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MINUTES OF CROOKED RIVER ELEMENTARY SCHOOL PUBLIC INFORMATION SESSION
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ABB ENVIRONMENTAL



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**MINUTES OF
CROOKED RIVER ELEMENTARY SCHOOL
PUBLIC INFORMATION SESSION
MAY 13, 1993**

**PREPARED BY
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This is to certify that the attached minutes are, to the best of my knowledge, a complete transcription of the original recording of the proceeding at Crooked River Elementary School, Public Information Session held on May 13, 1993. The recording was performed by National Technologies Associates, Inc. of Orange Park, Florida. The original transcription was forwarded to ABB Environmental Services, and edited for completeness.

Signed on this 3rd day of August, 1993.

ABB ENVIRONMENTAL SERVICES, INC.

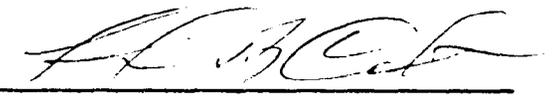
By: 
Frank B. Cater, Project Manager

ABB Environmental Services Inc.

**ABB ENVIRONMENTAL SERVICES
CROOKED RIVER ELEMENTARY SCHOOL
PUBLIC INFORMATION SESSION
MAY 13, 1993**

Capt. Scullion: "Good evening ladies and gentlemen and thank you for joining us tonight. I am Captain Len Scullion and I am the Public Works Officer for the Naval Submarine Base, Kings Bay. We appreciate your continuing support and your involvement in our joint effort to identify and correct the problems associated with groundwater contamination emanating from the Old County Landfill.

With us here this evening is Captain Mike O'Neil, the Commanding Officer of the Submarine Base; the City Manager for the City of St. Mary's, Mike Mahaney. We also have our consultants from ABB Environmental, and I'll introduce them in a minute, and Carl Lewis, who sits on the City Council for the City of St. Mary's. We are also joined by Mr. Ed Lohr, Ed where are you? Ed is our Project Manager from Technical Side for the Navy from Engineering Field Division of the Southern Division, Naval Facility and Engineering Command in Charleston and Ed has been with this project since the initial assessment stage.

Our environmental consultants here this evening are Mr. Frank Cater. Frank is the project manager for ABB Environmental and he has been with this project since the beginning. He is a professional engineer with 7 years experience in engineering and project management. And Frank will deliver the project presentation this evening. Also from ABB Environmental is Dr. Marland Dulaney. Dr. Dulaney is a board certified toxicologist with several years experience with toxicity of chemicals in humans, and that includes 3 years of study on specific hazardous waste/risk assessments similar to what we're dealing with this evening. And Dr. Dulaney has conducted the preliminary risk evaluation for the Crooked River Plantation Subdivision, and we are here to discuss this evening.

Also here this evening is Lt. Commander Mike Patterson the assistant Public Works Officer at the Subase and Mike is the Chairman of the Technical Review Committee. And this is Bob Steller. Bob is our Public Affairs Official at Kings Bay associated with this project and (indistinguishable) how the information is (indistinguishable).

Our agenda this evening; the purpose of the meeting is to update you on progress of our investigation. Update you since our last public meeting we had in December and to inform you of the results of the human health screening risk evaluations that were conducted over the last few months. And as always, at the end of the presentation we're looking forward to questions concerning the results of the screening risk evaluation and the next step in our

investigation and remediation of contaminated groundwater plume emanating the Old County Landfill.

You all have a handout of the slides as we are going along, if you have questions you can use that page to write your question down on it and to refer back to it as we get into the question and answer session.

Meanwhile, I think for those of you who may not have attended the first couple of meetings. How many of you are here for the first time this evening? Okay a good portion. We'll do a quick overview to get you up to speed as to where we are. In January of 1992 the investigation of the Old County Landfill and other sites at Kings Bay was initiated. In August, after several verified groundwater sampling events, vinyl chloride and several other volatile organic compounds were confirmed in one of the monitoring wells. We established 9 monitoring wells around the landfill on the western perimeter of the Base. And one of those had several detects of volatile organic compounds. We confirmed those after a numbering of sampling events. Upon further investigation, the contaminants were also detected in the groundwater of the western edge of Georgia Spur 40 right-of-way.

At this time the Navy Officials, we notified folks in St. Mary's and the county, Georgia's Department of Natural Resources and the U.S. Environmental Protection Agency Region IV in Atlanta.

In September we notified the public of the groundwater contamination, and we held our first public information session.

In October we held our second public information session. At that time we informed the public of our upcoming major investigation of the groundwater plume.

At this meeting the private irrigation well survey forms and sampling permission forms were also discussed. During our investigation, groundwater samples in and around the landfill, on the right-of-way of Georgia Spur 40, and in Crooked River Plantation Subdivision were collected and analyzed for contamination, as were surface water and sediment samples from Porcupine Lake. In addition groundwater samples from 51 private irrigation wells in Crooked River Plantation Subdivision were collected and analyzed for contamination and a screening level air analysis was conducted in the subdivision.

In October and November a technical review committee was established to review and comment on the documents which were produced regarding the status of the investigation. This committee is comprised of representatives of the Navy, the State and Federal regulators; City and County officials; and members of the subdivision in your community.

At that time, the development of community relations plan was initiated and we interviewed several residents and individuals in the community and the Administrative Record was begun.

Continuing now into December. In December two technical review committee meetings were conducted to discuss the status of the investigation. And our third public meeting was conducted on December 17. During that public meeting the analytical results of the private wells samples were released to residents of the subdivision as were the analytical results of the groundwater samples, taken on private property.

In January of 1993, a meeting was held among Sub-base Kings Bay representatives, Southern Division Naval Facilities Engineering Command, ABB Environmental Services, the Georgia Departmental of Environmental Protection, and USEPA Region IV in Atlanta. At this meeting the methodology to be used in the Screening Risk Evaluation for Crooked River Plantation Subdivision was agreed upon. As we started this process of informing you that in September what we are going through and what the progress of the investigation was, we advised you that there is a an awful lot of regulatory reviews required for all of our steps and the meeting in January was to have them review with us our Screening Risk Evaluation methodology so that we could up front get their concurrence on how we were doing the evaluation.

In February another TRC (Technical Review Committee) meeting was held to determine and discuss what was discussed in the Interim Corrective Measures Study, the document that was submitted to the regulatory agencies. The document includes the results of the Screening Risk Evaluation. This document was submitted to Georgia DNR and to the USEPA Region IV. It has been reviewed by Georgia DNR, but we do not have their final comments at this point and we are waiting for the review of this document by Environmental Protection Agency Region IV in Atlanta. And this leads us to the purpose of tonight's meeting. Tonight, we will discuss our investigation progress made since the last meeting in December and we will review the results of Human Health Preliminary Screening Evaluation. I'd like to turn the presentation over to Mr. Cater and Dr. Dulaney who will provide us with the update of regulatory evaluations of the Interim Corrective Measures Study and provide results of our Preliminary Screening Risk Evaluation."

Mr. Cater: "Thank you Capt. Scullion. First part of tonight's technical presentation will be an update on the evaluation of the data collected during our Interim Corrective Measures Screening Investigation that occurred during October and November of 1992. With the use of this slide we will show you the locations where we conducted the screening level air analyses. We were using a direct reading instrument. We were scanning for the presence of vinyl chloride and other similar volatile organic compounds, or what we call VOCs. The people that are here tonight for the first time,

quite a few of you, a volatile organic compound is basically what we are saying, it is a compound that evaporates very rapidly into the air. And vinyl chloride is one of those compounds, there are 37 compounds that fall into group of volatile organic compounds. We also were able to establish background levels on vinyl chloride and the other VOCs within the St. Mary's area. In December we told you that there was no vinyl chloride or other VOCs detected in the air and that is the results of our ambient air investigation. We did not detect any vinyl chloride or VOCs in the air of the subdivision around Crooked River Plantation.

This slide is a representation of the location of 51 private irrigation wells that were sampled during the investigation in October and November. The results of that investigation, we had vinyl chloride and other fuel-related contaminants detected in 16 of the private irrigation wells. The contamination of five of these wells include vinyl chloride, dichloroethene, and ethylbenzene, are contaminants that we believe are related to the plume. The other 11 wells had basically contaminants we believe are related to naturally occurring compounds or laboratory artifacts from sampling procedures or laboratory procedures.

In January we returned to sample nine additional private irrigation wells that had requested it and we were not able to get to in November. And we re-sampled two of the five wells which contamination was previously had been detected. The additional analytical results from the two wells re-sampled were such we felt we needed to have further confirmation or clarification of those results. Of the nine wells that we sampled, that were sampled the first time in January, the contamination was detected in eight of these wells. However, vinyl chloride was not detected in any of the tested eight wells that had contamination. The eight wells of the nine, with contamination, only four were found to have contaminants that could potentially be related to the plume. The other four wells were found to contain chemicals such as carbon disulfide, which is a naturally occurring chemical in an anaerobic condition. In other words, made as the bugs are eating the groundwater. We also again had acetone which could have been a potential laboratory artifact or it could potentially be from the landfill, we don't discounted it, we don't feel that acetone is present in the groundwater under Crooked River Plantation at this time. We have mailed to the resident's that we sampled in January the results, if any of those residents are here tonight we will be available after the meeting to go over your results if you have any questions. I brought a copy with me so I can go over them with the each individual if you have any questions.

Next slide is a location of the hydrocone sampling points that we have taken to study the composition and the extent and the groundwater plume. In January we came back into the landfill, in March, excuse me, in March we came back into the landfill we took another 14 sampling points from the landfill. At this time that

data is currently being evaluated and interpreted. That data will be used to hopefully begin to allow us to identify and concentrate on the location of the source of the contaminations within the landfill as we move forward, even as we are going through these phases. Using this data, based on the analytical results of the hydrocone groundwater investigation, we have generated a view of the groundwater plume. We also have three views that we enclosed with your handout, this is the one that is the intermediate plume view which I would like to explain this to you in a minute. This view is a "snapshot in time" of the possible extent of the plume at an intermediate depth. Where depth is represented on your handout of 20 to 30 feet, 25 to 35 feet; it shows the location of the concentration of the contouring line generated through a computer program; it is the total of all volatile organics found in the groundwater. It shows us the location of the high concentration in two areas of the plume. The other two are; one is a higher depth of what we are using as the shallow groundwater relating to in the subdivision of about 16 to 20 feet underneath the ground and the other is a depth 40 to 50 feet below ground surface in the subdivision. We provide that information for you to show you how the shape the plume is at this time, based on analytical results of October and November. As this groundwater plume continues to migrate to the west northwest, from the landfill toward Porcupine Lake and out toward the marsh, the shape and location of the plume will continue to change. The use of the private irrigation wells inside the subdivision will also influence that change and the composition of the plume. The use of the wells in down gradient of the plume will tend to draw it to a faster rate than normally occurs, whereas the use of the wells to the side of the plume could change the shape and the flow of the plume towards those wells. This is one reason we ask that you would please voluntarily not use your private irrigation wells.

At this time what I'd like to do is to be able to allow Dr. Dulaney to come up and present to you. The basic portion of our presentation tonight is what all this means to you in terms of Human Health Risk and the future uses of groundwater, and where we are today, I'll come back with those later on tonight."

Dr. Dulaney: "Good evening folks. I'm here to try an answer one of the questions, one of the first questions that we were asked during our meeting back in September. That question was "Are we going to develop adverse health effects because we were exposed to something in the groundwater in our subdivision?" I'm not going to beat around a bush this is the bottom line. " There is no evidence of increase in cancer risk due to exposure to contaminants in the groundwater. There is no evidence that for some of the contaminants that don't cause cancer but can cause other health effects, there is no evidence that these contaminants out there can cause adverse health effects in the neighborhood." How did we reach these conclusions, let's look at the steps one by one, so we

can inform you of the steps that we took to come to these conclusions and hopefully you will agree with us.

Okay, first of all if you remember from the handout that was, or the mailing fact sheet that was mailed out to you last week. You have to know what's out in the neighborhood and know what the contaminants are, you have to know how you can be exposed to that, you need to know the toxicity of the chemicals that are out there, and once you have all these three factors then you can calculate the risks. So first of all, let's look at what's out there. There was no contamination detected in the shallow groundwater. The only contamination that was detected in the neighborhood was between 15, I'm sorry 16 to 51 feet below ground level. In the shallow groundwater there is no contamination. As you can see here this is the representative of the deep groundwater. Nothing was detected in the air in your subdivision nor were any contaminants associated with the plume detected in Porcupine Lake, either in the water or in the sediments.

Now what we did find was 17 contaminants, seven of these contaminants have been noted to cause cancer or better potential to cause cancer in either laboratory animals studies or in man. The other 10 of these compounds that are out there in the groundwater plume, can cause non-cancer effect, it causes other health effects if you are exposed to enough of it for over a long enough period of time."

Public: "Do you have a list of those 17 contaminants?"

Dr. Dulaney: "Huh, yes I do, I don't have them with us right now, but I can provide you with a list of that, definitely. Also, in that handout you will find this equation right here. Risk has two parts, exposure and toxicity. If you are not exposed to a chemical you can't have a risk and if the chemical doesn't have a very high toxicity then your risks are corresponding low. Some contaminants can have a high toxicity, so they can have a higher risk associated with them. So this, equation right here we're going to come back to time and time again because this is really the heart of the risk assessment. Risk composed of exposure and toxicity.

Now the other thing we needed to know was how you all used your groundwater. So that was the purpose for the private wells questionnaires that we passed out in the other meeting. We needed to know how you all use your groundwater. And what we found was there, was that there were three major uses of your groundwater out in the neighborhood. They were irrigation, and this by far was the most common. And some of you answered that you used it for washing outdoor items, washing cars with it, some perhaps outdoor chairs and things like that. And a small number of you answered that you used it to fill swimming pools, mostly filling like child swimming pools or little slip and slides and things like that. So these are

the three exposures identified these that you could be exposed to contaminants in the groundwater.

Okay, now with these two pieces of information we are now able to estimate what your exposure is. Okay, now its very important for you all to understand that we don't estimate everyone's exposure. What we do is, we measure the exposure in a hypothetical family or a make believe family that lives in the neighborhood. And this family we give their exposure to be the highest that is reasonable. Okay we call this "worst case" scenario and this is the hypothetical family in you neighborhood that we studied. They have a private irrigation well that is in the contamination plume. They use this water for irrigation of lawn and garden, for washing the outdoor items and for filling both the child and adult swimming pools. Now they don't use their city water for any of these purposes. And they live in this house and they use all these things, they use the groundwater for all of these purposes up to thirty years.

Okay, from this and from your questionnaires we were able to identify three routes of exposure. Now the first one is inhalation, in that we mean that the contaminants are released into the air during the irrigation and your breathe them in through the air. The second route is through the skin, some contaminants, if they get on your skin they can penetrate through the skin into your blood stream. And we believe this can occur in two methods. First, it can occur when you are using it, using the groundwater, for washing an outdoor item. You get the water on you skin and there is a potential for absorption to occur. This can also occur when you are swimming, obviously when your skin gets wet there is a potential for absorption to occur in that pathway. Now, the third exposure route is through incidental ingestion. That's the accidental swallowing of water when you are swimming; sometimes you get mouthful of water and you spit it out, but you don't get it all out. Or your out washing your car and your mouth becomes dry and you take a mouthful of it, that's incidental ingestion. And because you may not get it all out of your mouth, that's an exposure pathway. So these are the three exposure pathways that we look at. Inhalation, through skin contact, and accidental swallowing or incidental ingestion.

Okay, now as far as the "worst case" scenario we also came up with a "worst case" hypothetical groundwater plume. This groundwater plume doesn't exist in your neighborhood, we just had to make it up, because we wanted it to be part of the "worst case" scenario. So in this groundwater plume we made several assumptions. First of all, the groundwater plume has all the chemicals that were detected in it. It has, there is some parts of the plume that have some chemicals and other parts of the plume have other chemicals. But we assumed that this hypothetical groundwater plume has all the chemicals that were detected. Not only are they out there, but they are out there at the highest

detected concentration that we found in the plume and most of those concentrations are not in your neighborhood. They're in the right-in-way or they are over there by the landfill. But we assumed that the highest concentration of those detected anywhere, out there are in this hypothetical groundwater plume. And the third point is the plume never changes. It never moves, it's never degraded by bacteria, it's never diluted by rainwater. It never changes for up to thirty years. Okay, so we covered the hypothetical family, we covered the hypothetical groundwater plume. There is one other thing, we also assume that they don't use, the hypothetical family, doesn't use this groundwater for drinking. They use only city water for drinking.

Okay, lets look at the exposure assumption we used for resident inhalation. We identified 18 private irrigation wells under the plume that Mr. Cater showed you before. We assume that all 18 irrigation systems are used 2 hours a day and 350 days a year. Now you see the 350 days a year pop up all through our presentation that's because EPA says, that on an average the average family is away from their homes for two weeks a year. So we use 350 days as your exposure period.

Okay, we also assume that 90 percent of the contaminants that are in the groundwater are released into the air and that are available for you to breath. 90 percent released into the air for you to be able to breath. Now we also had to take into consideration things like temperature, rainfall, because you may not use all of your irrigation systems when its raining. We also need to take into account things like terrain, and also wind, because that's going to affect the air concentration. So we used a computer model to give us what would be the "worst case" air concentration that could exist in this area that we studied, which is your neighborhood. And we assumed that was the highest concentration, and that you were exposed to that 24 hours a day, seven days a week, 350 days a year. The children were exposed for 3 or 6 years. And the EPA says your suppose to study the children for 6 years. And that also adults from 3 to 30 years. Now the reason why we look at 3 years for both adult and children because of the military tour of duty many times is three years. So we wanted to know what would be the risk to family that moved in the neighborhood for three years and did their tour of duty and then moved on. So we wanted to see what that scenario would be like as well. EPA said that's fine, you can look at that as long as you also look at 6 years and 30 years.

Okay, now in your handout this is a complex slide so the information we cover is in the next three pages in your handout. Okay, for incidental ingestion, again we told you the facts that occur by either in the swimming pool or by washing out door items. And we had a difference between the adults and child swimming pool scenario and I wanted to bring this out to you before we go on. First of all, we assumed that the swimming pool was filled with

only with contaminated groundwater and that 90 percent of the contaminants are lost out, because as Frank told you these are volatile chemicals. And because the swimming pool is just sitting out there in the back yard these chemicals will eventually evaporate. So 90 percent of those chemicals will evaporate, except for vinyl chloride. And 100 percent of the vinyl chloride evaporates. We also have another assumption that we put in there that because of vinyl chloride its a very funny chemical acts very unusually at 50 percent of what's out there in the water is available to move through your skin the rest of it is non-available.

We also used the EPA mandated exposure scenario for swimming. And they say that you have to, that you look at a person swimming 4 hours a day, 88 days a year. And they say that the average person consumes or accidentally swallows 1.6 ounces of water per hour. And that's, this is 1.6 ounces, about the size of a shot glass. This is what they say you accidently swallow every hour that you are swimming during that 4 hours a day, 88 days a year. Okay now for the child scenario its a little bit different, again we only assume that contaminated groundwater. And in this situation we assume that no chemicals are lost and this one is 90 percent, here we assume no chemicals are lost. And this is because in the situation like a slip and slide there's always groundwater, there's always water coming into it or when kids are playing in kiddie pools they'll splash the water out and they'll turn the hose back on. Well we assumed that because of this constant turnover of water and because when you all are done and the kids go back inside, you usually dump the pool. There's always fresh groundwater in the swimming pool. So we assume that there are no chemicals lost due to evaporation from the water. Again we use the EPA numbers four hours a day, 88 days a year and the shot glass full of water. (BELL) I'm sorry, we are recording this, and if I'm talking and bell rings, it is usually in the transcript "the bell rings and I can't understand what they are saying." So sorry about that, we are back to the kid drinking the shot glass of water. Also, we talked about incidental ingestion occurring when your out washing your car or something your mouth gets dry and you get a little soap in your mouth and you wash your mouth out. Okay, we assume that 90 percent of washing, like spraying your cars and things like that, that most of the contaminants are coming out into the air. We assume that you do this for 2 1/2 hours a day, 2 days a month. This works out to be an average of about 10 minutes a day. But it is more realistic that you are actually going to be doing this all at one time. So we look at the exposure scenario about 2 1/2 hours, 2 days a month. And again the person consumed the shot glass full of water every hour they are out there.

Okay, the other part of the exposure that has to do with what the swimming scenario, the washing, was with skin contact. Some chemicals, especially volatile organic chemicals can pass through the skin. Now vinyl chloride, its kind of debatable whether vinyl

chloride can actually do it. EPA says that you have to do this, you have to measure it, but it is pretty much theoretical. It hasn't been shown that in any human or animal study that vinyl chloride can be absorbed. But because its out there the EPA says this is what you have to do, we of course followed their guidance and we looked at the dermal absorption vinyl chloride. The assumption is very much the same on the groundwater, 90 percent. Again we use the 50 percent available. The four hours a day, 88 days a year and we assume that if you are fully immersed in the water that the entire skin area of the body is available for absorption. The child is very much the same only groundwater, no chemicals are lost and we use the skin area of the child for the absorption. And for washing the car the only difference in that is we assume absorption to the head, the neck, the hand, the forearm, and the lower legs. We assume that you would be wearing short sleeve shirt and shorts, while your out there washing your car and washing your items.

Okay, now we covered in the first part of the equation, now lets take a really brief look at the second part. And that's toxicity. Toxicity in plain language is the degree to which a contaminant can harm you. That's really what it is. Some chemicals have a high degree of toxicity. Some chemicals have a low degree of toxicity, in our measure of how toxic the actual chemical is. Now we don't get to derive these numbers, the EPA gives them to us. And they give them to us in two groups. If the contaminant has been shown in either laboratory animals or man to be able to cause cancer, it gives us information in something called the cancer slope factor. And all that is the relationship between the probability of developing cancer over your entire lifetime and your dose. So its really a measure of the toxicity we described, the more you dose the more your risk. And that factor compares it to the cancer slope factor.

Now, for non-cancerous they provide something called a reference dose. And a reference dose is the concentration that the EPA says that you can be exposed to everyday in you life with no harmful affects. That's all it is, its what you have been exposed to everyday with no harmful affects. Now because we are living in the EPA Region IV, they require an extra 10 fold level of protection for children. You've got add an extra 10 fold safety factor for kids in Region IV. They're the only region that requires you to do this. But they said we want to add this extra safety factor for the kids, just to be sure. And so that's what we did.

Now we're back to this equation again. Okay, now we're going to look at the risks. The risks, because the cancer slope factor measures cancer we give you the information for cancer separately than for non-cancerous risks. So what we're first going do is look at the cancer risk that we calculated for this hypothetical family

and hypothetical groundwater plume, for the exposure assumption that we just covered.

Okay, the EPA says the acceptable risk range is the probability of a lifetime probability of developing cancer due to exposure from 1 to 100 per million people. In other words, you have a million people exposed somewhere between 1 and 100 people may develop cancer, that's an acceptable risk range. Let me give you this in context though, the background risk of developing cancer in the United States is between 20 and 25 percent, so what we're talking is the difference is between 1 and 100 per million people and 250,000 per million people. So these risks to put it in context, the background times the background rate would be 250,000 people per million. Comparing that 1 to 100 that gives you an idea of what kind of numbers we're talking about. You've got very low numbers."

Public: "Can you explain this a little more?"

Dr. Dulaney: "Okay, the EPA says that the acceptable risk range is 1 to 100 people per million add to develop cancer because of your exposure. If you're exposed to a contaminant to a chemical the acceptable risk range in the population is 1 to 100 per million people exposed."

Capt. Scullion: "Dr. Dulaney another way to address that might be out of a million people based on a normal background just the United States 250,000 of them have the risk of getting cancer. If you add this to it 250,001 and 250,100 would have the risk of getting cancer." Did that make sense?

Dr. Dulaney: "Right. Okay, so what we're looking at here is a lifetime cancer for a million people in this hypothetical neighborhood. Okay, and what you see is that the adult is well below that, the child is, for the three year exposure is within the range, but the six year exposure is slightly above that range. This is almost totally due to vinyl chloride and most of that has to do with the dermal absorption vinyl chloride. And we told you that vinyl chloride absorption is theoretical, that these are what the calculated numbers tell us. That the risk of six years is a hundred and eighty and as Capt. Scullion told you the background risk is same million people would be 250,000."

Public: "Isn't another reason that number so large because of the "ten fold factor you were talking about earlier"?"

Dr. Dulaney: "No, that has to do with the hazardous index." "We'll get that out in just a second. Okay, this is because of the dermal absorption of vinyl chloride and if you remember in the child swimming pool scenario. It has 100 percent of the chemicals and contaminants there. Well in the adult only had 10 percent. So right there, there's a ten fold factor there. But we wanted it to

be the "worst cast." We think this is one of the reasons why that this number was not within the risk range that we would like. But remember now this is a hypothetical family this is not a family out in the neighborhood.

Well, let's look at the non-cancerous effect and what you see is again the adult has a number, what you do is for hazardous index, you measure your exposure dose and divide that and compare that to your reference dose. If that number is less than one it means there is no indication there's going to be hazardous effect out there. If the number is greater than one, it doesn't mean there's going to be hazardous effect; it means that you have to further analysis. Okay, now one of the reasons why this child is greater than one is that extra ten fold factor that you brought up. That extra ten fold factor wasn't in there, that number would be much less than one, it would be .53 rather than 5.3. But it says we have to do an additional analysis, so let me show you what we looked at. Okay. It was mostly due two chemicals out there. cis-1,2-dichloroethene and toluene. The reference that we use from the EPA was not based upon human study. It was based upon high dose rat feeding studies. The rats were fed high concentrations over their lifetime and they looked for toxic effects. And because they had to extrapolate from rats to man, they used uncertainty factors. You can see the uncertainty factors were used were either thousand or greater. So they had to do a lot of uncertainties to make this extrapolation rats to man. And because of that EPA also told us that they have low to medium confidence that these numbers have anything to do with actual human situations. They're based upon animals more than they're based upon man, so they maybe more applicable to animals than they are man because they have a low confidence. In addition, we found that toluene, the highest detected concentration of toluene, was less than another EPA value that they give us, called a maximum contaminant level. That is the concentration that they say could be in your drinking water for a lifetime. So in one hand, they're saying that exposure there might be a problem with the hazardous index. On the other hand, they're saying you can drink this in your drinking water for a lifetime. While risk assessment is a really new area and we haven't worked out all the bugs yet. So every once and awhile we come across an inconsistency like we did here.

Toluene is a very common solvent. Your exposed to it in fingernail polish, every time you fill up your gas tank your exposed to toluene. Its a very common solvent in magic marker. You popped a magic marker and whiffed, smells kind of funny that sweet smell. Many times that's' toluene. A very common solvent. Your exposed to toluene a lot in your everyday life.

And we looked into literature we found that cis,-1,2-dichloroethene was once used as general anesthetic for surgery in humans. The only reason why they discontinued it was that it was slightly flammable. And so after a few unfortunate incidents, they

moved on to something else. But there wasn't a toxicity problem associated with this. So when we look at all these pieces of information, plus that extra ten fold level of protection that the EPA Region IV requires us. That told us that, if the number is greater than one; but when we look at all these other pieces of information along with it, there's no indication that a hazardous toxic, a hazardous non-cancerous effect would occur in this hypothetical family that was exposed to these kinds of concentration found there.

That brings us back to our conclusions. And that is that we do not expect any adverse kinds of affects associated with exposure to groundwater. Why? Well first of all, we look to use a hypothetical plume. That plume doesn't exist. Its made up, its make believe. The actual plume out there is much different. We used very conservative exposure assumptions. For example, the 88 days a year, the four hours a day. Its a very conservative exposure factors. If you swim less than that then your exposure is less. The toxicity factors we talked about, the cancer slope factors, the hazardous index, these are very conservative numbers. Because we're not really sure yet how accurate risk assessment is in everyday life. Because its a real new area. These are very conservative numbers, we add a lot of safety factors and we talked about that tonight. Many of them, especially for toluene and cis-1,2-dichloroethene they're greater than a thousand. And there's that extra little conservatism that we add for children, here in the EPA Region IV.

And finally, residents in this neighborhood can chose to further reduce your risk by simply by doing two things. First of all, you can minimize skin contact with water from your private irrigation wells. No exposure, no risk. The second is, you can avoid filling your swimming pools with this. You can avoid using it for your water play devices and things like that. Again, don't use the water for these purposes, there's no risk. Now, inhalation, the risk associated with air inhalation was very, very low. They were, we showed you in cancer risks before measured in chances per million, well by inhalation we had them by chances per billion. That's how low those risks are out there, for inhalation. So you can these two simple steps, a non-skin contact and avoid filling your swimming pools.

Okay. I guess this takes us to Mr. Cater, who is going to tell us where we are from here, or where we go from here."

Mr. Cater: "What I would like to do is discuss where do we go from here and what are we doing right now. One of the things we need is regulatory concurrence on the information we have presented to you tonight. We also have two other reports that are in process going to the regulators to be reviewed. The next step after we get regulatory concurrence, and we expect to have this by June, is that we will initiate the next phase of our work within the Old County

Landfill. (BELL) The next, the first portion of that phase will be developing two work plans. One will be, what is called a RFI work plan, which is the RCRA Facility Investigation work plan. That work plan will continue the investigative part. The second work plan we are on the drawing board with, is the Interim measures work plan. The Interim measure is just what it says, its a measure or interim event of removing or treating groundwater in the plume, within the area or the subdivision. And it is also made in design to complement the final solution, when we arrive at the final solution. A third step will be to implement those work plans. In the RFI we're looking at additional wells sampling, you'll be seeing wells within the subdivision area. We'll be doing soil sampling, we'll be doing ecological sampling, we'll be doing tissue sampling from the fish in Porcupine Lake, if there is any in there."

Public: "Yes."

Mr. Cater: "We'll catch a few. And we will also be gathering information and laying ground work for a full baseline risk assessments. The interim measuring portion will be installation of recovery wells. We will have recovery wells on the left side of Spur 40 to start with. There may eventually, at sometime, be a couple wells in the subdivision area, but we can't answer that right now. It could potentially happen the additional portions (indistinguishable) or even on the plume side, where basically we had two hot spots to try and isolate those. We are also going to be installing pilot scale test with the air stripper and a test system of a bio-reactor, using bugs to strip or eat the contaminants in the groundwater before we discharge that groundwater, the treated groundwater. We will also be gathering all the information to develop our full scale plans for the full remediation of this site. Basically our time frames are that we anticipate beginning to do our field work early Fall, actually when our systems come on line in early 1994. That is basically our game plan at this point. An overall view of it is we are going to be moving forward to remove, the source, if we can relocate it, if we can't, then we are going to continue treating the groundwater, that is a requirement at this time. We have contamination of groundwater, we're going to move towards a full closing on that site, probably turn it into a soccer field or a baseball diamond. And the ultimate goal is to go through the procedure for corrective measures study and corrective measures implementation and correct what has been done in the past. And that is the environmental restoration program. Fortunately the Navy this is their goal, their aim. So even if we stand up here and say the risk is minimal, there's not a lot of risk in there, we're not walking away from the site. At this time I would like to turn to Capt. Scullion."

Capt. Scullion: "Thank you, Frank. That concludes our formal presentation for this evening. We'd like to open this for

questions and discussion; what I would like to ask Dr. Dulaney, we have that list of seventeen chemicals and what I would like to do if you would just review that for us."

Dr. Dulaney: "I have them in alphabetical order. First there's Benzene, methyl ethyl ketone, chlorobenzene, 1,4-Dichlorobenzene, 1,1-Dichloroethane, 1,2-Dichloroethane, there's, this next one is - 1,2-Dichloroethene, and there's a cis isomer and trans isomer, their very closely related, but they're just slightly different, one's called cis and one's called trans. There's 1-,2-Dichloropropane, Ethylbenzene, methyl butyl ketone, methyl isobutyl ketone, Tetrachloroethene, Toluene, Trichloroethene, Xylene, and Vinyl Chloride."

Capt. Scullion: "We'll get a list of those and put them out to our normal mailing for the record, so you will have that reference, okay. Now that we've done the past we'll try to have one person to have the floor when they're asking the question and give the respect and the floor to that person. But when that person is through and we think we have answered the question we will move on to the next question. So, we're ready for our first question. Yes."

Public: "Analyzing the data that you have done so far and coming to the conclusion that the risk is very minimal, very low, is that pretty much what you expected it and if it isn't, is it better or worst situation than was expected?"

Capt. Scullion: "That's a difficult question to answer. Do we want to try to put a fix on that, is it better or worse within the range."

Mr. Cater: Let me understand that question. Your asking when we first started, did we expect a higher risk when we first stepped out on this?"

Public: "Did you expect the results you received, or did you expect better results or worst results as far as risk is concerned?"

Mr. Cater: "As far as the risk is concerned. Actually this was just brought out in our last public meeting in December. In September at our first public meeting we indicated that we really did not think that we were going have a high risk."

Public: "And this data kind of proves it."

Mr. Cater: "The data kind of proves it, we didn't know how extensive it was and its a little surprising the number of compounds, that we did find in some areas that were a little more extensive then we anticipated. But because that is not drinking water and we pretty well knew the only use was through the

irrigation we didn't anticipate the high risk. The numbers came out higher because the swimming scenario's and the incidental ingestion and the dermal absorption that was associated with that."

Capt. Scullion: "Did that answer your question?"

Public: "Yes sir."

Capt. Scullion: "Man in purple shirt."

Public: "If we are going to use our irrigation system now, is there any concern about moving the plume? We talked about that but then you gave us the impression at the end, that really isn't the problem using our irrigation system."

Capt. Scullion: "We have discussed this several times at the four meetings. Using the irrigation system, if you are out in front of the plume its going draw the plume westward. Its going to accelerate the movement of the plume. If you are around the perimeter of the plume, you are going to influence the plume to do other things than the natural groundwater flow would have it go. So, our basic recommendation is to minimize the use of the groundwater out there because you'll accelerate the plume. And we leave that with you. So we certainly don't have the regulatory power to say, don't use that. Now, keep in mind that the information that we put together in our screening evaluation study is before two regulatory agencies. Those with the power to do that. We do not have the results of their regulatory review. Neither us or the city and as soon as we know that we'll pass that on and again, this is something that we may put forward too. They may look at our analysis and require supplemental analysis based on what we did or changes to certain factors. Now, we did meet with both agencies up front in January to review the methodology. You know, to get an overview of methodology to get their concurrence. Now their toxicologist are looking at what we submitted."

Public: "First, of all how fast is the plume moving. I mean do you have any indication from what you've been measuring?"

Capt. Scullion: "Frankly, we had an estimate on that and its only an estimate, I don't know if we've done a lot of technical assessment."

Mr. Cater: "Our initial estimates are basically somewhere between 20 and 50 feet a year."

Public: "And a second is, the levels you have here are those increasing, in other words, it looks like a higher concentration over the whole area of 500 to 1000 is that going up?"

Capt. Scullion: "We'll find that out. We'll find that out when we monitor over time. Now, we have really done limited sampling in

the last year. And one of the things we have to do, for a long period of time, is monitor, take samples and evaluate those samples on a periodic basis. So we really can't answer your question as to whether they are going up or whatever, the groundwater will move if they move from here to there from one well to the next well. We're required now to put some deeper wells in. Most of the wells we have are shallow. The screening height is six to 16 feet, roughly?"

Mr. Cater: (BELL) "The bottoms of our wells currently installed are at 13 feet below ground surface."

Capt. Scullion: "Thank you. That's the screening pickup. Now the reason we have data on how deep it is 16 to 51 because of the hydro-punching samples that we took all over. Now the need is we get deeper wells in to monitor on a regular basis undisturbed, the sampling of groundwater."

Public: "Is there going to be a schedule set up to sample private wells or is this going to be a one time thing we did and if we are going to sample, how long are we going to do this?"

Capt. Scullion: "I guess we don't have a plan for routine sampling at this point."

Mr. Cater: At this time we are not planning a routine sampling of the private wells. We will be installing monitoring wells out in the subdivision. If something came along we felt it necessary to do it, again the potential is there, the regulators come back at us and said we had to do, we would end up having to do it. The purpose of our private well sampling was two fold: (1) to give the people a good satisfaction of what they had in their wells and (2) what was the potential of the jetted well being able to draw the very volatile organic compounds up out of the ground being able to have the exposure. We found out in few wells that there is potential there, we were answering the question if you will, more than do a scientific study with it, and doing a methodology testing. Its better when we're doing a testing of a well that we know well construction and that we have a certain kind of screen set. What we do is bail the well and not pump it to get the samples. And those of environmental samples we really need for scientific investigations. So we don't at this time really anticipate doing any further rounds of private irrigation well sampling."

Public: Is there any correlation, you didn't offer any actual results (indistinguishable). Is there any correlation between what you actually found and say in time weight and averages of potential (indistinguishable) industrial exposure?"

Dr. Dulaney: "You are asking if we compared what we did to time weighted averages?"

Public: "Can you contrast what some of these we'll be exposed to at work, (indistinguishable)?"

Dr. Dulaney: "We do have, we did calculate the air concentration for the inhalation. The comparison of time weighted averages, what you are talking about is occupational scenario. With those of risk assessment, this in my practice has not been very good. We give you an example, which I continue to use, methylene chloride is a very common chemical used in the industry. The cancer risk for a worker exposed to methylene chloride, which is hopefully acceptable, over their working lifetime. The EPA cancer risk for that is about 12 percent. So that means 12 percent of the workers that were exposed to this would develop cancer because of that. The two methodologies don't compare very well at all. And that's the bottom line. We do have some air concentrations that we could compare to TWA or OSHA PEL, but the comparison for that (change tape)."

Public: (Indistinguishable)

Capt. Scullion: What we expect was the agencies to give us a response in late May and we are still waiting on delivery date from EPA or the Georgia DNR. We are going up to see them tomorrow. We are going to fly up. We really, to move forward in some of the program studies that we are doing in investigation, we need an answer for this analysis. I think we spoke in the past and I know you have been at several meetings, but we have been pushing along without waiting for the regulatory approval on some of these things. We told them what we're doing, given them good time to look at it from a view point of an overview and we've just kept moving along. We feel we are at a point now where we really need under the interim corrective measures screening evaluations to get their answers. And then we will move forward, but yes sometime this June we hope to have those.

Public: "Okay, the second part of my question is its (indistinguishable) to cap our wells off. The second half is does the city thought any more about compensating us for our water usage if we have to revert back to using city water?"

City Manager: "I can comment on that. No, we haven't. We're very hopeful as the EPA and... were involved in the procedures that were developed, the techniques, and everything that has been done to data as far as evaluating risks and toxicity and so forth. We are hopeful that is what is happening. I don't think it worth our while to spend a lot of time and effort at this point trying to create a "worst case" scenario. The "worst case" scenario that we have come up with so far is that there is minimal risk. Now there's a chance EPA can come back and I say that this is not going to work, that this is not acceptable, and so forth. At that point we will reevaluate. But I think that we are hopeful enough that it

will be approved that we can go on with remediation and not worry about it and capping wells."

Mr. Lewis: "I would like say more on that statement. Generally in sampling groundwater surface wells with a high list of contaminants from thousands of things. Chemicals you spray in the yard effect them...Generally speaking in these certain wells used for irrigation, you have a lot of exposure. You have testing because there is a possibility of lots of exposure totally not related to general exposure from the situation. There is a risk involved in any kind of well."

Capt. Scullion: "Anybody else? Again, we thank you for coming and we hope that you leave here this evening knowing that we have told you everything we know because we have, and we are trying to move forward, with a fast a rate of possible in examining and getting to the point of correcting the groundwater contamination as best as we can. Again, thank you and we'll keep in touch."