

OUTFALL MONITORING SCIENCE ADVISORY PANEL (OMSAP) MEETING
Monday, April 29, 2002, 10:00 AM to 2:00 PM, WHOI Carriage House
FINAL MINUTES

ATTENDANCE

Members Present: Andy Solow, WHOI (chair); Bob Beardsley, WHOI; Norb Jaworski, retired; Bob Kenney, URI; Scott Nixon, URI; Judy Pederson, MIT/Sea Grant; Mike Shiaris, UMass Boston; and Jim Shine, Harvard School of Public Health.

Observers:

Bruce Berman, Save the Harbor/Save the Bay; Peter Borrelli, Center for Coastal Studies; Mike Bothner, USGS; Todd Callaghan, MCZM; Cathy Coniaris, MADEP; Mike Delaney, MWRA; David Dow, NMFS; Patricia Foley, Save the Harbor/Save the Bay; Tom Fredette, USACoE; Maury Hall, MWRA; Carlton Hunt, Battelle; Russell Isaac, MADEP; Chris John, MWRA; Ken Keay, MWRA; Matt Liebman, EPA; Lisa Lefkovitz, Battelle; Steve Lipman, MADEP; Stormy Mayo, Center for Coastal Studies; Mike Mickelson, MWRA; Jerry Neff, Battelle; Jeff Reade, MWRA; Andrea Rex, MWRA; Steve Rhode, MWRA; Larry Schafer, retired; Jack Schwartz, MADMF; Dave Taylor, MWRA; and Steve Tucker, Cape Cod Commission.

SUMMARY OF ACTION ITEMS & RECOMMENDATIONS

1. OMSAP approved the October 16, 2001 minutes with no amendments.
2. OMSAP accepted the March 2002 MEG report. OMSAP recommends the following: MEG continue its review of the model output; MEG membership should rotate; and that MWRA develop a plan to maximize the use of this model (e.g. publish in peer-reviewed journals and graduate thesis work).
3. OMSAP recommends that MWRA continue mussel monitoring using the same protocol as summer 2001.
4. OMSAP will convene during summer 2002 to begin discussions on developing a process for the review of the Monitoring Plan.

MINUTES

WELCOME, APPROVAL OF MINUTES

ACTION: OMSAP approved the October 16, 2001 minutes with no amendments.

FLOATABLES

L. Schafer suggested that any planned sampling for floatables consider what sizes of material should be sampled, and what volume of effluent should be screened since floatables are rare in secondary-treated effluent and difficult to quantify. N. Jaworski asked why there is a floatables threshold if the floatables coming out of the treatment plant cannot be measured quantitatively. B. Berman replied that the Clean Water Act includes aesthetic criteria.

A. Rex pointed out that MWRA has already come to an agreement with EPA and MADEP as to how MWRA will to sample floatables. A flow-paced sampler has been designed and will soon be ready to sample at the plant. In addition, MWRA is sampling in the nearfield with nets.

PUBLIC INTEREST ADVISORY COMMITTEE UPDATE

P. Foley reiterated one important comment from the fall 2001 OMSAP workshop, the importance of continuing to monitor the effects of the outfall. She then thanked the members of OMSAP as well as those from the regulatory agencies who were enormously helpful in providing outreach to the public as we planned these meetings.

MWRA UPDATE

M. Mickelson described the bacterial exceedance in December 2001. The chlorine level was too low, coinciding with a rainstorm and the problem was quickly corrected. The second exceedance, mussel bioaccumulation, will be described in greater detail later. Also, this spring, there was a bloom of *Phaeocystis*, with levels up to one million cell/L (not as high as the 14 million cell/L measured in 1997).

S. Mayo said that the spring 2002 concentrations of right whales are probably the lowest seen in 17 years of study, probably even lower than 1997. ~15 individual right whales have compared to the 80-100 individuals normally seen. The residency time, though difficult to calculate, seems to be exceedingly low. In February, the only time that whales were present, a brief burst of *Pseudocalanus* was measured and this was followed by the lowest concentrations of *Calanus* that we have ever seen. He is not inclined to think that this is due to the *Phaeocystis* bloom. It does appear to be a very unusual year for right whales and zooplankton. Water 20 miles east of the Cape has abundant right whales and *Calanus*. The nitrogen isotope monitoring program is continuing and he has asked Joe Montoya to present to OMSAP at an upcoming meeting.

D. Dow mentioned that he heard that there were concentrations of right whales on Stellwagen Bank and he asked if they could sample there for *Calanus*. S. Mayo replied that they sampled near there (east of the bay), and they have seen almost exclusively late stage *Calanus*, but the patches are not as close to the surface. As we have seen in the past, right whale distributions are tightly tied to the availability of their food resource. B. Beardsley asked if the aerial survey goes outside of Cape Cod Bay. S. Mayo replied that the Center for Coastal Studies, with MADMF funding, is working principally in Cape Cod Bay. Occasionally when we have extra time, we travel outside the bay. NMFS is flying aerial surveys outside of Cape Cod Bay.

BIOACCUMULATION OF CHLORDANE AND PAH IN MUSSEL TISSUE: A CAUTION LEVEL EXCEEDANCE

C. Hunt reviewed the progress made in analyzing data related to the mussel tissue exceedance for chlordane and polynuclear aromatic hydrocarbons (PAHs) sampled during summer 2001 at the outfall site in Mass Bay. Caution level thresholds for the two parameters are set at twice the baseline. The caution level for chlordane is 205 ppb (lipid-normalized) compared to the 250 ppb measured during the summer of 2001. The caution level for total PAH is 2160 ppb (lipid-normalized, using the NOAA list of 24 PAHs) compared to the 3024 ppb measured. The values are well under the FDA thresholds for human health. The Deer Island Treatment plant was operating very well during the entire mussel deployment period. Chlordane and PAH values in the effluent were low, even lower than the water quality criteria.

C. Hunt related the levels measured in mussels and effluent using standard bioaccumulation equations, and evaluated the potential health effects to human and mussels. [For more details, see MWRA Report entitled "Evaluation of 2001 Mussel tissue contaminant threshold exceedance" located at: <http://www.mwra.state.ma.us/harbor/enquad/pdf/2002-05.pdf>]

J. Shine suggested that desorption (not quantified) would increase the dissolved phase and cause more bioaccumulation. S. Nixon mentioned a possible bias due to use of log vs. log plots in these analyses. D. Dow highlighted the assumption that the concentrations found in mussels result from equilibrium partitioning rather than from the food sources such as phytoplankton and detritus.

N. Jaworski asked why the mussels from the outfall had double the concentrations of chlordane than those from Deer Island and Boston Inner Harbor. J. Neff suggested that there may be a larger flux of atmospheric chlordane to Mass Bay. Also we are dealing with extremely low concentrations that are not only hard to measure but also hard to interpret environmentally.

B. Berman suggested that caged mussels be deployed more often than just in summer. M. Hall replied that the deployment must be synchronized with the mussel spawning cycle which affects the mussel lipid content and thus contaminant concentrations. B. Berman asked if longer deployments would give higher concentrations, but C. Hunt replied that this is an equilibrium process.

B. Beardsley asked why the Rockport mussels are so much cleaner than Cape Cod Bay mussels. M. Hall replied that the sampling location is at a more exposed site with less sediment deposition where they are thoroughly cleansed. C. Hunt continued with his presentation on the evaluation of the exceedance. He explained that predicted values for chlordane were not higher than the measured. J. Shine assumed that the equations used did not specifically account for variations in DOC (dissolved organic carbon). C. Hunt said they will try to factor in DOC. M. Shiaris noted that there seems to be more uncertainty for chlordane than PAHs. C. Hunt said that it is because they are measuring extremely low levels of chlordane in the mussel tissue.

A. Solow said that since predicted exceeded observed and observed exceeded the threshold, we would have predicted that there would have been an even larger threshold exceedance. He asked C. Hunt what he thought about that. C. Hunt replied that when these thresholds were developed in the mid-1990's, based on the best science available, they used bioaccumulation factors for fish, which have different metabolic pathways than mussels. As a result, two times baseline seemed like a good threshold at the time. J. Shine added that it could be that the predicted levels are too high for accounting for factors such as DOC differences. A. Solow agreed and said that it could be due to many different factors. B. Beardsley added that another factor could be what the actual dilution is in the ocean. C. Hunt said that the cause of the disparity between the measured and predicted chlordane values is in part due to the susceptibility of the chlordane method to analytical interferences and the fact that a more recent chlordane bioaccumulation regression coefficient was not used. The difference between measured and predicted PAH values may be due to the fact that 80% of the PAHs in mussel tissue are high-molecular weight (HMW). The HMW PAHs are slow to come to equilibrium and thus deployment time may be too short for these compounds to reach equilibrium, causing an underestimate in measured relative to predicted concentrations. For both chlordane and PAHs, uncertainty in the various factors used in the predictions could contribute to the disparity between measured and predicted concentrations.

J. Shine asked if there are standard reference materials (SRMs) for chlordane as a quality check. If they run those materials and obtain results comparable to the known standard, then they can believe the results from the unknown samples. L. Lefkovitz replied that they have in the past done some mass spectrometry in their tissue analysis for some of the pesticides because with ECD, it is difficult to know whether there is a false positive. There were slight variations, but they do not have identified co-elutions as they do with some of the PCBs, DDTs, and dieldrin, but there is the potential for some

interference. C. Hunt added that given the analytical method that they use and the quality control checks that are included, they believe that the results are relatively accurate. They can improve those numbers by using another method with greater accuracy, but it is much more expensive. He then described the sources of error in bioaccumulation factors and their potential contribution. Next, he discussed caged mussel exposure to the effluent plume. The effluent plume was in different locations over the course of the mussel deployment. Mussels were exposed to both background contaminant levels and varying levels of dilute effluent. This depends on effluent flow, current speeds, rise height of the effluent (which is stratification driven), and the background build-up of effluent (i.e. far field dilution).

C. Hunt summarized by saying that the predicted PAH and PCB concentrations in mussel are fairly good with predicted values 2-3 times higher than measured. Predicted chlordane concentrations are also good with predicted values 2-3 times lower than measured. Variability in measured data and assumed literature values may cause some of the discrepancy. Reducing uncertainty in level of contaminant concentration in the effluent and in the partitioning between dissolved and particulate phases are important factors in predicting bioaccumulation potential.

C. Hunt then went on to discuss the predicted PAH concentration in water [see handout]. Looking at the full suite of PAHs measured, they wanted to look at whether there is the potential for any kind of health impact on those mussels. He listed the types of information examined and it appears that even considering a cumulative basis, the mussels are not being affected by the contaminants that are being measured.

T. Callaghan asked if mussels can live at the depth at which the cages were deployed. C. Hunt replied yes, though the species living around the outfall in 100 feet of water is different from the test species. T. Callaghan asked what this monitoring is designed to look at, whether it is a signature of the outfall, or the health of the mussels. C. Hunt replied that the reason why we do this monitoring is to see if there are bioaccumulating compounds that are taken up at levels of concern. J. Neff added that we are using the mussels as a surrogate for a valued ecosystem component (e.g. fish). If the mussels remain healthy, then we assume that it is safe for other organisms too. C. Hunt mentioned that MWRA also samples flounder and lobster from around the outfall and analyzes their tissues for contaminants, and there were no exceedances in 2001. J. Shine added that since mussels do not metabolize these compounds very well, they can be considered a “worst-case scenario” for bioaccumulation.

D. Dow asked if they have looked in the literature for whether biomarkers of effects and what the levels of PAH would be associated with those as potential health effects as opposed to chronic/acute toxicity. J. Neff replied that the criteria they used was from mussel work in Great Britain that looked at scope for growth, which integrates many factors. They developed a level above which this biomarker is effective. We used that, as well as acute toxicity data. D. Dow said he was thinking of molecular, as opposed to scope for growth. J. Neff said that there are no unique molecular biomarkers for PAHs in mussels. C. Hunt added that there is not that much information available on different effects vs. contaminant levels on this species.

B. Berman thinks that to discuss the potential effects on mussels, then the length of exposure is important. He wondered how long it takes for chlordane concentrations in mussel tissue to reach equilibrium, whether there are good data that show particulate-bound vs. dissolved. J. Pederson said that mussel scope for growth studies in New Bedford Harbor (high load of PAHs and PCBs) and a clean site found that you would have some effect with high PCBs, but not as much as you would

expect. Studies have also been done on reproductive output and as far as she knows, those are the only biological data on effects of these contaminants on reproductive output. With the PCBs in New Bedford Harbor, reproduction was cut in half, but the levels are so much higher than in Mass Bay. So it is hard to prove that there are any effects on the mussels using the literature. M. Hall added that the concentration that the mussels would be exposed to would be partially driven by the dilution. These mussels were placed in the thermocline. As the thermocline begins to breakdown, around September, the dilution is going to go up, and the concentrations that they are exposed to should go down.

T. Fredette asked if even though HMW PAHs are increasing, do we have some sense where they are on that curve. J. Neff replied that there are some ways to estimate that using a polynomial regression to predict how close to the equilibrium they may be. The problem with long-term exposure is that the offshore environment is probably not ideal for mussels because they may not be getting enough food. T. Fredette agreed that the mussels seem to be approaching equilibrium, but that seems to be a lingering question. S. Nixon asked what the cost of the mussel monitoring program is. K. Keay replied ~\$100K/year.

S. Mayo asked if they have looked at the mussels that normally live near the outfall. C. Hunt replied that they have not looked at the horse mussels that are down at that depth. S. Mayo thinks that certainly that would be a good example of an animal that is exposed to the effluent over the long term and is not starving. C. Hunt agreed that that was a good concept but what they do not know is what the effluent concentration is right at the bottom. All of the data from summer 2001 shows that the plume is up in the water column and it is not right at the bottom. The effluent does rise, as predicted, to the pycnocline area in the summer and then is diluted, so the exposure at the bottom might be much lower. S. Mayo still thinks that would be interesting and would not cost as much as the caged mussel studies. C. Hunt said the bottom line of his presentation is that they do not see a potential for an effect. J. Schwartz asked if the mussels have had the chance to all spawn. C. Hunt replied that they are taken from Rockport at the end of June and by then they have spawned. J. Schwartz noted the difference in fat content between mussels that have and have not spawned. M. Hall said that they have looked at the spawning season in the past, which is why they have chosen the dates of deployment, because presumably the animals have already spawned.

C. Hunt then listed the open questions and uncertainties: (1) what is the actual average concentration of contaminants to which the mussels are exposed at caged mooring locations; (2) what fraction of Deer Island effluent, as well as the diluted effluent at the exposure locations, is dissolved and therefore most bioavailable to the deployed mussels; and (3) are the present threshold values or deployment locations appropriate for the intended purpose of the fish and shellfish program. S. Nixon asked if another question was, has the program fulfilled the purpose for which it was designed, and so the \$100K/year could be better utilized elsewhere.

J. Pederson asked if they are measuring the lipid concentration of each of these samples or is it an average. M. Hall replied that it is measured with each replicate and each replicate is 10 mussels. R. Isaac asked if chlordane is in limited use, or banned. C. Hunt replied that it has been banned for quite some time, but there are still some homes that may have these chemicals and still use them, and there also is an atmospheric input. N. Jaworski added that chlordane is also probably in runoff.

J. Schwartz suggested that MWRA forgo further study and use the \$100K/year toward source reduction efforts. C. Hunt thinks that is one option that could be considered. He then presented possible studies for 2002: (1) field measurements of PAHs and pesticides in the offshore water; (2)

better characterizing effluent concentrations of the organic compounds; and (3) analyzing mussels from more than one deployment at a constant distance (60m) from the outfall. Field measurements were rejected on the basis of technical challenges and high cost relative to the utility of the data for describing the average exposure duration and concentration. More precise estimates of contaminant levels and forms discharged by MWRA in concert with a modified analytical plan for the 2002 caged mussels are recommended to help evaluate if the Contingency Plan thresholds for PAH and chlordane are overly conservative [see handout for details].

N. Jaworski thought that mussel bioaccumulation could be studied in a laboratory using various dilutions of effluent. C. Hunt said that unfortunately they did not set up the mussel monitoring that way. T. Fredette asked if the levels that were measured in the effluent were different than the levels that were used to make the initial predictions. If they are comparable, then perhaps the wrong equations were used. M. Hall thinks that for some of the estimates, pilot plant data were used in ~1995. Some contaminant concentrations are now higher, and some are lower, however, there is not a large difference. T. Fredette thought he heard that using the old way of predicting, they would have not predicted a 2x baseline difference. Using the new, better equations, now that we understand the science and the kinetics better, now we would predict the 2x baseline difference, so did we set ourselves up unknowingly for failure, and if we had used this better knowledge, would not have set the same threshold, is that really the question, instead of going out and trying to do longer deployments and other things, you are still going to come up with the same thing. C. Hunt does not know if we would have set the same threshold but the numbers would say that it would be higher than what the 2x baseline is, if we believe the forward calculation.

J. Shine thinks what we are getting at is that we had a nice discussion about why chlordane might have exceeded the 2x baseline threshold. But the real question is, what threshold should we have, what are the goals, so we want to protect human health, organism health, or detect change. Maybe the 2x baseline threshold is flawed from the onset and we need to come up with a better strategy for setting thresholds. S. Nixon thinks that 2x baseline was the best threshold that could be developed at the time, a program was put in place and we have one year of post-discharge data. Everything that C. Hunt has said is that all the evidence suggests that this is not a problem. People checked it out, it is not a problem, and it would be best to put the resources into looking at other potential problems. A. Solow feels that there was a threshold that was set, it has been exceeded, and it is not exactly clear why. There is a proposal to spend more resources on more detailed studies to understand it, he is not in favor of that, since it seems like it is a waste of money. On the other hand, just to stop the mussel monitoring, even if it is the right thing to do scientifically, someone has to pay attention to the confidence that people will have in this program. He agreed with J. Shine that the mussel monitoring should continue because we only have one year of post-discharge data. He thinks the sampling should continue for a few more years. M. Shiaris suggested also monitoring PAH and chlordane in effluent more closely so that the models can be more fine-tuned. J. Shine thinks continued monitoring of the mussels is the best approach because they are bioaccumulating and hopefully representative of other bioaccumulating components. Obviously we have a worst-case scenario because these mussels are hung in the effluent.

A. Solow listed the three options for OMSAP to consider: (1) recommend that MWRA conduct the monitoring activities C. Hunt listed; (2) recommend to stop mussel monitoring; and (3) recommend that MWRA continue mussel monitoring as in 2001 at least for a few more years. OMSAP could also decide to revise thresholds.

J. Shine thinks part of a monitoring program is to demonstrate compliance, that they are protecting the environment so we still need to demonstrate this, year in and year out. S. Nixon thinks the first option should be rejected in favor of using those resources for more important and pressing questions. OMSAP agreed. J. Shine does not think that over these thresholds is a top priority. He does think that it is important to consider whether we looking for “meaningful change” or “significant change”. By hanging mussels right at the effluent, we have seen that there is some significant change, we have made it so we are definitely going to see that, it still may not be meaningful and so he does not see it necessarily being worth getting more spatially resolved sampling where at our worst case scenario we have seen a change. It is worth knowing but it is still below some meaningful level where we would have more concern.

N. Jaworski asked if the additional effluent data would help reduce the uncertainty C. Hunt presented. C. Hunt said yes, it would produce data that are locally relevant. N. Jaworski thinks then that one more year of sampling plus the additional effluent monitoring makes sense. A. Solow pointed out that these are going to resolve uncertainties about something that is not all that important.

S. Nixon noted that the data do not suggest that bioaccumulation is anywhere near as significant as you would expect it to be based on your conservative physical assumptions in the laboratory work. And you have 5 compounds that have been tested for in a worst-case environment with the cage right over the diffusers. How much more evidence do you want to have before you say bioaccumulation is not an issue for these compounds.

N. Jaworski said that since this is a combined sewer system, there is a lot more discharge in a wet year vs. a dry year. S. Nixon still not think there would be a big difference between a wet and a dry year. A. Solow does not think that we have to prove it year in and year out in perpetuity, but at least twice. J. Shine pointed out that annual monitoring would make it possible to spot trends in bioaccumulation.

J. Pederson thinks that there should be at least another year of monitoring for the mussels and she does not think that MWRA needs to do too much more in terms of the effluent plan. This is leading nicely into the next discussion. When we developed the Monitoring Plan, we realized that there were questions to be answered and that we had almost no good monitoring data for Massachusetts to give us any clue as to what was important. It was understood that after the outfall went on-line, we would come back to revisit the monitoring plan to see if the frequency and spatial distribution were correct.

P. Borrelli agreed that the monitoring should continue. He liked J. Pederson’s comment about the big picture. Just as how we are concerned about what comes out of the pipe, we should be concerned about what goes in it. A better understanding of what the source is would be good. MWRA has the responsibility to run the outfall and see what it can do about source reduction and public education.

S. Nixon said that since the evidence is showing us that bioaccumulation is not a big problem he will vote against continuing the mussel monitoring. N. Jaworski does not want to stop the mussel monitoring because even though the values were not high, PAH and chlordane in mussel tissue did increase from the previous year.

B. Berman asked about the high PAHs values in mussel tissue from in the Boston Inner Harbor. S. Rhode replied that the ratio of the high molecular weight to the low molecular weight indicates that the source is road runoff of combusted fuels (i.e. soot) so it seems unlikely that it is the oil operations in Chelsea Creek. B. Berman asked if the Inner Harbor farfield monitoring is required in the permit. A.

Rex replied no, only the nearfield is required in the permit. MWRA is monitoring in the harbor to measure changes.

A. Solow does not think it seems right to stop monitoring for something that has a threshold after only one year. Perhaps the threshold needs to be revised, but we will monitor next year to see if there is evidence of a trend or if this was an anomaly.

J. Shine asked what would happen if this threshold were exceeded again. A. Rex replied that this is a caution threshold which means something is different from the way it was before, and we notify everyone. What we try to do is look to see if it meant anything, and in this case, we do not think it does, except that perhaps we set our threshold too conservatively. If this happens again next year, we will not go through this same calculation exercise.

ACTION: OMSAP recommends that MWRA continue mussel monitoring using the same protocol as summer 2001 (7 members yes, 1 member no).

MODEL EVALUATION GROUP UPDATE

B. Beardsley described the recent activities of the Model Evaluation Group (MEG). The MEG was established a few years ago by OMSAP to review a report by HydroQual, “the Bays Eutrophication Modeling Analysis for the period 1992-1994”. Members are: Bob Beardsley (WHOI), Eric Adams (MIT), Jeff Cornwell (U. Maryland), Don Harleman (MIT), Jack Kelly (EPA), Jay O’Reilly (NMFS), and John Paul (EPA). The group meets periodically to review modeling reports and evaluate model performance. The Bays Eutrophication Model consists of two models, the hydrodynamic model (predicts the flow and dilution of the effluent in the bays) and the water quality model (predicts parameters such as dissolved oxygen).

B. Beardsley reviewed the recent modeling reports and MEG review [for details see March 2002 MEG report]. The MEG met in March 2002 to review the following reports:

- Calibration of the Massachusetts and Cape Cod Bays Hydrodynamic Model: 1998-1999. Report 2001-12.
- Addendum to "Bays Eutrophication Model (BEM): modeling analysis for the period of 1992-1994." Report 2001-13.
- Boundary sensitivity analysis for the Bays Eutrophication Model (BEM). Report 2001-14.
- Analysis of the addition of a third algal group to the Bays Eutrophication Model (BEM) kinetics. Report 2001-15.

B. Beardsley then summarized the March 2002 meeting and listed MEG’s recommendations:

- The hydrodynamic model results for 1998-99 are acceptable. HydroQual should run the water quality model for this period with both two and three algal groups.
- Additional documentation about the HydroQual hydrodynamic model should be added to the “Calibration of the Hydrodynamic Model: 1998-1999” report, so that this report when completed will be the definitive report on this model.
- The higher resolution hydrodynamic model grid should be used in all new runs.
- All water quality runs should be done with the same spatial resolution as the hydrodynamic model.
- Recent plume tracking data should be compared to hydrodynamic model predictions.
- Recent ideas about how to embed a more accurate nearfield model should be considered.

- There is a need for more *in situ* water quality measurements.
- The MEG would like to encourage that interesting events captured by the model be analyzed further, written up, and published because it would provide much more understanding about how the bays work. It also would give the program much higher visibility.

S. Nixon asked if it is safe to assume that the bottom water dissolved oxygen in the nearfield around the diffusers is influenced by the dissolved inorganic nitrogen input across that northern boundary. B. Beardsley replied yes. S. Nixon asked if there has been any systematic comparison of the Chesapeake, Long Island Sound, and Mass Bay water quality models. He knows they all have a common history with HydroQual. He wondered how different the natural world is in these three systems according to the models. B. Beardsley replied that part of the objective of one of the reports was to try to have what has been used in the Mass Bay modeling documented thoroughly so that one could compare it to other models. His qualitative impression is that the Mass Bay model is not different from Long Island Sound. He does not think there is a significant difference in the coefficients in the models. M. Mickelson thought that was correct but will look into it further [the principal difference is in the algal kinetics and stoichiometry]. S. Nixon thinks certainly it would be interesting to compare the models. He noted that the Chesapeake Bay model was not well documented. S. Nixon then asked if MEG will continue its work. A. Solow assumed that the MEG would continue. MWRA agreed. J. Pederson thinks that it is important that the MEG continue to review the model output.

S. Nixon said that this model was put together to make some predictions about the impact of a specific management action, the construction and operation of the outfall. It was used for that purpose and decisions were made. It was shown to agree to some degree with the monitoring data and that database grew over time. The question is, does MWRA still need the model since it has a very extensive monitoring program.

N. Jaworski thinks that having the model is like an insurance policy. For example, if there is a debate for adding nitrogen treatment, the model can show the large contribution of nitrogen from the northern boundary. A. Solow also thinks there is a value if there is an effect seen in the monitoring data and there is a question about the cause. The model could be used to test competing hypotheses, for example, was what happened at the boundary sufficient to explain what happened at the outfall. J. Shine agreed.

S. Nixon thinks this is an extremely valuable scientific resource for the state of Massachusetts and he would argue that MWRA having built it, funded it, developed it, and verified it, the model should now be taken care of by the state and used as a community based model so all the institutions could use it. A. Rex replied that making the model available to the research community this was one of MWRA's goals when the model was transferred to U Mass Boston, but MWRA has to maintain and run the model according to the permit. K. Keay said that U Mass Boston understands that there will be a scientific oversight body, either the current MEG, or something similar to it, that they would be discussing model runs and preparing reports for them.

S. Nixon thinks that the critical part of a successful modeling program (and monitoring) is to have this independent review. It is important that the MEG maintain independence and someone has to always bring skepticism to the process. He suggested rotating the MEG membership. Also, the hydrodynamic model is very good but perhaps less attention has been focused on the water quality model. A specific review of the water quality model may be needed. B. Beardsley agreed about the issue of

independence. However, MEG members such as Don Harleman have added a healthy dose of skepticism.

ACTION: OMSAP accepted the March 2002 MEG report. OMSAP recommends the following: MEG continue its review of the model output; MEG membership should rotate; and that MWRA develop a plan to maximize the use of this model (e.g. publishing in peer-reviewed journals and graduate thesis work).

DEVELOPMENT OF PROCESS FOR REVIEW OF AND MODIFICATIONS TO MWRA'S EFFLUENT OUTFALL AMBIENT MONITORING PLAN

A. Rex stated that MWRA has conducted almost 10 years of monitoring in Mass Bay and in a few months, we will complete our second year of post-discharge monitoring. We think it is appropriate right now because the nature of the questions is changing. Initially the question was, what are the acute impacts of the outfall, if any. Now we need to think of a Monitoring Plan that looks at more long-term impacts and can be supported over the longer term. She pointed out that there is a process outlined in the permit for reviewing and changing the Monitoring Plan.

The Monitoring Plan was developed over a two-year period in a very structured way. It included input from regulators, scientists, and the public. We would suggest that modifications be considered in a similar structure and fashion. We are very interested in improving the focus and efficiency of this program and we are also interested in the cost. The cost of this program has increased dramatically over the past few years and right now we are spending about \$4 million a year on monitoring and modeling. She suggested that OMSAP convene a subcommittee that will look at reviewing the Monitoring Plan and making modifications to the Monitoring Plan over course of the next couple of years or so. She would like to hear discussion on that.

S. Nixon agreed with A. Rex, with the amount of data that have been collected, it is time to see if MWRA can monitor smarter and more efficiently than in the past. This is not a trivial task. The data need to be analyzed and that is beyond what OMSAP is able to do. Perhaps some resources can be given to Battelle present recommendations, suggestions, and their analyses for modifications to the Monitoring Plan. A. Rex was not implying that OMSAP was to analyze raw data; she would like OMSAP to agree on a structure for making the review happen. She also would like to see more active participation on the part of the agencies and the public throughout this process.

J. Shine thinks that MWRA could reduce the number of nearfield stations without losing statistical power because the stations are so close together. N. Jaworski agreed that the review of 10 years of monitoring is not a trivial task. He asked how the bulk of the work would be done. A. Rex replied that MWRA and its contractors would do most of the work but they would like to do it in the context of interaction with the OMSAP. She thinks it would be useful to have an OMSAP meeting this summer to get started.

J. Pederson noted that page 3 of MWRA's information briefing outlines the process that was followed from the NRC book "Managing Troubled Waters". When the Monitoring Plan was first developed, the questions were primarily those raised by the public. The scientists worked on deciding how to answer those questions. This is a good time to go back and look at those questions.

A. Solow noted that though there have been 10 years of monitoring, there have only been 2 years of post-relocation monitoring. Also, it has always been his feeling that one would want to compromise

on the spatial coverage and capitalize on the temporal coverage and so it is better to look, especially for subtler effects over time. So that is a compromise to make here between tight spatial coverage and longer time sampling. C. Hunt said that he would like to see everyone working as a group, where MWRA and their consultants present analyses, then OMSAP, the regulators, and the public work together. He thinks it is important to lay out this process before the review begins. B. Beardsley thinks it is important to document changes to the monitoring program. A. Rex thinks the best place to start for this review is an overview of exactly what MWRA does. She asked OMSAP what they thought about convening a subcommittee for the review. S. Nixon thought OMSAP was small enough that a subcommittee was not needed. He thinks it would be useful to meet this summer. B. Berman pointed out that it will be important to have the public involved throughout this process.

ACTION: OMSAP will convene during summer 2002 to begin discussions on developing a process for the review of the Monitoring Plan.

ADJOURNED

MEETING HANDOUTS:

- Agenda
- April 2002 OMSAP/PIAC/IAAC membership lists
- October 2001 draft OMSAP minutes
- MWRA information briefings and copies of presentations

Summary prepared by C. Coniaris. Post-meeting comments are included in [brackets]. All such comments have been inserted for clarification only. They do not, nor are they intended to, suggest that such insertions were part of the live meeting components and have been expressly set-off so as to avoid such inference.

OUTFALL MONITORING SCIENCE ADVISORY PANEL (OMSAP) MEETING
Monday, July 15, 2002, 10:00 AM to 2:00 PM, WHOI Redfield Auditorium
FINAL MINUTES

ATTENDANCE

Members Present: Andy Solow, WHOI (chair); Bob Beardsley, WHOI; Norb Jaworski, retired; Scott Nixon, URI; Judy Pederson, MIT/Sea Grant; Mike Shiaris, U Mass Boston; and Jim Shine, Harvard School of Public Health.

Observers: Bruce Berman, Save the Harbor/Save the Bay; Mike Bothner, USGS; Todd Callaghan, MCZM; Cathy Coniaris, MADEP; Mike Delaney, MWRA; David Dow, NMFS; Marty Dowgert, USFDA; Dave Duest, MWRA; Stephen Estes-Smargiassi, MWRA; Patricia Foley, Save the Harbor/Save the Bay; Sal Genovese, Safer Waters in Massachusetts; Janine Geraigery, MWRA; David Gilmartin, MWRA; Pam Harvey, MADEP; Carlton Hunt, Battelle; Russell Isaac, MADEP; Mingshun Jiang, U Mass Boston; Chris John, MWRA; Ken Keay, MWRA; Ben Kelly, Save the Harbor/Save the Bay; Wendy Leo, MWRA; Suh Yuen Liang, MWRA; Matt Liebman, EPA; John Lipman, Cape Cod Commission; Alison McCabe, MWRA; Mike Mickelson, MWRA; Andrea Rex, MWRA; Jack Schwartz, MADMF; Silvia Spring, Save the Harbor/Save the Bay; Crista Trapp, Harvard School of Public Health; Steve Tucker, Cape Cod Commission; and Meng Zhou, U Mass Boston.

Boston University students: Fahed Alzonoohi, Brenda Berasi, Irfan Budiswanto, Kullaya Chiammanisakul, Marc Core Claudio, Vicki Ann Frawley, Zack Gou, Tom Goucher, Tamim Jabr, Jessica Kelly, Laurie Lopez, Juan Pablo Mendoza, Mary Murphy-Phillips, Megan Newcomer, Gerry Poulin, Jessica Rosery, Herb Ross, Sunit Srisainsuchat, Jin Toppi, and Yu-Chi Wang.

SUMMARY OF ACTION ITEMS & RECOMMENDATIONS

1. OMSAP approved the April 29, 2002 minutes with no amendments.
2. OMSAP decided on a time line and process of review:
 - OMSAP will host two workshops to review the monitoring plan by task (e.g. effluent, fish/shellfish, benthos, water quality), PIAC and IAAC members work with OMSAP to provide input.
 - Outside experts will be invited to attend the workshops.
 - If additional questions arise out of the workshops, then OMSAP will form subcommittee(s). Subcommittees will consist of OMSAP, PIAC, and IAAC members, and outside expertise.
 - After each workshop, there will be a follow-up meeting for OMSAP to develop recommendations.
 - Additional issues to be addressed during the review:
 - Include suggestions for alternative measurement technologies, especially for those questions where natural variability indicates need for very high number of samples.
 - Review reporting frequency – is the present volume and frequency of reports appropriate or needed, or should some of the reporting emphasis shift to publishing in peer-reviewed literature.
 - Quality Assurance for each task area.
 - Internet availability of data.
 - How the Bays Eutrophication Model can be used in the review process.

- o Identify long term datasets that MWRA can use to lengthen their baseline record.
- o Which questions are "ongoing" for foreseeable future?
- o Data from other monitoring programs that are relevant or likely to continue should be included (e.g. Center for Coastal Studies, Gulf of Maine Ocean Observing System, GulfWatch, United States Geological Survey).
- o Are emerging tracers useful (e.g. nitrogen isotopes, caffeine, endocrine disruptors, antibiotics).

Rec'd Schedule	Task
July through September 2002	• MWRA review other projects that evaluated monitoring plans for ideas on the process (National Research Council, S. California, Chesapeake, S. Florida, Tampa Bay, San Francisco Bay, Mamala Bay Hawaii). • MWRA review monitoring questions, suggests questions which have been answered, which should be revised in light of new information, which questions remain the same. • OMSAP develop a list of questions they would like MWRA to address.
September 2002	OMSAP MEETING September 24, 10:00-2:00, DEP Boston • MWRA will present their evaluation of other monitoring plans. • MWRA will present questions that the monitoring plan is supposed to address and potential new questions. • MWRA will present, if needed, information about water quality statistics. • MWRA identifies if there are any potential "fast track changes" of parameters or sampling locations - if OMSAP and regulators agree, MWRA submits those proposed modifications to EPA and DEP as interim modifications. • OMSAP will: discuss, possibly modify monitoring questions; plan workshops by task area (effluent, water column, sediment, fish and shellfish); determine schedule for each task area or each question; identify emerging questions for monitoring and/or special supporting studies.
September through November 2002	• Invite outside experts to workshops. Include engineers knowledgeable about treatment processes and effluent monitoring where appropriate. • MWRA will consider refinements to monitoring questions that may be necessary in order to conduct power analysis of sampling design. For example, the questions may need to be phrased in terms of numeric hypotheses. • Some questions may appropriately be split into "spatial extent of change" and "temporal trends near the outfall." These two types of question might require differing sampling designs. • How do we determine the appropriate duration of the individual monitoring studies? • Can the Bays Eutrophication Model be used to evaluate some pieces of the monitoring plan? • OMSAP review/approve final set of monitoring questions.
November 2002	OMSAP 2 DAY TECHNICAL WORKSHOP: EFFLUENT, PATHOGENS, FISH/SHELLFISH BIOACCUMULATION, SEDIMENT CONTAMINANTS

- Nov 2002 • OMSAP meet to make final recommendations after November workshop.
 - Jan 2003

 - February 2003 **OMSAP 2-3 DAY TECHNICAL WORKSHOP:
WATER QUALITY, BENTHIC COMMUNITY**

 - February- June 2003
 - MWRA and consultants conduct power analyses to determine frequency and location of sampling for each area where data already exist. Can the data answer the questions?
 - OMSAP meet to make final recommendations after February workshop. Discuss how results of power analyses affect monitoring designs.
 - Include special effluent sampling in this analysis.

 - July 2003
 - MWRA produces initial draft of revised monitoring plan.
 - OMSAP meet to review initial draft of revised monitoring plan.

 - August 2003
 - MWRA produces draft of revised monitoring plan.

 - September 2003
 - OMSAP meets to develop preliminary recommendations, seeks additional public and regulator input.

 - November 2003
 - MWRA submits final revised monitoring plan.
 - OMSAP makes recommendation to regulators on monitoring plan.
 - OMSAP recommends a process for any further revisions that may be needed over time (e.g. recommends to EPA and DEP that revisions can continue even after permit expires, and specific recommendations on further results that would be needed before a particular revision could be recommended).

 - January 2004
 - After receiving public comment, EPA and DEP approve monitoring plan.
-

MINUTES

WELCOME, APPROVAL OF MINUTES

ACTION: OMSAP approved the April 29, 2002 minutes with no amendments.

PUBLIC INTEREST ADVISORY COMMITTEE UPDATE

P. Foley summarized the April PIAC meeting. PIAC members present at that meeting thought that cost should not drive discussions on monitoring such as the discussion on mussel contaminant monitoring at the April OMSAP meeting. Overall, the members present felt that monitoring is extremely important and we should not be limited to the current monitoring approaches. PIAC will meet later today to discuss the plan for reviewing the monitoring plan and will communicate what they think their role should be with OMSAP and the regulators.

OVERVIEW OF MWRA'S EFFLUENT OUTFALL AMBIENT MONITORING PLAN AND SUMMARY OF SHORT-TERM RESULTS

M. Mickelson reviewed MWRA's current monitoring plan [for details see: MWRA's information briefing entitled "Overview of MWRA's Effluent Outfall Ambient Monitoring Plan and summary of short-term results"; "MWRA effluent outfall monitoring plan: Phase II post discharge monitoring"]

<http://www.mwra.state.ma.us/harbor/enquad/pdf/ms-044.pdf>; and “2000 Outfall monitoring overview” <http://www.mwra.state.ma.us/harbor/enquad/pdf/2001-10.pdf>].

M. Mickelson outlined the basic monitoring questions considered when the monitoring plan was developed:

- Are fish and shellfish safe to eat (with respect to toxics)?
- Are shellfish safe to eat (with respect to pathogens)?
- Also, Is it safe to swim?
- Are living resources protected from enrichment?
- Are living resources protected from toxics?
- Are aesthetics being maintained?

DEVELOPMENT OF A PROCESS FOR EVALUATING THE MONITORING PLAN

A. Rex outlined their example of a time line for monitoring plan review [for details see MWRA’s information briefing: “Process considerations for reviewing and modifying MWRA’s Effluent Outfall Ambient Monitoring Plan”]. A. Solow then opened the discussion up to OMSAP and the audience.

S. Nixon wondered how MWRA measures ecosystem degradation. K. Keay thinks this measurement is indirect, at best. For example, MWRA monitors the benthic community in the nearfield and farfield compared to the nine year baseline and looks for changes that are indicative of degradation. S. Nixon thinks “ecosystem degradation” has no operational definition. M. Mickelson noted that the questions listed above were developed in 1991 based on concerns. The Outfall Monitoring Task Force (OMTF) worked with us to develop specific studies that could test related aspects. A. Rex added that the concept of ecosystem degradation was translated into detailed monitoring questions.

J. Pederson pointed out that most of the questions listed above were based on public concerns about the outfall. K. Keay added that these questions were broken down into ~23 specific questions listed in the “MWRA effluent outfall monitoring plan phase I: baseline studies”. The original monitoring plan development was an effort to translate the broad concerns into more testable studies. M. Mickelson added that these questions have been made quantitative in the Contingency Plan which contains 97 thresholds.

S. Nixon noted that there is no operational definition for degradation and so he does not think it is a useful term. It is not a term that should be used in a monitoring program, it is fine for a public discussion, then your job is to translate that into something you can measure and make sense out of. J. Shine asked if S. Nixon thought that benthic infaunal diversity was an indicator of ecosystem degradation. S. Nixon replied no, ecosystem degradation cannot be measured.

D. Dow asked relative to the recent press on right whales and the Center for Coastal Studies (CCS) work, how MWRA monitors marine mammals. M. Mickelson noted that D. Dow is referring to an article in the Cape Cod Times which arose from observations by the Center for Coastal Studies that right whale numbers and zooplankton measurements were very low in Cape Cod Bay this spring and the article reported that the CCS nitrogen isotope study has shown nitrogen from the outfall stretching down to Plymouth. The article implied that those two observations are connected. He thinks that this is a stretch and the authors of the research would also agree. M. Mickelson responded to D. Dow’s question by saying that MWRA has a dedicated marine mammal observer on board during its surveys. During the baseline period, not many whales were found near the vicinity of the outfall and so far there is no evidence that whales are attracted to the outfall. MWRA is also providing water samples to the

CCS for their nitrogen isotope tracer study. The CCS nitrogen isotope tracking data have shown that the outfall plume is measurable down to the waters off of Plymouth, comparing well to the ammonia effluent signal measured by MWRA.

A. Solow returned to the discussion about ecosystem degradation. He agreed with what was said about that and added that it seems that some of the monitoring is aimed at very well specified questions, like is the level of toxics exceeding some threshold. Ecosystem monitoring is exploratory, so it is a good idea to continue monitoring to see if anything unanticipated occurs. M. Mickelson pointed out that thresholds relate to human health, degradation, or change. A. Rex noted that in addition to the regular outfall monitoring, MWRA also conducts exploratory special studies that examine specific questions about the environment, e.g. zooplankton ecology. K. Keay agreed that it is good to continue monitoring to see that there are no detrimental effects of the outfall, or subtle changes that might not otherwise be detected. B. Berman thinks it is important to continue monitoring for quite some time to pick up subtle changes (i.e. the difference between variability and trends).

M. Bothner thinks it is important to try to discern trends from variability. He asked if MWRA measures a spike in floatables collected in Mass Bay during the summer from boaters. M. Mickelson replied that they do see more trash in the summer that is too large to have passed through the treatment plant. The outfall plume surfaces in the winter and sometimes a fine white material can be seen. This material has been analyzed and is composed of fats and harmless bacteria. There is also a species of diatom called *Thalassionema* that can sometimes be measured around the outfall.

S. Nixon thinks the issue of right whales and zooplankton is an example of why the monitoring is in place. He asked if MWRA responded to the recent press on right whales and the outfall. A. Rex replied that they did not respond because it was an issue of misreporting. In addition, the science of why the right whales numbers were so low in Cape Cod Bay is difficult to explain. We also did not have any data available from the Center for Coastal Studies that we could respond to. J. Pederson agreed that there were no data available so OMSAP did not respond. It did not make sense to respond and have this escalate without having any data.

J. Pederson returned to the question of how we define ecosystem degradation because she thinks that the OMTF was trying to address this with the last two questions listed above. She does not think that we deal with this well scientifically. That is why it would be good to look at how we might do things better. She asked N. Jaworski and S. Nixon, based on their experience, how other monitoring programs have dealt with this issue. N. Jaworski described the only long term data set he could find, from the Potomac River and Chesapeake Bay for dissolved oxygen (DO) and nutrients. Even though there has been a significant decrease in phosphorus discharged to the Upper Potomac, phosphorus levels in the surface waters and DO in the bottom waters in the lower estuary have not changed since 1965.

J. Shine agreed that we can successfully measure parameters such as DO, salinity, and nutrients, but how ecosystem health is measured has been a longstanding question. S. Nixon thinks it is difficult because the public does not understand or necessarily care about the benthic community structure. He thinks that a benthic degradation index would be a mistake. The other programs that he knows of use the same approach, monitor as much as possible, then look differences between variability and trends. K. Keay noted that MWRA uses indicators of change for the benthic community, not a benthic degradation index. S. Nixon thinks that there is a danger when “report cards” are prepared for bodies of water. J. Shine agreed with S. Nixon. To measure a degraded system, there are measurements like

evenness and richness in the benthic community structure that are somewhat indicative of change. S. Nixon said that everyone thinks of diversity as good, but it may not matter in terms of function. N. Jaworski thinks that the most difficult thing to say is if enrichment has been enhanced, because it cannot even be seen in the 40 years worth of Potomac/Chesapeake data.

B. Beardsley asked about the scientific response to future press releases. A. Rex said that OMSAP advises EPA and MADEP, but if MWRA had data available, they would share it with OMSAP for review. Perhaps the process of responding to press should be made more formal. B. Berman said that Save the Harbor/Save the Bay received telephone calls regarding the recent press, but we did not respond because we also did not have any data. P. Foley does not think we can establish formal rules on how to respond to press. She thinks in the future, the OMSAP and PIAC chairs should confer before there is a response to press.

OMSAP then began a discussion to develop a plan for reviewing the monitoring plan. A. Rex noted that even though the outfall has been on-line for almost 2 years, there are plenty of data available that can be analyzed to see if we are monitoring well. We anticipate that the review will take about a year and a half. We want OMSAP to lead it, and it is extremely important that the regulators and the PIAC also be involved. We think that it might be possible to fast track some changes, and that will also have to be reviewed. We suggest OMSAP form subcommittees to review parts of the monitoring and include members of the public and regulatory agencies. We suggest that the monitoring questions be reviewed and modified and MWRA will be analyzing the 10 years of data to help that along. We suggest that changes to the sampling design be based on statistical analyses and also technical advances including new ways to measure, for example measuring DO *in situ* or the use of satellite imagery. Finally the process does require, as outlined in the permit, public notice and regulatory approval. We hope to have changes in place by calendar year 2004. MWRA's goal is to make this make this program better focused and more efficient. She asked the regulators, EPA and MADEP, if MWRA is taking the correct approach in asking OMSAP to review the monitoring plan within the process that is outlined in the permit. P. Harvey replied yes, this approach will work. There is a provision in MWRA's discharge permit about changes in the monitoring plan which is different from a formal permit modification and also different from the permit renewal process so that the notice is through the Environmental Monitor for public comments and the EPA and MADEP approve the changes. The permit allows for a less complicated and extensive process for monitoring plan revisions than actual permit changes.

N. Jaworski asked if MWRA's statement "incorporate findings from monitoring to date" includes other data, e.g. fisheries. A. Rex replied that they would look at this, if OMSAP asked them to. J. Pederson said that when the monitoring plan was being developed, because the MA Division of Marine Fisheries (MADMF) was studying fish populations, the OMTF decided that MWRA did not have to monitor fisheries. However, this can be revisited.

A. Solow thinks, in principle, the process outlined by MWRA seems straightforward. P. Foley believes that there should be more public notice in this process. She thinks that perhaps PIAC may want to host public meetings. B. Berman added that it might be useful, in addition to having public participation in the subcommittees, to have regional public meetings sooner in the beginning, rather than at the end.

R. Isaac believes it is important to go through this review process and examine the data. However it may be difficult to drop any monitoring with such a short post-discharge period. A. Solow thinks that

is why statistical analyses will be important, to examine statistical power. R. Isaac added that it might also be possible to see a trend that is not due to the outfall. Some statistically significant changes may not be due to the outfall. A. Solow agreed and said that this is why it is important to look for pre-discharge trends. S. Nixon thinks that the 10 years of data is enough to be able to tell us if the monitoring sample design is sufficient. A. Solow agreed. J. Pederson thought perhaps now we could try to use modeling and the monitoring together more effectively. Bob Beardsley agreed. He also supported what N. Jaworski had to say, in that this is a good opportunity to compare the monitoring data with the other environmental data that have been collected, for example, the Boston Buoy has collected data for decades. Also, there might be long term fishery data that would be useful to have to help with the trends analysis. A. Solow thought that was a good idea.

W. Leo asked that OMSAP suggest if there are other examples of long term outfall monitoring programs, besides the list provided by MWRA, that have well-documented reviews of their monitoring. S. Nixon thinks that Florida Bay is a good example. He suggested MWRA contact the South Florida Water Management District. He also suggested MWRA contact the Tampa Bay National Estuary Program. B. Beardsley suggested that they look into San Francisco Bay monitoring. J. Pederson suggested Mamala Bay in Hawaii.

A. Solow asked what was meant in MWRA's information briefings about "emerging questions". A. Rex replied that there are some questions that MWRA does not examine that may prove to be important, e.g. estrogen mimickers. N. Jaworski asked whether the review process should be undertaken by question or task (e.g. effluent, water quality, benthos, fish/shellfish). He thinks by task is more logical, but noted that one task can answer more than one question. OMSAP agreed that the review should proceed by task.

N. Jaworski suggested that Quality Assurance (QA) is addressed during this review process. We will not know how well the monitoring plan is working unless we spend some time looking at QA. B. Beardsley thinks that we should also look at how the monitoring data are presented on the web so that others have the ability to review the data. B. Berman thinks that is a good idea and also thinks that it would be good to host a public meeting in the September-November 2002 time frame to present the review process.

S. Nixon asked what the role of Battelle will be during this review process. A. Rex replied that they will have an important role in conducting power analyses and helping the MWRA staff compile and analyze the monitoring data. OMSAP then discussed Battelle participation the review vs. conflict of interest. B. Beardsley thinks that Battelle understands issues such as spatial variability very well since they collect the samples and analyze the data. They should definitely be present during the review process, but not making decisions.

OMSAP then discussed whether they should convene subcommittees to review parts of the monitoring plan. J. Pederson said that there were no subcommittees when the monitoring plan was developed. Instead, there were dedicated workshops to look at parts of the monitoring plan, e.g. nutrients, benthic communities, and invite outside experts. The OMTF did not make decisions at these workshops, instead, they had time to absorb the information and make decisions at a later meeting. All those interested were invited, including outside experts not involved with the MWRA monitoring. S. Nixon agreed to proceed with the review on a task-by-task basis, and he also agreed to invite outside experts. The value of OMSAP is its diverse experience and having subcommittees meeting on their own would lose the value of interaction among OMSAP members. A. Solow liked the idea of having a 2-day

workshop to review a portion of the monitoring plan and inviting additional outside experts to attend. If there are questions that arise out of the workshops, then form a subcommittee.

OMSAP discussed the time frame for review. K. Keay said that all 2002 data will not be ready until February 2003. J. Pederson and A. Solow both thought it was important to begin the review process, even if all of the 2002 data were not available. J. Pederson noted that the November 14, 2002 meeting date should be rescheduled because there is an invasive species workshop then. She suggested trying to schedule the workshop on Monday and Tuesday of that same week.

C. Hunt asked OMSAP what they would like to see presented to them at the September 24, 2002 OMSAP meeting. B. Beardsley thought that it would be useful for MWRA to send OMSAP what they plan to present and then OMSAP can comment in greater detail. J. Pederson said that the water quality aspect of the monitoring is the most complicated would need its own 2-day workshop. S. Nixon thinks that for water quality, we should be looking at how “smart” the sampling density is in the nearfield and the farfield and number of stations required, etc. A. Rex noted that the answer to this question may be different for each parameter. K. Keay added that this is why we need the questions OMSAP wants addressed by September.

J. Pederson thinks that the November date is not set in stone, it depends if MWRA’s data analyses are completed in time. She thinks that the first 2-day workshop should address toxic contaminants and biota because the questions for these tasks are less complicated than those for water quality. S. Nixon added that effluent data evaluation is also relatively straightforward so this could also be addressed at the first 2-day workshop. It is also less complicated because OMSAP only has to review the effluent monitoring that is not mandated by the discharge permit. A. Solow said that the February 2003 2-day workshop could address water quality and benthic community monitoring.

A. Rex asked OMSAP if they thought new questions would arise before or during the workshop. A. Solow hopes that new questions could be identified before the workshops. B. Beardsley suggested that MWRA provide to OMSAP a list of old questions and potential new questions. OMSAP could comment and add to the list. A. Solow said that this could be presented at the September 24 meeting. At the workshop, we will review whether the monitoring is answering these questions. OMSAP agreed. N. Jaworski thought that the chlorophyll QA problem in fall 2000 is one example that could be presented on how MWRA addressed the problem.

S. Nixon asked how MADMF analyzes their fish data and whether they produce reports. R. Isaac replied that because of budget cutbacks, they no longer do chemical analyses, but they do still conduct fishery assessments. A. Rex said that OMSAP should also review MWRA’s reporting frequency, e.g. schedule for producing reports. A. Solow agreed. D. Dow noted that NMFS northeast shelf fisheries data will soon be posted on-line according to region. Mass Bay would be listed as part of the Gulf of Maine. This dataset includes temperature and salinity data since the 1960’s.

A. Solow summarized that MWRA will present the monitoring questions and their review of other monitoring plans at the September meeting. There will then be two workshops, one in November 2002 (two days) and the other in February 2003 (two to three days). C. Hunt asked if they can they present some information on water quality statistics to OMSAP before the February 2003 workshop. A. Solow thought that it would be ok to do this at the September 2002 meeting. B. Beardsley would like two things to be considered during the review: how the Bays Eutrophication Model can be used in this process and identifying long term datasets that MWRA can use to lengthen their baseline record. C.

Hunt asked if these datasets should be within Mass Bay. B. Beardsley replied that is depended on the data. For example, there is a buoy offshore of Portland, Maine that has been collecting data for ~30 years, longer than the Boston Buoy.

S. Nixon added that after OMSAP recommends revisions and MWRA makes changes to the monitoring plan, the OMSAP should review the new monitoring plan. J. Pederson suggested that folks review the National Research Council book “Managing Troubled Waters”. She said after a 2-day workshop, there needs to be a follow-up meeting when OMSAP makes decisions. Since there is so much information presented at workshops, it is important that OMSAP has some time to absorb the presentations and develop recommendations.

A. Solow asked what was meant on the MWRA information briefing about “fast track changes”. A. Rex said that there are some changes that are simple and may be without controversy that can be reviewed in a relatively short amount of time. A. Solow asked if MWRA can present these at the September 2002 OMSAP meeting. A. Rex agreed. P. Harvey thought that was fine since there is a process outlined in the permit for annual changes to the monitoring plan.

A. Solow asked PIAC how they felt about this process for review. P. Foley said that she is grateful that OMSAP seems serious about this review and thinks the categories of discussion are on target. PIAC will discuss how the public should be involved during this review and will report back to OMSAP.

M. Liebman asked what factors will be evaluated to determine whether or not the monitoring plan is revised. A. Rex thinks that will be a topic of the September 2002 meeting. A. Solow added that the monitoring plan is designed to answer questions and OMSAP will determine if this is occurring. M. Liebman said that there are other implicit factors that should be made explicit early on. N. Jaworski thinks that this cannot be done until the data are examined and we have an idea of the natural variability. J. Pederson thinks that it would be interesting if someone could come up with better ways to monitor, for example, monitoring with a line of buoys as opposed to collecting samples using ships. A. Solow agreed.

ACTION: OMSAP decided on a time line and process of review. See page 1 for details.

ADJOURNED

MEETING HANDOUTS:

- Agenda
- July 2002 OMSAP/PIAC/IAAC membership lists
- April 2002 draft OMSAP minutes
- MWRA information briefings and copy of presentation

Summary prepared by C. Coniaris. Post-meeting comments are included in [brackets]. All such comments have been inserted for clarification only. They do not, nor are they intended to, suggest that such insertions were part of the live meeting components and have been expressly set-off so as to avoid such inference.

OUTFALL MONITORING SCIENCE ADVISORY PANEL (OMSAP) MEETING
Tuesday, September 24, 2002, 10:00 AM to 2:00 PM, MADEP Boston
FINAL MINUTES

ATTENDANCE

Members Present: Andy Solow, WHOI (chair); Bob Kenney, U Rhode Island; Judy Pederson, MIT/Sea Grant; and Juanita Urban-Rich, U Mass Boston.

Observers: Ellen Baptiste Carpenter, Battelle; Bruce Berman, Save the Harbor/Save the Bay; Peter Borrelli, Center for Coastal Studies; Denise Breitenicher, MWRA; Ed Bretschneider, Wastewater Advisory Committee; Todd Callaghan, MCZM; Cathy Coniaris, MADEP; David Dow, NMFS; Dave Duest, MWRA; Patricia Foley, Save the Harbor/Save the Bay; Maggie Geist, Association to Preserve Cape Cod; Carlton Hunt, Battelle; Russell Isaac, MADEP; Chris John, MWRA; Ken Keay, MWRA; Ben Kelly, Save the Harbor/Save the Bay; Wendy Leo, MWRA; Suh Yuen Liang, MWRA; Matt Liebman, EPA; John Lipman, Cape Cod Commission; Steve Lipman, MADEP; Stormy Mayo, Center for Coastal Studies; Mike Mickelson, MWRA; Tara Nye, Association to Preserve Cape Cod; Cornelia Potter, MWRA Advisory Board; Andrea Rex, MWRA; Steve Rhode, MWRA; Jack Schwartz, MADMF; Dave Taylor, MWRA; and Steve Tucker, Cape Cod Commission.

SUMMARY OF ACTION ITEMS & RECOMMENDATIONS

1. OMSAP recommended minor revisions to MWRA's list of monitoring questions (see page 2).

MINUTES

PUBLIC INTEREST ADVISORY COMMITTEE (PIAC) UPDATE

P. Foley said that today PIAC will be discussing their public communications strategy during the OMSAP's outfall monitoring review. At the July PIAC meeting, members present agreed to work to inform and educate the public about the review. PIAC would like to have public meetings during the monitoring review process and hopes that OMSAP members would agree to participate. PIAC will also be discussing a concern brought up by S. Tucker on not being able to attend EPA, MADEP, and MWRA inter-agency TSS exceedance meeting.

AUGUST 2002 TOTAL SUSPENDED SOLIDS (TSS) EXCEEDANCES

D. Duest and D. Breitenicher reviewed the August 2002 TSS exceedances. [For more information, go to: <http://www.mwra.state.ma.us/harbor/pdf/200208tpx.pdf>, <http://www.mwra.state.ma.us/harbor/pdf/20020824tpx.pdf>, and <http://www.mwra.state.ma.us/harbor/pdf/20020831mtpx.pdf>] OMSAP had a discussion about the incident. T. Callaghan asked if the operational changes made at the Deer Island Treatment Plant were implemented only during the upset, or if they were permanent changes. D. Duest replied that plant operations and staffing are back to normal now that the treatment plant is operating normally. He noted that the return sludge was chlorinated to prevent the growth of filamentous bacteria. D. Dow asked about the presence of filamentous bacteria before the incident. D. Duest replied that filamentous bacteria normally occur in the effluent in low numbers. A. Solow thought that the experiment with Nyacol was planned well, and though the magnitude of the impact to the treatment plant was unanticipated, MWRA staff responded well. J. Pederson agreed and added that we have the Contingency Plan to notify us of events like this. The process worked well, and we learned from it. R. Isaac noted that if the feed rate of the high-sulfate waste were lower, then this event would not have

occurred. D. Duest said that the MWRA technical staff recommended a lower feed rate, but Nyacol disagreed. R. Isaac asked where the high-sulfate waste is going now. D. Breiteneicher replied that for the remainder of the experiment, the high-sulfate waste went to Fitchburg wastewater treatment plant and a treatment plant in New Jersey. Now that the experiment has been completed, the waste is being discharged back into the MWRA system at Nyacol's facility in Ashland. C. Hunt said that during the incident, the field team observed some evidence of the filamentous bacteria on nearfield surface waters. There was a lot of environmental sampling during the incident, including water quality sampling, caged mussel deployment, benthic sampling, USGS sampling, and a fecal coliform survey.

MWRA REVIEW OF OTHER WASTEWATER TREATMENT PLANT MONITORING PROGRAMS

OMSAP requested at their July 2002 meeting that MWRA research how other wastewater treatment plants have conducted monitoring reviews to see if MWRA can learn from them. M. Mickelson presented the results of this review. [For more information, see MWRA's information briefing entitled "Review of Revision Processes for Other Marine Monitoring Programs", for a copy contact Cathy Coniaris at 617-348-4026]. M. Mickelson said that MWRA's approach for review is similar to the approach used by other wastewater treatment plants.

STATUS OF MONITORING QUESTIONS

W. Leo reviewed all of the monitoring questions used as a basis for MWRA's outfall monitoring program [For more information, see MWRA's information briefing entitled "Review of Monitoring Questions, for a copy contact Cathy Coniaris at 617-348-4026]. OMSAP then discussed whether any of the questions need to be revised, or if additional questions should be added.

ACTION: OMSAP recommends the following revisions to the monitoring questions:

Question #5: "What are the concentrations of contaminants in the influent and effluent and their associated variability?" *OMSAP requests clarification in the question regarding any studies being done to improve analytical methods.*

Question #29: "Are there any benthic community changes correlated with changes in levels of toxic contaminants (or sewage tracers) in sediments?" *OMSAP recommends that though there is argument to remove this question, that it remain at least until after the technical review workshops.*

MONITORING REVIEW WORKSHOP PLANNING

C. Coniaris reviewed the proposed topics for each of the two OMSAP technical workshops. There was some discussion about the order of the presentations. S. Tucker suggested the Federal Reserve in Boston and a venue in Yarmouth as good locations for the workshops. J. Pederson suggested that OMSAP be asked to frame questions they may have before the workshops take place.

ADJOURNED

MEETING HANDOUTS:

- Agenda
- September 2002 OMSAP/PIAC/IAAC membership lists
- July 2002 draft OMSAP minutes
- MWRA information briefings and copy of presentation

Summary prepared by C. Coniaris. Post-meeting comments are included in [brackets]. All such comments have been inserted for clarification only. They do not, nor are they intended to, suggest that

such insertions were part of the live meeting components and have been expressly set-off so as to avoid such inference.