Defense Logistics Agency

THE FORMER MEMPHIS DEPOT

RESTORATION ADVISORY BOARD (RAB) MEETING

Agenda

Thursday, April 19, 2007 -- 6:00 p.m.
Ruth Tate Senior Citizens Center
(formerly the South Memphis Senior Citizens Center)
1620 Marjorie Street
Memphis, Tennessee

Welcome and Introductions	3 min.	Mr. Michael Dobbs **Environmental Manager** **Defense Distribution Center (DDC)**
Review and Approve Agenda	4 min.	Mr. Mondell Williams **RAB Co-Chair**
Review and Approve October RAB Minutes	4 min.	Mr. Williams
OLD BUSINESS **Community RAB Housekeeping Issues**	5 min.	Mr. Williams
NEW BUSINESS **Environmental Restoration Program Update**	20 min.	Mr. Tom Holmes **e^2M**
RAB Comment Period	15 min.	Mr. Williams
Public Comment Period	15 min.	Mr. Williams
Adjournment	3 min.	Mr. Dobbs

MEETING MINUTES
The Former Memphis Depot
Restoration Advisory Board
April 19, 2007
1620 Marjorie Street
Memphis, Tennessee

The Restoration Advisory Board (RAB) meeting was held at 6:00 p.m. on April 19, 2007 at the Ruth Tate Senior Citizens Center located at 1620 Marjorie Street, Memphis, Tennessee. The attendance list is attached.

WELCOME AND INTRODUCTIONS:

MR. DOBBS: Good evening. We'll get started. Good evening. On behalf of DLA (Defense Logistics Agency) and the Defense Distribution Center (DDC), I want to welcome everyone to this evening's Restoration Advisory Board (RAB). My name is Michael Dobbs. I'm the Environmental Manager for the DDC and DLA. As usual, tonight we're going to have a presentation by e²M, Mr. Tom Holmes, to give us an update as to where we are in the restoration program. Tom is to the right. He will be able to get us up to speed. And beside Tom is Dave Nelson with CH2M Hill. Okay.

MR. WILLIAMS: My name is Mondell Williams. I'm the Co-chair for the Restoration Advisory Board, and I, too, would like to welcome everyone to the meeting tonight. This is our first meeting for 2007.

REVIEW AND APPROVE AGENDA:

MR. WILLIAMS: If everyone would take a minute out to look over the agenda so we can have approval of the agenda, and I would like to get a motion.

MR. TYLER: So moved.

MR. WILLIAMS: Can I get a second?

MS. BROOKS: I second.

MR. WILLIAMS: All in favor?

THE BOARD: Aye.

MR. WILLIAMS: Abstained? (Brief pause.)

APPROVAL OF MINUTES:

MR. WILLIAMS: Okay, and if you would like to take a look at the minutes from the October meeting for 2006 for last year. Well, I don't think we have enough people here.

MR. TYLER: We'll have to move it to another setting.

MR. WILLIAMS: Okay, so, we will bypass that for the first moment here until we see if we can get some more people in to approve the minutes for 2006.

OLD BUSINESS; COMMUNITY RAB HOUSEKEEPING ISSUES:

MR. WILLIAMS: Okay, for Old Business: Do we have old business for the Restoration Advisory Board meeting minutes? Any old business? (Brief pause.) Okay. So, housekeeping. Okay.

MR. TYLER: Stanley Tyler. I would like to thank the chairman last year, Mr. Mondell, for doing such a good job and handling this situation. And I would like to thank all those that came to the little Christmas meeting we had in December. That was informative and that was good. We had an opportunity to fellowship and meet and greet people and act responsibly; and a lot of that had to do with the chairman, you know, setting the tone, letting people know you can disagree, but you don't have to be disagreeable. And hopefully this year we'll keep that same tone. Though we disagree, let us try to remember that like in elementary school we're supposed to be nice to our neighbors. Thank you.

NEW BUSINESS:

MR. WILLIAMS: Under New Business, I would like to direct a question to Mr. Ballard. Once the land has been turned over to the Redevelopment -- I mean, to the Redevelopment Board, you know, for reuse.

MR. BALLARD: Yes.

MR. WILLIAMS: My question is: Is there any way that if we wanted to say, "Well, could you go back and resample a certain area on the base," is it possible to be done?

MR. BALLARD: Yeah, it certainly is, but I hope they're on the facility now. We collect samples on the property that has been transferred in furtherance of our long-term monitoring for the Remedial Actions. If there is a specific area and, you know, reason or new information that you have that you want to bring to the BRAC (Base Realignment and Closure) Cleanup Team (BCT), we can look at that.

MR. WILLIAMS: Okay. Because I was just -- you know, I was just wondering like, for instance, over there by where the pond was, over there by the golf course, and over there by I think it was 629 where it had those big drums staged on the ground, I was just curious to that, if it could be, you know.

MR. BALLARD: Would that have been that old pesticide mixing building?

MR. WILLIAMS: Well, no. It was out back of it, on the side of it, where they kept all the five-gallon drums.

MR. BALLARD: But that was the building for it; right?

MR. WILLIAMS: Yeah.

MR. BALLARD: Mixing building. I know we did a lot of sampling around there during the golf course -- investigation around the golf course because of that, and those results are available for you to look at. If you would look at those first, and then see if there is any areas where maybe -- that you think we would have data gap ---

MR. WILLIAMS: Yeah, that's what I was wondering. You know the land they turned over, what, about three years?

MR. BALLARD: About.

MR. WILLIAMS: Over there by the golf course. So I was just curious to during a certain period of time that -- you know, the seasons have changed two or three times and maybe something might have accumulated or

occurred during that time, and I was just curious. That's all. Anyone else would like to comment? (Brief pause.)

NEW BUSINESS; ENVIRONMENTAL RESTORATION PROGRAM UPDATE:

MR. WILLIAMS: Mr. Holmes.

MR. HOLMES: Good evening. I'm Tom Holmes, the Project Manager for e^2M, the restoration Remedial Action contractor, and we'll talk about the three restoration areas at the Memphis Depot. They're all in slightly different stages. The Main Installation Remedial Action (RA) is underway. At the Source Areas on Dunn Field we're finishing -- the Remedial Design (RD) has just been finished, and the Remedial Action will be starting soon. And then the Off-Depot Groundwater RD, for the area west of Dunn Field is underway. So we'll go through the actions at those three spots, and then we'll end with project schedule and the next steps for the next few years.

On the Main Installation, we're basically using naturally existing bacteria in the groundwater to clean up the solvents in the groundwater. In two treatment areas where the concentrations are higher we are using Enhanced Bioremediation, and we are adding sugar that the bacteria will feed on. And then through that process they will eat more of the solvents and restore that naturally, to degrade. That will go away.

Outside those treatment areas we're just monitoring the naturally occurring activity that's occurring to degrade the solvents, and then in addition to that action we've instituted Land-Use Controls on the Main Installation to restrict activities to ensure protection of human health and the environment.

For the Enhanced Bioremediation Treatment in two areas, we installed a number of injection wells and performance monitoring wells. That was completed in September of 2006, and we began the sodium lactate injections, which is the carbon source that the bacteria feed on. In December we completed our first quarterly groundwater sampling event. We'll continue these quarterly groundwater sampling events during the treatment period, and then we're also collecting samples outside the treatment areas for Monitored Natural Attenuation.

The two treatment areas are shown here (Indicating) to this side is Treatment Area 2, which is along Airways Boulevard. This is the new police station. The golf course is down here, and then Treatment Area 1 over here in the southwest, which is on the Barnhart Crane (& Rigging) part. (Indicating) All of the Remedial Actions have criteria that have been established for us to evaluate whether they are operating properly and successfully. The operating properly component is whether they were installed as designed and/or just working as we had expected them to work. The operating successfully is -- are we meeting our goals for the remediation so that we are taking the proper steps to reach the Remedial Action objectives.

The criteria for operating properly for the Enhanced Bioremediation Treatment (EBT) are the well installation -- the installation of the injection wells and monitoring wells in the areas that were planned, and that has been completed. So that has been done. The distribution of lactate through the injection wells throughout the treatment areas, and we're making progress there. In the monitoring wells in two of the areas, the lactate has been seen in the wells. And in one area it hasn't been seen as much, and we have increased the volume of

lactate we're injecting in that area, so we will meet the goal. And then the injection volume is the third criteria and we are meeting that.

We're injecting the design volume in all three areas, and that -- as I said, we've made a modification to that in one area. Then the operating successfully components are the creation of anaerobic conditions that is the bacteria that we're trying to -- that we're using are anaerobic. They live best in areas in conditions of depleted oxygen where there is basically no oxygen in the aquifer, and we have created anaerobic conditions in the injection areas and some of the monitoring areas, and we expect those areas to expand as we continue the treatment. We have also added sugar to the sodium lactate solution. Sugar is preferred by aerobic bacteria which use up the oxygen creating the anaerobic condition, and then the lactate is preferred by anaerobic bacteria. So we're just adding a little sugar to the mix so that we can create the anaerobic conditions a little quicker. It's just standard sugar off the store shelf.

And then the second criterion is the maintenance of anaerobic conditions. So once we've establish them, we need to keep the conditions that way for the treatment to be effective, and that would be determined through the future groundwater monitoring events, and then we expect the Tetrachloroethene (PCE) and Trichloroethene (TCE) concentrations will decrease, and that will be -- in the one round of sampling we saw a little bit of a decrease. We expect to see more as we go forward, and it's a cumulative effect. So we didn't expect -- we wouldn't start injecting and things would change immediately. It takes place over time, and we feel that things are moving properly.

And then there are also conditions for the Monitored Natural Attenuation (MNA). Since there was no construction activity, there is no operating properly. So, we're just determining if the Monitored Natural Attenuation is successful, and the criteria we're looking at are the contaminant levels being reduced as expected, and that the plume is either stable or retreating. Over time we expect to see a slower decrease in concentrations of PCE and TCE because we're not trying to speed it up through the injection of lactate, but we still will see -- just in the naturally occurring method of biodegradation, we will see some decrease in concentrations. And this will be seen through the continued monitoring that we're doing.

The EBT injections will occur for two years. We are approaching halfway through the first year, and we're making the injections biweekly during this first year, and then we'll go to monthly in the second year. The first year will end in September 2007.

We expect to achieve the cleanup goals in the two treatment areas by the time the injections are ended. So that would be in two years, in the fall of 2008, and we expect to achieve the cleanup goals in the MNA areas in 2015.

After about the first year, in October, we expect to begin work on the Interim Remedial Action Completion Report, which we will prepare to demonstrate that the system has been installed as designed and is Operating Properly and Successfully (OPS), and present the results to date. And so we'll present all the data in that report, and it will go through TDEC (Tennessee Department of Environment and Conservation) and EPA (Environmental Protection Agency) for approval.

Now, the second area we're working at, the Source Areas on Dunn Field. So this is the property on the western portion of Dunn Field. There are three components to the Remedial Action, and they will be implemented in a phased approach.

The first thing we'll do is the standard Soil Vapor Extraction (SVE) where we install wells in the ground and put a vacuum on them and pull the vapor through them to pull the solvents out of the soil. This is in the fluvial zone, which is in area from about a depth of 30 feet to 75 feet, and that system is expected to operate for up to five years.

Following that, in roughly -- say in the fall, we expect to implement Thermal Enhanced Soil Vapor Extraction. What we're going to do there, this will occur in the upper 30 feet, which is very tight clay soil and standard SVE, Soil Vapor Extraction, wouldn't be effective there because the soils are so tight. And so we're going to heat the soil up to roughly a hundred degrees, to boiling point. The vapors, the water in there, will be heated and turned into steam. Some of it will be withdrawn. We'll pull the contaminants with it, and we'll clean up the upper soils that way. And we expect that operation to occur over a period of nine months.

And then finally we'll perform Zero-Valent Iron (ZVI) injections in the groundwater at a depth of 75 to 85 or so feet to complete the remediation and that will clean up the groundwater. And that will occur over a period of two to three months.

The entire thing will be phased. So we'll start with the fluvial SVE; and, as I say, in the fall we'll begin the thermal. That will last for nine months or so. Then we'll do the ZVI injections. The total project process is roughly a year and a half or so. We'll confirm that

the remedial goals have been met by each of those actions. We'll collect soil samples after each of the SVE phases. So after the nine months of the thermal treatment in the loess, we'll go back to the areas where we had elevated – high concentrations of the solvents in the soil to show that we have reduced those, and we'll see how it works, and we expect it to work well.

And then we'll do the same thing after -- in the deeper soils after the five-year period or at the point that the -- that it appears from our monitoring that the cleanup has been effective. Then we'll go back and we'll collect soil samples there.

After we perform the thermal Soil Vapor Extraction in these upper soils, we're going to go in and install some additional groundwater monitoring wells to determine the areas that need to have the ZVI injection. And those areas will be based on a groundwater -- a concentration level that's been set in the RD. That's about a thousand parts per billion in groundwater. Those are the groundwater source -- the areas in the groundwater and those are the areas that will be treated with the Zero-Valent Iron.

And then after the injections, we will collect additional groundwater samples to confirm that we have, indeed, lowered the groundwater concentrations to very low levels. These are the areas (Indicating). There are four areas. The map is -- north is to the top. You can see the railroad tracks just on the right-hand side. Person Avenue would be a little bit further. Hays Road would be on the south, on the bottom, and Dunn Avenue would be further off to the left. (Indicating)

MR. BALLARD: North is to the right.

MR. HOLMES: Sorry. North is that way (Indicating). All right, each of these areas will have -- three of the areas, one, two and four, will have all three of those components. Right now area three, the groundwater concentrations were not that high in that area, and we don't expect to perform the Zero-Valent Iron injection there. We will be collecting samples throughout the area to make sure that the Remedial Action that's required is performed.

The current status of the RD. EPA and TDEC have completed their review and approved the final Remedial Design. That was done in March. Paper copies of the documents are being prepared now and will be placed in the Information Repositories for public review, and we'll have another meeting here on May 10th where we will just provide a briefing for what's in the Remedial Design and actions that have taken place.

The Remedial Action has been spread into two components. There is the first -- as I said, the first action we want to take is for the fluvial SVE in those soils, the sandy soils from 30 to 75 feet. And, so a Remedial Action Work Plan has been prepared and presented to EPA and TDEC. They have prepared comments on that. We discussed the comments at our meeting today, and I think we're all in agreement, there is some additional information we're going to provide to EPA and TDEC. And then we expect to be able to approve the document, and then it will be copied and placed in the Information Repositories.

We've began some additional initial site preparation already. Actually, we began Monday of this week. There were some fact sheets passed out in the Hays Road neighborhood about that. We removed a soil pile that overlaid one of our treatment areas so that we could have access. It was just soil. There were no waste materials in

it. Apparently the report of the area, it was used for training of the equipment operators previously. And that soil was just moved over to another part of Dunn Field and worked into the landscape, and it will be seeded and covered.

And then we're going to begin installation of some additional monitoring wells in the area, too, in the next week or two. Construction of the SVE system itself will not begin until we've had the RD briefing in May.

Then the second phase will be the loess groundwater Remedial Action. EPA and TDEC are reviewing the Remedial Action Work Plan for that now. It was submitted a couple of weeks ago and approval is expected in the fall, and then, as with the other plans, it will be placed in the Information Repositories. And we expect to begin construction of the thermal SVE portion in the fall of this year, and then roughly a year or so after that we will perform the ZVI injections.

Then the third phase of this is the Off-Depot Groundwater RD. This is for the groundwater plume that is to the west of Dunn Field. We are -- a pre-final Off-Depot RD will be submitted to EPA and TDEC in July. We expect to complete that document in March. Upon approval, it will be placed in the Information Repositories, and we will conduct a briefing after that, which right now is expected to occur in May 2008. Then we'll complete the Remedial Action Work Plan for that action and begin construction in the summer of 2008.

There has been some additional information. We talked about this briefly at the last RAB meeting where we were talking about the implementation of the Permeable Reactive Barrier (PRB)

implementation study, and we also over the past couple of years have installed a number of additional groundwater monitoring wells to expand that network to the west of Dunn Field, primarily a lot of them in the area of the MLGW (Memphis Light, Gas and Water) substation at Menager and Rozelle. And with that additional information, the BRAC Cleanup Team determined that the planned Zero-Valent Iron, Permeable Reactive Barrier would not be the most effective approach for the cleanup. Right now Enhanced Bioremediation Treatment similar to what is being performed on the Main Installation is being considered.

One reason is that it's been successfully implemented on the Main Installation. We're seeing positive results. It will allow us to get out and begin the action relatively quickly and to treat a large area of the plume instead of just putting one barrier in, and the cost of the change in remedy will require an amendment to the Dunn Field Record of Decision. There will be a Revised Proposed Plan put together with public comment on that. So there will be more information coming out on that.

Then the next steps for the spring, we will continue the Main Installation Remedial Action with the sodium lactate injections and groundwater monitoring. We have already said we have completed the Dunn Field Source Areas RD, just the final thing would be to get the copies in the Information Repositories. And the components, as I mentioned, the fluvial Soil Vapor Extraction, the heating and Soil Vapor Extraction in the loess, in the upper soils, and the Zero-Valent Iron injections. We'll complete the RA Work Plan, and then we will conduct the briefing, as I said, on May 10th.

Then following that, in the summer and fall, we'll complete the Loess Groundwater Remedial Action Work Plan, and we'll begin that portion on the Source Areas, as I said, beginning with the thermal. We'll complete the Revised Proposed Plan for the ROD amendment and conduct a public comment period in November and December of this year.

In 2008, we'll complete the Off-Depot Groundwater RD. We will conduct the public briefing. We will begin the Off-Depot Remedial Action. We'll complete another Five-Year Review. The last one was done five years ago, and it's a Superfund requirement. So there will be -- we'll describe the status of the actions.

We expect to receive Operating Properly and Successfully determination for the Main Installation. That will allow us to complete the transfer of the property on the Main Installation.

In 2009, we will continue the long-term monitoring for the Main Installation. We'll operate and maintain the fluvial SVE, and we'll begin the ZVI injection portion of the Source Areas RA. In 2010, we'll receive the OPS determination for Dunn Field. We expect we will receive EPA approval of the Preliminary Closeout Report, which is based on completion of all construction activities, not the monitoring, but just the construction. And then the OPS determination for the Remedial Action will allow us to complete the transfer of Dunn Field through FOST (Finding of Suitability to Transfer) Number 6.

And that's all for the update. I will be happy to take any questions now.

MR. WILLIAMS: Yes. Question. How many different treatments -- well, let me get this straight. Did you use the same plan of treatments on the Main Installation that you used in Dunn Field? That was the first one.

MR. HOLMES: Well, of course, we're not using the same treatment for the Source Areas on Dunn Field, which is actually on Dunn Field. We are thinking about using a similar but not the same treatment for the groundwater area, to the west of Dunn Field.

MR. WILLIAMS: On the Main Installation or Dunn Field?

MR. HOLMES: On Dunn Field.

MR. WILLIAMS: On Dunn Field.

MR. HOLMES: I'm looking. I can show you a map.

MR. WILLIAMS: While you're showing me the map, at what point did you find out that the Zero-Valent Iron that you were injecting into the ground that -- didn't you say that wasn't a good ---

MR. HOLMES: We were using Zero-Valent Iron in two approaches, one was the injection where we inject it under pressure and it spreads out in an area where it's near the injection boring. And then there was another area where we were going to basically build a wall through the subsurface through a couple of different methods we looked at.

So, it would be, one, a barrier of iron that the water would have to flow through and be cleaned up. Now, we know that Zero-Valent Iron is successful at treating groundwater, but it's got to get in contact with the groundwater in the right place and in the right manner. And it just turned out through the implementation study that it wouldn't be effective because of the flow rate of the groundwater, the uneven surface at the bottom of the aquifer that would have -- we would have to sort of fill in all these nooks and crannies to make sure we caught all the water. So it just turned out for a number of reasons it wouldn't be -- and I guess the one other main thing was the wall was going to go in one area, and there were already solvents beyond that area.

And for a number of reasons, the wall couldn't effectively be moved. So we were still going to have to do something on the down gradient side of the water. So that was another reason why.

MR. WILLIAMS: See, the reason I had asked, because Mr. Tyler had stood up and down about that Zero-Valent Iron, where it's been used at, where -- you know -- who implemented it and how was it going on the other installations. That's what made me really think about it when you said that it's not a good process for what you're doing now on Dunn Field, and I recall him asking, "When you get through trying this, what will you try next?" That's the reason it came to mind.

MR. HOLMES: I remember we had some discussion at the last meeting about Plan B, and, you know, we're trying to perform the cleanup as quickly and as thoroughly as possible, and before we -- you know, before we go in and do a full-scale implementation. We want to have good confidence that it's going to work, which is the reason for the implementation study. And if new information comes up to show this isn't quite the way we had thought it was going to be, then we'll make a plan.

MR. BALLARD: I was going to say, a perfect example of that is that at the time that we completed the Remedial Investigation we thought at the time that we had a good handle on where the off-site contamination was in groundwater, and based on that, we proposed and selected the remedy that was written into the Record of Decision. Subsequent to that, and during Remedial Design data collection activities, we found that there were much more extensive and higher concentrations of the solvents in the groundwater further down gradient than where we had proposed to put in the barrier wall.

The Record of Decision had said that the contamination down gradient of where we were going to put the barrier in was low enough -- that was what our data showed at the time, was low enough to

allow to attenuate naturally, but when we put in additional wells in different locations and found the higher levels of contamination, we didn't feel that Natural Attenuation alone would be sufficient to address the extended area of the plume. So we decided to try one of the technologies we were going to use anyway, which was this Zero-Valent Iron injections, which we did in 2004 -- wasn't it? It was in 2004 and monitored that over a period of time. Turned out that we just didn't get the coverage and the amount of iron in to contact with the contaminated groundwater that we needed to in order to effectively clean that up, and we started looking at other options for addressing that groundwater.

And then with the PRB implementation study that Tom was just talking about, it was successful in some respects, but because of the conditions inherent at this site, we felt that as long as we have to address the groundwater that's further down gradient of where that wall was going to be, why not use one effective technology instead of two technologies, both of which are known to work, but we're not as flexible with how we can employ that Zero-Valent Iron as we are with how we can employ the Enhanced Bioremediation. Because with Enhanced Bio, if we find a little spot area over here that's just not getting treated, we can put in one more well and do some additional treatment there. So it has a lot of flexibility, and ultimately, we think the groundwater will be cleaned up more quickly because we can inject and effectively treat the whole area of the plume that Tom has displayed up here.

MR. HOLMES: Just to debrief. The areas that we're going to treat -- so the Source Areas Remedial Action will all take place within the property boundary of Dunn Field. You can see how the -- this is a picture of the groundwater concentrations with the colors. The red is the highest, and the green is lower. So you can see how it begins in these

areas. These are the Source Areas that are going to be treated on Dunn Field. And this area, all west of Dunn Field where there are no sources overlying the groundwater, will be treated in the Off-Depot Remedial Action. (Indicating) So this was areas where ---

MR. WILLIAMS: Okay, during the different changes of the seasons -- so we assume we've got four seasons. The water rises and falls in different seasons. So, my question is: During the time that the water was high and the testing was going on, wouldn't you have found out during that time that the Zero-Valent Iron would or wouldn't work, you know, during the season when you're checking your monitoring wells to see what was going on? Wouldn't it change any then?

MR. SPANN: It's not that the technology wouldn't work. It's that we made a decision that this is the right application for the technology.

MR. HOLMES: You want the map back?

MR. SPANN: Yes. If you imagine that the railroad line is where we were going to put the PRB -- that was the limit of the data we had when the ROD was signed and everyone agreed that this was the technology to put in; and as we kept developing data, we realized that the off-Depot portion of the plume was bigger than expected.

We could put that PRB in there today, but it wouldn't address the problem off-site, and so the decision was made to scrap the PRB. It's a great technology. It worked all across the country, but it's not right. It's the wrong key for this lock, so to speak. So we decide to do the Enhanced Bioremediation in off-site, off-Depot properties, where we can get to those properties quicker, make a more effective treatment for the groundwater, and it's really -- it was a timing thing. If we had known what we know now when we signed the ROD, I doubt that we would have seen the PRB in the ROD.

MR. WILLIAMS: Okay, my last question, then I will let Mr. Tyler. Okay, so, we all know the EPA sets the level of what's contaminated or what will affect the person, you know -- am I right? Okay. So, my question is: At any point during this study in the last five, six, seven, eight -- what was it, ten years? I'll just go ten, because I know it's been ten. At any point has the level of the concentration been great enough that it will affect or harm anyone?

MR. BALLARD: I will take that, and that answer is yes.

MR. WILLIAMS: Okay.

MR. BALLARD: But if you remember all the Risk Assessment training that Dr. Simon gave, you know, a couple of times, there are a number of elements that harm -- that have to happen before someone is harmed. You know, first the concentrations of contamination have to be high enough then there has to be a pathway for exposure. And in this case, we don't have a pathway for exposure because there are no water supply wells in the plume -- within the plume drawing water from the contaminated portion of the groundwater. So without the route, you know, risk -- so, to answer your question, yes, the concentrations have been high enough to harm someone. No one has been harmed because there's been no exposure to the contaminated groundwater.

MR. WILLIAMS: Okay, Mr. Tyler, I'll recognize you for a minute and take a breather here.

MR. TYLER: Good evening everyone. Getting back to my basic question. All right, Plan A did not work; correct? It was not the right fit. Okay, Plan B may be the right fit. Is that a fair question?

MR. HOLMES: Well, I think until we implement it, we describe how we're going to monitor it to confirm that it works. We think it's the right effect, but we're not just going out there and doing it and assuming it's going to work. We're going to implement the plan, implement the Remedial Action that's selected, and then we will monitor to see if it works.

There may be -- we think it will work. There may be some -- it may work perfectly just as it goes in. We may do some additional tweaks, make some enhancements as we go forward, and we'll see. But there is a goal. Remedial goals were set, and we're doing what we think will be the most cost effective approach to do that, to reach those goals.

MR. TYLER: Two things I have a problem with. People in the community hate to hear the word "quickly." You know, I've used that word several times. That sends a bad message to the community that you want to be expedient in this process. And the chemicals didn't get there expediently; it took time to put them there. So we want to be very careful when we say how ambitious we are on these timetables and goals.

And Plan C, what is it? And explain to me if Plan B does not work, what Plan C is right now.

MR. HOLMES: There will be in the Remedial Designs -- in the Remedial Designs that will be put into the Information Repositories there are contingency actions that are spelled out that if such and such happens, we'll do this. In other cases, it may be if such and such happens, we'll evaluate the results and decide the best task. Until we know what happens, we can't -- you know, you have to foresee it and know it's going to happen to spend a lot of time making a plan to react there.

So we'll look at the data, the results we get, and then evaluate that and come up with the best response that we can. We've got some things we've looked at. For example, with the solvents, the way the EBT, as they break down, sometimes you get – you might get other solvents that are different but also have remedial goals that occur as

this -- as the chlorines are removed. If we get some of those and they don't go down as quickly as we expect them to, then we might do some additional injections or change injections to do that.

So there are contingencies we're looking at based on the likelihood of something occurring, but whatever occurs, we'll be looking at the data and coming up with an appropriate response.

MR. BALLARD: Mr. Tyler, I can tell you that right now we don't have a Plan C. We're doing our best to make sure that that Plan B gives us the impact and the response we need to have. Environmental cleanup isn't a do it, you know, throw it in the ground and we're done.

So, when we say we're trying to get something going quickly, that means we want to get out and get going with our remediation so that we can put it in place, monitor it for effectiveness, and if there are any areas that need to be, you know, dealt with differently, focus on those areas. And I think what Tom was trying to, you know, say was that it's only after we take the next step and see and monitor and evaluate the effectiveness of it that we can decide if a Plan C is even called for or if plan B-2, meaning some other modification of Plan B, would be necessary.

For example, on the Main Installation, as he was mentioning, we started with injecting just, you know, sodium lactate; and in some areas we weren't getting the anaerobic response in the aquifer that we wanted to. There was too much oxygen in there. So we added sugar to the mix to help deplete the oxygen and create the anaerobic conditions we need for the anaerobic bacteria to eat up the contaminants. So, that was an example of how you look at your initial results and make the adjustments that you need to. No Plan C at this time.

MR. TYLER: Okay, have we thought about pump and treat? Is that on the table?

MR. HOLMES: Well, we are currently pumping water on the boundary of Dunn Field, and that was evaluated in the last Five-Year Review and determined, while it was having some effect, it wasn't appropriate as the final remedy. So, it's been looked at, and, as I say, is active, but we don't think it's the most effective remedy.

MR. BALLARD: And I would agree with that for Dunn Field, but I think it's something that we have as a fallback for the outside -- the other portion of the plume. The reason we didn't feel it was that effective as a groundwater treatment for Dunn Field was because the saturated thickness of the groundwater between the water table and the bottom of the aquifer didn't allow us to get a lot of good draw down and create a good barrier there at the fence line. Out where that plume is sitting and not moving a whole lot, yeah, out there, sort of west of the tracks might be a reasonable situation to make pump and treat effective. (Indicating)

We prefer to try this kind of approach, you know, the Enhanced Bioremediation, because the treatment occurs in the ground. We're not bringing anything up to the surface that needs to be treated and then disposed of. The contaminants are broken down to harmless end product rather than brought up, run through a treatment system, then the treatment residuals have to go to a hazardous waste disposal facility, and the treatment water has to get dumped into the sanitary sewer. You know, there are down sides to doing pump and treat, but it's not completely -- it's still an arrow in the quiver, if -- you know, if we have to use it.

MR. TYLER: Okay, my last two questions. Now, when you break down these chemicals and make them below EPA acceptable standards -- that's what you're saying with this new technology, that's what they're supposed to be; right?

MR. BALLARD: Yes.

MR. TYLER: So, there is no downside to any residual effects of doing this?

MR. BALLARD: When the chemicals degrade, they go through a series of steps as chlorine atoms are stripped off during the degradation process, and each time a chlorine atom is stripped off, another chemical is created. You know, the PCE, the tetrachloroethene, has four chlorines. In the process of breaking it down, one of those chlorines get stripped off and you have three. Now you have trichloroethene, and then another chlorine gets stripped off, you have dichloroethene; you know, could be cis-1-2, it could be trans-1-2, but it's dichloroethene. So, each of these products down to the vinyl chloride has its own level of toxicity. But the goal of the remedy and also the purpose for monitoring is to ensure that we get a complete degradation to a final end product of ethane, which is not a toxic end product. So, was that just too verbose a response to the question?

MR. TYLER: No, sir. You say you took three out of four bad chemicals and you're still left with one; right?

MR. BALLARD: No, no. You are left with one chemical.

MR. TYLER: Right.

MR. BALLARD: But it's a non -- not a toxic chemical.

MR. TYLER: There is only one that's (unintelligible).

MR. BALLARD: Right.

MR. TYLER: Okay. Sorry about my lay term. Forgive me. My last question here: You guys have an ambitious schedule, very ambitious, and I hate to say this, but I'm somewhat not too -- I'm very cautious about how much work you guys are going to do in the next 18 months. That's a lot of work, and that's a lot of data, and that's a lot of interpreting of data and a lot of reviewing of data. And then by the time you get deep into one process and you hit the data and, oops, this didn't work out, we've done been about -- down the road halfway, and now we've got to go back up and punt again.

I understand you want to be ambitious, but people in the community have been dealing with the issue for a long time. So I would caution you to kind of slow down a little bit, analyze the data a little longer and take a look at what you're doing. I know everything's about cost effectiveness. Let's just cut to the chase. It's all about money, but sometimes we shouldn't be too concerned about cost effectiveness, because this probably may go on to, what, 2015?

MR. HOLMES: Yes, on the Main Installation.

MR. TYLER: All right. I understand we want to try to get to 2015. I understand that, but there's a whole lot of information compact in this table here, and for the average layperson, if you're not paying attention, it will slip by you. Just so happens I'm one of them nerds, I kind of get off on this stuff, but that's just my thing. But we're dealing with the community, people who have been seeing trucks going in and out and things happening over there, and we just need to be a little bit more -- look at more -- just slow down a little bit and give the community an opportunity to soak some of this in. Because this is a lot of data, at least for me. Now, maybe for Mr. Myers, he's the technical person, he can eat it up, but a neophyte like me, it just takes a while. So, thank you for your efforts, and sorry about taking up all of this time.

MR. WILLIAMS: Mr. Covington.

MR. COVINGTON: A couple of questions. What's the heat source for the vapor extraction?

MR. HOLMES: It's electricity. There are two methods we're looking at. One we are talking to the vendors now to make the final selection. Both of them we think are effective. One of them drills a hole in the ground, puts a rod in there, and it gets very hot, like a toaster. And it, by heat conductance, it heats up the soil around it to the temperature we're looking for, which is 90 to 100 degrees Celsius. The elements that -- it's called resistive heating where it puts -- there are electrodes in the

ground that the -- at close spacings in these treatment areas where the electricity goes from one electrode to the other, and by doing that, it heats up the ground. The electrodes don't get any hotter than the ground. It's the resistance of the soil to the electricity passing through the heat, so it heats up the ground. And both of these have been used at a number of sites throughout the country and have been very effective and found to be particularly effective in this type of clay soil, silica clay soil we have in the upper 30 feet that is not -- that is difficult to treat by other methods.

MR. COVINGTON: What's it going to look like? Is there going to be a structure above it, a tent?

MR. HOLMES: No. There will be some large trailers. There will be -- of course, some transformers to bring the electricity from MLGW. They basically bring all of the equipment on trucks (unintelligible) equipment will come to the site. There will be a number of course, borings in the ground you won't see, but above it there will be the wires that connect to it. There will be -- the vapor comes out of this and goes into -- will have a pipe and then go into the treatment system.

So it won't be a building, and the depths -- the upper five feet of soil is not -- does not need to be cleaned up. It's below the remedial goals already. So there is the buffer of five feet up there, and then there will be these vapor extraction wells in the ground that will have a vacuum on them that will pull the vapors that are released as the water turns to steam, captures this, and then that is treated.

MR. COVINGTON: So it's totally contained, there is no way for it to get out?

MR. HOLMES: There is no way for it to get out. We will be monitoring it at the surface with the air monitoring to make sure that that doesn't happen, but with this five feet of cap above the heating zone, that will provide an effective cap.

MR. SPANN: Just to add to Tom, that all the piping conveyance for the vapors and things like that will be sealed under an engineered cap of the soil.

MR. HOLMES: That's not necessarily ---

MR. SPANN: Depends on which method we go with.

MR. HOLMES: Right. Actually, neither one is thinking -- the reason they were talking about a cap before is they thought they were going to treat all the way to the surface, in which case they needed to keep the heat in the ground, but with that five-foot cap -- and soil is not a very good conductor of heat, so five foot of cap is a very -- you know, would be a substantial cap. It will probably be warm to the touch, but it won't be hot, and, of course, the area -- well, there is the fence that is currently around it, and we haven't come up with a final decision as to whether, you know, there will be fences around the -- additional fences around the area, but it will be secured on the side. The health and safety is our primary concern.

MR. BALLARD: I think it would be interesting if the timing works out, to have a RAB tour of the -- you know, once it's -- everything is in the ground and, everything is hooked up and ready to go or even just go and have a tour of it while it's operating and have an explanation from the guys who are actually doing it about what's going on, where the vapors are coming into it, how they are separated in the moisture, and where does the condensate go to, and what's being used to treat the vapors, and just the whole thing. It's much more meaningful when you are standing there looking at it than when, you know, we're having a presentation.

MR. TYLER: Sign me up.

MR. HOLMES: There will be -- just to say, with the fluvial SVE system that we're going to put it first, there will be a small building. There will be like a trailer, kind of like a trailer that you see on the back of a semi that will house the equipment on a concrete pad. So that will be there.

That will be a structure that's going to be there, as I say, for up to five years, but there are no permanent structures with the heating.

MR. COVINGTON: Will the workers be suited up?

MR. HOLMES: No.

MR. COVINGTON: Is there anything ---

MR. HOLMES: Everything is under ground five feet. We'll monitor the air above it to make sure that there are no releases into the atmosphere.

MR. COVINGTON: Is there anything that you can think of that would happen that we would need to be prepared for a way of answering questions about what's going on there? I mean, is there anything out of the ordinary that you would see there that a neighbor or one of our tenants would know or be concerned about?

MR. HOLMES: I don't think so. I mean, there will be a lot of wires, you know, and that. But from the distance these areas are from the street -- as I said, it will be in these four. You know, it's not something -- they're not sticking up very high from the ground. So it's not very noticeable. I don't think it would be much more noticeable than the people who are out there now doing the sampling and the other things that are going on.

MR. WILLIAMS: Mr. Brittenum.

MR. BRITTENUM: Where is the nearest MLGW well to this?

MR. HOLMES: Mr. Myers may be able to answer that better than me. It currently would be way over here to the west, off this map.

MR. MYERS: I'm thinking that it's about a mile, mile and a half, if I remember correctly, but it's also in a different aquifer. Our well is in a different aquifer though.

MR. BRITTENUM: Okay. So, this aquifer -- now, is this plume in the aquifer or is it ---

MR. HOLMES: It's in what we call the fluvial. Let me hand to you another map that shows the depths of the -- so -- and this is somewhat an exaggerated scale. The horizontal scale is 200 feet to the inch and 50 feet to the inch. So here is the loess, the clay soils at the surface, the fluvial

sand beneath that, this clay. This is the one well that was installed by the Depot to monitor groundwater in the Memphis Sand which is used for the aquifer. That's the yellow down here (Indicating). So this is not a drinking water well. This is just a ten-foot screen for monitoring at the very top of it.

MR. BRITTENUM: When was that installed?

MR. HOLMES: Early on. That's MW (monitoring well) 37.

MR. BALLARD: That would have been 19 -- about 2000 or so or 1998 to 2000.

MR. HOLMES: And we have never seen any PCE or TCE in that well.

MR. BRITTENUM: Okay. So, where would the plume be in this?

MR. HOLMES: Well, in this picture, the plume is ---

MR. SPANN: It's generally in the orange.

MR. BRITTENUM: Okay.

MR. HOLMES: Yes. It's in here (Indicating). This blue line is the water table. So you can see this is the thickness of the aquifer we were talking about before. (Indicating) So in some areas it's very thin. In other areas it gets deeper. Basically, the top of this clay changes elevation, and that's the thickness of the aquifer.

MR. BRITTENUM: Okay and this monitoring well is used -- that's in the drinking water -- it's in the drinking water, and you haven't found any contaminants in the drinking water, but that's a monitoring well. Okay, great.

MR. WILLIAMS: Okay.

MR. BRITTENUM: What would be - what is going to be the condition of the soil once you complete all of your extraction or screening? What is the status of the soil in a -- I mean, is it so neutral that nothing will grow? What is the -- is it still soil? You know what I'm saying?

MR. HOLMES: It's not heated to the extent that it's turned to glass or anything like that. It will still be soil. The heat, depending on the method, where some of the borings get up to 1,400 degrees to heat up the soil by conductive heating, that soil around there will be baked pretty

heavily. The soil in the middle will only go up to a hundred degrees, and the bacteria will still live there.

So the soil -- they would eventually make their way back into the highly heated area. And, of course, all of this is occurring below the ground.

MR. BRITTENUM: All right.

MR. HOLMES: So not in an area that would be used for -- you know, so, grass can still grow on the top, and it's not damaged.

MR. BRITTENUM: Okay, and is there any -- who conducts the final test along the -- after you have completed your work, is there a final test, number one, after the confirmation test? And then who conducts the confirmation test?

MR. HOLMES: We collect – the Remedial Action contractor collects the confirmation samples at locations that are set forth in the plan that's approved by EPA and TDEC, and they are available. I don't think they have done it for a while. At times they are out with their -- during the sampling activity. The samples go to the independent laboratory which then performs a test and reports the results. We provide the laboratory reports to the agency so that they can review them as well, and we provide the results in our report, and the goals for what's considered clean or set forth in the ROD. And, so, those are the numbers that the soil sample results will be compared to.

MR. BRITTENUM: Now, did you say that an agency official goes with the contractor to collect the samples? Is that what ---

MR. HOLMES: That can happen.

MR. BALLARD: We will be out there -- either myself or someone from TDEC will be out when they are collecting the confirmation samples. The methods, the collection methods, preservation methods have all been reviewed and approved by EPA and will be out to make sure that their methods are followed properly.

Then when we get the confirmation results – my method of oversight is not to look over their shoulder every step. Because I know that I have these cleanup levels that we've set out in the ROD, and ultimately they have to meet those cleanup levels in order to be done.

So, what I like to focus on is not hounding them about every -- during every step of the way, but just reminding them, too, gently as we go along, that, "You know, we've got these MCLs (maximum contaminant levels), and we've got these soil cleanup levels, and at the end of the day, that's, you know, where the rubber hits the road." So, one of us will be out there when they're collecting confirmation samples to ensure it happens properly, and then the data packages will be reviewed by our lab folks. I'm with EPA.

MR. BRITTENUM: Okay. Would it be possible to give notice to the Memphis and Shelby County Health Department when you are about to do your confirmation samples, please?

MR. BALLARD: Okay.

MR. BRITTENUM: Pardon?

MR. HOLMES: It will be there.

MR. BRITTENUM: For the record -- we're on the record. I believe that was a confirmation. Is that correct?

MR. BALLARD: That's correct.

MR. BRITTENUM: Okay. Thank you. Then the last thing is you talked about the electricity hookup for the MLGW and all that. Who is going to pay for that hookup? I want to make sure everybody ---

MR. DOBBS: DLA pays for that.

MR. BRITTENUM: DLA, okay.

MR. WILLIAMS: Just a quick question then we are going to move on with the agenda. To my understanding, I'm not sure now, the flow of the contamination is north, east to west? How does that go?

MR. HOLMES: Well, it moves with the groundwater. So this may be a little confusing. The lines are the groundwater elevation, these blue lines. These arrows show the direction the groundwater flow is moving. So, depending on where you are, it flows in different directions. But here, from the Source Area, they flow mainly towards the west. They get to here. This is a trough, a low point. At this point, the flow is to the north and to the south, according to the well. But the plume, we're not seeing any movement, and all these black dots are monitoring wells in this fluvial upper aquifer. (Indicating)

So, we've got a lot of wells, as you can see, around it, and we're not seeing that plume move from there.

MR. WILLIAMS: At one time in one of the Restoration Advisory Board meetings we had discussed that there was a crack in the clay field somewhere in Dunn Field at one time a couple of years ago or something like that. do you remember that, Mr. Tyler?

MR. TYLER: Were those fissures?

MR. HOLMES: I'm not sure, but there are places in the clay we've seen where that intervening clay isn't present and the water that's in this upper aquifer can move down into what's called the intermediate aquifer, which is just a number of interbedded sands and clays, and that interbedding could move from the intermediate aquifer into the Memphis aquifer. But what we -- by the number of wells, we had to make sure that's really the focus of the cleanup, is the protection of drinking water supplies and we're not -- and it's not near one of those locations where there's groundwater flow into a lower aquifer, and the plan is to clean it up before it can get there.

So, this is the conceptual model. So it shows the source areas at Dunn Field, and it shows contamination moving down through the clay and the sand, the fluvial, and to here; and then this gray is a

contaminated portion of the aquifer, and this shows one of our pumping wells on the boundary of Dunn Field, and then it shows the plume moving, and it shows here a hole where the clay is not present between this fluvial aquifer and this intermediate aquifer, and then it shows conceptually, because we haven't seen it, a hole from the -- flow from intermediate into the Memphis. (Indicating) But this -- and when I say this is just a conceptual thing, in general, this presents a picture, but we don't have a case where, you know, the plume is in such close proximity to a hole in the aquifer. And with all the wells we have seen -- where we see one of these places where the clay is absent, we see a -- there's a significant change in the groundwater levels in that area as the water kind of slopes down into that.

What we're doing with our cleanup, the first thing we're going to do is the fluvial SVE I mentioned is going to pull the vapors out of that area (Indicating), and we wanted to go ahead and get it started so we can cut off any further movement from these source areas into here (Indicating). So that's the first step, is we cut that off.

Then we go in with -- and heat these upper areas to clean that. Then we see what's left down in the groundwater in these Source Areas, and we attack that with the ZVI, so a phased approach, as we described, to hit it and what we think would be, you know, an effective manner that will meet the goals in the ROD.

MR. WILLIAMS: Any more questions? Okay, Mr. Tyler.

MR. TYLER: We had a technical person here about a year ago, and they said that there might be some fissures in the clay when you drill. How do you repair those, and exactly what are those?

MR. HOLMES: Well, I'm not sure about fissures in the clay, and I wasn't here. I can't speak to that. I don't think that our – I mean, when we install the well and drill down through it, as we are pulling the rod back up out of the

ground, we pump -- we put our screen and sand around the screen so water can flow into the well, and then above that sand we put a layer of very dense clay, bentonite, to seal it, and then we put cement mixed with a little bit of grout above that. That will be 50 feet of cement.

Now, if there is a fissure created by the drilling, which I'm not familiar with that, the grout would serve to seal off that upper section of the well, prevent anything on the surface from getting down into the zone we're trying to monitor.

MR. WILLIAMS: Any more questions?

MR. MYERS: I would just say, I'm on for -- and I'm not as skeptic – Torrence Myers. I believe that any method that you use, giving them enough time and enough money, resources, that you can remediate it, but what I am concerned about, before the cleanup started initially, the first thing you do is determine your horizontal and vertical extent of your contamination; correct? And that, apparently, was not done the first time or it was not done to the extent that it was successfully determined so now you have.

Are you sure now of the vertical and horizontal extent of that contamination? Those lines look so smooth, and I don't know anywhere in the nation where you find such nice, smooth lines.

MR. BALLARD: You're right. This kind of -- the smoothness of the water, the flow lines, it's an artifact of the computer program that's used to interpret -- or interpolate between points where we have hard data. It's the best representation we can give with the data we have, and we really think now -- if you look at all the little black dots around there, those are all points which give us data on water level and also on whether contamination is present or absent. (Indicating) And at the time of

the RI we – the furthest out levels or wells we had were right along the railroad track there, MW54 being one of them.

And the data we had showed that for the wells we had along there, the concentrations were low enough that we were comfortable saying, okay, this is the distal end of the plume. And we think that Natural Attenuation will work, can be used here, and everything else would be treated by the PRB that we would install. You know, subsequent monitoring, what happened was we started seeing increasing levels of TCE and PCE in MW54, which prompted us to put in some more wells, again along the railroad track. We put in I think it was MW150 -- no -- yes -- no. 150, it was, and suddenly you had, you know, the concentrations at MW54 that were here, and MW150 that were quite a bit higher, which prompted us to put some more wells in.

So, as I said earlier, it's an iterative. It's a feedback system where we get data back, and we say "what's the next step you have to take?" You're correct. We didn't have it properly characterized during the RI, but we thought we did, and when we had the -- when we collected additional data as part of the long-term monitoring, we felt we had to take additional steps. But looking at what we have now, we've got this plume I think pretty well bounded on all sides.

MR. HOLMES: There is a lot more -- we've recently submitted a list of the location of the wells to Shelby County in accordance with the regulations for monitoring wells, and there are -- we're putting in MW219 now. So, there are a lot of wells, and a number of them have been installed since the ROD. So, I do think while these curves -- you know, things are smoothed out, both the lines and the concentrations, but the data points are correct. So, if this shows in green here, it's a concentration that matches the green there. So it's -- and you can see there are a lot

of wells and a lot of wells below the lowest concentrations which we're showing, which is a hundred there, which is the MCL, and we've got the results, you know. But the sampling has taken place over a long time. There are a lot of wells. It's getting a lot of review by EPA and TDEC, by our firm, by another peer review firm that DLA has hired, by CH2M Hill.

So, we do think -- I'm pretty confident that we have everything figured out pretty well, and we'll continue to look at things, and as new things come to light, then we react on that information, but I'm pretty confident that we're in good shape.

MR. WILLIAMS: Anymore questions? Okay, Mr. Brittenum.

MR. BRITTENUM: Thank you. After you have a successful treatment and you have completed everything you're going to do, what is the highest and best use for the property at that point?

MR. HOLMES: That's beyond me.

MR. DOBBS: I think the property is going to be zoned whatever it is locally, industrial.

MR. HOLMES: Light industrial.

MR. DOBBS: Light industrial. So, whatever light industrial fits within your city codes.

MR. BRITTENUM: So it would be useful property?

MR. DOBBS: Yes.

MR. HOLMES: Just like the Depot itself is -- the area down here is deemed ---

MR. BRITTENUM: Well, but, I mean, the Depot down there didn't have this type of situation, did it?

MR. HOLMES: Not these levels.

MR. BRITTENUM: Okay.

MR. WILLIAMS: Any more questions? Okay.

MR. COVINGTON: Just a point I guess of expansion on that. That's all subject to the zoning, which is light industry, and it's allowable now like warehousing and light manufacturing and distribution, those kind of uses, some commercial uses as well. So if there is no properly zoned ---

MR. BRITTENUM: It is usable land?

MR. COVINGTON: Usable land, yes.

RAB COMMENT PERIOD:

MR. WILLIAMS: We'll move on to the RAB comment period. Mr. Brittenum, just for a point of information, Dunn Field was offered to the city and county and they turned it down. So, just for point of knowledge, that they didn't want it.

MR. BRITTENUM: Was it offered - you mean ---

MR. WILLIAMS: Yeah, it was offered.

MR. DOBBS: No cost.

MR. WILLIAMS: No cost. They didn't want it. Pardon?

MR. BRITTENUM: You mean -- well, I mean ---

MR. WILLIAMS: And that's when they decided to put it on the market for sale.

MR. BRITTENUM: So, it has been put up for sale.

MR. WILLIAMS: Yes, it is. I don't know if it's sold or not.

MR. BRITTENUM: Who bought it?

MR. BALLARD: We don't have that -- the buyer has been approved. That hasn't been filed yet.

MR. DOBBS: When looking at Dunn Field, the FOST 4 area is to the right -- I don't know if we have a map.

MR. HOLMES: We do. I don't know if you can show us. So, the area here was FOST 4. In 2000 -- the blue here that was determined to be suitable for transfer, I think this was in the beginning of 2004 -- no -- well, 2004 or 2005, was determined to be available, and it was offered to the City of Memphis. They

were thinking about using it for a park, and then they determined just this portion, then they decided that they didn't want it, and so it vas available at public sale. (Indicating)

MR. BRITTENUM: So who brought it?

MR. DOBBS: We don't know who bought it, but DLA -- let's go back a little bit here. DLA doesn't own the property. The Army owns the property. The Army -- when it was turned back, you know when the City didn't want it the Army put it on an auction block and GSA (General Services Administration) sale. That was just concluded I think in the March time frame. It was purchased, bidded at $880,000 dollars. They are going through the process now for confirming that sale, and they are planning to deed it sometime in August.

MR. BRITTENUM: So, what agency received the proceeds of the sale? Was it the City?

MR. DOBBS: That goes back to -- no, the money goes back in the big pot in the sky for DOD to the BRAC account I believe.

MR. WILLIAMS: Thank you. Mr. Ballard, they were saying that you had some drums to remove and had to be removed by April 1st, but I really couldn't get off into the meat of this. So, just throw out what the drums was and what needed to be moved.

MR. BALLARD: If you remember, we've talked in the past about some groundwater contamination that has been coming from – onto Dunn Field off site to the northeast -- from off site, just coming and catching the northern tip of Dunn Field from off site, and TDEC and EPA -- right there. (Indicating) And TDEC and EPA have been conducting a site investigation looking for the source of that groundwater, and part of that site investigation is installing monitoring wells. EPA's funded it, and TDEC, you know, took care of the local oversight of the contractor doing the work.

And drilling generates drill cuttings. We were drilling in areas where we had – there is no reason to believe there was contamination in the soil. We were looking for where the groundwater contamination is and isn't and hoping to point back to a place where the contamination was generated or, you know, disposed of into the ground.

But the monitoring wells that were installed generated cuttings, and the well development process generates water, liquids which has to be containerized, and the -- I think what happened was the contract ended before the spoils could be properly disposed of, and so the DLA allowed the materials to be staged at Dunn Field, and Evan's going to expand on that right now.

MR. SPANN: Part of that investigation generated waste, like Turpin said, at the conclusion of the EPA contractor's contract the waste removed was still on Dunn Field. We've subsequently contacted EPA, Donna Webster, to ask her to get a new contractor on site to remove those wastes, and those waste drums were tested, I want to say, the first of the month, and we've already got the results back. All the water is clean, and the soils, we're still waiting on the sampling from that. Once we have all that data in hand, EPA and their contractor will make a decision on where to dispose of those materials and take them off site.

MR. WILLIAMS: Okay. Mr. Ballard, you had said something about some monitoring wells on the way. You didn't state these though. You said something about MW150 but I want to talk about MW214 and 215, 218, those monitoring wells, were those

monitoring wells you were putting that you discussed during the meeting, okay.

MR. BALLARD: Why are you asking me?

MR. WILLIAMS: Because it's on the report. This is just -- you know, I want to know. You are EPA. Let me do it like this. Hold on. Hold on. This is what I want to do. You said that you trust the contractor.

MR. BALLARD: Are you referring to the minutes? Which month? Which part?

MR. WILLIAMS: March.

MR. BALLARD: Which page?

MR. WILLIAMS: Page 5.

MR. BALLARD: Okay. Can I take a chance to look at that?

MR. WILLIAMS: Well, we just looked at it all together. That's what I was talking about. We can get it and have to rush through it, but while you're looking at that, let me say this: I understand that we have to trust the people that we work around. So, you say that you trust the contractors that they will do what you want done, but I found out in the city when you let chemical companies monitor how they handle their chemicals, sometimes they don't always give you the true facts; and we trust them and believe in them, too, you know. So, they have to file their reports with the health department, and not saying that all the chemical companies actually file all the reports that they should file with the chemical companies.

So when you're saying that you trust this gentleman, you know, but we would rather that you keep close tabs of what goes on, you know, with the contractors, since you are EPA and you're a part of the government, and they're just contractors. Does that make sense?

MR. BALLARD: I think I understand what you're saying. I don't know exactly how to respond to it right here. Okay, I understand what you're saying, and I'm here once a month or so for our meetings. When there's activities going on and I'm here, I go out and observe what's going on. I have never, in all the times that I have been out and made a surprise visit, seen anything that, you know, looks to me to be, you know, negligent or underhanded or anything like that. And in the nine years that I have been on this project now, I have come to have a level of trust in the folks from Department of Defense. I have never – when I've asked for something, never been said, you know, "We disagree. We are not going to give that to you." If it's something that I felt strongly is necessary -- now, if they – they will say, "We disagree for these reasons," and I find the reasons to be valid, okay, I back off.

I try not to ask for anything unreasonable, and I think they appreciate that, and, by the same token, when I ask for something and I say, "I really need it for these reasons," I have never been turned down. Okay. So, you develop a level of trust, and you're working in partnership always, understanding that these are the folks on the other side of the table. So, you know, trust, but verify; and that's where the confirmations issues come in for me. The confirmation samples are the proof of the pudding that the work has been done properly.

At the end of the day when they say, you know, "We think we're done, we want to take our confirmation samples," then I'm going to be out there watching them take the samples,

watching them package them up to ship off, and when the results come back from the independent laboratories, we'll get copies of all the raw data to be evaluated by our chemist.

MR. WILLIAMS: That was something else. Was that the question to this?

MR. BALLARD: You've got a question for that? Go ahead.

MR. SPANN: You want to explain your comment on that paragraph?

MR. HOLMES: I was just reporting that one of the things we do at the BCT meetings is discuss where we are with our various activities. We are installing some additional wells on the Main Installation in the outside of the treatment areas because we have some wells with concentrations that are higher than we are comfortable with, just leaving it alone. So we're finding out the extent of this area. It's all contained within the Main Installation. And I was just saying that we were -- installation of the wells was underway. We've completed a certain number. The clay at the bottom of the aquifer had been found about where we had expected, based on the previous wells; and that well installation will continue. And that well installation is, in fact, still continuing, and it's about to be wrapped up in the next couple of days, and we are collecting samples from those wells during the month of April.

MR. WILLIAMS: Okay. Anyone else have any comments? Mr. Tyler.

MR. TYLER: Stanley Tyler. First, when is the next BCT and where is it going to be?

MR. DOBBS: In your handout we gave you a projected schedule for the next year, and it looks like the next BCT meeting is going to be on May 10th.

MR. HOLMES: Before the RD briefing.

MR. DOBBS: Before the RD briefing. It's going to be here in Memphis.

MR. TYLER: Thank you for taking it out of Atlanta. Greyhound Bus is a long ride down there. All right, I just got these minutes, and there is a question here in a statement. It's Mr. Miller on page -

MR. DOBBS: Can you refer to, yeah, what page?

MR. TYLER: Page 7, March final BCT meeting. It says, "Mr. Miller says that given the cost of ZVI, it makes sense to reduce the source area of ZVI treatment as much as possible. Dunn Field groundwater."

MR. BALLARD: Is there a question?

MR. SPANN: I think what John was speaking to ---

MR. BALLARD: There is no question.

MR. SPANN: --- was just as Tom had discussed with our phased approach, the more we can do in terms of getting soil vapors take care of and in thermal treating the loess, the smaller the amount of treatment we have to do at the end. The bigger we can make the first two phases, the smaller that third phase is for us, and that's what the comment speaks to.

MR. TYLER: What has cost got to do with this?

MR. SPANN: The ZVI is an expensive treatment.

MR. TYLER: That's what I was getting at, you know. You know, it's not mentioned that it's expensive.

MR. BALLARD: Cost is always a factor. It's one of the nine criteria that we have to look at when you're selecting a remedy. This is not by any means an inexpensive remedy. In fact, the changes that Tom talked about earlier which would be put into a Record of Decision amendment really are pretty much a zero sum, at least in terms of our estimates, virtually no cost difference in that or the original remedy, but we think that we will reach the cleanup levels quicker. Now, I know you don't like that quicker word, but the quicker you get contamination out of

the groundwater, the more protective we're being of the Memphis aquifer.

MR. TYLER: All right, now, does quicker mean cheaper?

MR. BALLARD: No, not in this case.

MR. TYLER: I just want to make certain. You know, being a neophyte, I want to try to get all this clarification together.

MR. BALLARD: Not in this case. There are two elements of the remedial costs: capital costs and operation and maintenance costs, and in this case, in the case of the Permeable Reactive Barrier and all that, it was a high capital cost with very little operation and maintenance cost. In the case of the Enhanced Bioremediation, we'll probably be putting in a lot more wells than we otherwise would have, so there will be a moderate capital cost and a longer operation and maintenance because there will be guys out there every couple of weeks to every month injecting the carbon substrate into the aquifer.

So it's a trade off. Capital costs up front, O & M cost on the tail end.

MR. TYLER: One last question. It says that "May or June BCT meeting, be prepared to discuss the big picture criteria about the time frame for cleanup, the off-Depot plume and the general philosophy about CH2M Hill intent to meet the goals." Same page, 7, second paragraph.

MR. BALLARD: Is there a question?

MR. TYLER: Yes. "Big picture criteria," what is the big picture criteria?

MR. BALLARD: You're the one that asked if ---

MR. TYLER: On Page 7, Mr. Holmes suggested. "Mr. Holmes suggested."

MR. HOLMES: I was just asking Mr. Nelson that if we could -- if CH2M Hill could have the general outline of the off-Depot remedial activity for discussion instead of waiting, you know, until we

get to the end and they prepare a final document, which is reviewed internally prior to it being reviewed by EPA and TDEC, that -- so that we could discuss sort of the general layout of where we think we might inject wells, how much, how we might monitor it, just so the team could look at it and discuss it.

MR. TYLER: And I thought ---

MR. BALLARD: I think what we was referring to, rather than -- "big picture criteria" might not be the best term. More like a broad-brush approach. What is the broad-brush you know, approach to doing it. It's not that there is a bigger picture out there than we're dealing with. It's let's take a 15,000-foot view of this, given what, you know, the state – the point at which you are in developing your design.

Let's take a big picture view of that, and not so much getting down in the weeds on the details, but it helps the construction contractor in their forward planning to have a current picture of where the Remedial Design contractor is with the design.

MR. WILLIAMS: One last question and we're going to move on. How did we come up with this sugar treatment to -- or find the sugar to -- you know, I didn't get the gist of that.

MR. HOLMES: That was -- we have another ---

MR. WILLIAMS: One question. And where has it been used at?

MR. HOLMES: It's been used at a number of sites, and we can send you a list. We have a sub-consultant, Hugh Russell from Oklahoma, who used to work for EPA and does a lot of bioremediation sites. He's helping us to look at the data as we go in to look at whether we should do some sort of enhancements or give us some additional ideas on it, and we were discussing this one area of the treatment areas that we're not seeing the oxygen

levels go down as much as in the other areas, and one aspect was that the water we're injecting gets stirred up and gets oxygen in it. And he said, "Well, we can put some sugar in that, and that would -- the sugar will feed these bacteria that like aerobic conditions, like high oxygen. And on feeding it, they will take out the oxygen to get us to the anaerobic conditions we're looking for."

So, it was just a small fix that we implemented to -- we're putting about a pound of sugar in a 500-gallon tank, and if you have ever made iced tea, like I have, and you put a cup or so in a gallon, that's not very much sugar going in there, but it seems to be having some effect, and that's why.

MR. WILLIAMS: So, it's been a great success story for using that?

MR. HOLMES: I don't know that sugar is a great success story. We think it's been effective. It hasn't hurt anything.

MR. WILLIAMS: Okay. I'm just curious, you know, as to how you was coming up with the different methods you were using, you know, to work on your restoration part. That's all.

PUBLIC COMMENT PERIOD:

MR. WILLIAMS: All right, and we can move along if there is no more questions. Comment period from the public. (Brief pause.)

Okay. I have had a very exciting evening here, and I am so glad that the RAB members have been so attentive to what has been going on and what has been being presented and have been able to ask questions to what has been discussed in the meeting, and intelligent questions to me.

MR. BALLARD: That makes it exciting for the technical folks, too.

MR. WILLIAMS: Keep them on their toes. But, anyway, we're going to come to the end of this meeting, and I would like to know if anyone would like to ---

MS. MOORE: I need to make one comment to the RAB. Tell your neighbors about the public comment meeting on the 10th of May, which is the second Thursday in May. We usually meet the third Thursday. So this is on the second Thursday. So pencil that in your calendars, and I will have some flyers, and if you need to pick up some flyers, you can pick them up at the Depot. I will leave them with James, who sits there just off to the front. Just give me a call on my cell, (901) 573-1812, if you need flyers for your community to give people for the comment meeting.

So that schedule shows May 10th, and in September. So we need to pencil those in and get our community members back in. There are not enough members for a quorum. We need five community members, but we would also like permission, if we can get it, like we discussed it at the planning meeting, to post these draft minutes on the website. So, will someone make a motion to do that, please?

MR. TYLER: So moved.

MR. WILLIAMS: Can I get a second?

MS. MOORE: So we will post the draft minutes.

MR. WILLIAMS: All in favor? Any opposed?

MR. TYLER: One question. You didn't put a time down for the May 10th meeting.

MS. MOORE: Six o'clock, and there will be a short presentation. Dave will give a presentation, and we'll have -- it will not be seats like this, just everybody will be in the public. So get your -- pick your flyers up and have them for the comment meeting.

MR. BALLARD: I do want to add that this isn't -- this is not a public comment meeting like you have for a decision document. It's a public information meeting to say – you know, sort of -- and we're supposed to do this at certain distinct points in the Superfund process, and this is one of them, when you have completed Remedial Design. So, it's public information, but we also certainly encourage dialogue and questions just because we want everybody to understand, you know, what we've done and what our next steps are.

ADJOURNMENT:

MR. WILLIAMS: Would anyone like to make a motion to adjourn the meeting?

MR. TYLER: What time is the BCT?

MR. BALLARD: 8:30.

MR. TYLER: 8:30. All right. Make a motion to adjourn.

MR. WILLIAMS: Can I get a second?

MR. COVINGTON: I'll second it.

MR. WILLIAMS: All in favor?

THE BOARD: Aye.

MR. WILLIAMS: Any opposed? (Brief pause.) Abstained? (Brief pause.)

(Whereupon, at approximately 7:44 p.m. the meeting was adjourned.)

NEXT SCHEDULED MEETING:
THURSDAY, September 20, 2007
6:00 P.M.

Attendance List

Restoration Advisory Board Members

Mr. Mondell Williams	Community Co-Chair
Mr. Mike Dobbs	Facility Co-Chair
Mr. Turpin Ballard	Environmental Protection Agency (EPA)
Mr. Stanley Tyler	Citizen Representative
Mr. Jim Covington	Depot Redevelopment Corporation (DRC)
Ms. Peggy Brooks	Citizen Representative
Mr. Torrence Myers	Memphis Light, Gas & Water Division (MLGW)
Atty. Dedrick Brittenum	Memphis City Council
Mr. Evan Spann	Tennessee Department of Environment and Conservation (TDEC)

Others in Attendance

Ms. Jackie Noble	Defense Logistics Agency (DLA)
Mr. Chris Hobbins	AFCEE
Ms. Alma Black Moore	Frontline Communications
Mr. Terry Flynn	Frontline Communications
Ms. Liz Goheen	Frontline Communications
Mr. Tom Holmes	e^2M
Ms. Denise Cooper	e^2M
Mr. David Nelson	CH2M Hill

Memphis Depot

Environmental Restoration Program Update

Presented by

Tom Holmes, Project Manager
engineering-environmental Management Inc.

Memphis Depot Restoration Advisory Board Meeting
April 19, 2007

Presentation Overview

Updates:

- **Main Installation Remedial Action (RA)**
- **Source Areas Remedial Design (RD)**
- **Off-Depot Groundwater RD**
- **Project Schedule/Next Steps**

MAIN INSTALLATION

Remedial Action

- **Enhanced Bioremediation Treatment (EBT)**
  - Speeds up a natural process that exists in the environment to break down solvents in groundwater
  - Treats groundwater in two areas in the shallow aquifer where concentrations of solvents are the highest
- **Monitored Natural Attenuation (MNA)**
  - Utilizes a natural process that will improve the groundwater conditions over time
  - Treats groundwater containing low levels of solvents in the shallow aquifer
- **Land Use Controls**
  - Restricts certain activities on the site to ensure the protection of human health over the long term

MAIN INSTALLATION

Remedial Action

Enhanced Bioremediation Treatment

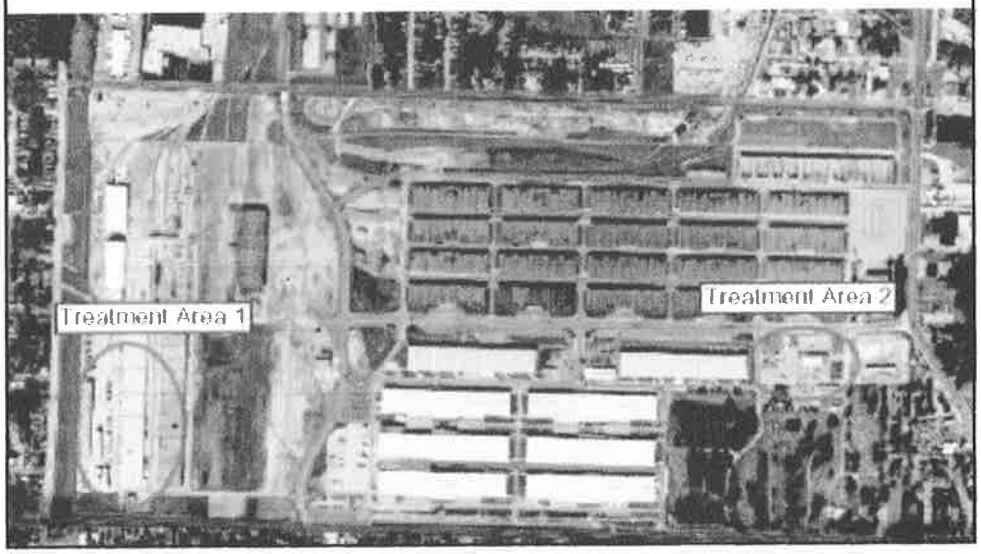
- <u>September 2006:</u> Completed construction and began sodium lactate injections
- <u>December 2006:</u> Completed first quarterly groundwater sampling event

Target Treatment Area 1 (southwest corner of MI)
- 37 injection wells

Target Treatment Area 2 (southeast corner of MI)
- 12 injection wells

MAIN INSTALLATION

Remedial Action



MAIN INSTALLATION

Remedial Action

Enhanced Bioremediation Treatment

Criteria for Operating Properly have generally been met

- **Well Installation:** Completed installation of the injection wells and performance monitoring wells.
- **Lactate Distribution:** Lactate is present in monitoring wells in the MW-101 area of TTA-1 and in all the TTA-2 monitoring wells. Increased the volume injected in the MW-21 area of TTA-1 to further distribute the lactate.
- **Injection Volume:** Have met the planned injection volumes.

MAIN INSTALLATION

Remedial Action

Enhanced Bioremediation Treatment

Conditions for Operating Successfully are being assessed

- Anaerobic Conditions Created: At injection locations and some downgradient monitoring wells. Sugar added to the sodium lactate solution to enhance anaerobic conditions. Continue groundwater monitoring.
- Anaerobic Conditions Maintained: Determine through future groundwater monitoring events.
- PCE and TCE Concentrations Decrease: Continue groundwater monitoring.

MAIN INSTALLATION

Remedial Action

Monitored Natural Attenuation

Conditions for Operating Successfully are being assessed

- Contaminant levels being reduced as expected
- Expected rate of contaminant loss established
- Plume is stable or retreating

MAIN INSTALLATION

Remedial Action

- EBT injections will occur for two years
  - Bi-weekly during first year and monthly during second year
- Expect to achieve cleanup goals in the EBT areas after second year (Fall 2008)
- Expect to achieve cleanup goals in the MNA areas by Fall 2015
- Submit Interim Remedial Action Completion Report (IRACR) to EPA and TDEC in 2008 for review and approval

DUNN FIELD

Source Areas RD

- Complete each action in a phased approach
  - Standard SVE (no heating) in fluvial sands, 5 years
  - Thermal heating and Soil Vapor Extraction (SVE) in top layer of soil (loess), 9 months
  - Zero-Valent Iron (ZVI) injection in groundwater, 2-3 months

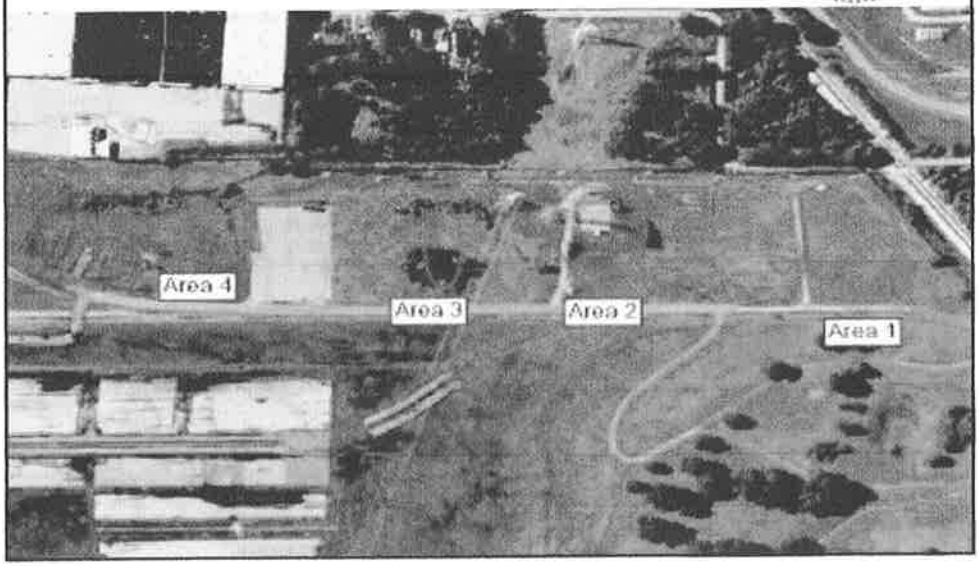
DUNN FIELD

Source Areas RD

- Confirmation of remedial goals
- Collect soil samples after each SVE phase to ensure actions meet remedial goals
- After thermal SVE is complete, additional monitoring wells will be installed to determine groundwater conditions and to confirm ZVI injection locations
- Collect groundwater samples after ZVI injections to ensure actions meet remedial goals

DUNN FIELD

Source Areas RD



DUNN FIELD

Source Areas RD

- EPA and TDEC have completed their review and approved the Final RD in March 2007
- The Final RD will be available in the Information Repositories for public review
- Source Areas RD Public Briefing on May 10, 2007

DUNN FIELD

Source Areas Remedial Action

Fluvial SVE Remedial Action

- Began site preparation in April 2007
- EPA and TDEC to approve the Fluvial SVE Remedial Action Work Plan in June 2007
- Upon approval, the Fluvial SVE Remedial Action Work Plan will be available in the Information Repositories for public review
- Begin construction in May 2007

DUNN FIELD

Source Areas Remedial Action

Loess/Groundwater Remedial Action

- EPA and TDEC reviewing Final Loess/Groundwater Remedial Action Work Plan. Approval expected by Fall 2007.
- Upon approval, the Loess/Groundwater Remedial Action Work Plan will be available in the Information Repositories for public review
- Begin construction of the thermal SVE system in Fall 2007

DUNN FIELD

Off-Depot Groundwater RD

- Submit Pre-Final Off-Depot Groundwater RD to EPA and TDEC in July 2007
- Complete Final Off-Depot RD in March 2008
- Upon approval, the Final Off-Depot RD will be available in the Information Repositories for public review
- Conduct Off-Depot RD Public Briefing in May 2008
- Complete Off-Depot Groundwater Remedial Action Work Plan in Summer 2008
- Begin construction of Off-Depot Groundwater Remedial Action in Summer 2008

DUNN FIELD

Record of Decision Amendment

- Based upon new information collected since signing of the Dunn Field Record of Decision (ROD) in April 2004
  - Permeable Reactive Barrier Implementation Study
  - Expanded groundwater monitoring network
- BRAC Cleanup Team (BCT) determined that an iron Permeable Reactive Barrier is not the most effective remedy for the Off-Depot plume
- Enhanced Bioremediation Treatment proposed as remedy for Off-Depot plume
  - EBT has been successfully implemented on Main Installation
- Change in remedy requires an amendment to the Dunn Field ROD

Next Steps

Spring 2007:

- Continue Main Installation Remedial Action (RA)
  - Enhanced Bioremediation injections and Groundwater Monitoring
- Complete Dunn Field Source Areas RD
  - Fluvial Soil Vapor Extraction (SVE), Loess heating and SVE and Zero-Valent Iron (ZVI) Injection
- Complete Fluvial SVE RA Work Plan
- Conduct Source Areas RD Public Briefing
  - May 10, 2007

Projected dates are based on current information and may be subject to change

Next Steps

Summer-Fall 2007:

- Complete Loess/Groundwater RA Work Plan
- Begin Loess/Groundwater portion of Source Areas RA
- Complete Proposed Plan for ROD Amendment and conduct Public Comment Period and briefing
  - November/ December 2007

Projected dates are based on current information and may be subject to change

Next Steps

2008:

- Complete the Off-Depot Groundwater RD
- Conduct Off-Depot Groundwater RD Public Briefing
- Begin Off-Depot Groundwater Remedial Action
- Complete Five-Year Review for Main Installation and Dunn Field
- Receive EPA 'Operating Properly and Successfully' (OPS) Determination for the Main Installation Remedial Action
- Complete Finding of Suitability to Transfer (FOST) #5 for Main Installation

Projected dates are based on current information and may be subject to change

Next Steps

2009:

- Continue long-term monitoring Main Installation RA
- Operate and maintain Fluvial SVE
- Begin ZVI injection portion of Source Areas RA

2010:

- Receive OPS determination for Dunn Field Source Areas and Off-Depot Groundwater RAs
- Receive EPA approval of Preliminary Closeout Report
- Complete FOST #6 for Dunn Field

Projected dates are based on current information and may be subject to change

Memphis Depot

Environmental Restoration Program Update

Presented by

Tom Holmes, Project Manager
engineering-environmental Management Inc.

Memphis Depot Restoration Advisory Board Meeting
April 19, 2007