



Pennsylvania Department of Environmental Protection

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June 12, 2001

Bureau of Radiation Protection

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Mr. Larry Camper
Chief, Decommissioning Branch
Division of Waste Management
Office of Nuclear Materials and Safeguards
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Dear Mr. Camper:

Please find enclosed a copy of the report that documents the Pennsylvania Department of Environmental Protection's Bureau of Radiation Protection verification survey of Cabot Corporation's Decommissioning Site in Revere, Pennsylvania. The report was prepared based on the survey performed by our staff on April 23, 2001. Please note that this survey was not intended to be a comprehensive survey, but instead it was essentially an audit of the site conditions prior to its removal from the Nuclear Regulatory Commission's Site Decommissioning Management Plan List. If you have any questions about the report, please contact Bryan Werner at (717)-787-2781.

Sincerely,

David J. Allard, CHP
Director
Bureau of Radiation Protection

cc: I Shanbaky, w/attachment, SERO
B. Werner, DEP
J. Pagano, w/attachment, SERO
B. Snyder

C/24



Verification Survey of Cabot Corporation's Decommissioning Site in Revere, Pennsylvania

Prepared by The Pennsylvania Department of Environmental Protection's Bureau of
Radiation Protection

June 4, 2001

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Pennsylvania Department of Environmental Protection, Bureau of Radiation Protection
Verification Survey of the Cabot Corporation Site in Revere, Pennsylvania

June 4, 2001

1.0 Summary

The Cabot Corporation site in Revere, Pa has four distinct locations containing radioactive thorium and uranium slag. The slag in these locations is a result of an industrial process performed by Kawecki Chemical, a predecessor to Cabot, in the early 1970's. The process was discontinued in 1976. The site was placed on the United States Nuclear Regulatory Commission's (NRC) Site Decommissioning Management Plan (SDMP) list for potentially difficult sites to decommission. Cabot performed a series of decommissioning efforts in 1990, 1992, and 1993 to remove portions of the slag material. A confirmatory survey performed by the Oak Ridge Institute for Science and Education showed that there are pieces of slag remaining in these four areas. (ORISE, 1993) However, a radiological assessment of the remaining radioactive material performed by the licensee's contractor, ST Environmental Professionals Incorporated (STEP), showed that the site meets the current NRC regulations for unrestricted use, and no further remediation is necessary. (STEP, 2001a Rev. 1) The remaining radioactive material onsite is currently maintained under NRC source material license SMC-1562.

The four known locations of the slag have been analyzed for future dose scenarios by STEP. (STEP, 2001b Rev. 1) The results of their analysis shows that the maximum dose over the next 1000 years will not exceed the current NRC dose limit of 25 mrem/year total effective dose equivalent (TEDE) for license termination and unrestricted release of the entire site. (10 CFR 20 Subpart E) The highest dose calculated by STEP was 1.7 mrem/year TEDE. This dose was calculated for both a resident and resident gardener scenario. These scenarios are modeled on the assumption of a person building a home on top of the affected areas, and the resident gardener includes having a vegetable garden also in the affected area.

However, The Pennsylvania Department of Environmental Protection's Bureau of Radiation Protection (DEP/BRP) desired to have adequate confirmation that the slag material was strictly in the four known locations, and that the radionuclide levels in the affected areas were generally as reported by Cabot. All Surveys performed by DEP/BRP were considered audit surveys for both the affected and unaffected areas. The DEP/BRP surveys were not intended to be comprehensive measurements of the entire site. The four affected areas cover approximately 3 acres of the entire 100-acre site, and there has been no confirmatory surveys performed outside of the slag pile areas. Cabot used old documentation and a mass balance of the radioactive material to demonstrate that only the four known affected areas were used as dumping locations for the slag. DEP/BRP decided to perform a limited survey of the unaffected areas to provide reasonable confirmation that there were no unrecorded dumping locations and to audit the previous surveys performed in the known affected areas. This survey was performed on April 23, 2001.

2.0 Survey Techniques

Procedures were prepared by DEP/BRP staff and approved prior to doing the survey. A copy of this procedure is provided in Attachment 1. The survey was separated into affected and unaffected areas. Each person involved with the survey used a Ludlum Model 19 Micro R Meter to measure the exposure rates. All meters were confirmed to have current calibration stickers.

The crew was also equipped with two Exploranium GR-130 miniSPEC detectors in case any unexpected radiological conditions were discovered. The Exploranium is a portable Sodium Iodide detector that is capable of performing gamma-ray spectroscopy. This would enable further investigation of any high readings found with the Micro R Meters. A soil sampling kit was also brought along to sample any areas with unexpected high readings. The Exploraniums and the soil sampling kit were not used because no unexpected conditions were found.

2.1 Background Determination

A background reading of 10 μ R/hr was established for the site. This background was found by comparing all the meters in a central location in the main parking lot. All of the meters were closely matched at approximately 10 μ R/hr. The 10 μ R/hr value was confirmed as the background level for the surrounding area.

2.2 Affected Areas

The affected areas were surveyed with at least a 50% scan, and any readings that were at least twice background were analyzed further. The data collected for each of the affected areas included a general area high and low reading with the detector held approximately one meter above the ground. Any visible slag pieces identified were examined for the highest direct contact reading. A GPS coordinate was taken at each affected area to reference it on a map.

The affected area survey data is provided in Attachment 2. A map showing the locations of the affected areas is provided in Attachment 3. Photographs taken in each of the affected areas during the survey are included in Attachment 4.

2.3 Unaffected Areas

The goal was not to survey the entire unaffected area of approximately 100 acres, and the DEP/BRP measurements were considered to be limited audits of conditions in the unaffected area. The surveys were performed in areas that were considered the most likely potential dumping areas. These areas included open fields that would be easy to access with large equipment. Survey locations also included areas that had a natural bank

that would easy to dump materials over the edge. The final area of concern was any location of disturbed ground where it appeared that heavy equipment had been used.

The survey crew was separated into two teams. Each team used flags to mark a survey location. At each survey location a GPS reading was taken at the center and a 100% survey was performed on approximately a 100 square meter area around the flag. The high and low reading at one meter above the ground was recorded for each area. Any readings over twice background were to be further investigated. However, no locations in the unaffected areas had any reading at twice background.

The unaffected area survey data is provided in Attachment 2. A map showing the locations of the survey areas in the unaffected area is provided in Attachment 3. Photographs taken in the unaffected areas during the survey are included in Attachment 5.

3.0 Survey Results

A few discrete pieces of slag were found during DEP/BRP's survey of the affected areas. These pieces were found in both the Old Pit Area and the Former Container Storage Area. Exposure rates within a few feet of the identified slag pieces at one meter above the ground ranged from approximately 20 to 30 $\mu\text{R/hr}$. The highest contact readings on a single piece of slag were approximately 150 $\mu\text{R/hr}$ in the Former Container Storage Area and 125 $\mu\text{R/hr}$ in the Old Pit Area. Other pieces of slag found in these two areas ranged from 20 to 95 $\mu\text{R/hr}$ on contact. These readings are consistent with those reported by Cabot.

The surveys in the Building 4 & 5 Area and the Parking Area revealed no discrete pieces of slag. Readings in these two areas were all below twice background. The highest reading at one meter above the ground was 15 $\mu\text{R/hr}$ in both affected areas.

DEP/BRP's limited survey of the unaffected areas showed no readings that were greater than twice background. The highest reading in the unaffected area was 17 $\mu\text{R/hr}$, and the lowest reading was 9 $\mu\text{R/hr}$.

The exposure rate readings listed do not have the background of 10 $\mu\text{R/hr}$ subtracted out.

4.0 Conclusions

This survey, the Radiological Assessment performed by Cabot (STEP, 2001b), and the NRC's Environmental Assessment (USNRC EA, 2001) and Safety Evaluation Report (USNRC SER, 2001) have provided the staff of the DEP/BRP enough information to agree with the removal of the Cabot Revere Site from the NRC's SDMP list. We are in agreement that the potential risk associated with the remaining radioactive material on this site will not exceed the 25 mrem/yr dose limit currently used by the NRC for license termination and unrestricted release of the entire site.

While the radiological conditions at the site meet NRC's current criteria for unrestricted use, the Commonwealth of Pennsylvania has residual waste regulations that also must be met by Cabot. (PADEP, 2001) In particular, DEP/BRP is concerned about the slag materials in the Old Pit Area being located adjacent to Rapp Creek. This concern was addressed in a letter from DEP/BRP to the NRC regarding their draft Environmental Assessment and Draft Safety Evaluation Report. (DEP/BRP, 2001) DEP/BRP has discussed this issue with Cabot, and Cabot has acknowledged these regulations. Upon the radiological release of the site by the NRC, the Commonwealth of Pennsylvania will need to work with Cabot to determine what steps might need to be taken to comply with these residual waste regulations.

5.0 References

Berger, 1993. Confirmatory Radiological Survey for Portions of the Cabot Corporation Revere Plant Revere Pennsylvania, Berger, J.D., and Smith, B.M., ORISE 93/D-13, Oak Ridge Institute for Science and Education, April, 1993.

DEP/BRP, 2001. Letter from David J. Allard (DEP/BRP) to Larry Camper (NRC), April 26, 2001.

STEP, 2001a. "Decommissioning Plan for Revere, Pennsylvania Site" for Cabot Corporation, ST Environmental Professionals, Inc., February 28, 2001, Revision 1.

STEP, 2001b. "Radiological Assessment for Revere, Pennsylvania Site" for Cabot Corporation, ST Environmental Professionals, Inc., February 28, 2001, Revision 1.

PADEP, 2001. Pennsylvania Code, Title 25. Environmental Protection, Chapters 287-299, Residual Waste Management, Pennsylvania Department of Environmental Protection, January 13, 2001.

USNRC EA, 2001. Draft Environmental Assessment for Cabot Performance Materials, Revere, PA, Draft 2001

USNRC SER, 2001. Draft Safety Evaluation Report of Cabot Performance Materials Decommissioning Plan and Radiological Assessment Dated February 28, 2001, Draft 2001

Attachment 1

Survey Procedures and Sample Data Sheets

Cabot Revere Site Survey Procedure*

Unaffected Areas

Survey teams will be formed, each with a GPS unit. One person on each team will be responsible for recording data.

At randomly selected areas (using best judgement), each team will post a flag with ID number and attempt to do a 100% scan on an area of at least 900 ft² (ten long strides by 10 long strides). Mark approximate location on site map (attached).

Each member with an instrument will note the highest and lowest exposure rate observed at waist (approximately 1 meter) level.

Areas of significant increase in exposure rate (2 x background) shall be flagged for additional investigation and possible sampling.

The highest and lowest exposure rate of any instrument (one high, one low for any area) will be recorded on the data sheet (attached). Place a check next to the instrument equipment ID number that had the highest and lowest reading.

Additional individual random scanning may be performed as time allows. Each individual will carry flags to mark any area of concern for additional investigation and possible sampling.

Affected Areas

Perform at least a 50% scan of each affected area using the appropriate data sheet (attached) and following the appropriate parts of the survey procedure for the unaffected area.

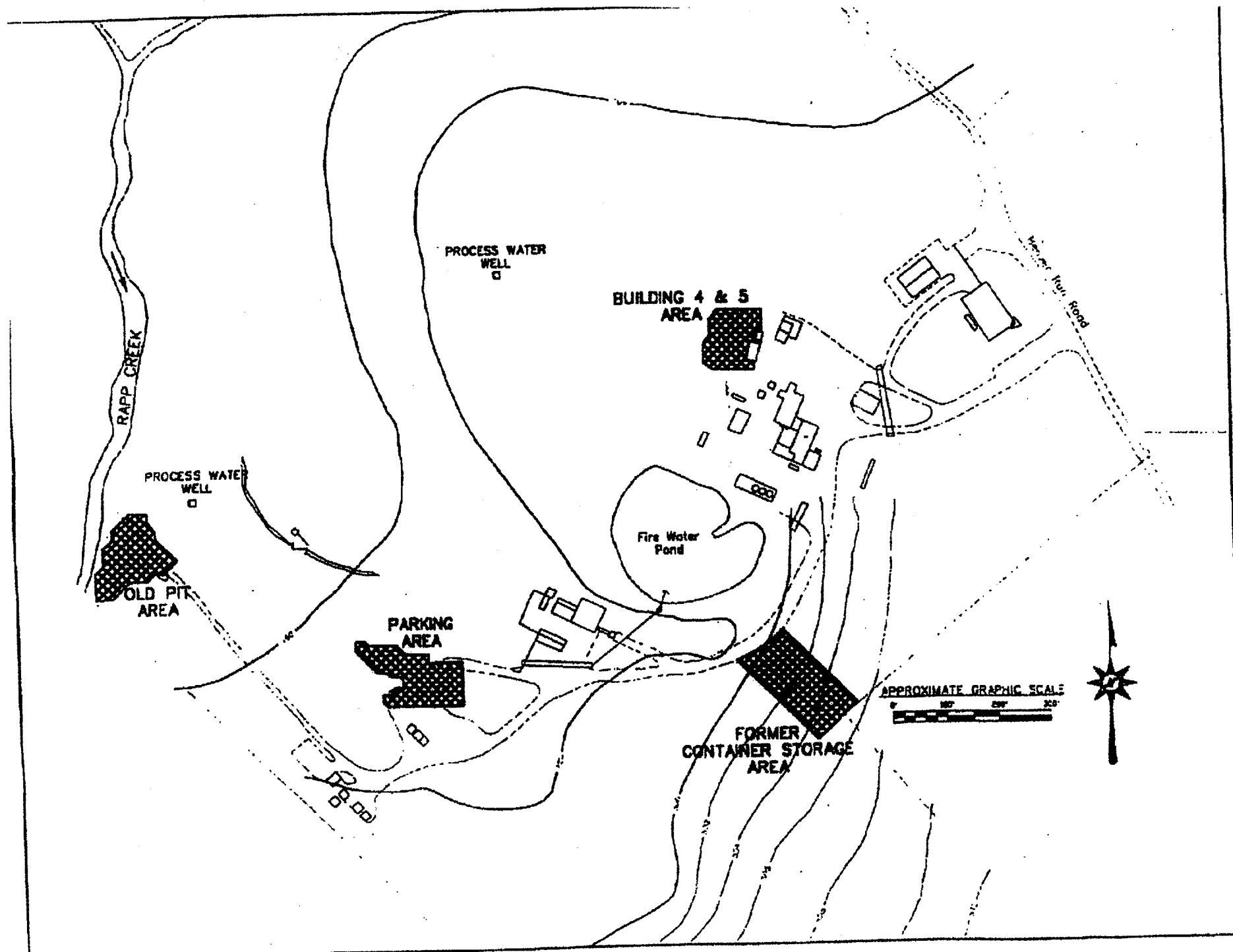
* with attachments

R. Ward 4/23/01

Prepared By Date

R. Ward 4/23/01

Approved By Date



Unaffected Area Survey

GPS Coordinates _____

Approximate Area (ft²) _____

Flag ID _____

Highest Reading (uR/hr) _____

Lowest Reading (uR/hr) _____

Surveyors _____

Survey Equipment ID _____

Remarks _____

Affected Area Survey

Building 4 & 5 Area

GPS Coordinates _____

Approximate Area (ft²) _____

Flag ID _____

Highest Reading (uR/hr) _____

Lowest Reading (uR/hr) _____

Surveyors _____

Survey Equipment ID _____

Remarks _____

[illegible]

Affected Area Survey
Parking Area

GPS Coordinates _____

Approximate Area (ft²) _____

Flag ID _____

Highest Reading (uR/hr) _____

Lowest Reading (uR/hr) _____

Surveyors _____

Survey Equipment ID _____

Remarks _____

[illegible]

Affected Area Survey

Old Pit Area

GPS Coordinates _____

Approximate Area (ft²) _____

Flag ID _____

Highest Reading (uR/hr) _____

Lowest Reading (uR/hr) _____

Surveyers _____

Survey Equipment ID _____

Remarks _____

[illegible]

Former Container Storage Area

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Figure 1. Schematic representation of the experimental design. The subjects were divided into two groups: the control group (CG) and the experimental group (EG). The CG was divided into two subgroups: the control group (CG) and the control group (CG). The EG was divided into two subgroups: the experimental group (EG) and the experimental group (EG). The subjects were divided into two groups: the control group (CG) and the experimental group (EG). The CG was divided into two subgroups: the control group (CG) and the control group (CG). The EG was divided into two subgroups: the experimental group (EG) and the experimental group (EG).

[illegible]

Attachment 2

Survey Data

Unaffected Area Survey of Cabot Revere*

| Map ID Number** | Background ($\mu\text{R/hr}$) | Average Reading ($\mu\text{R/hr}$) |
|-----------------|---------------------------------|--------------------------------------|
| | GPS Coordinantes (North/West) | |
| 1 | 40° 30' 26 / 75° 09' 11 | 10 |

| Map ID Number** | GPS Coordinantes (Lat/Long) | Highest Reading ($\mu\text{R/hr}$) | Lowest Reading ($\mu\text{R/hr}$) | Comments |
|-----------------|-----------------------------|--------------------------------------|-------------------------------------|---|
| 2 | 40° 30' 25 / 75° 09' 18 | 15 | 10 | Area included shale pile |
| 3 | 40° 30' 39 / 75° 09' 13 | 17 | 10 | Included part of wooded area |
| 4 | 40° 30' 39 / 75° 09' 14 | 15 | 10 | |
| 5 | 40° 30' 40 / 75° 09' 15 | 17 | 10 | |
| 6 | 40° 30' 40 / 75° 09' 17 | 16 | 10 | Area under power lines |
| 7 | 40° 30' 40 / 75° 09' 18 | 15 | 10 | |
| 8 | 40° 30' 40 / 75° 09' 20 | 15 | 10 | |
| 9 | 40° 30' 40 / 75° 09' 21 | 16 | 10 | Survey area extended to stream in the woods |
| 10 | 40° 30' 39 / 75° 09' 23 | 14 | 10 | |
| 11 | 40° 30' 32 / 75° 09' 24 | 15 | 10 | In woods along stream near the Old Pit Area |
| 12 | 40° 30' 42 / 75° 09' 16 | 15 | 10 | Wooded area next to power lines until reached the pipeline |
| 13 | 40° 30' 32 / 75° 09' 17 | 15 | 11 | Large Fill Pile probably from the excavation of a nearby pond |
| 14 | 40° 30.646' / 75° 09.407 | 13 | 10 | |
| 15 | 40° 30.633' / 75° 09.274 | 13 | 9 | |
| 16 | 40° 30.617' / 75° 09.224 | 11 | 9 | |
| 17 | 40° 30.638' / 75° 09.310 | 11 | 10 | |
| 18 | 40° 30.647' / 75° 09.364 | 11 | 9 | |
| 19 | 40° 30.653' / 75° 09.443 | 11 | 9 | |

* All Exposure Rate Readings do not have background of 10 $\mu\text{R/hr}$ subtracted out.

** Map ID Number is used to identify each location on the Geographic Position Map in Attachment 3.

Affected Areas*

| | GPS Coordinates (North/West) | General Area Readings** | | Discrete Slag Pieces | |
|------------------------|------------------------------|--------------------------------------|-------------------------------------|--|---|
| | | Highest Reading ($\mu\text{R/hr}$) | Lowest Reading ($\mu\text{R/hr}$) | Reading @ 1 meter ($\mu\text{R/hr}$) | Reading on Contact ($\mu\text{R/hr}$) |
| Container Storage Area | 40° 30' 29 / 75° 09' 10 | 15 | 12 | 50 | 150 |
| Old Pit Area | 40° 30' 31 / 75° 09' 24 | 17 | 10 | 40 | 125 |
| Parking Area | 40° 30' 29 / 75° 09' 19 | 15 | 11 | *** | *** |
| Building 4 & 5 Area | 40° 30' 25 / 75° 09' 18 | 12 | 10 | *** | *** |

| | Map ID Number**** | Comments |
|------------------------|-------------------|---|
| Container Storage Area | CSA | Various other slag pieces found within a 10 ft radius of the recorded slag piece. These pieces range from 25 to 50 $\mu\text{R/hr}$ on contact. |
| Old Pit Area | OPA | Various other slag pieces found within the affected area. These pieces range from 20 to 60 $\mu\text{R/hr}$ on contact. |
| Parking Area | PA | No discrete slag pieces identified. |
| Building 4 & 5 Area | B4&5A | No discrete slag pieces identified. |

* All Exposure Rate Readings do not have background of 10 $\mu\text{R/hr}$ subtracted out.

** General Area Readings are one meter from that ground and a couple of feet from any slag pieces identified.

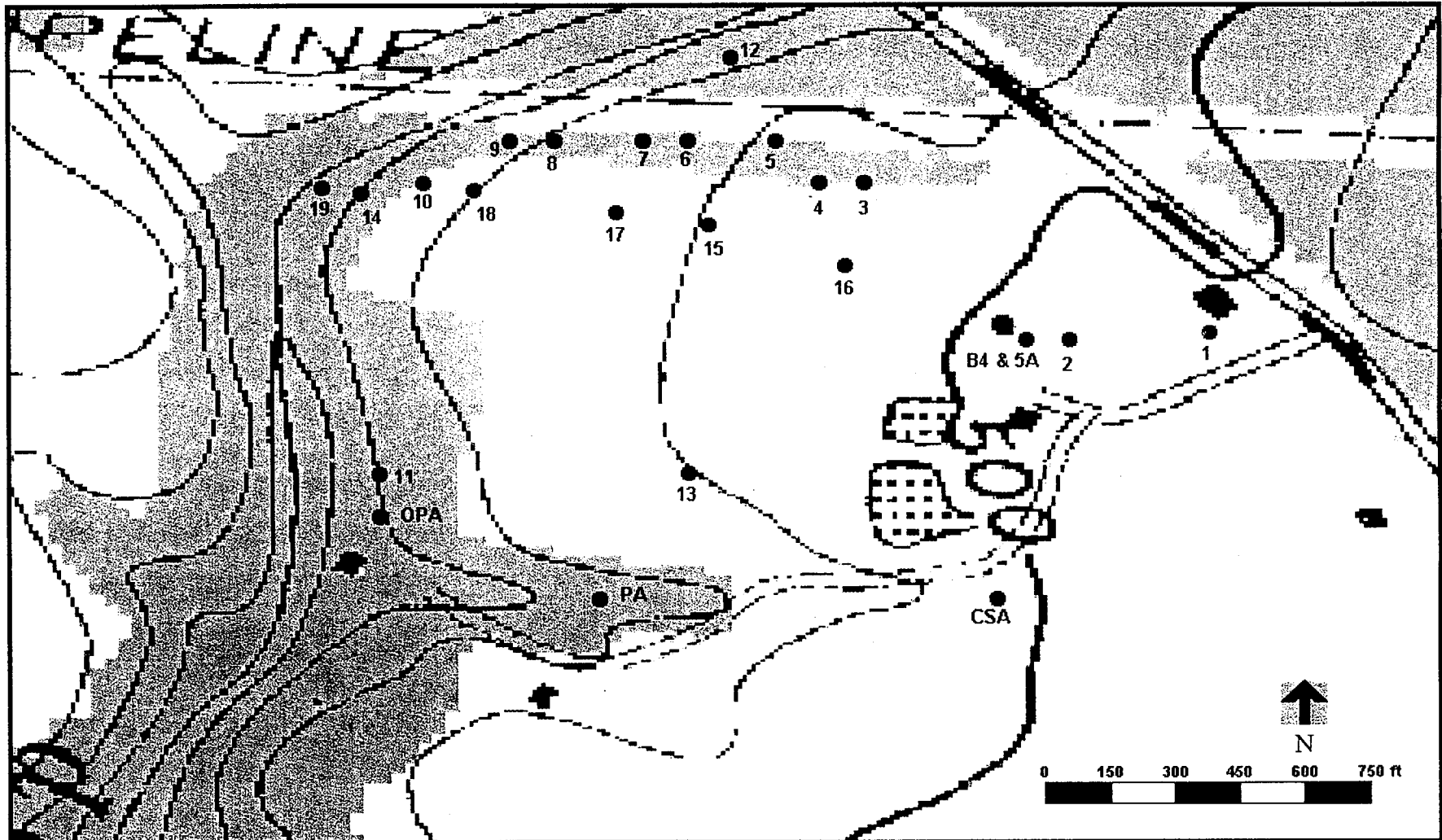
*** No Discrete Slag Pieces were identified in these two affected areas

**** Map ID Number is used to identify each location on the Geographic Position Map in Attachment 3.

Attachment 3

Geographic Position Map of Survey Locations

Geographic Position Map of Survey Locations



NOTE: The location labels reference the survey data Attachment 2.

Attachment 4

Affected Area Survey Photographs

Former Container Storage Area



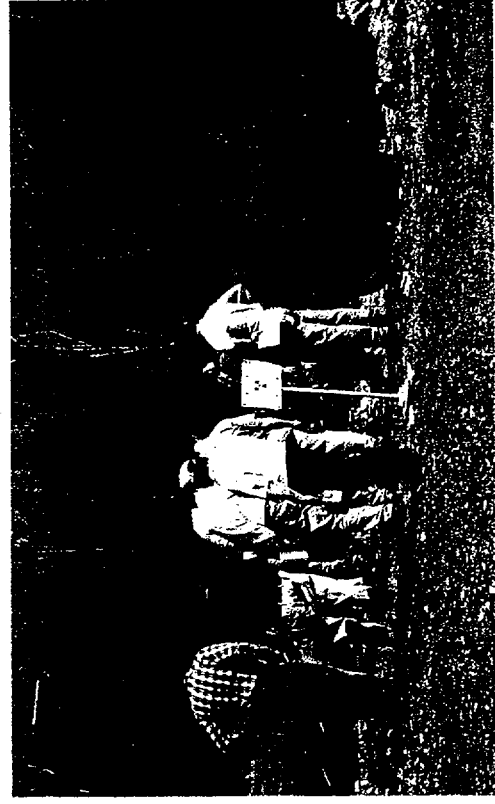
Old Pit Area



Parking Area



Building 4 & 5 Area



Attachment 5

Unaffected Area Survey Photographs

Unaffected Areas



Fill Pile Adjacent to a Pond



Open Field Behind Building 4&5 Area



Edge of Wooded Area



Rapp Creek Near Old Pit Area