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OPERABLE UNIT 10, SITE 35
ENGINEERING EVALUATION/COST ANALYSIS
MCB CAMP LEJEUNE
PUBLIC MEETING

COASTAL CAROLINA COMMUNITY COLLEGE
BUSINESS AND TECHNOLOGY BUILDING
JACKSONVILLE, NORTH CAROLINA
FEBRUARY 8, 2007

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MEETING BEGAN AT 6:03 P.M.

MR. BOB LOWDER: All right, folks. Thank you all for showing up. The first thing we'll be talking about is the public meeting for IR Site 35. I'd like to introduce Chris Bozzini from CH2M HILL, who will be making the presentation.

MR. CHRIS BOZZINI: Thank you, Bob. I guess I'll quickly review some of the rules we have for the public meeting. If you have a question, if you'll just say your name for the court reporter just so he can put it down in the written version. Other than that, feel free to ask questions. The reason we're here today is to talk about our Site 35 Engineering Evaluation/Cost Analysis Report. We did an EE/CA at the site, which is to evaluate the best approach to address a hot spot at Site 35. It's about a seven-and-a-half-acre area located within OU 10, which is Site 35. The target area is bounded by 4th, 5th, C, and F Streets. And our contaminants of concern are trichloroethylene -- TCE -- and cis-DCE, with the highest hits of about 300 parts per billion, and 1100. These are common solvents that we see at many sites across the base. Next slide. Okay. So we've got the map of Site 35, OU-10. Some of you will probably recall that we did a pilot study a year or two or three ago in this area, which is now the median of the bypass. But the area we're talking about doing this additional work in right now is this little subsection of OU 10. It's about two blocks.

It's an empty field. You've got barracks around here. It's pretty wide open. And, like I said, you just have this low level of contamination. Next slide. And this is kind of a bit of a zoom-in. These are the two fields, and we're going to focus more on these areas -- these hot spots have the higher hits, the 300 parts per billion and the 1100. Like I said, you can see it's just -- it's pretty much barracks around there. Next. The target area is located within OU 10. OU 10 came to light as part of the investigation of the old fuel farm. This resulted in additional investigation activities across Camp Geiger since, I believe, about the early 90's. So a lot of work has been done out there. The site is pretty well characterized. Currently, the overall Site 35 is in the RI/FS process that's getting finalized. Our goal is to have a record of decision this year -- the partnering team's goal. From a regulatory standpoint, we're doing this work under the national contingency plan, which is CERCLA -- Superfund. The Navy is the lead agency, being assisted by the Base, the EPA, and the State of North Carolina. Section 104 authorizes the Navy to take measures to protect the public health and welfare and the environment. And the Navy is the lead agency for doing this non-time critical removal action. The goal of our work is to identify the objectives of the removal action. We evaluate these options for effectiveness, implementability and cost. We

document our alternatives. And we comply with applicable and relevant and appropriate requirements; basically, the rules we have to operate under. Our objectives are to reduce these hot spots; the TCE and DCE. Our goal is an 80 percent reduction from the high concentrations. Our purpose in reducing these hot spots is to reduce the overall remedial time at the site, and clean up the site faster. We also feel that, by reducing the contamination, we reduce the potential for dispersion further across the site. The risk posed by the site would be intrusive activities: construction, utility work, et cetera. It is adjacent to dormitories. It's a dissolved plume -- dissolved groundwater plume. The groundwater is moving relatively slowly towards the creek to the east. And our nearest groundwater production well is 1,300 feet upgradient, so drinking water is not being impacted at all. As part of our evaluation, we looked at four alternatives. Air sparging, which is where we blow air into the sub-surface and we basically strip off contaminants. Enhanced reductive dechlorination is where we inject a food source -- lactate, oil, et cetera -- so we get the bugs which naturally degrade contaminants. Ferox is where we inject zero-valent iron, which causes a reaction that destroys the solvents. And chemical oxidation, which is a similar thing; it's just using a different type of chemical to break down the solvents. Once again, the law requires us to look at

nine aspects of each alternative: the overall protection of human health and environment; compliance with ARARs; long-term effectiveness and permanence; reduction in toxicity, mobility or volume; short-term effectiveness; implementability; cost; and acceptance by the State and the community. This last bullet is really the purpose that we're here today. It's to let the community be aware, to know what we're doing, and give them the opportunity to comment on it. The alternative of air sparging, we looked at two subgroups of doing this. One was putting in vertical wells, and the other one was putting in horizontal wells. We've used both these technologies at the base. The effectiveness -- the technology works. We've had the technology work at the Base. Specifically, we used Site 86. We had a horizontal well. Geology will affect how well it works. As far as implementation issues, there are certain issues of -- the sub-surface conditions will affect how well it operates. You sometimes get surfacing of the air, so we have bubbling or -- mud pots is kind of one way of thinking of it. It does require the continuous operation of a compressor or a blower. And there is some limitation to the number of vendors that can install these systems. The general cost is about 600 to 830 thousand dollars. The next approach that we looked at was enhanced reductive dechlorination. This entailed injecting about 6100 gallons of a substrate, and the

substrate we're looking at is a lactate/vegetable oil mix, using food-grade oil. We looked at a couple different ways, just injecting it with field equipment or installing wells -- permanent wells. The current conditions support reductive dechlorination. There have been some issues at other sites at the base with it, that it has worked well, but it hasn't worked completely. Our feeling is that complete degradation would occur over time. Implementation; you know, it is somewhat slower and it's a little difficult to predict how fast it would work. And our other general issue is the distribution of substrate in the sub-surface. The geology of Camp Lejeune makes -- you can inject it, but sometimes it doesn't always go where you want it to go. It's a very straightforward technology. It's used a lot, and we have a lot of vendors who can provide it, and it's very straightforward. You take the chemicals, you mix them, we pump it in the ground. Our general costs are about $400,000 to $800,000. The next technology is called ferox. It's where we take zero-valent iron and inject it into the ground under high pressure. It would require 330,000 pounds of the ZVI being injected at 16 locations. The ZVI technology was extremely effective for us at Site 88. The method of injecting it using pneumatic fracturing increases ROI. And the site is conducive to having reducing conditions, conducive to working well. Implementation issues are -- we

sometimes see surfacing when we use this technology. Basically, surfacing is where you get an upward flow of gas and iron, and you get some material coming out of the ground. It's unlikely to cause any detrimental effects to the sub-surface. It's a one-shot deal. You put it in and you just monitor it from that point out. However, it is a patented process with a limited number of vendors. And then, finally, the cost is 1.1 million dollars, kind of tying in to being patented and having a limited number of vendors. Our last technology we looked at was chemical oxidation. Once again, we've used this at the base. It would be injecting about 36,000 pounds of potassium permanganate either through injection wells or DPT points. Permanganate is a very well-known technology. It is effective. It becomes less effective when you have a high natural organic demand. Unfortunately, we have those conditions. We've had some success with chemical oxidation at the pilot study, but we had to go back and hit it a few times to get it that way. From an implementation standpoint, our high organic content at Site 35 is somewhat detrimental. It's going against us. Chemical oxidation will temporarily inhibit natural biodegradation. But there are multiple vendors. A lot of guys can do this, and it's pretty straightforward technology. The general cost range is about 500 thousand to a million dollars. Okay. That's a lot of talking. So we're trying to

summarize the pros and cons and the costs of each. Air sparging. It's straightforward. Routine equipment. It does require operational maintenance; something that clearly has to be checked on. And it's worked well at Site 86. The cons are: you get water pushing up to the surface which can kind of make a mess of a site, and adding a lot of oxygen could disrupt the natural degradation process that we need. For ERD: it's a very low cost approach, we have the right chemical conditions at the site for it, and it assists site-wide natural degradation of our contaminants. The cons are: sometimes it can be slow and we stall out the reaction, and also, it's delivery dependent. You have to kind of get it in the general area you want to treat. Ferox: shorter mediation time frame; we've got the right chemical conditions going on at the site. The cons are: a limited number of vendors, basically about two vendors that we're aware of. And it's very delivery dependent; you have to get the iron to where you want it to treat. Chem ox is very similar to ferox: it's a shorter mediation time frame, destruction occurs quickly. However, we've got high organic conditions which -- basically, we're swimming against the current with that. And it's delivery dependent; so once again, we need to get it to where we want it to go to do the treatment. On some occasions, the oxidant also basically slows down the natural degradation process, and there's also a potential issue with

metals. So, with all that said, the partnering team came to the conclusion that the preferred alternative is doing enhanced reductive dechlorination, injection using DPT. We'll inject 6,100 gallons of lactate and food-grade oil over 28 locations, injecting at a depth of 20 to 47 feet in one area, and 37 to 47 feet in the other area. And this approach allows us flexibility in the field; if we need to adjust pressures, flow rates, if we find that we're getting a larger influence, we can spread our points out. If we're getting a smaller influence, we can put them closer together. It's the lowest cost alternative. I think it only came in at about 400 thousand dollars, 450. And it's going to be assisting the overall site degradation, the overall natural processes; it's not going to be detrimental to that. Implementation issues: it is an active field, there are troops out there training, et cetera. So while we're working out there, there will be restrictions. You know, putting up barriers to keep troops away from us, away from the equipment. We do not anticipate being out there very long, so it will only be a short, temporary interruption. We'll only be working during daylight hours, and the site will be restored to a field, so if there's any kind of tracking or muddying up, we'll take care of it and make sure it's reseeded, et cetera. We've got some pictures. We just implemented this as part of our treatability studies at Site 89. So this is, in a sense,

what it's going to look like. You've got your small little rig that pushes a probe to the depth you want it, and you've got a mixing tank and a truck and hoses hooked up, and you just pump in the amount of material that we need to pump in there. Once again, like I said, it's pretty straightforward; just a couple of mixing tanks and some pumps. Community participation: public input is the key. It's one of the nine components in our decision-making process. The public comment period gives the public the opportunity to have a say in the process. We are currently in the middle of the comment period. It began January 25, and it will end February 25; a 30-day public comment period. Comments need to be postmarked no later than the 25th of February. And responses to comments will be prepared and included in the administrative record. This is all in the handout, so I'm not going to bother to go through it. But we've got the final reports; they're online. And it has the administrative record also. And in case you don't have computer access, there is a computer at the Onslow County Public Library. Once again, I think everybody knows who the primary points of contact are: Bob, Daniel Hood with the Navy, Gena Townsend with the EPA, and Randy McElveen with the State of North Carolina. So that concludes our presentation. Does anyone have any questions?

MR. LENNY SIEGEL: I'll ask a question.

MR. BOZZINI: Fire away.

MR. SIEGEL: You mentioned one of the --

MR. BOZZINI: Could you state your name for the record?

MR. SIEGEL: Lenny Siegel. You mentioned one of the downsides was the potential for stalling of the degradation process. How do you plan to overcome that?

MR. BOZZINI: Currently, we're just going to monitor, and if we have to, we can bio-augment, so we can add specific bugs to help push the reaction through. You know, we typically -- when we implement this, we do our objection, we do, at a minimum, quarterly monitoring. You know, we usually do the first month, and then quarterly thereafter. And if it's showing that there's stalling and we feel that we're stuck there, we would look to, most likely, bio-augment. Just add an appropriate bug.

MR. SIEGEL: Thanks.

MR. LOWDER: All right. Thanks, Chris, we appreciate it. Good job. If there are no other questions, that ends our public meeting.

MEETING CONCLUDED AT 6:25 P.M.

OU 10, SITE 35, EE/CA PUBLIC MEETING

STATE OF NORTH CAROLINA)

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