REMEDIAL PROJECT MANAGERS' MEETING

NASA/JET PROPULSION LABORATORY

6 September 2001

ATTENDEES:

Eric Aronson, CH2M Hill
Charles L. Buril, JPL
Asrar Faheem, Geofon
Keith Fields, Battelle
Tony Ford, Geofon
Kimberly Gates, Navy/NASA
Richard Gebert, DTSC
Marvin Hillstrom, Navy
Robert Kratzke, Navy
Ken Martins, CH2M Hill
Hooshang Nezafati, CH2M Hill
Judith A. Novelly, JPL
Mark Ripperda, USA EPA
Peter Robles, Jr., NASA
Peter Torrey, CH2M Hill
G. B. Wickramanayake, Battelle
Bryant Wong, CH2M Hill
David Young, RWQCB-LA
Richard J. Zuromski, Jr., NAVY/NASA

Reported by: Lester R. Linn, Jr., CSR 1054

Pasadena, California

September 6, 2001

9:37 A.M.

ZUROMSKI: We're going to go ahead and get started, then. We're going to start off with introductions.

My name is Richard Zuromski with the Naval Facility Engineering Command, Port Hueneme, California.

RIPPERDA: Mark Ripperda from the U.S. EPA.

GEBERT: Richard Gebert from DTSC.

YOUNG: David Young with the L.A. Regional Water Quality Control Board.

MARTINS: Ken Martins with CH2M Hill.

FORD: Tony Ford with Geofon, Incorporated.

FAHEEM: Asrar Faheem from Geofon, Incorporated.

HILLSTROM: Marvin Hillstrom from Southwest Division.

NEZAFATI: Hooshang Nezafati with CH2M Hill.

GATES: Kimberly Gates from Naval Facilities Engineering Command.

KRATZKE: Robert Kratzke from the Naval Facilities Engineering Service Center.

WICKRAMANAYAKE: Wickram from Battelle.

WONG: Bryant Wong, CH2M Hill.

TORREY: Peter Torrey, CH2M Hill.

ARONSON: Eric Aronson, CH2M Hill.

FIELDS: Keith Fields, with Battelle.

NOVELLY: Judy Novelly, JPL.

BURIL: Chuck Buril, JPL.

ROBLES: Peter Robles, NASA.

ZUROMSKI: Okay. Great. We have a full house today.

I wanted to start off with agenda item number 1. Actually, I think we're going to do this a little later, since we do have a packed house today. I know that Richard needs to get going a little bit earlier, so we're going to skip item number 1 and just move into items 2 and 3 and we'll go back to number 1 if we have time later on.

So Operable Unit 2 Draft Record of Decision is being worked on right now by Battelle and we have two representatives from Battelle here today, Keith Fields and Wickram. And Keith is going to give you a preview presentation of what is going to be contained in the draft ROD, which should be -- which we're really trying to tweak right now and get the final details done. And probably within the next two to three weeks, I'd say somewhere around there, we should

give you a copy of the draft ROD to review.

I want Keith to go through the ROD generally today and the strategy that we're taking and see if you have any comments on our general strategy, and if there are any comments today we could take those back and incorporate those into the draft as well.

So, Keith, go right ahead. I think everybody does have a copy of the presentations on the -- right behind the agenda.

FIELDS: I didn't get a copy of it.

ZUROMSKI: Here's a copy.

FIELDS: Thank you.

We will need the copy of the presentation because as we get into the closure strategy flow chart, which is page maybe 3 or 4, something like that,

w**********
****
****
****
****
****
****
****

I think will require the most discussion as a result of the comments we saw from the FS. So that primarily is our closure strategy.

And then we'll go into some -- there was some data collected by Geofon in July of 2001, here just a couple months ago, which was a complete survey of all the existing soil vapor points, and then a sampling of all vapor points that were not plugged. It ended up

being about 125 points, so there's a good baseline of data that we'd like to present and go through with you. And then I have questions and discussion last. But certainly, if you have questions at any point during the presentation, just let me know and we'll stop and talk about it right then. I think it's going to be geared more to a discuss-as-we-go presentation.

With regard to general ROD issues, we're going to be -- just so you know what to expect, we're going to be using 1999 EPA guidance on preparing RODs, unless you have other guidance documents that you would like to propose. But that's what we'll use as just a general guideline.

And then one thing, probably the only thing out of the ordinary, and you may have seen this before, may not, we're going to be incorporating NEPA values into the ROD. And those will just be -- they'll come up in like section headings and stuff that you may not typically see in a ROD, and it's environmental justice, socioeconomic and

transportation impacts and the like. It's to fulfill a requirement that NASA would like to obtain with regard to this ROD, to document some of these -- make sure we're covering the NEPA side and the CERCLA side. That's pretty much it for the general ROD discussion.

If you'd like to go to that remedial approach

flow chart, I think this will pretty much be the bulk of the discussion in our presentation here. If everybody's there we can just kind of go through that item by item.

Basically we'll start here with Operate the SVE System. And we can think about it as if we've already operated it, to a certain extent. It was just shut off in May, I believe, and it operated for six months. But we can kind of -- we'll either -- if we assume that we're kind of picking up, maybe, where we've already started as this and then we'll move through.

So once we're operating the system we're going to conduct weekly readings. And that would be to look at how much VOCs are removed, you know, taking FID readings, maybe taking some readings with Summa canisters and TO 14 analysis, or whatever it may take. But we'll refine that in the RDRA work plan, but basically following a similar approach that was taken

during the pilot testing activities.

Then we'll continue with a periodic monitoring of the vapor and groundwater VOC concentrations. And basically those two pieces of data will serve as all of our -- that's our decision-making data. That's basically what we're going to be using to evaluate the performance of the

system and also how well the site's being remediated. At least on a periodic basis, those are the two pieces of information we'll have.

So we'll evaluate that SVE operational data. And then we're going to look to see if performance objectives are achieved. And "performance objectives" have been defined. There's three performance objectives and we've considered, you know, basic -- when creating these performance objectives we considered the Regional Water Quality Control Board guidance, that 1996 guidance, took that into consideration. We took into consideration a -- I believe, Mark, you provided something from an Air Force Base --

RIPPERDA: Uh-huh.

FIELDS: -- that we took into consideration. And then, also, the Navy has prepared some similar sites where they had -- it was in Barstow. We considered

all that in developing these performance objectives.

But the first objective will be a reduction in the overall VOC concentration in the soil vapor points. We're going to be comparing that reduction to the baseline levels and then we will do modeling to evaluate if we've cleaned up to a point that prevents migration of VOCs to the groundwater at concentrations above MCLs. So that modeling would consist of using

something like VLEACH. I think that's an EPA -- it's at least on the EPA web site, that model. Or the Water Board has some modeling, more simplified modeling with their 1996 guidance. We can consider both of those. We can also consider -- and that would take us from the soil leaching to the groundwater.

And then we're proposing sort of a mixing zone in the groundwater to determine, once that's leached to the groundwater, what kind of concentrations we would expect within this mixing zone. So that would be sort of how we would evaluate whether or not the concentrations have been reduced to a point that seem to be protective of the environment. And if we reach the point where we could show that they are, in fact, protective, that would be, you know, response complete. We would be completed, you know, then we would go into some sort of a rebound

evaluation, continue monitoring. But also we all know that SVE -- we may not reach those levels in a cost-effective time frame. So we also want to provide some criteria that will allow us to not have to continue to operate for years and years when it's really not cost effective and when the cost per pound removed skyrockets and we're into a situation where we are no longer cost effective. And that kind of approach is documented in the Water Board guidance and

everything else.

But, then, what we'll evaluate that on is asymptotic mass removal. And that would be when our cumulative mass curve kind of levels out. It has a slope of zero over a certain time frame. And it's hard to define exactly, but I think, you know, as we proceed though we'll start to see the data and we'll be able to make a judgment as to when we've reached that asymptotic level of removal.

And, then, also it is important to consider the cost effectiveness, with the main objective being to, you know, prevent the migration, but preventing the migration, in fact, to reduce the cost of the groundwater cleanup program. If we can get rid of the VOCs to the extent possible within the vadose zone, that would reduce the time required to achieve

complete remediation of groundwater and reduce the mass of contaminants that had to be removed and treated in the groundwater. So we'll operate as long as it's more cost effective to keep operating than to try to clean it up with the groundwater actions.

And, then, if -- and then residual contamination, because once we get to that cost ineffective point, residual contamination or residual concentrations can be managed under the OU-1 and 3. Because all we're doing, you know, at that point, if

there is a possibility of contaminants leaching to the groundwater, migrating, they'll be captured and remediated through the groundwater remediation system. But we want to make that as cost effective as possible to make sure that, you know, we achieve the most cleanup we can in the vadose zone before trying to manage that under OU-1 and 3.

So if -- SVE, if the performance objectives are not achieved, the next box over to your left indicates that we'll perform some system optimization. We'll evaluate whether that's required. That may be installation of additional wells, that could be operating from different screened intervals, that could be operating at different flow rates; various things. It's sort of a general approach. But we'll

evaluate the need for optimization, and then, if it's necessary, we'll optimize and then we'll move back into this cycle.

If at the point when the performance objectives are achieved we'll stop SVE operation and then evaluate rebound concentrations over a period of time, basically evaluate them through the vapor monitoring points. When we've determined that rebound has not -- significant rebound has not been observed, then, if we have to, we'll either -- as it says here, either the RAO is achieved or we will manage the

residual VOC soil impacts under OU-1 and 3, and we touched on that earlier. If we do observe significant rebound then we would reinitiate system operation, optimize as necessary and get back into that cycle.

As far as defining "significant rebound," there's not a lot of guidance out there on it. We did -- there's been in literature it's proposed this evaluation of rebound to look at rebound as the log of the initial concentration for the last periodic sampling event over the final sampling event, and then of the log over the concentration at -- I think it's called the initial concentration over the final.

But basically what we're looking at there is a sort of an order of magnitude increase or decrease.

If you define it as .2 as a significant rebound, that would mean if there was five orders of magnitude initial decrease and there would be a single order of magnitude increase after that, that would be significant. So that's kind of how it's evaluated here. I think it's a point of reference. We can talk about -- you know, evaluate that later. But I think just trying to get some handle on how we would define "significant rebound." A little bit of rebound may not be cost effective to address, but certainly if we have what we would consider significant rebound we'd want to reinitiate operations.

Is there any questions on that, or would anybody care to add to what I've said?

RIPPERDA: Seems pretty straightforward.

ZUROMSKI: Right.

RIPPERDA: Are your monitoring points going to only be your extraction wells, or are you going to have some like monitoring-only points in between extraction wells?

FIELDS: Right now there's -- maybe Tony can let me know, but there's at least probably 30 points that are open that have, you know, vapor points that are available to sample. And that's -- we'll get into that next on the most recent data. But that

certainly -- we'll use those -- would be the evaluation for significant rebound and also for achieving VOC concentration reduction. We wouldn't want to take the extracted air and monitor that as for, you know, achieving concentration reduction because it would be so diluted with the air kicking in and extracting. Yes. So there are points out there existing and if required as part of, you know, to be able to evaluate the system effectively there may be more points installed.

GEBERT: To what extent are you going to use modeling, you know, to determine the fate and transport?

FIELDS: I think that --

GEBERT: You know, be kind of uncomfortable. There's a lot of modeling in lieu of sampling.

FIELDS: Certainly our modeling would just be to verify that our sampling results are protected. There's really -- there's no physical way for us to evaluate leaching. With the drilling techniques that are required here, if we did try to go down and perform some sort of an SPOP analysis or something like that to evaluate leaching, it's been demonstrated. It's just you get too much volitalization of the VOCs with the drilling

techniques and the sampling techniques that are required in such a geology.

So basically we'll be taking our vapor results, converting those to a soil concentration with our standard partitioning equations, and then evaluating that, with modeling, those concentrations if those concentrations that we observed would impact groundwater quality above drinking water standards or MCLs.

WICKRAMANAYAKE: Also you have, you know, groundwater monitoring data. Also we look at groundwater concentrations, it's going to be stable or decreasing. But that's good evidence of whether you still have soils, increasing groundwater

concentrations.

FIELDS: As a secondary line of evidence, we have up here in this third box to the right that we would look at groundwater VOC concentrations as well. I think that would be sort of an indicator to us at some point that if concentrations in the groundwater in that top aquifer were continually decreasing it would be a secondary line of evidence that we are not feeding additional contamination to the groundwater.

RIPPERDA: I think that sounds good, but I don't think that changing groundwater concentrations would

be happening on the time frame of your SVE operation.

FIELDS: Right. If you look -- that's very possible. But if you look at the -- we'll get into that data later. Basically if the wells that are existing at the site we did, you know, maintain, do analysis and it looks all but one of the wells either has stable or decreasing concentrations currently.

So certainly, not to say that there's not VOCs entering the groundwater but being degraded by natural mechanisms or dispersion at a rate less than the mass flux rate. But if you look at it, to a certain extent there's only one well that we identified that was probably increasing concentrations at this point. But if there's additional wells installed as a result of some of the groundwater

activities we may find -- we may be able to use that data in addition to evaluate.

Are there any other questions with regard to this approach?

ROBLES: Do you have any suggestions on addressing -- Richard, do you have any suggestions on addressing that concern about modeling as opposed to actual?

GEBERT: I don't recall the number of the deep vapor probes that you have. I don't know if it would

be sufficient so you get, you know, an overall picture of how the concentrations are being reduced.

FIELDS: Uh-huh. Yeah.

GEBERT: I don't know where the question was coming from.

FIELDS: As far as, you know, the deep points --

ZUROMSKI: There's 30, in total, vapor monitoring points right now. What we -- and we can get into it in a minute --

FIELDS: Location.

ZUROMSKI: Right. The location.

FIELDS: There's 125 points.

ZUROMSKI: There's 125 actual points. However, not all -- some of the points, as we've seen in the past, have been plugged. And so part of the analysis would be to see if we needed extra new vapor

monitoring points to substitute. Because we're not going to use the modeling to predict the end point. We're using the vapor concentrations into the model. So we need the vapor concentrations in order to make the model work in the first place.

FIELDS: I mean, I just -- I mean, like we were talking about, I don't know if there's another way to evaluate whether or not it's protective without doing some sort of transport modeling within the vadose zone

and then some sort of a mixing model within the groundwater.

If there's no other questions, we'll move on from here.

The two primary contaminants at the site which had the most -- the highest concentrations, relative highest concentrations, were carbon tetrachloride and TCE. So we've done some contour maps of those, some revised contour maps. And just to kind of get -- we did this for two reasons. One was to look at the distribution and then compare it to what we're seeing currently.

So if you look at the pre-SVE, these are results from before '98. And we combined the most recent results we could from each vapor point into sort of a combined model to get an idea of what concentrations were at the site before SVE.

ZUROMSKI: Keith, are those -- are the top numbers pre-SVE from the FS? Is that what that --

FIELDS: Yes. It would be FS/RI data, data between '96 and '98. We would just take the most -- you know, trying to get a snapshot before SVE. But not necessarily all the points were done, you know, the month before SVE started. So we had to go back and get the most recent data we could to combine into

sort of a single picture.

But you can see concentrations, particularly towards the center of the site, relatively high. Where I'm pointing with the mouse is Vapor Extraction Well 1. So you can see the pilot test well was located pretty much in the most heavily -- highest concentration area of carbon tetrachloride. And after operating that off and on since '98, the most recent evaluation that Geofon performed in July shows, you know, significantly reduced concentrations throughout the vadose zone. The highest concentration we saw pre-SVE for carbon tetrachloride was on the order of 400 ppb in vapor. Ppb -- I think you got it. Just ppb. No. Micrograms per liter. And then following, SVE, the highest we're seeing right now is 37. 39 micrograms per liter.

So you can see in the area around where the SVE well was located seems to be very effective as far

as removing the highest concentration areas of carbon tetrachloride.

A similar evaluation was done for the TCE. The TCE from the original, the pre-SVE data, 1998 and before, shows sort of three higher concentration areas. And you can see this upper right-hand concentrated area was probably unaffected by the SVE

operations. The SVE was primarily addressing the carbon tetrachloride, which is -- under the initial mass estimates, reflect probably the most prevalent VOC in the vadose zone. And then you can see fairly reduced concentrations of TCE around that vapor extraction well that was installed for the pilot testing activity, but still some areas on the fringes of the site where there are some slightly elevated concentrations remaining.

I did want to go through the mass estimation techniques. And in particular there was a -- we did a revised mass estimate because, you know, I think it's very important when we're doing this to try to get at least the best painting that we can, although certainly there's no way we can get an extremely precise mass estimate without, you know, thousands of vapor points.

But we tried to get the best mass estimate we could and then compare that to what was done in the

feasibility study. You'll remember in the feasibility study and the Proposed Plan meeting we said there were between 2,000 and 5,000 pounds estimated. Those were estimated -- the 2,000 pound estimate was based on what Foster Wheeler termed "Method 1," which was taking the vapor concentration and multiplying that by

the soil pore volume to get a total mass. And in order to approximate the vapor concentration they took the max concentration observed, which was that 400 ppb value for carbon tet and then the other one, and then divided that by two. And they took the total area that -- kind of the extent of the plume boundary, the vapor plume boundary, took that area and multiplied by 200 feet as an average depth. So you basically have a box. And they took the mass concentration from one point, divided that by two and assumed that that was the concentration throughout the whole box. If that makes sense.

Feasibility study Method 2 was the one that estimated 5,000 pounds. And in that what they did is they converted the vapor concentrations to soil concentrations using partitioning equations presented in the Regional Water Quality Control Board guide. It's the 1996 guide. Took the max concentration, again divided it by two and then multiplied by the soil volume within that box, and that came up with a

larger estimate.

What we did as a revised estimate is, we prepared 3D contours of all the data, since we have horizontal, you know, plan view data and we also have, you know, various monitoring points throughout the

column or throughout the vadose zone. We prepared a 3D model to kind of get a 3D shape of contours of the plume beneath the site. We did still convert soil gas to the soil concentrations. And then we calculated -- you know, there was concentration ranges of, say, from 1 to 3.7, 3.7 to 6.1, and we calculated -- used this program to calculate the volume of each of those ranges. And that volume was then multiplied by the average concentration of that range. So if it was 1 to 3.7, then it was 2 point something, then it was multiplied by that volume. And then we summed -- we did the volumes and then summed up all the sites.

You understand what we did?

RIPPERDA: Yes.

FIELDS: Okay. And this is just to visualize that. You know, instead of a box you sort of have this three-dimensional surface that you're using to calculate the concentrations.

Anyways, the revised mass, if you look at it, the feasibility study mass estimate was between 17,000, 29 to 41, 40 for carbon tetrachloride. The

revised estimate using the revised approach is 468 pounds. The reason for the difference or the drop is like we talked about. We took the max concentration from the FS, divided it by two and assumed that was

throughout the whole box. This, we're getting into a bit more refined approach. And if you took the weighted average concentration in the revised estimate, it's 35 micrograms per liter instead of 202 micrograms per liter.

In the feasibility study it does say, you know, that these estimates were done for -- you know, just to get a rough order of magnitude of, you know, the total mass.

But I think as we move forward we need to try to refine that mass estimate so that we can get a good idea of, you know, when we removed a certain amount how does that compare to the total. So a revised estimate is -- for carbon tetrachloride is 468, for TCE is 52. Taking the data from July 2001, the revised carbon tetrachloride mass is 9 pounds. The revised TCE mass estimate is 17 pounds.

If you look at the VOCs pulled from -- by the SVE systems, almost 95 plus percent of the VOCs pulled by, or extracted in the SVE system was carbon tetrachloride, which makes sense, based on those plume contours we saw, and it was placed right in the area

of highest concentration of carbon tetrachloride. And certainly less mass of the TCE was removed. So that the numbers seem to make sense. The revised estimate

also has a slightly different volume, reduced volume. And that would be because you're looking at a three-dimensional surface underneath instead of just creating a box underneath the vadose zone.

Any questions or comments on the approach taken for the revised estimates?

ROBLES: They have to think about it.

ZUROMSKI: And again -- and the reason we're presenting this to you today in this data and these approaches is because this is what you're probably going to see in the draft ROD and we don't want you to all of a sudden be surprised at what you see. We want to give you a chance to comment on the approach that we're taking. That's why we're presenting that to you today.

FIELDS: You can see our revised estimate for the TCE mass actually falls in between the feasibility study estimates. So, you know, there's -- looking at it that way I think it was just -- it was maybe overestimated slightly for the carbon tetrachloride primarily in the FS.

RIPPERDA: I guess I'm waiting for you guys to --

ROBLES: Keep going.

GEBERT: What you're saying here is that the total mass of the carbon tetrachloride underneath the site

is this figure here, revised 468 pounds?

FIELDS: That would have been pre '98 or pre-SVE. 468 pounds.

GEBERT: That's like one drum. That's all that was spilled?

FIELDS: That's what can be estimated from the concentrations that we observed in the vapor. Not that that's all that spilled. I mean, certainly, obviously a lot of that that was spilled was transported to the groundwater. The groundwater has impacts. There is either natural attenuation of some respect, but I would imagine -- I mean, you know, it's been since the, what, '60s, '30s. I mean, there's been plenty of time for there to be transport. But this is -- I mean based on the best data we have right now, this is the mass estimate that we can come up with.

GEBERT: So it's all gone to the groundwater, for the area. I have to look at the data to see it. I just --

FIELDS: Okay. Just to touch quickly on some of the operational data from the SVE system. This is a cumulative mass curve and this is what we would be looking at for asymptotic conditions being met. Phase

25 4 is what was done from January to May of this year.

1 And you can see, at least during that Phase 4, we
2 certainly wouldn't be considered asymptotic. So I
3 think there's probably some additional SVE extraction
4 that could be done at the existing pilot test well for
5 additional mass removal. In that Phase 4, about 17
6 pounds of VOCs were removed.
7 Just to get an idea of some of the vapor
8 concentrations, this vapor well, Vapor Point 25 was
9 located approximately 80 feet from the vapor
10 extraction well, and you can see the concentrations
11 quickly bottomed out and did not rebound over the
12 duration that we're -- you know, where it was
13 evaluated.
14 ZUROMSKI: If you want to see where that well is,
15 there's a map on the last page of this handout sheet,
16 and then you can see extraction well or --
17 FIELDS: One more back, Mark.
18 ZUROMSKI: 25. You can see. It's right next to
19 VP 1, the center, off to the right-hand side. 25.
20 FIELDS: Mark, it's -- next page. I'm sorry.
21 Vapor point 26. It's also 80 feet away. You
22 can see that concentrations in that point as well
23 quickly -- were quickly reduced by the vapor
24 extraction system. And you can see a slight rebound
25 in concentrations during the shutdown period from the

end of Phase 3 to the beginning of Phase 4 and then those are -- have since decreased.

Vapor point 34, which is about 280 feet from the vapor extraction well. You can see there's a nice decreasing concentration trend. Even during the time when the pilot system wasn't running we were still getting some decreasing concentrations in Vapor Point 34.

And then Vapor Point 36, which is 600 feet from the extraction well, which we would assume would not be impacted by the vapor extraction, you can see that it kind of jumps around a little bit from an initially low and then kind of jumps up. But you can see that there's, at least since August of '99 there's been a general decreasing trend in concentrations from that well, or those points within that vapor point location. This was that Mann-Kendall test that we mentioned earlier.

The only well that was identified as being probably increasing was this monitoring well 24, and that well is very close to vapor Extraction Well 1. So that would be -- you know, that may -- that's probably expected with the pre-'98 data of where the highest concentrations of VOCs were. But then the Wells 23, 13, 16, 7, 8, 11 were all stable or

decreasing, using the Mann-Kendall statistical analysis.

And in summary, if you look at the revised mass estimates for carbon tetrachloride, the 468, the 9, there's been a 98 percent reduction in carbon tetrachloride concentration based on those mass estimates, 67 percent mass reduction in TCE. The SVE system removed approximately 220 pounds of VOCs, 207 of which were attributed to carbon tetrachloride. The VOC concentrations in most of the vapor points seem to be decreasing, and the aquifer 1 groundwater concentrations are generally stable or decreasing.

So I think the point is things look pretty good. I think what's been happening so far has been effective and basically is still kind of determining where to put the -- any additional wells and where -- since we do have some elevated concentrations on the outskirts of our monitoring network, there may be a need for evaluating the need for additional monitoring points outside there to try to get a handle on the extent of VOCs.

ZUROMSKI: And also maybe to confirm some of the ports that had been plugged --

FIELDS: Right.

ZUROMSKI: -- in the estimate that we're making

right now as well, where there's maybe some lack of information in certain areas. Because the ports are plugged in some of the vapor monitoring points --

FIELDS: Right.

ZUROMSKI: -- we might have to install new points to -- especially not only to evaluate whether or not we need to continue that SVE at a certain point, but also for over a long-term periodic monitoring we need to be able to have reliable points to show that the site has achieved remedial action objectives as well.

FIELDS: Right.

RIPPERDA: So if this is all true, I guess it makes me happy that things are better than they seemed. I guess I feel bad for NASA, you guys didn't do this six months to a year ago, but --

So what's going to be the conclusion? Basically you're going to write the ROD with call for SVE, even though if this is all true, you may not even have to do much more. But you could still go out and reopen some monitoring points, maybe install a couple new monitoring points.

ZUROMSKI: Part of the strategy, actually, with installing monitoring points was, for example, when you go back to that map with the TCE and you see some outlying areas where there are higher concentrations,

was to -- in order to, number 1, confirm boundaries of those areas, drill the monitoring point. And if we find during the drilling that that's going to be a good area to do more SVE, convert the monitoring points into extraction wells, and then put more monitoring points around them. So we're going to try to, instead of just putting extraction wells in, drill the monitoring points, do some confirmation sampling as we drill them, then decide whether or not that monitoring point should become an extraction well or not. So that's part of some of the approaches that we're taking as well.

ROBLES: I want to make it clear we're not proposing that SVE is over. That's not what we're trying to propose.

What we're trying to say is that either the chemicals in question have migrated into the groundwater over the years and that there's not a lot of mass within the ground, but the pilot study has been very effective, but that we still have to bound the area. We're still -- it's not over. We got to go out there and prove that the site has gotten to a level where rebound is minimized, is cost effective (UNINTELLIGIBLE) levels. It's just showing you that it's better than what we thought. And that's one of

the things, because, you know, how effective this SVE is is very important to us and has to be determined. We're not saying SVE is over. No. Not by a long shot. We still have a lot to show here.

ZUROMSKI: Actually, in that new data, the July data, we're continue -- I guess we're going to do another round pretty soon and we're going to try to confirm the July data and basically take that data -- probably should -- I'm not sure.

Are we doing that next sampling round before the draft ROD or after? I think it's afterwards.

FORD: December.

ZUROMSKI: December?

FORD: Scheduled in December.

ZUROMSKI: So probably around the time we'll be deciding whether -- you know, where to put new wells or where to add additional monitoring points, will be the time we're going to be doing another sampling round and try to incorporate that all into the next sampling round. And that's later on this year.

ROBLES: So if you want to take this and look it over and make some comments about -- it's a shock, so you've got to look at it and make comments on it. But that's what we want to present. We don't want it to become cold. (UNINTELLIGIBLE). If you have any

concerns or questions, please feel free to give us a

call to discuss (UNINTELLIGIBLE) incorporate (UNINTELLIGIBLE. But I want to make it clear SVE is not over.

ZUROMSKI: And we also -- the big thing is really the approach that we're taking. There's issues with the approach that we're moving on with the ROD. Those are the things that we can get input on now that we can incorporate early on rather than waiting until we're in the draft final, we're getting to that final stage. Better to get them in now, get those comments, check the comments now on the approach. And that way we can make this just go along a lot smoother as we get towards final ROD. That was the purpose of this presentation.

Does anybody else have any other questions, comments, concerns at this point?

I know it's a lot to chew on just for the time being, but -- okay.

RIPPERDA: I've always asked for this and it's never really been formalized, but I'm definitely hoping to get some, at least some soil samples for perchlorate during the SVE.

One of the holes in the whole of OU-2 RI/FS was that it completely ignored perchlorate. I thought

I'd just throw it out. Well, we'll let you ignore perchlorate in your OU-2 as long as when you go to do

the SVE work you take some samples of perchlorate so at least you know what kind of mass source potentially is still there for your long-term perchlorate modeling. I know you can't really -- there's no way now to treat perchlorate in the vadose zone, but I'm still hoping for some perchlorate samples from the bore holes that you drill.

ZUROMSKI: And also that -- that's also part of the approach that we're taking, which we'll talk about later, with our in-situ pilot study that we're working on as well. So that might be another good opportunity to do that.

ROBLES: Okay.

ZUROMSKI: Richard or David, any more -- any comments right now?

GEBERT: No. Just the expected delivery date.

ZUROMSKI: Like I said, the draft ROD, probably -- I would say the best estimate is probably three weeks right now. And I don't want to say earlier than that, if it's not in your hands by then.
But I would say probably weeks from now.

RIPPERDA: So really none of this data really affects the ROD, the whole process of the ROD is gonna

stay the same, this data may strongly affect the work plan.

ZUROMSKI: Exactly.

FIELDS: Right.

ROBLES: Uh-huh.

ZUROMSKI: Exactly. And that's why we're trying to get comments on the decision, the way the decisions are going to be made more than, you know, the output of the data.

FIELDS: What will be in the ROD is the flow chart, performance objectives. The fact of not setting numeric goals within the ROD to say X value will be achieved. It has to do with the location of the detection of the VOC and then transport model.

BURIL: I believe what you really got with this change in the mass estimate is establishing more definitive parameters for design as opposed to anything else.

FIELDS: Correct.

GEBERT: It's going to affect the design much more than the ROD.

ZUROMSKI: And we have ideas for design that we're working on right now, too. Those will probably be forthcoming fairly soon as well.

Okay. Well, we do have a full slate here, so

let's go ahead and move on to the next presentation this morning. And that's going to be a discussion of our interim removal action, Operable Unit 3. And CH2M Hill is going to give you a presentation discussing

some of our preliminary recommendations that we're evaluating. There's three alternatives that we're going to be evaluating in the EE/CA. And we're going to go through those three alternatives. We're also going to talk about the introduction of the ARARs and the removal action objective. And then we'll talk about the current modeling results, and also the results from the extraction well modeling as well.

And that would be the big presentation on the second handout this morning.

Does everybody have a copy of the second presentation?

WONG: Good morning. My name is Bryant Wong of CH2M HILL, and I'm helping -- Hooshang Nezafati with the EE/CA, the EE/CA for the groundwater treatment at JPL.

Richard stole a little bit of my thunder. But the presentation, as Richard indicated, is as follows: First we're going give a little overview of the groundwater EE/CA. Then we'll discuss some of the remedial technical alternatives. Ken Martins will be

discussing that.

Then we'll discuss the ARARs. Peter Torrey will be talking briefly about that. And then discussing the groundwater modeling results, the preliminary results. And Eric Aronson will be leading

that discussion.

The crux of the groundwater EE/CA can be summarized by this simple single removal action objective statement. And what it is, is simply to reduce migration of site-related chemicals to the City of Pasadena and other water purveyors, drinking water production wells. That's our removal action objective.

RIPPERDA: Quick comment. If this is actually going to go into the EE/CA --

WONG: Yes.

RIPPERDA: -- then you should remove "City of Pasadena," and just say "water purveyors." We don't want Lincoln Avenue or other water purveyors to feel like they're second class.

WONG: Point taken.

ROBLES: Good point. Good point.

ZUROMSKI: How about just, then, "to reduce migration to site-related chemicals to drinking water production wells"?

RIPPERDA: Yes.

WONG: As part of the alternatives development, there's two components. There's the development of looking at various pumping scenarios within that treatment technology alternatives. The "pumping scenarios" refers to the effectiveness using the

groundwater model, and from that a single pumping scenario was then identified as the most effective scenario to meet our removal action objective.

Then three treatment technologies combinations were coupled with the selected pumping scenario to assemble the three alternatives that we're looking at in our EE/CA.

And that segues to the VOC treatment.

MARTINS: I'm Ken Martins, CH2M Hill. I'm going to talk about treatment. I'm a chemical engineer, spent many years in process engineering.

I want to talk about VOC treatment first. What we did there is, we just compared a liquid phase carbon treatment versus air stripping and kind of screened it to -- against each other to select the VOC treatment that we want to couple up with perchlorate treatment with different alternatives. So we first looked at liquid phase activated carbon treatment adsorption versus air stripping. We selected liquid

phase adsorption carbon treatment because it has similar costs as air stripping. That's similar capital O&M cost, but it's a simpler operation and really has better public acceptance. And between the two of those we thought that was good advantages towards carbon treatment as opposed to stripping.

Now, regarding perchlorate, we're going to

couple that up with -- the VOC treatment technology which we just mentioned is going to be the carbon treatment. The perchlorate technologies that we're going to evaluate are ion exchange using a bifunctional resin. That's not the ISEP process, but we're going to talk about that a little bit because we know you're familiar with that. Ex-situ anoxic biological treatment, and a subterranean bioreactor type treatment, which is also an anoxic biological process.

Now, the ISEP process, it was eliminated due to water quality impacts. The ISEP process is also an ion exchange process, but it uses a non-selective ion exchange resin. What that means is that it exchanges not only for perchlorate as targeting at, but it exchanges also for nitrate, sulfate, and most significantly, also for bicarbonate.

Now, to generate using a sodium chloride

solution or a brine, when it exchanges for all the other anions it causes an increase in the chloride level. We've confirmed this with data from the La Puente site, which is a currently functional ISEP process unit that's being used for perchlorate removal. Also causes a slight depression of pH because of the bicarbonate removal.

Now, for those that may not be familiar with

the ISEP unit, and I'm sorry about the graphics of this. It just comes out a little different when it's printed out. But you have a -- these vessels are arranged in a kind of circular pattern and maybe like three-fourths of those vessels are aligned and treating water. And it does throw in through a single bed at a time. Not in series, but actually one bed at a -- it's a one -- all the beds are in parallel, if you will. So the water passes only through one of the beds at a time. Then you have a portion that are under generation. And it's all done sort of in a continuous process, stepwise fashion.

Now, the ISEP process causes unacceptable changes in the water quality. For example, the process, you know, adds chloride to the treated water. The Basin Plan, for example, is only 100 milligrams per liter limit. That's based on input we have from

the Regional Water Board in response to the first draft of the FS. The existing groundwater, on average, is something like 25 to 30 milligrams per liter of chloride. Peak levels might be like 50 or so, in the area. But the ISEP-treated water might be in the range of 50 to 250.

Yes. Richard.

ZUROMSKI: And I guess we can -- we're looking at this problem right now, as a matter of fact, with

groundwater from our pilot study and we've had the same types of problems. So I think we've talked about this at past meetings, especially when we demonstrated the use of a non-selective ion exchange resin. And the data that we've seen on the site has shown that we're in about the 100 to 150 milligram per liter of chloride in our initial effluent. Once the ion exchange process does comes up to speed it comes down, and we have some data to show that as well. But we're dealing with that right now. And I know David's familiar with that problem too.

So that's what, really, he's talking about today, is that problem with the ion exchange cell.

MARTINS: Right. And I mentioned, too, it was confirmed that the La Puente system also is a full-scale system. Now, in La Puente it's not an

issue for them because it's serving as drinking water, which you have, you know, secondary MCLs of 250 for chloride. But in this case we have the Basin Plan limiting it to 100. And we do intend to reinject the water, so we need to meet that limit, and that causes some concerns for us. But it also causes a slight depression in pH, which causes a need for some additional treatment.

Alternative 1. That's going to be liquid phase carbon for VOCs in the bifunctional resins.

Actually, I was shooting for perchlorate. So you have the extraction wells passing first through the carbon treatment, then through the ion exchange resin for perchlorate, then into injection wells.

Looking first at more detail at the carbon treatment, it looks something like this. You got a pipeline from the wells. We're going to have each -- the water is always going to pass through two carbon beds in series so that we can sample between the beds to monitor for saturation of the lead bed. There'll be a total of five parallel trains of carbon. The first one's shown and then four shown in parallel with the dotted box. Each vessel is going to be roughly 20,000 pounds of carbon on line and each will process something on the order of about 600 to 700 gpm.

Yes.

BURIL: You just answered my question.

MARTINS: It'll backwash to a backwash tank. We're going to treat that with a glass-approved type polymer, which is generally recognized as a safe designation for water treatment chemicals. To remove the carbon fine, it's a small amount. This is also relatively uncontaminated carbon. We've only typically backwashed with the virgin carbon and get the carbon dust, the fines out. And then we'll have -- so we'll create a small amount of solid waste,

which will be trucked off site or removed off site and drummed, actually. It's a very small amount, just a few cubic feet a month at most for backwash. And the water from that's recovered in a process back to the head of the system.

Now, the ion exchange treatment is a little more complicated here. We have the pipeline from the carbon unit. I made a slight change in the diagram on the -- your handout. That's from the wells. It's coming from the carbon units I just mentioned. Passing first through bag filters and then into the ion exchange units. The ion exchange units we set up with three vessels in series at this point. We might get -- we might be able to optimize it further and

look at this two in series, the data from Oak Ridge National Lab, who developed this process. It was very -- it requires a very quick turnaround time in the beds in terms of the water passing through. It moves the perchlorate in very shallow depth, so we can probably operate with just two, but we're being a little conservative right now due to this cost estimating effort, we thought we'd go ahead and go with the three-bed round robin setup. I'll describe that.

Chuck, you had a question.

BURIL: Yeah. The bag filters, what's their

purpose?

MARTINS: Well, just to remove any traces of carbon fine that could come through from the carbon beds and to protect the ion exchange units. They're relatively cheap and they provide a cheap protection for the beds. They are going to be on line for six weeks at a time and we wanted to minimize the build-up of back pressure. It's a finer material than the carbon beds, the head of that, and so they could collect some solid (UNINTELLIGIBLE).

BURIL: What provision, if any, have you made for biological fouling of those?

MARTINS: Oh, of the resin beds?

BURIL: Of the bag filters.

MARTINS: Oh. The bag filters will be replaced on some frequency. It will be differential pressure switches across it when it hits, say, a 20 psi differential, open them up, change them out and you dispose of the bags.

Now, the three-bed round robin, how that would work is the first bed would be the lead, the second bed is in a lag position as a polisher, the third bed is on standby or in regeneration. When the first bed expires or is saturated, what was the second bed would become the first bed in the series. The standby, which is virgin or, you know, regenerated,

becomes the polisher bed position. And in what was the lead bed that expired goes into regeneration and then standby.

The regeneration process for this is -- it's more complicated. When Oak Ridge did its research with bifunctional resin, they found that it is very difficult to displace the perchlorate because it's very selective of perchlorate, which is why it is difficult to displace. But there was a process they developed using therachloride and hydrochloric acid. A combination of the two in a molar ratio of one to three, you get ferric tetrachloride, which is an

anion. That can displace the perchlorate. Okay? Then what we do is we rinse the resin with a dilute hydrochloric acid to dissolve away the ferric in a secondary step. So the first step you displace the perchlorate off. And the next step you rinse off the ferric itself.

BURIL: What ultimately is perchlorate replaced with on the resin itself?

MARTINS: Ultimately it goes back to chloride form.

Now, there's waste generated from this. There's a concentrated ferric waste and -- but a small amount. We're going to recover most of it and just dispose of the first third, where the most

concentrated part of it is and reuse the second two-thirds of it and then make it fresh for the last third for the next regeneration.

Then there's a larger volume of the rinsing from the hydrochloric acid. But we have a recovery process for that so that will be used again and again. We get a small waste from that, but that will just be combined with the waste from the ferric and trucked off site. There will not be on-site treatment of the ferric waste at this point.

All right. Now, we mentioned earlier about

the water quality impact for the ISEP process. So we felt it was important to cover what the water quality impacts for these alternative processes here.

Now, for the VOCs, the carbon tet, TCE and DCA, the carbon, of course, removes those to below MCLs. The perchlorate and nitrate will also be reduced to below their action level from the perchlorate. And in the case of nitrate, it actually comes in below its MCL, which is 10, as nitrate -- or as nitrogen -- sorry nitrate not nitrogen.

Chloride will be increased slightly, but a small amount compared to the ISEP process. And then TDS won't have any really significant change overall. Maybe one or two units either way.

GEBERT: Excuse me.

MARTINS: Yes.

GEBERT: Where did this data come from on the slide? Source slide?

MARTINS: Do you want to go backwards, Pete?

GEBERT: Is that from --

MARTINS: Which data in particular? The inlet or --

GEBERT: On the other slide. The treated water data.

MARTINS: Okay. Well, in the case of the VOCs,

based on well-known experience with VOCs for carbon removal. In the case of the chlorate and nitrate, Oak Ridge has done very extensive pilot -- bench and pilot scale testing with this bifunctional resin. And it's -- they've done maybe a half dozen different tests. Lots of literature out there regarding that. And their data all show that they can meet the 18 action level, pretty readily.

BURIL: So this isn't based on any actual pilot test of water taken from JPL?

MARTINS: Not effectively a JPL test. No. Right.

BURIL: Is there any full-scale system that utilizes this particular technology?

MARTINS: No. Just pilot scale level data that we have for Oak Ridge only.

So in our EE/CA, and even in our costing, I

added a little more contingency with this particular process on the cost. And we're going to talk about that issue with implementability issues in the EE/CA, that there is a little more risk with this process than the other process because it hasn't been done full scale. And that will just play, again, in the final decision for us.

But it's -- the data looks pretty -- really very, very solid, you know. There's lots of ion

exchange experience, of course. It's just this resin is something that's a little bit new in the regeneration process.

Does that answer your question okay?

GEBERT: Yes.

MARTINS: Okay. Alternative 2 is going to be an ex-situ anoxic biological treatment for perchlorate and then follow that by carbon for VOCs.

Now, in this case we reversed the order because we're going to get some removal of the VOCs with the biological treatment. And so we thought by reversing the order we -- doing the carbon secondary, we can save a little bit of carbon. But, you know, that could change later on, because there are some costs we've got to incur by capturing the head spaces of the reactor for the bioreactors and treating those with vapor-based carbon, and we need to take a closer

look at that. We do save some liquid phase carbon by doing this, but it's not a really huge number, honestly. And we might find it's simpler overall to reverse the order. But that's a design decision later on.

Okay. Now, we've already looked at the carbon treatments so I won't look at that again, but let's focus in on the ex-situ biological treatment.

Okay? This is modeled after the U.S. Filter and ENVIREX division process, which was pilot tested here. We had the pipe up from the wells. We add substrate which is a carbon source ethanol, and nutrients. We go into a fluidized bed reactor. There will be probably four reactors 14 to 16 foot diameter. The waters pump into the bottom.

There's a recirculation of the clean air if you have a little bit higher rates. We fluidize the bed of carbon. The microorganisms grow on the carbon, attach to the carbon. As they continue to grow, the carbon becomes less and less dense because the microorganisms are not as dense as carbon. They accumulate in this center section of the internals where there's a pump loop that abrades the carbon, removes some of the microorganisms off the carbon. The heavy carbon gets thrown back into the fluidized bed with the microorganism removal bed are pumped off

out of this little center cone area and sent off to the backwash tank, or be a sludge tank.

The water coming off this unit, though, still has a significant amount of microorganisms in it because as you have the fluidized bed underneath it, you have some just naturally break off because of the fluidized bed itself. It's not as aggressive as

pumped bed is, but it gets them off.

So we follow this with a media filter, a multimedia filter type where we polish the water, remove the remaining microorganisms, or at least the majority of them. Okay. And that's backwashed off and that goes into the backwash tank.

So then all the microorganisms and biomass are accumulated in the backwash tank and there we treat it like we described before for the carbon unit where they use a plate and frame filter press or some similar device, take it out as a solid waste. The treated water from that, the filtrate from the filter press, will come back to the head of the process. So once again, we only have a solid waste in this instance. (UNINTELLIGIBLE) or sludge waste at least. And that should be -- that is not going to be a hazardous waste. It's going to be innocuous waste.

Okay. I think I covered it all. So there it goes on to the carbon units, or vice versa.

Water quality impacts of this process. Once again, the VOCs are treated down below MCLs. Once again, perchlorate and nitrate are treated down below the interim action level for perchlorate and the MCL for nitrate. In this case, though, the differentiation is it increases the chloride and TDS

or chloride. There really should be no significant change in that value. Maybe plus or minus 1 or something similar to that value.

Finally, Alternative 3. Subterranean anoxic biological treatment for perchlorate and liquid-based carbon treatment. In this case here we chose to do the carbon treatment first because on the case of a subterranean bioreactor we felt it would be harder to control the head space vapor control off of that. So we felt it was probably a safer bet in this instance to try to do the carbon first. Plus, we actually had some other ideas about reinjection right after the treatment made it more sense to do the carbon first, too.

So the water comes from the carbon adsorbers. We're also going to be adding the ethanol and nutrients up front. In this case here it just goes right to the bioreactor. Now, instead of having carbon with a fluidized bed configuration like the ex-situ process I just described, it's just going to

be packed rock, something like half inch, three-quarter inch kind of size rock. But it's going to be big. It's going to be, you know, ten times the volume of the other reactor tanks. The microorganisms will grow on the rocks and accumulate on there. Okay?

So as the water passes through, they'll adsorb the perchlorate and utilize it as well as the nitrate. And this process produces a lot less biomass than the first process because it has a much longer sludge age. So the sludge -- the microorganisms themselves can decay and do what's called endogenous restoration, which means they eat themselves, actually.

But we do have a trace amount of microorganisms that make it through the system. So we -- we -- you know, we're going to polish that water after the reactor with a multimedia filter once again so that we can go to injection wells and not foul up the injection wells. That's the main objective there. That multimedia filter will be backwashed into our backwash tank and we'll remove the biomass once again with the plate and frame filter press. The filtrate from that press once again will be returned back to the head of the process, like before.

BURIL: What was the metabolite that you put in at the beginning?

MARTINS: Ethanol. We looked at acetate, but

since we actually have history here of ethanol used for the ex-situ process that we tested, we know that it could function. It's a lot cheaper. I was shocked how much cheaper it was. So we're -- ethanol is what

we're looking at. So it is -- there is going to be -- there will have to be a fire -- explosion-proof tank set up and such, and controls.

BURIL: Explosion-proof parking lot.

ROBLES: How big is this? We're talking about nine acres. Right?

MARTINS: Yeah. Each -- there's three reactors that will be in parallel. Three acres each, a total of nine acres, roughly. You know, things will change in design, I'm sure. But that's just roughly.

BURIL: You make the presumption here that the ethanol is completely consumed?

MARTINS: Well, yes. However, we -- even if it's -- it's going to go to the injection well, and actually if there are trace amounts left in there, it will simply help with some in-situ degradation of other trace perchlorate that may be in the aquifer. By the time that water gets in a drinking water well it would definitely be all consumed.

Now, if that became a concern, we can add some kind of anaerobic reactor following that as we would with a polisher. But at this point, we don't

think that's needed.

Okay. Water quality impacts.

NEZAFATI: Did you mention that in order to make

sure that the injection wells are not clogged you have additional filter?

MARTINS: Yes.

NEZAFATI: Okay.

MARTINS: We mentioned that. And that was the main incentive for adding them. Unfortunately, we had to kind of protect the injection wells from biomass accumulation.

So I think this is my last slide. Treatment results and water quality impacts for the carbon with subterranean bioreactive process. Identical, as we described earlier, for the other bioprocess, and that is going to treat all the VOCs to MCLs, perchlorate to the interim action level. Nitrate would be driven down to nil. And chloride and TDS will have no significant change.

And I think ARARs start next.

Anybody have any questions on treatment or --

ZUROMSKI: Any questions?

Actually, did you want to talk about --

ROBLES: Wait until after.

ZUROMSKI: After the meeting?

ROBLES: After the meeting.

TORREY: My name is Peter Torrey, and I'll just give just a brief few minutes here on the applicable

or relevant and appropriate requirements.

Probably the most important issue is that this EE/CA and this interim removal action, or this EE/CA is for an interim removal action. And that means that the final remedy will meet the cleanup ARARs inside the groundwater plume. Interim action will address the other ARARs, such as the injection limits, location-specific ARARs for the implementation of the interim removal action. And again, the final remedy will address the cleanup levels in the groundwater.

And the other thing I wanted to point out is, we've begun the process of identifying State ARARs for things that we think are State requirements that will apply to the interim action, and we would like your input to help identifying things that you might think are ARARs for this.

ZUROMSKI: Right. I think we're -- part of this today is really to give everybody, at least the three of you, a good picture of, again, what -- for the removal action what we believe are the ARARs. But at the same time, we need your input as to what additional ARARs you may think are applicable, relevant or appropriate. So we're actually -- this is

25 a quick introduction, but we are sensitive to you as

1 well if you feel that there are any additional ARARs
2 that we're going to need to the EE/CA. And if you can
3 get those to us possibly before we give you the draft
4 EE/CA, that would be very helpful.
5 TORREY: And again, the final remedy will -- there
6 will be another ARARs analysis to introduce the ARARs
7 that are applicable for the final remedy.
8 One of the primary -- one ARAR that addresses
9 the injection is the Regional Board's requirement for
10 waste discharge requirements. As most of you probably
11 know, permits or other administrative requirements are
12 not required under CERCLA actions, but we understand
13 that those WDRs are pretty much on a case-by-case
14 basis. There are some general permits, but it doesn't
15 look like any of them apply to this. And so we have
16 to consult with you to get those, get the action
17 numeric limits for discharge. You know, we've pretty
18 much made the assumption that it's going to be Basin
19 Plan objectives because we've seen other general plan
20 discharge permits. But we just want to open that up
21 for discussion and make sure you let us know what
22 those injection limits are.
23 There are other -- some other
24 location-specific ARARs and, you know, some of the
25 minor ones, but we wanted to bring up these.

Another one, a significant one we're looking at is the California and Federal Endangered Species Act for the Arroyo toad. And we're placing our conveyance pipelines, and once we get those locations set we'll know whether that's an ARAR for the site if we have to cross, you know, some of the habitat. Those ARARs prohibit the take of endangered species, and we think we can mitigate that.

That's really all I have. I just want to hear some comment from you, if you have any at this point, on other State ARARs or other ARARs.

ZUROMSKI: And just for your information, our proposed delivery date is sometime toward the end of October to get you a copy of the draft EE/CA. And so if sometime prior to that time, preferably maybe this month, if you do have input on ARARs, if you could submit those to us so we can include them in the draft process so that by the time you get it we could -- again, we're trying to facilitate the document preparation. So that if you can give us any of that information before we give you the draft, it would really be helpful.

YOUNG: I'll do my best to find out if there are any applicable ARARs that we want to discuss because we want to implement them.

ZUROMSKI: And if we need to have a separate meeting to discuss them as well, CH2M Hill, myself, Peter, we would all be happy to do that as well.

RIPPERDA: There are probably not any hidden ARARs. CH2M Hill must have written a ton of RODs and got all the standard Department of Transportation, RCRA and Air.

TORREY: Right.

RIPPERDA: Just have a standard list that you go through and cross out either they are applicable here or they're not.

TORREY: Yeah. Just -- I mean there are some tricky issues just with, you know, the different things we're doing here. And reinjection is not a typical, you know, solution to -- you know, lots of times it's (UNINTELLIGIBLE) to purveyor discharge the surface water. So that's -- you know, that's one thing we need to put on and there's always some small site-specific things that we -- you know, takes a good look to identify everything.

ROBLES: Okay. One down. One more sheet.

ZUROMSKI: Yeah. One more sheet. And I guess

this kind of goes back to Ken, is the cost.

MARTINS: I don't know if we have it on the --

ZUROMSKI: Yeah. I don't know if it's on the -- it's not on the presentation, but everybody should have a copy of that.

ROBLES: This shows the relative cost of each of the alternatives. As you can see, we put three zeros behind each of them.

ZUROMSKI: This includes piping --

MARTINS: Capital cost is --

ZUROMSKI: Capital costs for everything.

MARTINS: -- extraction wells, piping to the system, the treatment and piping to those injection wells and the injection wells, and 10 monitoring wells.

ZUROMSKI: And 10 monitoring wells?

MARTINS: Yes. That's a bonus.

ZUROMSKI: Oh.

ROBLES: Now, my question to the regulators is this: If you notice, we do not have ISEP down there as proposed, because Ken Martins basically stated that we can't meet the Basin Plan with it. If we want to lower the cost of these things, if we can get relief from the Basin Plan, then we can put in a fourth alternative, which is the ISEP system. But right now

the Basin Plan is a major hurdle for us to get through

because of the fact is that over in La Puente, they're doing some drinking water treatment which is at a higher level than the Basin Plan. That's the Regional Water Quality Control Board. So that's the question that I'm asking.

Now, these are going to be the costs of what we're talking about, our three alternative. So if we want to lower the cost, one of the biggest issues is the Basin Plan.

RIPPERDA: You should always include -- if ISEP is something you want to consider, if you want to possibly propose, you should include it.

ROBLES: Okay.

RIPPERDA: Things always fall out of the screening process. You never go with only the alternatives that meet the preliminary screening and all criteria. You're supposed to throw out more ideas and let things get screened out. And if the Basin Plan screens out the ISEP process, that's okay. At least you've got it in there. You've got the cost. And it's, you know, available for discussion -- if you don't include it because you're afraid it won't meet a screening process, then you won't have a way to discuss it.

ROBLES: Okay.

TORREY: One thing I might point out, the way I understand the Basin Plan, too, is that these are

water quality objectives for bodies of water and not necessarily, you know, discharge requirements. So there is -- there is flexibility with the Regional Board to -- I mean, generally, they set their discharge requirements at the Basin Plan objectives because if the discharges don't violate the water quality objectives, then the water is not going to. But there is -- there is flexibility for them to allow a higher -- allow the discharge to be higher just so the body of water doesn't exceed the Basin Plan. You might be able to --

YOUNG: You're right. And the sites and the discharges are evaluated on a case-by-case basis. So again, we can review this and see if there's potential for, you know, making this available -- an available alternative. So --

ROBLES: If you could consider that. Because as a removal action, it might be prudent. As a final remedial action, it might not be. So this is the removal action for containment of the plume. So I'd like you to kind of look at that and see. Because I think that we need to add the ISEP system as a fourth alternative with that and let the Basin Plan screen it

out, but at least it's good for discussion in that sense. You know, like a cost/value.

MARTINS: Yeah. I could do that for you.

ZUROMSKI: Do you know what it is offhand, by any chance, Ken? What these three numbers would be, the capital --

MARTINS: No. No. I'd have -- but I could -- I mean, I can get it to you next week. I think I have a basiss to do an estimate for an ISEP process through our system.

There's just lots of other fees -- not fees, but other contingencies and, you know, piping costs and site factors and stuff that are added into that. So I can't just --

ZUROMSKI: Okay.

MARTINS: But I did want to mention to you also that we will never exceed the secondary MCL for chlorides even with the ISEP process. So it would be above the Basin Plan, but not above a secondary MCL. I thought that might make a difference for you there.

ZUROMSKI: But again, this is the same issue that we're dealing with right now with our pilot study discharge.

MARTINS: Right.

ZUROMSKI: And if we're, you know -- I guess,

since we've already gone along a little bit in -- you and your folks are already looking at these types of issues, might want to just add that onto the --

MARTINS: Sure. We'll --

ZUROMSKI: -- things we discussed.

YOUNG: If we can resolve this issue that we're going with right now, then maybe that can be preliminary to, you know, incorporating this alternative.

ZUROMSKI: Absolutely.

BURIL: And, David, there's a little bit of a precedent that I don't know if you're aware of, but Valley Water Service just upgradient from us -- does inject water on a periodic basis. Some of it is Colorado River water. But I do believe they blend it to drop down the perchlorate content more closer to the Basin Plan. I don't know that they meet Basin Plan requirements.

YOUNG: Okay.

RIPPERDA: Don't a lot of the purveyors inject Colorado River water at some point, or is it just Valley?

ZUROMSKI: Just Valley.

BURIL: Just Valley, that I'm aware of in this immediate area.

ROBLES: Okay.

ZUROMSKI: So the second half of this is Eric Aronson. And we just talked about the ARARs and the alternatives. One of the parts of that entire scenario, of course, is the modeling and where do we

put the extraction and injection wells. So Eric, I think, when I was not here back in August, did give you a preview of what we were working on and now we're going to present, I believe, the results from all of the work that he's done so far.

ARONSON: Yeah. And this sort of -- Ken talked about sort of the back end. Well, I guess it -- originally discussed that we identified one proposed pumping alternative and then obviously went through the different treatment scenarios.

I'm going to talk about that alternative which was selected. So obviously the purpose of this was for the interim removal action to evaluate the effectiveness of each of these pumping scenarios, or various pumping scenarios, at meeting the RAO, which is essentially just trying to assess how effective each one of these alternatives is in protecting the downgradient or local purveyor extraction wells.

RIPPERDA: Can we take a five-minute break?

ZUROMSKI: Sure.

ROBLES: Sure.

ZUROMSKI: Absolutely.

(A recess was taken from 10:56 a.m. to 11:03 a.m.)

ZUROMSKI: Okay. We're ready. We'll get back -- started again.

And again, Eric Aronson. (UNINTELLIGIBLE) introduction. Please go ahead.

ARONSON: All right. As we were talking about, this is through the interim removal action, so it's focused on, you know, addressing the RAO for the interim removal action and not the long-term or -- remedy of the site. Ultimately, basically what we did was, we looked at a bunch of various permutations and looked at optimizing or coming up with the best production scenario to meet that RAO.

That recently was broadly broken up into three categories we looked at at that time. On-facility extraction wells with on-facility injection wells, off-site extraction wells with on-facility injection wells, and then a combination of both on-facility and off-facility extraction wells.

For evaluating it, ultimately we were looking at moving the well locations around screen intervals to the depths at which the wells would be producing.

And the various pumping rates were to identify which of the scenarios and to move wells around to identify the most effective pumping scenario alternative.

And then ultimately to evaluate the scenario alternatives we looked at determining the capture zones for the extraction wells to -- in comparing those with the perchlorate and other chemical plumes

to ensure that the capture zones were drawing water from those plume areas, particularly so in the area of Well 52 or the location where they're experiencing or have experienced some impacts from perchlorate.

Ultimately, just -- the on-facility only extraction wells failed to meet the RAO, which is, you know, focused on protecting the purveyor production wells. And that's basically a function of distance from those wells.

Richard.

ZUROMSKI: Sure. I wanted to just interrupt momentarily. And one thing that we wanted to clarify was that in the past OU-1 and 3 were called on site and off site. And really the site is a CERCLA site.

So we're trying to clarify that for when we're telling you where we're placing wells. It's on the facility and off the facility, because the CERCLA site encompasses the entire chemical plume. So it's a

little change in the language. Make it more appropriate, CERCLA. So just in case that confused any of you who were working with that on that on site and off site in the past, it's now on site -- on facility, off facility.

RIPPERDA: Thanks, Richard. That clears it all up.

ZUROMSKI: I figured Mark would be the least

knowledgeable in that area. And I'm sitting next to him. I figured that would be the best for him.

RIPPERDA: Thanks.

ZUROMSKI: Sure. You're welcome.

ARONSON: All right. Ultimately, the off-facility only extraction wells, that does provide fairly effective containment for around there. But the best option ultimately for the same total extraction is a combination of off-facility and on-facility extraction wells.

That recommended -- or that preliminary recommendation is a total extraction injection of 3,000 gpm. That consists of two off-facility extraction wells. I'll show you the figures. The next three figures we'll look at some capture zones for the various depths of the aquifer out here. And I'll show you the locations of where these wells are.

Consist of two off-facility extraction wells that produce at 1200 gpm from the deeper layers, layers 2 and 3. And those are located near the Arroyo Well or near the production wells where they are experiencing the impact. One on-facility extraction well that produces at 600 gpm. And it's focused in the more shallow zone. And then the reinjection is from six upgradient facility wells that are operating at about 500 gpm each.

RIPPERDA: A quick question.

ARONSON: Sure.

RIPPERDA: Do the costs of the three treatment options include this configuration of three extraction, five inject?

MARTINS: A little caveat there. Actually, the third well was recently added. So my costs from about a week ago is two extraction wells, pipeline, treatment system, discharge pipeline and six injection wells. So we're down one extraction well, the estimate that you have. So that's about it.

BURIL: Question for you, then. If you didn't have the third extraction well, then, are the capacities, the systems that you costed going to change?

MARTINS: These are all 3,000 gpm. There's two

larger extraction wells versus the three small ones here.

BURIL: I see.

ARONSON: Having this additional extraction -- although we get the same performance in these regions, allow basically for at least distributing some of the production and providing a larger capture zone ultimately by having one located in focus, you know, closer to where the shell chemical is.

What this figure shows here is the fall 2000

perchlorate contours for the -- what's called in the RI report the layer 1 or the shallow interval. And then overlaid with this is the capture zones. This is basically the zones of water that are contributed within, you know, sort of the bounding surfaces. This is sort of the top of -- this layers, I guess the black dashed line is the sort of the top of that and the blue being the bottom portion of the -- what's defined as layer 1.

And then, of course, the reinjection wells looking upgradient in this parking lot here. And this additional extraction well is just a very short distance from the proposed treatment plant location.

RIPPERDA: So even though Extraction Well Number 3 is the only one that produces from layer 1, this

capture zone still swings that far down to the south --

ARONSON: Well, basically, these --

RIPPERDA: -- together with what wells --

ARONSON: Just -- yeah.

RIPPERDA: -- 1 and 2 pull down from layer 1 or --

ARONSON: Okay. This -- yeah. There's going to be vertical grades, because obviously there's water flowing into these wells. Basically water recharged in this area or from the top of layer 1 and from the

bottom of layer 1 end up either in this well or in these wells. So they might end up in the top portion of the screened interval in layer 2. But there is overlap too, as well. These are both producing from layer 1 and 2. This is 1 and 2. This is from 2 and 3. So there is an overlapped area there. This is moving both laterally and vertical, which we see in the -- you know, in these -- as these perchlorate plumes move down and we'll see in the next slides. In the deeper layers they have moved farther to the east. There's focused near the extraction wells.

Here's a similar figure for layer 2, the intermediate interval. What we see here is -- now you can -- a little bit more clear that in the

intermediate depth that these extraction wells are located north of Well 52 and just south or around Arroyo -- the Arroyo Well.

And the purpose of this is to -- you know, obviously provides much protection to sort of move the shift or continue -- well, one of the advantages of this, anyways, is (UNINTELLIGIBLE) located naturally downgradient of sort of where this water has been -- you know, obviously we've seen it migrating. The plumes obviously indicate where it's been migrating. And so it's focused on sort of being in the natural downgradient as it is.

Richard.

ZUROMSKI: Would you back up to that last line on aquifer layer 1 or capture layer 1? I think back on Mark's question. The question was we have really the only extraction well that's screened in layer -- in this layer 1 is 3. Correct?

And I think what Mark's question was is that that's going to be adequate to capture reinjection and the plume in layer 1 because the rest of the water will either move to layer 2 before it gets down to that side of the site.

ARONSON: Correct.

ZUROMSKI: Okay.

BURIL: Could I ask a question regarding construction of the reinjection wells. Where are they screened?

ARONSON: These -- the reinjection wells basically are currently screened through all three layers. Ultimately it's sort of a trade off on if you restrict where you're allowing your injection to go in, then you can start --

BURIL: Why screen in layer 1?

ARONSON: Particularly, I -- I think the advantages, we were just looking at distributing the water appropriately, just putting it solely into layer 1 or whatever would obviously result in mounding, but

allowing it to -- you know, the full length of the screen would be to maximize that interval to reduce the number of wells.

BURIL: Are these passive injection, or active?

ARONSON: These are active injection wells.

ZUROMSKI: But that would reduce the number of wells necessary because they're screened over a large area. Is that what you're --

ARONSON: Often you're relating to the amount of water you can inject -- getting out of an injection well to sort of coming back with a gpm per foot type of estimate. And so increasing your screening lengths

is ultimately going to be related to sort of the capacity.

BURIL: The operations will be much easier, yeah, I agree.

GEBERT: The extraction wells are screened over all four layers?

ARONSON: Extraction well 3 is screened over layer 1 and 2, the shallower portions. And then the Extraction Wells 1 and 2 are screened over layers 2 and 3.

ZUROMSKI: Because layer 4, as identified in the RI, is really not until way out past the site, really doesn't come prevalent until --

ARONSON: That's correct.

ZUROMSKI: -- it's way outside the site.

ARONSON: Layer 4 really picks up more in this area and then thickens as it heads to the east.

Any questions on the layer 2?

We talked about this a little bit. And then basically similar type effect in layer 3. This is the deepest interval. And basically the same type of explanation.

ROBLES: Now, we need to identify that those reinjection wells are in the riding club parking lot that is being leased by JPL. So we're going to have

to go to the riding club to get permission to put those in there. If we don't, then we're going to have to figure out another place to put those reinjection wells.

ARONSON: Just to tell you, for this general area, it's pretty insensitive. We experimented with having a little further north and south. Obviously, that's not --

BURIL: No, no. You missed the point.

ARONSON: Oh, I just want to --

BURIL: The large road there running north-south to what's the eastern side of that parking lot, everything from there west belongs to somebody else. You would be on JPL land proper once you're pretty much on the building that you're in now.

ARONSON: Yeah. I just wanted to note that any specifics to which portions or parcels or whatever is not a big issue.

ZUROMSKI: But it we would require a lease of the property.

ARONSON: Definitely. Yeah. That issue doesn't go away.

BURIL: All right.

ZUROMSKI: It's just who we lease it from. Who is the most friendly.

BURIL: You don't want the answer to that question.

RIPPERDA: How many parking spots do you lose?

BURIL: The correct answer is zero.

ARONSON: Well, depends on where you can locate some of the -- some of the edges of the perimeter of that. So --

RIPPERDA: So how about completely moving them? I know where you've got them now. They're upgradient and kind of creates this, like if you take it out here, clean it, put up back upgradient, kind of like circling the water through the same place. But if you moved them completely south. And I don't know anything about land access, but --

BURIL: South belongs to Metropolitan Water District and also to City of Pasadena as part of the

Hahamongna Watershed Park.

RIPPERDA: So if you did move it south -- and that might be easier access than riding club.

BURIL: Potentially.

RIPPERDA: But anyway, did you model it with the injection wells in an entirely different location?

ARONSON: We did try some other locations, but these were restricted to looking at on-facility locations. Other locations on facility really don't

have the advantages and actually probably detract. Obviously you could have a part -- an issue of separating portions of the plume or things like that. This actually sort of was definitely the best, anything that adds to your hydraulic control a little bit and at worst doesn't do any kind of negative impact at all.

RIPPERDA: Although it sounds like -- either I'm not understanding everything, but it sounds like that's not truly on facility. It's on leased facility, but it's not --

BURIL: It's on leased, yes. JPL calls it their own, but it really isn't. We lease that on a five-year --

ZUROMSKI: What about that street that runs between 180 and the parking lot? Do we own that street?

BURIL: I believe that's the property line.
ZUROMSKI: Do your know the name of the street?
BURIL: As long as you put some water wings on this thing right here we're in, I think you'd be fine.
RIPPERDA: Because like for hydraulic control, I don't really see where going completely upgradient affects the shape of a plume any. It's maybe a convenient place to put it or it may be a safe place

to put it hydraulically, but it doesn't provide any extra control, whereas the way your plumes migrate, you know, just kind of naturally the way pumping and groundwater flow conditions, your plumes kind of go this way. So if you had injection down here to create more force to swing the migration towards your extraction wells -- maybe it would work. Maybe it wouldn't.
BURIL: Sure.
RIPPERDA: But it seems like if you're going to talk about hydraulic control --
BURIL: Is that the one with the southwestern border?
ROBLES: Right.
RIPPERDA: Yeah. Or even like due south.
(OVERTALK)
ARONSON: You're exactly right. And what I was saying, it provides sort of minimal advantage. It

doesn't detract at all, definitely. And it seems to provide some small added control because now you are sweeping water east-west, according to the -- just trying to get back to the information that shut that down. But you do see this basically doing particle tracking from the injection wells. Basically it comes across here, sort of through this area and then some

of it comes around. So it does look to provide some minimal benefit, although water would be basically sweeping across there to a large degree anyway. But possibly moving it south or other types of permutations like that could have had -- you know, provide similar benefit or possibly enhanced.

ZUROMSKI: Is another added benefit possibly flushing of the chemicals to the extraction well, especially through the hot spots on the site?

ARONSON: Well, ultimately water would be sort of flushing through that area regardless. So it's going to be flushing through that area whether or not it's the reinjected water or the other water. But it does -- one of the things is, obviously the travel time between here and here is a pretty lengthy amount of time. So it's not something like, you know, we're flushing through pore volumes.

ZUROMSKI: Right.

ARONSON: It's the same amount of water. It's

going to have this water sweeping through behind it before, obviously, injected water.

RIPPERDA: I just want to see a few more scenarios. In some ways we rush to full SVE without even having a complete mass-in-place calculation done. So I don't want to just say, "Oh, well, of course

we've got to put the injection wells there. Let's go out and spend 35 million if that's not the best place," or there might be cheaper options, fewer wells. Maybe putting the wells right in the corner of your capture zone layer 1 box.

ARONSON: Where is that?

RIPPERDA: To the south. Right down in there. Like maybe putting them there would short-circuit flow from them to the extraction wells so that would be a terrible location. But maybe it wouldn't be a terrible location. So I just want to maybe see a few more scenarios evaluated --

ARONSON: Sure.

RIPPERDA: -- if there are going to be potential access problems with being in the parking lot up there. But you could go all the way -- I don't know anything about land access, but if you could go far enough away so you don't have short-circuiting, like somewhere down in here.

BURIL: Anything that's not on the JPL site

itself, aside from, you know, aside from the western parking lot, which belongs to the riding club, or the eastern Arroyo Well that belongs to the City of Pasadena, virtually everything else is owned by somebody else except what's right in the boundary of

JPL and the Metropolitan Water District or the City of Pasadena.

RIPPERDA: So this is no problem. You can just put wells in there without having to ask anybody.

BURIL: That one, no. That is the western parking lot.

RIPPERDA: Right. So again, it's like I don't care if this is owned by MWD. If this is not an easy place, then why does that preclude you asking about this if you're going to have to get --

BURIL: Oh, no, it doesn't.

RIPPERDA: Yeah. So I guess that's my point, is don't let land ownership preclude where you do your modeling runs. I hate this paradigm, "Oh, we have to look at injection on site only." That's -- because you're afraid to go ask somebody if it ends up being cheaper to use somebody else's property, since what you called on site isn't actually -- I know it's not you. You're just --

BURIL: A lot of work.

ARONSON: I got you.

ZUROMSKI: That's a good point.

RIPPERDA: And also while I'm kind of on the topic, this looks like you're going for full capture. I don't know how well this is going to integrate in

with the ultimate long-term remedy. I don't know what the long-term remedy is going to be, but if this ends up being the long-term remedy, then 35 million, plus or minus, seems okay. If this is an interim remedy, it isn't going to, basically, become the long-term remedy, then this is a bunch of money for an interim action.

So if it's truly going to be interim, you might not have to get such complete capture. You might have to get capture just such that, you know, immediate wells are driven above MCLs, but you can be letting some particles through. So you could maybe do some other runs with less complete capture but that still meet the objectives of not having downgradient wells fill above MCLs or something like that.

BURIL: Would you be thinking of things along the line like saying just Extraction Well 3 as an interim as opposed to all three of them, or --

RIPPERDA: Yeah. Either just Extraction Well 2 or just Extraction Well 3. I'm not sure Extraction Well 3, especially just in layers 1 and 2, is going to be protective.

BURIL: That was just an example.

RIPPERDA: Yeah. But possibly just a single extraction well and, you know, two injection wells.

And if you're pumping less water, then the injection well's going to be closer, maybe two will be on site or something like that.

ROBLES: Good point.

RIPPERDA: I know modeling is not cheap, but it's cheap compared to 35 million.

NEZAFATI: I think Mark answered my question. Our assumption was that for the injection well locations we're restricted to on facility. So we didn't even really look at the off-facility locations because of, you know, discussion with the NASA and what have you. So I think that was the assumption. But what I'm hearing that you want us also look at off-facility locations for --

ZUROMSKI: We need to look at the best locations is what he's saying.

NEZAFATI: If hydraulically we get the benefit, the most benefit, basically, from those locations.

RIPPERDA: Right. With best cost and the best --

NEZAFATI: And the best --

RIPPERDA: Or the best cost benefit.

BURIL: One that has the best technical solution considering all the criteria, not necessarily address

the policy considerations.

RIPPERDA: Right.

ROBLES: And also I heard Mark say is don't look at total capture of the plume if partial capture is cost effective. This is interim. Its main goal is to minimize the impact to other producing wells.

NEZAFATI: That was the second point I wanted to stress, that that's a very good point because obviously we have the model. We can move back and look at scenarios that, you know, have to basically capture as much as this particular one is capturing and then scale it downgrade.

ROBLES: And then we add on the effect of the ISEP, Ken.

MARTINS: Yeah. I'll work with them and see if there's a way of --

ROBLES: And we may need to look --

MARTINS: -- reducing the chloride levels and then we'll look -- we'll include it anyway so it could be compared against and immediately screened out if it has to be because of the Basin Plan. But maybe there's a work-around.

ZUROMSKI: But we should also make sure that even if we -- when we do look at removing extraction wells and removing injection wells and moving them, still being able to obtain the goal of protecting and -- the

removal action objective.

ROBLES: Right.

ZUROMSKI: If we can't meet the removal action objective with less, then tell us that. But also I think Mark's point is how can we still meet that objective with less, if possible.

RIPPERDA: And my comments are relative to NASA, not to you, the guy standing there, but of course you do what NASA tells you to do.

ROBLES: Sometimes.

RIPPERDA: But part of doing this EE/CA, you guys, like based on what they're telling you technically, should be thinking what's the ultimate ROD going to call for, what's your long-term remedy. Is it going to be essentially wellhead treatment and then direct to the -- what customers? Is it going to be just to continue running whatever you have, or do you go with a less complete system than this, and then your long term would be to add like Wells 1 and 3. Or if you start with this and your long term would be to add a fourth well or something. You need to seriously think about what your ultimate remedy is going to be and that will help scale this EE/CA.

ARONSON: Just to give you an idea of one of the things we kind of talked about. Ultimately, one scenario we also looked at was basically operating

these two wells, which provides for the same capture in this area, but ultimately requires more pumping, and it came out to be 3,000 gpm. So redistributing this a little bit and providing for, you know, capturing higher concentrations, addressing things closer to the source zone seemed to be a better option. So -- but it is -- you know, it's very similar for those types of -- for that capture. Again, maybe we should focus -- maybe I'm looking at a smaller area around there. But we're really concerned with drawing things away from Well 52, which is already sort of in -- experienced impacts -- as soon as possible.

ZUROMSKI: How does the Extraction Well 2 impact Pasadena Water & Power's production at Well 52? Will we have to have some type of an agreement with them regarding their ability to produce because our Extraction Well 2 would impact their ability to produce at 52?

ARONSON: One of the things we have going on is, obviously we're reinjecting so we're sort of balancing some of the water coming in and out of the basin. The fact that we are extracting some of this -- well, if these two are operating 1500 each, 3,000 gpm, it's likely to have a little bit more effect on this one,

on Well 52 located that closely. If these are at 2400 gpm, I would still expect to have some kind of reduction in capacity. Not -- my guess is that it wouldn't be extremely significant. Part of that is because, obviously, we know that the Arroyo Well had been operating at very high rates in the past, exceeding the 2400 gpm in this particular alternative that's located there. And it has been able to sustain that. And so within maybe the range of where they're looking at, or have experienced, probably would be within the ranges they've experienced in the past.

BURIL: Has your computer model done anything in trying to predict concentrations of contaminants in various points within the capture zone?

ARONSON: No. We haven't done any solute transport at this point. This is focused on really --

BURIL: There's one concern I'll voice here --

ARONSON: -- (UNINTELLIGIBLE) which is a little (UNINTELLIGIBLE)

BURIL: -- only because I think it's important to maybe give consideration to it, and that is that as you put in Extraction Well 1 and 2 there, depending upon where the zone of capture is in relation to 52, you may draw higher levels of contaminants down to the point where 52 may be able to get an increased

concentration of a given contaminant.

52 currently is only able to pump while blending with Ventura Well. And they are on the ragged edge, from what I've heard from the City of Pasadena, being able to do that. If this scenario would create a situation where the concentrations in 52, particularly perchlorate, would increase, they would lose that well.

ARONSON: Sure.

BURIL: You may very well be in a position of going backwards from what your stated goal is.

RIPPERDA: And that leads -- part of my making sure you guys are thinking about all options is, especially if La Puente is treating perchlorate-contaminated water and then selling it directly, it seems like an EE/CA should evaluate more than just extraction-injection. What about putting a treatment system on Well 52 and actually, you know, including that kind of in your capture zone. Maybe they could pump up at higher rates then.

ROBLES: Consider wellhead treatment.

RIPPERDA: Consider wellhead treatment Well 52.

BURIL: Ultimate disposal of public supply.

RIPPERDA: Yeah.

GATES: I think in our discussions with them we've

had previously in discussing what our options are they're already planning on turning down their production Well 52 somewhat because of the effect that we're going to have on them with our wells being so close. So they're going to have to up Ventura and Windsor anyway. They're already aware.

RIPPERDA: If you give them wellhead treatment at Well 52 --

GATES: Right.

RIPPERDA: -- they could actually increase production a little bit --

GATES: Right.

RIPPERDA: -- so you wouldn't have blending constraints on how much production they have and that way Well 52 would act as a little more of a capture zone well for your system.

GATES: But at the same time we're going to be doing a replacement well and all these other things. So that may not even be necessary. It will depend a lot (UNINTELLIGIBLE).

RIPPERDA: Right. But you should still --

GATES: There will be another new well.

RIPPERDA: You're replacing the Arroyo Well.

GATES: Right.

RIPPERDA: But if Well 52 gets screwed by

perchlorate, then, you know, one of your long-term remedy costs would be replacing Well 52 as well as the Arroyo Well. So, again, it's like open your mind a little bit, evaluate more alternatives.

ARONSON: I guess I had one comment on that and that only would be that right now we see there's a -- got basically the impacts looking at the monitoring wells that are sort of on this, look to be sort of restrained in here. Ventura is not experiencing those impacts. So the operational life, you know, do we want to continue to pull water further south, whereas Well 52, you know, the remedy or extractions (UNINTELLIGIBLE) things start to change and clean up might be a pretty short-lived venture because it is sort of at the toe.

RIPPERDA: Yeah.

ARONSON: It's on the onset of experiencing sort of rising or -- rising perchlorate concentrations.

RIPPERDA: Right.

ARONSON: So it's definitely something to look at. But that might be a consideration in that discussion.

RIPPERDA: Right. Certainly for the good of the plume it would be better to turn Well 52 off and run your Extraction Wells 1 and 2 and that way you're not pulling stuff to the south at all. But reality is

Pasadena needs the water from Well 52. So unless you

were to run Wells 1 and 2 with wellhead treatment and sell that to a purveyor, which you may not have time for in this EE/CA. But again, I just -- I hate to see 35 million poured into something like now rather than waiting six more months or one more year, if possible, to get a better solution. I'm not saying I want to like drag our feet.

ROBLES: No. No. We understand. That's another -- (Unintelligible).

ZUROMSKI: Again, that's why we're having this discussion here today, because we haven't even really developed -- we're in the process of developing our interim draft and we haven't even developed -- I haven't even seen that yet. So you're really getting in on our front end in getting this in the beginning of the process (UNINTELLIGIBLE).

RIPPERDA: I know one of the problems is the DOH requirement for, you know, treating water from any contaminated sites.

I guess I'm still disappointed that two years into this you still haven't started any kind of -- it's like maybe you're not going to ever purvey water or sell water to purveyors or give water to purveyors, or whatever. But since this system is going to cost

35 million, you know, some significant portion of that cost has to be piping, installing wells, pumps, moving

that much water that far, why haven't you guys start the whole DOH review process? You would be reasonably far along so that if it does work out to be more economically viable, you've shaved six months or a year off that DOH review time.

ZUROMSKI: Actually, I think -- is it -- we talked about this in one of our meetings, the DHS 97-005 policy. And we have done some initial analysis with it. Because I'm not sure how much we have done with it so far.

NEZAFATI: We have not done -- this application (UNINTELLIGIBLE)

ZUROMSKI: I know we haven't done any application.

NEZAFATI: No. No.

ZUROMSKI: I know we haven't done any application.

NEZAFATI: Yeah.

ZUROMSKI: But how much of analysis have we done so far in that direction?

NEZAFATI: Well, we looked into the question that Mark has, that why not -- we question the same -- basically we have the same question. Arroyo Well. Can we basically get this back on line and then treat the water with wellhead treatment and give it

purveyors and not inject it. I mean, you're talking about pipeline. We talked about injection wells. There are problems with injection wells. They get

clogged up and whatnot. You have to have waste water and whatnot. There's a lot of O&M.

But what was really discussed and done and we found out that we have -- 97-005 is triggered for that. And then we discussed it with you and reviewed, and then the opinion was, well, we want to get this EE/CA basically in a certain time frame. And that was -- that was basically the decision which you make.

So what we did look into the 97-005 was that when it's applicable to EE/CA, if we didn't have the wellhead treatment and then we didn't give the water to purveyor directly. And then we basically -- our very basic evaluation showed that we didn't have to go through that route.

TORREY: It's the purveyor's responsibility to do that work. But what we do -- maybe this is what you're asking. We do have some information through the RI, information gathered in the RI/FS that can be, you know, reformatted for that -- for that 97-005 evaluation. So it's not like we're starting from ground zero. But there is some of that background information.

RIPPERDA: Okay. But when DOH came and talked to us in this room, whenever it was, more than two years ago, that was before they had done the review of La Puente, and they basically scared you witless by

saying it's a minimum of three years and you said "Fine. We're never going there." But I guess DOH has shown in La Puente that, you know, they can review it, they can review it faster. I don't want to rule it out.

I know the local people, nobody likes drinking treated Superfund water. But they do. It's like -- Hawaii is different. But at all my sites in Hawaii everybody is drinking treated Superfund water and nobody cares. It sounds like in La Puente, you know, they're drinking treated Superfund water and maybe they're not happy about it. I know they're not happy about it because we've gotten calls from Congress saying "Why are you ramming this down people's throats?" And, like, well, because it's the best thing to do. So it's doable. But if you're afraid of the public outcry, you don't think it will get through a proposed plan meeting, you know, fine, do this.

ROBLES: Good point.

ZUROMSKI: Okay.

ZUROMSKI: Any other comments, questions, concerns?

Should we move on to pilot study progress while I've still got Richard here for another 10 minutes?

ZUROMSKI: No more comment? Okay.

All right. Let's go, then, right straight into item number 4, Pilot Study Progress. SVE in OU-2, the six-month pilot study that Geofon did, unfortunately they left, just was completed back right before the last public meeting, in June. And --

BURIL: Remind us what it was.

ZUROMSKI: SVE.

BURIL: Okay.

ZUROMSKI: Right. And as Battelle presented earlier, they removed 17 pounds of VOCs during that pilot study. And right now they are doing monitoring now to decide whether or not we are going to restart that depending upon what the rebound effect is. And so that's being evaluated.

Foster Wheeler packed bed reactor OU-1. David and I have been talking about this on the phone. We all know that back probably about two and a half, three months ago the -- we stopped operation of the

Foster Wheeler packed bed reactor pilot study because we were experiencing clogging. And so we went back. We looked at the technology and we are now retrofitting the technology with a new type of packing material and using solely the JPL native bacteria. And we're working on that and probably by the end of this month we'll be restarting. And our only issue

right now is the disposition of the treated water in the vapor tank that's on the site. The chloride level is above 100, about 150, I think it is. And we're -- I'm in consultation with David right now, and David's management, to decide what we're going to do with that water. And so that's where that is at the moment.

And in-situ pilot study in OU-1 is looking very good, but again, nothing definite. I did get funding for it from NASA. I presented back in May at the Federal Mediation Technologies round table. We talked about this with NASA and NASA management. They are very supportive of this project for the in-situ pilot study and what we're doing right now is there's a Navy research program, ESTCP, Environmental Technology Security Evaluation Program.

KRATZKE: Technology Certification.

ZUROMSKI: -- Evaluation Program -- Certification Program. They have a -- they have four proposals that

are supposedly going to be funded over the next month that involve in-situ pilot studies for perchlorate reduction. And I am trying my hardest to get on that list as one of the selected sites. If that doesn't happen, like I said, NASA has provided us the funding and told us to move forward with that.

So one way or the other over the next couple months here we're going to be initiating the contract

and the workplan for the in-situ pilot study. So that is going to happen. It's just right now are going to build on the Navy and DoD's knowledge or are we going to just move on our own way -- we're trying to use as much knowledge that we already have internally in technology transfer with the Navy? So that's where the status of that is right now.

Let me backtrack up to item number 1, Project Overview And Schedule. I just wanted to kind of be going through that right now. The biggest delivery things that we're talking about right now are the draft Record of Decisions for OU-2 and the draft EE/CA for Operable Unit 1 and 3. And what we -- expected delivery dates, like I said earlier, probably around three weeks right now for the draft Record of Decision, which would put us towards the end of September. And EE/CA we're looking at our internal

draft around the same time for us towards the end of the month and then probably about 30 days later or so, towards the end of October, we'll be shooting for giving you guys the draft EE/CA. Again, trying to solicit your input here today and over the next month or so to help us get those documents really -- you know, really help to screen, draft review times, go down a little bit.

And I believe that's really everything as far

as things that are coming up the pipe over the next month or so.

Does anybody have -- I'll move on to item number 8.

Does anybody have anything else that they'd like to talk about today that we should address? I know there's going to be a lot coming for you to review over the next couple months.

RIPPERDA: I want to talk about the EE/CA more.

ZUROMSKI: Okay.

RIPPERDA: Maybe I'll just talk to you afterwards. Or I can talk now?

ZUROMSKI: Okay.

Well, are there any other items besides the EE/CA, the ROD or anything else that we -- that anybody wants to bring up today? Okay.

Well, really, the only other item, then, is the EE/CA. So if you'd like, since we have everybody in the room who is probably somewhat involved in that, go right ahead.

RIPPERDA: Can CH2M Hill be any more derivative with their Microsoft ripoff? Sorry.

BURIL: No.

RIPPERDA: So I'm just going to kind of repeat some of the same stuff I said. I hate to be rushing into this EE/CA when there may be other options. With

an EE/CA comes a public meeting. So if you wanted to float a trial balloon to see what people in the community think, your EE/CA, you can do many different removal actions. So your first removal action could be to say let's put wellhead treatment on the Arroyo Well and then give that water to Pasadena for distribution. That's your first removal action, treat the Arroyo Well water, you know. So immediately you start the whole DOH review process and maybe that -- well, that can't really last that much longer than getting land use access for injection wells and piping and all the -- all this. So I don't think that would take any longer than the one you have here. You know, see how that goes.

If you get crucified by the public and

they're not going to let you do it, you know, then you know now rather than going through the whole ROD process and getting to a final remedy that may or may not include wellhead treatment. But at least you know now what the public thinks of it.

So I like it from that perspective. It gives you a chance to go out now to something that you're not wedded to, something you don't desperately need and go out in public. And if that doesn't work, you do the wellhead treatment and you see that the plume is still growing, you need something more, then you --

you've already done most of the work. Then you do a second EE/CA for extraction and reinjection. So that's something to think about.

I know that would require a complete rewrite, basically a whole new approach, but --

ZUROMSKI: But like I said, nothing's been written yet, either.

RIPPERDA: Okay.

ZUROMSKI: So this is a good time to say that.

RIPPERDA: I'm not saying you have to do that. Just saying --

ZUROMSKI: Right.

RIPPERDA: -- strongly consider it.

ZUROMSKI: Okay. David or Richard? You guys have

any other comments?

I did my best to get you -- get all the information and to bring it to the meeting, so --

RIPPERDA: Right.

ZUROMSKI: Well, before, then, we adjourn, we would like to pick a time for the next meeting. I'm going to propose, at least for the time being -- according to our current schedule, we were going to present the EE/CA to you at a specific meeting for the EE/CA and the ARARs discussion only in late October. So I don't want to schedule that yet based on some of your comments today because if it's going to push us

one way or the other, we can just kind of hold off on that. But I would like to schedule the next regular RPM meeting, which would be probably sometime towards the end of the year and --

ROBLES: In December.

ZUROMSKI: In December. So I wanted to see when everybody would be available for that. That would put us -- let's see. September, October --

ROBLES: December 6.

ZUROMSKI: December 6th is a Thursday. That's a possibility.

BURIL: Don't make it December 7.

ZUROMSKI: What's December 7?

BURIL: Pearl Harbor day.

ROBLES: December 6 is --

RIPPERDA: For all those World War II veterans in the room.

BURIL: Right. Exactly.

ZUROMSKI: December 6? Does that --

GEBERT: That works for me.

ZUROMSKI: That works for your schedules?

GEBERT: Fine.

ZUROMSKI: Same time. Same place. Actually, we talked about time earlier. Mark said that he could get here at 9:00 and we could get out of here earlier. Is that -- any objections to that?

GEBERT: Not at all.

ZUROMSKI: So 9:00 o'clock on December 6 at the -- same time, same place.

And the EE/CA meeting is up in the air right now. Let me at least say -- I was thinking towards that last week of October, the week of the 29th if -- do you have -- are you -- at least I throw that out. Are any of you going to be around or not around that week? That's, of course, if everything still goes on schedule.

Okay. Well, that's the week I'm looking at right now, but we're going to have -- of course have a

meeting with our contractor and talk about the things that we talked about today. So if that's going to impact the schedule at all, I'll let you know. But otherwise, I'll throw out some proposed dates for a meeting on the EE/CA.

BURIL: Are you still having your first-of-the-month teleconferences as well?

ZUROMSKI: We are still having first-of-the-month teleconferences, which I guess would be -- October 4th, would be the next one. And then November 1st. Two teleconferences. And those are at 10:00 A.M. versus 9:00 A.M.

BURIL: October 1 would probably be a good opportunity to finalize an EE/CA date.

ZUROMSKI: Absolutely.

Okay. Does anybody else have any other questions, comments, issues, concerns?

If not, thank you very much, and -- for -- if anybody wants to -- this meeting is adjourned.

(At 11:47 a.m. the meeting concluded.)