PROJECT NOTE NO.	PROJECT NO.
PN-0249/250-16 CLE-C01-01F249/250-I2-0007	01-F249/250-YS

CONFIRMATION OF:				
	CONFERENCE		DATE HELD	2-3 March 1993
	TELECOM	X	DATE ISSUED	19 March 1993
	OTHER		RECORDED BY	Kathy Brewer/CH2M HILL
			PLACE	Santa Ana, California

SUBJECT

Contract Task Order (CTO) No. 249/250
Naval Complex (NC) Long Beach
Remedial Investigation/Feasibility Study (RI/FS) Work Plan
Data Quality Objectives (DQOs) Review Meeting

PARTICIPANTS: (* DENOTES PART-TIME ATTENDANCE)

A. Muckerman - Code 1823.AM
C. Leadon - Code 1852.CL*
B. Fisher - Code 231.WFC*
A. Ulaszewski - LBNSY
LtCdr J. Snyder - NAVSTA Long Beach
J. Grovhoug - NCCOSC
B. Kanter - Port of Long Beach*
C. O'Rourke - DTSC
A. Rege - DTSC
J. Christopher - DTSC
A. Winans - DTSC*
J. Polisini - DTSC*
M. Pumford - RWQCB*
M. Lyons - RWQCB*
K. Brewer - CH2M HILL
P. Torrey - CH2M HILL
B. Wong - CH2M HILL*
B. Peterson - CH2M HILL*
D. Heinle -CH2M HILL*
J. Freidman - IT Corp.

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A meeting was held on 2-3 March 1993 to review the draft Data Quality Objectives (DQOs) for the RI/FS Work Plans being prepared for the Naval Station (NAVSTA) Long Beach and the Naval Shipyard Long Beach (LBNSY). Other topics discussed were toxicity testing for harbor sediments and the baseline risk assessment approach. This project note summarizes the discussion.

On 2 March, the meeting started at 0910 hours and concluded at 1600 hours. On 3 March, the meeting started at 0830 hours and concluded at 1630 hours. Each day's participants are noted on the attached sign-in sheet.

Introductions

Participants who were not present at previous meetings were introduced: Michael Lyons, from the Los Angeles Regional Water Quality Control Board (RWQCB) Bay Protection Program; and Bruce Peterson, statistician at CH2M HILL.

Review of DQOs

Before the meeting, the participants received a copy of the proposed DQOs for all of the sites at NC Long Beach except Sites 4 and 7. One of the objectives of this meeting was to get comments on the proposed DQOs from the group and make proposals for modifications where necessary.

Kathy Brewer summarized the waste disposal history and conceptual model for Sites 1 and 2. The key assumptions for the proposed groundwater DQOs at Sites 1 and 2 are:

o Contaminant characteristics and concentrations are not expected to vary significantly across the site due to the nature of the releases.

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- A significant period of time has passed since the releases occurred.
- The groundwater and surface water interactions on the Mole are a well-mixed system.

Therefore, the proposal was to treat groundwater at Sites 1 and 2 as one decision unit and to characterize accordingly.

There was discussion on whether the burn area and cut and fill areas that can be identified from historical photos should be made separate decision units. Allen Winans also expressed the preference that, for the initial characterization of groundwater quality, well points be used instead of monitoring wells whenever possible.

The group had difficulty agreeing on a common set of DQOs for the site, so the discussion moved on to statistical methods used to support DQOs. The DQOs later discussed for Sites 1 and 2 are summarized later in this project note.

Statistical Methods and Sampling Approaches

Bruce Peterson explained binomial sampling theory (copies of his presentation charts are attached). If an assumption can be made that the area/media being sampled (e.g., groundwater, surface soils, subsurface soils) was contaminated by a consistent process, then analysis of three samples from that population provides an 85 percent probability that the highest value from those three samples is greater than the median value for the population. With five samples, the probability increases to 95 percent.

The general approach proposed for the sites on NC Long Beach is to define areas of concern based on similar mechanism of potential contamination, similar type of contamination, or similar remedial actions. Then, if necessary, the area of concern can be broken down into smaller decision units based on types of remedial actions that may be performed.

Three to five samples would be collected from one decision unit for analysis. If the highest value for a particular contaminant from that sampling group is less than the cutpoint (some risk-based or regulatory-based concentration limit), then it will be assumed that the median concentration for that contaminant is below the cutpoint, and no remedial action will be necessary for that contaminant.

If the highest value for a particular contaminant exceeds the cutpoint, then it is possible that the median concentration exceeds the cutpoint. A decision must be made whether to proceed with remedial action for that decision unit or to collect more data before making a remedial action decision. A cost/benefit analysis should be done to weigh the cost of further data collection vs. the cost of remediation.

B. Peterson pointed out that this is a very conservative approach, since decisions are being made on an upper bound of the median and not the median itself. He presented a table (attached) that illustrated the likelihood of false positive (calling a site "dirty" when it is clean) and false negative (likelihood of calling a site clean when it is dirty) results. As the variability in the data increases, the likelihood of a false positive (and thus the conservatism in the approach) increases. This allows the Navy to identify sites for no further action with a relatively low cost investigation, and then to balance the cost of further investigation with the cost of proceeding with remedial

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action. It also provides the regulators with a fairly high confidence that there is a low probability that a site that is dirty will be classified as clean.

If a decision unit is determined to have a heterogeneous contaminant distribution, then it must be decided whether there is expected to be a concentration gradient (as in a groundwater plume) or if there are discrete areas of contamination ("hot spots") that are not related to each other spatially. In cases where there is a concentration gradient and there is some knowledge of the source location, sampling along a grid can be used to characterize contaminant concentrations within the plume and to define its boundaries. Real-time data collection, such as the use of groundwater probes or soil gas probes with fast-turnaround analysis, is very useful in tracking plumes in this manner.

Hot spots are more difficult to characterize because "rare things are hard to find". If a sampling program is to address the issue of finding hot spots, then the expected size and shape of the hot spot must be defined. K. Brewer illustrated the procedures used for determining the grid spacing necessary in finding a hot spot using the sandblast grit pit at Site 12 as an example. That discussion is summarized later in this project note under the site-specific DQO discussions.

The meeting participants divided into two working groups to discuss: (1) sediment evaluation issues and (2) groundwater DQOs and sampling approach. Each work group's discussion is summarized in the following sections.

Sediment Sampling and Toxicity Evaluation

The sediment sampling work group consisted of A. Muckerman, C. Leadon, B. Fisher, J. Grovhoug, J. Snyder, B. Kanter, A. Rege, J. Christopher, K. Brewer, B. Peterson, D. Heinle, and M. Lyons. Jim Polisini from DTSC participated (via a conference call) in part of the sediment evaluation discussion.

Characterization of sediments at depth was discussed. Chemical characterization of sediments collected below 5 cm will be done, but D. Heinle said that it is likely that bioassay tests of those sediments would result in a lot of false positives because of naturally occurring toxicity that results from anaerobic conditions. There is no standard protocol for aerating the samples to eliminate that bias. J. Christopher asked if there was a way to correlate the chemical results from the sediments at depth to the chemical and toxicity results for surface sediments in order to estimate the toxicity of the deep sediments. J. Polisini expressed reservations about that approach. He also said that he is mainly concerned with in-place sediments, so he is not certain how important it is to address deeper sediments at this time. A. Muckerman commented that since it is likely that future land uses will require dredging, deeper sediments need to be addressed as part of the investigation. No closure was reached at the meeting regarding bioassay testing for deeper sediments.

D. Heinle expressed some concern about the logistics of doing pore water bioassays. It is possible that enough pore water can be obtained from a reasonable sediment sample size to do a sea urchin bioassay. Bob Kanter suggested that a suspended sediment bioassay may be substituted for a pore water bioassay. J. Polisini said that bivalve larvae may be appropriate for a suspended sediment bioassay test. D. Heinle will look into the different tests available and propose either a pore water or a suspended sediment bioassay test to complement the whole sediment bioassays.

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There was discussion on the usefulness of collecting bioaccumulation data. It was decided that bioaccumulation data would be useful for evaluating possible long-term effects on ecological receptors and for evaluation of the source term for uptake of aquatic organisms for the human health risk assessment. Because it is uncertain if a sufficient mass of benthic biota can be collected at the sampling locations, laboratory bioaccumulation tests will be done on the sediment samples collected. The sampling and analysis plan will include provisions for biota sampling and analysis if larger biota are collected during sediment sampling.

In addition to the bioaccumulation tests, fish will be collected from the drydock for analysis. These analyses will indicate what people may be exposed to if they consume fish caught in the area. However, it was agreed that it will be difficult to correlate the results of the tissue analysis with contamination observed at the site because of the wide-ranging nature of fish.

Bill Fisher conducted the first round of the creel survey at NC Long Beach on 28 February. He suggested that perch and opal-eye would be good fish for tissue analysis because they do not have a wide range, and they are species that are caught for consumption.

B. Kanter commented that there have been studies done in the area on food chain relationships that can be used for further ecological evaluation, if necessary.

D. Heinle explained that the proposed approach for evaluating water-column effects is to assume that one meter of sediment is disturbed and suspended in 12 meters of water and that all organic contaminants and all inorganic contaminants (above background) would be bioavailable. The sediment-to-water ratio is based on the average disturbance from propeller wash and the depth of the water column in the harbor. If the model predicts that water quality criteria will be exceeded, and the need for remediation is not indicated from the in-place sediment toxicity testing, then water-column bioassays may be done to confirm the need for remediation. There was general agreement that this was a good approach as long as it is supported in the Work Plan.

The issue of testing for acid volatile sulfide (AVS) and simultaneously extracted metals (SEM) was discussed. The Jacobs Engineering Group (Jacobs) Team does not have a protocol for the SEM analysis. J. Polisini will find a protocol and forward it to D. Heinle. After reviewing the protocol and the costs, D. Heinle will decide whether to include AVS-SME as part of the sediment characterization.

Assuming that there is a fairly uniform distribution of contaminants in the main portion of the harbor, this area was proposed as one decision unit. A fairly large grid would be used to determine sample locations throughout the harbor. Grid-size will be based on a cost-benefit analysis. Samples may be composited for each grid point to get a more representative sample. The proposed eastern boundary for this decision unit is the deep channel; no investigation (besides reference station sampling) is proposed for areas on the other side of the channel.

Chemical analysis is proposed for all of the sediment samples. Samples may be composited for bioassay and bioaccumulation testing. Again, this will be based on a cost-benefit analysis.

The following decision criteria were proposed for data evaluation:

- If all of the samples come up clean, no further action is needed.
- If most of the samples are determined to be toxic, consider remediation for the whole harbor.
- If the data indicate that there is a concentration gradient and that some portions of the harbor are toxic while others are not, Phase 2 sampling may be needed to better define areas of concern and to evaluate sediment transport mechanisms.

Five areas of the harbor have been identified as possibly having sediment contamination distributions that are different from those of the rest of the harbor because of currents and use patterns.

- Under Piers 1, 2, and 3 (near Shipyard, less traffic)
- Under Piers 6, 7 and 9 (near Station, more traffic)
- Under Piers 10, 11, 12, 15, and 16 (Mole piers)
- Small boats marina
- Northeast corner of harbor

The sampling strategy is to take approximately 3 randomized samples from each of these areas and to base the remedial action decision for the decision unit on those samples.

John Snyder commented that, because Pier 12 is newer than the other Mole piers, it may be appropriate to consider it a separate decision unit.

B. Kanter and J. Snyder questioned whether the boundary for the main harbor decision unit should be the deep channel or the NC Long Beach property boundary, which runs from the southwest corner of Pier Echo to the tip of the Mole. The Navy may not want to sample on Port of Long Beach property, since it may be difficult to determine the origin of any contamination found there. A. Muckerman said that she would check with Rex Calloway, legal counsel at SOUTHWESTDIV, on this issue.

The appropriateness of compositing samples from the different sampling locations for the bioassay tests was discussed. Compositing samples would be useful in controlling costs, and there were no strong opinions voiced against it. D. Heinle will evaluate further whether the DQOs for the sediment evaluation can be met if composite bioassays are used.

J. Grovhoug commented that if tributyltin is found in harbor sediments, careful evaluation of possible sources is required. Though the Navy no longer uses tributyltin, it is used by commercial ships and pleasure craft.

Hydrogeology Discussion

The hydrogeology DQO work group consisted of A. Winans, M. Pumford, C. O'Rourke, A. Ulaszewski, P. Torrey, and J. Freidman.

During the discussion, A. Winans had the following suggestions:

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- o Include chloride in the general parameters analysis for facility-wide groundwater characterization.
- o Focus determinations of groundwater flow directions on Sites 6, 9, 12, 13, rather than on the Mole.
- o Use the current data set for evaluation of background concentrations.
- o Address high lower-explosive-limit (LEL) readings seen during Site Inspection (SI) drilling activities in DQOs for Site 6A.
- o Tie datum for surveying to adjacent properties so that water level information available from the TCL site and the Southern California Edison (SCE) site can be used in the RI evaluation.
- o Use of 4" wells.
- o Specify the use of Cone Penetration Test (CPT) probes as part of the well point sampling.

The usefulness of geophysical methods for locating the sandblast waste disposal pit at Site 12 was discussed. J. Freidman spoke with Tony Martinlaho, a geophysicist at International Technology Corporation (IT), during the break. He indicated that ground-penetrating radar (GPR) would probably not be an effective method for locating the pit because of the heterogeneous nature of the surrounding fill material. Instead, EM-31 may be a better choice because it might be able to detect electrical conductivity differences between the sandblast grit and the surrounding fill. The GPR could be a backup method to the EM-31. A. Winans said that he would like to see a clear explanation of the reasons for choosing one method over another in the Work Plan.

Both M. Pumford and A. Winans stated that wells could be abandoned after the RI if they proved to be clean. A. Winans reiterated that the more use of hydropunch-type sampling instead of installing wells, the better. He also said that it would not be necessary to confer with the California Department of Toxic Substances Control (DTSC) on changes in sampling locations that have to be made in the field. The reasons for the change need to be well documented, however.

C. O'Rourke expressed concern over contamination at depth at sites that have solvent contamination.

Background Evaluation

One of the DQOs for the facility-wide assessment is to determine what range of metals in groundwater and soil is representative of "background" (ambient) conditions at the facility and which are elevated as the result of contamination. Given the nature of the areas surrounding the facility on Terminal Island, it is difficult to obtain samples that could be assumed to be representative of background conditions.

The sampling approach proposed is to obtain groundwater and subsurface soil samples from the monitoring wells that are proposed as part of the facility-wide groundwater monitoring network that lie outside the influence of any of the identified sites. These samples will be assumed to be representative of a "clean" population. B.

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Peterson explained that the ranges observed in this clean population will be compared to the ranges observed from sites where metals contamination is not suspected and to sites where metals contamination is suspected to determine where there are significant differences in the populations (i.e., where concentrations exceed "background").

To characterize background levels in surface soils, it is proposed to collect 12 to 18 samples from areas on the Naval Station (NAVSTA) Long Beach that are currently administration areas and have no past history of waste disposal or storage (as determined from historical photos). This sample size provides a good estimate of the mean (assuming a homogeneous population). The samples would be analyzed for semivolatile organic compounds and pesticides as well as metals in order to evaluate the potential levels of contaminants that could be present from vehicle exhaust and routine pest control activities.

There was general agreement that the sampling approach and the statistical evaluation methods proposed would satisfy the background DQO.

Sample-Specific Risk Assessment

The Jacobs Team is proposing that a sample-specific risk assessment be utilized as part of the baseline risk assessment. K. Brewer explained how sample-specific risk assessment differs from the traditional risk assessment approach and presented an example of how a sample-specific risk assessment is more useful for the feasibility study. The discussion is summarized in the attached paper.

J. Christopher commented that the sample-specific risk assessment and the associated risk-contours that can be derived from it appears to be a good approach; however, he emphasized that concentration contours still need to be presented in the RI report for Applicable or Relevant and Appropriate Requirements (ARARs) and fate and transport analysis.

DQOs for Sites 1 and 2

The group defined the following areas of concern (AOC) for Sites 1 and 2:

- Surface soils at the ball fields
- Subsurface soil in the burn pit area
- Subsurface soil in the trench areas
- Groundwater underlying the rest of the site

The trench areas will be identified from aerial photos and from a geophysical survey of the site prior to sampling.

The nature of the contamination in each AOC will be assumed to be homogeneous; that is, one part of the AOC is not expected to have significantly different types and levels of contamination than another. Therefore, the sampling approach will be to collect three to five samples from each area and use those samples to determine whether the AOC is clean or further study or remediation is required, as discussed under "Statistical Methods and Sampling Approach."

The group discussed whether samples obtained from temporary well points would be of sufficient quality to use for risk assessment decisions. Until now, the proposed

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sampling approach had been to use monitoring wells wherever groundwater data for risk assessment is required (Level IV data) and to use temporary well points only for determining extent of contamination (Level II data). The primary concern is that in silty soils there would be a lot of sediment in groundwater samples collected from well points that could lead to artificially elevated levels of some organics and metals in groundwater. The advantage of using temporary well points is that the cost of characterizing AOC for the risk assessment would be less. The Jacobs Team will explore this issue further during the preparation of the Sampling and Analysis Plan. C. O'Rourke commented that a field test of the temporary well point method chosen should be planned prior to sampling.

DQOs for Site 3

The group decided that there were probably enough pits dug at Site 3 over its 30-year operation period that it should be considered a single AOC. The sampling approach discussed was to focus groundwater and soil sample collection on known pit areas (as identified from aerial photos) and to use that data to guide a remedial action decision for the whole area.

For the remedial alternatives evaluation, it is important to characterize the vertical extent of soil and groundwater contamination. The lateral extent will be assumed to be the historical boundaries of the site and can be further defined during remedial design and remedial action, if required.

C. O'Rourke commented that he would like to see some confirmation of the site boundaries by doing some sampling east and west of the site. DTSC also wants to confirm the presence or absence of dense nonaqueous-phase liquid (DNAPL) by characterizing groundwater quality at depth. These comments will be addressed in the updated DQOs.

J. Grovhoug questioned whether sediment sampling should be done along the boundaries of Site 3. It is possible that contaminated groundwater discharge and erosion of soil materials from the Mole could have led to contaminated sediments in that area. Similar discharges could have occurred from Sites 1 and 2, though lower levels of contamination are expected from those areas. A. Muckerman suggested that the outer Mole be made an AOC. She also suggested making the harbor side of the Mole near Site 3 a separate AOC; currently, that area is grouped with the rest of the main portion of the harbor as an AOC.

K. Brewer said that she would ask Steve Costa (physical oceanographer on the Jacobs Team) about sediment transport in the West Basin of Long Beach Harbor near Site 3 and whether he thinks contamination there would be significantly different than in the main portion of the harbor. She will also discuss with him sediment transport along the outer edge of the Mole.

The boundaries for the AOC on the outer Mole were discussed. The boundary line for NAVSTA Long Beach is only 50 to 100 feet from the Mole (J. Snyder will confirm distance). J. Grovhoug stated that the focus for the sampling should be close in to the Mole, where the highest levels of contamination would be expected. If a significant problem is found, then further sampling can address the extent.

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J. Snyder commented that there has been significant erosion along the outer Mole. An underwater survey of the Mole was completed two years ago and may be useful in guiding sampling locations. J. Snyder will provide a copy of the survey to the Jacobs Team.

J. Christopher questioned whether this year's storms would have caused significantly more erosion in the past year and said that there may be the need for another survey. It was agreed that another survey would be included as an option in the Sampling and Analysis Plan (SAP). He also stressed that remedial alternatives that include leaving contaminated soils in place on the Mole should address stabilizing the Mole against further erosion.

A. Muckerman asked if it was necessary to sample surface water along the Mole to see if it is being impacted. K. Brewer explained that it would be difficult to answer the question of whether surface water is being impacted through direct sampling due to the uncertainties regarding other sources of contamination in the harbor area and the uncertainties as to where the groundwater discharge points may be. A more defensible approach is to characterize groundwater quality and then, using a model that incorporates groundwater flow and a certain size mixing zone in surface water, estimate likely surface water concentrations that would result from groundwater discharges.

DQOs for Sites 4 and 7

DQOs for Site 7 will be developed based on the AOC defined in the project meeting and the toxicity evaluation approach that has been discussed. It was decided that specific issues relating to sampling methods and bioassay procedures will be discussed between J. Grovhoug, D. Heinle, J. Polisini, and M. Lyons via conference calls and memorandums during the development of the SAP. The Jacobs Team will forward the telephone conversation records for these calls to A. Muckerman.

The Work Plan sections for Site 4 are still being developed. A meeting to discuss DQOs for Site 4 was set for 19 March at 1000 hours at CH2M HILL's office in Santa Ana. The Jacobs Team will forward a summary of the conceptual model and the draft DQOs for Site 4 to the meeting participants prior to the meeting.

DQOs for Site 6A

The group decided to consider Site 6A one AOC because of similar types and concentrations of contaminants expected throughout the area. The focus of the groundwater investigation will be on determining the extent of contamination. Surface soils will be sampled to assess the potential for direct contact hazards. There is a significant amount of subsurface soil data available from the SI.

The significance of the high LEL readings seen at B-20A at Site 6A during the Site Inspection was discussed. The hypothesis is that it was caused by methane gas generated from the decomposition of wood or other organic matter. A flame ionization detector (which can detect methane) and a photo ionization detector (which cannot detect methane) will be used to do borehole monitoring during the RI to confirm or deny that hypothesis. If there is methane gas buildup in the disposal area, it would need to be addressed during remedial design if the site was closed in place as a landfill.

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As part of the presampling geophysical survey that is being performed for other sites, a survey will be done for Site 6A to locate disposal trenches. If there are discrete trenches, these may be the focus of remedial activities.

DQOs for Site 9

There was general agreement on the DQO approach for Site 9 that was presented in the draft DQO tables. J. Christopher agreed that a soil gas survey under the floor of Building 129 would provide the information necessary to evaluate the source term for air pathway evaluation for air inside the building.

DQOs for Site 12

K. Brewer reviewed the evaluation that was done on the leaching pathway for the tributyltin disposal pit for Site 12. Because there is no data available on the sandblast grit in the pit and the location of the pit is unknown, she used data on tributyltin concentrations in sandblast grit from other Naval facilities to do the evaluation. Using the leaching model presented at the last meeting and conservative assumptions regarding the leachability of tributyltin, it is possible that tributyltin exceeds the Enclosed Bays and Estuary Standards in groundwater within Site 12. Lead and other heavy metals may also be leaching. However, it is unlikely that elevated levels of these compounds would discharge to surface water, given the distance to the discharge point. Based on groundwater flow estimates for the area, plume length could vary from 40 to 1,000 feet.

K. Brewer presented some calculations that illustrated the level of effort that would be required to locate the disposal pit. Using an assumed hot-spot size of 15 by 15 feet and an 80 percent confidence interval, approximately 1,150 borings would be needed to locate the pit. At a 50 percent confidence interval, approximately 750 borings would be needed. If the hot-spot size was increased to be the minimum size of the assumed groundwater plume, then approximately 90 to 120 well point samples would be required to locate it within Lot X. If it is assumed that the plume has traveled far enough that it has crossed the Lot X boundary, then monitoring could focus along the downgradient edge of the site and fewer well point samples would be required.

A. Winans suggested that geophysical methods be used to try to locate the pit. There was some discussion over whether geophysical methods could locate that type of anomaly, and it was decided to try it as part of the presampling survey. A. Winans suggested that, if the geophysical survey is unsuccessful, well points be used to monitor groundwater along the northern and western boundaries of the site. If tributyltin or elevated concentrations of metals is not found, then it may be assumed that the area impacted by the leaching from the pit is small and is not likely to adversely impact surface water.

There was some discussion over the appropriate boundary for Site 12. The Initial Assessment Study (IAS) stated that the tributyltin sandblast grit was disposed of somewhere in Lot X. The most likely disposal location was shown in the IAS and SI Report. Because the actual disposal location in Lot X is not known, the boundaries of Site 12 will be expanded to include all of Lot X.

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Other DQO-Related Issues

There was not sufficient time to discuss the draft DQOs for the other sites in the meeting and no written comments were provided. A. Muckerman requested that the DQO tables identify specific each AOC and DQOs for each AOC. This will be done for the Draft Work Plan.

C. O'Rourke voiced a concern regarding possible sandblast grit disposal in the eastern portion of the Naval Shipyard Long Beach (LBNSY). The analysis of sandblast grit at Site 11 indicates that it is a possible direct contact hazard, and there is evidence of sandblast grit in surface soils at other areas of the shipyard. He is also concerned about the possible leaching hazards of buried grit. A. Muckerman requested that he submit a letter to the Navy outlining his concerns and then they can meet to discuss an appropriate course of action.

Action Items and Comment Review Meeting

Action items from this meeting are listed in the attached table. A meeting to discuss comments on the Draft Work Plans prior to the formal comment submittal was tentatively set for 17 and 18 June.

Nonparticipant Distribution

R. Green - Code 0232.RG
M. Nuzum - Code 1813.MN
P. Husted - Code 0232.PH
G. Guha - JEG/Pas
R. Udabe - JEG/Pas
A. Vela - JEG/Pas
K. Tomeo - CH2M HILL
J. Harris - CH2M HILL
File - CTO Notebook/PMO
File - PMO
File - CH2M HILL

Follow-up Actions from Data Quality Objectives Review Meeting Naval Complex Long Beach RI/FS Work Plans 2-3 March 1993	
Action Required by	**Description**
Jacobs Team	Forward conceptual model summary and draft DQOs for Site 4 to meeting participants prior to the 19 March meeting.
A. Muckerman	Check with legal counsel at SOUTHWESTDIV regarding issues associated with sampling outside of property boundary and provide guidance to the Jacobs Team on this issue.
J. Snyder	Confirm Naval Station property boundary along outer Mole.
J. Snyder	Provide copy of underwater inspection report for Mole to Jacobs Team.
C. O'Rourke	Submit letter to the Navy outlining concerns regarding possible sandblast grit disposal at LBNSY.
J. Polisini	Send analytical protocol for acid-volatile sulfide (AVS) and simultaneously extracted metals (SEM) to Don Heinle.

Sign-In
March 2-3

Name		Organization	Phone
Allen Winans	3/2	DTSC-HQ	916-255-2104
Mark Pumford	3/2	RWQCB-LA	(213) 266-7613
Michael Lyons	3/2	LARWQCB	(213) 266-7616
Don Heinle	3/2	CH2M HILL	206 453 5000
Jeff Friedman	3/2-3/3	IT Corp	714/660-5393
Bruce Peterson	3/2	CH2M Hill	206 453 5000
Peter Torrey	3/2-3/3	CH2M HILL	714-250-5500
BRYANT WONG	3/2-3/3	CH2M HILL	714/250-5500
C ANNA ULASZEWSKI	3/2-3/3	LBNSY	(310) 547-7862
John P Christopher	3/2-3/3	Cal EPA/DTSC	916 255 2033
JEFF GROVHOUG	3/2-3/3	NCCOSC RDT&E Division	(619) 553-5475
Andrea Muckerman	3/2-3/3	US Navy-Southwest Division	619 532 1250
CRAIG O'ROURKE	3/2-3/3	DTSC - REG. 4	310 590-4875
ANAND REGE	3/2-3/3	DTSC - Reg. 4	310-590-4880
BOB KANTER	3/2	PORT OF LONG BCH	(310) 590-4156
JOHN SNYDER	3/2-3/3	NAVAL STATION LB	310 5477513
Christopher Leador	3/2	Southwest Div, NAVFAC	(619) 532-1153
Bill Fisher	3/2	SWDIV / Natural Resources	(619) 532-1480
Kathy Brewer	3/2-3/3	CH2M HILL	714-250-5500

Sampling Strategy at L.B.N.C.

1. Identify Area of Concern (AOC) from historical records and S.I. study

   - Similar mechanism of potential contamination

   - Similar type of potential contamination

   - Similar remedial Actions

2. Collect N samples from AOC

   Note: even if most (or all) N samples are non-detect; confidence that largest value is greater than p^{th} percentile is

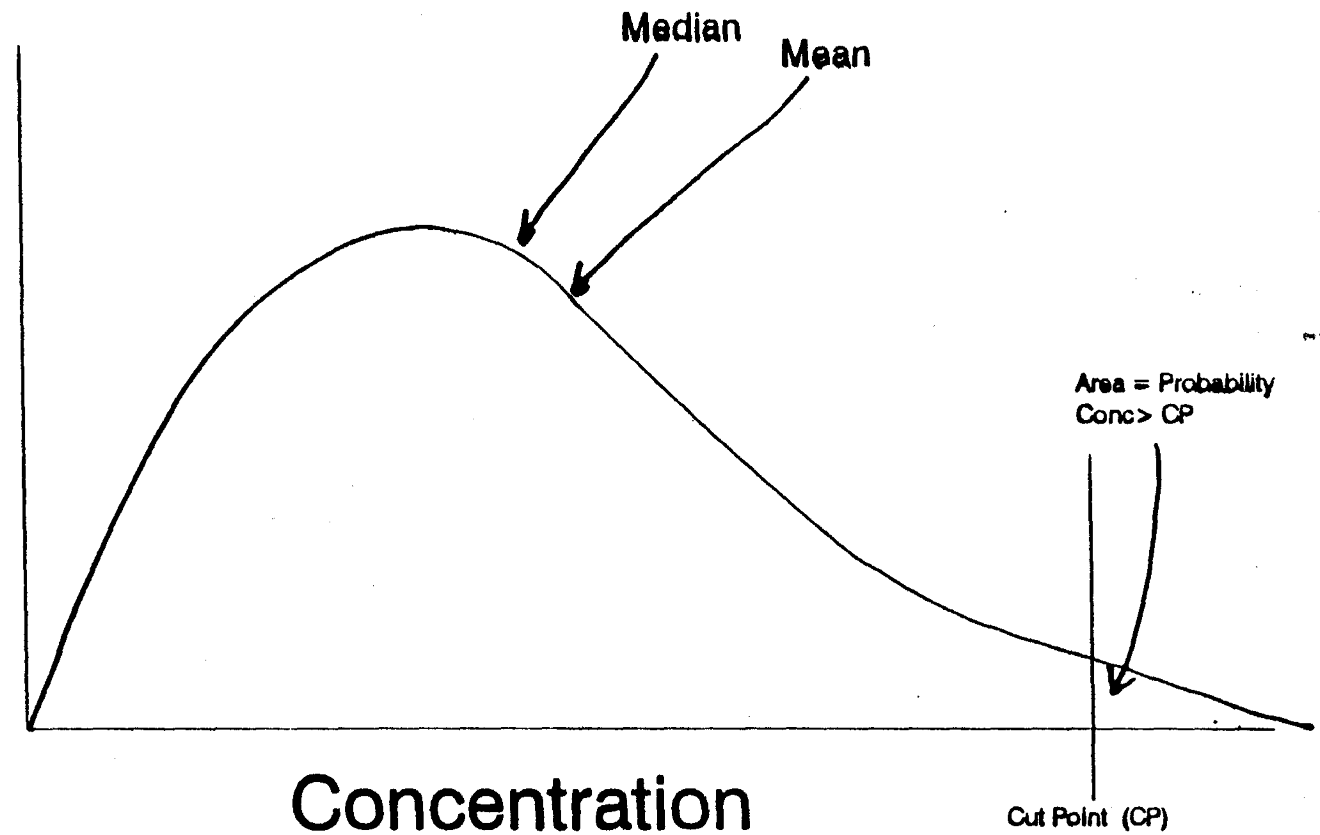
   $$\text{Confidence} = 1 - p^N$$

3. If data meets criterion then AOC is ok; NFA decision

   If data does not meet criterion then
   - further study

   or - remedial action

Log Normal Distribution



Ratio of mean to cutpoint for largest value of N samples from Log Normal distribution			
Sample Size N	Variability CV	mean/C.P. at 20% rejection	mean/C.P. at 90% rejection
3	0.8	.42	.90
3	1.2	.28	.88
5	0.8	.40	.64
5	1.2	.25	.55

SAMPLE-SPECIFIC VS CONVENTIONAL APPROACH FOR RISK ASSESSMENT

Presented at Naval Complex Long Beach RI/FS Work Plans Project Meeting 3 March 1993

In the following discussion, the conventional approach for data grouping for risk assessment is contrasted with the sample-specific approach. A case study is presented to illustrate the points made.

The Conventional Approach

The risk characterization approach typically used for Superfund risk assessments has assumed that exposures can occur simultaneously to all chemicals detected over a relatively large geographic area, sometimes site wide. Exposure point concentrations have been assumed to be the upper 95% confidence limit on the arithmetic mean concentrations (RAGS, EPA 1989). The result of such an assessment is a boiled down point estimate of risk for the predefined "area of concern" in which concentrations were averaged. While this conservative "short hand" approach might serve well as a risk management tool for cases which require no remediation, for sites which the no-action alternative is unlikely, the approach yields no information about the spatial distribution of risks within the predefined "area of concern" or data grouping. In addition, since the remedial investigation and feasibility study are being conducted concurrently, information from the baseline risk assessment is needed to simultaneously support the feasibility analyses. The information provided by the baseline risk assessment, using the conventional approach, is not in a form directly useable to the FS.

The Sample-Specific Approach

Rather than generating a single point estimate of risk site wide, TWCA proposes to characterize site risks by evaluating sample-specific risks. This approach retains information on the spatial distribution of risk throughout the site. Sample specific risk or hazard index calculations use the same equations to estimate reasonable maximum exposure (RME) risks as defined in RAGS. Exposure parameter values and toxicity values are the same as those used in a conventional, site-wide calculation. The only mechanical difference in calculating sample-specific versus site-wide risk lies in the concentration values used. Where the conventional, site-wide approach uses the 95% upper confidence limit concentration for all contaminants of concern, sample-specific risk calculations use concentrations reported from each individual site characterization sample of the relevant medium. However, the sample-specific risks are still considered to be reasonable maximum due to the use of conservative assumed exposure parameters in the calculation of intake, including upper bound medium intake rates (e,g,. 2 liters/day), exposure frequencies (e.g., 350 days/yr), exposure durations (e.g., 30 yr), and averaging times (e.g., 70 yr lifetime). These parameters are still applied in a multiplicative manner (as in the conventional approach) and retain their conservative nature. The advantages of the sample-specific risk characterization approach over the conventional approach are summarized below:

- **It retains spatial information.** Sample-specific risk calculations retain the spatial information inherent to the site characterization data. Information on the spatial discreteness of risk (and contamination) is provided. Sample-specific risks can be used to discriminate areas of the site exceeding target risk levels (thereby requiring action) from areas to which exposure results in calculated risk levels which are acceptable.

- **It avoids unnecessary assumptions.** Calculation of sample-specific risk estimates avoids the assumption inherent to the site-wide risk calculations, that contaminant levels coincide spatially across the site. That assumption implies concurrent exposure to all contaminants at comparably conservative (high) levels. It results in unpredictably conservative estimates of site-wide risk. To the extent that maximum contaminant concentrations are in different locations for different chemicals (as is often the case), simultaneous exposure to these "hot spots" becomes less likely.

- **It can estimate central tendency in risk.** If necessary, point-interval estimates of risk or hazard levels (such as the mean, the median, the upper 95th quantile) can be estimated from the sample-specific risks rather than derived from aggregated estimates of contaminant concentrations.

- **It allows easy visualization of site risks.** The site-wide profile of risk, generated on a sample-specific basis, can be graphically displayed using contours (or equivalent). These can be overlaid with chemical-specific risk contours to visualize the major risk contributors. Also, risks from different assumed pathways can be spatially compared to identify when multipathway risks should be accounted for.

- **It allows variable exposures to be accounted for.** If location-specific differences in potential exposure are known, these can be accounted for and adjusted on a sample-specific basis. If necessary, varying exposure assumptions used in the calculation of sample-specific risks would provide extremely useful sensitivity analyses to evaluate the relative proportion of risk accounted for by exposure assumptions versus variability in site contaminant levels.

- **It allows location-specific uncertainty analysis.** An estimate of spatial variability associated with sample specific risks is possible. By identifying location-specific areas of uncertainty in risk characterization, a more direct interface between risk assessment and risk management is provided.

- **It provides increased usefulness to feasibility analyses.** Sample-specific risk is a logical tool which can be used in streamlining the RI/FS process. It directly translates cumulative contaminant concentrations within specific samples to point estimates of risk of exposure in specific areas of a site, focusing remediation efforts. The spatial delineation of contaminants which dominate risk levels allows feasibility teams to generate volume estimates and concentration distributions of the contaminants requiring remediation.

- **It allows location-specific risk reduction analyses.** By evaluating different treatment technologies and their relative efficiencies, risk reductions can be estimated on a location- and contaminant-specific basis.

- **It can result in cost savings.** By identifying discrete areas of unacceptable risk during the baseline risk assessment, there are potential savings in the feasibility analyses and cleanup costs.

Case Example

Table 1 presents an example comparison of sample-specific RME risk versus site-wide RME risk. The difference in calculation method is demonstrated in this table. Site-wide (conventional) risks are calculated by chemical, across the rows in the table. The chemical-specific risks are then summed to yield the site-wide risk estimate. Sample-specific risks are computed down the columns for each well. This example uses actual data from eight wells in an area where volatile organic compounds were detected. Using the conventional site-wide approach, the RME excess lifetime cancer risk for the total "area of concern" defined by the location of these wells is estimated to be $2x10^{-4}$. Using this value alone, the groundwater in this whole area would appear to be at concentrations which likely need remediation (assuming for the purposes of this example that risks greater than 10^{-4} generally require remediation). However, analysis of sample-specific risks reveals that site risks are relatively localized, with only a single well (well C) in the area exceeding a risk of 10^{-4}. Centering remediation efforts on this single well (and possibly wells B and D) focuses action to the highest priority location. Wells C and D, (the two worst wells), are shallow wells, indicating contamination with the most toxic compounds is primarily in the shallow water-bearing zone. The information from these wells, along with knowledge of the physical-chemical properties of the risk-driving chemicals, can be used by the feasibility team to evaluate the efficiency and time requirements for treatment (for example, using soil-vapor extraction) or whether controlling groundwater use is most feasible.

Table 1
EXAMPLE COMPARISON OF SAMPLE-SPECIFIC RME RISK VERSUS SITE-WIDE RME RISK

Chemical	Cancer Slope Factor[a]	Concentration in Well (ppb)								95% UCL Conc. (ppb)	Excess Lifetime Cancer Risk[b]
		Well A	Well B	Well C	Well D	Well E	Well F	Well G	Well H		
Benzene	0.029	5U	5U	5U	5U	1.0	5U	5U	5U	2.68	$9x10^{-7}$
Chloroform	0.0061	1.0	5U	5U	1.0	5U	5U	5U	5U	2.61	$2x10^{-7}$
1,2-Dichloroethane	0.091	5U	1.5	5.5	2.67	5U	5U	5U	5U	3.57	$4x10^{-6}$
1,1-Dichloroethene	0.6	5U	1.0	3.63	5U	5U	5U	5U	5U	2.94	$2x10^{-5}$
1,1,2,2-Tetrachloroethane	0.2	5U	5U	3.38	2.5	5U	5U	5U	5U	2.83	$7x10^{-6}$
Tetrachloroethene	0.051	9.0	2.5	88.8	72.0	4.5	5U	5U	5U	47.8	$3x10^{-5}$
1,1,2-Trichloroethane	0.057	2.0	6.0	28.0	12.3	5U	5U	5U	5U	13.6	$9x10^{-6}$
Trichloroethene	0.011	1.67	15.8	53.8	15.3	2.25	5U	5U	5U	24.5	$3x10^{-6}$
Vinyl Chloride	1.9	5U	1.0	6.25	5U	5U	5U	5U	5U	3.82	$9x10^{-5}$
Well-Specific RME Risk[b]		**$7x10^{-6}$**	**$4x10^{-5}$**	**$3x10^{-4}$***	**$6x10^{-5}$**	**$3x10^{-6}$**	**ND**	**ND**	**ND**		
Percent Contribution to Total Risk		1.7	9.8	73.2	14.6	0.7	0	0	0		
										Site-Wide RME Risk	**$2x10^{-4}$**

a in units of risk per mg/kg/day.
b Based on standard default residential exposure assumptions.
* Individual well risk exceeds $1x10^{-4}$.