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1	**Graphic representation of data:** depiction of groundwater contamination "plumes" are not representative of actual field conditions and not supported by the data. But, rather the result of computerized assumptions.	The groundwater plumes presented in the Remedial Investigation Report (RIR) (USACE 2007a) were drawn based on locations where site-related contaminants (i.e., radionuclides or chemicals) were detected in groundwater above background levels or risk-based preliminary remedial goals. The plume maps were hand drawn, based upon field data and subsequent background screening, and digitized for input as a source term to the groundwater flow and contaminant transport model (RIR, Sections 5.1.1and 5.1.2). It is acknowledged that the plume configurations conservatively estimate the actual extent of groundwater contamination, especially since some include data points for water found in underground pipelines. This conservatism was used to account for uncertainty associated with the distribution of data points and to ensure that plume boundaries are not underestimated. In the RIR Addendum, groundwater plume maps will be revised to exclude some of this conservatism (such as showing wastewater in subsurface pipelines as groundwater contamination), to better reflect the current status of groundwater contamination at the site. In the Remedial Investigation Report Addendum, the word "plume" will be defined prior to its first use to better reflect its definition of area of groundwater contamination as opposed to portraying groundwater and contaminant movement. The United States Army Corps of Engineers (Corps) is preparing a RIR Addendum, which will include a more accurate depiction of current groundwater plume boundaries (RIR Addendum, USACE 2010), Section 4.0). The RIR Addendum will include revised plume maps based on a reassessment of the groundwater data. This reassessment will correct misreported results from the laboratory, exclude results from pipeline water, and include additional groundwater results collected during the RIR Addendum field activities. The reassessment will evaluate additional groundwater samples that will be collected from areas with uncertain plume boundaries or where the possibility of off-site groundwater contaminant migration exists. Preliminary groundwater results from the RIR Addendum indicate that although

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		uranium is detected in wells off-site and at the boundary of NFSS in three areas of the site, the uranium concentration was only slightly above drinking water standards. Since groundwater is not a source of drinking water at NFSS or adjacent properties, the risk associated with this is negligible. However, the Corps will evaluate which of the new wells installed should be included as part of the ongoing Environmental Surveillance Program to ensure the protection of human health and the environment.
2	**Integrity of the IWCS:** One of the primary objectives of the RI is to assess the long-term integrity and viability of the IWCS to contain the residues within the structure. This was not included in the analysis.	The long-term integrity and viability of the IWCS was assessed during the RI through several means. Based upon all Remedial Investigation, Remedial Investigation Addendum, and Environmental Surveillance Program data, the IWCS is currently functioning as designed. A geophysical survey of the IWCS conducted during the RI (RIR, Appendix C) indicated no short-term competency issues (e.g. cap settling, cutoff wall/dike failure, seismic vulnerabilities, etc.) within the IWCS. A topographic survey and other reconnaissance surveys were conducted during the RI to assess the integrity of the IWCS (RIR, Sections 3.2 and 3.3) and will be updated in the RIR Addendum (RIR Addendum, Sections 5.2). The on-going competency of the IWCS is assured through continuous maintenance of the vegetative cover and visual inspection of the IWCS cap for fissures, desiccation cracks, depressions or other physically observable features that may compromise its integrity (RIR Addendum, Section 5.3). The Environmental Surveillance Program also includes monitoring of radon and gamma radiation as a direct indicator of cap performance and integrity (RIR Addendum, Section 5.3). The RI and Environmental Surveillance Program data speak to the short-term viability of the IWCS. If the IWCS had been breached, we would expect to see continuously increasing trends in uranium concentration in groundwater, which would be detected in one or more of the two-ring array of wells surrounding the IWCS. The annual (increased to biannual in 2008) Environmental Surveillance Program monitoring would detect an increase in concentration at wells near the IWCS. So far, only seasonal variation in uranium concentration in groundwater near the IWCS has been noted, not an increasing trend that would be indicative of

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		a breach (ESPTM 2008, Section 6.8). Additionally, the RI data collected from lower water-bearing zone wells did not indicate site contamination from the IWCS (RIR, Sections 5.10.1.4). The IWCS was constructed with a compacted clay cap and cut-off walls to minimize the likelihood of movement within the structure. The most likely scenario that would threaten the integrity of the IWCS and allow clay to move would be an earthquake. Remote sensing geophysical surveys were used to identify potential threats to the integrity of the IWCS, including fractures, closed depressions, voids, and caverns (RIR, Appendix C). The geophysical survey also examined the clay cut-off wall, assessed water saturation within the IWCS, and examined deep-seated features near the IWCS such as seismic pressure points. From analyses of the electromagnetic, seismic reflection and magnetotelluric data, there do not appear to be any major, deep-seated faults, fractures, geologic discontinuities, or seismic pressure points within the area surveyed at the NFSS, nor voids or caverns that would allow the IWCS cap to settle. Therefore, it can be concluded that significant major deep-seated faults or similar features do not cross under the IWCS and significant settling of the IWCS contents is not likely. This issue will be further investigated in the RIR Addendum where the Corps will use historic "as-built" drawings (1992 or later due to IWCS additions that took place in 1991) and a more recent survey of the IWCS to better assess any settling of the IWCS that may have occurred since cap placement (RIR Addendum, Section 5.4).

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3	**Contamination identified south of the IWCS:** An area of elevated radiological measurements was noted south of the IWCS. This area was not adequately explained and requires additional investigation.	The RIR includes several references to historical operations conducted in the area south of the IWCS near former Building 409 that may have contributed to the elevated radiological measurements located in this area (RIR, Section 1.5.2, Section 5.6.1.1, Section 5.6.3, Section 5.10.1.4, Section 7.3.10, Section 7.3.17,). Historical documentation and analysis of aerial photos indicate that piles of contaminated rubble were located just south of the IWCS prior to and during IWCS construction (RIR Addendum, Section 5.3). As with other documented storage areas on-site, there is localized groundwater contamination in this area that may be due to leaching from contaminated soil associated with this temporary storage. Groundwater contamination in this area may also have resulted from operations conducted at former Building 409 prior to IWCS construction. According to as-built construction drawings and construction reports, the pipelines leaving Building 409 were removed and plugged when the building was demolished and all pipelines leaving the IWCS were removed and plugged when the south dike was constructed. The Building 409 plume shown in the RIR was drawn using dissolved total uranium data from monitoring wells, temporary well points and manhole locations. The linear plume extending north and east was drawn using uranium concentrations from one temporary well point (TWP833) and an existing manhole (MH06) on a sanitary pipeline. The plume was drawn assuming that groundwater was following a 10-inch potable water line which was left in place. For plume delineation, water in the manhole was assumed to be in direct contact with groundwater. Since the RIR was released in 2007, new information regarding the shape and extent of the groundwater plume southeast of the IWCS has been reviewed and this information suggests that the configuration of this plume may be overly conservative. For example, it was found that the concentration of dissolved total uranium at the temporary well point (TWP833) in the center of this plume had been misreported by the laboratory. The actual concentration was ten times lower than what was reported in the RIR. Also, the configuration of the plume is conservative because it was drawn assuming that pipeline water was in direct which does not appear to be the case. If we correct the misreported uranium value at the temporary well point, remove manhole data since it is not

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		representative of groundwater, only include data measured in groundwater and include more recent Environmental Surveillance Program data, the configuration of the plume is different. The RIR Addendum will present a revised uranium groundwater plume map based on updated information (RIR Addendum, Section 4.5). There is currently no indication that contamination is moving out from the IWCS. Environmental Surveillance Program data do not indicate an increasing trend in uranium concentrations in groundwater wells near the IWCS that would be indicative of a breach.
4	**Volatile organic compound contamination identified in Exposure Unit 4:** Chlorinated solvent contamination in high concentrations was identified in soil and groundwater samples in EU4. The concentration warrant additional investigation and remedial action.	In December 2009, additional investigation was conducted along the northern boundary of EU 4 to better define the extent of the VOC plume. The results of this investigation will be reported in the RIR Addendum (Section 4.3). This investigation included the collection of soil gas samples to determine if an inhalation risk to a hypothetical future construction worker exists (RIR Addendum, Section 4.4).
5	**Over dependence on statistics and modeling:** Presentation relies heavily on computerized data evaluation and manipulation. Insufficient and/or inappropriate data.	Section 5.0 of the RIR includes a discussion of the occurrence and distribution of site-related constituents across the site, including occurrences in groundwater. This discussion includes information on historic site activities that account for the large majority of the distribution of contaminants. The Corps conducted an extensive amount of sampling for both chemical and radiological constituents over three-phases of RI data collection conducted between 1999 and 2003, and continues to generate data as part of the ongoing Environmental Surveillance Program. For example, over 200 groundwater samples have been collected from temporary and permanent wells at the NFSS. All site results were screened against background and risk limits to assess the nature and extent of contamination and quantify the potential risk that it posed to human health and the environment (RIR, Section 4.9). Based upon RI findings, investigations conducted as part of the RIR Addendum focused on the collection of soil and groundwater data to refine the nature and extent of radiological and chemical groundwater plumes near the NFSS property

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		boundary and in the vicinity of the IWCS. The results of this investigation will be presented in the RIR Addendum (Section 4.0). These results substantiate that there are no continuous sand lenses that would result in a preferential pathway for contaminant migration.
6	**Presentation of report:** Several comments on the report discuss the lack of supporting information for statements or the need for graphical presentation of information (for instance, the presence of sand lenses and their continuity).	Generalized geologic cross sections showing the NFSS subsurface stratigraphy and the occurrence of sand lenses will be included with the RIR Addendum (Section 12.10 and Appendix 12-J). During the RI, hundreds of geologic logs for monitoring wells or boreholes installed at the NFSS that fully penetrate the upper clay till were used to construct three-dimensional structure maps of the glacial deposits (Groundwater Model, USACE 2007c, Section 2.2.2.2, Figure 2.12). These subsurface structure maps provide a visual profile of glacial deposits at depth. In addition to the subsurface profiles, a geostatistical study of these borings was conducted and concluded that the sand lenses are not interconnected over distances greater than 15 to 20 feet horizontally and over 4 to 5 feet vertically. After the RIR was completed, it was discovered that the Phase 3 soil boring logs had been omitted from the calculation of sand lens inter-connectivity. Recalculation of the sand lens inter-connectivity incorporating these boring logs will be included in the RIR Addendum (Section 12.10 and Appendix 12-J).
7	**Combining data from different geologic units/flow zones**	**If the concern is with background development:** A re-examination of the NFSS groundwater background data set was performed to assess the effects of combining data from the upper water-bearing zone and the lower water-bearing zone to determine site-wide groundwater site related compounds (RIR Addendum, Section 6.2.2). Results of this re-examination suggest that dividing the combined background groundwater data set into separate data sets for the two water-bearing zones does not result in more descriptive background statistics or more reliable delineation of SRCs. Furthermore, this evaluation supports the continued use of a combined background data set to determine site-specific groundwater background levels and SRCs, as was done for the 2007 RIR.

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		Since the estimate of background groundwater concentrations was calculated using combined data from more lower water-bearing zone wells (15 wells) than upper water-bearing zones (8-12 wells), the estimate of groundwater background levels is lower than the estimate would be had it been based solely on upper water-bearing zone wells where contamination is located. Using data from the upper and lower water-bearing zones combined results in lower estimates of background levels and is conservative when determining the nature and extent of site contamination. The RIR Addendum will include a re-examination and justification of the NFSS groundwater background data set that will include a comparison of NFSS background values with background results from other study areas (Section 6.3). **If the concern is with the site-related data:** If the concern regards combining the lower water-bearing zone and upper water-bearing zone concentrations to assess risk in the Baseline Risk Assessment (USACE 2007b), note that this was done with the understanding that the New York State Department of Environmental Conservation did not view the clay layer separating the upper water-bearing zone from the lower water-bearing zone as a true aquitard. As some connection between the upper water-bearing zone and lower water-bearing zone is possible, the exposure point concentrations in groundwater used for the risk assessment assumed that a single contaminated layer of groundwater was present below the site. This was a very conservative measure which effectively increased the potential for contamination in a deeper water-bearing zone which has a higher rate of groundwater yield, thus increasing the potential estimated exposure to groundwater contamination. Please note that for purposes of displaying nature and extent of the chemicals of potential concern in groundwater, the RIR presented the upper water-bearing zone and lower water-bearing zone concentrations separately (RIR, Section 5.10.1.4).

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.