
RESTORATION ADVISORY BOARD
FOR
NAS JRB/ARS WILLOW GROVE

Willow Grove, PA, August 7, 2002

Meeting held at the Naval Air Station Joint Reserve Base at 6:10 p.m. on the above date before Kimberly A. Overwise, a Registered Professional Reporter and Notary Public of the Commonwealth of Pennsylvania.

FOSTER
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SPEAKERS:

JIM EDMOND

JIM COLTER

RUSS TURNER

KEVIN KILMARTIN

PRESENT:

CDR. RICH ROSENE	RON SLOTO
CHARANJIT GILL	JEFF DALE
HAL DUSEN	GEORGE R. HOFFER
SETH PELEPKO	GARY J. HORNE
LINDA R. WATSON	ERIC LINDHULT
LISA M. BRADFORD	JIM VETRINI
THOMAS HIBBS	TED ROTH
RAY LEOPOLD	KATHERINE SHEEDY
KAYE MAXWELL-MARTIN	MARIA MAGILTA
MARY LIZ GEMMILL	AMANDA KITTELSON
ARNOLD J. HAGERTY	LISA YEUTTER
TIMOTHY L. FREDERICK	

MR. EDMOND: I'd like to welcome you and thank you all for coming today. For those who went on the tour, you saw our fine haz mat facility. For those who didn't, you missed it. I'd like to introduce Commander Rosene. He is the new cochairperson. He took over Commander Viera's spot about a month ago.

A couple other things, I gave the public affairs officer today a list of all you fine community folks for air show tickets. The air show, like I said before, is the 13th through the 15th of September. Admission is free as always to the air show, but you can get up-close and personal VIP seating by taking advantage of one of the seating areas. Each are at a different price with different benefits, let's say. You folks will be getting tickets for one of the air shows. I do not know which one yet but for one of them.

This is very likely my last RAB meeting. I have tentatively accepted a position for Admiral McLaughlin. I'm going

to go see him next week, pay him and his chief of staff Captain Lewelling a visit. And if I like what I hear, I'm going to accept the job permanently. Like I said, I've already accepted the job with the understanding I still have to talk to them before I commit to selling my house. So if I do accept the job, there will be somebody else here doing my job next RAB meeting, whether three months, five months, depending on how much Jim has to talk about or Hal and Gill.

Anything the community wants to bring up?

RAB MEMBER: Where are you going?

MR. EDMOND: Naval Reserve Force, which is in New Orleans. The position is regional environmental coordinator for EPA Regions 8 and 9 and also the Navy on-scene coordinator for oil spills, hazardous substance spills for those two regions also. It's a nice job. Like I said, my bosses are down there. Commander Rosene's bosses are down there.

We make trips down to New Orleans semiregularly. And the food is excellent and the weather's not too bad. It doesn't snow.

RAB MEMBER: They claim to be the rainiest city in the country.

MR. EDMOND: It's subtropical there. The median temperature in February, which is the coldest month, is 49 degrees. I'm leaving my long johns up here. Rain's fine. It rains in Hawaii too.

Well, without any ado, we'll move on. If everyone has an agenda, I'm going to turn it over to Jim Colter, as you all know, the IR program manager. He's going to update the status on Navy Site 1 RI, the feasibility study and other work for Site 5, and Russ is going to give us a short demonstration on the admin record, what it's going to look like when it's finalized, computerized, and all that.

MR. TURNER: Before you hand over, one question maybe for the stenographer, are there new community

members on the RAB? She doesn't know their names if there are. Why don't we introduce ourselves for the stenographer.

MR. EDMOND: That sounds good.

MS. GEMMILL: Liz Gemmill, community cochair.

MS. MARTIN: Kaye Maxwell-Martin, community member.

MR. VETRINI: Jim Vetrini, community member.

MR. HIBBS: Tom Hibbs, community member.

CDR. ROSENE: Rich Rosene, executive officer of NASJRB.

MR. FREDERICK: Tim Frederick, neighbor.

MR. HAGERTY: Arnold Hagerty, neighbor.

MR. LINDHULT: Eric Lindhult, community member.

MR. ROTH: Ted Roth, community.

MR. HOFFER: George Hoffer, community.

MR. HORNE: Gary Horne, Horsham Environmental Advisory Board.

MR. PELEPKO: Seth Pelepko, DEP.

MS. WATSON: Linda Watson, EPA.

MS. BRADFORD: Lisa Bradford, EPA.

MR. TURNER: Russ Turner, Tetra Tech for the Navy.

MR. DUSEN: Hal Dusen, environmental officer for the Air Force.

MR. GILL: Charanjit Gill for the Air Force.

MS. SHEEDY: Kathy Sheedy, EA Engineering.

MS. MAGILTA: Maria Magilta, EA.

MR. KILMARTIN: Kevin Kilmartin.

MR. SLOTO: Ron Sloto, USGS.

MR. DALE: Jeff Dale, Navy.

MS. KITTELSON: Amanda Kittleson, Navy.

MS. YEUTTER: Lisa Yeutter, Navy.

MR. EDMOND: And for those you don't know, Tetra Tech, Russ and Kevin, and EA Engineering are two environmental contractors. They have different areas of responsibility on the Base. Tetra Tech has the majority of the work with EA doing our fuel farm project.

Jim?

MR. COLTER: Well, first thing I wanted to do was introduce some of the new folks here from my division down in Philadelphia. As you all know, I'm Jim Colter. I'm the IR program manager for Willow Grove in charge of the program, budgetary and technical support to clean up some of the Navy IR sites on the Base. Jeff Dale you've seen here quite regularly. He's our technical manager for Willow Grove, who I rely on a lot for technical review and assistance. We also have Lisa Yeutter now who's been assigned as our risk assessment person. She's a couple year old grad from Penn State. And

so she is going to be working in charge of our risk assessment in human health and ecological. And we actually have some issues, comments, responses and things from the EPA Lisa will be in charge of responding to along with Tetra Tech. And Amanda Kittelson is a new intern from Penn State. She's up here learning about what a RAB is and what an RPM does and what a technical manager does. She'll be rotating throughout different codes within my office and eventually will be a technical manager similar to Jeff.

We haven't met I guess for about six months so I'll try to give you a quick update as far as what we've been doing in the last six months. The first site we've been working on is Site 5, the fire training area. We all should have received a draft feasibility study back in February of '02. Actually, I have received comments from the EPA, PADEP, and a couple community members on that right now. The Navy and Tetra Tech are working on responses to those comments and are going

to incorporate our changes into a final feasibility study. We expect that probably sometime by the end of October, couple months away yet on that. After that, we'll be in our preferred remedial action plan, basically taking one of the alternatives out of the feasibility study we think is the most economical, most implementable, most permanent that meets all of the cleanup goals we set in the FS. We'll put a document together to summarize what we think that preferred remedy is and then eventually issue a record of decision to go ahead and implement that. We hope to do all that in '03 and possibly even maybe award a design by the end of '03. That's how the budget looks right now.

Any questions on the fire training area?

CDR. ROSENE: I understand the terms temporary and permanent. What does most permanent mean? What does that mean?

MR. COLTER: As far as putting some type of remedial system in,

permanent is how much cleanup of the contaminants you can do. You can cap them. You can cover them. You can extract them. Extracting and treating is the most permanent way of dealing with the contaminant, but it's also the most expensive way.

CDR. ROSENE: Most complete?

MR. COLTER: So we have to balance how much completeness we want with other factors. That's what's done in the feasibility study.

RAB MEMBER: My understanding, permanent would mean some kind of ongoing remediation that would not eliminate the problem but reduce it, in other words, an aeration tower or something of that sort as opposed to excavating, pumping it all out, whatever.

MR. COLTER: Well, first, for groundwater, we're talking mostly about the groundwater at Site 5. We'll probably be pumping it out and reducing the volume of contamination. The one problem with a

pump and treat system is you can't achieve zero or 100% cleanup. You get to a point --

RAB MEMBER: Is that what you call permanent then?

MR. COLTER: Well, permanent in the way when you take a contaminant out, it won't reappear. When the source is gone, that will not reappear.

RAB MEMBER: So that is not permanent then?

MR. COLTER: It's permanent in the sense the contaminant won't return, but we won't achieve 100% cleanup. We won't get to nondetect value for a certain chemical because you technically just can't do it, but what we do get out will not come back. That's what I mean by a permanent solution. The most permanent solution obviously is like excavating soils. That's the most permanent. But this is groundwater so it's a little different.

RAB MEMBER: What's the most permanent for groundwater?

MR. COLTER: Pumping it up,

treating it, and getting rid of it, but technically you can't -- the drinking water standard is 5 parts per billion. We have a thousand at Site 5. Typical pump and treat systems will probably get that down to somewhere around 100 or 250 parts per billion, but at the same time you're pumping out a lot of groundwater and treating a lot of this groundwater, you get to a point where you get a lot of mass removed when you start this system up. The longer you pump it, the less contaminants you pull out. And eventually you stop pulling out a lot of contaminants, but you're pumping a lot of water and it gets very --

RAB MEMBER: So you're depleting the water basin?

MR. COLTER: We would treat it and put it back in.

MR. EDMOND: See, that's what he's saying. What you're doing is -- environmental has a term that dilution is not a solution, but that's basically what you're doing. You're pulling out

chemicals, putting the water back, which is making the amount of chemical per square foot of water less. So that's what he's saying. You just keep pumping and pumping and getting less and less, but you're also getting less bang for your buck until it comes to a point where it's so cost-prohibitive for the amount of chemicals you're taking out for the cost of doing it, even the EPA or State will say no, it's costing the taxpayers too much money. That's what they'll end up doing.

MR. COLTER: Technically, it gets down to a point where the chemicals are biodegradable. They will degrade at their own rate. You get down to that point where natural degradation happens as fast or even faster than you pulling it out and treating it at some point. So when we get to that point, we kind of go to what's called a monitor natural attenuation.

RAB MEMBER: So there's no liquid solution that you pump down, say an epoxy grout type of situation, and create a hole of permanent containment?

MR. COLTER: Not yet. There's always innovative people doing technologies and everything, but there hasn't been anything yet. And we have a fractured bedrock geology so that kind of limits us as to what we can do.

MR. EDMOND: As you know, PCE and TCE are prevalent through Montgomery and Bucks County. We can clean up ours, but it's coming back. It's like, you know, just impossible to get it out of the water system. There's just too many years. As long as we keep it and strip the water before we put it out to the people to drink, it's fine, but to get the water to the pristine level at this time of our civilization, it's almost impossible. It is impossible.

MR. COLTER: The FS that you have outlines all these different alternatives and how good they are. That's a good source of information. We'll do more as the RABs go on. We'll get into more of the preferred remedy for Site 5 as we develop it.

RAB MEMBER: And when did you say we're going to receive responses to comments?

MR. COLTER: Probably the next six weeks or so. Then we're going to try to finalize that report by the end of October.

The next site we've been working on is Site 2, the antenna field landfill. Most of you know we issued a draft of that site along with the other three sites back in April of '98. Part of the comments we received from the EPA was that report wasn't complete. They had done an epic photo review study. It's a study of aerial photographs and somebody sits down and looks at different bare areas, anomalies. I'm not sure if they're disposal areas. I'm not really sure what they are. EPA gave us a list of those areas for Site 2. Jeff Dale went out to take a look at them. A lot of them are concrete, like a culvert, concrete culvert for a drain.

There's usually an

explanation for what the anomaly is and EPA is just looking for us to verify what that is. Jeff went out earlier to do that for Site 2. What he did end up finding was most of the anomalies were just that, they were just concrete drainage basins and things like that. What we did find was about 11 drums out in the vegetated area behind the landfill. So what we've decided to do was to hire an environmental consultant. Who we chose was RMC Corporation. They're an environmental firm. We have four very small environmental firms working for us. They're part of what's called an EMAC program, environmental multiple award contract. When we need something done that's small scope and we need it fast, we put a scope out to these four contractors. They compete against each other and low bid usually wins.

So RMC, Incorporated, is the one we've awarded this work to. In the next probably month or so, they're going to put together a work plan. What we want

them to do is go out, take a look at the drums. One of them has contents in it. We don't know what it is. We want them to determine what the contents are, go ahead and dispose of -- after they find out what it is, dispose of all the drums, and then take soil samples from beneath each drum to determine if any previous contents might have leaked into the soil and had any adverse impact. Once we get all that data, we'll turn that data over to Tetra Tech and they'll revise the Site 2 report to find out if this is of any concern or not. So, like I said, the work plan for that will be probably in the same six-week period as the Site 5 response to comments. We'll send it out to the RAB and regulators to look at. And once we get a concurrence with our scope of work, then we'll put them out in the field.

Any questions on Site 2?

The next site we've been working on is Site 10, the Navy's fuel farm. As we've stated at several of these meetings, we've had a light nonaqueous

phase recovery system going since about 1998. EA Engineering has been the lead consultant with that effort. What we've been finding over the last year or so with our monthly reports from EA is that the system basically became inefficient. We basically were pumping a lot of groundwater and not recovering much product. It's kind of along the same lines we were talking about, spending way too much money for recovery of contaminants. So we asked EA to give us a couple suggestions about what technology we can switch to to maybe try to maximize product recovery at a lower cost or more efficient cost.

At the same time, we had discussions with Pennsylvania DEP. And they had been getting all of our data along the same time. They suggested maybe that we have enough data and pumped enough product that maybe a site closeout is actually a possibility. So we sat down with them and asked them what do you require of us to confirm a site closeout might be possible and they gave us a list

of actions that they wanted us to see implemented. One was to sample for monitor natural attenuation parameters, that being if you have natural biodegradation going on, one of the parameters is you'll have CO_2, carbon dioxide, being given off. So you sample for that and see if that's available. That's kind of an indication things are biodegrading. We're also going to determine if there's a downward migration of these contaminants in the area. We're going to have to sink a couple groundwater wells and take some samples of that. We're also going to take some samples for lead in soil. It's something that's not part of your normal set of anolytes that you sample for. And because it was a fuel farm, there's the possibility that lead is present. We haven't seen it but we're going to take a final round of soil samples just to confirm that. EA Engineering will be doing that work and we're actually writing that scope of work right now to forward to them. They'll send us a proposal. We'll get them under

contract and they'll be out there probably the same time the EMAC contractor is out at Site 2 based on funding. It could happen late this year. Our fiscal year starts October 1. So if the money's not available at the end of this year, which is about a month away, we'll get it next year. And then we'll have to see how the winter goes. Most of this field work, we should be doing most of our contractual and work plan work over the winter. And by the construction season, March, April time frame, we should be ready to be in the field doing all this.

As Jim said earlier, the main update we wanted to do for you tonight --

RAB MEMBER: Excuse me. On this site, I'd like to ask DEP if there's a site closeout, does that absolve the Navy of the responsibilities?

MR. PELEPKO: DEP, the state agency you're addressing?

RAB MEMBER: Right. You're the ones going to give the site closeout?

MR. PELEPKO: No. They're essentially responsible for the release as long as it's there. We have a program called Act 2 that allows -- it's a risk-based program and allows for sites to be closed with some residual levels of contamination present as long as we can determine that there are no potential receptors, for instance, no one's drinking the groundwater, there's no vapor migration concerns. Most of these things don't seem to be an issue at the Navy fuel farm because, from what I can tell in my analysis of the data, concentrations are relatively low. What I'd like to see done is another round of groundwater sampling, actually give me a good indication what concentrations we're dealing with at this point after, you know, several years of remediation. And it will be a cooperative effort moving toward site closure, but the Navy will remain responsible for the release at that site.

RAB MEMBER: If closed? Because my understanding is a lot of those

VOCs are in the soil in the rock and they will migrate back out.

MR. PELEPKO: Well, we have to go with what science tells us will happen. We have to look at concentration trends over years and years of data collection. If we see a decrease in trends, we see a decrease in --

RAB MEMBER: I understand, but then it leaches out in one, three, eight years.

MR. PELEPKO: When contaminants are left in place, there's typically a postremediation care plan associated with leaving those in place. And, if deemed necessary by the State, that would involve continued monitoring.

MS. BRADFORD: Also, depending on what's left and where it is and characteristics determine what we would have to do. We just ask for a round of samples.

MR. EDMOND: The thing with the Navy fuel farm, it's almost in the center of the aeration station, so it's

basically been encapsulated within the air station. The fire training area now is closed to Horsham Road. So the community does have that concern because of the proximity to the fence line. We've done modeling with the samplings we've taken and we basically know how far the plume's gotten out and how much the plume has been subtracted by the pump and treat.

RAB MEMBER: Here's a quick question on the fire training area. Well, from my review of it, which was certainly not that extensive, there might be another alternative to look into, anaerobic degradation. Is that something that will be pursued?

MR. COLTER: Tetra Tech is looking at that now. We're developing a response to that. I really don't know what that response is yet, but they're working on it. They'll consider it. You know, if it's viable, we'll include it. If for other technical reasons it's not, we'll certainly explain that to you, but that will be part of our comment response letter

we'll send back to everybody how we responded to that.

Two of the things that Tetra Tech has been working on, one has been -- you all have gotten all these reports, like the Site 1 report. It's very voluminous, a lot of pages. Most of our reports are like that. Those documents, the letters, the comments that the regulators will send, all of that is what constitutes an administrative record. The Navy has to maintain that administrative record to document what comments were made, what decisions were made that led up to the Navy taking a certain action. I have bookshelves of data for Willow Grove that we've been doing for the last ten years. Now we're in the age of computers and what most of the Navy is working toward is putting all of that paper on readable compact disks.

So we asked Tetra Tech to go ahead, put together the admin record, make sure we have all the correspondence from every site, every investigation we've done,

and put that admin record on a CD. And they've been working real hard on that and actually Russ Turner has a little how-to presentation. Once we get this done, we'll send out CDs to folks. And if you have the right capable computer, you can access any of our reports, any of our documents a lot easier than flipping through the pages.

Go ahead, Russ.

MR. EDMOND: Let me also say, with the administrative record, we've had a problem. We keep our records for community consumption we'll call it in the Horsham municipal building. Well, basically real estate people, contractors, you know, construction contractors come in to look at something and sometimes these books don't get back to the receptionist. They take them with them. And so we have holes in our administrative record where there weren't holes before because people take the documents out. There's no control. I mean, the receptionist at the municipal building, she cares, but she gives the book to somebody to look at and

turns her back to do something else and him and the book or her and the book are gone. So this will help us control our administrative record a little better.

Russ?

MR. TURNER: Like Jim says, the trouble is if you want to make information available to the public, you put it in a public place, some of it disappears and it's suddenly no longer available to everyone.

I'm just going to stay seated. Can people hear me okay? Then I won't be in the way of everyone.

We've been working on this project a number of months so Jim wanted us to show some progress here. This administrative record that currently is at the Horsham Township building on the other side of the Base off Horsham Road, like Jim mentioned, has hundreds of documents. And so the goal here was to -- we prepared several hundreds of these boxes and sent them off to a company that copies them and puts them into a format that can be

searched. So instead of having that document available in the township building, it now can be put on a CD and everyone can have one or Jim is hoping that before too long, we can find an Internet site to put it on. Willow Grove has an Internet site. We haven't worked out all the features of how it would be put on there.

MR. EDMOND: The firewall problems and things of that nature.

MR. TURNER: And, if necessary, we have sites we can put it on almost immediately. We could make a temporary --

MR. EDMOND: Remote site Tetra Tech would run.

MR. TURNER: Like we did before. If you remember, a few months back we made some information available. We gave you a long address with like 34 characters. We could do that again.

MR. EDMOND: Until we get the firewall issues fixed.

MR. TURNER: Exactly. So

then what would it be? Like I said, this isn't completed but we have here an index. I guess the first thing is what are these thumbnails. There are several pages, I think 18 or 22 pages, of individual documents that correspond to things as small as a one-page letter or as thick as the Phase 2 RI report, which is enough to choke a horse. They each get one location in here. Now you'll be able to search -- first of all, the first level of search, you can look at the thumbnails, but there's an automated search by description of the document or EPA category name. EPA under the Superfund program has developed a tracking number and category numbers, so they're organized by those. And they're also organized by recipients or the person who's sending it maybe and they are available.

RAB MEMBER: When you say "search," you're talking about control F kind of thing?

MR. TURNER: Well, let me show you.

RAB MEMBER: Because I don't see any link.

MR. EDMOND: This is more or less a demonstration. It's not the full-blown project.

MR. TURNER: What's the question exactly?

RAB MEMBER: How do you use the search?

MR. TURNER: To do the search, you use this function here. You go to find, what you want to find. Let's say you want to find hazard ranking. Okay? In the early part of the ranking of the Base as a Superfund location, the individual sites were ranked according to the hazard. It's a big program provided by the EPA. So in that first page, there's a document that talks about Willow Grove comments on the hazard ranking system. So if we're doing a search, we can call up that document. And then within the documents that we show there, you can do another search to find -- it didn't find the word "hazard" in there, but let's try again.

RAB MEMBER: It's in the subject.

MR. COLTER: It may be very sensitive, won't pick up partial words.

MR. TURNER: Let's try it again.

RAB MEMBER: It's a scanned document.

MR. TURNER: Let's assume that one's not working. Let's try another one.

RAB MEMBER: In other words, these are more than just images?

RAB MEMBER: Russ, I think it's because it's a scanned document.

MR. TURNER: It is, but we've set it up so, if it works properly, we can search the document. These will be scanned documents of large reports, so you have to be able to search the document. So let's look through here and search for liability.

MR. EDMOND: Do CERCLA. Will it find it within the document or just find the document?

RAB MEMBER: I didn't think it could search scanned documents.

RAB MEMBER: I agree. A scanned document appears just as a raster file.

MR. TURNER: No, it has to be searchable. I'm wondering what I'm doing wrong. It worked this afternoon. When this works properly -- there it is. I knew this worked this morning. When we have it working right, we'll be able to do this no matter how long the document is. I know it's scanned in. In addition to that, we'll have some additional features, some links to other documents as well. What are some of the other features? This is new to me, I have to admit, and we're having a little trouble with the contractor. They're not giving us the perfect product.

MR. COLTER: What's key is obviously you have to click one of those four options. Just keep that in mind when this becomes available on the Internet or as you get your own CD, but like these Phase 1 RIs are about 300 pages long. If

you're looking for a certain compound or chemical and you want to read up, if you just type in the word, it will take you to the first page probably of many pages where that word shows up. So try to refine your search to help you narrow down what you want.

MR. TURNER: Let's try one more.

RAB MEMBER: I think we get the idea, Russ. You can go on.

MR. TURNER: Okay. That's really all I have to show right now. I know it's not much. When it's working correctly -- I think the point here is we spent some money on this already. We wanted to show something's happening. It's going to provide better information to the public. The system out there now is not complete and there's a better product coming. That's the best I can put on it.

RAB MEMBER: One comment, maybe those thumbnails, if you could have a bubble help or something come up on that. I don't know if it has that capability.

How do you know what No. 1 is or No. 2 is? They kind of all look the same, all the thumbnails. I don't know if there's a way you could give a bubble help on that image or not.

MR. TURNER: When we use the thumbnail, we get that page. So I got this yesterday. I don't know enough about it. We want to keep the presentation short. Something's coming. The Navy has done this at other sites. Jim has done it at his other sites and found it to be very helpful. We're going to get it working here and make it available.

MR. COLTER: The main point right now is eventually we'll be sending out these CDs. We're still going to have to send out hard copies for review, but we may be able to reduce a lot of that by sending CDs. Eventually we will be on an Internet site, either Willow Grove's itself or I've in the past used Tetra Tech's server with a specific password that just deals with the Base and its IR program and nothing else associated with the Base. We

don't have any security issues. That makes it really readily available to the public if you have access to the Internet at home and feel like looking at something we're doing.

MR. EDMOND: Or if you need to look at the Phase 2 RI.

MR. COLTER: So that's the goal. We just got into it. Like I said, there were hundreds and hundreds of documents and tens of thousands of pages that had to be scanned and that's what they've been working on for the last six months. We're getting it down to a point where we're seeing some return. As we go on, this will get better.

RAB MEMBER: Just a comment on contractors, having looked at archives and fiche and film and so forth, they can be sloppier than hell. They get them off at an angle. They'll get them so they don't pay enough attention and there's not enough depth of field in the lens. The operator was probably a minimum wage type 30, 40 years ago or whatever. Who knows?

But you're trying to look at this stuff and figure out what the hell it is. Unless you have quality control on it, it's tough when you have tens of thousands of documents.

MR. TURNER: We're doing more for the Navy. We've had a contractor who's been very good in Pittsburgh, but two things happened. We had to go with the low bidder. We have to bid it out. And, plus, we want to have more than one contractor. We're bringing in a new contractor now and we'll have it perfected. Before we accept it, it will be put into shape and correct. In fact, some of those images are color and off large size drawings and everything. They'll all be in there. It will be good.

MR. COLTER: The last thing I want to talk about today is Site 1 groundwater. That's basically the crux of this meeting. Just a little bit of background. Back in again 1998, we put out a draft RI report for all of the sites, including Site 1 and its groundwater contamination issue. One of the comments from the EPA was where is this

contamination in the public supply wells here on Base coming from. A lot of us thought it was Site 1-related, but we've had this presentation in the past. Tetra Tech was able to show because of the groundwater flow directions and pumping influence of the wells, really Site 1 wasn't the source of the contamination in the supply wells, but they still wanted to know where it was. EPA asked us to somehow look around the supply wells themselves to see if there was a bedrock fracture coming into the bore hole well. Maybe that was feeding from another source somewhere else on the Base. Instead of rigging those supply wells with monitoring wells, what we were able to do was work out a deal with the Willow Grove Base itself to shut down one well at a time, pull the 50-year-old pumps, expose the bore hole, allow USGS to go in there and get a lot of good hydrogeologic data. And what we've been doing since then is taking that data from USGS, feeding it to Tetra Tech, and doing an analysis of where that fracture is.

And, actually -- I don't want to steal Kevin's thunder, but it's pretty interesting what we found. You all have it in the report we sent you. This is going to be our way to put that down into something a little more understandable so when you go back and read it, put it together with what Kevin says tonight and it will make sense to you.

Go ahead, Kevin.

MR. KILMARTIN: Two more minutes you would have concluded my whole statement.

As Jim mentioned, what I want to do tonight is just present a summary of the groundwater investigations that have been conducted for the remedial investigation of Site 1, which is the Privet Road compound. Most, if not all, of you have seen the report that was recently issued and you know that the RI itself is not just groundwater, that soil, surface water, sediment, many other media were sampled. But as Jim said, what I want to do right now is just concentrate on the

groundwater portion. Site 1's been investigated now for the better part of 20 years. And what I want to do tonight is present our current interpretation that's in this most recent document in light of some of this more recent work that's been conducted. Site 1 is hydrogeologically a very complicated site, very complex. What I really want to do is just focus right in on the conclusions that we've reached and dispense with maybe all of the details of how we got to these conclusions. They're all presented in a lot of detail in the report. Again, I'm just going to try to focus right in on the conclusions.

Privet Road compound is located right here. It's currently now a fenced area that's approximately one-half acre in size, although historically the suspected former waste activities extended outside of the present fenced area. The site operated from 1967 through 1975 as an open waste disposal area. And the groundwater quality issues in the vicinity of the site became apparent because of

water quality issues with three Base supply wells that are located nearby, the two Navy supply wells that are located immediately adjacent to the Privet Road compound and the former Air Force supply well that's located just in the vicinity a little further away. I'll point those out in just a second. This area right here is the Privet Road compound. This is the current fenced area. The historic waste disposal activities are suspected to have occurred through approximately this area right here. The two Navy supply wells are NW-1 and NW-2 and the Air Force -- the former Air Force well, I believe it was located right here.

MR. GILL: No, I don't think it was. I really can't see from here --

MR. KILMARTIN: I'm sorry. It's in this little building right here. That well is no longer used as a potable source. Two other items not on this map, one is that -- you've seen presentations before from the Air Force. One of their CERCLA sites, the wash rack area, is

located here. And the other Navy site that Jim discussed just a little bit earlier, the fuel farm, is located probably a little bit off this map here but right down here in this area, in the same general vicinity of the Base. These wells here with the exception of the NW-1 and NW-2 show all of the multiple monitoring wells that have been installed over the years by both the Navy and the Air Force to investigate both the Privet Road site and the wash rack area.

As I mentioned, the two Navy supply wells and the Air Force supply well historically have been impacted by solvents, particularly PCE and, to a lesser extent, TCE and a few other solvents. PCE and TCE are common industrial solvents. But, again, as Jim's mentioned, a clear-cut or definitive source of the solvents really has never been delineated. Privet Road was suspected. Possibly it's a likely suspect because it was a waste area. It's located immediately adjacent to the two Navy wells. And the wash rack area was

suspected again because it's in the general vicinity. It's a waste area located in the general vicinity of the supply wells. So it really wasn't known was Privet Road the cause of these problems, was it the wash rack, was it both of them, or was it maybe neither of them? Was there some other source? And, as Jim mentioned and I'll be pointing out in just a second, a lot of this data that we've collected and analyzed over the years rather than clearly pointing out that it was one or the other kept indicating to us that it really didn't seem to be either or, if it was them, they certainly were not the major contributors.

As I mentioned before, hydrogeologically this is a very difficult, complicated site. It's hard to work. And several factors have combined to make this a difficult area to interpret. Briefly, I just want to point those out briefly. One is the hydrogeology of the area. We've discussed this in past meetings and we'll see it in a couple of slides in just a few minutes, but we know that even though

there's only one geologic formation underlying the site, the Stockton formation, which again is that nice, reddish-brown rock that you see along the side of the road, for example, when you're taking the northeast extension up towards Allentown, even though that's the one formation underlying the site, there really are two what we call different hydrogeologic units. There's a shallow what we call unconfined unit and a deeper semiconfined to confined unit. I'll explain those terms in just a second. Simply, what we'll want to remember just for the rest of this talk is all that means is we have two sequences of rocks, the shallow unconfined and the deeper I'm going to call it confined, that water doesn't communicate freely between those two units. There's a barrier to the flow separating those units. We'll see it in just a second. So the point is that there are two different hydrogeologic units underlying the site and that the groundwater doesn't communicate freely

between those two units.

The second complicating factor -- and we've already discussed it -- is that there are two high-demand supply wells immediately adjacent to the site and these wells cycle. They go on, they go off depending on the demand for that particular day. A well pumping as hard as these wells pump influences the way groundwater flows. When the pumps are on, those wells are drawing groundwater towards the well and so naturally the groundwater isn't flowing in exactly the same manner or the same directions that it would flow when the pumps are off. Complicating that is the fact that those two aquifers we just talked about, the shallow and the deeper portions of the aquifer, react differently to the pumping or stressing of that aquifer. So there are a lot of different variables involved that we have to look at in order to determine exactly what's happening here.

The third complicating factor -- and for a long time it was an

extremely complicating factor -- Jim talked about was the fact that the two supply wells are much deeper than any of the monitoring wells here. And they're also constructed differently. We've talked about in the past how the monitoring wells are constructed with well screen, typically a 10- or 15-foot section of screen, such that when we sample that well, we know exactly the vertical position within the aquifer that that sample is coming from. The supply wells, of course, are not monitoring wells. Their mission is to draw as much water as they can. Therefore, they're not screened. And what they are are just open bore holes within the bedrock. And so the groundwater is entering those wells from many, many different vertical depths and those wells each are at least about 350 foot deep. So for the longest time we were sampling those wells and we knew they were being impacted by these solvents, but we really had no idea at all at what depths those solvents were entering those wells. Were the

solvents entering from nearly ground surface down to 350 feet or were the solvents entering from very depth-specific intervals? For example, was the shallow water pretty clean but the deeper water dirty? We just didn't know.

And then the fourth and last complicating factor, especially for the Privet Road area, was the fact that we knew that besides the groundwater flowing in different directions depending on whether the pumps were on or off, there were other potential source areas that had to be considered, not just the Privet Road compound. We also know that there were off-site water quality issues. Now, were the off-site problems migrating onto the Base and contributing to the problems in the Navy supply wells or were the supply wells being influenced by an on-Base source that was also migrating off-Base and causing that off-Base problem? We didn't know. The information just wasn't there.

So in order to address all of those issues and try to bring closure to

this problem and determine exactly what was happening here with the supplies, the Navy performed some additional work that again is discussed in a lot of detail in the report that was recently issued. And I just want to briefly discuss some of that now.

In order to understand the problem regarding the different groundwater flow directions with the pumping versus the not pumping scenarios with the wells and the fact that the shallow aquifer was reacting differently to the pumping than the deeper aquifer, the Navy conducted a long-term water level study. They installed additional monitoring wells and performed multiple rounds of water level measurements. What you see up here on the slide right now, this is an example of the long-term water level study that was performed. This is just for three particular wells. Many more wells were monitored. I just put this up as an example. And these data were acquired by putting transducers, which are essentially

automatic data recorders, in these wells.

It's interesting here just as an example. I mentioned how the shallow aquifer might redact than the deep aquifer to the pumping. The shallow aquifers or unconfined are these bluish and greenish lines here. The deeper or the confined aquifer well is this red line. You can see that the change in water levels in the confined monitoring well are much stronger and more pronounced. What you're seeing here is literally the water level in those monitoring wells rising and falling in direct response to the supply wells turning on and off. So there's a real obvious connection here. The supply wells go on. It lowers the water level in the well. The supply wells go off and the water level goes back up. So this is an example of some of that data that were acquired by the water level study. It was an iterative process. What we did was did the long-term water level study. What that did was point out where additional monitoring points were needed. The Navy went out, installed those

additional monitoring points to fill those gaps, and then did additional water level acquisition to have a more complete data set.

To determine the groundwater flow directions, these water levels are plotted aerially on a map to look at the lateral distribution. And without going into the details, I can just point out that this, for example, is the groundwater flow conditions for the deeper or the confined aquifer under nonpumping conditions when the supply wells are off. And what that's telling us -- again, here's the Privet Road compound right here and here's the Navy supply wells here and here, 1 and 2 -- is that when those wells are off and groundwater's just flowing under its natural condition, the general groundwater flow direction is to the northwest. North is directly up on this map. So groundwater's basically flowing in a northwestward direction. I don't have a figure for the shallower or the unconfined portion of the aquifer, but it's basically

exactly the same, that under nonpumping conditions, the groundwater in both aquifers is flowing from this we'll call the upgradient portion of the compound to the downgradient portion.

Now, under pumping conditions, once those wells turn on and start drawing the water in to get their water supply, what happens naturally is they alter the pattern of groundwater flow. They capture groundwater from their general vicinity. And what we found is for -- again, this is for the confined or deeper aquifer. When those wells turn on, there's basically a groundwater divide that forms right along the northwestern corner or northwestern edge of the compound that basically goes right through here and all the water on this side of that divide is drawn into the supply wells. So that's showing two things. One, it's showing that groundwater from the Privet Road compound site is being drawn towards or into the supply wells, but the groundwater from the Air Force, the wash rack area, is not being

drawn into the supply wells. And we'll see the significance of that in just a second.

RAB MEMBER: Excuse me. At the end of the blue bars there you have, is that the feet that you're down, 287?

MR. KILMARTIN: That's the elevation above sea level of the water level in these particular wells. What we do is post the data that we know that we can measure and then we interpolate by contouring in between.

RAB MEMBER: Thank you.

MR. KILMARTIN: And just very briefly, it's really not critical for this discussion, the way we use these numbers to determine which way the groundwater's flowing is the water level elevation you measure in a well is measuring a property we call the hydraulic head of the aquifer at that particular vertical depth that the water's entering the well through the well screen. The hydraulic head is roughly analogous to the amount of energy in the aquifer at that point. Groundwater flows from areas of

higher head to lower head or higher energy to lower energy just the same way, you know, if you watch The Weather Channel, the wind blows from high pressure to low pressure or electricity flows from high potential to low potential. It's all the same analogy. So what we do is by interpolating between our known data points with these contours, we know that the groundwater flows roughly perpendicular to those contours. So by drawing these, I know two things. I know that water's going to flow from the higher number to the lower number and I know it's going to flow roughly perpendicular to the lines I drew. That's how I determined the groundwater flow directions.

The second thing we looked at is the vertical flow component of the groundwater in the aquifer. Now, I think it's pretty obvious or it's pretty easily understood that the groundwater is flowing through the fractures in the rock and flowing through the bedrock. It's not just a stagnant pool, but sometimes what gets a

little harder to pick out or see is groundwater is not just flowing laterally. It also moves vertically because that head or energy is not the same through the different vertical portions of the aquifer. So, for example, if we were all down within the rock right now, you know, water may be flowing from me to you, but it may not be in a plane. The water particles up near my head may end up down near your foot by the time it travels over that lateral distance. So we also needed to look at the vertical component of the groundwater. And the way you do that or we did it is we constructed a hydrogeologic cross-section that went basically along this red path here. If you remember from previous talks, the hydrogeologic cross-section, the easiest way to imagine that is just imagine that along this red line we dug a trench 100 feet deep and we just jumped down in that trench and looked at the wall of the trench looking this way here into the rock. That's what a cross-section is.

We can go to the next slide and take a look at what we learned and what we saw. This is the cross-section. It goes from the -- this particular one goes from the Navy supply well No. 2 down through the Privet Road compound, which is right through this area here. This is the ground surface, this upper -- this is the ground surface right here. Remember, we're in this trench looking at the walls of the trench. Right here on the surface, this is about where the Privet Road compound is. Then it goes down through the wash rack area. So it's a pretty extensive section. And a couple of things that are notable here and will become a little more important in just a few minutes, one is that we talked about the Stockton formation and the different rock units in the formation. The thing to notice and you can see here in the cross-section is the rocks are not perfectly horizontal. What they do is we call it dip. Again, you can see that in the road when you're driving along the northeast extension -- well, not if you're

driving, if you're a passenger.

RAB MEMBER: And you're a geologist.

MR. KILMARTIN: Next time you do it, just look. It's interesting. You'll see the rock units are not perfectly horizontal. They dip. You can actually look and see different rock layers and they're dipping along the road. They have different attitudes. And you see the same thing in this cross-section here that a particular rock unit, say this sandstone, at a certain depth here goes we call this the updip direction. At some point it's going to outcrop at the surface. So the rocks are not flat. They're dipping. And the rocks that are at depth in the downdip area at some point are going to actually outcrop at or near the surface.

The other thing I wanted to point out here, I talked about earlier the two different geologic units, the shallower unconfined and deeper confined. This is the shallower unit here. This stippled area is sort of a transition zone. And

below that is what again for this talk I'm calling the deeper or confined unit. You can see this is again elevation above sea level. So you can see that transition zone beneath the Privet Road compound, just to pick a number, occurs at a depth of about 50 feet. The shallower aquifer is above that. The confined aquifer is below that. And you have a transition zone in between.

The other important thing to note here -- again, we'll see it in just a second -- is because the rocks are dipping, what is confined under the Privet Road compound, that same unit if you follow it updip at some point is not confined. It becomes part of the shallower aquifer. So the hydrogeologic unit is not rock-specific unit. That's a little arcane but it will become important in just a second.

One other thing to note on this, this green, these are some of the solvent levels that were detected in these wells. And these are not any particular solvent. Those are total VOCs, so it would be TCE plus the PCE plus whatever else we

happen to find in that well. And one of the things you notice here, and we'll see it on some other maps in just a second, is the shallow or unconfined aquifer really is nondetect, nondetect or very low numbers, whereas in the deeper or confined aquifer we're finding much higher numbers of solvent. And if we remember, water levels or the water from this portion of the groundwater from here cannot really easily communicate with the groundwater here. It's being separated by this transition zone.

As a general rule of thumb -- there's a lot of exceptions to everything, but as a general rule of thumb, what you would expect is if you were near the source of contamination, your higher levels of solvent in your groundwater should be in your shallower portion of your aquifer. If you think about it for a second, it only makes sense because the spills or the releases are occurring up here on the ground surface and those solvents then are migrating down. The

water table, of course, is the top of the saturation. They're migrating through the water table into your aquifer. So it would only make sense that the unconfined or the shallow portion of the aquifer should be impacted more highly if you're near the source of your contamination. Many times in many sites a confining layer will be so effective that if you have a release here, you may have a lot of contamination in this portion of the aquifer but very little to none below that confining layer. Why? Because the groundwater can't travel through this transition zone.

RAB MEMBER: How about if there are no solvents added to the surface in the last 20 years? Would that be what you'd expect?

MR. KILMARTIN: It would depend whether that residual solvent still existed in the aquifer or had been moved.

RAB MEMBER: If nothing more was being added, would it have migrated down? This is lightweight stuff that floats on top, isn't it?

MR. KILMARTIN: Not necessarily, no. If it's a pure solvent in its pure form, it actually will sink in water like the way Liquid Drano sinks through the tub to get down to the drain. It's denser than the water. Although typically -- not typically but many times the solvent that's released isn't in its pure form anymore and it's what we refer to as the dissolved phase. So rather than floating on top of the water or sinking through the water, it literally travels with the water. And if you remember, before I mentioned that water particles are moving through the aquifer. They're moving laterally but they're also moving vertically. The solvents pretty much will follow that same track. If the groundwater's moving from here down to there, you'll oftentimes be able to track your plume moving from here to there because it's literally moving with the groundwater.

RAB MEMBER: Excuse me. Given this gentleman's same scenario that

there would be no additional additives in the last 20 years, shouldn't that pretty much be out of the picture by now?

MR. KILMARTIN: Typically, no.

RAB MEMBER: To where it's down to -- even though it's going down and spreading out? When you go down and you spread out, now the parts per million become less; am I correct?

MR. KILMARTIN: Yes, but what will typically happen -- and it's really the same thing that Jim was talking about earlier relative to the Navy fuel farm that in that example you pump and pump and pump and eventually get to a point where you've got the stuff you just can't get out. What will happen when you release something at the surface there, as it migrates down through the water table, a good portion of it becomes trapped either in the soil or in the very shallow bedrock. It becomes what we call a residual source. So it literally becomes trapped in the rock near or at the source.

And what you see then as clean water migrates through it, some of that source gets dissolved into that clean water and that's how you generate your plume. I know it's been a long time ago, but when we looked at a -- a good example of that is the fire training area we just discussed. When you look at the compound concentration contours at the fire training area, what you'll see is sort of a bull's eye of high numbers right there at the source and then as you get away from that source, it gets progressively lower, which is again reflecting your residual or trapped source right where the spill occurred and then your water passing through that source creating your dissolved plume.

MR. TURNER: Real quick question, Kevin. Here, how would water be moving here? It would tend to be moving up, wouldn't it?

MR. KILMARTIN: Yes.

MR. TURNER: It has to do with the question that's out there.

MR. KILMARTIN: Typically,

especially for organics, you will get this trapped or residual source there.

RAB MEMBER: What would be the expected lifetime of that? As the gentleman said, 20 years --

MR. COLTER: Let me interrupt here. Let's let Kevin finish the presentation and we'll have questions at the end because there's a lot more information that might answer your questions.

RAB MEMBER: No problem.

MR. KILMARTIN: This particular cross-section, that was made using water level or again hydraulic head measurements under nonpumping conditions. The wells were not pumping. What you see here in the shallow or unconfined aquifer is groundwater flowing perpendicular to these red lines and from higher numbers to lower numbers. That really didn't come out real well electronically. Sorry about that. But what it shows is in the unconfined or shallow aquifer, the water is flowing generally again in a northwesterly

direction. And as we talked about before, in a vertical sense, it's flowing down. The water particles that originate at the water table are sinking in the aquifer as it moves downgradient. Conversely, in the confined zone, that water as we saw again is moving in a northwesterly direction, but that water, the driver for that water is migrating upwards in the aquifer. Again, this is when the wells are not on.

This is the same slide, same situation, except now these water levels were measured when the Navy supply wells were pumping, when they were on. And what you see here -- again, here's the Privet Road compound -- is there's that groundwater divide that we saw in one of the earlier maps. And we see that this well here is pumping. And what it's doing now, that groundwater rather than flowing in that northwesterly direction is being drawn back into that well. The same thing here. This head here is higher than that head there. The groundwater is being drawn into that well. So the groundwater below

Privet Road compound is being drawn into that well. Groundwater from down in the vicinity of the wash rack is not.

So one of the first conclusions we were able to reach then fairly early in the game based on this information is that the groundwater from the Privet Road compound could, in fact, be impacting the well, that Privet Road just based on this information alone could be a source of the problems that the Navy was having in that well, but the wash rack wasn't. The wash rack may have its own separate problem, but whatever was going on down there was not impacting the Navy wells. We couldn't look at the wash rack area as a contributor to that problem.

Now, again, this is one of the supply wells. I mentioned earlier that one of the problems we had, one of the biggest data gaps was that we didn't know the vertical distribution of contamination within this well or the other Navy supply well. As Jim mentioned earlier, fortunately the Navy and USGS worked out a

deal where the USGS, United States Geological Survey, was able to come in and do two things. One is geophysically log this well so we learned a lot about the type of rocks that were in there. The second is they were able to do what we call packer tests. If you remember, it's been quite a while now but Dan Goode from USGS was here and gave a whole presentation on that project. So I don't really want to go into that or repeat it now except briefly just remind you that what these packer tests showed -- again, what a packer test is is they're literally packers that inflate within the well so you can take groundwater samples from discrete vertical intervals so you know the vertical distribution of the contamination in that well. What the USGS studies showed for both of the Navy supply wells is that the shallow portion of the water entering the supply wells from the shallow zones was very clean. Most of it had no solvent at all or had very low levels. The bulk of the problem in these supply wells for both

of them was coming in at deeper depths, which is again exactly mirroring what we saw in that previous cross-section that the higher solvent numbers were coming from down here in the confined zone as opposed to the unconfined and again just creating further doubt or suspicion as to whether the Privet Road compound itself was contributing anything at all to this problem, if it was even a player in this game.

I'm getting near the end here. What I want to do is just briefly present -- these are going to be a series of four maps showing the two major solvents, the TCE and PCE, for both the shallow or the unconfined aquifer and the deeper portion of the aquifer. Now that we had the vertical distribution of these solvents within the supply wells, we could use that data in conjunction with the existing or older monitoring wells plus the new ones that the Navy installed as a result of their long-term water level study and hopefully make more sense of what, you

know, historically we've seen over here in the supply wells.

This first slide, this is the TCE concentration in the unconfined or shallow portion of the aquifer. What you see generally is that the concentrations are either non, nondetect, ND, that means none was found in that well, or they're relatively low, mostly single digits. The federal MCL or allowable level of this compound in drinking water is 5. So you see that almost all of the detections are even below the federal MCL. Relative to the Privet Road compound, two of the wells immediately downgradient -- remember, groundwater is flowing this way -- didn't have any TCEs. One well up here in this northern corner had 1 part per billion. This will become important in a second. You can see that this general quadrant here the shallow wells had very low levels. The Air Force also had some TCE, but we've already seen two things. One is that that TCE can't be drawn into the Navy wells and, secondly, that a release of TCE here at the

wash rack isn't going to travel up here to cause these detections. So these detections here we wanted to take a look at and see maybe what their significance is because we didn't feel they were coming from the Privet Road compound and we also knew they weren't coming from the wash rack. So both of our CERCLA sites were sort of eliminated as the source of our contamination here.

The other thing we noted and we thought it was extremely significant and interesting is this Well 6B here that the Air Force installed as part of their wash rack study. Now, that well ultimately became a deeper well that monitors the deeper zone, but the Air Force acquired some very important information before installing the well within that bore hole. They did packer tests within it, exactly the same way that USGS performed the packer tests in the Navy well. And what the results of those packer tests showed is that there was TCE in levels you can see here. The packer test was from 12 to 22

and 27 to 37. You remember that transition zone's around 50 feet. So what this was telling us was there was some pretty good TCE levels in the shallow zone here. In fact, you know, except for this one well right at the wash rack, there were the highest concentrations in the unconfined aquifer.

Now, if we remember the directions of groundwater flow, this TCE can't be coming from the wash rack and really it can't be coming from the Privet Road compound either. We've got nondetects in between. And we know groundwater is flowing in that direction anyway. So the question became, well, what's it from and what's the cause of that and is that having any influence on the supply wells? I guess the answer is we don't really know the answer to that yet. If you just apply the general groundwater flow directions that we talked about and you trace this groundwater with the TCE in it back upgradient closer to where its source may be, we're hypothesizing here and we do discuss it in

the document, but it seems like it may be indicating a source of TCE somewhere in the general vicinity of the fuel farm or even upgradient of that. We don't know. We did point that out and discuss it in the document.

This next slide, second of the four, this is the TCE in the deeper portion of the aquifer or confined portion of the aquifer. The first thing you notice is the numbers generally are -- they're higher, much higher than we saw in the shallow portion of the aquifer mirroring what we saw in the hydrogeologic cross-section. The other thing is that these wells here that had the generally low level of TCE in the unconfined also do seem to have some TCE here in the deeper portion of the aquifer and that the highest concentrations of TCE anywhere are found immediately downgradient of that same potential source that we saw in the shallow portion of the aquifer. And then again the TCE, although the TCE is not found in very high levels in the supply wells, it is

higher in the deeper portion of the aquifer.

This is the PCE in the unconfined portion of the aquifer. The PCE has historically always been detected at higher levels in the supply wells than the TCE. PCE is the major solvent or the dominant solvent found in the supply wells. Typically, when we would sample these wells and get the total PCE throughout the whole well, not these depths specific from packer tests, we would find in general about 50 to 60 parts per billion of PCE in this well here. Again, this is the shallow or unconfined aquifer. What you see is the PCE is nondetect almost everywhere except again this same general area where very low levels of TCE showed up in the unconfined aquifer if you remember that from two slides ago. And what we interpret that as meaning is that somewhere there seems to be a generally smaller, low level source of solvents that are contributing both PCE and TCE to the aquifer that's causing this impact.

Now, one other additional important piece of information that's not reflected on this slide is historically there used to be -- this is the Navy Public Works building. Historically, there used to be a monitoring well located somewhere right around this area right here. And it was installed and sampled in 1985. And that well had both TCE and PCE in it very similar to what we're finding right here along this quadrant. We can't find that well. We don't know if it has been destroyed or paved over or if there's a building on top of it now or what the story is, but basically we just don't have that well anymore. We can't find it. Because of that, we also don't know which way -- we don't have the hydraulic head or energy information from the aquifer in this area.

But for the shallow portion of the aquifer, it's generally not a stretch or it's generally accepted as your first approximation that your groundwater is flowing in the exact or basically the same direction as your surface water is

flowing or would flow if surface water was at that point basically from areas of higher elevation to lower elevation. And combined with the fact that we know the groundwater here was contaminated because we have the results from that well, we also know from our water level studies that regardless of whether you're in pumping conditions or nonpumping conditions for your pumping wells, there's really no way for that water here that had the TCE and PCE to have originated from either Privet Road or wash rack. The water just does not flow in that direction.

So we know that that water was not being sourced from here, but if you look at the direction that shallow groundwater would flow or is assumed to flow here, these faint lines here are your surface topography. If you think of those the same way that our red lines were used in a previous map, that groundwater's flowing perpendicular roughly to the surface there. It seems reasonable to assume that if you had a minor source up

here, that groundwater would travel in roughly perpendicular to these contours. And when you do that, you basically end up exactly where we find that low levels of TCE and PCE.

So that's the reasoning behind one of the other conclusions that you'll read here is that this little quadrant of low level mixed TCE and PCE we don't believe is related at all to the Privet Road compound, which is the site that we were investigating, but it appears to be sourced from some minor source somewhere in the vicinity of the Public Works building. Exactly where, we don't know, and we really can't recreate the conditions because we don't have that well anymore, but that's what the data are telling us. So this PCE doesn't appear to be related at all to Privet Road much in the same way that this TCE that we saw here doesn't seem to be related to Privet Road in the same way that the TCE we saw here doesn't seem to be related to Privet Road. Basically all of the PCE, TCE solvent

detections we're finding in the groundwater here, when we combine what we know about how these solvents travel in groundwater with the knowledge we have regarding how the groundwater is flowing in this area, none of these detections appear to be emanating from Privet Road. Strengthening that conclusion -- again, I mentioned before that Privet Road RI is not just groundwater, that all of the other media were sampled. We took or the Navy took 20-something soil borings through this area here. The borings start right at the surface, go right down to the top of the bedrock, basically as far as you can bore without actually starting to drill again to sample the soil. There's no solvents in those soils, which you would expect to find that residual contamination in the soils if, in fact, that was the source. So all of these multiple lines of data to us are indicating that Privet Road compound, which is the subject of the investigation, really is, if anything, guilt by association, that it was assumed to be the source, probable

source, of the solvents in the supply wells because it's adjacent to the site.

This is the PCE detections in the deeper portion of the aquifer. I'll pretty much skip this. Really the only notable things here, one is that the PCE in the Navy supply well 1, which is the dominant solvent in that well, again is much higher in that deeper portion of the aquifer that doesn't communicate freely with the shallower portion. The second thing I think was pretty interesting was the fact that in these wells here that had the highest TCE of all, there's no PCE. So what that seems to be indicating is whatever is sourcing what I call this portion of the plume is separate TCE-only plume that clearly is different and not related at all to this plume here. I said earlier this site gets very complicated. We've got groundwater flowing in many directions and it became more and more apparent to us that there wasn't a single plume here but coalescing several plumes.

So just in brief review,

what we saw up to this point was that the Privet Road compound does not appear to be the source of the solvent contamination. It looks like there's a generally low level mixed TCE-PCE plume originating possibly somewhere up here near the public works building. There appears to be a TCE-only plume that is possibly originating somewhere near the fuel farm or maybe even upgradient of that. And the Air Force wash rack area does appear to have a minor TCE issue, but it's not related at all to the Navy supply well issue.

There's only one more thing I need to talk about and that's the next slide. If you remember, the fourth complicating factor that we discussed was the fact that we knew there were groundwater issues off-site. Whether those off-site issues were impacting the Navy or vice versa, whether the Navy was causing those issues, we really didn't know and didn't have the data to say.

What we did, though, with this additional data, particularly the

additional data that USGS collected, is we went back and started looking through all the available data in the different regulatory agencies, their files, to see what we knew about the off-site situation here. I'll try to cut to the chase here and go right to it. The one site that really caught our eye and was very interesting to us is the former Pellet Aircraft facility basically right across 611.

The EPA conducted a site investigation, an SI, back in the late '80s at this site. One of the really notable pieces of data I saw in that report was two surface water samples were collected. And these weren't surface water samples along a stream. These were in drainage ditches. So this water was not groundwater discharging to the surface. This wasn't even real surface water. This was temporary or intermittent surface water that was collecting in ditches. And that coupled with observed releases from that facility showed me that PCE and TCE and

again others were being released into the environment at that location. Another thing that caught my eye or our eye was the PCE was the dominant solvent exactly like we were finding in the supply wells.

The next thing that caught our eye -- again, there's a lot of information on this slide, but these blue lines here are from one of the USGS reports for the work that we've done here for the Navy at the Base. And these are part of the results from a regional water level study that the USGS conducted in order to determine the regional groundwater flow directions. And what you see here -- remember that the groundwater flows from higher to lower hydraulic head -- is that from this former facility here, the groundwater is pretty much flowing right toward the Privet Road area.

The fourth thing that we thought was significant was if you remember from one of my cross-sections when we talked about the deeper confined aquifer and that the higher solvent levels were in

the deeper aquifer and we discussed that generally that's not what's typically found, you would find it in the shallow and how would you get that solvent into the deeper aquifer, if you remember, those rocks tilt and come out at the surface and that's generally or that's where that contamination can enter the aquifer and then it migrates down within those units eventually becoming part of the confined aquifer further downdip. USGS in taking the -- remember, they did a vertical series of packer tests. They took the most highly contaminated portion of the supply well. They could pinpoint that vertically because of their packer tests. We know the generate of dip of the rock units because of the cross-sections we made and the correlations we made. So they took that most contaminated section of the supply well and tracked it with its tilt back updip to determine about where on the surface does that outcrop and become part of the surface features. And when you overlay that outcrop belt or zone, it's

right there at the facility.

So to us those are multiple lines of evidence indicating a very likely migration pathway for that PCE and TCE to be ending up in the supply wells. We looked all over the place at Privet Road and in the vicinity of Privet Road and we can't make the connection. We can't find a likely source on-Base yet. Given the directions of groundwater flow, dip of the rock units, and where the most highly contaminated rock units in the supply wells outcrop at the surface and the fact that there is a shallow release of those same compounds, to us it seems to be indicating that either Pellet or something very near that facility is a more likely source of the problem in the supply wells. Now, there certainly isn't enough data to conclusively say that and by no means we're trying to prove that in the RI. The conclusion we're trying to reach in the RI from these multiple ways of looking at the problem is no matter how we looked at it, we don't see a connection between Privet

Road, which again is the source or the subject of that report, and the groundwater problems in that immediate vicinity.

I'm sorry I ran on, but there was a lot of information.

RAB MEMBER: Strike and dip are related?

RAB MEMBER: Dan Goode was talking about a dense line that basically separates the high points.

MR. KILMARTIN: This line here, this is basically the regional groundwater divide. If you remember back from our fire training area discussions, one of the really complicating things about the fire training area is the source of that plume is really close to a groundwater divide. By divide, what we mean is it's a point where groundwater flow direction basically divides. Some of it's going to go that way and some's going to go that way. This divide here, that's the divide that we're talking about in the fire training area. It goes right through the Base here. Again, what it means is that

from this divide, groundwater on this side is flowing that way, groundwater from that side is flowing that way. That dense rock diabase that he talked about, that really is way down here and really is not a player at all in any of this discussion that we did tonight.

RAB MEMBER: But it does indicate at least you're not on the other side of that.

MR. KILMARTIN: Yes, certainly.

RAB MEMBER: And contaminants can't go the other way.

MR. COLTER: One more piece of information in the report that wasn't brought out is when Kevin was talking about the potential source possibly of TCE only in this area that came down to the well on the Air Force property, one of the things we did was we did a preliminary assessment type investigation, which means we went to all of these buildings in this area and we also looked at historic Base maps of this area to determine if there was any

industrial type activities that were conducted up here that maybe there's an on-Base source that got released that contributed to this problem. What we found was every building and every historic building and use in this area was administrative only. There was no maintenance or any other activities that would account for solvents being used other than the Public Works building. So that also led us to believe it might have been an off-site type of source and that's the logic we discussed to get where we got.

RAB MEMBER: Excuse me. You mentioned about that. I'm a tool and die maker. Tinneus-Olsen is right down --

MR. EDMOND: Tinneus is down further.

RAB MEMBER: I'm a tool and die maker with 40 years experience. I know for years it was an accepted practice I'll say up until the last 10, 15 years, we'd take solvents and dump them and everything else. I mean, this was just an accepted practice. And the same thing with C & C

Ford.

MR. COLTER: What we did actually, Tinneus-Olsen actually found MTBEs in one of their water supply wells. What we did in response was we put wells just south or downgradient flow direction on our property to see if that MTBE they were seeing was coming onto the Navy property. But in addition to MTBE, we did VOC analysis and we found no VOCs at all on our property. We put a well upgradient of Tinneus-Olsen on Navy property and we found MTBE there. If you follow that further upgradient, you have that Coastal station right there where PADEP's doing a tank removal and investigation right there. You may want to say Tinneus-Olsen, but we didn't see anything there when we sampled.

RAB MEMBER: If the source is off-site, we can do a great job at treating the symptoms, but we're not going to get to the cause. So is EPA going to come in and determine -- what we have here is finger-pointing. It's over the fence. Our hands are clean. But there is

obviously a source somewhere. If this study indicates it is across the street, is EPA going to take a look at getting that cleaned up?

MS. BRADFORD: What we have to do is look in the immediate area --

RAB MEMBER: We've already heard Pellet Aircraft seems to be very clear.

MS. BRADFORD: I don't know if that's the site or what. I'm in federal facilities, but I would try to find out if that's being investigated.

MR. COLTER: We got that information from Pennsylvania DEP. They have conducted a site investigation there. You know, in fairness to the regulators, they just got this report three weeks ago. This is one thing we'll have to discuss and probably will be part of their review is those conclusions we've made, what's the next step. And we're not sure about what the answer to that is just yet, but it's a good question.

RAB MEMBER: Could you go

back one slide? I was wondering if there's an apron in the upper right I think between the Public Works building you mentioned and -- just to the left, a little farther to the left.

MR. EDMOND: It's a parking lot.

MR. TURNER: Asphalt parking lot.

MR. COLTER: The aircraft runways are way up.

RAB MEMBER: It just looks to me like the contours are going in the direction from that parking lot down.

MR. COLTER: That's just a parking lot up there is all.

MR. EDMOND: On the left-hand side are the aprons way up north.

MR. TURNER: They're way off this map. Do we have one that shows it?

MR. KILMARTIN: Not in this presentation.

MR. TURNER: So that's the parking lot and the runways are way over

here.

RAB MEMBER: So nothing could have drained from that parking lot down to Privet Road compound?

MR. EDMOND: The runway and parallels are all in this area here.

MR. COLTER: To answer your question, as far as surface, there's always things that could be released in a parking lot. When it rains, it flows over land in the direction of topography. But typically what you see in a parking lot is not VOC. It's fuels and PAHs and things like that. We're not seeing the same type of contaminants you might see from a parking lot.

RAB MEMBER: If this is Jim's final meeting, I'd like to express for the record an appreciation for his concern for our community and his patience with the meetings and some of our stupidity.

MR. EDMOND: I was going to comment five years ago I was tasked to put together this community board and because

of your motivation and time and effort you put in, it's made my job very easy. So I appreciate the community members giving up their time and effort. Some of these meetings have been very dry. You're now all junior hydrogeologists and/or geologists. Without you guys, we couldn't have been here and my task of keeping this board together would have been very difficult. I thank you all.

MR. COLTER: Put ovation.

Following on what Jim said, I'm glad to see a lot of attendance by the community because obviously Kevin put a lot into this presentation. We love doing it as long as it's for a good purpose. If you have one or two, it kind of makes us a little down on all the effort we put in. It's good to see the high level of interest here in the community.

RAB MEMBER: Let's go back to that thing I brought up probably a year and a half, two years ago about changing the time of the meeting. The time we meet is not very helpful to many people in the

community because it's so early. I suggested a look be taken at moving it to perhaps 7:30. It doesn't affect me. If I'm teaching at night, I'm not here.

MR. COLTER: I believe we did pose that question and the response we got was the majority kind of liked the way it is.

RAB MEMBER: That's the people who are here.

MR. COLTER: Well, we're always looking for new members.

MR. EDMOND: What we can do is make it a little later, publicize it, and see if we get any extra support.

MR. COLTER: Typically other meetings start at 7:00. That's not bad.

RAB MEMBER: The important thing I think is these folks that are paid like Jim and Jim and XO, that extends their day.

RAB MEMBER: They're on overtime.

MR. COLTER: We're on 24/7.

MR. EDMOND: I've been

called in at 2 o'clock in the morning. At least I'm here. I don't have to come in from South Jersey.

RAB MEMBER: You see what I'm saying.

MR. EDMOND: We try and be receptive to the community's needs. We want to make this not just a shell of a board. We want community participation, as many community members as we can, a cross-section of the community because it makes our job easier because the community knows what we're doing. And we're trying to do not only what's right but what's good for the environment. And it really helps us. So if it's better making it later, we'll try it once or twice. If it flies, we'll salute it. If not, we'll bring it back. That's one of the reasons we met earlier. Township land use is at 8 o'clock at night. Some of the people like Mike Magee, Tom Friedman and stuff are trying to juggle two at once. Well, neither one of them came either. Tom has come many times.

RAB MEMBER: If you make it too late, I won't be able to be here. I'll get stuck in the carpool thing.

MR. EDMOND: We'll try maybe 6:30, 7 o'clock next time and run it by and see what we can do. Maybe we'll advertise a little bit more and see if we can get a little bit more community participation. But you guys have done a great job.

RAB MEMBER: Getting the word out in the paper.

MR. EDMOND: A lot of people I don't want to say aren't concerned but they don't think they have a say. You guys have to spread the word I think more so than us putting ads or me telling people because me being a government employee, a member of the station staff, sometimes people construe this as we're trying to have a meeting to pacify the general public that we're doing something. And really we were mandated by Congress, yes, but you guys have given us a lot of constructive criticism, a lot of good ideas. People like Eric and Jack who are in the field or

were in the field sometimes bring us a different perspective that we overlook. You guys that are just maybe environmentalists, you have no background in hydrogeology or engineering or whatever, your suggestions have been just as good because sometimes we're looking at things from a technical perspective and we miss the easy stuff where you bring the easy stuff to us and it strikes a bell. We save the government money and time. So you guys have been doing a great job.

RAB MEMBER: Is one of the conclusions from this study that you're also going to look at the fuel farm?

MR. COLTER: As a matter of fact, we're doing, as I said earlier, a series of groundwater and soil work at the fuel farm to hopefully support a closeout of that site from the groundwater data that we do collect because we don't have any deeper wells at the fuel farm. Actually, that's one of PADEP's requests was to have a few deeper wells to see what's down there below the fuel farm. All of that data,

similar to the Air Force sharing their wash rack data, we'll feed that to Tetra Tech to figure in that little corner there. We will have some groundwater data from the fuel farm, but remember there was no VOC type use there. It's all petroleum. So we shouldn't be seeing VOCs and, if we do, it's not necessarily from the fuel farm. It just may actually further support something off-site going downdip.

RAB MEMBER: Wasn't that part of the jet fuel?

MR. COLTER: No.

MR. EDMOND: They're BTEX type compounds.

MR. COLTER: The only other thing I'll mention before we get out of here we're working on is back in 1998 we did a soil removal action and all of you got the documents on that about our work plan. And after we dug up all the PCBs from the Privet Road compound, our Privet report, we have to write a record of decision for that site, what are we going to do next. Basically the record of

decision is no further action. All of the actions were taken. We'll be working with the EPA submitting a document to them for their review. After they look at it and they're happy with it, we'll send it out to the general RAB. That will be in the next six months or so. That's it.

MS. BRADFORD: Can we get a quick count of who would be interested in changing the time? Because I know from EPA standpoints it's better the time it is because we only get paid for the hours we are physically in this meeting. So if this meeting lasts one hour, we don't get paid from the time it takes us to get from wherever we're leaving from here and back to where we're leaving from. And I get off from work at 4:30 and then I live in Cherry Hill, New Jersey. I don't want to go all the way to Cherry Hill, come back for a meeting, go all the way back, and only get one hour of time.

RAB MEMBER: Federal mandates state if it's a meeting not under EPA control, you should be paid for that.

MS. BRADFORD: Travel time?

RAB MEMBER: Yes. If it's a meeting not under your control, you do get paid for it.

MS. BRADFORD: Do you know where that's found?

RAB MEMBER: I don't have it at my fingertips, but I've lived by it for 15 years.

MR. COLTER: We'll take a look at the other meeting and we'll talk a little bit more about it and make sure.

RAB MEMBER: Could I make a suggestion? It seems like we have federal employees and then we have the community members. Possibly if all the federal employees get together and see what best suits them --

MR. COLTER: We're on your schedule. I'll tell you the truth.

I want to thank you all for coming. Good luck to Jim in his future endeavors.

(Whereupon the meeting adjourned at 8:15 p.m.)