

U.S. NUCLEAR REGULATORY COMMISSION
REGION I

INSPECTION REPORT

Inspection No. 03003754/2011002
07001100/2011002

Docket No. 03003754
07001100

License No. 06-00217-06
SNM-1067

Licensee: ABB, Inc.

Location: 2000 Day Hill Road
Windsor, CT 06095

Inspection Dates: August 17, 24 and 25, 2011, and September 19-20, 2011

Date Follow up
Information Received: September 16, 2011, October 6 and 27, 2011, and November 14,
2011

Inspector: John Nicholson
Health Physicist
Decommissioning Branch
Division of Nuclear Materials Safety

Approved By: Marc Ferdas, Chief
Decommissioning Branch
Division of Nuclear Materials Safety

EXECUTIVE SUMMARY

ABB, Inc.
NRC Inspection Report No. 03003754/2011002 and 07001100/2011002

NRC Region I staff conducted a visit to the ABB, Inc. (ABB) Windsor, Connecticut site to observe in-process remediation of the site brook. The inspector also collected Final Status Survey (FSS) verification soil samples for confirmatory radiological analysis by the NRC's contractor, the Oak Ridge Institute for Science and Education (ORISE). The samples were split between the NRC, ABB, and the Connecticut Department of Energy and Environmental Protection (CT DEEP). This report summarizes the observations made during visits to the ABB site conducted August 17 and 24-25, and September 19-20, 2011, and radiological analytical data from sample results received on September 16, 2011, October 6 and 27, 2011, and November 14, 2011, from ORISE.

During the August 17 and 24-25, and September 19-20, 2011 site visits, the NRC inspector observed remediation activities in the site brook area and the collection of soil samples for gamma spectroscopy analysis. Nineteen FSS verification split soil samples were collected by the inspector with assistance from the licensee's sample collection contractors. The inspector submitted the samples to the NRC's contractor laboratory, ORISE, for radiological analysis. In a September 16, 2011, letter report to the NRC, ORISE provided their results from the analysis of the soil samples. A tabulation of the analytical results appears at the end of this inspection report along with maps of the sample locations.

The inspection consisted of interviews with cognizant personnel, field observations, and a review of documentation. Based on this review, the inspector noted the following:

The NRC FSS verification results from the split soil samples from the site brook CE-FSS-33-02, CE-FSS-33-04, and CE-FSS-33-08 survey units met the cleanup criteria established in the Decommissioning Plan, Revision 2, dated August 2010, with a few exceptions. These are discussed in the report details.

Waste soil was transported to an interim storage area on the ABB site and properly loaded into intermodal containers for shipment to a licensed waste disposal facility. Appropriate radiological surveys and analysis of waste soil samples were conducted and appropriate records of these activities were maintained.

Remediation activities for the site brook were still in progress in accordance with routine operating procedures.

REPORT DETAILS

I. Final Status Survey Activities and Analysis of Confirmatory Soil Samples

a. Inspection Scope

During the site visit on August 17, 2011, the inspector observed contract personnel performing remediation work in survey unit CE-FSS-33-02, one of the survey units in the site brook. During the August 24-25 and September 19-20, 2011 visits the inspector collected 19 FSS verification soil samples from Class 1 survey units in the Site brook. The locations of the soil samples collected are indicated on the accompanying maps. These 19 soil samples were split between the NRC, CT DEEP, and ABB. The NRC samples were sent to the NRC's independent laboratory, ORISE, for radiological analysis. All 19 split samples were also analyzed in the ABB onsite analytical laboratory by ABB contract personnel and also analyzed by Eberline Services for CT DEEP. The samples were analyzed by high-resolution gamma spectroscopy. Data were reported for Th-232, Ra-226, Co-60, and total Uranium (U). The set of analytical results are presented in the accompanying table. Results were compared to the Decommissioning Plan Revision 2 criteria. The site-specific Derived Concentration Guideline Level (DCGL) for soil in picocuries per gram (pCi/g) for the radionuclides of interest at the ABB Windsor site are total uranium (U) 557, cobalt-60 (Co-60) 5.0, thorium-232 (Th-232) 4.0, and radium-226 (Ra-226) 4.0.

b. Observations and Findings

Active remediation was in progress during the August 17, 2011 visit. Bladder dams were set up at either end of the survey unit upstream and downstream. Large diameter plastic piping was used to divert the brook into two channels from one bladder dam to the other. In addition, perforated plastic piping was driven down into the ground in several locations in the area under remediation and a submersible pump was placed at the bottom of each pipe. Ground water was continually channeled past the downstream bladder dam. Other submersible pumps were used to pump out surface water in the brook between the two bladder dams. All water pumped from the active work area was collected in a large tank next to the brook. The water was then pumped up into three 20,000 gallon tanks. The water in the tanks was analyzed, and if it met the discharge criteria it was discharged to the city of Windsor sewer system. The site has a permit to discharge 50,000 gallons per day into the sewer system. The sewage treatment plant was notified prior to discharge.

An excavator was set up next to the brook to remove contaminated soil. A large funnel stand held the 3 to 5 cubic yard bags in place as they were filled with soil by the excavator. Composite samples were collected while each bag was loaded. These samples were analyzed on site. A front loader carrying two bags per trip traveled from the brook loading area to the waste pad. The inspector observed the surveying of the front loader and bags at the egress point. At the waste pad the bags of soil were lifted into intermodal containers and cut open. Approximately 15 bags of soil was needed to fill each intermodal container. Because the soil was wet when it was placed in the intermodal container, the container was allowed to sit for three to four weeks as free

standing water was removed and the soil dried.

During the onsite visit on August 24 and 25, 2011, ten FSS verification split soil samples were collected by the inspector and the CT DEEP inspector with assistance from ABB's sample collection contractors. Another nine soil samples were collected during the onsite visit of September 19-20, 2011. The samples were collected from Class 1 survey units, CE-FSS-33-02, CE-FSS-33-04, and CE-FSS-33-08 in the site brook. These areas had been remediated and sampled for FSS by ABB and its contractors prior to the NRC onsite inspections. The inspector surveyed the areas with a sodium iodide (NaI) detector. Biased samples were collected based on the survey results. The NRC split samples were sent to the NRC's laboratory contractor, ORISE, for radiological analysis. These samples were split with the CT DEEP, who sent their samples out for analysis to Eberline Services, and ABB, who performed on site analysis through their contractor Radiation Safety and Control Services (RSCS).

The Decommissioning Plan (DP), Revision 2, dated August 2010 allows for the use of a DCGL Elevated Measurement Comparison (DCGL EMC) to be performed on localized soil area where repeated remediation attempts have not been successful to reduce residual contamination levels to less than the DCGLs. The DCGL EMC allows for small areas of elevated residual contamination to be accepted if the DCGL EMC criteria are met and the overall average residual concentration in the entire survey unit (including the elevated area) meets the cleanup criteria. The method for determining the value for the DCGL EMC was to modify the DCGL by a correction that accounts for the difference in area and the resulting change in dose. The area factor is the magnitude by which the concentration within a small area of elevated activity can exceed the DCGL while maintaining compliance with the release criteria. The DCGL EMC value for uranium for the Windsor site for a one square meter area is 10,992 pCi/g. The DCGL EMC value is area dependent. DCGL EMC values for the radionuclides of interest at the Windsor site for various square meter size areas are in Table 14-2 of the DP. The concentration in the elevated area is then compared to the DCGL EMC and accepted if it is less than the DCGL EMC value. An additional calculation is also performed to determine if the overall average concentration in the entire survey unit is less than the cleanup criteria in the DP. Final calculations were not available at the close of this inspection; however, they will be in the FSS submittal report for the site brook area, and will be reviewed by the NRC at that time.

The inspector requested that ORISE recount samples 11-19-9 and 11-24-4. In addition an alpha spectroscopy analysis by ORISE was also requested for these two samples. The results were received from ORISE in letter reports on October 27 and November 14, 2011. The sample recount by gamma spectroscopy came out the same as the original analysis for each sample. The alpha spectroscopy results for the two samples are also found in the accompanying table.

ABB Inc., CE Windsor Site

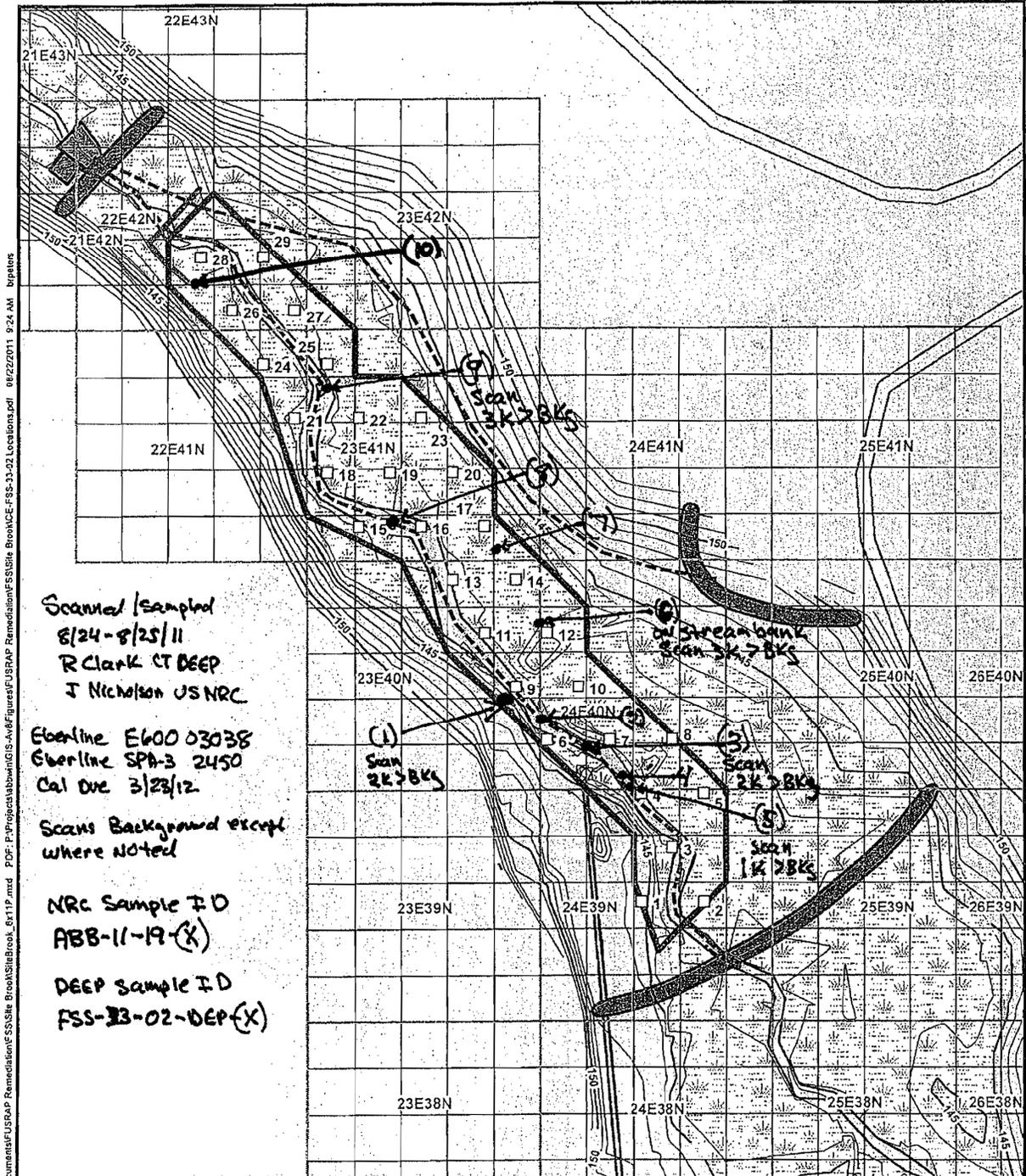
Gamma Spectroscopy of soil samples site brook
Results are in units of picocuries per gram (pCi/g)

| Sample Location | Th-232 | Ra-226 | Co-60 | Total U |
|-----------------|-------------|-------------|-------------|--------------|
| ABB-11-19-1 | 0.83 ± 0.13 | 0.55 ± 0.06 | 0.01 ± 0.05 | 146 ± 10 |
| ABB-11-19-2 | 0.92 ± 0.92 | 0.74 ± 0.06 | 0.00 ± 0.04 | 23.9 ± 2.7 |
| ABB-11-19-3 | 0.92 ± 0.14 | 0.65 ± 0.06 | 0.07 ± 0.03 | 59.6 ± 5.4 |
| ABB-11-19-4 | 0.85 ± 0.13 | 0.52 ± 0.06 | 0.04 ± 0.04 | 33.6 ± 3.8 |
| ABB-11-19-5 | 0.75 ± 0.12 | 0.63 ± 0.05 | 0.01 ± 0.03 | 4.1 ± 1.3 |
| ABB-11-19-6 | 0.52 ± 0.11 | 0.50 ± 0.06 | 0.08 ± 0.03 | 189 ± 25 |
| ABB-11-19-7 | 0.31 ± 0.08 | 0.31 ± 0.04 | 0.03 ± 0.05 | 3.0 ± 0.64 |
| ABB-11-19-8 | 0.45 ± 0.09 | 0.34 ± 0.04 | 0.04 ± 0.02 | 37.4 ± 3.5 |
| ABB-11-19-9 | 0.98 ± 0.22 | 0.69 ± 0.10 | 0.15 ± 0.05 | 1,850 ± 106* |
| ABB-11-19-10 | 0.71 ± 0.14 | 0.46 ± 0.06 | 0.69 ± 0.08 | 315 ± 20 |
| ABB-11-24-1 | 0.96 ± 0.14 | 0.75 ± 0.06 | 0.00 ± 0.04 | 11.5 ± 1.8 |
| ABB-11-24-2 | 0.35 ± 0.12 | 0.44 ± 0.08 | 0.08 ± 0.03 | 88.7 ± 7.2 |
| ABB-11-24-3 | 0.60 ± 0.13 | 0.43 ± 0.06 | 0.55 ± 0.07 | 268 ± 17 |
| ABB-11-24-4 | 0.72 ± 0.16 | 0.54 ± 0.08 | 1.13 ± 0.11 | 796 ± 46* |
| ABB-11-24-5 | 1.21 ± 0.23 | 0.67 ± 0.09 | 0.07 ± 0.07 | 38.2 ± 4.8 |
| ABB-11-24-6 | 0.86 ± 0.14 | 0.68 ± 0.07 | 0.03 ± 0.06 | 21.5 ± 2.9 |
| ABB-11-24-7 | 0.98 ± 0.15 | 0.77 ± 0.07 | 0.01 ± 0.06 | 2.3 ± 0.74 |
| ABB-11-24-8 | 0.67 ± 0.12 | 0.51 ± 0.06 | 0.06 ± 0.05 | 50.0 ± 3.9 |
| ABB-11-24-9 | 0.78 ± 0.14 | 0.59 ± 0.07 | 0.02 ± 0.05 | 18.9 ± 1.7 |

Alpha Spectroscopy of two soil samples site brook
Results are in units of picocuries per gram

| Sample location | U-234 | U-235 | U-238 | Total U |
|-----------------|-------------|------------|------------|--------------|
| ABB-11-19-9 | 2,350 ± 180 | 81 ± 18 | 17.5 ± 7.7 | 2,500 ± 106* |
| ABB-11-24-4 | 797 ± 54 | 24.4 ± 3.4 | 18.0 ± 2.6 | 839 ± 54* |

*exceeds site-specific DCGL established in DP, rev. 2 dated August 2010



Scanned /sampled
8/24-8/25/11
R Clark CT DEEP
J Nicholson USNRC

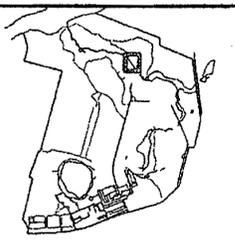
Eberline E600 03038
Eberline SPA-3 2450
Cal Due 3/23/12

Scans Background except
where noted

NRC Sample ID
ABB-11-19 (X)

DEEP Sample ID
FSS-33-02-DEP (X)

Document: P:\Project\ABB\MIN\GIS-Av\MapDocuments\FUSRAP Remediation\FSS\Site Brook\CE-FSS-33-02 Locations.pdf 08/22/2011 9:24 AM bipleton



Legend

- Sample Location
- CE-FSS-33-02

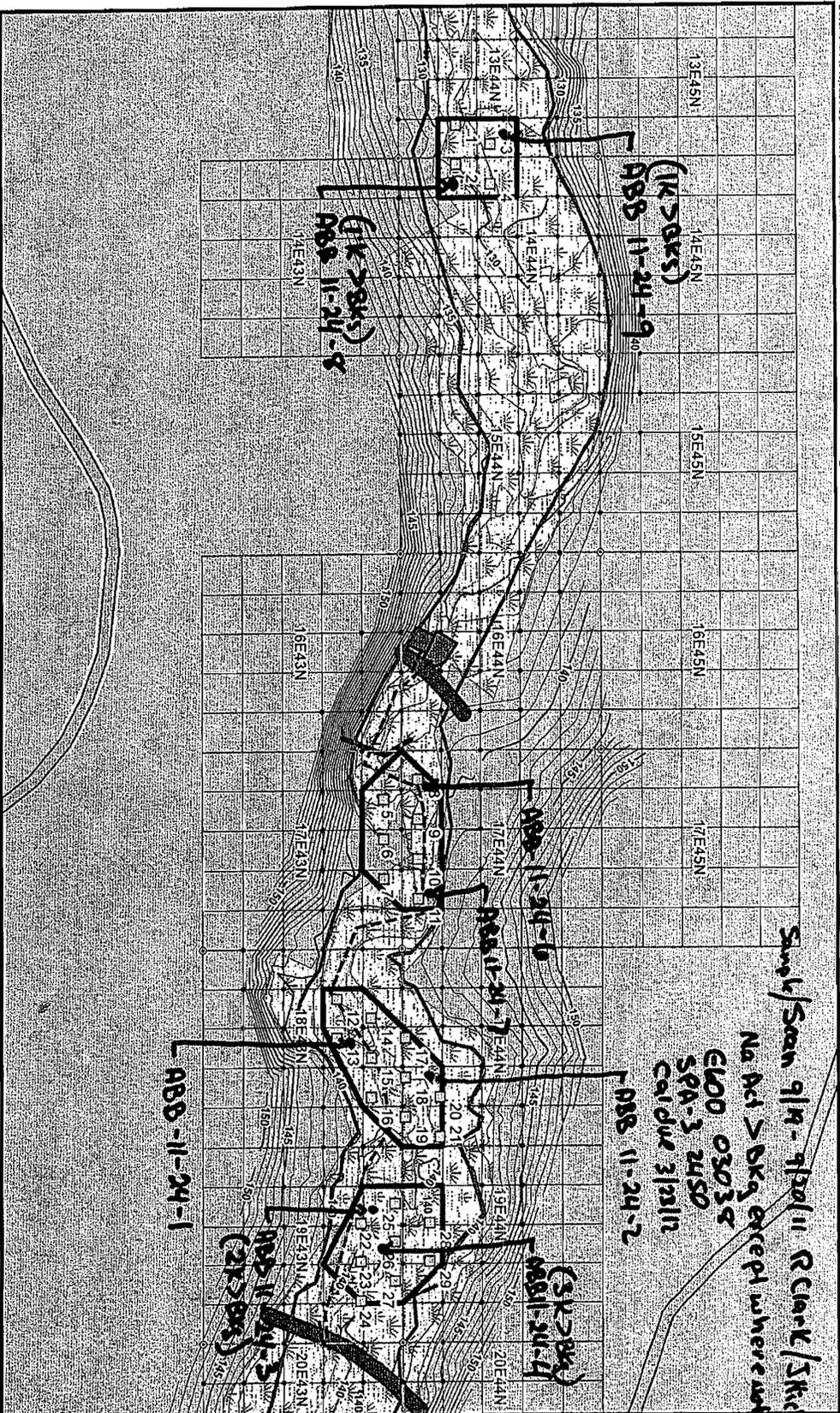
N
 0 30 60
 Feet

Prepared/Date: BRP 08/22/11 Checked/Date: GSM 08/22/11

CE-FSS-33-02
 Sample Locations

 CE Windsor Site
 Windsor, Connecticut





Sample/Scan 9/19 - 9/20/11 R Clark / J Skidmore
 No Axi > Dkg except where noted
 EL00 0303g
 SPA-3 24SD
 Caridur 3/20/11
 ABB-11-24-2

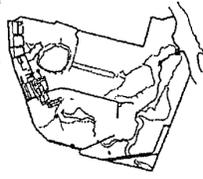
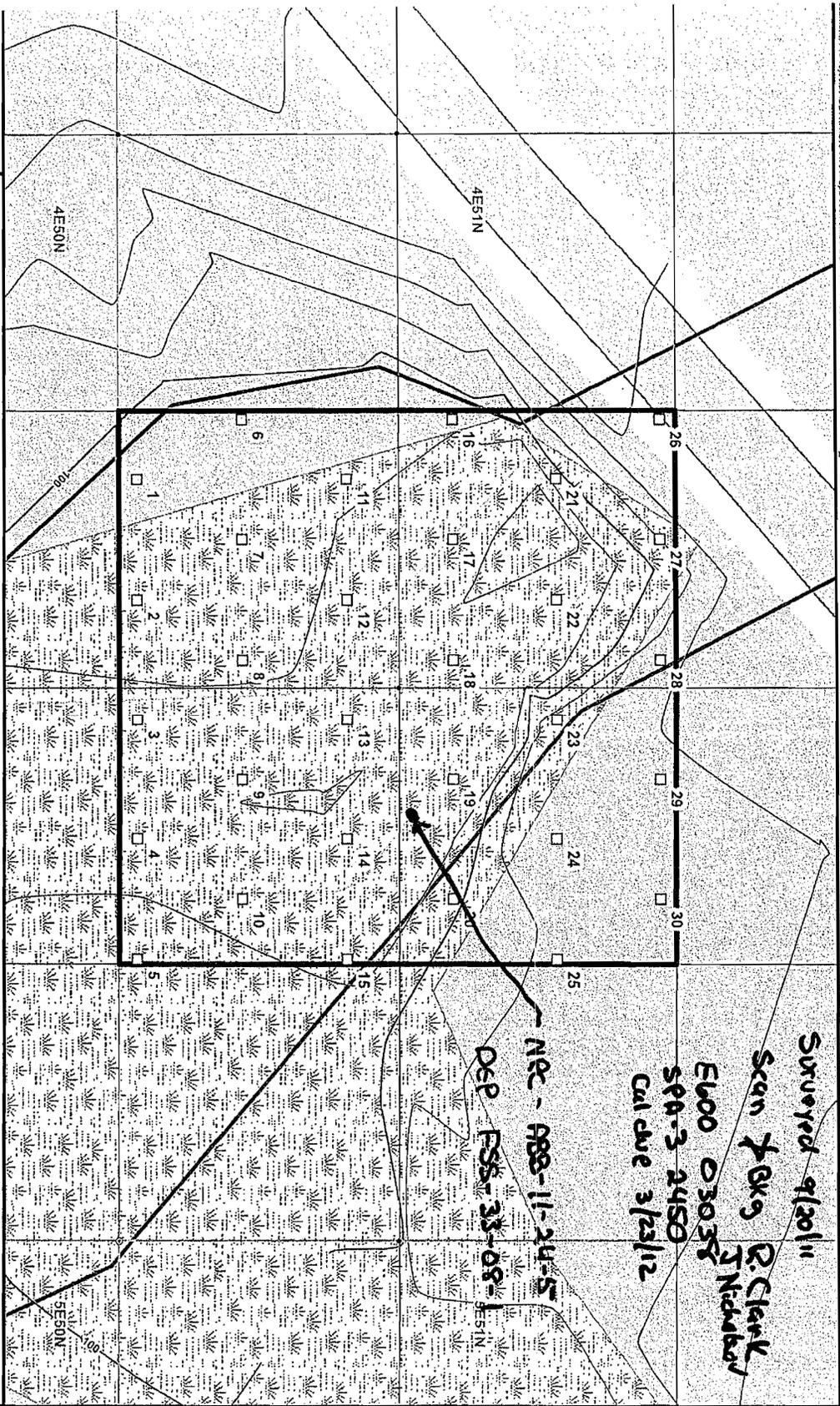
Legend

- Sample Location
- CE-FSS-33-04

Site Brook
 CE-FSS-33-04
 Locations
 CE Windsor Site
 Windsor, Connecticut

Prepared/Date: BRP 09/13/11 Checked/Date: GSM 09/13/11

amec



Prepared/Date: BRP 09/14/11
Checked/Date: GSM 09/14/11

- Legend
- CE-FSS-33-08
 - Sample Location

Site Brook
CE-FSS-33-08
Locations
CE Windsor Site
Windsor, Connecticut



c. Conclusions

The NRC and CT DEEP coordinated splitting soil samples at the completion of remediation activities for survey units at the Site brook. Samples were analyzed by the NRC's contractor ORISE and data was reported for Ra-226, Th-232, Co-60, and total U. In two samples the NRC results for total uranium exceeded the DCGL, but were acceptable when the DCGL EMC criteria were applied. ABB intends to address these data in the FSS submittals for the site brook.

I. Exit Meeting

The inspector discussed his observations from the inspection with the ABB, Director of Nuclear Engineering and Compliance and the Radiation Safety Officer in a telephone call on December 21, 2011.

ATTACHMENT: SUPPLEMENTAL INFORMATION

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PARTIAL LIST OF PERSONS CONTACTED

| | |
|--------------|---|
| John Conant | ABB, Inc., Director, Nuclear Engineering and Compliance |
| Heath Downey | Principal Health Physicist, Radiation Safety Officer |

INSPECTION PROCEDURES USED

IP 87104 Decommissioning Inspection Procedure for Materials Licenses

ITEMS OPEN, CLOSED, AND DISCUSSED

None

LIST OF DOCUMENTS REVIEWED

Derivation of the Site-Specific Soil DCGLs Addendum Soil DCGLs for Thorium and Radium, August 2010 [ML102310548]

Decommissioning Plan – Revision 2 CE Windsor Site, Windsor, CT, August 2010 [ML102310473]

LIST OF ACRONYMS USED

| | |
|----------|---|
| ABB | ABB, Inc. |
| Co-60 | Cobalt-60 |
| CT DEEP | Connecticut Department of Energy and Environmental Protection |
| DCGL | Derived Concentration Guideline Level |
| DCGL EMC | DCGL Elevated Measurement Comparison |
| DP | Decommissioning Plan |
| FSS | Final Status Survey |
| NaI | sodium iodide |
| ORISE | Oak Ridge Institute for Science and Education |
| pCi/g | picocuries per gram |
| Ra-226 | Radium-226 |
| Th-232 | Thorium-232 |
| U | Uranium |