



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION**

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April 11, 2000

Dennis Waskiewicz  
U.S. Army Corps of Engineers  
New England Division  
696 Virginia Road  
Concord, MA 01742-2751

**SUBJECT: PRELIMINARY STAFF COMMENTS AND RECOMMENDATIONS RESULTING FROM THE REVIEW OF 1996 RADIOLOGICAL CHARACTERIZATION AND FINAL SURVEY REPORT: GENERAL SERVICES ADMINISTRATION WATERTOWN, MASSACHUSETTS SITE**

Dear Mr. Waskiewicz:

As discussed in the April 7, 2000, telephone conversation between Marie Miller of my staff and Mary Ellen Iorio of your staff, the purpose of this letter is to provide the U.S. Army Corps of Engineers with the preliminary comments and recommendations resulting from NRC staff's review of the January 1996, "Radiological Characterization and Final Survey Report: General Services Administration Watertown, Massachusetts Site." As part of the staff's effort, portions of the May 1996 "Draft Supplemental Phase II Comprehensive Site Assessment: GSA Property Watertown, Massachusetts" were also reviewed.

Staff's review of the January 1996, report is documented in the attached Technical Evaluation Report (TER). The TER is divided into three sections: 1) background information about the GSA Watertown site, including its remediation history and current regulatory framework; 2) staff's technical evaluation of the report, which provides a section by section summary of the characterization efforts and staffs associated concerns; and 3) a summary of the staff's general concerns and recommended actions, which could lead to their resolution.

In order to achieve timely resolution of the issues identified in the attached TER, and therefore expedite the remediation effort and ultimate decommissioning of the Watertown site, I would encourage continued dialogue between the NRC technical staff and the staff of the U.S. Army Corps of Engineers. Toward these means, Marie Miller will be working with you to arrange a meeting at your facility, tentatively on May 10, 2000. In advance of this meeting, Ms. Miller will contact you to develop an agenda to support our discussions regarding the attached comments and perhaps clarify some of the concerns based on additional information that was outside of scope of this review. Representatives from the Commonwealth of Massachusetts Department of Environmental Protection and the Department of Public Health/Radiation Protection Program have been invited to our upcoming meeting.

Please feel free to contact myself, or Marie Miller, with any questions or concerns you may have at 610-337-5200 or 5205, respectively.

D. Waskiewicz  
U.S. Army Corps of Engineers

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Thank you for your cooperation.

Sincerely,

***Original signed by Marie Miller***

Ronald R. Bellamy, Chief  
Decommissioning and Laboratory Branch  
Division of Nuclear Materials Safety

Attachment: Technical Evaluation Report

cc w/Attachment:

Michael Borisky, Health Physicist, Army Research Laboratory  
Mary Ellen Iorio, Technical Project Manager, Army Corps of Engineers  
Hans Honerlah, Health Physicist, Army Corps of Engineers  
Craig Durrett, Chief, Bureau of Waste Site Clean-up, MADEP  
Thomas O'Connell, Radiation Control Program, MADPH  
Michael Stroebel, Government Services Administration  
Michael Driscoll, Town Manager  
Samantha Overton, Metropolitan District Commission  
Reference Department, Watertown Free Public Library  
Commonwealth of Massachusetts

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## TECHNICAL EVALUATION REPORT

### RADIOLOGICAL CHARACTERIZATION AND FINAL SURVEY REPORT: GENERAL SERVICES ADMINISTRATION WATERTOWN, MASSACHUSETTS SITE

#### PURPOSE

This Report documents NRC Staff's review of the January 1996 "Radiological Characterization and Final Survey Report" for the GSA Watertown site. This report is organized into three sections: 1) background information about the GSA Watertown site, including its remediation history and current regulatory framework; 2) staff's technical evaluation of the January 1996 characterization and final survey report; and 3) staff recommendations. This final section, staff recommendations, is a discussion of the "path forward" that the staff envisions will lead to the timely remediation and ultimate "decommissioning" of the Watertown Site.

#### BACKGROUND

##### **Site Description**

The GSA property is located at 670 Arsenal Street in Watertown, Massachusetts. The property, which occupies ~12 acres and contains buildings 234, 235, 236, 237, and 653, was formerly part of the adjacent Watertown Arsenal. A portion of the property is situated within a wetland area, as designated by the Watertown Conservation Commission. Surface water, in the form of a pond, is located along a portion of the Northwest property boundary. The water table is very shallow (~12 inches) across the property.

Property 20, which adjoins to the GSA property to the northeast, was temporarily leased by GSA from the Massachusetts Department of Environmental Protection from 1948-1951. While it is technically not part of the "GSA Property," Property 20 was included in the January 1996 report and is considered for purposes of remediation and decommissioning to be part of the GSA Watertown site.

##### **Site History**

The United States Army acquired the GSA Property from the Commonwealth of Massachusetts in 1920. On-site buildings were constructed in the mid-1940s and fill material was placed and leveled in swampy areas of the site. Through 1968 the site was used as a "fill site" for rubble and debris from the operations of the adjacent Watertown Arsenal. In approximately 1955 an area was constructed in the northern portion of the GSA property to burn Depleted Uranium (DU) chips and turnings created by machining operations. This area, which is discussed in more detail below, is referred to as the "Burn Pit." In addition the Atomic Energy Commission and the Massachusetts Engineer District used the GSA property until the end of 1960's as a storage site for radioactive solid waste and DU chips and turnings. Property 20 apparently became contaminated during the three year period (1948-1951) when it was leased for use as a fill site. During this time tailings residue, from the early research at the Arsenal on uranium ores and refining conducted by Massachusetts Institute of Technology, was likely placed on Property 20. Although the fill may have met disposal conditions at the time, the contamination is greater than the current criteria for uranium and radium.

## Regulatory Framework

Because the Site includes both chemical and radiological contamination, several regulatory agencies are involved in its overall remediation. These agencies include: 1) The Massachusetts Department of Environmental Protection (MADEP); 2) The Massachusetts Department of Public Health; 3) The Watertown Conservation Commission; 4) The Environmental Protection Agency; and 5) The Nuclear Regulatory Commission (NRC).

Under the revised Massachusetts Contingency Plan (310 CMR 40.0000) MADEP has designated the Site as "Tier IA"; meaning that response actions conducted at the GSA site are subject to direct MADEP oversight and approval. Toward satisfying these requirements a separate characterization report was prepared that deals primarily with the chemical contamination at the site. This report, "Draft Supplemental Phase II Comprehensive Site Assessment," was prepared in May 1996 and has been reviewed by NRC staff.

Similar to MADEP's prioritization of the site, the NRC has included the GSA site in its Site Decommissioning Management Plan (SDMP). The SDMP list includes sites with radiological contamination in excess of NRC criteria that NRC staff have determined "require special attention to ensure timely decommissioning" (NUREG-1444). While no NRC license formally covers this site, the majority of the contamination resulted from the storage and burning of uranium-contaminated materials from licensed activities at the adjacent Watertown Arsenal.

## Release Limits

The following limits for radiological contaminants have been established for the unrestricted release of the GSA Site:

<u>Requirement</u>	<u>Average</u>	<u>Maximum allowable</u>
Total Surface Contamination*	4,545 dpm/100 cm <sup>2</sup> averaged over 1 m <sup>2</sup> area	13,635 dpm/100 cm <sup>2</sup> maximum in a 1 m <sup>2</sup> area
Removable Surface Contamination*		909 dpm/100 cm <sup>2</sup>
Soil Concentration- Depleted U	35 pCi/g averaged over a 100 m <sup>2</sup> area	105 pCi/g maximum in 100 m <sup>2</sup> area
Soil Concentration- U+daughters	10 pCi/g averaged over a 100 m <sup>2</sup> area	30 pCi/g maximum in 100 m <sup>2</sup> area
Soil Concentration- Radium-226	5 pCi/g Surface (0-15 cm)	
Soil Concentration- Radium-226	15 pCi/g Subsurface (below 15 cm)	

\*These requirements represent the Massachusetts Department of Public Health guidelines for depleted uranium, which are slightly more conservative than NRC requirements.

Correspondence to the Army Corps of Engineers dated August 19, 1999, documents the applicability of the grandfathering provisions of 10 CFR 20.1401(b)(3) for the GSA site. These grandfathering provisions permit unrestricted release of the site at the concentration limits (see above Table) given in Federal Register 46 FR 52061, *Disposal or On-Site Storage of Thorium*

*or Uranium Waste from past Operations*, rather than the dose-based limits of 10 CFR 20 Subpart E, adopted by the NRC in 1997 (62 FR 39088).

### **Previous Characterization and Remediation Activities**

While the report that is the subject of this review represents the results of site characterization by Morrison Knudsen (MK) in 1993 and 1994, the GSA Site has been the subject of previous characterization and remediation activities.

In 1981 Argonne National Laboratory conducted a comprehensive radiological survey at the GSA property at the request of the U.S. Department of Energy. Results of this investigation include:

- significant levels of radioactive contamination were found on site grounds, particularly in the area where DU waste had been burned (burn pit);
- contamination extending to depths of 6 feet was discovered in some locations;
- uranium tailings-type materials and uranium ore-type materials were found in an area north of the burn pit area (Property 20); and
- 13 of 25 analyzed soil samples were contaminated with uranium with concentrations ranging from 5.2 pCi/g to 26,000 pCi/g.

In 1988 and 1999 Chem-Nuclear Systems, Inc. performed characterization and remediation activities at the site. These activities included removal of a concrete pad from the burn pit surface, removal of a subsurface concrete monolith located northwest of the burn pad, and removal of soil and building rubble contaminated, which has no detectable DU.

Finally, prior to the characterization effort documented in the 1996 report, MK performed remediation at the GSA Site, specifically in the area of the burn pit. Although remediation ceased prior to completion, due to excessive volume of waste being generated, MK was able to excavate over 3,600 cubic feet of mixed waste. MK discovered that a layer of construction debris (contaminated with DU up to 330 pCi/g) approximately 5 to 8 feet thick, exists between the contaminated topsoil and underlying peat (with no detectable DU).

### **Decommissioning Objective**

NRC Staff understands that the decommissioning objective is to remediate the site to meet NRC's unrestricted release criteria. However, it is also our understanding that a feasibility study or future evaluation by the Army Corps of Engineers may propose a restricted release for selected areas, such as the burn-pit, and that the dose based limits and other requirements of 10 CFR Part 20, Subpart E would apply.

## **GSA SITE AS A WHOLE**

### **Background**

This section documents the staff's review of Section 4.1 of the "Radiological Characterization and Final Survey Report." In Section 4.1 the GSA Site as a whole is characterized with a gamma exposure rate survey and with a random soil sampling survey.

### **Characterization Effort Documented in Report**

A gamma exposure rate survey was performed over the entire GSA Property. A 15 meter by 15 meter grid was established for the site and measurements were made 1 meter above the surface at the intersection of grid lines. 192 total measurements were taken. Data from this survey shows that gamma radiation at the site is generally uniform, with the exception of a few elevated areas.

A second survey was a soil sampling program of the entire site in which random samples were collected at the surface and subsurface (2 feet) from 25% of the 15-meter grid intersections. In addition, 12 points identified as "elevated" during the exposure rate survey were sampled. None of the samples are reported to have exceeded the guideline value for DU, however, several samples exceed the guideline value for uranium plus daughters of 10 pCi/g. The report indicates that the elevated levels may be due to increased natural background in the vicinity of the site.

### **Staff Comments**

1. Staff concurs with the general finding that the GSA Property as a whole (excluding the "burn pit," the "clinker area," "Property 20," and some elevated areas) does not have "significant" contamination of surface or subsurface (2 feet) soils
2. The historical characterization stated that the buildings were erected in the mid-1940s. This would imply that the buildings on the GSA site were constructed before the introduction of radioactive material to the site. The date the buildings were erected should be confirmed to ensure the buildings were not erected on contaminated fill. Otherwise, the soil under the buildings should be characterized.
3. More information is required to categorize the contamination discussed in Section 4.1 as "background" or "natural radioactivity." Because of the somewhat complicated former history of use/storage of radioactive materials at the site (involving the Arsenal, the Massachusetts Engineering District, the Atomic Energy Commission, and the Massachusetts Institute of Technology), staff feels that elevated levels of Thorium-232, of which ATML's license only permitted a small amount of, is not itself a sufficient basis for assuming an elevated background. Additional information should be provided in the form of statistical comparisons between "site" data and data from "off-site" background measurements. Information regarding background conditions may be available from the survey work conducted for the Watertown Arsenal.

4. Staff is concerned that sampling “at depth” has only been performed to 2 feet for the majority of the site. Rubble and fill reported to be contaminated with DU (Section 2.3.3) is said exist across the site at depths of ~8-9 feet. In addition, the 1981 ANL report, the results of which are summarized above, found soil contamination extending to depths of 6 feet in some locations. Additional surveys need to be performed at depth. However, if contamination at depth is only present in the Burn Pit and site history can preclude the possibility of contamination at depth for the rest of the site, this information should be provided in lieu of further surveys. Also, the use of the in-situ spectrometry results may also provide better characterization with respect to sub-face contamination.
5. More information will be required on contamination in other mediums at the site. Specifically staff still has concerns about the characterization of groundwater at the site (see January 28, 1994, Response to Technical Assistance Request). In addition, analyses of surface water at the site should be performed (or submitted if they have already been performed as part of other regulatory requirements).

## **BURN PIT**

### **Background**

This section documents the staff’s review of Section 4.2 of the “Radiological Characterization and Final Survey Report,” characterization of the Burn Pit. The Burn Pit originally consisted of a ground level concrete pad upon which DU was burned in metal containers, to stabilize for shipping. Currently the pit is approximately 25 to 30 feet in diameter and has been excavated to depths of 9 feet as the result of previous remediation efforts by CNSI and Morrison Knudsen.

The following survey methods were used at the burn pit:

- Soil boring and split spoon sampling and gamma analysis of water from monitoring wells (Section 4.2.1)
- Scanning for DU chips (Section 4.2.2)
- In situ gamma spectrometry (Section 4.2.3)
- Near-surface soil sampling (Section 4.2.4)
- Bulk soil analysis (Section 4.2.5)
- Water sample (Section 4.2.6)

### **Characterization Effort Documented in Report**

#### **4.2.1- Soil boring and split spoon sampling and gamma analysis of water from monitoring wells**

Both vertical, angled, and horizontal samples were taken from the soil surrounding the pit. Three near-surface stratigraphic units (listed in order from the surface downward- 1. fill, 2. peat, and 3. sediment) were identified and cross-sections were developed. Seventy-one total samples were collected and analyzed by gamma spectroscopy. Eighteen samples contained measurable concentrations of Thorium-234 in the topsoil to “fill” layer. Only one location is reported to have contamination as deep as the peat layer(<9 feet) and this may be an artifact of the analytical technique.

Of the four wells in the Burn Pit area, samples of groundwater were only obtainable from two. Both of these wells were sampled and then analyzed for Radium-226, Thorium-234, and Uranium-235 using gamma spectroscopy. Neither sample is reported to have had activity above the Minimum Detectable Activity (MDA). Information concerning the depths/aquifer that these samples were obtained from was not included in the report.

#### 4.2.2- Scanning for depleted uranium chips

A surface survey was conducted over a large area around the burn pit using large area gas-flow proportional counters. Five areas were selected to provide information about the DU depth profile. In these areas, which were each about 60 m<sup>2</sup>, surface scans were performed then successive 3 inch layers of soil were removed and the areas were re-scanned. This process continued until the water table was reached (~ 12 inches).

The DU chips were found to extend laterally further than was anticipated. Scanning continued until a perimeter 2 meters wide was measured outside the roped area without observing any chips. The controlled area boundary was appropriately expanded when surveying was complete. DU chips were also shown to extend vertically to ~12 inches, the depth at which water table was encountered thereby preventing further surveying.

#### 4.2.3- In situ gamma spectrometry

In situ gamma spectrometry was initially performed at six locations around the burn pit. Soil samples were taken and independently analyzed for a check of the in situ measurement accuracy.

Twenty-six additional locations were later chosen to better define the extent of burn pit contamination. As a result the contamination was seen to extend further than originally anticipated to the east of the burn pit.

#### 4.2.4- Near-surface soil sampling

Samples were collected and analyzed in order to develop isodose contours of DU activity within the fenced area around the burn-pit. Approximately 460 m<sup>2</sup> exceed the DU concentration limit. The findings in this section generally correlate well with the results of the in situ gamma spectrometry survey. However, the results somewhat contradict the DU chip information (4.2.2).

#### 4.2.5- Bulk soil analysis

Three areas near the burn pit, including a previously identified "hot spot," were collected at the surface (0-3.5 inches) and subsurface (1-12 inches). DU chips were removed and analyzed and remaining soils were then separated into three size fractions and analyzed. Data is reported for each of the size fractions and also for DU chips from selected samples.

#### 4.2.6- Water sample

One sample of water was collected for radioactive analysis. It is not clear from the report where this sample was taken from, however, staff assumed it was taken from standing surficial water in the excavated area. Results from the analysis of the sample were "less than MDA" for all isotopes of concern.

## **Staff Concerns**

1. Staff recognizes that different methods of analysis each have their inherent complications, and also that for the Burn Pit area the purpose of the report is for characterization rather than unrestricted release. However, the varying analytical protocols (e.g. for DU separation, assuming natural radioactivity in sands used for analysis, etc.) will need to be less ambiguous as the decommissioning process progresses. Staff anticipates a dialogue with GSA, which will result in a succinct sampling protocol to demonstrate compliance. This protocol should be finalized prior to conducting the Final Status Survey.
2. Staff is concerned that groundwater has not been sufficiently addressed (see January 28, 1994, Response to Technical Assistance Request), specifically in the vicinity of the Burn Pit. In addition it is not clear what was analyzed for Section 4.2.6.
3. It is stated several times within Section 4.2 that the vertical extent of contamination can not be determined due to the presence of the water table at ~12 inches. GSA will need to document any further characterization plans and more importantly remediation plans for contamination below this level.
4. As further remediation activities, specifically in the burn pit area, will be necessary below the water table, GSA will need to describe special procedures and/or precautions, which will be performed during remediation to allow access to contamination at depth, and prevent the spread of contamination during remediation activities.

## **CLINKER AREA**

### **Background**

This section documents the staff's review of Section 4.3 of the "Radiological Characterization and Final Survey Report," characterization of the Clinker Area. The Clinker Area is named from the large number of small clinkers or pieces of slag from furnace operations that are found on the surface of soil. The Clinker area were divided into three zones (I, II, and III; see 4-46).

Surveys in the Clinker Area have been divided into three sections:

- A single in situ measurement in zone 1 (Section 4.3.1)
- Scanning for DU chips in Zones 1,2, and 3 (Section 4.3.2)
- Soil sampling in all Zones (Section 4.3.3)

### **Characterization Effort Documented in Report**

#### **4.3.1- A single in situ measurement in zone 1**

One in situ measurement was made in the clinker area. The DU activity for this "large area measurement" (represents about 300 m<sup>2</sup>) is 79 pCi/g, indicating that remediation is required.

#### **4.3.2- Scanning for DU chips in Zones 1,2, and 3**

Similar to the surveying conducted in the Burn Pit area, Zones 1, 2, and 3 of the Clinker Area were scanned for DU chips. DU chips were detected and flagged in Zones 1 and 3. The report states that contamination in Zone 2 is believed to be from "clinker" material rather than DU

chips. The vertical distribution of DU chips in the Clinker Area is not discernable from the surveys performed in this section.

#### 4.3.3- Soil sampling in all Zones

Sixteen surface soil samples were collected on, and just below, the surface. Contamination in excess of concentration limits was detected.

#### **Staff Concerns**

1. The report states that “the depth of contamination is unknown” however the depth of contamination is estimated to be 1 foot (see 4-50 and 6-3). Staff is concerned that like the Burn Pit area, contamination may exist at depth in the Clinker Area, and specifically that the estimate of 1 foot is not conservative in light of the characterization work at the adjacent Burn Pit.
2. The report states that contamination in “Zone 2” is not believed to be DU, but is “probably due to natural radioactivity found in the clinker material.” Note clinker material (i.e. slag from furnace operations) will need to be remediated if its activity is in excess of the concentration limits established for the unrestricted release of the site.

#### **BOUNDARY**

##### **Background**

This section documents the staff’s review of Section 4.4 of the “Radiological Characterization and Final Survey Report.” As a result of the discovery of contamination outside of the fenced areas around the controlled area, an extended perimeter was proposed for the fence. Section 4.4 documents the survey performed to confirm that no contamination existed at the proposed fence location.

##### **Characterization Effort Documented in Report**

An in situ gamma spectroscopy survey was conducted at selected boundary areas. In all boundary locations the fraction of the limit was measured to be less than 1.0. Therefore the conclusion was reached that the proposed fence location would effectively encompass the contamination.

##### **Staff Concerns**

No concerns were identified during staff’s review of Section 4.4.

#### **RIVERBANK**

##### **Background**

This section documents the staff’s review of Section 4.5 of the “Radiological Characterization and Final Survey Report.” The survey in this section was performed as a result of discussions with previous workers at the GSA site that revealed that when DU was burned, smoke was transported by wind eastward across Greenough Boulevard

### **Characterization Effort Documented in Report**

Before performing the survey, likely areas of contamination were mapped out using meteorological (wind direction) data collected from the AMTL site during the reactor decommissioning. As a result, the expected deposition of smoke and any uranium oxides was found to be to the northeast of the burn pit, toward Property 20. As surveys had already been performed in that direction, surveys for this section were conducted to the east of the Burn Pit. Two soil samples (one at 0-6" depth and another at 6-12" depth) were taken from each of five locations. No uranium or radium was found in any samples based on gamma spectrometry and consequently no samples were submitted for total uranium analysis.

### **Staff Concerns**

No concerns were identified during staff's review of Section 4.4.

## **PROPERTY 20**

### **Background**

This section documents the staff's review of Section 4.6 of the "Radiological Characterization and Final Survey Report." Property 20 is the subject of Section 4.6.

### **Characterization Effort Documented in Report**

#### **4.6.1- Surface Soil Sampling**

Twenty-six soil samples were taken from Property 20, and each was analyzed by gamma spectroscopy. The depth at which the samples were taken, is not clear from the report. Ten samples were found to have concentrations of either Uranium plus its daughters or DU in excess of unrestricted release limits.

#### **4.6.2- In Situ Gamma Spectroscopy**

Nineteen locations were measured by in situ gamma spectroscopy. Four locations had values in excess of the limits for Uranium plus its daughters.

### **Staff Concerns**

1. Particularly because of Property 20's history, which includes the "dumping and bulldozing" of contaminated materials, staff would like to see surveys/analyses performed at depth to demonstrate that the vertical extent of contamination is understood.
2. Analyses of the water from the pond located at Property 20 and of pond sediments should be performed (or provided if they have already been performed). Again a combination of the low water table, filling in of the site with rubble, and dumping and bulldozing of radioactive waste at Property 20 raises concerns that the pond and underlying soil/sediment could be contaminated.

## **TERMINATION SURVEY DESCRIPTIONS AND RESULTS**

### **Background**

This section documents the staff's review of Section 5 of the "Radiological Characterization and Final Survey Report." Section 5 describes the results of the termination surveys conducted in 1993 and 1994. Surveys were performed in the following areas:

- Building 235 Annex
- Sewer manholes outside Building 235
- Building 237
- Sewer manhole #147
- Building 653

### **Characterization Effort Documented in Report**

#### **Building 235**

Building 235 was initially surveyed in 1993. At that time two thousand five hundred and twenty-two direct alpha/beta measurements were taken, with the highest result of 3,260 dpm/100 cm<sup>2</sup>. In addition Six hundred and thirty-two samples of removable activity were collected and all sample results were less than 10 dpm/100 cm<sup>2</sup>. Finally, four hundred and thirty-two gamma exposure rate measurements were performed, with no results above the established investigation level.

In 1994 part of the Building 235 annex was used to sort bulk soil fractions during the Burn Pit area bulk soil samples. Therefore to assure no subsequent contamination occurred the area was re-surveyed in 1994. Direct surface measurements and analyses of samples of removable activity were performed and no contamination in excess of NRC release criteria was found.

#### **Sewer manholes outside Building 235**

Two sediment samples were collected from the sewer manholes outside Building 235. The samples were analyzed for gamma emitting radionuclides. One sample showed no peaks, indicating no activity concentrations. The second sample showed only naturally occurring nuclides.

#### **Building 237**

Four hundred and ninety-five direct alpha/beta measurements were taken in Building 237. All measurements were below NRC guideline values and the established investigation levels. One hundred and nineteen samples of removable activity were taken and all results were less than the MDA (10 dpm/100 cm<sup>2</sup>). Finally one hundred and four gamma exposure rate measurements were made in Building 237. All of these measurements were below the established investigation level.

#### **Sewer Manhole #147**

Flowing water in the manhole prevented collection of a sediment sample. One water sample was collected and Thorium-234 levels were found to be lower than the MDA.

#### **Building 653 (Pumphouse)**

Fifty-seven gamma exposure rate measurements were taken in Building 65. All of the measurements were below the established investigation level. In addition three hundred and sixty-nine direct beta measurements were taken. All of these measurements are reported to have been well below NRC guideline values.

### **Staff Concerns**

1. A sediment sample from Manhole #147 should be obtained to verify that contamination is not present in excess of release limits.
2. If the structures that were determined to meet NRC's release limits will be demolished, what precautions will be taken to prevent contamination of the demolished materials (e.g. will rubble be stored away from areas with surface DU contamination)?
3. Have surveys been performed on Buildings 234 and 236? These buildings should be classified as affected or unaffected and should be appropriately characterized as part of the decommissioning plan.

**STAFF RECOMMENDATIONS**

The "Radiological Characterization and Final Survey Report," the subject of this review, contains an abundance of characterization data for the GSA site. Generally staff feels that this characterization is adequate to begin planning the specific remediation activities for the site (i.e. drafting a decommissioning plan). Staff's concerns with the individual aspects of the survey's have been listed above in their respective sections. However, four general technical concerns, which should be addressed prior to further decommissioning activities, are listed below along with the basis for the concern and recommended actions:

<b><u>Concern</u></b>	<b><u>Basis for Concern</u></b>	<b><u>Recommended Action</u></b>
<b>Background</b>	Report claims a higher natural background at the site than in surrounding area...Complicated by complex history of radioactive material at the site	Statistical comparison between measured off-site background and believed on-site background
<b>Analytical Procedures</b>	Alternative methods for dealing with DU chips in sample analysis, using sand with detectable radioactivity for analyses for which the background is hard to detect from contamination, etc.	As part of the decommissioning plan and/or future correspondence with NRC an approved protocol for future sampling and analysis should be developed
<b>Hydrology</b>	Very shallow water table and a lack of data	Provide analysis of surface water (from both ponds) and additional groundwater data (see 1994 TAR response referenced above)
<b>Depth of Contamination</b>	Most of the site has only been surveyed to a depth of 12"...however, there is evidence suggesting contamination exists to at least 3' (and possibly as deep as 9' in the rubble/fill)	Provide historical evidence that fill material could not be contaminated, Perform additional analysis to demonstrate 12" is the limit of contamination and/or be prepared to do so as part of the final status survey