



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 6

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September 21, 2005

SUBJECT: Region 6 Response to SAB Review Comments on "Emergency Response Quality Assurance Sampling Plan for Hurricane Katrina Response Support, Interstate Highways 10 and 610 Intersection New Orleans, Orleans Parish, Louisiana"

FROM: Miguel I. Flores, Director /s/ William K. Honker
Water Quality Protection Division (6WQ)

TO: Science Advisory Board

Thank you for providing comments and suggestions on the Quality Assurance Sampling Plan. We have integrated your suggestions to the maximum extent possible under the current circumstances, as described in bold type below:

Overall Study Design

Comments recognized the need for collecting samples for immediate environmental categorization, but recommended the development of a comprehensive strategy for both water and sediment samples, and also atmospheric sampling to examine possible aerosol formation. A conceptual model regarding potential sources of contaminants and their exposure routes was recommended as a viable way to proceed. It was suggested the development of water quality models to track contamination should be considered. Also, decision rules should be developed to assist field crews when encountering novel situations as will inevitably happen. Explicit statement of sampling location selection criteria was also recommended.

Under this QASP, EPA is strictly focusing its efforts on characterizing water quality in the flooded areas of New Orleans. In the meantime, EPA is also developing a strategy to sample soils, sediment, and other residues as water is removed from the city. Atmospheric sampling and the development of water quality models will continue to be considered.

The number of sampling locations has greatly increased since the draft of the QASP was originally released for review. Sample collection sites now cover the entire flooded area of the city in a grid pattern and are outlined in Appendix F of the QASP. Due to severe time constraints to get a revised QASP to the field sampling crews, and the lack of information available from the contractor who originally developed the sampling design, the QASP could not be updated to include a full discussion of the sampling design used in this project. However, to assist the SAB in understanding how the sampling design was developed, we will outline the factors used in the development of the design herein.

A Collaborative Sampling (CS) design, utilizing Visual Sampling Plan (VSP) software, was developed for this effort. The primary purpose of sampling using the CS module in VSP was to construct a confidence level on the mean for the sampling area with greater cost effectiveness than possible using simple random sampling. Utilizing estimates of expensive versus inexpensive analytical costs of measurements as inputs to the program, as well as the assumed correlation between expensive and inexpensive measurement methods, it was determined that a CS sampling approach (using inexpensive analytical methods) would be more cost effective at estimating the population mean than if the entire measurement budget was spent on obtaining only expensive analysis results at field locations selected using simple random sampling or grid sampling. Utilizing a 95% confidence level, the calculated number of field locations to be measured by the inexpensive analytical measurement method was 60. These 60 sites were placed over the sample area (all flooded areas in and around New Orleans) using a systematic triangular grid with a random start location.

Although the above sample design has been the basis for where samples are collected, given the complex nature of the situation in the city, field crews have been granted maximum flexibility to make decisions in the field based upon their on-site observations of site access and health and safety concerns.

A reviewer questioned why inclement weather was a sampling constraint. Recognizing the safety issues involved, this reviewer felt the collection of samples in inclement weather was standard practice in stormwater monitoring and should be considered in this study. The use of updated aerial photographs and interviews with professionals familiar with the sites was also recommended.

Field crews will make every effort to collect samples as planned. Inclement weather sampling will only be a constraint if it is determined to be a safety concern. Maps of the study area are being regularly updated to reflect changes in the coverage of floodwaters. Assistance from local personnel familiar with the flooded areas, in conjunction with observations by the field sampling crew, were considered in the selection of sample sites.

Commenters also recommended the QASP should make better use of OSWER's *Guidance for Monitoring At Hazardous Waste Sites: Framework for Monitoring Plan Development and Implementation* (OSWER Directive No. 9355.4-28. January 2004). A general plan for training of field personnel should be included in the overall conceptual design.

EPA will consider incorporating the referenced guidance as on-site conditions and the sampling plan evolve.

Sampling Protocols

Health and Safety Issues. EPA should coordinate with CDC/NCEH/ATSDR because they will be conducting biomonitoring of response and cleanup personnel. In particular, EPA should be looking in water and sediment for the analytes that CDC is sampling in body fluids and tissue.

The samples are being analyzed for total coliforms and *E. coli*. These bacteria are commonly found in high numbers in the feces of humans and other warm-blooded animals. Finding total coliforms and *E. coli* in a water sample indicates the potential presence of pathogens and therefore a risk of illness or infection by being exposed to the feces-contaminated water. EPA and CDC have agreed that examining water samples for pathogens, such as *Vibrio cholera*, *Shigella*, *E.coli* 0157 or *Salmonella* would not be useful at this time.

More specifically, pathogens will not be determined at this time because:

- **Pathogens are difficult to grow in the laboratory, especially in highly contaminated surface waters.**
- **Finding one pathogen will not predict the risk from other pathogens.**
- **Finding pathogens in standing water will not affect how imminent risk is presented to the public or how decisions are made.**
- **Wastewater from a large population is expected to contain enteric pathogens, therefore, identifying the presence of fecally-contaminated water will give a broader risk perspective than detecting specific pathogens.**

The sampling effort devoted to measuring total coliforms and *E. coli* will be more effective if a large number of samples are tested and the results are applied to warning the public about risks associated with contact with contaminated floodwaters.

Interagency coordination, particularly with security (law enforcement, National Guard, etc.) should be incorporated in the plan, including locations of hospitals and first aid facilities. The use of modified, Level D safety equipment appropriate for aquatic sampling was recommended. Hard hats, flotation devices, snake boots, steel toes, chemical-resistant boots, and respirators were also suggested.

The QASP discusses the implementation of a health and safety plan (HASP) in Section 3.1.1 which includes the requirement that the field team be advised of the location of the local hospital prior to initiating field activities. The HASP specifies that surface water sampling will proceed utilizing Level D safety equipment.

Sample Collection Procedures. GIS coordinates should be recorded for sampling locations as well as specific physical features. Protocols for use of digital cameras in addition to film cameras need to be developed.

Guidance for recording location data has been incorporated into the QASP. Latitude/longitude coordinates will be collected and documented with environmental

related data samples. This is in addition to, and not precluding, other critical location identification data such as depth, street address, elevation, or altitude. Due to time constraints, protocols for the use of digital cameras could be developed but will be considered in future updates to this or other similar QASPs.

Depth of water may be a concern and stratified sampling may be necessary.

EPA's intent is to generally characterize water quality across the entire New Orleans area. The need for additional stratification of sample sites by depth of water for this type of general characterization of floodwaters does not seem readily apparent.

Crews should take soil samples as well as water samples where feasible.

EPA is developing a strategy to sample soils, sediment, and other residues as water is removed from the city.

Concern was expressed on the ability to maintain clean decontamination equipment in the sampling area. Less restrictive sampling procedures were suggested where decontamination is not possible.

EPA would welcome any suggestions that the SAB may have regarding less restrictive sampling procedures to minimize contamination.

Number of Samples

Summary: In general the SAB questioned the adequacy of the sampling plan, i.e. number of sites, number of samples and criteria for selection.

Will the sampling really be conducted at a single location, at the intersection of Interstate Highways I-10 and I-610? The rest of the plan, for the most part, appears to be related to longer-term, wide area sampling. Also, this number of samples may be too few to characterize the conditions found on site. What is the rationale for the number of samples and duplicates? Explicit statements on the selection criteria for sample locations are needed. The locations must be selected to support the DQO, and should be articulated in the QASP.

The QASP indicates that the site location is "New Orleans, Orleans Parish, Louisiana, at the intersection of Interstate Highways 10 (I-10) and I-610." The problem is that according to maps, I-10 and I-610 intersect in two different places, 4 miles apart, both in Orleans Parish. This could lead to a significant communications disconnect.

EPA has greatly expanded the sampling plan for the New Orleans vicinity since the draft QASP was released for comment. A limited number of field staff were available for sample collections on the first day that the area could be accessed safely, so sampling was initially limited to a screening level effort. Additional sites were sampled on subsequent days, in the

central part of the flooded area. On September 8, field crews began to collect samples across the entire flooded area, based on a grid pattern that targets 60 sites.

Due to severe time constraints to get a revised QASP to the field sampling crews, and the lack of information available from the contractor who originally developed the sampling design, the QASP could not be updated to include a full discussion of the sampling design used in this project. However, to assist the SAB in understanding how the sampling design was developed, we will outline the factors used in the development of the design herein.

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Although the above sample design has been the basis for where samples are collected, given the complex nature of the situation in the city, field crews have been granted maximum flexibility to make decisions in the field based upon their on-site observations of site access and health and safety concerns.

It would be helpful to understand whether the sampling in New Orleans is part of a larger program being undertaken by the Agency. Presumably, Region 4 has a similar effort planned for Alabama and Mississippi, which should be acknowledged here.

This QASP is focused solely on sampling of floodwaters in the New Orleans area. Mississippi and Alabama do not fall in U.S. EPA Region 6 and will be handled by EPA's office in Atlanta. However, initial discussions are underway regarding a long-term sampling plan for Lake Pontchartrain, the Mississippi River, and the Gulf of Mexico.

This area is surely "a larger body of surface water" but how will "near to shore" be determined in this circumstance? Will samples be taken by the side of the interstates?

Please note that sampling will occur at many other sites in addition to the interstates. Specific sample locations at each pre-determined site will be determined in the field based on access and health and safety considerations.

The plan should provide guidance on how representative it is of the overall area, in terms of whether there are pollutants that are particularly likely or unlikely there (e.g., proximity or distance from industrial facilities). There is currently no explanation of why just one site is chosen and why this particular one.

Establishing the spatial variability in priority pollutant concentration probably represents a more urgent need for onsite decision-makers (spatial variability will also impact the scope of any subsequent sampling activities). Six samples seem inadequate to support such a decision that will apply to the area of interest, i.e., “in New Orleans, Orleans Parish, Louisiana, in the area of the intersection of Interstate Highway 10 (I- 10) and I-610.” I recommend more samples with only a low percentage (such as 10%) being split for sister laboratory analyses.

The geo-spatial distribution will be extremely important from the public health perspective and the social aspects of different communities as well.

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While the QASP may not be the place to discuss it, sampling site selection as well as agents to test for would be more informed if some "focus groups" with responders could meet to get a sense of where problems may be and the types of concerns they have.

EPA will consider this option in future updates to the QASP.

Microbiology / Coliforms

Summary Statement. Although the total coliform test is used to detect fecal contamination, it does not work well as an indicator of waterborne pathogens. The presence of fecal coliforms does not necessarily correlate with pathogens and the lack of coliforms does not mean that the water is uncontaminated. Therefore, analysis for specific pathogens should be considered.

The samples are being analyzed for total coliforms and *E. coli*. These bacteria are commonly found in high numbers in the feces of humans and other warm-blooded animals. Finding total coliforms and *E. coli* in a water sample indicates the potential presence of pathogens and therefore a risk of illness or infection by being exposed to the feces-contaminated water. EPA and CDC have agreed that examining water samples for

pathogens, such as *Vibrio cholera*, *Shigella*, *E.coli* 0157 or *Salmonella* would not be useful at this time.

More specifically, pathogens will not be determined at this time because:

- Pathogens are difficult to grow in the laboratory, especially in highly contaminated surface waters.
- Finding one pathogen will not predict the risk from other pathogens.
- Finding pathogens in standing water will not affect how imminent risk is presented to the public or how decisions are made.
- Wastewater from a large population is expected to contain enteric pathogens, therefore, identifying the presence of fecally-contaminated water will give a broader risk perspective than detecting specific pathogens.

The sampling effort devoted to measuring total coliforms and *E. coli* will be more effective if a large number of samples are tested and the results are applied to warning the public about risks associated with contact with contaminated floodwaters.

Representative Comments Relevant to Microbiology:

- ...I recommend that analyses be included for additional microbiological contaminants that are better indicators of the presence of pathogenic organisms, including fecal coliform, *E. coli*, and enterococci. There are standard tests for all three of these groups of organisms.

The samples are being analyzed for both total coliforms and *E. coli*.

- Appendix B, SOP for minimizing cross-contamination. Disinfection is not adequately addressed. Disinfection will be important to avoid cross-contamination in the collection of samples for analysis of microbiological contaminants.

EPA will re-examine Appendix B in future iterations of the QASP. EPA would welcome any suggestions that the SAB may have regarding improvements in Appendix B.

- The selection of total coliform bacteria is troubling. This will not be a useful parameter, as the results will all be very high and will not necessarily indicate any public health risk. The measurement of likely pathogens would be much more suitable.

See response to the summary statement above regarding the analysis of pathogens.

Suite of Chemicals

I. General comments on selection of contaminants:

1. I think that the chemicals to be looked for are probably OK.
2. The rationale for the choice of analytes needs better justification.

3. Sec. 2.2. The term "priority pollutants" has a specific regulatory meaning. I don't think that a focus on the 129 water quality priority pollutants is intended here, but rather, as indicated in the section, on pollutants that "pose an imminent and substantial danger to life and health." I recommend that "priority" be deleted.
4. The choice of chemicals that pose acute versus chronic health effects was questioned. The water constituents targeted for analysis include VOCs, SVOCs, total metals, pesticides, herbicides, PCBs, and total coliform bacteria. These are not what I would have chosen for an emergency assessment of pollutants that "pose an imminent and substantial danger to life and health." The chemicals listed are mostly of concern for longer-term exposure and chronic health risk. What is the reason for analyzing PCBs at an early stage of emergency response?
5. Recommendations are to: (1) include a table of the Contaminants of Concern (COCs), analytical methods, reporting limits, and practical quantification limits; (2) use the full RCRA Priority Pollutant list, and (3) add Total Petroleum Hydrocarbons to the list of analytes.

II. Additional contaminants. The following contaminants should be considered for monitoring: phenols (creosote-treated pilings); formaldehyde (embalming); total petroleum hydrocarbons (petrochemical industry and flooded gas stations, autos).

III. Unknown contaminants. Some reviewers suggested that steps should be taken to identify unknown contaminants: all GC/MS analyses should include the identification of TICs (Tentatively Identified Compounds); metal analyses should be performed on an instrument with a scanning ICP spectrometer or one that has a focal curve with many elements - so that non-routine elements do not go undetected; strongly polar or large compounds that are detectable by LC/MS/MS and are now of increasing environmental concern.

IV. Some reviewers felt that other parameters should be monitored in addition to chemicals. Conductivity or salinity measurements, nutrients, BOD5, COD, and suspended solids should also be added to the list as they are likely associated with potential receiving-water effects of the discharged waters. Ammonia, fluoride, potassium, detergents, and fluorescence analyses are such better indicators of sewage contamination than bacteria.

In light of the widespread flooding in New Orleans and surrounding parishes, EPA believes it to be imperative that it be able to characterize the chemical and biological hazards to which relief workers, law enforcement and other emergency services personnel, and others who risk prolonged exposure to the flood waters and other residual pollutants may be exposed. Given the quantity and variety of chemicals which are routinely stored in a large city, and, in this case a large port city, EPA believes that the sampling plan must address a wide spectrum of chemical pollutants likely to have been released. Further, since the sanitary sewer system has been out of service since the early days of the flooding, biological pathogen contamination may pose a significant and immediate health risk. This sampling plan, while perhaps not as thorough as one may wish for under more favorable conditions, strives to strike a balance between timely and geographically relevant sample collection and

analyses and protecting the short and long term health of emergency workers and citizens on the ground.

Many of the contaminants on the list to be analyzed are the standard suite which are determined for most EPA emergency responses, because they are those that are usually found. If during subsequent sampling and analyses, they are not found or EPA is advised by ATSDR/CDC, they can be removed from the list. For those analytes being monitored, they have been clarified in table format in the revised QASP. Due to the potential release of crude oil in the New Orleans vicinity, and as suggested in comment #5 above, total petroleum hydrocarbons analysis was added to the list of analytes.

Contaminated Sediments

The fury of the initial surge and subsequent flood waters carried significant amounts of sediment and debris. These materials are likely to be the major cause of long-term exposures. Considering the cost of mobilizing the sampling team, if sediments become available for sampling, the sampling team should consider collecting sediment samples. A comprehensive sediment sampling plan should be developed and implemented.

EPA is developing a strategy to sample soils, sediment, and other residues as water is removed from the city.

Number of Laboratories

Summary: The SAB recommends one certified laboratory, not two.

The use of one laboratory makes sense provided that it is certified for all the analytes and meets all EPA requirements for certification (QA/QC audits, chain-of-custody, training, etc.) My gut reaction was that it should be the best laboratory and maybe an EPA laboratory. I think all users of the data, especially the public, will want to know that the data is of the highest quality. Just curious, can one laboratory analyze for everything?

I am having trouble with the notion of duplicate samples going to two labs. On one side I think this would be good. However, who wins if they do not agree? Do we send that sample to a third lab to see who measured the correct values?

The draft is not clear about inter-laboratory comparisons. The rationale for having two labs external to EPA should be clarified, if that is the final decision. It may be better to use one lab and take more than 6 samples and 6 duplicates.

EPA's laboratory in Houston and its mobile laboratories are not high production facilities. Almost all of the samples that are taken by EPA during emergency responses are analyzed by commercial labs. Very few commercial labs have enough analytical capacity or the expertise to perform all the analysis needed within the short time frame needed for this type

of action, so more than one commercial lab must be contracted. Duplicate samples have been eliminated in the revised QASP. Some duplicate samples may be taken so that they may be analyzed by the Louisiana State environmental laboratory at Louisiana Department of Environmental Quality, so that they can keep apprized of the progress of the cleanup in their State.

Archiving and Custody of Samples

Summary: The SAB recommends archiving all samples.

The QASP states "Samples that have been analyzed will be disposed of by the designated laboratory in accordance with the laboratory SOPs." This is not appropriate for at least the initial samples of a short-lived phenomenon of such significant importance and for samples that may prove to have historical importance. The original sample container labels can be used to answer questions that arise later, sample residuals, sample extracts and sample digestates could be re-analyzed to answer unanticipated questions. Instruct the lab to archive empty sample containers and properly store all unused samples, extracts and digestates.

I would suggest that they make plans to gather split samples of water and store some for future, as yet undetermined analyses. Once the team is on site, gathering additional samples is minor compared to the logistics of getting to and from the sampling site.

Sample Chain-of-Custody Procedures. The language appears to have been pulled out of previous reports prepared for Superfund investigations. Will the planned sample collection for emergency response really be of an "evidentiary nature" with the data of a quality that will be useful in "legal proceedings"? If this will not be the case, then I recommend that the language here be modified to remove references to data collection for Superfund-related legal actions.

Are there time constraints on the delivery of samples to the labs? If so, is the contractor able to guarantee timely delivery?

The chain-of-custody reports, sample volumes, preservatives, and other QA/QC components are all standard, but may be very difficult to accomplish in a disaster area. Suitable protocols that can be used in challenging field conditions should be specified and used.

Storage of excess samples by labs is normally done for a couple of months and is covered in the contract between EPA and/or its contractor and the lab. It is considered to be good lab practice to keep all analytical products until the reports have been accepted by the client. But since many of the analytes degrade fairly quickly, those leftovers are usually of little use. Additionally, storage can lead to cross contamination. EPA Superfund Contract Lab Program has an archiving procedure and this will be considered in future modifications of the QASP, for use during the dewatering process of New Orleans, so that a few representative samples may be archived. The statement about needing Sample Chain of Custody records that are of "evidentiary nature" has been removed from the revised QASP.

Other field records and sample handling requirements have been clarified in the new QASP, but record requirements have been kept the same because these are required in the contract EPA has with its emergency response contractor, who will be collecting most of the samples.

Communications Needs

The document needs to define any guiding principles or EPA guidelines that will serve as the foundation for public communications. Comment should be made as to whether any information - even if general in nature - will be provided to the public about the sampling activity. Given that "the community" is not readily identifiable at this point, web-based or mass media methods may be the most appropriate channels. Also, it would be helpful to have a publicly advertised phone number people can call for more local environmental information. Clean up will begin as soon as people return to their homes and businesses and that is when the rashes, infected cuts, and headaches will escalate. Understanding the exposure risks beyond injuries will be extremely useful in responding to health complaints that will arise.

Although "community relations" are mentioned, there is no explicit commitment to such activities. Given the apparent deep resentment by area residents regarding their treatment over the past week, it is essential that we be proactive in sharing all information with them - even if it is "just" a baseline sample. Because the natural community has been scattered by events, an innovative outreach program will be needed, involving community representatives, so that they feel like full partners in the monitoring and restoration of their community. Without such involvement, EPA could be seen as part of the problem, rather than part of the solution, despite the hard and dangerous work undertaken by its staff and contractors.

EPA is providing daily updates to the public on hurricane response efforts, including monitoring activities, on its website. For more information, go to:
<http://www.epa.gov/katrina/index.html>.

Ensure that the document states that this is part of an effort not only in New Orleans, but other areas of southern Louisiana, Alabama, and Mississippi. State that this is a coordinated, multi-state environmental response by the federal government. The plan should also specify which agency is the designated authority for all evaluations.

EPA feels that these matters do not need to be covered in the QASP. This plan strictly covers the sampling and analysis of water that is to be pumped out of the city of New Orleans. Mississippi and Alabama do not fall in U.S. EPA Region 6 and will be handled by EPA's office in Atlanta.

To make this plan credible to local residents, the plan should provide explicit statements that define the exact selection criteria for each sample location; i.e., how representative each sampling area is compared to the overall area and why just one site is chosen and why this particular one. It should also include language to the effect that decisions may be made in the field based upon potential sources, access, and health and safety concerns. Without these criteria, the actual choices could appear arbitrary and capricious to the general public.

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Editorial

There are also a number of editorial comments that should be considered. This includes sections and appendices that were not found, acronyms that were not defined, and suggested time recording formats. A section on data management and reporting was also recommended.

Due to time constraints to provide an updated copy of the QASP for field crews, not all editorial comments could be addressed. These comments will be addressed in future iterations of the QASP.

EPA's Emergency Response contractor, Westin, has an extensive data management and reporting system, which is not and should not be covered in this site specific QASP. Much of that system is on a secure website, which is accessible to authorized EPA personnel. However, please note that EPA is sensitive to the needs of the New Orleans community. EPA provides daily updates on its website (<http://www.epa.gov/katrina/index.html>). All floodwater quality test results and associated health warnings are regularly updated as results are validated.