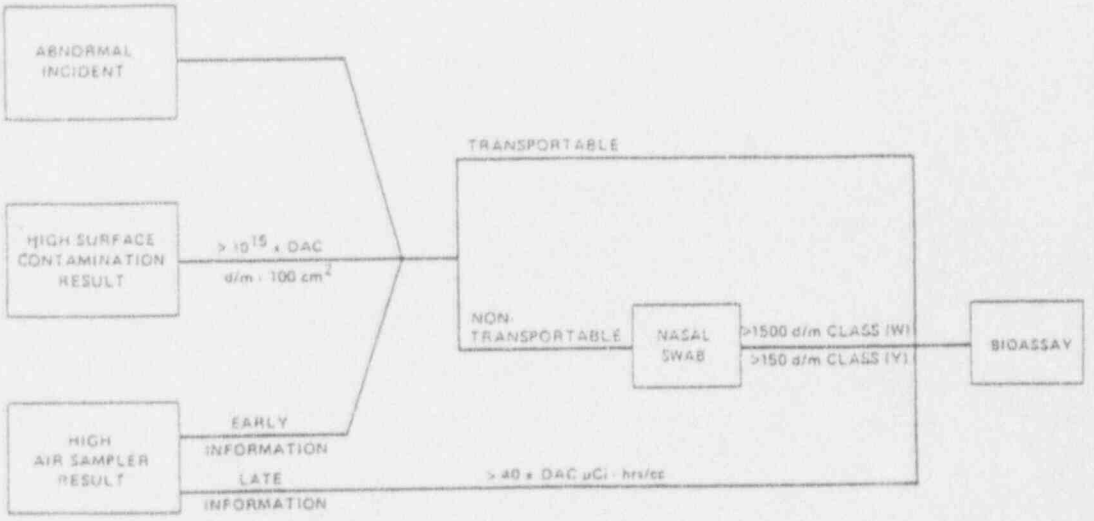


Figure 2 Criteria for Diagnostic Bioassays During Special Investigations

FROM Reg Guide 8.11 June 1974

ACTION PLAN
BIOASSAY URINANALYSIS

Action PLAN

BIOASSAY URINANALYSIS

NOTE: See January 1987, Div. 8, Task OP013-4
Revision R.G. 8.22

Yellow Cake	U_3O_8 --- U	0.848	U	85%
Ta Ores	U_3O_8 --- U	0.002	U	0.2%

<15 ug/l U - no action

15 ug/l U - 1) Confirm Results
2) Identify Problems

>15 ug/l U - 1) Confirm Results
2) Identify Problem
3) Screen Other Workers
4) Limit Exposed Worker
5) Improve Engineering

>35 ug/l U - 1) All of the Above
2) Obtain in Vivo Count
3) Urine Albuminuria
4) Stop work in area until evaluation of Engineering and Safety.

WCG/jle
WCGLIC1

CABOT PERFORMANCE MATERIALS WORK/EQUIPMENT INSTRUCTION			
RADIOLOGICAL SAFETY PROCEDURES MANUAL			
RAD-023	REVISION NO. 0	DATE: OCTOBER 1993	PAGE 1 OF 10

WRITTEN BY: William C. Gannon, Radiation Safety Officer
William C. Gannon [date]

ISSUED BY: Joanne L Erb 10/13/93 Quality Systems Assistant
Joanne L. Erb [date]

APPROVED BY: Anthony T. Campitelli 10/14/93 Manager, Environmental
Anthony T. Campitelli [date] Affairs

R.S. Barron 10/15/93 Director of Operations
Robert S. Barron [date]

R J Kresge 10/18/93 Manager, Safety & Health
Randall J. Kresge [date]

REVISION INDEX

REVISION NO.	REVISION DATE	REVISION DESCRIPTION
0	10/93	Supercedes original issue 02/90; reformatted.

SCOPE/RESPONSIBILITY OF THE RADIATION SAFETY OFFICER

The Radiation Safety Officer (RSO) shall have the responsibility for application, amendment, renewal, or termination of all licenses, permits, registrations required for purchase, possession, storage, use, transfer, or disposal of radioactive materials, radiation producing equipment, or other potentially hazardous materials or devices that require regulatory controls. The duties of the RSO shall include, but are not limited to, the following:

- Provide effective leadership for the identification and control of risks to health, safety, security, and assure compliance with applicable regulations.

- Receive, review, and act on all applications for the purchase, storage, use, transfer, or disposal of licensed radioactive materials including review and approval of the qualifications of users, facilities, procedures, and equipment involved.

- Provide training to supervisors and employees to achieve the following:

  Insure that personnel are aware of potential risks associated with the operations.

  Instruct personnel in the use of protective clothing and other safety devices provided to reduce their risk of exposure to acceptable levels.

  Inform the personnel about specific documentation and control of such risks.

- Supervise occupational health surveillance program.

- Investigate and document all accidental exposures, incidents, or situation that might result now or in the future in a claim of damages, or allegations or violation of regulations of our policies or procedures for loss prevention.

1 REFERENCE DOCUMENTS

Title 10 Code of Federal Regulations, Section 20 (updated yearly) 1993.

2 REGULATORY CONTROLS

2.1 Federal controls over radioactive materials are based upon an internationally accepted criteria for radiological protection of workers, the public, and the environment. These standards and safety criteria have been established by the International Commission on Radiological Protection (ICRP) in cooperation with the National Council on Radiation Protection and Measurement (NCRP). The publications of the NCRP provide reference material for an understanding of radiation protection.

Radioactive materials controlled by the United States Nuclear Regulatory Commission (NRC) are:

2.1.1 Special Nuclear Materials: uranium enriched in the radionuclides U-235 and U-233 and plutonium.

2.1.2 By-product Materials: includes materials which have become radioactive due to radiation exposure.

2.1.3 Source Materials: natural uranium or thorium, or any combination thereof, in any physical or chemical form, or ores which contain 0.05% by weight of uranium plus thorium.

2.2 The NRC's regulations are contained within the Code of Federal Regulations (CFR), Title 10, Chapter 1. The parts of particular interest to us are:

Part 19:	Notices to Workers
Part 20:	Standards for Protection Against Radiation
Part 30:	Licensing of Byproduct Material
Part 40:	Licensing of Source Material
Part 110:	Export and Import of Nuclear Facilities and Materials
Part 170:	Fees for Facilities and Materials Licenses and other Regulatory Services Under Atomic Energy Act of 1954, as amended

3 RADIATION SAFETY OFFICER CONTROL

3.1 Radiation Content Analysis

3.1.1 Methods of determining concentrations of radioactivity in virtually any material are used. Using these analytical systems, radiation in air, liquid, and/or solid samples can be measured.

3.1.2 Care must be taken to assure that the sample submitted for analysis is truly representative of the bulk of the material under study. Specific information as to the method of collection, date, and location of a sample, are extremely important details that must be documented for each sample.

3.2 Selection and Authorization of Storage Sites

3.2.1 Any area or facility in which licensed radioactive materials are stored or used must be approved in advance by the RSO. These areas or facilities must meet certain specific structural, security, health, and regulatory standards.

3.2.2 Radioactive materials must not be stored in the same facilities with materials which might substantially increase the fire or explosive hazard of the storage space and its radioactive contents. Reasonable protection must be afforded against unauthorized entry, theft, leakage, or dispersion by fire effects or water. This area will be posted with signs labeled "Radioactive Material". These licensed materials must also be safeguarded against dispersion by wind, precipitation, or absorption into soil or paving material. An inventory of source material is maintained and summarized at least annually.

3.3 Control and Decontamination of Accidental Spillage

3.3.1 Every reasonable effort must be made to control and promptly decontaminate accidental spillage of products containing source material. The RSO can recommend appropriate precautionary measures to avoid unnecessary risk to personnel, facilities, and equipment. The RSO, or his assistant, should be notified promptly or the contamination might spread to sewers, roads, streams, etc.

3.4 Transfer of Ownership

3.4.1 Regulations authorize transfers of any source material to unlicensed persons or organizations in quantities not exceeding a total of 15 pounds (of uranium or thorium as contained in materials having more than 0.05% by weight uranium plus thorium) or a total of 150 pounds in any one calendar year. The new owner must have a valid license covering the specific purposes for which these source materials will be used and that the locations, personnel, etc, are currently and correctly covered in their license. The RSO will be able to verify the validity and applicability of licenses and should be contacted for prior approval when and if total possession limits exceed 150 pounds or 15 pounds per shipment.

3.5 Decontamination/Release of Facilities

3.5.1 When facilities, trucks, ships, materials handling equipment, etc, are to store, transport, or handle radioactive materials,, they must be designated with labels, placards, and/or other means, as being restricted and reserved for that particular use which is authorized by our license and applicable regulations. When the items have been used for their particular purposes, ascertain that all licensed radioactive materials have been removed. Furthermore, all traces Of radioactivity must be decontaminated to levels equal to less than the limits specified in Attachment 1.

3.6 Radiological Safety Training

3.6.1 The RSO, and the RSO assistant(s), will have a minimum of 40 hour Radiation Safety Training.

3.6.2 Training courses will be presented to the affected production workers as part of the safety program. The refresher courses will provide new information and review proposed changes in the Standard Operating Procedure (SOP) as regulatory requirements change.

3.7 Radiation Instrumentation

3.7.1 See Attachment 2, "Survey Meters on Gauge Track" for the equipment available for use in evaluating and controlling radiation risk.

3.8 Calibration of Survey Instruments

3.8.1 All radiation survey instruments are calibrated and serviced with standards traceable to the United States National Bureau of Standards primary sources at 6 month intervals.

3.9 Environmental Sampling (quarterly)

3.9.1 Air: Hi-volume air samples are taken in sections of the manufacturing plant where dust from ores or residues would be prevalent and at the property line with a continuous air sampler at the nearest neighbor.

3.9.2 Water: Liquid samples are taken from various outfall streams or ponds which could be sources of radiation, as well as groundwater from wells.

3.9.3 Dust: Smears of 100 cm^2 surface areas are taken where dust from the ore processing will occur, or where dust from the process could be tracked by operators.

3.10 Corrective Action Levels

3.10.1 Air Samples:

natural uranium action	5×10^{-11} μCi/ml*
natural uranium limit	5×10^{-10} μCi/ml
natural thorium limit	5×10^{-13} μCi/ml

* Federal Register, Tuesday, May 21, 1991

3.10.2 Water Samples:

natural thorium action	3×10^{-9} μCi/ml
natural thorium limit	3×10^{-8} μCi/ml
natural uranium limit	3×10^{-7} μCi/ml

3.10.3 Smear Samples:

total alpha action	0.5 dpm/cm² or (2.25 X 10^{-7} μCi/cm²)
total alpha limit	2 dpm/cm² or (9 X 10^{-7} μCi/cm²)

3.10.4 Corrective Actions

3.10.4.1 Take more samples.

3.10.4.2 Initiate clean-up.

3.10.4.3 Investigate cause.

3.10.4.4 Institute repair.

3.10.4.5 Spot check often to see if OK.

4 RADIATION SAFETY OFFICER AUTHORITY

4.1 The RSO has the authority to shut down plant operations if and when radiation limits, or safety limits, have been reached. (See License Application, section 2.1.2, dated November 23, 1988.)

5 RADON SURVEYS

5.1 A Radon Accumulation is done with Landauer Track Etch for a period of 3 months, which are sent to Landauer.

6 QUARTERLY RADIATION SURVEY

6.1 The RSO shall schedule quarterly radiation surveys, along with a health physicist, to personally survey the grounds and buildings where source materials are stored or handled and the radioactive chemical wastes are secured. An inventory of all by-product sources is taken.

7 NEWLY RECEIVED MATERIALS' SURVEYS

7.1 Shipments of ores into the plant are checked by the RSO or his designee using one of the calibrated survey meters. Occasionally, small lots of these materials do come into the country unmarked and containing higher levels of thorium and uranium. Ores reading >2mR/H shall be posted and the area roped off for the protection of the employees.

8 OUTLINE/ROUTINE SAFETY CHECKLIST

8.1 Monthly

Survey 073 Area
Radiation Worker Bioassay
Film Badge (TLD)
Check Daily X-Ray Form

8.2 Quarterly

Effluent Samples (liquid)
Hi-Vol Air
Mausoleum Control Sheet
Survey Meter Calibration
Radon Samples
Smear Samples (as needed)
Tulpehocken Street Dump Survey

8.3 Semiannual

Wipe Isotopes
Survey X-Ray Producing Equipment
Survey EB Furnaces
Inventory Isotopes
Inventory Source Material
Check Ventilation

8.4 Annual

Urine Samples for Uranium accumulation
Radiation Quiz for Workers
ALARA Meetings
Sample Grass, Corn (forage) for fluorides
Calibrate Hi-Volume Air Equipment

9 EMERGENCY ASSISTANCE TELEPHONE ROSTER

Name	Position	Office Number	Home Number
Gannon, William C.	RSO	215-369-8391	215-584-6271
Feola, Nicholas C.	Assistant RSO	215-367-2181	215-323-0431
Kresge, Randall J.	Assistant RSO	215-367-2181	215-262-6092
Shope, James R.	Assistant RSO	215-367-2181	215-326-6581
Compitelli, Anthony T.	Assistant RSO	215-367-2181	215-987-3115

10 RECORDS (MAINTAINED BY THE RSO)

10.1 Personal Radiation Monitor - Film Badge, TLD, Urinalysis

10.2 Radioisotope Inventory

10.3 Radiation Surveys

10.4 Instrument Calibrations

10.5 Training Records

10.6 Inspection Records

10.7 Licenses and Registration

10.8 Analysis Data Records (air, smear, water)

ATTACHMENT 1
LIMITS FOR UNCONTROLLED AREAS
Surface Contamination Limits

ALPHA EMITTERS		
REMOVABLE:	average over any one surface	$\frac{15\ pCi}{100\ cm^2} = \frac{33\ dpm}{100 cm^2}$
	maximum	$\frac{45\ pCi}{100\ cm_2} = \frac{100\ dpm}{100 cm_2}$
TOTAL (fixed):	average over any one surface	$\frac{450\ pCi}{100\ cm^2} = \frac{1000\ dpm}{100 cm^2}$
	maximum	$\frac{2250\ pCi}{100\ cm^2} = \frac{5000\ dpm}{100 cm^2}$
		$\frac{0.25\ mrem}{hr}$ at 1cm

BETA-GAMMA EMITTERS		
REMOVABLE: (except Hydrogen 3)	average over any one surface	$\frac{100\ pCi}{100\ cm^2}$
	maximum	$\frac{500\ pCi}{100\ cm_2}$
(Hydrogen 3)	average over any one surface	$\frac{1000\ pCi}{100\ cm^2}$
	maximum	$\frac{5000\ pCi}{100\ cm^2}$
TOTAL (fixed):	$\frac{0.25\ mrem}{hr}$ at 1cm from surface	

ATTACHMENT 2
SURVEY METERS ON GAUGE TRACK

Gauge ID/Model Number
RSM / L37373
RSM / V224
RSM / M4102
RSM / L62889
RSM / L65534
RSM / M22138
RSM / L71633
RSM / L71602
RSM / M412714

ATTACHMENT C-1

DOCUMENT CHANGE FORM

CABOT PERFORMANCE MATERIALS DOCUMENT CHANGE NOTICE	DCN NO.:

INSTRUCTIONS

THIS FORM IS TO BE COMPLETED FOR ALL PROCEDURE CHANGES (e.g., DPs, Analytical Methods, WIs, MSs), AND FORM CHANGES. **DEPT. SUPERVISOR OR MANAGER TO COMPLETE SECTIONS 1 THROUGH 7 BEFORE RETURNING TO QUALITY SYSTEMS.**

1. Originator and date of request.
2. Department Supervisor or Manager approval.
3. Type of change required (*Dept. Supervisor or Manager circles the appropriate type of change.*)
4. Procedure number **AND** revision number of document being changed.
5. Change(s) - include, at a minimum, the Section and/or para. no.(s) being changed (*include copies of marked-up pages - each change must be initialed and dated by Dept. Supervisor or Manager.*)
6. Specific reason(s) for the change. (*Attach supporting data and analysis, if appropriate, to support the requested change.*)
7. The effective date of the change (*to be completed by supervisor.*)
8. Date received in Quality Systems.
9. Quality Systems Representative Initials.

RETURN THIS FORM TO THE QS DEPT. INCLUDING A COPY OF THE MARKED-UP PROCEDURE PAGES AND ANY BACKUP MATERIAL TO SUPPORT THE CHANGE.

1. PERSON REQUESTING CHANGE:	DATE:
2. SUPERVISOR/MANAGER APPROVAL:	
3. TYPE OF CHANGE (*please circle one*): PEN & INK OR REVISION	
4. PROCEDURE NO. & REVISION NO.:	
5. CHANGE REQUESTED: (*Additional space on reverse.*)	
6. REASON FOR CHANGE: (*Additional space on reverse.*)	

7. EFFECTIVE DATE:	8. DATE REC'D IN QS:	9. QS INITIALS:

DOCUMENT CHANGE NOTICE (*continued*) | DCN NO.:

CHANGE REQUESTED

REASON FOR CHANGE

ATTACHMENT D

PPC PLAN

CABOT CORPORATION

BOYERTOWN PLANT

PREPAREDNESS, PREVENTION, AND CONTINGENCY PLAN

(PPC PLAN)

January 25, 1994

(originally prepared December 11, 1981,
last revised October 1990)

TABLE OF CONTENTS

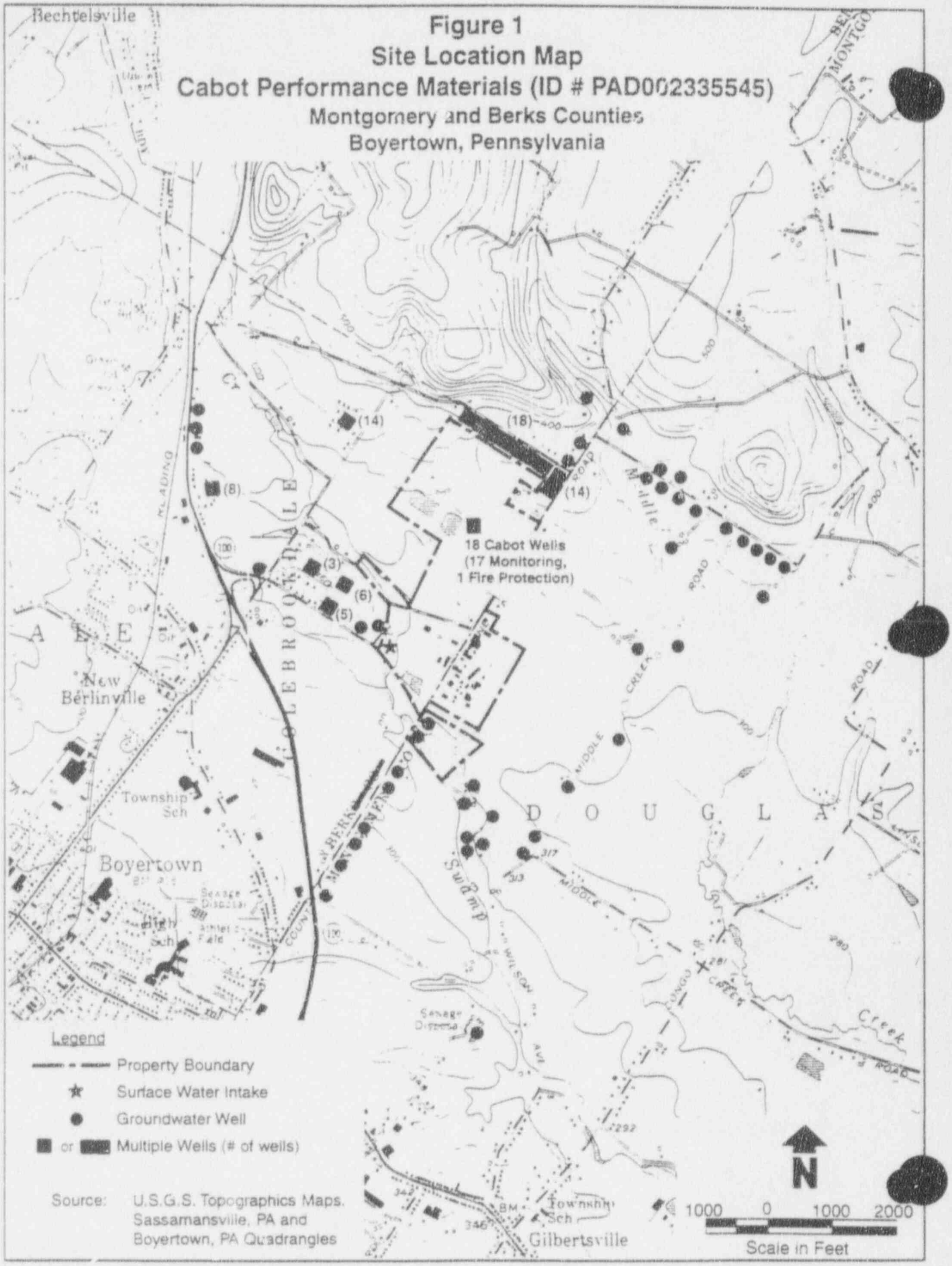
Section 1 - General Description of Industrial Activity

The Boyertown Plant is located on County Line Road and is situated partially in Colebrookdale Township, Berks County and partially in Douglass Township, Montgomery County. Figure 1 shows the plant location and surrounding features, including the locations of known public and private ground water users, public and private surface water intakes, and nearby surface water bodies. Figures 2 through 7 present more detailed maps of the plant and include the property boundaries; areas of raw material and product storage (tanks); unloading and loading operations; manufacturing activities (buildings); waste handling, storage, and treatment facilities (tanks and buildings 015, 054, and C78); areas where spills and leaks would most likely occur; process and storm drain lines; outfalls; fenced areas; and entrance and exit routes to the site.

The plant is engaged in the production of non-ferrous metals, non-ferrous alloys, and inorganic chemicals. Columbium and tantalum are produced by digesting ores with hydrofluoric acid, followed by extraction of the ore leachate with MIBK (methyl isobutyl ketone), hydrofluoric acid, sulfuric acid, and deionized water. These refractory metals are then further refined and processed to produce metals and inorganic compounds. Wastewaters are treated on site and are discharged after treatment to Swamp Creek via NPDES-permitted outfalls. Sludge from the wastewater treatment plant is disposed of at the Pottstown Landfill. Numerous air pollution control devices, consisting of baghouses and wet scrubbers, are used throughout the plant to control emissions. Air emissions and wastewater discharges are monitored routinely.

The aforementioned processing operations result in the generation of hazardous waste materials, primarily acid waste. Acid wastes are collected in storage tanks located near the various processing areas in the plant (see Section 3). The collected wastes are then pumped to one of six Segregation Tanks (Table 1), from which they are pumped to the wastewater treatment plant for neutralization. The treated wastes are

Figure 1
Site Location Map
Cabot Performance Materials (ID # PAD002335545)
Montgomery and Berks Counties
Boyertown, Pennsylvania



then filtered (Bldg 062) to remove solids, and the aqueous phase is pumped to Lagoon 5, a hypalon-lined storage lagoon. Prior to discharge, the water is pumped from Lagoon 5 to Lagoon 6 (hypalon-lined), neutralized to meet the NPDES discharge requirements, and discharged to Swamp Creek. In the course of a year, approximately 8 million gallons of hazardous waste are treated through this system.

Additional small quantities of hazardous waste are generated at various locations on site during product manufacturing and testing. These wastes, which consist of ethanol and methyl alcohol, are drummed and stored in a locked, limited-access shed (Bldg. 054). The drummed liquid hazardous wastes are shipped off site to Ecoflo in North Carolina for proper disposal in an incinerator. The volume of waste generated and shipped off site during the course of a year is approximately 10,000 gallons.

Section 2 - Description of Existing Emergency Response Plans

This PPC plan is an update of the existing PPC Plan that was initially prepared in December 1981 and was most recently revised in October 1990. Most of the elements required in the new Plan, as delineated in PADER's October 1993 Guidelines for the Development and Implementation of Environmental Emergency Response Plans, were present in the 1990 Plan. Sections 10 (Pre-Release Planning) and 25 (Downstream Notification Requirement for Storage Tanks) are the only new sections in this revised Plan.

Section 3 - Material and Waste Inventory

Raw materials, process intermediates, and waste materials are stored on site in tanks and drums, as listed in Table 1. These materials have the potential for endangering public health and safety or causing environmental degradation through accidential releases. These materials are listed by common chemical or trade name. The table also notes structural controls that minimize the risk of releases.

Material Safety Data Sheets (MSDS) for all stored materials are maintained in the Security Office and are available to all employees. The MSDSs meet the requirements of 29 CFR 1910.1200(g). Some of the materials listed in Table 1 would pose a high risk if subject to release, explosion, or fire. Detailed descriptions of these materials are provided in Table 2.

Table 1

MATERIAL STORAGE INVENTORY

ITEM/BLDG	VOLUME (gal)	MATERIAL STORED	CODE	LOCATION
1 Oil				
T614	20,000	#6 Fuel Oil	D-I	Bldg. 039
T613	72,000	#6 Fuel Oil	D	Bldg. 039
T285	1,000	Waste Oil	D-I-M	Bldg. 024
T211	900	Waste Oil	D-I-M	Bldg. 036
T612	200	Kerosene	O	Bldg. 085
2 Propane				
T218	2,000	Propane	O	Bldg. 022
3 Gasoline				
T219	1,000	Gasoline	U	Bldg. 040
4 Organic Storage				
T030	9,000	MIBK	I-D-M	Bldg. 074
5 Hydrogen Peroxide				
T029	7,000	50% H_2O_2	M	Bldg. 074
T032	600	50% H_2O_2	M	Bldg. 074
6 Ammonia				
T281	10,000	Anhydrous NH_3	M	Bldg. 018
T004	1,000	Anhydrous NH_3	M	Bldg. 055
T005	1,000	Anhydrous NH_3	M	Bldg. 055
T273	15,000	15% NH_3 Solution	A-D-I-M	Bldg. 029
T274	15,000	15% NH_3 Solution	A-D-I-M	Bldg. 029
T275	15,000	15% NH_3 Solution	A-D-I-M	Bldg. 029
T276	15,000	Weak Ammonia Waste	A-D-I-M	Bldg. 029
T272	1,000	NH3 Scrubber Water	A-M	Bldg. 023
7 NaOH				
T210	6,000	20% Caustic	D-I-M	Bldg. 036

Table 1

MATERIAL STORAGE INVENTORY

ITEM/BLDG	VOLUME (gal)	MATERIAL STORED	CODE	LOCATION
8 Lime				
T247	35,000	Lime Slurry	C-I-M	Bldg. 015
T248	45,000	Lime Slurry	C-I-M	Bldg. 015
T249	7,700	Lime Slurry	A-M	Bldg. 015
T246	1,300	Lime Slurry	O-I-M	Bldg. 096
9 Sodium				
T202	10,000 lb	Sodium/Raw Material	A	Bldg. 100
drums	4@ 55 gal	Sodium/In Process	A	Bldg. 106
drums	75@ 55 gal	Sodium/Raw Material	M	Bldg. 040
10 Chlorine				
cylinders	12@ 150 lb	Chlorine	O	Bldg. 038
cylinders	2@ 1 ton	Chlorine	O	N.Bldg.055
11 Argon				
T200	6,000	Argon	O	Bldg. 032
T282	3,200	Argon	O	Bldg. 096
T011	1,500	Argon	O	Bldg. 106
12 Sulfuric Acid				
T255	6,500	93% H_2SO_4	I-M	Bldg. 035
T028	7,000	93% H_2SO_4	D-I-M	Bldg. 074
T414	5,500	93% H_2SO_4	D-I	Bldg. 083
13 Hydrochloric Acid				
T008	5,000	20° Be HCl	D-A-I-M	Bldg. 055
14 Nitric Acid				
T609	7,600	Nitric Acid	D-I-M	Bldg. 058

Table 1

MATERIAL STORAGE INVENTORY

ITEM/BLDG	VOLUME (gal)	MATERIAL STORED	CODE	LOCATION
15 Hydrofluoric Acid				
T241	7,300	70% HF	C-I-M	
T261	6,300	70% HF	D-A-I-M	
T023	9,400	70% HF	L-M	
T608	5,100	70% HF	D-I-M	
T411	2,000	70% HF	D-I-M	
T412	11,400	70% HF	D-I-M	
T413	17,300	70% HF	D-I-M	
T024	16,600	Dilute HF	D-I-M	
T025	16,600	Dilute HF	D-I-M	
T026	16,600	Dilute HF	D-I-M	
T027	16,600	Dilute HF	D-I-M	
16 Bldg. 001-H_2TiF_6				
T223	3,000	Fluoride Solution	A-I-M	N. of Bldg. 001
T222, T224, T225	3,600 ea	Fluoride Solution	A-I-M	N. of Bldg. 001
T220, T221	4,500 ea	Fluoride Solution	A-I-M	N. of Bldg. 001
T226, T227, T228	2,300 ea	Zir Liquor	A-I-M	Bldg. 001
T229, T230	650 ea	Zir Liquor	A-I-M	Bldg. 001
T231	3,000	Mother Liquor Storage (Fluoride Liquid)	A-I-M	Bldg. 001
17 Waste Treatment				
T232, T233, T234	8,500 ea	General Waste Treat.	A-I-M	Bldg. 015
T235	9,000	General Waste Treat.	A-I-M	Bldg. 015
T236	11,000	General Waste Treat.	A-I-M	Bldg. 015
T237	3,700	General Waste Treat.	A-I-M	Bldg. 015
T238	18,400	General Waste Treat.	A-I-M	Bldg. 015
T239, T240	20,000 ea	General Waste Treat.	A-I-M	Bldg. 015
T242	6,300	HF Scrubber Water	C-I-M	Bldg. 015
T243	28,000	HF Scrubber Water	C-I-M	Bldg. 015

Table 1

MATERIAL STORAGE INVENTORY

ITEM/BLDG	VOLUME (gal)	MATERIAL STORED	CODE	LOCATION
18 Waste Collection				
T260	6,000	Acid Fluorides	D-A-I-M	Bldg. 019
T259	10,000	Acid Fluorides	D-A-I-M	Bldg. 019
T278	25,000	Weak Ammonia Waste	D-I-M	Bldg. 029
T279	25,000	Weak Ammonia Waste	D-I-M	Bldg. 029
T277	2,000	Intermediate Ammonia	D-I-M	Bldg. 029
T256	24,000	Strong Acid Waste	D-I-M	Bldg. 019
T257	24,000	Weak Acid Waste	D-I-M	Bldg. 019
T258	24,000	Weak Acid Waste	D-I-M	Bldg. 019
T280	24,000	Strong Acid Waste	D-I-M	Bldg. 029
T262	10,000	Weak Acid Waste	I-M	Bldg. 019
T283	1,200	Weak Acid	A-I-M	Bldg. 030
T284	1,200	Weak Acid	A-I-M	Bldg. 030
T033	3,000	Lab Wastes	C-I-M	Bldg. 025
T034	3,000	Lab Wastes	C-I-M	Bldg. 025
T209	6,400	Dilute Fluorides	D-I-M	Bldg. 036
T207, T208	16,000 ea	Dilute Fluorides	D-I-M	Bldg. 036
T203	42,000	Dilute Fluorides	C-I-M	Bldg. 046
T007	5,000	NH_3 Solution	D-I	Bldg. 055
T006	3,000	Fluoride	D-I	Bldg. 055
T400	100,000	Plant Wastes (treated)	D-I	Bldg. 062
T401	100,000	Plant Wastes (treated)	D-I	Bldg. 062
T410	20,000	Clear Filtrate	O	Bldg. 062
T015	5,500	Lab Wastes	D-I	Bldg. 098
T016	5,500	Lab Wastes	D-I	Bldg. 098
T014	11,000	Plant Wastes	D-I-M	Bldg. 098
T253	900	Fluoride Scrubber (Recycle Liquid)	A-C-M	Bldg. 090
T252	550	Scrubber Recycle	A-C-M	Bldg. 090
T254	900	Scrubber Recycle	A-C-M	Bldg. 090

Table 1

MATERIAL STORAGE INVENTORY

ITEM/BLDG	VOLUME (gal)	MATERIAL STORED	CODE	LOCATION
18 Waste Collection				
T020	12,600	Strong Acid Waste	D-I-M	Bldg. 074
T021	12,600	Raffinate (weak acid)	D-I-M	Bldg. 074
T022	15,000	Strong Acid Waste	D-I-M	Bldg. 074
drums	80 55 gal	Ethanol, Methanol, Lab Chemicals	C-I-M	Bldg. 054

*Code:
A - Confined Process Area
C - Curbed Area
D - Diked Area (continment volume sufficient to hold the volume of the largest single tank plus an allowance for precipitation)
I - Impermeable
L - Limestone Pit
M - Area Monitored by Spill Containment System
O - Open Area
U - Underground

Table 2
Chemical Descriptions

Anhydrous Ammonia **CAS #7664-41-7** **RQ = 100 lb**

(1) Description: Anhydrous ammonia is stored as a compressed gas in liquid form. Upon release it quickly boils and vaporizes to a lighter-than-air gas. It has a high affinity for water and has a choking effect when inhaled.

(2) Locations:

a. A 10,000-gallon tank is located 80 feet northwest of Bldg. 018. It is marked as T281 on Figure 5.

b. Two 1,000-gallon tanks are located on the southwest side of Bldg. 055. They are marked as T004 and T005 on Figure 4.

c. A transport (delivery) vehicle operated by a vendor could be at various locations within the plant.

(3) Release: A spill incident would be an uncontrolled discharge from a bulk storage tank, transfer line, or transporting vehicle. It could result from a tank rupture; a corrosion leak; a broken valve, pipe, or other device; or the failure of a pressure relief valve to close. A discharge would be uncontrolled if it could not be readily stopped and it appeared that the contents of the tank could be completely released.

(4) Response Action: The Emergency Response Team would control the release of gas by spraying water fog upon the source of discharge, approaching it from an upwind direction and wearing protective equipment and clothing. Response efforts would also be directed toward using any means possible to stop the discharge.

[The vendor can be called to render assistance: National Ammonia (215-535-7530).]

Table 2
Chemical Descriptions
(continued)

Anhydrous Ammonia

(5) Isolation and Evacuation: In the event of an uncontrolled discharge, a zone 100 feet upwind and 200 feet downwind of the spill would be evacuated. All evacuated plant personnel would report to th Security Office for head count and reassignment. Plant evacuation procedures are described in Section 21.

If the spill was continuous and severe, the Emergency Response Coordinator (ERC) could order an evacuation of the windcone zone for an area 0.7 mile long by 0.4 mile wide. Any required community evacuation would be initiated by the ERC.

Propane **CAS #74-98-6**

(1) Description: Propane is stored as a compressed gas in liquid form (LPG). Upon release, it quickly boils and vaporizes to a gas that is approximately the same density as air. Propane is highly flammable and in the proper concentration will explode upon ignition.

(2) Locations:

a. A 2,000-gallon bulk storage tank is located east of Bldg. 022 (Warehouse) near the property line fence. It is marked as T218 on Figure 5.

b. A propane delivery truck could also be on site.

(3) Release: A spill incident would be an uncontrolled discharge from the bulk storage tank or a transporting vehicle. A spill could result from a tank rupture, a corrosion leak, a broken valve or pipe, or the failure of a pressure relief valve to close. The discharge from the tank could be on fire when discovered. A discharge would be uncontrolled if it could not be readily stopped and it appeared that the contents of the tank could be completely released.

(4) Response Action: A release of propane gas would be handled with extreme caution. In all cases, the Boyertown Fire Dispatcher would be notified immediately and the Emergency Response Team would be summoned. If the gas was burning, water would be sprayed on the metal tank to keep the tank cool and prevent the fire from spreading. If the released gas was not burning, it would be approached with extreme caution as it could be ignited at any time with explosive force. The Emergency Response Team would direct their efforts to stopping the discharge at the source. All approaches to the spill would be from an upwind direction by Response Team members wearing protective

Propane

clothing.

[The vendor, AmeriGas (215-855-9063), can be called for assistance, and the Emergency Response Coordinator or the Security Officer can call the local fire company for back-up by dialing 911.]

(5) Isolation and Evacuation: In the event of an uncontrolled discharge, a zone 100 feet upwind and 200 feet downwind of the spill would be evacuated. If there was no fire at the point of discharge and quantities of gas were being released, such that the risk of explosion was high, the Emergency Response Coordinator could order an evacuation of the windcone zone for a distance of 500 feet or more. All evacuated plant personnel would report to the Security Office for head count and reassignment. It is not expected that community evacuation would be necessary.

Table 2
Chemical Descriptions
(continued)

Metallic Sodium **CAS #7440-23-5** **RQ = 10 lb**

(1) Description: Metallic sodium is a soft solid at ambient temperatures and has a melting point of 280°F. If heated to a temperature above 150°F in the presence of oxygen, it will ignite and burn, generating dense, choking, caustic fumes. Sodium is explosive in contact with water.

(2) Locations:

a. Molten sodium is stored in bulk in a 10,000-pound tank located in Bldg. 100. It is marked as T202 on Figure 5.

b. Up to 75 55-gallon drums of sodium are stored in the center of Bldg. 040.

c. Four 55-gallon drums of sodium are stored/in use in Building 106.

(3) Release: A spill incident is defined as a discharge of molten sodium that is burning, cannot be readily stopped, and appears to be accumulating faster than the fire is consuming it. A spill would be judged more serious if other sensitive equipment or combustibles were exposed to the fire.

(4) Response Action: Because a discharge of molten sodium will ignite spontaneously in the presence of air, specially trained personnel working in Bldg. 032 are available on all shifts for fire fighting assistance. In the event of a spill, these workers, along with the Emergency Response Team and the Boyertown Fire Dispatcher, would be notified.

The Emergency Response Team would direct its efforts toward stopping the discharge at the source and smothering the burning sodium. The ERT would wear protective equipment and clothing during response

Metallic Sodium

operations.

(5) Isolation and Evacuation: In the event of a sodium fire, a zone 200 feet in diameter around the involved building would be evacuated. At the discretion of the Emergency Response Coordinator, a larger area could be evacuated, depending upon the severity of the spill. All evacuated plant personnel would report to the Security Office for head count and reassignment. Community evacuation would not be necessary.

Methyl Isobutyl Ketone (MIBK) ***CAS #108-10-1*** ***RQ = 5,000 lb***

(1) Description: MIBK is a volatile, flammable liquid with a characteristic organic odor. The vapors are heavier than air and disperse poorly. The liquid does not mix well with water.

(2) Locations:

a. A 9,000-gallon bulk storage tank is located in the south corner of the fenced area next to Bldg. 074. This tank is designated T030 on Figure 4.

b. An MIBK delivery truck could be on site.

(3) Release: A spill incident would be a large volume release of MIBK from the MIBK storage tank or a delivery truck, with or without a fire. The bulk storage tank is located within a diked area that is designed to contain the volume of the storage tank with an allowance for accumulated precipitation.

(4) Response Action: A discharge of liquid MIBK from the bulk storage tank would be contained within the dike surrounding the tank, and all efforts would be directed toward preventing ignition of the vapor. The Emergency Response Team would be summoned and, if no fire had started, the area would be cordoned off to prevent accidental ignition. All vehicular traffic, including fire fighting equipment, would be kept at least 100 feet away from the spill.

Foam would be applied to the spill to suppress vapors and fire. If any substantial amount of MIBK had accumulated (2-3 inches) or it appeared that substantial amounts would be released from the tank, the ERC or the Security Officer would call the Boyertown Fire Dispatcher for assistance. The MIBK supplier, R.W. Eaken, Inc. (610-926-2136)

Methyl Isobutyl Ketone (MIBK)

could also be called for assistance if neeeded. Once the spill was under control, efforts would be directed toward returning the spilled liquid to enclosed tanks.

(5) *Isolation and Evacuation: If a spill resulted in an accumulation of liquid MIBK within the diked area of the storage tank, the area within a radius of 100 feet would be evacuated. If there was a fire in or near the MIBK storage tank, Bldgs. 074, 087, and 088 would be evacuated. All evacuated plant personnel would report to the Security Office for head count and reassignment. Community evacuation would not be necessary.*

Table 2
Chemical Descriptions
(continued)

Hydrofluoric Acid, Aqueous (HF) **CAS #7664-39-3** **RQ = 100 lb**

(1) Description: Aqueous HF (70%) is a colorless liquid that vaporizes readily at ambient temperatures. It is a highly corrosive and toxic acid, and the vapors are pungent, irritating, corrosive, and toxic.

(2) Locations: Bulk storage of 70% HF is located in seven tanks at five locations. There may also be a delivery truck at various locations on site.

T241 A 7,300-gallon tank is located between Bldg. 001 and the Wastewater Treatment Plant (Bldg. 015).

T261 A 6,300-gallon tank is located east of Bldg. 019.

T023 A 9,400-gallon tank is located south of Bldg. 074, adjacent to the MIBK storage tank.

T608 A 5,100-gallon tank is located east of Bldg. 058.

T411 A 2,000-gallon tank is located south of Bldg. 073.

T412 A 11,400-gallon tank is located south of Bldg. 073.

T413 17,200-gallon tank is located south of Bldg. 073.

(3) Release: A spill incident would be an uncontrolled discharge of 70% HF from a bulk storage tank, a delivery truck, or a process line.

(4) Response Action: The Emergency Response Team would control the release of gas and dilute the acid by spraying water fog on the source of the discharge, approaching it from an upwind direction wearing protective equipment and clothing. Efforts would also be directed toward stopping the discharge and neutralizing the spill.

(5) Isolation and Evacuation: In the event of an uncontrolled discharge of 70% HF, a zone 200 feet upwind and 500 feet or more downwind of the spill would be evacuated. Depending on the magnitude of the spill and wind conditions, the Emergency Response Coordinator could initiate the evacuation of a windcone zone, which could require community

Table 2
Chemical Descriptions
(continued)

Hydrofluoric Acid, Aqueous (HF)

evacuation. The Emergency Response Coordinator would advise local emergency response officials regarding the dimensions of the evacuation zone. All evacuated plant personnel would report to the Security Office for a head count and reassignment.

Chlorine **CAS #7782-50-5** **RQ = 10 lb**

(1) Description: Chlorine is stored as a compressed gas in liquid form. Upon release it quickly boils and vaporizes to a greenish-yellow gas that is heavier than air. Chlorine gas has a choking effect when inhaled and forms hydrochloric acid and toxic chlorine compounds in contact with moist air and water.

(2) Locations: Approximately ten 150-pound cylinders are stored in racks outside Bldg. 038 and two cylinders are in use inside Bldg. 038. There are also two 1-ton chlorine cylinders on the north side of Bldg. 055. A chlorine delivery truck may also be on site.

(3) Release: A spill incident would be an uncontrolled discharge from a cylinder or a tranporting vehicle. It could result from a cylinder rupture, a corrosion leak, a broken valve or piping, or the failure of a pressure relief valve to chlose. A discharge would be uncontrolled if it could not be readily stopped and it appeared that the contents of the cylinder could be completely discharged.

(4) Response Action: The Emergency Response Team would be summoned to knock down and disperse the vapors and dilute the resulting acid with water. Water must not be sprayed directly on leaking cylinders. The spill would be approached from the upwind side only by personnel wearing protective equipment and clothing. Efforts would also be directed to stopping the discharge if possible. Outside agencies could be called for additional assistance at the discretion of the Emergency Response Coordinator.

The supplier, Manley-Regan Chemicals, could be called for assistance if needed (717-944-7471). The ERC or the Security Officer can call

Chlorine

for outside agency assistance by dialing 911.

(5) *Isolation and Evacuation: In the event of an uncontrolled discharge of chlorine, a zone 200 feet upwind and 500 feet or more downwind of the spill would be evacuated. Depending on the magnitude of the release and wind conditions, the Emergency Response Coordinator could initiate the evacuation of a larger zone, which could include community evacuation. All evacuated plant personnel would report to the Security Office for headcount and reassignment.*

Nitric Acid (70%) **CAS #7697-37-2** **RQ = 1,000 lb**

(1) Description: Nitric Acid (70%) is a clear, colorless to yellowish liquid that emits irritating and corrosive vapors at room temperature.

(2) Locations:

a. A 7,600-gallon bulk storage tank is located at Bldg. 058. It is marked as T609 on Figure 7.

b. Approximately 15 7-gallon glass carboys of 70% nitric acid are located outside Bldg. 101/047.

c. Approximately 100 7-gallon glass carboys are stored between Bldgs. 010 and 018.

(3) Release: A spill incident would be an uncontrolled discharge from a tank, a bulk delivery vehicle, or a carboy.

(4) Response Action: The Emergency Response Team would be summoned to try to stop the discharge, dilute the spill and knock down the vapors with water spray, and spread calcite. A spill would be approached from the upwind side only by personnel wearing protective equipment and clothing.

(5) Isolation and Evacuation: In the event of an uncontrolled discharge, a zone 200 feet upwind and 500 feet or more downwind of the spill would be evacuated. Evacuated plant personnel would report to the Security Office for a head count and reassignment. Community evacuation would not be necessary.

Sulfuric Acid (93%) ***CAS #7664-93-9*** ***RQ = 1,000 lb***

(1) Description: Sulfuric Acid (93%) is a colorless to light gray, oily liquid, with an irritating acidic odor.

(2) Locations:

a. A 6,500-gallon tank is located on the east side of Bldg. 035. It is marked as T255 on Figure 5.

b. A 7,000-gallon tank is located east of Bldg. 074. It is marked as T028 on Figure 4.

c. A 5,500-gallon tank is located beside Bldg. 083 at Lagoon #6. It is marked as T414 on Figure 6.

d. A delivery truck could be on site.

(3) Release: A spill incident would be an uncontrolled discharge from a storage tank or a bulk delivery vehicle.

(4) Response Action: The Emergency Response Team would be summoned to try to stop the discharge and neutralize the spill with calcite. Only personnel wearing protective equipment and clothing would be permitted to approach the spill area.

[Diamond Shamrock (204-922-2700), the sulfuric acid supplier, could be called for assistance, if needed.]

(5) Isolation and Evacuation: Plant personnel would be evacuated from the immediate area around a spill and immediately downwind, but no other evacuations would be necessary.

Table 2
Chemical Descriptions
(continued)

Hydrogen Peroxide (50%) **CAS #7722-84-1**

(1) Description: Hydrogen peroxide (50%) is a clear, colorless, water-like liquid. It is a strong oxidizer, and a spill would react almost immediately with dirt and standing water to generate an irritating steam cloud. Combustible materials contaminated with hydrogen peroxide (50%) could continue to smolder or burn for as long as 24 hours.

(2) Locations: A 7,000-gallon bulk storage tank is located south of Bldg. 074. It is marked as T029 on Figure 4. A 600-gallon measuring tank, T032, is adjacent to the bulk tank. A delivery truck could also be on site.

(3) Release: A spill incident would be an uncontrolled discharge from one of the storage tanks or a delivery truck.

(4) Response Action: The Emergency Response Team would dilute the spill with water, approaching it from an upwind direction and wearing protective clothing. Efforts would also be directed toward stopping the discharge. Flushing of the spill area would continue for some time after the discharge was stopped to ensure adequate dilution and complete flushing of the spill into the nearby storm drain.

[If necessary, the assistance of a DuPont hydrogen peroxide safety expert could be obtained by calling CHEMTREC (800-424-9300).]

(5) Isolation and Evacuation: In the event of an uncontrolled discharge of hydrogen peroxide (50%), a zone up to 200 feet or more downwind of the spill would be evacuated. Evacuated plant personnel would report to the Security Office for a head count and reassignment. No other evacuations should be necessary.

Section 4 - Pollution Incident History

In the past, limited releases within the facility have resulted from leaks in process tanks or pipelines, accidents during materials handling, overflows from tanks, and escape of liquid from buildings or confined areas. Investigations and corrective action records of pollution incidents are kept by the waste and compliance group. These incidents generally resulted in a change of pH in the effluent discharged to Swamp Creek.

Continuous pH monitoring of both storm and process effluent is conducted to prevent pH excursions in the plant's discharge. If a non-compliance situation is detected, the discharge is routed to one of two lined spill containment basins for additional treatment prior to discharge. Each basin has a capacity of approximately 1,000,000 gallons.

The following instances of non-compliance with the DER Solid Waste Management Rules and Regulations have occurred in past years. DER has been notified in writing of these incidents:

1. November 18, 1986, oil in heat exchange system overflowed reservoir onto macadam driveway. Spill was contained by spill containment facility.

2. January 27, 1987, treated waste spilled from an internal plant pipeline and was cleaned up and contained by spill containment facility.

3. January 29, 1987, liquid waste tank ruptured. All liquid contained by dike and spill containment facility and treated.

4. March 13, 1987, process tank ruptured. Spill was contained by spill containment facility, neutralized, and removed for disposal.

5. July 14, 1987, acid storage tank developed a leak during plant shutdown. The spill was neutralized using a compound unable to precipitate fluorides and runoff containing soluble fluorides was discharged to Swamp Creek.

6. September 15, 1988, liquid waste tank developed a leak. Most of the contents were contained in dike. About 100-150 gallons escaped and were neutralized at the site.

7. April 12, 1989, underground pipeline carrying filtered, treated wastewater to storage lagoons developed a leak. Since area where leak occurred is monitored daily, only about 100-200 gallons of material leaked from pipe. Due to small amount of leak, no remedial action was taken.

8. August 10, 1989, oil in heat exchange system overflowed from system onto macadam driveway. Fugitive oil was captured and contained by spill containment facility.

9. February 13, 1990, acid storage tank developed a small leak. The spilled material was neutralized at the site and treated at on-site treatment facility.

10. May 22, 1991, oil in heat exchanger leaked into steam side of unit and was discharged along with condensate. Fugitive oil was captured and contained by spill containment system.

11. April 11, 1992, waste line developed a leak. Approximately 50-100 gallons leaked from failed pipe. Spilled material was neutralized on site.

12. September 21, 1993, valve failure resulted in an acid spill. Material was neutralized on site and removed for disposal.

Section 5 - Implementation Schedule For Plan Elements Not Currently In Place

Facilities at the Cabot Corporation Boyertown Plant presently meet the requirements of this PFC Plan. If changes in operations or processes alter the effectiveness of this plan, the appropriate corrections will be made and revised PPC Plans will be distributed to the necessary individuals and agencies.

Section 6 - Organizational Structure of Facility for Implementation

The responsibility and authority for developing, implementing, and maintaining the PPC Plan have been given to the PPC Committee by management. The PPC committee consists of the following personnel:

Emergency Response Coordinator (ERC) — Randall J. Kresge
(Health & Safety Manager)

The responsibilities of Emergency Response Coordinator include, but are not limited to, the implementation of the PPC Plan, the notification of local authorities in the event of an emergency, conducting the annual Plan review, and maintenance of the Plan. He is also responsible for training of employees and ensuring their awareness of the Plan.

Manager of Operations — John S. Lindell

The Manager of Operations is responsible for the resources needed for successful implementation of the Plan. In addition, he has the responsibility to make all levels of management aware of the Plan and its importance to the continued safe operation of the plant.

Plant Engineering Representative — Edward J. Keenan

The responsibility of the Plant Engineering Representative is to provide support, in an engineering capacity, for the maintenance of the Plan.

Plant Health & Safety Engineer — John J. Stankas

The plant Health & Safety Engineer is responsible for the inspection and maintenance of the emergency response equipment. He is also responsible for assisting the Health & Safety Manager with health-and-safety-related aspects of the PPC Plan.

Manager of Environmental Affairs — Anthony T. Campitelli

The Manager of Environmental Affairs has the responsibility for ensuring the proper operation of the facility's environmental control

systems. He is also responsible for reviewing the environmental aspects of the plan and serving as a technical resource for the implementation of the plan.

This plan will be reviewed on an annual basis or as required by the Boyertown Plant PPC committee. Evaluations of the PPC Plan will include, but not necessarily be limited to, a review of new materials, processes, and wastes handled; identification of potential spill sources; review of past incidents and spills and countermeasures used; and review of spill reporting procedures and visual inspection programs. Changes in the PPC Plan, as well as changes in existing processes or new construction relative to the Plan, will be reviewed and approved by the PPC committee before implementation.

Section 7 - List of Emergency Coordinators

Primary ERC:

Randall J. Kresge

Plant Telephone	(610) 367-2181 Ext. 346
Home Telephone	(610) 262-6092
Home Address	4410 Main St., Whitehall, PA 18052

1st Alternate ERC:

John Stankas

Plant Telephone	(610) 367-2181 Ext. 380
Home Telephone	(610) 770-1949
Home Address	1121 North 22nd Street, Allentown, PA 18104

One of these two people will be on the premises or on-call at all times to serve in the capacity of Emergency Response Coordinator. The ERCs are familiar with all elements of the PPC Plan, plant operations, locations of significant stored or handled materials, plant records, and plant layout. Each of these people has the authority to implement the PPC Plan.

Section 8 - Duties and Responsibilities of the Coordinator

The Emergency Response Coordinator has the responsibility to establish preparedness and prevention programs for all major potential spill areas, ensuring that fire extinguishers, fire control equipment, protective clothing, breathing apparatus, spill control equipment, decontamination equipment, water at adequate volume and pressure, spill clean-up equipment, adsorbents and other spill event materials, internal communications systems, and other spill event equipment are maintained, available, and operative.

The ERC is also responsible for establishing and maintaining a training program for the purpose of timely and proper responses to emergency and spill events. All involved personnel are familiar with the procedures, equipment, systems, and mobilization of the PPC Plan. This includes practice response drills, and periodic review of the Plan with all personnel working in the areas where major potential spill events could occur.

The ERC or his alternate will notify the Operations Manager of spill events, non-compliance situations, and other emergencies.

Section 9 - Chain of Command

The Shift Incident Commander (IC) is the primary contact in the event of a spill or other emergency. Any employee witnessing a spill, release, or other emergency will notify the Security Officer by dialing ext. 111. The Security Officer will then contact the IC, who will then specify which personnel from the following table are to be contacted, depending on the type of emergency and time of day. The IC also has the authority to implement emergency response measures, including release assessment (source, hazards), release containment and cleanup, disposal of cleanup residuals, maintenance of spill response equipment, and submittal of necessary reports. Internal notification procedures for spills and other emergencies are posted on bulletin boards throughout the plant.

		Office Phone	Home Phone
Emergency Response Coordinator	Randall J. Kresge	367-2181 (ext. 346)	262-6092
1st Alternate ERC (Safety)	John S. Stankas	367-2181 (ext. 380)	770-1949
Waste & Compliance	Anthony T. Campitelli	367-2181 (ext. 412)	987-3115
	John M. Franey	367-2181 (ext. 466)	779-2516
Maintenance Group	* Stratton G. Capiotis	367-2181 (ext. 350)	987-9510
	* Mark Stovall	367-2181 (ext. 417)	926-2885
Production (12-8 Shift)	* Albert Lepore	367-2181	777-4933
	* Randy B. Kehl	(page x465)	367-7678
Production (8-4 Shift)	** Roger Heil	Page x465	629-8793
	Kevin P. Cope	Page x358	432-3669 (U)
	Richard W. Fronczak	Page x312	367-7321
	* Ron Leidy	Page x465	327-3996
Production (4-12 Shift)	* T. Robert Zajdowicz	Page x465	929-2767 (U)
	* D. Kline	Page x465	367-7703
Weekends/Holidays	Security Officer	Page x454	

(U) = Unlisted
* = Incident Commander
**= Primary Incident Commander

Raw materials, process intermediates, and waste materials are stored and managed in tanks throughout the facility. All tanks are shown on Figures 3 through 7, and information on the tanks' contents, materials of construction, and containment systems is provided on Figures 4 through 6.

Leaks and spills could theoretically occur at any of the tanks due to overflowing or to leaking or failure of a valve, pipe, or the tank itself. The highest risks for spills are during tank truck unloading of acids and MIBK. There are no containment facilities for tank truck unloading, but acid tankers unload over crushed limestone gravel at tanks T412(HF), T413(HF), T608(HF), T023(HF), T008(HCL), T609(HNO_3). With the exception of MIBK, any spills that might occur could flow to storm or process drains and would be managed by the plant's spill containment system (described below). An MIBK spill could also flow to storm or process drains but would not be automatically detected by the spill containment system.

All process areas and buildings have floor drains that connect to process or waste storage tanks and ultimately to the plant's wastewater treatment system. Any acid or alkaline material spilled into a process drain would be treated in the wastewater treatment plant.

All other areas of the plant that contain tanks are served by the network of storm sewers (Figure 2). The stormwater collection system is designed so that all water and spills from yard areas flow to the closest inlet drain. There is no flow away from the storm drains in active areas of the plant. The plant's stormwater discharge is continuously monitored for pH, with automatic rerouting of the effluent to a lined basin for treatment if the pH is outside the allowable NPDES limits. Thus, any acid or alkaline spill into a storm drain would ultimately be contained and treated if it was significant enough to alter the pH in the plant's storm water discharge. The only material that would not be detected in the effluent is MIBK. The MIBK tank is in a diked area, but a large spill outside the dike

could result in a release to the storm system and ultimately to Swamp Creek.

Most of the tanks at the plant are either diked or are located in active process areas served by process sewer drains. All diked areas are sufficient to contain the volume of the largest tank within the dike, plus an allowance for accumulated rainfall. The dikes around the acid storage tanks and the MIBK tank are constructed of concrete with an impervious coating resistant to the stored material.

Response plans and practices for specific high-risk material spills are provided in Table 2 of this PPC Plan. This includes gaseous chemicals with the potential for windblown spill dispersal and solid materials with hazardous properties.

Section 11 - Material Compatibility

Due to the nature of plant operations, it is imperative that plant personnel be aware of material compatibility. It is the responsibility of the engineering and maintenance departments to ensure that good engineering practices are followed with respect to compatible materials of construction and corrosion resistance when new or replacement equipment is installed.

Prior to process start up, a Process Hazard Review is conducted to evaluate risks and any potential harm to employee and public health and welfare or to the environment. A major consideration is a review of the materials of construction and their suitability for the environment in which they will be used.

Raw materials, chemical process intermediates, and waste materials are processed/stored in tanks and other vessels constructed of compatible materials. Once dedicated to a particular use, pipelines and vessels remain in that service. All vessels and pipelines are thoroughly cleaned and evaluated for compatability before reuse in a different process. There are no incompatible materials stored or used in such a way that inadvertent mixing could occur. Finished products are stored in warehouse areas such that there are no material compatibility problems.

In some parts of the plant, non-compatible materials are stored in adjacent areas, e.g., waste acid and lime slurry at the wastewater treatment plant. In these situations, curbs or dikes are employed to prevent accidential mixing of these materials in the event of a spill incident.

Section 12 - Inspection and Monitoring Program

Visual inspections of all tanks, piping, pumps, valves, dikes, and other equipment are informally conducted on a daily basis by all employees working in process areas. All employees are constantly on the alert for unusual conditions that are immediately reported to their supervisor or the Security Officer for corrective action. The Emergency Response Coordinator is notified of all releases to the environment.

Under the requirements of the Permit-By-Rule-Program, the hazardous waste storage tanks, dikes, and piping are visually inspected daily for leaks or other indications of potential failure. The drum storage area for hazardous waste is also inspected on a daily basis. These records are on file in the office of the Manager of Environmental Affairs. Sample inspection forms are included as Appendix 1.

The metallic acid storage tanks are tested ultrasonically for metal thickness annually. The results are on file in the Maintenance Office.

The hazardous waste storage tanks are equipped with level indicators and high level alarms. The level indicators are continuously monitored by the wastewater treatment plant operators, as these tanks supply the primary feedstock to the treatment plant. The high level alarms, which automatically shut off the tank fill pumps, sound at both the Security Office and the Wastewater Treatment Plant.

Continuous monitoring of pH is also conducted on the plant's NPDES discharge. An excursion from the allowable pH range results in automatic rerouting of the effluent to a lined basin for additional pH adjustment.

Section 13 - Preventive Maintenance

Since many of the chemicals and operations at the plant are hazardous by nature, a sustained program of maintenance and inspection is maintained for the health and safety of plant personnel.

The preventive maintenance program is designed to ensure the reliability of safety devices, minimize the potential for accidental release of hazardous materials, maintain the operational integrity of critical pieces of equipment, and comply with all applicable laws and codes. Records and schedules are maintained by the departments responsible for performing the checks. Examples of the checks performed include:

A: Mechanical Maintenance

1. Towmotors are inspected every 150 hours of operation.
2. Fume scrubbers are shut down, disassembled, and inspected quarterly.
3. Chains, wire rope, and synthetic fiber lifting devices are inspected annually.

B: Electrical Maintenance

1. Cranes and hoists are inspected monthly.
2. Transformers, power distribution panels, and all high voltage power lines are inspected annually, and any defects are repaired during the shutdown week.
3. Calibrations are performed on miscellaneous controllers and monitors at varying times as required by each piece of equipment.

C: Utility Maintenance

1. Pressure relief valves are tested annually.
2. Certified pressure vessels are inspected biannually.
3. Safety checks are performed monthly on fired pressure vessels, and complete internal inspections are conducted annually.
4. Sprinkler systems are inspected weekly.
5. Fire extinguishers are inspected monthly.
6. Safety showers and eyewashes are inspected weekly.

7. All bulk storage tanks that contain corrosive materials are inspected annually.

D. Environmental Department

1. Air monitoring and sampling is performed on a continuous basis.
2. Monitoring of wastewater discharge is also performed on a continuous basis to ensure compliance with regulations.

If a piece of equipment is determined to require maintenance, a written work order request must be submitted to the maintenance department. After the equipment has been repaired, the completed work order is returned to the requisitioner and a copy is kept in the maintenance department. The Plant Waste & Compliance Group maintains a record of all repairs to environmental control equipment. The records include the date maintenance was requested, maintenance work done to the equipment, and the date that the maintenance was completed.

Section 14 - Housekeeping Program

It is the responsibility of each plant employee to maintain good housekeeping in his/her work area.

Good housekeeping practices include the following:

A. Any spilled solids will be cleaned up immediately by the operator of the department or vehicle from which the spillage occurred. The operator will notify the supervisor as to what was spilled. If, in the opinion of the supervisor, the material poses a hazard, the supervisor will contact the Environmental Compliance Group.

B. Any spilled solids that are known to be soluble should not be cleaned up by the operator, unless approved by the supervisor. If, in the opinion of the supervisor, the material poses a hazard, the supervisor will contact the plant Waste & Compliance Group.

C. Spilled liquids should not be cleaned up by the operator unless approved by the supervisor. The supervisor will notify the plant Waste & Compliance Group.

All buildings in process areas are served by internal sump systems. Any material released within a building is captured by the sump and pumped into waste storage tanks. From these tanks, the material is transferred to the wastewater treatment plant. Waste storage tanks are located outdoors in diked containment areas with sumps to return any liquid in the dike to the plant wastewater treatment system.

The entire manufacturing facility is further protected from spills and other releases by a network of underground drainage piping, referred to as the secondary containment or storm sewer system. The storm sewer is connected to two lined lagoons (basins 1 and 2) that are continuously monitored for

pH. Material captured in basins 1 and 2 may be transferred to the wastewater treatment plant if required.

A permanent record of spills is maintained by the plant Waste & Compliance Group to insure that clean-up complies with environmental requirements.

Section 15 - Security

The entire production area is enclosed with a 6-foot high chain link fence topped with 3 strands of barbed wire. The gates are kept closed and locked at all times (except the main gate and the technology gate due to constant plant traffic). All visitors to the plant must sign in at the Security Office and be cleared. All visitors must secure hard hats and safety goggles at the Security Office before entry to the plant is permitted. At the end of the visit, visitors must sign out and return safety equipment.

All remaining Cabot property is posted and enclosed with steel wire fencing, with gates kept locked at all times. The parking lots and production areas are well lighted at night. Remote camera surveillance of the parking areas and gates will be instituted by summer 1994, with television monitors to be installed in the Security Office.

The Security Office is manned 24 hours a day, 7 days a week. From 6:00 p.m. to 7:00 a.m. Monday through Friday, and on weekends and holidays all day, the Security Officer tours the 38 guard stations every 1-1/2 hours. On tour, the Security Officer is constantly on the alert for unlocked gates, broken pipes, overflowing tanks, odors, alarms, fires, prowlers, electrical malfunctions, or other unusual conditions.

Section 16 - External Factors

Factors external to the plant would have minimal adverse effect on public health and safety or the environment. If a power outage occurred, discharge of wastewater would be discontinued through automatic closing of a valve on the plant effluent line. The generation of additional plant wastes would cease during a power outage since chemical operations would shut down. A power outage would be the only significant consequence of wind, rain, or snow storms.

The plant is located outside of the 100 year flood plain. In 1972, flood waters from Hurricane Agnes (100+ year flood) reached the plant, but no environmental hazards due to plant operations occurred.

The plant has never experienced a labor strike during which excessive vandalism occurred. All environmentally sensitive operations at the plant are conducted in areas inside the chain link fence and would not be easily accessible to vandals.

Section 17- Employee Training Program

All employees are trained in the processes with which they work and are aware of the hazards associated with materials and chemicals used in the plant. Employees are trained to be on the alert for unusual conditions, which are immediately reported their supervisor for corrective action. Spill prevention is emphasized as a part of the daily routine to minimize waste of new materials, avoid unnecessary waste treatment, and safeguard human health and the environment.

Equipment and Process Operators receive process and equipment operations training, as well as training covering the following:

1. Emergency shutdown procedures
2. Emergency reporting procedure
3. Evacuation procedures
4. Incipient fire extinguishment
5. Incidental spill response
6. Personal protective equipment
7. Specific chemical safety training including hazards and risks

Emergency Response Team members receive approximately 80 hours per year of training covering the following:

1. Emergency communications
2. Emergency command structure
3. Fire response (incipient and stuctural)
4. Spill response procedures
5. Personal protective equipment
6. First aid and CPR
7. Emergency response plan
8. Basic chemical terminology and toxicology
9. Decontamination procedures
10. Basic rescue techniques

In addition, all employees who handle hazardous waste are given yearly

training, as required by 25 PA 265.16. At Cabot Corporation, this training is conducted in an on-the-job-fashion. An outline of the general training instruction for employees is included in Appendix 2, along with a sample training check list for one job area. The general training program is modified depending on the employment area and individual needs of the employee. Employee training records and training dates are on file in the office of the Manager of Environmental Affairs.

Section 18 - Countermeasures To Be Undertaken By Facility

Generally, if a liquid spill were to occur, it would be contained either locally (dikes or process drains) or by the spill containment facilities (process drains and storm sewers). Any employee witnessing a chemical spill or release is to call the area supervisor or the Security Officer at extension 111 to report the incident. The Security Officer will contact the necessary management personnel and Emergency Response Team personnel and await instructions. Specific spill response measures to be taken in areas of major potential hazard are summarized in Table 2. Section 10 details spill containment features at the plant.

Section 19 - Countermeasures To Be Undertaken By Contractors

Most environmental hazards that may occur at the plant can be controlled by the use of in-house personnel and equipment. In the event that the hazard cannot be contained or cleaned up through the use of in-house resources, the following will be contacted.

A. For heavy equipment, trucks, and labor:

R. M. Guinther, Inc. (610) 367-8587

R.M. Guinther, Inc. will provide excavating equipment within 4 hours of receiving a telephone request. Cabot has a service contract with Guinther to provide these services.

B. Laboratory Services

(1) Lancaster Labs
Lancaster, PA (717) 656-2301

(2) RMC Environmental Services
Pottstown, PA (610) 327-4850

Lancaster Labs and RMC Environmental Services will supply sample containers for soil, water, or other contaminated media within 24 hours of receiving a telephone request. Both laboratories will provide 2-day turn around for sample analyses if requested by Cabot.

C. Clean-up Services by Experienced Contractors

(1) J. J. Spill Service
P.O. Box 966
Norristown, PA 19404 (610) 277-4511

(2) Mobile Dredging & Pumping Co.
3100 Bethel Rd.
Chester, PA 19013 (610) 497-9500

J.J. Spill Service will mobilize vacuum trucks, pressure washing equipment, and labor to the plant within 24 hours of receiving a telephone request. They will assist in the cleanup of oil spills. J.J. Spill Service has been employed by Cabot in the past.

Mobile Dredging and Pumping Co. will mobilize appropriate equipment to the plant within 4 hours of receiving a telephone request. They will assist in the cleanup of any spill. Mobile Dredging and Pumping Co. has been employed by Cabot in the past.

D. Disposal Services

(1) ECOFLO
P.O. Box 692
Bladensburg, MD 20710 (301) 773-9500

(2) Waste Management of PA/Pottstown
P.O. Box 220
Gilbertsville, PA 19525 (610) 367-1300
(800) 635-8383

Ecoflo will accept shipments of hazardous and non-hazardous waste in 55-gallon DOT containers with 24 hours advance notice. Cabot has a yearly service agreement with Ecoflo.

Waste Management of PA will pick up non-hazardous waste for disposal at their Pottstown facility. They will provide waste pick up within 24 hours of receiving a telephone request. Cabot has a long-term service agreement in effect with Waste Management.

Section 20 - Internal and External Communications and Alarm Systems

Internal communications systems at the plant consist of telephones, a public address system, fire alarm pull stations, and an emergency radio (portable radios) system. Telephones are located in most offices and buildings and can be used to call other areas of the plant. Most office phones can also be used to call outside the plant. Telephones are also used to access the public address system by dialing 465, waiting for the ringing to stop, and making the announcement. Cabot has established an internal emergency call number (111) that is to be used by employees to notify the Security Officer in the event of a spill or other emergency.

Fire alarm pull stations are located in buildings 008, 009, 011, 016, .018, 021, 022, 023, 024, 025, 032, 033, 036, 038, 039, 043, 047/101, 050, 051, 055, 056, 060, 062, 073, 074, 075, 077, 087, 093, 095, 098, and 106. These alarms ring locally as well as in the Security Office, which is manned 24 hours a day, 7 days a week. The Security Officer can also trigger fire alarms from the Security Office.

There is also an emergency radio system at the plant. The base station for this system is located in the Security Office, and the ERT units and ICs carry pagers. Portable radios are available to ICs, ERT Officers, and other personnel as needed in an emergency. This equipment is used daily by the Security Officers.

All external communications with police and fire agencies are through the outside phone system. There are no direct alarm ties with any outside agency. In the event of a plant-wide power failure, only restricted-use phones would be down. The majority of phones are connected to outside power sources and are available to call outside the plant.

Section 21 - Evacuation Plan for Installation Personnel

Because a spill or other emergency could necessitate evacuation of a building, work area, or the entire plant, Cabot has developed a comprehensive employee evacuation plan. This evacuation plan is summarized in the following paragraphs and is included as Appendix 3 to the PPC Plan.

Evacuation will be ordered by the Incident Commander or alternate. The IC will be called to the site of any spill or emergency and will determine if evacuation is required. Should evacuation be required, the IC and appropriate management personnel will direct the Security Officer to broadcast an evacuation notice over the public address system. All emergency announcements and evacuation orders will be repeated three times. If there is a power outage, portable radios and the portable loudspeaker from the ERT vehicle can be used to broadcast evacuation announcements. Fire alarms, which are located in most buildings (see Section 20), also serve as an evacuation signal for personnel in those buildings.

All building exits within the plant are appropriately marked and are well known to all personnel. All buildings and work areas at the site have designated evacuation routes and assembly points that are posted in each building. The primary rally points for most of the plant are the two parking lots on County Line Road. Once at the rally point, supervisors (or a designated alternate) are responsible for a head count of all personnel from their areas.

Section 22 - Emergency Equipment Available for Response

The emergency response equipment is maintained in good condition and is kept in the emergency response vehicle. The Plant Safety Engineer is responsible for inspection, testing, and maintenance of this equipment. The emergency response vehicle is located between Bldg. 009 and Bldg. 021. The following is a list of the equipment in the emergency response vehicle.

Qty		Item
12	ea	Level A suits (fully encapsulating)
4	ea	Fully encapsulating flash suits
12	ea	Level B suits
24	ea	Level C splash suits (two pieces)
12	ea	Complete sets of fire turnout suits
12	ea	Nomex fire resistant coveralls
12	ea	One-hour Scott Air Paks with 12 spare bottles
30	pr	Chemical resistant boots in various sizes
24	pr	Each of chemical protective gloves
12	pr	Abrasion resistant leather gloves
6	ea	Full-facepiece air purifying respirators
6	ea	Half-facepiece air purifying respirators
12	ea	Hardhats
6	ea	Wool blankets
1	ea	Stokes basket stretcher
1	ea	Back board
1	ea	Emergency medical kit
1	ea	Oxygen resuscitator/inhalator
1	ea	Transistor megaphones
1	ea	Diaphragm pump, hand powered, with 50 feet hose
1	ea	Electri~ pump, explosion proof
1	ea	Electric pedestal pump
1	ea	Electric generator
6	ea	Extension cords, 50 feet
2	ea	Rechargeable high-intensity hand lights
1	ea	Portable high-intensity flood light
2	ea	High-intensity flood lights mounted on vehicle
10	ea	Portable FM radios
6	ea	Voice activated (VOX) send/receive units
6	cs	Absorbant spill pads and pillows
1	ea	Canvas tarp, 20' x 20'
2	ea	Roll polyethylene, 12' x 100' x 3 mil
4	ea	Portable fire extinguishers (1 ABC, 2 BC & 1 D)
3	ea	50' length 5/8" water hose
2	ea	50' length inch-and-a-half fire hose
1	ea	50' length two-and-a-half fire hose

3	ea	Fire hose carts (each with 250' fire hose & fixtures)
8	ea	Variable nozzles
4	ea	Gated wye fixtures
6	ea	Long handled shovels
2	ea	Stepladders
1	ea	Extension ladder
30	ea	Traffic control cones
		Barrier tape and other warning devices
		Assorted hand tools
		Assorted container leak control devices and materials
2	ea	85-gal polyethylene over-pack drums
1	ea	Decontamination shower unit
1	ea	Decontamination pool, collapsible
		Assorted decontamination tools and equipment
1	ea	Drum truck
1	ea	Chlorine "A" Kit (for 150# cylinders)
1	ea	Chlorine "B" Kit (for 1-ton cylinders)
		Calcite, ground (spill neutralization/diking)
1		22' box truck for ERT equipment storage/transporation
1		12' box trailer for same

The Emergency Response Team members receive at least 8 hours of spill and fire response training each month. The above equipment is used in conjunction with this training and has been chosen to provide the optimum protection for ERT members in the event of an actual incident.

In addition to the above, safety showers and eye wash stations are located throughout the plant and are functionally tested at least weekly. Fire extinguishers are located in every building on the plant site. Extinguishers are located at exits and interior doorways.

Section 23 - Agreements with Local Emergency Response Agencies and Hospitals

The following local agencies and hospitals have received copies of the Cabot PPC Plan and have agreed to perform fire fighting, emergency medical and/or chemical release response services. The order of notification is dictated by the type of assistance required.

A. Gilbertsville Fire Company
1454 East Philadelphia Avenue
Gilbertsville, PA 19525
Phone: 911

B. New Berlinville Fire Company (Liberty)
P.O. Box 36
New Berlinville, PA 19545
Phone: 911

C. Gilbertsville Ambulance
97 Jackson Road
Gilbertsville, PA 19525
Phone: 911

D. Pottstown Memorial Medical Center
1600 East High Street
Pottstown, PA 19464
Phone: (610) 327-7000

E. Douglass Township Police Dept.
19 Municipal Drive
Gilbertsville, PA 19525
Phone: 911

F. Colebrookdale Township Police Dept.
R. D. #1
Boyertown, PA 19512
Phone: 911

G. PA Department of Environmental Resources
55 North Lane, Suite 6010, Lee Park
Conshohocken, PA 19428
Phone: 832-6000

H. Berks County Local Emergency Planning Committee
P.O. Box 520
Leesport, PA 19533
Phone: (610) 348-6100

I. Boyertown Lions Community Ambulance
50 South Chestnut Street
Boyertown, PA 19512
Phone: 911

Section 24 - Notification Lists

In the event of an emergency or spill, the following agencies will be notified as required.

A. Pennsylvania Department of Environmental Resources

(1) Conshohocken Regional Office (610) 832-6080

(2) If regional office cannot be contacted: (717) 787-4343

B. National Response Center (800) 424-8802

C. Pennsylvania Emergency Management Agency (and P.E.M.C.)

Harrisburg	(717) 783-8150
Montgomery County	(610) 631-6530
Berks County	(610) 374-4800

D. Pennsylvania Fish Commission (717) 626-0228

E. Police - Dial 911 for Emergencies

(1) Douglass Twp. - Montgomery County (610) 327-1441
(2) Berks County (Colebrookdale) (610) 367-2500

F. Fire Department - Dial 911 for Emergencies

(1) Montgomery County (Gilbertsville) (610) 323-2424

(2) Berks County (New Berlinville) (610) 367-2500

G. Berks County Local Emergency Planning Committee
P.O. Box 520
Leesport, PA 19533 (215) 348-6100

H. The public water suppliers and industrial water users listed in Section 25 of this PPC Plan.

Section 25 - Downstream Notification Requirement for Storage Tanks

The following municipalities and surface water users are located within 20 miles downstream of the Cabot Boyertown plant. Each downstream facility has received written notification detailing the types and quantities of materials stored at the Cabot Plant. An updated inventory of stored materials will be provided in writing to each of these facilities on an annual basis, and Cabot will update the downstream users list annually as part of the PPC Plan review.

Table 25-1
Notification List

Philadelphia Suburban Water Company 762 Lancaster Avenue Bryn Mawr, PA 19010 610-645-1132 610-525-1402 (emergency) Preston Luitweiler (Manager, Research & Environmental Affairs)	Perkiomen Valley Watershed Association Skippack Pike & Haldeman Road P.O. Box 55 Schwenksville, PA 19473 610-287-9383 610-287-5141 (emergency) Letitia M. Ryan (Executive Director)
Hickory Valley Golf Club 1921 Ludwig Road Gilbertsville, PA 19525 610-754-6112 610-754-6006 (emergency) Mike Stuanzl (Golf Course Supt. & Manager)	Berks Products Corporation Gilbertsville Ready Mix Concrete Plant Wilson Avenue Gilbertsville, PA 19525 610-369-1061 (Ted Koch, Plant Manager) 610-374-5137 (emergency) Robert B. Coleman (Safety/Environmental Coordinator)
Upper Providence Township 1286 Black Rock Road Box 406 Oaks, PA 19456 610-933-7899 (police) 610-933-9179 (admin.) 911 (emergency) George Waterman (Township Manager, or police on duty will make contacts)	Berks County Emergency Management Agency RD#1 Agricultural Center Leesport, PA 19533 610-374-4800 610-374-4800 (emergency) John E. Loos (Director)
Borough of Schwenksville 140 Main Street, Borough Hall Schwenksville, PA 19473 610-287-7442 610-287-5011 (emergency) Ronald Clossin (Emergency Management Coordinator)	Colebrookdale Township P.O. Box 194 New Berlinville, PA 19545 610-369-1362 610-367-2688 (emergency) Stanley Stoudt (Code Enforcement Officer)
Lower Frederick Township Box 253, 9 Hendricks Road Zieglersville, PA 19492 610-287-8857 610-489-9332 (County Radio Room) Edward J. Kroll (Chief of Police) or Lorraine Cuddy (Manager)	Lower Providence Township 100 Parklane Drive Eagleville, PA 19403 610-539-8020 610-539-5900 (police) Robert L. Keyser Sr. (Emergency Management Coordinator)
New Hanover Township 2943 North Charlotte Street Gilbertsville, PA 19525 610-323-1008 610-323-2424 (emergency) Stanley Glanski (Emergency Management Coordinator)	Berks County 633 Court Street Reading, PA 19601 610-378-3014 610-378-4911 (Berks Co. radio) John Ravert (County Environmentalist)

Table 25-1
Notification List
(continued)

Douglass Township, Montg. Co. 1320 E. Philadelphia Avenue Gilbertsville, PA 19525 610-367-6062 610-367-5257 (emergency) E. William Zern (Emergency Operations Coordinator)	Upper Frederick Township P.O. Box 597 Frederick, PA 19435 610-754-6436 610-754-6583 Charles Meehan (Emergency Coordinator)
Perkiomen Township 467 Gravel Pike Graterford, PA 19426 610-489-4034 Montgomery County Radio Room Joseph McMahon (Emergency Management Coordinator) John Moran (Township Fire Chief)	County of Montgomery Office of Emergency Preparedness 50 Eagleville Road Eagleville, PA 19403 610-631-8536 Sam Tabak
Limerick Township 646 W. Ridge Pike Limerick, PA 19468 610-495-6432	Borough of Collegeville 347 Main Street Collegeville, PA 19426 610-489-9208

APPENDIX 1

Hazardous Waste Storage Area Inspection Forms

ONTH: ____________ YEAR: ____________

HAZARDOUS WASTE DRUM STORAGE AREA

Date / Day of Month →	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
1. Evidence of leaks on area surrounding storage building.																															
2. Integrity of containment intact.																															
3. No deterioration of piping.																															
4. No drums leaking.																															
5. Drums grounded.																															
6. No drums deteriorating.																															
7. Drums labeled and dated.																															
8. No drums over 90 days.																															
9. Inspector.																															

DISCREPANCY REPORT

Date	Nature of Discrepancy	Date Corrected

07/12/91

ONTH: _____ YEAR: _____

WASTE SEGREGATION STORAGE

Date / Day of Month →	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
1. Evidence of leaks on area surrounding tanks.																															
2. Integrity of tank containment intact.																															
3. Dike and curbing, no deterioration.																															
4. No storage tanks leaking.																															
5. Sump pump functioning.																															
6. No piping leaking.																															
7. No valves leaking.																															
8. No pumps leaking.																															
9. High level warning system operational.																															
10. Inspector.																															

DISCREPANCY REPORT

Date	Nature of Discrepancy	Date Corrected

ONTH: ______________ YEAR: ______________

WASTE WATER TREATMENT PLANT

	Date / Day of Month →	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
1.	Evidence of leaks on area surrounding tanks.																															
2.	No pumps leaking.																															
3.	No valves leaking.																															
4.	No piping leaking.																															
5.	Sump pumps functioning.																															
6.	No treatment tanks leaking.																															
7.	Calibration of pH meter.																															
8.	High level warning system operational.																															
9.	Inspector.																															

DISCREPANCY REPORT

Date	Nature of Discrepancy	Date Corrected

MONTH: ______________ YEAR: ______________

BLDG 074 / LIQUID - LIQUID SEPARATION

Date / Day of Month →	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
1. Evidence of leaks on area surrounding tanks.																															
2. Integrity of tank containment intact.																															
3. Dike and curbing, no deterioration.																															
4. No valves leaking.																															
5. No piping leaking.																															
6. No storage tanks leaking.																															
7. Sump pumps functioning.																															
8. High level warning system operational.																															
9. Inspector.																															

DISCREPANCY REPORT

Date	Nature of Discrepancy	Date Corrected

APPENDIX 2

Hazardous Waste Training

HAZARDOUS WASTE HANDLING TRAINING

SUPERVISORS:

NCBean, RJBechtel, HGCarter, KPCope, JMSarla
WDMcCann

MAIN POINTS:

1. Instruct employees in locations of emergency equipment and exits located in respective Departments. Department equipment may include oil dry, shovels, rags and other items required for the clean up of spills. Should also cover Personal protective equipment available for employees.

   Develop procedure by department for spill notification. All spills must be reported to the Environmental Department. This is necessary in order to notify State agencies if required and to develop plans for future spill prevention.

2. Assure that all employees are familiar with the operation of the plant phone system. In the event of a major incident the 111 number has priority access in the guard booth.

   Discuss alarms where applicable (Waste Plant). Proper operation of the alarms is important for compliance with State programs.

3. Discuss automatic waste cut-offs. This is applicable only in the Waste Plant.

4. The plant PPC Plan covers events such as fire and explosions. RJKresge is the Emergency Response Coordinator. Notify department employees concerning relevant parts of Plan.

5. In the event that a spill poses a threat to groundwater immediate notification of the Environmental group is imperative. Action must be taken to stop the source of the spill and contain the spill to as small an area as possible. Once the spill is contained, clean-up may begin.

6. Instruct employees concerning the proper shutdown requirements for their respective areas. These requirements should consider protection of the environment as part of the procedure.

7. All waste materials being put into drums must be placed in a proper DOT drum for the material being stored. This information is available from PLRutter or ATCampitelli.

   All drums must be labeled and dated before materials may be placed into the drums. All drums will be required to have a log sheet which will track the material being added to the drum, amount of the material, the person adding the material and the date of the addition to the drum.

8. Address the issue of housekeeping to prevent spills or incidents when handling hazardous materials. Maintain waste areas in a clean and orderly fashion, making the access to area safe. Assure that the space available is sufficient for the job to be performed.

IMPLEMENTATION:

1. Training will be conducted in an on the job fashion. Only the supervisor knows which employees actually handle the hazardous wastes. Those workers must be instructed under this program.

2. Written documentation for training of employees must include job title, and date that training was conducted. This information will be maintained in the Environmental Office for inspection by State auditors.

ATCampitelli/cas
04/30/93
traindoc.atc

HAZARDOUS WASTE HANDLING TRAINING CHECKLIST

DEPARTMENT: _____

POSITION: _____

SUPERVISOR: _____

Training Area Employee Name:	Instructed (✓)	Date	Initials
Emergency Equipment			
Emergency Exits			
Spill Notification			
Phone System			
111 Number			
Waste System Alarms			
Automatic Waste Cut-Offs			
PPC Plan			
Fire / Explosions			
Groundwater Protection			
Shutdown Procedures			
General Housekeeping			
Operational Checks			
Personal Protective Equipment			

INSTRUCTION COMPLETED _____
(supervisor)

DATE _____

ATCampitelli/cas
04/29/93
tranform.atc

APPENDIX 3

Evacuation Plan

OVERSIZE DOCUMENT PAGE PULLED

SEE APERTURE CARDS

NUMBER OF OVERSIZE PAGES FILMED ON APERTURE CARDS 6

9403180098-01-06

APERTURE CARD/HARD COPY AVAILABLE FROM

RECORDS AND REPORTS MANAGEMENT BRANCH

Articles of

AGREEMENT

between

CABOT CORPORATION

Boyertown, Pennsylvania

and

INTERNATIONAL CHEMICAL WORKERS

LOCAL 959

Effective February 7, 1993
Expires February 5, 1995

TABLE OF CONTENTS

AGREEMENT

THIS AGREEMENT is made and entered into this 7th day of February 1993, between CABOT CORPORATION and its successors and assigns (hereinafter referred to as the "Company") and the INTERNATIONAL CHEMICAL WORKERS UNION and its LOCAL 959 (hereinafter referred to collectively as the "Union").

WITNESSETH:

In consideration of the mutual interests of the Company, the Union, and the employees and their desire to stabilize employment, to facilitate the manufacture of the products of the Company in an efficient manner, to acknowledge the need for high productivity and quality standards, to establish an orderly procedure for the settlement of disputes between the parties, and to promote and improve the relationship between them, the parties hereto promise and agree that:

Article 1. RECOGNITION

1:01. Recognition of Union

Recognition of the Union as exclusive bargaining agent for laboratory and quality control technicians at the Boyertown Plant, excluding production and maintenance employees, janitors and truck drivers, watchmen, guards, office, and clerical employees, process control employees,

draftsmen, and professional employees and supervisors as defined in the National Labor Relations Act.

1:02. Equal Treatment

The Company and the Union agree that they will not discriminate against any employees in the payment of wages, assign-to jobs, seniority, promotion, demotions, training, transfer, lay off, recall, discipline, discharge, or any other term or condition of employment because of race, color, religion, sex, disability, or national origin; nor based on age (as provided for in any applicable State or Federal Law.

The Company and the Union agree to keep each other advised of developments which have a bearing on the issue of discrimination when it affects both parties.

It is understood that when a reference is made in this Agreement to the masculine gender the intent is to include the feminine gender.

1:03. Probationary Period

It shall be a condition of employment that all employees of the employer covered by this agreement who are members of the Union in good standing on the effective date of this agreement shall remain in good standing. It shall be a condition of employment that all employees covered by this agreement, and hired on or after its effective

date shall, on the 60th working day following the beginning of such employment, become a member and remain in good standing in the Union. The sixty (60) working day period may be extended an additional thirty (30) working days by mutual agreement. The Financial Secretary shall be notified when an employee has completed his sixty (60) working days of employment.

1:04. Union Dues

The Company agrees to deduct each month from the wages of each employee covered by this agreement, upon receipt of a legal written request for such deduction, signed by the individual employees, Union membership dues (including the initiation fee) in such amounts as shall be fixed pursuant to the by-laws of the Local in which the employees are members and the constitution of the Union.

The total amount so deducted each month shall be remitted to the Union not later than the tenth (10th) day of the succeeding month, with a statement attached indicating the employees whose dues have been checked off.

1:05. Definition of Bargaining Unit Work

Bargaining Unit work is defined as routine technical work performed by technicians on a regular basis including any work required to maintain standards of safety and housekeeping in and around employee's work area. The Company reserves the right to have supervisors and

professional employees perform technical work for the purpose of trouble shooting, development of new processes and modification of current procedures.

When the Company introduces new work or revises old work and has established a workable standard operating procedure, which has proven suitable, the supervisor will introduce the work and train the technicians. The Company will inform the union.

1:06. Management Rights

All powers or authority which the Company has not specifically abridged, delegated or modified by this agreement will be recognized by the union as being retained by the Company. In no event shall this clause be used to abrogate any of the conditions or provisions of this Agreement.

1:07. Unlawful Provisions

In the event that any of the provisions of this Agreement shall be held to be in violation of any state or federal law or regulation, such determination shall not in any way affect the remaining provisions of this Agreement.

1:08. Non-economic Provisions

Should it be determined that any of the non-economic provisions of the contract are unsatisfactory to

either of the parties, they may be amended by mutual agreement.

Any Memo of Understanding signed by the Company and Union shall become a part of the contract effective as of the date of signing.

Article II. WAGES, HOURS, AND OVERTIME

2:01. Wages

The wage schedule, effective February 7, 1993 appears in Exhibit "A", attached hereto and made a part hereof.

2:02. Shift Hours

The regular hours of work shall be eight (8) per day and forty (40) hours per week. The regular work week is to commence at 12:00 Midnight Sunday and end the following Monday at 12:30 A.M. The change of time from Eastern Standard to Daylight Saving or from Daylight Saving to Eastern Standard will be done at 2:00 A.M. Sunday morning. The shift hours shall be as follows:

First Shift - 12:00 Midnight to 8:30 A.M.
Second Shift - 8:00 A.M. to 4:30 P.M.
Third Shift - 4:00 P.M. to 12:30 A.M.

2:03. Overtime

For all hours worked in excess of eight (8) in any work day, employees shall be compensated at the overtime rate of one and one-half times the regular rate of pay.

Employees shall be compensated at one and one-half their regular rate of pay for all hours worked before or after their regular shift provided they have worked their regular eight (8) hour shift, if made available to them.

2:04. Weekend Work - Saturday

For all hours worked on Saturday, employees shall be paid at the premium rate of one and one-half times their regular rate of pay.

2:05. Weekend Work - Sunday

For all hours worked on Sunday, the employees shall be paid at the premium rate of twice the regular rate of pay.

2:06. Shift Premium Pay

For the inconvenience of working evening and night hours, first shift and third shift employees shall be paid a shift premium of three (3) per cent of their base hourly wage.

An employee assigned to the first shift who completes his regular eight (8) hour turn and continues to work into the second shift, shall continue to receive the first shift premium for the hours worked on the second shift.

An employee assigned to the second shift who completes his regular eight (8) hour turn and continues work for a portion of the third shift, shall not receive the third shift premium for the hours worked on the third shift.

2:07. Call back pay

A minimum of four (4) hours at the applicable rate shall be paid when an employee is called back for emergency work.

2:08. Overtime Distribution & Advance Scheduling of Overtime

All overtime in a particular department shall be distributed equally among all employees who are qualified to do those jobs in that department.

The employee with the least amount of overtime charged in the department and who is qualified to do the required job, will work that overtime when it becomes available. If the person refuses the overtime, it will go to the next lowest in charged overtime who is qualified to do the required job. If an employee is missed in the above assignment due to an oversight, the employee shall be

compensated for one-half the amount of overtime which should have been his. The employee will be charged for the overtime for which he received compensation.

If an employee desires to work the weekend after a vacation period, or if an employee is absent on a Thursday when weekend overtime is scheduled, the employee must call the supervisor by Thursday - 9:00 A.M. of that week, informing him of the employee's availability for weekend overtime.

All employees who will be absent on Thursday and/or Friday (sick, vacation, etc.) or work an odd shift (1st, 3rd) should sign up on the "availability list for weekend overtime" which will be posted or distributed prior to Thursday of each week. If an employee indicates he is available for weekend overtime he will automatically be assigned such, and will be notified when he is scheduled, when he arrives for his regular shift in the case of odd shift employees, or by the telephone in the case of absent employees.

If an employee indicates he is not available for weekend overtime, he will automatically be charged and will not be asked for that particular overtime.

Failure to sign the "availability list" will not exclude an employee from overtime but will limit the responsibility of the Company to a telephone call to the employee and if the employee cannot be reached he will be charged.

Shift hours for the regular work week are defined in the contract. The weekend overtime schedule will be by mutual agreement if the conditions of material and equipment permit.

Overtime in Research and Development will be offered to those individuals working on a particular project in order of:

1. Those assigned to the project and qualified.

2. Those not assigned to the project but qualified to do all the tasks to be done during the overtime period.

When an employee enters a different department, he shall be charged with the same amount of overtime as that charged to the employee with the greatest amount of overtime in his new department. He will also be charged with hours of worked overtime equal to the lowest in the department. The charged and worked hours shall be determined and assigned at the time of the employee's qualification for overtime in the department. An employee absent for any reason, shall be charged with any overtime that would have been his had he been present.

An employee who is laid off from a department and is recalled to that department within the same calendar year shall be charged with the greatest amount of charged

overtime in his department. He will retain the same number of overtime hours worked that he had prior to the lay off.

If an employee is recalled in a year other than the year of the lay off, he shall be charged with the greatest amount of charged overtime in his department and the lowest number of overtime hours worked.

Charged and worked hours will revert to zero on January 1st of each year.

All overtime hours worked or refused Monday through Saturday will be charged at one and one-half times the number of hours worked or refused. All overtime hours worked or refused for a Sunday will be charged at twice the number of hours worked or refused.

Advance Scheduling of Overtime

When the Company declares, at least two (2) weeks in advance, that a department will require full coverage for an entire month, the technicians, in that department will be asked to schedule their overtime for that month. It is further understood that advanced scheduling of overtime will not require mandatory overtime as stated in Article 2:11.

Employees will be required to work a minimum forty (40) hour work week, but at their option may select their work days and days off during the designated period. Designated minimum departmental manning requirements

must be met at the time when advance scheduling is declared. Selection of work days must be presented to the employees' supervisor one week prior to the month. If an insufficient number of employees have signed-up the Company may cancel the full coverage work schedule by the end of the month.

All time off for weekdays (Monday through Friday) will be granted based on seniority. Saturday and Sunday will continue to be considered premium days. The Company will guarantee overtime availability to all signed-up employees for the entire one month period. Regular work rules will apply equally to week days and week ends.

At the end of the full coverage month, the offering of overtime will revert to the normal overtime offering process.

Under this advance scheduling clause, the technicians, will retain their bid shifts, while retaining the right to request shift changes. Casual overtime (need to fill-in for an absence, etc.) will continue to be covered in the usual manner.

2:09. Notice of Weekend Overtime

All known available weekend overtime shall be offered by the end of the second shift on Thursday.

Overtime which becomes available after the above scheduling deadline will not alter the initial schedule but will be scheduled as new overtime.

Weekend overtime will be scheduled for periods of no less than four (4) hours.

2:10. Overtime List

The Company will make available an overtime list by department showing the overtime worked and charged for each employee and update such list as overtime is worked.

2:11. Overtime Requirement

Overtime in a job will be offered to the qualified employees with the least amount of charged hours until the overtime requirement is satisfied. However, the qualified employees with the least amount of worked overtime hours must accept the overtime.

Overtime of four (4) hours or less, immediately following or preceding a shift, will be offered to the qualified employee(s) on that shift.

2:12. Transfer to Another Department

The Company shall have the right, in the event there is not enough available work for all employees in a department, to temporarily transfer the least senior

employee(s) to another department where available work exists on the same shift.

The Company may not replace the employee(s) in the department where the temporary transfer exists, however, employees in the departments affected by the temporary transfers may be reassigned on their shift by department managers, if necessary, for the best utilization of manpower.

The temporary transfer shall not be for any period in excess of fifteen (15) working days.

2:13. Reporting Pay

Employees reporting to work at their regular starting time, when they have not been notified in advance that work is not available, shall be given eight (8) hours of work or eight (8) hours of pay at their straight time hourly rate, except where work is not available by reason of acts of God, fire, utility power failure, strikes, or work stoppages in connection with labor disputes.

In the case of Saturday and Sunday work, if the employee has reported to work at their regular starting time, the guarantee shall be for four (4) hours pay at the rate of the day.

2:14. Work Schedule

In order to avoid loss of pay, when an employee occasionally has an important personal matter which makes it necessary to be absent during regular working hours, the Company will attempt, with the cooperation of other employees, to mutually rearrange the employee's work schedule, at no additional cost to the Company. When such arrangements are made, the Company will inform the Chief Shop Steward of such arrangements.

2:15. Shift Assignments

The Company will make every effort to the extent practicable to equalize different shifts in Research & Development. It will give as much advance notice as possible.

Shift assignments will be made in the following manner:

1. Those assigned and qualified on the project.
2. Those assigned on the project but not qualified.

Within each of the above categories, the Company will solicit volunteers. Where there are none or an insufficient number of volunteers, the low person(s) in terms of different shifts worked will be required to work.

A person will not be required to work more than two different shifts or make more than two shift changes in one week.

The Company intends to schedule odd shifts in Technology only when required by continuous procedures or availability of equipment or scheduling requirements.

2:16. Distribution of Overtime

In the event all the qualified employees in a particular department turn down overtime (as outlined in Article 2:11), it shall be distributed on an equal basis as far as is practicable among qualified employees from other departments who sign up on an out-of-department overtime list. If an employee is offered such work and does not accept same, it shall be counted as time worked for the purpose of equal overtime distribution on this special sign-up list. All overtime worked in other than the employee's department will not be charged against him in his department.

If all qualified employees in the department turn down overtime and employees from other departments fail to fill the job, the overtime will be worked in accordance with Article 2:11.

2:17. Twelve Hours of Work

Employee will not be permitted to work more than twelve (12) consecutive hours without an eight (8) hour break.

Any exception to the above, such as working on a special project that requires more than twelve (12) consecutive hours, will be discussed between the Company and Local 959.

Article III. SENIORITY

3:01. Seniority

Seniority shall be unit wide.

3:02. Job Posting

When a vacancy occurs it will be posted for a period of seventy-two (72) hours. Employees outside the department in which the vacancy occurs, as well as in the department, will be permitted to bid. The job will be awarded on the basis of the following factors:

(1) Length of continuous service
(2) Ability to perform the work within a reasonable length of time
(3) Physical fitness

When (2) and (3) are relatively equal, then one (1) shall prevail.

The senior bidder who satisfied the above requirements must accept the job.

Up to two successful bids will be allowed within a twelve (12) month period. Bids within a department shall not count.

If a job is posted and there are no bidders, the Company can elect to hire a new employee or place the least senior employee in the unit in the vacancy. In either event, the employee filling the vacancy will be considered to have been the successful bidder on the job.

An employee who receives a job under this paragraph shall have recall rights to his previous bid job. When a vacancy in his previous bid job occurs, the employee must return to that job.

3:03. Lay Off Procedures

Lay off shall be by seniority within the department and shift. The affected employee may exercise his unit wide seniority to bump in any department and/or shift in which there is a less senior employee. If he elects to exercise his unit wide seniority, he shall be given a ten (10) working day trial and training period to prove his ability to perform the work involved.

If the employee cannot demonstrate his ability in the ten (10) day trial and training period, then he shall be given a second bump. He will bump the junior employee in another department and/or shift.

In either event, the bumping employee and the remaining employees in the department and shift may be reassigned by Department Managers, if necessary, for the best utilization of manpower.

If the affected employee elects not to exercise his unit wide seniority to bump, he will be placed on a voluntary lay off status.

Any employee bumped off his job under the provisions of this section, shall have the right to bump another less senior employee in accordance with this section or elect to be placed on a voluntary lay off status.

Recall for those employees still working will be the reverse of lay off, and employees must accept recall.

Recall for those employees not working will be as follows:

(a) Employees who are not working because of an involuntary lay off will be offered open jobs according to their qualifications and seniority. If a qualified employee elects not to return to work he will be placed on a voluntary lay off

status. In any event, an employee cannot refuse to return to his bid job and shift and the least senior qualified employee must return to the open job.

(b) Employees who are not working because they have elected a voluntary lay off status will only be recalled to their bid department and shift except as indicated on 3:03 (c).

(c) If, in following the procedures outlined in (a) and (b), the Company cannot fill the open job, the Company will offer the job to employees who are on involuntary lay off in order of seniority. If the involuntary laid off employee refuses recall, he will be placed on voluntary lay off status. If no involuntary laid-off employee accepts the job, the least senior involuntary laid-off must accept the job. If the job opening is an unbid vacancy, the employee placed on the job will be considered the successful bidder.

If there are no involuntary laid off employees, the Company will offer the job to employees who are on voluntary lay off status in order of seniority. If no voluntary laid off employee accepts the job, the least senior voluntary laid off employee must accept the job. If the job opening is an unbid vacancy the employee

placed on the job will be considered the successful bidder.

3:04. Payroll Change Notice

The Company will give the Union and the employee a copy of the payroll change notice within twenty-four (24) hours of the change.

3:05. New Hire - Probationary Employee

A new employee shall be considered a probationary employee for the first sixty (60) working days after employment of the new employees, during which time no seniority shall accrue. During such trial period, the Company may discharge the employee with or without cause and the termination cannot be made the subject of the Grievance Procedure. After the conclusion of the trial period, the employee shall be deemed to be a regular employee and his seniority shall start as of the date of employment. The Company agrees to notify the Financial Secretary when new employees have passed their probationary period.

3:06. Removal from Seniority List

An employee shall be removed from the seniority list and his employment terminated for the following reasons:

(a) If the employee quits:

(b) If the employee is discharged for just cause:

(c) If an employee fails to return to work within one-hundred sixty-eight (168) hours after the mailing of a registered or certified notice of recall sent to him at his last known address as shown upon the Company's records. At the time of mailing, the Company will notify a designated Union Official. The one-hundred and sixty-eight (168) hours notification period may be extended at the discretion of the Company.

(d) If an employee is involuntarily laid off or is unable to work due to a non-occupational illness or injury for a period equal to his length of continuous service with a minimum of twenty-four (24) months, or a period not exceeding forty-eight (48) consecutive months, whichever is less. However, his seniority will not accumulate beyond a twenty-four (24) month period.

(e) If an employee elects a voluntary lay off and is laid off for a period equal to his length of continuous service with a maximum of twenty-four (24) months.

(f) If the employee in the Armed Services with reinstatement rights does not report for work within the time provided in the Universal Military Training and Service Act.

3:07. Super Seniority

The Chief Shop Steward, President, Vice President, Secretary, Treasurer and Safety Committee Chairman of Local 959 shall have unit-wide super-seniority for the purpose of lay off only.

3:08. Leave of Absence

Members of Local 959 will be granted leave of absence for the purpose of holding office as Business Agent or International Representative of the International Union. Such a leave of absence shall be for a period of the term of office, but not to exceed one year, with the privilege of renewal by mutual agreement.

A minimum of two (2) weeks written notice of intent to take leave of absence as outlined above will be required.

Leave of absence for other business of the International Union will be granted with a minimum of two (2) weeks written notice. The maximum leave granted to the bargaining unit will be up to ten (10) working days in a calendar year.

Employees granted leave of absence under this section must return to work within two (2) weeks from the expiration of such leave. The provisions of this paragraph will apply to only one (1) employee at a time.

3:09. Medical Bump

If an employee is physically unable to perform his job, as evidenced by Doctor Certification, the said employee will be given a permanent medical bump, which will now be considered his new bid job.

He will exercise the bump as outlined in Article 3:03 by seniority and physical capabilities.

Employees affected by the above procedure shall receive a bump as outlined in Article 3:03, however their bump shall not be considered permanent and they shall maintain recall rights.

In the event there is a question concerning the employee's physical ability to perform a job, it will be referred to a Company Doctor. Should there be a disagreement between the Company Doctor and the employee's Doctor concerning his physical ability to perform the job, the matter will be referred to a third Doctor selected by mutual agreement between the Company and the Union.

His decision will be final. The grievance procedure will be waived in connection with the foregoing medical procedure.

Article IV. VACATIONS AND VACATION PAY

4:01. Vacations

Each employee who is on the company's active payroll on the lst of the month following their anniversary date will be paid according to the following schedule:

Continuously employed for 6 months.....5 days
Continuously employed for 1 year..... .10 days
Continuously employed for 6 years.....11 days
Continuously employed for 7 years.....12 days
Continuously employed for 8 years.....13 days
Continuously employed for 9 years.....14 days
Continuously employed for 10 years.....15 days
Continuously employed for 15 years.....20 days
Continuously employed for 25 years.....25 days

4:02. Vacation Period

(a) The vacation period shall be the twelve (12) month period from the lst of the month following an employee's anniversary date. The Company has the right to elect to shut down the plant for one (1) week for vacation purposes. provided notification of the date of shut down is

given to employees on or before April 15th of the year in which the shut down occurs.

(b) Employees entitled to more than one (1) week's vacation will receive their additional vacation time within their respective twelve (12) month period, and so long as there is no interference with scheduled operations. Employees should give forty-eight (48) hours notice of request for vacation of less than one (1) week. Employees will be permitted to take up to one week of their vacation in one-half day increments by giving twenty-four (24) hours notice.

(c) The Company will post the number of employees permitted to be on vacation at one time on a given shift and department. In scheduling vacations employees will be given preference according to their seniority. However, in order for an employee to displace a junior employee who has already scheduled his vacation, sixty (60) days notice will be required.

4:03. Vacation Pay

Vacation pay shall be calculated at the regular straight time rate the employee is receiving at the time the vacation is taken and shall be paid to each qualifying employee at the time the vacation begins if the employee so requests.

4:04. Vacation Bonus

Employees with one (1) year of service, shall receive a bonus of $150.00. Bonus is payable in one lump sum along with first vacation check.

4:05. Pro-rated Vacation Pay and Bonus

An employee who leaves the Company payroll shall receive vacation pay and vacation bonus on a pro-rated basis. Computation of payment shall be based on the number of weeks worked from the lst of the month following their anniversary date.

4:06. Holiday during Vacation Period

If a holiday occurs during the vacation period of the employee, he shall be entitled to take that day some other time with pay.

Article V. HOLIDAYS

5:01. Holidays

The following days shall be recognized as holidays:

New Year's Day
Good Friday
Memorial Day

Independence Day
Labor Day
Thanksgiving Day
Day After Thanksgiving
Day Before Christmas
Christmas Day
*Personal Holiday
*Personal Holiday
*Personal Holiday
(*Personal holidays must be taken within the calendar year.)

5:02. Holiday Pay

Eight (8) hours holiday pay at normal hourly day rate will be granted to all wage roll employees who have completed their probation. An employee on lay off or leave of absence will be entitled to receive holiday pay for any holidays that occur within the first thirty (30) calendar days of his absence from work. In the case of illness or accident, the employee will be entitled to receive holiday pay for any holidays that occur within the first ninety (90) calendar days of the illness or accident.

5:03. Pay - Working on Holiday

An employee who is required to work on any of the recognized holidays shall be paid for each hour worked at the rate of double his regular hourly rate in addition to his holiday pay as provided in Section 5:02.

Article VI. GENERAL PROVISIONS

6:01. Wash-Up Time

Up to a fifteen (15) minute paid wash-up time will be allowed based on individual needs.

6:02. Insurance

The Company shall pay the cost of the following benefits to all employees covered by the present Agreement after thirty (30) working days of employment:

Life Insurance
Effective 2/07/93 . . . . . $21,000
Effective 2/07/94 . . . . . $22,000
Accidental Death and Dismemberment
Effective 2/07/93 . . . . . $21,000
Effective 2/07/94 . . . . . $22,000
Sick Benefits (after sick leave benefits have been exhausted) . . . . . 65% of weekly wages
Life Insurance for Retirees who retire from active service $1,000.00
Blue Cross/Blue Shield "65" Special for retirees who retire from service and have attained the age of sixty-five (65). Company will pay $75.00 per month toward the cost of the coverage.
Blue Cross (Employee and Family) . . . 365 Day Plan

Mandatory Second Opinion for Elective Surgery
Blue Cross . . . . . Diagnostic
Blue Shield (Employee and Family) Prevailing Rate Plan
Dental Plan (Employee and Family) . . . Delta Plan 1B
Major Medical . . . . . $100.00 Deductible
$250,000 Maximum
80/20% on First $2,000
Long-term Disability Insurance (with three (3) years service) . . . . . Up to one-half (1/2) monthly salary up to age 65
Mail Order Prescription Drug Program (maintenance drugs only)
* Supplemental Life Insurance $21,000
Effective 2/07/94 . . . . . $22,000
* Spouse Life insurance $10,000
* Child Life Insurance $5,000

* Employee payment through Payroll Deduction

The Company will continue Blue Cross and Blue Shield benefits for laid off employees for the remainder of the month in which they are laid off and one (1) additional month.

Employees will be permitted to continue their Blue Cross and Blue Shield benefits during a period of lay-off by making payment of premiums for same to Human Resources Office prior to the 15th of each month during lay-off.

6:03. Gloves, Clothes, Safety Equipment

The Company during the term of this agreement will continue to supply work gloves, work clothes, and safety equipment as it has in the past.

6:04. Safety Glasses

The Company will pay the cost of an employee's prescription Safety Glasses once each year. The prescription must be filled by a company-designated source.

The Company will also pay the replacement cost for work-damaged prescription safety glasses. The prescription must be filled by a company-designated source.

6:05. Physical Examination

The Company will provide each employee once a year a complete physical check-up.

6:66. Health and Safety Committee

The Company and the Union agree to promote habits of safety and health and will cooperate in a program of accident prevention and support of safety and health rules and regulations. For this purpose there shall be a committee established composed of at least three representatives of management, including a safety official, and three representatives of the Union. The Union representatives

shall be selected by the Local Union and be designated to the Company.

The Committee shall:

(1) Meet once a month. Minutes of meetings will be issued to all members of the committee.

(2) Make personal inspections of the work areas once a month.

(3) Make recommendations for the correction of unsafe acts or conditions and the elimination of both unsafe procedures and unsafe conditions. Also, to review progress of plans to correct these conditions and procedures including the generation and/or approval of specific maintenance work orders for the correction of unsafe conditions. All safety work orders will be reviewed at subsequent safety committee meetings. Any work order that have not been completed after thirty (30) days will be addressed in writing by the Maintenance Department. If the Safety Committee requires further clarification the Maintenance Manager will respond in person. In the case of serious injury the Company will promptly review the facts of the case with the union safety committee.

(4) Review and analyze reports of work related illness and injuries in order to make recommendations for the prevention of accident and disease. Copies of industrial injury reports submitted for Workman's Compensation and first aid reports that are prepared when first aid treatment is administered, will be supplied to the Union and the injured employee.

(5) Promote Health and Safety education and recommend promotional efforts which will motivate employees to accept and adopt safe working habits.

(6) Recommend that the Company, in special cases, contact outside sources for expert consultation where such expert advice seems justified.

(7) Monitor the practice concerning company supplied work clothing and shower requirements.

All unresolved Committee problems shall be referred to in writing jointly to the Director of Technology, of Cabot Corporation, Boyertown Plant, or his designated representative and the Chief Shop Steward of the International Chemical Workers Union Local 959.

An employee who believes that he is being required to work under conditions which involves an immediate danger to his safety beyond the hazards inherent in the particular operation in question, shall request an immediate meeting with his supervisor. If the matter is thereby not resolved, the employee may ask for a meeting with his union safety representative, supervisor, the company safety official and the manager of the operation. If the matter is still not resolved, the alleged unsafe condition, will be referred to the Director of Technology or his designated representative. During this time the employee shall receive full wages at this regular rate of pay.

If in the opinion of the Director of Technology or his designated representative, no unsafe condition exists, the situation will be explained to the employee and the union safety representative.

The Company agrees to abide by all Safety and Health regulations required by applicable federal and state laws. The Company further agrees to maintain all accident and health-hazard records required by federal and state laws and will make available Form 100 (Log of Injuries and Illnesses) and Form 102 (Calendar Year Summary) for review by the members of the Safety Committee. In the event any new forms are required under the OSHA regulations during the life of this agreement they will also be reviewed with the Safety Committee.

The Company will comply with federal and state regulations to properly identify harmful substances and hazards. The Company shall provide a continuous training program to assure all employees adequate training in safe handling practices.

The Company agrees to provide to the Union the generic names of all substances used by the technician unit at the Boyertown Plant. The Company agrees to review with the Union pertinent health and safety records of the workplace environment as required by state or federal regulations.

The Company agrees to inform the Health and Safety Committee on new processes and major process changes as they relate to health and safety before they are implemented.

The Company agrees to instruct one of the Union's representatives from the Health and Safety Committee in the use of exposure monitoring equipment.

Freedom of movement, with supervisory approval, will be given designated safety committee members for the purpose of the investigation of health and safety problems.

Members of the Health and Safety Committee will be paid at their regular rate of pay for time lost attending safety meetings, conducting inspections or performing any other safety function designated by the Company.

In case the Union desires to have a qualified International Chemical Worker's Safety and Health person enter the technician unit work area to investigate a particular Safety and Health problem, permission shall be granted upon application to the Manager, Employee Relations to make such visit to the technician's unit work areas at a mutually satisfactory time provided.

a) any such visit shall be limited to the investigation of the particular Safety and Health problem as arranged with the Manager, Employee Relations.

b) the International Chemical Workers Safety and Health person observes applicable Company Rules and government regulations while in the Technician's Unit work areas, and

c) a representative of the Company will accompany the above Safety an Health representative during such visit.

6:07. Leave for Death in Immediate Family

The Company will grant up to three (3) days leave of absence with pay to an employee for death in the employee's immediate family (Parents, Spouse, Children, Brothers and Sisters, Mother-In-Law and Father-In-Law). It is understood that this leave will surround the day of the funeral.

In addition to the above, the Company will grant a one day leave of absence with pay to an employee for death in his family (Grandparents, Grandchildren, Brother-In-Law, Sister-In-Law).

6:08. Leave of Absence

Any employee may request in writing personal leave of absence without pay for good and sufficient cause not to exceed thirty (30) working days. The refusal or allowance of personal leave of absence shall be at the discretion of the Company.

6:09. Regular Monthly Union Meetings

Union Committee representatives shall be granted time off to attend the regular monthly Union meeting at no cost to the Company. The Union shall endeavor to schedule monthly meetings so as not to conflict with the normal weekday work schedule.

An employee on the third shift, who gives one week's notice to his supervisor, shall be given unpaid time off to attend a union meeting provided that there is adequate staffing in the department on the day of the meeting.

6:10. Pension

The Pension Plan applicable to Employees in the bargaining unit will be the Pension Plan for Technical

Employees at Boyertown, Pennsylvania, dated January 1, 1976. The base pension benefit will be $22.15 per month per year of service to the participant's normal retirement date. For employees who retire after February 7, 1994, the base pension benefit will be $23.15 per month per year of service to the participant's Normal Retirement Date.

Employees that have attained the age of 63 as of their retirement date will have a 1/4% reduction of their monthly pension benefit.

The parties have agreed to other provisions of the Plan, and this Plan is subject to the Company's obtaining and/or retaining approval by the Internal Revenue Service and compliance with the Employee Retirement Income Security Act of 1974.

Copies of he detailed plan will be in the possession of the Union and the Company.

The Company will review annually, with two (2) representatives of Local 959, International Chemical Workers Union, the annual valuation report of the Actuary and such additional information as shall be reasonably required for the purpose of keeping the union properly informed concerning the operation of the negotiated Pension Plan.

6:11. Sick Leave

Annual sick leave will be available on the following basis:

Over 1 year of service....5 days of sick leave per year
Over 3 years of service..10 days of sick leave per year
Over 5 years of service..15 days of sick leave per year

Sick leave will be computed starting with the third day of doctor-certified illness or the first day of doctor-certified accident or hospitalization.

An employee absent from work because of an illness of one (1) or two (2) days will have the option to schedule the days as vacation.

In accordance with the schedule in paragraph one, an employee may not accumulate more than two and one-half (2 1/2) years of sick leave on a monthly pro rata basis, starting with his hire date.

An employee's accumulated sick days will be calculated as follows:

One twelfth of his annual sick leave, based on years of service, will be added each month, until he reaches a total of two and one-half times his annual sick leave. When he uses some of his sick leave, it will again accumulate monthly

toward two and one-half times his annual sick leave, even while he is out on sick leave.

6:12. Tuition Refund

A tuition refund plan will be provided. Employees may enroll in a BS in Chemistry or BS in Chemical Engineering degree program and be eligible for refund of the cost of tuition for that program, as long as such employee maintains a passing grade in that program. Approval for these programs must be obtained prior to the start of each program and prior to the beginning of each semester or term in the program.

Employees enrolling for a job related program of courses (such as science, math or computer related) will be reimbursed for the cost of tuition for approved courses completed a passing grade. Approval of courses must be obtained prior to the start of each course.

6:13. Jury Duty

An employee serving on jury duty or appearing as a subpoenaed witness shall be compensated by the Company for the difference between his regular hourly rate and the jury duty or subpoenaed witness pay received for such served time.

6:14. Bulletin Boards

Three (3) conveniently located bulletin boards shall be maintained by the employer for use by the Union.

6:15. Severance Pay

Severance pay will be provided an Employee if the Boyertown Laboratories are closed or moved, and if the Employee is not relocated at Boyertown in a job of comparable value.

Severance pay will be one week of base pay for each full year of service as of an employee's severance date.

6:16. Beards

An employee will be permitted to grow and wear a beard at the discretion of the employee's supervisor, taking into consideration the type of work the employee is required to perform and complying with Safety and Health Regulations.

6:17. Rotation within each classification

During the 1986 contract negotiations, the Company indicated its intent to continue the practice of rotation and training of Analytical and Quality Control Technicians, within each classification, to qualify them for all work

performed in their various work areas. The above will also apply to Research and Development when practical.

At the time they qualify, written notice will be given to the employee and the Union of all employees who qualify in each area in the rotation program. A list of such employees will be posted.

6:18. Investigation of Union Problems

Freedom of movement, with supervisory approval will be given union stewards or officials for the purpose of the investigation of union problems.

6:19. Personal Breaks

The Company intends to permit a reasonable amount of time for personal breaks during the day provided it does not interfere with the orderly operation of the department.

6:20. Discipline

The Company agrees that prior to the time an employee is given time off for discipline, except in the case of an immediate discharge offense, Management will meet with the Executive Board of the Union to discuss the problem. In the case of an immediate discharge offense the employee will be suspended and Management will meet later

with the Executive Board of the Union to discuss the problem.

Such meeting will be independent of the regular grievance and arbitration procedure.

6:21. Safety Shoes

The Company will pay, each calendar year, the cost of Company approved safety shoes upon presentation of proof of purchase.

6:22. Meal Allowance

Whenever an additional four (4) hours of mandatory overtime is assigned to any eight (8) hour shift, to an employee on that shift, a meal allowance of $3.00 will be paid the employee.

6:23. Recognition of Departments

For the purposes of this Agreement, the Company and the Union have agreed to recognize the following Departments --

1. Research and Development (previously Technology)
2. Analytical (previously Functional Test and Analytical)
3. Quality Control

6:24. Problem Solving Meetings

The Company agrees to the practice of holding problem-solving meetings with prepared agendas, with a maximum of five (5) members of the Union's Executive Committee, and with the intent of promoting and improving communications and relationships between both parties. By mutual agreement of parties, witnesses may be called.

6:25. Employee Development

The Company and the Union agree to promote the development of each employee. For this purpose, there shall be a committee composed of at least three (3) representatives of Management and three representatives of the Union. The Union representatives shall be selected by the Local Union and be designated to the Company.

The Committee shall:

(1) Meet once a month, or, if necessary, more frequently, by mutual agreement. Minutes of meetings will be issued to all members of the Committee.

(2) Review available training and development resources.

(3) Make recommendations to the Company and Union for employee training and development programs.

(4) Review and recommend to the Company and Union requirements for the Cabot Technician Certification Program.

(5) Any and all recommendations shall be subject to mutual agreement by all parties.

Article VII. NO STRIKE - NO LOCKOUT CLAUSE

7:01. No Strike - No Lockout

Section 1

Neither the International Chemical Workers Union nor its Local 959 will cause nor encourage a strike (including sympathy strikes), slow down or work stoppage during the term of this Agreement, and the Company will not during the term of this Agreement conduct any lockout.

Section 2

The Company agrees there shall be no liability on the part of the International Chemical Workers Union, because of any strikes, slow-down or work stoppage,

provided that the International Chemical Workers Union shall, within twenty-four (24) hours after receipt of notice from the Company to the International Headquarters, Akron, Ohio, of the commencement of any such strike, slow-down or work stoppage, follow the procedure set forth in Section 3 hereof.

The Company agrees there shall be no liability on the part of Local 959 because of any strike, slow-down or work stoppage provided that Local 959 shall, within twenty-four (24) hours of the commencement of such strike, slow-down or work stoppage, follow the steps set forth in Section 3 hereof.

Section 3

(a) Publicly declare that the strike is unauthorized.

(b) Order its members to return to work notwithstanding the existence of any wildcat picket line.

(c) In good faith use every reasonable effort to terminate such unauthorized strike.

(d) Refrain from interfering with any disciplinary action which the Company may take against any employee who is engaged in said strike or work stoppage, provided that if an issue of fact exists as to whether or not any particular employee has

engaged in any such unauthorized action, such issue will be subject to the grievance procedure including arbitration.

Article VIII. ADJUSTMENT OF GRIEVANCES AND ARBITRATION

8:01. Arbitration

Should any difference arise between the Company and the Union or between the Company and any employee with respect to the interpretation or application of the terms of this agreement, it shall be settled in accordance with the following procedure.

Step 1. A conference between the Shop Steward and the aggrieved employee's Supervisor shall be held to present the matter to the Supervisor. A grievance must be presented to the employee's supervisor within twenty-five (25) work days of the incident or when the employee has become aware of the incident. The aggrieved employee may be present. The supervisor will give his decision on the grievance within one (1) work day.

Step 2. If the Union is dissatisfied with the decision of the Supervisor, the Union may appeal within five (5) work days the Supervisor's decision to the Manager, Employee Relations in writing. The Manager, Employee Relations shall call a conference with the Chief Steward, Shop Steward, Grievant, supervisor and Department or Section

Manager to discuss the matter. At this meeting, the Company and the Union will attempt to determine the issue(s) and hear direct testimony of those involved in the grievance. The plant Personnel Manager will give his decision within two (2) work days after Step 2 is instigated.

Step 3. If the Union is dissatisfied with the decision of the Manager, Employee Relations, the Union may appeal within five (5) work days. Within fifteen (15) days of such appeal, arrangements will have been made to have a conference between the Union Grievance Committee, the International representative and the Company Grievance Committee, to discuss the grievance. This time limit may be extended by mutual agreement. At this conference the Company and the Union each reserve the right to call for the presence of the Grievant, Supervisor, or other persons directly involved with the grievance. A decision will be given within five (5) work days after Step 3 is instigated.

Step 4. If no agreement can be reached in Step 3, either party desiring arbitration must so notify the other party in writing within ten (10) days of the date of disagreement; the Union notice to be given to the Manager, Employee Relations and the Company notice to be given to the President of the Local Union. Within five (5) days thereafter, the grievance shall be referred to the Federal Mediation and Conciliation Service for arbitration pursuant to its Rules and Regulations. Neither party will unnecessarily delay the arbitration. The decision of the arbitrator shall be final and binding and all expenses of the

arbitration shall be shared equally by the Company and the Union.

Article IX. EXPIRATION AND RENEWAL

9:01. Expiration

This agreement shall remain in full force and effect until 12:01 A.M. February 5, 1995, and shall be continued for an additional period of one (1) year unless a written notice by either party is given sixty (60) days prior to said February 5, 1995, or anniversary thereof, of a desire to terminate this Agreement.

IN WITNESS WHEREOF, the parties hereto have hereunto set their hands and seals the day and year first written above.

ACCEPTED BY:

LOCAL 959 INTERNATIONAL
CHEMICAL WORKERS UNION

By: Patrick B. Green
By: Louis R. Kulp
By: Donald R. Ritter
By: Gerald C. Setley
By: John A. Shirk, Jr.

APPROVED BY:

INTERNATIONAL CHEMICAL
WORKERS UNION

By: Edward Rock
International Representative

APPROVED BY:

CABOT CORPORATION

By: Kathleen F. Sokat
Director of Human Resources
By: Anthony J. Hickl
Director of Technology
By: Terry R. Mest
Manager, Employee Relations

EXHIBIT "A"

	Effective 2/07/93	Effective 2/07/94
Trainee	$10.72	$11.20
Technician-4 Mo.-4 Yrs.	$12.75	$13.32
Technician-4 Yrs.-8 Yrs.	$13.62	$14.23
Technician-Over 8 Yrs.	$14.49	$15.14

Certified Technician Differential additional $.35 per hour

The Company may, in a particular case, pay more than the above rates for trainees, depending upon the training and experience which the employee brings to the job.

If the Company is going to pay more than the 4 month-4 year rate, it will meet with the Union an explain its reasons for doing so.

The Union may grieve the reasonableness of the Company decision through the grievance and arbitration procedure.

Under no conditions shall the rate paid to the new hire be higher than the highest rate in the contract.

ARTICLES OF

AGREEMENT

between

CABOT CORPORATION

Boyertown, Pennsylvania

and

INTERNATIONAL CHEMICAL WORKERS

LOCAL 619

Effective May 23, 1992
Expires May 21, 1994

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AGREEMENT

THIS AGREEMENT is made and entered into this 23rd day of May, 1992, between Cabot Corporation and its successors and assigns (hereinafter referred to as the "COMPANY") and the INTERNATIONAL CHEMICAL WORKERS UNION and its LOCAL 619 (hereinafter referred to collectively as the "UNION").

WITNESSETH:

In consideration of the mutual interests of the Company, the Union, and the employees, and their desire to stabilize employment, to facilitate the manufacture of the products of the Company in an efficient manner, to establish an orderly procedure for the settlement of disputes between the parties and to secure a closer and more harmonious relationship between them, the parties hereto promise and agree that:

Article I. Recognition

1.01. Recognition of Union

Recognition of Union as exclusive bargaining agent for production and maintenance employees, and janitors, and truck drivers at the Company's Boyertown plant excluding watchmen, guards, office and plant clerical employees, laboratory employees, professional employees and supervisors as defined in the National Labor Relations Act.

1.02. Equal Treatment

(a) All employees shall receive equal treatment as provided by the provisions of the agreement without discrimination on account of sex, age, marital status, race, color, creed, religion, national origin, disability or union membership.

(b) It is understood that when a reference is made in this Agreement to the masculine gender the intent is to include the feminine gender.

1.03. Probationary Period

It shall be a condition of employment that all employees of the employer covered by this agreement who are members of the Union in good standing on the effective date of this agreement, shall remain members in good standing, and those who are not members on the effective date of this agreement shall on sixty (60) working days following the effective date of this agreement, become and remain members in good standing in the Union. It shall be a condition of employment that all employees covered by this agreement, and hired on or after its effective date shall, on the 61st working day following the beginning of such employment, become a member and remain in good standing in the Union. The Financial Secretary shall be promptly notified when an employee has completed his sixty (60) working days of employment.

1.04. Union Dues Deduction

(a) The Company agrees to deduct each month from the wages of each employee covered by this agreement, upon receipt of a legal written request for such deduction, signed by the individual employees, Union membership dues (including the initiation fee) in such amounts as shall be fixed pursuant to the bylaws of the Local in which the employees are members and the constitution of the Union.

(b) The total amount so deducted each month shall be remitted to the Union not later than the tenth (10th) day of the succeeding month, with a statement attached indicating the employees whose dues have been checked off.

1.05. Outside Contracting

(a) Employees not members of the bargaining unit will not engage in any of the production and maintenance work normally performed by employees covered by this agreement.

(b) Work customarily performed by employees of the Company shall not be contracted out provided that the Company has the necessary tools and equipment, and provided there are qualified employees available who can perform the work in question in an acceptable time schedule. Management will discuss with the Union its plan for contracting out such work previous to any commitment with an outside contractor.

(c) An outside contractor record will be kept and will be initialled by both a Company and Union representative. Signing the book does not mean that the Union approves of or agrees

with management's decision to contract out work from the bargaining unit, but shall indicate that proper notification and discussion has taken place per Article 1:05 (b).

1:06. Management Rights

All powers or authority which the Company has not specifically abridged, delegated or modified by this agreement will be recognized by the Union as being retained by the Company. In no event shall this clause be used to abrogate any of the conditions or provisions of this agreement.

1:07. Unlawful Provisions

In the event that any of the provisions of this contract shall be held in violation of any local, state, or federal law or regulation, such provision shall not in any way affect the remaining provisions.

1:08. Amendment of Non-Economic Provisions

Should any of the non-economic provisions of the contract become unsatisfactory to either of the parties, during the life of the contract, they may be amended by mutual agreement between the Union and the Company. Any change in the provisions under this article must be consistent with the history of the bargaining parties.

Article II. Wages, Hours and Overtime

2:01. Wages, New Job Classifications

(a) The wage schedule effective May 23, 1992 appears in Exhibit A attached hereto and made a part hereof. This reflects a 4.5% per hour across the board increase based on rates effective May 20, 1991; 4.5% per hour across the board increase on May 24, 1993 based on rates effective on May 23, 1992.

(b) If a new job classification is created or the content of present jobs are meaningfully changed or merged during the term of this Agreement by the Company, the Company and the Union will attempt to agree upon a rate for that job. In case no agreement can be reached, the job will be paid at the rate determined by the Company and the dispute may be processed through the grievance procedure and, if necessary, submitted to arbitration in accordance with the provisions of Article VIII.

(c) It is understood, however, that the award of the arbitrator must be consistent with the present wage rate structure as set forth in Exhibit "A" for similar work, skill and responsibility and any adjustment resulting from the grievance will be retroactive to the time an employee was assigned to the job. Notwithstanding, the provisions of Article VIII, a grievance of this nature may be filed at any time within twenty-five (25) days after the job has been created. For the purpose of filing a grievance, work days shall mean Monday through Friday, excluding weekends and holidays.

(d) It is further agreed that any changes in existing jobs or merging of jobs (i.e. combining of maintenance and production jobs) will be consistent with the collective bargaining history of the parties.

2:02. Shift Hours

The regular hours of work shall be eight (8) per day and forty (40) hours per week, the regular work week to commence at 12:00 Midnight Sunday and end the following Sunday at 12:00 Midnight. The change of time from Eastern Standard to Daylight Saving or from Daylight Saving to Eastern Standard will be done at 2:00 A.M. Sunday morning.
The shift hours shall be as follows:

First Shift - 12:00 Midnight to 8:00 A.M.
Second Shift - 8:00 A.M. to 4:00 P.M.
Third Shift - 4:00 P.M. to 12:00 Midnight

2:03. Overtime Pay

Employees shall be compensated at one and one-half times their regular rate of pay for all hours worked before or after their regular shift. If for some reason, a man is told there is no work for him after he worked four (4) hours before his shift and four (4) hours on his regular shift, he gets paid for four (4) hours at time and one-half plus eight (8) hours for his regular shift. If the employee elects to go home early he still gets paid time and one-half for the hours he worked on his off shift plus the hours he worked on his regular shift. The regular shift hours will be paid at employees rate of pay, of said bid job. This will not apply in cases of a temporary shift change not to exceed two days.

2:04. Weekend Overtime - Saturday

For all hours worked on Saturday, employees shall be paid at the premium rate of one and one-half times their regular rate of pay.

2:05. Weekend Overtime - Sunday

For all hours worked on Sunday, the employees shall be paid at the premium rate of twice the regular rate of pay.

2:06. Shift Premium Pay

(a) For the inconvenience of working evening and night hours, first shift employees shall be paid a shift premium of thirty-five (35c) cents per hour and third shift employees a shift premium of thirty (30c) cents per hour.

(b) An employee assigned to the first shift who completes his regular eight (8) hour turn and continues to work into the second shift, shall continue to receive the first shift premium for the hours worked on the second shift.

(c) An employee assigned to the second shift who completes his regular eight (8) hour turn and continues to work for a portion of the third shift, shall not receive the third shift premium for the hours worked on the third shift.

2:07. Reporting Pay

(a) Employees reporting to work at their regular starting time, when they have not been notified in advance that work is not available, shall be given eight (8) hours of work or eight (8) hours of pay at their straight time hourly rate, except where work is not available through no fault of the Company. In connection with work during the week, the affected employee may at his discretion be given an opportunity to bump another employee with less seniority provided they are competent and able to do the work.

(b) In the case of Saturday and Sunday work, if the employee has reported to work, the guarantee shall be four (4) hours pay at the rate of the day.

2:08. Call back pay

(a) Employees called back for emergency work Monday through Friday shall receive pay at one and one-half times the employee's straight time hourly rate for all hours worked with a guarantee of receiving an amount equal to four (4) hours pay at one and one-half times the employee's straight time hourly rate.

(b) Employees called back for emergency work on Saturday, shall receive a minimum of four (4) hours work or four (4) hours of pay at one and one-half times the employee's straight time hourly rate.

(c) Employees called back for emergency work on Sunday shall receive a minimum of four (4) work or four (4) hours of pay at double time the employee's straight time hourly rate.

2:09. Equipment Failure

Any employee affected by equipment failure shall exercise their rights under Paragraph 3:01 to determine which employee or employees shall continue to work for the remainder of the shift in the area affected by such failure. In the event there is not sufficient work for the affected employees, the Company will provide work for those affected employees in other areas without reduction in their hourly rate.

2:10. Out of Classification Overtime

(a) All overtime work performed other than the employee's particular job shall be distributed on an equal basis among qualified employees who sign up in an out of classification overtime book. No equalization will be required from one job classification to another. It is further understood that this work shall be paid at the employee's rate of pay or rate of said job, whichever is higher. If an employee is offered such work and does not accept same, it shall be counted as time worked for the purpose of equal distribution. All overtime worked in other than the employee's job classification will not be charged against him, in his job classification.

(b) If an employee is missed in the assignment of overtime from the above lists, due to an oversight, he shall be offered the next available overtime from such list.

(c) A designated company representative will review the Out of Classification Overtime Book on a periodic basis for reasons relating to major job changes, i.e., procedure or

equipment changes and length of time since employee last accepted overtime. Names will be removed if:

--A major change has occurred to the job relating to procedures or equipment.

--Employee has not accepted overtime for three (3) consecutive months.

When the decision has been made to remove a name, and prior to its removal the Company will notify the affected employee and the designated union representative, and will discuss with them the reasons for the decision. Disputed decision may be grieved under Article VIII.

(d) Whenever major job changes occur which would eliminate all names for overtime eligibility on a job, the company will refamiliarize a minimum of three (3) senior previously qualified employees in order of seniority on said job.

(e) Employees can not refuse to work overtime in their department, and then work overtime in another department.

(f) Any imbalance due to a missed assignment of overtime from the above lists in a monthly period due to an oversight shall be corrected within the next monthly period. If an imbalance of more than eight (8) hours still exists, the Company will pay the affected employee the hours in excess of eight (8) hours.

2:11. In Classification Overtime

(a) All overtime on an employee's particular job and shift shall be distributed on an equal basis over a monthly period. Any imbalance at the end of that time shall be corrected within the next monthly period. If an imbalance of more than eight (8) hours still exists due to an oversight the Company will pay the affected employee the hours in excess of eight (8) hours.

(b) A Management Representative shall keep a uniform record of all overtime by department on a monthly basis and posted daily on the bulletin board.

(c) Overtime made available and not worked will be counted the same as if it had been worked. The employee with the least amount of overtime charged in the classification and shift shall be offered the next available overtime in his classification and shift. If he is missed

due to an oversight, he shall be offered the next available overtime in his classification and shift. When an employee enters a new job and shift, he shall be charged with the same amount of overtime as that charged to the employee with the greatest amount of overtime on his new job and shift. An employee absent for any reason shall be charged with any overtime that would have been his had he been present.

(d) All overtime hours worked Monday through Saturday will be charged at one and one-half times the number of hours worked. Overtime hours for a Sunday will be charged at twice the number of hours worked.

(e) Probationary employees qualified on their bid job are eligible to work overtime on said bid job. This overtime will be equalized in accordance with this article

(f) When there is a need, including the acceleration of training, the trainee can be offered overtime in the job for which he is being trained.

(g) Overtime offered to employees in training will not be equal-zed in accordance with this article.

2:12. Notice of Weekend Overtime

(a) The Company will notify employees of scheduled overtime for Saturday and Sunday as follows:

12-8 shift: BY 2:00 A.M. Thursday
8-4 shift: BY 10:00 A.M. Thursday
4-12 shift: BY 6:00 P.M. Thursday

(b) Employees not nonified in accordance with the above shall have the right to refuse this overtime. The hours refused will not be charged against the employee in preparation of the overtime distribution list. Any imbalance that might result from such refusals will not be the basis for a grievance.

(c) When practical the Company will give employees notice of Sunday overtime at the same time it gives notice of Saturday overtime.

(d) Any employee who desires to work the weekend after an absence (vacation period, illness, etc.) must notify his supervisor by the above times of his interest. It will be the responsibility of the employee to confirm, by the end of the week, if overtime has been scheduled for him. If the employee has failed to indicate his interest, within the proper time frame, he will only be eligible to work the weekend after all qualified employees in the department, and in the Out of Class Overtime Book have been asked.

2:13. Overtime Telephone Calls

All telephone calls made for overtime shall be logged and the time charged accordingly.

2:14. Cancellation of Overtime

When it is necessary to cancel overtime scheduled prior to the shift, the Company will notify the employee four (4) hours prior to his scheduled reporting time. If the employee is not so notified, the employee will be paid at straight time for one-half of the hours he was scheduled to report early to his shift.

2:15. Sixteen Hours of Work

Employees will not work more than sixteen (16) consecutive hours without an eight (8) hour break.

Article III. Seniority

3:01. Plant Seniority

Seniority shall be plant seniority.

3:02. Definition of Departments

There will be twelve (12) departments. Refer to Exhibit "C".

3:03. Lay Off Procedures

(a) For the purpose of promotions, layoffs and recalls, the following factors shall be considered:

(1) Length of continuous service

(2) Competency and ability to do the work

(3) Physical fitness

In the evaluation of competency and ability to do the work and physical fitness, management shall be the judge in the first instance, but if any claim of discrimination arises, it shall be subject to the Grievance and Arbitration procedures of this Agreement.

(b) If, because of an emergency situation it becomes necessary to shut down any operation within the scope of this contract, for a period not to exceed two (2) days, the Company will offer those affected employees any available work in the plant. The term emergency shall mean unforeseen circumstances. When these circumstances occur and the emergency application is to be applied, it will be discussed with the Chief Steward or his designated representative.

(c) If an non-emergency layoff occurs for a period not to exceed twenty (20) working days, the affected employees may bump any employee in the plant, with less seniority, provided they are competent and able to do the work.

(d) In order to be considered competent you must have completed the prescribed training period for the job and hold a pink slip on the job.

(e) Employees bumping into a formerly held job will, if necessary, be given a familiarization period.

(f) Non-training jobs can be bumped without prior holding of a pink slip.

(g) In the event of a layoff, the affected employee may exercise his plant-wide seniority to bump any junior employee with up to a ten (10) day training period and must be able to satisfactorily perform at the end of this training period. "A" maintenance positions may only be bumped by qualified "A" maintenance persons.

(h) Should the employee not wish to exercise his plant-wide seniority to bump a junior employee (except extended training period jobs, unless qualified), he will be placed on a voluntary layoff status and will only have recall rights to the jobs and shifts in his bumping chain.

(i) Should the employee fail to qualify in any of the extended training period jobs which he bumps, he will not receive any further bumps but will revert to a voluntary layoff status.

(j) Should the employee fail to qualify on any other jobs onto which he may bump, he will then be able to bump any less senior employee in the "A" Helper or Labor Pool classification or any job held prior. If the employee elects to bump onto the "A" Helper classification he will be given another ten (10) day maximum training period. Failure to qualify for this job during the maximum ten (10) day training period will result in layoff without any additional job opportunities until they are made available through the recall procedure.

(k) Recall shall be the reverse of layoff and an employee must accept recall to prior held jobs and shifts. In order to be considered as having held a job for the purposes of recall to it, an employee must have successfully completed the prescribed training period.

(l) Employees will be given the option to return to any prior held job on a different shift. If they elect to accept such an option all jobs in the recall chain after such election will be dropped from the recall chain.

(m) Should the employee not elect such an option, he will maintain his normal recall chain and the vacancy will be filled by offering the job to the qualified laid off employee in order of seniority. The junior qualified employee must accept the job and shift.

(n) In addition, each employee not working will be offered jobs for which they are qualified but not in their recall chain. If an employee elects not to take this offer, he will only be offered jobs according to the normal recall procedure. However, the junior qualified employee must accept the job and shift.

(o) If an employee accepts a job he will remain on it until laid off, bumped or recalled to a previous job within the normal recall procedure.

(p) When the Company announces its intent that a job will not be in existence any longer, employees holding that job as a bid job will make a permanent bump to a job which they will then hold as their bid job. If any shift is laid off for a twelve (12) month period those affected employees will receive a permanent bump. An employe- 's affected by a permanent bump will make a permanent bump to a job which then beco. . ois bid job.

(q) The Company will give the Union and employee a copy of the payroll change notice within forty-eight (48) hours of the change.

3:04. Job Assignments

(a) Any job opening which exceeds ten (10) working days shall be filled by any employee who has recall rights to such job. In the event there are not available employees with recall rights, the following shall apply: In case the vacancy is that of an operator, the position will be offered to the senior helper of said bid operation in question.

(b) The position of helper will be filled by the senior employee working at the Labor Pool rate.

(c) In the event a vacancy should exist within an operation where no helper is involved, the position will be filled by an assignment from the same shift, if possible. When it becomes obvious that an employee will be assigned to a job for a period of sixty (60) days or more the Company will discuss this assignment with the Executive Committee in order to mutually resolve the filling of this vacancy.

(d) If and when the absent employee returns to his bid job and is physically able to perform said job, he will do so. The employees filling the vacancies created by the absence will return to their previously held jobs.

(e) If the returning employee is not physically able to perform the duties of his former classification, the said employee will use the bumping procedure as outlined in Article III.

(f) In the event there is a question concerning the employee's physical ability to perform a job, it will be referred to a Company doctor. Should there be a disagreement between the Company doctor and the employee's doctor concerning his physical ability to perform a job, the matter will be referred to a third doctor selected by mutual agreement between the Company and the Union.

(g) His decision will be final. The grievance procedure will be waived in connection with the foregoing medical procedure.

(b) An employee who returns to his bid or bumped job under the foregoing paragraph shall return to the job he previously held when the reason for his recall no longer exists.

(i) Employees on assignment can be bumped:

1. By an employee who can perform the work immediately if the temporary assignment is anticipated to continue less than sixty (60) days from the time of the lay off.

2. By an employee with up to a ten (10) day training period and must be able to satisfactorily perform at the end of this training period if this temporary assignment is anticipated to continue more than sixty (60) days from the time of the layoff.

3:05. Job Vacancies

(a) Whenever a job in the bargaining unit becomes vacant for any reason (except vacation, illness, injury or leave of absence, or there is an employee off the job that holds the same bid and shift, and all recall rights by job and shift have been exhausted) the Company will post the job and the shift on which the vacancy arises and keep it posted for forty-eight (48) hours. The vacancy will be filled by the senior bidding employee. In filling that vacancy the senior bidding employee will be given an opportunity to try the job with a reasonable training period (depending on the type of job) unless it is obvious that he does not have the skill and ability to perform it satisfactorily within such training period. Bids will not count against employees requesting shift change on the same job. The names of all bidders will be posted. If the successful bidder is not transferred to the bid job within a period of fifteen (15) days, the Company will submit in writing upon request the reason for such non-transfer. In the event no bids are received, the job will be awarded to the most senior employee in the labor pool not holding a bid job.

(b) If there are no employees in the labor pool without a bid job, the Company may hire a new employee or assign the least senior employee not working to the job. In either case it will become the employee's bid job. No senior labor pool employee will be assigned to an "A" Maintenance job. Maintenance positions will be filled in accordance with Exhibit "B". The definition of a bid job shall mean the job and shift an employee bids, permanently bumps or was assigned according to 3:05. Each employee shall be limited to three (3) successful bids in any

twelve (12) month period. If employee is the successful bidder and then withdraws it shall count as a bid.

(c) The preceding paragraph does not apply in the case of posting a job which is not a replacement job. In the event that an employee is the senior bidder on more than one posted job he must indicate which job is his first preference and withdraw from all other bids on which he is the senior bidder within forty-eight (48) hours of the award. This shall mean he also withdraws his name from all other bids.

(d) Employees in "Extended Training Jobs" are prohibited from bidding out of their position for a period of twelve (12) months after completion of the training.

3:06. Probationary Employees

A new employee shall be considered a probationary employee for the first sixty (60) working days after employment of the new employee, during which time no seniority shall accrue. During such trial period, the Company may discharge the employee with or without cause and the termination cannot be made the subject of the Grievance Procedure. After the conclusion of the trial period, the employee shall be deemed to be a regular employee and his seniority shall start as of the date of employment. The Company agrees to notify the Financial Secretary when new employees have passed their probationary period.

3:07. Removal from Seniority List

(a) An employee shall be removed from the seniority list and his employment terminated for the following reasons:

(1) If the employee quits.

(2) If the employee is discharged for just cause.

(3) If an employee fails to return to work within one hundred forty-four (144) hours after the mailing of a registered or certified notice of recall sent to him at his last known address as shown upon the Company's records. At the time of the mailing, Company will notify a designated Union Official. If an employee fails to return in accordance with this sub section (3:07)(c) because of a valid excuse acceptable to the Company, this sub section (3:07)(c) will not apply.

(4) If an employee is laid off for a period equal to his length of continuous service with a minimum of twenty-four (24) months, or for a period not exceeding forty-eight (48) consecutive months, whichever is less. However, his seniority will not accumulate beyond a twenty-four (24) month period.

(5) If an employee is unable to work due to a non-occupational illness or injury for a period equal to his length of continuous service with a maximum of twenty-four (24) months. If the employee's illness or injury exceeds the twenty-four (24) month period and he continues to keep the Company informed every six months with a medical statement of his inability to return to work because of his non-occupational illness or injury he will be eligible for reinstatement to a job that his seniority will allow him to bump as outlined in Article III, but is not eligible for benefits and does not accrue seniority after his continuous service or twenty-four (24) months is exceeded.

(6) If the employee in the Armed Services with reinstatement rights does not report for work within the time provided in the Universal Military Training and Service Act.

3:08. Transfer out of Bargaining Unit

When an employee is transferred to a position outside of the bargaining unit, he shall have thirty (30) calendar days in which he may return to the bargaining unit or forfeit all rights to his seniority. Under no circumstances shall this be executed more than twice.

3:09. Super Seniority

The Executive Committee of Local #619 consisting of the President, Vice President, Recording Secretary, Financial Secretary and Chief Steward shall have plant-wide super-seniority for the purpose of layoff only.

3:10. Leave of Absence - Union Business

(a) Members of Local #619 will be granted a leave of absence to serve as a Business Agent or International Representative of the International Union for a period not in excess of ninety (90) calendar days at no cost to the Company. The member granted this leave of absence will be permitted to continue his Blue Cross and Blue Shield benefits by making payment of premium for same to the Personnel Office prior to the 15th of each month during the leave. If the period exceeds ninety (90) calendar days, the employee shall forfeit all rights to his seniority.

(b) A minimum of thirty (30) calendar days notice of intent to take such leave of absence as outlined above will be required.

(c) The provision of this paragraph will apply to only one (1) employee at a time.

Article IV. Vacations and Vacation Pay

4.01. Vacations

(a) Each employee who is on the Company's active payroll on the 1st of the month following their anniversary date will be paid according to the following schedule:

Continuously employed for 6 months.....3 days
Continuously employed for 8 months.....4 days
Continuously employed for 10 months.....6 days
Continuously employed for 1 year.....7 days
Continuously employed for 2 years.....8 days
Continuously employed for 3 years.....9 days
Continuously employed for 4 years.....10 days
Continuously employed for 10 years.....15 days
Continuously employed for 15 years.....20 days
Continuously employed for 25 years.....25 days

(b) Employees hired after May 23, 1992 will be paid according to the following schedule:

Continuously employed for 1 year.....7 days
Continuously employed for 2 years.....8 days
Continuously employed for 3 years.....9 days
Continuously employed for 4 years.....10 days

Continuously employed for 10 years.....15 days

Continuously employed for 15 years.....20 days

Continuously employed for 25 years.....25 days

(Vacation becomes effective on the 1st of the month following their 1st year anniversary date).

4.02. Vacation Period

(a) The vacation period shall be the twelve (12) month period from the 1st of the month following an employees anniversary date. The Company has the right to elect to shutdown the plant for one (1) week for vacation purposes, provided notification of the date of shutdown is given to employees at least three (3) months before the shutdown weeks occur.

(b) Employees entitled to more than one (1) week vacation will receive their additional vacation time within their respective twelve (12) month period according to their seniority and so long as there is no interference with production.

(c) The Company will post the number of employees permitted to be on vacation at one time on a given shift and department. In scheduling vacations employees will be given preference according to their seniority. However, in order for an employee to displace a junior employee who has already scheduled his vacation, 60 days notice will be required. The department vacation schedule will be posted for the purpose of informing employees of days open for vacation scheduling.

(d) Employees entitled to more than five (5) days of vacation may take any days in excess of five (5) days in daily increments provided they give three (3) days notice and no interference with production. When the Company limits the number of employees on daily vacation to meet production and maintenance requirements section 4:02 (c) will apply.

(e) The supervisor may grant daily vacation with one (1) day's notice for good and sufficient reason.

(f) Up to three days (3) days of vacation may be taken in one-half day increments with twenty-four (24) hours notice. The supervisor may approve a one-half day vacation with less notice for good and sufficient reason. An employee taking one-half days will be expected to work four (4) hours that day and will not receive a paid lunch period.

(g) During plant shutdown, all maintenance employees, whether by bid or bump, are required to work unless, by mutual agreement, previously scheduled vacation can be honored.

4.03. Vacation Pay

(a) Vacation pay shall be calculated at the regular straight time of the employee's bid job as of their anniversary date and shall be paid to each qualifying employee at the time the vacation begins if the employee so requests.

(b) Shift premium and loyalty bonuses shall be paid on vacation pay.

4.04. Vacation Bonus

Employees with one year of service, shall receive a bonus of $200.00. Bonus is payable in one lump sum along with first vacation check.

4.05. Pro-rated Vacation (Termination)

An employee who leaves the Company payroll shall receive vacation pay and vacation bonus on a prorated basis. Computation of payment shall be based on the number of weeks worked from the 1st of the month following their anniversary date.

Article V. Holidays

5.01. Holidays

(a) The following days shall be recognized as holidays:

New Year's Day
Good Friday
Memorial Day
Independence Day
Labor Day
Thanksgiving Day
Day after Thanksgiving
Day before Christmas
Christmas Day
* Personal Holiday
* Personal Holiday
* Personal Holiday

(* Effective beginning calendar year 1993. Personal holidays must be taken within the calendar year.)

(b) The supervisor may grant personal holidays with three (3) days notice and no interference with production. A personal holiday may be granted with one (1) day's notice for good and sufficient reason.

5.02. Holiday Pay

(a) Eight (8) hours holiday pay at normal hourly day rate will be granted to all wage roll employees who have completed their probation. Shift premium and loyalty bonuses shall be paid on holiday pay.

(b) An employee on layoff or leave of absence will be entitled to receive holiday pay for any holidays that occur within the first thirty (30) calendar days of his absence from work. In the case of illness or accident, the employee will be entitled to receive holiday pay for any holidays that occur within the first one hundred twenty (120) calendar days of the illness or accident.

5.03. Pay - Working on Holiday

(a) An employee who is required to work on any of the holidays listed in Section 5.01 shall be paid for each hour worked at the rate of double time his regular hourly rate in addition to his holiday pay as provided in Section 5.02.

Article VI. General Provisions

6.01. Wash-up Time

Each employee will receive at the end of his work day a fifteen (15) minute paid shower period. The employee is required to use this time for the purpose provided and may not punch out until the close of his shift.

6.02. Insurance

The Company shall pay the cost of the following benefits to all employees covered by the present agreement after sixty (60) calendar days of employment:

Life Insurance	$21,000
Effective 5/24/93	$22,000
Accidental Death and Dismemberment	$21,000
Effective 5/24/93	$22,000
Sick Benefits	$300.00 per week
Effective 5/24/93	$315.00 per week
Blue Cross (Employee and Family)	365 Day Plan
Blue Cross	Diagnostic
Blue Shield (Employee and Family)	Prevailing Rate Plan
Blue Shield	Diagnostic
Mandatory Second Opinion for Elective Surgery	
Dental Plan (Employee and Family)	Delta Plan 1B
Major Medical	$100.00 Deductible
80/20% of first $2,000	$250,000 Maximum
Mental	$50,000 Maximum
$50,000 Out Patient Visitations and Skilled Nursing Facility Coverage	
Mail Order Prescription Drug Program (Maintenance Drugs Only)	

Blue Cross, Blue Shield, Major Medical
(Employee and Dependents) for employees who retire
from active service (between age 62 to 65)
With thirty (30) years service between age 60 to 65)
Blue Cross/Blue Shield "65" Special for retirees who
renre from active service.
Life Insurance for retirees who retire from active service . . . $2,000

(b) The Company will continue Blue Cross and Blue Shield benefits for laid off employees for the remainder of the month in which they are laid off and one (1) additional month.

(c) Employees will be permitted to continue their Blue Cross and Blue Shield benefits during a period of layoff by making payment or premiums for same to the Human Resources Office prior to the 15th of each month during the layoff.

6:03. Work Gloves

The Company will furnish work gloves to employees in all departments and old gloves when no longer usable may be exchanged for new ones.

6:04. Work Clothes

The Company will continue its present policy of supplying employees with work clothes.

6:05. Safety Glasses

(a) The Company will pay the cost of an employee's prescription Safety Glasses no more than once every two (2) years. The prescription must be filled by a company-designated source.

(b) The Company will pay for the replacement of safety glasses damaged from work, through a company-designated source. This will only include present glasses, not new prescriptions.

6:06. Physical Examination

The Company will provide each employee once a year a complete physical checkup.

6:07. Health and Safety

(a) The Company agrees to maintain a joint Labor-Management Health and Safety Committee. The Committee shall be composed of four (4) representatives of Management, including a safety official, and four (4) representatives of the Union. The Union representatives shall be selected by the Local Union.

(b) All unresolved problems shall be referred in writing jointly to the Director of Operations of Cabot Performance Materials, Boyertown Plant, or his designated representative and the Chief Shop Steward of the International Chemical Workers Union Local 619.

(c) No employee shall be required to work on a job or machine while its safety is being questioned by any four (4) members of the Health & Safety Committee, and during such time he shall receive full wages at his regular rate of pay, even if transferred to a lower rated job.

(d) When an alleged unsafe condition is reported, it shall immediately be referred to the designated representative of the Director of Operations. When necessary, the condition will be corrected immediately.

If in the opinion of the designated representative of the Director of Operations no unsafe condition exists, the situation will be explained to the members of the Health and Safety Committee and the employee will return to work.

(e) The Company agrees to abide by all Health and Safety regulations required by the applicable federal law.

(f) The Company further agrees to maintain all accident and health hazard records required by federal and state laws, and will make a copy of Form 200 (Log of Injuries and Illnesses) on a monthly basis and Form 200 (Calendar Year Summary) for the Union members of the Safety Committee. In the event any new forms are required under the OSHA regulations during the life of this agreement, they will also be reviewed with the Safety Committee.

(g) The Company will comply with federal and state regulations to properly identify harmful substances and hazards.

(h) The Company shall provide a continuous training program to assure all employees adequate training in safe handling practices.

(i) The Company agrees to review with the Union pertinent health and safety records of the work environment as required by state and federal regulations.

(j) In case, the Union desires to have a qualified International Chemical Workers Health and Safety person enter the plant to investigate a particular Health and Safety problem, permission shall be granted upon application to the designated Human Resources representative to make such visit to the plant at a mutually satisfactory time provided:

(1) any such visit shall be limited to the investigation of the particular Health and Safety problem as arranged with the designated Human Resources representative.

(2) a representative of the Company will accompany the above Health and Safety representative during such visit.

(k) Any dispute which may arise with respect to health and safety, which are not resolved by the Plant Health and Safety Committee, shall be referred to the third step of the grievance procedure directly without the requirements of the grievance steps as provided for in this agreement.

(l) The Company agrees to make available to each employee's personal doctor his or her medical records held by the Company upon the employee's signed release for such records and a written request from his personal doctor.

(m) When a Union Health and Safety Committee representative spends time at the monthly Health and Safety inspection and/or meeting, he will be compensated for such time at his regular straight time hourly rate of pay.

(n) In the event that an employee is temporarily unable to perform his job due to compensable injury or occupational disease, but can perform another job, the employee shall be paid at either his regular rate of pay or the rate covering the job worked, whichever is higher for a period of up to six (6) months.

(o) Permission will be given designated safety committee members for the purpose of the investigation of specific health and safety problems when the Company has reasonable notice and the investigation is conducted on the Safety Committee member's regular shift.

(p) One Union Health and Safety Committee representative shall be paid at his/her regular rate of pay for time spent in accompanying the Occupational Safety and Health Compliance Officer during inspections in the plant which time shall include attendance at opening and closing conferences.

(q) One Union Health and Safety Committee representative will be paid for attendance at NIOSH opening and closing conferences.

(r) The Company will train one representative of the Health and Safety Committee, designated by the Union, the method of monitoring workplace environment. Once trained, this representative may observe monitoring performed by the Company when a question arises in the Health and Safety Committee as to the validity of the monitoring process.

(s) The Company agrees to provide the Union and the injured employee copies of Industrial Injury Reports submitted for Worker's Compensation.

(t) The Company agrees to provide the generic names of all substances used by production and maintenance employees at the Boyertown Plant.

6:08. Leave for Death in Immediate Family.

(a) The Company will grant up to three (3) consecutive days leave of absence with pay to an employee for death in his immediate family. (parents, spouse, children, brothers and sisters, mother-in-law and father-in-law).

(b) In addition to the above, the Company will grant a one (1) day leave of absence with pay to an employee for death in his family (grandparents, grandchildren, brother-in-law and sister-in-law).

6:09. Leave of Absence

Any employee may request in writing personal leave of absence without pay for good and sufficient cause not to exceed thirty (30) days. The refusal or allowance of personal leave of absence shall be at the discretion of the Company. The employer will provide the Union with a copy of any documentation showing whether the leave request was granted or denied.

6:10. Monthly Union Meeting

(a) The Executive Committee and the Shop Stewards shall be granted time off to attend the regular monthly Union meeting at no cost to the Company.

(b) The Company will grant time off to certain Union members as authorized by the Executive Committee to attend to legitimate Union business at no cost to the Company provided it does not interfere with the efficient operation of the plant.

6:11. Lunch Period

The Company agrees to give all employees covered by this agreement one-half hour paid lunch, subject to the following condition. To receive the paid lunch, the employee must work at least some time after lunch. The Company has discretion in deciding whether to let an employee work after lunch.

6:12. Pension Plan

(a) Pension Plan applicable to employees in the bargaining unit will be amended to provide that effective on May 23, 1992 the normal pension benefit will be $23.25 per month per year of service (maximum of 35 years). For employees who retire after May 24, 1993, the normal pension benefit will be $24.25 per month per year of service (maximum 35 years).

(b) The Company will review annually, with two (2) representatives of Local 619, International Chemical Workers Union, the annual valuation report of the Actuary and such additional information as shall be reasonably required for the purpose of keeping the Union properly informed concerning the operation of the negotiated Pension Plan.

(c) Agreed to change the method of calculating Vesting and Benefit service effective October 1, 1983 from "Hours of Service" to an "Elapsed Time" concept. Effective October 1, 1989 the current vesting of ten (10) years shall be changed to five (5) years (cliff) vesting.

(d) Vesting Service is used to determine your eligibility for a retirement benefit. Vesting Service shall include the aggregate of all continuous periods of employment for a retirement benefit. Vesting Service shall include the aggregate of all continuous periods of employment with Cabot regardless of the number of hours worked. Vesting Service shall also include:

(1) Any period of up to 12 months during which a Participant is absent from work for any reason other than because of quit, retirement, discharge or death;

(2) Any period from the date the Participant quits, retires, or is discharged if he or she returns to employment with Cabot as an eligible Participant within 12 months of such quit, retirement or discharge;

(3) Any period of military service with the United States if the Participant leaves Cabot employment directly for such service and is reemployed by Cabot as an eligible Participant within 3 months after he or she was entitled to be released or such later period as required or permitted by law;

(e) Benefit Service is used to determine the amount of your retirement benefit. In all cases, a Participant shall be credited with Benefit Service for all period of his or her Vesting Service except that no benefit service will be earned beyond your normal retirement date.

(f) Effective May 20, 1989 employees with thirty (30) years of service may retire without reduction of their pension benefit at age sixty (60).

(g) Break-In-Service - If you leave Cabot for at least a year and later rehired, the time you were away may be considered a break-in-service. If you end your employment before you are vested, your prior Vested Service and Benefit Service will be forfeited if your break equals or exceeds your length of service before the break. If you end your employment, after you are Vested and are later rehired, your service before and after your break will be counted.

6:13. Jury Duty

An employee who has an obligation serving society in the form of jury duty or appearing as a subpoenaed witness provided he is not a party in the case, shall be compensated for the difference in his regular hourly rate and the jury duty or subpoenaed witness pay received for such time that the employee executes his obligation.

6:14. Medical Treatment - Workman's Compensation

The Company will pay for lost time for medical treatment or examination due to injury covered by Workman's Compensation.

6:15. Tuition Refund Plan

A highly skilled work force is required to respond to the rapidly changing industrial environment. To help employees enhance their skills a Tuition Refund Program will be provided. Employees may enroll in High School Equivalency Program or high school/college level courses in Computer Applications, Mathematics, Chemistry or Metallurgy. College level courses should be taken at a State University, but other institutions and course work will be considered for good and sufficient reason. Approval of courses must be obtained from Human Resources prior to the start of the course. Upon completion of the course with a grade of C or better the employee will be reimbursed for the cost of tuition.

6:16. Military Duty

(a) Any employee who has completed his probationary period, upon his call to yearly Peacetime Training Camp shall be entitled to two (2) weeks pay difference.

(b) Any employee who has completed his probationary period, upon his Emergency Call-up shall be entitled to two (2) weeks pay difference for any authorized time designated by the appropriate Armed Forces Service.

6:17. Severance Pay

Severance Pay of one (1) week straight time pay for each year of completed service; with a maximum of ten (10) years, will be provided an employee in the event of a complete and permanent plant closing.

6:18. Safety Shoes

(a) The Company agrees to pay up to seventy ($70.00) per year toward the purchase of required safety shoes upon presentation of proof of purchase.

(b) The program begins ninety (90) days from the signing of this agreement to provide the Company time to finalize safety shoe requirements by area in the plant after review and recommendation by the joint Labor-Management Health and Safety Committee.

Article VII. No strike-No Lockout Clause

7:01. No Strike - No Lockout

Section 1.

Neither the International Chemical Workers Union nor its Local 619, will cause nor encourage a strike (including sympathy strikes), slowdown, or work stoppage during the term of this Agreement, and the Company will not during the term of this Agreement, conduct any lockout.

Section 2.

(a) The Company agrees there shall be no liability on the part of the International Chemical Workers Union, because of any strikes, slowdown or work stoppage, provided that the International Chemical Workers Union shall, within twenty-four (24) hours after receipt of notice from the Company to the International Headquarters, Akron, Ohio, of the commencement of any such strike, slowdown or work stoppage, follow the procedure set forth in Section 3 hereof.

(b) The Company agrees there shall be no liability on the part of Local 619 because of any strike, slowdown or work stoppage provided that Local 619 shall, within twenty-four (24) hours of the commencement of such strike, slowdown or work stoppage follow the steps set forth in Section 3 hereof.

Section 3.

(a) Publicly declare that the strike is unauthorized.

(b) Order its members to return to work notwithstanding the existence of any wildcat picket line.

(c) In good faith use every reasonable effort to terminate such unauthorized strike.

(d) Refrain from interfering with any disciplinary action which the Company may take against any employee who is engaged in said strike or work stoppage, provided that if an issue of fact exists as to whether or not any particular employee has engaged in any such unauthorized action, such issue will be subject to the grievance procedure including arbitration.

Article VIII. Adjustment of Grievances and Arbitration

8:01. Grievance and Arbitration Procedure

(a) Should any difference arise between the Company and the Union or between the Company and any employee with respect to the interpretation of application of the terms of this agreement, it shall be settled in accordance with the following procedure:

Step 1. A conference between the Shop Steward and the aggrieved employee's supervisor shall be held to present the matter to the supervisor. A grievance must be presented to the employee's supervisor within twenty-five (25) work days of the incident or when the employee has become aware of the incident. If necessary, the aggrieved employee may be present. The supervisor will give his decision within one (1) work day. For the purpose of filing a grievance, work days shall mean Monday through Friday, excluding weekends and holidays.

Step 2. If the Union is dissatisfied with the decision of the supervisor, the Union may appeal within five (5) work days the supervisors decision to a designated Company representative in writing. The designated Company representative shall call a conference with the Chief Steward to discuss the matter. The designated

Company representative will give his decision within two (2) work days after Step 1 is initiated.

Step 3.

(a) If the Union is dissatisfied with the decision of the designated Company representative, the Union may appeal within five (5) work days following which a conference shall be called between the Union Grievance Committee and the International Representative and the Company Grievance Committee to discuss the grievance.

(b) At this conference the Company and the Union each reserve the right to call for the presence of the grievant and the supervisor directly involved with the grievance. If the grievance is a multi-employee grievance the Union will only be allowed one (1) representative.

(c) If either party elects to have the presence of their respective witness, they must notify the other party at least two (2) weeks prior to such conference.

(d) If there is more than one (1) grievance for the conference, an agenda will be prepared in order to keep the time spent by witnesses attending the conference to a minimum. The Company will pay the bargaining unit witnesses attending the conference for the purpose of giving testimony at their straight time hourly rate but not to exceed two (2) hours.

(e) A decision will be given within two (2) work days after Step 3 is instigated.

Step 4.

(a) If no agreement can be reached in Step 3, either party desiring arbitration must so notify the other party in writing within ten (10) days of the date of disagreement: the Union notice to be given to the designated Company representative and the Company notice to be given to the President of the Local Union. Within five (5) days thereafter the grievance shall be referred to the Federal Medication and Conciliation Service for arbitration pursuant to its Rules

and Regulations. The decision of the arbitrator shall be final and binding and all expenses of the arbitration shall be shared equally by the Company and the Union.

(b) The time limits in this article may be extended by mutual agreement of the parties.

Article IX. Expiration and Renewal

9:01. Expiration

This agreement shall remain in full force and effect until 12:01 A.M. May 21, 1994 and shall be continued for an additional period of one (1) year unless a written notice by either party is given sixty (60) days prior to May 21, 1994 or anniversary thereof, a desire to terminate this agreement.

IN WITNESS WHEREOF, the parties hereto have hereunto set their hands and seals the day and year first written above.

ACCEPTED BY:

LOCAL 619 INTERNATIONAL

CHEMICAL WORKERS UNION

By: Domenick C. Solazzo
President

By: Daniel J. Matz
Vice President

By: Marvin R. Williams, Jr.
Recording Secretary

APPROVED BY:

INTERNATIONAL CHEMICAL

WORKERS UNION

By: Edward Rock
International Representative

ACCEPTED BY:

CABOT CORPORATION

By: Robert S. Barron
Director of Operations

By: Kathleen F. Sokat
Director of Human Resources

By: Nicholas C. Feola
Manager, Manufacturing

By: Terry R. Mest
Manager, Employee Relations

EXHIBIT "A"

Wage Schedule and Loyalty Bonus

Classification	Effective 5/23/92	Effective 5/24/93
Production:		
Crew Leader	15.82	16.53
"A" Operator	15.62	16.32
EB Furnace Operator	15.76	16.47
"B" Operator	15.43	16.12
Helper	15.12	15.80
Foil Mill Operator	15.82	16.53
Intermediate Mill Operator	15.79	16.50
Slitter Operator	15.76	16.47
Roll Grinder Operator	15.76	16.47
Die Maker	15.76	16.47
Wire Drawing Operator	15.76	16.47
Mill Products Operator	15.76	16.47
Extraction Operator	15.76	16.47
Flat Breakdown Mill Operator	15.76	16.47
Boiler Room Operator	15.76	16.47
Mill Prod. Order Proc. Op	15.76	16.47
VAR Furnace Operator	15.76	16.47
Separation #2 Operator	15.76	16.47
K-Cell Operator	15.76	16.47
Pdr. Furn/ Mill/Classify Op	15.76	16.47
Slitter/Welder	15.76	16.47
Powder Utility Operator	15.76	16.47
Maintenance General:		
Maintenance General Journeyman	16.18	16.91
"A" Mechanic	15.93	16.65
Helper	15.12	15.80

Maintenance General Apprentice:		
Entry	15.12	15.80
Level 2 (1 Year)	15.34	16.03
Level 4 (2 Years)	15.53	16.23
Level 6 (3 Years)	15.73	16.44
Level 8 (4 Years)	15.93	16.65
Maintenance Electrical:		
Maintenance Electrical Journeyman	16.18	16.91
"A" Electrician	15.93	16.65
Helper	15.12	15.80
Maintenance Electrical Apprentice:		
Entry	15.12	15.80
Level 2 (1 Year)	15.34	16.03
Level 4 (2 Years)	15.53	16.23
Level 6 (3 Years)	15.73	16.44
Level 8 (4 Years)	15.93	16.65
Painters	14.52	15.17
Labor Pool	14.04	14.67
Labor Pool Entry	12.70	13.27
Janitors	14.04	14.67

Loyalty Bonus

(a) As an incentive for all employees to remain on their bid jobs, a loyalty bonus will be instituted. This bonus will commence one (1) year after job qualification and will be as follows:

(1) For "A" Mechanics and "A" Electricians 10¢ per hour per year of continuous service thereafter up to a maximum of five years.

(2) For Extended Training Operators 5¢ per hour per year of continuous service thereafter up to a maximum of four years.

(3) For Training jobs 5¢ per hour per year continuous service thereafter up to a maximum of two years.

(4) For Non-Training jobs 5¢ per hour per year continuous service thereafter up to a maximum of one year.

(b) This bonus will stay in effect provided the employee remains working in the plant even though laid off or bumped from his bid job.

(c) The bonus shall be terminated as a result of his bidding on another job or being laid off out of the plant.

EXHIBIT "B"

Maintenance Training Jobs

(a) The Company and the Union agree to establish, and maintain through the Maintenance Training Committee, an Electrical and Mechanical Apprenticeship Training Program certified by the Bureau of Apprenticeship and Training, U.S. Department of Labor. All successful bidders for electrician or mechanic position must successfully complete the program requirements for final qualification.

Previously qualified "A" Electrical and Mechanical employees whose bid job is in Maintenance may elect to be certified under the program. The base rate of those not electing certification will not be affected.

(b) Jobs in the maintenance classification will be filled in accordance with the following provisions:

(1) Vacancies for Maintenance jobs will be filled by posting the appropriate job in the apprentice category, such as Maintenance Electrical Apprentice or Maintenance Mechanical Apprentice. Maintenance training bids will be posted in the manner of a specific training shift (or shifts if required to attend Apprenticeship Program classes), and future bid shift. The successful bidder into the appropriate Apprenticeship Program will be the most senior bidder meeting the requirements of the Apprenticeship Program. Qualified mechanics or electricians may bid on respective trainee jobs. However, if a qualified mechanic is the senior bidder on a trainee job posting, he will be moved to the job as a qualified mechanic when it is necessary to fill the vacancy, and it will not be required to report the opening at the time of moving. To fill a current need for a qualified mechanic or electrician because of a vacancy, and there are no qualified bidders on the job posting, the Company may assign the most junior qualified mechanic or electrician to that shift.

(2) Rate and Progression. The apprentice will commence at a rate which is less than the current rate for the maintenance man in the job. Upon satisfactory completion of performance standards, the Apprentice's rate will be increased in accordance with Exhibit "A".

(3) Electrical and Mechanical Apprentices will be required to successfully complete the minimum federal requirement of 144 hours of theoretical instruction per year of training in accordance with the

Apprenticeship Program. The Company will pay the tuition for outside courses in advance. The apprentice is expected to attend a minimum of 80% (80 percent) of the class sessions. If the course is failed but minimum attendance guidelines have been met, tuition will be reimbursed for retaking the course upon successful completion. Present apprentices are not required to take courses until they apply for the Apprentice Certification Program.

(4) A Maintenance Training Committee will be established consisting of three (3) representatives from the bargaining unit and three (3) representatives from Management. The duties of the Committee shall include the following:

(c) To formulate and carry out plans to create and maintain a certified Apprenticeship Program including:

(1) Determine tasks required for the Mechanics Program as well as the Electricians Program to provide the necessary experience and training on the job.

(2) Determine the specific related instruction necessary for the trade.

(3) Approve the duly executed Apprenticeship Agreement between the Company and the apprentice.

(4) Evaluate aptitude tests and approve their use if found appropriate for entry into the Apprenticeship Program.

(5) Hear and resolve all differences which may arise in regard to the terms and conditions of these Standards of Apprenticeship.

(6) Approve tests for determining the Apprentices' progress in manipulative skill and technical knowledge, and to cooperate with the Supervisor of Apprentices in carrying out his responsibilities to the Apprentice, the Company, and the Committee.

(7) Certify the names of Apprentices who have satisfactorily completed their apprenticeships, requesting the issuance of Certificates of Completion of Apprenticeship to the Apprentices so designated.

(8) Determine the requirements necessary to certify previously qualified "A" Mechanical and Electrical Maintenance employees who desire to be certified.

(9) To offer constructive suggestions for the improvement of training.

(10) To determine if an apprentice who is failing to make satisfactory progress should be given any additional time to qualify in accordance with the Apprenticeship Program.

(d) Supervisor shall make a report of the apprentice's progress in accordance with the Apprenticeship Program to the Maintenance Training Committee.

(e) If the apprentice fails to qualify while in the first six (6) months of the program, he shall be permitted to return to his former job. If disqualification occurs between six (6) months and three (3) years into the program, he shall be permitted a plant-wide bump into the Helper classification. If disqualification occurs after three (3) years, he shall be permitted a plant-wide bump. Any dispute involving the satisfactory progress of an apprentice shall be submitted to Step 3 of the grievance procedure. If not resolved at the 3rd Step, the parties will have the dispute resolved within thirty (30) days by a mutually selected arbitrator.

(f) Because of the special training involved, an apprentice is not subject to being bumped. In the event it is necessary to layoff an apprentice, he will be limited to bumping into the Helper classification throughout the plant.

(g) Employees who are successful bidders into the Apprenticeship Program are prohibited from bidding out of their position after completion of their second year of training and until three (3) years after successful completion of the program.

(h) Previously qualified Mechanics and Electricians who bid into a Maintenance Department opening from a production job will be considered "Qualified" but not certified in the Apprenticeship Program. Depending upon the length of time the employee has been out of the department, the Training Committee may require some specific refamiliarization training.

(i) Maintenance Advanced Training Bonus - All qualified "A" Mechanics and Electricians who choose to take and successfully complete a 20-hour minimum outside advanced training course (Electronic Technician, Air Conditioning/Refrigeration, Certified Welder, etc.) shall receive a one-time bonus of $100 (or $200 for a 40-hour or longer course). The Company will pay tuition costs for the course. The training course will be subject to the approval of the Maintenance Training Committee. An employee may receive a maximum of $200 bonus per calendar year.

EXHIBIT "C"

Departments

Department #1
Ta Salts
OG Ta205
Chemical Utility Operator

Department #2

Ta/Cb Digestion
Ta/Cb Extraction
Scrap Dissolution

Department #3

Ti Zir Salts
Drying Room
Waste Filter Plant

Department #4

K-Cell

Department #5

Powder Furnaces

Department #6

Powder-Acid Leach
Powder-Blend/Pack

Department #7

CIP, Bar Furnace,
Annealing
AIRCO EB

Department #8

L-H EB
Consarc VAR
Scrap

Department #9

Wire Drawing
Strand Annealing
Clean - Coat
Die Maker
Order Processor (Wire)

Department #10

Mill Products Operator
Intermediate Mill
Foil Mill
Roll Grinder
Slitter
Slitter/Welder
Order Processor (Mill)
Order Packing
Flat Breakdown Mill

Department #11

Painter
Maintenance Helper
Mechanic
Electrician
Boiler Room Operator
Utility Operator

Department #12

Storeroom
Janitor
Shipping/Warehouse
Labor Pool

LETTER OF INTENT

MARCH 3, 1980

During the 1980 negotiations, the Company agreed to establish two (2) employees as painters, at a rate to be established at negotiations, to be used in painting the facility. This agreement does not mean that the Company can not use other employees or contractors to perform painting at least forty (40) hours per week. If a painting contractor is used on the weekend the Company will work the painters on the weekend.

LETTER OF UNDERSTANDING

MARCH 4, 1980

The Company understands that the Union does not recognize the Company's guidelines dated January 9, 1979 and will not recognize any future attendance guidelines generated by the Company.

In dealing with lateness and absenteeism, the Company will take into consideration all the facts applicable to each individual employee.

MEMO OF UNDERSTANDING

MAY 17, 1986

Non-Training jobs referred to in 3:03 are defined as the following jobs:

1. Painter
2. Separation #2 Ta Salts Helper
3. Shipping/Warehouse Helper
4. Maintenance Helper (Mech and Electrical)
5. Flat Mill Helper
6. TiZir Helper
7. Metal Consolidation Helper
8. Metal Powder Leaching Helper
9. Janitor
10. Labor Pool

Extended training jobs referred to in 3:03 are defined as the following operator jobs:

1. Separation #1 Extraction
2. Flat Breakdown Mill
3. Order Processing - Mill Products
4. EB Furnace
5. Foil Mill
6. Intermediate Mill
7. Crew Leader
8. VAR Furnace
9. Boiler Room
10. Mill Products
11. Wire Drawing
12. Slitter
13. Roll Grinder
14. Die Maker
15. Separation #2
16. K-Cell
17. Powder Furnace/Mill/Classify
18. Slitter Welder
19. Chemical Utility
20. Powder Utility

LETTER OF UNDERSTANDING

MAY 17, 1986

An employee who takes a disability retirement due to an non-occupational disability, prior to reaching age 62, shall receive a continuation of benefits for two years, in the same manner as provided for in § 3:07(a)(5).

ATTACHMENT E

RESUMES OF KEY SAFETY PERSONNEL

5/13/93

William C. Gannon
Quality Assurance Engineer
Radiation Safety Officer

EDUCATION:

B.S. Chemistry, Albright College, 1952

EXPERIENCE SUMMARY:

Mr. Gannon has 37 years experience in the areas of chemistry and quality assurance with Cabot Corporation including 30 years in radiation safety. He has 20 years AIHA Laboratory supervisory experience. He has completed several courses on radiation safety and has served as the Boyertown plant Radiation Safety Officer (RSO) since 1987. Previously, he waste the assistant RSO

POSITIONS HELD:

CQE	Cabot KBI	1989 - 1992
Quality Assurance Supervisor	Cabot KBI	1988 - 1989
Senior Chemist	Cabot KBI	1987 - 1988
Manager Analytical Development	Cabot KBI	1980 - 1987
Analytical Development Supervisor	Cabot KBI	1963 - 1980
Laboratory Supervisor	Cabot KBI	1961 - 1963
Analytical Chemist	Cabot KBI	1955 - 1960

PROFESSIONAL DEVELOPMENT:

COURSE/SEMINAR	SPONSOR/INSTITUTION	DATE(S)
Advanced Chemistry in Masters Program, including Radioisotope Methodology (Dr. Grafton Chase)	St. Joseph's College	1961 - 1963
Training course in Radiological Safety	Applied Health Physics (Dr. Robert A. Gallagher)	1967
SHORT COURSES:		
Biological Effects of Ionizing Radiation	Harvard School of Public Health	June 7-9, 1982
Environmental Radiation Surveillance	Harvard School of Public Health	July 11-15, 1983
Hearing Protection Devices and	Cabot Corp./EAR Div.	December 6, 1982

Hearing Conservation

Occupational and Environmental Radiation Protection	Harvard School of Public Health	August 19-23, 198
Advanced Work Shop on Occupational and Environmental Radiation Protection	Harvard School of Public Health	July 13-17, 1987
Quality Management	Penn State University	1990 (30 hours)
Statistical Quality Control	Penn State University	1990 (30 hours)

PROFESSIONAL MEMBERSHIPS:

American Chemical Society - Analytical Chemistry Division
American Society for Test Materials (ASTM)
Society for Applied Spectroscopy - Lehigh Valley Section
American Industrial Hygiene Association - Delaware Valley Section (AIHA)
American Society for Quality Control (ASQC)
Delaware Valley Section for Radiation Safety (DVSRS)

SUZAN A. FREY

EXPERIENCE

BASF CORP INFORMATION SYSTEMS, Bedford, MA 10/87 - Present

Manager, Safety and Ecology

Responsible for the start-up and management of the Safety and Ecology department at Information Systems. Overall initiate and direct the site to ensure full safety, health, and environmental compliance with the federal, state, and local regulations plus the corporate policies in an efficient and cost effective manner.

Examples of environmental programs were air permit upgrades, underground storage tank monitoring and replacement, asbestos removal, TSCA compliance, recycling projects, MWRA sampling and permit negotiations, and managing hazardous waste. Directed clean-up of tetrahydrofuran spill which used soil-venting and U-V oxidation of contaminated soils and groundwater under the Mass. Contingency Plan regulations. Instrumental in gaining town and state environmental permits for the construction and start-up of a new facility in a joint venture with Fuji.

Safety and Industrial Hygiene programs included Right-to-Know, accident reporting and investigation, safe work permits, DuPont STOP training, safety incentives, safety committees, inspections, area and personal sampling. Accident rate was reduced by 74% within four years.

Five business areas consisted of 1) mixing dispersions, coating, and slitting, 2) production of audio, video, and computer reels and video cassettes, 3) manufacture of plastic components, 4) assembly of floppy diskettes and 5) warehousing operations. Supervised two professionals, one secretary and one co-op student.

MILLIPORE CORPORATION, Bedford, MA 1/84-10/87

Health and Safety Manager

Responsible for the development and start-up of the Bedford site safety and industrial hygiene programs. Initial safety projects included accident reporting and investigation, record keeping and statistical reports. Other highlights were institution of safety rules and procedures, employee safety training, supervisor training, Right-to Know compliance and the DuPont STOP program.

Initiated a chemical inventory, area and personal sampling, medical exams and chemical handling training. Evaluated the ventilation of work areas and hoods. Other concerns involved clean rooms, radiation and biohazards.

Millipore Corp. has been a manufacturer of filters and membranes which serviced the medical, research, electronics and beverage industries. Housed at the Bedford site were manufacturing, engineering, research and development, technical service and corporate functions. Supervised one secretary.

AIR PRODUCTS AND CHEMICALS, Paulaboro, NJ 12/79 - 12/83

Safety, Health, Environmental Supervisor

Directed safety and loss prevention programs to ensure a safe work environment, protect plant property and maintain regulatory compliance. Responsible for employee safety training, internal audits, emergency and disaster planning, process hazards assessments and the plant safety council. Implemented many company directives using DuPont safety training materials. Reduced accident rate by 42%.

Industrial hygiene responsibilities included evaluating potential health risks for existing and new processes and making recommendations for corrective actions. Managed respiratory programs, employee training, and sampling for various dusts, noise and organic vapors.

Environmental responsibilities involved all phases of managing air, water and hazardous waste programs. Pollution control equipment included wet scrubbers, packed tower, carbon adsorber, baghouse and thermal oxidizer. Highlights encompassed sampling, employee training and all permit applications and negotiations.

Paulsboro plant manufactured organic and inorganic catalysts. Typical chemicals included amines, chromium, nickel and copper. Supervised one maintenance mechanic.

ALLIED CHEMICAL, West Conshohocken, PA 9/77 - 11/79

Specialist, Operations Services

Responsible for the environmental, safety, industrial hygiene and medical programs for the Nypol plant. Monitoring, permit negotiations, fire brigade, forklift training, safety training, waste disposal, rules and procedures were examples of job responsibilities. Conducted environmental and safety audits at other locations. Products were nylon pellets and monofilaments.

BOARD OF HEALTH, Wayland, MA 4/89 - Present

Elected Official

Serving second three-year term to an elected three-member board. Involved with subdivision approval, storm water drainage, septic

systems, variance hearings, ground water monitoring and food service compliance issues. Currently participating as chairman.

EDUCATION

DREXEL UNIVERSITY, Philadelphia, PA 9/76 - 8/77
MASTER OF SCIENCE, Environmental Engineering and Science.

DREXEL UNIVERSITY, Philadelphia, PA 9/70 - 8/74
BACHELOR OF SCIENCE, Biology and Psychology.

REFERENCES

References furnished upon request.

ORGANIZATIONS

Board of Certified Safety Professionals - Certified Safety Prof.
Massachusetts Safety Council - Director 6/92 - Present
American Society of Safety Engineers
American Industrial Hygiene Association

RANDALL J. KRESGE
4410 Main Street
Whitehall, PA 18052
(215) 262-6092

PROFESSIONAL OBJECTIVE:

To provide the management and employees of an organization with the leadership and support necessary to achieve and maintain an exemplary safety and health program.

WORK EXPERIENCE:

2/79 To Present — Cabot Corporation, Boyertown, PA 19512

7/85 - Present -- Safety and Health Manager -- Provide leadership, technical support, and program development services to two Pennsylvania manufacturing locations and the Corporation. Coordinate emergency response efforts, workers' compensation, major hazard analysis, hazard communication, and IH activities.

2/80 - 7/85 -- Safety and Industrial Hygiene Supervisor -- Provided safety leadership, technical support, program guidance, and IH services to two Pennsylvania manufacturing locations.

2/79 - 2/80 --- Industrial Hygiene Specialist -- Provided exposure monitoring, auditing, and program development support under guidance of certified Industrial Hygienist.

7/78-2/79 — General Battery Corporation, Reading, PA 19601
Employed as Industrial Hygiene Technician. Provided exposure monitoring and basic IH auditing services to eight manufacturing locations.

PROFESSIONAL DEVELOPMENT:

Continue to develop and maintain technical management and leadership skills. Have completed courses in safety management, radiation safety, hearing conservation, hazardous materials, industrial fire fighting, occupational health, and applied industrial hygiene. Hold certifications as Radiation Safety Officer, Occupational Hearing Conservation, First Aid, and CPR.

Member A.S.S.E. Lehigh Valley Chapter, and A.I.H.A. Central PA Chapter.

EDUCATION:

Kutztown University, Kutztown, PA 19530
B.A. - Physical Sciences, May 1978.

PERSONAL:

Am married with one child. Enjoy archery, hunting, and fishing in spare time. Involved in refurbishing our home as time permits.

resume.rjk

JOHN M. FRANEY

25 WOODLAND AVE.
READING, PA 19606
(215) 779-2516

EDUCATION Shippensburg University, B.A. Geoenvironmental Studies, December 1985.

RELEVANT COURSES:
Physical Geology/ Historical Geology/ Geomorphology/ Mineral & Rock Resources/ Soil Science/ Applied Meteorology & Climatology/ Hydrology/ Oceanography/ Zoology/ Botany/ Ecology/ Field Natural History/ Cartography/ Environmental Land Use Planning/ Remote Sensing/ Conservation of Natural Resources/ Man's Atmospheric Environment/ Industrial Geography/ Economic Geography/ Economics II/ General Chemistry/ Chemical Bonding/ Calculus I.

PROFESSIONAL LICENSES
- Certified Pennsylvania Sewage Enforcement Officer; License # 01930.
- Licensed Pennsylvania Real Estate Salesperson; License # RS-172181-L.

PRESENT EMPLOYMENT Cabot Performance Materials, P.O. Box 1608, County Line Road, Boyertown, PA 19512-1608.
TITLE: Senior Environmental Control Associate. Employed from September 1990 to present time.
Job responsibilities include:

1. Environmental Compliance: Regulate waste water and storm water discharges to ensure compliance with our NPDES Permit. Responsible for completion of various reports to federal and state environmental regulatory agencies, including: NPDES Discharge Monitoring Report, Quarterly Ambient Air Sampling Report, Toxic Release Inventory (Form R), Biennial Residual Waste Report, Biennial Hazardous Waste Report.
2. Waste Water Treatment: Responsible for operation and maintenance of acid neutralization waste water treatment facility.
3. Environmental Sampling: Responsible for administering plant-wide environmental sampling program.
4. Scrubber Test Auditing Program: Responsible for auditing testing performed on various permitted air emission cleaning devices, to ensure compliance with our air permits.

PREVIOUS EXPERIENCE I. Applied Geotechnical and Environmental Services. (AGES),
1151 S. Trooper Road, Norristown, PA 19403. Phone # (215) 666-7404.
Engineering and Soils Laboratory Technician. Employed from November 1988 to September 1990.
Performed the following functions.

1. Soils Laboratory: Responsible for performing various soil testing analysis using ASTM prescribed test methods. Managed soil testing results using VonGueten Soils Engineering Software.
2. Environmental Sampling: Participated in various ground water, surface water, soil, industrial hygiene, and stack sampling projects.
3. Surveying: Participated in property boundary and construction stake-out surveying utilizing electronic distance measurement surveying equipment. Familiar with some basic drafting, manual and computer deed plotting, using Figure Oriented Geometry(FOG) software for survey data management.
5. Construction Inspection: Involved in overseeing various construction projects to ensure compliance with pan specifications. Familiar with using nuclear densometer for field soil compaction testing.
6. Geology: Conducted Subsurface geologic and soils investigations through test pit evaluation, split spoon test borings, core borings, and monitoring well installation.

JOHN M. FRANEY

25 WOODLAND AVE.
READING, PA 19606
(215) 779-2516

PRIOR EXPERIENCE (CONTINUED)

II. Spotts, Stevens, and McCoy. Consulting Engineers.
P.O. Box 6307, Reading, PA 19610-0307. Phone # (215) 376-6581.
Engineering Technician: April 1987 - November 1988. Involved in the following project areas:

1. Sewage Enforcement Officer: Responsible for administering the provisions of the Pennsylvania Sewage Facilities Act for various municipal clients.
2. Asbestos Abatement Air Monitoring Technician: Responsible for conducting both area and personnel industrial hygiene air sampling during asbestos removal projects
3. Environmental Sampling: Assisted in various ground water, surface water, coal and soil environmental sampling projects.

III. Radiation Management Corporation (RMC). Environmental services.
Fricks lock Road, RD #1 , Pottstown, PA 19646 Phone # (215) 326-9662.
Environmental Field Technician: February 1986 - April 1987, involved with the following projects:

1. Dissolved Oxygen Monitoring Program: Responsible for collecting dissolved oxygen and conductivity measurements as various monitoring points along the Schuylkill River between Pottstown and Philadelphia for Limerick Generating Stations nuclear power plant facility.
2. Monitoring Station Calibration Program: A quality assurance/ quality control program which involved performing daily calibrations of the dissolved oxygen and conductivity monitoring equipment,
3. Waste Management Ground Water Sampling: Assisted member of the geology staff for sampling Waste Management municipal landfill facilities.

SEMINARS & CONTINUING EDUCATION

1. PK-4, PA Hazardous Waste regulations. PA Chamber of Business and Industry, October 20, 1993.
2. Pollution Prevention, PA Chamber of Business and Industry, September 2, 1993.
3. Environmental Regulations Course, Executive Enterprises Inc., May 20 & 21 , 1993.
4. The Nuts and Bolts of Environmental Compliance, MABC, April 14, 1993.
5. Intermediate Quatro Pro, June 1992.
6. Integrated Environmental Management, MABC, eight week course, February- March 1992.
7. Chemical Emergency Response Training Course. 40 hours training, September 24-26, 1993.
8. Understanding The Clean Air Act Amendments, 1991
9. Storage Tanks and Secondary Containment, 1991.
10. Statistics, Penn State University, Berks Campus, Winter Term 1991.
11. OSHA 1910.120 (E) (2), 40 Hours Training Hazardous Waste Site Operations, Synergist Inc., January-February 1990.
12. Wetlands Course, West Chester University, June , 1989.
13. Radiation Safety and Use of Nuclear Soil Gauges, CPN Corp., March 1989.
14. AHERA Asbestos Abatement Building Inspectors Course, Temple University, December 1987.
15. Real Estate Practice, Berks Real Estate Institute, November-December 1987.
16. Real Estate Fundamentals, Berks Real Estate Institute, September -October 1987.
17. Groundwater Sampling Techniques, Waste Management Inc. & ETC Labs, September 1986.

REFERENCES

Available upon request.

ATTACHMENT F

LOCAL 959 UNION CONTRACT

ATTACHMENT G

LOCAL 619 UNION CONTRACT

ATTACHMENT H

RESPIRATOR PROGRAM, POLICY, REQUIREMENTS,

AND GUIDELINES

CABOT CORPORATION

BOYERTOWN PLANT

RESPIRATOR PROGRAM

POLICY, REQUIREMENTS & GUIDELINES

02/25/87 (update)
04/18/88 (update)
06/22/90 (update)
01/31/91 (update)
04/30/91 (update)

SDW/cmn/jle/respprg.wp
May 1, 1991

TABLE OF CONTENTS

SECTION I - CABOT-BOYERTOWN RESPIRATOR POLICY

A. This program has been developed to provide protection for Cabot - Boyertown employees from respiratory hazards when:

1. Effective engineering controls are not feasible or while they are being instituted.

2. A change in procedure or process equipment has taken place and is being tested and there is doubt of the exposure levels.

3. One enters a confined space of unknown oxygen content or an oxygen content below 19.5%.

4. An emergency situation occurs releasing to the atmosphere an unknown quantity of a harmful substance.

B. A harmful air contaminant is any substance listed by OSHA in Subpart Z- "Toxic and Hazardous Substance", 29 CFR Part 1910, or published by the American Conference of Governmental Industrial Hygienists (ACGIH).

This program meets and is in conformity with the following and all other governmental safety and health regulations relative to respiratory protection in the work environment:

1. OSHA Standard 29 CFR 1910.134 Respirator Protection.

2. NIOSH and MSHA approved respiratory protective devices.

3. ANSI Z 88.2, 1969: Practices for Respiratory Protection.

SECTION II - SELECTION OF RESPIRATORS

A. The Safety & Health Assistant and/or Senior Plant Safety Engineer selects and prescribes the respiratory protection devices for each job and for any anticipated emergency use situation. Respirators are selected and prescribed suitable to:

1. The nature of the hazard.

2. The extent or degree of the hazard.

3. Work requirements - stress, heat, cold, etc.

4. Conditions, characteristics, and limitations of the respiratory protection devices.

B. The following publications or literature are used in the respiratory protection devices:

1. NIOSH/OSHA Standards Completion Program: "Respirator Decision Logic".

2. ANSI Z 88.2, 1969: Practices for Respiratory Protection".

3. NIOSH: "Respiratory Protection Factors". (Appendix A)

4. Material Safety Data Sheet for the applicable substance.

C. All selected respirators are NIOSH/MSHA approved (see Fig. 1). Where no approval exists for a substance or a particular respirator (i.e. disposable dust respirators), selection of the respirator for the contaminant is made only after evaluating the selection consideration with the manufacturer.

D. During any production, service, or research job, at which the worker's breathing zone concentrations for a substance are known to exceed the Permissible Exposure Limit (PEL) of the substance as published in OSHA standard, Subpart Z, 29 CFR Part 1910, the worker is required to wear a suitable respiratory protection device until the job is brought under control. Should OSHA not list a PEL, the substance's Threshold Limit Value (TLV) published by the ACGIH is used.

E. Jobs requiring the routine use of a respirator are air sampled as required by government regulations and job conditions. The most recent sample(s), which in the opinion of the Safety & Health Assistant and/or Senior Plant Safety Engineer are considered reliable air sample data, are used to determine the adequacy of the

respiratory protection being considered. The affected worker(s) are immediately notified through their supervisors of any respiratory protection change(s).

F. Designated union representatives are notified of air sampling results as soon as possible after the sample analyses are complete.

G. The responsible supervisor will contact the Safety & Health Assistant prior to:

1. Making any process, material, or equipment changes.

2. The testing of a new process or equipment.

3. Demolitions, cleaning equipment, or other services which involve harmful substance exposure or confined space entry.

H. It is the responsibility of the Safety & Health Assistant and/or Senior Plant Safety Engineer to evaluate any changes, tests, or actions and instruct the supervisor(s) in appropriate respiratory protection requirements. Where feasible, the breathing zone of the worker(s) performing the above described job(s) is air sampled.

SECTION III - MEDICAL SURVEILLANCE

Pulmonary function tests, including at least Forced Vital Capacity (FVC) and Forced Expiratory Volume-one second (FEV), are offered to Cabot - Boyertown employees who might wear respiratory protection. These test results together with the available medical history data are interpreted by the plant's physician to determine the ability of the employee to wear respiratory protection. Persons who have a history of pulmonary dysfunction, cardiovascular disease, epilepsy, or other illnesses, which may affect the worker's personal health by wearing a respirator, will not be assigned to a respirator-use job unless the physician authorizes it. This restriction applies to an emergency respirator job function such as a chemical release episode.

Should a respirator wearer suffer a facial injury or change whereby he cannot obtain an effective respirator seal, his supervisor immediately restricts him from a job requiring respirator use. This restriction continues until the Safety & Health Assistant requalifies him with a prescribed job respirator fit test.

SECTION IV - TRAINING AND EDUCATION

The Safety & Health Assistant is responsible for training all employees in the use of the respirators at the time of hire, bi-annually for individuals assigned to Respiratory Protection Areas, and prior to assignment of an individual to a respirator use area from a non-respirator use area.

A. Outline for Training and Education in the Principles of Respiratory Protection for Cabot-Boyertown

1. Introduction - Factors affecting selection of respiratory protection (general).

   a. Protection of the Employee from Occupational Hazards

      (1) Air contaminants
         (a) dust - grinding, crushing, drying
         (b) fume - welding, molten metal operations
         (c) mist, gases, vapors - acid, solvents
         (d) Effects on the skin or eyes - irritation, dermatitis, burns
      (2) Respiratory effects - asbestosis, irritation
      (3) Oxygen deficient atmosphere

   b. Federal Regulations Governing Respirator Use (general)

      (1) Permissible Exposure Limit (PEL)- OSHA
      (2) Respirator Protection Factors (general)
      (3) Duration of exposure

2. When Respiratory Protection is Necessary

   a. Engineering controls - when infeasible or are being instituted.

   b. Equipment failure, emergency situations, poor work habits, unknown concentrations.

3. Types of Respirators and Structure

   a. Air purifying

      (1) Half and full facepieces, Racal
      (2) Filters and cartridges

b. Atmosphere Supplying

(1) Supplied air - sand blast hood
(2) SCBA (self-contained breathing apparatus) - Scott air packs

c. Respirator parts (half facepiece)

(1) filters/cartridges, gaskets, inhalation valves
(2) exhalation valve cover, exhalation valve
(3) facepiece and straps

4. Users's Ability to Wear

a. Slight restriction of normal breathing

b. Medical problems affecting the wearing of respirators, i.e., asthma, emphysema, suspected lung or heart problem

c. Medical examination-pulmonary function testing, assignment to a non-respirator use job

5. Fit Test

a. Positive Pressure Test

b. Negative Pressure Test

c. Smoke Tube Test - irritant smoke

6. Proper use of Respirator

a. Position of Straps

b. Positive Pressure Field Test

c. Interfering Factors, e.g.: Facial hair, dentures, scars, etc.

d. Speaking through Respirator without Lifting Facepiece

7. Care and Storage of Respirator

   a. when not in use-place in plastic bag with straps outside of facepiece.

   b. at the end of shift-return to cleaning station; do not store in locker, work area, etc.

   c. change filters or cartridges when breathing with respirator becomes difficult or contaminant is smelled.

8. 5 Point Summation

   a. Choose the right respirator and filter for the right job. Use the charts available in the respirator pick-up area.

   b. Be certain your respirator fits properly before and during the job.

   c. Wear it. It does no good hanging from your neck or lying about in the work area.

   d. Don't contaminate the inside of the facepiece.

   e. Return the respirator for cleaning.

SECTION V - RESPIRATOR FIT TESTING

The Safety & Health Assistant or the Senior Plant Safety Engineer conducts a qualitative respirator fit test for each employee, if this test has not been previously administered, before the employee works in a respirator-use area. The user is tested with the prescribed work respirator(s) including any applicable emergency use respirator.

The fit test and training is repeated bi-annually and whenever another type of respirator is prescribed for the job. Fit testing and training are also repeated whenever the wearer has any facial changes which do not permit a seal after applying the positive pressure field test.

It is essential that no facial hair contact the respirator seal area. Any facial hair in contact with the respirator seal area must be removed in accordance with the following Cabot-Boyertown Plant Safety Rule:

> "Beards are not permitted in areas of respirator use. A beard or interfering facial hair does not permit an effective seal of a respirator. It also creates an additional hazard in the event of a molten metal or corrosive chemical splash. A mustache on the upper lip will be permitted."

Results of all fit tests administered and training dates are recorded on the Respirator Fit Test & Training Record (Appendix B).

A. Qualitative Fit Testing

The preferred and more positive test is the irritant smoke test. Although for test purposes only, high efficiency particulate cartridges are substituted and used with the irritant smoke to test fit.

Prior to smoke tube testing the subject first conducts a positive, and when possible, a negative pressure test. This preliminary test precaution is taken to avoid unnecessary exposure to the smoke or vapors should the individual have an inadequate seal.

1. Positive Pressure Test

a. The subject puts the respirator on with both straps in their correct position.

b. The exhalation valve is closed by pressing against it lightly with the palm of the hand or finger tips. When necessary, remove the exhalation valve cover to gain access to the valve.

c. Exhale lightly into the facepiece.

d. A satisfactory fit is obtained if the facepiece "balloons" slightly without any noticeable outward leakage around the facepiece.

e. If leakage occurs, the wearer should readjust the strap tension or repositior. the facepiece and repeat the test. If leakage persists, an alternate respirator should be obtained and the test repeated.

2. Negative Pressure Test

a. The subject puts the respirator on with both straps in their correct position.

b. The inlet source of air of the cartridge or filter media is closed off by covering it lightly with the palms of the hands. If an air supply delivery tube is the inlet source of air, the tube can be closed to cut off the air supply.

c. During inhalation, the facepiece will collapse slightly if there is no leakage.

d. A satisfactory fit is obtained if the facepiece does not return to its original integrity after a few seconds.

e. If leakage occurs, the wearer should readjust the strap tension or position of the facepiece and repeat the test. If leakage persists, an alternate respirator should be obtained and the test repeated.

3. Smoke Tube Test

This test must be preceded by the positive and, if possible, the negative pressure tests. The smoke tube test is intended for qualitative determination of facepiece seal and can be used on all types of respirators other than disposable types. High efficiency cartridges (fume and/or radionuclides approved) must be used. The irritant smoke may pass through the filter media of a disposable respirator, or a cartridge approved only for dust, organic vapors, or acid gas.

a. The test should be performed in a area which allows proper ventilation of generated smoke while providing adequate exposure to the individual being tested.

b. An irritant smoke (the preferred smoke tube is the MSA Stannic Chloride Tube-Part No. 5645) is generated by aspirating air through the smoke tube using an aspirator bulb. The exit end of the smoke tube should be covered with a piece of Tygon, rubber, or plastic tubing to prevent contact of the glass edges of the open tube with the individual's face.

c. With eyes closed (to avoid eye irritation by the smoke), the subject should move his head from left to right while wearing his respirator in the proper fashion. During the head movements, the

smoke generated should be directed around the entire sealing surface of the mask. Smoke generation should begin at approximately one foot from the respirator and approach no closer than six inches.

NOTE: The slightest indication of irritation by the employee, viz., cough, facial distortion, back-up motion, etc., should prompt immediate discontinuance of smoke generation. The cause of irritation may be due to a poor seal.

d. After approximately 30 seconds (with no subject response), verbal instructions to move head up and down are given while continuing smoke generation.

e. After approximately 15 seconds (with no response), verbal instructions are given for the employee to speak his name, address, social security number or some simple series of verbal comments to allow testing of the seal during use of the face muscles. A leak at this point may not necessarily mean poor fit, but does provide an additional margin of proof that a good seal can be achieved.

f. Before asking the employee to open his eyes, any smoke in the individual's breathing zone should be dispersed by waving a hand across the face of the employee as needed.

g. Any indication of detection of the smoke by the subject should prompt refit attempts to include readjusting strap tension, placement of mask on face, etc. If subject continually fails this test and it appears obvious that no fit can be achieved, consideration to a different size or style of respirator must be given. It is most likely that several different sizes or styles will be needed due to the various facial geometries encountered.

B. Recordkeeping

1. The tester records each fit test on the "Respirator Training and Fit Test Record" (Appendix B). Both satisfactory and unsatisfactory fit test results are recorded for all types of respirators tested.

2. In addition, the tester will give each employee fit tested a copy of the "Employee Respiratory Protection Procedures" (Appendix C).

3. The appropriate respirator, bearing the employee's identity number, is issued to the employee when he is assigned to a job requiring an air purifying respirator.

4. A list of each assigned respirator by number and type is maintained by the Safety & Health Assistant and is posted in the Respirator Cleaning Room.

SECTION VI - CLEANING AND MAINTENANCE PROGRAM

The cleaning and maintenance program has been established to insure that the respiratory protection devices in use are maintained to the effectiveness of their original condition. The program contains these basic services:

1. User identification on individually assigned respirators.

2. Inspection for defects before and after use of each routinely used or emergency respirator.

3. Appropriate cleaning and disinfecting of respirators.

4. Repair and replacement of defective parts as authorized by the manufacturer.

5. Storage for routinely used and emergency respirators.

6. An inspection of all respirators is performed monthly. Defective parts are replaced as necessary and the date of inspection is recorded.

A. Standard Operating Procedure (SOP) for Cleaning, Disinfecting, and Storage

The following SOP is in accordance with the manufacturer's recommendations and OSHA requirements. The cleaning and disinfecting facilities are provided and maintained in a clean environment. The individual responsible for cleaning respirators (the Safety & Health Assistant) is trained by and reports to the Safety & Health Manager in the performance of his or her duties.

1. Facilities are provided to store the respirators in a clean plastic bag in locations where they are protected against dust, damaging chemicals, excessive sunlight, and extreme heat or cold. These combined "respirator storage - used respirator drop" locations are as follows:

a. For Production and Maintenance personnel - in the respirator storage room of Building 107.

b. For Technology and Analytical personnel - in the lunch room in Building 011 and hallway outside lab 13.

2. Emergency respiratory protection equipment (SCBA) is stored in clean, easily accessible locations throughout the plant. The storage areas are as follows:

a. Building 106 - in the fire hose shed beside the Technology Pilot Plant.

b. Sodium Fire Fighting Equipment Shed East Side of Building 100.

c. Building 009 - in the Emergency Response Trailer.

d. Building 030 - in the fire hose shed next to building.

B. Standard Operating Procedure (SOP) for Cleaning, Disinfecting, and Storage of Respirators

1. All used respirators will be returned to the respirator drop locations at the end of the individuals' shifts and retrieved for cleaning and inspection. The drop locations are as follows:

a. Building #107 - respirator storage room.

b. Building #011 - hallway receptacle outside Lab #13.

2. Note the condition of each respirator returned, i.e., strap missing, valve missing, etc.

3. Disassemble each respirator and inspect each part for wear and distortion. Discard only dust/mist filter pads from assigned respirators. Cartridges from assigned respirators will be replaced on respirator they were removed from after the facepiece is cleaned if they are in visibly good condition. Wear impermeable gloves during disassembly step.

4. Respirators from all three shifts will be disassembled and washed in the dishwasher or by hand.

5. When washing with the dishwasher, place all parts (excluding filters and cartridges) into dishwasher. Place the dishwashing detergent into all three

halves of the container on the inside of dishwasher door. Close and lock door and press the button marked "soak and scrub/pots and pans". When dishwasher has completed 1 full cycle remove parts and place in drying cabinet for forced air drying. Follow steps 9 and 10.

6. When washing by hand, place all parts (excluding filters and cartridges) into a warm water-detergent solution (not to exceed 120°F) using Aairkem A-33 Dry. Soak in solution for 10-20 minutes. Gloves are to be worn during the dismantling, cleaning, washing, and disinfecting operations to avoid dermatitis and for hygienic reasons.

7. Scrub the facepiece and cartridge holder with a brush and hand wash other parts.

8. Rinse all parts in clear, warm water and place in drying cabinet for forced air drying.

9. Reassemble each respirator, replacing worn parts and filter media as necessary. Replacement parts must be those approved as exact replacement parts. Filter media must be those approved for each individuals's job by the Safety & Health Assistant and/or Senior Plant Safety Engineer.

10. Place each dried respirator in a clean plastic bag and return it to the individual's storage bin. The list of assigned respirators must be reviewed to ensure that all employees have clean respirators available for use.

C. Inventory Control

1. A sufficient number of prescribed respirators, replacement parts, air purifying filters and cartridges is maintained and properly stored in the Respirator Cleaning Room. A weekly audit of inventory in the cleaning room will be performed by the Safety & Health Assistant to avoid serious depletion of replacement parts. The Safety & Health Assistant will order all replacement parts based on this audit.

2. Replacement parts for defective or spent units are those approved as exact replacement parts. Parts are not interchanged with components having a different NIOSH/MSHA approval number.

3. When a replacement respirator is issued to an individual, only a like respirator for which the wearer has been satisfactorily fit tested is issued.

4. A sufficient number of prescribed air purifying respirators are maintained and properly stored in the event that personnel not assigned respirators (i.e. maintenance personnel) will need respiratory protection of this type.

SECTION VII - PROGRAM SURVEILLANCE AND EVALUATION

The Safety & Health Assistant makes a complete program evaluation at least annually. This evaluation and its accompanying "Respirator Audit" with comments will be reviewed with the Safety and Health Manager. Whenever necessary, the written procedures will be modified to reflect the evaluation results.

A. Air Sampling/Biological Monitoring

1. Biological tests taken to determine the amount of harmful substances inhaled and work related illnesses due to harmful substance inhalation are cause for an immediate hazard control evaluation, including the effectiveness of respirator program.

2. Jobs which require the routine use of the respirators are air sampled periodically. Both personal and ambient air samples are taken according to the measured level of air contamination in the worker's breathing zone and the protection factor of the required respirator.

B. Audit of Job Area for Compliance and Problems

1. It is the responsibility of the Safety & Health Assistant to make frequent inspections of job areas where respirators are required noting such things as:

   a. Proper use and compliance

   b. Interim job care given the respirator

   c. Condition of the respirator

   d. Environmental problems such as heat, moisture, cold

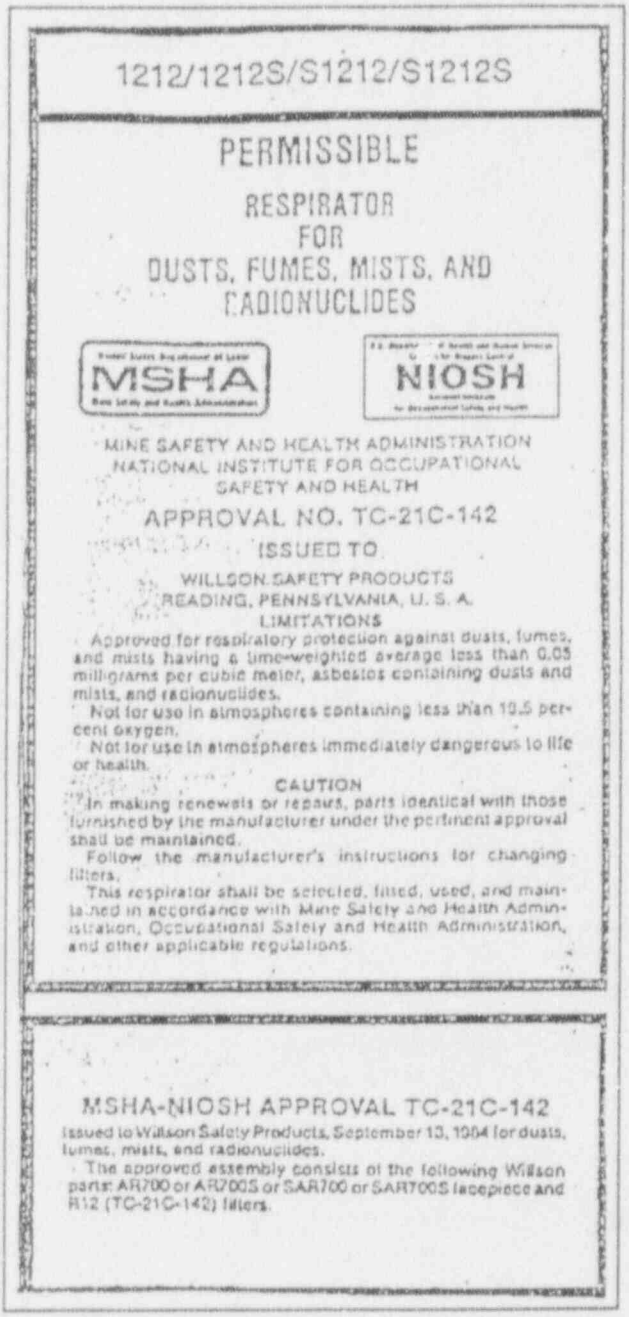
   e. User discomfort and fatigue

2. The Safety & Health Assistant also audits and evaluates the cleaning and disinfecting program, inventory, training, and required record-keeping. Deficiencies observed in any of the above will be resolved by the Safety & Health Assistant and the appropriate personnel (i.e., supervision, etc.).

C. Audit for Respirator Program Compliance

1. The following Respirator Audit is to be completed by the Safety & Health Assistant annually. The completed audit will be reviewed with the Safety & Health Manager. Acknowledgement of each column indicates that the item is acceptable. If deficiencies are observed and further action is required, the Action Required column is noted by placing a numerical reference to subsequent entries in this column. The number(s) and specific recommendations are to be entered in the Audit Review Comments Section.

2. After completion of the audit, the auditor and any co-inspectors shall sign and date the form.



1212/1212S/S1212/S1212S

PERMISSIBLE

RESPIRATOR
FOR
DUSTS, FUMES, MISTS, AND
RADIONUCLIDES

MSHA

NIOSH

MINE SAFETY AND HEALTH ADMINISTRATION
NATIONAL INSTITUTE FOR OCCUPATIONAL
SAFETY AND HEALTH

APPROVAL NO. TC-21C-142

ISSUED TO

WILLSON SAFETY PRODUCTS
READING, PENNSYLVANIA, U. S. A.

LIMITATIONS

Approved for respiratory protection against dusts, fumes, and mists having a time-weighted average less than 0.05 milligrams per cubic meter, asbestos containing dusts and mists, and radionuclides.

Not for use in atmospheres containing less than 19.5 percent oxygen.

Not for use in atmospheres immediately dangerous to life or health.

CAUTION

In making renewals or repairs, parts identical with those furnished by the manufacturer under the pertinent approval shall be maintained.

Follow the manufacturer's instructions for changing filters.

This respirator shall be selected, fitted, used, and maintained in accordance with Mine Safety and Health Administration, Occupational Safety and Health Administration, and other applicable regulations.

MSHA-NIOSH APPROVAL TC-21C-142

Issued to Willson Safety Products, September 13, 1984 for dusts, fumes, mists, and radionuclides.

The approved assembly consists of the following Willson parts: AR700 or AR700S or SAR700 or SAR700S facepiece and R12 (TC-21C-142) filters.

FIGURE 1
TYPICAL NIOSH/MSHA APPROVAL LABEL

APPENDIX A
RESPIRATOR PROTECTION FACTORS[a]

Type of Respirator	Permitted for Use in Immediately-Dangerous-to-Life-or-Health Atmosphere[f]	Respirator Protection Factor
		Qualitative Test
Vapor or gas removing, or half-mask facepiece[e]	NO	10, or maximum use limit of cartridge or canister for vapor or gas, whichever is less.
Combination particulate filter and vapor or gas removing, or half-mask facepiece [b,e]	NO	10, or maximum use limit of cartridge or canister for vapor or gas, whichever is less.
Particulate filter, full facepiece[b]	NO	100
Vapor or gas removing, full facepiece	NO	100, or maximum use limit of cartridge or canister for vapor or gas, whichever is less.
Combination particulate filter and vapor or gas removing, full facepiece[b]	NO	100, or maximum use limit of cartridge or canister for vapor or gas, whichever is less.
Air-line, continuous flow, helmet, hood, or suit, without escape provisions	NO	N/A - No tests are required due to positive pressure operation of respirator. The protection factor provided by the respirator is limited to the use of the respirator in concentrations of contaminants below the immediately-dangerous-to-life-or-health (IDLH) values.
Air-line, continuous flow, helmet, hood, or suit with escape provisions[e]	YES	N/A - No tests are required due to positive-pressure operation of respirator. The maximum protection factor is 10,000 plus[g].
Self-contained breathing apparatus, pressure demand type open circuit, or positive pressure type closed circuit, half-mask facepiece, or full facepiece	YES	N/A - No tests are required due to positive pressure operation of respirator. The maximum protection factor is 10,000 plus[g].
Combination respirators not listed[d]	YES	The type and mode of operation having the lowest respirator protection factor shall be applied to the combination respirator.

N/A - Not applicable since a respirator fitting test is not carried out.

[a]A respirator protection factor is a measure of the degree of protection provided by a respirator to a respirator wearer. Multiplying the permissible time-weighted average concentration or the permissible ceiling concentration, whichever is applicable, for a toxic substance, or the maximum permissible airborne concentration for a radionuclide, by a protection factor assigned to a respirator gives the maximum concentration of the hazardous substance for which the respirator can be used. Limitations of filters, cartridges, and canisters used in air-purifying respirators shall be considered in determining protection factors.

[b]When the respirator is used for protection against airborne particulate matter having a permissible time-weighted average concentration less than 0.05 milligram particulate matter per cubic meter of air, or less than 2 million particles per cubic foot of air, or for protection against airborne radionuclide particulate matter, the respirator shall be equipped with a high-efficiency filter(s).

[c]If the air contaminant causes eye irritation, the wearer of a respirator equipped with a half-mask facepiece or mouthpiece shall be permitted to use a protective goggle or to use a respirator equipped with a full facepiece.

[d]If the powered air-purifying respirator is equipped with a facepiece, the escape provision means that the wearer is able to breathe through the filter, cartridge, or canister and through the pump. If the powered air-purifying respirator is equipped with a helmet, hood, or suit, the escape provision shall be an auxiliary self-contained supply of respirable air.

[e]The escape provision shall be an auxiliary self-contained supply of respirable air.

[f]The definition of "oxygen deficiency - not immediately-dangerous-to-life-or-health" is as follows: The 19.5 percent figure is used by others because slight symptoms, such as increased heart beat and respiration rate, may be observable. (Patty, Frank Arthur. *Patty's Industrial Hygiene and Toxicology*: Wiley Interscience Publication, 1979, p.665)

[g]The protection factor measurement exceeds the limit of sensitivity of the test apparatus. Therefore, the respirator has been classified for use in atmospheres having unknown concentrations of contaminants.

APPENDIX B
RESPIRATOR FIT - TEST & TRAINING RECORD

Employee: _____

Social Security No.: _____ Date of Hire: _____

Initial Training Date: _____ Trainer: _____

Test Date & Tester	Respirator Tested (1)	Facial Hair (2)	Test Results - Comments (3)

(1) Facepiece
H-half mask
F-full mask
(include specific mfg. model)

(2) Facial Hair
M-moustache
B-beard
B( )-beard
(day's growth)
G-goatee

(3) Qualitative Test Results
P-pass
F-fail
ST-smoke tube
IA-isoamyl acetate

APPENDIX C
EMPLOYEE RESPIRATORY PROTECTION PROCEDURES

1. At the start of your shift, remove your respirator from the storage bin assigned to you and verify your number on the facepiece. If you have not been assigned a respirator and need one, choose the appropriate respirator from among the UNASSIGNED RESPIRATORS. If you need help see your supervisor or Safety Department personnel.

2. Remove the respirator from its plastic bag, check the parts, and perform the positive pressure fit test before using the respirator on the job. Keep the plastic bag in your pocket when using the respirator.

3. On the job, when not using your respirator, return it to the plastic bag. DO NOT lay an unbagged respirator anywhere in the work area since contaminants will settle on it.

4. Perform the positive pressure fit test periodically while wearing the respirator.

5. Wear the respirator with all straps in their correct position.

6. At the end of you shift, return the respirator to the used-respirator drop areas as follows:

   A. Production and Maintenance personnel - respirator storage room of Building #107.

   B. Technology personnel - in the Building #011 hallway receptacle outside Lab #13.

7. Respirators placed in the drop area will be cleaned, disinfected, refurbished, and returned to the storage area before the start of your next shift.

8. If at any time you have a problem with your respirator, contact your foreman immediately.

   NOTE: Dust filters will be changed daily, however, filter cartridges may not be changed on a daily basis unless necessary. If you have difficulty breathing or smell a contaminant while wearing the respirator properly, a change of cartridge may be necessary - see your foreman.

APPENDIX D
MONTHLY CHECK LIST FOR RESPIRATORS

Year _____			Year _____		
MONTH	X	Initial	MONTH	X	Initial
January			January		
February			February		
March			March		
April			April		
May			May		
June			June		
July			July		
August			August		
September			September		
October			October		
November			November		
December			December		

APPENDIX E
RESPIRATOR AUDIT

Program Acceptability

		Yes	Action Required
I.	ADMINISTRATION OF PROGRAM		
A.	Is one individual responsible for the program?	_____	_____
	If YES, indicate name: _____		
B.	Is the program administrator qualified in all aspects of the program, respirators, and equipment?	_____	_____
II.	STANDARD OPERATING PROCEDURES		
A.	Is there a policy statement establishing the plant's respirator program?	_____	_____
	If YES, indicate date issued: _____		
B.	Is there a detailed S.O.P. for:		
1.	training and education	_____	_____
2.	fit testing	_____	_____
3.	recordkeeping (including fit test results)	_____	_____
4.	cleaning and disinfecting	_____	_____
5.	selection and use (including emergency use)	_____	_____
6.	inspection and repair	_____	_____
7.	emergency evacuation	_____	_____
III.	INSPECTION PROGRAM		
A.	Are respirators used where oxygen deficient atmospheres exist or are suspected?	_____	_____

		Program Acceptability	
		Yes	Action Required
B.	Are respirators used where engineering controls are not feasible or where they are being instituted?	_____	_____
C.	Is training and education of user(s) being utilized?	_____	_____
D.	Is fit-testing routinely performed (qualitative)?	_____	_____
E.	Are employees fit-tested?	_____	_____
1.	at time of hire	_____	_____
2.	bi-annually	_____	_____
3.	other (specify)	_____	_____
F.	Is the instructor and fit-test administrator properly trained and competent to execute the program?	_____	_____
G.	Are adequate records maintained?	_____	_____

IV. SELECTION, USE & ISSUE

A.	Are respirators selected by a qualified, competent individual?	_____	_____
	If YES, indicate name: _____		
B.	Are records of respirators issued and required filter media maintained?	_____	_____
C.	Are respirators issued in the personal identification of the user?	_____	_____
D.	Are respirators worn properly?	_____	_____
E.	Have respirators in use been properly fit-tested?	_____	_____
F.	Is the respirator providing adequate protection for the use it is intended?	_____	_____

Program Acceptability

		Yes	Action Required
G.	Have air samples been updated relevant to respirator use?	_____	_____

V. CLEANING AND MAINTENANCE

A.	Is an appropriate cleaner/disinfectant being used for washing?	_____	_____
	If YES, what is the cleaner? _____		
B.	What washing method is used?		
	1. hand	_____	_____
	2. machine	_____	_____
	3. other (specify)	_____	_____
C.	Does the wash temperature exceed 49°C (120°F)?	_____	_____
D.	Are respirators dried using:		
	1. normal evaporation	_____	_____
	2. forced air evaporation	_____	_____
	3. machine drying	_____	_____
	4. cabinet drying	_____	_____
E.	Are cleaning and disinfecting facilities hygienically satisfactory?	_____	_____
F.	Are respirators individually bagged after cleaning and repair?	_____	_____
G.	Are the cleaning personnel adequately trained in filter media replacement and assembly of the various respirators used?	_____	_____

Program Acceptability

		Yes	Action Required
VI.	STORAGE		
A.	Are respirators stored to protect them from:		
1.	contamination	_____	_____
2.	excessive heat	_____	_____
3.	excessive cold	_____	_____
4.	direct sunlight	_____	_____
5.	harmful chemicals	_____	_____
B.	Are respirators stored in an accessible area?	_____	_____
C.	Is the storage/distribution area adequately identified as such?	_____	_____
D.	Are there provisions for obtaining a respirator if one is not available at the storage/distribution center?	_____	_____
E.	Are respirators returned for cleaning on a daily basis?	_____	_____
VII.	INSPECTION		
A.	Are routine-use devices inspected before and after each use?	_____	_____
B.	Are emergency-use devices inspected		
1.	after each use	_____	_____
2.	monthly	_____	_____
C.	Are emergency-use devices physically donned to test operational integrity?	_____	_____

If YES, what is the test frequency?_____

		Program Acceptability	
		Yes	Action Required
D.	Are oil-less compressors used to provide a supplied air source?	_____	_____
E.	If an oil lubricated compressor is used for emergency or routine use devices, is it properly controlled with:		
	1. overheating warning alarm	_____	_____
	2. carbon monoxide warning alarm	_____	_____
	3. routine monitoring of carbon monoxide in air	_____	_____
	4. particulate and oil mist filters	_____	_____
F.	If a compressed air source is used for emergency or routine use devices is the air intake remote from possible air contaminants?	_____	_____
G.	Is cylinder breathing air certified and properly identified for the use intended?	_____	_____

VIII. SURVEILLANCE OF AIR CONTAMINANTS

A.	Are confined entry and suspected oxygen deficient atmospheres monitored to determine respirator type needed?	_____	_____
B.	Are air samples routinely taken to monitor exposure where respiratory devices are required?	_____	_____
C.	Who is responsible for air sample surveys:		
	1. plant personnel (names)	_____	
D.	Where are air samples sent for analysis:		
	1. plant laboratory	_____	
	2. outside laboratory (specify)	_____	
E.	Is the laboratory certified by AIHA?	_____	_____

		Program Acceptability	
		Yes	Action Required
F.	Are biological samples taken to monitor exposure where respiratory devices are required?	_____	_____
G.	Who is responsible for biological monitoring surveys:		
	1. plant personnel (names) _____		
H.	Where are biological samples sent for analysis? (name of laboratory) _____		
I.	Is the laboratory appropriately licensed?	_____	_____
J.	Is pulmonary function testing performed relevant to air contaminants that produce harmful lung pathology?	_____	_____
K.	Who is responsible for pulmonary function testing if performed?		
	1. plant nurse _____		
IX.	INVENTORY		
A.	Is there adequate supply of:		
	1. respirator facepieces	_____	_____
	2. facepiece lens replacement	_____	_____
	3. replacement straps	_____	_____
	4. replacement valves:		
	a. inhalation	_____	_____
	b. exhalation	_____	_____
	5. replacement valve seats		
	a. inhalation connector	_____	_____
	b. exhalation connector	_____	_____
	6. replacement valve covers	_____	_____

		Program Acceptability	
		Yes	Action Required
7.	gaskets	____	____
8.	filters	____	____
9.	filter holders	____	____
10.	cartridges	____	____
11.	harnesses/belts	____	____
12.	other (specify)	____	____
13.	breathing air cylinders	____	____
14.	length of hose for supplied air devices	____	____

X. RESPIRATOR PROGRAM AUDIT REVIEW COMMENTS

Audit Conducted by: _____

Co-inspector(s): _____

Date of Audit: _____

PROGRAM ACCEPTABILITY CRITIQUE

ACTION REVIEW ITEM NUMBER	COMMENTS

ATTACHMENT I

WRITTEN QUALIFICATION FOR RADIATION WORKER SAFETY

WRITTEN QUALIFICATION FOR RADIATION WORKER SAFETY

The possession and use of radioactive materials is subject to some form of government regulation. These regulations cover purchase, possession, storage, use, resale, transfer, and disposal of radioactive material. The Atomic Energy Act of 1954 created the U.S. Atomic Energy Commission (AEC) and provided a mechanism for the Federal Government to administer effectively with radiation problems. The standards and safety criteria have been developed by the International Commission on Radiological Protection (ICRP) in cooperation with a very prestigious nongovernmental organization in the U.S. called the National Council on Radiation Protection and Measurement (NCRP).

Source Material means natural uranium or thorium, or any combination thereof, in any physical or chemical form, or ores which contain 0.05% by weight of uranium or thorium.

The AEC has changed its name to the NRC or Nuclear Regulatory Commission. And the NRC regulations are contained in the Code of Federal Regulations (CFR) Title 10, Chapter 1, parts:

Part 19	Notice to Workers
Part 20	Standards for Protection Against Radiation
Part 40	Licensing of Source Material

There are at least 170 parts dealing with various topics similar to the ones listed.

Our current business and operating plans require our company to be licensed so that we can obtain and use source material. Many of the minerals, slags, ores, and other resources contain various concentrations of these unwanted radioactive elements.

Every reasonable effort must be made to control and promptly decontaminate accidental spillage of products containing source material. The intrinsic value of these materials, as well as compliance with applicable pollution control regulations and accountability requirements require prompt action be taken to prevent contamination and loss of these materials. Confine any accidental spillage to as small an area as possible to prevent tracking, by wind, rain, or personnel. Although these materials are only mildly radioactive and may not constitute a serious risk, they can be easily detected and could result in substantial and unnecessary financial loss by creating adverse public relations and regulatory actions. Property damage by radioactive contamination is excluded from most standard insurance coverage.

Specific radiation limits have been established for the protection of radiation workers. These limits are based upon long term exposure considerations and contain sufficient margins of safety to make occupational exposure to radiation within these limits an acceptable risk.

Occupational Dose		
Body Area	Per Year (mRem)*	Per Qtr (mRem)
Whole Body	5,000	3,000
Hands and Forearms	75,000	25,000
Feet and Ankles	75,000	25,000
Skin of Whole Body	80,000	10,000

* milliRems

A female employee shall immediately notify her employer when she knows of her pregnancy. The Radiation Safety Officer must be notified in writing of the precautions taken to limit radiation dose to the fetus to ALARA (As Low As Reasonable Achievable) but not to exceed 0.5 Rem during the gestation period. Protection against the absorption of radioactive materials into the body is extremely important. Although there are "MPC's" (Maximum Permissible Concentrations) for radioactive substances in air and water, every effort must be taken to avoid the inhalation, ingestion, or absorption. In the restricted Radioactive Materials area, the loose dust or removable dust (smear sample) shall have levels less than 10 dpm (disintegration per minute) per square centimeter of alpha contamination and less than 10 dpm per square centimeter of beta-gamma contamination. The radiation level shall not exceed 2 mRem per hour.

Any area in which there exists airborne radioactive material in concentrations in excess of the amount specified must be posted for respirator use. Respiratory devices must be individually fit, tested, and worn by any person who enters such an area.

Appropriate air sampling should be conducted by the RSO (Radiation Safety Officer) or his official designee.

It is essential that a calibrated and operable survey meter be maintained for radiation detection.

Periodic maintenance and calibration is required for these instruments every 6 months and a record must be maintained of the latest date of calibration. Survey instruments are delicate and it is essential that reasonable care be taken to assure reliability. Survey instruments should be protected from rain, excessive heat or dust by placing them into a clear plastic bag when not in use.

EMERGENCY PROCEDURES

As soon as a worker discovers or suspects a potentially serious radiation risk, he should limit or confine the extent of the risk without jeopardizing himself or others by, for

example, evacuating the area. Then notify the supervisor of the area and the RSO so they can help with additional aid.

One of the major breathing hazards associated with uranium milling facilities results from the resuspension in air of uranium and its daughters (by-products). It is necessary to maintain exposure levels at ALARA. Particular areas in question would be ore storage, ore handling, ore crushing, ore grinding, leaching and concentration, and finally the press cake handling and storage. Radon 222 and its daughters are also released in the ore grinding process. Ventilation should be adequate to maintain the concentration of those natural isotopes at or below 25% of their limiting value specified in 10 CFR Part 20.

Personal cleanliness is recommended for those who work around radioactive elements. Wash your hands frequently, be careful not to get dust on food or cigarettes that may get into your mouth and into your body. Use a respirator anytime there is a dusty operation in progress. The company recommends the purple type cartridge for your respirator with R-12 designation. When working in an area with acid fumes, you will have to use two cartridges in combination, one for acid and the other for dust. Remember, it is far easier to keep the radioactive particles out of your body than it is to remove them once they have found their way in.

SUMMARY

Now lets summarize the basic Radiation Safety facts that will help us with our job in Ore Processing:

1. You can't detect radiation except with a counting instrument.

2. Our best protection is distance from the source; get away. The next is shielding; stay behind lead or concrete walls.

3. For emergencies, isolate the area, keep others away, call for help to the supervisor and RSO.

4. Radiation workers should have personal cleanliness as a high priority. Keep the radioactive dust and dirt out of your body. Wash your hands before eating or smoking and wear respiratory protection.

/cas
attach-I.atc

ATTACHMENT J

HEALTH PHYSICS CONSULTANT FORM

RMC
Radiation Management Consultants

RADIATION SURVEY/AUDIT REPORT
1ST QUARTER 1992

PREPARED FOR:

CABOT CORPORATION
COUNTY LINE ROAD
BOYERTOWN, PA. 19512
ATTN: MR. WILLIAM C. GANNON
RADIATION SAFETY OFFICER

PREPARED BY: RADIATION MANAGEMENT CONSULTANTS

C. E. Mc Gee — 5-21-92

CHARLES E. MC GEE, PH.D.
SENIOR CONSULTANT

DATE

[1,35]92CABOTQ1.REP;1

5301 Tacony Street, Box 208 • Philadephia, PA 19137-2309 • (215) 537-0672 • FAX # (215) 533-9924

RADIATION AUDIT/SURVEY - 1ST QUARTER 1992 - CABOT

I. INTRODUCTION:

The work for this quarter consisted of a tour and survey of selected facilities, review of ALARA Report dated April 6, 1992 and other radiation safety related documents. Also, significant discussion was held on the status of SMB-920 license application, the Revere and Reading sites and the decommissioning plan. The on-site survey was performed by Radiation Management Consultants(RMC) at the Cabot, Boyertown, Pa. facility on 05 May, 1992. The survey was performed by C.E. Mc Gee, Senior Consultant, with the assistance of Mr. William Gannon, Radiation Safety Officer for Cabot.

II. SURVEY RESULTS:

All readings were made with a Johnson Model GSM-5 count rate meter (S/N 1897) with a GP-200 GM probe(S/N 1897A) and/or a Victoreen Model 471(S/N 685) ion chamber.

1. In Building 018 readings of 1.2-2.0 mR/hr were noted near TaCb ore Lot #3176 and about 2 mR/hr near lot #3165. All other areas were less than 0.5 mR/hr.

2. Building 073(Grinding) had readings of about 0.2-0.5 mR/hr. The new Torit Downflow Unit(Dust Collector) had piles of ore around it reading about 0.3 mR/hr. Also several drums had been turned upside down along side of the building near the dust collector. Material had fallen on the ground from these drums that gave readings of about 0.2 mR/hr(10X background).

3. At the request of Mr. Gannon, I surveyed around the Electron Beam Welder. Readings of about 10 mR/hr were noted streaming from the edges of ports(2) at about thigh level. Normally readings this high would be of significant concern; however, these readings come from areas that are not readily entered by the operators body/extremeties. Also, readings of about 0.2 mR/hr were noted at the viewing port.

4. The mausoleums were toured to visualize the locations of the soil samples taken in response to comments made by PA DER.

III. REVIEW OF ALARA REPORT AND FACILITIES STATUS:

1. ALARA REPORT:
   a) Mr. Gannon is correct when he states that Cabot needs to implement a documentmented ALARA program. Cursory thoughts would indicate as a minimum, the plan should address:
      1) Management:
         i. Statement of committment to protection of personnel, public and environment.
         ii. RSO - duties, authority, who he reports to, etc.
         iii. Licenses and Permits
         iv. ALARA Committee
         v. Source material purchasing, inventory and waste disposal.

III. REVIEW OF ALARA REPORT AND FACILITIES STATUS:(CONT'D)

1. ALARA REPORT:(CONT'D)
   a) CONT'D
      2) Facilities:
         i. Initial ALARA design review ★
         ii. ALARA review of facility/process modifications ★
         iii. Listing/limiting facilities that are potentially contaminated
         iv. Decontamination/decommissionings
      3) Environmental Monitoring:
         i. Monitoring sites as required by license with action/reporting levels
         ii. Administrative action/investigation levels and actions to be taken
         iii. Annual/historical Environmental Report to include tables/graphs of all data, summary discussion of each site and detailed explanation of any investigation of anomalous results.
      4) Personnel:
         i. Training
         ii. Monitoring for external exposure
         iii. Monitoring for internal exposure
   b) The data(tables and graphs) contained in the ALARA Committee Meeting report(April 6, 1992) is a good start toward the Environmental Report mentioned above. However, all tables and graphs MUST have units and should show action levels contained in NRC license and/or Corporate administrative action levels. I would also recommend that they be ordered coordinated with specific license conditions. Several data points appear to exceed license conditions - I plan to discuss these with Mr. Gannon during our next meeting.(See license conditions 19 and 21.)
   c) Mr. Gannon mentioned record keeping requirements relative to decommissioning. The specific regulation is 10CFR40 paragraph 40.36(f) - copy attached.

2. FACILITIES STATUS:
   a) SMB-920 License Renewal - Request was submitted in 1988. Based upon telephone discussion with Mr. Keith McDaniel of NRC you can expect action during the Fall of 1992. Initial action will probably be a request for additional information 'plan time to complete required response'.
   b) Revere Site - Request for Unrestricted Release submitted March 27, 1991. Again based upon discussion with NRC you can expect a reply during the June-July 1992 time frame. Expect a FEW locations that will require additional decontamination. They WILL NOT let you see the 'Draft' Oak Ridge report. 'Plan time to complete decontamination in July'.

III. REVIEW OF ALARA REPORT AND FACILITIES STATUS:(CONT'D)

2. FACILITIES STATUS:(CONT'D)

c) Reading Site - Again based upon discussion with NRC, you can expect a reply during the June-July 1992 time frame. Expect a significant number of locations in the building that will require additional decontamination. ' Plan time to complete decontamination of the building during August/September'. I am not exactly sure what you expect to get/gain from the ERM Reading site study.

Help needed

3. RADIOACTIVE SOURCES:

a) We should be hearing within the next couple of weeks on whether Amersham will accept the return of Cm-144 source. It looks favorable based upon discussions with their U.S. Radiation Safety Officer, however, final decision comes from England.

IV. CONCLUSIONS/RECOMMENDATIONS:

1. The new dust collector outside building 073 MUST be modified ASAP. You are presently contaminating the surrounding area which WILL INCREASE YOUR DECONTAMINATION COSTS SIGNIFICANTLY. Drums that contain residual ore SHOULD NOT be dumped/stored alongside the building. If I had been RSO[RSO had been in proper chain of command - see '1.a.1)ii.' above] this facility design and/or location would not have been approved.

2. Due to many significant changes in NRC regulations, pending licensing requests and the required decommissioning plan, I STRONGLY RECOMMEND that Mr. Gannon be DIRECTED to spend the equivalent of 50% of his work hours on Radiation Safety for the remainder of 1992 and 1993. Management decisions/plans, funding and personnel allocations for the remainder of 1992 ARE CRITICAL. After 1993 a minimum of 25% of work hours should always be allocated for his Radiation Safety duties.

3. I would like to review the ERM documents related to the license application including the HP Manual revisions. Unless needed for current/short-term operations, I WOULD NOT SUBMIT ANY ADDITIONAL LICENSING INFORMATION to NRC until you receive their questions/request for additional information (Fall 1992). Then you can submit your answers AND ANY ADDITIONAL INFORMATION/AMENDMENT REQUESTS that are desired.

4. Thin(1/16"-1/32") lead(Pb) gaskets should be installed on the (2) thigh level ports and torqued down until ther is no radiation leaks. The eye-level viewing ports should have Pb glass checked for degradation. Visually it looks in fairly bad shape. Depending upon operational factors Pb glass is usually replaced on a known frequency.

EB WELDER

5. The radiation readings around the mausoleums should create SIGNIFICANT concern. If real, these readings are, most probably, caused by improper off-loading of the sludge into the buildings.

IV. CONCLUSION/RECOMMENDATIONS:(CONT'D)

6. No abnormal values were noted during review of TLD results. No information is required to be placed in the Internal Dose section of the TLD reports. This will only be required after implementation of new 10CFR Part 20 which will probably occur on or after 1 January 1994.

7. I suggest that you assign the below priority and completion dates to your pending radiation safety problems:

1) Number 2 above - ASAP
2) Number 4 above - 15 June 1992
3) Number 1 above - 15 July 1992
4) Decon of Revere - 31 July 1992
5) Decision on sludge process/processing - 31 July 1992
6) Investigation of reason behind high readings around Mausoleums and corrective action plan - 31 July 1992
7) Decon of Reading building - 31 August 1992
8) Decision on future handling of Reading waste dump area - 31 August 1992
9) Number 3 above - 31 August 1992
10) Preparation of Scope of Work and Request for Bids for Decommissioning Plan - 30 September 1992
11) Project outline and task assignments for developing ALARA Plan and completion of HP Manual review - 30 October 1992

I can make additional time available to assist or supervise on any of the above projects starting about 1 July 1992.

ATTACHMENT K

RSO AUTHORITY LETTER

CABOT

DATE: November 12, 1993

TO: J. S. Lindell

FROM: R. S. Barron

SUBJECT: RADIATION SAFETY OFFICER

cc: ATCampitelli, MJEngel, NCFeola, WCGannon, LEHuber, RJKresge

In conformity with the rules and regulations of the Nuclear Regulatory Commission, and the terms and conditions of Cabot's Radiation Safety Procedures, this will confirm that the Radiation Safety Officer (RSO) shall and does have the authority to shut down an operation if, in the opinion of the RSO, the operation poses a threat to the health and safety of the employees or of the public. Each operation suspended by the RSO will not be resumed except by my authority.

Robert S. Barron

Robert S. Barron
General Manager

/cas
rso-1112.rsb

ATTACHMENT L

RSO MAINTENANCE OF HEALTH & SAFETY FILES

CABOT

DATE: November 12, 1993

TO: W. C. Gannon (RSO)

FROM: R. S. Barron

SUBJECT: MAINTENANCE OF CABOT HEALTH AND SAFETY RECORDS

In accordance with 10 CFR 20.2106(F), the Radiation Safety Officer is responsible for maintaining health and safety records relating to operations licensed by the Nuclear Regulatory Commission. These records must be maintained until the Nuclear Regulatory Commission terminates the pertinent license which requires said records.

As the Radiation Safety Officer on the license (SMB-920) for Boyertown operations, the collection and maintenance of the aforementioned records will be your responsibility.

Robert S. Barron

Robert S. Barron
General Manager

/cas
rso-1112.rsb

ATTACHMENT M

URINANALYSIS ACTION PLAN

Table 1

CORRECTIVE ACTIONS BASED ON MONTHLY URINARY URANIUM RESULTS[a]

Urinary Uranium Concentration	Interpretation	Actions
Less than 15 µg/L	Uranium confinement and air sampling programs are indicated to be adequate.[b]	None. Continue to review further bioassay results.
15 to 35 µg/L	Uranium confinement and air sampling may not provide an adequate margin of safety.[b]	1. Confirm results (repeat urinalysis). 2. Identify the cause of elevated urinary uranium and initiate additional control measures if result confirmed. 3. Determine why air samples were not representative and did not warn of excessive concentrations of airborne uranium. Make corrections. 4. Determine whether other workers could have been exposed and perform bioassay measurements for them. 5. Consider work assignment limitations until the worker's urinary uranium concentration falls below 15 µg/L. 6. Improve engineered protection or respiratory protection program as investigation indicates.
Greater than 35 µg/L	Uranium confinement and perhaps air sampling programs are not acceptable.[c]	1. Take the actions given above. 2. Continue operations only if it is virtually certain that no other worker will exceed a urinary uranium concentration of 35 µg/L. 3. Establish work restrictions or increase engineered protection for affected employees if ore dust or high-temperature-dried yellowcake are involved. 4. Analyze bioassay samples weekly.

Table 1 (continued)

Urinary Uranium Concentration	Interpretation	Actions
Confirmed to be greater than 35 µg/L for two consecutive specimens, confirmed to be greater than 130 µg/L for any single specimen, or air sampling indication of more than a quarterly limit of intake	Worker may have exceeded regulatory limit on intake.	1. Take the actions given above. 2. Have urine specimen tested for albuminuria. 3. Obtain an in vivo count if worker may have been exposed to Class Y (nontransportable) material or ore dust. 4. Evaluate exposures. 5. Establish further engineered or respiratory protection requirements as indicated. 6. Consider continued work restrictions on affected employees until urinary concentrations are below 15 µg/L and laboratory tests for albuminuria are negative.

[a]Use Figures 1-3 to adjust action levels for other frequencies of bioassay sampling. The model used in NUREG-0874 (Ref. 1) employs fractional composition values (F_1, F_2, F_3) for Class D, Class W, and Class Y components of yellowcake compounds. The assigned values in NUREG-0874 are based on data from available literature. The use of alternative values of F_1, F_2, and F_3 specific for a particular operation are acceptable provided (1) details regarding their determination are described and mentioned in employee exposure records (see paragraph 20.401(c)(1) of 10 CFR Part 20) and (2) the model as published in NUREG-0874 is then used in the determination of alternative urinalysis frequencies and action levels.

[b]However, note from Figure 3 that, if a person is exposed to uranium ore dust (Class W material) alone, the urinary concentration at 1 month may be only 6 µg/L, close to the detection limit, even for an exposure equal to one annual limit of intake.

[c]Unless the result was anticipated and caused by conditions already corrected.

ATTACHMENT N

ORE RESIDUE PROCESS DESCRIPTION

Ore residues are continually being generated by existing processes and are added to the previously generated amounts stored in several vaults at Boyertown, PA.

The revisions to the existing process will start at the multi-vault waste storage site. Material from the storage bins is to be loaded into containers using a front end loader on a concrete pad near the vaults. A skid with two diked electrically heated 120 gallon quick recovery water heaters will be available at the storage vaults to wash down equipment. A collection sump will collect washed down material and this material will be pumped to a collection container. Containers will be designed with no bottom openings and the ability to seal the tops to eliminate potential spillage of material.

Containers will be transported down to the processing plant using a flat bed truck. A maximum of two trips per day would be required for a daily batch.

Solid sludge will be reslurried at the processing plant by adding water directly to the container. Portable agitation will be available if necessary; however, material is extremely thixotropic and readily slurried. The slurry will be pumped into the processing building from the container.

The process building operation is designated as a closed kettle system. The reslurried material is to be [illegible]ed, sampled and measured in the weigh tank. The slurried materia[illegible]om the present process is also sampled and measured in the weigh t[illegible]nk. The mix is dropped to one of two pre-soak tanks. Using a closed weigh feeder system, carbon and iron are added to the pre-soak tank. The mixed acid, from its holding tank, is pumped to the weigh tank, measured, sampled, adjusted (HF/H_2SO_4 ratio), and then introduced into the pre-soak tank. A time/temp cycle is initiated. After the specified time, the slurry is pumped to a digestion tank for digestion completion. During the pre-soak operation H_2 will be monitored. The mixed acid utilized in the process comes from the acid recovery system which feeds the storage holding tank. The HF and H_2SO_4 storage tanks are connected to the holding tank and weigh tank from the existing pumping lines. Increased capacity of H_2SO_4 storage is to be accomplished by purchasing a 13,000 to 13,500 gallon tank and installing it on the newly constructed dike and saddle installation.

The pre-soak tank material is pumped to the main digester tank where a second time/temp cycle is initiated. When Digestion is complete, the digested material is then pumped to the Digester hold

tank (filter supply tank). The material is then pressure filtered using a 3 wash counterflow system. The use of surge tanks will keep operations as continuous as possible. The filtrate, with a small amount of solids, will be held in a clarifier tank. Two clarifiers will be used in the system, each processing one day's worth of filtrate production. Free acid normality will be adjusted in one clarifier using HF while the other is filling. The settled or clarified material will be decanted and pumped through one of two polishing filters in parallel to an extractor feed check tank.

The filter cake from the filter press will be captured by an under-press conveyor which will feed an in-line delumper system. The delumper will in turn feed an inclined screw to a holding bin. The bin will serve as a holding container for feeding the kiln. A jacketed water-cooled screw at the base of the bin will feed the kiln on a delumper-feeder to a cooled inclined screw conveyor. The conveyor is to discharge to a material disposal bin. The gas exhaust from the kiln may be cooled in an air cooling exchanger. The warmed air to serve as the air supply to the kiln.

The cooled exhaust gases will be fed to a scrubbing system which recovers a mixed acid for use in Digestion.

The new building is to be of a design similar to 073 Building.

The two scrubbers required for the process are to be skid mounted and located north of the building housing the revised process.

The mixed acid recovery system will include a Venturi scrubber followed by a 2-stage scrubbing system.

Basic sprinkler type of fire protection system is included in the engineering plans for the building addition.

A functional quantitative/quality control laboratory has been provided. An operational control room, sanitary facility, and motor control center have also been considered.

Additional items include eye wash safety shower, hose stations, emergency equipment, utilities, floor drains, painting and storage areas.

RELEVANT FACTS

Stored Material (ore residues)	→	*~30MM lb / 400,000 cu/ft*
Contained Tantalum	→	*792,000 lb Ta_2O_5 @ 2.64%*
Projected Recovery	→	*562,000 lb Ta_2O_5*
Daily Sludge Input	→	*39,000 lb/day*
Daily Sintered Material Production	→	*25,000 lb*
Daily Ta_2O_5 Recovery	→	*677 lb*

ATTACHMENT O

EXECUTIVE SUMMARY -- BOYERTOWN SDFP

EXECUTIVE SUMMARY

The Radiological Engineering and Decommissioning Services division of Scientific Ecology Group, Inc., is providing a decommissioning cost estimate for Cabot Corporation's Boyertown, Pennsylvania, site. The cost estimate was determined using a systematic approach. Appropriate release levels were first determined for the site. Historical data was then reviewed to determine the radioactive materials expected to be present on-site. An on-site evaluation was performed to verify activity levels. Information on equipment and structures was obtained to determine decontamination and deconstruction methodologies which would minimize the decommissioning cost.

Costs were then estimated which include manpower and equipment, radioactive waste volume reduction, packaging, shipping, burial, and final release surveys. The decommissioning cost estimate is $3,957,985 and is typical of 1993 costs. This estimate is for budgetary purposes only and is not a proposal or cost estimate for Scientific Ecology Group, Inc., to perform work.

ATTACHMENT P

DETAIL ON BOYERTOWN SDFP

CABOT BOYERTOWN SITE DECOMMISSIONING COST ESTIMATE

LOCATION	EQUIPMENT FOR DECON VOLUME (FT^3)	DECON RADWASTE VOLUME (FT^3)	EQUIPMENT FOR VR WEIGHT (LB)	EQUIPMENT FOR VR VOLUME (FT^3)	VR RADWASTE VOLUME (FT^3)	CONTAM CONCRETE AREA (FT^2)	REMOVED CONCRETE VOLUME (FT^3)	SOIL VOLUME (FT^3)	DECON SOIL VOLUME (FT^3)
BUILDING 73	14,254	713	210,183	6592	2,197	29,870	689	45,300	2,265
BUILDING 74	6,039	302	3,880	734	245	13,900	280	7,500	375
WAREHOUSE 18						7,680	160		
WAREHOUSE 10						8,450	35		
BUILDING 87						3,440	31	28,058	1,403
DEVELOPMENT LAB									
ANALYTICAL LAB									
MAUSOLEUMS	5	0	1,660	606	202	143,376	4,109	18,400	920
LOADING DOCK									
WINTER STORAGE AREA						2,556	107	3,600	180
ROAD TO MAUSOLEUMS								2,700	135
TIN SLAG STORAGE FIELD								73,050	3,653
TOTALS :	*20,298*	*1,015*	*215,723*	*7,932*	*2,644*	*209,272*	*5,411*	*178,608*	*8,930*

LOCATION	EQUIPMENT DECON COST	RADWASTE DISPOSAL COST	RADWASTE VOLUME REDUCTION COST	CONCRETE REMOVAL COST	SOIL PROCESS COST	SOIL DISPOSAL COST	RELEASE SURVEY AREA (FT^2)	RELEASE SURVEY COST	ADDITIONAL HP SUPPORT DECON WORK	TOTAL COST
BUILDING 73	$14,254	$112,110	$229,629	$10,455	$463,872	$70,555	97,653	$46,463	$13,101	$1,058,092
BUILDING 74	$6,039	$25,749	$6,045	$4,865	$76,800	$11,681	60,520	$28,795	$5,800	$226,295
WAREHOUSE 18		$4,984		$2,688			64,660	$30,860	$1,536	$104,928
WAREHOUSE 10		$1,090		$2,958			38,480	$18,309	$1,690	$62,527
BUILDING 87		$966		$1,204	$287,314	$43,700	98,456	$46,845	$688	$479,173
DEVELOPMENT LAB							1,024	$487		$1,511
ANALYTICAL LAB							1,822	$867		$2,689
MAUSOLEUMS	$5	$134,295	$3,448	$50,182	$188,416	$28,658	235,376	$111,992	$28,678	$781,049
LOADING DOCK							1,200	$571		$1,771
WINTER STORAGE AREA		$3,333		$895	$36,864	$5,607	2,556	$1,216	$511	$50,982
ROAD TO MAUSOLEUMS					$27,648	$4,205	54,000	$25,693		$111,546
TIN SLAG STORAGE FIELD					$748,032	$113,775	146,100	$69,514		$1,077,422
TOTALS :	*$20,298*	*$282,527*	*$239,122*	*$73,245*	*$1,828,946*	*$278,182*	*802,047*	*$381,614*	*$52,003*	*$3,957,985*

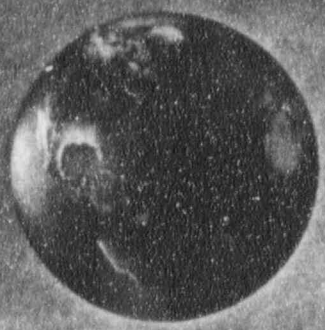
ATTACHMENT Q

1993 ANNUAL REPORT CABOT CORPORATION

Cabot Corporation Annual Report

1993

"THIS YEAR, WE SAW THE FULLEST IMPLEMENTATION YET OF THE STRATEGIC VISION THAT CABOT MANAGEMENT SET FORTH IN THE LATE '80S AND HAS PURSUED RELENTLESSLY."



BUSINESS	PRODUCT FUNCTION	END PRODUCTS	MARKETS
Specialty Chemicals and Materials			
■ CARBON BLACK			
Tire Blacks	Reinforcement, durability, traction, rolling resistance	Tires, retreading materials	Tire manufacturers, retreaders
Industrial Rubber Blacks	Reinforcement, resilience, appearance, conductivity, dynamic flexibility	Hoses, belts, roofing materials, gaskets, molded products, weatherstripping	Automotive, construction, architecture, consumer products
Special Blacks	Pigmentation, jetness, ultraviolet protection, insulation, electrical conductivity	Inks, coatings, plastic films, cables, pipes, magnetic media, sealants	Inks, plastics, paints, electrical cable
■ CAB-O-SIL (Fumed Silica)	Thickening, dispersing, flow control, reinforcement	Paints, coatings, pharmaceuticals, cosmetics, adhesives, sealants, cable gels, silicone rubber	Automotive, construction, varied consumer products (drugs, cosmetics), electronics
■ CABOT PERFORMANCE MATERIALS (Tantalum, Niobium)	Capacitance, corrosion resistance, high temperature strengthening, super conductivity, light refraction	Computers, instrumentation, heat exchangers, tank linings, surgical clips, turbine blades, ballistics, magnetic resonance imaging, optical glass	Electronics, medical, aerospace, chemical process industry, defense, lighting, telecommunications
■ CABOT PLASTICS	Processability, pigmentation, ultraviolet protection, insulation, conductivity, reinforcement	Plastic containers, bags, pipes, cables, agricultural films, liners, toys, foils, antistatic tubing	Agriculture, electrical cable, transportation, electronics, packaging, consumer products
■ CABOT SAFETY	Personal protection equipment, energy absorption materials and systems	Earplugs, earmuffs, hard hats, prescription and non-prescription eyeglasses, goggles, face shields, dust masks, respirators, damping materials, molded foams, barriers, blankets	Industrial, consumer, and specialty markets
Energy			
■ CABOT LNG (Liquefied Natural Gas)	Combustion	Energy	Natural gas distributors, cogeneration facilities, electric utilities
■ TUCO (Coal)	Fuel for power generation	Electricity	Utilities

continued on inside back cover

Financial Highlights

Dollars in thousands, except per share amounts	1993	1992	1991
OPERATING RESULTS			
Operating revenues	$ 1,614,315	$ 1,556,986	$ 1,482,089
Net income from continuing operations	$ 37,410[3]	$ 62,223	$ 39,825
Per common share from continuing operations	$ 1.80[3]	$ 3.18	$ 1.69
Net income	$ 11,301[3]	$ 62,223	$ 127,260[1]
Per common share	$ 0.41[3]	$ 3.18	$ 5.80[1]
FINANCIAL POSITION (AS OF SEPTEMBER 30)			
Assets	$ 1,489,473	$ 1,554,529	$ 1,462,396
Working capital	$ 189,985	$ 194,153	$ (7,039)
Net property, plant and equipment	$ 646,520	$ 703,216	$ 670,426
Stockholders' equity	$ 442,273	$ 492,955	$ 426,863
Per common share	$ 23.62	$ 26.90	$ 23.46
OTHER DATA			
Shares outstanding - thousands	18,726	18,327	18,199
Number of stockholders of record	2,200	2,300	2,500
Return on average stockholders' equity	1.7%[3]	12.5%	25.4%[1]
Common stock dividends	$ 1.04	$ 1.04	$ 1.04
Number of employees	5,400	5,400	5,300

[1] The 1991 results reflect a $78 million ($3.66 per share) gain associated with the divestiture of Cabot's oil and gas exploration and production subsidiary through an Exchange Offer completed during the second quarter.

[2] The 1993 results include a $31.1 million ($1.66 per share) after-tax restructuring charge, partially offset by an $8.7 million ($0.46 per share) after-tax energy reserve adjustment.

[3] The 1993 results include a $31.1 million ($1.66 per share) after-tax restructuring charge, partially offset by an $8.7 million ($0.46 per share) after-tax energy reserve adjustment plus a $26.1 million ($1.39 per share) after-tax charge for required accounting changes.

Table of Contents

Dear Fellow

When current management took responsibility for Cabot six years ago, we committed ourselves to the vision of continuously improving our six principal businesses. We were determined to make each of them "world class." As part of that effort, we devoted ourselves to the overriding goal of creating shareholder value by lowering costs, improving environmental and safety behavior, and increasing margins and rates of return.

While the economic environment in the last few years has been challenging, indisputable evidence exists that we are realizing our vision. As a result of our significant investment in modern plants, technology and training, Cabot today is better prepared than ever before to meet the most exacting customer needs anywhere in the world with high-quality products.

We have also transformed Cabot over the past six years into a company with a dramatically different financial profile. While not immune to economic cycles, as was especially clear in fiscal 1993, our ongoing cost reduction efforts now allow us to achieve reasonable operating income in down cycles, with the expectation of substantially greater operating income when world economies rebound. Combined with the reduced number of shares outstanding — roughly 19 million today versus 28 million six years ago — the higher levels of operating income translate into increased value for shareholders on a per share basis.

Left to right: John D. Curtin, Jr., Executive Vice President ■ Kennett F. Burnes, Executive Vice President ■ John G.L. Cabot, Vice Chairman and Chief Financial Officer ■ Samuel W. Bodman, Chairman and President

This should in no way suggest that we are yet satisfied with the Company's earnings in what was a decidedly difficult fiscal 1993. The first half of the year was especially weak, with $1.29 earnings per share versus $2.01 earnings per share for the first half of fiscal 1992. The shortfall in the first half of 1993 was linked to several causes — particularly the profound recession in European industrial activity, which began in mid-1992 and persists to this day, and the turmoil in the natural gas industry caused by deregulation. An upswing in the North American economy and a rebound in our LNG business in the spring and summer helped pave the way for our strong finish in the second half of fiscal 1993, with net income per share for the year, excluding one-time adjustments, of $3.00, compared to $3.18 in 1992.

Your Company responded to the European economic deterioration with the decision to close a carbon black plant and to reduce capacity in Cabot's plastics operations. These actions, coupled with related restructuring provisions, resulted in a $31 million, or $1.66 per share, after-tax charge to our earnings and equity accounts. Our reported net earnings were further reduced by $26.1 million of net charges, or $1.39 per share, related to FAS 106 and 109 — recently enacted accounting standards related to postretirement benefits and income taxes, respectively.

Stockholder:

While we are contracting our manufacturing capacity in selected European markets, we are expanding where conditions warrant. In the past three years, we have invested about $125 million in China, Japan, Hong Kong, Indonesia, Mexico, Wales and the Czech Republic. These investments were necessary to reinforce our global market position, to respond to emerging environmental standards, and to meet or exceed the quality requirements of our customers. We are well along in achieving these strategic objectives in each of our new plants. Lower global economic activity and higher start-up costs hampered the efforts of our "greenfield," or newly constructed, plants to meet their financial objectives. But we continue to take a long-term view of these investments and expect further improvement next year.

While investments such as these seldom produce immediate positive returns, slow economic conditions further delayed our return on investment. However, signs of an improved return began appearing in the second half of 1993 and our results responded accordingly. We are increasingly confident of continued, significant improvement in the months and years ahead because of the considerable investments made and the proprietary product developments under way.

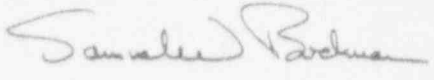
Operationally, we are very pleased with what we are accomplishing. We are removing costs from every layer of the business. Our teams of market and technical specialists all over the world are creating proprietary, higher-margin products. We are shipping specialty materials to customers that augment the value of their products. We are opening doors to customers we have never before directly served. More importantly, the enthusiasm of our product and technical teams suggests promising future prospects. Employees throughout the world are proving that our industrial product lines can be made more exciting — and more profitable — by working intensely with our customers. These are not simply expressions of intent; they are realized in the examples that lie in the pages ahead.

We are convinced that we are pursuing the correct strategic course and that further financial improvement will follow. We are equally convinced, however, that even the best strategic plans are meaningless without highly skilled and dedicated people to implement them. They are ultimately responsible for the quality of our products and the quality of our all-important relationships with customers. But employees can only create value when they believe in what their company is doing. That belief is now emerging throughout Cabot's world. Our customers know it — and so do our competitors.

I am most grateful for the steadfastness of Cabot's employees over the last six years. I am pleased to pay special tribute to those employees who, in the past two years, have constructed and readied for commercialization six new plants in five new countries. These employees and their families have uprooted themselves from familiar places in order to root Cabot in distant markets.

The planting is done; we expect to reap a bountiful harvest in the years ahead.

Sincerely yours,



Samuel W. Bodman

Chairman and President

FOCUSING ON:

The C

As many companies strive to reengineer themselves and their processes, Cabot is already benefiting from a more fundamental transformation: from product-driven supplier to market-driven partner. Simply put, Cabot is creating opportunities by focusing all its resources — from research and development to sales and service — on customer objectives. By helping our customers develop new products and processes, we are forging the kind of mutually beneficial, long-term partnerships that distinguish today's most effective global competitors.

Virtually every Cabot business can point to examples of the power of our market-driven strategy. In Europe, a Cabot Plastics team opened up an untapped market by creating new masterbatches — plastics concentrates — that add strength and smoothness to agricultural films, an enormous worldwide market. In talks with customers who make packaging films, Cabot Plastics learned that these manufacturers faced special problems with the films they sold to farmers for encapsulating hay, which is used to feed animals in the winter. Traditional carbon black masterbatches create film with a rough surface that tears easily when stretched around the coarse foodstuff, making it difficult to automate the wrapping process. Starting from scratch and working with our Special Blacks unit, the Plastics team designed a masterbatch that provides all the benefits of carbon black while adding tear resistance to the film. Today, the world's largest manufacturer of agricultural stretch-wrap film is using Cabot's masterbatch exclusively, and other potential customers across Europe and the Pacific Rim are evaluating the product.

By making our customers' concerns our own, we're enjoying similar successes across Cabot:

- Through an aggressive quality improvement program, prompted by competitive challenges faced by Dow Corning in the North American silicone rubber market, our Cab-O-Sil unit now produces what our customer calls "the highest quality fumed silica in the world."

◀ ANIMAL FEED, ENCASED IN AGRICULTURAL FILM CONTAINING A CABOT PLASTICS MASTERBATCH, DOTS THE LANDSCAPE IN EUROPE, WHERE THE NEW PRODUCT IS A GREAT SUCCESS.

FOR CRITICAL MARKET ▶ INFORMATION, CABOT SAFETY EMPLOYEES ARE PUTTING THEIR "FEET ON THE STREET" — VISITING END-USERS DIRECTLY.

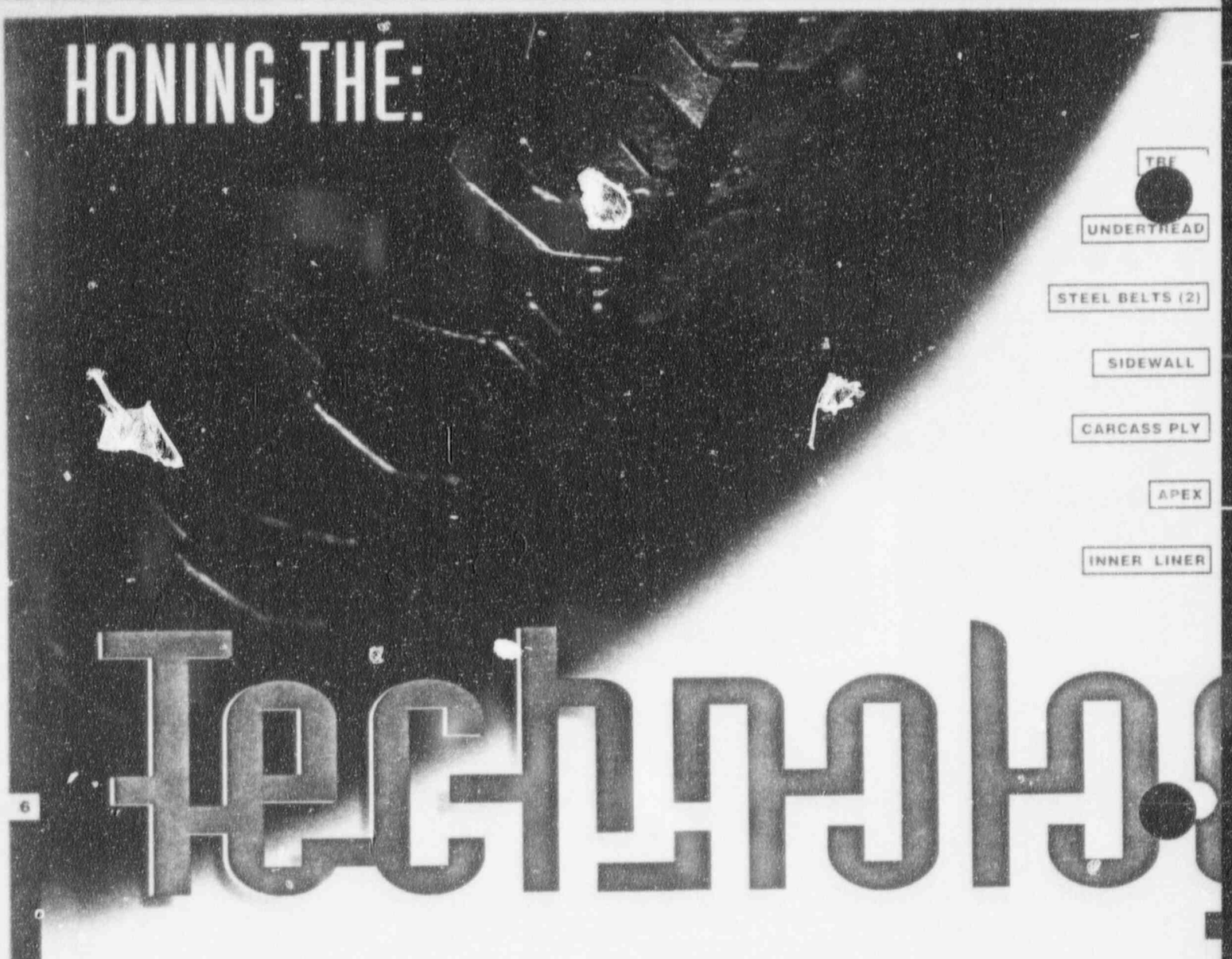
ustomer

■ When deregulation raised concerns among natural gas distributors about the reliability of traditional, pipeline-based sources of supply, Cabot LNG extended its penetration of the northeastern U.S. market by emphasizing the flexibility of liquefied natural gas, which the customer can store to use later, or to safeguard against supply shortfalls. In addition, Cabot LNG is now working directly with electric utilities to assist customers seeking an ample supply during the peak demand periods of winter cold and summer heat. Through its innovative tank management program, Cabot LNG monitors inventory and usage levels and "rents" unneeded LNG storage capacity from its utility customers, providing additional revenue to the utility while increasing its own storage and sendout capacity.

■ Cabot Safety, which manufactures an extensive line of hearing, eye and respiratory protection products, recently launched its "Feet on the Street" program, focused on information gathering rather than sales. Through the program, the company is developing a comprehensive understanding of end-user requirements and is differentiating itself in the marketplace. Recent college graduates have been hired and trained to make in-person calls on end-users to gather information about customer needs, supply safety-related information to customers (a service much in demand), and promote specific Cabot Safety products. They are reaching many companies that are under-served by traditional distribution channels — possibly representing half the safety market. In the process, Cabot Safety is training and developing a new generation of marketing professionals — the best way — "on the street."

In short, Cabot is strengthening its businesses by focusing on customer needs as the most effective route to product sales — the heart of the market-driven concept.

HONING THE:



Technolo

Meeting our cu[illegible]ers' needs is not simply a matter of identifying the right Cabot pro[illegible]lve their problems and fulfill their specifications. It also requires an ability to anticipate needs and create products that differentiate Cabot while creating competitive advantage for our customers. The key is our knowledge of our manufacturing processes and our ability to control them to create new products with highly predictable characteristics.

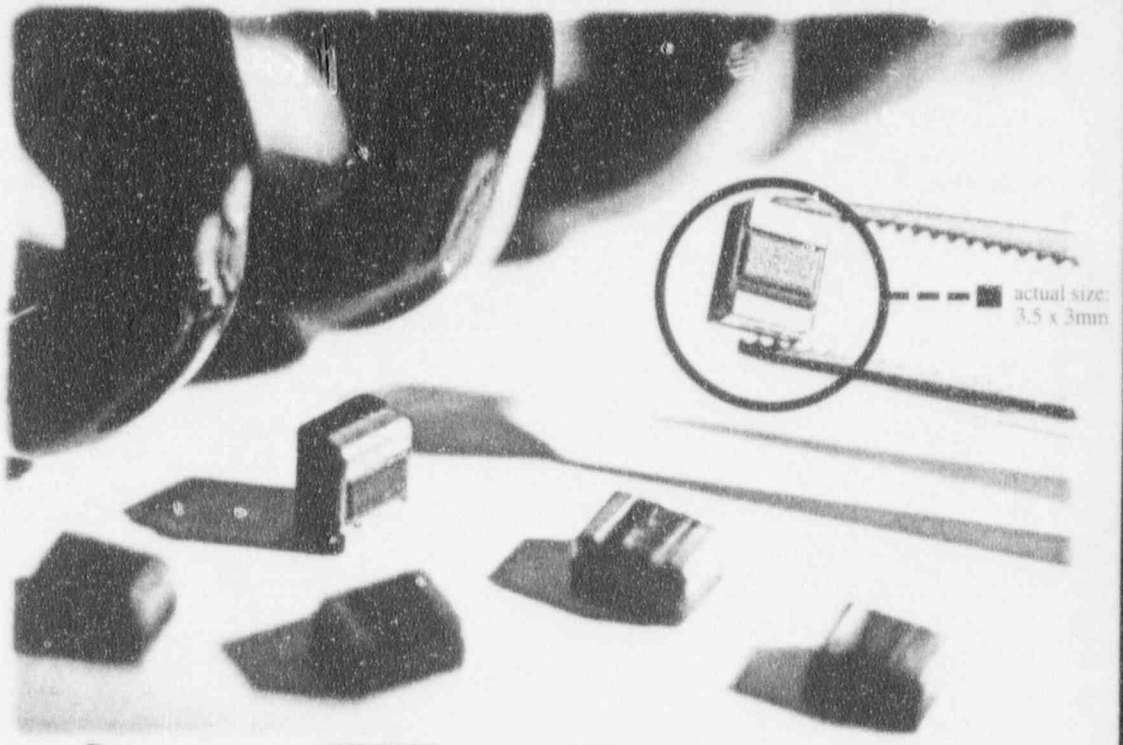
Our long-term leadership in our specialty chemicals businesses depends on our growing ability to modify the structure and chemistry of the materials we manufacture, resulting in better performance of our customers' products. In recent years, we have invested heavily in extending our knowledge of the production, behavior and handling of carbon black, fumed silica and tantalum microaggregates and micr[illegible]sculates.

It's an investment that has already yielded a significant return in new patent applications for low rolling resistance tire blacks. Cabot's largest customer segment, tire manufacturers, face special challenges in the years ahead as U.S. automobile companies strive to comply with Corporate Average Fuel Economy (CAFE) Standards. These legislated standards require that each manufacturer's "fleet" achieve average fuel efficiency of 27.5 miles per gallon currently with a projected efficiency standard of 40 miles per gallon by the turn of the century. In Europe, the "green" movement of environmental responsibility and expensive gasoline have created similar pressures on auto makers.

Tire makers that help car companies worldwide meet higher mileage standards with more efficient tires will gain a significant competitive advantage. As a result, many of our customers have asked us to help them lower the rolling resistance of their tires. Carbon black is the only commonly used rubber compound ingredient that both increases treadwear durability and traction. Until now, however, it has done it at the expense of increased rolling resistance. Our stepped-up research and development efforts have produced a new generation of carbon blacks that, according to preliminary customer evaluations, still

◀ IN A TYPICAL RADIAL GER TIRE, ALL MAJOR — AND SOME MINOR — COMPONENTS CONTAIN CARBON BLACK, FOR N AVERAGE OF 5.4 POUNDS.

THE CELLULAR PHONE IS ONE ▶ OF ;ODAY'S MOST EXCITING APPLICATIONS FOR SURFACE-MOUNT TANTALUM CHIP CAPACITORS. CABOT PERFORMANCE MATERIALS'S C-110 TANTALUM POWDER IS USED TO PRODUCE A TINY ANODE FOR THE CAPACITOR MARKET, WHICH IS GROWING AT AN ANNUAL RATE OF 21%.



ical Edge

impart essential traction and durability to tires while lowering rolling resistance — a clear advantage for our customers and for Cabot.

From Carbon Black to Cab-O-Sil to Cabot Performance Materials (CPM), our technological excellence is distinguishing Cabot in the marketplace.

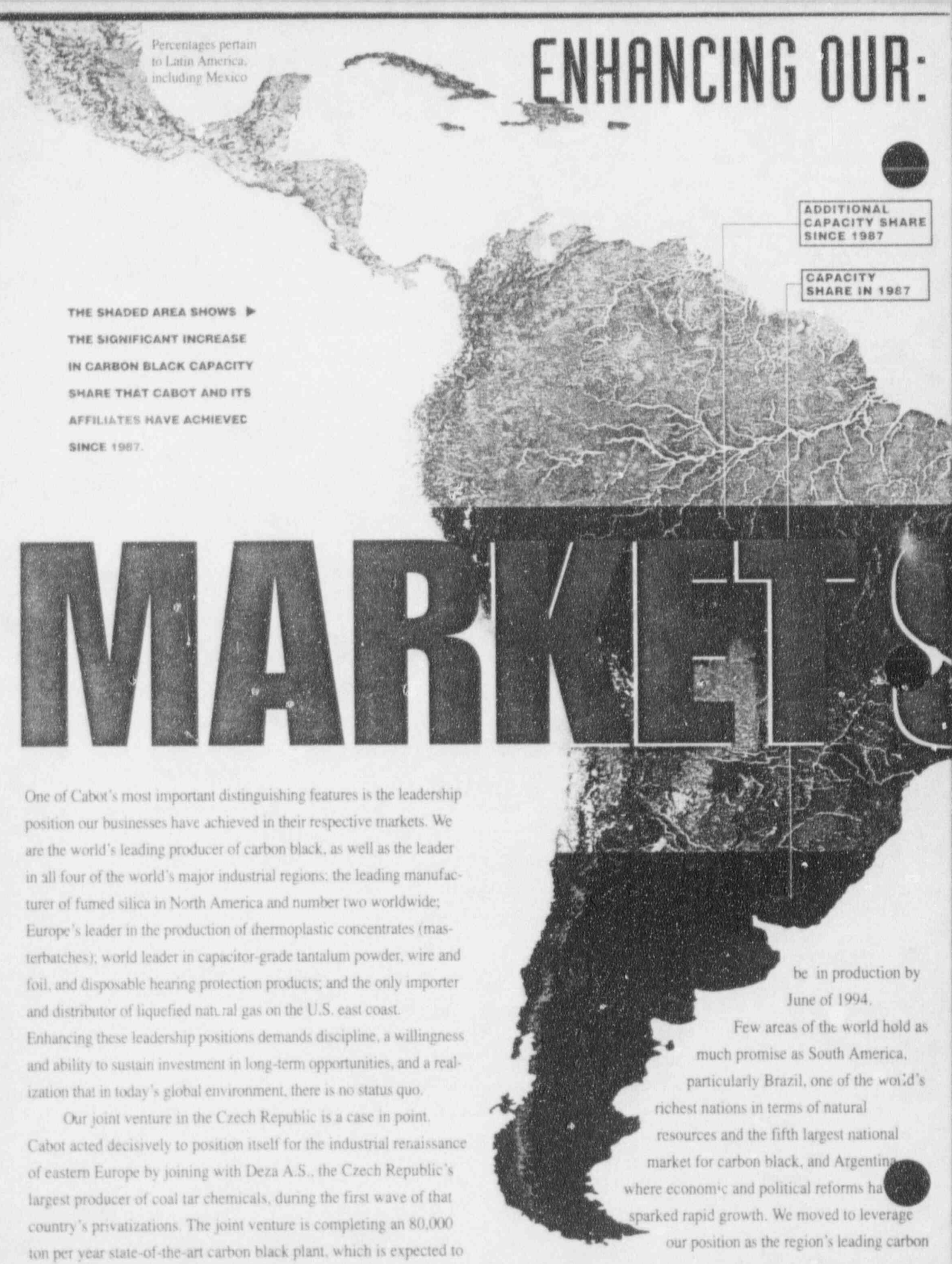
■ With the development of Black Pearls 3700, a super-clean, easy-dispersing black used in medium- and high-voltage power cable, we are the first company to produce "furnace blacks" — our primary technology — with performance characteristics that equal or exceed "acetylene blacks," a competing technology. Black Pearls 3700 is more cost-effective in a customer's formulation due to its superior processing characteristics.

■ Our knowledge of fumed silica chemistry allows us to create aqueous dispersions of Cab-O-Sil that extend its reach far beyond traditional applications, into industries ranging from cosmetics to the manufacture of integrated circuits, where it serves as a high-purity final polishing agent to assure a smooth, flat surface on which to print layers of microcircuits.

■ By producing increasingly fine grades of microscopic tantalum powder, we're extending our leadership position as a supplier of tantalum powder to capacitor manufacturers. Indeed, flaked tantalum powders, produced by CPM using patented processes, allow manufacturers to make smaller capacitors that operate at higher voltages with extremely high reliability — essential characteristics in applications ranging from cellular telephones to automotive ignitions.

Of equal importance, inspired by our market-focused approach, Cabot technologists are looking at our products from fresh perspectives and asking new questions. Drawing on our understanding of our customers' markets, how can we add value to their applications in new ways? Can we use our growing knowledge of surface chemistry as well as form and structure to open doors to new industries that may never have considered carbon black or fumed silica? The answers will write the next chapter in the history of Cabot.

ENHANCING OUR:



THE SHADED AREA SHOWS ▶ THE SIGNIFICANT INCREASE IN CARBON BLACK CAPACITY SHARE THAT CABOT AND ITS AFFILIATES HAVE ACHIEVED SINCE 1987.

MARKETS

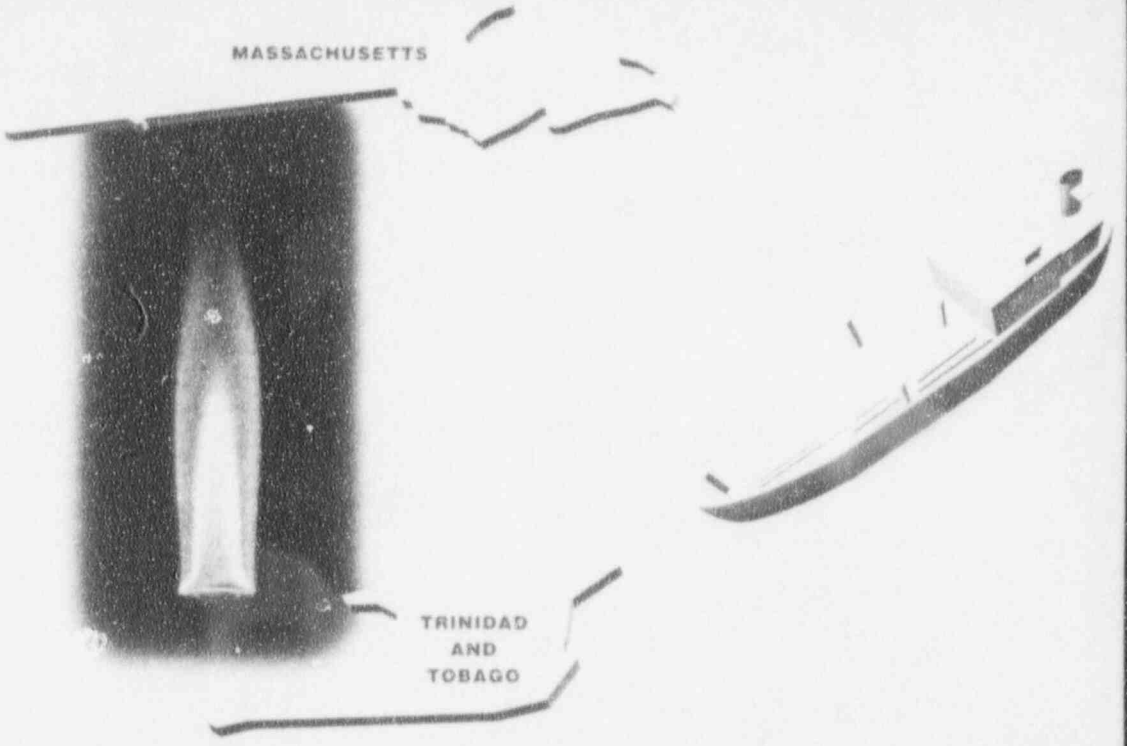
One of Cabot's most important distinguishing features is the leadership position our businesses have achieved in their respective markets. We are the world's leading producer of carbon black, as well as the leader in all four of the world's major industrial regions; the leading manufacturer of fumed silica in North America and number two worldwide; Europe's leader in the production of thermoplastic concentrates (masterbatches); world leader in capacitor-grade tantalum powder, wire and foil, and disposable hearing protection products; and the only importer and distributor of liquefied natural gas on the U.S. east coast. Enhancing these leadership positions demands discipline, a willingness and ability to sustain investment in long-term opportunities, and a realization that in today's global environment, there is no status quo.

Our joint venture in the Czech Republic is a case in point. Cabot acted decisively to position itself for the industrial renaissance of eastern Europe by joining with Deza A.S., the Czech Republic's largest producer of coal tar chemicals, during the first wave of that country's privatizations. The joint venture is completing an 80,000 ton per year state-of-the-art carbon black plant, which is expected to be in production by June of 1994.

Few areas of the world hold as much promise as South America, particularly Brazil, one of the world's richest nations in terms of natural resources and the fifth largest national market for carbon black, and Argentina, where economic and political reforms have sparked rapid growth. We moved to leverage our position as the region's leading carbon

◀ BY CONSOLIDATING AND LEVERAGING THEIR MARKET POSITIONS, CABOT AND ITS AFFILIATES IN LATIN AMERICA HAVE INCREASED THE VOLUME OF CARBON BLACK SOLD BY 76% SINCE 1987.

FROM THE ISLAND NATION OF ▷ TRINIDAD AND TOBAGO TO THE MARINE TERMINAL OF EVERETT, MASSACHUSETTS, CABOT TRINIDAD LNG CORPORATION IS FORGING ANOTHER LINK IN THE LIQUEFIED NATURAL GAS SUPPLY CHAIN.



TRENGTH

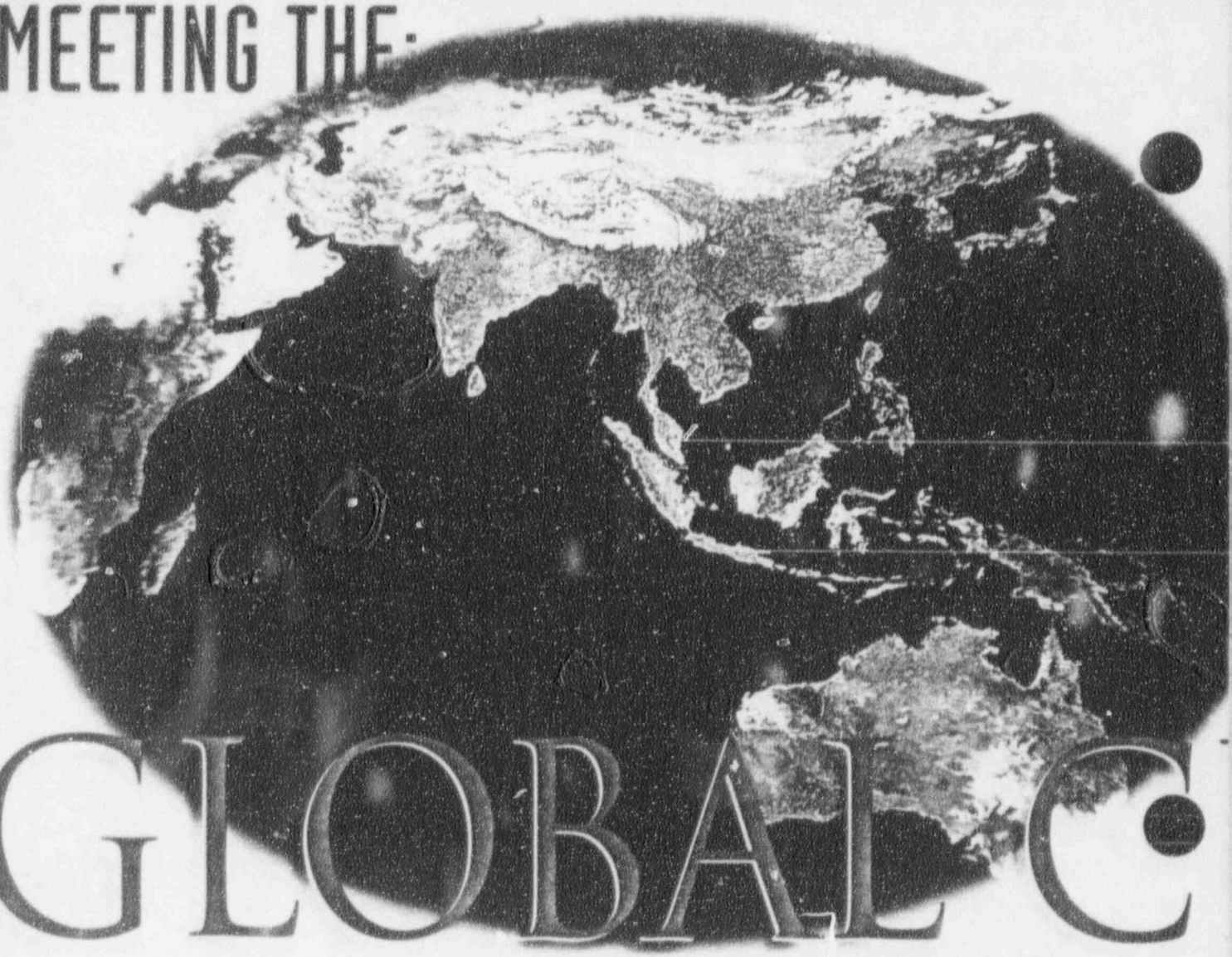
black supplier by acquiring our joint venture partner's minority interest in Capuava Carbonos, giving us 100% ownership and prompting a name change to Cabot Brasil Industria e Comercio Ltda. The move has allowed us to begin integrating our Brazilian and Argentine operations, a process we expect will yield significant savings, as well as enhance our responsiveness to customer needs. And signaling our long-term commitment to the region, we created our South American Carbon Black Division, moving management from Atlanta to Sao Paulo, a hemisphere closer to our customers.

Other businesses took strategic steps to maximize market position and performance as well. In the tantalum marketplace, stability of price and supply, coupled with technological excellence, are the foundation of long-term customer relationships. Already recognized as a technical leader, Cabot Performance Materials (CPM) strengthened its raw materials supply position and insulated itself and its customers from dramatic price swings by buying the remaining two-thirds interest in the Tantalum Mining Corporation of Canada Limited (Tanco). The purchase makes CPM the world's only fully integrated supplier of tantalum, with reserves in excess of 1.5 million pounds of tantalum oxide.

Assuring a diversified source of supply is also the driving force behind the creation of a new Cabot LNG subsidiary, Cabot Trinidad LNG Corporation, just one example of strategic development initiatives in the Caribbean and New England to create a more integrated production and distribution system. Cabot LNG is working with the government of Trinidad and Tobago and two other multinational energy companies on the development of that nation's extensive proven gas reserves. Cabot Trinidad is facilitating the completion of feasibility studies for a proposed liquefaction plant and LNG export project with a capacity of 300 million cubic feet per day. Deliveries of LNG produced by the project could begin arriving at Cabot LNG's Everett, Massachusetts terminal in 1997, a boon to natural gas customers who rely on Cabot LNG to satisfy peak, as well as year-round, demand.

Market leaders have special responsibilities to their customers and shareholders. Our markets never stand still and Cabot is making the investments needed to stay a step ahead.

MEETING THE



GLOBAL C

A global company must respond not only to the changing needs of its customers; it must also be willing to realign its resources with shifts in regional and global economic conditions. Long-term economic weakness, such as that plaguing European industrial markets, warrants retrenchment. On the other hand, extended periods of double-digit regional economic growth, exemplified by the rapid movement of southeast Asian countries into the ranks of the developed nations, merit significant new investment. In 1993, Cabot confronted the challenges of Europe while aggressively pursuing emerging Asian opportunities.

The European carbon black and plastics markets have both been shaken by a prolonged recession. Complicating the situation has been an increasing trend among European tire makers to seek more cost-effective locations to make their products, particularly when these sites are closer to their own customers. As a result, they have moved a portion of their production "offshore" to the U.S. and Asia. The inevitable result: overcapacity in the western European carbon black industry. In response, Cabot is engaged in consultations regarding the possible closure of its Hanau, Germany facility, and rebalancing its resources to meet demand from other plants in Europe. Cabot intends to remain Europe's leading carbon black maker, as well as the leader in carbon black research and development and customer service.

Cabot Plastics has had to confront similar issues, and has acted decisively to reduce costs while focusing its resources on carefully delineated segments using black (carbon black) and white (titanium dioxide) masterbatches. By reducing administrative staff and manufacturing capacity, Cabot Plastics significantly cut overall operating expense while retaining sufficient resources essential to serve customers in key markets such as pipe manufacturing, automotive parts, packaging, and agricultural films.

While Cab-O-Sil faces similar market conditions in Europe, its rebalancing has been less dramatic, in part because the characteristics of its business and technology allow it to shift production among a flexible network of plants, and in part because it has always run a lean operation in Europe by sharing sales, laboratory and staff resources with other Cabot divisions.

"MALAYSIAN CARBON SDN. BHD. (MCSB) IN PORT DICKSON IS ONE OF PNB'S SUCCESS STORIES IN JOINT VENTURES WITH FOREIGN COMPANIES. THE 'THINK GLOBAL AND ACT LOCAL' APPROACH USED BY CABOT IS UNDENIABLY THE KEY TO ITS SUCCESS. PNB AS A LOCAL PARTNER FEELS VERY COMFORTABLE WITH THE PROFESSIONALISM AND SINCERITY OF CABOT AND ITS PEOPLE. THIS IS ALL TRANSLATED TO THE BOTTOM LINE, WHERE MCSB'S PROFIT BEFORE TAX MULTIPLIED SIX TIMES IN THE LAST 10 YEARS AND ITS RETURN ON EQUITY IN 1993 WAS MORE THAN 25%."

MOHD. HILMEY MOHD. TAIB
GENERAL MANAGER OF PNB/ PNB NOMINEE DIRECTOR, MCSB

Kuala Lumpur, Malaysia

MALAYSIA: CARBON BLACK SHIPMENTS HAVE GROWN AN AVERAGE OF 12% ANNUALLY OVER THE LAST FIVE YEARS.

INDONESIA: WE EXPECT TO DOUBLE 1993 CARBON BLACK SHIPMENTS IN 1994 BY UTILIZING FULLY THE PLANT'S CURRENT CAPACITY.

CHALLENGE

As Europe deals with an economic slowdown, momentum builds in southeast Asia, where Cabot has had a presence for 30 years. This year, we underscored our determination to play a significant role in the region's economic growth by moving our regional headquarters from Australia to Kuala Lumpur, Malaysia. Malaysia was a natural choice, given the success of our operations there, and our close relationship with PNB, the Bumiputra Investment Trust, a Malaysian investment company that frequently acts as a joint venture partner and is a stockholder in hundreds of Malaysian companies.

For more than a decade, our relationship with PNB has demonstrated the power of a well-crafted strategic alliance between partners with complementary strengths. Cabot has brought technology and jobs to Malaysia, providing day-to-day management of the Port Dickson facility, while PNB has provided not only investment capital but local knowledge, political insight and customer contacts.

Our venture with PNB has grown to include our new carbon black plant in Cilegon, Indonesia, where PNB and Cabot fulfill similar roles in cooperation with Indonesian investors. With more than 200 million people, Indonesia is the fifth most populous country in the world. Three of the world's four leading tire manufacturers have manufacturing plants there, and the fourth is represented through a technology agreement. Just 13 months after opening, the Cilegon plant is oversold and has announced an expansion program to double its capacity — one of the shortest periods between startup and expansion in Cabot's history. Similarly, the Malaysian plant is at full capacity and expansion is planned there as well.

In China, where we opened a carbon black plant in 1991, we are also looking at expansion opportunities. Our progress there is especially satisfying, given the challenges of operating in an unfolding business environment.

With opportunity comes risk. Our goal has been to identify those opportunities that hold forth the promise of the best long-term returns, and then to allow time for our strategies to reveal their potential. It's a stance that demands a willingness to deal decisively with problems as well as opportunities. But it's one that is now exhibiting its value to Cabot customers and stockholders.

DIRECTORS

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JAMES J. BRADLEY, Trustee: Boston Museum of Science. Director: Fiduciary Trust Company

KENNETT F. BURNES, Executive Vice President. Director: Neozyme Corporation I, Neozyme Corporation II

JOHN G.L. CABOT, Vice Chairman of the Board and Chief Financial Officer. Director: Cabot Oil & Gas Corporation, Eaton Vance Corp.

ROBERT A. CHARPIE, former Chairman of the Board; Chairman, Ampersand Ventures (venture capital management). Director: Alliant Techsystems, Inc., Ashland Coal, Inc., Ceramics Process Systems Corporation, Champion International Corporation, Federated Stores, Inc.

JOHN D. CURTIN, JR., Executive Vice President. Director: American Oil and Gas Corporation, Imperial Holly Corporation

ROBERT P. HENDERSON, Managing Partner, Greylock Investments Limited Partnership and Greylock Limited Partnership (private equity investments); General Partner, Greylock Ventures Ltd. and Greylock Capital Ltd. Director: Eastern Enterprises Inc., Filene's Basement, Inc., Structural Dynamics Research Corp., Thompson Advisory Group L.P.

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DAVID V. RAGONE, Senior Lecturer, Massachusetts Institute of Technology; Partner, ASMV Management Company Limited Partnership (venture capital management). Director: Augat Inc., SIFCO INC.

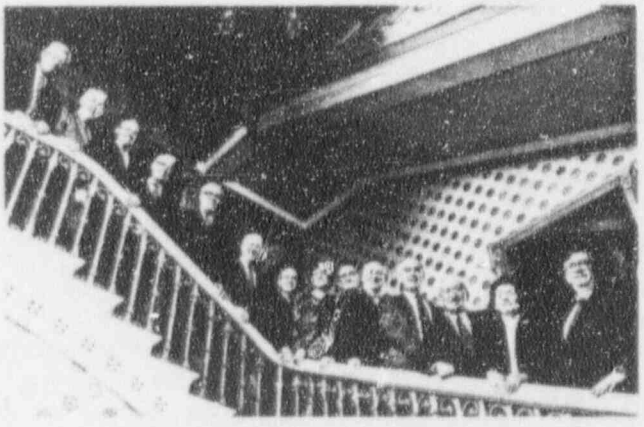
CHARLES P. SIESS, JR., Acting General Manager, Bridas S.A.P.I.C. (oil exploration). Director: Cabot Oil & Gas Corporation, CAMCO, Inc., Rowan Companies, Incorporated

MORRIS TANENBAUM, Director: American Cyanamid Company, American Electric Power Company, Inc.

DIRECTORS EMERITI

THOMAS D. CABOT, Honorary Chairman of the Board

LOUIS W. CABOT



Cabot Corporation Board of Directors
(not present: Messrs. O'Brien and Siess)

Cabot's financial performance in fiscal 1993 reflected the progress it has made over the past several years in enhancing its global position and lowering its cost structure through investment in plants, operations and training. Cabot in 1993 showed itself capable of generating reasonable returns on a per share basis even in the face of a deep economic downturn in Europe. Cabot largely offset weakness in Europe by capitalizing on opportunities in the more vibrant markets of North America and Latin America, and through continued attention to costs and capacity.

Earnings per share in 1993 were $0.41 after one-time adjustments for restructuring ($1.66 per share expense), energy reserves ($0.46 per share income) and accounting changes ($1.39 per share net expense). Before these adjustments, 1993 earnings per share were $3.00 as compared to $3.18 in fiscal 1992. Management views this result in light of the weak worldwide economic conditions to be quite favorable and is confident about the potential for continued earnings improvement despite the EPS decline in 1993 versus 1992.

Quarter to quarter comparisons show that the most significant declines in operating income were experienced during the first half of fiscal 1993. Second half results illustrate overall improvement in operating performance and positive trends in the Company's core businesses. Several factors contributed to the second half improvement, exclusive of one-time adjustments, versus 1992, including the flattening of the European recession, growth in North American Specialty Chemicals volumes and margins, higher than anticipated volumes in the Company's LNG business, and the results of continued cost reduction efforts.

The following analysis of operating results and financial condition should be read in conjunction with the Consolidated Financial Statements and accompanying Notes.

RESULTS OF OPERATIONS

Net sales and other operating revenues increased 4% in 1993, compared to an increase of 5% in 1992 over the prior year. The 1993 increase is largely due to stronger business performance in the Company's North American Specialty Chemicals operations driven by improvements in the automotive and tire industries. In particular, the North American Rubber Blacks business, aided by price and volume improvement, returned to meaningful profitability in 1993 from its weak 1992 performance.

European Specialty Chemicals sales continued to lag with year to year comparisons down 9%. In 1993, Energy Group sales increased 12% over 1992, reflecting higher natural gas prices, which permitted summer imports during 1993. This compares to an increase of 6% in 1992. The 5% increase in the Company's net sales and other operating income in 1992 versus 1991 was mainly attributable to increased shipment volumes resulting from a strengthening of the Company's overall market position, and to the consolidation of the operating results of the Company's Brazilian carbon black plant. In 1993, 41% of total net sales and 56% of Specialty Chemicals sales were made outside the United States. This compares to 45% and 59%, respectively, in both 1992 and 1991.

With continued economic uncertainty around the world, the Company expects only slight near-term sales growth. It expects to continue to benefit from a North American recovery. Unfavorable conditions are expected to continue in both Europe and Japan with recovery not anticipated in 1994. Conditions in the Company's affiliate operations in Japan may worsen, making carbon black capacity reductions advisable.

Cost of sales as a percentage of net sales was 75% in 1993, 74% in 1992 and 76% in 1991. The increase in 1993 is a result of lower capacity utilization, particularly in higher margin European operations. The decrease in 1992 resulted from economies of scale related to higher volumes, and successful cost reduction programs.

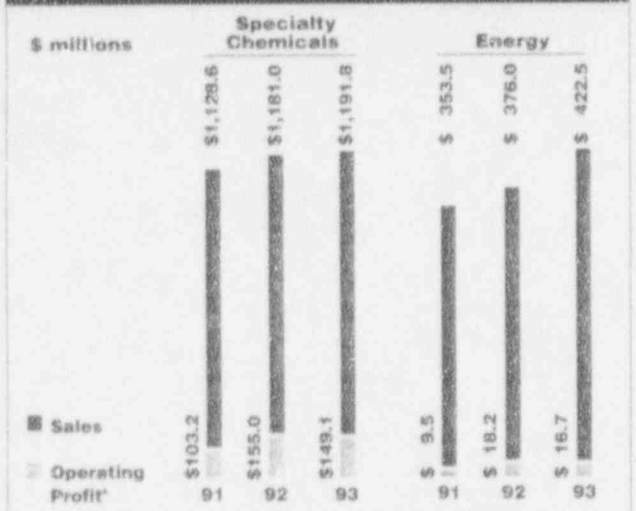
Selling and administrative expenses decreased 3%, or $5.4 million in 1993, versus an increase of 3% in 1992. The improvement reflects continued progress in the Company's ability to reduce net costs and the positive effect of foreign currency exchange. Cost reductions in 1992 were more than offset by moderate strategic investment in systems and market development.

OPERATING PROFIT

Operating profit was $118.4 million in 1993, $173.2 million in 1992, and $112.7 million in 1991. Operating profits in 1993 include a $47.4 million ($31.1 million after tax) restructuring charge. The Company decided to take this restructuring charge as part of ongoing efforts to improve operating efficiencies, particularly in the depressed European Specialty Chemicals business, and to rationalize European production capacity. In line with this decision, the restructuring charge was taken to cover a plant closing in Europe, to scale back the Plastics recycling business, and for the closing of certain European

Specialty Chemicals production lines. The 1993 operating margin before the restructuring charge was 10% compared to 11% in 1992 and 8% in 1991.

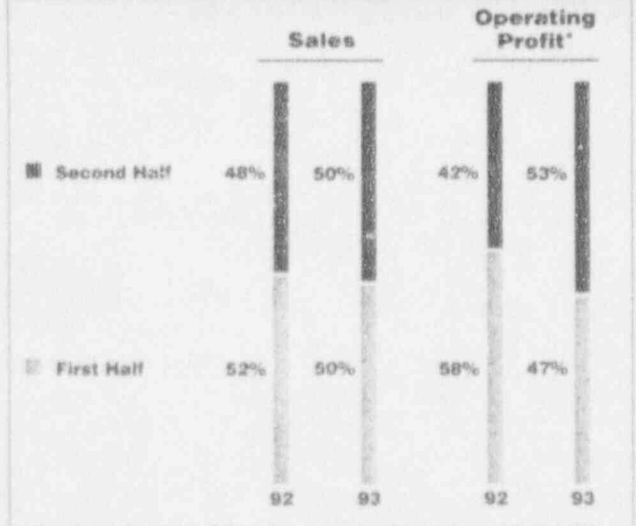
Sales and Operating Profit Fiscal Years 1991, 1992, 1993



* Operating profit excludes a $47.4 million restructuring charge in 1993.

The 4% decrease in 1993 operating profit before the restructuring charge can be attributed to the disappointing European results, and a slow first half in both Specialty Chemicals and the Energy Group. However, strong second half results partially offset first half sluggishness. In 1993, 53% of operating profits, before restructuring, were generated in the second half of the year compared to 42% in 1992 and 30% in 1991. Second half improvement can be attributed to the better performance of the Company's North and South American Specialty Chemicals operations, and volume and pricing improvement in the Energy Group.

Comparison of First Half and Second Half Results Fiscal Years 1992, 1993



* Operating profit excludes a $47.4 million restructuring charge in the second half of 1993.

Improvement in both the volume and mix of products sold accounted for most of the 54% increase in operating profit in 1992. Increased volumes resulted in lower unit costs while higher-margin specialty products were a greater component of total sales. Cost reduction efforts, significantly lower restructuring charges and the consolidation of the results of the Company's Brazilian operation were also key factors. Partly offsetting these improvements were start-up and operating expenses at the Company's new plants in Japan, Hong Kong and Wales.

OTHER EXPENSES

Interest expense for 1993, 1992 and 1991 was $44.0 million, $41.7 million and $38.7 million, respectively. The increases in 1993 and 1992 resulted from lower capitalized interest due to the completion of new manufacturing facilities in 1992. This was mitigated somewhat by declining interest rates in both years.

Unallocated corporate expenses rose in 1993 to $20.7 million from $14.9 million in 1992 and $11.7 million in 1991 primarily due to non-recurring favorable items in 1992 and 1991. Excluding these items, corporate management expense was approximately equal in all three years. Included in 1993's $20.7 million net expense was a $4.5 million gain on an insurance settlement. This compares to gains totaling $12.4 million in 1992: a $5.5 million gain associated with the sale of The Maple Gas Corporation securities; a $3.6 million gain from receipt of a third-party payment in connection with a voluntary site cleanup; and a $3.3 million gain from the sale of American Oil and Gas Corporation (AOG) securities. Included in 1991 net expenses were a $6.1 million reversal of prior years' incentive compensation accruals, a $4.1 million transfer of corporate reserves to the divisions, and a $1.6 million gain from the redemption of AOG securities. Exclusive of all the favorable offsets, unallocated corporate expenses actually decreased 8% in 1993 after a 16% increase in 1992.

PROVISION FOR INCOME TAXES

The effective tax rates on income from continuing operations were 44% in 1993, 46% in 1992, and 50% in 1991. The 1993 rate would have been 40% without restructuring charges. The improved tax rate primarily reflects the diminished impact of unbenefited foreign losses and lower earnings in other foreign jurisdictions with high tax rates. A more detailed analysis of income taxes is presented in Note K to the Consolidated Financial Statements.

SELECTED FINANCIAL DATA BY INDUSTRY SEGMENT

Years ended September 30 Dollars in millions	1993	1992	1991	1990	1989
NET SALES AND OTHER OPERATING REVENUES					
Specialty Chemicals and Materials	$1,191.8	$1,181.0	$1,128.6	$1,106.5	$ 951.3
Energy	422.5	376.0	353.5	441.4	852.2
Net sales and other operating revenues	$1,614.3	$1,557.0	$1,482.1	$1,547.9	$1,803.5
OPERATING PROFIT (LOSS)					
Specialty Chemicals and Materials (a)	$ 101.7	$ 155.0	$ 103.2	$ 147.3	$ 111.5
Energy (b)	16.7	18.2	9.5	(2.5)	(75.5)
Total operating profit	118.4	173.2	112.7	144.8	36.0
Interest expense	44.0	41.7	38.6	41.1	34.1
Unallocated corporate expenses, net (c)	20.7	14.9	11.7	39.7	27.4
Gain on resolution of matters from divested energy businesses	14.2	—	—	—	—
Income (loss) from continuing operations before income taxes	$ 67.9	$ 116.6	$ 62.4	$ 64.0	$ (25.5)
DEPRECIATION, DEPLETION AND AMORTIZATION					
Specialty Chemicals and Materials	$ 81.5	$ 80.5	$ 70.8	$ 55.5	$ 40.6
Energy	2.8	2.7	17.9	29.3	56.6
General corporate	0.2	0.9	0.5	0.7	0.5
Total	$ 84.5	$ 84.1	$ 89.2	$ 85.5	$ 97.7
FIXED ASSET ADDITIONS					
Specialty Chemicals and Materials	$ 63.9	$ 76.5	$ 138.0	$ 122.2	$ 134.9
Energy	0.7	1.3	59.4	51.8	57.4
General corporate	0.4	0.3	0.6	0.4	—
Total	$ 65.0	$ 78.1	$ 198.0	$ 174.4	$ 192.3
IDENTIFIABLE ASSETS					
Specialty Chemicals and Materials	$1,117.4	$1,191.2	$1,059.6	$1,099.5	$ 790.1
Energy	116.1	132.6	159.4	398.6	392.8
General corporate	89.3	79.9	83.5	89.5	99.3
Equity in affiliates—Specialty Chemicals and Materials	103.1	91.0	100.1	86.4	80.3
Equity in affiliates—Energy	63.6	59.8	59.8	57.9	54.9
Total	$1,489.5	$1,554.5	$1,462.4	$1,731.9	$1,417.4

(a) Includes a $47.4 restructuring charge in 1993, and aggregate charges of $18.9 for reorganization of carbon black operations, realignment of the ceramics business, and environmental issues in 1989.

(b) Energy operating profit includes losses from restructuring of the Energy Group of $25.8 (see Note B of Notes to Consolidated Financial Statements) and $71.7 in 1990 and 1989, respectively.

(c) Unallocated corporate expenses, net, include corporate management costs reduced by investment income.

INCOME FROM CONTINUING OPERATIONS

Income from continuing operations was $37.4 million after tax ($1.80 per share). Income is inclusive of several one-time adjustments that collectively amounted to a reduction of $33.2 million before taxes. These adjustments include a $47.4 million before-tax ($1.66 per share after-tax) restructuring charge, and a favorable energy accrual adjustment of $14.2 million before-tax ($0.46 per share after-tax). Without these one-time adjustments, net income from continuing operations would have been $59.8 million ($3.00 per share), compared with $62.2 million ($3.18 per share) and $39.8 million ($1.69 per share) in 1992 and 1991, respectively.

NET INCOME APPLICABLE TO COMMON SHARES

Net income applicable to common shares was $7.7 million ($0.41 per share) in 1993, compared with $58.5 million ($3.18 per share) in 1992, and $123.5 million ($5.[illegible] per share) in 1991. Income in 1993 includes the one-time adjustments mentioned above, and an additional charge of $26.1 million after tax for required accounting changes. Income for 1991 included a $77.9 million ($3.66 per share) gain associated with the COCC Exchange Offer. The equity impact of this gain was offset by the acquisition of 6.4 million Cabot common shares through the Exchange Offer. (See Note B to the Consolidated Financial Statements.)

SPECIALTY CHEMICALS AND MATERIALS GROUP

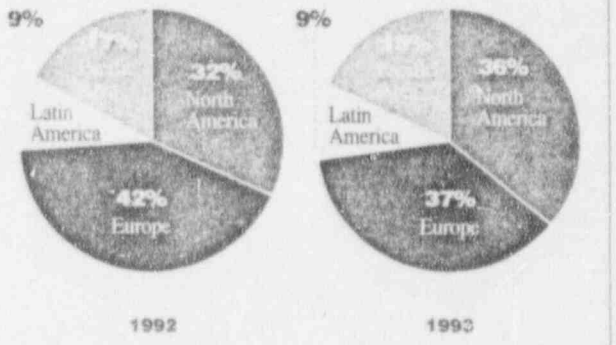
The Specialty Chemicals and Materials Group includes the Company's global specialty chemicals operations. These operations manufacture carbon black, a very fine black powder used as a reinforcing agent in tires and most other rubber products, and also widely used as an agent in many specialty applications such as inks, plastics, cables and coatings; fumed silica, a specialty chemical used as a thickening, dispersing and reinforcing agent in hundreds of products such as silicone rubber and polyester resins; thermoplastic concentrates and specialty compounds; and capacitor tantalum materials and other metals and alloys for the electronic, medical, defense and aerospace markets. The Specialty Chemicals and Materials Group also includes Cabot Safety Corporation which manufactures safety products and energy absorbing industrial materials.

Sales for the Specialty Chemicals and Materials Group were up 1% in 1993 and 5% in 1992. All business divisions reported gains for 1993, with the exception of the Plastics Division which reported a 4% decline in sales. Volumes in Specialty Chemicals remained essentially flat in 1993. Volume decreases in Europe, brought about by recession, were offset by volume increases in North America, Latin America and the Pacific Region, owing to Cabot's strong global position and ability to capitalize on the opportunities in the stronger regions to offset the weaker ones. Overall, European volumes were off 7% in 1993 versus 1992. The 1992 sales growth reflects increases in all of the Group's businesses. Cabot Performance Materials, Cabot Plastics and Cab-O-Sil operations all achieved double-digit sales growth in 1992. In the Carbon Black business, increased volumes and the inclusion of the Brazilian operation were offset by lower prices related to lower feedstock costs.

Fifty-three percent of total Specialty Chemicals sales originated outside North America in 1993, versus 57% in 1992. Including 100% of affiliate Specialty Chemicals sales and allocating North American exports to destination region, 64% of sales were made outside North America in 1993 compared to 68% in 1992.

In 1993, operating profit declined 34% after the restructuring charge of $47.4 million and 4% before the charge, as compared to a 50% increase in 1992. The decline in 1993 was due to a reduction in the higher margin European business, the performance of three new plants started up in 1992 which were not yet fully utilized or profitable, and a sales shift towards lower margin products in the Company's Safety business. These declines were not fully offset by profit improvement in the North American Carbon Black and Performance Materials businesses. The 1992 operating profit increase was due to increased volumes, the favorable translation effect of a weaker U.S. dollar and cost structure improvement in Europe, as well as increased volumes in North America. The Group's operating margin was 8.5% in 1993 (12.5% before the restructuring charge), 13.1% in 1992 and 9.1% in 1991.

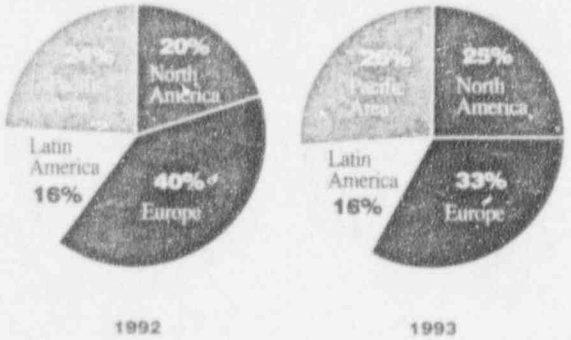
Specialty Chemicals Revenues by Geographic Region



Revenues include 100% of equity affiliate sales.
Region reflects sales destination point.

The Company is the world's only global manufacturer of carbon black, with 61% of 1993's consolidated carbon black revenues generated from operations outside the United States. Carbon black is manufactured on five continents in 25 plants in 18 countries. During 1993, construction began on a new plant in the Czech Republic. Many carbon black facilities are wholly owned by Cabot Corporation, and others are affiliates, jointly managed and operated with local partners in the specific region. Financial results from the carbon black affiliate plants are reported in the income statement as Equity in Net Income of Affiliates. The Carbon Black Divisions serve three main market segments, and each is affected in varying degrees by fluctuating economic conditions. Sales to tire manufacturers represent the largest percentage of carbon black sold by volume and weight. This segment is dependent on both new automobile tire sales and the replacement tire business. The makers of industrial rubber products such as hoses and gaskets represent a second market for carbon black. The third market is made up of the users of very high grade, higher margin carbon blacks used in inks and other special applications. These last two segments have been less affected by depressed economic conditions in the United States and Europe. The Industrial Rubber Blacks and Special Blacks segments also reduce the Company's dependence on the tire industry.

Carbon Black Revenues by Geographic Region



Revenues include 100% of equity affiliate sales.
Region reflects sales destination point.

In Carbon Black, total sales for 1993 increased 1% from 1992 sales levels. In 1992, sales were also up 1% over 1991. Double-digit sales increases were achieved in North American Carbon Black in 1993, largely due to the improved Rubber Blacks business, but were not strong enough to offset the sales declines in European rubber blacks. In Special Blacks, European sales remained constant with 1992 levels, despite adverse economic conditions. Before restructuring charges, Carbon Black operating profit dropped in 1993 primarily due to lost European volumes and the effect of lower plant utilization on profits. Second half volume improvements in other regions helped to offset this shortfall. Over 58% of the Company's carbon black was produced outside North America, compared to 61% the prior year. Including 100% of the Company's affiliate revenues, 75% of the carbon black was sold to customers outside North America versus 80% in 1992. Volume declines in Europe are not expected to rebound in the near term, and therefore the Company has announced its intention to close a European plant.

In 1992, Rubber Blacks' results improved significantly over 1991. North America increased shipment volumes by 8%. Although feedstock costs decreased, margins remained thin due to competitive pressures. In Europe, operating profit improved, following a decline in 1991, reflecting the positive translation effect of a weaker U.S. dollar, increased volumes, and cost reduction programs. Special Blacks' operating profit declined somewhat in 1992 due to start-up costs of operations of the new Japanese plant and deterioration in the Japanese economy.

In the Plastics Division, revenues fell 4% in 1993 because of lower volumes and prices, largely due to the division's European exposure and the strategic elimination of low margin products. Costs were lowered and capacity was reduced at two plants in 1993. The shrinking cost base has had a positive effect on overall earnings for the division. Increased losses were realized in the Plastics recycling business and no economic improvement is predicted. Therefore, the Company has announced its plan to scale back the recycling business.

Cabot Safety Corporation continues to face flat to declining trends in industrial employment, the primary driver of its market demand. Nevertheless, the subsidiary maintained 1992 sales levels in 1993 and continued aggressive cost cutting helped preserve product margins. Price pressure and a continuing customer shift to lower margin products reduced profitability compared to 1992.

The Cab-O-Sil Division's profitability growth was stalled in 1993 by a combination of the weakness of the European economies and the costs associated with expanded capacity. The North American fumed silica business, however, showed continued improvement throughout the year. This trend is expected to carry into early 1994.

Cabot Performance Materials had another favorable year driven by the capacitor product line. Continued strong demand from capacitor producers led to solid performance in this business. In 1993, performance was boosted by higher operating absorption and improving cost controls. Sales increased modestly in 1993, after a significant increase in 1992.

Fixed asset additions in the Specialty Chemicals and Materials Group were 16% lower in 1993 than

1992; capital additions also were 45% lower in 1992 versus 1991. Capital spending slowed in 1992 due to the completion of construction of manufacturing facilities in Wales, Japan and Hong Kong. The Czech Republic plant on which construction began in 1993 is accounted for as an equity affiliate.

THE ENERGY GROUP

The Energy Group includes two operating subsidiaries: Cabot LNG, a liquefied natural gas importing and terminalling operation, and TUCO, a coal fuel services business.

The Company also owns a 35% interest in American Oil and Gas Corporation (AOG/NYSE), whose operating results are reflected in Cabot's equity in net income of affiliates and are thus not included in the Energy Group segment.

The Group's alignment reflects a significant restructuring begun in 1989 and completed in the second quarter of 1991, with the Company's Exchange Offer of common stock it owned in Cabot Oil & Gas Corporation. (See Note B to the Consolidated Financial Statements.) The Exchange Offer allowed the Company to focus its energy operations more tightly and reduce the number of Cabot common shares outstanding.

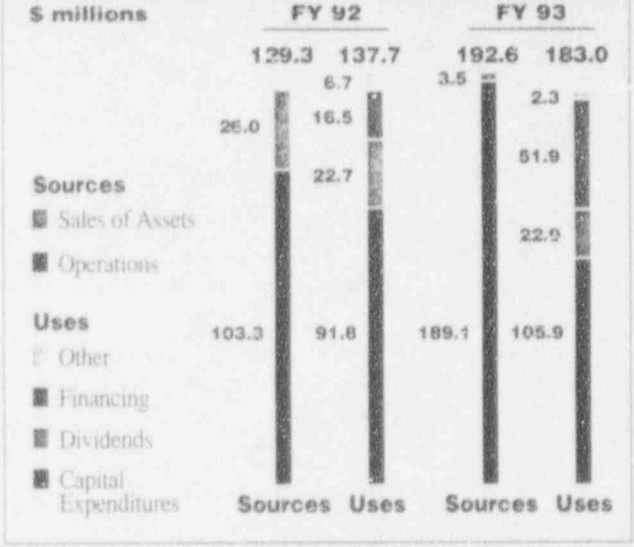
Energy Group sales were $422.5 million in 1993, $376.0 million in 1992 and $353.5 million in 1991. Energy sales in the first half of the year were disappointing, declining 6% from 1992. Most of this decline was attributable to the LNG business. An increased supply of natural gas prompting lower prices, further complicated by warmer winter weather, decreased first half sales. In addition, changes in Federal regulations led to an increase in Cabot's index-based gas supply costs causing a temporary but significant margin squeeze. Sales rebounded in the second half of the year, increasing 42% over the same period in 1992. During this period, Cabot LNG brought in nine cargoes as compared to three in 1992. The increased volume, coupled with better natural gas prices, accounted for most of the improvement. In 1992, sales increases were triggered by favorable natural gas prices, and an unseasonably cold fall and winter. Cabot LNG imported 18 cargoes in 1993, 14 in 1992 and 11 in 1991.

Cabot LNG has entered into several contracts with independent power producers who have constructed cogeneration facilities. The first of these facilities came on line in the last quarter of 1993. Volumes generated from these relationships should help to stabilize seasonal fluctuations in sales. The Company expects Cabot LNG to continue to post profits in 1994. However, volumes may be adversely impacted by constraints on supplies of LNG due to refurbishment activity at the supplier's Algerian liquefaction facilities.

TUCO had 1993 revenues which were up 9% from 1992. This increase, and a comparable increase in operating profits, is partially due to increased demand for electricity, brought about by a relatively hotter summer in Texas.

FUNDS FLOW AND LIQUIDITY

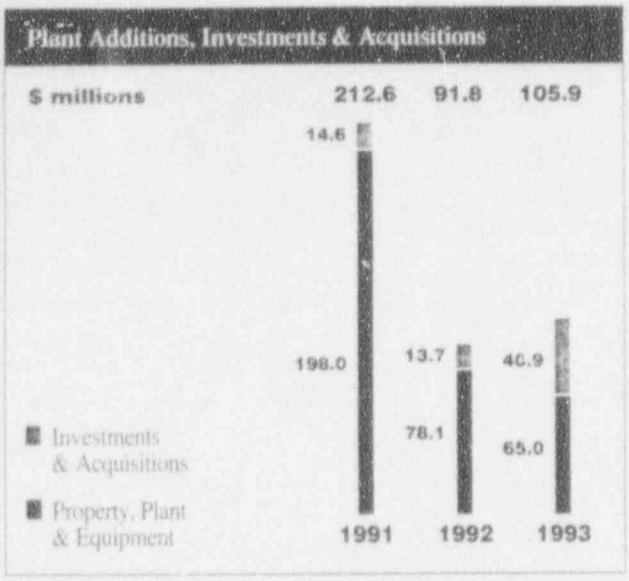
Sources and Uses of Cash Fiscal Years 1992, 1993



Cash generated in 1993 from the Company's operating activities increased 83% to $189 million from $103 million in 1992. The increase resulted primarily from the fact that there were significant additional working capital needs related to the opening of new plants in 1992 which stabilized in 1993. Excluding an increase in accruals primarily related to restructuring charges which reduced net income, total working capital remained essentially flat in 1993 as compared to a $68 million increase in 1992.

Total 1993 capital expenditures for property, plant and equipment were $65 million, a 17% decrease from the $78 million spent in 1992. This spending was used to improve and enhance existing business facilities. In 1993, the Company also invested $17.8 million in the acquisition of the remaining 38.5% interest of its Brazilian carbon black subsidiary and smaller amounts totalling $23.1 million in its Czech Republic, Mexican and Indonesian carbon black affiliates, and to purchase the remaining interest in a tantalum mine.

Sales of property, plant and equipment, and investments decreased from $26 million in 1992 to $4 million in 1993. In 1992, proceeds included $10 million plus accrued dividends from AOG's redemption of the Company's shares of AOG participating preferred stock, and $5.5 million from the sale of its interest in The Maple Gas Corporation.



The improved cash flow allowed the Company to decrease its borrowings by $65 million in 1993. The net reduction in borrowings improved the Company's ratio of total debt (including short-term debt net of cash) to capital to 50.4% in 1993 from 51.5% in 1992. However, the Company anticipates a partial reversal of this debt reduction to meet near-term seasonally high working capital requirements and to pay certain accrued expenses. Thereafter, the Company plans to further reduce total debt during 1994 with excess operating cash flow. At September 30, 1993, there were no amounts outstanding under a $250 million line of credit. The Company is actively working to resolve several environmental issues regarding sites primarily associated with divested businesses in the United States. At September 30, 1993, the Company had $38 million accrued for these issues versus $43 million in 1992.

Management expects cash from operations and present financing arrangements, including the Company's unused line of credit, to be sufficient to meet the Company's cash requirements for the foreseeable future.

COMMON STOCK

In April 1989, the Company's Board of Directors authorized the purchase of up to one million of its common shares and retired the balance of all previous authorizations. At September 30, 1993, a balance of 400,000 shares remained under that authorization.

During 1991, the Company acquired 6.4 million common shares from stockholders who tendered their Cabot shares pursuant to the COGC Exchange Offer (see Note B to the Consolidated Financial Statements). The number of Cabot common shares outstanding declined 25% to 18.2 million in 1991 from 24.4 million in 1990, primarily as a result of the Exchange Offer.

During the 1993 fiscal year, the Company paid cash dividends of $1.04 per share reflecting a quarterly dividend of $0.26 per share. The book value per share of Cabot stock decreased 12% to $23.62 at September 30, 1993.

QUARTERLY STOCK PRICE AND DIVIDEND DATA

Fiscal 1993	Dec	Mar	Jun	Sep	Year
Cash dividends per share	$ 0.26	$ 0.26	$ 0.26	$ 0.26	**$ 1.04**
Price range of common stock					
High	49.62	43.88	48.75	56.25	**56.25**
Low	41.12	37.25	39.62	46.62	**37.25**
Close	43.38	42.50	48.75	55.50	**55.50**

Fiscal 1992	Dec	Mar	Jun	Sep	Year
Cash dividends per share	$ 0.26	$ 0.26	$ 0.26	$ 0.26	**$ 1.04**
Price range of common stock					
High	35.00	42.63	47.63	52.25	**52.25**
Low	28.13	32.50	40.50	44.50	**28.13**
Close	33.38	40.88	45.00	48.00	**48.00**

NEW ACCOUNTING STANDARDS

The Company adopted two new accounting principles during 1993: Financial Accounting Standards Board (FASB) Statement of Financial Accounting Standards No. 106, "Employers' Accounting for Postretirement Benefits Other Than Pensions" (SFAS 106), and FASB Statement No. 109, "Accounting for Income Taxes" (SFAS 109).

SFAS 106 mandates the accrual of costs for certain postretirement health care and life insurance benefits on an "as-earned" basis. The accumulated benefit obligation associated with the Company's adoption of SFAS 106 could be recognized at once or on a gradual basis over the average remaining service period of active employees. The Company recognized the entire accumulated benefit obligation in 1993 so that future earnings will not be burdened with benefits earned in the past. As a result, the Company recorded a $43.2 million after-tax charge for the cumulative effect of the change in accounting for postretirement health care and life insurance benefits. In addition to the cumulative effect, the change in accounting increased the 1993 pre-tax expense by $0.8 million.

SFAS 109 requires an asset and liability approach for financial accounting and reporting for income taxes. The Company recognized a $17.1 million benefit as the cumulative effect of adoption of SFAS 109.

The Company has recognized the cumulative effects of the changes in the methods of accounting for postretirement health care and life insurance costs and income taxes as of the beginning of fiscal 1993 in the Consolidated Statement of Income.

CABOT CORPORATION CONSOLIDATED STATEMENTS OF INCOME

Years ended September 30 Dollars in thousands, except per share amounts	1993	1992	1991
Revenues:			
Net sales and other operating revenues	$1,614,315	$1,556,986	$1,482,089
Interest and dividend income	4,225	5,217	5,906
Total revenues	1,618,540	1,562,203	1,487,995
Costs and expenses:			
Cost of sales	1,211,655	1,151,063	1,132,526
Selling and administrative expenses	204,804	210,213	204,669
Research and technical service	45,651	37,470	37,668
Interest expense (Note G)	44,043	41,714	38,661
Loss on Specialty Chemicals and Materials Group restructuring (Note B)	47,400	—	—
Gain on resolution of matters from divested energy businesses (Note B)	(14,177)	—	—
Other charges, net	11,264	5,144	12,109
Total costs and expenses	1,550,640	1,445,604	1,425,633
Income from continuing operations before income taxes	67,900	116,599	62,362
Provision for income taxes (Note K)	(30,699)	(54,549)	(31,054)
Equity in net income of affiliated companies (Note D)	209	173	8,517
Income from continuing operations	37,410	62,223	39,825
Discontinued operations (Note B):			
Income from discontinued operations	—	—	9,492
Gain on disposition of discontinued operations	—	—	77,943
Income before cumulative effect of accounting changes	37,410	62,223	127,260
Cumulative effect of accounting changes	(26,109)	—	—
Net income	11,301	62,223	127,260
Dividends on preferred stock, net of tax benefit of $1,934, $1,910 and $1,971	(3,632)	(3,709)	(3,748)
Income applicable to common shares	$ 7,669	$ 58,514	$ 123,512
Income per common share (Note A):			
Primary			
Continuing operations	$ 1.80	$ 3.18	$ 1.69
Discontinued operations	—	—	0.45
Gain on disposition of discontinued operations	—	—	3.66
Cumulative effect of accounting changes	(1.39)	—	—
Income per share	$ 0.41	$ 3.18	$ 5.80
Fully diluted			
Continuing operations	$ 1.80	$ 2.97	$ 1.63
Discontinued operations	—	—	0.41
Gain on disposition of discontinued operations	—	—	3.41
Cumulative effect of accounting changes	(1.39)	—	—
Income per share	$ 0.41	$ 2.97	$ 5.45

The accompanying notes are an integral part of these financial statements.

CABOT CORPORATION CONSOLIDATED BALANCE SHEETS

September 30 Dollars in thousands	1993	1992
ASSETS		
Current assets:		
Cash and cash equivalents	$ 40,267	$ 30,656
Accounts and notes receivable (net of reserve for doubtful accounts of $6,321 and $6,073)	258,057	265,530
Inventories (Note C)	192,350	226,199
Prepaid expenses	8,771	17,311
Deferred income taxes (Note K)	41,761	15,076
Total current assets	544,206	554,772
Investments:		
At equity (Notes B and D)	166,669	150,811
At cost	7,911	5,729
Total investments	174,580	156,540
Property, plant and equipment (Note E)	1,250,228	1,274,656
Accumulated depreciation and amortization	603,708	571,440
Net property, plant and equipment	646,520	703,216
Other assets:		
Intangible assets (net of accumulated amortization of $26,926 and $25,671)	78,873	87,396
Deferred income taxes (Note K)	5,752	—
Other assets	39,542	52,605
Total other assets	124,167	140,001
Total assets	$1,489,473	$1,554,529

September 30 Dollars in thousands	1993	1992
LIABILITIES AND STOCKHOLDERS' EQUITY		
Current liabilities:		
Notes payable to banks	$ 1,501	$ 74,500
Current portion of long-term debt (Note G)	25,205	9,684
Accounts payable and accrued liabilities (Note F)	297,201	276,435
U.S. and foreign income taxes	25,029	—
Deferred income taxes (Note K)	1,285	—
Total current liabilities	354,221	360,619
Long-term debt (Note G)	459,275	479,882
Deferred income taxes (Note K)	86,344	119,917
Other liabilities (Note I)	147,360	91,400
Commitments and contingencies (Note L)		
Minority interest	—	9,756
Stockholders' equity (Notes G, H, I, and J):		
Preferred stock:		
Authorized: 2,000,000 shares of $1 par value		
Series A Junior Participating Preferred Stock		
Issued and outstanding: none		
Series B ESOP Convertible Preferred Stock 7.75% Cumulative		
Issued: 75,336 shares (aggregate redemption value of $74,982 and $76,018)	75,336	75,336
Less cost of shares of preferred treasury stock	(3,003)	(2,693)
Common stock:		
Authorized: 80,000,000 shares of $1 par value		
Issued: 33,887,484 shares	33,887	33,887
Additional paid-in capital	33,621	30,324
Retained earnings	861,803	873,422
Less cost of common treasury stock (including unearned amounts of $7,321 and $4,692)	(483,184)	(494,824)
Deferred employee benefits	(68,781)	(70,050)
Foreign currency translation adjustments	(7,406)	47,553
Total stockholders' equity	442,273	492,955
Total liabilities and stockholders' equity	$1,489,473	$1,554,529

The accompanying notes are an integral part of these financial statements.

CABOT CORPORATION CONSOLIDATED STATEMENTS OF CASH FLOWS

Years ended September 30 Dollars in thousands	1993	1992	1991
CASH FLOWS FROM OPERATING ACTIVITIES			
Net income	$ 11,301	$ 62,223	$ 127,260
Adjustments to reconcile net income to cash provided by operating activities:			
Depreciation, depletion and amortization	84,476	84,128	89,163
Deferred tax provision	11,060	22,920	11,584
Gain on sales of investments	(2,841)	(12,790)	(1,666)
Effects of accounting changes	26,109	—	—
Equity in income of affiliated companies, net of dividends received	5,779	5,593	(2,137)
Other, net	3,391	5,491	5,757
Gain on disposition of discontinued operations	—	—	(77,943)
Changes in assets and liabilities:			
(Increase) decrease in accounts receivable	(17,332)	(14,246)	20,117
Decrease (increase) in inventories	17,412	(27,181)	14,983
Increase (decrease) in accounts payable and accruals	38,555	(26,693)	2,638
Other, net	11,233	3,889	(42,542)
Cash provided by operating activities	189,143	103,334	147,214
CASH FLOWS FROM INVESTING ACTIVITIES			
Additions to property, plant and equipment	(65,009)	(78,070)	(198,010)
Investments and acquisitions (excluding cash acquired)	(40,905)	(13,745)	(14,583)
Sales of property, plant and equipment, and investments	3,506	26,033	13,267
Cash used by investing activities	(102,408)	(65,782)	(199,326)
CASH FLOWS FROM FINANCING ACTIVITIES			
Proceeds from long-term debt	9,259	118,778	20,675
Reduction in long-term debt	(27,384)	(11,823)	(45,671)
(Decrease) increase in short-term debt	(46,392)	(126,696)	94,050
Issuances (purchases) of treasury stock, net	12,647	3,185	2,163
Cash dividends paid to stockholders	(22,920)	(22,694)	(26,277)
Cash (used by) provided by financing activities	(74,790)	(39,250)	44,940
Effect of exchange rate changes on cash	(2,334)	(6,683)	(2,069)
Increase (decrease) in cash and cash equivalents	9,611	(8,381)	(9,241)
Cash and cash equivalents at beginning of year	30,656	39,037	48,278
Cash and cash equivalents at end of year	$ 40,267	$ 30,656	$ 39,037

The accompanying notes are an integral part of these financial statements.

A. SIGNIFICANT ACCOUNTING POLICIES

The Consolidated Financial S. ments have been prepared in conformity with generally acc. ted accounting principles. The significant accounting policies of the Company are described below.

PRINCIPLES OF CONSOLIDATION

The Consolidated Financial Statements include the accounts of Cabot Corporation and majority-owned and controlled domestic and foreign subsidiaries. Investments in majority-owned affiliates where control is temporary and investments in 20 percent to 50 percent-owned affiliates are accounted for on the equity method. All significant intercompany transactions have been eliminated.

CASH EQUIVALENTS

For purposes of the statement of cash flows, the Company considers all time deposits and short-term investments with a maturity of three months or less at time of purchase to be cash equivalents.

FOREIGN CURRENCY TRANSLATION

Substantially all assets and liabilities of the Company's foreign operations are translated at year-end exchange rates. Revenues and expenses are translated at the weighted average rate during the year. Foreign currency gains and losses arising from transactions are reflected in net income. Balance sheet translation gains and losses are reflected as a separate component of stockholders' equity.

INVENTORIES

Inventories are stated at the lower of cost or market. The cost of most domestic inventories is determined using the last-in, first-out method. The cost of other domestic and all foreign inventories is determined using the average cost method or the first-in, first-out method.

PROPERTY, PLANT AND EQUIPMENT

Property, plant and equipment is recorded at cost. For financial reporting purposes, depreciation of property, plant and equipment is calculated using primarily the straight-line method based on estimated economic lives.

EARNINGS PER SHARE

Earnings per share is computed on the basis of weighted average shares outstanding during each year. Fully diluted earnings per share considers conversion of the Company's Series B ESOP Convertible Preferred Stock held by the Company's Employee Stock Ownership Plan (Note H) and shares issuable under t Company's incentive compensation plans (Note J).

INCOME TAXES

In the fourth quarter of 1993, the Company adopted Statement of Financial Accounting Standards (SFAS) No. 109, "Accounting for Income Taxes," retroactive to October 1, 1992. Under the new method, deferred income taxes are provided based on the estimated future tax effects of differences between financial statement carrying amounts and the tax bases of existing assets and liabilities. Provisions are made for the U.S. income tax liability on earnings of foreign subsidiaries, except for locations where the Company has designated earnings to be permanently invested.

INTANGIBLE ASSETS

Intangible assets are comprised of the cost of business acquisitions in excess of the fair value assigned to the net tangible assets acquired and the costs of technology, licenses and patents purchased in business acquisitions. The excess of cost over the fair value of net assets acquired is amortized on the straight-line basis over either 40 years or an estimated useful life, whichever is shorter. Other intangibles are amortized over their estimated useful lives.

INTEREST RATE SWAP AGREEMENTS

The Company enters into interest rate swap agreements to convert a portion of its fixed-rate obligations into floating-rate borrowings. The interest rate differential to be received or paid is recognized over the lives of the agreements as an adjustment to interest expense.

FORWARD FOREIGN CURRENCY EXCHANGE CONTRACTS

Forward foreign currency exchange contracts are purchased to reduce the impact of foreign currency fluctuations on operating results. Realized and unrealized gains and losses on these contracts are recorded in net income currently, with the exception of gains and losses on contracts designed to hedge specific foreign currency commitments which are deferred and recognized in net income in the period of the commitment transaction. Income includes, in Other Charges, foreign exchange losses of $1,977,000, $3,021,000 and $2,018,000 in 1993, 1992 and 1991, respectively.

B. RESTRUCTURING

SPECIALTY CHEMICALS AND MATERIALS

During 1993, the Company recognized a $47.4 million charge for the restructuring of certain Specialty Chemicals and Materials businesses. The restructuring includes an anticipated carbon black plant closing in Europe, a scaling back of the Company's Plastics recycling business and the closing of certain Specialty Chemicals production lines.

ENERGY

During 1989, the Company merged its natural gas transmission unit with American Oil and Gas Corporation (AOG). The Company also sold its natural gas liquids extraction business and certain oil and gas reserves.

In the AOG merger, the Company received cash and various securities. On September 30, 1993, the Company's AOG investment represented approximately 35% of common stock of the total voting rights of AOG's outstanding shares. The Company accounts for its investment in AOG under the equity method.

In the sale of its natural gas liquids extraction business the Company received cash and various securities. The Company's sale of those securities in 1992 resulted in a $5.5 million gain.

In 1990, the Company consolidated its oil and gas exploration and production operations under a wholly owned subsidiary, Cabot Oil & Gas Corporation (COGC), which in turn completed an initial public offering of 3,565,000 shares of its Class A common stock. The Company retained ownership of common stock representing 82% of the voting rights in COGC.

On March 28, 1991, the Company completed an Exchange Offer of its COGC common stock for shares of the Company's common stock. Approximately 6,378,000 shares of the Company's common stock were tendered by shareholders in exchange for approximately 15,308,000 shares of COGC common stock on the Exchange Offer's basis of 2.4 shares of COGC common stock for each share of the Company's common stock. The Company then distributed all remaining shares it owned of COGC, approximately 1,440,000 common shares, to the Company's shareholders of record, on a pro rata basis. The Company recognized a $77,943,000 gain net of taxes and related expenses on the Exchange based on the closing price of $34.75 of the Company's common stock on March 27, 1991. COGC's operating results have been stated as discontinued operations in the Company's consolidated statements of income. In determining profit or loss from discontinued operations, interest was allocated based on the ratio of COGC's net assets to the Company's consolidated net assets.

During 1991, COGC generated net revenues of $92 million, interest expense (net) of $4 million, income tax expense of $7 million and net income of $9 million.

During 1993, the Company recognized a $14,177,000 gain on the favorable resolution of certain matters related to divested energy businesses.

C. INVENTORIES

Inventories were as follows:

September 30 Dollars in thousands	1993	1992
Raw materials	$ 45,589	$ 56,974
Work in process	36,923	27,669
Finished goods	77,747	102,742
Other	35,091	38,814
Total	$195,350	$226,199

Inventories valued under the LIFO method comprised approximately 23 percent and 27 percent of 1993 and 1992 totals, respectively. The estimated current cost of these inventories exceeded their stated valuation determined on the LIFO basis by $26,958,000 and $30,984,000 at September 30, 1993 and 1992, respectively.

D. INVESTMENTS

INVESTMENTS

Investments in net assets of affiliated companies accounted for under the equity method amounted to $166,669,000 and $150,811,000 at September 30, 1993 and 1992, respectively. The combined results of operations and financial position of the Company's equity-basis affiliates are summarized below:

Years ended September 30 Dollars in thousands	1993	1992
CONDENSED INCOME STATEMENT INFORMATION		
Net sales	**$860,535**	$674,001
Gross margin	**151,502**	142,300
Income before accounting changes	**5,259**	2,117
Net income	**6,080**	2,117
Equity in net income of affiliated companies	**209**	173
CONDENSED BALANCE SHEET INFORMATION		
Current assets	**$306,749**	$268,870
Non-current assets	**618,890**	557,814
Current liabilities	**313,196**	286,671
Non-current liabilities	**234,387**	192,476
Net worth	**378,056**	347,537

During fiscal year 1991 the Company's investment in its Brazilian subsidiary was accounted for on an equity basis. Effective October 1, 1991, the results of the Brazilian subsidiary were fully consolidated. The Company acquired the remaining 38.5% minority interest in its Brazilian subsidiary during 1993.

E. PROPERTY, PLANT & EQUIPMENT

The cost of property, plant and equipment, by industry segment, was as follows:

September 30 Dollars in thousands	1993	1992
Specialty Chemicals and Materials	**$1,156,692**	$1,182,186
Energy	**91,566**	90,860
General corporate assets	**1,970**	1,610
Total	**$1,250,228**	$1,274,656

F. ACCOUNTS PAYABLE & ACCRUED LIABILITIES

Accounts payable and accrued liabilities consisted of the following:

September 30 Dollars in thousands	1993	1992
Accounts payable	**$ 85,893**	$109,303
Gas contract liabilities	**15,243**	18,926
Accrued employee compensation	**20,224**	24,410
Restructuring liabilities	**41,364**	—
Other accrued liabilities	**134,477**	123,796
Total	**$297,201**	$276,435

G. DEBT

Long-term debt consisted of the following:

September 30 Dollars in thousands	1993	1992
Notes due 1994, 9.875%	**$150,000**	$150,000
Notes due 2002–2022, 8.07%	**105,000**	105,000
Notes due 1997, 10.25%	**100,000**	100,000
Guarantee of ESOP notes due 2013, 8.29%	**68,781**	70,050
French franc-denominated notes due 1995–1997, 8.37%–15.12%	**16,419**	22,675
Notes due 1993, 7.40%	**14,998**	13,249
Australian dollar-denominated notes due 1995, 12.90%	**4,352**	8,022
Industrial Revenue Bonds due 1997–2014, 9.35%–14.00%	**6,000**	6,000
Other, including foreign term loans	**22,930**	14,570
	488,480	489,566
Less: current portion of long-term debt	**(29,205)**	(9,684)
Total	**$459,275**	$479,882

In June 1992, the Company filed a $300 million debt shelf registration statement with the Securities and Exchange Commission. Subsequently, $165 million of notes payable were refinanced with notes of a weighted average maturity of 19 years and a weighted average interest rate of 8.07%. The notes were issued at par and provide for principal to be repaid at maturity.

During fiscal 1989, the Company's Employee Stock Ownership Plan (ESOP) borrowed $75,000,000 from an institutional lender in order to finance its purchase of 75,000 shares of the Company's Series B ESOP Convertible Preferred Stock. This debt bears interest at 8.29% per annum, and is to be repaid in equal quarterly installments through December 31, 2013. The Company, as guarantor, has reflected the outstanding balance of $68,781,000 as a liability on the Company's consolidated balance sheet at September 30, 1993. An equal amount, representing deferred employee benefits, has been recorded as a reduction of stockholders' equity (Note H).

The Company may borrow up to $250,000,000 at floating rates under the terms of a revolving credit and term loan facility. The agreement contains provisions regarding minimum net worth requirements and certain indebtedness limitations which would limit the amount available for future borrowings. Commitment fees are paid based on the unused portion of the facility. The facility is available through March 31, 1994. No amounts were outstanding under this credit agreement at September 30, 1993.

The aggregate principal amounts of long-term debt due in each of the five fiscal years 1994 through 1998 are $29,205,000, $158,655,000, $13,855,000, $8,612,000 and $103,245,000, respectively.

Cash paid for interest during 1993, 1992 and 1991 totalled $41,970,000, $44,347,000 and $50,602,000, respectively. The Company capitalized no interest in 1993, $3,963,000 in 1992 and $8,745,000 in 1991.

Based primarily on dealer quotes, the fair value of long-term borrowings was approximately $555,000,000 at September 30, 1993.

H. STOCKHOLDERS' EQUITY

The following table summarizes the changes in stockholders' equity for each of the three years in the period ended September 30, 1993.

Years ended September 30 Dollars in thousands	1993	1992	1991
PREFERRED STOCK			
Beginning of year	$ 75,336	$ 75,336	$ 75,336
End of year	$ 75,336	$ 75,336	$ 75,336
PREFERRED TREASURY STOCK			
Beginning of year	$ (2,693)	$ (2,393)	$ (707)
Purchase of treasury stock	(310)	(300)	(1,686)
End of year	$ (3,003)	$ (2,693)	$ (2,393)
COMMON STOCK			
Beginning of year	$ 33,887	$ 33,887	$ 33,887
End of year	$ 33,887	$ 33,887	$ 33,887
ADDITIONAL PAID-IN CAPITAL			
Beginning of year	$ 30,324	$ 26,597	$ 26,986
Sale of treasury stock to the Profit Sharing and Savings Plan	861	(50)	(137)
Issuance of treasury stock under employee compensation plans	2,436	3,777	(252)
End of year	$ 33,621	$ 30,324	$ 26,597
RETAINED EARNINGS			
Beginning of year	$ 873,422	$ 833,893	$ 742,363
Net income	11,301	62,223	127,260
Common dividends paid ($1.04, $1.04, $1.04 per share)	(19,288)	(18,985)	(22,529)
Preferred dividends paid to ESOP, net of tax benefit	(3,632)	(3,709)	(3,748)
Distribution of COGC common stock	—	—	(9,453)
End of year	$ 861,803	$ 873,422	$ 833,893
COMMON TREASURY STOCK			
Beginning of year	$(490,132)	$(493,584)	$(276,648)
Purchase of treasury stock	(57)	(1,678)	(223,127)
Sale of treasury stock to the Profit Sharing and Savings Plan	1,896	502	4,413
Issuance of treasury stock under employee compensation plans	12,430	4,628	1,778
End of year	$(475,863)	$(490,132)	$(493,584)
UNEARNED COMPENSATION			
Beginning of year	$ (4,692)	$ (1,415)	$ (1,699)
Issuance of treasury stock under employee compensation plans	(4,609)	(3,693)	(472)
Amortization	1,980	416	756
End of year	$ (7,321)	$ (4,692)	$ (1,415)
DEFERRED EMPLOYEE BENEFITS			
Beginning of year	$ (70,050)	$ (71,220)	$ (72,298)
Principal payment by ESOP under guaranteed loan	1,269	1,170	1,078
End of year	$ (68,781)	$ (70,050)	$ (71,220)
FOREIGN CURRENCY TRANSLATION ADJUSTMENTS			
Beginning of year	$ 47,553	$ 25,762	$ 43,369
Foreign currency translation adjustments	(54,959)	21,791	(17,607)
End of year	$ (7,406)	$ 47,553	$ 25,762
TOTAL STOCKHOLDERS' EQUITY, END OF YEAR	$ 442,273	$ 492,955	$ 426,863

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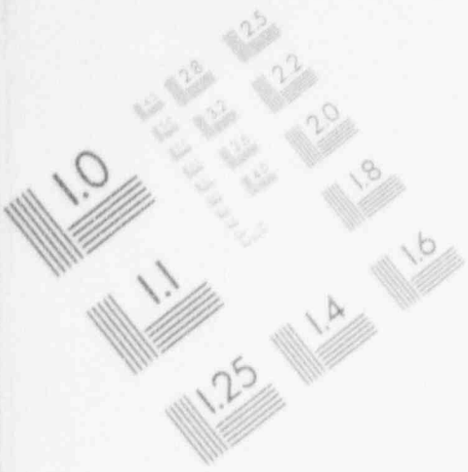
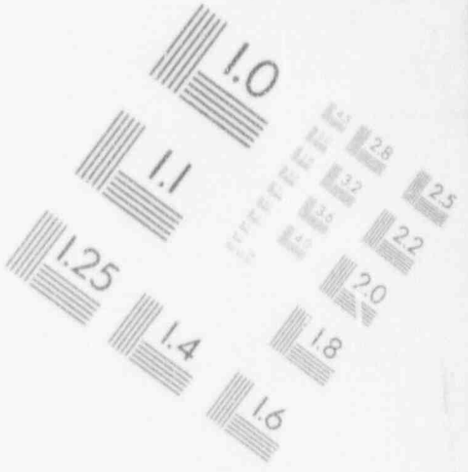
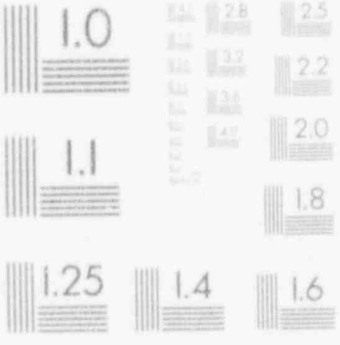
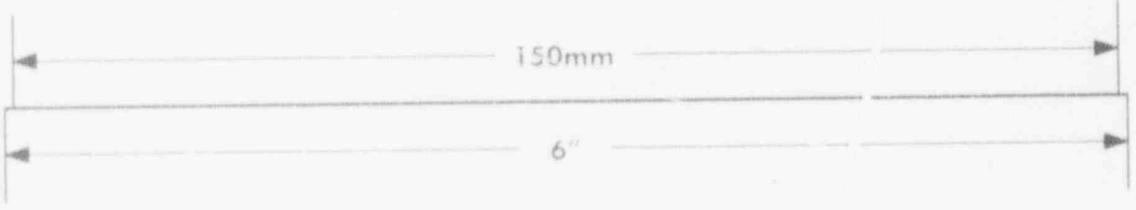
IMAGE EVALUATION TEST TARGET (MT-3)









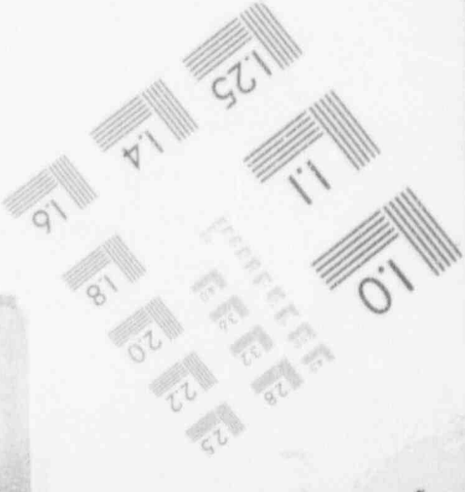


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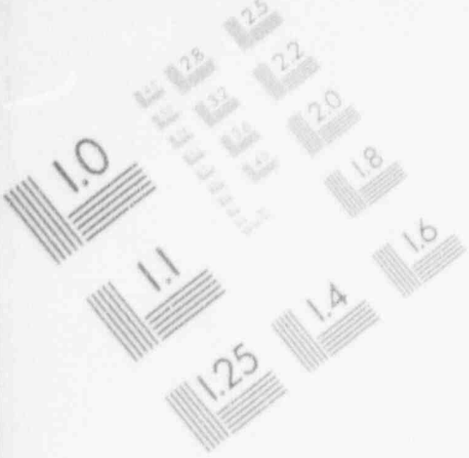
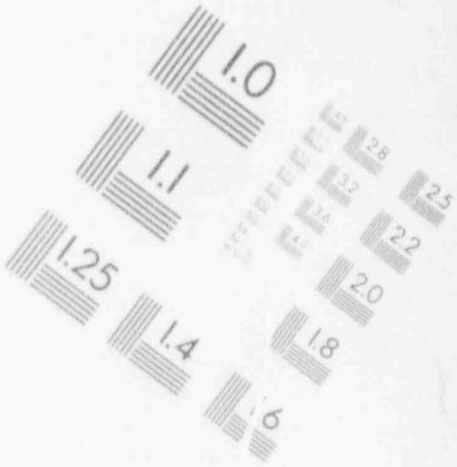
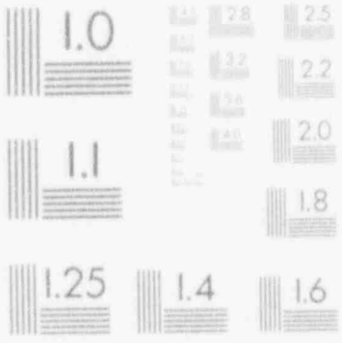
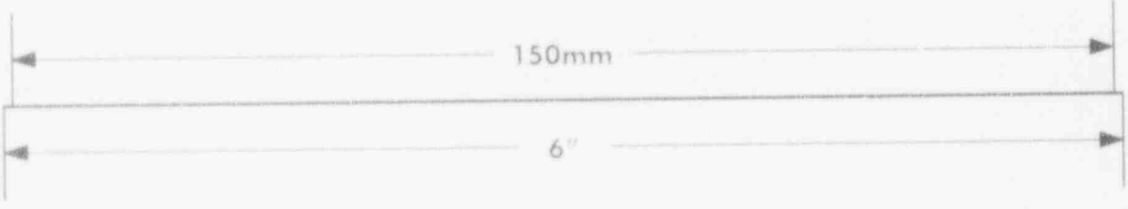
IMAGE EVALUATION TEST TARGET (MT-3)









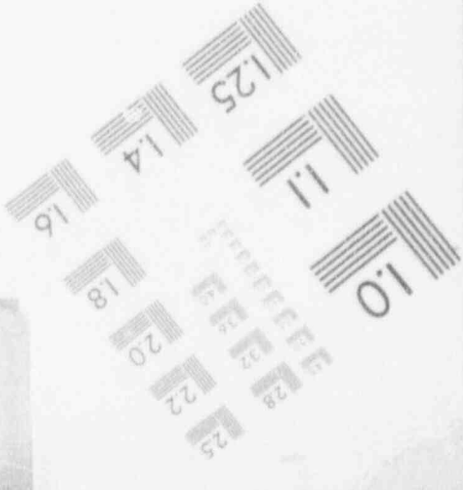


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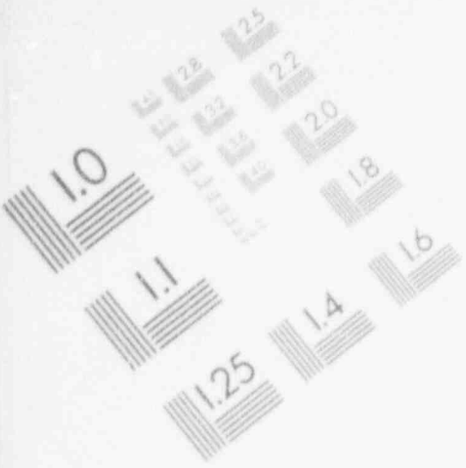
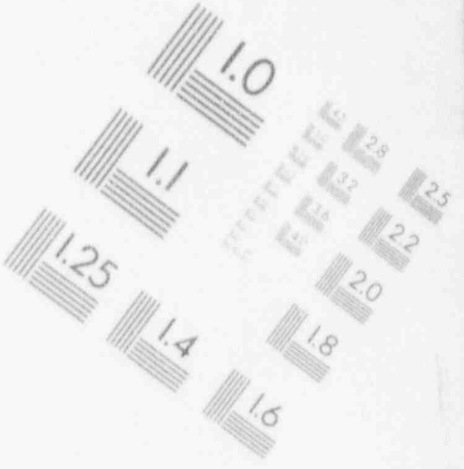
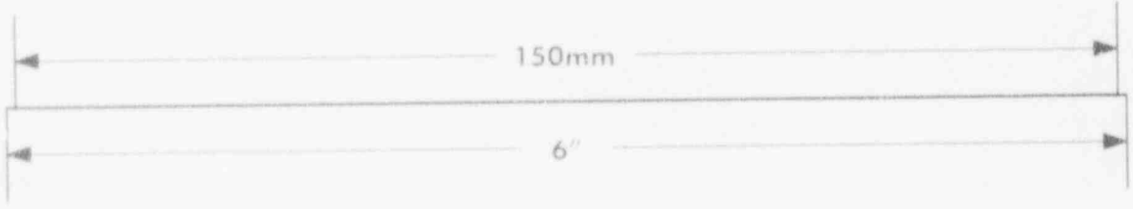
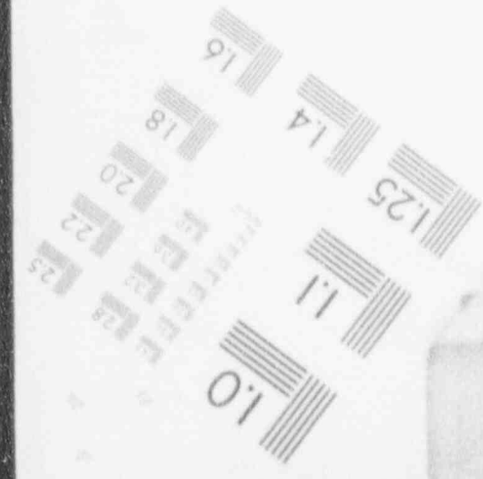
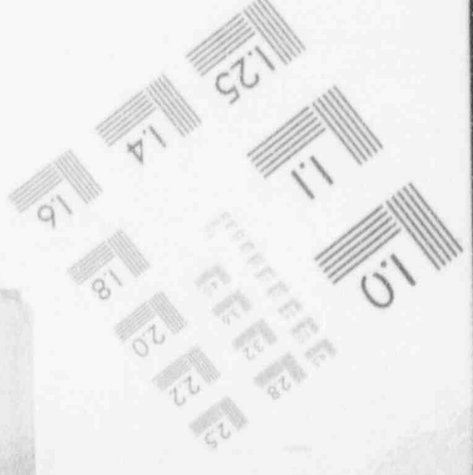
IMAGE EVALUATION
TEST TARGET (MT-3)











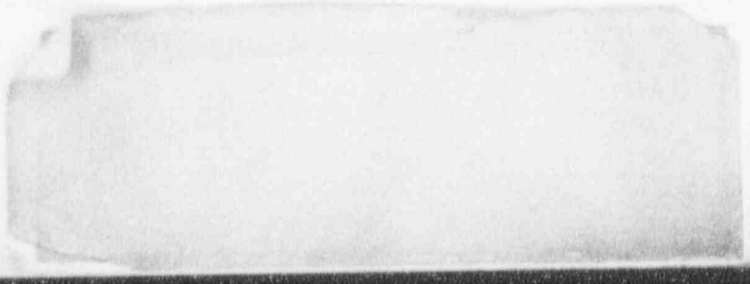


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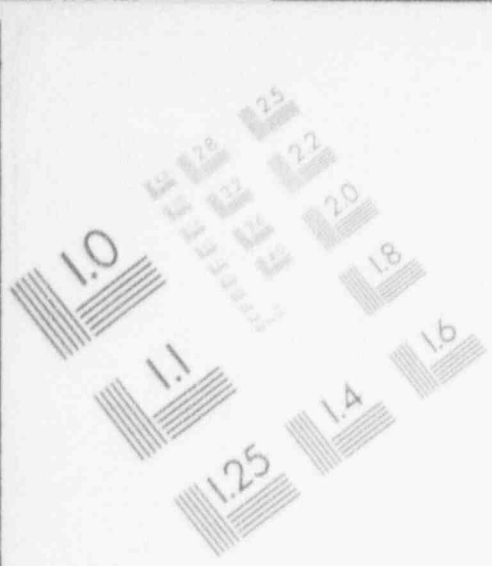
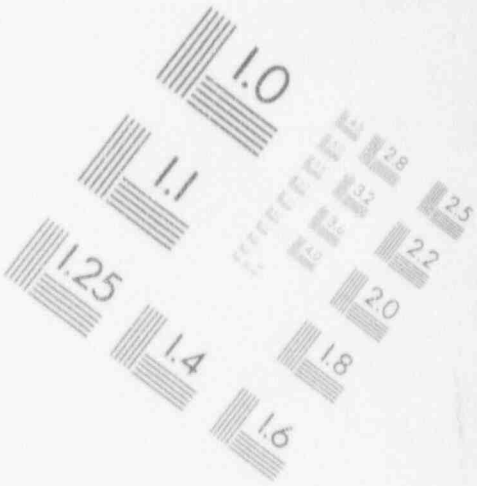
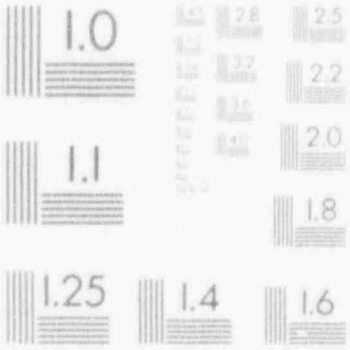
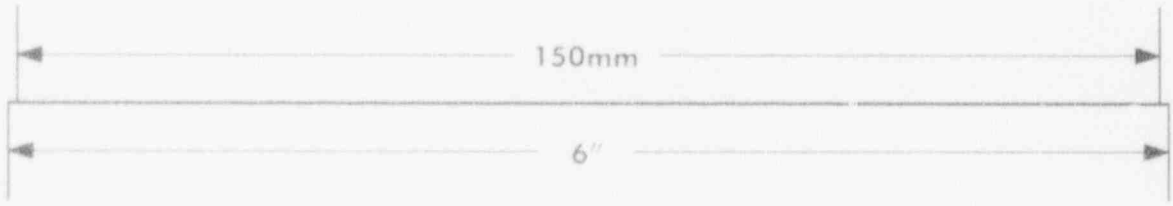
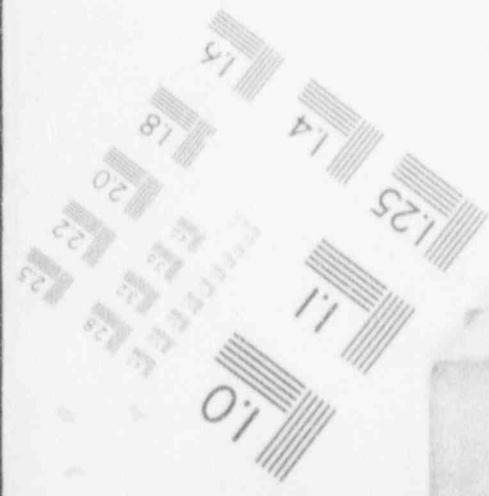
IMAGE EVALUATION TEST TARGET (MT-3)

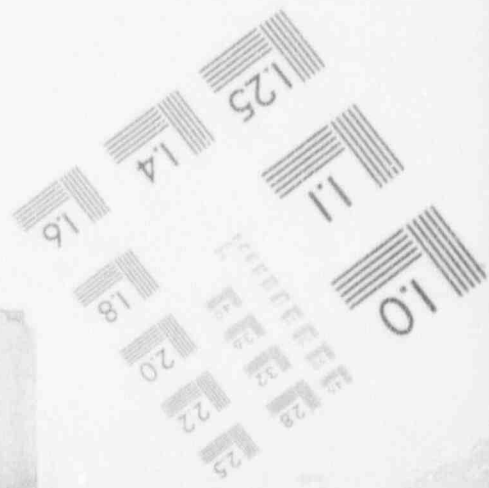












SHARES OF STOCK

September 30	1993	1992	1991
PREFERRED STOCK			
Beginning of year	**75,336**	75,336	75,336
End of year	**75,336**	75,336	75,336
PREFERRED TREASURY STOCK			
Beginning of year	**3,230**	2,559	706
Purchased	**456**	671	1,853
End of year	**3,686**	3,230	2,559
COMMON STOCK			
Beginning of year	**33,887,484**	33,887,484	33,887,484
End of year	**33,887,484**	33,887,484	33,887,484
COMMON TREASURY STOCK			
Beginning of year	**15,560,213**	15,688,415	9,467,025
Purchased	**1,300**	34,617	6,427,988
Issued	**(400,410)**	(162,819)	(206,598)
End of year	**15,161,103**	15,560,213	15,688,415

In November 1986, the Company declared a dividend of one Preferred Stock Purchase Right (Right) for each outstanding share of Cabot common stock. In August 1988, the Company amended the terms of the Rights. The Rights are not presently exercisable. Each Right entitles the holder, upon the occurrence of certain specified events, to purchase from Cabot a unit consisting of one one-hundredth of a share of Series A Junior Participating Preferred Stock at a purchase price of $100 per unit. The Rights further provide that each Right will entitle the holder, upon the occurrence of certain other specified events, to purchase from Cabot, Cabot common stock having a value of twice the exercise price of the Right or, upon the occurrence of certain other specified events, to purchase from another person into which Cabot was merged or which acquired 50% or more of Cabot's assets or earnings power, common stock of such other person having a value of twice the exercise price of the Right. The Rights may be generally redeemed by Cabot at a price of $0.05 per Right. The Rights expire on December 3, 1996.

During fiscal 1989, the Company placed 75,336 shares of its Series B ESOP Convertible Preferred Stock with the Company's Employee Stock Ownership Plan (ESOP) for cash at a price of $1,000.00 per share. Each share of the Series B ESOP Convertible Preferred Stock is convertible into 21.8675 shares of the Company's common stock subject to certain events and anti-dilution adjustment provisions, and carries voting rights on an "as converted" basis. The trustee for the ESOP has the right to cause the Company to redeem shares sufficient to provide for periodic distributions to plan participants. Such shares shall be redeemed at their fair market value, and may be redeemed by the Company for cash, shares of the Company's common stock, or a combination thereof at the Company's option. Each share is redeemable at the option of the Company at a price of $1,046.50. The redemption price declines annually until it becomes $1,000.00 on and after November 19, 1998, plus accrued but unpaid dividends to the redemption date.

The issued shares of Series B ESOP Convertible Preferred Stock are entitled to receive preferential and cumulative quarterly dividends, and rank as to dividends and liquidation prior to the Company's Series A Junior Participating Preferred Stock and common stock. At September 30, 1993, 1,567,000 shares of the Company's common stock were reserved for conversion of the Series B ESOP Convertible Preferred Stock.

In April 1989, the Company's Board of Directors authorized the purchase of up to one million of the Company's common shares and retired the balance of all previous authorizations. At September 30, 1993, a balance of 400,000 shares remained under this authorization.

I. PENSION PLANS & POSTRETIREMENT BENEFITS

PENSION PLANS

Net periodic pension cost in 1993, 1992 and 1991 was comprised of the following elements:

Years ended September 30 Dollars in thousands	1993	1992	1991
Current year service cost	$ 9,254	$ 7,768	$ 8,478
Interest accrued on pension obligations	9,964	9,995	9,558
Actual return on plan assets	(12,357)	(10,760)	(9,370)
Net amortization	(1,580)	(2,549)	(3,293)
Net periodic pension cost	$ 5,281	$ 4,454	$ 5,373

The following table sets forth the funded status of pension plans:

September 30 Dollars in thousands	1993	1992
Actuarial present value of projected benefit obligations	$144,254	$129,057
Plan assets at fair value (primarily fixed-income and equity securities)	150,659	140,103
Excess of plan assets over projected benefit obligations	6,405	11,046
Unrecognized net gain	(14,767)	(17,108)
Unrecognized prior service cost	(3,261)	(5,027)
Unrecognized net asset being amortized over 16 years	(8,798)	(9,308)
Net deferred pension credit (included in other deferred liabilities)	$ (20,421)	$ (20,397)

The Company has trusteed, non-contributory pension plans covering most employees in the United States and certain foreign subsidiaries. Benefits provided under the Company's defined benefit pension plans are primarily based on years of service and the employee's compensation. The Company's funding policy is to contribute annually amounts based upon actuarial and economic assumptions designed to achieve adequate funding of projected benefit obligations.

Pension benefits accrue under several benefit plans, including the following two plans: the Cash Balance Plan (CBP), a defined benefit pension plan, and the Employee Stock Ownership Plan (ESOP). In November 1988, the ESOP was funded with the Company's newly issued Series B ESOP Convertible Preferred Stock, which was acquired with $75,000,000 borrowed by the ESOP (Notes G and H). During 1991, the Company divested a subsidiary, Cabot Oil & Gas Corporation (COGC). COGC's employees had been participants in the Company's CBP. Prior to the COGC divestiture, COGC employees ceased to be CBP participants. The Company accounted for this occurrence as a curtailment and recognized a $2,700,000 gain.

At September 30, 1993 and 1992, the projected benefit obligations included accumulated benefit obligations of $122,065,000 and $105,833,000, respectively, of which $111,240,000 and $96,197,000 were vested in 1993 and 1992, respectively.

The following weighted average rates were used in the calculations:

	1993	1992
Discount rate	7.2%	8.1%
Expected rate of return on plan assets	7.9%	8.6%
Assumed rate of increase in compensation	5.3%	5.9%

POSTRETIREMENT BENEFITS

The Company has defined benefit postretirement plans that provide certain health care and life insurance benefits for retired employees. Substantially all U.S. employees become eligible for these benefits if they have met certain age and service requirements at retirement. The Company funds the plans as claims or insurance premiums are incurred.

Effective October 1, 1992, the Company adopted the provisions of Statement of Financial Accounting Standards (SFAS) No. 106, "Employers' Accounting for Postretirement Benefits Other Than Pensions," which requires accrual of these benefits during the years an employee provides service. Prior to October 1, 1992, the expense for these benefits was recognized as actual claims or insurance premiums were incurred. As of October 1, 1992, the cumulative effect of adopting this change was a $43.2 million after-tax charge. In addition to the one-time charge upon adoption, the effect of the change in accounting increased 1993 pre-tax expense by $800,000, resulting in a pre-tax net periodic postretirement benefit cost of $5.5 million.

Net periodic postretirement benefit cost was comprised of the following components:

Dollars in thousands	1993
Current year service cost	$ 580
Interest accrued on postretirement benefit obligations	4,920
Net periodic postretirement benefit cost	$5,500

The following table sets forth the funded status of the postretirement benefit plans:

Dollars in thousands	September 30, 1993
Accumulated postretirement benefit obligation:	
Retirees	$ 59,196
Fully eligible active plan participants	5,122
Other active plan participants	11,836
	76,154
Plan assets at fair value	—
Excess of accumulated postretirement benefit obligation over plan assets	(76,154)
Unrecognized net loss	9,942
Unrecognized prior service cost	—
Accrued postretirement benefit cost	$(66,212)

The discount rate used in the actuarial calculation of the accumulated postretirement benefit obligation was 6.5%, and a 5.0% rate of increase in compensation was assumed.

A 12.5% annual rate of increase in the per capita cost of covered health care benefits was assumed in 1994; this rate was assumed to decrease 1% annually to an ultimate rate of 4.5% in 2002 and remain at that level thereafter. The health care cost trend rate assumption has a significant effect on the amounts reported. For example, increasing the assumed health care cost trend rates by one percentage point in each year would increase the accumulated postretirement benefit obligation as of September 30, 1993 by approximately $5.9 million and the aggregate of the service and interest cost components of net periodic postretirement benefit cost for the year then ended by approximately $400,000.

The cost of retiree health care and life insurance benefits paid as claims or insurance premiums were $3,965,000 and $2,825,000 in 1992 and 1991, respectively.

J. PROFIT SHARING & INCENTIVE COMPENSATION PLANS

The Company has a Profit Sharing and Savings Plan which covers salaried employees of most U.S. operations. Accrued contributions of the Company, which are based upon an annual return on stockholders' equity, were $1,178,000, $2,269,000 and $1,527,000 in 1993, 1992 and 1991.

The Company has an Equity Incentive Plan for key management employees. Under this plan, participants may be granted various types of stock and stock-based awards. During 1988-1991, the awards granted consisted of stock options, performance appreciation rights (PARs) and tandem units which may be exercised as stock options or PARs. These awards were granted at fair market value of Cabot's stock at date of grant, and vest ratably on each of the next four anniversaries of the award. In 1992 and 1993, awards consisted of common stock of the Company which employees could elect to receive in the form of restricted stock purchased at a price equal to 50% of the closing price on the date of the award, nonqualified stock options at fair market value of Cabot's stock on the date of the award, or a combination of one-half of each. The awards vest on the third anniversary of the award.

During 1992, the Company purchased PARs previously awarded from employees electing to accept a repurchase offer. The purchase price for the PARs was determined using a valuation method that established the value of each PAR considering, among other factors, the date awarded, the time normally taken to exercise, the market price of Cabot's common stock and the level of the Standard & Poor's Industrials index at the date of issue of the par. The Company repurchased 273,658 PARs at a cost of approximately $3,800,000. The following table summarizes the plan's activity from September 30, 1990 through September 30, 1993:

	Stock Options Tandem Options and Restricted Stock	PARs	Price Range
September 30, 1990	615,032	307,516	$25.25 to $41.88
Granted	337,910	4,834	$28.00 to $32.25
Cancelled	(20,206)	(10,103)	$30.38 to $41.88
September 30, 1991	932,736	302,247	$25.25 to $41.88
Granted	204,356	—	$30.88 to $46.75
Exercised	(91,226)	(274,208)	$28.00 to $41.88
Cancelled	(59,905)	(25,402)	$30.38 to $41.88
September 30, 1992	985,961	2,637	$25.25 to $46.75
Granted	**215,935**	**—**	**$43.88 to $45.63**
Exercised	**(50,043)**	**(560)**	**$29.25 to $41.88**
Cancelled	**(37,714)**	**—**	**$28.00 to $46.75**
September 30, 1993	**1,114,139**	**2,077**	**$25.25 to $46.75**

The options expire at various dates through September 2002. Options for 555,691 shares were exercisable at prices ranging from $25.25 to $46.75 at September 30, 1993. The Company had reserved 1,817,668 shares of common stock for issuance under the plan at September 30, 1993. There were 558,063 shares available for future grants at September 30, 1993.

The Company has an Incentive Stock Plan for certain key management employees under which 57,000 shares of Cabot common stock have been authorized to be issued, and have been awarded, to plan participants. At September 30, 1993, 55,250 shares were vested under this plan. Awards totalling 5,250 shares, which vest over three years, were made in 1991. None were made in 1992 or 1993.

K. INCOME TAXES

In the fourth quarter of 1993, the Company adopted Statement of Financial Accounting Standards (SFAS) No. 109, "Accounting for Income Taxes," retroactive to October 1, 1992. The Company recognized the cumulative effect of adoption in its restated first quarter, resulting in an increase to net income for the year ended September 30, 1993 of approximately $17.1 million.

Income before income taxes and the cumulative effect of accounting changes was as follows:

Years ended September 30 Dollars in thousands	**1993**	1992	1991
Domestic	**$32,780**	$ 56,964	$27,067
Foreign	**35,120**	59,635	35,295
Total	**$67,900**	$116,599	$62,362

A summary of taxes on income is as follows:

Years ended September 30 Dollars in thousands	**1993**	1992	1991
U.S. federal and state:			
Current	**$16,798**	$ 10,865	$ 7,897
Deferred	**(5,305)**	14,720	3,007
Total	**$11,493**	$ 25,585	$10,904
Foreign:			
Current	**26,077**	20,002	16,367
Deferred	**(6,871)**	8,962	3,783
	19,206	28,964	20,150
Total	**$30,699**	$ 54,549	$31,054

The provision for income taxes at the Company's effective tax rate differed from the provision for income taxes at the statutory rate as follows:

Years ended September 30 Dollars in thousands	**1993**	1992	1991
Computed tax expense at the expected statutory rate	**$23,596**	$39,644	$21,203
Foreign income:			
Impact of taxation at different rates, repatriation and other	**2,412**	3,423	1,591
Impact of foreign losses for which a current tax benefit is not available	**2,158**	4,023	4,922
State taxes, net of federal effect	**407**	2,105	1,794
Amortization of assets not deductible	**(19)**	592	763
Foreign sales corporation	**(1,000)**	(650)	—
Increase in U.S. tax rate	**(812)**	—	—
Other, net	**3,957**	5,412	781
Provision for income taxes	**$30,699**	$54,549	$31,054

Significant components of deferred income taxes at September 30, 1993 were as follows:

Dollars in thousands	Deferred Tax Assets	Deferred Tax Liabilities
Property, plant and equipment	$ 24,698	$ 68,560
Pension and other benefits	40,199	7,412
Environmental issues	13,207	40
Restructuring charges	13,964	2,381
Deferred revenue and accrued gas contracts costs	16,899	—
State and local taxes	6,097	—
Net operating loss and other tax carryforwards	13,073	—
Other	20,943	100,287
Subtotal	149,080	178,680
Valuation allowances	(10,516)	—
Total	$138,564	$178,680

The net change in the valuation allowance for deferred tax assets in 1993 was an increase of $80,000. The change relates primarily to foreign net operating losses generated in the current year. The major component of the valuation allowance at September 30, 1993 relates to the uncertainty of realizing certain foreign and state deferred tax assets.

For 1992 and 1991, the deferred tax provisions, computed in accordance with Accounting Principles Board Opinion No. 11, represent the effects of timing differences between financial and income tax reporting. The significant components giving rise to the timing differences for 1992 and 1991 were:

Years ended September 30 Dollars in thousands	1992	1991
Depreciation, depletion and amortization	$ 5,832	$ 4,737
Sale of investments	2,455	567
Undistributed earnings from affiliates	2,247	—
Accrued reorganization	2,166	(1,925)
Inventory items	374	(966)
Deferred revenue and accrued gas contract costs	342	(5,270)
Pension and benefits	(308)	4,471
Ceramics restructuring	—	2,140
Environmental issues	(530)	(1,741)
Other, net	11,104	4,777
Total deferred provision	$23,682	$ 6,790

Approximately $65,468,000 of net operating losses and other tax carryforwards remained at September 30, 1993, $21,263,000 of which expire in the years 1994 through 1998, and $44,205,000 of which can be carried forward indefinitely. The benefits of these carryforwards are dependent on taxable income during the carryforward period in those foreign jurisdictions wherein they arose, and accordingly, a valuation allowance has been provided where management has determined that it is more likely than not that the carryforwards will not be utilized. Additionally there are $22,224,000 of net operating losses in U.S. state jurisdictions which will expire in the years 1997 through 2007. Where appropriate, a valuation allowance has been provided against the tax benefits of these state loss carryforwards.

United States income tax returns for fiscal years 1988 and 1989 are currently under examination by the Internal Revenue Service. Assessments, if any, are not expected to have a material adverse effect on the financial statements.

Foreign earnings of $33.3 million are considered permanently invested outside the United States. Repatriation of these earnings to the United States would result in additional taxes of approximately $1.5 million.

Cash paid for income taxes during 1993, 1992 and 1991 totalled $25,934,000, $28,518,000 and $45,926,000, respectively.

L. COMMITMENTS & CONTINGENCIES

LEASE COMMITMENTS

The Company leases certain transportation vehicles, warehouse facilities, office space, machinery and equipment under cancellable and non-cancellable leases, most of which expire within 10 years and may be renewed by the Company. Rent expense under such arrangements totalled $14,514,000, $14,798,000 and $17,144,000 in 1993, 1992 and 1991, respectively. Future minimum rental commitments under non-cancellable leases are as follows:

Dollars in thousands	
1994	$ 15,456
1995	13,394
1996	12,078
1997	10,023
1998	9,738
1999 and thereafter	52,205
	$112,894

CONTINGENCIES

The Company is a defendant in various lawsuits and is involved in other gas contract issues and environmental proceedings wherein substantial amounts are claimed. At September 30, 1993, approximately $38,000,000 was accrued for environmental proceedings. In addition, in a lawsuit stemming from the divested energy business, a jury verdict in the amount of $27.5 million (not including post-judgment interest, which accrues at the rate of 10% per annum) was entered against the Company in January, 1991. The case is presently on remand before a Texas Court of Appeals for consideration of the Company's appeal on certain grounds, the Texas Supreme Court having reversed an earlier Court of Appeals ruling in favor of the Company on other grounds. In the opinion of the Company, these suits and claims should not result in final judgments or settlements which, in the aggregate, would have a material adverse effect on the Company's financial condition.

The Company is contingently liable under a guarantee of project construction debt of one of the Company's joint ventures. The Company's guarantee will expire upon the joint venture's achievement of certain production benchmarks. At September 30, 1993, approximately $21 million was outstanding under the joint venture's debt agreements.

M. FINANCIAL INSTRUMENTS & CONCENTRATIONS OF CREDIT RISK

FINANCIAL INSTRUMENTS

The Company enters into forward foreign currency exchange contracts to hedge foreign currency transactions on a continuing basis for periods consistent with its global contractual exposures. The effect of this practice is to minimize variability in the Company's operating results arising from foreign exchange rate movements. The Company does not engage in foreign currency speculation. The Company's foreign exchange contracts do not subject the Company to risk due to exchange rate movements because gains and losses on these contracts offset losses and gains on the assets, liabilities, and transactions being hedged. The Company had $35,137,000 of foreign exchange contracts outstanding at September 30, 1993. The fair value of such contracts, which was the replacement value, represented a net unrealized gain of approximately $971,000 as of September 30, 1993, based on dealer quotes. The forward exchange contracts generally have maturities which do not exceed six months. See Note A for information on the Company's accounting policy on forward exchange contract gains and losses.

CONCENTRATIONS OF CREDIT RISK

Financial instruments which subject the Company to concentrations of credit risk consist principally of trade receivables. International tire manufacturers comprise a significant portion of the Company's Carbon Black customer base. Carbon Black had trade receivables of approximately $46,233,000 and $50,302,000 from international tire manufacturers at September 30, 1993 and 1992, respectively. Although the Company's exposure to credit risk associated with nonpayment by tire manufacturers is affected by conditions or occurrences within the tire industry, trade receivables from the international tire manufacturers were current at September 30, 1993, and no manufacturer exceeded 8% of the Company's receivables at that date.

N. FINANCIAL INFORMATION BY INDUSTRY SEGMENT & GEOGRAPHIC AREA

Financial information by industry segment for 19 through 1993, as set forth on page 15, is an integral part of these financial statements. Energy segment sales include sales to a major customer in the amount of $265,800,000, $242,600,000 and $235,100,000, in 1993, 1992 and 1991, respectively. Transfers between geographic areas are recorded at cost plus mark-up or at market.

Financial information by geographic area for fiscal years 1991 through 1993:

Years ended September 30 Dollars in millions	1993	1992	1991
SALES			
United States:			
Sales, excluding export sales			
Specialty Chemicals and Materials	$ 521.4	$ 487.9	$ 485.2
Energy	422.5	376.0	353.5
Export sales	73.9	65.5	48.0
	1,017.8	929.4	886.7
Europe	512.3	562.8	559.2
Other areas	156.9	154.3	119.6
Total	1,687.0	1,646.5	1,565.5
Less: Eliminations	72.7	89.5	83.4
Net sales	$1,614.3	$1,557.0	$1,482.1
OPERATING PROFIT			
United States:			
Specialty Chemicals and Materials (a)	$ 98.5	$ 92.5	$ 56.9
Energy	16.7	18.2	9.5
Europe (a)	(16.0)	52.4	51.2
Other areas (a)	19.2	10.1	(4.9)
Total operating profit	118.4	173.2	112.7
Interest expense	44.0	41.7	38.6
Unallocated corporate expenses, net (b)	20.7	14.9	11.7
Gain on resolution of matters from divested energy businesses	14.2	—	—
Income (loss) before income taxes	$ 67.9	$ 116.6	$ 62.4
IDENTIFIABLE ASSETS			
United States:			
Specialty Chemicals and Materials	$ 480.9	$ 464.5	$ 436.2
Energy	116.1	132.6	159.4
Europe	437.2	533.3	455.3
Other areas	199.3	193.4	168.1
General corporate (c)	89.3	79.9	83.5
Equity in affiliates – United States	63.6	59.8	63.9
Equity in affiliates – Europe	21.8	16.9	12.2
Equity in affiliates – other areas	81.3	74.1	83.8
Total	$1,489.5	$1,554.5	$1,462.4

(a) Operating profit in 1993 included losses from restructuring of the Specialty Chemicals and Materials Group of $2.9 in the United States, $43.8 in Europe and $0.7 in other areas.
(b) Unallocated corporate expenses, net, include corporate management costs reduced by investment income.
(c) General corporate assets include cash, temporary cash investments, income taxes receivable, deferred taxes and headquarters' assets.

Q. UNAUDITED QUARTERLY FINANCIAL INFORMATION

Unaudited financial results by quarter for the fiscal years ended September 30, 1993 and 1992 are summarized below and should be read in conjunction with Management's Discussion and Analysis of Results of Operations and Financial Condition.

Dollars in millions, except per share amounts	Dec	March	June	Sep	Year
FISCAL 1993					
Net sales	$396.1	$407.6	$418.8	$391.9	**$1,614.3**
Cost of sales	$300.3	$306.0	$311.6	$293.8	**$1,211.7**
Income:					
Continuing operations	$ 11.9	$ 14.0	$ 18.4	$ (6.9)	**$ 37.4**
Income before cumulative effect of accounting changes	$ 11.9	$ 14.0	$ 18.4	$ (6.9)	**$ 37.4**
Cumulative effect of accounting changes[1]	$ (26.1)	—	—	—	**$ (26.1)**
Net income	$ (14.2)	$ 14.0	$ 18.4	$ (6.9)	**$ 11.3**
Income applicable to common shares:					
Continuing operations	$ 11.0	$ 13.1	$ 17.5	$ (7.8)	**$ 33.8**
Cumulative effect of accounting changes	$ (26.1)	—	—	—	**$ (26.1)**
Income applicable to common shares	$ (15.1)	$ 13.1	$ 17.5	$ (7.8)	**$ 7.7**
Income per common share (Primary):					
Continuing operations	$ 0.59	$ 0.70	$ 0.94	$ (0.41)	**$ 1.80**
Cumulative effect of accounting changes	$ (1.40)	—	—	—	**$ (1.39)**
Income per common share (Primary)	$ (0.81)	$ 0.70	$ 0.94	$ (0.41)	**$ 0.41**
FISCAL 1992					
Net sales	$384.8	$417.9	$371.0	$383.3	$1,557.0
Cost of sales	$287.4	$303.1	$269.5	$291.1	$1,151.1
Income:					
Continuing operations	$ 16.6	$ 22.0	$ 16.4	$ 7.2	$ 62.2
Net income	$ 16.6	$ 22.0	$ 16.4	$ 7.2	$ 62.2
Income applicable to common shares	$ 15.7	$ 21.1	$ 15.5	$ 6.2	$ 58.5
Income per common share (Primary):					
Continuing operations	$ 0.86	$ 1.15	$ 0.84	$ 0.34	$ 3.18
Income per common share (Primary)	$ 0.86	$ 1.15	$ 0.84	$ 0.34	$ 3.18

[1] During the fourth quarter of 1993, the Company adopted two new accounting standards related to postretirement benefits and income taxes. Both of these standards were adopted effective October 1, 1992, and as a result, the first quarter has been restated.
[2] Includes $31.1 million after-tax restructuring charge and $8.7 million after-tax gain on resolution of matters from divested energy businesses.

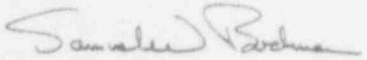
MANAGEMENT RESPONSIBILITY FOR FINANCIAL REPORTING

The accompanying financial statements were prepared by Cabot Corporation in conformity with generally accepted accounting principles. The Company's management is responsible for the integrity of these statements and of the data, estimates and judgments that underlie them.

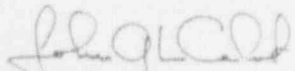
Cabot Corporation maintains a system of internal accounting controls designed to provide reasonable assurance that the Company's assets are safeguarded from loss or unauthorized use, that transactions are properly authorized and recorded, and that financial records are reliable and adequate for public reporting. The standard of reasonable assurance is based on management's judgment that the cost of such controls should not exceed their associated benefits. The system is monitored and evaluated on an ongoing basis by management in conjunction with the Company's internal audit staff, independent accountants, and the Audit Committee of the Board of Directors.

Coopers & Lybrand, independent accountants, were engaged by the Company to audit these financial statements. Their audit was conducted in accordance with generally accepted auditing standards and included a study and evaluation of the Company's system of internal accounting controls, selected tests of that system, and related audit procedures as they consider necessary to render their opinion.

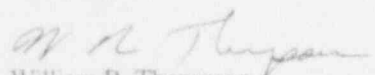
The Audit Committee of the Board of Directors provides general oversight responsibility for the financial statements. Composed entirely of Directors who are not employees of the Company, the Committee meets periodically with Company management, internal auditors and the independent accountants to review the quality of the financial reporting and internal controls as well as the results of the auditing efforts. The internal auditors and independent accountants have full and direct access to the Audit Committee, with and without management present.



Samuel W. Bodman
Chief Executive Officer



John G.L. Cabot
Chief Financial Officer



William R. Thompson
Chief Accounting Officer

REPORT OF INDEPENDENT ACCOUNTANTS

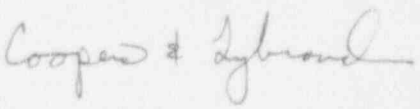
TO THE DIRECTORS AND STOCKHOLDERS OF CABOT CORPORATION

We have audited the accompanying consolidated balance sheets of Cabot Corporation as of September 30, 1993 and 1992 and the related consolidated statements of income and cash flows for each of the three fiscal years in the period ended September 30, 1993. These financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on these financial statements based on our audits.

We conducted our audits in accordance with generally accepted auditing standards. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation. We believe that our audits provide a reasonable basis for our opinion.

In our opinion, the financial statements referred to above present fairly, in all material respects, the consolidated financial position of Cabot Corporation as of September 30, 1993 and 1992, and the consolidated results of its operations and its cash flows for each of the three fiscal years in the period ended September 30, 1993, in conformity with generally accepted accounting principles.

As discussed in Notes I and K to the Consolidated Financial Statements, the Company changed its methods of accounting for postretirement benefits other than pensions and for income taxes, respectively, in fiscal 1993.



Boston, Massachusetts
October 29, 1993

CABOT CORPORATION ELEVEN YEAR SUMMARY — 1

Years ended September 30 Dollars in millions, except per share amounts and other data	1993	1992	1991	1990	1989	1988	1987	1986	1985	1984	1983
CONSOLIDATED INCOME											
Revenues:											
Net sales and other operating revenues	$1,615	$1,557	$1,482	$1,548	$1,804	$1,561	$1,309	$1,348	$1,644	$1,272	$1,141
Interest and dividend income	4	5	6	10	5	8	9	8	3	4	3
Total revenues	1,619	1,562	1,488	1,558	1,809	1,569	1,318	1,356	1,647	1,276	1,144
Costs and expenses:											
Cost of sales	1,212	1,151	1,133	1,179	1,486	1,289	1,020	1,061	1,411	1,054	949
Selling and administrative expenses	205	210	205	191	166	154	135	130	106	90	77
Research and technical service	46	37	38	35	34	28	34	34	32	27	23
Interest expense	44	42	38	41	34	31	27	29	28	18	19
Special charges and impairments	—	—	—	15	24	17	22	—	197	—	—
Loss on restructuring	47	—	—	26	72	—	—	—	—	—	—
Gain on reversal of Energy Group accruals	(14)	—	—	—	—	—	—	—	—	—	—
Other charges (income), net	11	5	12	7	18	(58)	10	6	5	(1)	4
Total costs and expenses	1,551	1,445	1,426	1,494	1,834	1,461	1,248	1,260	1,779	1,188	1,072
Income (loss) from continuing operations before income taxes	68	117	62	64	(25)	108	70	96	(132)	88	72
(Provision) benefit for income taxes	(31)	(55)	(31)	(32)	(4)	(52)	(32)	(42)	61	(38)	(31)
Equity in income of affiliated companies	—	—	9	10	9	6	2	3	2	4	1
Income (loss) from continuing operations before extraordinary charge	37	62	40	42	(20)	62	40	57	(69)	54	42
Extraordinary charge, net of tax	—	—	—	—	—	(1)	(11)	(2)	—	—	—
Discontinued operations (net of tax effects):											
Income (loss) from operations	—	—	9	29	14	(1)	(1)	16	18	43	22
Gain (loss) on dispositions	—	—	78	—	24	—	—	—	(35)	—	—
Cumulative effect of accounting changes	(26)	—	—	—	—	—	—	—	—	—	—
Net income (loss)	$ 11	$ 62	$ 127	$ 71	$ 18	$ 60	$ 28	$ 71	$ (86)	$ 97	$ 64
COMMON SHARE DATA											
Income (loss) from continuing operations	$ 1.80	$ 3.18	$ 1.69	$ 1.55	$ (0.93)	$ 2.27	$ 1.06	$ 1.94	$ (2.16)	$ 1.68	$ 1.33
Net income (loss)	0.41	3.18	5.80	2.73	0.55	2.24	1.04	2.49	(2.70)	3.02	2.09
Dividends	1.04	1.04	1.04	1.04	1.01	0.92	0.92	0.92	0.92	0.92	0.92
Stockholders' equity at September 30	23.62	26.90	23.46	23.37	19.84	22.55	21.46	21.16	19.56	22.54	20.99
Stock prices—High	56.25	52.25	35.88	37.50	45.00	48.38	45.13	32.00	33.75	28.88	30.88
Low	37.25	28.13	23.00	25.00	34.88	25.50	28.50	20.50	20.50	22.63	19.00
Close	55.50	48.00	33.00	25.13	35.63	38.75	42.00	29.00	21.50	27.00	27.13
Average shares outstanding—millions	19	18	21	24	26	27	28	29	32	32	32
Shares outstanding at year end—millions	19	18	18	24	25	27	28	28	32	32	32
PERCENTAGES											
Income (loss) from continuing operations as a percentage of sales	2.3%	4.0%	2.7%	2.7%	(1.1)%	3.9%	2.2%	4.1%	(4.2)%	4.3%	3.7%
Return on average stockholders' equity	1.7%	12.5%	25.4%	12.6%	2.5%	10.0%	4.8%	12.2%	(12.0)%	13.9%	9.6%
OTHER DATA											
Number of employees at year end	5,400	5,400	5,300	6,000	5,500	5,200	5,100	6,600	7,700	7,500	7,200
Number of stockholders of record	2,200	2,300	2,500	2,700	2,800	2,900	3,100	3,400	4,300	4,700	5,100

CABOT CORPORATION ELEVEN YEAR SUMMARY — 2

September 30 Dollars in millions, except per share amounts	1993	1992	1991	1990	1989	1988	1987	1986	1985	1984	1983
CONSOLIDATED FINANCIAL POSITION, SEPTEMBER 30											
Current assets:											
Cash and cash equivalents	$ 40	$ 31	$ 39	$ 48	$ 16	$ 65	$ 82	$ 123	$ 28	$ 4	$ 47
Accounts and notes receivable	258	266	238	285	281	297	254	211	254	317	214
Inventories	195	226	190	213	178	169	171	155	172	317	329
Prepaid expenses	9	17	11	23	19	13	17	14	10	11	10
Deferred income taxes	42	15	16	10	11	17	54	—	—	—	—
Net current assets of discontinued operations	—	—	—	—	—	—	—	97	180	—	—
Total current assets	544	555	494	579	505	561	578	600	644	649	600
Current liabilities:											
Notes payable to banks	2	75	181	111	49	19	25	15	32	17	22
Current portion of long-term debt	29	10	29	8	19	9	13	25	15	14	15
Accounts payable & accrued liabilities	297	276	290	322	274	344	357	218	270	325	177
U.S. and foreign income taxes	26	—	1	2	18	21	22	29	21	1	10
Total current liabilities	354	361	501	443	360	393	417	287	338	357	224
Working capital	190	194	(7)	136	145	168	161	313	306	292	376
Current ratio	1.5	1.5	1.0	1.3	1.4	1.4	1.4	2.1	1.9	1.8	2.7
Property, plant and equipment, at cost	1,250	1,274	1,137	1,534	1,325	1,610	1,501	1,211	1,107	1,563	1,105
Accumulated depreciation, depletion and amortization	603	571	467	655	582	771	707	569	483	512	448
Net property, plant and equipment	647	703	670	879	743	839	794	642	624	1,051	657
Investments	174	157	163	149	139	86	41	48	35	36	[redacted]
Other assets	124	140	135	125	30	30	23	19	18	16	
Net assets of discontinued operations	—	—	—	—	—	27	27	201	274	—	—
Deferred liabilities	234	211	165	218	181	223	235	206	249	338	164
Total	$ 901	$ 983	$ 796	$1,071	$ 876	$ 927	$ 811	$1,017	$1,008	$1,057	$ 922
Capitalization:											
Long-term debt	$ 459	$ 480	$ 369	$ 481	$ 387	$ 320	$ 220	$ 426	$ 382	$ 337	$ 246
Minority interest	—	10	—	19	—	—	—	—	—	—	—
Stockholders' equity	442	493	427	571	489	607	591	591	626	720	676
Total capitalization	$ 901	$ 983	$ 796	$1,071	$ 876	$ 927	$ 811	$1,017	$1,008	$1,057	$ 922
Total assets	$1,489	$1,555	$1,462	$1,732	$1,417	$1,543	$1,463	$1,510	$1,595	$1,752	$1,310
CHANGES IN CASH AND CASH EQUIVALENTS, SEPTEMBER 30											
Cash provided by continuing operations*	$ 189	$ 103	$ 147	$ 128	$ 38	$ 135	$ 180	$ 129	$ —	$ —	$ —
Working capital provided by continuing operations	—	—	—	—	—	—	—	—	144	406	155
Capital expenditures (including acquisitions and investments)	(106)	(92)	(213)	(298)	(233)	(214)	(82)	(80)	(184)	(505)	(80)
Proceeds from long-term debt	9	119	21	93	12	254	43	131	180	117	9
Reduction in long-term debt	(27)	(12)	(46)	(5)	(19)	(159)	(261)	(77)	(131)	(25)	(15)
Cash dividends paid	(23)	(23)	(26)	(30)	(30)	(25)	(26)	(26)	(29)	(29)	(30)
Other, net	(32)	(103)	108	144	183	(8)	105	18	44	(7)	(22)
Increase (decrease) in cash and cash equivalents	$ 10	$ (8)	$ (9)	$ 32	$ (49)	$ (17)	$ (41)	$ 95	$ 24	$ (43)	$ 17

*Statements of Cash Flows have been presented in the primary financial statements for fiscal years beginning in 1986. Accordingly, cash provided by continuing operations for those years in lieu of working capital provided by continuing operations.

OPERATING MANAGEMENT

Samuel W. Bodman, Chairman and President

John G. L. Cabot, Vice Chairman and Chief Financial Officer

Kennett F. Burnes, Executive Vice President

John D. Curtin, Jr., Executive Vice President

CAB-O-SIL DIVISION

William F. Reardon, Vice President

William P. Noglows, North American General Manager

Helmut Lorat, European General Manager

CABOT LNG CORPORATION

R. Gordon Shearer, President

Joseph A. Teves, President—Distrigas Corporation

CABOT PERFORMANCE MATERIALS DIVISION

Robert S. Barron, General Manager

CABOT PLASTICS INTERNATIONAL DIVISION

Dirk L. Blevi, European General Manager

David B. Collins, Pacific Area General Manager

CABOT SAFETY CORPORATION

Jon A. Barton, President

CARBON BLACK DIVISIONS

Winfred R. Cates, Vice President, Carbon Black Operations

- **Patrick H. Edel,** General Manager — European Carbon Black Division
- **Mark H. Hague,** General Manager — North American Carbon Black Division
- **Chang Loo Sih,** General Manager — South American Carbon Black Division
- **Donald R. Young,** General Manager — Pacific Asia Carbon Black Division

Kenyon C. Gilson, Vice President, Carbon Black Marketing and Development

- **Melinda A. Mabry,** General Manager — Compound Materials Sector
- **Francois R. Pesret,** General Manager — Special Blacks Sector
- **Steven R. Reznek,** General Manager — Chemical Business Research and Development
- **John W. Riehl,** General Manager — Industrial Rubber Blacks Sector

CORPORATE OFFICERS

Samuel W. Bodman, Chairman, President and Chief Executive Officer

John G. L. Cabot, Vice Chairman and Chief Financial Officer

Kennett F. Burnes, Executive Vice President

John D. Curtin, Jr., Executive Vice President

Jon A. Barton, Vice President

Winfred R. Cates, Vice President

Patrick H. Edel, Vice President

Michael G. Fowler, Vice President

Kenyon C. Gilson, Vice President

Charles A. Gray, Vice President

Mark H. Hague, Vice President

Margaret J. Hanratty, Vice President and Treasurer

John H. Horn II, Vice President

Anthony H. James, Vice President

L. Craig Johnstone, Vice President

Karen M. Morrissey, Vice President

William F. Reardon, Vice President

Robert Rothberg, Vice President and General Counsel

R. Gordon Shearer, Vice President

William R. Thompson, Vice President and Controller

Donald R. Young, Vice President

Mario J. Cornacchio, Assistant Treasurer

Donald G. Warner, Assistant Controller

Charles D. Gerlinger, Secretary

Harry J. Gwinnell, Assistant Secretary

William L. May, Jr., Assistant Secretary

Edith C. McGuinness, Assistant Secretary

CABOT CORPORATION
INVESTOR INFORMATION

CORPORATE OFFICES

Cabot Corporation
75 State Street
Boston, Massachusetts 02109-1806
(617) 345-0100

INVESTOR RELATIONS

Investor inquiries are most welcome, and individuals are invited to contact this office by letter at the corporate address listed above, or by telephone at (617) 342-6366, to request Company information.

FORM 10-K

The Form 10-K, filed annually with the Securities and Exchange Commission, is also available without charge by writing or calling the Investor Relations Department.

STOCK TRANSFER AGENT AND REGISTRAR

The First National Bank of Boston is the sole transfer agent and registrar of Cabot Corporation stock. Stockholders with inquiries about stock ownership, changes of address, dividend payments or the dividend reinvestment plan may contact the Bank directly at the address and phone number listed below:

The First National Bank of Boston
Shareholder Services
Mail Stop 45-02-09
P.O. Box 644
Boston, Massachusetts 02102-0644

Stockholder Inquiries: (617) 575-2900
For the hearing impaired: (800) 952-9245 (TTY/TTD)

Please mention Cabot Corporation, your name as printed on your stock certificate, your social security number, and include your address and telephone number in all correspondence.

DIVIDEND REINVESTMENT PLAN

Cabot Corporation offers a convenient dividend reinvestment and cash purchase plan for its registered shareholders to provide them with a simple and economical way to add to their holdings. The plan allows stockholders to automatically reinvest all or part of their dividends into additional shares of Cabot Corporation. Participation in the Plan also allows stockholders to purchase up to $10,000 worth of Cabot Corporation stock, on a quarterly basis, free of brokerage fees and commissions. Cabot Corporation assumes responsibility for any fees associated with the transaction. To begin participating in the plan, write or call The First National Bank of Boston and request an enrollment form.

ANNUAL MEETING

The Annual Meeting of Stockholders will be held Friday, February 11, 1994 at 10:00 a.m. at the State Street Bank and Trust Company, 225 Franklin Street, Boston, Massachusetts. All stockholders are invited to attend.

STOCK LISTING

Cabot Corporation common stock is listed on the New York, Boston, and Pacific Coast stock exchanges under the symbol, CBT.

BUSINESS	1993 HIGHLIGHTS	OUTLOOK
Specialty Chemicals and Materials		
■ CARBON BLACK *Tire Blacks*	■ Increased North American utilization to full capacity ■ Progressed on fuel efficient tire materials ■ Stronger North American performance; depressed European demand ■ Acquired remaining interest in Brazilian affiliate	■ Continuing growth in the Far East and China ■ Persistent recession in Europe and Japan requiring cost and capacity reductions ■ New plant in Czech Republic scheduled to open in June 1994
Industrial Rubber Blacks	■ Launched seven new products for increased performance and customer productivity enhancement ■ Created new organizational focus	■ Investing in new technology to upgrade product capabilities ■ Further success in providing carbon black solutions to customer needs
Special Blacks	■ Continued success of new products for gloss ink market ■ Growing presence in emerging markets in the Far East and South America	■ Capital investments and development work focusing on cleaner blacks and new product applications ■ Continued strong non-cyclical performance
■ CAB-O-SIL (Fumed Silica)	■ European recession curtailed sales growth ■ Growing use of Cab-O-Sil in electronics market and in applications requiring treated fumed silica grades	■ Successful cost reduction program leverages profitability potential ■ Focus on new product development and cost management
■ CABOT PERFORMANCE MATERIALS (Tantalum, Niobium)	■ Invested in additional melt capacity ■ Developed chlorination capabilities ■ Acquired ownership of Tanco, largest tantalite reserve in North America ■ Preparing for ISO 9000 certification	■ Strengthening position in capacitor markets via high capacitance tantalum powder development and barium titanate expansion ■ Broaden global market penetration
■ CABOT PLASTICS	■ Retrenchment implemented, costs and capacity reduced ■ Reduced scope of recycling activities	■ Increasing efforts to enhance performance of masterbatches for agricultural film and other specialized market niches ■ Strategic study of product distribution issues
■ CABOT SAFETY	■ Achieved cost reductions through consolidation of manufacturing operations ■ Received ISO 9002 approvals ■ Introduced innovative personal protection products ■ Marketed new commercial applications of proprietary molded foams	■ Penetrating new markets with existing and derivative products ■ Global implementation of modern information system ■ Capitalizing on proprietary manufacturing and materials technologies
Energy		
■ CABOT LNG (Liquefied Natural Gas)	■ Implementation of FERC Order 636 caused some disruption in market, but appears to be leading to a more attractive business environment	■ Continuing to develop additional sources of LNG supply in Atlantic Basin ■ Seizing new market opportunities
■ TUCO (Coal)	■ Continued to supply coal throughout railroad disruptions caused by U.S. Midwest flooding, running extra trains	■ Increases in alternative fuel costs likely to increase demands for coal services

continued from inside front cover

CABOT

CABOT CORPORATION
75 STATE STREET
BOSTON, MA
02109-1806

ATTACHMENT R

LETTER OF CREDIT

BANK OF BOSTON
THE FIRST NATIONAL BANK OF BOSTON
POST OFFICE BOX 1763
BOSTON, MASSACHUSETTS 02105 U.S.A.

DATE: July 16, 1990

BENEFICIARY

U.S. NUCLEAR REGULATORY COMMISSION
REGION 1
475 ALLENDALE RD.
KING OF PRUSSIA, PA 19406

IRREVOCABLE STANDBY LETTER OF CREDIT NO. I-031-LACO-50054319

THIS CREDIT EXPIRES July 31, 1991

Gentlemen:

We hereby establish our Irrevocable Standby Letter of Credit No. I-031-LACO-50054319 in your favor, at the request and for the account of Cabot Corporation, County Line Road, Boyertown, PA 19512 up to the aggregate amount of (Seven Hundred Fifty Thousand and No/100 U.S. Dollars) U.S. Dollars 750,000.00 available upon presentation of :

(1) Your sight draft, bearing reference to this Letter of Credit No. I-031-LACO-50054319, and

(2) Your signed statement reading as follows: "I certify that the amount of the draft is payable pursuant to regulations issued under authority of U.S. Nuclear Regulatory Commission."

This letter of credit is issued in accordance with regulations issued under the authority of the U.S. Nuclear Regulatory Commission (NRC), an agency of the U.S. Government, pursuant to the Atomic Energy Act of 1954, as amended, and the Energy Reorganization Act of 1974. The NRC has promulgated regulations in Title 10, Chapter I of the Code of Federal Regulations, Part 40, which require that a holder of, or an applicant for, a license issued under 10 CFR Part 40 provide assurance that funds will be available when needed for decommissioning.

This letter of credit is effective as of July 16, 1990 and shall expire on July 31, 1991, but such expiration date shall be automatically extended for a period of one year on July 31, 1991 and on each successive expiration date, unless, at least 90 days before the current expiration date, we notify both you and Cabot Corporation, as shown on the signed returned receipts. If Cabot Corporation is unable to secure alternative financial assurance to replace this letter of credit within

(continued)

BANK OF BOSTON
THE FIRST NATIONAL BANK OF BOSTON
POST OFFICE BOX 1763
BOSTON, MASSACHUSETTS 02105 U.S.A.

DATE: July 16, 1990

30 days of notification of cancellation the NRC may draw upon the full value of this letter of credit prior to cancellation. The bank shall give immediate notice to the applicant and the "NRC" of any notice received or action filed alleging (1) the insolvency or bankruptcy of the financial institution or (2) any violations of regulatory requirements that could result in suspension or revocation of the bank's charter or license to do business. The financial institution also shall give immediate notice if the bank, for any reason, becomes unable to fulfill its obligation under the letter of credit.

Whenever this letter of credit is drawn on under and in compliance with the terms of this letter of credit, we shall duly honor such draft upon its presentation to us within 30 days, and we shall deposit the amount of the draft directly into the standby trust fund of Cabot Corporation in accordance with your instructions.

Each draft must bear upon its face the clause "Drawn under Letter of Credit No. I-031-LACO-5005319 dated July 16, 1990 of The First National Bank of Boston, Boston, MA" and the total of this draft and all other drafts previously drawn under this letter of credit does not exceed $750,000.00.

Except so far as otherwise expressly stated herein, this letter of credit is subject to the "Uniform Customs and Practices for Documentary Credits (1983 Revision), International Chamber of Commerce Publication No. 400" and to the extent not inconsistent therewith, the Uniform Commercial Code of the State of Pennsylvania.

Kindly address all correspondence regarding this letter of credit to the attention of our Letter of Credit Operations, P.O. BOX 1763, BOSTON, MA 02105, attention ROBERT MARSHALL, mentioning our reference number as it appears above. Telephone inquiries can be made to ROBERT MARSHALL at (617) 434-3186.

Very truly yours,

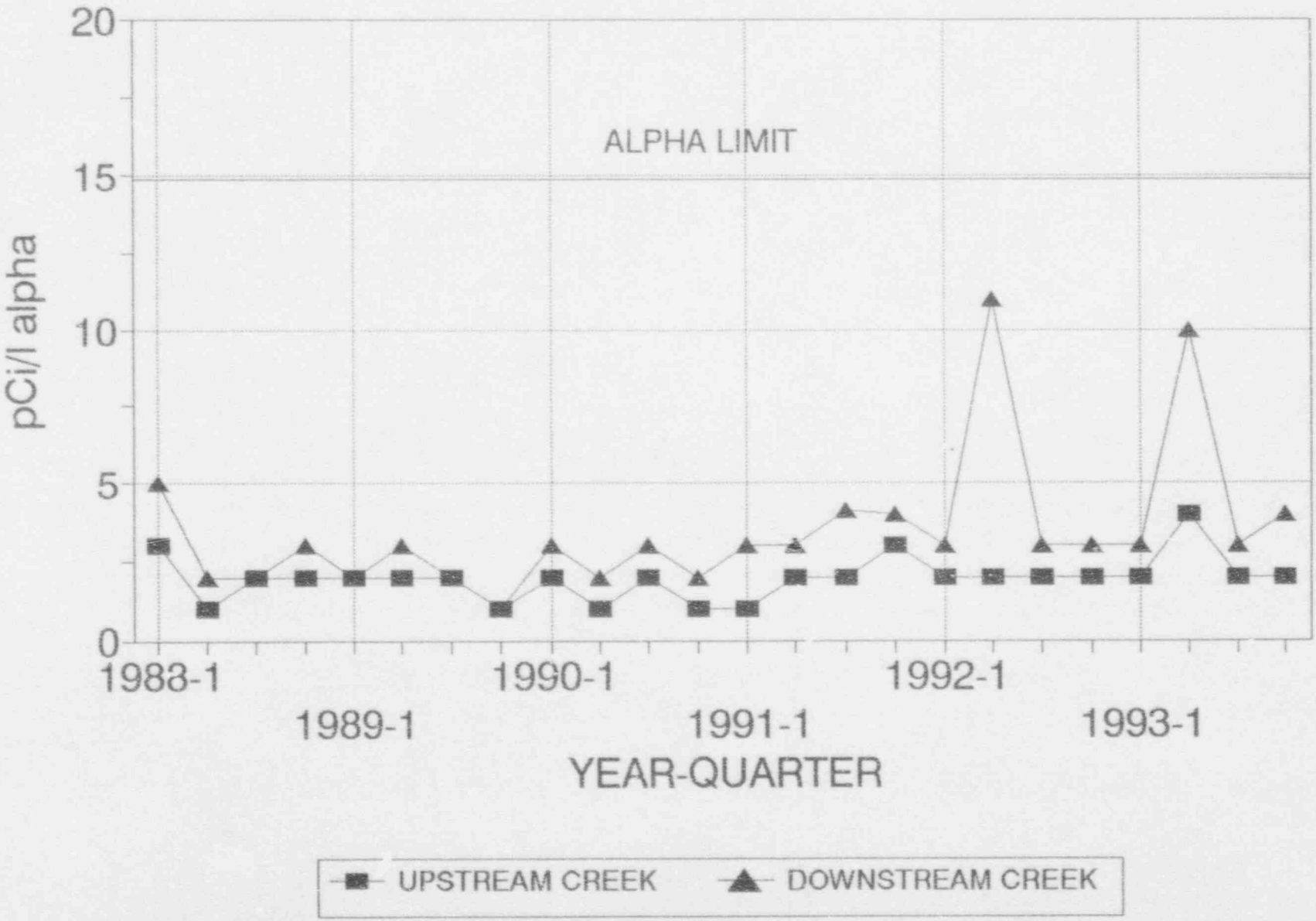
D.R.Pacheco, Trade Services Representative

ATTACHMENT S

ENVIRONMENTAL AND RADIATION MONITORING DATA

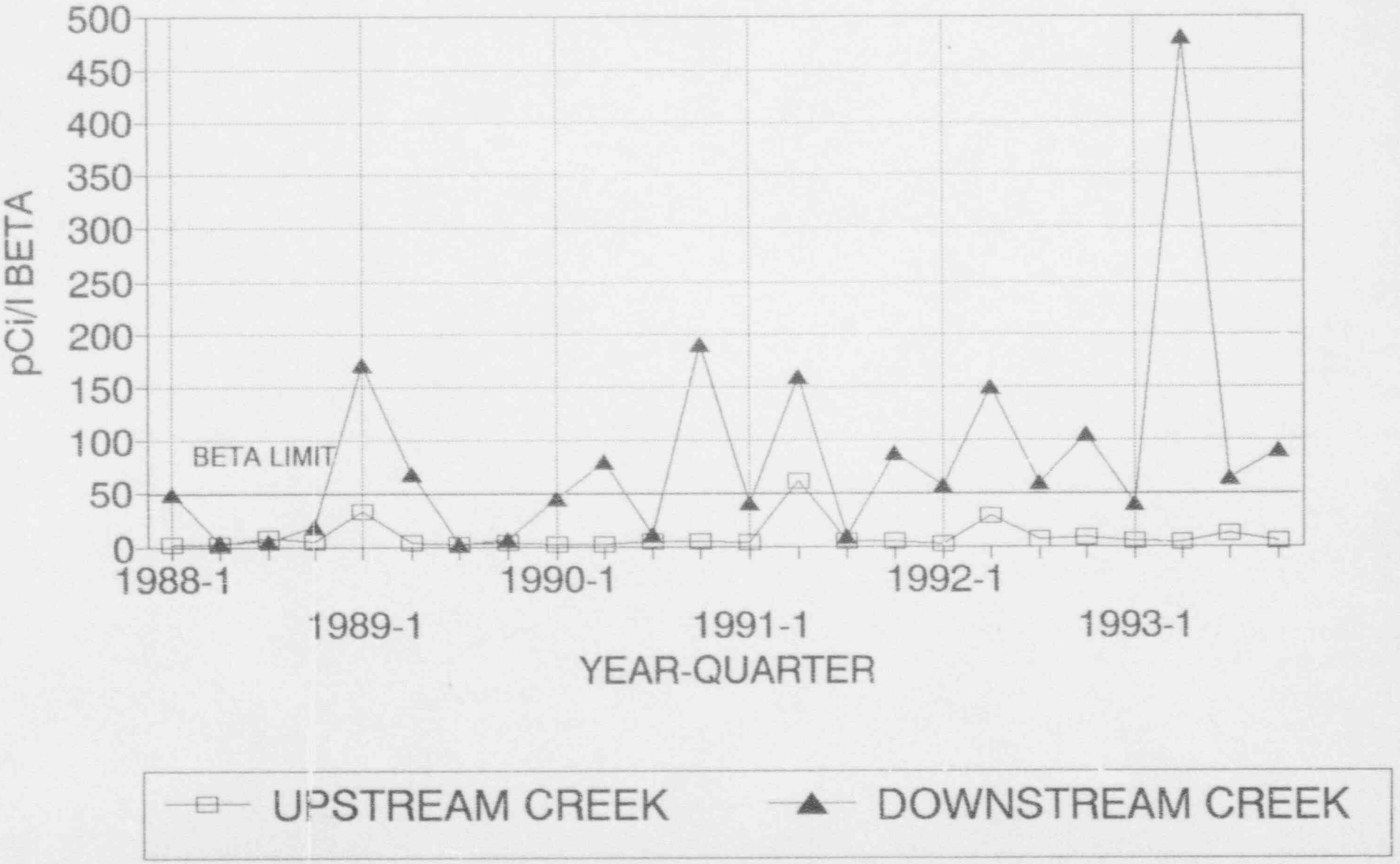
SWAMP CREEK

CREEK WATER GROSS ALPHA ANALYSIS



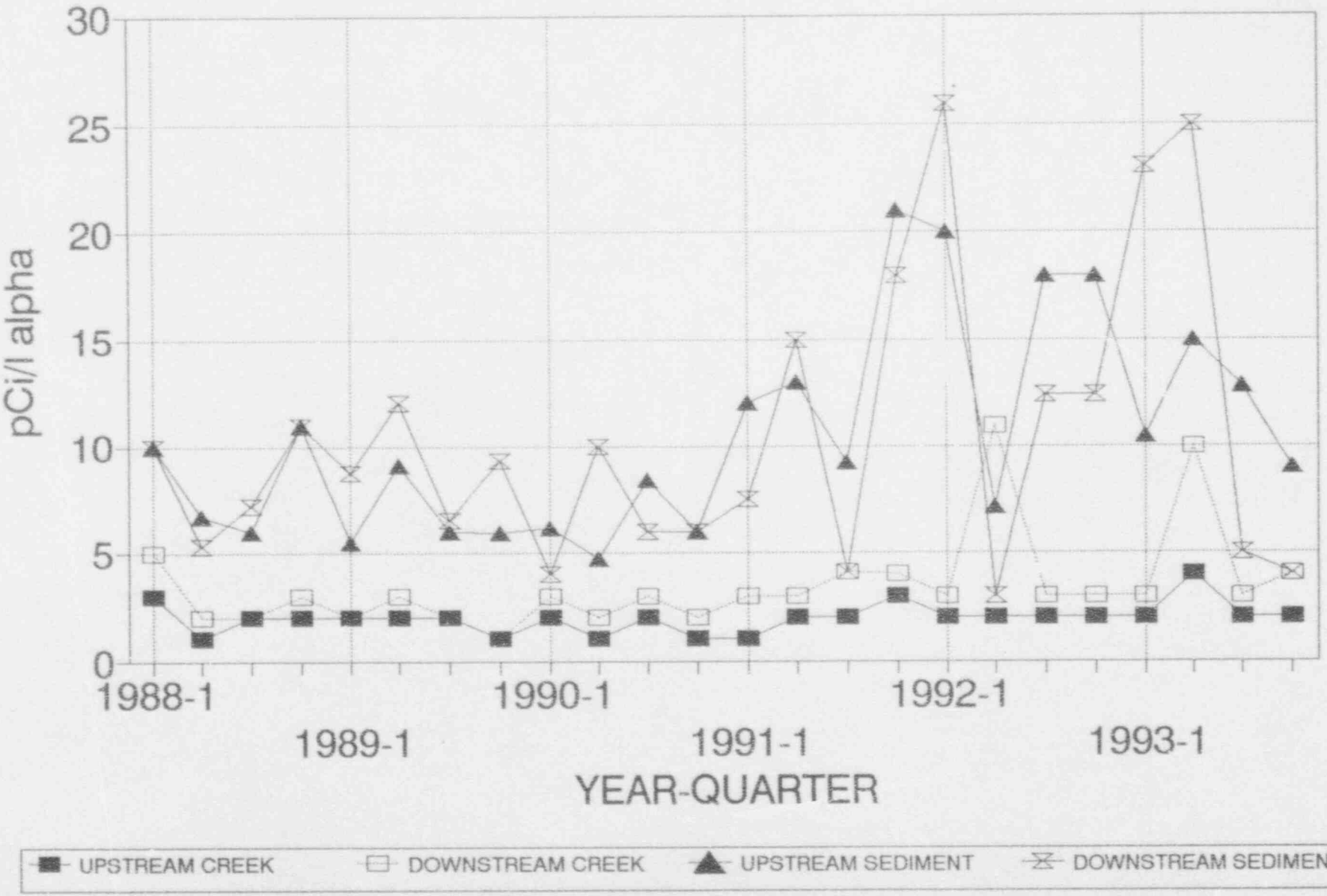
SWAMP CREEK

CREEK WATER GROSS BETA



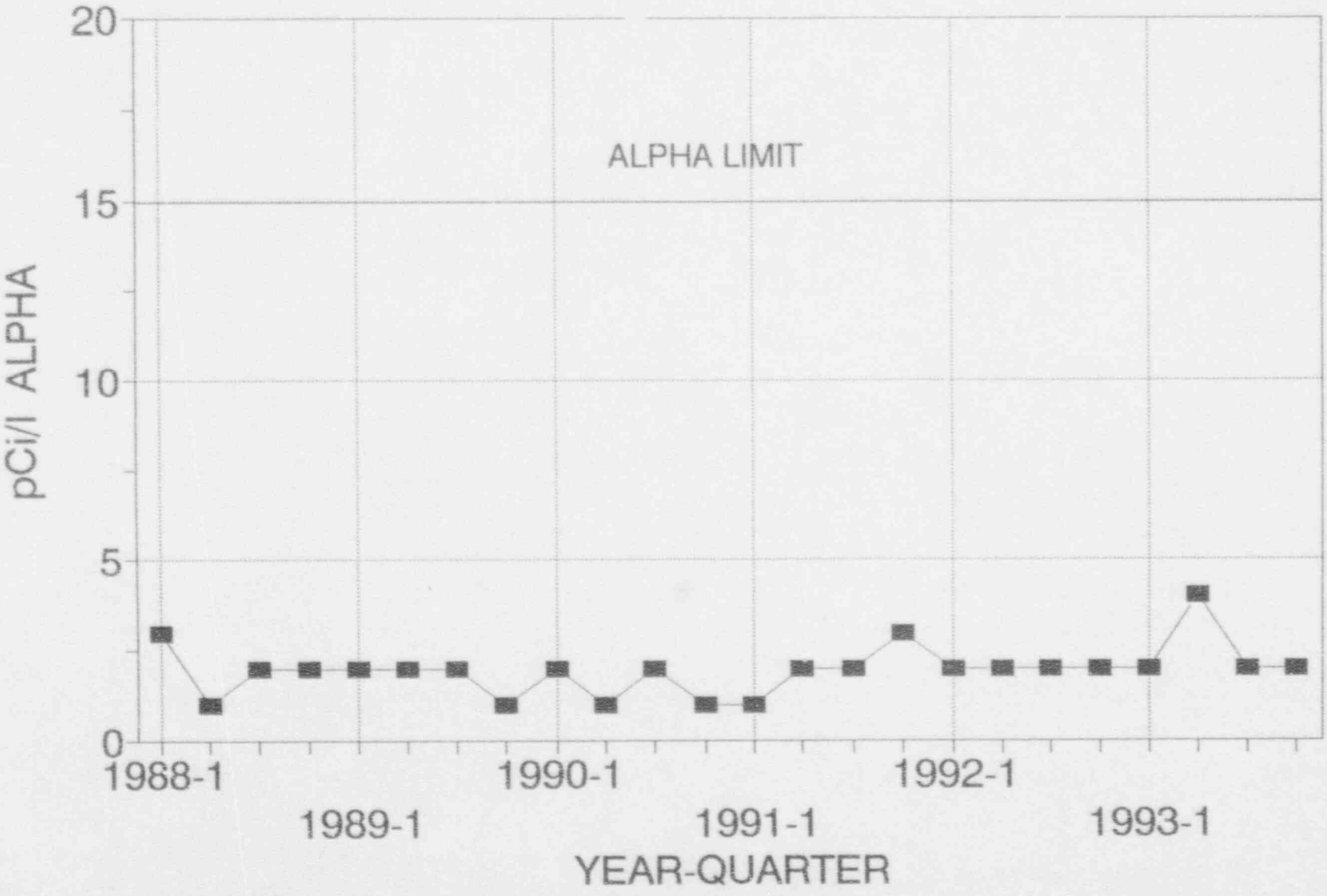
SWAMP CREEK

CREEK WATER AND SEDIMENT ANALYSIS



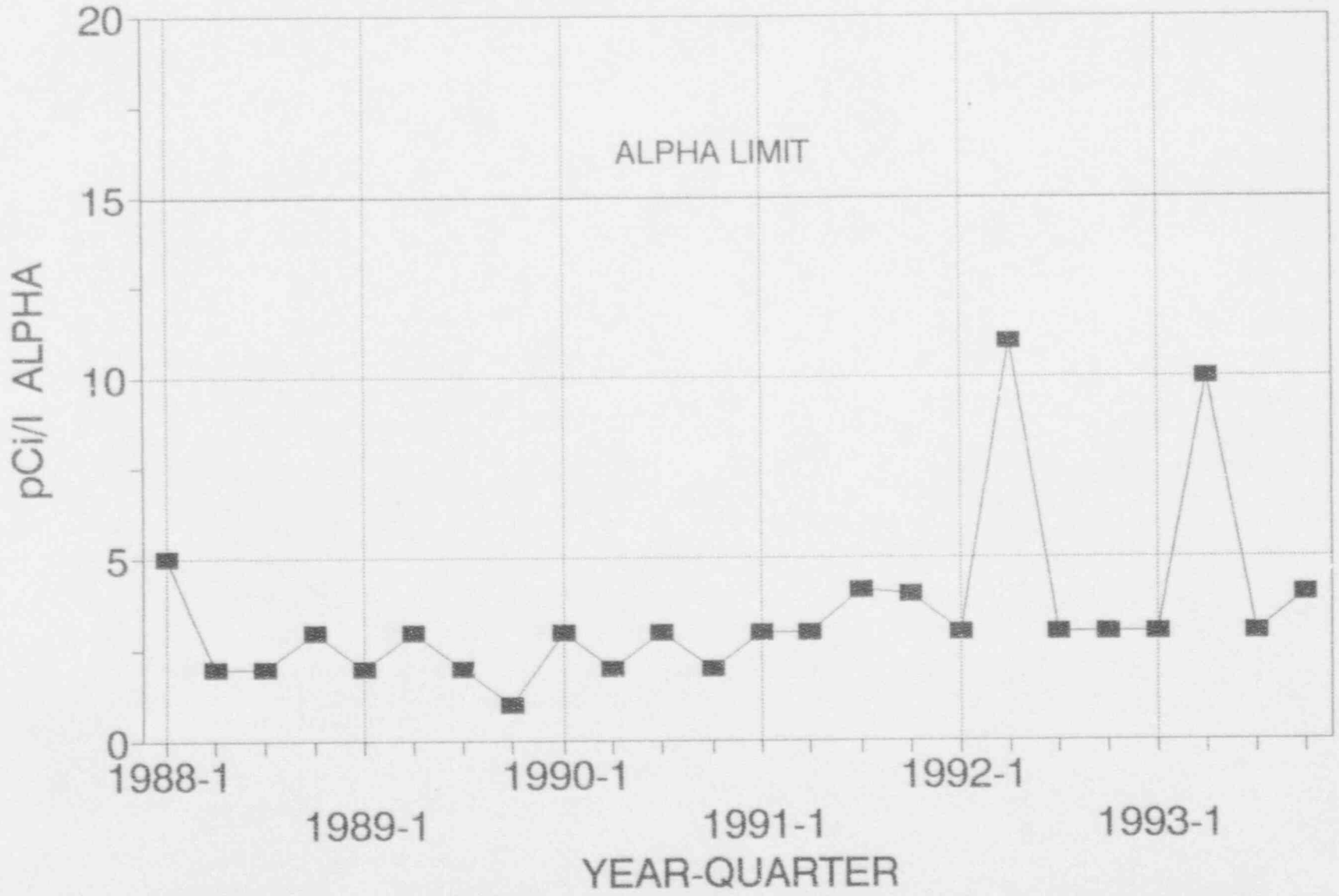
SWAMP CREEK

UPSTREAM CREEK GROSS ALPHA

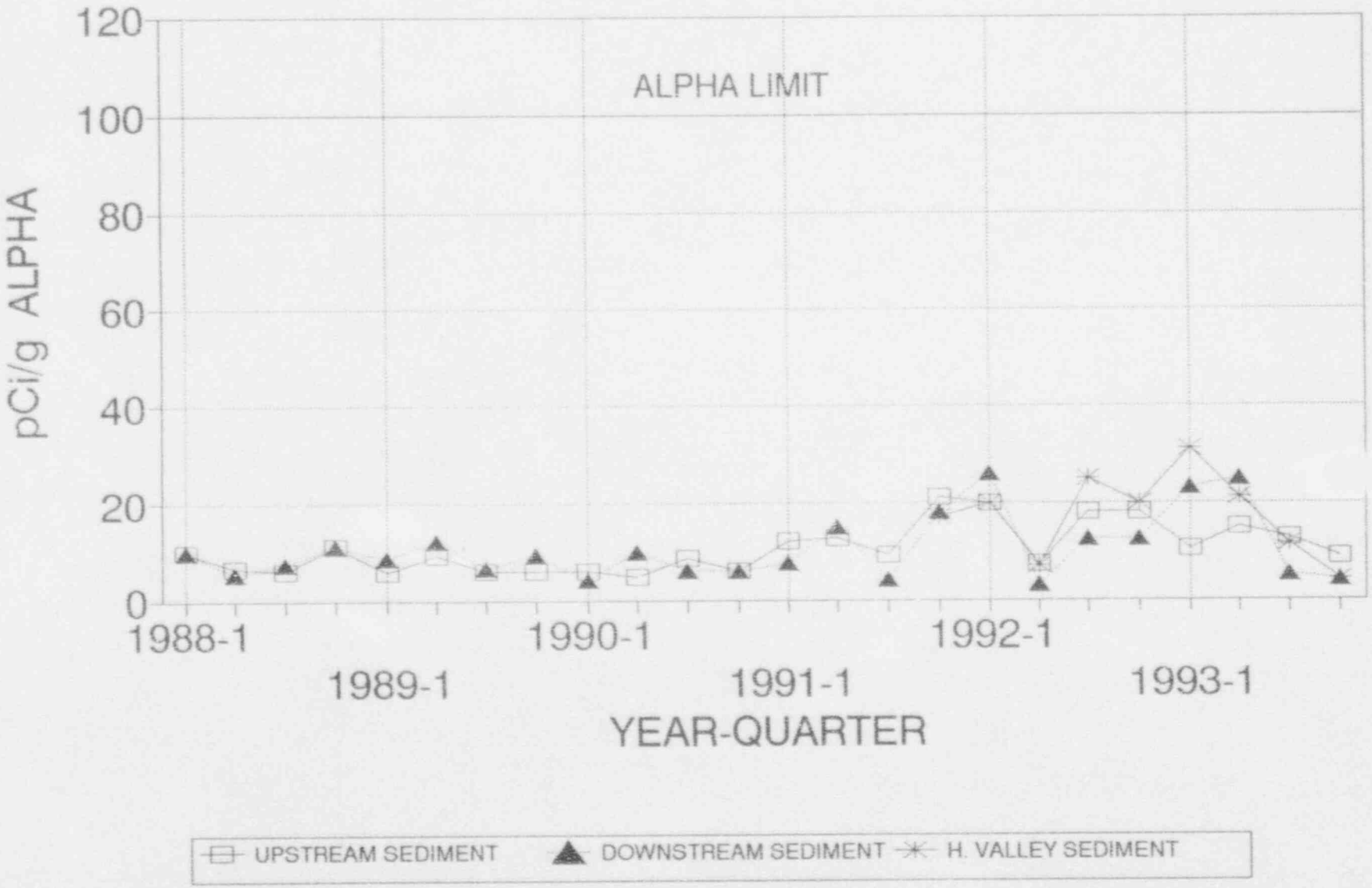


SWAMP CREEK

DOWNSTREAM CREEK GROSS ALPHA

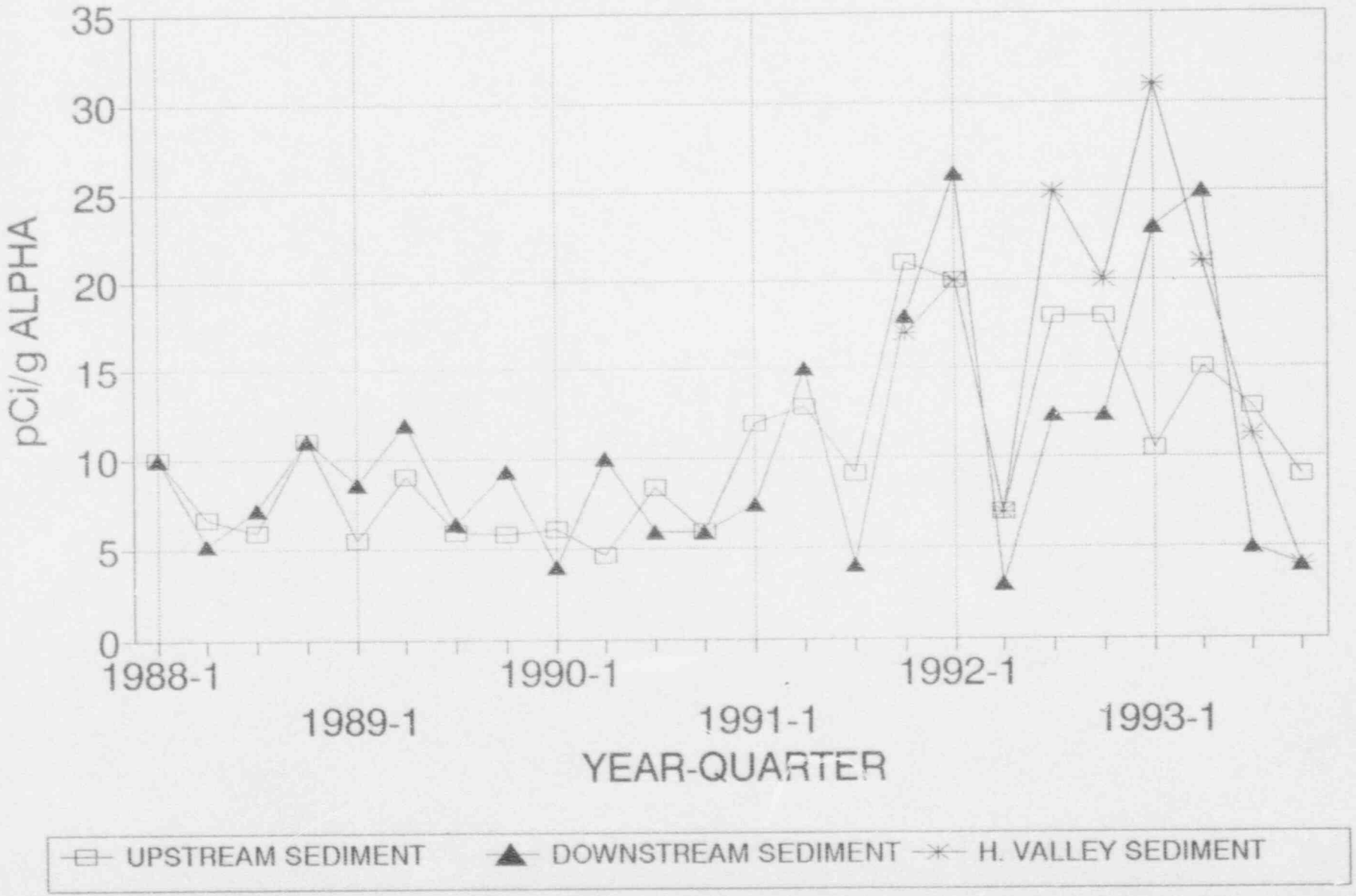


SWAMP CREEK
SEDIMENT



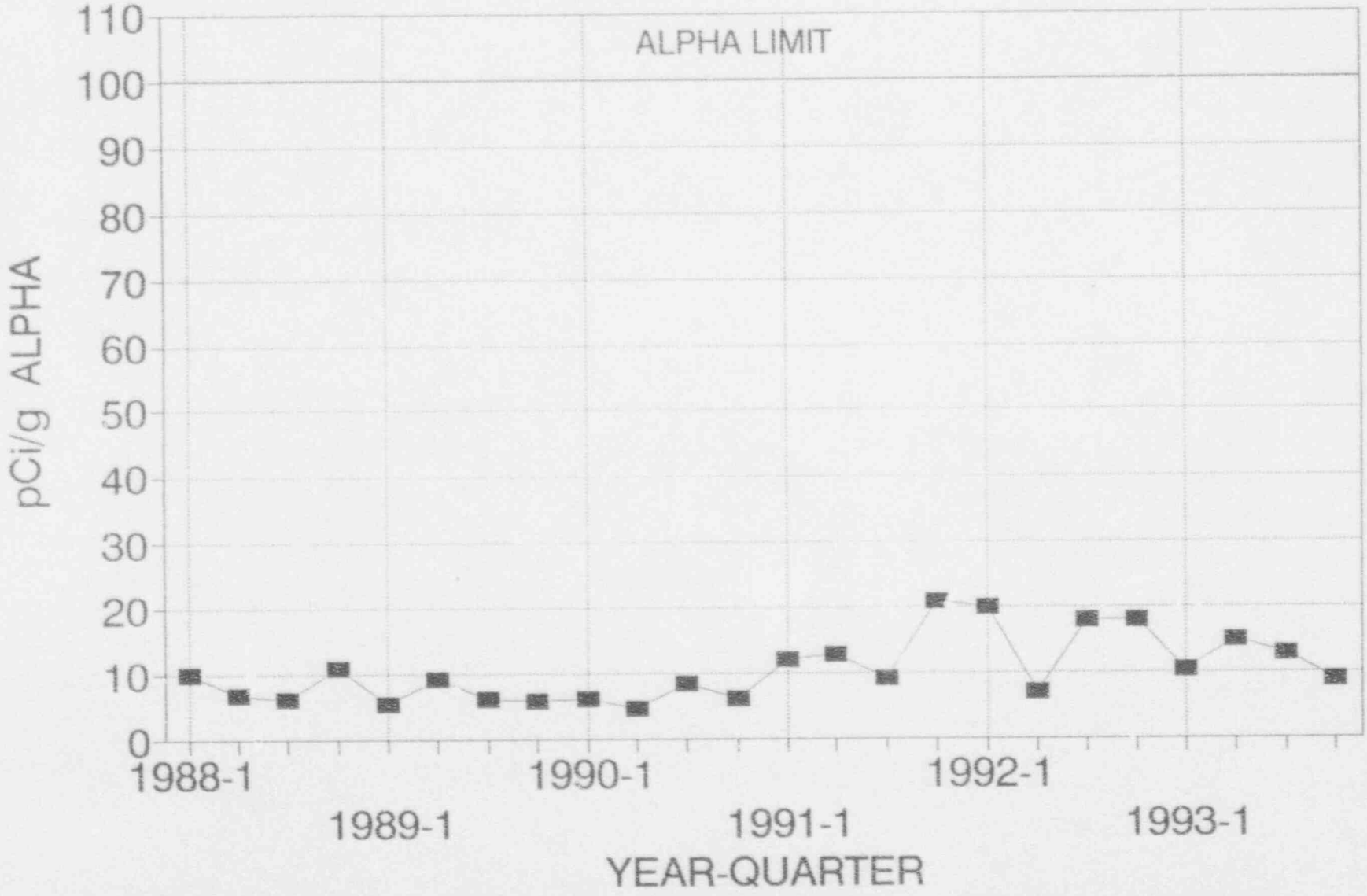
SWAMP CREEK

SEDIMENT GROSS ALPHA



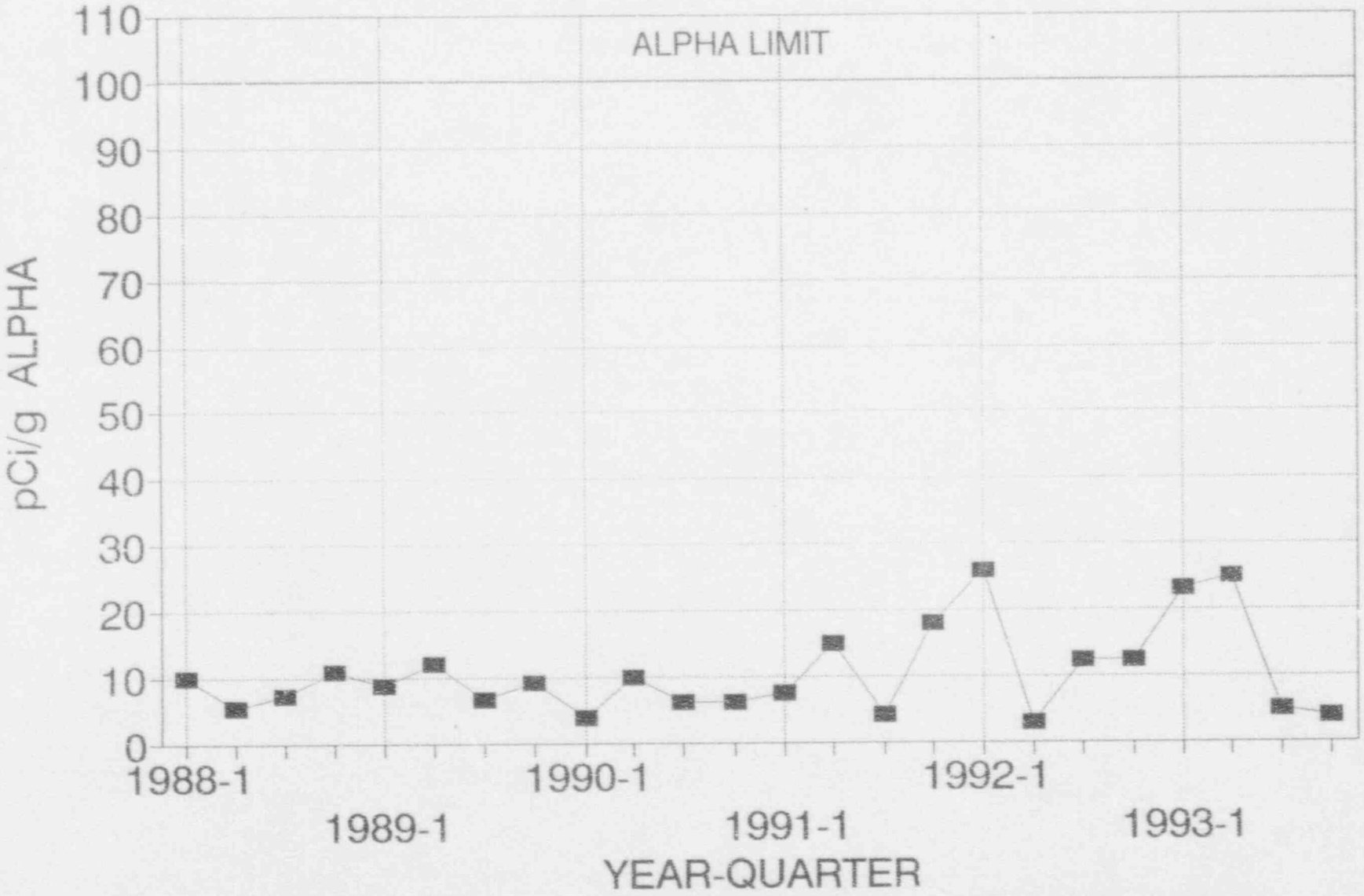
SWAMP CREEK

UPSTREAM SEDIMENT GROSS ALPHA



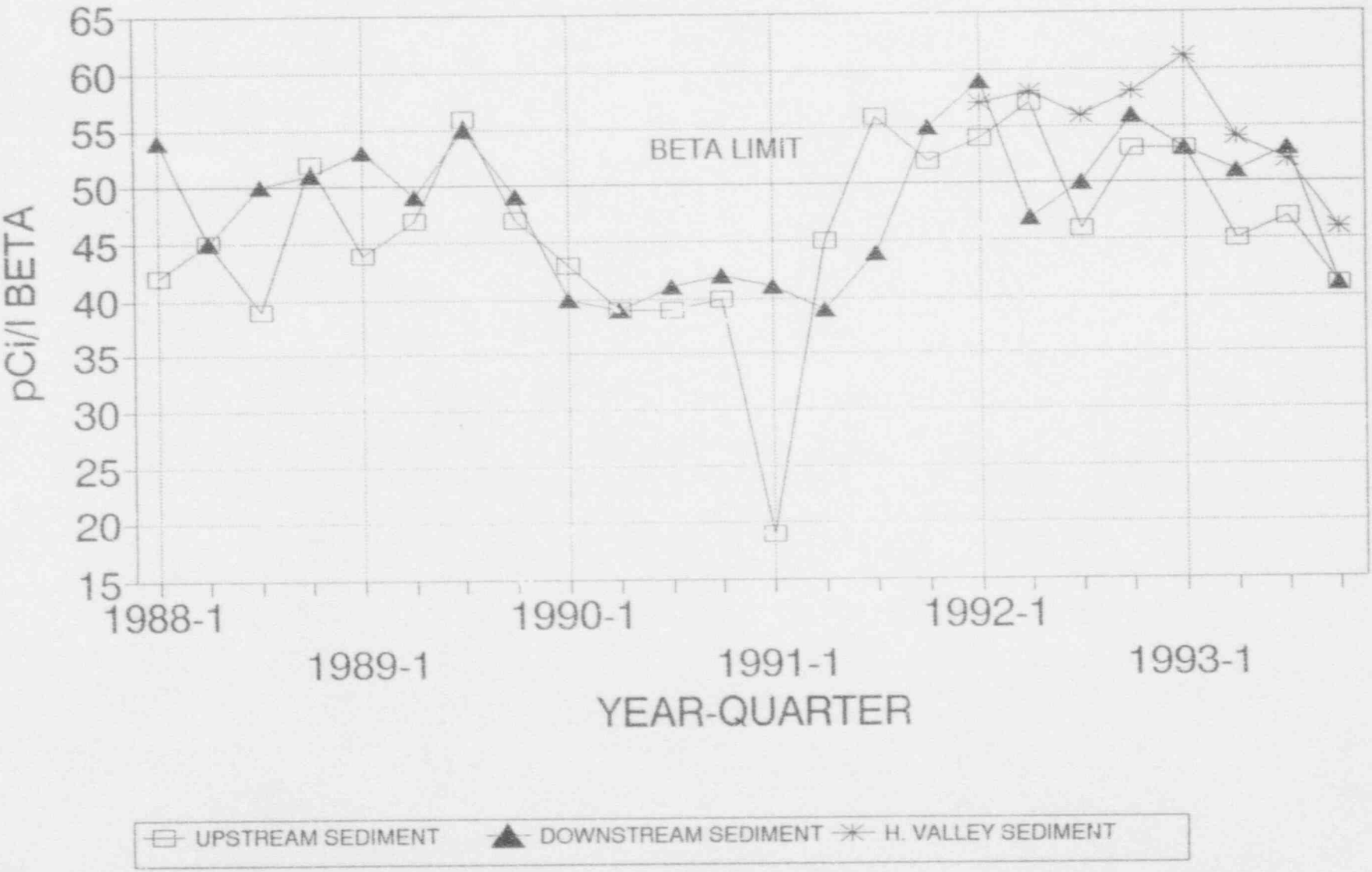
SWAMP CREEK

DOWNSTREAM SEDIMENT GROSS ALPHA



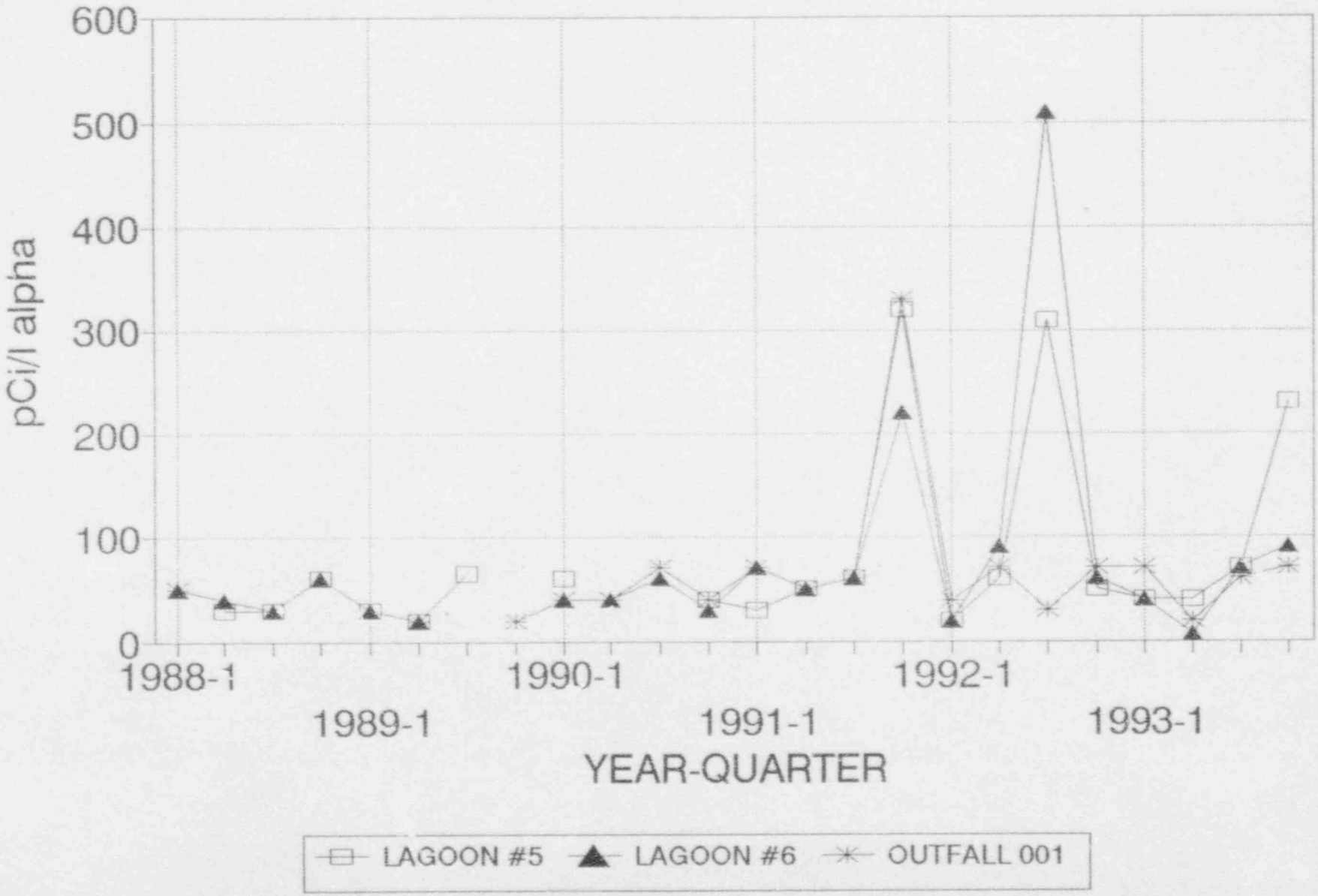
SWAMP CREEK

SEDIMENT GROSS BETA



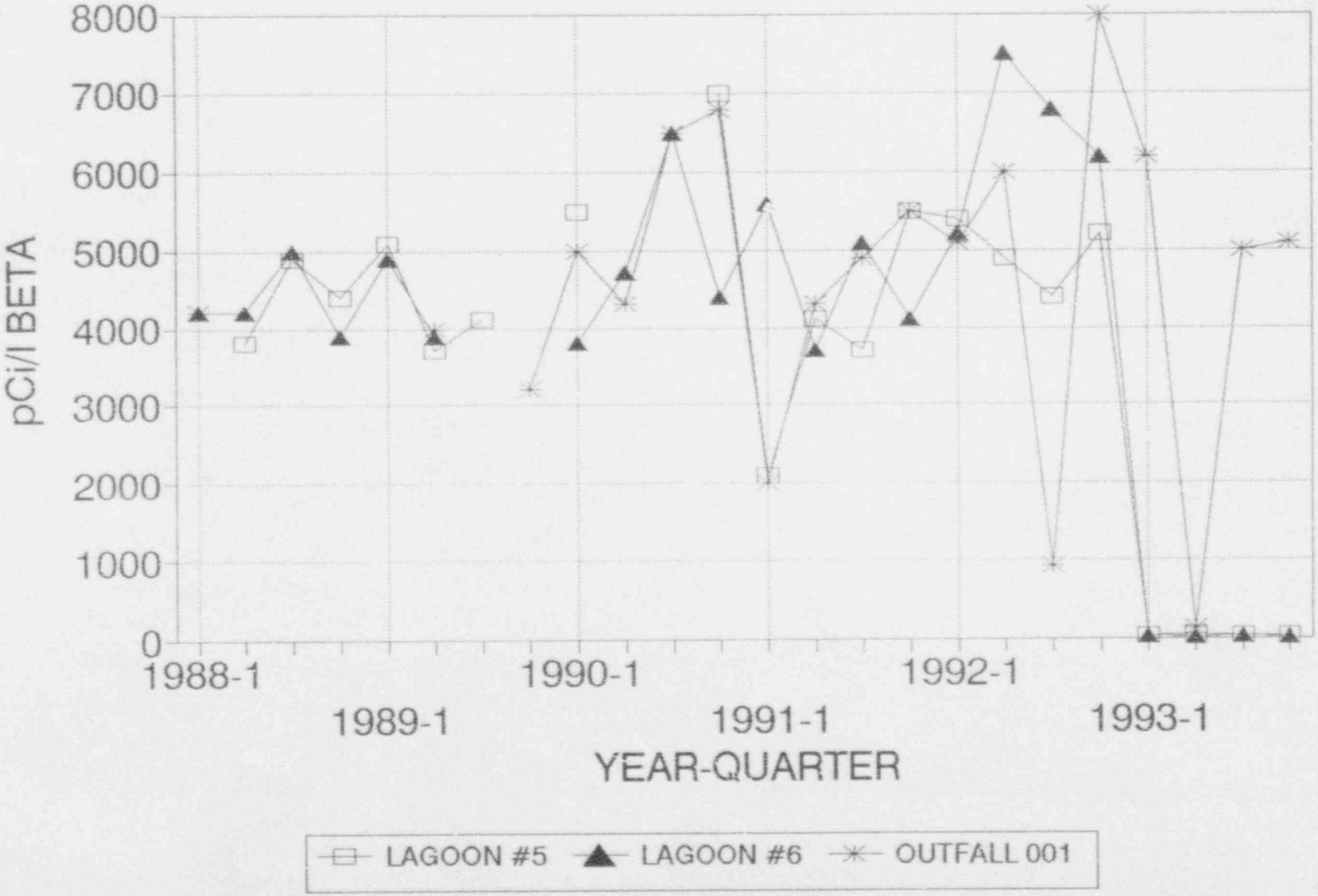
WASTEWATER

GROSS ALPHA ANALYSIS



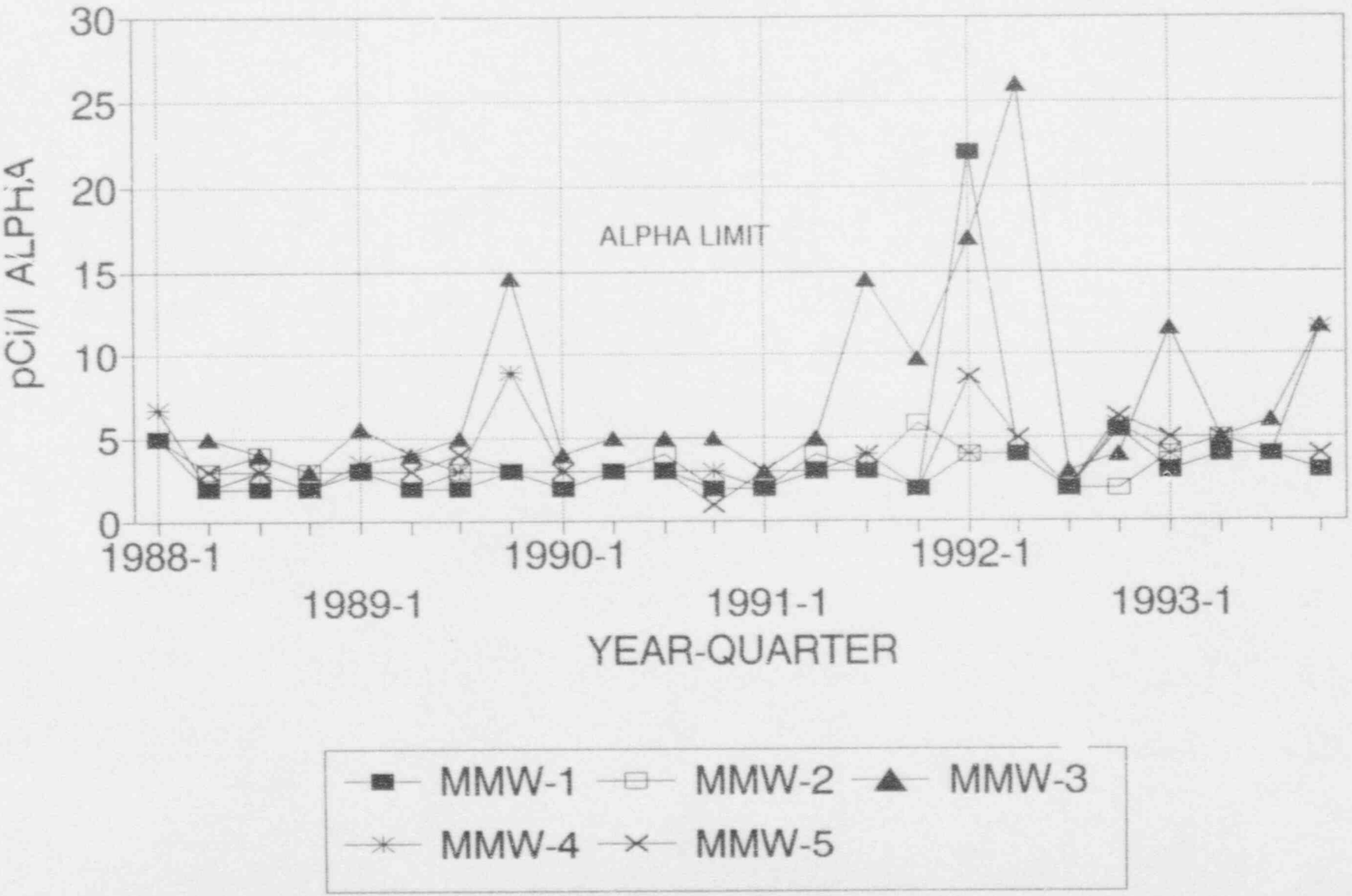
WASTEWATER

GROSS BETA ANALYSIS



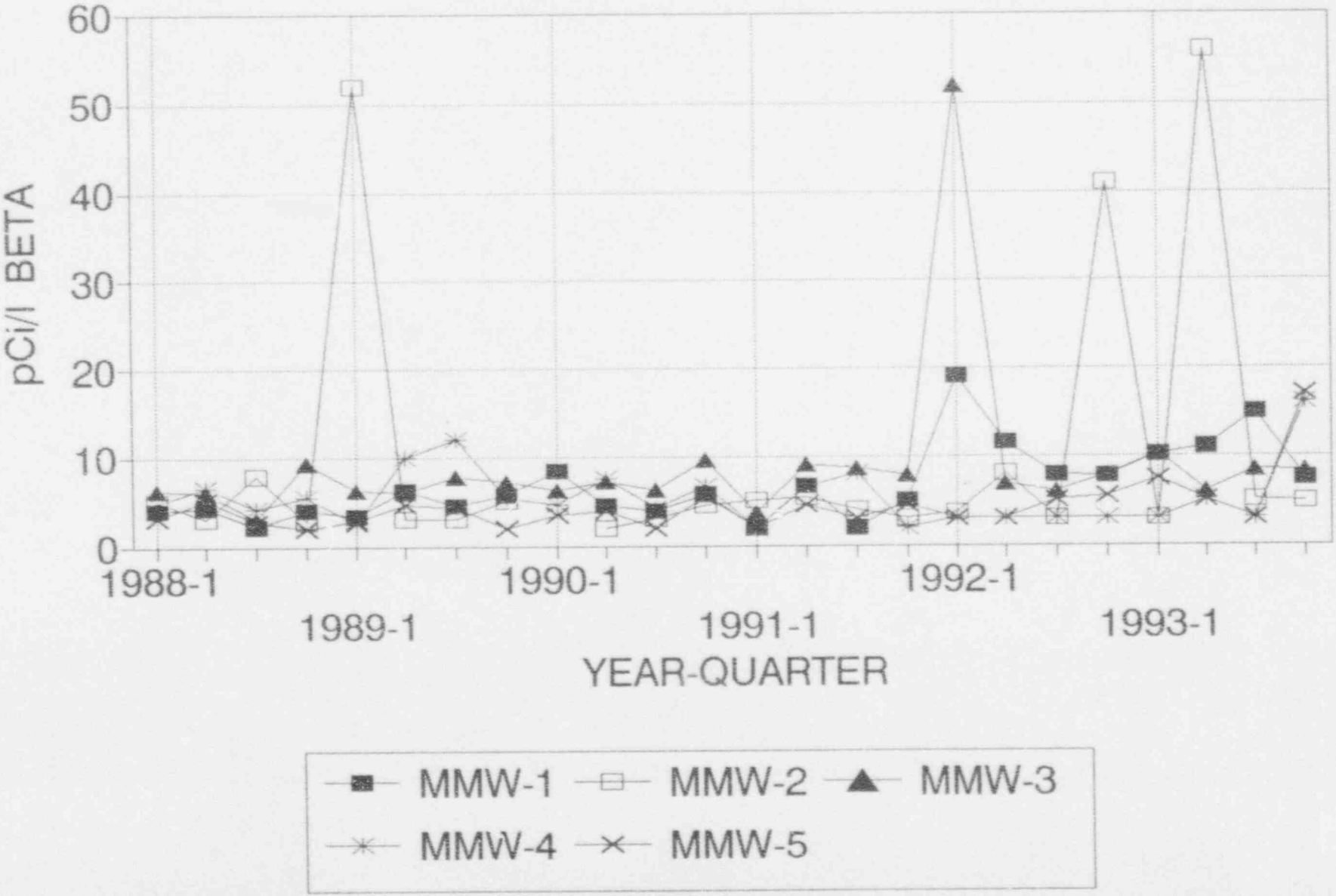
MAUSOLEUM MONITORING WELL

GROSS ALPHA ANALYSIS

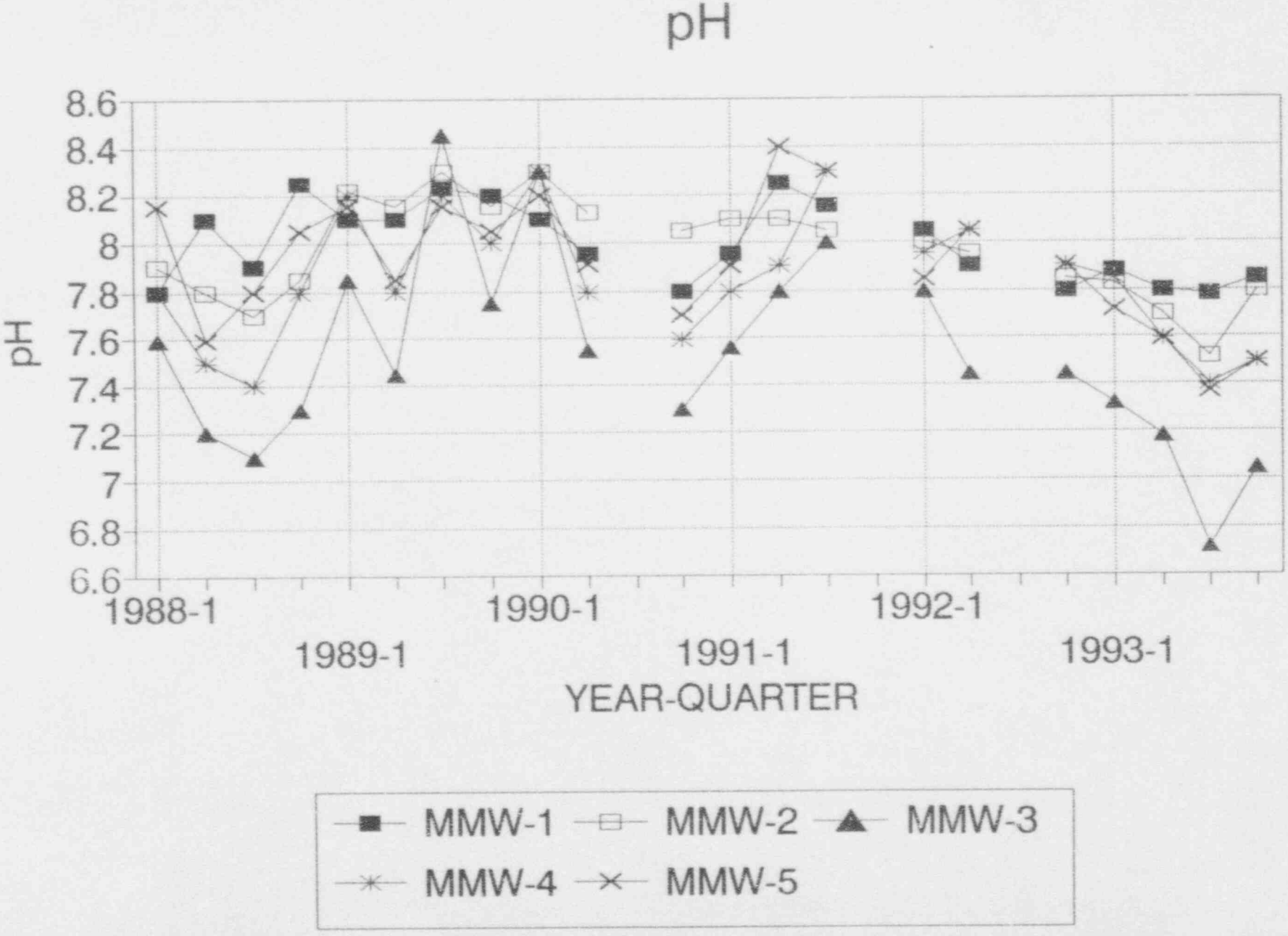


MAUSOLEUM MONITORING WELL

GROSS BETA ANALYSIS

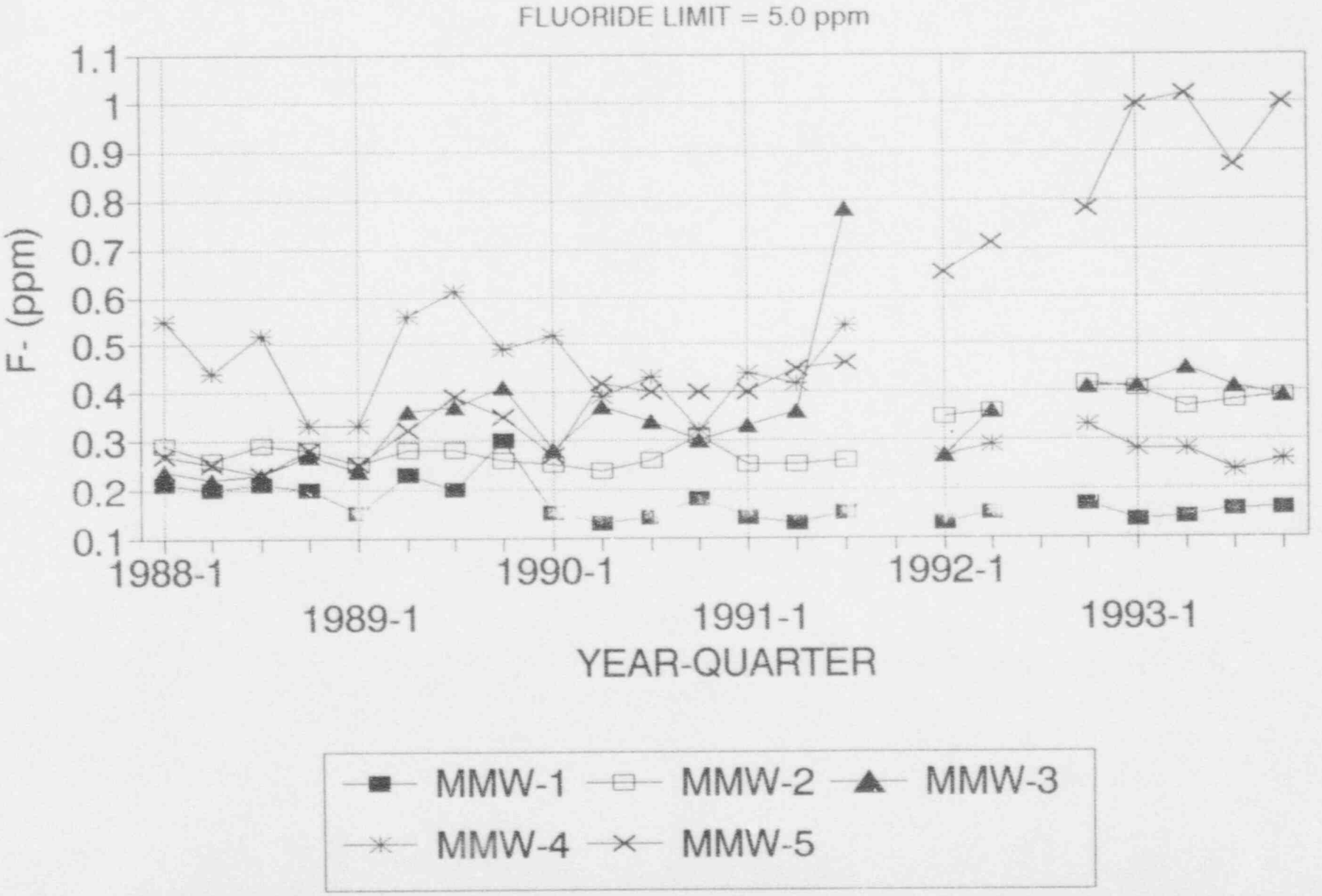


MAUSOLEUM MONITORING WELL



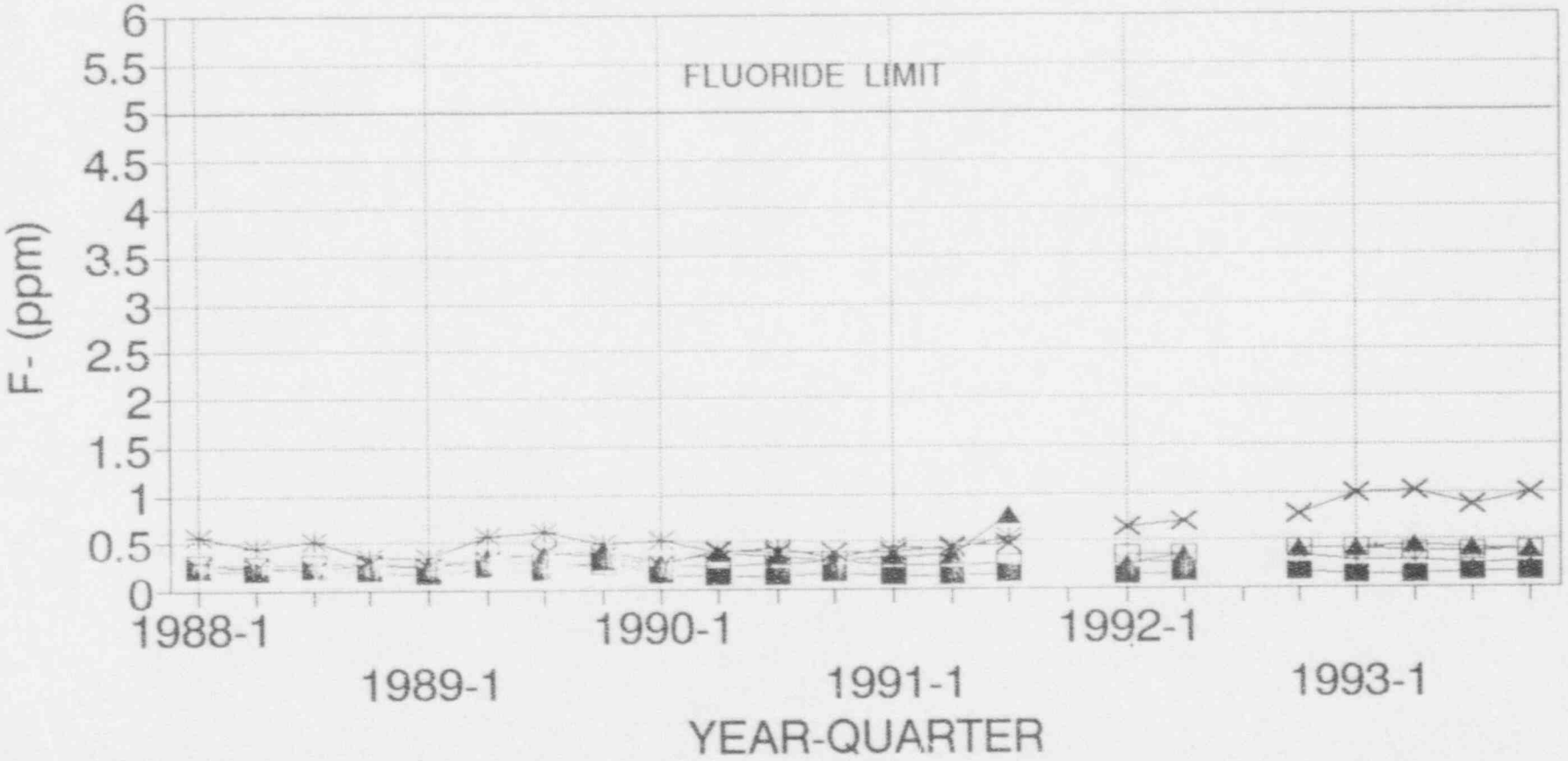
MAUSOLEUM MONITORING WELL

FLUORIDE

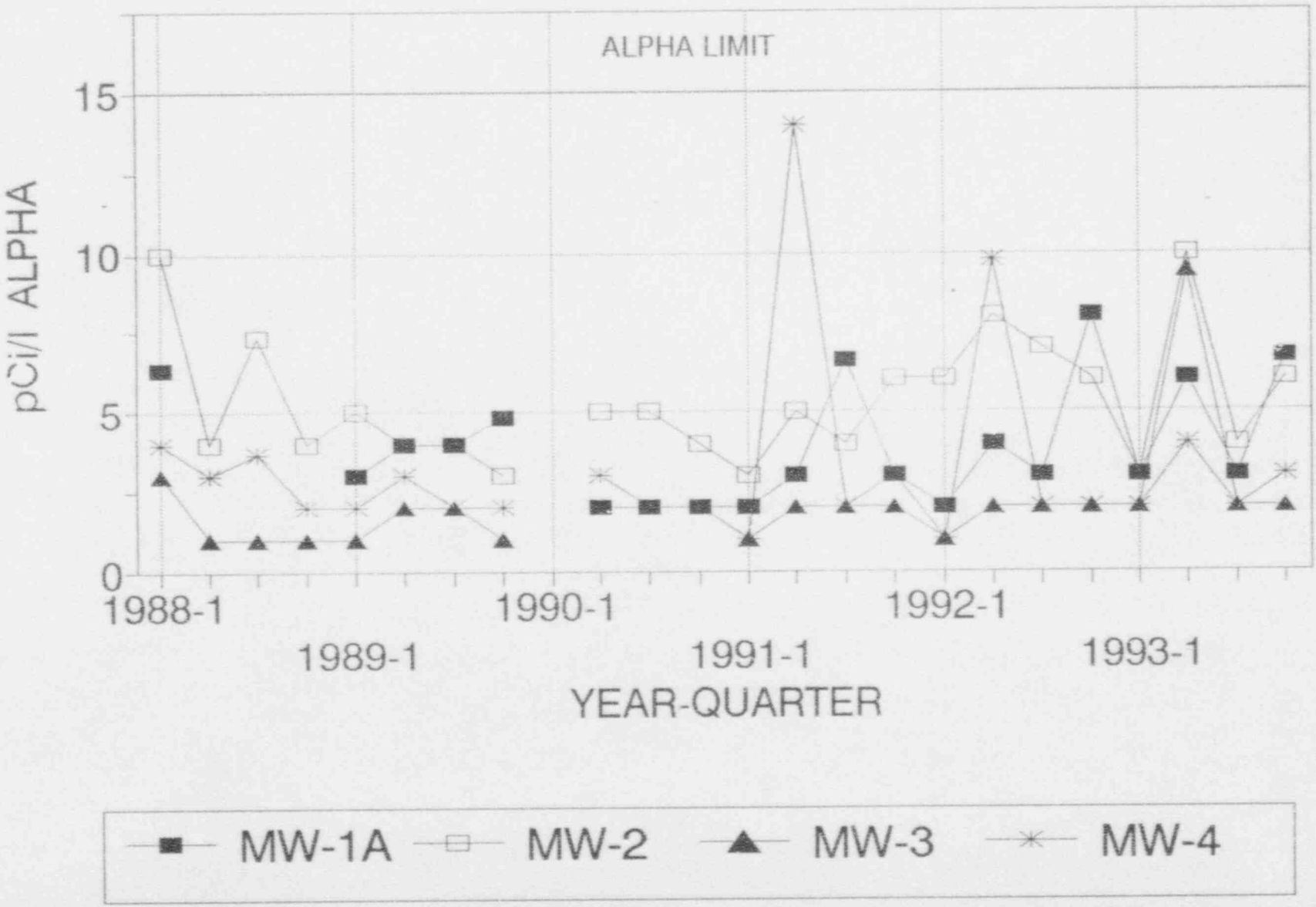


MAUSOLEUM MONITORING WELL

FLUORIDE

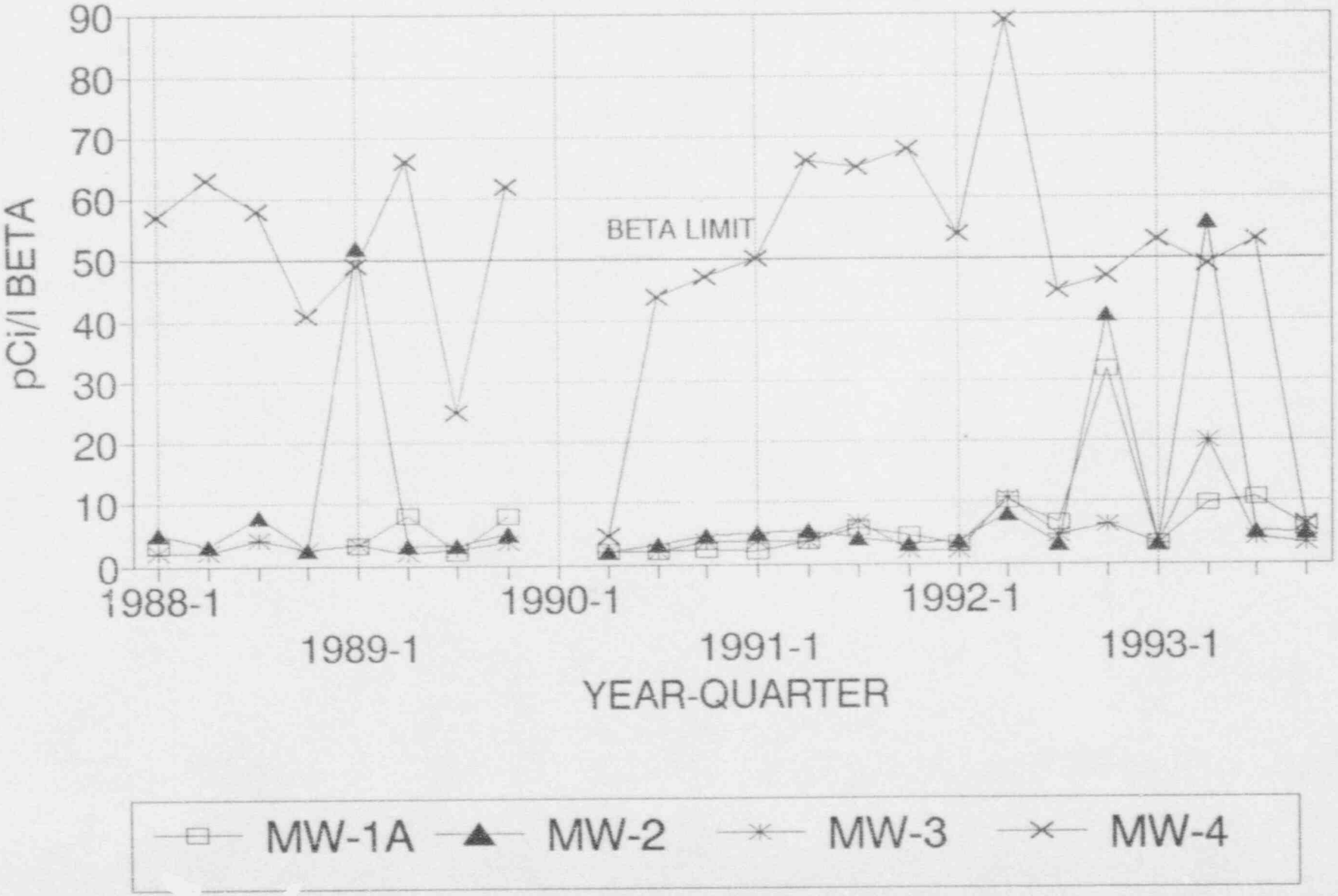


MONITORING WELL
GROSS ALPHA ANALYSIS



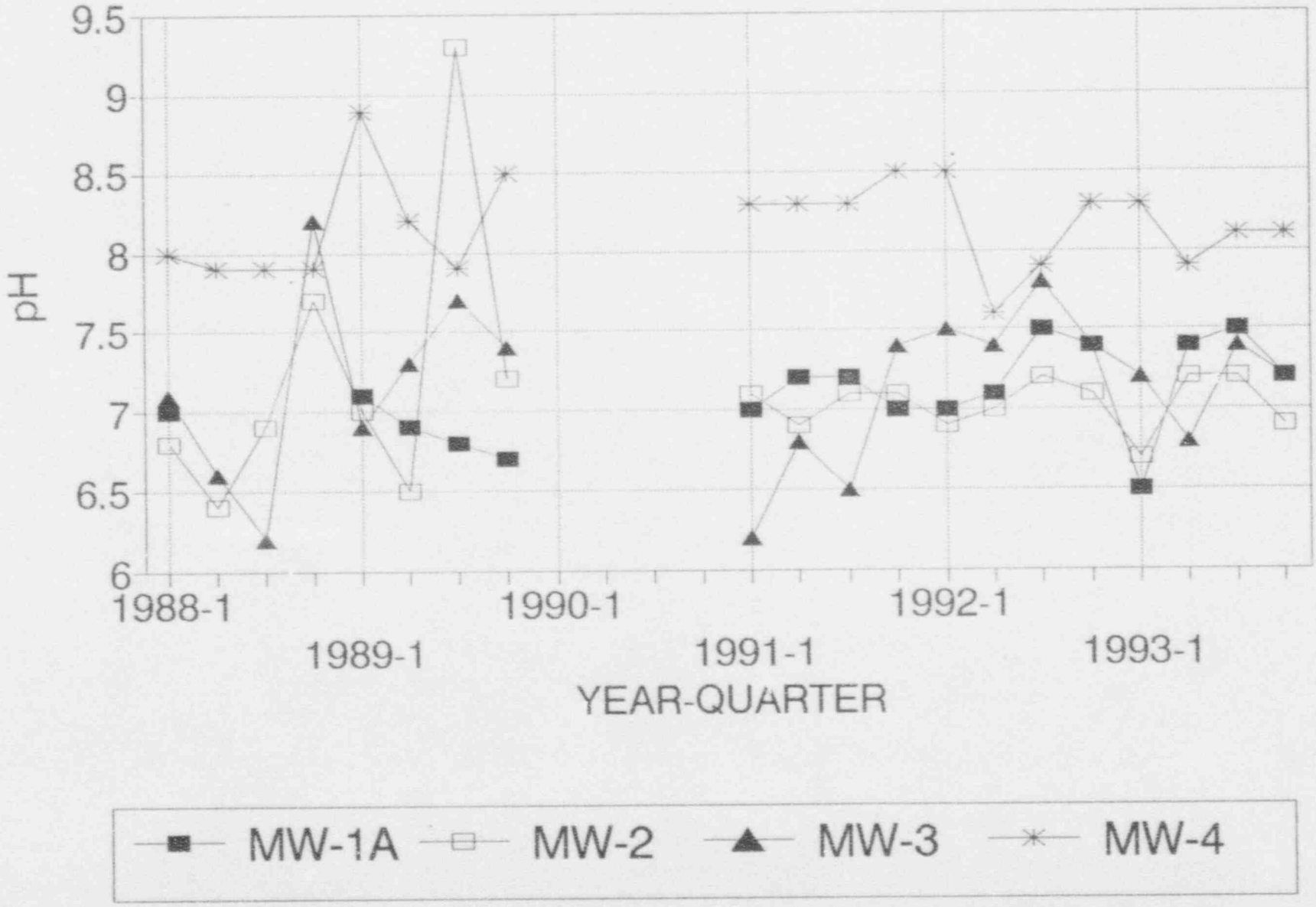
MONITORING WELL

GROSS BETA ANALYSIS



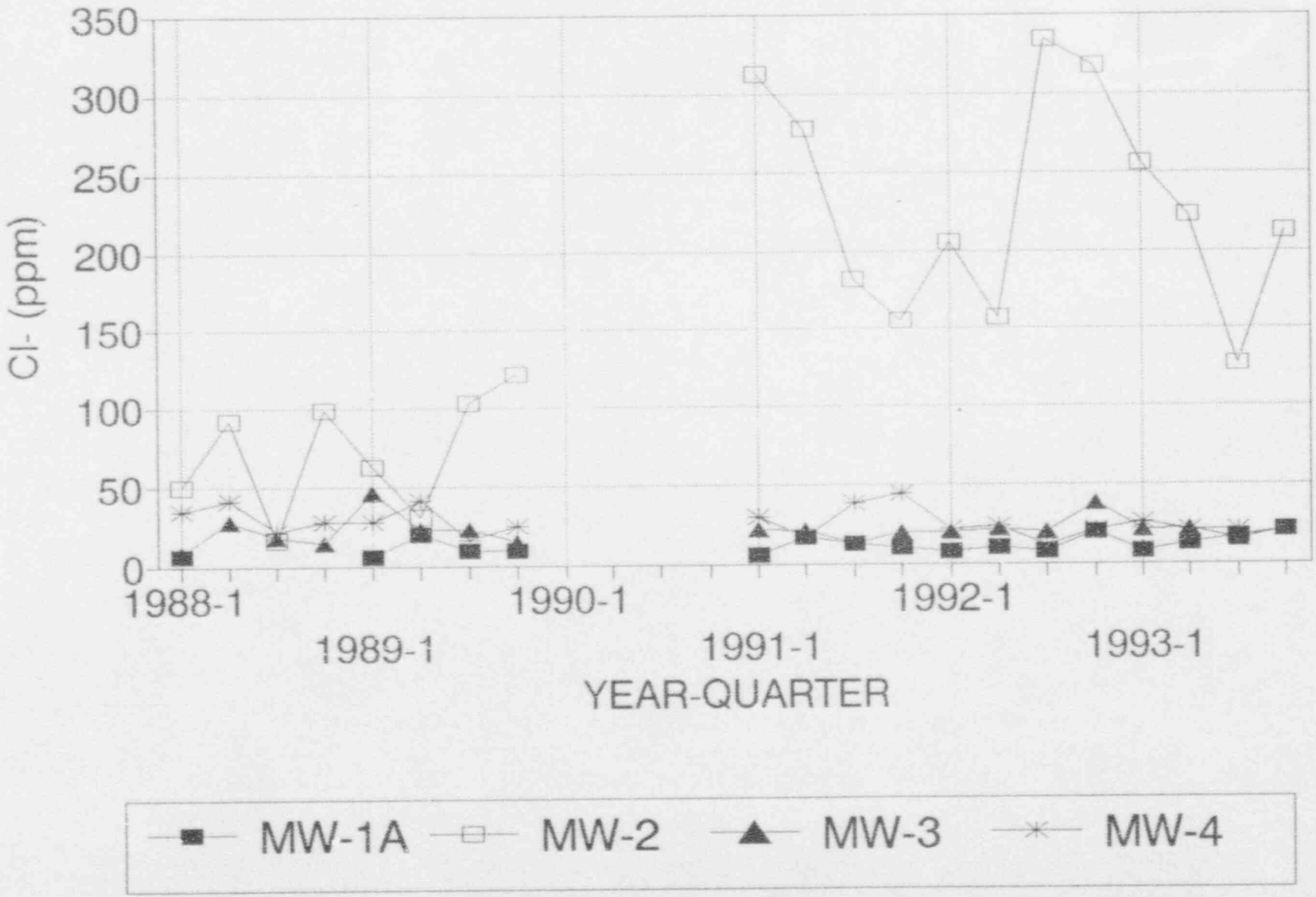
MONITORING WELL

pH



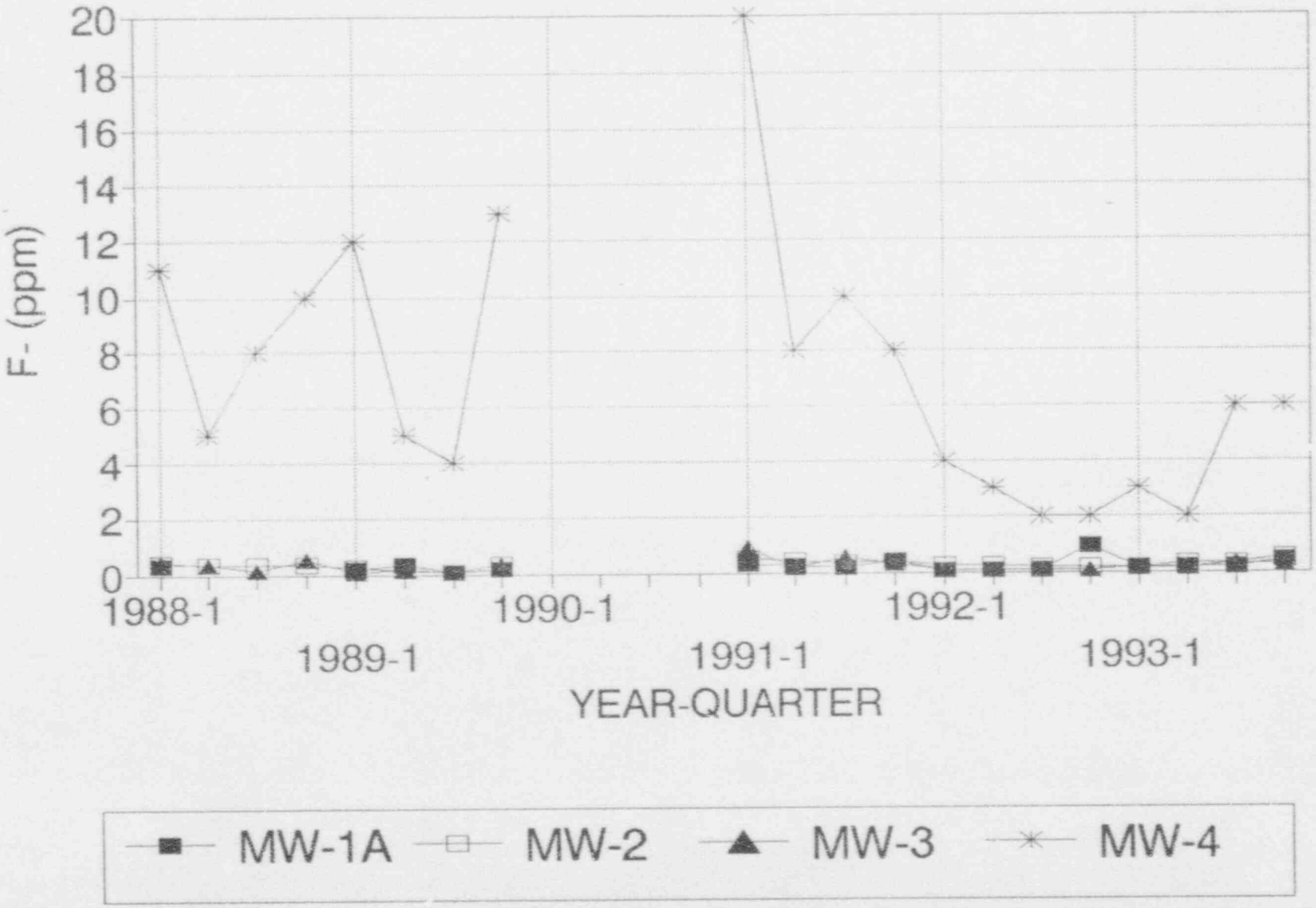
MONITORING WELL

CHLORIDE



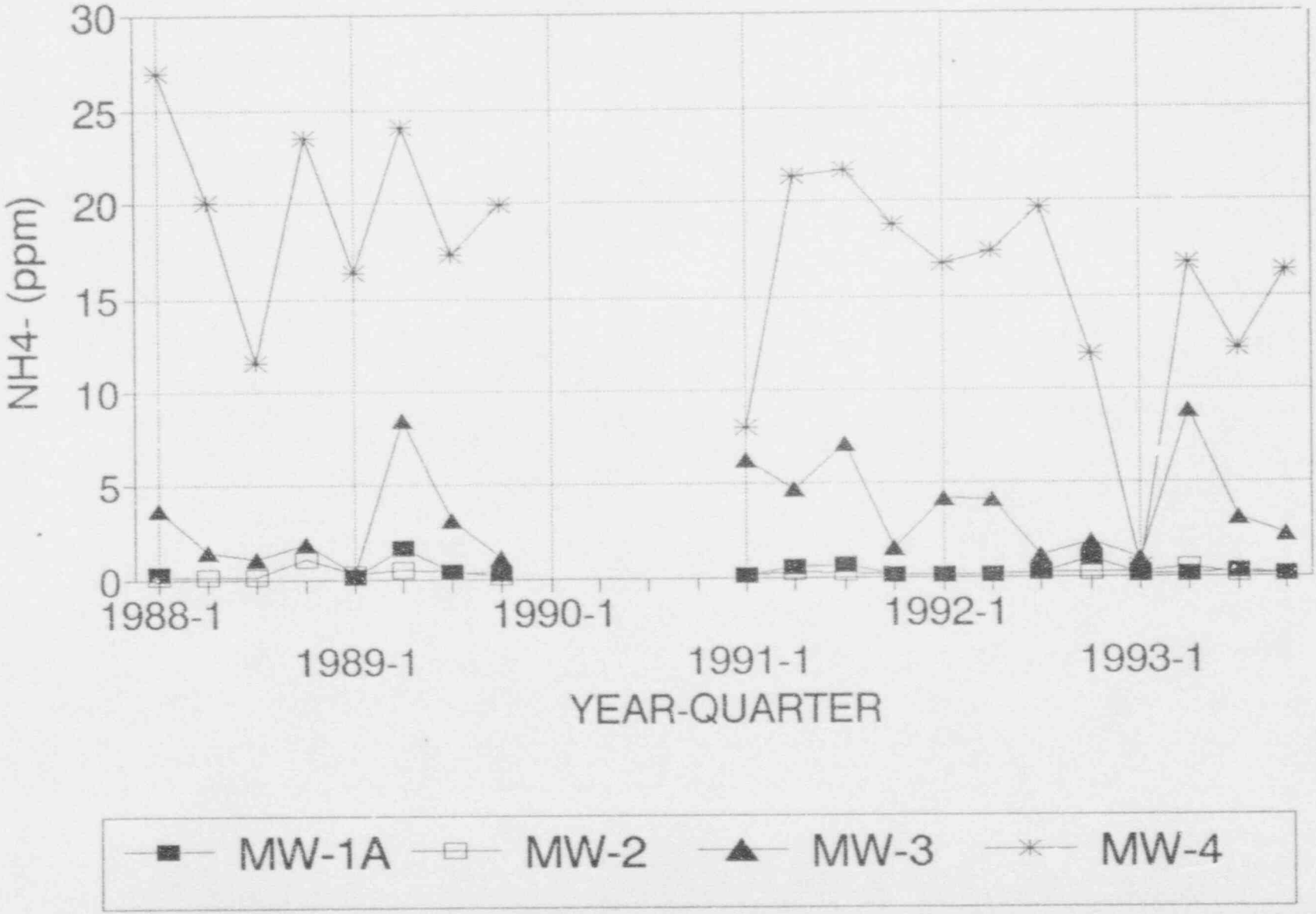
MONITORING WELL

FLUORIDE

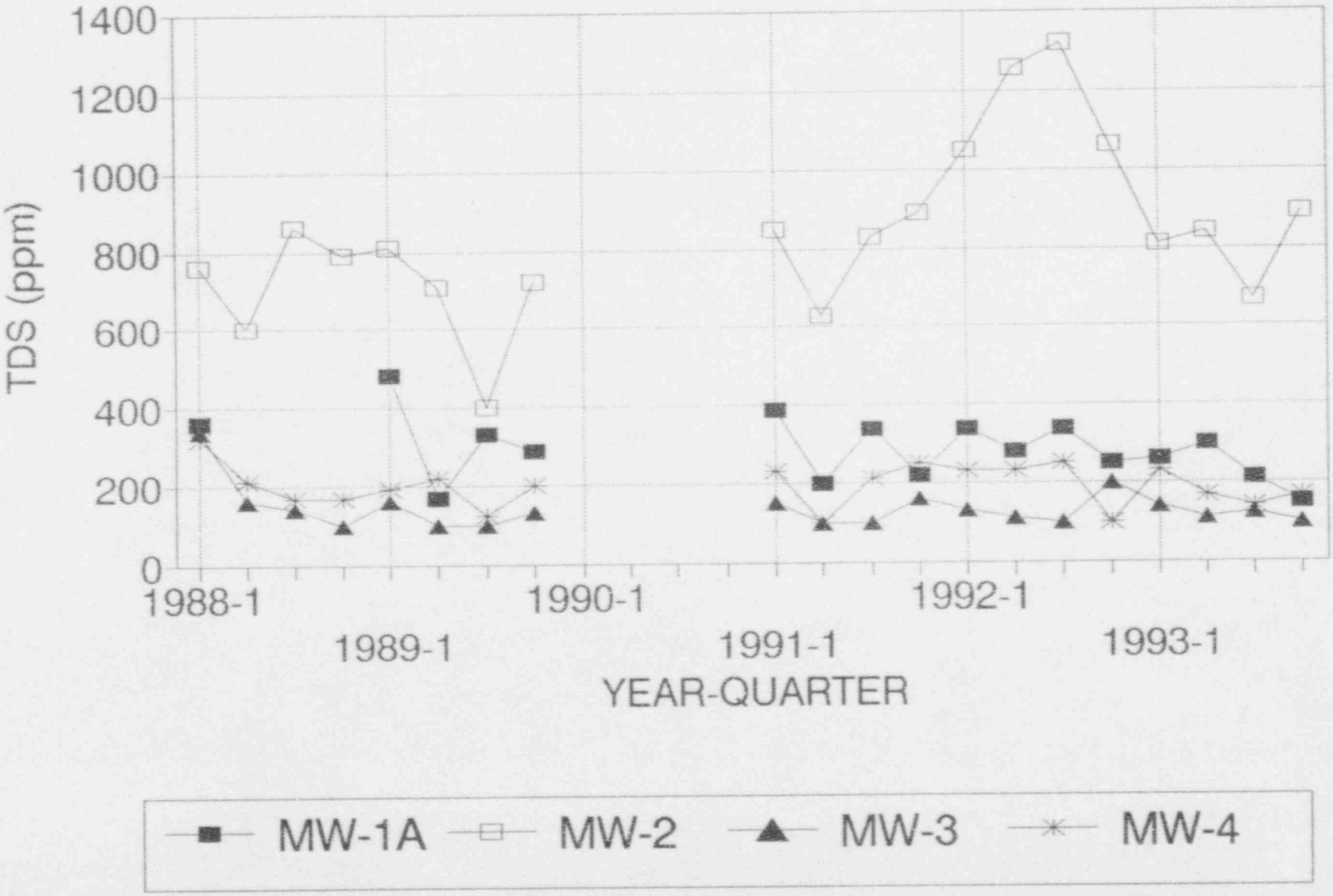


MONITORING WELL

AMMONIUM

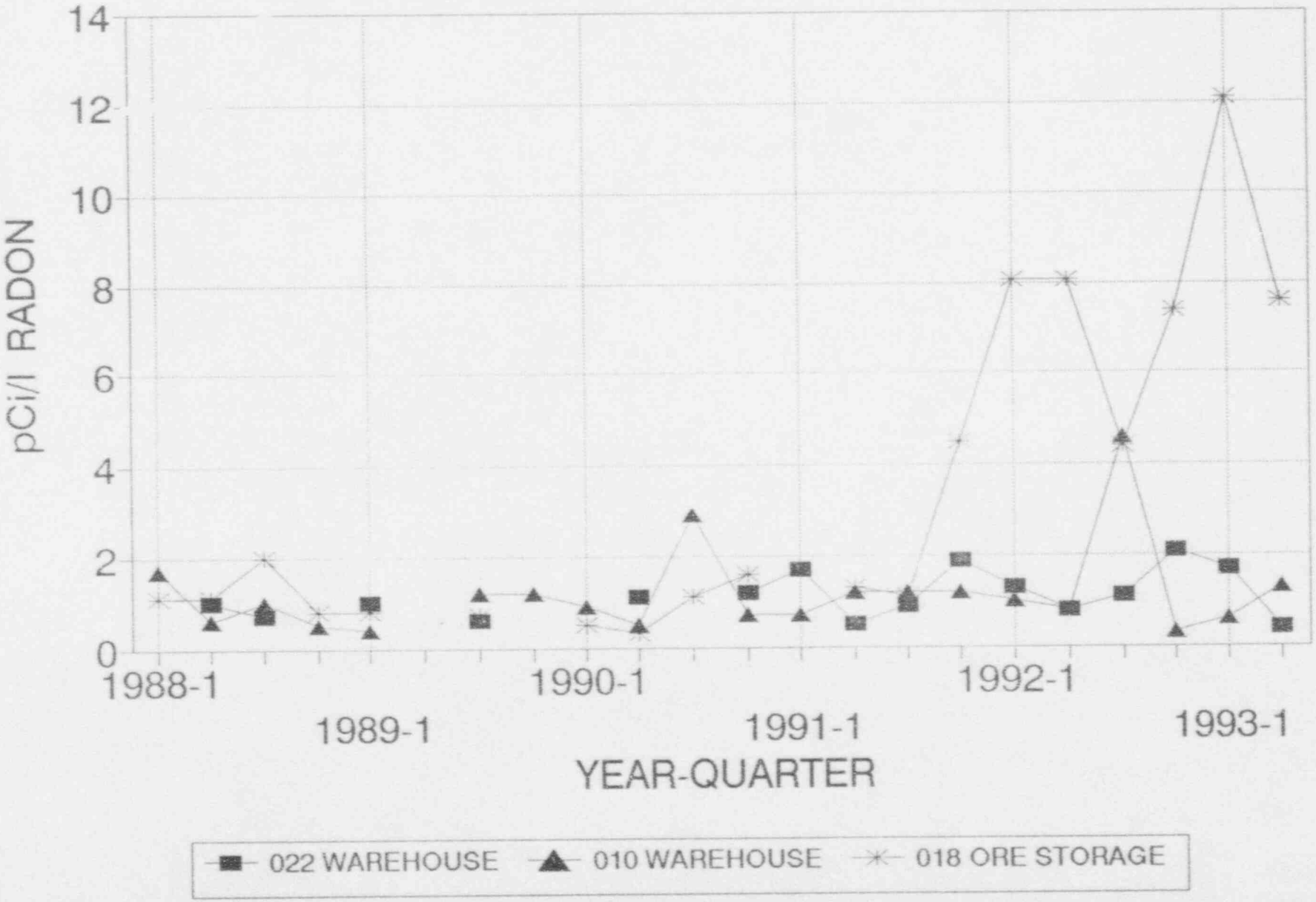


MONITORING WELL
TOTAL DISSOLVED SOLIDS

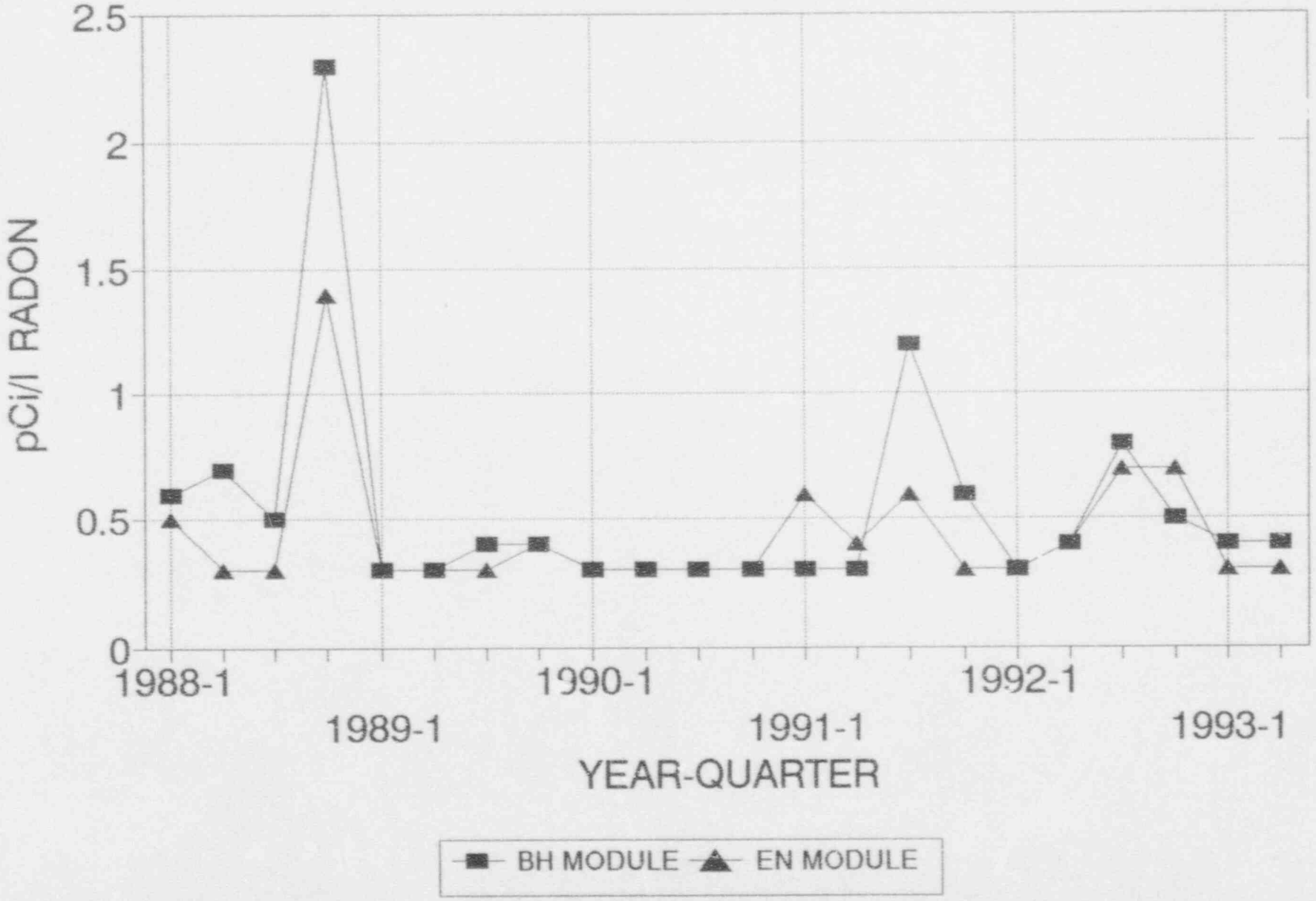


AVERAGE RADON CONCENTRATION (pCi/l)

WAREHOUSE STORAGE AREAS

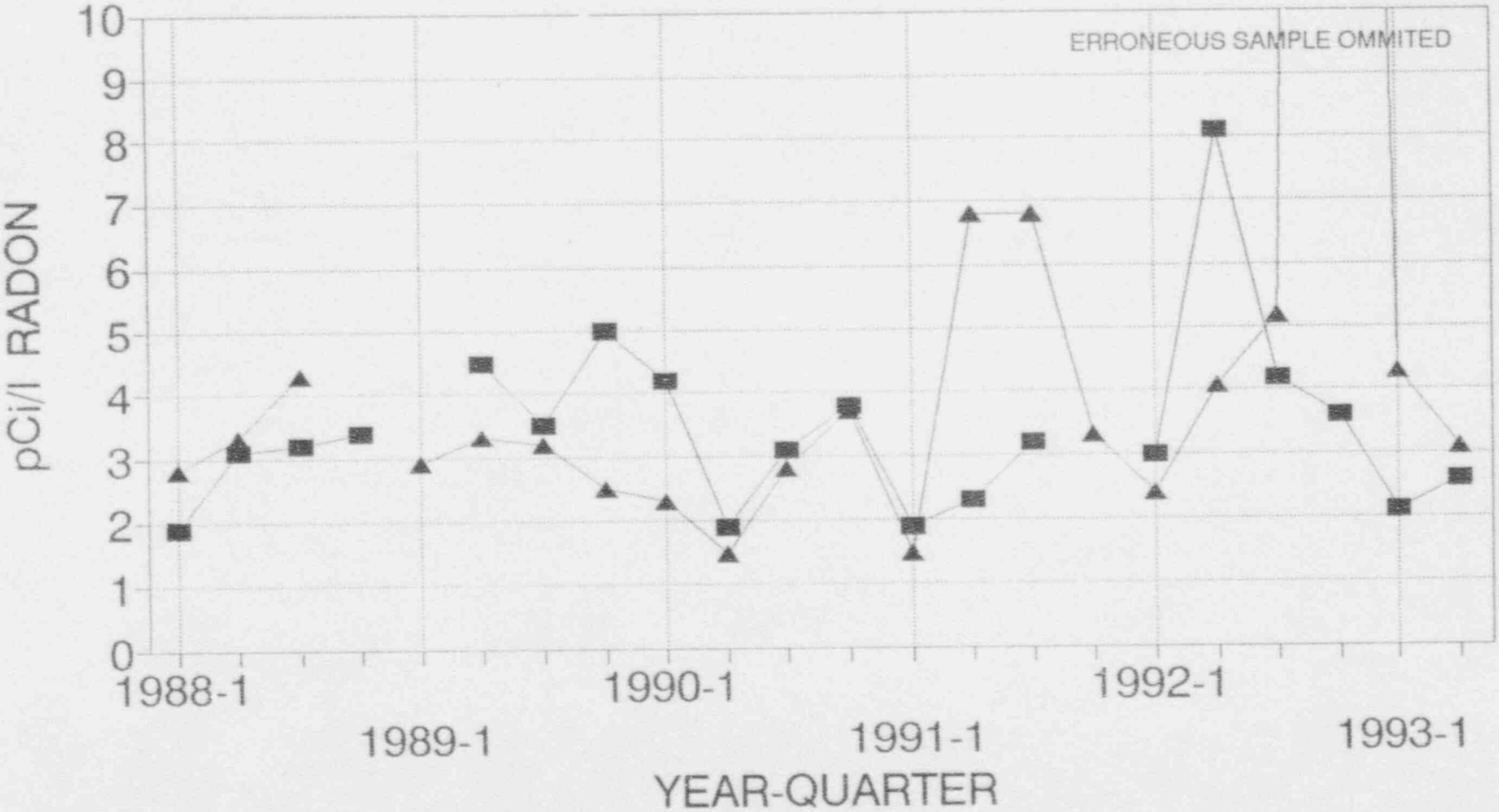


AVERAGE RADON CONCENTRATION
BACKGROUND AREAS

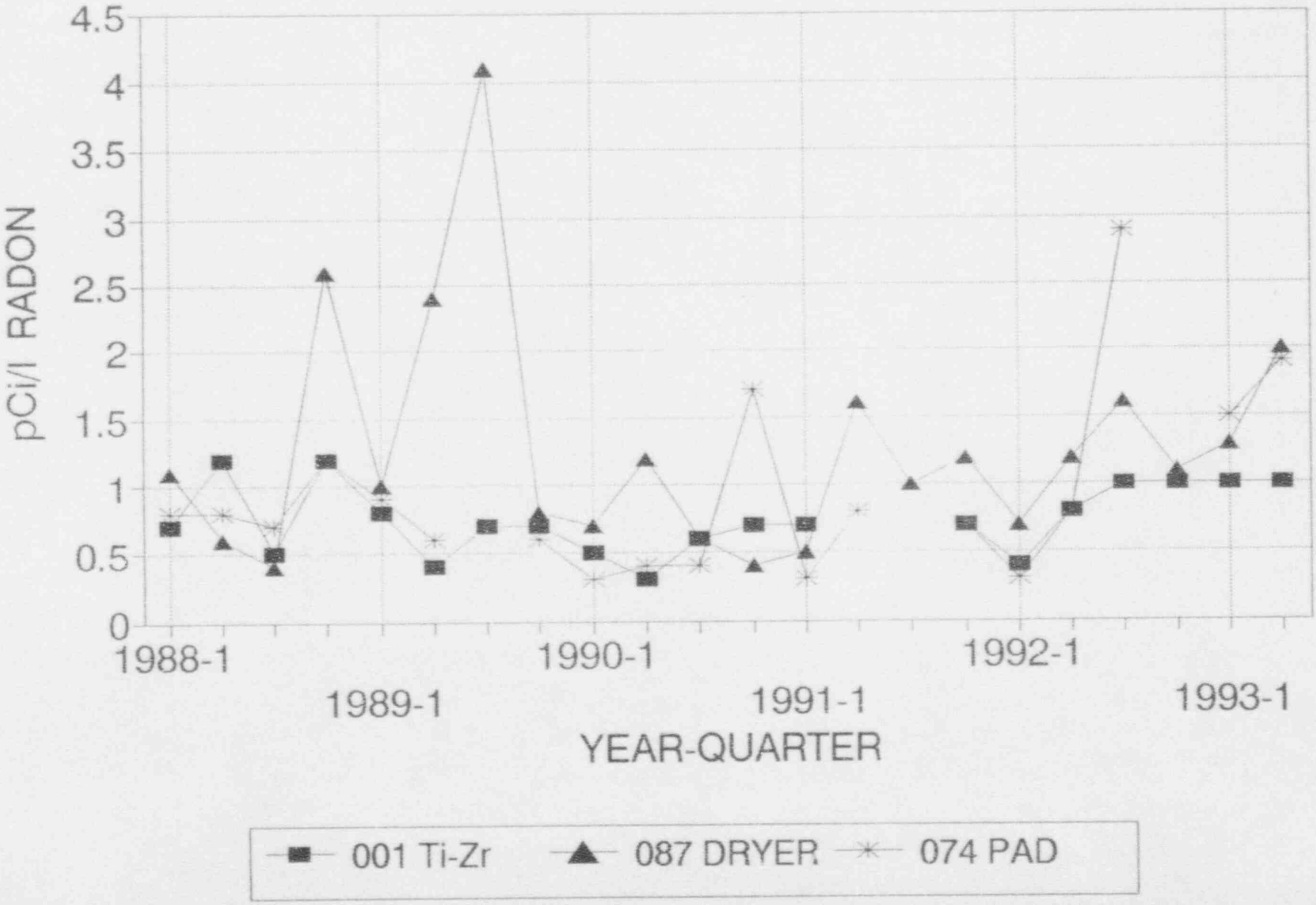


AVERAGE RADON CONCENTRATION
ORE PROCESSING AREAS

AVERAGE RADON CONCENTRATION
ORE PROCESSING AREAS

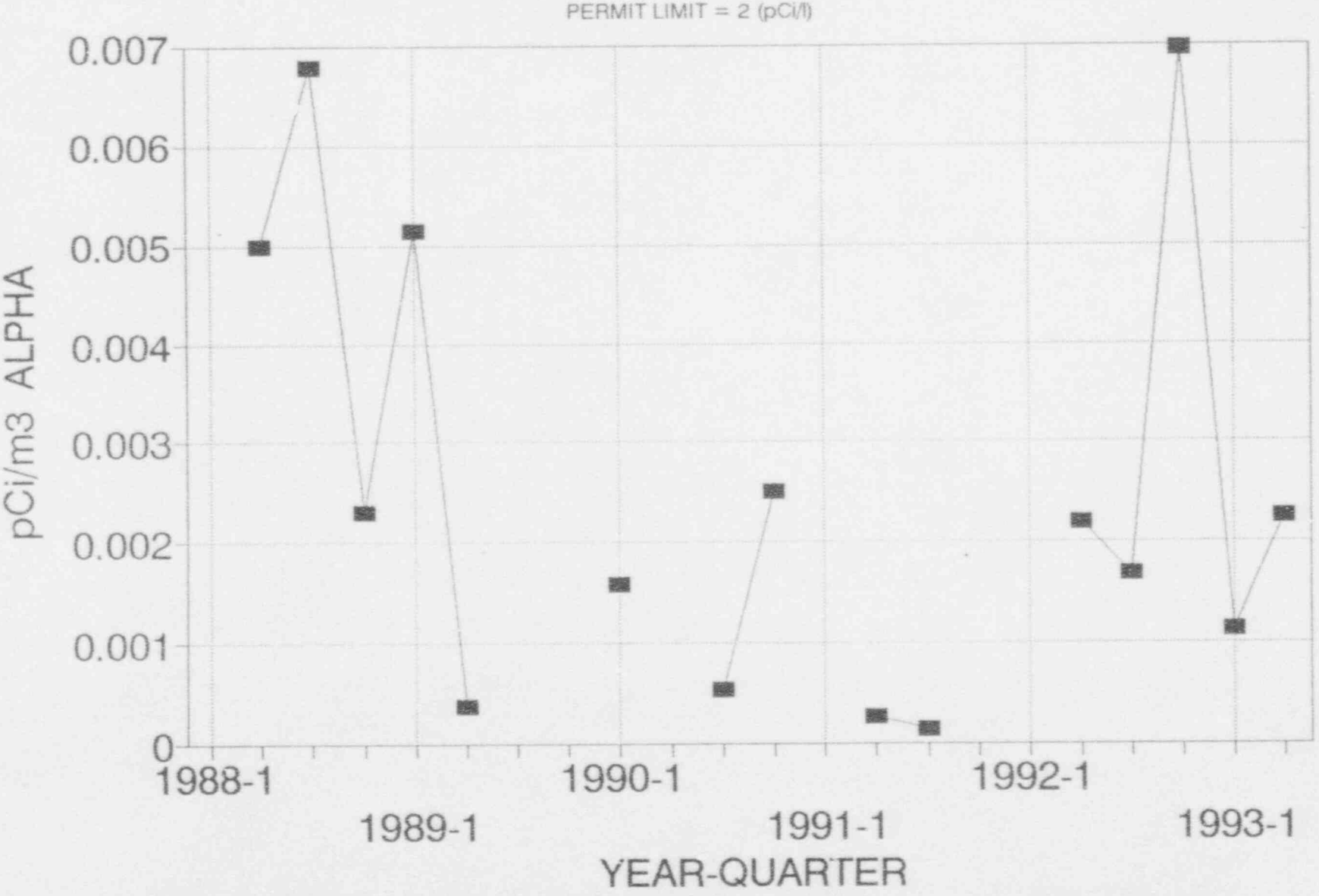


AVERAGE RADON CONCENTRATION
PROCESSING AREAS



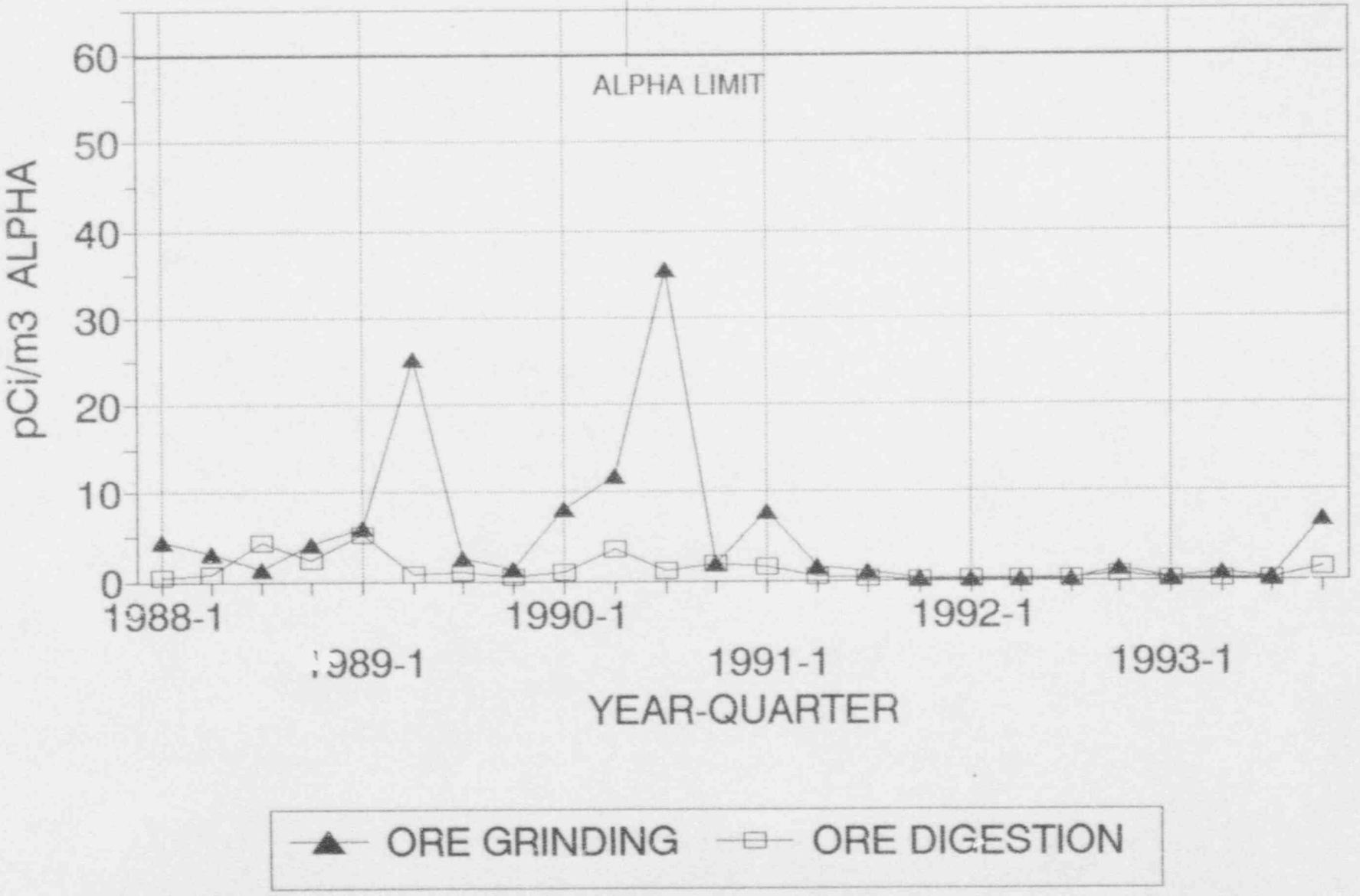
WALKER'S AIR SAMPLE

GROSS ALPHA



BLDG. 073 HIGH VOLUME AIR SAMPLE

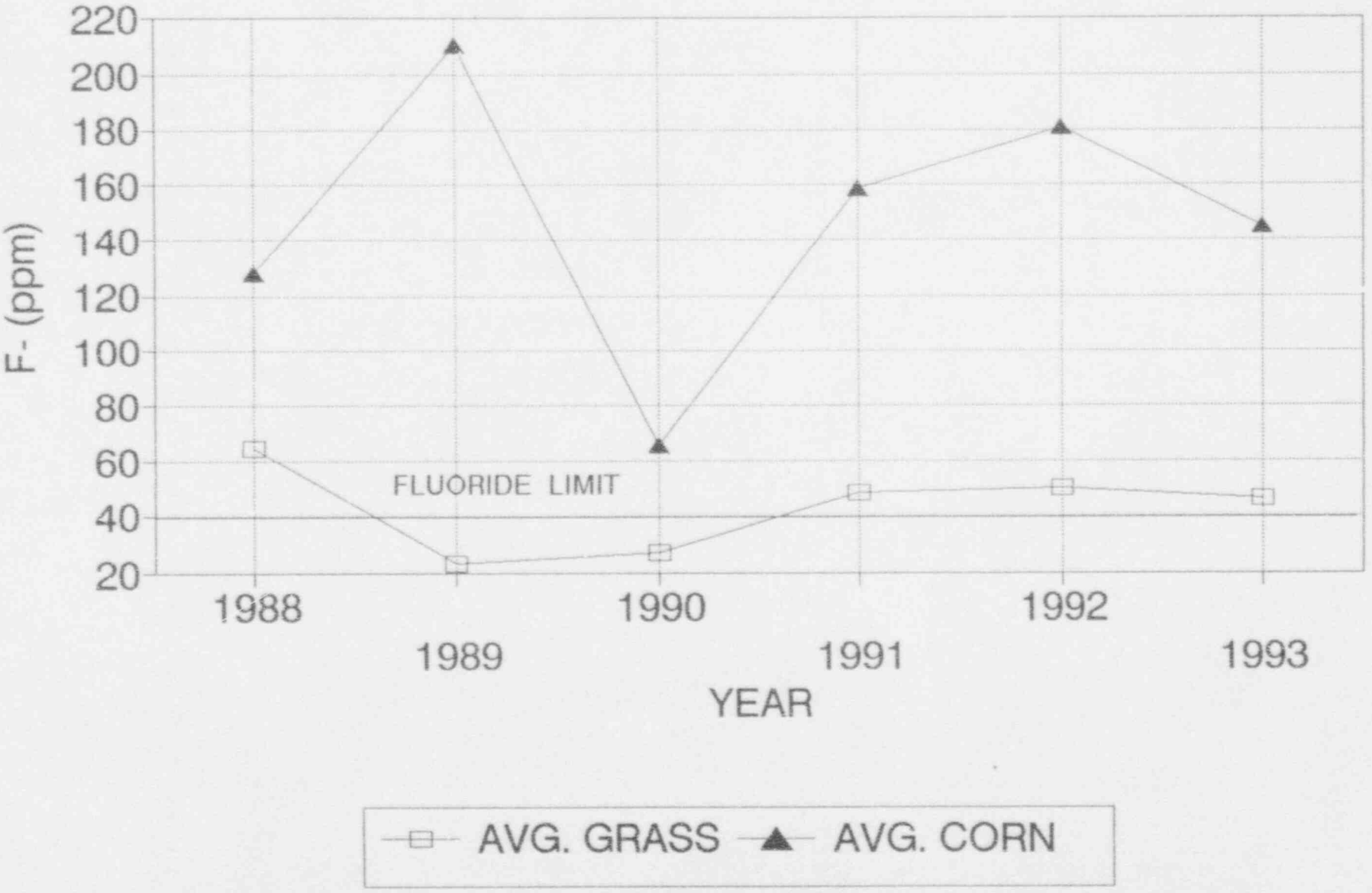
GROSS ALPHA ANALYSIS



BLDG. 073 HIGH VOLUME AIR SAMPLE

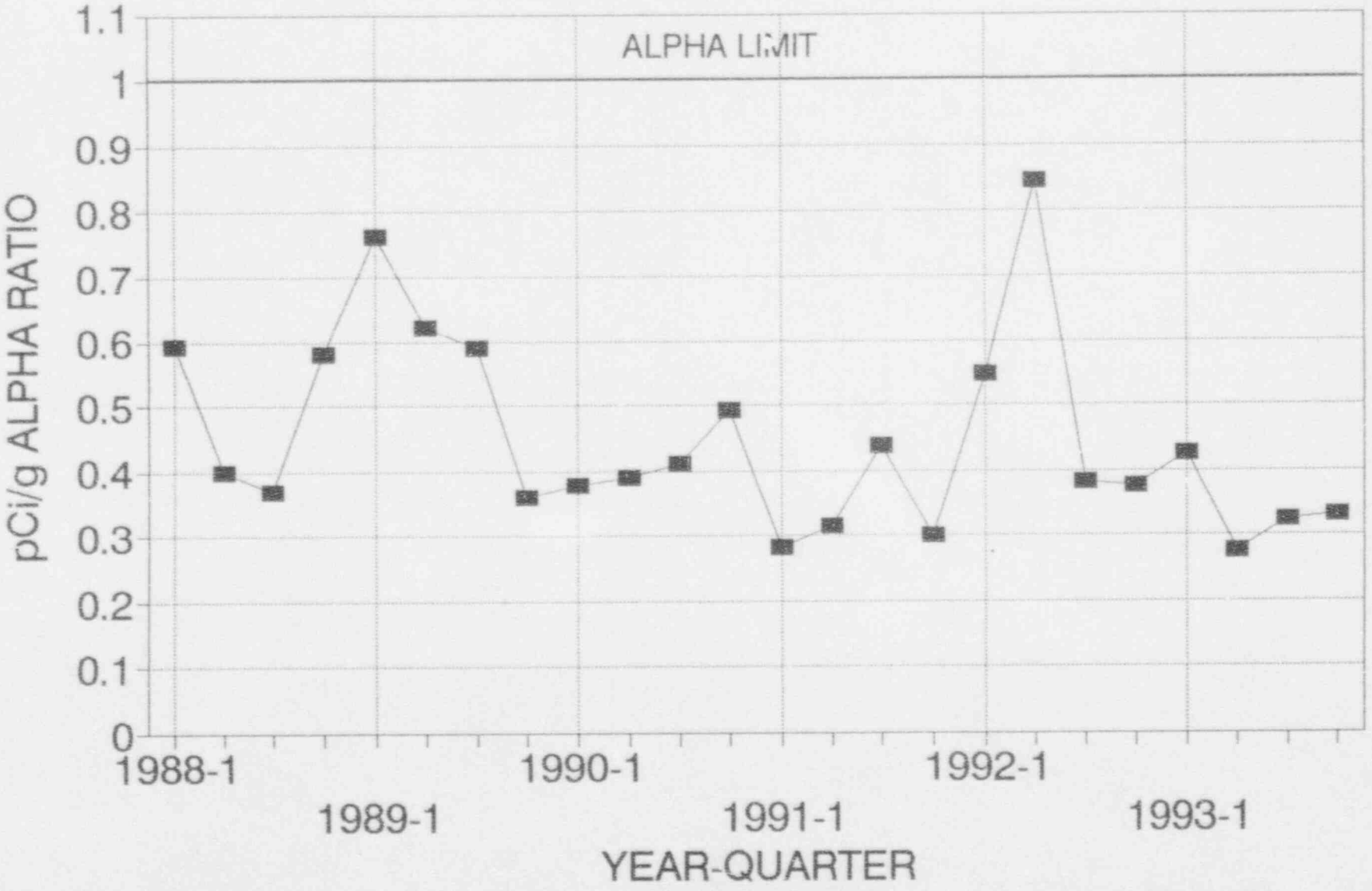
GROSS BETA ANALYSIS

ANNUAL FORAGE CROP SAMPLING
AVERAGE FLUORIDE CONCENTRATION



BLDG. 062 FILTERCAKE

ALPHA RATIO



NRC SAMPLING SUMMARY
ALPHA

YEAR-QUARTER	CREEK UPSTREAM (pCi/l)	CREEK DOWNSTREAM (pCi/l)	SEDIMENT UPSTREAM (pCi/g)	SEDIMENT DOWNSTREAM (pCi/g)	HICKORY VALLEY SEDIMENT (pCi/g)	LAGOON #5 (pCi/l)	LAGOON #6 (pCi/l)	OUTFALL 001 (pCi/l)	MW-1A (pCi/l)	MW-2 (pCi/l)	MW-3 (pCi/l)	MW-4 (pCi/l)
1988-1	3.0	5.0	10.0	10.0			50.0	50.0	6.3	10.0	3.0	4.0
1988-2	1.0	2.0	6.7	5.3		30.0	40.0			4.0	1.0	3.0
1988-3	2.0	2.0	6.0	7.2		30.0	30.0			7.3	1.0	3.7
1988-4	2.0	3.0	11.0	11.0		60.0	60.0			4.6	1.0	2.0
1989-1	2.0	2.0	5.5	8.7		30.0	30.0		3.0	5.0	1.0	2.0
1989-2	2.0	3.0	9.1	12.0		20.0	20.0	20.0	4.0	4.0	2.0	3.0
1989-3	2.0	2.0	6.0	6.5		65.0			4.0	4.0	2.0	2.0
1989-4	1.0	1.0	5.9	9.3				20.0	4.8	3.0	1.0	2.0
1990-1	2.0	3.0	6.1	4.0		60.0	40.0	40.0				
1990-2	1.0	2.0	4.7	10.0			40.0	40.0	2.0	5.0	2.0	3.0
1990-3	2.0	3.0	8.4	6.0			60.0	70.0	2.0	5.0	2.0	2.0
1990-4	1.0	2.0	6.0	6.0		40.0	30.0	40.0	2.0	4.0	2.0	2.0
1991-1	1.0	3.0	12.0	7.3		30.0	70.0	70.0	2.0	3.0	1.0	1.0
1991-2	2.0	3.0	12.9	15.0		50.0	50.0	50.0	3.0	3.0	2.0	14.0
1991-3	2.0	4.1	9.2	4.1		60.0	60.0	60.0	6.6	4.0	2.0	2.0
1991-4	3.0	4.0	21.0	18.0	17.0	320.0	220.0	230.0	3.0	6.0	2.0	3.0
1992-1	2.0	3.0	20.0	26.0	20.0	20.0	20.0	58.0	2.0	6.0	1.0	1.0
1992-2	2.0	11.0	7.1	3.0	7.0	60.0	90.0	70.0	4.0	8.0	2.0	9.8
1992-3	2.0	3.0	18.0	12.4	25.0	310.0	510.0	30.0	3.0	7.0	2.0	2.0
1992-4	2.0	3.0	18.0	12.4	20.0	50.0	60.0	70.0	8.0	6.0	2.0	2.0
1993-1	2.0	3.0	10.5	23.0	31.0	40.0	40.0	70.0	3.0	3.0	2.0	2.0
1993-2	4.0	10.0	15.0	25.0	21.0	40.0	7.0	20.0	4.0	10.0	9.4	4.0
1993-3	2.0	3.0	12.8	5.0	11.3	70.0	70.0	60.0	3.0	4.0	2.0	2.0
1993-4	2.0	4.0	9.0	4.0	4.0	230.0	90.0	70.0	6.7	6.0	2.0	3.0

NRC SAMPLING SUMMARY
BETA

YEAR-QUARTER	CREEK UPSTREAM (pCi/l)	CREEK DOWNSTREAM (pCi/l)	SEDIMENT UPSTREAM (pCi/g)	SEDIMENT DOWNSTREAM (pCi/g)	HICKORY VALLEY SEDIMENT (pCi/g)	LAGOON #5 (pCi/l)	LAGOON #6 (pCi/l)	OUTFALL 001 (pCi/l)	MW-1A (pCi/l)	MW-2 (pCi/l)	MW-3 (pCi/l)	MW-4 (pCi/l)
1988-1	2.0	49.0	42.0	54.0			4200.0	4200.0	3.0	5.0	2.0	57.0
1988-2	2.7	2.8	45.0	45.0		3800.0	4200.0			3.0	2.0	63.0
1988-3	7.2	4.9	39.0	50.0		4900.0	5000.0			7.9	4.0	58.0
1988-4	4.8	18.0	52.0	51.0		4400.0	3900.0			2.7	2.5	41.0
1989-1	32.0	170.0	44.0	53.0		5100.0	4900.0		3.0	52.0	3.4	49.0
1989-2	3.6	68.0	47.0	49.0		3700.0	3900.0	4000.0	8.2	3.0	1.8	66.0
1989-3	2.2	2.0	56.0	55.0		4100.0			2.0	3.0	2.5	25.0
1989-4	2.8	6.4	47.0	49.0				3200.0	7.8	5.1	3.7	62.0
1990-1	2.0	45.0	43.0	40.0		5500.0	3800.0	5000.0				
1990-2	2.0	80.0	39.0	39.0			4700.0	4300.0	2.0	2.0	2.0	4.5
1990-3	4.5	11.0	39.0	41.0			6500.0	6500.0	2.0	3.0	2.0	44.0
1990-4	4.3	190.0	40.0	42.0		7000.0	4400.0	6800.0	2.3	4.5	3.6	47.0
1991-1	3.2	41.0	19.0	41.0		2100.0	3600.0	2000.0	2.0	5.0	3.5	50.0
1991-2	62.0	160.0	45.0	39.0		4100.0	3700.0	4300.0	3.7	5.4	3.5	86.0
1991-3	5.2	8.9	56.0	44.0		3700.0	5100.0	4800.0	5.9	4.0	6.8	65.0
1991-4	5.0	88.0	52.0	55.0		5500.0	4100.0	5500.0	4.5	3.0	2.0	68.0
1992-1	2.0	58.0	54.0	59.0	57.0	5400.0	5200.0	5100.0	3.0	3.6	2.0	54.0
1992-2	29.0	150.0	57.0	47.0	58.0	4900.0	7500.0	6900.0	10.4	8.2	10.8	89.0
1992-3	6.0	60.0	46.0	50.0	56.0	4400.0	6800.0	910.0	6.6	3.0	4.5	45.0
1992-4	0	105.0	53.0	56.0	58.0	5200.0	6200.0	8000.0	32.0	41.0	6.4	47.0
1993-1	4.5	39.0	53.0	53.0	61.0	20.0	20.0	6200.0	3.0	3.0	2.0	53.0
1993-2	4.0	480.0	45.0	51.0	54.0	44.0	10.0	130.0	9.8	56.0	29.0	49.0
1993-3	11.9	64.0	47.0	53.0	52.0	27.0	30.0	5000.0	10.9	5.0	4.0	53.0
1993-4	5.0	90.0	41.0	41.0	46.0	31.0	10.0	5100.0	5.9	4.8	3.0	6.4

NRC SAMPLING SUMMARY
ALPHA

YEAR-QUARTER	MAUSOLEUM WELLS ALPHA MMW-1 (pCi/l)	MMW-2 (pCi/l)	MMW-3 (pCi/l)	MMW-4 (pCi/l)	MMW-5 (pCi/l)	AIR BLDG. 073 GRINDING (pCi/m3)	AIR BLDG. 073 DIGESTION (pCi/m3)	FILTERCAKE ALPHA RATIO (pCi/g)	WALKER'S AIR (pCi/m3) (* E-03)	WALKER'S AIR (pCi/m3)
1988-1	5.0	5.0	5.0	6.7	5.0	4.4	0.475	0.592		
1988-2	2.0	3.0	5.0	2.0	3.0	2.98	0.829	0.400	5.00	0.00500
1988-3	2.0	4.0	4.0	3.0	3.0	1.33	4.200	0.369	6.80	0.00680
1988-4	2.0	3.0	3.0	2.0	2.0	4.04	2.280	0.580	2.30	0.00230
1989-1	3.0	3.0	3.5	3.5	3.0	6.01	5.200	0.762	5.15	0.00515
1989-2	2.0	2.0	4.0	4.0	3.0	25.30	0.710	0.620	0.38	0.00038
1989-3	2.0	3.0	5.0	3.0	4.0	2.46	0.930	0.590		
1989-4	3.0	3.0	14.6	8.9	3.0	1.29	0.390	0.260		
1990-1	2.0	2.0	4.0	3.0	3.0	8.20	0.970	0.379	1.57	0.00157
1990-2	3.0	3.0	5.0	3.0	3.0	11.80	3.600	0.390		
1990-3	3.0	4.0	5.0	3.0	3.0	35.50	1.980	0.412	0.54	0.00054
1990-4	2.0	2.0	5.0	3.0	3.0	1.76	1.760	0.494	2.50	0.00250
1991-1	2.0	2.0	3.0	2.0	3.0	7.80	1.500	0.281		
1991-2	3.0	4.0	5.0	3.0	3.0	1.53	0.490	0.315	0.27	0.00027
1991-3	3.0	3.0	14.5	4.0	4.0	0.97	0.320	0.440	0.14	0.00014
1991-4	2.0	5.8	9.7	2.0	2.0	0.21	0.150	0.300		
1992-1	22.0	4.0	17.0	4.0	8.6	0.96	0.290	0.550		
1992-2	4.0	4.0	26.0	4.0	5.0	0.03	0.203	0.846	2.20	0.00220
1992-3	2.0	2.0	3.0	2.0	2.0	0.16	0.271	0.384	1.68	0.00168
1992-4	5.4	2.0	4.0	5.7	6.3	1.25	0.620	0.377	6.96	0.00696
1993-1	3.0	4.0	11.6	4.0	5.0	0.34	0.135	0.426	1.13	0.00113
1993-2	4.0	5.0	5.0	5.0	5.0	0.77	0.992	0.276	2.26	0.00226
1993-3	4.0	4.0	6.0	4.0	4.0	0.25	0.122	0.324		
1993-4	3.0	3.0	11.7	11.6	4.0	6.78	1.276	0.332		

NRC SAMPLING SUMMARY
BETA

YEAR-QUARTER	MAUSOLEUM WELLS BETA MMW-1 (pCi/l)	MMW-2 (pCi/l)	MMW-3 (pCi/l)	MMW-4 (pCi/l)	MMW-5 (pCi/l)	AIR BLDG. 073 GRINDING (pCi/m3)	AIR BLDG. 073 DIGESTION (pCi/m3)
1988-1	4.1	3.8	6.2	4.9	3.1	3.200	0.771
1988-2	4.3	6.4	6.1	6.6	5.2	2.090	0.750
1988-3	2.2	3.5	3.0	4.2	2.6	1.300	3.200
1988-4	4.0	6.2	9.3	5.5	2.0	3.240	1.540
1989-1	3.3	5.2	6.3	2.5	2.9	4.690	4.490
1989-2	6.2	4.7	6.1	10.0	4.7	11.700	1.050
1989-3	4.5	7.0	7.8	12.0	4.4	1.920	0.930
1989-4	5.8	6.8	7.3	5.3	2.0	1.480	0.310
1990-1	8.5	2.5	6.3	4.7	3.5	7.000	0.930
1990-2	4.5	6.3	7.2	7.6	3.8	7.600	2.800
1990-3	3.8	4.4	6.2	4.2	2.0	7.600	2.800
1990-4	5.7	9.0	9.6	6.7	5.6	1.060	1.000
1991-1	2.0	2.3	3.7	2.0	2.0	6.000	1.600
1991-2	6.7	6.9	9.1	6.5	4.6	1.650	0.720
1991-3	2.0	5.8	8.6	8.1	3.0	2.850	1.040
1991-4	5.0	4.6	8.0	2.0	4.6	0.580	0.460
1992-1	19.0	3.0	52.0	3.0	3.0	0.394	0.658
1992-2	11.5	3.0	6.9	3.0	3.0	0.246	0.444
1992-3	7.9	3.0	6.1	3.0	5.1	0.159	0.176
1992-4	7.8	3.0	7.9	3.0	5.5	0.992	0.715
1993-1	10.2	5.9	10.3	3.0	7.4	0.425	0.122
1993-2	11.0	15.0	6.0	5.0	5.0	1.045	0.515
1993-3	13.0	3.0	8.4	3.0	3.0	0.763	0.459
1993-4	7.4	8.9	8.3	16.0	17.0	1.252	4.094

FORRAGE CROP SAMPLES

GRASS

F- (PPM)

FORRAGE SAMPLES

F-

DATE	GRASS 1	GRASS 2	GRASS 3	GRASS 4	GRASS 5	GRASS 6	GRASS 7	GRASS 8	AVG. GRASS
1988	59:1	69.3							64.20
1989	10.2	37.9	21.5	22.9					23.13
1990	22.7	28.4	28.9						26.67
1991	34.5	41.5	55.2	62.1					48.33
1992	50.0	40.0	56.0	54.0					50.00
1993	29.0	40.0	51.0	65.0					46.25

FORRAGE CROP SAMPLES

CORN

F- (PPM)

FORRAGE CROP

F-

DATE	CORN 1	CORN 2	CORN 3	CORN 4	CORN 5	CORN 6	CORN 7	CORN 8	CORN 9	CORN 10	CORN AVG
1988	92.5	94.6	195.3	175.5	142.4	66.9					127.87
1989	169.0	257.0	242.0	174.0							210.50
1990	96.6	92.0	58.3	73.8	8.4						65.82
1991	227.0	146.0	161.0	157.0	100.0	164.0					159.17
1992	177.0	166.0	222.0	174.0	218.0	128.0					180.83
1993	205.0	135.0	147.0	144.0	91.0	150.0					145.33

NRC SAMPLING SUMMARY
RADON

AVERAGE RADON CONCENTRATION (pCi)

YEAR-QUARTER	BLDG 022 WAREHOUSE (pCi)	BLDG 010 WAREHOUSE (pCi)	BLDG 018 ORE STORAGE (pCi)	BLDG 001 Ti-Zr (pCi)	BLDG 087 DRYER (pCi)	BLDG 074 PAD (pCi)	BLDG 073 DIGESTION (pCi)	BLDG 073 GRINDING (pCi)	STATION BH (pCi)	STATION EN (pCi)
1988-1		1.7	1.1	0.7	1.1	0.8	1.9	2.8	0.6	0.5
1988-2	1.0	0.6	1.1	1.2	0.6	0.8	3.1	3.3	0.7	0.3
1988-3	0.7	1.0	2.0	0.5	0.4	0.7	3.2	4.3	0.5	0.3
1988-4		0.5	0.8	1.2	2.6	1.2	3.4		2.3	1.4
1989-1	1.0	0.4	0.8	0.8	1.0	0.9		2.9	0.3	0.3
1989-2				0.4	2.4	0.6	4.5	3.3	0.3	0.3
1989-3	0.6	1.2	0.7	0.7	4.1		3.5	3.2	0.4	0.3
1989-4		1.2		0.7	0.8	0.6	5.0	2.5	0.4	0.4
1990-1		0.9	0.5	0.5	0.7	0.3	4.2	2.3	0.3	0.3
1990-2	1.1	0.5	0.3	0.3	1.2	0.4	1.9	1.5	0.3	0.3
1990-3		2.9	1.1	0.6	0.6	0.4	3.1	2.8	0.3	0.3
1990-4	1.2	0.7	1.6	0.7	0.4	1.7	3.8	3.7	0.3	0.3
1991-1	1.7	0.7		0.7	0.5	0.3	1.9	1.5	0.3	0.6
1991-2	0.5	1.2	1.3		1.6	0.8	2.3	6.8	0.3	0.4
1991-3	0.9	1.2	1.1		1.0		3.2	6.8	1.2	0.6
1991-4	1.9	1.2	4.5	0.7	1.2	0.7		3.3	0.6	0.3
1992-1	1.3	1.0	8.1	0.4	0.7	0.3	3.0	2.4	0.3	0.3
1992-2	0.8	0.8	8.1	0.8	1.2	0.8	8.1	4.1	0.4	0.4
1992-3	1.1	4.6	4.4	1.0	1.6	2.9	4.2	5.2	0.8	0.7
1992-4	2.1	0.3	7.4	1.0	1.1		3.6	61.5	0.5	0.7
1993-1	1.7	0.6	12.1	1.0	1.3	1.5	2.1	4.3	0.4	0.3
1993-2	0.4	1.3	7.6	1.0	2.0	1.9	2.6	3.1	0.4	0.3
1993-3										
1993-4										

WATER SAMPLING TEMPERATURE
(DEGREES FAHRENHEIT)

DATE	NPDES OUTFALL 002	UPSTREAM @ STATION 4-A	DOWNSTREAM @ STATION 6-1	DOWNSTREAM TEMPERATURE CHANGE
01/03/92	45	41	40	-1
01/08/92	42	38	37	-1
01/14/92	51	45	43	-2
01/24/92	42	35	30	-5
01/29/92	42	32	34	2
02/05/92	46	32	28	-4
02/14/92	44	34	26	-8
02/20/92	46	40	32	-8
02/28/92	50	40	40	0
03/05/92	49	39	38	-1
03/13/92	45	40	40	0
03/20/92	43	36	38	2
03/25/92	48	37	41	4
04/02/92	50	42	42	0
04/05/92	55	47	47	0
04/16/92	56	46	48	2
04/24/92	70	58	58	0
04/30/92	62	54	52	-2
05/07/92	58	50	50	0
05/14/92	70	60	60	0
05/21/92	64	55	56	1
05/28/92	64	53	54	1
06/03/92	67	58	57	-1
06/11/92	67	57	59	2
06/17/92	70	62	64	2
06/25/92	68	63	64	1
07/01/92	76	67	70	3
07/17/92	72	64	66	2
07/22/92	73	65	65	0
07/29/92	71	60	63	3
08/06/92	68	59	62	3
08/11/92	74	63	67	4
08/20/92	70	60	63	3
08/26/92	76	66	68	2
09/01/92	70	62	62	0
09/11/92	74	67	68	1
09/18/92	73	63	64	1
09/23/92	68	61	62	1
12/01/92	59	50	49	-1
10/08/92	57	47	48	1
10/14/92	55	48	48	0
10/21/92	54	45	46	1
10/28/92	54	45	45	0
11/06/92	51	44	47	3
11/11/92	52	43	45	2
11/18/92	47	41	44	3
11/27/92	52	46	46	0
12/01/92	50	42	42	0
12/10/92	46	33	34	1
12/16/92	43	40	40	0
12/22/92	45	39	38	-1
12/30/92	46	41	40	-1
MIN	42.0	32.0	26.0	-8.0
MAX	76.0	67.0	70.0	4.0
AVG	57.5	49.1	49.4	0.3

SWAMP CREEK @ 4-A

DATE	YEAR	ph	Cl	F	NH-4	NH4-N	TDS
Jan3	1992	7.1	12.3	0.20	< 0.10	< 0.0(	140
Jan8		7.3	11.0	0.12	< 0.10	< 0.08	210
Jan14		7.2	36.8	0.12	< 0.10	< 0.08	< 100
Jan24		7.2	11.0	0.20	0.27	0.21	300
Jan29		7.1	9.8	0.16	0.11	0.09	< 100
Feb5		7.2	8.1	0.24	< 0.10	< 0.08	160
Feb14		7.0	8.6	0.16	< 0.10	< 0.08	130
Feb20		6.9	14.5	0.10	< 0.10	< 0.08	210
Feb28		7.2	9.3	0.20	< 0.10	< 0.08	< 100
Mar5		7.3	10.1	0.14	< 0.10	< 0.08	170
Mar13		7.0	11.0	0.14	< 0.10	< 0.08	220
Mar20		7.4	13.5	0.12	0.12	0.09	140
Mar25		7.0	8.6	0.16	0.17	0.13	120
Apr2		7.1	46.6	0.16	< 0.10	< 0.08	290
Apr8		7.1	30.2	0.14	< 0.10	< 0.08	< 100
Apr16		7.0	24.6	0.20	0.15	0.12	130
Apr24		7.4	11.0	0.10	0.13	0.10	< 100
Apr30		7.5	8.6	0.12	0.26	0.20	< 100
May7		7.6	8.6	< 0.10	0.14	0.11	109
May14		7.3	12.3	< 0.10	0.20	0.16	< 100
May21		7.4	13.5	0.16	0.25	0.19	< 100
May28		7.3	9.8	< 0.10	< 0.10	< 0.08	129
Jun3		7.(	9.3	< 0.10	0.24	0.19	< 100
Jun11		7.2	10.1	0.18	0.40	0.31	110
Jun17		7.6	8.6	< 0.10	< 0.10	< 0.08	< 100
Jun25		7.1	13.8	< 0.10	0.12	0.09	< 100
Jul1		7.1	14.7	< 0.10	0.18	0.14	< 100
Jul17		7.0	8.6	0.16	0.59	0.46	140
Jul22		7.6	8.6	0.20	0.18	0.14	170
Jul29		7.4	7.4	< 0.10	0.25	0.19	< 100
Aug6		7.7	11.5	< 0.10	< 0.10	< 0.08	130
Aug11		7.8	24.6	< 0.10	0.13	0.10	290
Aug20		7.4	12.3	0.14	0.22	0.17	< 100
Aug28		7.2	9.8	0.14	0.12	0.09	110
Sep1		7.6	17.2	0.10	< 0.10	< 0.08	150
Sep11		7.6	12.8	0.20	0.19	0.15	100
Sep18		7.2	14.2	0.22	0.10	0.08	< 100
Sep23		7.3	10.3	0.24	0.10	0.08	< 100
Oct1		7.4	11.0	0.18	0.22	0.17	170
Oct8		6.8	9.8	0.12	0.13	0.10	160
Oct14		7.1	12.2	< 0.10	0.21	0.16	140
Oct21		7.3	10.0	0.10	0.17	0.13	120
Oct28		7.1	9.0	0.14	0.16	0.12	130
Nov6		7.0	17.1	0.10	0.22	0.17	150
Nov11		7.2	12.2	0.14	< 0.10	< 0.08	100
Nov18		7.2	9.8	0.14	0.12	0.09	220
Nov27		7.1	12.7	0.12	0.19	0.15	160
Dec1		7.3	8.6	0.16	< 0.10	< 0.08	< 100
Dec10		7.0	12.2	< 0.10	0.35	0.27	150
Dec16		6.3	10.3	< 0.10	0.16	0.12	< 100
Dec22		7.5	12.2	< 0.10	0.11	0.09	160
Dec30		7.4	11.0	0.10	0.16	0.12	< 100
MIN		6.3	7.4	< 0.10	< 0.10	< 0.08	< 100
MAX		7.8	46.6	0.24	0.59	0.46	300
AVG		7.2	13.1	< 0.14	< 0.16	< 0.13	< 139

* NOTE: ALL CONCENTRATIONS ARE (PPM), EXCEPT pH.

LAGOON #6
(OUTFALL 001)
WASTEWATER DISCHARGE

DATE	YEAR	pH	Cl	F	NH4	NH4N	COD	TSS	SO4	PO4
Jan3	1992	6.8	4220	7.0	28.2	21.90	14,800	3.4	3,870	< 0.15
Jan8		6.4	4050	5.0	29.4	22.83	14,900	4.8	3,830	< 0.15
Jan14		6.9	4250	16.0	28.3	21.97	14,500	4.8	4,050	< 0.15
Jan24		6.7	4230	9.0	30.2	23.45	15,000	6.5	3,910	0.17
Jan29		6.9	4050	10.0	31.6	24.54	14,800	4.0	4,060	< 0.15
Feb5		6.7	4110	9.0	38.2	29.66	14,900	3.9	4,060	< 0.15
Feb14		6.5	4060	13.0	30.9	23.99	15,000	5.0	4,060	< 0.15
Feb20		6.4	4220	6.0	29.0	22.52	15,000	4.3	4,240	< 0.15
Feb28		6.5	4320	8.0	28.0	21.74	14,300	2.6	3,940	0.55
Mar5		6.4	4270	4.0	28.4	22.05	14,800	3.0	4,000	< 0.15
Mar13		6.9	4300	8.0	32.1	24.93	14,500	7.6	3,780	< 0.15
Mar20		7.0	4290	6.0	30.5	23.68	14,100	2.4	4,120	< 0.15
Mar29		6.8	4250	10.0	29.1	22.60	14,200	4.2	3,830	< 0.15
Apr2		6.7	4380	16.0	34.2	26.56	15,000	3.1	3,910	< 0.15
Apr8		6.7	4660	36.0	33.0	25.62	15,400	4.0	4,000	< 0.15
Apr16		6.2	4700	19.0	36.3	28.19	15,200	5.1	4,140	< 0.15
Apr24		6.9	4770	11.0	35.4	27.49	16,000	6.0	3,880	< 0.15
Apr30		6.7	4789	15.0	36.9	28.65	15,900	4.7	3,860	< 0.15
May7		6.8	4780	10.0	54.8	42.55	16,500	5.9	4,050	< 0.15
May14		7.0	4490	3.0	34.6	26.87	16,100	7.0	4,320	< 0.15
May21		7.0	4750	13.0	29.3	22.75	15,900	6.5	4,350	< 0.15
May28		6.5	4830	8.0	29.2	22.67	7,300	3.9	4,760	0.32
Jun3		6.8	4720	6.0	27.6	21.43	16,500	5.5	4,640	0.22
Jun11		6.5	4380	9.0	54.2	42.09	14,900	4.8	4,320	< 0.15
Jun17		6.7	4630	20.0	14.6	11.3	15,800	4.9	4,650	< 0.15
Jun25		6.7	4590	20.0	23.7	18.40	15,800	5.0	4,790	< 0.15
Jul1		6.7	4640	18.0	23.0	17.86	16,600	4.2	4,840	< 0.15
Jul17		6.5	4330	13.0	52.9	41.08	16,700	5.2	5,110	< 0.15
Jul22		6.9	4330	6.0	14.1	10.95	16,900	4.4	5,700	< 0.15
Jul29		6.9	4030	10.0	23.8	18.48	13,700	4.8	11,630	< 0.15
Aug6		7.3	4210	10.0	33.4	25.94	15,800	4.2	4,900	< 0.15
Aug11		7.3	4630	10.0	19.9	15.45	17,100	5.5	4,960	< 0.15
Aug20		7.2	3910	20.0	18.3	14.21	15,200	3.6	4,200	< 0.15
Aug26		6.6	4810	10.0	23.2	18.01	14,700	4.3	4,700	< 0.15
Sep1		7.1	4810	5.0	20.4	15.84	16,700	5.3	4,770	< 0.15
Sep11		6.9	4790	8.0	20.5	15.92	16,400	4.7	4,670	< 0.15
Sep23		7.2	5250	10.0	18.9	14.68	18,800	7.3	5,270	< 0.15
Oct1		7.1	5130	9.0	15.3	11.88	17,100	6.0	4,810	< 0.15
Oct14		6.7	5220	10.0	15.0	11.65	17,200	6.2	4,840	0.20
Oct21		6.7	5100	3.0	15.2	11.80	16,300	5.4	1,150	< 0.15
Oct28		6.8	5110	12.0	17.5	13.59	17,200	7.5	4,520	< 0.15
Nov6		6.5	5140	7.0	16.6	12.89	16,900	4.9	4,560	< 0.15
Nov11		6.5	5080	11.0	19.5	15.14	17,000	5.1	4,600	< 0.15
Nov18		6.7	4690	13.0	19.5	15.14	15,800	5.4	4,400	< 0.15
Nov27		6.9	4630	13.0	28.7	22.29	15,500	5.8	4,190	< 0.15
Dec1		6.7	4520	23.0	21.2	16.46	15,100	4.5	4,000	< 0.15
Dec10		6.4	4820	11.0	47.8	37.12	15,900	5.2	3,850	< 0.19
Dec16		6.8	4150	8.0	5.5	4.24	13,700	6.9	3,560	< 0.15
Dec22		7.2	3930	13.0	46.3	35.95	16,400	7.1	4,510	< 0.15
Dec30		6.8	4550	14.0	46.5	36.11	15,300	5.5	3,940	< 0.15
MIN		6.2	3910	3.0	5.5	4.24	7,300	2.4	1,160	< 0.15
MAX		7.3	5250	36.0	54.8	42.55	18,800	7.6	11,630	0.55
AVG		6.8	4538	11.3	28.4	22.06	15,496	5.0	4,422	< 0.17

* NOTE: ALL CONCENTRATIONS ARE (PPM), EXCEPT pH.

LAGOON #6
(OUTFALL 001)
METALS

DATE	YEAR	Al	Mg	Mn	Zn	Pb	Cr	Ba	Li	Cu	Cd	Se	B
Jan3	1992	0.16	< 0.10	0.16	< 0.10	< 0.02	16.8	6.8	4.90		< 0.01	< 0.02	2.0
Jan8		0.11	< 0.10	0.13	< 0.10								
Jan14		0.21	< 0.10	< 0.10	< 0.10								
Jan24		0.15	< 0.10	< 0.10	< 0.10								
Jan29		0.11	< 0.10	< 0.10	< 0.10								
Feb5		< 0.10	< 0.10	0.10	< 0.10								
Feb14		0.11	0.12	0.11	< 0.10	< 0.02	12.4	7.8	5.40				
Feb20		0.10	< 0.10	0.11	< 0.10								
Feb28		0.26	< 0.10	0.12	< 0.10								
Mar5		0.17	< 0.10	< 0.10	< 0.10	< 0.02	13.4	7.9	5.20				
Mar13		0.17	< 0.10	< 0.10	< 0.10								
Mar20		0.13	< 0.10	0.14	< 0.10								
Mar29		0.18	< 0.10	< 0.10	< 0.10								
Apr2		0.12	< 0.10	0.11	< 0.10	< 0.02	15.5	7.8	5.50	320	< 0.01	< 0.02	1.6
Apr8		0.12	< 0.10	0.12	< 0.10								
Apr16		0.19	< 0.10	0.11	< 0.10					640			
Apr24		0.14	1.18	0.12	< 0.10								
Apr30		0.20	0.11	0.13	< 0.10					610			
May7		0.16	0.17	0.13	< 0.10	< 0.02	16.7	7.8	5.80	655			
May14		0.24	0.18	0.22	< 0.10								
May21		0.23	0.29	0.12	< 0.10								
May28		0.47	0.34	0.12	0.16								
Jun3		0.54	0.37	0.13	< 0.10	< 0.02	15.6	7.7	5.40	480			
Jun11		0.21	0.20	0.19	< 0.10								
Jun17		0.14	0.22	0.12	< 0.10								
Jun25		0.18	0.17	0.17	< 0.10								
Jul1		0.17	0.28	0.11	< 0.10	< 0.02	18.3	6.7	6.20	495	< 0.01	< 0.02	2.4
Jul17		0.42	0.24	0.12	< 0.10								
Jul22		0.20	0.22	0.14	< 0.10								
Jul29		0.57	0.24	< 0.10	< 0.10								
Aug6		0.25	0.16	0.13	< 0.10								
Aug11		0.41	0.12	0.13	< 0.10	< 0.02	13.2	7.3	4.40	535			
Aug20		0.19	0.19	0.15	< 0.10								
Aug26		0.26	0.13	0.17	< 0.10								
Sep1		0.24	< 0.10	0.19	< 0.10	< 0.02	12.7	9.2	5.40	500			
Sep11		0.18	0.19	0.15	< 0.10								
Sep23		0.29	0.11	0.19	< 0.10								
Oct1		0.29	0.14	0.16	< 0.10								
Oct14		0.22	0.17	0.18	< 0.10	< 0.02	15.6	11.1	6.80	474	< 0.01	< 0.02	2.0
Oct21		0.25	0.16	< 0.10	< 0.10								
Oct28		0.27	0.20	0.14	< 0.10								
Nov6		0.24	0.17	0.16	< 0.10	< 0.02	9.8	6.5	5.70	595			
Nov11		0.23	0.12	0.16	< 0.10								
Nov18		0.31	0.15	0.14	< 0.10								
Nov27		0.21	0.11	0.27	< 0.10								
Dec1		0.28	0.12	0.28	< 0.10	< 0.02	5.4	4.7	2.10	610			
Dec10		0.20	0.16	0.11	< 0.10								
Dec16		0.22	0.19	0.15	< 0.10								
Dec22		0.19	0.37	0.14	< 0.10								
Dec30		0.18	0.34	0.20	0.14								
MIN		< 0.10	< 0.10	< 0.10	< 0.10	< 0.02	5.4	4.7	2.10	320	< 0.01	< 0.02	1.6
MAX		0.57	1.18	0.28	0.16	< 0.02	18.3	11.1	6.80	655	< 0.01	< 0.02	2.4
AVG		< 0.22	< 0.18	< 0.14	< 0.10	< 0.02	15.6	7.6	5.23	546	< 0.01	< 0.02	2.0

* NOTE: ALL CONCENTRATIONS ARE (PPM), EXCEPT pH.

DITCH #7
(OUTFALL 002)

DATE	YEAR	pH	Cl	F	NH4	NH4-N	TDS	TSS	PO4
Jan3	1992	7.2	43.2	21.0	4.16	3.23	440	6.0	< 0.15
Jan8		7.1	45.2	21.0	5.10	3.96	620	5.2	< 0.15
Jan14		7.5	49.1	20.0	7.10	5.51	410	6.2	< 0.15
Jan29		7.3	83.5	20.0	4.06	3.15	640	2.8	< 0.15
Feb5		7.2	63.8	16.5	4.06	3.15	540	2.6	< 0.15
Feb14		7.0	49.1	22.0	4.94	3.84	720	1.8	< 0.15
Feb20		6.8	81.0	21.0	5.53	4.31	550	3.6	< 0.15
Feb28		7.0	68.7	34.0	3.79	2.94	490	8.0	< 0.15
Mar5		7.1	73.7	32.0	4.29	3.33	800	5.0	< 0.15
Mar13		7.2	39.3	24.0	3.72	2.89	520	14.4	< 0.15
Mar20		7.1	93.3	11.0	3.95	3.07	670	7.6	< 0.15
Mar25		7.0	63.8	16.0	4.18	3.25	600	6.0	< 0.15
Apr2		7.2	44.2	23.0	6.50	5.05	370	5.4	< 0.15
Apr8		7.2	34.4	9.0	4.77	3.70	420	8.0	< 0.15
Apr16		6.9	63.8	16.0	4.63	3.60	340	3.8	< 0.15
Apr24		7.2	71.2	10.0	5.06	3.93	630	10.2	< 0.15
Apr30		7.2	63.8	10.0	4.86	3.77	580	3.0	< 0.15
May7		7.2	49.5	6.0	4.75	3.69	460	7.0	< 0.15
May14		7.3	58.9	8.0	4.95	3.84	710	3.4	< 0.15
May21		7.3	66.3	15.0	4.66	3.62	660	4.0	< 0.15
May28		7.2	49.1	8.0	5.47	4.25	210	7.2	3.41
Jun3		7.4	25.6	16.0	8.50	6.60	530	7.8	< 0.15
Jun11		7.2	57.9	22.0	4.68	3.63	580	4.4	< 0.15
Jun17		7.3	33.8	13.0	2.79	2.17	540	5.4	< 0.15
Jun25		7.2	37.3	20.0	3.21	2.49	520	4.4	< 0.15
Jul1		7.2	29.0	15.0	3.19	2.48	480	2.0	< 0.15
Jul17		7.1	34.4	14.0	5.40	4.19	380	4.4	< 0.15
Jul22		7.4	49.1	14.0	5.06	3.93	700	3.0	< 0.15
Jul29		7.4	22.1	10.0	4.63	3.60	370	4.0	< 0.15
Aug6		7.7	29.5	9.0	3.00	2.33	230	5.6	0.21
Aug11		7.8	34.4	9.0	2.76	2.14	780	3.2	< 0.15
Aug20		7.6	34.4	10.0	2.70	2.10	550	.0	< 0.15
Aug26		7.0	44.2	10.0	2.62	2.03	470	4.8	< 0.15
Sep1		7.5	63.8	9.0	1.45	1.13	670	5.8	< 0.15
Sep11		7.5	40.3	17.0	1.05	0.82	520	3.8	< 0.15
Sep18		7.3	37.8	8.0	2.86	2.22	270	3.2	< 0.15
Sep23		7.8	54.0	11.0	2.22	1.72	650	3.8	< 0.15
Oct1		7.4	30.3	8.0	4.80	3.73	510	2.4	< 0.15
Oct8		6.5	60.2	12.0	4.00	3.11	300	4.2	< 0.15
Oct14		7.1	49.9	7.0	3.88	3.01	490	3.5	< 0.15
Oct21		7.2	47.9	12.0	5.64	4.38	640	2.0	< 0.15
Oct28		7.2	58.7	9.0	4.58	3.56	630	3.6	< 0.15
Nov6		7.1	49.4	7.0	3.16	2.45	310	7.6	< 0.15
Nov11		7.1	34.2	9.0	3.35	2.60	620	2.0	< 0.15
Nov18		7.1	44.0	9.0	3.02	2.35	490	3.8	< 0.15
Nov27		7.2	36.7	9.0	2.19	1.70	420	5.0	< 0.15
Dec1		7.1	53.8	16.0	5.46	4.24	380	5.2	< 0.15
Dec10		6.9	53.3	14.0	4.80	3.73	240	1.8	0.03
Dec16		6.1	44.0	10.0	4.33	3.36	620	8.8	< 0.15
Dec22		7.3	44.0	8.0	4.79	3.72	360	8.8	< 0.15
Dec30		7.4	53.8	9.0	7.80	6.06	660	3.6	< 0.15
MIN		6.1	22.1	6.0	1.05	0.82	210	1.8	0.03
MAX		7.8	93.3	34.0	8.50	6.60	780	14.4	3.41
AVG		7.2	50.2	13.9	4.28	3.33	515	5.1	< 0.21

NOTE: ALL CONCENTRATIONS ARE (PPM), EXCEPT pH.

DITCH #7
(OUTFALL 002)
QUARTERLY METALS ANALYSIS

DATE	YEAR	Cd	Sb	Pb	Al	Mg	Mn	Zn	B
Jan3	1992	< 0.01	< 0.02	< 0.02	1.56	7.75	0.30	< 0.10	< 1.0
Jan8									
Jan14									
Jan29									
Feb5									
Feb14									
Feb20									
Feb28									
Mar5									
Mar13									
Mar20									
Mar25									
Apr2		< 0.01	< 0.02	< 0.02	0.95	8.60	0.46	< 10	< 0.5
Apr8									
Apr16									
Apr24									
Apr30									
May7									
May14									
May21									
May28									
Jun3									
Jun11									
Jun17									
Jun25									
Jul1		< 0.01	< 0.02	< 0.02	0.58	8.50	0.15	< 0.10	< 1.0
Jul17									
Jul22									
Jul29									
Aug6									
Aug11									
Aug20									
Aug26									
Sep1									
Sep11									
Sep18									
Sep23									
Oct1									
Oct8									
Oct14		< 0.01	< 0.02	< 0.02	0.62	7.10	0.12	< 0.10	< 1.0
Oct21									
Oct28									
Nov6									
Nov11									
Nov18									
Nov27									
Dec1									
Dec10									
Dec16									
Dec22									
Dec30									
MIN		< 0.01	< 0.02	< 0.02	0.58	7.10	0.12	< 0.10	< 0.5
MAX		< 0.01	< 0.02	< 0.02	1.56	8.60	0.46	< 0.10	< 1.0
AVG		< 0.01	< 0.02	< 0.02	0.93	7.99	0.26	< 0.10	< 0.9

NOTE: ALL CONCENTRATIONS ARE (PPM), EXCEPT pH.

DITCH #7
(OUTFALL 002)

DATE	YEAR	pH	Cl	F	NH4	NH4-N	TDS	TSS	PO4
Jan3	1992	7.2	45.2	21.0	4.16	3.23	440	6.0	< 0.15
Jan8		7.1	45.2	21.0	5.10	3.96	620	5.2	< 0.15
Jan14		7.5	49.1	20.0	7.10	5.51	410	6.2	< 0.15
Jan29		7.3	83.5	20.0	4.06	3.15	640	2.8	< 0.15
Feb5		7.2	63.8	16.5	4.06	3.15	340	2.6	< 0.15
Feb14		7.0	49.3	22.0	4.94	3.84	720	1.8	< 0.15
Feb20		6.8	81.0	21.0	3.55	4.31	550	5.6	< 0.15
Feb28		7.0	68.7	34.0	3.79	2.94	490	8.0	< 0.15
Mar5		7.1	73.7	32.0	4.29	3.33	600	5.0	< 0.15
Mar13		7.2	39.3	24.0	3.72	2.89	320	14.4	< 0.15
Mar20		7.1	93.3	11.0	3.95	3.07	670	7.6	< 0.15
Mar25		7.0	65.8	16.0	4.18	3.25	600	6.0	< 0.15
Apr2		7.2	44.2	23.0	6.50	5.05	370	5.4	< 0.15
Apr8		7.2	34.4	9.0	4.77	3.70	420	8.0	< 0.15
Apr16		6.9	63.8	16.0	4.63	3.60	340	3.8	< 0.15
Apr24		7.2	71.2	10.0	5.06	3.93	90	10.2	< 0.15
Apr30		7.2	63.8	10.0	4.86	3.77		5.0	< 0.15
May7		7.2	49.5	6.0	4.75	3.69	4	7.0	< 0.15
May14		7.3	58.9	8.0	4.95	3.84	710	3.4	< 0.15
May21		7.3	66.3	15.0	4.66	3.62	660	4.0	< 0.15
May28		7.2	49.1	8.0	5.47	4.25	210	7.2	3.41
Jun3		7.4	25.6	16.0	8.50	6.60	530	7.8	< 0.15
Jun11		7.2	57.9	22.0	4.68	3.63	580	4.4	< 0.15
Jun17		7.3	53.8	13.0	2.79	2.17	540	5.4	< 0.15
Jun25		7.2	37.3	20.0	3.21	2.49	520	4.4	< 0.15
Jul1		7.2	29.0	15.0	3.19	2.48	480	2.0	< 0.15
Jul17		7.1	34.4	14.0	5.40	4.19	380	4.4	< 0.15
Jul22		7.4	49.1	14.0	5.06	3.93	700	3.0	< 0.15
Jul29		7.4	22.1	10.0	4.63	3.60	370	4.0	< 0.15
Aug6		7.7	29.5	9.0	3.00	2.33	230	5.6	0.21
Aug11		7.8	34.4	9.0	2.76	2.14	780	3.2	< 0.15
Aug20		7.6	34.4	10.0	2.70	2.10	550	6.0	< 0.15
Aug26		7.0	44.2	10.0	2.62	2.03	470	3.8	< 0.15
Sep1		7.5	63.8	9.0	1.45	1.13	670	5.8	< 0.15
Sep11		7.5	40.3	17.0	1.05	0.82	520	5.8	< 0.15
Sep18		7.3	37.8	8.0	2.86	2.22	270	3.2	< 0.15
Sep23		7.8	54.0	11.0	2.22	1.72	650	3.8	< 0.15
Oct1		7.4	30.3	6.0	4.80	3.73	510	2.4	< 0.15
Oct8		6.5	60.2	12.0	4.00	3.11	300	4.2	< 0.15
Oct14		7.1	49.9	7.0	3.88	3.01	490	3.5	< 0.15
Oct21		7.2	47.9	12.0	5.64	4.38	640	2.0	< 0.15
Oct28		7.2	58.7	9.0	4.58	3.56	650	3.6	< 0.15
Nov6		7.1	49.4	7.0	3.16	2.45	310	7.6	< 0.15
Nov11		7.1	34.2	9.0	3.35	2.60	620	2.0	< 0.15
Nov18		7.1	44.0	9.0	3.02	2.35	490	3.8	< 0.15
Nov27		7.2	36.7	9.0	2.19	1.70	420	5.0	< 0.15
Dec1		7.1	53.8	16.0	5.46	4.24	380	5.2	< 0.15
Dec10		6.9	53.3	14.0	4.80	3.73	240	1.8	0.03
Dec16		6.1	44.0	10.0	4.33	3.36	620	8.8	< 0.15
Dec22		7.3	44.0	8.0	4.79	3.72	360	8.8	< 0.15
Dec30		7.4	53.8	9.0	7.80	6.06	660	3.6	< 0.15
MIN		6.1	22.1	6.0	1.05	0.82	210	1.8	0.03
MAX		7.8	93.3	34.0	8.50	6.60	780	14.4	3.41
AVG		7.2	50.2	13.9	4.28	3.33	515	5.1	< 0.21

* NOTE: ALL CONCENTRATIONS ARE (PPM), EXCEPT pH.

DITCH #7
(OUTFALL 002)
QUARTERLY METALS ANALYSIS

DATE	YEAR	Cd	Sb	Pb	Al	Mg	Mo	Zn	B
Jan3	1992	< 0.01	< 0.02	< 0.02	1.36	7.75	0.30	< 0.10	< 1.0
Jan8									
Jan14									
Jan29									
Feb5									
Feb14									
Feb20									
Feb28									
Mar5									
Mar13									
Mar20									
Mar25									
Apr2		< 0.01	< 0.02	< 0.02	0.95	8.60	0.46	< 0.10	< 0.5
Apr8									
Apr16									
Apr24									
Apr30									
May7									
May14									
May21									
May28									
Jun3									
Jun11									
Jun17									
Jun25									
Jul1		< 0.01	< 0.02	< 0.02	0.58	8.59	0.16	< 0.10	< 1.0
Jul17									
Jul22									
Jul29									
Aug6									
Aug11									
Aug20									
Aug26									
Sep1									
Sep11									
Sep18									
Sep23									
Oct1									
Oct8									
Oct14		< 0.01	< 0.02	< 0.02	0.62	7.10	0.12	< 0.10	< 1.0
Oct21									
Oct28									
Nov6									
Nov11									
Nov18									
Nov27									
Dec1									
Dec10									
Dec16									
Dec22									
Dec30									
MIN		< 0.01	< 0.02	< 0.02	0.58	7.10	0.12	< 0.10	< 0.5
MAX		< 0.01	< 0.02	< 0.02	1.36	8.60	0.46	< 0.10	< 1.0
AVG		< 0.01	< 0.02	< 0.02	0.93	7.99	0.26	< 0.10	< 0.9

* NOTE: ALL CONCENTRATIONS ARE (PPM), EXCEPT pH.

DITCH #7
(OUTFALL 002)

DATE	YEAR	pH	Cl	F	NH4	NH4-N	TDS	TSS	PO4
Jan3	1992	7.2	43.2	21.0	4.16	3.23	440	6.0	< 0.15
Jan8		7.1	45.2	21.0	5.10	3.96	620	5.2	< 0.15
Jan14		7.5	49.1	20.0	7.10	5.51	410	6.2	< 0.15
Jan29		7.3	83.5	20.0	4.06	3.15	640	2.8	< 0.15
Feb5		7.2	63.8	16.5	4.06	3.15	540	2.6	< 0.15
Feb14		7.0	49.1	22.0	4.94	3.84	720	1.8	< 0.15
Feb20		6.8	81.0	21.0	5.55	4.31	550	5.6	< 0.15
Feb28		7.0	68.7	34.0	3.79	2.94	490	8.0	< 0.15
Mar5		7.1	73.7	32.0	4.29	3.33	600	5.0	< 0.15
Mar13		7.2	39.3	24.0	3.72	2.89	520	14.4	< 0.15
Mar20		7.1	93.3	11.0	3.95	3.07	670	7.6	< 0.15
Mar25		7.0	63.8	16.0	4.18	3.25	600	6.0	< 0.15
Apr2		7.2	44.2	23.0	6.50	5.05	570	5.4	< 0.15
Apr8		7.2	34.4	9.0	4.77	3.70	420	8.0	< 0.15
Apr16		6.9	63.8	16.0	4.63	3.60	340	3.8	< 0.15
Apr24		7.2	71.2	10.0	5.06	3.93	630	10.2	< 0.15
Apr30		7.2	63.8	10.0	4.86	3.77	580	5.0	< 0.15
May7		7.2	49.5	6.0	4.75	3.69	460	7.0	< 0.15
May14		7.3	58.9	8.0	4.95	3.84	710	3.4	< 0.15
May21		7.3	66.3	15.0	4.66	3.62	660	4.0	< 0.15
May28		7.2	49.1	8.0	5.47	4.25	210	7.2	3.41
Jun3		7.4	25.6	16.0	8.50	6.60	530	7.8	< 0.15
Jun11		7.2	57.9	22.0	4.68	3.63	580	4.4	< 0.15
Jun17		7.3	53.8	13.0	2.79	2.17	540	5.4	< 0.15
Jun25		7.2	37.3	20.0	3.21	2.49	520	4.4	< 0.15
Jul1		7.2	29.0	15.0	3.19	2.48	480	2.0	< 0.15
Jul17		7.1	34.4	14.0	5.40	4.19	380	4.4	< 0.15
Jul22		7.4	49.1	14.0	5.06	3.93	700	3.0	< 0.15
Jul29		7.4	22.1	10.0	4.63	3.60	370	4.0	< 0.15
Aug6		7.7	29.5	9.0	3.00	2.33	230	5.6	0.21
Aug11		7.8	34.4	9.0	2.76	2.14	780	3.2	< 0.15
Aug20		7.6	34.4	10.0	2.70	2.10	550	6.0	< 0.15
Aug26		7.0	44.2	10.0	2.62	2.03	470	4.8	< 0.15
Sep1		7.5	63.8	9.0	1.45	1.13	670	5.8	< 0.15
Sep11		7.5	40.3	17.0	1.05	0.82	520	5.8	< 0.15
Sep18		7.3	37.8	8.0	2.86	2.22	270	3.2	< 0.15
Sep23		7.8	54.0	11.0	2.22	1.72	650	3.8	< 0.15
Oct1		7.4	30.3	8.0	4.80	3.73	510	2.4	< 0.15
Oct8		6.5	60.2	12.0	4.00	3.11	300	4.2	< 0.15
Oct14		7.1	49.9	7.0	3.88	3.01	490	3.5	< 0.15
Oct21		7.2	47.9	12.0	5.64	4.38	640	2.0	< 0.15
Oct28		7.2	58.7	9.0	4.58	3.56	630	3.6	< 0.15
Nov6		7.1	49.4	7.0	3.16	2.45	310	7.6	< 0.15
Nov11		7.1	34.2	9.0	3.35	2.60	620	2.0	< 0.15
Nov18		7.1	44.0	9.0	3.02	2.35	490	3.8	< 0.15
Nov27		7.2	36.7	9.0	2.19	1.70	420	5.0	< 0.15
Dec1		7.1	53.8	16.0	5.46	4.24	380	5.2	< 0.15
Dec10		6.9	53.3	14.0	4.80	3.73	240	1.8	0.03
Dec16		6.1	44.0	10.0	4.33	3.36	620	8.8	< 0.15
Dec22		7.3	44.0	8.0	4.79	3.72	360	8.8	< 0.15
Dec30		7.4	53.8	9.0	7.80	6.06	660	3.6	< 0.15
MIN		6.1	22.1	6.0	1.05	0.82	210	1.8	0.03
MAX		7.8	93.3	34.0	8.50	6.60	780	14.4	3.41
AVG		7.2	50.2	13.9	4.28	3.33	515	5.1	< 0.21

* NOTE: ALL CONCENTRATIONS ARE (PPM), EXCEPT pH.

SANDFILTER BACKWASH SETTLING POND (OUTFALL 003)

DATE	YEAR	pH	TSS	PO4
01/09/92	1992	7.2	1.0	0.19
01/20/92		7.8	2.0	0.19
01/28/92		7.9	3.0	0.24
02/06/92		7.2	14.0	0.20
02/14/92		7.4	1.0	0.15
03/05/92		7.4	1.0	< 0.15
03/19/92		7.2	1.0	< 0.15
03/26/92		7.8	6.0	0.28
04/06/92		7.0	6.0	< 0.15
04/15/92		8.2	41.0	< 0.15
04/29/92		7.9	1.0	< 0.15
05/06/92		7.5	17.0	< 0.15
05/14/92		8.5	8.0	0.17
05/21/92		9.1	9.0	0.29
06/07/92		7.3	1.0	0.26
06/17/92		8.0	9.0	0.25
07/09/92		7.0		0.52
07/14/92		7.4	1.0	0.53
07/24/92		7.6	1.0	0.45
07/30/92		7.6	1.0	0.15
08/25/92		7.5	9.0	0.17
09/24/92		8.8	16.0	0.15
10/04/92		8.0	6.0	< 0.15
10/13/92		7.2	13.0	0.30
10/21/92		7.4	1.0	< 0.15
11/02/92		7.2	6.0	< 0.15
11/09/92		7.0	1.0	< 0.15
11/18/92		7.3	2.4	< 0.15
11/27/92		7.6	1.0	< 0.15
12/15/92		6.5	1.0	< 0.15
12/22/92		7.3	1.0	< 0.15
MIN		6.5	1.0	< 0.15
MAX		9.1	41.0	0.53
AVG		7.6	6.0	< 0.21

* NOTE: CONCENTRATIONS ARE (PPM), EXCEPT pH

SWAMP CREEK @ 6-1

DATE	YEAR	pH	Cl	F	NH4	NH4-N	TDS
Jan3	1992	7.1	61.4	0.82	0.59	0.46	200
Jan8		7.0	103.1	0.92	0.90	0.70	630
Jan14		7.4	61.4	0.92	0.92	0.71	220
Jan29		7.2	93.3	0.72	0.90	0.70	500
Feb5		7.1	90.8	0.54	0.74	0.57	420
Feb14		6.8	63.8	0.56	0.60	0.47	350
Feb20		7.0	27.5	0.70	0.49	0.38	190
Feb28		7.0	61.4	0.80	0.54	0.42	230
Mar5		7.1	65.1	0.58	0.39	0.30	330
Mar13		6.9	60.1	0.78	0.90	0.70	590
Mar20		7.6	98.2	0.70	0.65	0.50	470
Mar25		7.1	67.5	0.50	0.58	0.45	380
Apr2		7.3	56.5	0.32	0.30	0.23	290
Apr8		7.0	98.2	0.62	1.00	0.78	480
Apr16		7.0	49.1	0.70	1.12	0.87	490
Apr24		7.5	14.7	0.26	0.19	0.15	130
Apr30		7.5	98.2	0.56	1.01	0.78	460
May7		7.6	110.5	0.50	0.84	0.65	450
May14		7.4	71.2	0.32	0.25	0.19	310
May21		7.3	47.9	0.50	0.90	0.70	380
May28		7.0	73.7	0.56	0.23	0.18	360
Jun3		7.2	49.1	0.56	0.61	0.47	510
Jun11		7.1	98.2	0.52	0.53	0.41	410
Jun17		7.4	73.7	0.26	0.26	0.20	230
Jun25		7.2	81.0	0.86	0.53	0.41	470
Jul1		7.1	95.7	0.50	0.33	0.26	120
Jul17		7.0	24.6	0.42	0.43	0.33	130
Jul22		7.3	93.3	0.68	0.68	0.53	600
Jul29		7.6	90.8	0.70	0.56	0.43	390
Aug6		7.5	93.3	0.56	0.49	0.38	410
Aug11		7.5	83.5	0.44	0.40	0.31	380
Aug20		7.2	95.7	0.80	0.64	0.50	410
Aug28		7.4	54.0	0.50	0.40	0.31	260
Sept1		7.6	83.5	0.48	0.31	0.24	320
Sept11		7.4	90.8	0.82	0.58	0.45	380
Sept18		7.4	71.2	0.82	0.47	0.36	340
Sep23		7.6	34.4	0.44	0.71	0.55	170
Oct1		7.2	105.1	0.82	0.60	0.47	500
Oct8		7.0	100.2	0.50	0.48	0.37	340
Oct14		7.1	105.1	0.66	0.57	0.44	550
Oct21		7.1	24.6	0.72	1.07	0.83	380
Oct28		7.1	105.1	0.66	0.58	0.45	460
Nov6		7.0	105.1	0.58	0.36	0.28	420
Nov11		7.1	95.4	0.62	0.48	0.37	540
Nov18		7.2	81.9	0.36	0.48	0.37	540
Nov27		7.8	67.2	0.44	0.27	0.21	330
Dec1		7.0	75.8	0.50	0.97	0.75	290
Dec10		6.8	82.9	0.48	1.16	0.90	560
Dec16		6.0	97.8	0.58	1.46	1.13	720
Dec22		7.2	75.8	0.34	1.52	1.18	360
Dec30		7.5	45.2	0.34	0.49	0.38	230
MIN		6.0	14.7	0.26	0.19	0.15	120
MAX		7.8	110.5	0.92	1.52	1.18	720
AVG		7.2	75.6	0.59	0.64	0.49	385

* NOTE: ALL CONCENTRATIONS ARE (PPM), EXCEPT pH.

SWAMP CREEK @ HICKORY VALLEY GOLF COURSE

DATE	YEAR	pH	Cl	P	NH4	NH4-N	TDS
01/03/92	1992	7.0	99.4	0.50	0.43	0.33	400
01/08/92		7.2	69.5	0.60	0.43	0.33	380
01/14/92		7.3	56.5	0.86	0.34	0.26	250
01/24/92		7.2	37.3	0.52	0.63	0.49	260
01/29/92		7.0	65.8	0.32	0.21	0.16	300
02/05/92		7.1	78.6	0.40	0.44	0.34	280
02/14/92		6.9	58.9	0.38	0.42	0.33	410
02/20/92		7.0	24.3	0.24	0.24	0.19	240
02/29/92		6.8	24.6	0.42	0.19	0.15	870
03/05/92		7.2	41.7	0.32	0.16	0.12	380
03/13/92		6.7	43.0	0.36	0.53	0.41	320
03/20/92		7.2	67.5	0.24	0.26	0.20	270
03/25/92		6.8	46.6	0.24	0.16	0.12	340
04/02/92		7.2	34.4	0.32	0.33	0.26	230
04/08/92		7.4	83.5	0.42	0.40	0.31	340
04/16/92		7.9	93.3	0.58	0.37	0.29	460
04/24/92		7.7	88.4	0.36	0.27	0.21	390
04/30/92		7.8	89.6	0.44	0.23	0.18	370
05/07/92		7.5	90.8	0.38	0.17	0.13	420
05/14/92		7.4	61.4	0.26	0.46	0.36	330
05/21/92		7.5	90.1	0.42	0.21	0.16	490
05/28/92		7.1	86.9	0.10	0.24	0.19	350
06/03/92		7.1	35.0	0.40	0.43	0.33	390
06/11/92		7.1	72.4	0.30	0.21	0.16	340
06/17/92		7.4	95.7	0.24	0.18	0.14	370
06/25/92		6.9	85.9	0.80	0.22	0.17	400
07/01/92		7.2	90.8	0.64	0.10	0.08	440
07/17/92		7.2	27.0	0.16	0.53	0.41	260
07/27/92		7.5	98.2	0.64	0.33	0.26	480
07/09/92		7.1	83.5	0.52	0.21	0.16	370
08/06/92		7.8	103.1	0.38	0.27	0.21	470
08/11/92		7.7	95.8	0.38	0.24	0.19	530
08/20/92		7.3	68.3	0.48	0.28	0.22	430
08/26/92		7.2	93.3	0.48	0.16	0.12	380
09/01/92		7.5	54.0	0.44	0.18	0.14	390
09/11/92		7.4	81.0	0.66	0.15	0.12	430
09/18/92		7.5	46.7	0.52	0.21	0.16	440
09/23/92		7.5	60.9	0.44	0.15	0.12	230
10/01/92		7.5	95.8	0.54	0.25	0.19	480
10/08/92		6.8	80.7	0.40	0.23	0.18	360
10/14/92		7.0	81.9	0.32	0.22	0.17	340
10/21/92		7.2	105.9	0.46	0.36	0.28	420
10/29/92		7.0	100.7	0.48	0.10	0.08	480
11/06/92		7.3	37.9	0.20	0.25	0.19	100
11/11/92		7.1	83.1	0.40	0.35	0.27	420
11/1[illegible]2		7.1	64.8	0.12	0.37	0.29	380
11/27/92		7.0	55.0	0.22	0.34	0.26	360
12/01/92		7.2	51.3	0.26	0.30	0.23	230
12/10/92		6.8	85.8	0.28	0.24	0.19	390
12/16/92		6.2	70.9	0.22	0.51	0.40	390
12/22/92		7.0	64.8	0.10	0.50	0.39	310
12/30/92		7.4	55.0	0.16	0.56	0.43	160
MIN		6.2	24.3	0.10	0.10	0.08	100
MAX		7.8	105.9	0.86	0.63	0.49	870
AVG		7.2	69.7	0.39	0.30	0.23	370

* NOTE: ALL CONCENTRATIONS ARE (PPM), EXCEPT pH.

LAGOON #5 UNDERDRAIN

DATE	YEAR	pH	Cl	F	NH4	NH4-N	TDS
01/03/92	1992	6.9	270.0	2.4	28.6	22.21	1,190
02/06/92		6.8	402.0	2.1	28.9	22.44	1,050
03/05/92		7.1	157.1	1.6	26.7	20.73	1,060
04/03/92		6.9	171.9	1.0	29.0	22.52	1,160
05/07/92		7.2	221.0	1.3	27.8	21.59	1,040
06/03/92		7.2	147.3	2.1	34.2	26.56	1,200
07/01/92		7.3	333.9	1.3	35.0	27.18	1,040
08/06/92		7.3	245.5	0.9	31.0	24.07	1,040
09/28/92		7.0	785.6	2.9	16.5	12.81	560
10/14/92		7.0	146.7	1.7	21.6	16.77	780
11/18/92		7.5	107.6	1.5	1.8	1.40	250
12/02/92		6.9	156.5	1.6	0.9	0.70	520
MIN		6.8	107.6	0.9	0.9	0.70	250
MAX		7.5	785.6	2.9	35.0	27.18	1,200
AVG		7.1	262.1	1.7	23.5	18.25	908

LAGOON #6 UNDERDRAIN

DATE	YEAR	pH	Cl	F	NH4	NH4-N	TDS
01/03/92		7.0	245.5	1.8	2.9	2.25	1,160
02/06/92		7.0	304.4	1.2	4.9	3.80	1,220
03/05/92		7.2	211.1	0.9	10.1	7.84	1,110
04/03/92		6.9	194.4	1.3	5.4	4.19	1,250
05/07/92		7.0	245.5	1.1	5.3	4.12	1,030
06/03/92		7.1	294.6	2.2	8.6	6.68	1,210
07/01/92		6.9	284.8	0.6	5.5	4.27	1,040
08/06/92		7.1	211.1	0.5	4.8	3.73	1,400
09/28/92		7.0	338.8	1.6	8.4	6.52	930
10/14/92		6.9	352.1	1.0	8.8	6.83	1,310
11/18/92		7.0	195.6	3.1	11.3	8.77	1,310
12/02/92		6.5	254.3	2.4	9.3	7.22	1,160
MIN		6.5	194.4	0.5	2.9	2.25	930
MAX		7.2	352.1	3.1	11.3	8.77	1,400
AVG		7.0	261.0	1.5	7.1	5.52	1,178

PLANT MONITORING WELLS
QUARTERLY SAMPLING DATA

PLANT MONITORING WELL MW-1A								PLANT MONITORING WELL MW-2							
DATE	YEAR	pH	Cl	F	NH4	NH4-N	TDS	DATE	YEAR	pH	Cl	F	NH4	NH4-N	TDS
1/13/88	1988	7.0	6.2	0.30	0.30	0.23	360	1/13/88	1988	6.8	49.6	0.42	0.10	0.08	760
								4/6/88		6.4	92.2	0.34	0.10	0.08	600
								7/19/88		6.9	15.7	0.34	0.10	0.08	860
								10/17/88		7.7	99.1	0.38	1.07	0.83	790
1/19/89	1989	7.1	5.7	0.20	0.16	0.12	480	1/13/89	1989	7.0	62.2	0.26	0.29	0.23	810
4/26/89		6.9	19.6	0.38	1.60	1.24	170	4/20/89		6.5	30.0	0.14	0.44	0.34	710
8/11/89		6.8	8.8	0.10	0.34	0.26	330	8/11/89		9.3	103.0	0.10	0.34	0.26	400
9/22/89		6.7	9.2	0.22	0.33	0.26	290	9/22/89		7.2	121.7	0.38	0.10	0.08	720
	1990								1990						
1/18/91	1991	7.0	5.4	0.30	0.10	0.08	390	1/10/91	1991	7.1	312.3	0.54	0.10	0.08	850
4/8/91		7.2	17.4	0.24	0.58	0.45	200	4/8/91		6.9	277.9	0.40	0.30	0.23	630
8/2/91		7.2	12.3	0.18	0.69	0.47	340	7/12/91		7.1	181.7	0.36	0.17	0.13	830
11/12/91		7.0	9.8	0.40	0.13	0.10	220	11/12/91		7.1	155.2	0.40	0.13	0.10	890
3/25/92	1992	7.0	7.4	0.10	0.14	0.11	340	3/25/92	1992	6.9	205.2	0.24	0.11	0.09	1050
6/3/92		7.1	10.6	0.10	0.10	0.08	280	6/3/92		7.0	157.1	0.26	0.10	0.08	1260
8/11/92		7.5	7.4	0.10	0.24	0.19	340	8/11/92		7.2	333.9	0.18	0.17	0.13	1320
10/14/92		7.4	19.6	0.98	0.98	0.76	250	10/14/92		7.1	317.9	0.22	0.19	0.15	1060
3/23/93	1993	6.5	7.3	0.12	0.13	0.10	260	3/23/93	1993	6.7	256.2	0.18	0.17	0.13	810
6/29/93		7.3	12.2	0.18	0.13	0.10	300	6/29/93		7.2	223.0	0.32	0.48	0.37	840
9/22/93		7.5	16.6	0.20	0.25	0.19	210	9/22/93		7.2	127.1	0.32	0.10	0.08	670
11/10/93		7.2	20.8	0.42	0.15	0.12	150	11/10/93		6.9	212.2	0.52	0.10	0.08	890

PLANT MONITORING WELL MW-3								PLANT MONITORING WELL MW-4							
DATE	YEAR	pH	Cl	F	NH4	NH4-N	TDS	DATE	YEAR	pH	Cl	F	NH4	NH4-N	TDS
1/13/88	1988	7.1	8.1	0.46	3.70	2.87	340	1/13/88	1988	8.0	34.6	11.00	27.00	20.97	320
4/6/88		6.6	27.7	0.36	1.41	1.09	160	4/6/88		7.9	41.5	5.00	20.10	15.61	210
7/19/88		6.2	17.5	0.16	1.00	0.78	140	7/19/88		7.9	21.7	8.00	11.60	9.01	170
10/17/88		8.2	13.8	0.50	1.86	1.44	100	10/17/88		7.9	27.7	10.00	23.50	18.25	170
1/13/89	1989	6.9	46.1	0.10	0.29	0.23	160	1/13/89	1989	6.9	27.7	12.00	16.40	12.73	190
4/20/89		7.3	23.0	0.18	8.50	6.60	100	4/20/89		8.2	41.5	5.00	24.10	18.71	220
8/11/89		7.7	23.0	0.10	3.10	2.41	100	8/11/89		7.9	16.1	4.00	17.30	13.43	120
9/22/89		7.4	14.7	0.34	1.10	0.85	130	9/22/89		8.5	24.4	13.00	19.90	15.45	200
	1990														
1/10/91	1991	6.2	22.1	0.92	6.29	4.88	150	1/10/91	1991	8.3	29.5	20.00	8.00	6.21	230
4/8/91		6.8	20.6	0.18	4.70	3.65	100	4/8/91		8.3	17.2	8.00	21.30	16.54	100
7/12/91		6.5	12.3	0.60	7.10	5.51	100	7/12/91		8.3	38.3	10.00	21.70	16.85	210
11/12/91		7.4	19.6	0.28	1.51	1.17	160	11/12/91		8.5	44.2	8.00	18.80	14.60	250
3/25/92	1992	7.5	19.6	0.10	4.20	3.26	130	3/25/92	1992	8.5	22.1	4.00	16.70	12.97	230
6/3/92		7.4	22.1	0.10	4.10	3.18	110	6/3/92		7.6	23.6	3.00	17.40	13.51	230
8/11/92		7.8	19.6	0.10	1.13	0.88	100	8/11/92		7.9	10.8	2.00	19.70	15.30	250
10/14/92		7.4	38.1	0.10	1.87	1.45	200	10/14/92		8.3	20.5	2.00	11.90	9.24	190
3/23/93	1993	7.2	20.5	0.20	0.95	0.74	140	3/23/93	1993	8.3	25.4	3.00	0.48	0.37	230
6/29/93		6.8	22.0	0.14	8.83	6.86	110	6/29/93		7.9	21.0	2.00	16.70	12.97	170
9/22/93		7.4	14.7	0.28	3.08	2.39	120	9/22/93		8.1	20.5	6.00	12.10	9.39	140
11/10/93		7.2	20.5	0.26	2.21	1.72	100	11/10/93		8.1	23.5	6.00	16.30	12.66	170

ATTACHMENT T

MUD TO LANDFILL MONITORING

ATTACHMENT T
MUD TO LANDFILL

	Uranium	Thorium	Σ
March 1987	7.6	<2.0	0.58
June 1987	4.5	3.56	0.39
October 1987	10.7	3.66	0.84
January 1988	6.5	2.6	0.52
March 1988	7.5	2.6	0.59
June 1988	5.0	2.0	0.40
October 1988	3.9	4.16	0.37
December 1988	5.9	8.33	0.58
January 1989	9.5	3.9	0.76
April 1989	8.4	1.6	0.63
July 1989	7.0	4.2	0.59
November 1989	4.2	2.0	0.36
February 1990	4.7	<2.0	0.38
June 1990	4.4	3.5	0.39
September 1990	5.2	2.0	0.41
November 1990	6.03	2.9	0.49
January 1991	3.33	2.0	0.28
April 1991	3.8	2.0	0.35
August 1991	5.0	3.8	0.44
November 1991	3.6	2.0	0.30
February 1992	6.9	2.7	0.55
April 1992	10.9	3.23	0.85
August 1992	4.4	3.2	0.38
4th Qtr Nov 1992	3.13	3.76	0.305
1st Qtr February 1993	5.17	2.64	0.43