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1	Address the Adequacy of the IWCS and its plan for its continued monitoring. Assessment of the IWCS with the goal of defining its acceptability as a containment structure now and into the future for a minimum of 10 years. This assessment should specify the time frame for assessment reviews into the future until such time as the waste can be handled, removed, and safely disposed at an appropriate facility. IWCS physical inspections to confirm the findings of the geophysical surveys should be considered.	The integrity of the IWCS was evaluated during the Remedial Investigation (RI) (Remedial Investigation Report (RIR), USACE 2007a, Section 3.2, Appendices B and C), and it is maintained and assessed on an ongoing basis by weekly inspections and biennial Environmental Surveillance Program monitoring (RIR Addendum, Section 5.0) . The Environmental Surveillance Program monitoring provides useful information used by the Corps to ascertain whether there are any developing environmental impacts associated with the site. The Corps also maintains a regular presence at the site, and should any unusual events occur, action can be taken quickly. Additional information regarding the IWCS contents and integrity will be presented in the following technical memoranda to be prepared in support of the Feasibility Study (FS): • Radon Assessment • IWCS Radiological Exposure Assessment • Waste Disposal Options and Fernald Lessons Learned • Remedial Action Objectives and Applicable or Relevant and Appropriate Regulations • Alternatives Development and Screening Technologies. During the RI, the geophysical survey of the IWCS indicated that there are no vulnerabilities that would result in significant settling of the IWCS (RIR, Appendix C). Also, there was no major seismic pressure points identified that would make the IWCS especially vulnerable to an earthquake. Additionally, in the Groundwater Model (issued as the third component to the RIR), the Corps used predictive modeling, supported by actual site data, to determine that the IWCS will adequately mitigate contaminant migration for 200 years, provided it is maintained and the cap retains its current level of flow-inhibiting characteristics (Groundwater Model, USACE 2007c, Section 5.1). In the RIR Addendum, the Corps used historic (as built – 1992 or later due to the 1991 addition) and current surveys of the IWCS to demonstrate that negligible settling of the IWCS cap has occurred since its placement (RIR Addendum, USACE 2010, Section 5.0). Additionally, the RIR Addendum will include a

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		discussion of how contamination was identified in the area of the current IWCS in 1981, which predated the IWCS, as a result of poor handling of the R-10 residues and was the likely source of current groundwater contamination adjacent to the IWCS. In addition, the Corps is proposing a phased approach to the FS, where the IWCS will be assessed as the first operable unit to be followed by the Balance of Plant (soils, buildings, underground lines, ditches, etc.) and groundwater. This approach allows for a sequencing of decisions based upon potential risk and logistics for each operable unit, and will bring the IWCS to the forefront of the CERCLA investigation.

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2	Conduct investigation of Vicinity Properties previously addressed by the Department of Energy along with off-site sediment, surface water and outfalls.	The Corps has authority to address under FUSRAP;Vicinity Property G, Vicinity Property E and Vicinity Property E′, which are being addressed under an effort separate from the RI. The Corps has forwarded this concern and provided available data to the Department of Energy and has had discussions with them regarding the findings of the remedial investigation and how the findings have raised concerns about past remedial efforts conducted by the Department of Energy. The Department of Energy is responsible for determining the eligibility of a vicinity property for the FUSRAP. Following regulatory closure of a vicinity property by the Corps, the Department of Energy provides necessary long-term care as needed. The Department of Energy has responsibility for 23 completed vicinity properties near the NFSS. During a community workshop in December 2009, as a result of stakeholder concern, the Department of Energy discussed their intent to review land use and assess protectiveness at closed NFSS Vicinity Properties Q, R, X, S, T, and W (See http://www.lrb.usace.army.mil/derpfuds/loow/loow-ws-presentation-doe-2009-12.pdf). The Department of Energy explained that these properties were selected for re-evaluation because of questions raised by local citizens and because the properties are either accessible to the public or adjacent to NFSS drainage ditches. The Department of Energy recently completed "NFSS Vicinity Properties, New York: Review of Radiological Conditions at Six Vicinity Properties and Two Drainage Ditches" (DOE 2010), which reviews of all the work that has been done on the closed vicinity properties. This document is available on the internet at: http://www.lm.doe.gov/Niagara/Vicinity/Documents.aspx. Public input or questions concerning all closed NFSS vicinity properties should be directed to Bob Darr, Public Affairs Specialist at (720)377-9672 or bob.darr@LM.doe.gov.
3	Determine the source and extent of cesium-137 contamination on-site and possibly off-site in soil and groundwater.	Although the predominant radionuclides of potential concern at NFSS include the naturally occurring uranium, thorium and actinium decay series, fission products (such as cesium-137) and plutonium associated with past waste storage activities

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		are also present at low concentrations (RIR, Sections 5.9.5 and 7.2.2) (Note that cesium-137 and strontium-90 exist at low levels across NFSS and around the world as a result of fallout from past atmospheric testing of nuclear weapons). The RI focused on cesium-137 and strontium-90 because these fission products were thought to be the most prevalent on the site. The NFSS Baseline Risk Assessment (USACE 2007b) did not identify strontium-90 as a radionuclide of concern; however, cesium-137 was identified as a radionuclide of concern in soil and groundwater. Many fission by-products have relatively short half-lives (such as 30 years for cesium-137) and, because waste storage activities occurred many decades ago, some fission by-products would have since decayed to undetectable levels. Cesium-137 detected in the upper groundwater-bearing zone during the RI is likely due to soil artifacts from turbid groundwater samples taken from wells. The presence of cesium-137 identified during the RI has not been replicated in the noted wells on site, even after four rounds of sampling subsequent to the issuance of the RI. Cesium-137 has been retained as a radionuclide of concern and will be addressed in the FS Phase of the CERCLA process (RIR, Section 5.9.4.3). Any alternatives associated with removal will address cesium-137. Based on the potential sources of cesium-137 contamination, remediation will address: • cesium-137 associated with atmospheric fallout; • cesium-137 associated with electron tubes or the University of Rochester waste; and • cesium-137 associated with Knolls Atomic Power Laboratory waste materials stored at the site in the past. The Corps will continue to pursue the acquisition of any available historical records discussing these waste streams. The Corps obtained additional analytical results for plutonium-239 and other potential fission products during the RIR Addendum field effort. These results

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		will be included in the RIR Addendum (RIR Addendum, Section 11), as well as in the FS evaluations.
4	Conduct further evaluation of Pu-239 in soil and groundwater.	Additional soil and groundwater sampling for plutonium-239 was conducted as part of the RIR Addendum field effort. In addition to three wells sampled for plutonium-239 as part of the Environmental Surveillance Program in October 2008, soil and groundwater samples were collected during the RIR Addendum field effort at 23 locations in select areas of the site to further assess potential off-site migration of contaminants in groundwater. Soil cuttings from previous RI activities that are currently being stored as investigation derived waste (IDW) have also been sampled and analyzed for plutonium-239. Samples were collected from approximately 54 drums of IDW. The results of this sampling will be included in the RIR Addendum to be issued by the Corps (RIR Addendum, Section 11).
5	The Risk Assessment should consider the scenario where the IWCS maintenance stops and engineering controls fail. Both dissolved and suspended phases should be considered. The toxicity risk from uranium should be included in the BRA.	The Groundwater Model for the NFSS evaluated a scenario with conditions that include discontinuation of IWCS maintenance and failure of engineering controls. This scenario evaluated an earthquake where the cap is assumed to have failed, and the bottom of the IWCS structure becomes rubble (Groundwater Model, Section 4.5.2.2). In addition to studying the potential impacts to groundwater, as discussed above, the Corps will be assessing the potential impacts to the environment and to the public with respect to radon releases and gamma radiation exposures for various alternatives in the FS Phase of the project. These alternatives will include No Action and No Further Action alternatives that will assess discontinuation of IWCS maintenance as well as engineering control failure.

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6	Provide a better characterization (source and delineation) of radiological (uranium and radium) contaminants adjacent to the IWCS in subsurface soil and groundwater.	Additional soil and groundwater sampling was conducted in late 2009 as part of the RIR Addendum field activities. Sampling focused on select areas of the site where there is a potential for off-site migration of contaminants. The area to the south and west of the IWCS was included in this sampling program. Temporary well points (TWPs) were installed during this investigation and 10 of the TWPs were converted to permanent groundwater monitoring wells (RIR Addendum, Section 3.2.3.2). Soil and groundwater samples were analyzed for both chemical and radiological parameters (RIR Addendum, Section 3, Table 3-4). The work plan associated with this effort was provided to both EPA and NYSDEC for review prior to commencement of the field activities. Groundwater surrounding the IWCS will be sampling biannually as part of an ongoing environmental surveillance program to ensure that the IWCS is performing as designed. Groundwater wells that were installed during the RIR Addendum will be considered by the Corps for inclusion into this program. Although groundwater is not a drinking water source, groundwater is routinely monitored at the site to measure IWCS performance and ensure the protection of human health and the environment.
7	Evaluation of the appropriateness of groundwater modeling via actual sampling.	A wide range of groundwater models are available to simulate conditions at the NFSS. The models employed are industry standard models that are publicly available and endorsed by the U.S. EPA. For NFSS, several models were used including SEasonal SOIL (SESOIL), Hydrologic Evaluation of Landfill Performance (HELP) and MODHMS®. The methodology employed by these models is explained in the Groundwater Model (Section 3.1). Extensive setup and preparation was required to predict: (1) the vertical flow of groundwater through unsaturated waste within the IWCS; (2) contaminant migration through the unsaturated waste within the IWCS; (3) contaminant migration through unsaturated soils; and (4) groundwater flow and contaminant migration through the saturated zone. Extensive environmental sampling has been conducted at the NFSS, and additional sampling to address data gaps and potential off-site migration of contaminants was performed as part of the RIR Addendum field effort. The

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		Corps has no plans to refine the groundwater model. The model is not intended for high-resolution simulation of small scale features. The model is designed to provide predictions on the order of years, decades and millennia. Predictions are based on assigned values of bulk hydraulic conductivity for the various hydrostratigraphic units and physical systems. Localized variations in permeability due to isolated sand lenses or abandoned and sealed pipelines embedded in a low-permeability matrix will not have a material effect on large-scale contaminant transport from a proximal array of point sources.

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8	The groundwater radiological conditions and modeling should consider the total and dissolved phase of the radionuclides. Figures showing groundwater plumes of the total phase need to be included in the RIR. Samples should be equally analyzed and evaluated for both the Dissolved and Suspended phase and reported as such.	Both total and dissolved radionuclide concentrations in the upper and lower water-bearing zones were presented in the RIR (Section 5). The groundwater plume figures in Section 5 were developed using soluble results to illustrate the worst case of groundwater movement and potential contaminant impacts. The plume figures were used to evaluate the potential for off-site migration of contaminants in groundwater. Additional groundwater data was collected during the RIR Addendum field effort to further define the extent of radionuclide contamination in groundwater in select areas of the site. This sampling was conducted in late 2009. Both total and dissolved results will be presented in the RIR Addendum for radiological constituents and metals in groundwater (RIR Addendum, Section 3). The RIR Addendum will also discuss the dissolved nature of uranium on-site, or the fact that uranium in filtered and unfiltered groundwater are comparable demonstrating that the figure in the RI showing the filtered Total Uranium would be comparable in nature and extent to an unfiltered Total Uranium figure. The filtered (or dissolved) Total Uranium figure was included in the RI since the dissolved fraction would present what was available for contaminant transport (which is hindered by the natural clay). However, the unfiltered Total Uranium results were used for risk screening purposes (even though groundwater at NFSS is not used for drinking water) in the Baseline Risk Assessment. For other radionuclides (such as radium) in groundwater, dissolved results were used as the best illustration of radium present in groundwater since radium prefers to adhere to soil particles than dissolve. Turbidity will result in increased radium results in groundwater for unfiltered samples, thereby over representing actual radium concentrations available for contaminant transport. Again, the unfiltered results were used for risk screening purposes (even though groundwater at NFSS is not used for drinking water) in the Baseline Risk Assessment. Lastly, groundwater contaminant plumes were identified only if two close proximity groundwater locations exhibited elevated concentrations. If one location exhibited an elevated groundwater result, a groundwater contaminant plume was not identified for that single location.

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9	Installing groundwater monitoring wells downgradient of the site.	Additional soil and groundwater sampling was conducted in late 2009 as part of the RIR Addendum activities (RIR Addendum, Section 3). Sampling focused on select areas of the site where plume delineation is needed or where there is a potential for off-site migration of contaminants. Temporary well points (TWPs) were installed during this investigation and 10 of the TWPs will be converted to permanent groundwater monitoring wells (RIR Addendum, Section 3.2.3.2). Some of these TWPs and permanent groundwater monitoring wells were installed along the north and west downgradient boundaries of the NFSS (RIR Addendum, Tables 3-1 through 3-3). The work plan associated with this effort was provided to both EPA and NYSDEC for review prior to commencement of the field activities. Uranium in shallow groundwater downgradient of the site, according to NFSS RIR Addendum, is slightly above drinking water standards, but is limited in extent off-site where groundwater is not used as a drinking water source. Groundwater is monitored biannually at the site as part of an ongoing environmental surveillance program to ensure that the IWCS is performing as designed and monitor the potential for off-site migration. Groundwater wells that were installed during the RIR Addendum, including those installed downgradient of the site will be considered by the Corps for inclusion into this program to measure IWCS performance and ensure the protection of human health and the environment.
10	Deletion of radionuclides based on the frequency of detection (< 5%) should be removed from the RIR.	The screening process described in the RIR was not used to determine Site Related Compounds (SRCs) that exceeded background levels. However, the screening process mentioned in this comment and used for the Baseline Risk Assessment was developed using the guidance contained in the Risk Assessment Guidance for Superfund (RAGS) developed by EPA (EPA/540/1-89/002, dated December 1989). As discussed in Section 4.4.2 of the RIR and illustrated in Figure 4-1, frequency of detection is only one component associated with determining whether a detected constituent should be considered a Site Related Constituent (SRC). When possible, a weight-of evidence test was also used.

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		Also, as stated in Section 3.1.1 of the Baseline Risk Assessment; "Results for parent radionuclides are sometimes reported in addition to results for short-lived decay products. To eliminate this duplication and/or mislabeling, the parent radionuclide result is always used and equilibrium conditions are assumed." This takes into account the daughter radionuclides that may or may not have been detected, thus providing a more accurate assessment than simply relying on actual analytical results for radionuclides known to be associated with a parent radionuclide. For the radionuclides alone, the Corps does not see any benefit or rationale for revising the screening methodology used in the RIR and Baseline Risk Assessment, which was based on the RAGS guidance. Please not that only two detected radionuclides were not identified as radionuclides of concern (ROCs): americium-241 and cobalt-60 (RIR, Sections 5.9.4.1 and 5.9.4.2. Americium-241 was detected in 9 out of 768 samples with minimum and maximum detected values of 0.0301 pCi/g and 0.636 pCi/g, respectively. Cobalt-60 was detected in 1 out of 768 samples with an estimated value of 0.0058 pCi/g. Also, any cobalt-60 that would have been brought to the site over fifty (50) years ago would have decayed significantly since it only has a half-life of 5.27 years. This is supported by the sampling results for cobalt-60.

References

RIR: USACE 2007a. Remedial Investigation Report for the Niagara Falls Storage Site. Prepared for the Corps by Science Applications International Corporation. December 2007.

BRA: USACE 2007b. Baseline Risk Assessment for the Niagara Falls Storage Site. Prepared for the Corps by Science Applications International Corporation. December 2007.

Groundwater Model: USACE 2007c. Draft Final Groundwater Flow and Contaminant Transport Modeling Report. Niagara Falls Storage Site. Lewiston, New York. Prepared for the Corps by HydroGeoLogic Inc. (HGL) September 2007.

RIR Addendum: USACE 2010. Draft Revision 1- Remedial Investigation Report Addendum for the Niagara Falls Storage Site. Prepared for the Corps by Science Applications International Corporation. April 2010.