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Interim Waste Containment +
Structure Remedial Alternatives
Technical Memorandum +

Niagara Falls Storage Site (NFSS)
\+ Youngstown, New York
Formerly Utilized Sites Remedial
Action Program
\+ June 5, 2013

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Transcript of proceedings held in the above-entitled matter at Lewiston Senior Center 4361 Lower River Road, Youngstown, New York 14174 on June 5, 2013 at 6:00 p.m. Pursuant to notice.

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P R O C E E D I N G S

MR. DOUGLAS SARNO: This is the third workshop we've had on the five technical memorandum that the Corps is preparing in support of the feasibility study, this is the fourth of those memorandum on the technical alternatives that are going to form the basis of detailed analysis in the feasibility study report that is scheduled to come out next year. It is not a decisional meeting, there is no choice being made tonight, there is no proposal being made tonight.

This is outlining the different alternatives that are going to go through detailed technical analysis. So, it's largely set up as an informational meeting to help people understand those choices and how they are going to be used in the FS as the process moves forward. We're going to spend about an hour in the presentation.

The Corps and SAIC, who is an FS contractor, is going to present the different details of the, of the various alternatives. And then we'll break and people can go and ask questions, there are posters and information in the back of the room that you can use to ask those questions. You also have copies of the slides that are going to be talked about tonight in the handouts that are here as well as the fact sheet for this technical memorandum and the list -- you'll see some of these, the screening that was done to evaluate different technologies in the process tonight and that will all be described.

We're going to have folks in the back of the room from the Community Action Council taking notes of all the questions and all the comments that are given and that group is going to meet again on June 17th to go over all of that community input and produce a summary for the Corps and everyone is welcome to come to that meeting and be part of that process in addition to being able to give comments and ask questions during the poster session.

There is also a comment card in here, you can feel free to write out any comments or thoughts you have that you want to pass along to the Corps.

We're going to try to keep the presentation to about an hour and then the poster session to about an hour and try to let folks get out of here by no later than 8:00 o'clock, it really is a beautiful evening out there, so we don't want to keep you cooped up in here. So, we're going to go right to the presentation. Bill Kowalewski is going to start us off and give us an introduction to tonight's activities. And, Bill has been Chief of Special Projects for the Corps.

MR. WILLIAM KOWALEWSKI: Thanks, Doug. Can everyone hear me in the back, is the sound good? Okay, great. As Doug mentioned, welcome, my name is Bill Kowalewski, I'm with the Buffalo District US. Army Corps of Engineers. And the Buffalo District is responsible for executing the FUSRAP projects in New York, Pennsylvania and Ohio, including the Niagara Falls Storage Site.

Again, this is our third workshop on the feasibility study for the Interim Waste Containment Structure at the Niagara Falls Storage Site. I'm going to go next to the agenda here. I'll give a few quick opening remarks, introductions and sort of set the stage for the technical presentation.

Then what we'll do is, we'll have a little presentation on the background of the Niagara Falls Storage Site, the Interim Waste Containment structure, what's in it, how that structure is built. And then we'll transition to the discussion of the alternatives that are being considered for the long term remedy of the site.

I just want to discuss what Doug mentioned earlier that this is an informational briefing about the informational document, there's no decisions within the document, there's no decisions required tonight. This is really just to present information to you about these alternatives and then discuss those, get your questions and concerns. Okay, as far as roles and responsibilities and who do we have here tonight to help you get through this.

I mentioned already that we've got a number of folks from the Buffalo District Corps of Engineers as well as our prime contractor SAIC. The Buffalo district is the caretaker for the site which belongs to the Department of Energy, so we provide the site security, the daily operations and maintenance, the environmental surveillance and we're responsible for doing all the investigations, studies and any cleanup actions that might be conducted at the site.

Right now, what I'd like to do is just introduce a couple of our key technical staff that are going to be available for you and let you know what their specialty is in case you have questions.

Obviously, you know Doug Sarno our technical facilitator and community liaison. From our Environmental Engineering team, and if you can just give a little waive for the audience here, Jane Staten, Michelle Barker, Samantha Pack from SAIC and

Dan Delp as well, SAIC. Dr. Karen Keil, Karen is our toxicologist and risk assessor, so anything to do with public health, that's in her lane. Bill Frederick up front, he's our Hydrogeologist on the site, so his specialty is anything to do with groundwater, groundwater contamination. Neil Miller and Hank Spector, Health Physicists, and their job and specialty is radiation protection.

Okay, I don't think I missed anyone else. Okay, I also would like to introduce, we have Paul Giardina and Dr. Oleg Povetko from the USEPA Region 2. And I see Kent Johnson and John Mitchell and Ken Martin from the New York State DEC, okay.

The approach that we're going to take tonight is to, as I mentioned, give you kind of an informational presentation about the document that we released in April and then take your questions and comments and hopefully leave you with good understanding of the menu of alternatives that we are looking at for the site. This presentation will be a summary of the screening process and the evaluation criteria that the Corps will use to evaluate these alternatives.

The topic, the particular topic for tonight is a document released in April and it is the

Technical Memorandum for the Interim Waste Containment Structure, Remedial Alternatives Technologies Development and Screening, that's a mouthful. What it means, we've prepared kind of a menu of options for a long term remedy at the site and we're going to present those options to you tonight.

Okay, before I go any further, I just wanted to orient you quickly to the site and how the study is being conducted with relation to components of the site. This is a map of the Niagara Falls Storage Site and this light shaded area is the Federal property known as the Niagara Falls Storage Site. This dark blue item, that's the Interim Waste Containment Structure, that's the ten acre landfill, if you will, with the radioactive materials in it.

Outside of that containment structure is what we call the Balance of Plant, so all of the soils and infrastructure and buildings and structures that are outside of that ten acre cell are in the balance of the plant.

And finally, the third component of the site is the groundwater, which lies underneath the site throughout it in different elevations, different areas. And we've broken the site down into these three components for our feasibility study.

We will run each of these components through the CERCLA decision making process, so there will be three separate decisions coming off the site, a long term remedy for this cell, a long term remedy for the soils and infrastructure and finally a long term remedy for the groundwater that's under the site. Tonight's presentation is limited to the Feasibility Study of this component, just the ten acre cell.

And, I should mention that the reason for that is that this cell is where 99% of the risk on the site resides. It's the most important and we really can't make any decisions about what's going to happen to the soils or the groundwater on the balance of the site until we get to a decision on what will happen to these materials. Okay, next, I'm going to just walk through these technical memoranda for you and bring you up to speed on where we're at.

These technical memoranda are, if you will, chapters of the Feasibility Study, we decide that rather than drop a great big huge technical document out there that's been years in the making, we would break it down into more manageable pieces and address each piece as we develop it, roll it out to the community and these workshops so that you understand it, so that we understand your concerns and your questions about it before we move onto the next chapter of the study.

So, the first Technical Memoranda that came out was in July of 2011 and that was the waste disposal options, this memoranda explored locations throughout the country that could potentially accept the waste that's within the containment structure. It also looked at the disposition of the wastes from the Fernald site, which is sort of a sister site, they have the same, some of the same wastes contained within them.

The next two Technical Memoranda which came out in January and February of 2012 explored the potential health risks from different hypothetical cleanup scenarios. So, they looked at the radon gas assessment and also health effects from radiation, which could be experienced if and when the cell is opened up and different remedies are pursued.

Presently, tonight's topic is right here, as I mentioned it's the remedial alternatives, this is the menu of potential solutions for that cell on the site. It was released in April and tonight we'll go through that in detail with you before we move on to our final Tech Memo, this is scheduled to come out in August of this year and it is focused on the regulatory framework that governs each of these alternatives. So, there's certain state and federal laws and regulations that will touch each of these alternatives and we have to go through that analysis to make sure that these remedies comply with the applicable regulations and laws.

What I'll do next is just a quick run through of the overall process that we're following here at the Niagara Falls Storage Site. Our first action was to complete the remedial investigation, this was completed in April of 2011. This investigation quantified the nature and the extent of the materials in the cell and also assessed the human health and ecological health hazard associated with those contaminants.

We're now in the phase of developing these technical memoranda that support the feasibility study. When the technical memoranda are done, and remember that will be in August of this year, we will then use those technical memoranda as the building blocks to complete the feasibility study and we'll talk a little bit more about that further in the presentation.

Again, this feasibility study identifies and evaluates the various solutions that are possible at the site. After that is done, the Corps will perform the Feasibility Study, identify its proposed option for implementation, we will issue that in what's called a proposed plan.

And there's a very deliberate and official formal comment period when that proposed plan is released. Throughout this entire process from start to finish, we will accept your public comments at any time, but this is the most key time period in the process.

After that proposed plan is released, we will collect and compile all of the public input and we'll form a responsiveness summary and based upon that input, we will either proceed to a record of decision where the US Army Corps will decide which solution will be implemented at the site. The process also gives us enough flexibility that we can revise options in the proposed plan and feasibility study.

If something is identified that we missed, or we got wrong, we can go back and revise that and there is that flexibility. But, the general process is this, we get to a record of decision.

Once that decision is made, we are now in the cleanup phase of the project. We will conduct a technical design to implement that remedy and then it's boots on the ground and shovels in the ground with remedial action.

After the Corps is finished with the remedial action and verifies the cleanup goals have been met, there's a closeout period where the site is prepared for turnover back to the US Department of Energy, they are the perpetual caretaker of the site after the Corps is finished. And it is their job to monitor the site and to make sure that the Corps remedy is working for the period of time intended.

And I should also state that this process I just outlined for you, while tonight we're focused on the Interim Waste Containment Structure, we will follow exactly the same process for those other two units, the Balance of Plant, the soils and the infrastructure and then the groundwater.

But, we have to get through to at least this point before we can finish the decision making for those other two units.

Okay, that concludes my opening remarks, I'm going to turn it over to Michelle Barker and she's going to give you an overview of the site, the cell and what's in it.

MS. MICHELLE BARKER: Okay, thanks, Bill. Before discussing the Remedial Alternatives Technical Memoranda for the Interim Waste Containment Structure, we'll go through a brief review of the background and design of the Interim Waste Containment Structure with emphasis on where the radioactivity is contained.

In 1942 the US Government acquired approximately 7,500 acres of land known as the Lake Ontario Ordnance Works, which is shown in the figure in tan. Just to orient you, the site is located on Pletcher Road a few miles east of this building. The Government produced Trinitrotoluene, or TNT at the LOOW for one year before production ceased operation. In 1944, the Manhattan Engineer District was granted a portion of the LOOW for storage of radioactive residues.

A portion of this area was identified as the Niagara Falls Storage Site, in light blue. During and after World War II, the Manhattan Engineer District contracted with processing facilities in other parts of the country to extract uranium from ore to create the uranium metal needed to develop atomic bombs. The unused ore material left over after the extraction process is called the residues.

The extraction process did not remove all of the radioactivity contained in the ore material and therefore the residue material also contains radionuclides, mainly radium for this site. Between 1944 and 1954, the MED and its successor agencies periodically shipped ore residues from the processing facilities to the Niagara Falls Storage Site for storage purposes.

Starting around 1980 the government began a series of actions to consolidate all of the residues and other wastes stored at the Niagara Falls Storage Site into one place on site.

From 1983 to 1986, the Interim Waste Containment Structure (in navy) was built. And residues, wastes and contaminated soil throughout the Niagara Falls Storage Site and its associated vicinity properties were placed within that structure.

The primary areas for storage of the residues within the Interim Waste Containment Structure identified in this photo from the 1970's, at the top of the photo the northern portion of the IWCS is the R-10 residue pile, it's sort of that circular feature. The higher activity residues were stored in buildings 411, 413 and 414, which were the former LOOW fresh water treatment plant buildings.

Over the next several slides, we're going to walk you through the construction of the cell and this will prepare you to -- when Sam and Dan talk about the alternatives later. Okay, this historic photograph shows a closer look at the original LOOW, waste water treatment-- or, excuse me, fresh water treatment plant, the residues are currently stored in buildings 411, 413 and 414 within the IWCS.

As in the previous slide, this historic photograph shows the southern end of the Interim Waste Containment Structure. This is during the early construction of the Interim Waste Containment Structure zooming in on the three buildings that were used to store the residues. The building with the grid like structure is building 411. You can see the grid-like beams that supported the roof and building structure. Buildings 413 and 414, which are here, are the round structures on top of the photo.

The other buildings in this photo were demolished as part of the IWCS construction and were added to the IWCS before it was closed. They are part of the waste that we designate as contaminated rubble and debris. As shown in the photo, there's a clay cutoff wall and dike system that was constructed around the entire perimeter of the IWCS.

This photo shows the inside of building 411 prior to the transfer of the residues. Building 411 originally was a reservoir built to hold water, this reservoir now helps to contain the residues and waste stored within the Interim Waste Containment Structure. This slide shows an aerial view of the IWCS, the orientation of the historical photo on the left is duplicated in the schematic of the constructed cell on the right. The waste contained within the IWCS includes radioactive residues in the form of K-65 residues, other residues and R-10 residues.

Additionally there is contaminated soil and debris contained within the IWCS. The K-65 and other residues were specifically placed into the LOOW freshwater treatment buildings, these are buildings 411, 413 and 414. The R-10 residue was placed on the ground north of building 411 along with contaminated soil and debris from various removal actions from vicinity properties. The residues were intentionally placed at the bottom and in the middle of the IWCS in order to maximize the distance between the residues and the outside environment.

The figure on the right shows the placement of the cutoff wall and dike, surrounds the cell there. An initial cutoff wall was constructed to isolate the R-10 residues, you can see that connected to building 411. It was extended to isolate the south of the cap to contain buildings 411, 412 and 413. Before we move on to the next slide, please note in the schematic figure on the right that building 411 is divided into four bays, the smallest bay on the west side is bay A.

So, this schematic presents a cross section of the southern IWCS. Excuse me, I'm sorry, it shows a cross section of IWCS at this location. So, we're going to -- it's like you slice down and you actually are looking this way at it. Know that the background has changed from the historical photo and now is overlaid by a recent photograph that shows the current conditions of the IWCS.

In the following slides we use cross sections to illustrate the construction and contents of the IWCS. These cross sections have the vertical scale exaggerated so you can see the features inside.

This is illustrated by the two cross sections on this slide, both figures show cross section of the IWCS through buildings 414 and 411.

414 is here and this is 411 and that's four bays. The upper figure has no exaggeration, it's approximately true to scale and it gives you a general idea how flat the actual structure is.

The lower figure shows the IWCS with approximately ten to one vertical exaggeration. And as you can see, the details of the structures and construction are visible. This schematic presents a cross section of the south part of the IWCS, it includes buildings 414 and the four bays of building 411. The placement of the residues inside these buildings was intended to containerize the residues.

Building 411, as we mentioned is composed of four bays, bays A, B, C and D. Bays B, C and D make up most of the building, they total 180 by 200 feet and they are 19 feet deep. Bay A is the smallest of the bays, it's 44 by 47 feet and 19 feet deep. The K-65 residues, the highest radioactive residues at the site were placed in bays A and C. Other residues, L-30's and the F-32 were placed in bays A -- excuse me, placed in bays D, C and B. The L-50's were placed in the two round buildings, which are buildings 414 and also 413. Those buildings are 62 feet in diameter and 19 feet deep.

Additionally, contaminated soils from onsite and offsite remedial actions were placed on top of the residues stored in the building structures. The key message we want to convey is that we -- it is well known where the high activity residues are stored within the former buildings. The schematic also shows the IWCS cover that was placed over the entire IWCS once all waste activities were complete.

The design of the cell includes three layers, a three foot layer of compact low permeability clean clay which acts as a barrier for infiltration of precipitation and radon emanation, a one foot layer of loosely compacted soil to act as a protective layer to the clay liner and a six inch layer of topsoil with shallow rooted turf grass to control erosion and minimize damage from seasonal freeze and thaw. The protectiveness of the cap was estimated to be 25 to 50 years at the time of design.

A high level of maintenance is conducted to preserve the cover and therefore the protectiveness is expected to remain for at least the 50 years. This schematic also shows the clay cutoff wall and dike that surrounds the entire waste containment structure, they were constructed of compacted low permeability native clay soils.

The bottom of the IWCS is formed by two

naturally occurring clay layers of low permeability, the brown clay and the gray clay. The cutoff wall and dike and the clay bottom at the IWCS were designed to be effective for up to a thousand years. The total volume of the waste in IWCS is estimated to be 372,905 cubic yards, this total includes approximately 4,000 cubic yards of K-65 residue.

For the illustration, the volume of the K-65 residue would fit inside of an Olympic size swimming pool. As shown by the pie chart on the top of the slide, the K-65 comprise approximately one percent of the total volume of the waste inside the waste containment structure. The remaining 99% includes other residues, R-10 residues, contaminated soil and debris. And the majority of the waste volume is contaminated soil, most of which is located on the north end of the IWCS.

Additionally the K-65 residues represent approximately 91% of the total radioactivity in the IWCS as presented in the pie chart in the bottom right. The remaining wastes including the other residues, K-65 residues, contaminated soil and debris comprise the remaining 9% of the radioactivity. Therefore the K-65's account for 1% of the total waste volume of the IWCS, but 91% of its radioactivity.

The slide -- on the left that is a schematic of the cutoff wall and dike that surrounds the entire IWCS, the cutoff wall is an engineered barrier to prevent the migration of contaminants from the waste within the IWCS.

On the right is a photo showing the installation of the cutoff wall around the IWCS and in the process of being compacted to achieve very low permeability. The cutoff wall was constructed into the brown clay unit. An important fact to understand here is that the wall extends down 1.6 feet into the gray clay, and the gray clay is a natural clay unit with extremely low permeability.

The overall height of the cutoff wall and dike varies between 25 and 35 feet below ground surface, and you could really get perspective when you, you could see this is a person walking on the ground surface.

Also, you can note that there's very little standing water within the trench itself. The design life for the construction of the cutoff wall was two hundred to a thousand years. The IWCS is designed to prevent exposures to the radioactive material stored within it. Remember that the primary health concerns are radon gas and gamma radiation. And the IWCS was designed to shield against the release of radon gas and direct gamma radiation exposures. First and foremost the placement of the residues inside these concrete structures provides containment and shielding.

Secondly, the layering of the contaminated soil above the residues, they reduce the amount of seepage of radon gas, it's slowed by the dense clay layers. The gamma radiation is absorbed by the same clay layers, the radon gas moves slowly through the clay and decays due to its 3.8 day half life before reaching the surface. The radon does not easily diffuse through the IWCS, the gamma rays are absorbed by the dense clay and the soil layers.

In much the same way that clay prevents the migration of radon to the surface, the low permeability clay layer also minimizes the infiltration of rain water, but also into the lower levels of the IWCS. The vegetative cover at the top is designed to act as a protective cover to the clay layer and to control erosion and to minimize damage from seasonal freeze and thaw.

Okay, I'd like to introduce Samantha Pack. Sam and Dan Delp are with SAIC and they are going to be providing an overview of the remedial alternatives tech memo.

MS. SAMANTHA PACK: Thanks, Michelle. So, here's the IWCS today as we start in on the feasibility study, this is what it looks like today.

One very important thing I want to reiterate that Michelle pointed out in the last slide is that the IWCS is operating as it was designed. The ongoing monitoring shows that the gamma radiation levels outside of the IWCS and the radon gas levels are all at background. So, we have time to make some good decisions here. There we go.

Okay, we're actually going to get into the tech memo now. As we started into this process we very quickly realized that the very different characteristics of the different wastes within the IWCS would likely result in us evaluating and potentially selecting different alternatives for the different wastes, different technologies for the different wastes. So, we very quickly realized we had to subdivide the IWCS into subunits, we're going to show you the subunits. This is an important concept because this concept gets carried through the rest of the feasibility study.

The first subunit is subunit A, which is the high activity residues inside buildings 411, 413 and 414. This is just these high activity residues themselves, that's subunit A.

Subunit B is everything else in the southern part of the IWCS. This includes a lot of debris, a lot -- it also includes the actual building structures for these buildings. We're not exactly sure how much residual high activity residue is in the building structures, we'll learn that as we go.

Subunit C is everything in the northern part of IWCS, primarily the R-10 pile, the R-10 pile and all the soils that were placed on top of the R-10 pile over the years, those soils came from the cleanup of the Lake Ontario Ordnance Works and from elsewhere on the Niagara Falls Storage Site.

One very important concept here, these R-10 residues, even though they are residues also, are very different from the residues within these buildings. The parent ores of the R-10 residues contained a little over 3% uranium. The parent ores of the residues in these buildings contained for K-65 residues as much as 65% uranium, this is a very important difference.

Because of this, the radium concentrations in R-10 residues are much lower than the radium and radon gas concentrations associated with these high activity residues. So, we're going to go through the steps of the CERCLA feasibility study that we have had to follow in this tech memo.

CERCLA, for anybody who wants to know is the Comprehensive Environmental Response Compensation Liability Act, it's the federal law that requires landowners to cleanup hazardous and radiological wastes if they pose a threat to human health or the environment. And it is the law and it is the guidance that we are following in this process, it's a very prescriptive process, we don't get to make anything up.

So, in this tech memo we are actually implementing the first five steps of the CERCLA feasibility study process. The first step, and I'm going to go through each of these steps in more detail in the next slides, so bear with me.

The first step is that we're going to establish remedial action objectives and develop general response actions, we identify treatment technologies and process options, we evaluate the effectiveness, implementability and the qualitative cost of these technologies and options and then we assemble them into a set of remedial alternatives.

The output of this tech memo is the set of remedial alternatives that gets evaluated in the detailed analysis of alternatives in the feasibility study.

So, the preliminary remedial action objectives for the IWCS, and I have been asked to read these verbatim because they are important, but I need my glasses.

So, the first one, prevent unacceptable exposures of receptors to the hazardous substances associated with uranium ore mill tailings, i.e., radium 226 and its short-lived decay products inside the IWCS, that's the first objective.

The second one, minimize/prevent the transport of hazardous substances within the IWCS to other environmental media, i.e., soil, groundwater, surface water sediment and air outside of the IWCS.

And, the final one, during implementation of the remedial alternatives, minimize and prevent releases and other impacts that could adversely affect human health and the environment, including ecological receptors. This is a very important objective for this particular site because of the potential for exposure to radon gas during the cleanup.

Second step, we had to develop a set of

general response actions, these are high level approaches to dealing with the waste inside of the IWCS, it may range -- oops. They range from actually no action, which isn't on here, all the way to removing everything. And, again, these are just high level general response actions. Take note that as we move forward, we can combine a couple of them together to actually develop an alternative, for example, you can combine removal and treatment into a single alternative. But, to evaluate technologies, we start with these five general response actions.

Okay, you have a handout, I think in your packet, where we actually walk through this first screen for -- it's a table, I think it's listed table 3.1, okay. And it's a table, and in the very far left corner are the general response actions. The next column is the remedial technology types that fall within that general response action.

The next column is process options and more detailed description of the technology. And then in the last column we show whether or not it is implementable for this site. If a technology or a process option is not implementable at the site, it gets screened out right away in this very first step, we cannot carry it through, it would be a waste of our time. So, here is an example of that process, we have a general response action which is removal, a technology type, which is a mechanical removal, you know, something as simple as a backhoe.

And the process options, earth moving equipment, we actually looked at several different kinds of mechanical earth moving devices, drag lines, clam shells, all sorts of things. And then for each one of those, we decided whether or not it was implementable. So, that's the process that their guidance requires us to follow and that is what you see in your handout.

Okay, the next step is to actually do a next layer screen. For every technology type, or process option that made it through that first screen, we then evaluate its effectiveness, implementability and then qualitative or relative cost, we don't have hard cost numbers at this point, we just kind of look at a high, moderate and low cost. I think, I don't know, is table 4-1 in the packet? Okay, so you've also got this screen and how they went through that screen for each technology that made it through the first screen.

Again, back to our example, the earth moving equipment, we looked at the effectiveness, implementability and cost, rated it either high, medium or low and based on that, we either retain a technology to move it as a candidate for an alternative or we screen it out. A technology gets screened out at this stage if it has a low for effectiveness and low for implementability or if it has a low, or moderate low.

What we're trying to do is avoid spending a lot of time and effort on a technology that isn't implementable or may not be effective. We're trying to really rise to those that have a high potential to work well at our site.

So, you can see in that table 4 where we went through that systematically for every technology. After we went through all of that we identified -- that all leads to the identification of five alternatives that we plan to carry through the detailed analysis of the alternatives in the feasibility study. And these are the five alternatives we live with from here on out.

Those five alternatives include no action, and before anybody worries too much, let me explain what a no action alternative is in the CERCLA feasibility study. Number 1, it's required by CERCLA to look at it. It is truly no action, it's no nothing, it's no engineering controls, no maintenance, no monitoring, no nothing. It basically asks the question if we walked away from the site today, would it be safe for human health and the environment? So, it serves as our baseline against which we evaluate everything else.

I can tell you now that no action is not a viable alternative at this site. The second alternative we are going to be looking at is enhanced containment of all the subunits, so that the north and the south part of the IWCS would just receive an enhanced cap under this alternative.

The next two alternatives are both partial removal alternatives, meaning part of the IWCS gets removed and disposed of offsite and parts of it stay, and again an enhanced cap.

Under the first one, we would just remove the residues in subunit A, so the high activity residues, the 99% of the threat in the IWCS would be removed here. After we remove, treat and dispose those residues, we would then put an enhanced cap on everything that's remaining.

The next partial removal alternative is removal and treatment of everything in the south part of the IWCS and just leave everything in the north part of the IWCS. And then we would just put an enhanced cap on top of subunit C in the north.

And then the last alternative that we'll be looking at in the feasibility study is complete removal of everything. Removal, treatment of the high activity residues and then disposal offsite. So, right there, folks, you have the five proposed alternatives to carry through the feasibility study.

And with that, we're almost done and I think we're on time pretty well. I'm going to present the lead engineer of the feasibility study and he's going to walk you through some schematics of each of these alternatives. Dan.

MR. DANIEL DELP: Thanks, Sam. This schematic overlying an aerial view is important because it's going to be shown through all the next five alternatives plus this line right here is going to develop cross sections. I'll show how we plan to attack, or how the alternatives plan to attack the waste inside the IWCS. But, before we do that, I'd like to summarize a few things and just go through a couple of the features.

Number one, we're at a point in the process and in the presentation whereby the technologies and the process options were put together to form alternatives. These alternatives are conceptual in nature, they're not designs, they're just a way of combining these technologies that have been shown to have the highest effectiveness and implementability.

The second thing I'd like to just go over again is this. You will see the term subunit A, B and C thrown around these alternatives. And subunit A is the residues that are contained in the structures, not the structures themselves, but just the residues in the structure.

Subunit B, is the structures themselves plus the rubble and debris and contaminated soil that occurs in this part of the IWCS. Subunit C is everything north of there.

So, what you will see in the next slide is a cross section made by cutting this line down through the IWCS, and you'll notice right here, it makes a jog and it makes a jog there so that we can show you on a cross section view these structures.

This line here is the clay dike and cutoff wall. This is the R-10 pile, these are the structures and you will see the clay dike cutoff wall is around the R-10 pile. So, with all that buildup, our first slide is no action.

And a couple things I want to show on this,

this shows the existing IWCS and as you recall, we talked about vertical exaggeration. These slopes are not that steep, this is a vertically exaggerated section, the slopes out there actually are what's known as three feet, three to one, they're called. It's three feet horizontal to one foot vertical, it can easily be mowed, it is not that steep. This cross section shows the R-10 pile, shows the brown clay, the gray clay. And the no action, like Sam said, it includes no action, no security, no maintenance, no monitoring, no land use controls. It's required by CERCLA process and it's used as a baseline for study comparisons only.

The next alternative is enhanced containment of subunits A, B and C. Again, this is an alternative that is conceptual in nature that says what can we do to enhance the cover system existing at the site? And, so some of the components that you will see on the next slide are enhancements to the cap such as increasing clay thickness, additional drainage layers, installing state of the art high density polyethylene liners or some type of liners and a reduction in the side slopes. In other words we're making the slide slopes flatter, we would make the side slopes flatter in this concept.

And in such a concept there would be a five to one slope instead of a three to one slope, so it would be five feet horizontal to one foot vertical and that adds stability to the unit. Again, land use controls, federal ownership, surveillance monitoring, maintenance and security would all be ongoing just like it is now.

And the next slide shows an example of an enhanced containment cap. These are typically used, this came from, you know, a typical design to cover materials such as this. And we'll start at the bottom on the existing cap, it contains three feet of compacted clay, there's twelve inches of common fill soil that acts as rooting depth for the turf grass out there and then there's six inches of topsoil.

An enhanced cap would consist of this clay also, it would add a 60 mil geomembrane, now a mil is a thousandth of an inch, so 60 mil would be six hundredths of an inch thick, basically the thickness of two credit cards. On top -- and the liner comes in big sections, it's fused together, it's heat fused together and it's laying right over the top of the clay. On top of that is a sand drainage layer, that when the rainfall hits that liner there's an outlet for it, so that outlet's to the sides of the IWCS, you would have a geotextile fabric over the top of the sand drainage layer.

And then above that is a rip rap layer, and rip rap is nothing more than rock that is sized to meet some -- a gradation requirement. In this case we would say -- would use a rip rap that's maximum twelve inch diameter, minimum four inch and an average of eight inch diameter rock. So, it's a rock that's used not only to prevent root penetration, but it's to prevent any type of biotic intrusion, groundhogs, anything like that from burrowing down into the -- getting to the geomembrane or the clay.

Above that you would have increased thickness of common fill again to act as a soil moisture storage and rooting depth and above that would be the topsoil. So, that's how a conceptual enhancement could be done to existing clay cap at the site.

Alternative 3A, is removal, treatment and offsite disposal of subunit A, with enhanced containment of subunits B and C. I'll talk about the enhanced containment of subunits B and C. First, it would be using that same type of conceptual cap that we just talked about and in reality, this material would get removed. So, we would remove subunit A, and of course it would be treated as needed and shipped offsite.

There's two reasons you would treat, two reasons. One would be to meet the waste disposal criteria and the other would be to meet transportation criteria. So, subunit A would be removed, be treated as needed, shipped offsite.

The excavations where the material came from would be backfilled with clean fill and then the enhanced cap would be put over the entire footprint, just like we saw in the alternative. This is what it would look like, material removed from here in the white. What does that buy us, what does that do for us?

Well, in effect the volume of waste inside subunit A represents 10% of the total volume in IWCS. But it represents 98% of the radioactivity. So, that alternative would remove 98% of the radioactivity in the IWCS, while enhancing the remaining footprint with an enhanced cap.

And, here you will see some of the -- cross section of how that would happen. Of course, some type of mechanical method will be used to come in and remove this material, but before any of that happens, you have to have radon controls, a radon control system would be constructed. You would have to have a treatment facility built to be able to treat the waste, so it could be shipped offsite.

So, in this alternative, you remove whatever you need to on top, which we are calling subunit B. What's laying on top of the residues is also a part of subunit B, so you need to remove as much as you have to, to get to the residues. That material also in concept would be treated and removed offsite and disposed in an acceptable facility.

Enhanced containment of B and C and the footprint of A, land use controls, continued maintenance monitoring and surveillance, security, the like. So, in this one, we're removing the residues, getting them treated, getting them shipped offsite, getting them disposed of and then putting an enhanced cap over the remaining footprint.

Alternative 3B, is removal, treatment and offsite disposal of subunits A and B. So, it's not only the residues that's going to be removed here, in concept form it would be this whole subunit B plus the residue. So, it would be the residues, the buildings and whatever debris, rubble and contaminated soil is in subunit B.

Subunit A and B remove, treated as needed and shipped offsite, the excavations backfilled again, we will see in a subsequent slide how that's going to be accomplished. And then an enhanced cap installed over this portion here.

Again, this is what it will look like. And, the final disposition of the IWCS under that scenario would look like this, a cross section view, there's the R-10 pile, subunit C. Again this slope looks steep, it would be a 5 to 1 slope just like we talked about for the other alternatives.

Clean fill put in, into the areas that the waste was removed. Subunits A and B, removed, treated, shipped offsite. And this is the original IWCS surface. Again, we would take the top off of the clay dike and this would be graded to promote surface runoff. Again, land use controls continue, maintenance, monitoring, surveillance, this portion is capped with the enhanced cap.

The effect of alternative 3, both waste volume and activity, subunits A and B make up 33% of the waste volume in the IWCS, but make up 99% of the radioactivity. So, removing, removing this right here is a third of the waste basically, but removing 99% of the radioactivity.

The fourth alternative is to remove, treat and dispose of everything. Again, like we discussed previously in the previous slides, the residues would be gone, you'd have to have the requisite controls for transportation, for disposal, this would be done in some type of phasing. The excavations, backfill with clean soil, that's what it would look like, everything removed. And the final disposition would look like this, clean fill to promote drainage, and this would be the line of the existing IWCS now.

So, it would just look like a flat surface to remote drainage. I'd like to turn it over to Bill now, Bill.

MR. WILLIAM KOWALEWSKI: Okay, just two more slides, folks. And I'm going to wrap up with painting a picture for you of where we go from here.

The alternatives that were just described to you, right here, will all be individually put through the CERCLA criteria that are prescribed for the evaluation. And, we did mention some of these earlier. All of these alternatives must, stop or go; meet both of these two criteria. Be protective of human health and the environment and comply with the regulations. So, nothing can go forward beyond this point without satisfying those two criteria.

We then evaluate those alternatives against what are called balancing criteria. We look at the long term effectiveness and permanence of that solution, the short term effectiveness, the reduction in the toxicity, the mobility or the volume of that waste through treatment. We evaluate how implementable is it, do we have the technologies available to execute that remedy?

And finally, we look at the cost, and this would be the quantitative cost of what each remedy would cost. After the balancing criteria are applied, there's what they call modifying criteria, and these really are the acceptance, you know, what do the regulatory agencies and the public feel about these alternatives. And what kind of acceptance level do they enjoy with the community?

After the individual analysis of each alternative, there's a comparative analysis, so, we compare them against each other. And that will come out in the feasibility study. Going back to our process, what I just mentioned about the evaluation criteria and if you will, the scoring of those alternatives takes place in the feasibility study, we expect to have that done in 2014.

After that is rolled out and we engage the public, the Corps will then go back to their desks and figure out, okay, from our analysis, which one of those alternatives floats to the top as the alternative that the Corps will propose implementing at the site? We'll release that in a proposed plan and right now the schedule is 2015.

After that is rolled out and we go through the public engagement phase and get your comments and concerns about it, we take those back and ultimately come up with a record of decision and make a choice on which alternative will be selected.

And, again, once that's done, we go through the cleanup phase where we actually execute the remedy. We'll do that for the IWCS and then we'll go back and do it for the soils and infrastructure and also the groundwater. And those three records of decision will constitute the final ultimate comprehensive remedy for the Niagara Falls Storage Site. Okay, that concludes our presentation and, Doug, I'll turn it back to you.

MR. DOUGLAS SARNO: Thank you. I want to thank Bill and Sam and Dan for a great presentation. Now, if you go to the back and find anybody with a -- SAIC or a Corps of Engineers name tag on, they're going to be hanging out at the posters, you can ask any detailed questions. You've got the slides in front of you if you want to refer to a specific slide. This is your chance to kind of get down into the details of this thing, understand this range of alternatives, ask any questions about the alternatives. Remember, this is all going to be the framework that they're going to use to evaluate against in the feasibility study.

Please help yourself to coffee and we'll hangout as long as you have questions.

(Proceedings concluded)

CERTIFICATE

I, RHETT L. BAKER, certify that the foregoing transcript of proceedings in the matter of US Army Corps of Engineers, Re: Presentation of Interim Containment Remedial Alternatives Technical Memorandum Niagara Falls Storage Site (NFSS) Formerly Utilized Sites Remedial Action Program as recorded and transcribed from a SONY BM-146 recording and transcribing machine, and is a true and accurate record of the proceedings herein.

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