UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON D.C. 20460

OFFICE OF THE ADMINISTRATOR
SCIENCE ADVISORY BOARD

September 7, 2005

The Honorable Stephen L. Johnson
Administrator
U.S. Environmental Protection Agency
1200 Pennsylvania Avenue, NW
Washington, DC 20460

Dear Administrator Johnson:

On Saturday, September 3, 2005, Dr. Vanessa Vu, the Staff Director of the Science Advisory Board (SAB) received a request for the SAB to provide an expedited review of a document entitled, *"Emergency Response Quality Assurance Sampling Plan for Hurricane Katrina Response Support Interstate Highways 10 and 610 Intersection New Orleans, Orleans Parish, Louisiana,"* prepared by an Agency contractor for Region VI. Given the urgency of the request, the SAB was not able to conduct a formal consensus review and meet the requirement of the Federal Advisory Committee Act. However, twenty four experts serving on SAB committees and panels provided their individual comments, as enclosed.

Many commentors were concerned about the limited number of samples specified in the proposed plan. Subsequent to submission of their comments, Dr. Vu received clarification from the Office of Research and Development that the Agency had already begun to collect thousands of samples in the affected areas. That is clearly the appropriate response. The enclosed expert comments offer numerous suggestions for improving the plan.

Given the enormity of the adverse human and environmental impacts that have occurred, in my view, the EPA would be well-advised to consider innovative problem-solving and communications approaches. In addition to the technical questions, the Agency needs to be prepared to address questions related to natural and social science issues. For example, how will the data from this sampling effort be presented and communicated to decision-makers and the public? What is the technical basis for clean up decisions? How clean must areas be made before it is appropriate to resume various activities? How will those decisions be made? How will affected parties be involved in those decisions?

The SAB, through its Homeland Security Advisory Committee, is ready to assist the Agency to support its mission in this national crisis.

Sincerely,

/signed/

Dr. M. Granger Morgan
Chair
Science Advisory Board

Enclosure

U.S. Environmental Protection Agency
Science Advisory Board

Individual Expert Comments on EPA's Emergency Response Quality Assurance Sampling Plan for Hurricane Katrina Response Support

U.S. Environmental Protection Agency (EPA) Region 6 developed a Quality Assurance Sampling Plan (QASP)[1] to determine the presence of priority pollutants in storm water runoff resulting from Hurricane Katrina that poses an imminent and substantial danger to life and health. The QASP was developed to conduct a screening sampling event in the southern area of Louisiana where there is standing water that is easily accessible. On September 3, 2005 EPA's Office of Research and Development (ORD) requested an expedited review of the QASP by the EPA Science Advisory Board (SAB). EPA requested that the SAB review the plan and provide comments on the advantages/disadvantages of using one versus two laboratories to analyze the samples. Given the urgent request, the SAB was not able to conduct a formal consensus review of the plan and meet the requirement of the Federal Advisory Committee Act. However, 24 members of the SAB, SAB Committees, and Panels were able to provide the following written comments on the QASP. Comments are provided alphabetically by reviewer. The roster of experts who reviewed the QASP is included in the appendix.

Dr. Henry Anderson

I was able to give the QASP a quick review. I think that the laboratory methods and the sample collection protocol are fine. I especially liked the detailed safety plan.

I am not sure how detailed the QASP is supposed to be in regards to the rationale for the selection of test parameters or for the selection of sampling sites. That is where I have some concerns and the plan could use some strengthening.

What was in the QASP was very cursory and not well justified. Lab methods and sample collection, storage etc were very detailed.

I think that the chemicals to be looked for are probably OK. I might consider adding phenol. When we had the flooding of the Mississippi in Wisconsin, creosote treated pilings that had been in the water as well as in the sediment caused concern for cleanup workers. Another consideration would be formaldehyde. I don't know if formaldehyde was used in the area to embalm, but if it was, each body would have about 2-3 gallons of formaldehyde. In another flooding episode in Wisconsin, we had a cemetery submerged and after the water began to recede our team could smell and measure formaldehye while walking through the facility.

[1] Emergency Response Quality Assurance Sampling Plan for Hurricane Katrina Response Support, Interstate Highways 10 and 610 Intersection, New Orleans, Orleans Parrish, Louisiana. Prepared by Weston Solutions, Inc., San Antonio, TX, September, 2005

So water near such sites (because of above ground burial formaldehyde may not have been used) might be looked at for formaldehyde.

The rationale for the choice of analytes needs better justification. I hope EPA is coordinating with the CDC/NCEH/ATSDR as I suspect they will begin doing some biomonitoring of response and cleanup personnel. Whatever CDC looks for should also be strongly considered by EPA in the water and the sediment that will remain.

I think that using only total coliforms as the biologic indicator is inadequate. If the goal here is to assess human health risk, other organisms such as enterococcus and some of the viruses such as hepatitis A should be added (think of the testing done on shellfish beds as a model - that is where a lot of this water and sediment may end up.) At the very least they need to speciate the coliforms as there will certainly be animal and bird coliforms as well as human. Some of the Beach testing comprehensive protocols being used in the Midwest freshwater lakes and rivers would be good place to start - talk to Region V. Perhaps my greatest concern would be the indication that perhaps as few as one site would be tested. I would strongly support using only one lab and expanding the number of test sites. I know it will be difficult to get sampling teams to a lot of sites, but it will be the geo-spatial distribution that will be extremely important from the public health perspective and the social aspects of different communities as well. Areas where there were concentrations of people with standing water that will be there for some time needs to be assessed for biologic agents more than other areas where contamination will come from failed sewer pipes or flowing water movement etc.

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 occur to get a sense from them of where problems may be and the types of concerns they have.

While the water is an immediate concern and I support getting samples collected ASAP, I hope Region VI is also working on a comprehensive sediment/muck sampling strategy. My concern for the longer term is for when people begin to go back in where houses are still standing and shovel up the muck that will be left behind and clean their yards and homes. That is when the rashs, infected cuts, headaches will escalate. The emergency responders and clean up professionals can be protected as described in the QASP, but as the public goes back - and this is in any of the areas inundated, understanding the exposure risk beyond injuries will be extremely useful in responding to health complaints that will arise.

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.

I am glad to see that the QASP process is being followed. There is a tendency in emergencies to skip this type of planning and detail. They are to be commended.

Dr. William Bellamy

General Comments

This plan looks like it has been put together without a clear definition of purpose and response. If this is to help protect public health in the short term, significantly more pathogen work should be included and a rapid response plan should be developed. No matter what the reason, coliform analyses have little if any relevance during a storm situation to public health.

It appears that this sampling plan has been put together based on a hazardous waste protocol, when the problem is more attuned to water resources, wastewater, and drinking water concerns. Members of the team should include water quality expertise.

There should be some assurance that there is background information on the receiving waters impacted by the water being pumped out of the area. If there is none, consideration should be given to sampling the receiving waters as well; if long term environmental assessments are going to be included in EPA's plans.

Sampling the pump discharges from this area may provide some of the best environmental information. Testing should probably be cared out on a routine basis for the discharges. This testing can be used to assess the impact to the environment and possible impact to the reclaimed habitable areas.

1.1 – PROJECT OBJECTIVES

There should be a better definition provided for this testing. The current objective is to test for conditions that *pose an imminent and substantial danger to life and health*.

If imminent (i.e., short term) public health concerns are the issue, most of the analyses do not evaluate this type of risk. Most of the analyses are for chronic type exposures to metals, pesticides, herbicides, etc. These are not going to pose short term health impacts because the area will be drained over the short term.

Pathogens, on the other hand, are an imminent danger. However, there is very little being done to test for pathogens. Coliform testing is not adequate or very relevant. At a minimum E coli (e.g., Colialert) should be assessed. Consideration should be given to other bacterial and protozoan pathogens as well.

I would think that some of the sampling is being done (i.e., the objective) to establish a background for future reference. For example, it may be reasonable to establish a background level of water borne pollutants to provide a starting point for testing sediments in drained areas and receiving waters (e.g., Lake Ponchartrain). If this is the case, so state, it may influence the selection of sampling locations.

2.1 SITE LOCATION AND DESCRIPTION

It would seem that a rational should be stated that ties the location of the sampling to the objectives of the sampling. If sampling is for protection of human health, samples should be taken where standing water and the population are in close proximity. If the sampling is to provide background information for further cleanup activities, sampling should be conducted where sediments are apt to collect; e.g., at the discharge of the pump stations. The sampling

locations are one of the most important aspects of this activity, clearer definition should be provided.

3.2 SAMPLING/MONITORING APPROACH

Why is SW-846 Test Methods for Evaluating Solid Waste, Physical/Chemical Methods being stated as the reference? It seams reasonable that the test methods should follow Standard Methods and EPA's Methods and Guidance for the Analysis of Water. The contaminants will most likely be in low concentrations and as such drinking water or wastewater analytical techniques should be used.

4. ANALYTICAL APPROACH

Same comment as 3.2. Analytical results should also be compared to Primary and Secondary Drinking Water Standards as well as normal NPDES requirements.

APPENDIX A

ASSIGN PROBABILITY VALUES…….. The response in this table indicates samples are being collected for "baseline and screening purposes" not for imminent and substantial danger to life and health. There is a disconnect here that indicates that the true purpose of the sampling and analysis may not be clearly defined.

Dr. John Crittenden

1) I am having trouble with the notion of duplicate samples going to two labs and these are pros/ cons.

a) 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?

b) Have comparative studies like this been done before? So that we can avoid two labs running the same samples because we know the results are fairly similar.

c) It would be great to get more spatial and temporal resolution by sending one one sample to a lab. Maybe we could have some limited samples (in hot spots) to 3 labs for a comparison.

d) Perhaps some labs would be willing to do the analysis for a lower fee?

e) I guess this raises more questions but some samples have a longer shelf life than others and we could double up later if we find some very interesting results. The key would be to take alot of sample to find interesting trends and then confirm them by doubling or tripling the sampling.

2) I would hope we would do more biological sampling than just Coliform. This is the only one that I saw in the QASP. This is really only the beginning. I defer to micro experts as to what would be the minimum.

3) In addition to chemical concentrations, we need to determine the hydrology. Flow times concentration is mass quantity and we need this for WQ modeling purposes.

4) Conductivity or salinity measurements are fairly easy and perhaps these could be used to determine the mix or salt water and fresh water.

5) Once the disaster area dries out, it maybe of interest to examine aerosol formation.

7) I see they have begun to pump out N O. I wonder what that water quality is? It sounds crazy but I wonder what the addition of powered carbon and a flocculant would do before discharge. They could prepare make shift basin(s). They will be cleaning up anyway so a little sludge should not be that big of a deal. The discharge of contaminated particles into Lake P. could make things worse.

8) The QSAP seems to cover traditional QA/QC protocols, adequately.

Dr. David A. Dzombak

General Comments

The sampling plan contains all the typical elements as well as a quality assurance plan, but some of the elements are quite general, apparently because the objectives of the sampling have not been well defined. There are inconsistencies in the stated objectives of the sampling in the document, as outlined below. The sampling plan would be strengthened by some additional thinking about and clarification of the objectives. The scope of the plan is also not clear. The plan as written seems to be general and flexible to accommodate an open-ended emergency response mission. However, at places in the document it is indicated that sampling will occur at one particular location and will encompass the collection of just six samples (with a duplicate of each sample). I recognize the urgency of the situation and the desire to get started, but a phone conference less than 30 minutes in length should be able to clarify the situation regarding objectives and the scope. It is unclear how the data will be used, so it is hard to comment on the rationale for the various water constituents proposed for analysis. However, if, as stated on page 2-1, the primary purpose of the sampling is indeed to assess the presence of "pollutants in storm water runoff resulting from Hurricane Katrina that pose an imminent and substantial danger to life and health", then I think that the sampling plan should have more emphasis on microbiological contaminants that pose acute human-health risks and less focus on the traditional Superfund-related contaminants usually associated with long-term, chronic health risks.

Specific Comments

1. Sec. 2.1. 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 related to longer-term, wide area sampling.

2. 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.

3. Sec. 3.2.1, Sampling. The water constituents targeted for analysis include VOCs, SVOCs, total metals, pesticides, herbicides, PCBs, total coliform bacteria. This is not the list of constituents 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. Very high concentrations of some chemicals in the classes of compounds listed can pose acute health risks; the focus of analysis should be on this relatively small subset. I can't see the reason for analyzing PCBs at an early stage of emergency response. For acute health risks, I would be much more concerned about microbiological contaminants. In this context, analysis for total coliform bacteria is insufficient. Total coliform bacteria is an indicator of microbial contamination that includes fecal coliform, the human health indicator of primary interest, as well as many other coliform bacteria that are present naturally in the environment. 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.

4. Sec. 3.3, Surface Water Sampling. The discussion here seems to indicate that the entire sampling program will encompass a total of only six surface water samples, with a duplicate sample for each sample collected at a particular time and location. If the scope of the sampling program will be broader, as I suspect is the case, then this discussion of the scope of the plan should be fixed.

5. Sec. 5.2, Sample Chain-of-Custody Procedures. The language here 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 reference to data collection for Superfund-related legal action.

6. Appendix A, Step 1, State the Problem. The problem statement given here is outdated. There clearly have been many releases of contaminants to the storm water from Hurricane Katrina. Isn't the objective now to assess the extent and locations of contamination, to aid planning for cleanup and remediation?

7. Appendix A, Step 5, Decision Rule; and Appendix D. If the intended use of the data collected is really to investigate the presence of contaminants that "pose an imminent and substantial danger to life and health", then contaminants with the greatest potential for acute health effects should be of primary concern. A focus on contaminants that pose greatest risk for acute human health effects is not evident in the sampling plan (see Comment 3) and in the decision rule presented in Appendix A, Step 5, which refers to the list of chemicals in Appendix D. For many of the chemicals listed in Appendix D, a standard list of chemicals considered in Superfund investigations, acute health risks are not of great concern, or acute toxicity data have not been developed. The contaminants of primary interest should be identified from this long list. There are no microbiological contaminants listed in Appendix D; several are of importance and should be added (see Comment 3).

8. Appendix A, Step 7, General Sampling and Analysis Design. The language here again indicates that only six surface water samples will be collected, with a duplicate of each sample. Is this really the full scope of the sampling effort? See also Comment 4.

9. 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.

Comments on the use of one versus two laboratories for sample analysis

Any QA/QC plan is formulated with consideration of how the data will be used. In this project, I expect that the primary use of the data will be to get an idea of kinds of contaminants and their approximate abundance in different parts of the flooded zones, in order to formulate appropriate later quality management plans for the pumping and remediation efforts. Thus, I think that a high degree of accuracy will not be of primary importance in this situation, and that there will not be a strong need for inter-laboratory confirmation of results. For data intended for use in assessment and remediation planning purposes, use of one lab in order to obtain efficiencies of scale and broader spatial coverage seems justifiable, assuming that the lab possesses EPA certifications and has a reputable internal QA/QC program that has been audited in the past. For analyses of water samples from the drinking water system, as that is brought back up, a higher degree of accuracy would be warranted for public health protection and interlaboratory comparison would be desirable. I expect that the emergency response folks won't be thinking about the drinking water system for some time, however.

Dr. Taylor Eighmy

Here are some brief comments. Obviously time is of the essence and sampling needs to start, so these comments are designed to help rather than hinder. I sort of took the view of the interest in and reaction to how EPA managed sampling in NYC after 9/11 as a guide as to how this effort might be viewed by the public. I responded as a knowledgeable lay person, rather than as an expert.

1. 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?

2. Generally, this QASP adheres to typical EPA protocols about sampling and data quality objectives, so from that perspective, I think it is fine.

3. I was a bit unclear about the purpose of the QASP and determining presence of priority pollutants in storm water run-off with respect to imminent health risk: is this the first of many efforts? Is it only presence/absence in what are clear source terms at six locations? Is it geospatial extent? Or is it geospatial and temporal extent?

4. It was not clear why the location of I-10 and I-610 was the best location to collect six samples. Certainly logistics are at play and folks know why this is the best place. It was just not clear to me.

5. Obviously, on site determination of where to collect the six samples will have to be made... again, how will the data be used? (see my comment 2).

6. I was surprised that it is only six samples plus duplicates... this relates to my second comment. Given all the exposure over time to various point sources by the public, first responders, etc., I would think that more samples will be needed and that this will need to be geospatial and temporal in extent.

7. Regarding health risks from human pathogens (e.g., enteric viruses such as Enteroviruses, plus *Vibrio cholera, Salmonella* spp. and other microbial pathogens) and using colifoms as indicators... might some additional resources be used to collect samples and look for the presence of actual pathogens by extracting microbial community DNA and amplifying genes for 16S rRNA (specifically 16S rDNA, amplifying target primers with PCR, and then sequencing as appropriate) for target pathogens? I think the likelihood of coliforms will be high without any indication of the presence of specific pathogens of concern. I am no expert here, but your water-born pathogen experts of the SAB might have even better techniques to recommend that clearly show presence/absence. I also think this is where public health interests will reside the most.

Dr. Baruch Fischhoff

1. I assume that the sampling site has been chosen for its accessibility, in this difficult time. Whatever the reason, 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. Presumably, the project involves individuals with the local knowledge needed to provide this context. If not, then such individuals should be recruited, so that the work will be seen as credible by local residents.

2. Although "community relations" are mentioned, there is no explicit commitment to such activities. According to the draft plan, such relations will only be conducted "if necessary." 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 risks becoming seen as part of the problem, rather than part of the solution, despite the hard and dangerous work undertaken by its staff and contractors.

3. Given the controversy over determination of an area's security status, the plan should specify which agency is the designated authority for such evaluations. I appreciate the concern for workers' well being.

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

5. Is the depth of the water at the site relevant to the sampling procedure? That is, are there mixing issues that might suggest stratified sampling by depth?

6. The SCDM Benchmarks and EPA MSSLs (as well as the associated legislation) provide reasonable points of departure for decision making. However, it is not unreasonable to assume that the special circumstances of this event will lead to unique decision-making processes. The project should be ready to serve those processes, even if their structure cannot be determined at this time. The plan should have some recognition of this possibility.

7. The discussion of decision rules seems to assume that the current surface water levels and associated contaminations will remain there indefinitely (until treated). If significant water flows are expected, then that should be reflected in the plan.

8. Is there value to taking soil samples, once the crew is in the field, even if those will not be analyzed immediately (or perhaps ever)?

9. If the purpose of this project is to identify acute dangers, would the resources not be better invested in getting rough assessments from a greater variety sites? For example, is there any addition expense incurred by chain-of-custody procedures? If so, can it be justified, given the intended use of the data? Revising my first point, taking all the samples at one point improves the precision of understanding the (possibly transient) state of affairs there, but at the expense of knowing nothing at other sites. Taking the samples to remote labs, with state-of-the-art equipment will, similarly, provide the highest quality work on these samples. Would the people whose health is at acute risk (in the rescue and recovery operations, in retrieving valuables and restoring their homes and businesses, in receiving medical treatment), be better served by quicker, less precise results? The document provides no justification for its overall strategy. Hence, it has not made the case that is it the best investment of our limited resources or even worth doing at all, especially if that means creating health risks for EPA staff and contractors.

<u>Comments on the use of one versus two laboratories for sample analysis</u>

I think that they need to drop back and identify the decisions for which the data will be used. Without that policy context, why not take just one sample and analyze it six times at different labs? If they don't have guidance on the policy context (and have just been told to find out something about acute risks), then perhaps we should offer to provide it for them. That would, at minimum, require conversations with people on site, whose lives and livelihoods will depend on the results. Otherwise, this study may not only be an inefficient use of scarce resources, but actually injurious, if we are wasting money that could be used to provide essential information.

Dr. Steven Heeringa

I have reviewed the QASP looking most closely at the proposed sampling methods and QA/QC for the collection, handling and COC for the water samples. I am not a water scientist but the procedures outlined in this QASP look to be in good order.

The QASP has limited information on the specific locations of the sampling points in the I-10 and I-610 intersection vicinity. From page 1-1 it appears that the contractor's project leader will choose the six sampling locations. Since this data collection is clearly a preliminary screening with only six point observations I do not believe there is strong scientific guidance (beyond a reasonable distribution of locations over the target area and common sense) on achieving a representative screening sample. Based on the initial results of these distributed screening samples, there are adaptive procedures for sampling to extend our knowledge beyond the six samples to look for gradients in concentration, sources, etc. But this is clearly a next phase. The purpose here appears to be to determine if with some probability problems exist or not. For completeness, I would suggest to the contractor, that if they are not already doing so, that GIS coordinates be recorded for the exact sampling locations along with specific physical features of the sampling location including water depth, current flow(if present). Water chemists on the SAB can certainly provide a sense of what are the standard variables that should be captured for each sample location in this screening for water-borne contaminants.

Comments on the use of one versus two laboratories for sample analysis

This question goes to the tradeoff between the ability to detect laboratory effects in measurement vs. the ability to increase thespatial distribution/density of sampling to detect variability inconcentration at the original site. At this stage, I would argue for additional samples at the site andaccept a single laboratory measurement. Adding samples provides robustness to any conclusions drawn about the variability of potential contaminant concentrations and the variability associated with drawing small water samples in over a broad water surface with variable depth and localized flow/mixing properties.

Dr. Michael Kavanaugh

In parallel with collecting the samples, I hope there is significant effort going into what to do with the data. This is not discussed at all in this document. The other critical issue is whether the priority pollutant analyte list misses some important chemicals. That list is more than 30 years old. EPA should certainly include any chemicals with substantial human toxicity that may likely be present because of the nature of the flooding.

(Dr. Kavanaugh provided the following comments as inserts within the sections of the QSAP identified below.)

Section 1.1. Basis for assuming that six samples will be “representative” should be stated somewhere. Obvious urgency here is getting the data quickly. If values of priority pollutants vary wildly from different locations, how will you determine what is “representative” and what

conditions represent an imminent threat? I recommend that the plan have contingencies in case the distribution of results is quite broad, say more than one order of magnitude.

Section 1.3 (Data Quality Objective). singular or plural?

Section 2.2. Would be useful to summarize quickly what levels for selected likely contaminants amongst the priority pollutants represent an imminent and substantial endangerment to humans. I assume eco risks are not being considered at this time. I also recommend that non-priority pollutants that are likely to be present and are considered highly toxic should be included in the analyte list. I do not have specific recommendations here, but certainly other experts within the agency may have specific suggestions. On the other hand, perhaps the only acute issues are microbial rather than chemical at this time. Is that issue being handled by other sampling programs?

Appendix A, Step 2. "If any contaminant exceeds the specified benchmark in the surface water, the media represented by that sample will be considered contaminated and will require additional attention." too vague. What attention??

Dr. Lynda Knobeloch

The draft sampling plan appears to be well designed and detailed in its description. My comments and suggestions are itemized below.

1). The number of sampling locations (6) is very small given the large landmass that has been flooded and will be pumped over the coming weeks. It is unclear why this area was selected for sampling and whether additional sampling at other sites will be done in the future. Perhaps this is explained in another document. If not, a brief explanation would be helpful.

2). The sampling location is in the area of the intersection of I-10 and I-610. How many square miles or acres of land will be represented by this sampling? What are the likely sources of contamination in this area? Will the analytes detect the most hazardous substances that are stored or used by these facilities?

3). In section **2.2 Site Concerns**, imminent and substantial danger to life and health are mentioned. Is the purpose of the sampling to protect clean up workers, to protect surface water quality, or both? Is the purpose of the testing to protect against short-term/high level human exposure? This should be explained more completely in the sampling plan because the interpretation of the test results, i.e. the screening levels against which your results are compared, will depend on the intent of the sampling.

4). In addition to testing for chemicals of concern, it is often useful to assess physical characteristics of stormwater such as pH, temperature, turbidity, and conductivity. These parameters are inexpensive to measure and may be useful in evaluating the impact of the discharge water on surface water quality and aquatic life.

5). Depending on the types of facilities located in this region, it may be useful to include radioactivity and pharmaceuticals in your list of analytes. Pharmaceuticals would not pose an

imminent hazard to clean up workers, but could have an impact on surface water quality. Limited testing for them may be of interest depending on the analytical costs.

6). Section 3.4, Sample Management, describes Geographic Location as a school or a park. Since many of these landmarks may be destroyed during the cleanup and rebuilding of New Orleans, it would be helpful to record GIS coordinates during sample collection if this is feasible. Collection of GIS coordinates would help in the mapping of sample results.

Dr. Thomas La Point

In the interests of time, I am emailing you my review of the QASP you had sent to me yesterday. I did read it and find it highly appropriate as a plan to use to determine the presence of priority pollutants in New Orleans resulting from the flooding. I have some specific comments and questions you may wish to address:

1. On page 3-3 of the QASP, Section 3.3 on Surface sampling begins with the statement that six (6) surface water samples and six duplicates (total of 12) will be taken from each sample location. If the samples to be analyzed include all the priority pollutants and those selected from Appendix D, Human Health Screening levels, this project could be hugely expensive and still not assess risk from human or animal exposure to the chemicals. I would strongly recommend using a GIS-based approach to determine where waste storage areas are/were, where gasoline stations are, where small-scale industrial businesses are (including dry cleaning facilities, hazardous waste recycling stations, other "solvent-oriented" industries), and co-locate these with a map of how the drainage patterns flow within the sub-basins that were flooded. If I may suggest, following something like this plan would allow a "triage" system to be established to find out where the highest concentrations of chemicals would be.

The question I also have in regard to this is, "why 12 samples?" It may be more efficient to stratify on the basis of "flooded duration" or "concentration of industrial shops" or somesuch. Then, those areas suspected of having the highest concentrations could be sampled with a smaller "n" and those with more dilution requiring a higher sample size to determine the extent of contamination.

2. The Analytical Approach described on Page 4-1, Section 4 discusses the types of samples to be collected (as listed in Table 4-1 and Appendix D). In an effort to make this a cost-effective sampling approach, I would recommend a preliminary screen, looking for key contaminants that could serve as markers for either a more extensive sampling afterwards or lead to immediate "high-priority" cleanup needs. For example, a high priority on sampling should be pesticides, both organochlorine and organophosphorus. The rationale is that many homes in New Orleans that were flooded are of wood and the formosan termite has been a long-term problem. Although I am sure that legal pesticides are being applied to this problem, there is always the chance that some -few- folks may have relied on "good, old" (and dangerous) banned pesticides.

It is also important to look for known and suspected carcinogens as a priority scan, as petrochemicals are widely distributed throughout the basin and no doubt were shifted about in the winds and subsequent flooding.

3. Finally, given the long list of chemicals in Appendix D, I hope there are some "marker" compounds that would be listed in the first priority scan of chemicals. If found, and if the chemicals are known to co-occur with others, the list could be trimmmed and more samples taken. Doing so would allow for a further scan of areas and more samples to be taken, rather than spend lots of dollars on fewer samples for chemicals that may not be present, at least in certain locations.

Comments on the use of one versus two laboratories for sample analysis

My opinion on this is to sample more places, going with one lab to conduct the analyses. To be most cost-effective on any cleanup procedures, it will be optimal to have an idea of the spatial extent of contamination, rather than having more labs involved, with fewer samples each.

Thank you for the opportunity to review the QASP. I hope my review was not too cursory and that it was submitted in a timely manner for you.

Dr. Paul Lioy

I have reviewed the plan, and have some serious concerns about the ability to meet the stated objectives. Because of the urgency of the situation, my comments are provided directly on the draft.

(Dr. Lioy provided the following comments as inserts within the sections of the QSAP identified below.)

Comment #1 (introduction): Before one can focus on the Methods and QA, the appropriateness of these must be placed into the context of the application to achieve the goals of the above statement. Thus, I will specifically focus on these major issues.

Our country is attempting to deal with potentially serious acute exposures and health effects. The sampling plan needs to be directed to that problem. At this time it appears that the sampling plan is focusing primarily “priority pollutants.” Many of these do not cause acute or “an imminent and substantial danger to life and health.” Please reconsider which chemical and biological contaminants of concern need to be measured to achieve your goals since results obtained from this EPA sampling program will be an important “first set of data” for the New Orleans recovery efforts.

Comment #2 (Section 1.1): What is the purpose of sampling at the selected locations? The city of New Orleans being evacuated; therefore, imminent health concerns (in addition to the many currently being experienced by the many thousands of evacuated or stranded victims) will primarily be associated the recovery workers and the security forces over the next few weeks. The Agency needs a sampling plan directed toward reducing their exposure and risk.

Comment #3 (Section 1.1): What will these samples represent? Is the storm water runoff to be used as drinking water? Unless this point is stated clearly in this document, I would assume that storm water that will be going into the delta region (i.e. wetlands). The results from the sampling

will have to be explained to the public and the press. What they represent will be a critical feature of that discussion.

My suggestion would be to sample in flooded buildings to get an idea of imminent health concerns. Namely, what will be in the water around the building in the buildings upon entry by various professional personnel and owners? Of course re-sampling will be necessary later on to examine mold during the recovery process.

Comment #4 (Section 2.2): Again, most of the "priority pollutants" selected for sampling do not present imminent health concerns. You should strongly consider sampling for biologicals of all types, and chemicals that cause acute health effects. For example, PCB's are a very low priority at this time. In contrast, "OP" Pesticides and Coliform counts are examples of the types of pollutants that can, upon acute exposure, cause imminent health effects. Please review and revise the agents of concern based upon the objectives of the plan.

Comment #5 (Section 3.12): Community outreach requires a strong statement about the purpose and the objectives of the sampling plan. To maintain attention on "an imminent and substantial danger to life and health," there should be greater emphasis on sampling at locations where there will potentially be "actual contact" by people with hazardous pollutants, and biological agents (bacteria, viruses etc). Thus, my recommendation to focus on flooded homes and buildings, and eventually the water supply, once the system is brought back on line.

Comment #6 (Section 3.2): There needs to be a well defined sampling strategy. Samples that are taken without a well articulated strategy, and that focus determining the levels of many pollutants associated with primarily long term health effects during an acute exposure event will not be easy to explain to the public. The testing for pesticides (e.g. OP) and Coliform counts are a good start. Please re-evaluate the selection of chemicals and biological agents of concern, and state the reasons why specific locations will be sampled at this time. Over the course of the next six months, and prior to rehabitation of the city, there is plenty of time available for measuring the typical priority pollutants.

Comment #7 (Section 3.3): Since the sampling program is being developed to address imminent health threats, the Agency must consider who is going to come into contact with acute biological and chemical toxicants "now". Since New Orleans has been evacuated or will be evacuated soon, I suggest focusing on protecting the recovery workers and security personnel from exposures that can lead to imminent health effects. Question, will the greatest concerns be surface water or standing water? The routes of exposure must also be identified. The greatest concerns would be dermal exposures, and incidental ingestion at this time.

Comment #8 (Section 4): As stated above, many of these pollutants do not cause imminent health effects based upon acute exposures. The agency should seriously consider measuring the levels of viruses and bacteria etc. that can cause various diseases. As stated in Comment #7 incidental ingestion and dermal contacts should be a major concern at this time.

The appendix provides a number of benchmarks. Most are associated with long term risks, and not acute toxicant exposures. Further, many have no relationship to the types of samples to be taken by contractors. These guidelines appear to be related to drinking water, soil, and ambient

air levels. Such samples are not included as part of this sampling plan; therefore, please tailor the Appendix to the goals sampling program that is being developed at this time.

Dr. Randy Maddalena

This is a nice QA plan but in my opinion, assuming I understand the objective, it is not appropriate for an emergency response scenario. I cannot imagine that six samples collected from a single location will provide any useful information to the folks on the ground in New Orleans.

The *Emergency Response – Quality Assurance Sampling Plan* (ER-QASP) is fine if the data is meant to support legal action. However, I think the plan is woefully inadequate for supporting "emergency response" activity. The focus should be on providing as much of the right kind of information as possible to the emergency response teams and provide this information as quickly as possible. I do not know what the conditions are like on the ground in New Orleans but in an emergency situation, if I had to choose between running a quality assurance sample to build confidence in my answer about a single location or running a new sample from a different location, I would choose the new sample/location every time.

The details in the ER-QASP are fine for most situations but if the intent is to support the emergency response phase following the hurricane Katrina disaster in New Orleans then I think the plan is lacking in the following areas:

1. The plan does not provide enough spatial resolution across the flooded region to determine if priority pollutants are present at dangerous levels. If there is a reason to believe that the intersection of I-10 and I-610 is representative of the region (i.e., outflow of drains from multiple pump locations) then this should be indicated in the plan. Otherwise, I think the situation warrants **ongoing sample collection** (as opposed to a specific number of samples) over a wide spatial area or at select drain points that clearly represent the area of interest.
2. The plan does not provide temporal resolution to determine trends in contaminant levels (i.e., concentrations going up or down). Identification of some integrating points draining large areas (i.e., pump station outfall) might provide this information at a screening level. I think locations that integrate large areas should be identified and used to collect multiple samples to assess trends in contaminant levels.
3. Given the wider scope of sample collection recommended above, the sample collection process will need to be streamlined. There may be an opportunity/need to develop simple field deployable sample kits and use emergency responders or cleanup crews in the field or additional "environmental teams" that can rapidly move into areas as soon as they are secure. One way to simplify the sample kits might be to reduce the volume of sample collected at each location. I think a number of the target chemicals in Table 4-1 can be extracted from the same liter of water.
4. The suggestions above will increase the burden on analytical labs so there is a need to develop a network of qualified analytical laboratories for rapid sample turnaround. The "maximum holding times" listed in Table 4-1 are not relevant for this phase of the response. The goal during the screening phase should be to turn around samples

overnight or at the very most, within a couple of days. The ER-QASP should present a plan to assure laboratory recruitment and comparability so that the capacity exists to process a large number of samples very quickly. For example, spiked water sample can be prepared with known levels of contaminant and an aliquot can be sent (blind) to each participating lab to assure comparable results.

I understand that there are likely to be policy and contractual issues that support the use of a more formal QA/QC plan but I think that given the pressing need to support emergency response activity that is active and ongoing, there is also good reason to **temporarily** reduce the burden of QA and increase the sample throughput. As conditions in the field change from emergency response to long-term remediation, more precise and scientifically defensible data may be warranted.

Dr. John Maney

SUMMARY OF ISSUES

1) SITE LOCATION: 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.

2) NUMBER OF SAMPLES: Six samples are inadequate to meet the stated goals of "evaluate the nature of the contaminants present." Will address later.

3) HETEROGENEITY: Short-term and long-term heterogeneity is not addressed in the plan. Will address later.

4) CONCEPTUAL MODEL: No conceptual model is discussed in the QASP. A conceptual model regarding the potential sources of contaminants (e.g., refineries, chemical companies, POTWs) and their distribution by and in the flood waters (e.g., downstream vs. upstream from a source) must be developed and be used to decide upon sampling locations. Data may eventually prove that your conceptual model is wrong, but in the process a lot will be learned. Sampling that is not directed by some conceptual model, is less likely to answer questions. Will address later.

5) PHASES: There is no discussion of total versus suspended versus dissolved contaminant levels. However, many of the priority pollutants are hydrophobic (i.e., likely adhered to particulate matter) and eventually much of the water will have been pumped, drained or evaporated which means that the fate and impact of suspended, dissolved phases will be different. Some thought should be given to these issues before sampling. Will address later.

6) 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 mobilization of the sampling team, if sediments become available for sampling, shouldn't the sampling team be prepared to collect samples? Will address later.

7) SUBSAMPLING: Water samples are likely to contain suspended material that will separate prior to analysis. Some contaminants may preferably adhere to container walls. Have to determine how these samples will be handled (e.g., entire sample prepared with container rinses or phase separation prior to analysis.)

8) CONTAMINANTS of CONCERN: The priority pollutants are a good starting point. But should at least ensure that all GC/MS analyses include the identification of TICs (Tentatively Identified Compounds). Likewise, with the heavy presence of the petroleum industry in New Orleans, a GC analysis for petroleum hydrocarbons should be included – may serve to be a useful fingerprint for sourcing. Likewise, the 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. Likewise, the specified gas chromatographic methods do not detect strongly polar or large compounds that are detectable by LC/MS/MS and are now of increasing environmental concern.

9) SAMPLE DISPOSAL: The QASP states "Samples that have been analyzed will be disposed 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. (Dr. Maney's detailed comments are provided below)

DETAILED COMMENTS

<u>I. VARYING QASP OBJECTIVES</u>

1) Section 1.1: "The objective is to determine the presence of priority pollutants in storm water runoff resulting from Hurricane Katrina that poses an imminent and substantial danger to life and health."
2) Section 3: "Samples collected by START-2 will be used to evaluate the nature of the contaminants present."
3) Section 4: "In determining the nature and extent of potential contamination, analytical results will be compared to EPA Region 6 Human Health Medium-Specific Screening Levels (MSSLs) in addition to site-specific background levels."
4) APPENDIX A (Page 1): "Surface water samples will be collected from storm water resulting from Hurricane Katrina to determine if there is a release to surface water with concentrations of chemicals of concern."
5) APPENDIX A (Page 1): "these samples are being collected for baseline and screening purposes"

What may appear to be slight nuances between these objectives can and should have significant impact on the sampling and analytical program. For example, regarding the first objective that is concerned with the risk (danger) to "life and health". Is this specific to 'human' life and health or are ecological impacts also intended to be evaluated. A concern for ecological impact may require analysis for different contaminants.

[NOTE: The use of terms in the first objective such as "imminent and substantial danger" and comparison to the MSSLs may unnecessarily and incorrectly alarm the public sometime in the future when they review the resulting data in light of this objective. In addition, comparison of a mean concentrations or UCL's to a threshold, is more appropriate than comparison of some outliers as is specified by the QASP.

Furthermore, flood waters should be associated with acute exposures not the chronic exposures that likely underlie the rationale for MSSLs. Using MSSLs to ensure that analytical method detection limits are sufficient is fine, but the use of MSSLs to determine the risk from temporal flood waters is likely unjustified.

SUGGESTION: At this stage a data collection activity is not capable of answering such risk/danger questions. Suggest changing the Objective (See below).]

The second objective uses an ambiguous, unspecific term, 'nature'. Although likely intended to mean 'type', it will still mean different things to different project personnel.

The third objective expands upon the second and intends to determine the 'extent" of potential contamination which is an ambitious undertaking. Besides being ambitious and requiring orders of magnitude more samples than planned, what value will it have in light of the temporal nature of flood waters?

Objective 4 is less ambitious and more appropriate. Regarding Objective 5, it is unclear how data will be used to for baseline and screening purposes.

At this stage, it appears that the samples will be collected and data will be used for informational purposes. After these data are available, more will be known, specific questions will arise and the next data collection activity can be more focused.

SUGGESTION: In the interim a suggested objective is 'To estimate the concentration and variability of priority pollutants in flood waters accessible to sampling'.

SUGGESTION: If EPA personnel have specific questions or have a conceptual model about sources and how contaminants were dispersed, then a more specific Objective can be written and the data collection activity designed to answer these questions or test the conceptual models.

II - CONCEPTUAL MODEL & SAMPLING LOCATIONS

No conceptual model is discussed in the QASP, however existing EPA guidance (EPA/G-4HW) encourages the use of conceptual models to select sampling locations and manage uncertainty. EPA's new draft guidance (EPA/G-4) states;

The planning team will typically begin by developing a conceptual model of the problem, which summarizes the key environmental release, transport, dispersion, transformation, deposition, uptake, and behavioral aspects of the exposure scenario which underlies the problem. The conceptual model is an important tool for organizing information about

the current state of knowledge and understanding of the problem, as well as for documenting key theoretical assumptions underlying an exposure assessment.

SUGGESTION: At a basic level, through the TRI and other databases, EPA is well aware of potential contaminant sources (e.g., refineries, chemical plants, POTWs, gas stations, chemical and pesticide warehouses, hazardous waste treatment companies, petroleum distribution terminals) and by an understanding of the storm surge and the levee breaks can predict the initial and most vigorous direction of water flows and the likely direction of transport and routes of dispersion (i.e., upstream or downstream of the source).

The conceptual model can be combined with particular areas of concern (e.g., hospitals that may be the focus of initial clean-up actions or residential areas).

Therefore a conceptual model will suggest sampling locations and likely places to start a data collection activity. Data may eventually prove that your conceptual model is wrong, but in the process a lot will be learned. Sampling that is not directed by some conceptual model, is less likely to answer questions or provide useful information. A conceptual model that is supported by data will justify extrapolation (with all the appropriate caveats) to similar release areas.

Even a crude conceptual model when used as the basis to plan a data collection activity will usually result in more useful information than convenience sampling. The choice of the I-10/I-610 interchange sampling location may be justified but no justification was presented. Likewise as I stated in an earlier email;

"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****.*

III – HETEROGENEITY & THE MASS AND NUMBER OF FIELD SAMPLES

<u>Flood Waters</u>

If environmental scientists worked in Walgreen's "Place called Perfect", then all matrices, waste drums and populations of interest would be homogenous and a single sample would suffice.

However, when dealing with flood waters they are likely to be variable with regards to the presence and concentration of the contaminants of interest. This heterogeneity requires multiple samples to document contaminant variability over time and space (horizontal and vertical).

SUGGESTION: Would suggest a *random start systematic sampling along a transect* (Page 56 of EPA 530-D-02-002) or **preferably** a *random sampling within segments along a transect* (Page 56 of EPA 530-D-02-002). The later is preferable when cyclical heterogeneity is a possibility and when a probabilistic approach is necessary to preclude the potential of selection bias. This later approach can be implemented as easily as systematic sampling if all sampling

points are chosen before sampling. The angle/direction of the transect can also be randomly chosen.

At least periodic collocated samples are necessary to ensure that the concentration differences experienced along a transect are real and not a function of short-term heterogeneity (i.e., document through collocated samples that the concentration differences between collocated samples are/are not significantly less than those between distant sampling locations).

Sampling along a transect addresses horizontal heterogeneity, but not vertical or temporal heterogeneity. Unless vertical and temporal sources of variability are not of importance (highly unlikely assumption) then samples should be sampled along a depth profile (*random sampling within segments along a depth transect)* to address vertical heterogeneity. The horizontal and vertical sampling should then be repeated at some subsequent (and practical) time interval to detect temporal heterogeneity.

Phases

The presence of suspended particulate matter or floating particulate matter, hydrophobic surface layers (LNAPL) and submerged hydrophobic layers (DNAPL) will further complicate sampling and data use, unless these phases are sampled and documented properly in the field and appropriate analyzed.

SUGGESTION: It may be better to treat these phases as separate populations, sampling and analyzing them separately (while recording relative masses as compared to the water column).

SUGGESTION: If a sample contains multiple phases and the sample can not be analyzed in its entirety, then caution should be employed when subsampling (Refer to ASTM Standard D6323 and EPA 530-D-02-002, pages 135 – 138 for subsampling guidance).

Sediments

If sediments are collected then particulate heterogeneity (variability of the contaminant of interest between particles) can be a significant factor.

SUGGESTION: To minimize this problem, artifacts such as windswept vegetation and impervious rocks can usually be precluded unless obviously contaminated (a few samples of these artifacts can be collected and analyzed or archived to prove they are not significant contributors).

For sediment samples a minimum 500 gram sample should control Fundamental Error (FE) for particles up to 0.37 cm in diameter without particle size reduction. Be aware of the limitation of the specified SW-846 metal preparation methods (i.e., minimum 1 gram sample size for Method 3050B and maximum 0.5 gram sample size for Method 3051). Avoid Method 3051 because of the small sample sizes that are employed. Request that the laboratory employ minimum 10 gram sample sizes to increase sample representativeness when employing Method 3050B and to consider particle size versus fundamental error (EPA 530-D-02-002, pages 197 - 200).

Pitard (Piere Gy's Sampling Theory and Sampling Practice, Francis F. Pitard, CRC Press, Page 241) suggests a 'one-dimensional Japanese slab-cake' subsampling approach for selection of the analytical aliquot from the field sample. Also refer to Nocerino, et al. (Environmental Forensics, 6:35-44, 2005), EPA 530-D-02-002, pages 135 – 138 and ASTM Standard D6323 for additional subsampling guidance.

The above discussion encourages an increased number of samples over what was originally proposed in the QASP. This need for more samples to properly characterize a population emphasizes the importance of a defensible conceptual model in focusing one's sampling effort and monies.

As a counterbalance to the understandable concern regarding the increased cost of more samples, it is important to note that the cost of mobilizing a sampling team and equipment to correctly collect a single sample (especially in a disaster area) are large compared to the additional cost of collecting more samples, which will dramatically increase the usability of data. Thus the Agency is encouraged to increase the number of samples.

The cost-effectiveness of field testing (e.g., portable GC for VOCs) to focus sampling or to increase the number of samples can make it a valuable tool under certain field conditions. Thus feasibility of field testing should be evaluated.

IV. CONTAMINANTS of CONCERN

The priority pollutants are a good starting point, but improvements can be made.

SUGGESTION: The QASP should at least ensure that all GC/MS analyses include the identification of TICs (Tentatively Identified Compounds).

Likewise, with the heavy presence of the petroleum industry in New Orleans, a GC analysis for petroleum hydrocarbons should be included – this may serve to be a useful fingerprint for sourcing.

In addition, 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 significant concentrations of non-routine elements do not go undetected. This is a very cost-effective modification.

Furthermore, the specified gas chromatographic methods do not detect strongly polar, labile or large compounds that are detectable by LC/MS/MS and are now of increasing environmental concern. EPA should have Bill Budde of EPA's Cincinnati laboratory conference with EPA's Region VI staff to determine if a manufacturer of these compounds exists in the flooded areas. If such a manufacturer exists, then LC/MS/MS can be considered for samples collected in areas surrounding these facility.

V. 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 as opposed to flood waters that will be pumped or drained away.

SUGGESTION: Considering the cost of mobilization of the sampling team, if sediments become available for sampling, shouldn't the sampling team be prepared to collect samples?

VI. SUBSAMPLING

The QASP or an associated laboratory document should specify handling and subsampling procedures as suggested above for all samples especially multi-phased or solid samples.

SUGGESTION: Refer to the following for subsampling guidance**;**

- Nocerino, et al. (Environmental Forensics, 6:35-44, 2005)
- EPA 530-D-02-002, pages 135 – 138
- ASTM Standard D6323 for additional subsampling guidance
- Piere Gy's Sampling Theory and Sampling Practice, Francis F. Pitard, CRC Press

VII. SAMPLE DISPOSAL

The QASP states "Samples that have been analyzed will be disposed by the designated laboratory in accordance with the laboratory SOPs."

SUGGESTION: 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 value. 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.

The laboratory should also be instructed to maintain all instrumental raw data and preparation data for future review.

VIII. USE OF MULTIPLE LABORATORIES

SUGGESTION: Since heterogeneity of the flood waters will likely be a significant factor during data assessment/data use, the use of a single lab will eliminate inter-laboratory variability that would add to the estimate of heterogeneity (although, inter-laboratory variability should be a small contributor versus population heterogeneity, if proven labs are chosen and defensible subsampling SOPs are employed).

Therefore the use of one laboratory is defensible for the brunt of the samples unless the workload impacts lab capacity. However even if lab capacity is not challenged, periodic use of a second laboratory is valuable from a quality control perspective. These periodic QC split samples can be used to detect bias and evaluate the ruggedness of the chosen subsampling and analytical

methods. [The QASP doesn't mention or define split samples versus duplicate samples – often a point of confusion – I assumed that duplicate samples are collocated samples and that split samples are from a single sample aliquoted into two or more portions.)

Lastly, the QASP indicates that duplicate/collocated samples will be collected. At least some of these duplicate/collocated samples should still be collected, even if their original intent was solely to allow for analysis by a second lab. As mentioned above, these samples are critical to prove that the difference in concentrations detected over space or time is real and not just a function of matrix heterogeneity or near –term heterogeneity.

Would suggest collecting initial samples in duplicate until short and long-term heterogeneity is understood. If analytical capacity is an issue, don't have to analyze all duplicate samples upfront. A periodic analysis of duplicate/collocated samples will quickly indicate the role of short-term heterogeneity. (Refer to the above Section III.)

IX. QASP SPECIFIC COMMENTS

- GENERAL: As changes are made in response to reviewer comments, some of these comments may no longer be pertinent.
- Page 1-1, Section 1: REMOVE "at the" from last line.
- Page 1-1, Section 1.1: As suggested above in Section IV add TICs, GC/FID for Petroleum Hydrocarbons, specify ICP instrumentation to expand elements beyond priority pollutants and consider LC/MS/MS when appropriate.
- Page 2-1, Section 2.1: Revaluate whether this is an appropriate sampling location (Refer to Section II above). If it is an appropriate location specify which of the two intersections is meant.
- Page 2-1, Section 2.1: REMOVE "that poses an imminent and substantial danger to life and health".
- Page 3-1, Section 3: REPLACE sole Sentence with "Samples collected by START-2 will be used to determine the presence of priority pollutants in floodwaters accessible to sampling". Or "Samples collected by START-2 will be used to estimate the concentration and variability of priority pollutants in flood waters accessible to sampling."
- Page 3-2, Section 3.2.2: This section should refer to table 4-1.
- Page3-3, Section 3.3: This section should be re-written to address more samples (Refer to Section II and III above.)
- Page 3-4, Section 3.6: This section should refer to table 4-1.
- Page 3-4, Section 3.6: Wording should be added about the archiving of sample containers, residual samples, extracts and digestates as well as all instrumental raw data to facilitate later review. Remove wording about sample disposal.
- Page 4-1, Section 4: Remove wording about the nature and extent of potential contamination and comparison to MSSLs. At this point the only value of the MSSLs is ensuring that the chosen analytical methods are sensitive enough to detect the contaminants at these levels.
- Page 5-1, Section 5: The Weston QAPP should be reviewed by EPA laboratory personnel to ensure that it meets EPA standards.

- Page 5-1, Section 5: Definitions for Duplicate/Collocated samples and Split samples should be included to preclude confusion by field personnel.
- Page 5-5, Section 5.3: This section should indicate that there will always be a backup camera in case of camera mal-function.
- Appendices: All appendices should be paginated.
- Appendix A. STEP 2:. Consider modifying alternative actions. For example, if sampling is altered to test a conceptual model, these alternative actions would confirm or disprove the model.
- Appendix A. Step 3: Refer to the above Section I and consider removing the SCDM and MSSLs benchmarks.
- Appendix A. Step 5:. Refer to the above Section I and consider removing the SCDM and MSSLs benchmarks.
- Appendix A: The remainder of the DQO outputs will likewise have to be modified to accommodate changes in the project Objectives.
- Appendix B: Due to the lack of resources and the likely difficulty in decontaminating equipment, disposable sampling equipment will be preferable.
- Appendix B. Method 1002.01: The peristaltic method would likely discriminate against particulate matter, especially when sampling in moving waters.
- Appendix B. Method 1101.01. A COC form should be included in the SOP.
- Appendix B. Method 1102.01: SOP should state that the COC will include wording requiring the laboratory to maintain all sample containers, sample residuals, extracts and digestates.
- Appendix B. Method 1201.01: As stated above due to the lack of resources and the likely difficulty in decontaminating equipment, disposable sampling equipment will be preferable.
- Appendix B. Method 1502.01: SOP should require a backup camera in case of camera mal-function.

Dr. Michael McFarland

The following attachment contains my "quick and dirty" evaluation of the Orleans Parish stormwater Quality Assurance Sampling Plan. The plan provides very comprehensive quality control steps that will ensure proper sample integrity and analysis.

With respect to the question raised by ORD, I would tend to support the Agency's position that collection of a greater number of spatial samples is more critical within the short term than necessarily comparing inter-laboratory results. In my opinion, establishing the spatial variability in priority pollutant concentration probably represents a more urgent need for on-site decision-makers (spatial variability will also impact the scope of any subsequent sampling activities).

Thanks again for the opportunity to review the report and I look forward to future correspondence.

In general, the Hurricane Katrina Response Support Quality Assurance Sampling Plan (QASP) provides clear and comprehensive quality control (QC) steps that will be taken to ensure proper water sample collection, transport and analysis. Moreover, the QASP clearly describes the risk

communication methodology that will be implemented to ensure timely dissemination of information to the public.

With respect to the field sampling, the QASP indicates that six (6) grab samples of stormwater (and duplicates) shall be taken at the intersection of Interstate Highways 10 (I-10) and I-610 and analyzed to determine whether any priority pollutants pose an imminent and substantial danger to life and health. Although the approach is fundamentally sound, the QASP fails to specify with what confidence (i.e., 95%, 99%, 99.9% or greater) the decision has to be made. In other words, assigning a level of confidence required to support a decision will statistically establish the amount of sampling (i.e., number of samples) that needs to occur. Additional comments pertaining to the main body of the report and Appendix A are summarized in the following:

Main Body of Report

- It is unclear how sample location will be documented (i.e., GPS coordinates, street coordinates, etc.). It is also unclear whether sample water depth will be documented or if it should be assumed that all samples will be taken at the water surface.

- A summary list of acronyms should be provided at the beginning of the report.

Comments on Appendix A (Data Quality Objective)

The QASP provides a commendable description of the data quality objective (DQO) process for sampling the surface water. However, as indicated above, the QASP fails to assign a confidence level at which the Agency is willing to support its decisions. In other words, how much confidence does the Agency need to have to support a decision that the contaminated stormwater does or does not pose an imminent risk to human health and the environment?

In reality, analysis of the six water samples will not only provide information with respect to the *mean* concentration of a particular priority pollutant but will also establish an estimate of the pollutant's *variability* (through estimating the standard deviation associated with a particular pollutant's concentration). By combining knowledge of the pollutant's variability with the Agency's established confidence level (i.e., acceptable level of uncertainty - typically 99% confidence level), the minimum number of samples that need to be collected can be estimated (this is the quantitative aspect of the DQO field sampling design process). Fully completing the DQO process would allow, amongst other things, for the Agency to support a claim that the contaminated stormwater poses no imminent danger to public health or the environment with an established level of confidence.

In fairness, the QASP takes this approach in the first six steps of the DQO process (Appendix A) but then, on Step 7, the QASP falls short of completing the quantitative component of the DQO process. Because of this omission, it should be noted that, even if the laboratory analyses of all six stormwater samples indicate that the priority pollutants are below a contaminant specific action level (i.e., EPA MSSLs or SCDM Benchmarks), the present sampling design will not support a claim that the stormwater is safe (provides no imminent danger to public health or the environment) *with confidence*. To support a claim that a particular media poses no unacceptable

risk with confidence, contaminant variability must be taken into account when determining the minimum amount of data necessary to collect.

Comments on the use of one versus two laboratories for sample analysis

I tend to support the Agency's position that collection of a greater number of spatial samples is more critical within the short term than necessarily comparing inter-laboratory results. In my opinion, establishing the spatial variability in priority pollutant concentration probably represents a more urgent need for on-site decision-makers (spatial variability will also impact the scope of any subsequent sampling activities).

Dr. Michael Newman

I have examined the provided documents as quickly as possible. Obviously, I did not have time to focus on every important detail. One issue did concern me. The decision rule is -- "If any result in a surface water sample is above the contaminant specific action level or background, then the media represented by that sample may require additional attention, otherwise the surface water does not require additional attention. Additional attention means more sampling, surface water collection and treatment, or other action deemed necessary by EPA."

Six samples seems 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.

Comments on the use of one versus two laboratories for sample analysis

The one issue that concerned me last night while reading the materials was the low number of samples. I am not certain that the proposed number of samples would be representative of the area about which they want to make a decision. Without a doubt, I would take more samples that provide more spatial information about the extent of contamination. Could they have two labs analyze only a subset (10-20%) of the samples? That would give you better spatial information by increasing the number of samples and also enough understanding of the interlaboratory variability.

Dr. Christine Owen

(Dr. Owen provided the following comments as inserts within the sections of the QSAP identified below.)

Section 3.4. STRONGLY urge the use of GPS to identify sampling locations. There are handheld devices that are relatively inexpensive and easy to use. Also, in the absence of readily identifiable landmarks, it allows repeatability of location if needed.

Section 3.5. Consider using travel blanks set up apriori and then bundled with each set of samples form a sample location.

Section 3.5. How accessible is potable water in the area? It may be critical to have ALL equipment etc. prepared before entering the field and have specialized equipment dedicated to each of the six sample locations in case you can't wash things off in between.

Section 4, page 4-1. Suggest including general chemistry parameters such as TKN, nitrate, nitrite, TP, OP for laboratory analyses. Later on it may be informative in data interpretation. Also, need to run temp, pH, and conductivity in the field.

Section 5.1. Earlier suggestions to use trip blanks is taken care of in this section.

Section 5.2, page 5-3. Recommend that duplicate sample bottles are identified uniquely (i.e., 112 a versus 112 b).

Section 5.3 page 5-4. (site observations). Include field water quality parameters such as pH, temp, conductivity, etc.).

Section 5.3, pag3 5-4. (site sketches). Use GPS !

Section 5.3, page 5-4 (sampling location). Should include sampler's initials.

Section 5.3, page 5-5 (photographic documentation). EXCELLENT idea.

Dr. Rebecca Parkin

Overall, the plan is reasonable and appropriate. Understandably from the short time frame to prepare it, there are some disconnects that should be addressed. I have listed my comments in order of the draft, not order of importance.

Page(s)	Section and/or Paragraph	Line(s)	Comment
iii	Appendix C		Not found in the draft.
	Appendix E		Not found, but I assume this was intentional.
1-1	1.1, para. 1		In Appendix A, Step 6, last item, it is noted that sampling will be conducted for baseline and screening purposes. If so, that objective should be noted here.
	1.1, para. 2		If I understand correctly, there will be only 6 samples and 6 duplicates taken in the area of the Intersection of I-10 and I-610. The language here is much more general, however, raising the question as to whether samples will be taken at locations other than this intersection. 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?
3-1		1	In section 3.2.1 and later sections, chemicals and total coliform are noted as being of interest; they should be noted here.
	3.1	1	OSC is not defined in the document.
	3.1.2		This section is quite vague, but is likely to become very important; especially as the public becomes aware of the sampling activity, and increases pressure to return to their homes and businesses. This section needs to be expanded, particularly with 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, will there be a publicly advertised phone number people can call for more local environmental information?
3-2	3.2.1, para. 2	1-2	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.
		4	This is the first mention of "total coliform." Up to this point, I thought the samples were limited to assessment of chemicals. Perhaps, "chemicals and fecal contamination" should be more clearly stated at the beginning of Section 3, on p. 3-1.
		7	It is unclear why only the shortest holding time is noted here. It would be better to refer the reader to Table 4-1 for a complete listing of the holding times.
	3.2.2	2	I would cite Appendix A here.
3-4	3.6	Title	It is unclear why "holding times" is in the title. There is no content about these times in this section.
	3.6, para. 2	1	The first sentence is unclear to this reviewer.
4-1		6	1. Which level/s noted in Appendix D will be used for comparisons? There is no column marked "surface water" and "tap water" will not be relevant. It is crucial to note which column/s of data will serve as the basis for

			comparison. 2. Are site-specific "background" levels available? If not, how will these be obtained? The draft does not address this issue elsewhere.
5-2	5.2, para. 1	8-9	Who will train "all personnel?" When will they get this training? Will training follow an existing training protocol? If not, will each sampler have a copy of the protocols (e.g., in Appendix B) available on site?
	5.2, para. 2	1	A should be B.
5-3	5.2	Last line	A should be B.
5-4	COC	3	Subsection 5.1 was not found in this draft.
5-4	Photographic documentation	4	Insert "each" (?) before "phase."
App. A	Step 1	2	Add "total coliform" to "chemicals of concern" to capture the full intent of the sampling plan.
	Step 2	1	1. Add "total coliform" to "chemicals of concern" to capture the full intent of the sampling plan. 2. A referral to Appendix D or other part of the draft should be included where "benchmarks" is used in this step.
	Step 3, 2nd input	Right column	"vetals" is a typo.
	Step 4, 2nd item & Step 5, 1st item		Does "population" refer to a population of samples, sample locations, or people? Both items need to be clarified.
	Step 4, item 5	Right column	This sounds circular; redraft to be more informative. (E.g., will be sampling be conducted x # of days after the plan is completed? After an initial site examination has been conducted? Etc.)
	Step 6, item 2	Right column	Add "than Type II (below)" at the end of this column's last sentence.
	Step 6, 3rd item	Right column	The ends of both sentences are the same. Are both correct?
App. D	SOP 1002.01, Equipment		1. Add waterproof ink pens. (See SOP 1501.01, Procedures, 2nd bullet.) 2. Refer to SOP 1101.1 after "chain-of-custody forms and seals."
	Preparation	5	How will the general site survey be done before site entry? Will aerial photos be used? Will information be obtained from professionals who have been or are already on site? Clarify in the draft.
	Surface water sampling,	1-3	This area is surely "a larger body of surface water," but how will "near to shore" be determined

	para. 2		in this circumstance? Will samples be taken by the side of the interstates? Clarification in the draft would be helpful.
	SOP 1101.1, Procedure, last para.	4 (top of 2nd page)	"Figure" 1101.01-A was not found in the draft. Is Table 1101-A what was intended here?
	Table 1101.01-A	Field sample ID, right column	MS and MSD are not previously defined.
		Time	A post-noon (e.g., 1330) time example should be included.
		Comments, right column	The description needs more meaning; e.g., should "split sample" be noted here? (See SOP 1102.01, Procedure, item 3.)
	SOP 1102.01, Procedure	1-2	DOT and IATA are not previously defined.
	SOP 1201.01, Procedure, para. 1	5	No section on "non-abrasive methods" was found in this draft. However, the entire text below the opening box is repeated.
		Sample collection activities, 8th bullet	This is the first mention of "air sampling." Is this bullet relevant to this project? If not, note in the draft that no air samples will be taken.
	SOP 1502.01, Procedure, para. 2		This paragraph needs to be expanded. Although digital cameras will be used, there is no section for their use (as is available for 35 mm film). Relevant comments – such as those about "diskettes" – should be consolidated into one section.
	Specific Protocol, 1st bullet	2	Replace "military time" with language used for time on Table 1101.01-A.
App.D	Table		1. The font size and deep tone of the green used make this table difficult to read. 2. More importantly, the data to be used as benchmarks or comparisons for the samples is not clearly indicated.

Dr. Robert Pitt

• General Comments:
I recognize that time is of the essence and that this plan was assembled very quickly in order to initiate the sampling program. Given the nature of the problem, I am concerned that this plan for such a minor effort is even being reviewed. Since the contractors are already selected and "on call" for emergency response, I would have hoped that they would have been in place and sampling well before now. Debating the merits and making changes to this plan would cause unnecessary delay in initiating some data gathering activities. Changes should be made after the initial plan is started.

However, I am concerned about several aspects of this proposed sampling program:
- The few numbers of samples and limited sampling locations will result in little useful data. A better description of the limited objectives of the sampling program is needed at the front of this document.
- 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. Strict adherence to the formal QA/QC procedures may not be possible under the devastated conditions in New Orleans. Driving samples will likely be needed to the labs, and close-by laboratories therefore need to be identified. Cleaning sampling equipment may be very difficult in the field. Pre-cleaned equipment will be needed for each sample to be obtained. The sampler personnel should be stationed close to the sampling area, but in an area having complete services to ensure these protocols are followed as well as possible.
- The use of a screening protocol using indicator parameters at many more locations throughout the city would be an important supplement to this limited sampling effort.
- There is no discussion of the outcomes of this sampling program. Concurrent efforts are needed to monitor the effects of the discharged contaminated waters, especially the possible long-range effects on the fishing and tourist industries, for example. It is assumed that stopping of the pumping, or treating of the discharged waters, are not feasible options, and that the main objectives of this sampling effort is only to quantify and characterize the discharged wastewaters.

• Specific Comments (my comments are in the parentheses):

Pg. 5: Six sampling locations near intersection of I-10 and I-610, with duplicates (therefore a total of 12 samples? Such a small number of samples, focused at a single area, will not likely be very useful)

Pg. 5: Objective: "determine the presence of priority pollutants in storm water runoff resulting from Hurricane Katrina that poses an imminent and substantial danger to life and health." (What will be the response if the samples indicate excessive contamination? I assume that the New Orleans pumping would not be stopped, nor that the pumped water would be treated. The "receiving water" effects of the pumped water needs to be determined and appropriate postings made, along with follow-up evaluations of resources to ensure safe conditions at some later time.)

Pg. 8: Sampling approach and procedures: “Samples collected by START-2 will be used to evaluate the nature of the contaminants present.” (What is meant by “nature of the contaminants present?” Again, what will be the response to the analytical results?)

Pg. 8: The health and safety plan specifies that: “The HASP specifies that surface water sampling will proceed in Level D (safety glasses, disposable gloves, and steel-toed boots).” (if sampling from boats, then flotation devices also needed; “snake-proof” waders may be more suitable than steel-toed boots if wading for samples.)

Pg. 8: “the field team will be advised of the location of the hospital specified in the HASP prior to initiating sampling activities.” (The local hospitals are currently not functioning. Make sure evacuation methods are available, and advanced first-aid supplies and training are available to the samplers).

Pg. 9: analytes to include: “The surface water samples will be delivered to Sherry Laboratories, Lafayette, Louisiana; to EMSL in Houston, Texas; and to the EPA Region 6 Laboratory in Houston, Texas, where volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), total metals, pesticides, herbicides, polychlorinated biphenyls (PCBs), and total coliform analyses will be conducted, utilizing EPA publication SW-846, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* and the Environmental Microbiology Proficiency Analytical Testing (EMPAT) Program testing (the holding time is 24 hours).” (Why total coliforms? They are known to be in very high concentrations. The more important concern should be for pathogens. Also, screening level analyses need to be obtained that indicate contamination with toxicants and other hazardous materials. These can be done faster and cheaper and can target areas for specific attention. As an example, rapid toxicity tests, such as Microtox, could be a suitable supplement to these standard procedures. Rapid PCR pathogenic tests can also be conducted. Finally, fate tests should be conducted as soon as possible in local receiving waters to enable quantification of the effects of the discharged contaminants. Some conventional pollutants, including nutrients, BOD_5, 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 much better indicators of sewage contamination that bacteria. Very high levels of E. coli or enterococci, above about 5,000 or 10,000 MPN/100 mL also indicates likely human sewage contamination in urban areas, in contrast to urban wildlife sources. Total coliform analyses will be of little use.)

Pg. 10. “All samples will be collected with clean decontaminated equipment (Appendix B, SOP 1201.01).” (How will equipment be cleaned in an area with little or no services? Will multiple sampling equipment setups be available for each separate sample? Again, less restrictive screening methods may be more suitable, at least simultaneously to these formal sampling protocols. Sample shipping will be a challenge and expensive, possibly requiring direct driving to labs directly from the field, as stated on pg 11. Again on Pg. 11. It is hard to assume that this complete sampler cleaning protocol will be possible in the area. Are there alternatives available for challenging situations?)

Pg. 10: "START-2 will collect six surface water samples (including six duplicate surface water samples) as part of the emergency response task to document a release to surface water." (Again, it is not clear how the data will be used. This implies that the analytical results will be used to document the releases of the water, but nowhere in the document is a discussion of the responses if the water is deemed unsuitable for discharge. Does this mean 6 samples, and duplicates, for "each" release of water? How will these separate incidents be defined?)

Pg. 12: "In determining the nature and extent of potential contamination, analytical results will be compared to EPA Region 6 Human Health Medium-Specific Screening Levels (MSSLs) in addition to site-specific background levels. Additionally, the analytical results will be compared to site-specific background concentrations." (How will the background concentrations be identified? Can compare to the National Stormwater Quality Database (Maestre and Pitt 2005)[2] for regional conditions. The use of total coliforms is very problematic, as the analytical results will extremely high, but not indicative of anything. If sewage contamination needs to be determined, then the use of chemical and biological tracers[3] is much more effective.)

Pg. 13 on: 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.

Appendix A, pg 21: "If any contaminant exceeds the specified benchmark in the surface water, the media represented by that sample will be considered contaminated and will require additional attention." (What does "require additional attention" mean?)

Pg 22: "The analytical data will apply until the surface water represented by the sample receives appropriate response action." (Again, what is the appropriate response action?)

Pg 22: why is inclement weather a sampling restraint? If these are "stormwater" samples, and if the pumping is to be operated around the clock, it is assumed that inclement weather will occur during prime sampling times. Obviously, unsafe weather conditions (severe weather watches and warnings) must be heeded. Also, no sampler should be in the field alone. All samplers need to be accompanied by at least one other person.

Pg. 23: "Type I Error: Deciding that the specified area represented by the surface water sample does not exceed the specified assessment level when, in truth, the surface water concentration of the contaminant exceeds its specified action level. The consequence of this decision error is that contaminated surface water will remain on-site or flow off-site, possibly endangering human health and the environment. This decision error is more severe." (With only 6 samples, the likelihood of type I errors will be very high. The acceptable level of errors need to be recognized and the sampling program to meet these error levels should be described.)

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[2] Maestre, A. and R. Pitt (2005). *The National Stormwater Quality Database, Version 1.1, A Compilation and Analysis of NPDES Stormwater Monitoring Information*. U.S. EPA, Office of Water, Washington, D.C. (final draft report). 465 pgs. August 2005.

[3] Center for Watershed Protection and R. Pitt. *Illicit Discharge Detection and Elimination; A Guidance Manual for Program Development and Technical Assessments*. U.S. Environmental Protection Agency, Office of Water and Wastewater. EPA Cooperative Agreement X-82907801-0. Washington, D.C., 357 pgs. Oct. 2004.

Pg. 24: "The assignment of probability values is not applicable to these DQOs because these samples are being collected for baseline and screening purposes." (This is a very critical statement and needs to be made early in the document. If these are screening analyses, then it is appropriate that screening protocols be used that allow many more samples. If the data quality objectives are for screening, then the levels of errors must still be specified to enable more suitable interpretation of the results.)

Dr. Joan Rose

I will address in this review the issue of human health and the acute and chronic dangers from microbial pollutants that are very likely to be found in these waters.

1. Objective of the study: The main objective of this plan as stated in the proposal is to determine the presence of priority pollutants in storm water runoff resulting from Hurricane Katrina that pose an imminent and substantial danger to life and health.

First it is not clear whether this is being directed at "danger to human life and health" or "aquatic life and health" or perhaps both. The terms imminent and substantial danger are also not well defined. The issue of human health will be both acute and chronic, obviously the types of contaminants of concern for monitoring and addressing the human health risk may be prioritized by several assessment parameters including

- Likelihood that they will be present: eg. found routinely in untreated sewage; identified via the past source control, pretreatment and NPDES data from New Orleans; numbers and types of Underground storage tanks; urban use of pesticides and herbicides.

- High risk to human health via exposure pathways: exposure to storm waters directly, (populations who are still wadding through these waters) and indirectly via the food chain and eventually via exposure to the shoreline along Lake Pontchartrain and potential to bioaccumulate and accumulation in sediments/sand.

- High risk to human due to the nature of the contaminant, toxicity, dose-response, health outcomes with short-term exposures or longer-term exposures.

Thus it is not clear that the list prepared for sampling will meet the objectives of the study and will feed into a decision framework for reducing the risks. Particularly identifying those risks that are "imminent and substantial".

2. Project Team

It is hard to judge this particular aspect as the team members and their backgrounds are not identified. It seems that the team should include someone with environmental chemistry, microbiology, sampling and analysis skills. The team may have these but it is not clear.

3. Site Location

As the levees are being fixed (I believe all are in place now) and the water is being pumped to Lake Pontchartrain, it seems that sites for sampling should include:

A. Areas of standing water yet to be pumped.

B. Areas that are actively being pumped (perhaps sampled at the pump stations)

C. Areas in and along the shore of Lake Pontchartrain.

4. Sampling plan

This seems to be well described the interaction with the community and the setting up of a safety plan is quite good. The group has recognized the need for a communication system with the key emergency response groups (fire and police).

5. Analytical methods

The major issue with this plan is that it does not address the microbial contaminants which I would consider pose the most imminent, immediate and substantial risk to human health above all other contaminants on the list. The one microbial that is on the list are the total coliform bacteria which will not be useful at all in addressing risk. These bacteria are commonly found in soil and we would expect them to be high in storm waters or anyplace where water and soil mix. Fecal indicators including *E.coli*, Enterococci, coliphage, *Clostridium perfringes* should be included. Enteric parasites including *Cryptosporidium* and *Giardia* should be monitored for. Pathogenic enteric viruses associated with aseptic meningitis, diarrhea, respiratory disease and myocarditis can be readily monitored for as well as key bacterial pathogens including *Salmonella*, *Campylobacter* and *Helicobacter* (associated with reactive arthriditis, Gullian Bare disease and ulcers). These are expected to be in sewage at high concentrations, survive and accumulate in sediments and sand, are related to acute risk of waterborne disease through recreational and drinking water exposure. In addition, *Vibrio vulnificus* is a significant concern and hazardous algal blooms which may emerge in the Lake would be both a risk to human and ecosystems. Many stressed individuals in this area may be at increased risk of severe outcomes from infectious disease and we know that these infections are now related to chronic problems in the populations.

If the microbials are not included in this study it can not meet the objectives stated in the study plan.

In regard to herbicides, pesticides, VOCs, the sampling and strategy should follow a risk paradigm [likely to be present and relative risks associated with short and acute exposures via storm waters]. Initial sampling could be undertaken to verify that those that were expected to be absent (some pesticide not used in the area for example) were indeed absent and the remaining effort could focus on those contaminants of greatest risk.

Dr. Gary Sayler

I have read the sampling plan. I find that the number of samples and replicates is not well justified. The location of samples also seems strangely concentrated at the junction of I10 and I640. It appears that we need a greater diversity in sample locations. There also needs to be clarification of the time dynamic. Is this a one time shot or are samples to be taken over predetermined time intervals? Samples need to be taken over several time intervals at various stages of the dewatering.

While sample blanks are prescribed, no spike samples are described. We need to know what the false negative rate is. This is true for chemicals and bacteria. Total Coliforms is a very poor test and all the samples will likely be quite high with no real understanding of pathogen risk, we already know the water is sewage contaminated. We need bacterial and viral pathogen data.

Decon for the samples to be collected for bacteria is poorly described. Chemical disinfection agents are not described for bacteria: need bleach solutions.

PCBs and other non polar compounds will likely be on the sediments and notfree in the water, need more attention to the sediments and fines as the water level drops.

Need air quality samples taken too.

Triplicate samples are more appropriate for statistical analysis and this should replace duplicate analysis. Duplicate seems very arbitrary for health risk evaluation purposed.

What is EPA OSC?

Dr. William Stubblefield

Comments on the use of one versus two laboratories for sample analysis

I have not had a great deal of time to go through the plan; however, I have to support the concept of gathering more spatial data. The one thing that you don't have in a situation like this is the luxuary of the level of QA that you might normally like. In an emergency situation I tend to revert to quanity over an area not necessarily quality--chiefly because samples can be reanalyzed if they are on the shelf....you can't go back a "grab another sample" because it won't be there. You need to determine the nature and extent at this point. It is always easier to gather more samples than you can analyze at a given time and come back and decide on what to analyze and to analyze for later....buying time.

Dr. Susan Teefy

If I understand ORD's question correctly, they would like to take more samples, but not split them between two labs. I think this is fine, so long as the rest of the QA/QC procedures in the document are followed, and the lab performs all of the standard internal quality checks.

September 7, 2005
Comments on QASP

I have just a few minor comments on the QASP, as follows:

Page 3-2: total coliform analysis is listed, but why not fecal coliform and/or e.coli analyses also? For the surface water samples, it is likely they will all be positive for total coliform, yet not necessarily for the more specific indicators of fecal contamination and potentially for pathogens.

Page 3-4: decontamination procedures – for the non-disposable equipment, such as pumps and tubing used to collect the samples; there is no sterilization step listed. For the bacteriological samples, rinsing and cleaning with detergent may not prevent carryover of microorganisms from one site to the next. It may be easiest, and most accurate, to simply not use non-disposable equipment for the bacteriological samples, but rather use the dedicated bottles and sampling equipment (e.g. new tubing in the peristaltic pump for each sampling location; this is discussed briefly in the SOP's)

Table 4-1: the method shown for coliform analysis is "EMPAT stds" I am not familiar with this method. Given the need to obtain results quickly, consideration might be given to using methods which will yield both total and fecal coliform results quickly.

SOP 1201.01 Decontamination, Sampling Equipment Decontamination: on the second page of this SOP, there is the statement "Tap water may be used from any municipal water treatment system for mixing of decontamination solutions". Given the likelihood that the local municipal water supplies may not be suitable for this purpose, other sources of mixing water should be used.

The ten steps on page 39 of the document (Field Sampling Equipment Cleaning Procedures) are very clear, and should be followed. Because the nature of the contaminants is not known, all steps should be followed (acid and solvent rinse).

SOP 1502. Photograph Logs: This document should be updated with a section on digital photographs, in addition to film photographs. Not a major issue at this time, but there is a need to ensure that the digital photos are properly cataloged and stored.

Mr. Timothy Thompson

This memo lists my comments to the above referenced QASP. In general, most of the material is present, but needs reorganization. While acknowledging that this is likely an initial reconnaissance survey at this stage, the QASP should be strengthened by incorporating specific statements on the objective for sample collection. Over-arching issues include:

- A statement of the overall program. Presumably 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
- Formulate a clear, concise, and understandable Data Quality Objective – what is the purpose of sampling in this specific area. This should include the intent of the localized

sampling (I-10/I-610 area only), criteria for how specific sampling locations will be selected in the field, and how the data will be used.

- Incorporate OSWER Directive No. 9355.4-28 on monitoring programs for hazardous waste sites.
- Formulate a Scientific Management Decision Point. Articulate what actions will be taken if contaminants are above or below the threshold levels.

Other specific comments are included by section, below.

Section 1

1. What is the relevance of the Contract and Technical Direction Document (TDD) that it is cited and included as Appendix E to the QASP? If the TDD contains specific information that pertains to the conduct of the survey, than it is relevant to include, but there should be a better explanation of what it is for.

2. The opening paragraph of the QASP states that six samples will be collected within the area of the intersection of I-10 and I-610. There is no clear statement of WHY this area was selected and WHAT is the objective of sampling. What then constitutes the boundaries of the area of study.

3. Globally recommend that *storm water* sampling be replaced with *floodwater* sampling.

Section 1.1

4. The entire QASP lacks a clear and concise statement of the objective and purpose of the study. Presumably with the small number of samples this is a reconnaissance survey, but why was the specific area selected over others? What is the intended use of the data? What is the Scientific Management Decision Point?

5. Within the context above, the QASP requires formulation and articulation of the Data Quality Objective (DQO). Since presumably this is the first of perhaps a larger, long-term monitoring program, 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).

6. Within the context of the two comments above, it would be helpful to understand what is the SMDP. Is it simply to target areas for additional study? If concentrations of Chemicals of Concern (COC) are below target levels, will the study conclude that it is safe for people to reoccupy those sites? The level of monitoring has to be commensurate with the intended use – we cannot judge from this document whether

Section 2

7. First paragraph of Section 2 discusses the impact of Hurricane Katrina on Louisiana, Alabama, and Mississippi. 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.

8. Again geography. The opening paragraph of Section 2.1 discusses the impact on southern Louisiana, but then goes on to say the target is location is the I-10/I-610 intersection.

The QASP needs to justify why this sampling location was selected, and what, if anything, is planned for the remainder of southern Louisiana (see also the opening sentence in Section 2.2).

9. It would useful to list what are the criteria that determine sample location. With only six samples (too few to adequately characterize such a big area) – it would be helpful to understand what are the search criteria for sample location.

Section 3

10. Section needs reorganization. Section 3.1 is titled "overview", but it only discusses HSP and Community Relations. Sections 3.2 and 3.3 contain duplicate information. Section 3.4 is about Sample Management, but only discusses sample labeling. Section 3.6 is titled sample containers, preservation and holding times – but says little about that in this section, and covers again in Section 4.

11. Section 3.1 says that OSC and START-2 will select sample locations in the field. That is ok, but what is needed are explicit statements of what are the sample location selection criteria. The locations must be selected to support the DQO, and should be articulated in the QASP. Should include language to the effect that decisions may be made in the field based upon potential sources, access, health and safety concerns. In the absence of site selection criteria, the actual choices could appear arbitrary and capricious to the general public.

Section 3.1.1

12. HASP should be listed as an Appendix to this document. Limitations imposed by safety concerns may impact decisions on where to sample.

13. At a minimum a modified Level D, or Level C, is more appropriate here. Given the potential conditions, the personal protection equipment should include inner/outer gloves, chemical resistant overalls and steel-toes chemical resistant boots, and a personal flotation device. Hardhats should probably be onboard in the event the crew is sampling under unstable overpasses or overhead wires. Also, respirators should be part of the field equipment – particularly since the field crew could encounter gas or other chemical fumes.

Section 3.2.1

14. This is the first place where the potential COCs are articulated. Three recommendations are to (1) include a table of the COCs, analytical method, reporting limit, and practical quantification limit; (2) use the full RCRA Priority Pollutant list, and (3) add Total Petroleum Hydrocarbons to the list of analytes. On the last point, it is more likely that gas-range organics (GRO) and diesel-range organics (DRO) will constitute the highest fraction of observed contamination – given the number of flooded gas stations, automobiles, and other sources of petroleum hydrocarbons in the area.

Section 3.3

15. Six (or even 12) samples may be too few, depending upon the sampling objective and area to be covered. Again, this reflects back to a clearly articulated DQO.

16. The QASP needs to state how geographic coordinates for the sampling location will be recorded. Recommend that use of a backpack differential Global Positioning System (e.g., Magellan dGPS). This will likely require and additional SOP from Weston – but I presume they have that. In addition, it will likely be difficult to find a geodetic survey marker in flooded areas

– so the document or SOP should include a discussion of how daily calibration of the dGPS will occur.

Section 3.5

17. Question whether a section on decontamination for water sampling is necessary. Water will be sampled by either (1) direct sampling to pre-decontaminated lab bottle, (2) use pre-cleaned disposable lab ware to dip and pore into lab bottles, or (3) using pre-cleaned tubing and pumping to sample container. Not clear what would need to be decontaminated.

Section 3.6

18. This section is ostensibly about sample preservation, containers and holding times, but this paragraph seems to be about turnaround times. Also, the meaning of the opening sentence is unclear. Recommend that Table 4-1 (which has containers, preservation and holding times) be re-titled as 3-1 and referenced in this section.

Section 4.0

19. Some statement should be made in this document concerning the Reporting Limits and/or Practical Quantification Limits needed to meet the program objectives. At a minimum, the RL/PQL should be below the lowest criteria in the SCDM table.

20. The SCDM values are more appropriate than the Region 6 MSSLs. The latter are listed in Appendix D and contains screening values for soil, air, and tap water. Of those, only the tap water values have any application to this specific QASP, and it is not clear why a drinking water standard would be applied to samples of floodwaters. Protective water consumption values are also in the SCDMs, so recommend that only those be used – and that they be placed into the QASP.

21. The RLs and the PQLs for this program should be set to below the lowest attainable SCDM.

22. This section discusses comparison to site-specific background values. With only six samples, it is difficult to know how the site-specific background levels will be established. If these are pre-Katrina, then the QASP needs to specify the source for this information. If one (or more) of the six samples are meant to be background, need to discuss how that background site(s) will be placed, and what confidence can be placed on that single value. Again, all of this should be incorporated into the DQO.

Section 5.1

23. SW846 requires matrix spike/matrix spike duplicate at a rate of 5%. Field duplicate at a rate of one per sampling day. Need to include these in the QASP.

Section 6

24. There is no section 6 – but there should be a section on data management and reporting. What will be the level of data QA/QC review after analysis, how the data will be managed, how nondetects and flagged data will be treated for analysis, where the data will be stored, and how the analysis to reporting will proceed should be included in the QASP.

Dr. Rae Zimmerman

Issue regarding expanding the sampling locations vs. the number of labs: This is a difficult tradeoff. The number of locations should be increased, given the extent of what happened. Reducing the number of labs could compromise credibility.

2.1 Site location and description – The QASP should contain some rationale for the particular location selected. Currently the QASP only identifies it, indicating that priority pollutants in storm water runoff is the objective of the sampling, so presumably it is a site that has had substantial runoff. Also, some baseline sampling should exist analyzed prior to the hurricane – new sampling sites should be selected near those in order to compare against baseline values. The report indicates that 6 samples will be collected at each location (3.3) but only one general location seems to be indicated in 2.1. So it is unclear how many total samples will be collected (i.e., 6 times how many locations?).

3.1.2 Community Relations – This should be specified in much greater detail. There now could be a substantial public outcry with respect to water quality the way there was after 9/11 with respect to air quality, especially when rehabitation occurs.

3.4 Sample Management – will be done according to Weston protocols, which I assume are consistent with EPA's. If these are consistent, it would be useful to state that.

Table 4-1 indicates seven major categories of pollutants. If the priority pollutants listed in the appendix will also be collected, this should be noted.

5.3 Project Documentation – Field Logbook – under the item "Site observations" the current hydrology should be noted, especially since the lake is apparently seeking its own level now, water was seeping back into the lake, the levee repairs will also affect water flows, etc.

APPENDIX
U.S. Environmental Protection Agency Science Advisory Board Reviewers for the Emergency Response Quality Assurance Sampling Plan for Hurricane Katrina Response Support

Dr. Henry Anderson, Chief Medical Officer, Division of Public Health, Wisconsin Division of Public Health, Madison, WI

Dr. William Bellamy, Vice President, Water Supply and Treatment, CH2M Hill, Englewood, CO

Dr. John C. Crittenden, Professor and Richard Snell Presidential Chair, Civil and Environmental Engineering Department, Ira A. Fulton School of Engineering, Arizona State University, Tempe, AZ

Dr. David Dzombak, Professor, Department of Civil and Environmental Engineering, Carnegie-Mellon University, Pittsburgh, PA

Dr. T. Taylor Eighmy, Research Professor and Director of the Recycled Materials Resource Center, Civil Engineering, University of New Hampshire, Durham, NH

Dr. Baruch Fischhoff, Howard Heinz University Professor, Department of Social and Decision Sciences, Department of Engineering and Public Policy, Carnegie Mellon University, Pittsburgh, PA

Dr. Steven Heeringa, Director, Division of Surveys and Technologies, Institute for Social Research, University of Michigan, Ann Arbor, MI

Dr. Michael Kavanaugh, Vice President, Malcolm Pirnie, Inc., Emeryville, CA

Dr. Lynda Knobeloch, Research & Toxicology Supervisor, Wisconsin Department of Health & Family Services, Wisconsin Department of Health & Family Services, Madison, WI

Dr. Thomas W. La Point, Director, Department of Biological Sciences, Institute of Applied Sciences, University of North Texas, Denton, TX

Dr. Paul J. Lioy, Deputy Director and Professor, Environmental and Occupational Health Sciences Institute, UMDNJ - Robert Wood Johnson Medical School, Piscataway, NJ

Dr. Randy Maddalena, Scientist, Environmental Energy Technologies Division, Indoor Environment Department, Lawrence Berkeley National Laboratory, Berkeley, CA

Dr. John P. Maney, President, Environmental Measurements Assessment, Gloucester, MA

Dr. Michael J. McFarland, Associate Professor, Department of Civil and Environmental Engineering, Utah State University, River Heights, UT

Dr. Michael C. Newman, Professor of Marine Science, School of Marine Sciences, Virginia Institute of Marine Science, College of William & Mary, Gloucester Point, VA

Dr. Christine Owen, Water Quality Assurance Officer, Tampa Bay Water, Clearwater, FL

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Dr. Joan B. Rose, Professor and Homer Nowlin Chair in Water Research, Department of Fisheries and Wildlife, Michigan State University, E. Lansing, MI

Dr. Gary Sayler, Distinguished Research Professor, The Center for Environmental Biotechnology, University of Tennessee, Knoxville, TN

Dr. William Stubblefield, Toxicologist, Parametrix, Albany, OR

Ms. Susan Teefy, Principal Engineer, Water Quality and Treatment Solutions, Inc., Castro Valley, CA

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