

Response to Comments Received Following NFSS Public Workshop on the RIR Addendum, held June 8, 2011

Comment No.	Received From	Comment	Response
1.	<div style="background-color: black; width: 100px; height: 1.2em; margin-bottom: 2px;"></div> - NCDOH	<p>In 2007, the RIR found that radiological contamination originating from the area of the IWCS is migrating eastward to the Model City site operated by Chemical Waste Management. We are concerned that the integrity of the IWCS has not been established, contrary to the RIRA conclusions, and modeling and sampling deficiencies will hamper efforts to evaluate the proposal for major excavation at Model City, as well as proposals to remediate other areas of the NFSS where radiological contamination has been detected. Specifically, NCDOH has identified three deficiencies in the RIRA.</p> <p>First, the source of highly elevated uranium in groundwater south and east of the IWCS has not been investigated. Until the source is confirmed as pre-existing contamination and not IWCS leakage, the RIRA conclusion that the integrity of the IWCS has not been compromised is premature.</p> <p>Second, groundwater modeling reported in the RIRA does not take into account large scale features such as pipelines, ditches and adjacent landfills. The upward trend of concentrations of uranium in well OW-11B strongly suggests that substantial groundwater and pipeline interaction is occurring, resulting in accelerated groundwater migration across the NFSS. Historical underground water lines that connect the area of the IWCS and Model City are intact. The Corps stated on June 8, 2011 that not all NFSS pipelines</p>	<p>Both the 2007 Remedial Investigation (RI) Report and the 2011 RI Report Addendum conclude that groundwater in the vicinity of the Interim Waste Containment Structure (IWCS) appears to be migrating to the northwest toward the West Drainage Ditch, not eastward. The purpose of the RI was to characterize and delineate existing contamination at the Niagara Falls Storage Site (NFSS), not to support the proposal for excavation at Model City. Where data gaps exist that might affect remedial activities at the NFSS, further delineation will be conducted during the Feasibility Study (FS) or as part of the Pre-remedial Action Design Phase.</p> <p>The Corps believes that the IWCS is performing as designed based on the extensive studies that have been completed. The U.S. Environmental Protection Agency has reached the same conclusion based on existing data. The RI Report and RI Report Addendum included investigations of the "lay-down" area east of the IWCS and the former "stockpile" area south of the IWCS. Groundwater plumes exist adjacent to the IWCS, however, aerial photos showing historic site operations, RI data, and longer-term Environmental Surveillance Program (ESP) data trends do not support the conclusion of IWCS leakage.</p> <p>The Groundwater Flow and Contaminant Transport Model (2007 and 2011 update) is a regional model that is focused primarily on predicting long-term contaminant transport beyond the boundaries of the NFSS. It is not designed to predict short-distance transport between on-site areas.</p>

		<p>have been sealed or severed. These pipelines may provide pathways for contamination to migrate off site.</p> <p>Finally, the RIRA provides no sampling plan for the evaluation of plutonium on the NFSS. Sample selection therefore lacks a coherent rationale. We would like to see a sampling plan designed to address our concerns about plutonium on both the NFSS and open vicinity properties. We note that significant levels of plutonium have previously been identified on VPG, including a portion of the Model City site.</p>	<p>During the Balance of Plant FS, the Corps will conduct additional field activities to address Balance of Plant identified data gaps if any are identified, such as radiological concentrations in well OW11B and the integrity of the underground utility lines south and east of the IWCS.</p> <p>As explained in Section 11 of the RI Report Addendum, a total of 166 samples of various environmental media at the NFSS were analyzed for plutonium-239/240. Based on the low number and concentrations of detections, plutonium-239/240 is not believed to be a significant contaminant at the site. However, its possible presence at various locations of the NFSS will continue to be considered during preparation of the Balance of Plant Operable Unit FS.</p> <p>The Corps is responsible for environmental investigation and response at three open vicinity properties, designated as Vicinity Property E, E' and G on an adjacent private parcel owned by CWM Chemical Services, LLC. A site investigation and drum removal on Vicinity Property G (USACE 2008a) confirmed the presence of chemical and radiological constituents remaining in surface and subsurface soils after previous cleanups of the parcel. Further investigation of this property was recommended. The Corps' current focus is on the IWCS and the balance of site soils and groundwater at the NFSS, however, investigations of the vicinity properties will begin once all areas are accessible for investigation and sufficient funding is available to not hinder the current progress on the NFSS property.</p>
2.	<div style="background-color: black; width: 100px; height: 1.2em; margin-bottom: 2px;"></div> NYSDEC	<p>Baker Smith Area in EUs 1 & 2: The actions taken by the USACE as part of the RI Addendum serve to</p>	<p>Since uranium was detected in off-site groundwater above the background level and slightly above the uranium safe</p>

		<p>enhance the understanding of groundwater containment in the northwestern portions of the NFSS. The total uranium groundwater contamination above drinking water standards (30 µg/L) appears to be limited in extent. However: the monitoring point furthest downgradient in the direction of groundwater flow (MW921) is still above the standard (37.51 µg/L). The USACE needs to conduct additional investigation in the vicinity of monitoring well MW921 in an effort to bound the extent of the detected contamination.</p>	<p>drinking water standard (maximum contaminant level [MCL]) in well MW921, three hydraulically downgradient Lake Ontario Ordnance Works (LOOW) monitoring wells were sampled to determine the off-site extent of this uranium plume. Uranium in these three LOOW wells was well below the safe drinking water standard. Based upon this information, it can be inferred that uranium contamination in groundwater is bounded to within the Town of Lewiston (former LOOW Waste Water Treatment Plant) property where groundwater is not a source of drinking water. As stated in the RI Report Addendum, measures are underway to restrict public access to this area.</p> <p>The Corps intends to conduct further investigations to address data gaps if any are identified for the Balance of Plant FS. Further evaluation of the groundwater contaminated area in the northwestern portion of the site will be considered during planning of data gap investigations.</p>
3.	<div style="background-color: black; width: 100px; height: 1em; margin-bottom: 5px;"></div> NYSDEC	<p><u>Groundwater contamination in the former Acid Area.</u></p> <p><u>EU 4:</u> Groundwater in this exposure unit is contaminated with three separate constituents, uranium, boron and volatile organic compounds (VOCs).</p> <p>Uranium: Groundwater contamination by uranium appears to be isolated. While concentration of total uranium in monitoring well MW934 is above drinking water standards, information collected from this area does not indicate a continuing source of contamination.</p> <p>Boron: Based on information presented in this report, it appears that the down gradient extent of boron contaminated groundwater has been established. The</p>	<p>The Corps agrees that the presence of dense non-aqueous phase liquid (DNAPL) in the Acidification Area (EU 4) will require further evaluation prior to the design or implementation of any remedial action in this site area. The presence of DNAPL near well 415 and the integrity of underground utility lines and their relationship to groundwater will be considered for further investigation during the Balance of Plant FS.</p>

		<p>distribution of the elevated boron coincides with the area affected by VOC contamination and may offer clues on the origin of the contamination. Additional definition of the source area will be required as part of the DNAPL remedial design.</p> <p>Volatile Organic Compounds: In response to the discovery of high levels of VOCs in well 415 as part of the Remedial Investigation, additional studies were performed in EU 4 to determine the nature and extent of VOC contamination. The investigation did reveal the presence of dense non-aqueous phase liquid (DNAPL) in the source area and dissolved phase VOC contamination migrating to the northwest. Additional definition of the source area will be required as part of the DNAPL remedial design.</p> <p>In addition, as part of the RI, VOC contamination was detected in several underground pipelines and manhole samples. The relationship between the pipelines and groundwater has not sufficiently investigated. Additional investigation is necessary.</p>	
4.	<div style="background-color: black; color: black;">[REDACTED]</div> on NYSDEC	<p><u>Nature and Extent of Groundwater Contamination in the Vicinity of the IWCS, EUs 7, 9, 10 & 11:</u> Additional investigation and evaluation of groundwater in the vicinity of the Interim Waste Containment Structure (IWCS) was conducted as part of the RI Addendum. Based on information collected during the investigations, the source of elevated levels of radioactive constituents determined by the USACE, historical surface storage of wastes, is plausible. However, the USACE has not sufficiently characterized the nature of portions of the areas of groundwater contamination. Areas of groundwater on the northern and western sides of the IWCS will require a long-term</p>	<p>The Corps will continue to monitor IWCS performance throughout the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) planning process; such monitoring will include evaluation of the stability of the contaminant concentrations in wells surrounding the IWCS. Additionally, during the Balance of Plant FS, the Corps will conduct additional field activities to address data gaps if any are identified for the Balance of Plant. This additional field activity will include further investigation of the area surrounding the IWCS, including the integrity of underground utility lines south and east of the IWCS.</p>

		monitoring program to establish the stability of the contaminant concentrations. The area south of the IWCS requires additional investigation to better define the area of contamination and the relationship between the pipelines in the area and groundwater migration.	
5.	██████████ NYSDEC	<u>Assessment of the Integrity of the IWCS:</u> The RI Addendum conducted an integrity assessment of the IWCS by four areas of review: topographic survey data; cap monitoring and maintenance procedures and data; aerial photography and assessment of groundwater contamination in the vicinity of the IWCS; and an assessment of pipelines serving as pathways to contaminant migration from the IWCS> These reviews indicate the cap settlement has been minimal, maintenance of the cap has been successful in minimizing radon emissions through the cap, groundwater contamination, at the concentrations detected in the vicinity of the IWCS can reasonably be attributed to historic site operations, and the piping between the interior and exterior of the IWCS were cut and removed during construction of the IWCS and the associated clay cut-off wall.	Review of this section of the RI Report Addendum is noted.
6.	██████████ NYSDEC	<u>Re-examination and Justification of NFSS Groundwater Background Data Set:</u> The additional evaluation of the background groundwater data set included statistical evaluation of the radiological and inorganic data comparisons to New York State Background data. Based on the evaluations, the background data set for groundwater is sufficiently conservative and sensitive to serve in determining impacts of past operations on NFSS groundwater.	Review of this section of the RI Report Addendum is noted, and the Corps acknowledges the commenter's concurrence that the background data set for groundwater is appropriate for determining impacts of past operations on NFSS groundwater.
7.	██████████ NYSDEC	<u>Comparison of NFSS Soil Background Levels to United States and New York Background Levels:</u> Review of	Review of this section of the RI Report Addendum is noted, and the Corps acknowledges the commenter's

		this section finds the range of background soil concentrations proposed by the USACE to be reasonable and acceptable.	concurrence that the background soil data set is appropriate for determining impacts of past operations at the NFSS.
8.	██████████ NYSDEC	<u>Characterization of Building Core, Road Core, Railroad Ballast Samples:</u> The Department has reviewed the further evaluation and discussion of the above media which has been sampled as part of the remedial investigation program. Based on Department review, the characterization appears to be sufficient to support a feasibility study of remedial options for these materials.	Review of this section of the RI Report Addendum is noted, the Corps also acknowledges the commenter's concurrence that the characterization of building core, road core and railroad ballast is sufficient to support a feasibility study of remedial options for these materials.
9.	██████████ NYSDEC	<u>Supplemental Environmental Surveillance Data:</u> Subsequent to the release of the RI report, the USACE has enhanced the environmental surveillance program with the sampling of additional groundwater wells and surface water locations and increasing the frequency of sampling locations. Data generated as part of the sampling enhancements has been useful in further evaluation of information presented in the initial RI. The data has allowed trend analysis to be conducted to better understand contaminant behavior. This being said, The Department believes that there has been insufficient investigation of monitoring well OW11B. Radiological concentrations in this well have shown a steadily increasing trend.	To address uncertainties associated with the upward trend of uranium concentrations at well OW11B, the Corps will conduct additional field activities during the Balance of Plant FS, including investigation of radiological concentrations in well OW11B and the integrity of the underground utility lines in the vicinity of this well (i.e., south and east of the IWCS).
10.	██████████ NYSDEC	<u>Radiological Investigation of Underground Utilities:</u> The results of radiological testing of underground utilities off the Niagara Storage site, serve to better characterize the pipelines as past pathways for contaminant migration. This data should be used in making remedial decisions as part of the former LOOW remedial action program.	The Corps will consider investigation results of the LOOW Underground Utilities Remedial Investigation when making remedial decisions for both the former LOOW and the NFSS. Additionally, activities for the NFSS Balance of Plant FS will include further investigation of the area surrounding the IWCS, and will address the integrity of underground utility lines east and south of the IWCS.
11.	██████████ NYSDEC	<u>Re-evaluation of Plutonium 239/240 in Soil:</u> As part of the Remedial Investigation (RI) and RI Addendum a	Review of this section of the RI Report Addendum is noted, and the Corps acknowledges the commenter's

		total of 166 samples were analyzed for Plutonium 239/240. These samples were collected from a range of media and locations across the NFSS. Based on the results of the analysis it does not appear that plutonium is a significant contaminant at the site.	concurrence that plutonium is not believed to be a significant contaminant at the site. The Corps will continue to consider the possible presence of plutonium at various locations of the NFSS during preparation of the FS.
12.	USEPA	<u>Recommendation 1:</u> We recommend delineating the uranium groundwater plume and restrict public access to the off-site shallow groundwater table until the USACE complete any necessary future remediation and restoration.	<p>The Corps assumes that the commenter is referring to the dissolved total uranium plume that is present in the Baker-Smith area in the northwest portion of the site. Since uranium was detected in groundwater just off-site in this area above the background level and slightly above the uranium safe drinking water standard (MCL), three hydraulically downgradient LOOW monitoring wells were sampled to determine the off-site extent of this uranium plume. Uranium in these three LOOW wells was well below the safe drinking water standard. Based upon this information, it can be inferred that uranium contamination in groundwater is bounded to within the Town of Lewiston (former LOOW Waste Water Treatment Plant) property where groundwater is not a source of drinking water. As stated in the RI Report Addendum, measures are underway to restrict public access to this area.</p> <p>The Corps intends to conduct further investigations to address data gaps if any are identified for the Balance of Plant FS. Further evaluation of the groundwater contaminated area in the northwestern portion of the site will be considered during planning of data gap investigations.</p>
13.	USEPA	<u>Recommendation 2:</u> In addition to the existing long term monitoring, given the implications of the contaminant presence in close proximity to the IWCS, if technically -feasible and practically achievable to	Groundwater monitoring wells that monitor the upper and lower water-bearing zones have been installed along the entire perimeter of the IWCS. Monitoring well locations were selected to be as close to the IWCS as possible and

		discriminate between the existing contamination near the IWCS and any potential contaminant breach from the IWCS, then we recommend that the USACE conduct long term groundwater monitoring in closer proximity to the IWCS to assess the trends of radiological contaminants (both radium and uranium).	<p>still ensure that the IWCS containment system, including the cap, dike/cut-off wall and clay bottom, was not breached during well installation. Groundwater monitoring wells surrounding the IWCS are close enough to the containment perimeter to provide early indication of any potential failure of the containment system. Biannual monitoring of these wells as part of the ESP provides further assurance that any potential failure of the IWCS will be quickly identified.</p> <p>The Corps will continue to monitor IWCS performance throughout the CERCLA planning process; such monitoring will include evaluation of the stability (and trend) of the contaminant concentrations in wells surrounding the IWCS.</p>
14.	USEPA	Recommendation 3: We recommend further assessment and delineation of radium-226 both in subsurface soil and groundwater, more specifically around the IWCS and in the northeast portion of the NFSS.	<p>Based on results of the RI and ESP, no further widespread investigation of radium in soil and groundwater is deemed necessary at this time.</p> <p>The residues stored at the NFSS are the result of uranium ore processing. During the processing of uranium ores, radium was precipitated as radium sulfate in the residues (DOE 1986). Radium sulfate is extremely insoluble in water. Additionally, migration of solubilized radium would be expected to be effectively inhibited by soil at the NFSS due to the very high radium sorption ratios observed (ORNL 1984). As such, the radium present in the subsurface at the NFSS is expected to be relatively immobile.</p> <p>During development of the RI Report, a review of the dissolved concentration data for radium-226 and radium-228 showed no plumes present in the upper water-bearing zone. Total concentration data for radium-226 showed</p>

			<p>sporadic detections above background levels and no distinguishable plume. The radium-226 and radium-228 values are relatively low with few exceedances of the drinking water standard for these radionuclides (5 picocuries per liter [pCi/L] for radium-226 and radium-228 combined). Furthermore, concentrations of radium-226 and radium-228 in surface water, sediment and groundwater are regularly monitored as part of the ESP. The combined radium-226 and radium-228 data for each of these site media are below applicable limits.</p> <p>During the Balance of Plant FS, the Corps will consider all radium data collected for the NFSS and will conduct additional field activities to address Balance of Plant data gaps if any are identified prior to final selection and design of any remedial alternatives. As reported in the RI Report Addendum, a data gap to be investigated is the increasing trend of radium-226 identified in ESP background well B02W20S located in the northeast portion of the site.</p>
15.	ina USEPA	Recommendation 4: We recommend further assessment of the integrity of the contaminated underground pipelines and the need for possible removal actions to eliminate any potential spread of contamination.	The potential for contaminant migration along former underground utility lines was examined during RI activities. During the Balance of Plant FS, the Corps will conduct additional field activities to address Balance of Plant data gaps if any are identified, such as the integrity of underground utility lines.
16.	USEPA	General Comments 1: The RI and its Addendum provided a detailed characterization of the radiological contaminants at the site; however, there are still minor gaps associated with radium contamination in subsurface soil and shallow groundwater that need to be addressed during the FS or the Pre-remedial Action Design phase.	As explained in the response to Comment 14, no further wide-spread investigation of radium in soil and groundwater is deemed necessary at this time based on results of the RI and ESP. During the Balance of Plant FS, the Corps will consider all radium data collected for the NFSS and will conduct additional field activities to address Balance of Plant data gaps prior to final selection and design of any remedial alternatives.
17.		General Comments 2: Further consideration should be	Groundwater monitoring wells that monitor the upper and

	USEPA	<p>given to further assess the uranium plume and potential radium contamination in the northern, western, and southern edges of the IWCS. While it is likely that the identified contamination near the IWCS is a result of previous operations, further delineation may be necessary to aid the remedial design action phase following the feasibility study. More importantly, given the implication of contamination presence in close proximity to the IWCS, if technically feasible and practically achievable to discriminate between the existing contamination near the IWCS and any potential contaminant breach from the IWCS, then we recommend that the USACE conduct long term groundwater monitoring in closer proximity to the IWCS to assess the trends of radiological contaminants (both radium and uranium).</p>	<p>lower water-bearing zones have been installed along the entire perimeter of the IWCS. Monitoring well locations were selected to be as close to the IWCS as possible and still ensure that the IWCS containment system, including the cap, dike/cut-off wall and clay bottom, was not breached during well installation. Groundwater monitoring wells surrounding the IWCS are close enough to the containment perimeter to provide early indication of any potential failure of the containment system. Biannual monitoring of these wells as part of the ESP provides further assurance that any potential failure of the IWCS will be quickly identified.</p> <p>The Corps will continue to monitor IWCS performance throughout the CERCLA planning process; such monitoring will include evaluation of the stability (i.e., trend) of the contaminant concentrations in wells surrounding the IWCS. Further investigation of areas surrounding the IWCS will be considered during the Balance of Plant FS to address any data gaps if any are identified.</p>
18.	USEPA	<p>General Comments 3: The Addendum seems to be geared more towards assessing the uranium plume instead of any potential radium plume. What is the rationale for focusing more on uranium when radium is the primary contaminant? Was the radium contamination identified during the RI in both subsurface soil and groundwater assessed further during the RI Addendum? If not, what is the rationale?</p>	<p>The residues stored at the NFSS are the result of uranium ore processing. During the processing of uranium ores, radium was precipitated as radium sulfate in the residues (DOE 1986). Radium sulfate is extremely insoluble in water. Additionally, migration of solubilized radium would be expected to be effectively inhibited by soil at the NFSS due to the very high radium sorption ratios observed (ORNL 1984). As such, radium present in the subsurface environment at the NFSS is expected to be relatively immobile. Uranium is more easily transported in groundwater than other radionuclides of concern at the NFSS, and due to its presence and mobility, uranium is the common site indicator for radiological transport of contamination groundwater. Furthermore, the</p>

			<p>groundwater plume figures were developed using soluble results to illustrate the worst case of groundwater movement and potential contaminant impacts.</p> <p>During development of the RI Report, a review of the dissolved concentration data for radium-226 and radium-228 showed no plumes present in the upper water-bearing zone. Total concentration data for radium-226 showed sporadic detections above background levels and no distinguishable plume. Radium-226 and radium-228 values are relatively low with few exceedances of the drinking water standard for these radionuclides.</p> <p>Concentrations of radium-226 and radium-228 in groundwater are monitored biannually as part of the ESP. ESP results indicate that total radium (Ra-226 and Ra-228) concentrations in groundwater are below the MCL of 5 pCi/L and the DOE Derived Concentration Guide of 100 pCi/L.</p> <p>Radium results were obtained for soil and groundwater samples collected during installation of wells for the RI Addendum and are presented in the report. Trending results for radium samples collected at ESP wells were also presented in the RI Report Addendum and indicate that only the ESP background well, B02W20S exhibits a definite increasing trend of radium-226. As reported in the RI Report Addendum, the increasing trend of radium-226 identified in this well will be further investigated as part of the Balance of Plant FS. The Corps will consider all radium data collected for the NFSS and will conduct additional field activities to address Balance of Plant data gaps if any are identified prior to final selection and design of any remedial alternatives.</p>
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19.	USEPA	General Comments 4: Further delineation of uranium plume and subsurface radium contamination would be necessary during the FS or as part of the Pre-remedial Action Design Phase.	The Corps will continue to monitor IWCS performance throughout the CERCLA planning process; such monitoring will include evaluation of the stability (and trend) of the contaminant concentrations in wells surrounding the IWCS. The Corps will also consider all radium data collected for the NFSS and will conduct additional field activities to address Balance of Plant data gaps if any are identified prior to final selection and design of any remedial alternatives.
20.	USEPA	General Comments 5: The USACE should take the necessary steps to restrict access to off-site shallow groundwater contamination.	Based on results of the RI and to address community and stakeholder concerns, measures are underway to restrict public access to this area. Access to shallow groundwater within the boundary of the NFSS is restricted by a security fence that surrounds the property.
21.	USEPA	General Comments 6: The USACE should consider installing test pits near underground pipelines to assess their integrity and to verify the findings of the historical assessment.	During the Balance of Plant FS, the Corps will conduct additional field activities to address Balance of Plant data gaps if any are identified, such as the integrity of underground utility lines. The Corps will consider various options for the investigation of underground utility lines, including the use of test pits or trenches to physically view the condition of subsurface materials and pipelines.
22.	USEPA	Specific Comments 7: ES.1, page ES-2- The paragraph talks about the use of the cancer risk level of E-4, the hazard index of 1, and the annual dose of 25 mrem. For clarification purposes, the EPA OSWER Directive 9355.0-30 "Role of the Baseline Risk Assessment in Superfund Remedy Selection Decisions" states that the risk number of 3 in 10,000 (3E-4) equates to an annual effective dose equivalent (EDE) of 15 mrem, when dealing with radiological carcinogens. EPA has considered cancer risk from radiation in a number of different contexts, and as consistently concluded that the level of 15 mrem/yr EDE as being not sufficiently protective. Also refer to OSWER Directive 9200-2-	The information provided on the Office of Solid Waste and Environmental Response (OSWER) Directive is noted; however, the exposure criteria referenced in this section of the RI was used for comparative purposes only. These exposure criteria have not been identified as applicable or relevant and appropriate requirements (ARARs) for the NFSS. The NFSS will be remediated to achieve cleanup criteria established by ARARs. The Corps will consider EPA's position regarding cancer risk levels due to radiation, put forth in OSWER Directives 9355.0-30 and 9200-2-28, however, these directives are not promulgated standards and are, therefore, not ARARs. The Corps is currently working to develop a technical memorandum to

		28.pdf, "Establishment of Cleanup Levels for CERCLA Sites with Radioactive Contamination." Consider, revising the text by stating that "by achieving the E-4 risk, the 25 mrem/yr is achieved.	identify remedial action objectives and ARARs for the IWCS and Balance of Plant Operable Units.
23.	USEPA	Specific Comments 8: ES.4.1, page ES-3 – Given that the scope of the RI addendum sampling effort did not include provisions for bounding the groundwater plume, the USACE should delineate the plume and restrict access.	<p>Since uranium was detected in groundwater above the background level and slightly above the uranium safe drinking water standard (MCL), three hydraulically downgradient LOOW monitoring wells were sampled to determine the off-site extent of this uranium plume. Uranium in these three LOOW wells was well below the safe drinking water standard. Based upon this information, it can be inferred that uranium contamination in groundwater is bounded to within the Town of Lewiston (former LOOW Waste Water Treatment Plant) property where groundwater is not a source of drinking water. As stated in the RI Report Addendum, measures are underway to restrict public access to this area.</p> <p>The Corps intends to conduct further investigations to address Balance of Plant FS data gaps if any are identified. Further evaluation of the groundwater contaminated area in the northwestern portion of the site will be considered during planning of data gap investigations.</p>
24.	USEPA	Specific Comments 9: ES.4.3, page ES-5, and ES.5.3, page ES-7 – Further consideration should be given to further assess the uranium plume and potential radium contamination in the northern, western, and southern edges of the IWCS. While it is likely that the identified contamination near the IWCS is a result of previous operations, further delineation may be necessary to aid the remedial design action phase following the feasibility study. More importantly, given the implication of contamination presence in close	Groundwater monitoring wells that monitor the upper and lower water-bearing zones have been installed along the entire perimeter of the IWCS. Monitoring well locations were selected to be as close to the IWCS as possible and still ensure that the IWCS containment system, including the cap, dike/cut-off wall and clay bottom, was not breached during well installation. Groundwater monitoring wells surrounding the IWCS monitor both the upper and lower water-bearing zones and are close enough to the containment perimeter to provide early

		<p>proximity to the IWCS, if technically feasible and practically achievable to discriminate between the existing contamination near the IWCS and any potential contaminant breach from the IWCS, then we recommend that the USACE conduct long term groundwater monitoring in closer proximity to the IWCS to assess the trends of radiological contaminants (both radium and uranium).</p>	<p>indication of any potential failure of the containment system. Biannual monitoring of these wells as part of the ESP provides further assurance that any potential failure of the IWCS will be quickly identified.</p> <p>The Corps will continue to monitor IWCS performance throughout the CERCLA planning process; such monitoring will include evaluation of the stability (and trend) of the contaminant concentrations in wells surrounding the IWCS. Further investigation of areas surrounding the IWCS will be considered during the Balance of Plant FS to address any data gaps if any are identified.</p>
25.	<p>██████ USEPA</p>	<p>Specific Comments 10: ES.5.4, page ES-8, 1st bullet – The bullet talks about the use of “as-built drawings” and the presence of the clay layer to inhibit contaminant vertical migration. Consider installing test pit(s) along existing pipelines to confirm the findings from the “as-built drawings” and the absence of bedding material, which could also aid in assessing contaminant lateral migration.</p>	<p>During the Balance of Plant FS, the Corps will conduct additional field activities to address Balance of Plant data gaps if any are identified, such as the integrity of underground utility lines. The Corps will consider various options for the investigation of underground utility lines, including the use of test pits or trenches to physically view the condition of subsurface materials and pipelines and assess the presence or absence of bedding material.</p>
24.	<p>██████ USEPA</p>	<p>Specific Comments 11: Section 3.3.2, page 3-13, 2nd paragraph – The section talks about the uranium plume. Wasn’t their radium contamination identified during the RI in EU-4? Was there an attempt to further assess the radium and to determine if there is radium subsurface contamination in subsurface soil and shallow groundwater during the RI Addendum in EU-4? This section may need to be revised to discuss radium investigations in EU-4 even if the results were below action levels.</p>	<p>Uranium is more easily transported in groundwater than other radionuclides of concern at the NFSS, and due to its presence and mobility, uranium is the common site indicator for radiological transport of contamination in groundwater. The residues stored at the NFSS are the result of uranium ore processing. During the processing of uranium ores, radium was precipitated as radium sulfate in the residues (DOE 1986). Radium sulfate is extremely insoluble in water. Additionally, migration of solubilized radium would be expected to be effectively inhibited by soil at the NFSS as a result of the very high radium sorption ratios observed (ORNL 1984). As such, radium present in the subsurface environment at the NFSS is expected to be relatively immobile.</p>

			<p>During the RI and RI Addendum, some radium-226 and radium-228 was observed in surface and subsurface soil within EU 4; however, only one result (surface soil at 0-0.5 feet [ft] depth) was greater than 5 pCi/g (picocuries per gram), which is the cleanup criteria for radium in surface soil (0-0.5 ft depth) as cited in 40 Code of Federal Regulations (CFR) 192 Subpart B. Thus, radium concentrations above this 5 pCi/g criterion are not widespread across EU 4.</p> <p>During development of the RI Report, a review of the dissolved concentration data for radium-226 and radium-228 at the NFSS showed no plumes present in the upper water-bearing zone. Total concentration data for radium-226 showed sporadic detections above background levels and no distinguishable plume. The radium-226 and radium-228 values are relatively low with few exceedances of the drinking water standard for these radionuclides (5 pCi/L for radium-226 and radium-228 combined).</p> <p>Although RI Addendum samples were analyzed for radionuclides, including radium, no additional evaluation of radium in EU 4 was conducted based on previous RI soil and groundwater results.</p> <p>The Corps will consider all radium data collected for the NFSS and will conduct additional field activities to address Balance of Plant data gaps if any are identified prior to final selection and design of any remedial alternatives.</p>
26.	<div></div> USEPA	<p><u>Specific Comments 12:</u> Section 3.3.3, page 3-16, 2nd paragraph – This section talks about the uranium plume. Wasn't there an attempt to further assess the radium and to determine if there is radium subsurface</p>	<p>For clarification, Section 3.3.3 of the RI Report Addendum addresses sampling in the IWCS area, not EU 4 as mentioned in the comment. This response addresses the IWCS area since the previous comment addressed EU 4.</p>

		<p>contamination in subsurface soil and shallow groundwater during the RI Addendum in EU-4? This section may need to be revised to discuss radium investigations in EU-4 even if the results were below action levels.</p>	<p>As explained in the previous comment response, uranium is more easily transported in groundwater than other radionuclides of concern at the NFSS, and due to its presence and mobility, uranium is the common site indicator for radiological transport of contamination in groundwater. Radium present in the subsurface environment at the NFSS is expected to be relatively immobile. Review of dissolved concentration data for radium-226 and radium-228 at the NFSS showed no plumes present in the upper water-bearing zone.</p> <p>During the RI and RI Addendum, some radium-226 and radium-228 was observed in surface and subsurface soil in areas immediately adjacent to the IWCS. However, in this area, only three results (two located adjacent to each other in surface soil at 0-0.5 ft depth east of the IWCS, and one in surface soil north of the IWCS) were greater than 5 pCi/g, which is the cleanup criteria for radium in surface soil (0-0.5 ft depth) as cited in 40 CFR 192 Subpart B. Thus, radium concentrations above this 5 pCi/g criterion are not widespread across the immediate vicinity of the IWCS.</p> <p>Although RI Addendum samples were analyzed for radionuclides, including radium, no additional evaluation of radium was conducted for the RI based on previous soil and groundwater results. As reported in the RI Report Addendum, trending of radium in on-site wells monitored as part of the ESP was conducted and an increasing trend of radium-226 was identified in ESP background well B02W20S, located in the northeast portion of the site. No other wells showed definite upward trends of radium concentrations.</p>
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			The Corps will consider all radium data collected for the NFSS and will conduct additional field activities to address Balance of Plant data gaps if any are identified prior to final selection and design of any remedial alternatives.
27.	USEPA	Specific Comments 13: Section 3.3.3.1.3, page 3-18, 1st paragraph – The last sentence states “all TWP’s in the IWCS area were sampled for filtered and unfiltered isotopic uranium analyses.” Please indicate why these samples were not analyzed for radium as well? If they were analyzed for radium, then such results need to be discussed even if they were below the action level.	<p>During the RI Addendum, filtered and unfiltered isotopic uranium results collected from temporary well points (TWPs) were reviewed and used as a screening aid to determine the location of the permanent monitoring wells. Samples from permanent monitoring wells were analyzed for a full suite of radionuclides, including radium. These results are presented in the RI Report Addendum.</p> <p>Due to its presence and mobility, uranium is the common site indicator for radiological transport of contamination in groundwater at the NFSS. Radium present in the subsurface environment at the NFSS is expected to be relatively immobile. Review of dissolved concentration data for radium-226 and radium-228 at the NFSS showed no plumes present in the upper water-bearing zone. Additionally, a review of surface and subsurface soil data for radium indicated that concentrations greater than the 5/15 pCi/g cleanup criteria for radium (40 CFR 192 Subpart B) is generally sporadic and not widespread across the NFSS.</p>
28.	USEPA	Specific Comments 14: Section 4.2 and 4.3 – The radiological results are sometimes reported in pCi/g and at other times in µg/g; whereas in the tables the results are reported in pCi/g. This can cause some confusion when correlating the data and possibly limiting future usability for the remedial action phase when the cleanup levels and the risk assessment modeling are based on the Ci unit. Where deemed applicable, recommend using the Ci unit for any future	Although it is preferable for all site investigative work to use consistent reporting units, this is often not the case due to the use of different laboratories and analytical methods. In general, RI results for radionuclides in soil were reported in pCi/g. For the first three phases of the RI, total uranium was also reported in micrograms per gram (µg/g). To correlate previous RI analytical results with RI Addendum results, a conversion method was used as explained in the RI Report Addendum. During the FS, an

		sampling efforts or establish a reliable conversion to convert the μg to the Ci unit.	appropriate unit will be used to develop cleanup levels and perform risk evaluations. As part of this effort, a reliable conversion to the appropriate unit will be established to ensure that all data is properly correlated and compared.
29.	USEPA	Specific Comments 15: Figure 4-2, legend – More clarification needs to be included in the legend. That is, the yellow color indicates plume concentration > 18 pCi/L. Recommend added an upper bound to this legend to indicate the maximum concentration in such area.	The commenter's concern is noted. In the event that groundwater plume figures are updated for the FS, revision of the legend as suggested will be considered.
30.	USEPA	Specific Comments 16: Figure 4-3, legend - More clarification needs to be included in the legend. That is, the yellow color indicates plume concentration > 1 pCi/L. Recommend added an upper bound to this legend to indicate the maximum concentration in such area.	The commenter's concern is noted. In the event that groundwater plume figures are updated for the FS, revision of the legend as suggested will be considered.
31.	USEPA	Specific Comments 17: Figure 4-4, legend - More clarification needs to be included in the legend. That is, the yellow color indicates plume concentration > 12 pCi/L. Recommend added an upper bound to this legend to indicate the maximum concentration in such area.	The commenter's concern is noted. In the event that groundwater plume figures are updated for the FS, revision of the legend as suggested will be considered.
32.	USEPA	Specific Comments 18: Figure 4-5, legend – The upper bound of the green legend is 30 $\mu\text{g/L}$, which is the action level. Recommend changing the upper bound of this legend to a number that is less than the action level.	The uranium plume figures presented in the RI were drawn to provide a simple interpretation of dissolved total uranium concentrations in the upper water-bearing zone. The green areas of the plumes were drawn to indicate where dissolved total uranium is less than or equal to the MCL of 30 microgram per liter ($\mu\text{g/L}$). Although the suggested revision could provide an acceptable way of viewing the data, revision of this figure as suggested will not change the overall conclusions of the RI. The RI groundwater plume figures will be used as a reference during FS efforts for the IWCS, Balance of Plant, and

			Groundwater Operable Units when cleanup goals will be developed for site media as part of remedial options.
33.	USEPA	<p>Specific Comments 19: Figure 4-6, legend – The upper bound of the green legend is 30 µg/L, which is the action level. Recommend changing the upper bound of this legend to a number that is less than the action level.</p>	<p>The uranium plume figures presented in the RI were drawn to provide a simple interpretation of dissolved total uranium concentrations in the upper water-bearing zone. The green areas of the plumes were drawn to indicate where dissolved total uranium is less than or equal to the MCL of 30 µg/L. Although the suggested revision could provide an acceptable way of viewing the data, revision of this figure as suggested will not change the overall conclusions of the RI. The RI groundwater plume figures will be used as a reference during FS efforts for the IWCS, Balance of Plant, and Groundwater Operable Units when cleanup goals will be developed for site media as part of remedial options.</p>
34.	USEPA	<p>Specific Comments 20: Section 5.4, pages 5-5 to 5-9 – This section talks about the definite trend increase of uranium in monitoring well OW11B and of radium-226 in monitoring well B02W20S (well number OW20S in the ESP data set), and possible increasing radium trends in four other wells (i.e., wells number A50, OW06B, OW15B, and OW17B). All these wells are in the upper water bearing zone (shallow groundwater). Below are the comments</p> <p><i>Uranium trend increase in well number OW11B located about 150 feet east of the IWCS.</i> The USACE suggests that the RI activities conducted near this well may have compromised the integrity of the contaminated pipeline near the well. Also, the closest well to OW11B is approximately 150 feet away. Recommend installing a test pit to assess the integrity of the pipeline and the source of the trend increase in uranium concentration. EPA also recommend installing additional wells in</p>	<p><i>Uranium trend increase in well number OW11B located about 150 feet east of the IWCS.</i> To address uncertainties concerning the increasing trend of uranium concentrations in well OW11B, the Corps will conduct additional field activities during the Balance of Plant FS. These activities will include investigation of radiological concentrations in well OW11B and the integrity of the underground utility lines south and east of the IWCS. The Corps will consider various methods of investigation, including the installation of test pits and additional wells to determine the source of the trend increase in uranium concentrations at OW11B. Based on the findings of this effort, the Corps will assess the need for any removal action to limit potential migration of contamination in the subsurface soil and groundwater.</p> <p><i>Radium increase in well number B02W20S located on the northeast portion of the site (near the southern edge of "O" Street).</i> As reported in the RI Addendum, the</p>

	<p>closer proximity to OW11B to determine the extent of contamination. Based on the findings, the USACE should also assess the need for a removal action to limit any potential spread of uranium contamination in the subsurface soil and shallow groundwater.</p> <p><i>Radium increase in well number B02W20S located on the northeast portion of the site (near the southern edge of "O" Street).</i> The USACE indicated that this well is not located in the groundwater plume area. This may be true for the currently identified plume area. However, the Addendum does not mention the source of the increase in the radium concentration, nor that this well location is bounded by other wells to assess the extent of radium contamination both in subsurface soil and shallow groundwater. EPA recommends further assessment of radium in this area to bound the extent of radium contamination in subsurface soil and groundwater and to assess the potential presence of any radium plume.</p> <p><i>Possible radium increase in well number A50 located in close proximity to the IWCS east wall.</i> The well is bounded by other wells. EPA recommends long term monitoring of radium at this location.</p> <p><i>Possible radium increase in well number OW06B located approximately 30 feet from the IWCS south wall.</i> EPA recommends long term monitoring of radium at this location and further assessment of radium in this area to bound the extent of radium contamination in subsurface soil and groundwater.</p> <p><i>Possible radium increase in well number OW15B</i></p>	<p>increasing trend of radium-226 identified in ESP background well B02W20S will be further investigated as part of the Balance of Plant FS. During development of investigative plans for the Balance of Plant FS, the Corps will consider installation of additional wells in this area as part of the effort to assess radium concentrations in well B02W20S.</p> <p><i>Possible radium increase in well numbers A50, OW06B, OW15B, OW17B.</i> Radium concentrations (as well as other radionuclide concentrations) are currently monitored biannually at these four wells as part of the Corps' ESP conducted at the NFSS. The Corps will continue to monitor these wells and other wells surrounding the IWCS throughout the CERCLA planning process.</p> <p>The Corps will consider all radium data collected for the NFSS and will conduct additional field activities to address Balance of Plant data gaps if any are identified prior to final selection and design of any remedial alternatives. Further investigation of areas surrounding the IWCS will be considered as part of the Balance of Plant FS.</p>
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		<p><i>located approximately 150 feet from the IWCS west wall and east of the West Drainage Ditch. This well is fairly bounded by other wells on the north, south and east sides. EPA recommends long term monitoring of radium at this location and at closer proximity to the IWCS. The USACE should also consider bounding this well from the west side.</i></p> <p><i>Possible radium increase in well number OW17B located approximately 150 feet from the IWCS west wall and east of the West Drainage Ditch. This well is fairly bounded by other wells on the north and south. EPA recommends long term monitoring of radium at this location and at closer proximity to the IWCS. The USACE should also consider bounding this well from the east and west.</i></p>	
35.	USEPA	<p><u>Specific Comments 21: Section 5.5, page 5-8, 2nd bullet</u> – The USACE should consider installing a test pit to verify that the 42-inch diameter pipeline was not underlain by bedding material.</p>	<p>No further investigation of the 42-inch diameter pipeline is deemed necessary based on observations made during the LOOW Underground Utilities Remedial Investigation. During the Underground Utilities Remedial Investigation for the LOOW, excavations were completed for various utility lines to visually confirm and document conditions of the lines and to assess the presence or absence of bedding material (USACE 2008b). The 42-inch diameter supply line originating within the NFSS property and traversing north was evaluated for the presence of bedding material due to concern from the public. Results of this investigation indicated that the line was not underlain by bedding material.</p>
36.	USEPA	<p><u>Specific Comments 22: Section 8.4.1, page 8-3, 2nd bullet</u> – It is unclear why gross alpha/beta analyses are performed on the ballast samples.</p>	<p>Gross alpha and beta analytical results were used to provide an overall indication of the presence or absence of alpha and beta emitting radionuclides. For investigative purposes, most RI sample parameters were selected to</p>

			detect a wide range of compounds. Gross alpha and beta analysis was often included in the radiological suite of analyses, which also included various radionuclides.
37.	USEPA	Specific Comments 23: Section 8.5.1, page 8-4, 2nd bullet – It is unclear why gross alpha/beta analyses are performed on the road core samples.	Gross alpha and beta analytical results were used to provide an overall indication of the presence or absence of alpha and beta emitting radionuclides. For investigative purposes, most RI sample parameters were selected to detect a wide range of compounds. Gross alpha and beta analysis was often included in the radiological suite of analyses, which also included various radionuclides.
38.	USEPA	Specific Comments 24: Section 9.2 page 9-2, 2nd bullet , - Whenever possible, EPA recommends assessing any potential groundwater contamination trends on a seasonal basis.	Groundwater flow conditions (i.e., water elevations) at the NFSS are assessed on a quarterly basis and chemical and radiological concentrations in groundwater are assessed on a biannual basis (Spring and Fall). Results of the Corps' ESP are published annually; these results include trending analyses that incorporate data collected during previous seasons.
39.	USEPA	Specific Comments 25: Section 9.2.2, page 9-3, 2nd paragraph – The paragraph talks about the use of the cancer risk level of E-4, the hazard index of 1, and the annual dose of 25 mrem. For clarification purposes, the EPA OSWER Directive 9355.0-30 "Role of the Baseline Risk Assessment in Superfund Remedy Selection Decisions" states that the risk number of 3 in 10,000 (3E-4) equates to an annual effective dose equivalent (EDE) of 15 mrem, when dealing with radiological carcinogens. EPA has considered cancer risk from radiation in a number of different contexts, and as consistently concluded that the level of 15 mrem/yr EDE (which equates to approximately a 3 E-4 cancer risk) or less protective and achievable. EPA has explicitly rejected levels above 15 mrem/yr EDE as not being sufficiently protective. Also refer to OSWER Directive 9200-2-28.pdf, "Establishment of Cleanup	The information provided on the OSWER Directive is noted; however, the exposure criteria referenced in this section of the RI was used for comparative purposes only. These exposure criteria have not been identified as ARARs for the NFSS. The NFSS will be remediated to achieve cleanup criteria established by ARARs. The Corps will consider EPA's position regarding cancer risk levels due to radiation, put forth in OSWER Directives 9355.0-30 and 9200-2-28, however, these directives are not promulgated standards and are, therefore, not ARARs. The Corps is currently working to develop a technical memorandum to identify remedial action objectives and ARARs for the IWCS Operable Unit.

		Levels for CERCLA Sites with Radioactive Contamination.” Consider, revising the text by stating that “by achieving the E-4 risk, the 25 mrem/yr is achieved.	
40.	USEPA	Specific Comments 26: Section 10.2, page 10-2, 2nd paragraph – See previous comment vis-à-vis the 1E-4 cancer risk and the 25 mrem/yr.	The information provided on the OSWER Directive is noted; however, the exposure criteria referenced in this section of the RI was used for comparative purposes only. These exposure criteria have not been identified as ARARs for the NFSS. The NFSS will be remediated to achieve cleanup criteria established by ARARs. The Corps will consider EPA’s position regarding cancer risk levels due to radiation, put forth in OSWER Directives 9355.0-30 and 9200-2-28, however, these directives are not promulgated standards and are, therefore, not ARARs. The Corps is currently working to develop a technical memorandum to identify remedial action objectives and ARARs for the IWCS Operable Unit.
41.	USEPA	Specific Comments 27: Section 10.4.2, page 10-4, last paragraph. – Explain what is the 2.43 pCi/g Ra-226 screen criterion is based on. Is it twice background?	<p>The background value for radium-226 in sediment is 2.43 pCi/g, which is the maximum detected value of radium-226 in the background data set. A brief explanation of this background value is provided below, while a full explanation of the development of RI background values is presented in the NFSS Baseline Risk Assessment.</p> <p>A standard 95% Upper Tolerance Limit (UTL) is calculated for data that are normally distributed, and a lognormal UTL is calculated for log-transformed data. The maximum detected concentration is used as a surrogate for the UTL for data that are neither normally nor log normally distributed. In addition, the maximum detected concentration is used as a surrogate UTL for any analyte with less than three sample results.</p>

			For the RI, a background value was defined to be the lesser of the 95% background UTL or the maximum value in the background data set. The distribution for radium-226 background data set was found to be neither normal nor lognormal. Therefore, the background value for radium-226 in sediment is 2.43 pCi/g, which is the maximum detected value of radium-226 in the background data set.
42.	USEPA	Specific Comments 28: Section 14, Conclusions – This section may require revisions based on the above comments.	No revisions to the RI Report Addendum are planned; however, the Corps will consider all public comments during NFSS FS efforts for the IWCS, Balance of Plant and Groundwater Operable Units.
43.	USEPA	Editorial Comments 29: Section ES.4.1, page ES-3 – This section talks about EU-1 and EU-2; whereas, the titles for Tables 3-6 through 3-14 is only for EU-1. Revise accordingly.	Concur. Tables that include sample results for TWP926 should reference EU 2 in the title, as this temporary well point was installed in EU 2 to investigate the northwestern groundwater plume area. However, no revisions or re-release of the RI Report Addendum are planned.
44.	USEPA	Editorial Comments 30: Section 8.1, page 8-1, 2nd paragraph, 9th line – Revise the sentence stating that “Demolition of Building 401 is scheduled for 2010.”	This text was drafted prior to the release of the RI Report Addendum in April 2011. The revision of this sentence did not get incorporated into the report at the time of publication. The sentence should read “Demolition of Building 401 was completed in 2010.” However, no revisions or re-release of the RI Report Addendum are planned.
45.	USEPA	Editorial Comments 31: Section 8.7.2, page 8-6, 2nd paragraph, beginning of third line – Replace “uranium-228” with “uranium-238”.	Concur. The text should be written as noted in the comment. However, no revisions or re-release of the RI Report Addendum are planned.
46.		I am concerned about leakage in the south area of the IWCS and the fact that it was not a primary concern of the Corps. I am concerned that the modeling did not use pipelines in its factoring. Where does all the rain water go if this area is impermeable? Why have monitoring well readings	Groundwater plumes exist adjacent to the IWCS, however, several lines of evidence have been examined and they indicate that the IWCS is performing as designed. The uranium groundwater plumes south of the IWCS are believed to be associated with former Building 409 and nearby residue storage activities. The 1956 aerial photo also shows material piles located south of the IWCS that

		<p>change over time if nothing migrates? I do not trust your models are correct.</p> <p>Water lines have not been sealed (going to Modern and one going to CWM). Water lines could be a pathway for leakage from the site. I was glad to hear that the Corps will study pipeline migration.</p>	<p>correspond to elevated concentrations of dissolved total uranium observed in area groundwater. The Groundwater Flow and Contaminant Transport Model (2007 and 2011 update) is a regional model that is focused primarily on predicting long-term contaminant transport beyond the boundaries of the NFSS. It is not designed to predict short-distance transport between on-site areas</p> <p>Although the clay-rich soils at the NFSS limit infiltration of groundwater to the subsurface, some infiltration does occur. Additionally, there are several ditches at the NFSS that contain water approximately 50% of the year and surface water run-off occurs as these ditches drain to larger on-site ditches, mainly the West Drainage Ditch and the Central Drainage Ditch. Water levels are monitored quarterly in wells across the NFSS and water table elevations fluctuate in response to seasonal precipitation events.</p> <p>The sanitary sewer, storm sewer, and acid waste lines on the NFSS were investigated during the RI, since they were more likely to be contaminated than the water line used to supply drinking water to the LOOW. Underground utility lines connecting the former LOOW freshwater treatment plant buildings have been cut, capped, removed, or grouted in place. Additionally, the LOOW Underground Utilities Remedial Investigation concluded that a majority of the former LOOW pipelines and all of the pipelines leaving the NFSS did not have bedding material. The pipelines are surrounded by clay with extremely low permeability that inhibits contaminant transport. During RI sampling efforts, 26% of the pipelines that reside below the groundwater table were dry; indicating that unimpeded connection between pipelines</p>
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			<p>and groundwater may not be prevalent.</p> <p>To address stakeholder concerns of IWCS leakage and pipelines acting as pathways for migration of contaminants, the Corps plans to further evaluate areas surrounding the IWCS during the Balance of Plant FS, including investigation of the underground utility lines east and south of the IWCS. The Corps will continue to monitor performance of the IWCS throughout the CERCLA planning process.</p>
47.	██████	<p>I am one of the most non technical guys at that meeting last night, but that being said, I do follow and understand most of it :-). One opinion I came away with was, the Corp does not think the containment site is leaking at this time, and is changing its verbiage from plume to contamination "interesting".</p> <p>Now this is a minor detail, but it goes to over all creditability - In slide # 10 the slide shows 6-mile creek going into 4- mile creek - that might be the southwestern drainage ditch. This runs south of the containment facility and could carry contamination to the west and then north.</p> <p>The area covered was too small. The topography (hope I have the right spelling - the lay of the land) As the Building Inspector for the Town said, ground water likely flows from the east to the west due to both CWM and Modern.</p> <p>Further, while the water is not really safe, that putting up a fence will protect the people. I do not believe that to be doing enough. - I know, money is almost</p>	<p>Both the Corps and the U.S. Environmental Protection Agency agree that the IWCS is performing as designed. Changing the verbiage from groundwater plume to areas of contamination is related to an updated understanding of conditions at the site. A groundwater plume is generally regarded as a volume of contaminated groundwater; one of the characteristics of a plume is that it is generally continuous and may migrate in a coherent way. Based on the RIR Addendum, groundwater flow at the IWCS is limited due to the presence of localized, disconnected sand lenses. For this reason, the groundwater contamination is not continuous or coherent, and has very little flow. The change in terminology was made to more accurately reflect the conditions of groundwater at the NFSS and the disconnected and very localized nature of the groundwater contamination.</p> <p>The NFSS receives surface run-off from the east and north (Modern Landfill and CWM Chemical Services), and from properties to the south of the site. Several ditches at the NFSS collect surface run-off. Over most of the site, surface water is conveyed through east-west ditches that empty into the Central Drainage Ditch, which flows north</p>

		<p>non-existent, but - - -</p> <p>It seems as if Corp. people continue to be moved from one area of responsibility to another, and that the "new" people continue to rediscover stuff that we have been "working on" for years. Study after study after study and little action.</p> <p>Maybe with the new Facilitator, money will be found to really make a difference. While I think Amy's intentions are good, her total distrust and nit picking does little to develop a sincere two way discussion. Sounds like the conference call was productive. Keep up the work :-)</p> <p>We still may get somewhere</p>	<p>and joins Four Mile Creek about 1.5 miles north of the NFSS. Surface run-off from the western and northwestern portions of the site flows to the West Drainage Ditch, which flows north and joins the Central Drainage Ditch. As part of the Corps' ESP, surface water and streambed sediment is monitored to assess the migration of constituents in these media should any occur. Surface water and streambed sediment sampling of radioactive, metal, and chemical constituents is conducted along the drainage ditch system in upstream, on site, and downstream locations.</p> <p>The Corps is currently working to complete several technical memorandums in support of the FS phase for the IWCS Operable Unit at the NFSS. Following completion of these memorandums, the FS document for the IWCS Operable Unit will be compiled followed by FS efforts for the Balance of Plant and Groundwater Operable Units. To provide a productive communicative environment with stakeholders, the Corps will continue to enlist the aid of a project facilitator throughout the CERCLA planning process for all three operable units (i.e., IWCS, Balance of Plant and Groundwater).</p>
48.		<p>I found the enclosed "Response to the Army Corps of Engineers" very revealing. I would appreciate a public response by the Corps to these specific facts.</p> <p>(See attached.)</p>	<p>On January 12, 2011, the Corps held a meeting with Ms. Ann Roberts, the author of the "Response to the Army Corps of Engineers" referenced in the comment. The topics raised by Ms. Roberts in her response were thoroughly discussed during the meeting and responses to key concerns discussed with Ms. Roberts have been compiled and are attached. In general, the following responses were provided by the Corps:</p> <p>The Corps believes that the IWCS is performing as designed based on the extensive studies that have been</p>

		<p>completed. The U.S. Environmental Protection Agency has reached the same conclusion based on existing data. Groundwater plumes exist adjacent to the IWCS, however, aerial photos showing historic site operations, RI data, and longer-term ESP data trends do not support the conclusion of IWCS leakage. The uranium groundwater plumes south of the IWCS are believed to be associated with former Building 409 and nearby residue storage activities. Historic aerial photos also show material piles located south of the IWCS that correspond to elevated concentrations of dissolved total uranium observed in area groundwater.</p> <p>During the January 2011 discussions with Ms. Roberts, the Corps discussed further evaluating the isolated, ~1,000 pCi/L uranium concentration south of the IWCS as part of a Balance of Plant data gap. However, there are groundwater wells closer to the south end of the IWCS that do not demonstrate an increasing trend in uranium concentration, indicating that the IWCS is functioning as designed.</p> <p>As-built drawings reviewed during the RI for former LOOW freshwater treatment plant buildings do not indicate the use of any bedding material for pipelines. As-built drawings for former LOOW freshwater treatment plant buildings also show that the building foundations and the connecting pipelines are located in the brown clay layer, which, due to the clay's low permeability, reduces the potential for contaminant migration surrounding the pipelines. Furthermore, approximately 18 ft of low-permeability gray clay, which underlies the brown clay layer, inhibits potential vertical groundwater flow and contaminant transport from the pipelines. Research</p>
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			<p>indicates that pipelines connecting the former LOOW freshwater treatment plant buildings were removed or filled and the ends plugged. As indicated in the RI Report Addendum, the Corps will conduct additional field activities to address Balance of Plant data gaps if any are identified, such as the integrity of the underground utility lines south and east of the IWCS.</p> <p>As explained in RI Report Addendum, a total of 166 samples of various environmental media at the NFSS were analyzed for plutonium-239/240. Based on the low number and concentrations of detections, plutonium-239/240 is not believed to be a significant contaminant at the site, but its possible presence at various locations of the NFSS will continue to be considered during preparation of the FS.</p> <p>Additionally, the Corps has enhanced the ESP to include more wells and a more extensive parameter list. The Corps will continue to monitor IWCS performance throughout the CERCLA planning process.</p>
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ARAR – Applicable or Relevant and Appropriate Requirement

CERCLA - Comprehensive Environmental Response, Compensation and Liability Act

CFR – Code of Federal Regulations

DNAPL – Dense Non-aqueous Phase Liquid

DOE – Department of Energy

ESP – Environmental Surveillance Program

FS – Feasibility Study

ft - feet

IWCS – Interim Waste Containment Structure

LOOW – Lake Ontario Ordnance Works

MCL – Maximum Contaminant Level

NCDOH – Niagara County Department of Health
NFSS – Niagara Falls Storage Site
NYSDEC – New York State Department of Environmental Conservation
ORNL – Oak Ridge National Laboratory
OSWER – Office of Solid Waste and Emergency Response
pCi/g – picocurie per gram
pCi/L – picocurie per liter
RI – Remedial Investigation
TWP – Temporary Well Point
µg/g – micrograms per gram
µg/L – micrograms per liter
USEPA – United States Environmental Protection Agency
UTL – Upper Tolerance Limit

DOE 1986. Final Environmental Impact Statement: Long-term Management of the Existing Radioactive Wastes and Residues at the Niagara Falls Storage Site. April.

Oak Ridge National Laboratory (ORNL) 1984. Geochemical Information for Sites Contaminated with Low-level Radioactive Wastes: I – Niagara Falls Storage Site. November. ORNL-6083.

USACE 2008a. Results of Site Investigation and Drum Removal - Vicinity Property G, Niagara Falls Storage Site, Lewiston, New York. Final Report. Prepared by Tetra Tech. October 2008.

USACE 2008b. Report of Results for the Remedial Investigation of Underground Utility Lines Formerly Used by the Department of Defense, Lake Ontario Ordnance Works (LOOW), Niagara County, New York. Prepared by EA Engineering, Science, and Technology, Inc. September 2008.

Response to the Army Corps of Engineers

Dr. Ann Roberts 6-8-11

Niagara Falls Storage Site ("NFSS") Remedial Investigation Report ("RIR") Addendum

1. The Army Corps states, "The Interim Waste Containment Structure ("IWCS") is performing as designed." However:

The IWCS is leaking

Upper Groundwater Bearing Zone ("UWBZ") water: Leakage is distinguishable from pre-existing contamination by the level of uranium detected in ground-water.

Pre-existing Uranium contamination levels range from 5ug/L to 100ug/L:

- However, Uranium levels in groundwater nearest the IWCS have been detected at about 1,000ug/L.
- Slightly further from the IWCS, Uranium levels between 800ug/L and 1,200ug/L have been detected, South and East of the IWCS.

Public requests to investigate the source of the high uranium detections South and East of the IWCS were ignored in the RIR Addendum. In addition, the public was precluded from seeing or commenting on the RIR Addendum "Sampling and Analysis Plan" prior to commencement of field work.

Groundwater within the sewer lines in the RIR has been deleted from the RIR Addendum. By reclassifying the water in these 8-ft. deep pipes as, instead, "surface" water, the RIR Addendum helps to cover up the fact that the IWCS is leaking. The sewer lines are in contact with groundwater most of the year. Groundwater infiltration into the sewer lines is inevitable after 70 years.

- The Corps did not sample groundwater down-gradient (east) of the well with the highest contamination. Therefore, migration of the contamination is ignored by the RIR Addendum.

2. The Army Corps states, "Groundwater contamination is not migrating laterally." However:

Groundwater contamination is migrating laterally (and vertically)

The RIR Addendum groundwater "modeling" did not take into account:

- Abandoned pipelines which move contamination much faster than the report predicts
- Groundwater discharges to the major surface ditches on the NFSS

The resumption of surveillance in the Lower Water Bearing Zone ("LWBZ") wells shows that vertical migration of contamination is significant.

3. The Army Corps states, "Plutonium is not a significant or widespread NFSS contaminant." However:

The detections of Plutonium referred to in the RIR Addendum are concerning since there was no sampling plan designed for these contaminants.

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APRIL 2011
Army Corps RIR Addendum - Uranium plumes around the IWCS
Missing 2007 data (in red)

