Summary of Information Regarding Radiological Conditions of NFSS Vicinity Properties

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The following is a summary of the information obtained from reviews of radiological survey reports, prepared by ORAU in support of the DOE Formerly Utilized Sites Remedial Action Program. These reports were obtained for review from the IVEA Program at ORAU/ORISE. A list of the reports, reviewed for this summary, is included at the end of this report. Hard copies of reports for ORAU survey activities of NFSS and NFSS Vicinity Properties are available at the South Campus Site of ORAU (these reports are not available in electronic form). In addition, there are 12 – 14 boxes of hard-copy supporting data and information, pertinent to the surveys. I inspected the contents of Box 54. That box contained records for NFSS Vicinity Properties G, H, J, K, L, and M. Files include property-specific survey plans, GPR reports, and field data forms for borehole investigations, walkover gamma scans, direct measurements, and surface samples. Access to final reports and supporting data/information may be arranged by contacting Ms. Ann Payne of the ORAU IVEA Program at (865) 576-9252.

1. The Comprehensive survey identified numerous pieces of slag-like rock in the paving base material beneath the asphalted parking lot, north of a two-story structure on Vicinity Property P. These pieces of slag-like material contained elevated radionuclide concentrations up to approximately 940 pCi/g of the Th-232 decay series and up to approximately 190 pCi/g of the U-238 series. Both of these naturally occurring decay series appeared to be in secular equilibrium The slag-like material was therefore not considered to be of MED/AEC origin and was not removed as part of the remediation of this property. Scattered pieces of rock, having similar naturally occurring radionuclide content, were also identified by the Comprehensive survey of Vicinity Property T, which is adjacent to Property P on the south.

2. The Comprehensive survey of Vicinity Property B identified fixed Ra-226 contamination on interior surfaces of a Warehouse along the east side of Marshall St. At the time of the survey, contamination of the surfaces included PCBs. The Warehouse was being used by SCA for storage of chemical wastes, but was not occupied by personnel. It was evident that contamination levels would have to be reduced, if the building was to be reused in the future. A 1987 report by Bechtel National Inc. (BNI) concluded that the potential hazard from PCBs exceeded that from Ra-226 and that eventual demolition and disposition of the building in a manner that met restrictions due to PCBs would also be satisfactory for the Ra-

226. The Verification Report for 1985 and 1986 remedial actions indicates that no further actions were taken to mitigate the surface contamination in this warehouse. Recent aerial photos of the area indicate that the Warehouse building still exists.

3. I talked with Andy Wallo (DOE/EH) who, during the late 1970s and early 1980s, worked for Aerospace Corp. under contract to DOE/NE and assisted in the initial identification of potential properties for inclusion in FUSRAP. He is a co-author of the 1981 "Background Repot and Evaluation of Resurvey Requirements for the Former Atomic Energy Commission Portion of the Lake Ontario Ordnance Works" - *I did not see that document in the DOE/LM lists.* His recollection was that this adjacent property had never been owned or used by AEC/ERDA/DOE, and the combination of site use history, aerial surveys by EG&G (WAMD-006 &010), and surveys by US AEC/ORO, BMI (BMI-2074) ORNL (ORNL/TM-7004), et. al., did not indicate radiological contamination had spread to the west of the DOE property and north of Vicinity Property R. Andy could not recall having seen any ground-level measurement or sampling data from that area, however, and my review of available documents did not identify any such surveys. At the time of the vicinity property remediations, this area was essentially unused. Current aerial photos indicate commercial use of this area.

4. In addition to the slag described in item 1, there were numerous locations, both on the NFSS Vicinity Properties (e.g., Property H) and at other locations in the Lewiston and Niagara Falls area, where another type of slag was used as a paving base. This second type of slag was more common than the slag described in item 1. It was also very hard and had a blue/green/gray coloring. The pieces were typically 1-2 inches in size and had generally flat sides with distinct edges; the individual pieces did not appear to be weathered or worn, suggesting that the slag was mechanically fractured into these small pieces. This type of slag contained equal activities of uranium and radium, in the range of approximately 5 to 50 pCi/g. It was not regarded as originating from AEC/MED operations. ORNL identified this slag at the Our Lady of Fatima Shrine, and attributed it to early elemental phosphorus operations by Niagara Falls electrochemical plants. ORNL called the material "cyclo-wallastonite". I have not been able to locate this term or any reference to such slag production on the internet. The hardness, appearance, and natural activity content of this slag and that described in item 1 remind me of the slag produced by the tantalum-columbium process and the phosphate fertilizer process in the Pocatello, ID area.

5. With regards to the location of subsurface (borehole) investigations, they were placed at locations of known previous burials, selected locations of surface contamination identified by the gamma scans and sampling, and locations of subsurface targets, identified by the ground penetrating radar. In addition, such boreholes were distributed through accessible portions of the properties to provide supporting data on subsurface conditions.

6. Survey coverage (i.e., reference grid spacing, gamma scan path intervals, spacing of systematic measurements and samples) was based on the history of use and results of previous surveys. For example, areas of previous know waste disposal may have been surveyed on a 5-m grid, while the remainder of the property was surveyed on a 20-m grid. Findings of multiple locations of residual contamination also resulted in subdividing the area and surveying at closer spaced intervals. It should be noted that the surveys of the vicinity properties did not include the West Drainage Ditch or the Central Drainage Ditch and 13 m either side of the Central Ditch, because remediation and survey of these areas were the responsibility of BNI.

7. There were several locations of known previous storage and disposal of waste and debris identified on the vicinity properties. They include:

    - Burials (2) of Mallinckrodt waste on Property E'
    - Above-ground storage areas (3) for KAPL waste on Property E'
    - Surface storage of contaminated equipment, material, and rubble on Property G (known as the Castle Garden Dump)
    - Burial of contaminated metal (source not indicated) on Property G
    - Burial of animal carcasses and waste from Univ. of Rochester on Property G
    - Above-ground storage area for KAPL waste in the "Vine St." triangle, to the southeast of the DOE site.

    Records indicated that waste had been removed from these locations prior to the comprehensive surveys by ORAU. ORAU surveys of previous burial areas included ground penetrating radar (GPR), boreholes, and measurements/sampling at closely spaced intervals. One of the locations – the former Castle Garden Dump – was largely covered by a large pond at the time of the survey and a thorough survey of the surface was not possible. It was recommended that this area be resurveyed at the time the pond is removed. Recent aerial photos indicate this pond still exists.

8. During the comprehensive surveys, GPR was performed at locations of known previous burials on properties E' and G to identify subsurface targets, which might possibly be buried waste that had not been thoroughly removed. No evidence of residual buried material was identified on Property E', but multiple locations of subsurface metal objects and other materials were identified on property G, in the vicinity of the former Univ. of Rochester and miscellaneous metal scrap burials.

    GPR was also performed on the berm of a retention pond on Property E, containing PCB-contaminated liquids. This area was investigated because of visual observations of buried drums and positive gamma scan results and samples. The GPR identified 22 distinct locations of drum-size targets in that berm. It should be noted that no remedial action was performed on this berm, because of

concerns that the integrity of the pond could be compromised. At the time it was recommended that the berm and the area beneath the pond should be reevaluated in the future, after the pond has been removed from service. Recent aerial photos indicate that the retention ponds no longer exist; they appear to have been filled in and the area leveled.

The GPR also provided identification of buried utilities, so they could be avoided during subsurface investigations.

Reports of the GPR investigations are included as appendices in the comprehensive reports and discussed in the results sections of those reports.

9. A small fraction of survey samples, containing elevated Cs-137 activity levels, were analyzed for Sr-90. Notably these samples were from the "Vine St." triangle and Vicinity Properties H', E', G and W. With exception of one sample from the area of the 707F and 718 foundations on the "Vine St." triangle where KAPL wastes had been previously stored, Sr-90- levels were lower than the Cs-137 levels, and the concentrations were less than the project guideline of 100 pCi/g. The one exception contained 111pCi/g of Sr-90. It is interesting to note that one sample from Property H' also contained 13 pCi/g of Co-60, along with 33 pCi/g of Cs-137 and 1.29 pCi/g of Sr-90.

   An "investigative" survey of the DOE property, performed by ORAU in 1986 and 1987 identified small isolated locations of elevated Cs-137 up to 838 pCi/g. There were no Sr-90 analyses performed on these samples.

   No Sr-90 analyses were performed for verification survey samples. I would surmise that the justification for limited Sr-90 analyses was that the Cs-137 levels were almost always higher than the Sr-90 levels, and because the Cs-137 guideline value (80 pCi/g in a March 1984 interim guideline document) was lower than the Sr-90 value (300 pCi/g), adequate remediation of the Cs-137 contamination would assure that the Sr-90 guideline had been satisfied.

10. As indicated above, there were several areas which could not be adequately surveyed during the comprehensive phase or which were not remediated and resurveyed by BNI for various reasons. Specifically these were:

    - Property B Warehouse (still present)
    - Former Castle Garden Dump beneath the pond on Property G (still present)
    - The PCB pond berm and area beneath the pond on Property E (removed)
    - Surfaces beneath liquid waste treatment tanks on Property E' (status unknown)

It seems that it would be prudent to determine whether any further evaluation or action involving these locations has been performed or is warranted, in order to "close the book" on these areas.

List of Documents Reviewed

Comprehensive Radiological Survey, Off-Site Property B, Niagara Falls Storage Site, Lewiston, New York, ORAU, May 1984.

Comprehensive Radiological Survey, Off-Site Property E, Niagara Falls Storage Site, Lewiston, New York, ORAU, March 1984.

Comprehensive Radiological Survey, Off-Site Property E', Niagara Falls Storage Site, Lewiston, New York, ORAU, September 1983.

Comprehensive Radiological Survey, Off-Site Property G, Niagara Falls Storage Site, Lewiston, New York, ORAU, April 1984.

Comprehensive Radiological Survey, Off-Site Property H, Niagara Falls Storage Site, Lewiston, New York, ORAU, March 1984.

Comprehensive Radiological Survey, Off-Site Property H', Niagara Falls Storage Site, Lewiston, New York, ORAU, June 1983.

Comprehensive Radiological Survey, Off-Site Property P, Niagara Falls Storage Site, Lewiston, New York, ORAU, March 1984.

Comprehensive Radiological Survey, Off-Site Property T, Niagara Falls Storage Site, Lewiston, New York, ORAU, March 1984.

Comprehensive Radiological Survey, Off-Site Property W, Niagara Falls Storage Site, Lewiston, New York, ORAU, February 1984.

Comprehensive Radiological Survey, Off-Site Property X, Niagara Falls Storage Site, Lewiston, New York, ORAU, May 1984.

Post Remedial Action Survey, Property of Modern Landfill, Inc., Former LOOW Site, Lewiston, New York, ORAU, January 1982.

Radiological Survey of the Niagara Falls Storage Site, Lewiston, New York, ORAU, December 1988.

Verification of 1983 and 1984 Remedial Actions, Niagara Falls Storage Site Vicinity Properties, Lewiston, New York, ORAU, December 1989.

Verification of 1985 and 1986 Remedial Actions, Niagara Falls Storage Site Vicinity Properties, Lewiston, New York, ORAU, July 1990.