



SHIELDALLOY METALLURGICAL CORPORATION

C. SCOTT EVES
VICE PRESIDENT - ENVIRONMENTAL SERVICES

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March 2, 1994

Mr. Gary L. Shear, Chief
Fuel Cycle and Decommissioning Branch
U.S. Nuclear Regulatory Commission
Region III
801 Warrenville Road
Lisle, Illinois 60532-5351

Certified Mail: P 284 355 081
Return Receipt Requested

RE: Reply to Notice of Violation:
License No. SMB-1507
Docket No. 040-08948

Dear Mr. Shear:

Shieldalloy Metallurgical Corporation (SMC) received your letter of February 2, 1994, which forwarded the findings of the inspection of our Cambridge, Ohio facility conducted from October 6, 1993 to January 13, 1994, and Notice of Violation (NOV). In accordance with the NOV and 10 CFR 2.201, SMC is writing to respond to the NOV and specifically set forth as requested: (1) the reason for the violation or the basis for disputing it, (2) the corrective actions that have been taken by SMC to resolve each of the two violations and the results achieved, (3) the corrective steps that will be taken to avoid further violations, and (4) the date when full compliance will be achieved.

VIOLATION:

1. 10 CFR 20.203(e)(2) requires in part, that each area in which natural uranium or thorium is used or stored in any amount exceeding one hundred times the quantity specified in Appendix C of this part be conspicuously posted with a sign or signs bearing the radiation caution symbol and the words: "Caution Radioactive Materials(s)." The quantity specified in Appendix C of 10 CFR 20 is 100 microcuries for both natural uranium and natural thorium.

Contrary to the above, on December 13, 1993, the perimeter of the West Slag Pile, containing approximately 7.24 curies (267.9 gigabecquerels [GBq]) uranium-238, 6.15 curies (227.6 GBq) thorium-232, and 5.98 curies (221.3 GBq) of radium-226, was not

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Mr. Gary L. Shear, Chief
U.S. NRC, Region III
March 2, 1994
Page 2

conspicuously posted with signs bearing the radiation symbol and words: "Caution Radioactive Materials(s)."

This is a Severity Level IV violation (Supplement IV).

1. During the initial visit on October 6-8, 1993 only one "Caution Radioactive Materials" (CRM) sign was posted around the West pile. When this concern was raised by the inspectors, five additional signs were placed strategically around the pile. On December 13, 1993, the inspectors indicated that the signage could be improved even further. Since then ten additional signs have been added interspersed between the previously existing signs. Bi-Monthly inspections of the West pile will include an evaluation of the signs to be sure that all are in place and legible. Full compliance with this violation has already been achieved.
2. 10 CFR 20.207 requires that licensed materials stored in an unrestricted area be secured against unauthorized removal from the place of storage. 10 CFR 20.207(b) requires that materials not in storage be under constant surveillance and immediate control of the licensee. As defined in 10 CFR 20.3(a)(17), an unrestricted area is any area to which access is not controlled by the licensee for purposes of protection of individuals from exposure to radiation and radioactive materials.

Contrary to the above, on December 13, 1993, licensed material in the West Pile, consisting of thorium, uranium and radium contaminated slag located at the Cambridge facility, an unrestricted area, was not secured against unauthorized removal, and was not under constant surveillance and immediate control of the licensee.

This is a Severity Level IV violation (Supplement IV).

2. 10 CFR 20.207(a) is applicable to this site and situation and requires that the licensed materials be secured against unauthorized removal from the place of storage. 10 CFR 20.207(b) is not applicable in this situation because this sub-paragraph applies only to materials that are not in storage. The material in question, the West Pile, is in storage. The requirement of sub-paragraph (a) is met in this circumstance because the thickness of the cap (>4 ft), the geotextile membrane and the size and shape of the material stored in the West Pile assure that unauthorized removal of these materials will not take

place. Based on walk-over surveys conducted by the USNRC, the Ohio Department of Health, and private contractors the exposed slag that is mentioned in the inspection report as being on the shoulders of the pile shows no elevated levels of radioactivity. Removal of individual pieces of this slag pose no danger to the individual removing the slag. The possibility of exposure to source material could only be realized through the use of mechanized equipment such as an excavator or large backhoe to remove quantities of source material. The primary risk of exposure would come from someone trying to obtain material in the west pile for use as fill material. Notwithstanding the above, SMC will undertake the following measures: Construction of a ditch on the west-north-west side of the pile and implementation of a bi-monthly inspection tour of the area. The ditch constructed in that area will prevent mechanical equipment from accessing the pile from the sewer pumping station access road which is the only point of access for earth moving equipment. The existing cover provides greater security than a fence due to the amount of time and type of equipment that would be necessary for unauthorized removal of FeCb slag. SMC feels that because of the thickness and construction of the multi-media cap and the elimination of access to the pile for mechanized equipment that the requirement of 10 CFR 20.107(b) is met. Full compliance including the additional measures described above will be achieved by April 30, 1994.

CONCERNS:

1. The use of potentially contaminated slag as fill at offsite locations is of concern to the NRC.
 1. SMC is unaware of any removal of NRC regulated slag from this site since SMC's acquisition of the site in 1987. Upon purchase of this site, SMC obtained a license for storage of source material and began decommissioning including placing material on top of the source material to provide a cover. As noted in the inspection report, no columbium ore has been processed since the 1970's. After this concern was raised, discussions with employees who worked at the site prior to 1972 indicated that none of them are aware of the removal of FeCb slag.

If additional information regarding the off-site transfer of NRC regulated materials becomes available, SMC will immediately notify the NRC.

Mr. Gary L. Shear, Chief
U.S. NRC, Region III
March 2, 1994
Page 4

2. The licensee's failure to implement its ground/surface water monitoring program and its failure to notify the NRC of this change in plans, is an area concern.
 2. SMC regrets that the NRC was not notified that the implementation of the groundwater monitoring program had been delayed. Should any such changes in this or similar programs be necessary, the NRC will be notified of the changes and the reasons for the changes in a timely manner. Currently the initial round of ground and surface water sampling has been completed. The second sampling episode is tentatively scheduled for May, 1994.

3. The failure to prevent deterioration of and to maintain the West Slag Pile cover is an area of concern to the NRC.
 3. The cap on the West Pile has been repaired with the addition of sand to cover the geotextile material. This sand cover will be inspected as part of the bi-monthly inspections procedure until the final soil and vegetation cover are complete.

Sincerely,



C. Scott Eves
V.P., Environmental Services

CSE:lms

CC: Michael A. Finn
Robert L. Swenson
Thomas A. Matthews
James P. Valenti
Peter Gillon, Esq. (Weil, Gotshal & Manges)
Carol D. Berger, CHP (IT Corp.)
Jay E. Silberg, Esq. (Shaw, Pittmaa, Potts & Trowbridge)



UNITED STATES
NUCLEAR REGULATORY COMMISSION

REGION III
801 WARRENVILLE ROAD
LISLE, ILLINOIS 60532-4351

FEB 02 1994

Shieldalloy Metallurgical
Corporation
ATTN: Mr. Scott Eves, Vice-President
Environmental Services
West Boulevard
P. O. Box 768
Newfield, NJ 08344

License No. SMB-1507
Docket No. 040-08948

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FEB 07 1994

Dear Mr. Eves:

SUBJECT: NRC INSPECTION REPORT 040-08948/93001(DRSS) DEPT. ENV. SERV.

This refers to the inspection conducted by Messrs. D. Sreniawski, C. Glenn, R. L. Glinski and G. M. McCann from October 6, 1993 through January 13, 1994. This inspection included a review of activities authorized under NRC Source Material License No. SMB-1507. At the conclusion of the onsite inspection, the findings were discussed with you and members of your staff. In addition, this inspection also included the review of radioanalytical data received from the Oak Ridge Institute for Science and Education on December 16, 1993 and January 11, 1994. The inspection findings and analytical results of samples collected were discussed with you on January 20, 1994, during a telephone conversation with Messrs. McCann and Glinski.

The areas examined during the inspection are identified in the report. Within these areas, the inspection consisted of selective examination of procedures and representative records, interviews with personnel, observation of activities, and a limited radiological survey.

During this inspection, certain of your activities were found to be in violation of NRC requirements. The violations are specified in the enclosed Notice of Violation. A written response to these violations is required.

In addition, there are three areas of concern addressed within the report. The concerns regard maintenance of the West Slag Pile cover, the monitoring program for surface and ground waters, and the discovery that contaminated slag was taken to offsite locations. Please include with your response to this letter, actions taken or planned to address these concerns.

In accordance with 10 CFR 2.790 of the Commission's regulations a copy of the letter, the enclosure, and your response to this letter will be placed in the NRC Public Document Room.

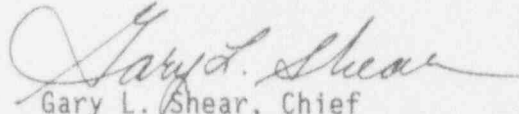
The response directed by this letter and the accompanying Notice are not subject to the clearance procedures of the Office of Management and Budget as required by the Paperwork Reduction Act of 1980, PL96-511.

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We will gladly discuss any questions you have concerning this inspection.

Sincerely,



Gary L. Shear, Chief
Fuel Cycle and Decommissioning Branch

Enclosures:

1. Notice of Violation
2. Inspection Report
No. 040-08948/93001(DRSS)

cc w/enclosures:

Michael A. Finn, Group
Secretary
Jay E. Silberg, Esq.
James Valenti, Radiological
Safety Manager
James Benetti, 5AT-26, U.S.
Environmental Protection Agency
Jennifer Wendel, U. S. Environmental
Protection Agency, Region V
David Smith, Ohio Environmental
Protection Agency
Harvey Bruegger, Ohio Department
of Health

NOTICE OF VIOLATION

Shieldalloy Metallurgical Corporation
Cambridge, Ohio

License No. SMB-1507
Docket No. 040-08948

During an NRC inspection conducted from October 6, 1993 through January 13, 1994, violations of NRC requirements were identified. In accordance with the "General Statement of Policy and Procedure for NRC Enforcement Actions," 10 CFR Part 2, Appendix C, the violations are listed below:

1. 10 CFR 20.203(e)(2) requires in part, that each area in which natural uranium or thorium is used or stored in any amount exceeding one hundred times the quantity specified in Appendix C of this part be conspicuously posted with a sign or signs bearing the radiation caution symbol and the words: "Caution Radioactive Material(s)." The quantity specified in Appendix C of 10 CFR 20 is 100 microcuries for both natural uranium and natural thorium.

Contrary to the above, on December 13, 1993, the perimeter of the West Slag Pile, containing approximately 7.24 curies (267.9 gigabecquerels [GBq]) uranium-238, 6.15 curies (227.6 GBq) thorium-232, and 5.98 curies (221.3 GBq) of radium-226, was not conspicuously posted with signs bearing the radiation symbol and words: "Caution Radioactive Material(s)."

This is a Severity Level IV violation (Supplement IV).

2. 10 CFR 20.207(a) requires that licensed materials stored in an unrestricted area be secured against unauthorized removal from the place of storage. 10 CFR 20.207(b) requires that materials not in storage be under constant surveillance and immediate control of the licensee. As defined in 10 CFR 20.3(a)(17), an unrestricted area is any area to which access is not controlled by the licensee for purposes of protection of individuals from exposure to radiation and radioactive materials.

Contrary to the above, on December 13, 1993, licensed material in the West Pile, consisting of thorium, uranium and radium contaminated slag located at the Cambridge facility, an unrestricted area, was not secured against unauthorized removal, and was not under constant surveillance and immediate control of the licensee.

This is a Severity Level IV violation (Supplement IV).

Pursuant to the provisions of 10 CFR 2.201, Shieldalloy Metallurgical Corporation is hereby required to submit a written statement or explanation to the U.S. Nuclear Regulatory Commission, Region III, 801 Warrenville Road, Lisle, Illinois 60532-5351, within 30 days of the date of the letter transmitting this Notice of Violation (Notice). This reply should be clearly marked as a "Reply to a Notice of Violation" and should include for each

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violation: (1) the reason for the violation, or if contested, the basis for disputing the violation, (2) the corrective steps that have been taken and the results achieved, (3) the corrective steps that will be taken to avoid further violations; and (4) the date when full compliance will be achieved. If an adequate reply is not received within the time specified in this Notice, an order or a demand for information may be issued as to why the license should not be modified, suspended, or why such other action as may be proper should not be taken. Where good cause is shown, consideration will be given to extending the response time.

FEB 02 1994

Dated _____

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 040-08948/93001(DRSS)

Docket No. 040-08948

License No. SMB-1507

Facility: Shieldalloy Metallurgical Corporation
Route 209 South
Cambridge, OH 43725

Inspection Conducted: October 6, 1993 through January 13, 1994

Inspectors: *Donald Sreniawski*
Donald Sreniawski
Senior Radiation Specialist

January 26, 1994
Date

Chad Glenn
Chad Glenn
Project Manager

January 26, 1994
Date

Raymont L. Glinski
Raymont L. Glinski
Radiation Specialist

January 26, 1994
Date

George M. McCann
George M. McCann, Chief
Fuel Facilities and
Decommissioning Section

January 26, 1994
Date

Approved: *Gary L. Shear*
Gary L. Shear, Chief
Fuel Cycle and Decommissioning
Branch

February 2, 1994
Date

Inspection Summary

Inspection on October 6 through January 13, 1994 (Report No. 040-08948/93001(DRSS))

Areas Inspected: This was an announced, limited scope safety inspection to evaluate the licensee's: (1) physical security and posting measures; (2) potential for release of licensed materials into the environment and the licensee's program to monitor for environmental releases; and (3) potential release of licensed materials off site. On December 13, 1993, NRC

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inspectors obtained additional information regarding the licensee's thermoluminescent dosimetry (TLD) monitoring program, and the status of the groundwater and surface water monitoring program. The NRC inspectors performed direct radiation measurements, collected soil/sediment and water samples from around the immediate perimeter of the slag piles, Chapman Run (stream sample) and the Chapman Reservoir (source of Cambridge, Ohio's public water supply.) The NRC inspectors also visited offsite locations to perform radiation measurements and collect samples.

Results: Of the areas inspected, two violations of NRC requirements were identified:

1. Failure to adequately control access to licensed material(s) located in an unrestricted area, 10 CFR Part 20.207(a) and (b) [Section 4].
2. Failure to adequately post an area with "Caution Radioactive Material(s)" signs, 10 CFR Part 20.203(e) [Section 4].

Three areas of concern were also identified during the inspection as follows:

1. Contaminated slag may have been used offsite as fill material [Section 3].
2. Licensee's delay in implementing its "Groundwater and Surface Water Monitoring Program for the East and West Slag Piles at the Shieldalloy Metallurgical Corporation" plan as indicated in a 1992 letter to the NRC [Section 4].
3. Failure to maintain the West Slag Pile cover in order to prevent its deterioration [Section 4].

DETAILS

1. Persons Contacted

- *# James Valenti, Shieldalloy Metallurgical Corporation (SMC),
Environmental Manager and Radiation Safety Officer (RSO)
- *#@Scott Eves, SMC, Vice-President, Environmental Services
- *# Charles E. Montague, Plant Manager, SMC
- * Jon W. Sedor, President, Local 5050, United Steel Workers of America
- * Dwain C. Baer, Ohio Department of Health (ODH)
- * Tom Matthews, SMC
- # Carol Berger, IT Corporation, Consultant to SMC

A State of Ohio Health Official also assisted in surveying and collecting samples from the East and West slag piles and offsite locations. NRC inspectors visited and interviewed representatives of the Cambridge Water Treatment Plant, who provided radiological data on water samples of the public drinking water. Additionally, the NRC inspectors interviewed several SMC employees who had been employed by Foote Mineral.

*Denotes individuals present during the exit meeting on October 8, 1993.

#Denotes individuals present during the exit meeting on December 13, 1993.

@Denotes individual contacted by phone on January 20, 1994.

2. Background

Shieldalloy Metallurgical Corporation (SMC) assumed license responsibility from its predecessor, Vanadium Corporation of America (Foote Mineral (SMB-00850)) in 1987. The 120 acre (20 acres are developed) site is located south of Cambridge, Ohio. The previous owners of the site had processed licensable quantities of uranium and thorium (6.9×10^3 pounds [3.1×10^3 kilogram (Kg)], license possession limit) contained in columbium ores. The ores were used to produce ferro-columbium alloys. The radionuclides from the ores became incorporated into waste slag and are stored in two separate piles (west and east) on the site. SMC representatives indicated that ferro-columbium production started approximately in 1957 and ended approximately in 1972. The approximate concentrations of source material in the columbium ores were 0.04% uranium and 2% thorium. SMC has decontaminated the manufacturing facilities and the adjoining areas. The only significant contamination remaining is that contained in the two slag piles. Attachment A is a map of the SMC site.

¹Columbium is a commercial name for niobium.

3. Description of Radioactive Slag Waste Piles

a. West Pile:

This pile originally consisted of approximately 3.0×10^5 tons (3.0×10^{06} kgs) of slag and soil covering 7.6 acres with an average concentration of thorium-232 (Th-232), uranium-238 (U-238) and radium-226 (Ra-226) of 1.4 picocuries per gram (pCi/g) {52.0 millibecquerels per gram (mBq/g)}, 3 pCi/g {111 mBq/g}, and 2.4 pCi/g {89.0 mBq/g}, respectively. Following decontamination of the manufacturing facilities and adjoining areas, an additional 1.4×10^5 tons (1.4×10^{06} kgs) of higher concentration slag was added to the West Pile. The additional material had an average concentration of Th-232, U-238, and Ra-226 of 42 pCi/g { 1.6×10^3 mBq/g}, 54 pCi/g { 2.0×10^3 mBq/g}, and 42 pCi/g { 1.6×10^3 mBq/g}, respectively. The top of the pile, according to SMC employees, is composed of at least 6-8 feet of cover material consisting of Chemfix (a clay-like material), a geotextile cover material, and approximately 6-8 inches of sand. This covers the top of the slag pile only. The shoulders of the piles are not covered and the slag is exposed. The licensee indicated during the December 13, 1993 exit meeting that it had planned to put a similar cover over the shoulder and then cover the entire pile with another 2 feet of soil and seeding. However, the licensee delayed this phase in 1991 when it failed to obtain final NRC approval for the containment request. Attachment B is a picture of the construction of the Chemfix cover.

b. East Pile:

This pile is uncovered and consists of approximately 9.0×10^4 tons { 9.1×10^7 kgs} of slag covering 2.6 acres with an average concentration of Th-232 of 4 pCi/g { 1.5×10^2 mBq/g}, U-238 of 21 pCi/g { 7.8×10^2 mBq/g} and Ra-226 of 66 pCi/g { 2.4×10^3 mBq/g}.

c. Remainder of Site:

Shieldalloy has decontaminated all of the site to below Option 1 levels, except for the slag piles. Confirmatory surveys have been performed by Oak Ridge Associated Universities (ORAU) on the decontaminated areas.

d. Release of Slag to Off Site Locations:

Discussions with former Foote Mineral employees indicated that slag had been released off site. However, they were not aware of any differentiation as to whether it was ferrocolumbium slag or ferrovanadium slag (non-radiological residual from current metal smelting). SMC emphasized during these discussions, that after it assumed control of the plant, no columbium ores were used in the production of alloys. Some ferrovanadium slag was sold or given

away beginning in approximately 1980. The hot ferrovanadium slag was dumped into onsite ponds where it became gravel like. This gravel-like slag increased the utility of this material for capping, road-fill, and other industrial uses. It was also determined that Foote Mineral stopped using columbium ores during the early 1970s.

The use of potentially contaminated slag as fill at offsite locations is of concern to the NRC.

No violations of NRC requirements were identified. One area of concern was identified.

4. Licensee's Radiological and Security Controls

a. Direct Radiation Measurements

SMC initiated a thermoluminescent dosimetry (TLD) monitoring program on March 27, 1992. The TLDs are processed by a NVLAP approved vendor, which provides the TLD monitors and analyzes the badges for the licensee at quarterly intervals. The monitors are approximately 3 feet (one meter) above the ground. One badge is kept in the plant manager's office as a quality control. Four badges are located on the East Pile Fence, eight are in the vicinity of the West Pile, and two are used to establish environmental backgrounds. One background TLD is placed near the plant entrance and one at a residence across the road from the plant. Approximate locations of the TLD monitoring stations are indicated on Attachment C. The inspectors reviewed the TLD monitoring reports for the quarters between March 27, 1992 and July 1, 1993. A summary of the TLD data is outlined in Attachment D.

Review of the licensee's data indicates that the direct exposure from licensed materials in the West Slag Pile would not exceed the limits for an unrestricted area as specified in 10 CFR Part 20.1301, "Dose Limit for Individual Members of the Public." The total effective dose equivalent limit is 0.1 rem (1mSv) in a year and the external dose limit is 0.002 rem (0.02 mSv) in any one hour. The inspectors also determined that the exposure outside the security fence around the perimeter of the East Slag Pile would not exceed the 10 CFR Part 20.1301 limits.

SMC does not have a routine program for performing direct radiation survey measurements other than the TLDs. No records of licensee surveys were reviewed during this inspection.

b. Environmental Monitoring Program

Interviews of SMC staff determined that no routine environmental water sampling has been done by SMC to date. In a letter dated March 11, 1992, the Region III office asked SMC what its intentions were for conducting a routine sampling program. In a July 7, 1992 letter responding to the Region's letter, SMC indicated that it would implement a monitoring program in the fall of 1992. SMC submitted its proposed program, "Groundwater and Surface Water Monitoring Program for the East and West Slag Piles at Shieldalloy Metallurgical Corporation, Cambridge, Ohio" for NRC review. In a August 12, 1992 letter, the NRC stated, "Based on our review, the proposed program appears to be adequate to more fully characterize site geology, hydrogeology and groundwater quality, and to establish an appropriate ongoing monitoring program. The proposed program should also provide sufficient data for analysis of potential groundwater and surface water impacts from the decommissioning options that will be assessed in Shieldalloy Metallurgical Corporation's (SMC's) "Technical Basis Document."

During the inspection on December 13, 1993, the licensee's staff indicated that four new wells for monitoring groundwater had been installed. This will bring the total number of groundwater monitoring wells on the site to 18. The locations of these monitoring wells are indicated on Attachment E. Also, licensee representatives indicated that a routine water sampling program had not been initiated due to previous water sampling problems associated with groundwater flow patterns and the potential for mixing of surface and groundwater. It was also indicated that funding for the monitoring program had been delayed, due to SMC's bankruptcy proceedings. SMC's staff indicated that there would be two initial sampling phases conducted before the routine program would be implemented. Licensee representatives indicated that the first phase would be started on December 14, 1993. The second phase is planned for the Spring of 1994, with implementation of the routine program in the fall of 1994. The inspectors discussed the licensee's July 7, 1992 letter which stated, "SMC has provided the NRC, EPA and Ohio EPA a copy of the Groundwater and Surface Water Monitoring Program, which will be implemented during the fall of this year." The NRC inspectors expressed their concern regarding SMC's failure to advise the Commission of its decision to delay its sampling program.

The licensee's failure to implement its ground/surface water monitoring program and its failure to notify the NRC of this change in plans, is an area concern.

c. Security/Posting

(1) East Pile

The East pile is enclosed with an eight foot high steel fence and is posted "Caution Radioactive Materials." The access gate to this pile is locked. The entire area of the East pile is, for the most part, easily observed from the roadway into the plant and from the plant itself. No indication of unauthorized access to this pile was noted during the inspectors walk around of the area.

(2) West Pile

(A) Posting

Most of the West Pile can be accessed from adjoining properties from almost any direction. This pile can be easily accessed via Vanadium Road. There is no fencing around the pile, but there is a synthetic barrier around a portion of the pile to hold back silt run-off.

On October 6-8, 1993, the inspectors observed that the west pile perimeter had one "Caution Radioactive Materials" (CRM) sign posted on the steel fence leading from the main plant area. No other CRM signs were posted around this pile. "No Trespassing" signs were posted prominently around the pile. Evidence of human activity was noted in several areas adjoining this slag pile, such as shotgun shells in a dry creek bed on the west side of the pile and waste building material dumped on the north side.

On December 13, 1993, the inspectors observed the licensee had placed 5 more CRM signs around the perimeter of the pile. However, the inspectors noted that the curvature of the West Slag Pile makes it possible to access this pile without observing a CRM sign. In addition, the inspectors inquired regarding the licensee's policy and procedure for maintaining caution and warning signs (CRM and "No Trespassing"). The licensee indicated that an employee checks the piles approximately monthly. However, there was no formal policy or procedure to detect torn, defaced or missing signs.

10 CFR 20.203(e)(2) requires, in part, that each area in which natural uranium or natural thorium is stored in any amount exceeding one hundred times the quantity specified in Appendix C be conspicuously posted with signs bearing the radiation caution symbol and the

words: CAUTION RADIOACTIVE MATERIALS. The Appendix C quantity specified for natural uranium and natural thorium is 100 microcuries.

The failure to conspicuously post sufficient CRM signs, such that person(s) approaching this slag pile would be alerted to the presence of radioactive materials is a violation of 10 CFR Part 20.203(e)(2).

(B) Security

The West Pile can be accessed from adjoining properties from almost any direction. This pile can be easily accessed via Vanadium Road. There is no fencing around the pile, but there is a synthetic barrier around a portion of the pile to hold back silt run-off. The top portion of the 7.6 acre pile is covered with a multi-layer clay/sand cap approximately 6-8 feet (1.9-2.5 meters) thick. The inspectors noted that some of the signs were torn. The inspectors also inquired about policies to prevent unauthorized access or intrusion into the piles and maintenance of the silt barrier. Licensee representatives indicated that an employee visits the pile approximately once a month, primarily to check or replace the TLD monitors.

SMC uses a guard service on weekends from 11:00 p.m. Friday to 11:00 p.m. Sunday and on holidays. This guard stays primarily in the general plant area and the guard's main duties are fire detection and access control to main plant buildings. The inspectors determined during discussions with the licensee's staff that the security guards duties did not include checking the slag piles for intrusion or conditions of signs, etc.

10 CFR 20.207 (a) and (b) state, in part, that licensed materials stored in unrestricted areas be secured from unauthorized removal and that licensed material in an unrestricted area be under constant surveillance and immediate control of the licensee.

The failure to have a program to assure adequate surveillance and immediate control of licensed materials or physical barriers to prevent access to licensed materials stored in an unrestricted area, is a violation of 10 CFR 20.207(a) and (b). The failure to prevent access is also contrary to License Condition No. 13 which states, "The licensee shall prevent access to contaminated areas until they are suitable for release for unrestricted use".

d. West Pile Cover Maintenance

On October 6-8, 1993, the inspectors observed that the cap was in adequate condition with the exception of one 5 x 50 foot (approximately 1.5 x 15.4 meters) gully where the geotextile material was exposed. Even though the sand portion of the capped area had eroded down to the geotextile layer, more than 6-8 feet (1.9-2.5 meters) of non-radioactive material covers the majority of the contaminated slag. On December 13, 1993, during the walk-over of the pile top, it was determined that the licensee had repaired the previously noted eroded area. However, several small eroded areas, approximately 5-12 inches (12.7-30.5 cm) in width were noted.

Maintenance of the capped West Pile was discussed with the licensee and it was determined that SMC has no routine program for upkeep of the sand cover. The purpose of the sand cover is to protect the geotextile barrier, which is subject to deterioration when exposed to weather. The geotextile cover is considered an important component of the cover system, therefore protection and maintenance of the sand cover to prevent its deterioration is important.

The failure to prevent deterioration of and to maintain the West Slag Pile cover is an area of concern to the NRC.

Two violations of NRC requirements were identified. Also, two areas of concern were identified.

5. NRC Surveys Conducted

Direct radiation surveys were performed and samples collected at the locations described below:

a. East Pile:

- (1) A number of surface count rate and 1 meter exposure rate measurements were taken. The measurements ranged from approximately 120 counts per minute (cpm) to 800 cpm and 20 microreontgens per hour (1R/h) [5.16 nanocoulomb per kilogram per hour [nC/kg/h]] to 150 1R/h [38.7 nC/kg/h]. The average gamma radiation level was 10 1R/h (2.58 nC/kg/h). The survey results are documented in Attachment F and the locations of the measurements are indicated on the Attachment G. Natural background radiation levels for the site were approximately 75 cpm and 10 1R/h (2.58 nC/kg/h).
- (2) A number of soil samples were collected from around the perimeter of this pile. The locations of these samples are indicated on Attachment G. The railroad and entrance road to the plant form an embankment on the south and east side of the East Slag Pile. The direct exposure rate

measurements (cpm) at the soil sample locations around the East Slag Pile and gamma spectroscopic analysis of the samples are listed in Attachment H. Analysis of the soil samples determined that the total activity for each sample collected was well below the NRC unrestricted use guideline value of 10 pCi/g (370 mBq/g) for natural thorium and uranium.

b. West Pile

- (1) Direct radiation measurements were performed over the top and sides of the pile. The direct radiation exposure rates on top of the pile were 9-12 μ R/h (2.3-3.1 nC/kg/h) at the surface. The exposure rates on the sides ranged from 10-35 μ R/h (2.58-9.03 nC/kg/h) at the surface, with a general reading of 10 μ R/h (2.58 nC/kg/h).
- (2) Biased (area of most likely concentration) soil and surface water samples were collected from around the West Slag Pile to detect any evidence of radiological contamination. The sample locations, exposure rate measurements and soil analysis results are presented in Attachment I.

The water samples were sent to the Oak Ridge Institute for Science and Education (ORISE) laboratory for analysis. The water samples collected from free running water supplies, (i.e., the stream by the Railroad Crossing (onsite), Cambridge Reservoir (offsite) and Chapman Run (two samples, one onsite and one offsite)) were below the U.S. Environmental Protection Agency (EPA) Public Drinking Water Limits for gross alpha and gross beta particle activity of 15 and 50 pCi/l (555-1,850 mBq), respectively. The results are presented in Attachment J. These samples averaged less than 3 pCi/l alpha (111 mBq/l) and had a range of beta activity of 3 pCi/l to 22 pCi/l (111-814 mBq/l). The water samples taken around the pile had elevated beta measurements ranging from 52 pCi/l to a maximum 270 pCi/l (1,924-9,990 mBq/l). Based on the ORISE gamma isotopic analysis (Attachment K), it appears that these elevated levels of gross beta are due to high concentrations of naturally occurring potassium-40 (ranging up to 184 ± 83 pCi/l) [$6,800 \pm 3100$ mBq/l]. Further, on the day the samples were collected, the sanitary lift station had malfunctioned and was pumping large quantities of sewage into the area.

None of the soil/sediment samples collected by the NRC exceeded the guideline values of 10 pCi/g (370 mBq/g) for natural uranium and natural thorium.

c. Public Water Supply

NRC inspectors visited the Water Treatment Plant for the City of Cambridge because of the proximity of the city's drinking water intake to the SMC site. Surface water at the SMC site flows generally to the north and west toward Chapman Run and ultimately to Wills Creek. The city of Cambridge draws its drinking water from Wills Creek approximately 2 miles downstream from the SMC site and this water is pumped to Cambridge Reservoir. Water from Cambridge Reservoir is gravity fed to the Cambridge Water Department where fluoride, lime, aluminum sulfate are added and the water is then run through sand filters before being discharged to the public drinking water system.

A substantial amount of information was available on the quality of drinking water for the city of Cambridge due to the routine water testing and analysis conducted by the city. Water Treatment Plant employees invited NRC staff to look over these water analysis reports. These reports provide water analysis information for a number of water contaminants, including radiological parameters. Eleven randomly selected reports spanning a period of time from February 1980 to February 1993 were reviewed. The gross alpha and gross beta concentrations averaged approximately 3 pCi/l and 4 pCi/l (111 and 148 mBq/l), respectively.

The NRC inspectors obtained a water sample from Wills Creek at the intake point for the city of Cambridge drinking water (offsite). A water sample was also taken just east of SMC's East Slag Pile where an unnamed drainage ditch passes under the railroad tracks (onsite). One final water sample was obtained from Chapman Run where the creek intersects with Route 209 a short distance east of the entrance to SMC (offsite). The results are presented in Attachment J.

d. Slag and Sand Samples

Two slag samples were collected from SMC's current ferrovanadium slag pile adjacent to the Mill Building. Radiation count rates at these two sampling points were 60-80 cpm beta-gamma (background is 50-60 cpm). A sample of zirconium sand which was used in the past production of an alloy which resulted in a "Grainol" slag was collected. Radiation measurements at this sampling point were in the range of 70-90 cpm. The licensee possesses approximately 6.0×10^3 pounds (2.7×10^3 kg) of this material. The analytical results of these samples are presented in Attachment L. Review of these data indicates that the current slag materials are well below the NRC guidelines for unrestricted use.

6. Radiation Detection Instrumentation

The following radiation detection instrumentation was used during the inspection:

- a. Ludlum Model 14C, with an Eberline model H-260 "pancake" probe attached, calibrated August 10, 1993.
- b. Ludlum Model 19, MircoR Meter, NRC Tag Number 11021, calibrated May 8, 1993

All meters were checked for constancy and operability with radioactive check sources prior to use.

7. Exit

At the conclusion of the onsite inspections on October 8 and December 13, 1993, the inspectors met with those individuals identified in Section 1 of this report. A summary of those areas inspected, the violations, areas of concern, and the forthcoming letter were discussed. The licensee did not identify any information provided during the inspection as proprietary.

Attachments:

- A. SMC Site map
- B. Picture of SMC Chemfix Cap under construction (West Pile)
- C. SMC Site Map (TLD Monitoring Station)
- D. SMC TLD Data Summary
- E. SMC Site Map (Water Monitoring Wells Locations)
- F. Radiation Survey Measurements East Pile
- G. RMT Map of the SMC Site
- H. Soil Analysis Results - East Pile
- I. Soil Analysis Results - West Pile
- J. ORISE Water Gross Alpha/Beta Analysis Results
- K. ORISE Water K-40 Analysis Results
- L. Analytical Results for Ferrovan Slag and Zircon Sand

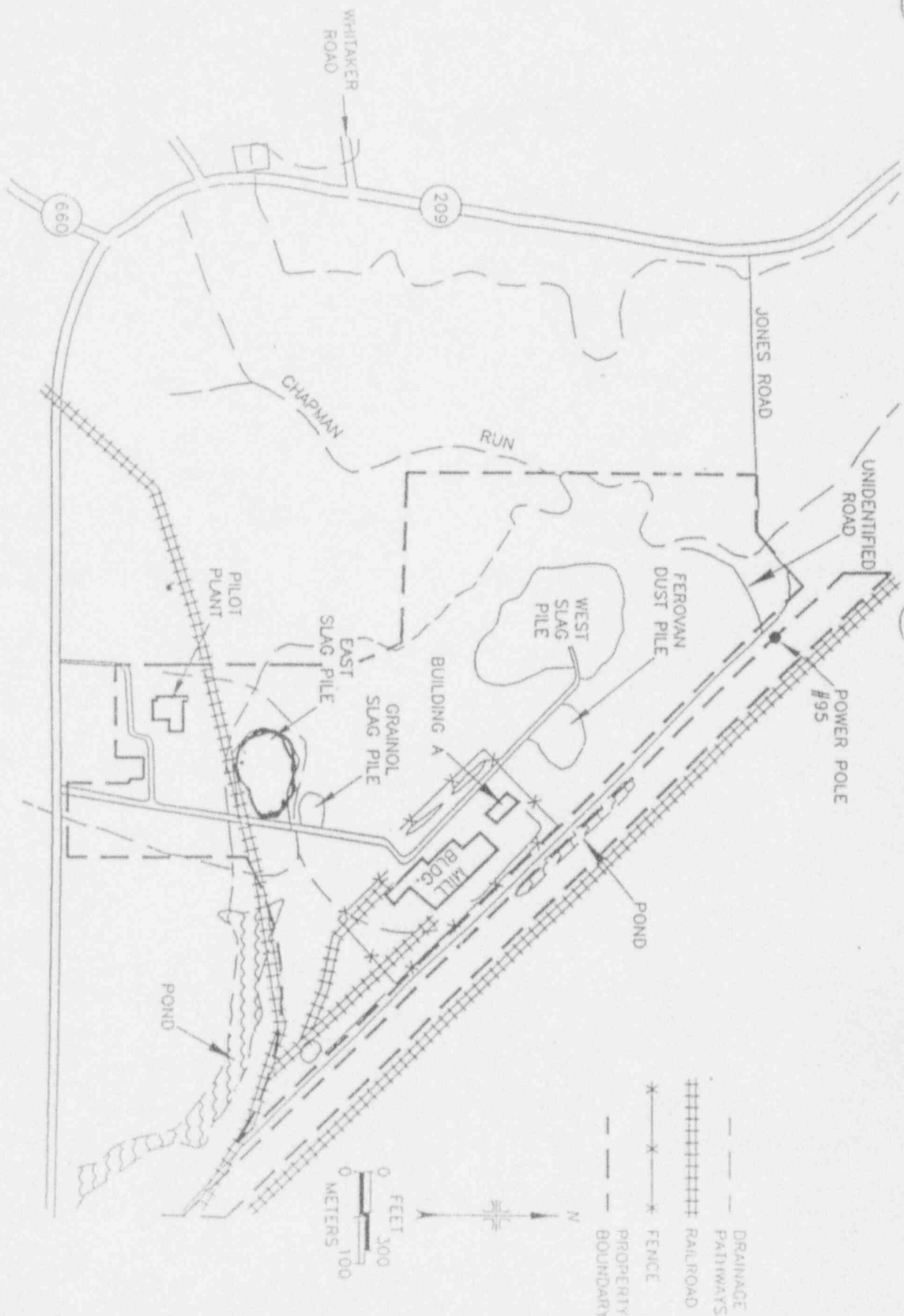
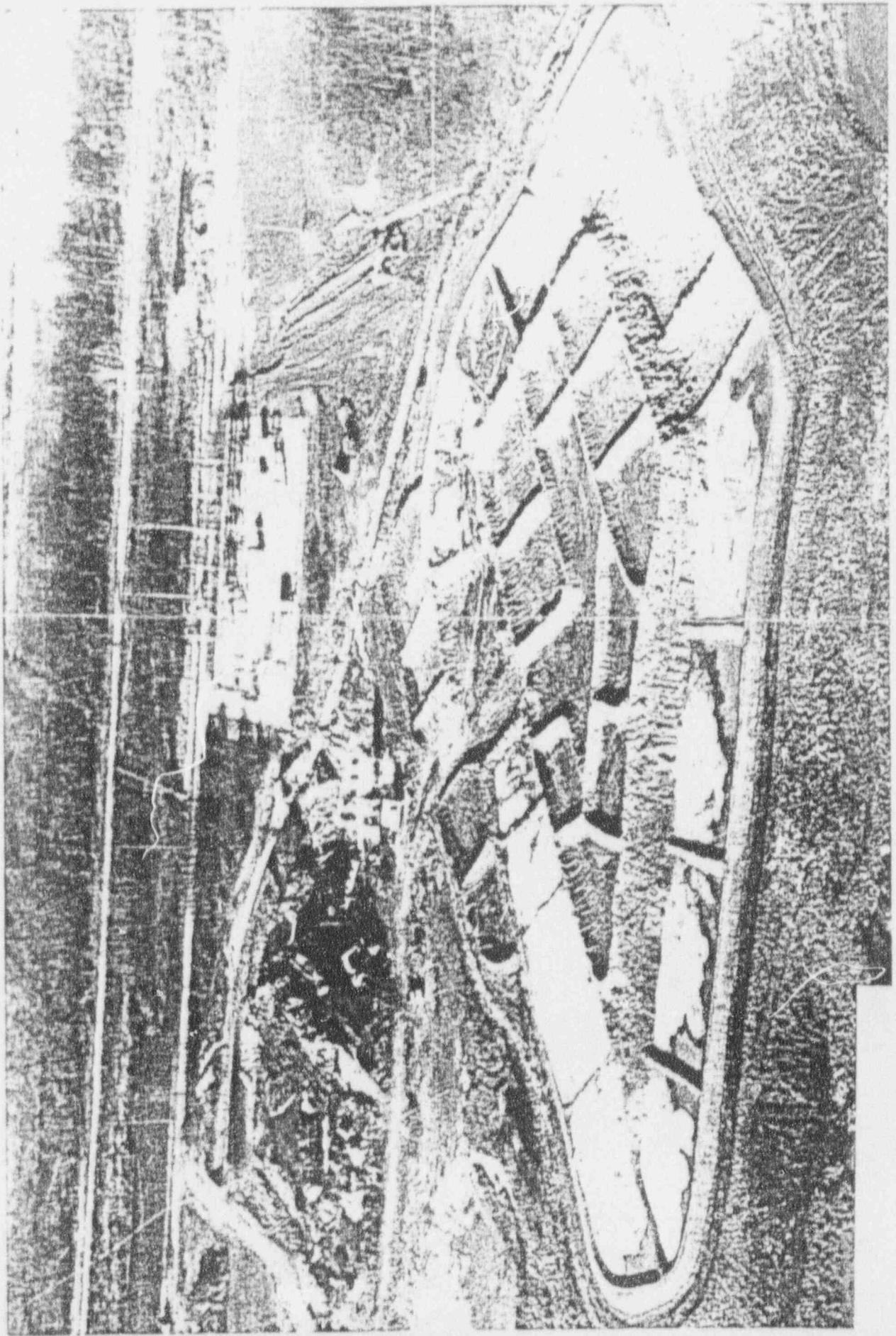


FIGURE 2: Shieldalloy Corporation, Cambridge, Ohio Plant Property Layout Indicating Prominent Surface Features

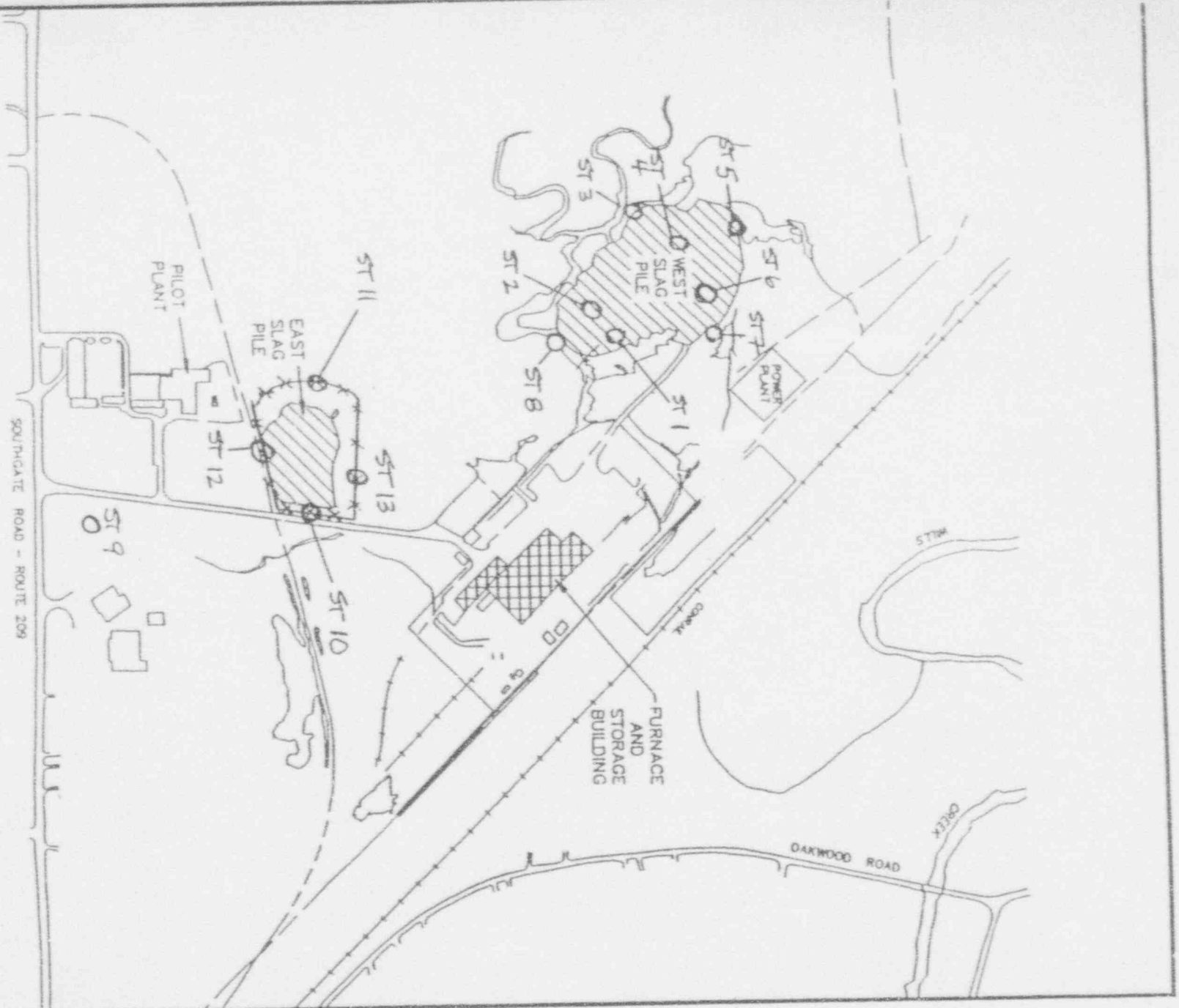




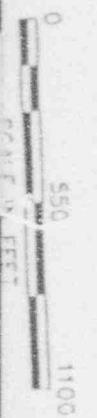
ATTACHMENT B

Page 1 of 1 Pages





STATION 14 AT TAMM'S HOME



	ENSR CONSULTING & ENGINEERING
	FIGURE 1-1 SITE MAP
SHIELDALLOY METALLURGICAL CORP. CAMBRIDGE, OHIO PLANT	



ATTACHMENT D
SHIELDALLOY METALLURGICAL CORPORATION
ENVIRONMENTAL TLD DATA SUMMARY

- Average mrem/month - annualized, for control badge, 3.0 mrem - 36 mrem/year.
- Average mrem/month - annualized, for background badge located at the plant entrance, 3.0 mrem - 36.0 mrem/year.*
- Average mrem/month - annualized, for background badge located at the TAM building, 4.0 mrem - 48.0 mrem/year*
- Average mrem/month - annualized, for the West Slag Pile, 2.0 mrem - 24.0 mrem/year.*
- Maximum mrem/month - annualized, for the West Slag Pile, 5.5 mrem - 66 mrem/year.*
- Average mrem/month - annualized, for the East Slag Pile, 18.7 mrem - 224 mrem/year.*
- Maximum mrem/month - annualized, for the East Slag Pile, 22.4 mrem - 418 mrem/year.* The highest TLD values were consistently those place at the southern portion of the East Slag Pile, Station 12.
- * Background subtracted

ATTACHMENT F

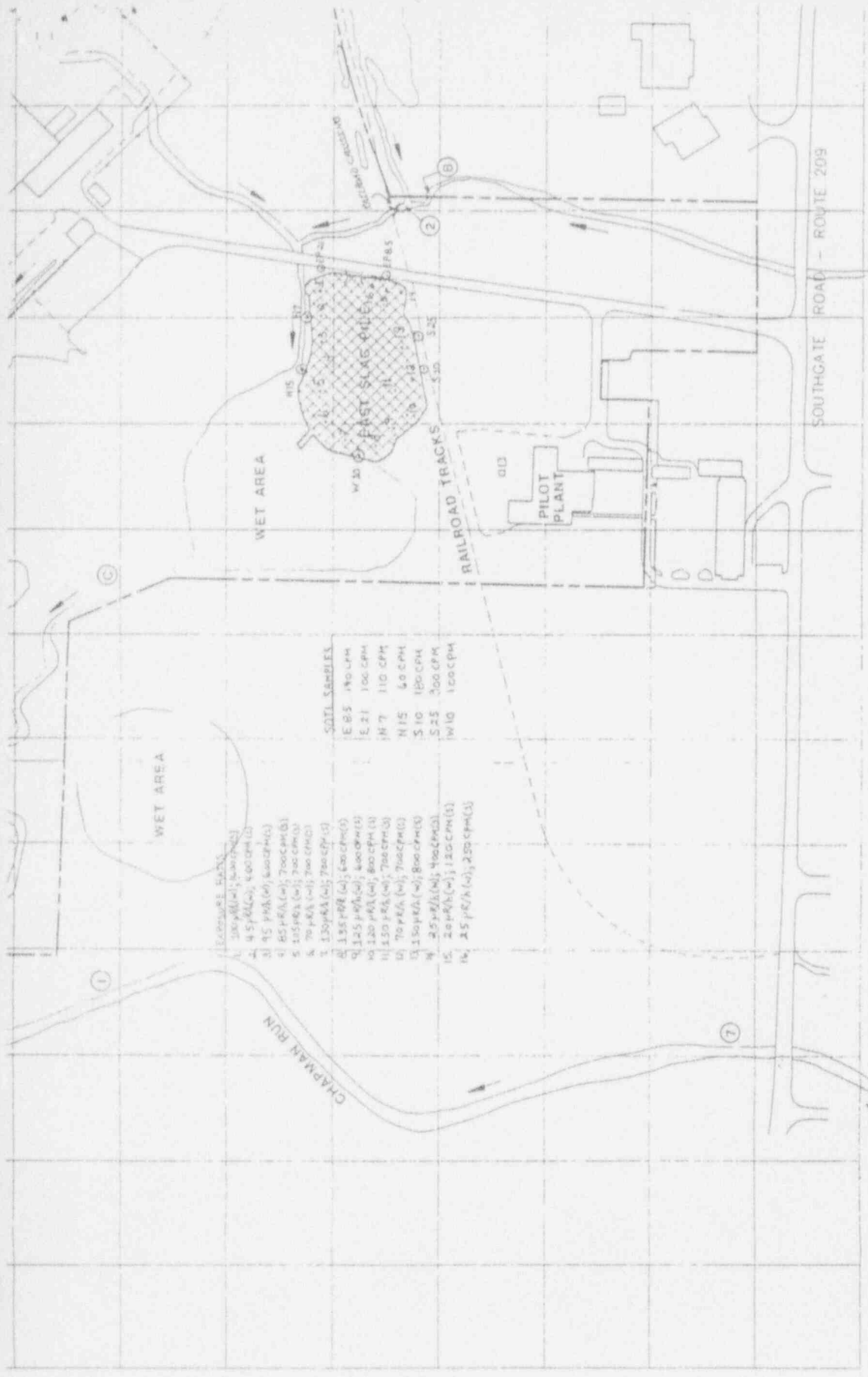
SHIELDALLOY METALLURGICAL CORPORATION

Radiation Survey Measurements East Pile

The following radiation measurements on the East Slag Pile are keyed to numbered locations on NRC Inspector's site map, Attachment G:

- (1) 1,600 counts per minute (cpm) (surface), 100 microreontgen per hour ($\mu\text{R/h}$) (waist)*;
- (2) 400 cpm (surface), 45 $\mu\text{R/h}$ (waist);
- (3) 600 cpm (surface), 95 $\mu\text{R/h}$ (waist);
- (4) 700 cpm (surface), 85 $\mu\text{R/h}$ (waist);
- (5) 700 cpm (surface), 105 $\mu\text{R/h}$ (waist);
- (6) 700 cpm (surface), 70 $\mu\text{R/h}$; (waist)
- (7) 700 cpm (surface), 130 $\mu\text{R/h}$ (waist);
- (8) 600 cpm (surface), 135 $\mu\text{R/h}$ (waist);
- (9) 600 cpm (surface), 125 $\mu\text{R/h}$ (waist);
- (10) 800 cpm (surface), 120 $\mu\text{R/h}$ (waist);
- (11) 700 cpm (waist), 150 $\mu\text{R/h}$ (waist);
- (12) 700 cpm (surface), 70 $\mu\text{R/h}$ (waist);
- (13) 800 cpm (surface), 150 $\mu\text{R/h}$ (waist);
- (14) 400 cpm (surface), 25 $\mu\text{R/h}$ (waist);
- (15) 120 cpm (surface), 20 $\mu\text{R/h}$ (waist);
- (16) 250 cpm (surface), 25 $\mu\text{R/h}$ (waist).

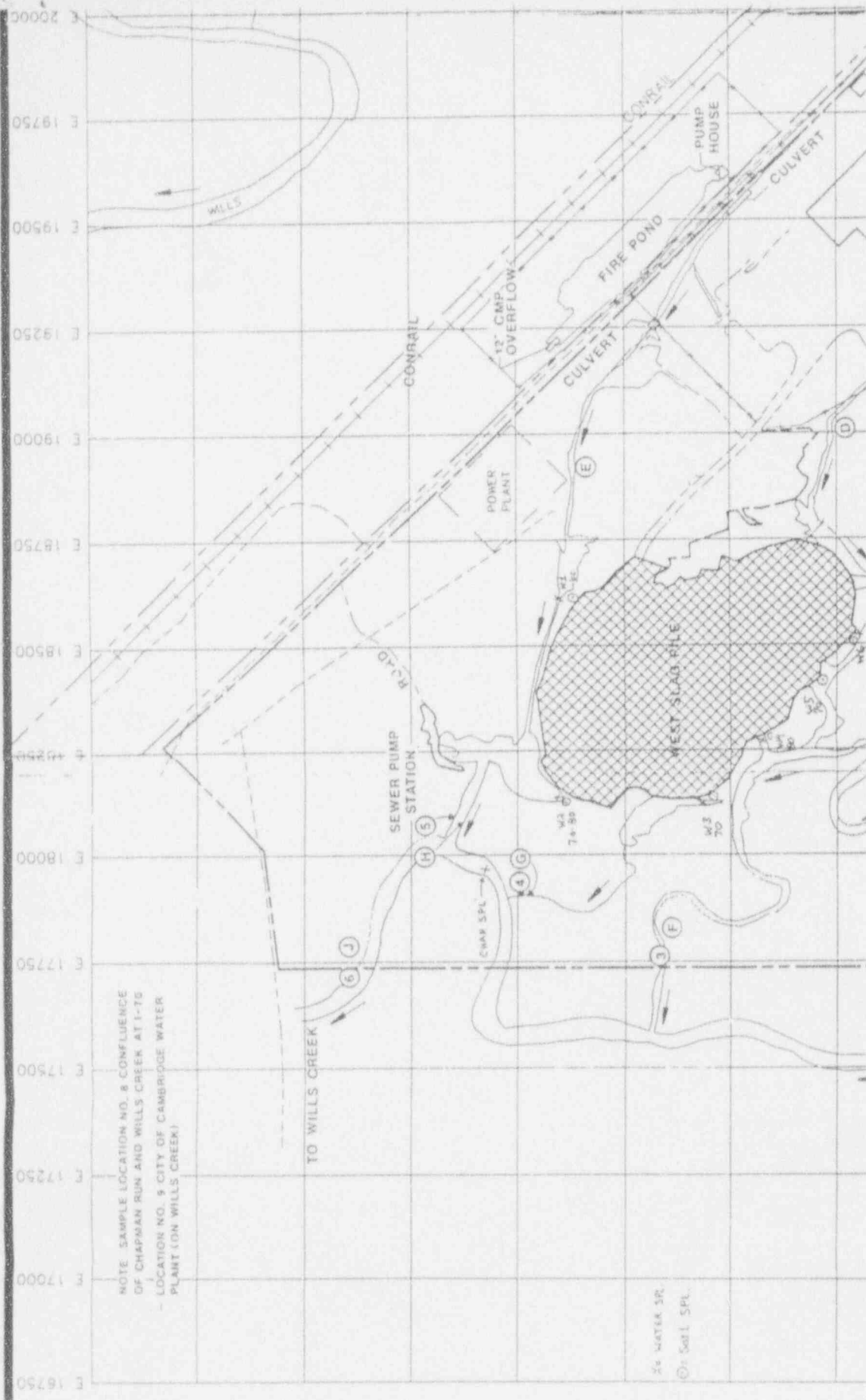
* $10\mu\text{R/h}$ is approximately equal to 2.58 nanocoulomb per kilograms per hour (nC/kg/h)



- 1. 100 pPR (w); 400 cPM (S)
- 2. 45 pPR (w); 400 cPM (S)
- 3. 45 pPR (w); 400 cPM (S)
- 4. 85 pPR (w); 700 cPM (S)
- 5. 115 pPR (w); 700 cPM (S)
- 6. 70 pPR (w); 700 cPM (S)
- 7. 130 pPR (w); 700 cPM (S)
- 8. 135 pPR (w); 600 cPM (S)
- 9. 135 pPR (w); 600 cPM (S)
- 10. 130 pPR (w); 800 cPM (S)
- 11. 130 pPR (w); 700 cPM (S)
- 12. 70 pPR (w); 700 cPM (S)
- 13. 130 pPR (w); 800 cPM (S)
- 14. 25 pPR (w); 400 cPM (S)
- 15. 20 pPR (w); 130 cPM (S)
- 16. 15 pPR (w); 250 cPM (S)

SOTL SAMPLES

E-85	70 cPM
E-21	100 cPM
M-7	110 cPM
N-15	60 cPM
S-10	180 cPM
S-25	300 cPM
W-10	120 cPM



NOTE SAMPLE LOCATION NO. 8 CONFLUENCE OF CHAPMAN RUN AND WILLS CREEK AT 1-75
- LOCATION NO. 9 CITY OF CAMBRIDGE WATER PLANT (ON WILLS CREEK)

1 - WATER SR
2 - SOL. SPL.

ATTACHMENT H

SHIELDALLOY METALLURGICAL CORPORATION

		<u>Analysis of the soil/ sediment samples</u>		<u>Surface Measurements cpm</u>
<u>EAST SLAG PILE</u>		<u>pCi/g</u>		
1.	Sample #7 (North)	Ra-226 Th-232 U-238	0.9 ± 0.04 1.6 ± 0.03 <1.0	110
2.	East Pile-8.5	Ra-226 Th-232 U-238	1.5 ± 0.04 1.3 ± 0.04 <0.8	140
3.	East Pile (North #15)	Ra-226 Th-232 U-238	0.7 ± 0.04 1.4 ± 0.03 <1.0	60
4.	East Pile (#21)	Ra-226 Th-232 U-238	1.1 ± 0.03 1.0 ± 0.02 <0.5	100
5.	East Pile (West #10)	Ra-226 Th-232 U-238	0.5 ± 0.03 0.4 ± 0.02 <0.5	100
6.	East Pile (South #10)	Ra-226 Th-232 U-238	1.3 ± 0.04 1.8 ± 0.08 <0.9	180
7.	East Pile (South #25)	Ra-226 Th-232 U-238	1.5 ± 0.06 1.9 ± 0.08 <1.0	300

Environmental Background values

Ra-226	1.1 ± 0.04
Th-232	1.4 ± 0.03
U-238	<0.9

ATTACHMENT I

SHIELDALLOY METALLURGICAL CORPORATION

<u>WEST PILE SAMPLES</u>		<u>Soil/sediment Sample</u> <u>Analysis</u> <u>pCi/g</u>	<u>Surface</u> <u>Measurements</u> <u>cpm</u>
1.	Sample #1	Ra-226 0.4 ± 0.03 Th-232 0.6 ± 0.02 U-238 3.0 ± 2.5	60
2.	Sample #2	Ra-226 0.6 ± 0.04 Th-232 0.9 ± 0.03 U-238 <0.6	70-80
3.	Sample #3	Ra-226 1.1 ± 0.08 Th-232 1.4 ± 0.05 U-238 <0.6	70
4.	Sample #4	Ra-226 0.6 ± 0.03 Th-232 0.8 ± 0.02 U-238 <0.6	80
5.	Sample #5	Ra-226 0.8 ± 0.07 Th-232 1.3 ± 0.05 U-238 <1.0	70
6.	Sample #6	Ra-226 0.7 ± 0.04 Th-232 0.03 ± 0.03 U-238 <0.5	100

RADIONUCLIDE CONCENTRATION IN SOIL AND SLAG
 SAMPLES FROM SHIELDALLOY
 CAMBRIDGE, OHIO



ATTACHMENT **15**

Page 1 of 1 Pages

GROSS ALPHA AND BETA ACTIVITIES IN WATER

Location or Sample I.D.	Activity (pCi/L) ^a	MDA (pCi/L)
Gross Alpha		
#1	-10 ± 7	14
#2	3 ± 13	24
#3	-27 ± 17	37
#4	-1.4 ± 3.9	7.3
Chapman Run	-5.4 ± 3.3	7.1
#6	-1 ± 5	10
Railroad Crossing-East Pile	3.0 ± 1.4	2.1
Cambridge Reservoir	-0.8 ± 2.2	4.1
Chapman Run	-3.8 ± 2.4	5.1
Gross Beta		
#1	81 ± 14	19
#2	270 ± 30	30
#3	220 ± 40	50
#4	52 ± 8	10
Chapman Run	22 ± 6	10
#6	100 ± 11	14
Railroad Crossing-East Pile	11 ± 2	3
Cambridge Reservoir	8.2 ± 3.8	6.1
Chapman Run	3 ± 9	16

^aUncertainties represent the 95% confidence level based only on counting statistics.

RADIONUCLIDE CONCENTRATIONS IN WATER
SHIELDALLOY, CAMBRIDGE, OHIO

Water Sample #	pCi/L Determined by Gamma Spectroscopy	
	K-40	
1	73 ± 96*	
2	184 ± 83	
3	170 ± 110	
4	<130	
Chapman Run	<120	
6	70 ± 110	
Rail Road Crossing East Pile	<96	
Cambridge Reservoir	25 ± 95	
Chapman Run	<130	



ATTACHMENT # K

Page 1 of 1 Pages

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*Uncertainties represent the 95% confidence level based only on counting statistics.

ATTACHMENT L

SHIELDALLOY METALLURGICAL CORPORATION

Analysis of "Ferrovanadium Slag" and Zircon Sand

<u>NRC Sample</u>	<u>pCi/g</u>
<u>Zircon Sand</u>	
radium-226 (Ra-226)	66.3 ± 0.4
thorium-232 (Th-232)	8.9 ± 0.2
uranium-238 (U-238)	74.4 ± 20.1

Ferrovanadium Slag
(dust)

radium-226 (Ra-226)	1.3 ± 0.07
thorium-232 (Th-232)	1.8 ± 0.05
uranium-238 (U-238)	<0.5

Ferrovandium Slag
(slag)

radium-226 (Ra-226)	1.2 ± 0.03
thorium-232 (Th-232)	1.5 ± 0.02
uranium-238 (U-238)	<0.6

March 1, 1994

MESSAGE NO. 0064

NO. OF PAGES INCLUDING THIS COVER 36

If you do not receive the number of pages indicated
or find they are illegible, please contact

Lidia Stasiuk at (609)692-4200 Ext. 348

TO: Peter Gillon

FROM: CSE *Scott C*

CC: MAF

SUBJECT: Inspection Report/Groundwater history

MESSAGE:

Peter;

Here is the inspection report from the NRC for the Cambridge facility. Per your request, I have also attached two slightly different summary histories of the development of the groundwater situation at Newfield. These two summaries are different only in that they have a different level of detail and one is more recent. The first summary is called "Shieldalloy Groundwater Contamination History" and the second "Summary - Shieldalloy Metallurgical Corporation Groundwater Remediation". If you have any questions, please call.

SHIELDALLOY METALLURGICAL
CORPORATION

DATE: February 28, 1994

TO: DRS

SUBJECT: Sampling of Groundwater for NJ EPA

FROM: LLA *L.L.A.*

Copies: CSE ✓

Having read the guidance document's guidelines for selecting statistical tests for our needs, I recommend that we use Section 7 contained within their Guidance Document. I also recommend the following:

- 1) Explain to the state that we will draw at least four samples at semi-annual intervals as per paragraph 3, Section 7 of the Guidance Document. This is for having a reference method only, as Section 7 is intended for continuous use.
- 2) We intend to plot data as suggested in Section 7.1.
- 3) We will adjust for seasonality once the first year's data is in place as in Section 7.2.
- 4) The method by which we will plot data is by using a combined Shewhart-CUSUM control chart as in Section 7.3.
- 5) If no trends are detected after a two year period, SMC will discontinue sampling.

RECEIVED

MAR 01 1994

DEPT. ENV. SERV.