TRC

Characterization of Slag and Related Materials in the Storage Yard

Prepared for

Shieldalloy Metallurgical Corp.
Newfield, NJ

Newfield, New Jersey

Prepared by

TRC

Windsor, Connecticut

January 2009

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CHARACTERIZATION OF SLAG AND RELATED MATERIALS IN THE STORAGE YARD

DECOMMISSIONING PLAN
SHIELDALLOY METALLURGICAL CORPORATION
NEWFIELD, NEW JERSEY

Prepared for

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Newfield, New Jersey

Prepared by

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January 16, 2009

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1.0 INTRODUCTION

Shieldalloy Metallurgical Corporation (SMC) is planning to decommission its facility in Newfield, New Jersey pursuant to a decommissioning plan (DP), prepared and submitted to the U. S. Nuclear Regulatory Commission (USNRC) and currently under review. The DP proposes to consolidate all licensed materials containing residual radioactivity within a portion of the existing Storage Yard at the site.[1] The consolidated materials will then be graded, covered with an engineered barrier and subject to long-term maintenance and monitoring.

During the manufacture of ferrocolumbium at the site, slag and baghouse dust from the production baghouses were transported to specific locations within the Storage Yard. In addition, materials removed during radiological remediation of various buildings and land areas at the site were also stockpiled within the Storage Yard. Figure 1 shows the Storage Yard with the various stockpiles identified as numbered areas. As part of the DP review process, SMC is performing additional characterization of the various stockpiles of in the Storage Yard in terms of their radioactivity content and their potential for release of radioactivity through leaching.

In July 2007, the USNRC requested additional information in order to complete its safety review of the DP.[2] This request sought additional information on the potential for release of radioactivity from the various Storage Yard stockpiles beyond that submitted in Rev. 1 of the DP. In addition, in November of 2008, SMC provided the USNRC with additional information showing that radionuclides had not migrated from the Storage Yard since the time of initial placement.[3] Nonetheless, SMC agreed to perform additional testing of the materials for their leachability potential pursuant to a protocol that was reviewed, in advance, by the USNRC.[4]

Samples of slag and baghouse dust from three areas in the Storage Yard (Areas 3, 4 and 8) were collected and subject to initial testing for leachability and to determine particle sizes and leach durations for additional testing.[5] Based upon the initial results that are described herein,

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[1] "Decommissioning Plan for the Newfield Facility", Report No. 94005/G-28247, (Rev 1a), Submitted by Shieldalloy Metallurgical Corporation, Newfield, New Jersey, June 30, 2006.

[2] Letter To Mr. David R. Smith, Shieldalloy Metallurgical Corporation, From Keith I. McConnell, Deputy Director Decommissioning and Uranium Recovery Licensing Directorate, Division of Waste Management and Environmental Protection, USNRC, Subject: "Request for Additional Information for Safety Review of Proposed Decommissioning Plan for Shieldalloy Metallurgical Corporation, Newfield, New Jersey", July 5, 2007.

[3] TRC Companies Inc., and Integrated Environmental Management, Inc., "Ground Water Impacts Analysis based on Subsurface Soil Sampling and Groundwater Monitoring", prepared for Shieldalloy Metallurgical Corporation, December, 2008.

[4] Shieldalloy Metallurgical Corporation, "Proposal to Utilize a Modified EPA Method 1312 for Kd Determination for Shieldalloy Metallurgical Corporation Storage Yard Materials", September 4, 2008.

[5] The term "initial testing" does not mean this was the first time materials in the Storage Yard had been tested for

additional testing will be conducted, using a risk-informed approach, on samples selected to be statistically valid and representative of the materials present at various locations within the Storage Yard.

The purpose of this report is to describe how samples will be selected for subsequent analysis, as well as provide the test results for samples that have already been collected and forwarded to the laboratory for testing. Included herein are descriptions of the sample selection protocol, the criteria for choosing samples for leachability testing, the field sampling campaign, and the findings from the preliminary leachability testing. The proposed program for subsequent leachability testing is also described. All of the results from this characterization effort, once completed, will be presented in the Source Term Document.[6]

leachability. Leach tests of various types on the material types that make up the preponderance of the volume in the Storage Yard were in fact performed in 1992 and 2005 as described in Rev. 1a of the DP.

[6] Shieldalloy Metallurgical Corporation, "Source Term Document for the Newfield Restricted Area", Report No. 94005/G-29359 (draft).

2.0 MATERIAL SELECTION PROTOCOL

The selection of the types of materials in the Storage Yard to be subject to leachability testing was based on the combination of statistically-based sampling and the use of an observational sampling approach. Both aspects of the material selection process are described separately in the following subsections.

2.1 Statistical Sampling

An appropriate methodological basis for assuring that the leachability testing results are statistically representative of the leachability of all of the materials in each area of the Storage Yard was similar to that associated with the December 2007 sampling of the soil, concrete and construction debris stockpiles within Areas 1, 2 and 5 in the Storage Yard. That methodology, which followed the guidance in MARSSIM, requires the collection of 17 systematic samples from each of the areas of interest.[7,8] The same statistically-based grid sampling was conducted for leachability testing of materials in the remaining Storage Yard areas, as described in this report. It called for the collection of one slag or baghouse dust sample from each of 17 locations in Areas 4, 6, and 8 and one from each of four locations in Areas 3 and 9, based on pre-set GPS coordinates.[9] Statistical sampling of Area 7 (aluminothermic slag and refractory) was not performed because these materials are similar in nature to those found in Areas 4, 6 and 8, thus their leachability characteristics are similar.

The grid-based samples were collected and submitted for analysis in two phases. For the initial testing, seven grid-based samples were collected from Area 3 (one slag sample), Area 4 (two slag samples), Area 6 (one slag sample) and Area 8 (three baghouse dust samples). These samples were submitted to the laboratory for the initial leachability testing.

Additional samples were collected from the remaining grids in Areas 4 and 8, with the sample locations staggered to reflect a more even distribution of the sample locations across

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[7] U. S. Nuclear Regulatory Commission, NUREG-1757, "Multi-agency Radiation Survey and Site Investigation Manual, MARSSIM", Rev. 1.

[8] Integrated Environmental Management, Inc., Report No. 94005/G-29353 (Rev. 0), "Sampling and Analysis Plan for Radiological Characterization of Selected Materials and Areas at the Newfield Facility", November 6, 2008, page 13.

[9] Statistically-based sampling of Areas 3 and 9 is not necessary. The CANAL stockpiled in Area 3 is comprised of crushed Area 4 slag, thus its leachability would be the similar to that of Area 4 materials except for the difference in particle sizes (i.e., approximately one-inch diameter particles in Area 3 and one foot or more particles in Area 4) and surface areas. Area 9 is comprised of a mixture of slag (Area 4) and baghouse dust (Area 8) and thus should exhibit leachability similar to those areas. Nonetheless, Area 3 and Area 9 were divided into four quadrants and one sample was collected from each quadrant as part of the statistical testing.

these specific stockpile areas. Samples were also collected from the centers of the remaining grids in Areas 3, 6 and 9. These additional samples were archived for future leachability testing, to be performed after the findings of the initial leachability tests were evaluated. A total of 52 additional statistically-based grid samples were collected from Areas 3, 4, 6, 8 and 9 (three from Area 3, fifteen from Area 4, sixteen from Area 6, fourteen from Area 8, and four from Area 9). These samples were collected during the June 2008 sampling campaign, and their locations are shown in white on Figure 1. Those among the grid-based samples that were submitted for initial slag leachability testing are shown in red on Figure 1.

Area 1 (soil mixed with slag), Area 2 (soil from D111, the building where ferrocolumbium was manufactured) and Area 5 (slag and demolition concrete) were previously characterized for their radiological constituents in December 2007, with measured radioactivity confirmed to be indistinguishable from background (i.e., less than a few picocuries per gram). Therefore, the stockpiles in those three areas were not re-sampled as part of the statistical sampling campaign. As noted above, statistical sampling of Area 7 was also not performed, as it was deemed unnecessary. The materials stored in Areas 1, 2, 5 and 7 were nonetheless evaluated during the observational phase of sampling, as described in the following section.

2.2 Observational Sampling

Over SMC's 50+ years of operational history, the various slag types that were generated at the Newfield site were segregated into their own stockpiles within the Storage yard. Over time, however, some co-mingling occurred and materials that are not visually equivalent to the rest of the contents of a given stockpile are occasionally encountered.

In order to identify and evaluate the leachability potential of all material types that may contribute significantly to the volume in a given area within the Storage Yard, visual observations were made of the contents of the nine Storage Yard areas. Observations included general descriptions of the types of materials (including slag materials) present within each pile; any similarities or differences between the composition of the materials observed; and the relative volumes of the various slag types in each area. Samples, hereinafter referred to as "observational samples," were thus collected based upon professional judgment to supplement the statistically-based samples.

For the larger pieces of slag, both the exterior and interior surfaces were examined (i.e., slag pieces were broken using a rock hammer to observe interior characteristics). Characteristics used to differentiate among materials included features such as texture (glassy, vesicles, microcrystalline, coarse crystalline), external and internal coloration, the presence of rinds, and assessment of whether the materials formed as a result of the cooling of the molten slag or subsequently formed by weathering, and the age of the slag (to the extent that it can be determined based on observations of coloration or location of placement within the stockpile). Types and general amounts of non-radiological materials mixed with the slag, such as refractory brick, refractory mould materials, soils, construction debris, etc., were also noted, and samples of these non-radiological (stable) materials were collected.

Thus, in the observational phase of sampling, samples of materials that were visually different from those surrounding them were collected and subject to field screening. The following samples were collected during the observational phase: three samples from Area 1; two samples from Area 2; three samples from Area 4; eleven samples from Area 5; four samples from Area 6; twelve samples from Area 7; one sample from Area 8; and two samples from Area 9. No additional samples were required from Area 3. Therefore, a total of 38 observational samples were collected from eight of the nine stockpile areas at the locations indicated in green on Figure 1.

All observations and the bases for determining which materials were sampled for subsequent field screening were documented through field notes and photographs, which will be included in the Source Term Document. All sample collection points were located and recorded by GPS.

During an NRC site visit on September 30, 2008, NRC noted a linear feature in the surface of the slag within Area 3. This feature was described as a mound with dimensions of approximately 30-foot long by 1-foot wide, by several inches high, with a limited amount of slag that exhibited a greenish-yellow encrusted coating. This linear feature was not observed during the June 2008 campaign. On November 3, 2008, SMC collected two samples of the greenish-yellow-coated slag and shipped them to SMC's Cambridge, Ohio analytical laboratory for metallurgical testing. The general location of the linear feature is shown on Figure 1.

2.3 Criteria for Observational Sample Selection

All of the statistically-based samples were archived for future testing. On the other hand, an observational sample was only designated for future leachability testing if it met selection criteria #1 and #2 below. In addition, one (1) sample exhibiting characteristics of criterion #3 was also selected for future leachability testing. The selection criteria were:

1) The sample is representative of a material type is estimated to make up at least one (1) percent of the total volume of the area from which it was collected; and

2) The radiological field screening of the sample indicates the presence of residual radioactivity that is at least five times that of the ambient background.

3) The sample exhibits a glassy texture and has the highest radiological field screening result.

The first two criteria were used to ensure that only material types of significance in each area were evaluated for leachability.[10] Material types with limited radioactivity content or which make up only a small fraction of the materials in an area would not be selected because their leachability was bounded by that of other materials having higher activity or greater volumes. Both of these selection criteria took into account input provided by NRC Staff. The third criterion was also provided by the NRC Staff who indicated that, based on their past experience, slag samples exhibiting a glassy texture tend to leach radioactive elements more readily than crystalline-textured slag.

[10] These criteria presume that if a material type does not add significantly to an area's volume, the Kd from the preponderance of the material in that area would be applicable.

3.0 FIELD CAMPAIGN

The majority of the samples for initial testing were collected in March 2008, with the remaining collected during a campaign that took place on June 16 through June 20, 2008. The June sampling campaign was a joint effort between TRC Companies, Inc. (TRC) and Integrated Environmental Management, Inc. (IEM). A licensed Professional Geologist from TRC conducted visual observations of the materials in the Storage Yard, collected the observational samples from a number of locations therein, and submitted them to a Registered Radiation Protection Technician (NRRPT) from IEM for field screening pursuant to IEM Radiation Safety Procedure No. Procedure No. RSP-106, "Radionuclide Screening of Slag and Baghouse Dust at Newfield", Rev. 0, June 12, 2008. Additional TRC staff collected and recorded the statistically-based grid samples and also submitted them to IEM for field screening.

3.1 Sample Collection

For the statistically-based grid sampling, the physical and radiological characteristics of each sample were documented in field observation notes and radiological field screening records. As noted, a total of 59 statistically-based grid samples (7 initial samples and 52 supplemental samples) were collected. Their GPS-located collection points are shown in Figure 1.

During the observational sampling, materials that were visually different from most of the other materials within each area were collected and physically described based on the characteristics indicated above in the *Material Selection Protocol* section. The physical and radiological characteristics of each sample were documented in field observation notes, photographs of sample locations, and radiological field screening records. A total of 38 observational samples were collected, with the GPS-located sample collection points shown in Figure 1. In addition, two samples of the above mentioned yellowish-green material were collected from the linear feature in Area 3 and tested for metallurgical analytes.

Appendix A contains a copy of the field notes. Appendix B1 contains the photograph record and associated photographic log for the observational samples as collected out in the field. Appendix B2 contains the photograph record and log for the size-reduced statistically-based grid and observational samples.

3.2 Radiological Field Screening

All of the collected samples were placed into gallon-sized ziploc bags, and the bags were labeled with the sample location identifier and the date and time of sample collection. The samples were then placed in coolers. Later, portions of each sample from Areas 4 and 6 were broken up ("downsized") using a steel sledge hammer until the pieces of material could be placed into a one-liter Marinelli beaker with minimal void spaces. Downsizing was also necessary for leachability testing as described below.[11] The downsizing took place in the Storage Yard, on top of a large steel table that was positioned near the vehicle entrance gate at the northwest corner of the Storage Yard (see Figure 1). After sample downsizing, the samples were transported to Building D117 for processing.

In Building D117, two sample processing areas were designated, the first for sample storage and the second for sample handling and screening. Each sample delivered to D117 was weighed, photographed, and field-screened pursuant to IEM's Procedure No. RSP-106, with ambient exposure rates monitored at least hourly during the screening process.[12] Once the screening of each sample was complete, the aliquot was returned to its respective ziploc bag (or, if necessary, re-bagged and re-labeled), and placed into sample coolers. Sample chain-of-custody forms were then completed for each filled cooler, and the coolers were placed into a locked room within D117 pending future action. Appendix C contains the results of the field screening.

Appendix E contains a summary of the sample identification number, sample collection date and time, sample location coordinates, detailed sample description, estimated material volume within the area (only for the observational samples), photograph identification code, and radiological field screening results of all the sampled materials.

3.3 Field Screening Results

For the statistically-based samples, the field screening results show a clear distinction between slag and baghouse dust. As shown in Appendix E, the statistically-based slag sample

[11] The largest particle size that can accommodated in the leach test reaction chambers is a nominal four-inch-diameter particle. The photographs in Appendix B1 (specifically, see Photo No. 69 for Area 4 and Photo No. 47 for Area 6) clearly show that the particle sizes in these areas are on the order of "feet" rather than "inches". As discussed below, downsizing increases the leachability of the material and increases the conservatism of the radioactivity release determinations

[12] Integrated Environmental Management, Inc., Radiation Safety Procedure No. RSP-106, "Radionuclide Screening of Slag and Baghouse Dust at Newfield", Rev. 000, June 12, 2008.

field screening results range from 114,582 to 1,073,907 counts/2 minutes with an average screening rate of 293,111 counts per minute. The statistically-based baghouse dust samples, on the other hand, have a range of screening activity between 20,493 to 77,200 counts/2 minutes, with an average of 21,300 counts per minute. Given the background count rate adjacent to the Storage Yard of 5,716 counts per minute, the average screening value of the slag is more than 50 times background, while the average activity of the baghouse dust is less than 4 times background. Thus, the average activity of the baghouse dust is an order of magnitude lower than that of the slag.

For the observational slag samples, field screening results ranged from 9,662 to 851,863 counts/2 minutes, with an average screening rate of 71,018 counts per minute. Given the background activity of 5,716 counts per minute, the average screening value of the observational slag samples was about 12 times background, so that the average screening value of the statistically-based grid slag samples was more than four times greater than for the observational slag samples. This indicates that the slag from the statistically-based grid locations, representing the majority of slag within each stockpile, contains higher activity than the observational slag samples, which represent a much lower volumetric percentage of the stockpile.

Area-specific statistics shown in Appendix E indicate that the mean field screening result ranges between 13,012 (Area 1) and 813,086 counts/2 minutes (Area 3). The second highest mean activity is found within Area 4 (292,411 counts per minute), which is similar to that of Area 3 (Area 3 is comprised of CANAL, which is nothing more than down-sized Area 4 slag). The mean of all the combined statistically-based and observational samples from all the areas is 146,167 counts per minute.

Appendix E shows that a total of 19 observational samples represented greater than one percent of the estimated material volume in any given area. This included materials from Area 2 (2-A and 2-B), Area 4 (4-A), Area 5 (5-A, 5-D, 5-E, and 5-K), Area 6 (6-A and 6-C), Area 7 (7-A, 7-B, 7-C, 7-D, 7-E, 7-G, 7-H, 7-J, and 7-K), and Area 9 (9-B). However, only seven of the 19 samples exhibited activity screening rates greater than five times the background activity rate (i.e., greater than 28,578 counts per minute). These were samples from Area 5 (5-A and 5-E), Area 6 (6-A and 6-C), Area 7 (7-D and 7-G), and Area 9 (9-B). None of these samples appear to be similar to, or of the same material as, those collected as part of the statistically-based grid sampling campaign.

As shown in Appendix F, the two samples collected from the linear feature located within Area 3 appear to be the vanadium-rich slag that is colloquially referred to as "Canal Lite" (i.e., a mixture of ferrocolumbium slag and ferrovanadium slag with a total source material content of less than 0.05% by weight). Photographs of the linear feature and collected samples are also included in Appendix F.

4.0 LEACHABILITY TESTING

The purposes of the leachability testing described in this report were two-fold. First, the testing sought to determine the optimum leach time for each material type and size. Second, an assessment was to be made of the dependence of the leach solution chemistry on particle size

Two samples of slag from Area 4, one from Area 3, one from Area 6, and three samples of baghouse dust from Area 8 were used for the initial tests. Testing was performed pursuant to modified EPA Method 1312 (U.S. EPA, 1990), commonly known as Synthetic Precipitation Leaching Procedure (SPLP), for the determination of distribution coefficients (Kd) [13]. (The modifications to the standard test were made to account for the physical configuration of the materials in the Storage Yard (i.e., large rocks instead of soil), and were provided to USNRC staff for review and concurrence.)[14] Appendix D contains the Certificates of Analysis, a tabular summary of results, and an interpretation of the results.

The following observations about the leachability of radioactive and stable elements from the materials in the Storage Yard can be made based on the results of the initial testing:

1. Despite the aggressive conditions under which the leachability tests were performed, only the radium isotopes (i.e., Ra-226 and Ra-228) in the slag leached in significant enough concentrations relative to the solid concentrations (i.e., calculated Kds would be lower than for the other radionuclides) to merit further consideration of potential future impacts to ground water.[15] All of the other radionuclides exhibited low leach potential, (i.e., calculated Kds would be high), reflecting a strong affinity for the solid matrix over the solution. The leachability of radionuclides from the baghouse dust was also insignificant relative to the solid concentrations despite the higher surface area to volume ratio of this material (i.e., calculated Kds would high).

2. For all radionuclides, leachability was highly dependent on slag particle size and the ratio of surface area to volume. The data show clear trends of lower concentrations for all constituents in the leachate as the slag particle size increases and the surface/volume ratio decreases.

3. The time needed to achieve equilibrium between the solids and the leach liquids cannot be definitively determined from the test data acquired to date, which is likely attributable

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[13] Distribution coefficients, or Kds, can be determined from the SLPL results by simply dividing the concentration of the element in the solid aliquot by the concentration in the leach solution, then applying the appropriate conversion factors such that the results are displayed in units of microgram per milliliter.

[14] Shieldalloy Metallurgical Corporation, "Proposal to Utilize a Modified EPA Method 1312 for Kd Determination for Shieldalloy Metallurgical Corporation Storage Yard Materials", September 4, 2008.

[15] The samples were submerged in the leach fluid for the duration of the testing. In-situ rain falls onto and runs off of the stockpiled materials, with no pooling underneath. The slag piles in the Storage Yard are never submerged.

to the use of different solid aliquots for the performance of each test that made up a given time series. [16]

[16] Due to the number of analytes and the solution volume requirements for their analysis, and in order to maintain the mass/volume relationship of the SPLP test protocol, a different reaction chamber with a separate solid aliquot was prepared for each leach duration in a time series. Therefore, the heterogeneity of the solid test particles was manifested in inconsistent changes in solution chemistry within a given time series.

5.0 INTERPRETATION OF FIELD SCREENING AND LEACHABILITY TEST FINDINGS RELATIVE TO SUBSEQUENT LEACHABILITY TESTING

The findings of the field-based screening of samples and the initial leachability testing were used to define the scope of the subsequent leachability testing. The following observations and conclusions as to the conduct of subsequent testing were reached:

1. Further testing of Area 8 (baghouse dust) samples is unnecessary because of low radionuclide concentrations in the baghouse dust and insignificant leach concentrations relative to solid concentrations. The existing data support the conclusion that these materials make an insignificant contribution to long-term radioactivity releases from the site.

2. Because radium isotopes (i.e., Ra-226 and Ra-228) are the only radionuclides that leached from the slag samples in significant enough concentrations relative to the solid concentrations, subsequent testing of slag samples is only necessary for the radium isotopes,. (Analysis for aluminum and calcium will also be included as a means of confirming that equilibrium has been reached).

3. The leachability of radionuclides was demonstrated to be highly dependent on slag particle size and, therefore, the ratio of surface area to volume. In consideration of the extremely conservative nature of the leach tests, which used slag particle sizes (12-mesh and down, approximately 1-inch and approximately 4-inch) that are much smaller than the average particle size of the slag in the Storage Yard (in all cases slag had to be crushed in order to attain these small particle sizes), subsequent tests of slag samples from all areas except Area 3 will only be performed on the 4-inch particle size, which is the largest particle size that can be accommodated in a laboratory reaction vessel. The testing of the slag samples collected from Area 3 will be performed on the material as received without further size reduction, since the materials in that area are already downsized.

4. The use of different solid aliquots for the performance of each test that made up a given time series analysis resulted in an inability to determine the length of time required to reach equilibrium between the solids and the leach liquids. This is attributed to solution concentration differences stemming from small-scale heterogeneity of the aliquots (i.e., localized variability in grain size, modal mineralogy and the presence of interstitial glass). Therefore, subsequent testing will utilize a single solid aliquot and solution in a time series for the duration of the test period. The solution will be sampled for analysis at 3, 7, and 14 days, or longer times, if necessary, until equilibrium is clearly established.

5. The solids and the extracted liquids in each reaction chamber will be analyzed only for radium isotopes, aluminum, and calcium (aluminum and calcium will assist in the determination of equilibrium). In addition, the concentration of these elements in the test chamber solids will be determined after leaching is complete. Restriction of the analytes

to these three constituents, and post-leaching assessment of solids concentration will enable acquisition of time-series data from a single solid/solution in a single reaction chamber.

Subsequent testing of the archived statistical-based samples and observational samples will be conducted using the procedures developed for the initial testing, as modified by the recommendations listed above.

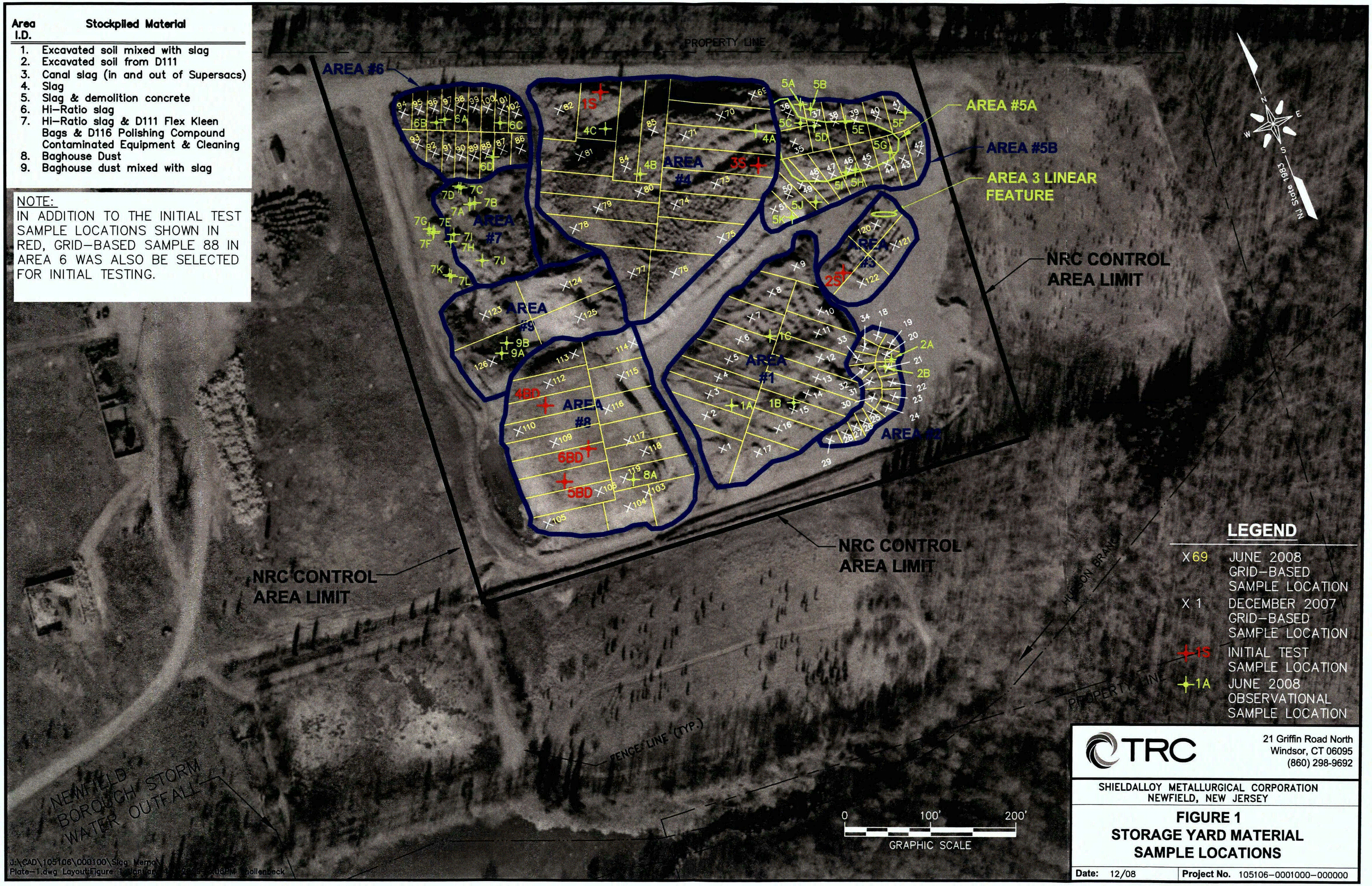
6.0 FUTURE TESTING ACTIVITIES

A determination is being made as to the leachability potential of the materials in the Storage Yard as part of the decommissioning planning process for the Newfield site. To make this determination, a total of 59 samples were collected from statistically-based locations within Areas 3, 4, 6, 7, 8 and 9. Seven samples were evaluated during initial leachability testing. All of the remaining samples, with the exception of those from Area 8 (which will be excluded from further testing as not a potential source of significant radioactivity leaching) remain archived and will be tested for conductivity and Ra-226, Ra-228, aluminum, and calcium leachability pursuant to the initial testing protocol, modified as recommended herein.

A total of 38 observational samples were collected from Areas 1, 2, 4, 5, 6, 7, 8 and 9. However, only seven of those met the criteria established for leachability testing (i.e., the sample be representative of a material type that makes up at least one percent of the volume of the area from which it was collected; and the radiological field screening of the sample indicate the presence of residual radioactivity that is at least five times that of the ambient background). These seven samples selected for testing included: 5-A, 5-E, 6-A, 6-C, 7-D, 7-G, and 9-B. A third leachability testing criterion, that a slag sample with a glassy texture that exhibited the highest radiological field screening result be considered, was met for sample 5-H, which had the highest activity (167,572 counts/2 minutes) of all the glassy-textured observational slag samples. Therefore, a total of eight (8) observational samples will be tested for conductivity and Ra-226, Ra-228, aluminum, and calcium leachability pursuant to the initial testing protocol, modified as recommended herein. All test results will be captured in the Source Term Document.

Area I.D.	Stockpiled Material
1.	Excavated soil mixed with slag
2.	Excavated soil from D111
3.	Canal slag (in and out of Supersacs)
4.	Slag
5.	Slag & demolition concrete
6.	Hi-Ratio slag
7.	Hi-Ratio slag & D111 Flex Kleen Bags & D116 Polishing Compound Contaminated Equipment & Cleaning
8.	Baghouse Dust
9.	Baghouse dust mixed with slag

NOTE:
IN ADDITION TO THE INITIAL TEST SAMPLE LOCATIONS SHOWN IN RED, GRID-BASED SAMPLE 88 IN AREA 6 WAS ALSO BE SELECTED FOR INITIAL TESTING.



LEGEND

X 69	JUNE 2008 GRID-BASED SAMPLE LOCATION
X 1	DECEMBER 2007 GRID-BASED SAMPLE LOCATION
+ 1S	INITIAL TEST SAMPLE LOCATION
+ 1A	JUNE 2008 OBSERVATIONAL SAMPLE LOCATION

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FIGURE 1
STORAGE YARD MATERIAL SAMPLE LOCATIONS

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APPENDIX A

TRC FIELD NOTES

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Field Book 1

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SMC
Storage Yard
Kd Determination

6/16/08 Weather: Pt. cldy, warm, hazy mid-upper 80s

12:20 Larry Burtlien arrives at SMC
Meet Chris Carlson & Brian Ross
12:45 Dave Smith arrives; takes LB & BR on driving tour of piles. CC downloading new GPS points from TRC Windsor
13:20 David White (Metalurg) arrives
LB, DS, DW discuss sampling strategy, procedures
13:45 CC & BR drive out to Storage Yard to set up
14:00 Alan Duff (IEM) arrives
Further sampling discussions with LB, DS, DW & AD
14:30 LB & AD arrive at Storage Yard
AD gives "tailgate" HASP discussion, major hazard is falling on unstable.
AD indicates that highest activity is on the "CANAL" pile (Area 3) and we should not stand on pile unless we are actively doing work on it.

6/16/08

AD uses radi meter to determine that the background activity is 1-2 mRem while standing adjacent to piles. Radioactivity drops to 0.5-1 mRem ~ 15' away from piles

15:00 CC & BR begin marking "tick" marks where the grid lines intersect edges of Areas 3, 4, 6, 8 & 9
TRC has added grid locations to Areas 3 (4 samples actually 3 due to previous sample collected from this pile) and Area 9 (4 samples) as per conference call w/ NRC representatives on 6/13/08.

15:15 LB & AD begin to conduct a preliminary survey of the Storage Yard piles. Walked over Areas 7, 9, 8, 1, 3, 5 & 4. Area 4 is very unstable and very high (~30 ft). Find

6/16/08

"easier" access route to top of Area 4 thru NW side of Area 5

LB gets preliminary understanding of variability of materials in the piles.

AD clarifies w/ Carol Berger (IEM) that the samples collected at the pre-determined GPS points must show significant radioactivity to justify sending to laboratory; if selected sample does not exhibit significant radioactivity, another sample nearby w/in the grid should be collected & screened for rad. Only samples showing significant rad. will be sent off to lab for Ra testing.

Also LB checks w/ Tom Oliva (TRC) to confirm this strategy - Yes and to ask whether samples selected for rad. screening should be surveyed w/ GPS. JO says should probably make

6/16/08

locate (w/ GPS) all samples taken off pile for rad screening regardless if they exhibit high or low rad.

LB indicates that the "observational" sampling will identify samples as follows:

Pile Area # - A, B, C, ...etc.

For example an observational samples collected from Area 9 will be identified as 9-A, 9-B, 9-C, etc.

The 17 samples collected from the Focused Areas (3, 4, 6, 8 & 9) will be identified as:

3-120, 3-121, etc.

1740 Strong thunderstorms moving into area. Decide to stop field activities for day.

1745 LB, CC, BR & AD leave site for day.

L. Butler

6/17/08 Weather: clear, breezy 65°F
Temps going up to 80°F

0705 LB arrives at Storage Yard site
AD onsite - LB signs HAS form
0720 CC & BR arrive onsite
- Setup for day -
review HAS tailgate meeting

0745 mob to Area 7 start at slag pile on north end of pile
Combination of friable slag, chunks, friable by products (fine grained ("soil") and (~20%) large "button" slags (~30%)

Friable slag has honey comb texture (cooling cracks) (~30%)
0805 collect sample of "soil"
I.D. # 7-A

Friable slag light to dark gray w/ an outside with lighter / white material on inside
N pile makes up ≈ 50% of Area 7

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0810 Collect sample of friable slag #7-B
Take 3 photos
#1 SE side of pile
#2 close up of 7-A "soil"
#3 " " " 7-B friable slag

On northeast side of N pile find more durable slag ≈ 6" diameter ≈ 40%
Type 1: Dark grey-black-purple w/ pumice texture but dense highly vesicular ≈ 20% of this portion of N pile
≈ 8% of N pile
Type 2: Grey - dk grey - fine grained dense w/ elongate cooling crystals ≈ 80% of this portion of N pile or ≈ 32% of N pile.

0820 Sample 7-C Type 1
" 7-D Type 2

Type 1: Fresh broken surface is lighter color w/ same vesicular texture
Type 2: Fresh broken face similar to unbroken face, w/ fine grained crystalline texture

Photos
#4 NE side of pile
#5 closeup of samples 7-C & 7-D

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Look at "west" pile w/in Area 7
Consists of mainly soil (~70%)
w/ concrete blocks (broken) (~10%)
and other various slag (~20%). This
pile makes up ≈15% of Area 7.

0840 Collect sample of soil
#7-E
Soil - Brown F Sand, little
F-M Gravel; little-trace slag piec

0845 Collect sample of concrete
lt. grey - white concrete w/
F-M Gravel - when broken open
yellow - lt. green color
#7-F

0848 collect sample of slag #7-G
Black coarse grained crystals
w/ little vesicles

Photos #6 General shot of west pile
looking NE
#7 closeup of 7-E and 7-F
#8 " " 7-G

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0900 Move to "center" pile w/in Area 7
Looks similar to friable slag
seen in "north" pile (~45%)
On N side of pile - crushed slag
is dk grey - black (~(50%))

0905 Collect sample of dk grey - black slag
#7-H
On top of pile is dense brown
to iridescent - color slag, with
numerous vesicles (~5%)
0907 Collect sample of dense brown/iridescent
slag #7-I

Photos #9 General shot of middle
pile looking N note lighter
colored slag on right / darker
colored slag on left
#10 Closeup of dark slag
#11 " " brown/iridescent slag

0915 Move to Concrete block pile SE corner
Large 1-4 feet across concrete
blocks w/ steel rebar w/in
Collect sample #7-J

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~~Photo~~ 12 Concrete pile looking E

0920 move to pile "outside" of Area 7 just to the SW but will include this w/in Area 7

Sign on W side of pile on ground indicates "CB-NITECH-RE-FACTORY"

Pile consists of ~80% "Soil" lt. grey to brown coloured F. Sand and Silt w/ little F-C grained Gravel sized slag pieces

~10% Purple, glassy slag

~10% Refractory brick

0928 Collect sample of "soil" #7-K

0930 " " " purple, glassy slag #7-L

Photo 13 General photo of pile looking W

14 Closeup of sample location

15 " " sign

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1000 Mob to Area 5

LB & AD conduct walking survey of area.

Area has mixture of building debris, slag, and soils from "haul road".

1040 Start on NW corner of Area 5

lt. grey - grey "soil" mixed w/ refractory brick & concrete blocks & slag. lt. yellow Brick has "BENEZET" on it

soil <5% of pile at Area 5

According to DS, over 95% of materials in Area 5 was from [illegible]

1045 Collect sample of grey "soil" #5-A

1050 Collect sample of brick #5-B

Photo 16 NW corner of Area 5 looking S

17 Closeup of "grey" soil

18 " " brick

Behind (south) of grey "soil" is a soil/slag mixture pile

slag looks similar to slag in Area 6. Subpile [illegible] of Area 5.

Soil is lt. brown F Sand and Silt

Soil (~60-70%) Slag (~30-40%)

1100 Collect sample of lt. brown soil w/ some slag #5-C

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Photo 19 Hbrown soil/slag pile

20 Closeup of area

Immediately to left (east) of this soil/slag pile is larger soil pile w/ vegetation growing on it

Soil is brown - red brown F. sand some silt, little F-M gravel, tr. slag pieces Subpile ≤ 10% of pile.

1116 Collect sample of soil pile #5-D

photo 21 General soil pile looking S

Sample collected w/in 5 ft of previous sample collected in Dec. 2007 #5-3? (1-2')

Photo 22 closeup of #5-D

23 wider angle shot of sample locations 5-A thru 5-D taken from road looking S

1120 Move further to east; another soil/slag pile w ~ 50% soil/ 50% slag slag is lt. gray - grey in color

1124 Collect sample of soil/slag #5-E

Photo 24 Soil/slag pile looking S

25 closeup of soil/slag pile

Subpile ≤ 5% of Area 5.

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Moved to far NE corner of Area 5

Found more refractory brick which is dk. red color and has "Chromex-B" imprinted on it

1132 Collect sample of brick #5-F

Photo 26 closeup of dk red brick

Red brick < 1% of pile at Area 5

NE corner climbed ~ 50 ft into piles toward SW found large forms of slag material which are < 1% of pile.

Photo 27 Cross-sectional photo of form showing purple cooling rind on outside surface w/ lighter purple layering ~ 1 inch away from outside. Then 2-3" thick light colored fine grained layer. Below is a very coarse crystalline textured zone w/ small square-shaped pattern forming a honey comb texture

When breaking this material w/ hammer got a brief sulfer odor

1140 Collect sample of slag #5-G

Photo 28 Closer view of slag material

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photo 29 longer scale view of slag looking toward W-NW taken from road

1200 move further toward SW and found pile w/ black glassy textured slag. Glassy texture has large crystal faces & appears to be toward inside of slag mound. Toward outside of mound crystals are smaller and somewhat elongated

1201 collect sample of black glassy slag #5-H

Photo 30 shot of slag pile w/ large chunks of black glassy slag

31 closeup of black slag note chunk behind sample location w "FEV" painted on it Ferro Vanadium

Black glassy slag ±15% of subpile but < 1% of Area 5.

Find lt purple/pink slag w/ vesicular texture makes up ~ 80% of this one subpile adjacent to black glassy slag < 1% of Area 5

1215 collect sample of lt. purple/pink slag #5-I

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Photo 32 closeup of lt. purple/pink slag

33 wider shot of pile w/ lt. purple/pink slag mixed in

34 closer shot of same area

1220 Find black greasy substance on far SW corner of Area 5 right next (north) of baghouse filters

pile about 20' long x 10' wide x 2-3' high ±1% of Area 5

Collect sample of black material #5-J

Photo 35 shot of black substance looking W

1245 Break for lunch lock up gate & sign out

1345 [illegible] & BR back onsite

LB + AD talk to Dave Smith

1415 LB + AD arrive at Area 2

Survey the area, find soil/concrete debris piles

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1430 Find soil/small slag piles w/ green coloration on slag

A total of 3 green tinged piles exist in area (~15%)

10+ piles w/ brown sand soil material (~70%)

2 or 3 piles of just concrete (~15%)

DS indicates that green tinged piles may have come from DY02

1440 Collect sample of green tinged soil/slag. Soil matrix is dk brown - lt. green. Slag is lt. green - lt. grey; Sample #2-A

1445 Collect sample of brown sand soil w/ concrete debris

Soil - Brown F sand, little M sand, little F-M gravel (cobb. pebbles) little slag (1/4"-1" diameter), Sample #2-B

Photo 36 shot of green pile (right) next to brown pile (left) looking W taken from road

37 closeup of green pile

38 " " brown pile

6/17/08

1450 Move to Area 1 - largest pile in entire Storage Yard

1450 - LB Surveys entire Area 1

1520 Vast majority of pile (>90%) is brown soil F. sand & silt, little F-M gravel (pebbles)

≤10% is composed of various slags many of which were seen in other areas

1500 Find pile w/ green glassy texture slag w/ large crystal faces w/ micaceous texture <1%

Collect sample #1-A

SW Quadrangle

Photo 39 Green slag pile

40 closeup of green slag

1510 Found a dense brown to dk brown slag w/ no vesicles, no iridescence w/in a soil pile located near the south-central part of Area 1 <1%

Collect sample #1-B

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Photo 41 Brown slag in soil pile looking S

42 Closeup of slag

1515 Found pile w/ brown vesicular w/ irridescence slag, w/ white crusty material on surface of slag

White crusty material is quite durable and appears to have formed as part of cooling process or as secondary mineralization

located approximately in the center of Area 1 < 1%

Collect sample of brown slag w/ white material #1-C

Photo 43 photo of brown slag pile looking S

44 Closeup of brown slag

1530 - 1800 Drove around w/ DS to show him progress thus far and discuss source of various building debris

6/17/08

1835 All leave site for day.

Larry Buttlien

6-17-08

20

6/18/08 Weather: Clear 62°F

1705 Going up to upper TOs
TRC + IBM Pt Cloudy
arrive onsite
Sign in North Gate Log Book

0730 CC + BR Start to collect
17 grid-based samples from
Area 4
LB continues Area 6 samples
Not a large amount of variability
in samples observed.
Generally a Grey fine-grained crystalline
texture for a majority of samples
Several samples have very coarse
grained-platy crystals which
may reflect differential
cooling of the slag.

0835 Start to Observe the
materials in Area 6 (LB+AD)
General observations: W side
of Area 6 has partial and
fully intake "pot buttons" 3-4' diameter
Approx. 70% of the buttons
are 18" to 24" thick; the

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other 30% of the W part of pile
is made up of buttons that are
3-5 feet thick. western portion makes
up ≈ 30-40% of Area 6.
The East half of the pile (≈50% of Area)
has many more partial buttons
that are 18-24" thick and
smaller diameter 24-30" diameter
w/ numerous white mineralization
in the cracks (secondary mineralization)
some of which has a "califlower"-like
texture.

In the general center of pile ≈ 15 ft
S of the "Northern" line of grid samples
I find numerous partial buttons
that have a green tinge. The
buttons are highly vesicular
and dense. Broken surfaces
still exhibit green ting but also
a grey - dk grey finer-grained
crystalline structure. makes up
≈10-15% of Area 6.
0920 Collect sample of green ting slag
#6-A

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Photos 45-48
Panorama photos of western half of Area 6 (from SW to NW) showing large buttons

Photo 49 Photo of sample #6-A location
50 " of Green buttons looking N
51 Closeup of green button

0950 NRC arrives w/ DS

0955 Collect sample of outer cooling ring of button. dk brown - dk purple crystalline texture, somewhat Friable
Sample #6-B makes up <1% of pile

Photo 52 Photo of outer cooling rind #6-B
1000-1100 53 Closeup of cooling rind
CB talks to Robert Johnson an Alan Fetterer about sampling program thus far.

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1120 ~~Move~~ CB & BR Move to E side of Area 6 to the smaller button area w/ the "cauliflower" secondary mineralization
Collect sample of cauliflower & slag material. Slag makes up ≈50% of Area 6.
#6-C
Button has cooling texture w/ bluish platy minerals toward interior of button. white sec. mineralization associated w/ fractures; ≈5% of each slag button.

Photos 54-55
Panorama of Eastern end of pile Area 6 looking NE to E
Photo 56 Closeup of sample location #6-C

1135 SE corner of Area 6
Collect white Refractory Brick material which is often found at base? of buttons
Sample #6-D <1% of pile
Photo 57 General area of brick collection looking E
58 Closeup of sample area.

1145 - 1150 LB & BR inspect white/A.grey "road" located between Area 4 and Area 1.
According DS, this is "lime" material
Appears TRC has already collected samples of this same material in Area 9

1155 I a the far SW corner of Area 5 LB finds pile of white material that is ≈ 30 ft long + 20 ft wide x 6 ft high <5% of Area 5 Pile
Materials on outer surface has a "corn flake" texture. When digging into pile has creamy white color w/ clayey texture

Collect Sample #5-K

Photo 59 photo of white material looking toward NE while standing on soil pile in Area 1
60 Closeup of sample

1215 LB, AD and BR break for lunch
NRC leaves site for lunch as well
1325 TRC, IEM & NRC back onsite
1330 - LB, CC & BR inspect Area 8
1345 Find NE quarter of top of baghouse dust pile is not covered w/ the gunite material and it exhibits an extensive amount (30-40%) of slag material. Slag appears to be similar to slag in Area 4
lt grey - grey fine grained slag
Area 8 pile is 10-15 feet high (thick)
Photo 61 Photo of NE quarter of Area 8 showing lack of gunite and slag material on surface looking N photo taken from SE corner of pile

1345 Collect sample of gunite
dk grey - black fine grained matrix w/ F-M gravel, gunite ≈ 3 x 1-1.5" thick which is <1% of Area 8.
Sample #8-A

Photo 62 Photo of pyrite sample area SE corner of pile near (~10ft SE of 8-119)

1415 Move to Area 9
Find dark colored slag area ≈ 50' long + 30' wide & 6-7' high
Slag is extensively vesicular in texture as part of partial buttons
Within pile find bluish grey opaque slag or refractory material
material exhibits concoidal fracture
~~This~~ material is ~~__%~~ of pile of dk slag
1425 Collect sample of bluish grey material #9-A

1500 Collect sample of the black to dk grey vesicular slag, very dense
makes up ~90-95% of this pile. The black slag pile makes up ≈ 10-15% of Area 9.
Sample #9-B

Photos 63 View of black slag pile in Area 9 look toward S

Photo 64 Closeup of bluish gray material #9-A
65 Closeup of black slag #9-B

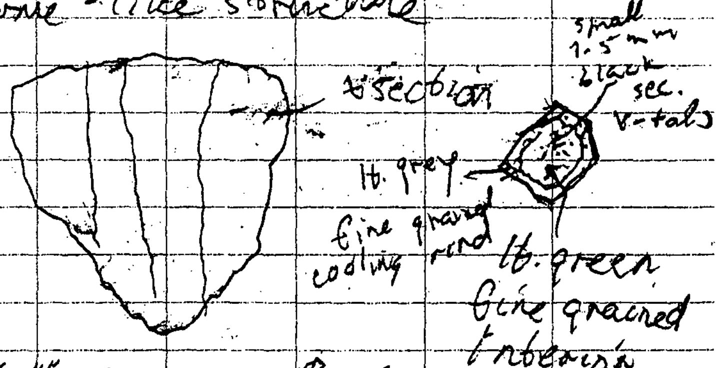
1530- NRC leaves site and final discussions w/ LB, CC&BR

1600 Move to Area 3 for inspection

lt. grey - grey Gravel sized material ~85% <> 0.5-1.5" diameter
~15% lt. brown color
Fine-grain texture
This is the "CANAL" slag which is the crushed material from Area 4

1610 Move to Area 4
Find the "Russian Highway" which is the linear path running from the NE corner of Area 4 towards the SW. This slag material was reportedly obtained from Russia in the slag/alloy process

Find hexagonal-shaped slag which tapers to ≈ 1-2" diameter on one end & 4-8" diameter on the other end. The hexagonal slag structures are contained w/in a larger dome-like structure



This "path" makes up ≈ ≤ 5% of entire Area 4 pile.

1620 Collected sample of hexagonal material #4-A

Photo 66 Photo of "Russian Hwy" looking toward SW

67 Closeup of x-section of Hex structure

68 shot of "dome structure containing hex structures

Towards top of pile find a white coarse-grained material that makes up < 1% of pile. May be some sort of refractory material

1700 Sample white material #4-B

Photo 69 Shot show white material amongst grey slag looking towards NE

70 closeup of white material

Photos 71, 72 & 73 Panorama shots of top of pile standing on SW corner of Area 4 looking in sequence from NW to N to NE. Note smaller fragments of dome material slag on W side of pile w/ large more fully intact "domes" towards the NE & E. Numerous fractures are seen in the partial fragments and in the full domes. The fractures appear to be cooling fractures that

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may have been enhanced by the elements (e.g., freeze/thaw) this seems to be supported by the fact that the larger cracks in the materials are on slag surfaces exposed to the elements (i.e. outside faces)

1730 Move off pile at Area 4

1750 TRC & IEM sign out of storage yard

Larry Bullen

6/19/08

Weather: Clear, cool 59°F
Forecast ~ clear 75°F

0705 LB Arrives at North Gate
AD onsite

0710 CC & BR onsite
Tailgate H&S discussion

0730 CB & CC start to inspect "lower tier" of Area 4 which is located along western northwestern & northern flank of pile,

Photos 74-75 Panorama of "valley" area between main pile (left) and "lower tier" pile (right) looking toward SW

Photos 76-77 Same "valley" area between main pile (background) and "lower tier" (left & right) standing on NW corner of "lower tier" looking SE. Also note sign (FE CB STD) in photo which was placed presumably before "lower tier" was deposited

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Photos 78-79 Panorama of "Lowentier" material looking NNE to NE

Photo 80 standing on western edge of "Lowentier" looking toward S note large domes in pile

0815 Collect sample of darker colored slag located at base of main pile #4-C
Darker slag seems to be very isolated in pile < 1%

Photo 81 Dark slag area at base of main pile
82 closeup of dark slag sample #4-C
Dark slag - Exterior dk brown to dk grey Interior fine grained crystalline very dense

0850 LB leaves Storage Yard

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0900-1200 BRD AD process slag materials in prep for Maranelli screening
CC assist w/ processing and organizing samples as well as off-site for gas.

1215-1245 Lunch. - storage yard locked

1245 AD begin Maranelli screening of collected samples.

1545 CC begins describing slag samples from Area 6

SAMPLE	DESCRIPTION
6-86	Dk gray fine grained slag w/ medium grained white inclusions some vesicles noted as well as some platy glassy crystals
6-87	Lt gray highly vesicular fine grained slag moderately fractured

SAMPLE	DESCRIPTION 6/19/08
6-88	Lt gray fine grained slag w/ Lt vesicules, sl white mineral deposits noted, refractory material rind on one side.
6-89	~~Lt gray~~ Med gray fine grained slag w/ platy vertical crystalization (honeycomb) on interior side. honeycomb has a gold hue to it. Few vesicules noted as well as some platy glassy crystals
6-90	Med gray fine grained slag lightly vesticulated platy vertical crystalization noted a/in several vesicules.
6-91	Med gray med-large grained slag highly vesticulated crystals appear to be platy/glassy in nature and are radomly configured w/ relation to each other.

SAMPLE	DESCRIPTION
6-92	Med gray fine-grained slag, lightly vesticulated
6-93/94	Med blue/gray fine-grained slag, lightly vesticulated w/ some white [illegible] w/in the matrix
6-94	Med gray fine-grained slag w/ platy vertical crystalization (honeycomb) on interior side honeycomb orientated in roughly a triangular way.
6-95	Lt blue/gray fine-med grained slag some secondary mineralization along fracture lines (lightly fractured)
1200	BOS off-site after cleaning work area in stack yard.
6-96	Medium blue/gray fine-med ~~grain~~ grained slag some secondary mineralization along fracture lines (lightly fractured) lightly vesticulated

SAMPLE DESCRIPTION 6/19/08

6-97 Med gray fine-grained slag highly vesticulated w/ few vugs

6-98 Dk gray coarse-grained slag glassy platy crystallization arranged randomly w/ relation to one another on outer portion, some honeycomb on interior side.

6-99 Lt gray fine-grained slag w/ some opaque white medium-grained crystal inclusions lightly vesticulated

1710 AD off-site

6-100 Lt gray fine-grained slag lightly vesticulated lightly fractured.

6-101 Lt brown exterior to purple interior medium grained sandy textured material moderately friable

SAMPLE DESCRIPTION

6-102 Dk gray fine-grained slag w/ some medium-grained glassy platy crystal inclusions Metallic bead inclusion

1730 CC off-site

6/20/08
weather: clear 60's → 80's

0710 CC arrives on-site @ ~~[illegible]~~ Bldg 117
AD + BR on-site

1430 Continue describing slag samples from Pile 4

SAMPLE	DESCRIPTION
4-69	Lt blue-gray ~~slag~~ fine-grained slag highly fractured little secondary mineralization (white color)
4-70	Med gray fine-grained slag dense solid sl secondary mineralization along one fine fracture line
4-71	Med gray fine-grained slag dense solid
4-72	Med gray fine-grained slag dense solid sl secondary mineralization along v fine fracture lines

SAMPLE	DESCRIPTION 6/20/08
4-73	Lt Gray/brown v-fine-grained slag indications of cubic fracture planes sl secondary mineralization
4-74	Med gray fine-grained slag dense/solid sl vesticulation on outside surface w/ some metal bead inclusions
4-75	Med gray fine grained slag lightly vesticulated moderately fractured w/ v-fine fractures some secondary mineralization along fractures
4-76	Med gray fine-grained slag solid/dense
4-77	Lt gray fine-grained slag tr vesticulation on outside surface lightly fractured w/ fine fracture some secondary mineralization along fracture lines

PILE 4

SAMPLE DESCRIPTION 6/20/01

SAMPLE	DESCRIPTION
4-78	Med gray fine-grained slag tr vesticulation
4-79	Lt ~~green~~ gray fine-grained slag solid/dense
4-80	Lt blue/gray fine-grained slag solid/dense
4-81	Med gray fine-grained slag v sl vesticulation solid/dense
4-82	~~Med~~ Dk gray fine to v fine grained slag metalic inclusions on outer edge v tr vesticulation O/S
4-83	Med gray fine-grained slag dense/solid
4-84	Lt gray fine-grained slag highly vesticulated
4-85	med gray fine-grained slag O/S.

1500 CC + BR off-site to recon SC-2 DB for pilot injection

1530 CC + BR back on-site
BR helping AD w/ samples
CC copying FB's

1630 BR off-site

1645 CC off-site AD to remain counting ~~all~~ samples + packaging up.

[signature]

APPENDIX B1

STOCKPILE OBSERVATIONAL SAMPLE PHOTOGRAPHS AND PHOTOGRAPHIC LOG


1-A
1500
6/17
06.17.2008 15:21
TRC-1-39


06.17.2008 15:21
TRC-1-40


06.17.2008 15:35
TRC-1-41


06.17.2008 15:35
TRC-1-42


06.17.2008 15:42
TRC-1-43


06.17.2008 15:42
TRC-1-44


2-B
1445
6/17
06.17.2008 14:52
TRC-2-38


2-A
2-A
1440
6/17
06.17.2008 14:51
TRC-2-37


06.17.2008 14:51
TRC-2-36


06.18.2008 16:30
TRC-4-66


Sharpie
06.18.2008 16:31
TRC-4-67


06.18.2008 16:32
TRC-4-68


06.18.2008 17:03
TRC-4-69


06.18.2008 17:03
TRC-4-70


06.18.2008 17:18
TRC-4-71


06.18.2008 17:19
TRC-4-72


06.18.2008 17:19
TRC-4-73


06.19.2008 08:07
TRC-4-74


06.19.2008 08:07
TRC-4-75


FE CB STD
06.19.2008 08:15
TRC-4-76


FE CB STD
06.19.2008 08:16
TRC-4-77


06.19.2008 08:22
TRC-4-78


FE CB STD
06.19.2008 08:22
TRC-4-79


06.19.2008 08:26
TRC-4-80


06.19.2008 08:35
TRC-4-81


06.19.2008 08:36
TRC-4-82