US Army Corps of Engineers
Buffalo District

Niagara Falls Storage Site

Formerly Utilized Sites Remedial Action Program
Remedial Investigation Report Public Information Session #2
September 10, 2008

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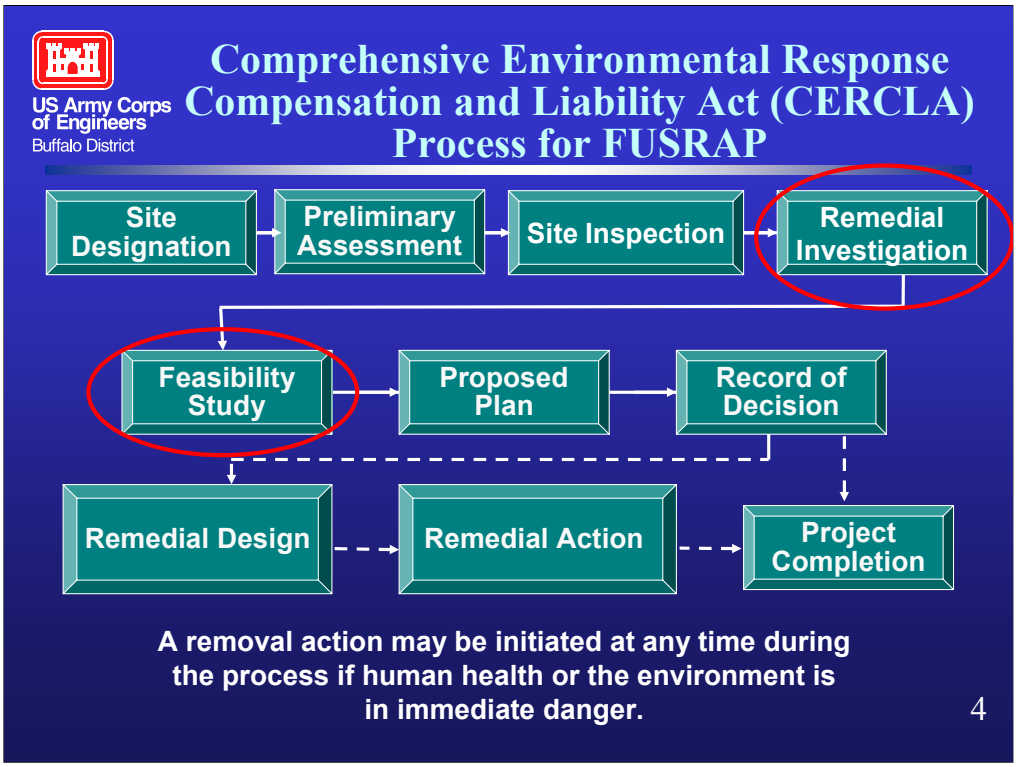
Introduction of Niagara Falls Storage Site (NFSS) Project Team

- U. S. Army Corps of Engineers Key Personnel
  - Bill Kowalewski – NFSS/LOOW Program Manager
  - Duane Lenhardt – Project Manager
  - Michelle Rhodes – Project Engineer
  - Judy Leithner – Regional Technical Specialist
  - Karen Keil – Environmental Toxicologist
  - William Frederick – Hydrogeologist
  - Arleen Kreusch – Outreach Program Specialist
- Contractors (SAIC, Tetra Tech, HGL, Argonne)

This is the second in a series of Public Information Sessions planned for the NFSS. Tonight we intend to follow up on public comments received since Public Information Session #1 held in May 2008. Moving forward we will start integrating FS discussions at future Public Information Sessions.



The Comprehensive Environmental Response Compensation and Liability Act, also known as “CERCLA” or “Superfund”, defines a systematic process for identifying, investigating and cleaning up hazardous waste sites.

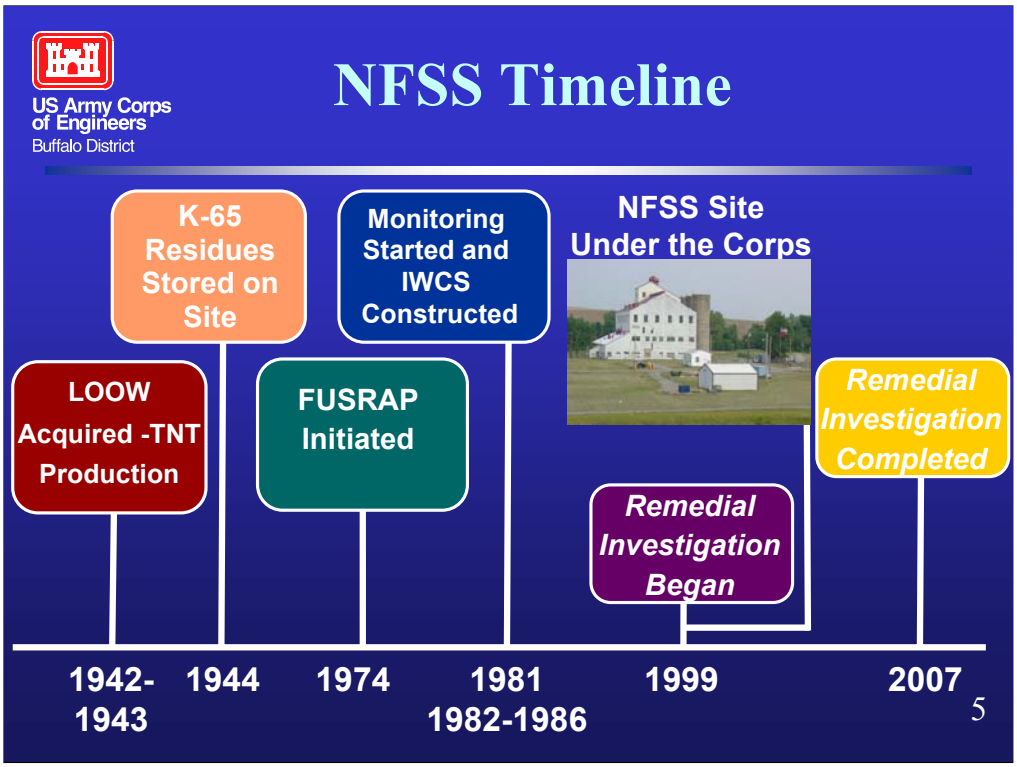
Actions at the NFSS are being performed consistent with CERCLA methods and this graphic shows you where we are in that process. As you know, we recently completed the Remedial Investigation, which defined the nature and extent of site contamination, and evaluated potential risks to human health and the environment.

The Feasibility Study is the next step in the CERCLA process. We are holding these meetings to review and respond to your comments submitted for the Remedial Investigation. Once all the Remedial Investigation comments are received, we will perform a data gap analysis and decide whether any of the data gaps identified need to be addressed in an addendum to the Remedial Investigation or whether they can be addressed as part of the Feasibility Study.

During the Feasibility Study, we will develop cleanup objectives and evaluate multiple remedial alternatives to address site contamination.

The Feasibility Study leads to the Proposed Plan where the preferred remedial alternative is selected. Finally, a Record of Decision will be filed to document the final decision on site closure.

Note that the CERCLA process allows for a removal action at any time during the process if human health or the environment is in immediate danger.



Now let's back up to see how we got here.

During World War II, the Army Corps of Engineers built several facilities across the United States to manufacture munitions for the war. In 1942, the Corps acquired more than 7,000 acres of agricultural land in northwestern New York State and constructed a TNT production plant known as the Lake Ontario Ordnance Works or LOOW. TNT production at the LOOW ended a year later in July 1943.

In 1944 the Manhattan Engineer District (MED) was granted use of a portion of the LOOW (191-acres) for the storage of radioactive residues generated by uranium ore processing. With this action, the NFSS was created.

In 1974 the Formerly Utilized Sites Remedial Action Program (FUSRAP) was formed to address the legacy left behind by the Manhattan Engineer District/Atomic Energy Commission program, including the materials stored at the NFSS.

Seven years later, in 1981, an environmental monitoring program was initiated to assess radon emissions from the NFSS and to look for radiological contaminants in surface water, sediment, and groundwater. Later that same year, radioactively contaminated soil from a vicinity property was excavated and placed in an area called the R-10 pile at the NFSS.

Various remedial actions were performed throughout the 1980's, including construction of the Interim Waste Containment Structure (IWCS) from 1982 to 1986.

In 1997, control of the NFSS was transferred from the Department of Energy back to the Corps. The Corps continued the environmental monitoring of the site and in February of 1999, the Corps issued the first scope of work directing the performance of the Remedial Investigation which was completed in 2007.

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Overview of Accomplishments

- Operation and maintenance of the IWCS
- Completion of the Remedial Investigation Report
- Site Maintenance and Environmental Surveillance Program

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Construction of the IWCS

•In the 1980s, the United States Department of Energy consolidated radioactive residues and contaminated soils and debris into the IWCS. Presented here is a photograph taken during IWCS construction and a photograph of how it appears today. The IWCS was engineered to slow radon emissions, rain infiltration, and the migration of contamination to groundwater.

•Residues were placed directly on naturally occurring clay and into the basement of Building 411. Prior to placing materials into the Building 411 basement, drains, pipes and openings in the basement were sealed. Details on this operation will be presented a little later.

•Approximately 190,000 yd3 of radioactive wastes and materials, containing radium and thorium, were placed in the IWCS.

•Construction of the IWCS took several years beginning in 1982 and ending in 1986. In 1991, isolated areas of residual radioactivity from across the NFSS site were incorporated into the IWCS.

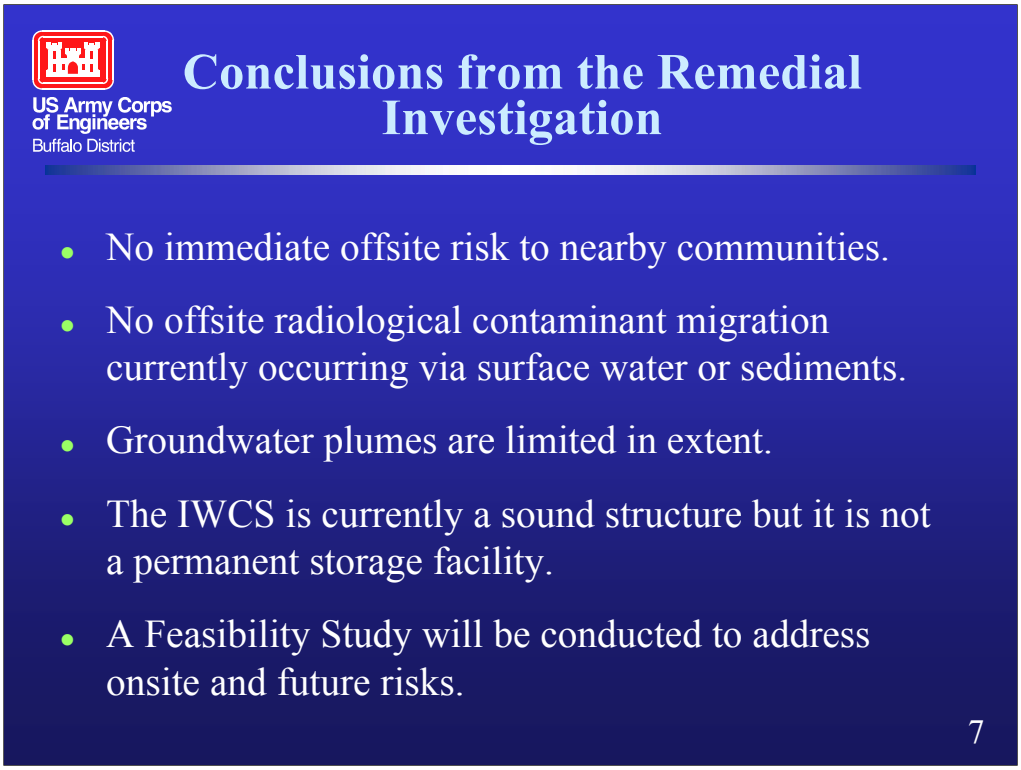
Completion of the RI

•The Remedial Investigation was conducted to determine the nature and extent of contamination and included a regional groundwater flow and contaminant transport model and an evaluation of the IWCS integrity.

•The Remedial Investigation was an 8-year effort, which included 3 phases of field investigation. During the Remedial Investigation more than 1,400 samples were collected and more than 150,000 analytical results were recorded.

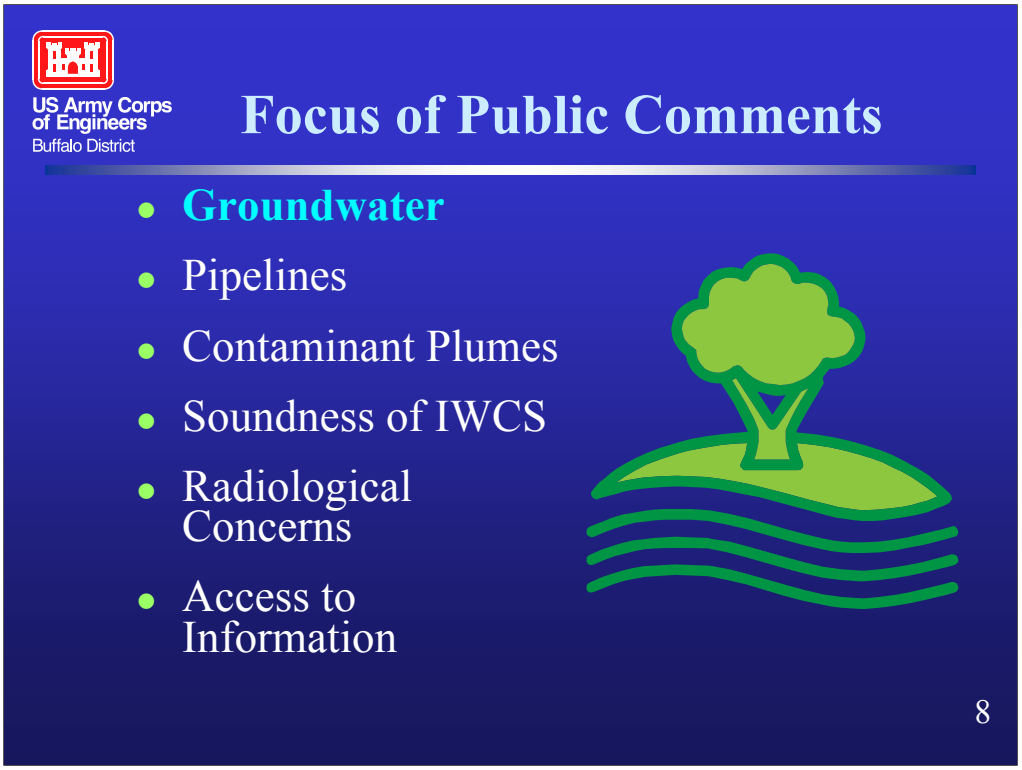
Environmental Surveillance Program

•The Corps' mission is the protection of human health and the environment. To accomplish this, the Corps conducts maintenance activities and annually publishes a Technical Memorandum, which highlights findings from Environmental Surveillance Program sampling. Measured radon and external gamma radiation data shows that exposures from the site are currently well below federal standards.



The key findings of the Remedial Investigation are…

- No immediate offsite risk to nearby communities.
- No offsite radiological contaminant migration currently occurring via surface water or sediments.
- Groundwater plumes are limited in extent and coincide with historic operational areas.
- The Remedial Investigation included an assessment of the integrity of the IWCS and concluded that with continued maintenance the structure will be sound for some time, however, the IWCS was not designed as, nor will it be used as a permanent storage facility.
- Finally, a Feasibility Study will be conducted to address onsite and future risks.



Since the Public Information Session held on May 7th we have received comments regarding a variety of topics. Your comments are important, especially as we perform our data gap analysis. Thank you for taking the time to read and comment on these large and technical reports.

Written responses to public comments will be available after all comments are received up to mid-October. We have grouped the Remedial Investigation comments received to date into the categories listed on this slide. Tonight we will discuss each of these categories in more depth to help focus and encourage additional public discussion and comment.

The principle focus of the comments we will address tonight include:

•Groundwater

•Pipelines

•Contaminant Plumes

•Soundness of the IWCS

•Radiological Contamination

•Access to Information

Several of these topics cover more than one issue, so let's get started with groundwater.

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Groundwater Comments

- Sand lenses and paleochannels
- Groundwater levels within the IWCS

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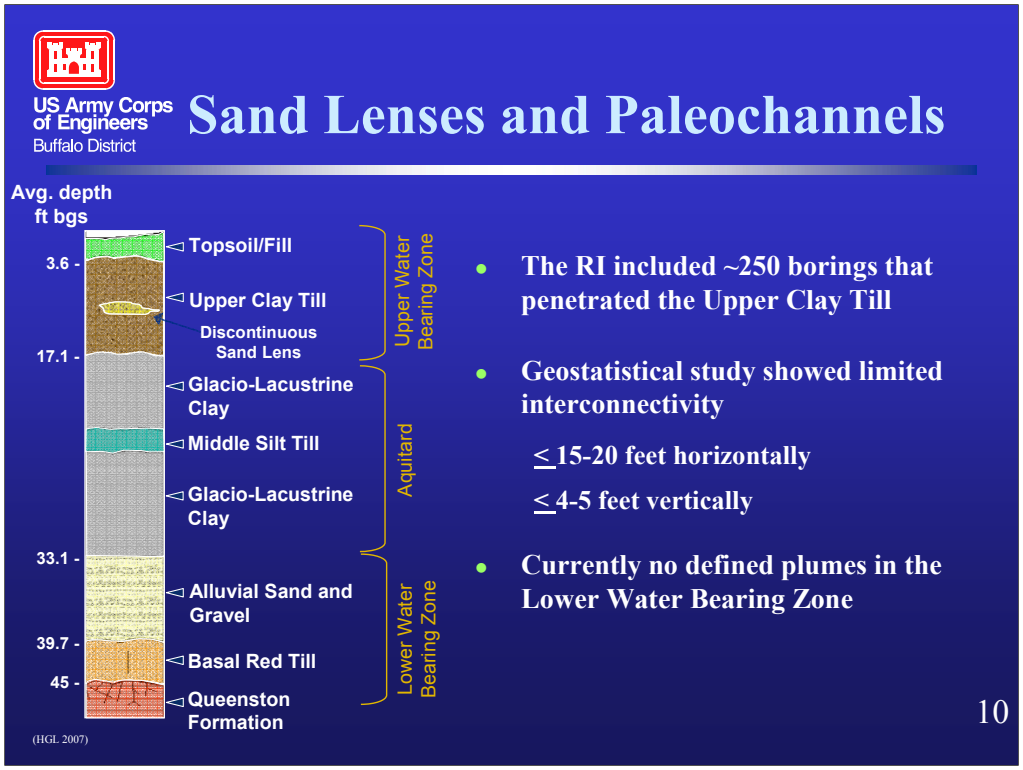
The NFSS groundwater model assessed groundwater dynamics both regionally and locally for the site.

The areas of comments that we received regarding groundwater flow dynamics concerned:

•The presence of sand lenses and the possibility of paleochannels and

•The level of groundwater within the IWCS.



Let's start our discussion with a couple of definitions

Sand Lenses

Roughly, 10,000 years ago, most of New York state was covered by glaciers. When the glaciers melted they left behind till deposits consisting of mixed clay, sand, gravel and boulders. Till deposits, like those found at the NFSS, slow groundwater flow and, consequently, contaminant migration. However, till deposits often contain embedded sand lenses, and the NFSS is no exception.

Paleochannels

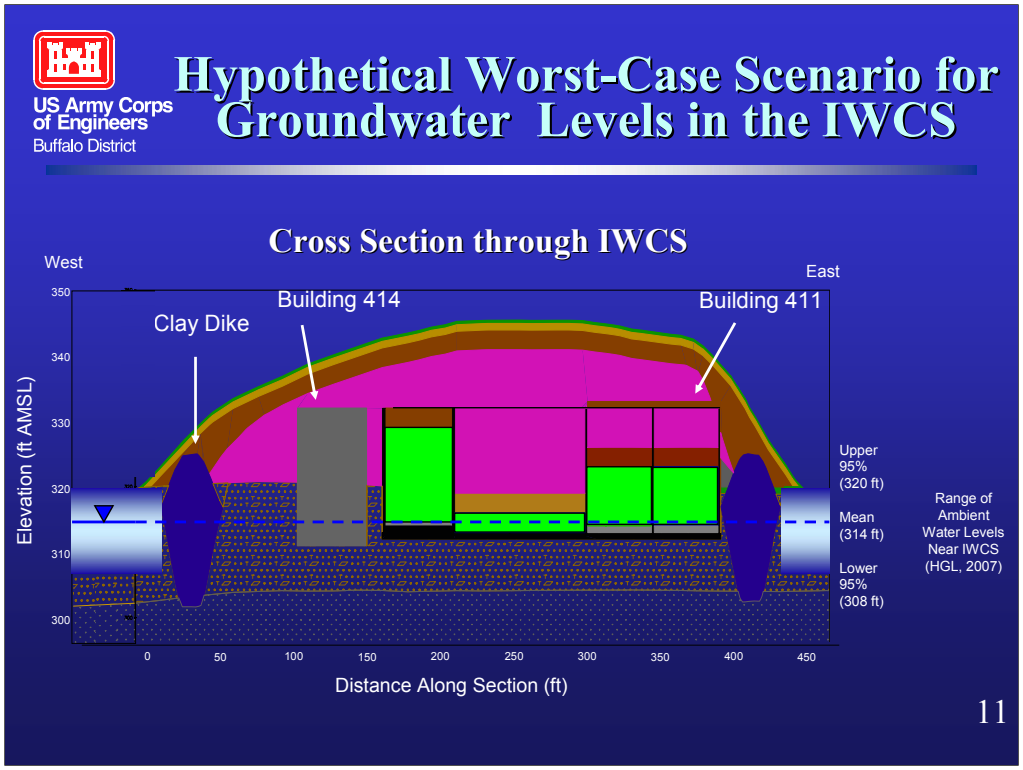
A paleochannel is a remnant of a stream channel cut into older rock and filled by the sediments of younger overlying rock, essentially a buried river channel. If present, a paleochannel would allow for faster contaminant migration.

The NFSS is situated over a clay layer called the Upper Clay Till, shown here in brown. The Upper Clay Till is approximately 15 feet thick and lies above a 40 foot multi-layer glacial complex designated as the Glacio-Lacustrine Clay.

During the Remedial Investigation 250 boreholes or monitoring wells were installed that fully penetrate the Upper Clay Till. These borings were used to construct three-dimensional structure maps of the glacial deposits at the NFSS to give us an understanding of what things look like underground. This graphic is a profile of subsurface layers at the NFSS including a depiction of where the sand lenses occur. It was drawn based on information obtained from the soil borings. 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. Given the tight data point coverage, especially in the vicinity of the IWCS, the presence of a paleochannel would most likely have been identified during the RI.

No defined plumes in the LWBZ

The finding of no defined plumes currently in the lower water bearing zone is further evidence that the Upper Clay Till is slowing groundwater flow and contaminant transport. There are locations in the LWBZ that exceed background concentrations but no defined plumes.



Concern was expressed regarding the level of groundwater within the IWCS itself. Geophysical results suggest that the water level inside the IWCS was 3 feet below the foundation of Building 411 at the time the measurement was taken. But without monitoring within the IWCS, the level of saturation cannot be definitively known.

If the elevation of the ambient water level surrounding the IWCS is also representative of the water level in the IWCS, a semi-saturated condition would exist at the base of the IWCS. However, it is believed that the flow-inhibiting properties of the IWCS cap restricts water infiltration into the IWCS and lowers the water table beneath the IWCS.

The possibility of rising groundwater levels within the IWCS residues was considered in a hypothetical, worse-case scenario considered by the groundwater model, which assumed saturated conditions based on the 95% upper confidence limit of measured groundwater levels. This level is around 320 ft Above Mean Sea Level. For reference, the bottom of the former Building 411 concrete flooring is 9 feet lower at 311 ft amsl.

For this hypothetical worse-case scenario, 66% of the residues were considered saturated. This groundwater model simulation assumed that the IWCS cut-off wall was not present but included the impact of horizontal and vertical flow barriers associated with the concrete walls of buried buildings (Buildings 411, 413, 414).

Results of the worse-case simulation predict an increased lateral extent of groundwater contamination and an exceedance of the U-238 screening level within 50 years directly below the IWCS. However, the predicted hypothetical worse-case groundwater plume shows no IWCS-related exceedance of the uranium screening level at the site boundary within 1,000 years. (HGL 2007 p 4-40)

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Focus of Public Comments

- Groundwater
- **Pipelines**
- Contaminant Plumes
- Soundness of IWCS
- Radiological Concerns
- Access to Information

The next topic for public comments was pipelines.

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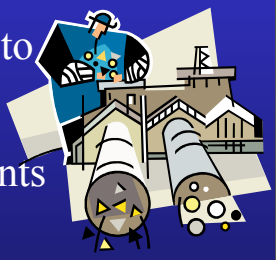
Pipeline Questions

- Are pipelines transporting contaminants across the NFSS?
- Are pipelines allowing contaminants to migrate out of the IWCS?
- Are pipelines transporting contaminants offsite?
- Are pipelines acting as pathways for groundwater flow?



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Several questions were received regarding pipelines at the NFSS, including:

Are pipelines transporting contaminants across the site?

Are pipelines allowing contaminants to migrate out of the IWCS?

Are pipelines transporting contaminants offsite? and finally

Are pipelines acting as pathways for groundwater flow?

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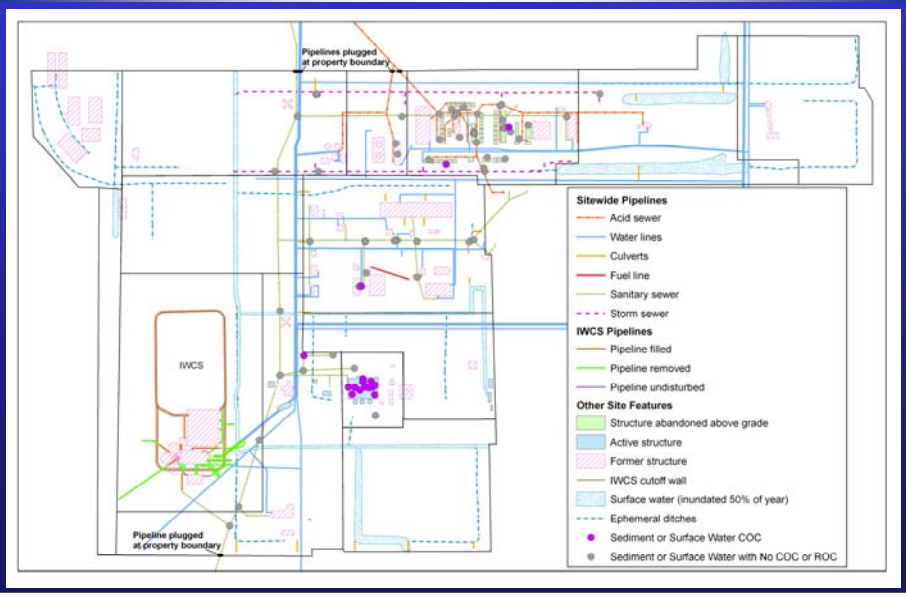
Are pipelines transporting contaminants across the NFSS?



The question “Are pipelines moving contaminants across the NFSS?” is a good one, because as you can see from this graphic, pipelines are present pretty much across the entire site. If you can’t make this out clearly from where you are seated a larger version of this graphic is available on the poster in the front of the room. But this graphic was included to show the extent of pipelines present across the NFSS property and you can see that they are quite widespread.

Also note that the different types of pipelines present at the NFSS are shown using different colors. A variety of pipelines are present at the NFSS but based on our knowledge of site operations we know that the most heavily contaminated lines are the acid waste (dashed red) and sanitary (dashed green) lines. These lines carried operational waste water so it makes sense that they would be the most heavily contaminated.

The flow in the acid waste and sanitary lines was based on gravity so the lines slope and get deeper as they approach the wastewater treatment plant north of the NFSS. Other lines carried clean water for drinking, fire suppression and industrial processing. These lines were pressurized and carried clean water. The Remedial Investigation sampling focused on the acid waste and sanitary lines because they are believed to be the most heavily impacted and they have manholes for easy access.

Although a variety of contaminants were found in pipeline water and sediment samples, only lead and PCBs were identified as Chemicals of Concern. These locations are shown on the graphic and may need further evaluation during the Feasibility Study.

Please note that this graphic also shows the four locations where acid waste and sanitary have been sealed at the property boundaries on the north and south sides.

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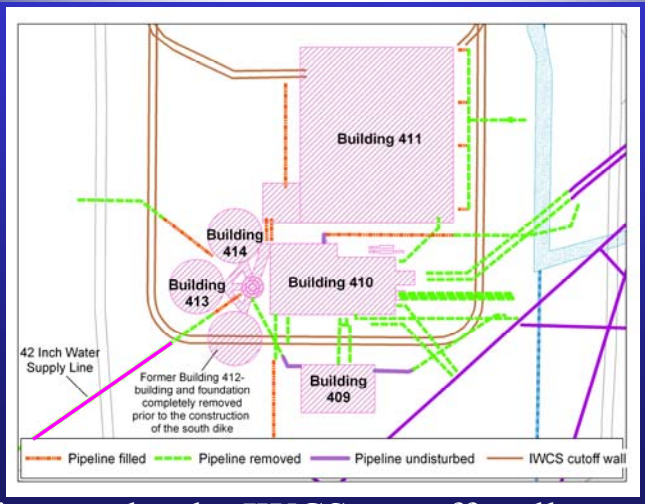
Are Pipelines Allowing Contaminants to Migrate out of the IWCS?



Lines under the IWCS cut-off wall were cut, sections removed, and the ends plugged

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Next up: “Are pipelines allowing contaminants to migrate out of the IWCS?”

To address comments received regarding the possibility of pipelines allowing contaminant migration out of the IWCS we went to the IWCS construction drawings. This graphic is based on an IWCS construction drawing titled the “South Dike Piping Plan and Schedule”. This drawing shows the location of pipelines under the IWCS, where the lines were filled and where sections of pipelines were removed.

Pipelines were excavated from the building perimeters to an area immediately outside the IWCS cut-off wall. Some lines between buildings were also removed. Lines were sealed at both ends with concrete or grout. This included lines running between the former wastewater treatment plant buildings and the 42-inch diameter freshwater intake line from the Niagara River.

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Are Pipelines Transporting Contaminants Offsite?

- One sanitary line and two acid waste lines extend off to the north - plugged
- One sanitary line flowing onsite to the south - plugged
- Fire suppression, drinking, process and cooling water pipelines – left intact but clean
- No porous bedding material observed around pipelines leaving the NFSS

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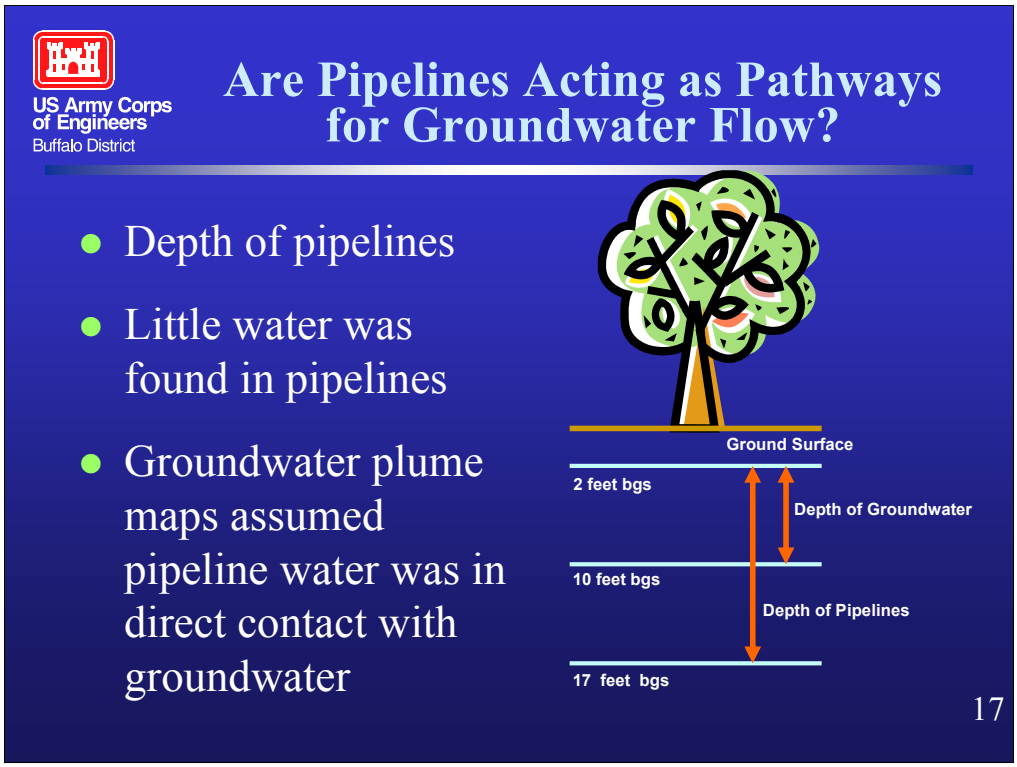
Are pipelines currently transporting contaminants offsite?

To answer this question, first note that relatively few lines cross the NFSS boundary. The site layout map that we presented on slide 14 shows a total of three sanitary lines (2 on the north side and 1 on the south side) and one acid waste line extending off the NFSS. All of these pipelines have been sealed at the property boundary.

Fire suppression, drinking, process and cooling water pipelines were left intact but are believed to be clean.

Another important observation for offsite contaminant transport via pipelines is that no porous bedding material (for example sand or gravel) was observed around pipelines leaving the NFSS. Porous bedding material would enhance the likelihood that pipelines would act as preferential pathways for contaminant migration. During pipeline construction, pipeline trenches were most often backfilled with native material. In some cases, like the one shown here, the pipeline was encased in concrete bedding material.

Furthermore, we have been and will continue to investigate radiological contaminants in offsite LOOW pipelines.



At the meeting back in May several questions were received regarding pipelines as potential routes for contaminant migration in groundwater and how this issue was addressed in the Remedial Investigation Report. Although the groundwater model did not quantify groundwater flow though pipelines or pipeline bedding material, this issue was addressed. Let's take a look at this:

Depth of pipelines

•This graphic compares fluctuation in the depth of groundwater with the depth of pipelines across the site. The range of groundwater depth accounts for seasonal fluctuation in the water table.

•Water levels in the UWBZ fluctuate between 2 and 10 feet bgs. Acid waste and sanitary sewer pipelines occur between 9-12 ft bgs with some lines as deep as 17 feet. Potable lines were pressurized, not gravity feed, so they are level across the site and located closer to ground surface, some as shallow as two feet below ground surface.

•Given these depth intervals there is a potential for the deeper lines to be exposed to groundwater more than just seasonally.

Little Water in Pipelines

•During the Remedial Investigation 20 pipeline locations and 31 manholes were identified for water and sediment sampling, 16 pipeline locations and 8 manhole locations were dry.

•The fact that little water was found in pipelines across the site could indicate that the lines are in relatively good shape since groundwater does not appear to be seeping into them.

The pipeline water that was found was considered to be in direct contact with groundwater.

•Despite the fact that little water was observed in onsite pipelines, water that was encountered was assumed to be in direct contact with groundwater in the upper water bearing zone. The groundwater plume maps presented in the RI were drawn to include pipeline water samples.

•This assumption is evident in groundwater plume maps, particularly southeast of the IWCS which you will see here shortly.

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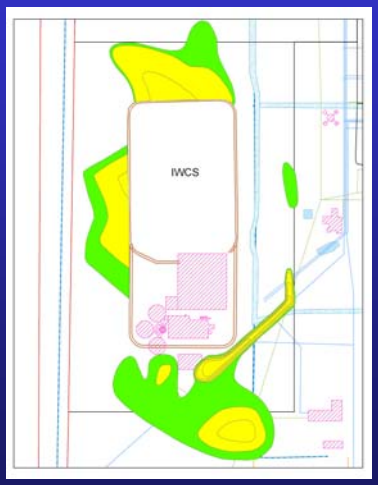
Focus of Public Comments

- Groundwater
- Pipelines
- **Contaminant Plumes**
- Soundness of IWCS
- Radiological Concerns
- Access to Information



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Now let's take a look at some of the contaminant plumes mentioned in your comments.

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Contaminant Plumes

The Remedial Investigation includes several depictions of groundwater plumes across the site. It is important to keep in mind that the depictions are a snapshot in time. The plumes were drawn with the data available at the time the Remedial Investigation was written using conservative assumptions to account for investigative uncertainties. The environmental concentration of contaminants and our understanding of what the data are telling us changes over time.

The picture on this slide shows the site-wide radiological groundwater plumes developed for the Remedial Investigation, overlain with the footprint of historic site operational areas. It is important to note that the locations of the existing groundwater plumes correspond closely with areas of historic site operations, particularly in the area around the IWCS. This suggests that the plumes that appear to be emanating from the IWCS, are in fact the result of historic operations and not current leakage from the IWCS.

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Contaminant Plumes

- Groundwater plume southeast of former Building 409 – pipeline interaction
- Total uranium in West Drainage Ditch –correlation between surface water and groundwater
- Groundwater plume northwest of NFSS

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Next let's take a look at some comments received regarding contaminant plumes at three specific locations including:

•The groundwater plume southeast of former Building 409

•Uranium in the West Drainage Ditch and the possibility for a connection between groundwater and surface water

•And finalyy, the groundwater plume in the northwest corner of the NFSS

PHOTO CAPTION

(May 6, 2002) West ditch taken at the intersection with "O" Street, facing south. Across mid-ground fence is Niagara-Mohawk property. Some standing water, grass and reeds.

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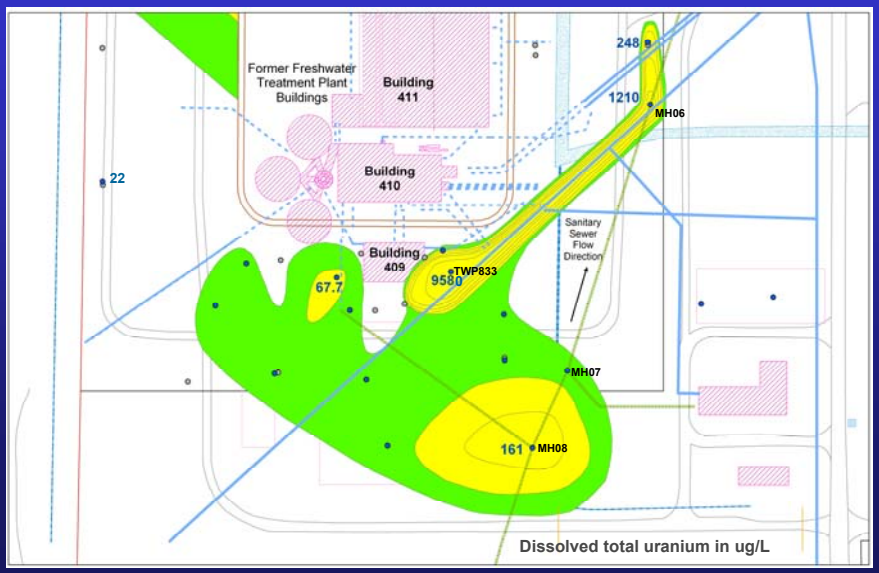
Groundwater Plume Southeast of Building 409



This slide shows the dissolved total uranium groundwater plume located southeast of the former Building 409. The areas shown in green exceed background levels. The areas shown in yellow exceed the drinking water standard.

•Building 409, which was formerly located south of the IWCS, was a secondary water reservoir associated with the LOOW fresh water treatment plant.

•During the building's use as an intermediate settling basin, partially purified uranium, known as 'yellow cake', accumulated in Building 409.

•In October 1985, after removal of the yellow cake, Building 409 underwent a gross decontamination operation using a high pressure wash.

•Building 409 was then demolished and the rubble was filled with concrete and covered with backfill to a minimum depth of two feet. During demolition, pipelines leaving Building 409 were cut and some sections were removed.

•Some, or all, of these past activities may be responsible for the uranium groundwater plumes now evident at the Building 409 area.

Configuration of the Plume

•We aren't surprised to find contamination in this area because it corresponds with DOE operations. The Building 409 plume 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 based on uranium concentrations from one temporary well point (TWP833) and water within an existing manhole (MH06) on a sanitary pipeline. The plume was drawn assuming that it was tracking a 10-inch potable water line which was left in place. The manhole water was not in direct contact with groundwater, but for plume delineation it was conservatively assumed to be.

•In researching this plume 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 is 10 times lower than what was reported in the Remedial Investigation.

•The configuration of this plume is most probably overly conservative because it was drawn assuming that pipeline water was in direct contact with groundwater.

•If we correct the misreported uranium value at the temporary well point, remove manhole data and include more recent Environmental Monitoring data the configuration of the plume is quite different.

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Groundwater Plume Southeast of Building 409

If we..

- Correct the uranium value at the temporary well point,
- Remove the concentrations measured in manholes, and
- Include more recent environmental monitoring data,

This is what the uranium plume would look like today.

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Uranium in West Drainage Ditch

- Pattern of uranium distribution
- Measured concentrations
- Other uranium sources

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At the meeting back in May, it was noted that the concentrations of dissolved total uranium in the groundwater plume west of the IWCS seemed to correlate with elevated concentrations of total uranium in West Drainage Ditch surface water. Concern was expressed that the Remedial Investification had misrepresented the distribution of total uranium west of the IWCS and that groundwater might actually be discharging to surface water.

Although there does appear to be some correlation between the levels of total uranium in surface water and groundwater west of the IWCS, several lines of evidence were examined that suggest otherwise. Including:

•the pattern of uranium distribution in surface water and groundwater

•the concentrations of uranium measured and

•other potential sources of uranium

Let's look at each of these points with some detail.

PHOTO CAPTION

(May 6, 2002) West ditch taken at the intersection with "O" Street, facing north. The center background shows the West Ditch outfall. Grasses, reeds and vegetative debris are evident.

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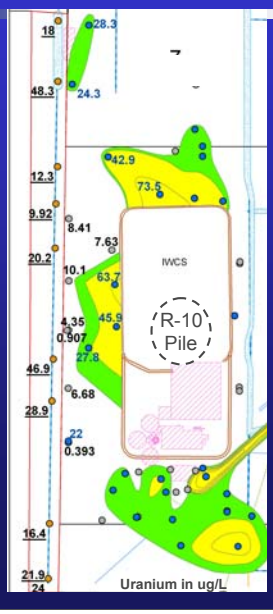
Uranium in West Drainage Ditch



- No clear pattern of uranium distribution
- Measured concentrations below risk-based benchmark
- Other uranium sources – erosion of the R-10 pile

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This slide shows the dissolved total uranium groundwater plume located west of the IWCS as well as total uranium concentrations measured in West Drainage Ditch surface water. Here again, the areas shown in green exceed background levels while the areas shown in yellow exceed the potable water standard. The concentrations measured in surface water are underlined.

Pattern of Uranium Distribution

•The first thing to note is that the concentrations of total uranium measured in West Drainage Ditch surface water are variable along the ditch. The concentrations range from 12.3 µg/L to 48.3 µg/L with no obvious concentration gradient. This suggests that the uranium could have come from several sources rather than a single source with gradually decreasing concentrations moving away from a groundwater seep or some other discreet source.

•Next, note that the concentrations of dissolved total uranium in groundwater decrease as we move westward away from the IWCS and that the concentration of total uranium detected in several wells located between the plume and the West Drainage Ditch are below background levels.

•It is also important to note that the potential for the West Drainage Ditch to receive groundwater influx at the rate needed to get the concentrations observed in surface water is inconsistent with the relative low mobility of uranium and low soil permeability observed at the NFSS.

•This pattern of contaminant distribution does not support the suggestion of groundwater transport to West Drainage Ditch surface water but is more indicative of historical soil erosion and overland flow.

Measured Concentrations

•Because no one is expected to use West Drainage Ditch surface water as a potable water supply the concentration of total uranium in West Drainage Ditch surface water was compared to the surface water screening level or preliminary remedial goal which is higher than the drinking water standard. Applying a drinking water standard to surface water would be unwarranted and highly conservative.

•The drinking water standard was used as a point of comparison for groundwater data. Note that the concentrations in the westernmost wells (shown with gray dots) are not only below the drinking water standard but are also below the background level for total uranium (16.7 ug/L).

Other Uranium Sources

•A radioactive R-10 storage pile was left uncovered and unprotected in this area for a number of years. Wind erosion and surface water runoff likely contributed to the contaminant migration. The R-10 pile is now contained within the IWCS.

•Since this graphic was drawn we have seen consistently decreasing concentrations of uranium in West Drainage Ditch surface water. By comparison, in the Central Drainage Ditch, which has been monitored over a longer time frame, the concentration of total uranium peaked in 2004, which is also the year that site clearing was done in preparation for RI field investigations.

•The mobility of uranium in surface runoff may have been enhanced by ground disturbing activities preceding RI field operations and low pH, or acid rainfall. While the Remedial Investigations were being conducted the pH of rainfall varied between 4.3 and 4.8 (NYSDEC data) which is low enough to increase the mobility of uranium from overland flow.

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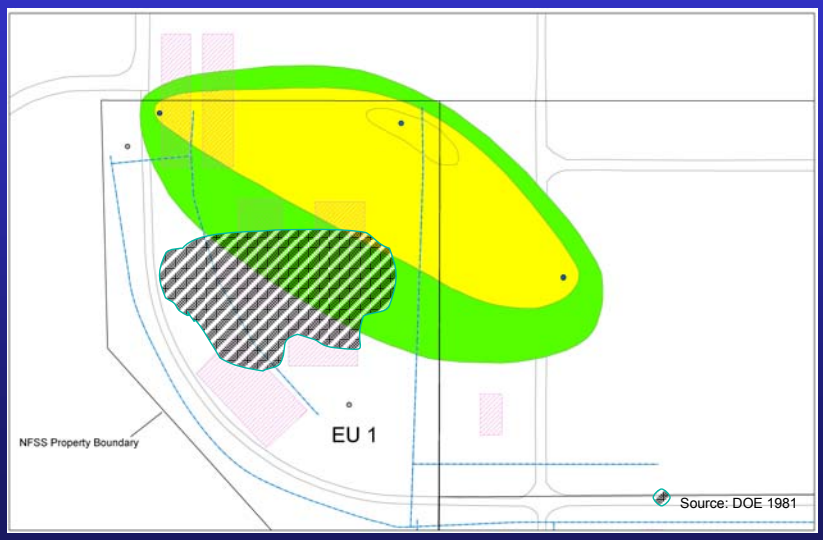
Groundwater Plume Northwest of NFSS



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At the May meeting, a concern was raised that a total uranium groundwater plume was migrating off at the northwest corner of the NFSS. The location of this plume also corresponds to a historic operational area. The current plume configuration does appear to extend off NFSS property to the north. However, this plume was drawn using relatively few data points.

Additional investigation for this area is currently being planned.

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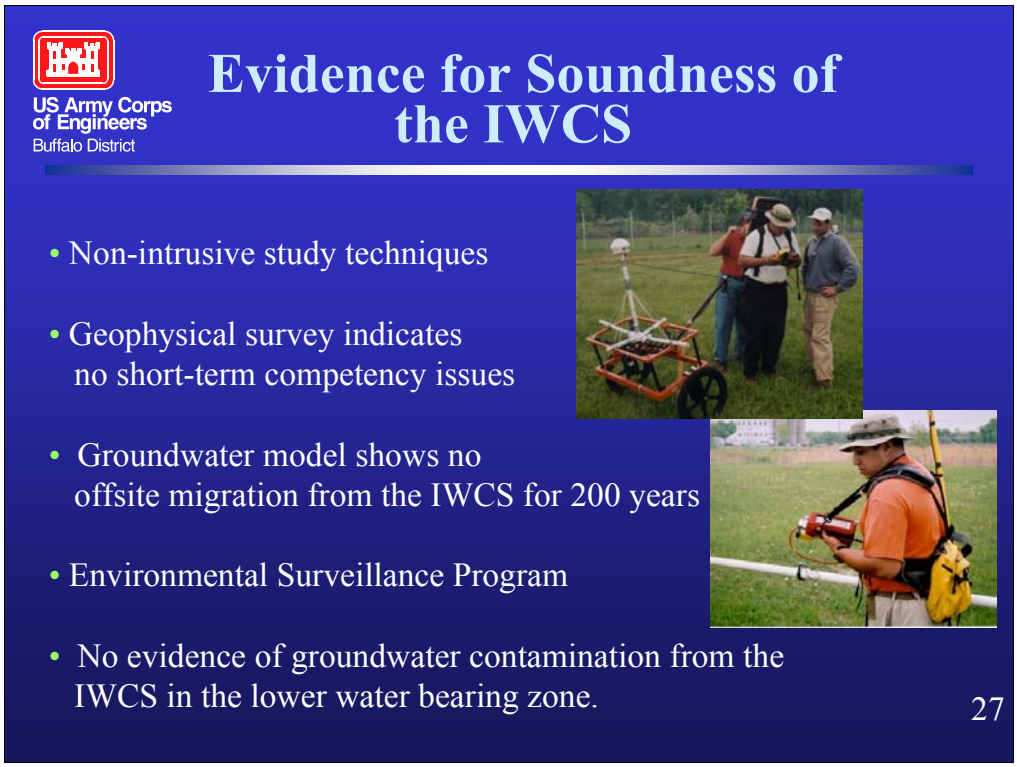
Focus of Public Comments

- Groundwater
- Pipelines
- Contaminant Plumes
- **Soundness of IWCS**
- Radiological Concerns
- Access to Information

Moving on to the soundness of the IWCS.



The Remedial Investigation used non-intrusive study techniques to maintain IWCS integrity and ensure worker safety.

Geophysical survey results for the IWCS indicate no short-term competency issues. The survey looked for fractures, closed depressions, potential voids and caverns. The survey found no major, deep-seated faults, fractures, geologic discontinuities, or seismic pressure points within the IWCS area.

In addition to the geophysical survey results we also have several other indications for soundness of the IWCS. Provided that the clay cap is maintained, the groundwater transport calculations for the IWCS indicate that the structure should adequately prevent contaminant migration for 200 years.

We currently monitor groundwater concentrations at 18 locations at the NFSS with 12 surrounding the IWCS. Data from these wells indicate only seasonal variation of uranium in groundwater near the IWCS. If the IWCS had been breached, we would expect to see continuously increasing groundwater concentration trends. We don't see this. In addition to groundwater monitoring, ongoing environmental surveillance activities also measure the release of radon gas and gamma radiation from the IWCS.

Further evidence for soundness of the IWCS is that we see no evidence of groundwater contamination from the IWCS into the lower water bearing zone, in other words, no downward migration from the IWCS.

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Focus of Public Comments

- Groundwater
- Pipelines
- Contaminant Plumes
- Soundness of IWCS
- **Radiological Concerns**
- Access to Information

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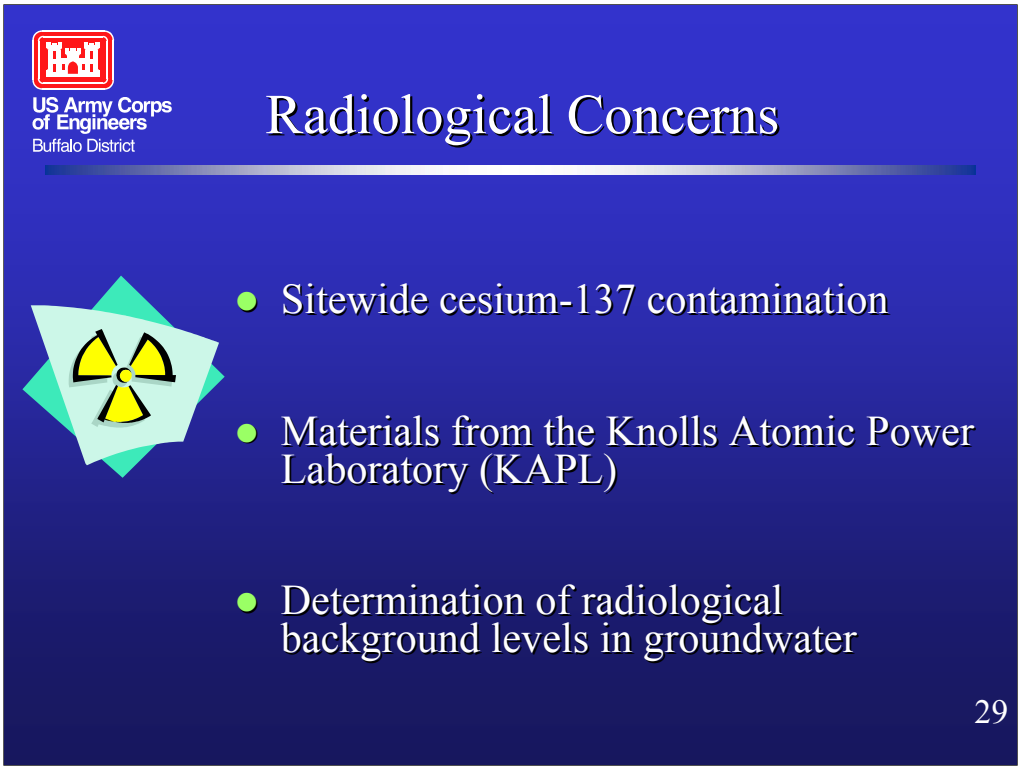
Moving on to radiological concerns.



Since the meeting back in May we received comments regarding several radiological concerns including

•Sitewide contamination with cesium-137,

•The storage of materials from the Knolls Atomic Power Laboratory at the NFSS, and

•Concerns regarding how radiological background levels were determined for groundwater.

Let's start with some background information on nuclear fission.

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Radiological Concerns

- Nuclear fission creates new atoms called "fission products". The RI included a site-wide evaluation of fission products.
- The majority of radionuclides present at the NFSS are naturally occurring members of the uranium, thorium and actinium decay series.
- Where cesium-137 was detected, additional groundwater samples will be analyzed for cesium and plutonium.
- Additional surface soil locations were analyzed for plutonium but not included in the RI data base.

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Nuclear fission can occur naturally but typically occurs in nuclear reactors or following the detonation of a nuclear weapon. Nuclear fission occurs when a stray neutron strikes the nucleus of a large atom, such as uranium. The neutron is, at first, absorbed into the nucleus creating an unstable atom. This unstable atom quickly breaks up releasing energy and fission products.

The majority of radiological constituents present at the NFSS include members of the naturally occurring uranium, thorium and actinium decay series. These radionuclides are found in the natural ores from which the NFSS residues were derived.

To assess the possibility that fission-product-contaminated materials had been stored at NFSS, the Remedial Investigation (Section 5.9) included a site-wide evaluation of fission by-products including cesium-137, cobalt-60, plutonium, strontium-90, americium-241 and isotopic uranium (uranium-234, uranium -235, and uranium-238). The ratios of the various uranium isotopes were evaluated for evidence of enrichment.

As part of the Environmental Surveillance Program, analyses for cesium-137 and plutonium will be added to three wells where cesium-137 was previously detected.

The Remedial Investigation included 68 data points for plutonium-239 in soil. Since the Remedial Investigation was completed an additional 17 data points for plutonium in soil which had been inadvertently omitted from the RI database, were found. However, there was no detectable plutonium in any of these 17 additional samples.

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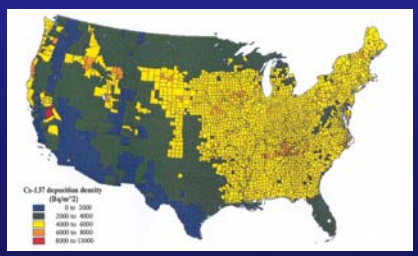
Sitewide Cesium-137 Contamination

- Worldwide distribution
- Cesium-137 greater than site-specific background
- Greater concentrations at depth than in surface soil
- Cesium-137 was identified as a radionuclide of concern



National Academy of Sciences www.nap.edu/catalog/10621.html

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At the May meeting, concern was expressed regarding site-wide contamination with cesium-137.

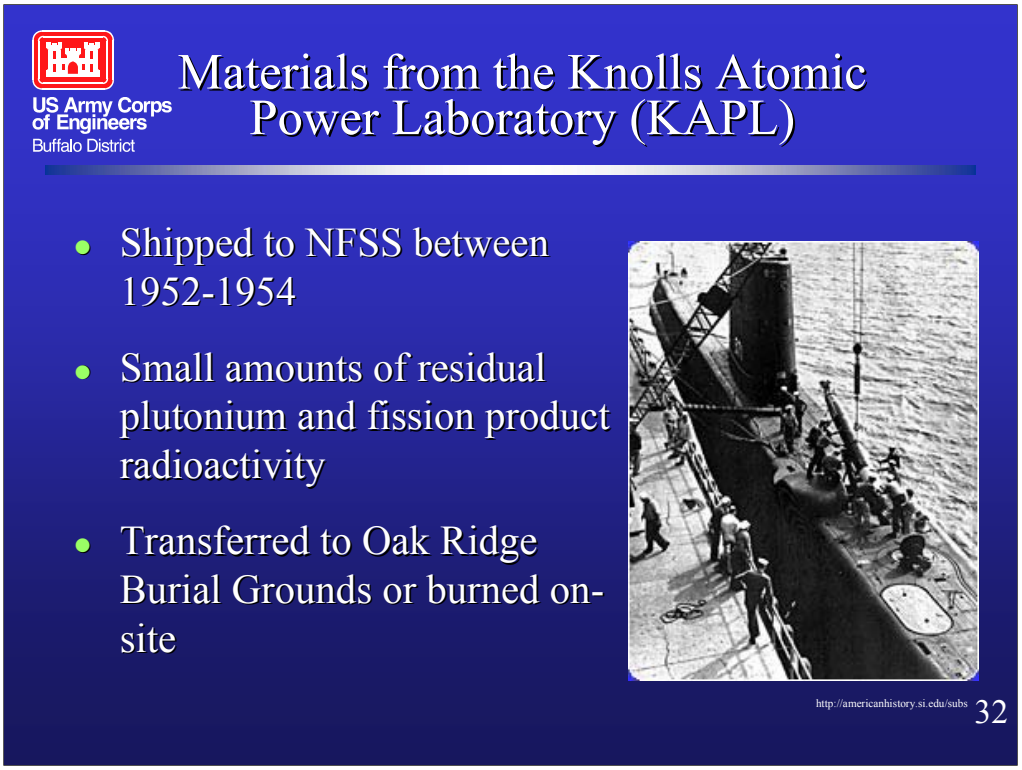
Cesium-137 is a nuclear fission product with worldwide distribution due to fallout from atmospheric testing of nuclear weapons. Between 1945 and 1980 over 500 atmospheric nuclear-weapons tests were conducted at various sites around the world. This map shows ambient levels of Cs-137 (Bq/m^2) for the lower 48 states due to atmospheric testing of nuclear weapons.

Most Remedial Investigation samples analyzed for radiological constituents, included analysis for cesium-137. In fact, cesium-137 was analyzed for in over 800 soil samples. So we have an abundance of analytical results for cesium-137 and the distribution of cesium-137 in site media is well characterized.

From this data we can see that the concentrations of cesium-137 at the NFSS are higher than site-specific background levels and are greater at depth than in surface soil. Since the concentrations and distribution of cesium-137 at the NFSS are not consistent with what would be expected from atmospheric fallout, cesium-137 was identified as a radionuclide of potential concern.

Although the source(s) of cesium-137 are not clear, potential risks due to exposure to cesium-137 were quantified by the Baseline Risk Assessment and cesium-137 was identified as a radionuclide of concern for the most conservative receptor scenario (farm child) in several exposure units. These areas of contamination will be further addressed by the Feasibility Study.

Figure citation: Exposure of the American Population to Radioactive Fallout from Nuclear Weapons Tests: A Review of the CDC-NCI Draft Report on the Feasibility Study of the Health Consequences to the American Population from Nuclear Weapons Tests Conducted by the United States and Other Nations. 2003. National Academy of Sciences. http://www.nap.edu/ctalog/10621.html



The Knolls Atomic Power Laboratory (KAPL), based in upstate New York, is a world-class research and development facility dedicated to the development and support of nuclear propulsion technology for naval reactors aboard U.S. Navy ships and submarines. The photo shows the U.S.S. Nautilus, the world's first nuclear powered submarine.

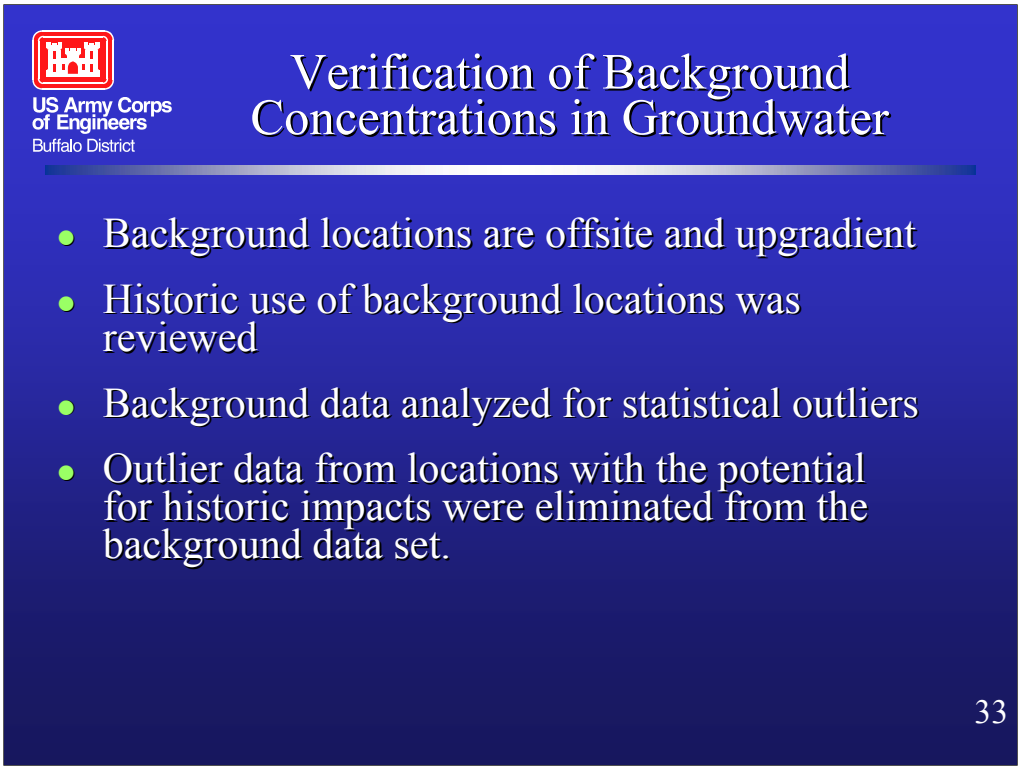
Materials from the Knolls Atomic Power Laboratory

•Although limited records are available, we do know that between 1952 and 1954, wastes generated at the KAPL were shipped to the NFSS. Records indicate that KAPL materials shipped to the NFSS included a small fraction of containers with residual plutonium and fission product radioactivity. A large majority of the radioactivity in this KAPL waste was due to fission product materials, like cesium-137, and only a small fraction of the material contained residual plutonium.

•KAPL materials were originally stored near a railroad spur north of NFSS but were later moved to several locations onsite.

•These materials were transferred to the Oak Ridge Burial Grounds during the late 1950's and low-level combustible waste was burned on-site.

•Records indicate that no plutonium-bearing waste or unmarked waste was burned onsite.



The final radiological concern regards the methods used to determine background groundwater concentrations.

•Background groundwater samples were collected at 26 locations along the boundary of the LOOW site and on Modern Landfill property.

•These locations were selected because they are offsite and upgradient from the NFSS and are believed to be unimpacted by site operations.

•These locations are also believed to be representative of onsite conditions because they were drawn from the same geologic materials. The further you move away from the site, the more likely it is that the geology and background conditions would be different.

•A review of historical use documents for the background locations was also conducted and rationale for the selection of background sample locations is presented in the Remedial Investigation Report.

•For a data set to accurately portray background conditions, the data must be free from other contaminant sources. Elevated concentrations at a background location would suggest the potential for other impacts and could cause the elimination of a well from the background data set. Without other sources of contamination, analytical results for a background data set are expected to be fairly uniform.

•To test for uniformity in the background data set, a statistical outlier test was conducted. Groundwater data from two background wells located near a rail bed on the Modern Landfill property were determined to contain outlier concentrations of uranium (PZ-21S and PZ-25S). Therefore, all data from these two wells were removed from the background data set.

•The same approach was used for all other background media including surface soil, subsurface soil, sediment and surface water.

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Focus of Public Comments

- Groundwater
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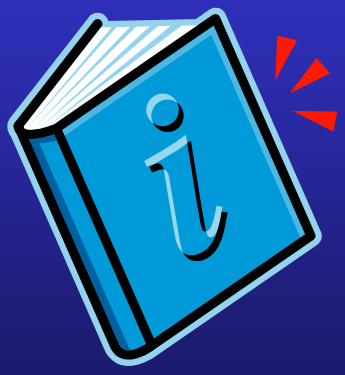


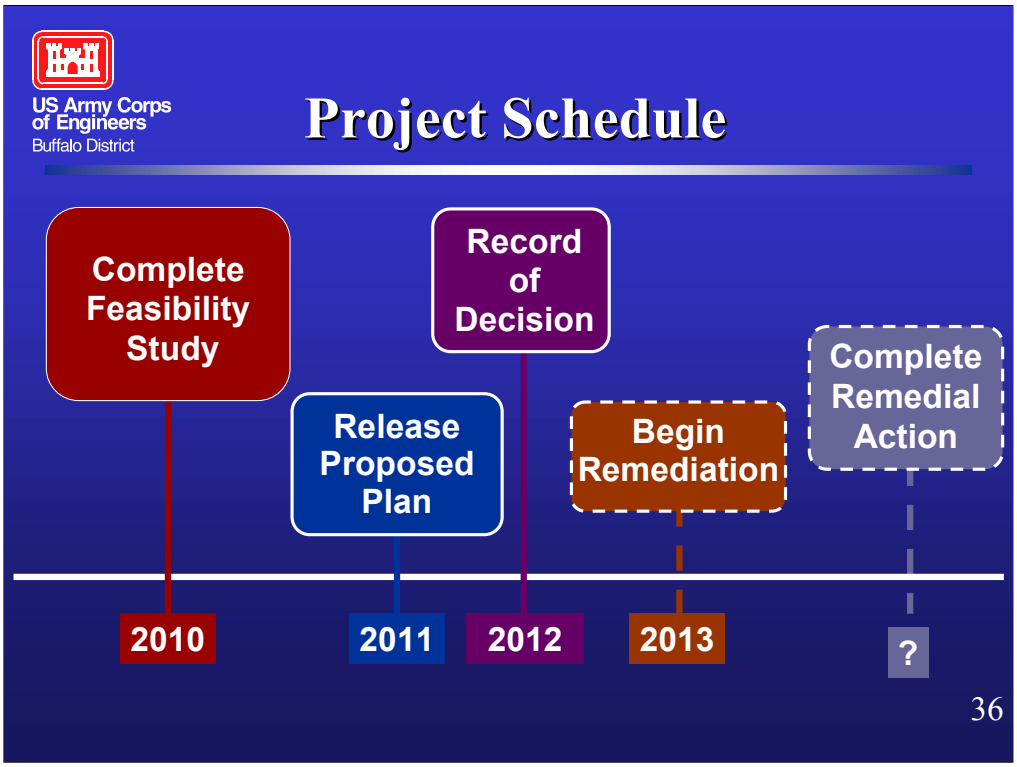
Remedial Investigation Report,

Baseline Risk Assessment

Groundwater Flow and Contaminant Transport Modeling Report

These reports may also be downloaded at:

http://www.lrb.usace.army.mil/fusrap/nfss/index.htm



This graphic gives an approximate timeline for upcoming work at the NFSS. The next step in the CERCLA process identification of RI data gaps and a decision regarding how we address them. We are about to embark on the Feasibility Study. We will continue to seek public input throughout completion of the Feasibility Study.

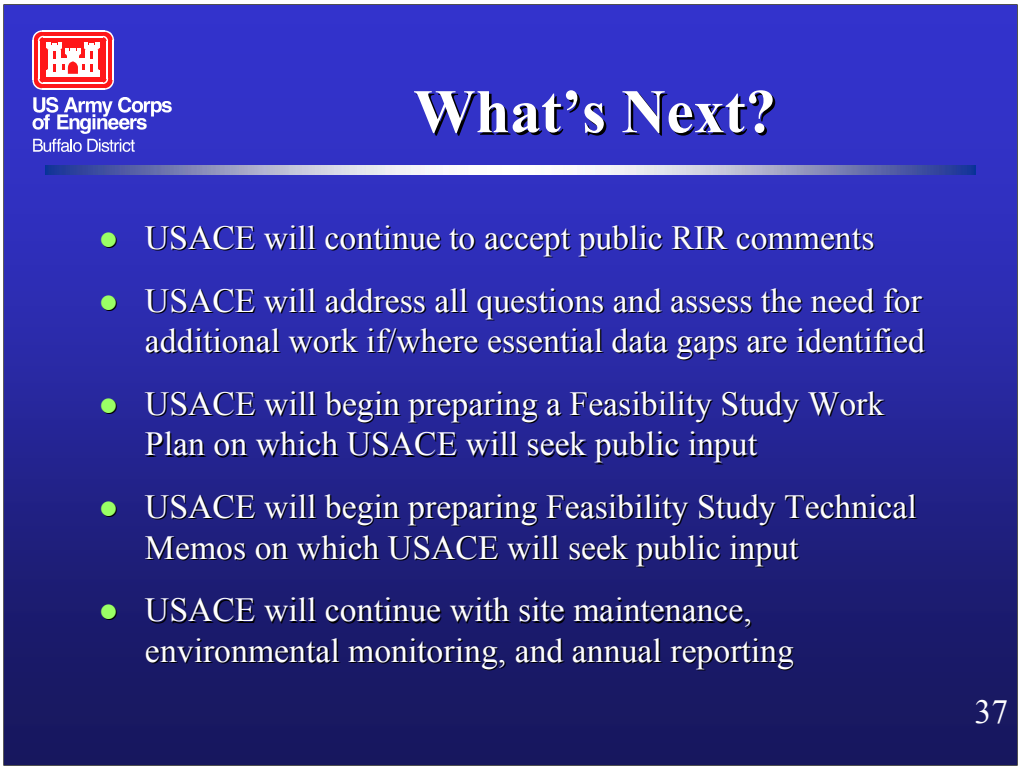
•Complete Feasibility Study, 2010

•Release Proposed Plan, 2011

•Record of Decision, 2012

•If necessary begin Remedial Action, 2013

•Remedial Action Complete



USACE will address all questions and assess the need for additional work if/where essential data gaps are identified

•Decision on need for RIR Addendum by the end of the year

USACE will begin preparing a Feasibility Study Work Plan on which USACE will seek public input

•The Feasibility Study Work Plan will include at minimum RIR conclusions, layout of FS Technical Memos, and Proposed FS Alternatives

USACE will begin preparing Feasibility Study Technical Memos on which USACE will seek public input

•The FS Technical Memos are pieces of the FS Report, issued in manageable chunks

•FS Technical Memos are portions of the FS that will allow the public the opportunity to provide focused comments prior to USACE drafting the FS Report.

•USACE will respond to public comments on the FS Tech Memos, but will not revise the FS Tech Memo. Instead, public comments will be incorporated into the Draft FS Report (per the responses to public comments).

USACE will continue with site maintenance, environmental monitoring, and annual reporting

•Each year, USACE publishes a Technical Memorandum, which highlights findings from Environmental Surveillance Program sampling.

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Questions

- If you have questions or suggestions for future public information sessions please fill out a comment card and leave it with us
- If you would like to be included on our mailing list for future information please leave us your name and mailing address
- We developed an electronic list service for the site. If you are interested in receiving "news from the Corps", please make sure we have your e-mail address.

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