

**January 16, 2001 Meeting of the Houston Ship Channel Dioxin
TMDL Stakeholder Group**

Participants Present: Charles Beckman, Dana Blume (for Laura Fiffick), Linda Broach, Ralph Calvino, Tracy Hester, Pam Kroupa, Ed Matuszak, Kristy Morten, Chris Sappington, Luis Sueiro, Linda Shead, Lial Tischler, Jack Wahlstrom, Bob Wood

Support Team Present: Yu-Chun Su, Dania Drogolewicz, Lisa Gonzalez, Larry Koenig, Carl Masterson, Randy Palachek, Hanadi Rifai, Monica Suarez, Pris Weeks

Others Present: Chris Barry (Harris County Pollution Control), Brian Cain (USFW), Michael Collins (URS Corp.), Sara Metzger (City of Pasadena), Marty Kelly (TNRCC-Houston), Todd Running (H-GAC), Chuck Wemple (H-GAC), John Westendorf (Oxy Vinyls)

1. The meeting for the Houston Ship Channel Dioxin TMDL Stakeholder Group was held from 1:30-4:30 PM at the University of Houston-Clear Lake (UHCL), 2700 Bay Area Blvd., Houston, Texas 77058, Bayou Building 1st Floor, Forest Room. Project notebooks were distributed to all members who were not present at the May 2000 Kickoff Meeting. Pris Weeks of the Environmental Institute of Houston (EIH) welcomed the group. Self-introductions were made. The meeting agenda was approved.

Weeks stated that TMDL stakeholder meetings are scheduled based on the submission of University of Houston (UH) technical reports to the Texas Natural Resource Conservation Commission (TNRCC). In addition to UH presentations, stakeholders can request presentations from sources outside of the TMDL process.

2. **Weeks** then gave a brief presentation to review the draft Ground Rules for the Dioxin TMDL Stakeholder Group although not enough stakeholders were present to approve the Ground Rules by consensus. Stakeholders were then asked to comment on the draft Ground Rules.

Linda Shead voiced concern regarding observer comments during meetings. She stated that observers often have technical information that may be valuable for the stakeholders to hear. However, the dynamics of a discussion might be changed if observers (who may only have a passing interest) are allowed to comment as stakeholders do. She suggested that seating be arranged to separate stakeholders from observers. She also suggested that observer comments be allowed at particular points in a discussion rather than just at the end of the meeting when all discussions have concluded.

Linda Broach added that it might be best to adopt seating similar to that at the Patrick Bayou TMDL meetings but allow observers to speak during a discussion rather than at the end of a meeting.

Lial Tischler raised a concern regarding consensus, stating that it would be an impediment if at every meeting not enough members were present to make a consensus decision (similar to the situation at this meeting). **Tracy Hester** then suggested that absentees participate via e-mail or remotely.

Carl Masterson suggested that the group agree to reach consensus of the stakeholders present and send the decision to stakeholders who were not present when the decision was made. If the absent stakeholders have a problem with the decision, then changes can be made at the next meeting. If the absent stakeholders approve, then the decision stands. **Shead** added that absent members might have until the next meeting to voice concerns, but after that time, consensus is made and the point is gone (to preserve meeting and discussion dynamics).

Weeks then asked if the group would adopt the Ground Rules with the following changes:

- Observer comments will be allowed at particular points in a discussion rather than at the end of the meeting.
- If consensus cannot be reached due to absent members, then tentative adoption is made and a final decision is subject to approval at the next meeting.

Larry Koenig asked what if an immediate decision is needed? **Hester** suggested that a final decision be delayed until the next meeting if possible. However, if an immediate decision is needed then the group can decide on a shorter time period for approval by the absent stakeholders. This can be done on an as-needed basis. **Ed Matuszak** asked what kind of oversight decisions might this apply to? Can we make majority and supporting decisions? Will the group's decisions have that kind of impact?

Koenig replied that the TNRCC will decide what is submitted to the Environmental Protection Agency (EPA). Decisions made at the stakeholder level might affect the University of Houston's (UH) next phase of work for example. If there is a split in the group, then the TNRCC will decide what to adopt. Stakeholder consensus strengthens recommendations, but if there are no recommendations from the stakeholders, then the TNRCC will still move ahead. **Matuszak** stated that Koenig's response clarified his question – absolute recommendations may be needed from the stakeholders. **Weeks** added that the consensus issue could be addressed as time goes on. The Ground Rules will be word-smithed with the above changes incorporated. Stakeholders will have until the next meeting to voice concerns or the Ground Rules will be adopted.

Weeks then asked the group to review the meeting summary from May 3, 2000. She added that meeting summaries will be distributed prior to meetings and members are asked to review them before coming to the meeting. Meeting summaries are fairly detailed and there is a possibility that there may be mistakes. She asked for additions and/or corrections to May 3 summary.

Broach asked that her name be added to the list of May 3, 2000 meeting participants. There were no other corrections. **Weeks** then stated that the amended summary would be sent out along with a version of the May 3, 2000 meeting summary that shows TNRCC institutional changes that have been put into place since the May 2000 meeting.

3. **Koenig** then gave a brief update of TNRCC institutional changes (see flow chart handout). He stated that the flow chart reflects policy changes that have been put into place since summer 2000. Prior to that time the TMDL implementation plan was approved after the EPA approved the TMDL allocation. The EPA will now approve a load allocation without approving the implementation plan. The State of Texas will approve and implement an implementation plan without federal approval.

Regarding stakeholder panels and the TMDL process, it was initially thought that the TNRCC would adopt what the stakeholders decided. In actuality, the Commission will make a decision taking stakeholders' advisory recommendations into account. It will be the same with the implementation plan – it will be drafted by the Commission, keeping stakeholder recommendations in mind. Sometimes stakeholder groups do not reach consensus. The Commission must continue to make progress even if the stakeholders cannot reach consensus.

Koenig went on to say that stakeholder panels are advisory panels that make recommendations. The TNRCC will draft the actual TMDL document based on technical reports.

Weeks then stated that the stakeholders were brought on board to stay until an action plan is adopted. Has this changed or has it been addressed? **Koenig** replied that the TMDL process would eventually reach the public comment period. When it does, the role of the stakeholder panel does not end, but its role may be diluted. There are roles for the stakeholders and the public all the way through the process, but we are not yet sure how formal those roles will be. Additionally, we are still not sure how EPA approval will affect the whole process.

Shead then asked do the EPA's rules not suggest that an implementation plan not accompany the load allocation? **Brian Cain** responded that the rules do say that, but it does not go into effect until October 2001.

Hester then asked at what stage is the dioxin stakeholder group presently at on the flowchart – data collection? If so, what is the usual duration of data collection? **Koenig** replied, yes, this group is somewhere in that vicinity. Data collection may last anywhere from 3 years minimum to 8-10 years.

Todd Running then gave an update on Clean Rivers Program (CRP) activities. The Houston-Galveston Area Council (H-GAC) conducts the CRP for this area of the state. Dioxin is one of the projects that came up under the CRP work plan. The University of Houston, PBS&J and Parsons have been feeding the CRP historical dioxin data. The CRP decided that more data collection is needed prior to the beginning of the Phase II TMDL workplan.

\$80,000 was made available for this continued monitoring with 70% of the monitoring designated for fish tissue analysis and 30% of the monitoring for sediment analysis. The contract was awarded to PBS&J. 20 sites will be sampled for sediment, 19-20 sites will be sampled for hardhead catfish and blue crab tissue and 4 sites will be sampled for oyster tissue. The data and information collected under the contract will be made available to this stakeholder group. The final report should be completed by August 31, 2001.

Hester then asked if Todd could e-mail a map and information to the stakeholder group after the meeting.

Bob Wood asked, regarding the contract, what list of congeners is being looked at and how did you decide which organisms to test? **Dr. Yu-Chun Su** (PBS&J) replied that the analysis is being done per a subcontract with Wright State University. He must check on

the list of congeners, he did not have that information available, but he was sure there were no PCBs on the list. **Running** added that the organisms chosen for tissue analysis were chosen based on those specified by the 303(d) list as suggested by the Texas Department of Health (TDH).

Wood then stated that Donohue Industries analyzed tissue from other species including flounder and croaker. Is there any reason why other species were not included in the study? **Running** replied that a segment cannot be removed from the 303(d) list unless the original listed species are tested and studied.

Ralph Calvino added that catchability is a factor – some species are not easily captured. **Lial Tischler** stated that 2 bottom-feeding and 1 water column species were originally included in the Donohue studies. **Randy Palachek** (Parsons) stated that catchability, trophic level and advisory listings are all factors that determine what species are analyzed.

BREAK

4. A presentation on technical findings to date was then given by **Dr. Hanadi Rifai**, an Associate Professor with the University of Houston's Department of Civil and Environmental Engineering. Dr. Rifai introduced her assistant, Monica Suarez. She also introduced the subcontractors who were present at the meeting: Randy Palachek with Parsons and Dr. Yu-Chun Su (attending for Paul Jensen) with PBS&J.

Dr. Rifai stated that she would be presenting a summary of the Phase I work completed over the past six months since summer 2000. Two quarterly reports have been submitted to the TNRCC (a lay language summary available at this meeting with the full document available on the H-GAC website in the near future). Slides of this presentation will be made electronically available via the EIH and/or H-GAC websites soon. The maps are in draft form and are subject to change.

She began her presentation by defining the term, TMDL, and stating that dioxin is the pollutant of concern for this particular project. TMDL allocation components get us from the target to the load allocation by: 1) identifying the problem, 2) identifying the water quality target, 3) evaluating watershed and water quality conditions, 4) assessing pollutant sources using theoretical models and 5) allocating pollutant loads.

The TMDL implementation plan is an extensive part of the process and includes: 1) description of pollution control actions, 2) development of a schedule for implementation of pollution control actions, 3) assurances of load allocation goal achievement, 4) determination of legal authority as some issues may not fall under the state umbrella, 5) formulation of a follow-up plan and 6) definition of measurable outcomes to evaluate plan implementation.

Dr. Rifai defined the 303(d) list and stated that the list had previously been updated biannually. It is unclear as to when the lists will be updated next. She then went over the TDH Seafood Advisory for the segments included in this TMDL and stated that this seafood advisory prompted the placement of these segments on the 303(d) list.

Major tasks for Phase I of the project include the: 1) assessment of current levels and trends in the project area (completed – assessed probably 99.99% of the available data),

2) assessment of major sources, transport and fate of dioxin the environment (in progress – the majority is completed), 3) participate in stakeholder involvement with the dioxin TMDL project by responding to the needs of the support team and stakeholders, 4) develop a work plan and cost estimates for Phase II (in progress – input of the stakeholders is critical).

Dr. Rifai then presented some background information on dioxin compounds and stated that of the 75 polychlorinated dibenzo-*p*-dioxins (PCDDs), 7 have dioxin-like toxicity. Of the 135 polychlorinated dibenzo-*p*-furans (PCDFs), 10 have dioxin-like toxicity. Of the 209 polychlorinated biphenyls (PCBs), 14 have dioxin-like toxicity yielding a total of 31 dioxin congeners with dioxin-like toxicity.

She stated that overall; dioxins have low solubilities and are persistent in the environment. Relatively speaking, PCBs have higher solubilities, higher volatilization and higher rates of mobilization than do PCDDs and PCDFs.

Acute exposure (short term) to dioxins above the Maximum Concentration Level (MCL) can lead to liver damage, weight loss, atrophy of the thymus gland and immune suppression. Chronic exposure (long term) to dioxins above the Maximum Concentration Level (MCL) can lead to reproductive effects including reduced fertility and birth defects. Dioxins are also potential carcinogens at this level of exposure. This information came from a 9-year EPA study available on the EPA website.

Because there are so many dioxin congeners, Toxicity Equivalency Factors (TEFs) are used to compare the toxicity of dioxin-like congeners with 2,3,7,8 TCDD (the most toxic of the dioxins). Three schemes are used for Toxic Equivalence (TEQ):

- I-TEQ = for dioxins and furans
- TEQ-WHO₉₄ = includes PCBs and is the Texas standard (used for effluent data in this project)
- TEQ-WHO₉₈ = a reevaluation of the 1994 standard (used in this project for tissue data)

MCLs as defined by the US EPA are:

- Drinking water = 3×10^{-8} mg/L (0.03 parts per trillion(ppt))
- Tissue = 0.7 ppt (risk level of 1×10^{-5}); this study is looking to see if the tissue data exceed 0.7 ppt
- Air = 0.1 ng I-TEQ/m³ in Europe (risk-based and site specific; no such standard used in the United States)

Major sources of dioxin include: 1) combustion sources, 2) metal smelting, refining and processing, 3) chemical manufacturing/processing of chlorinated compounds, 4) biological and photochemical processes and 5) reservoir sources (contamination occurred in the past, but still acts as a source of dioxin).

Dr. Rifai then gave an estimation of dioxin releases in the United States. Dioxin releases to the air are a major source as are releases to products (a primary source according to the 9-year EPA study). Total releases (to air, water, land and products) in the 1994 were more than 11 kg while total releases (to air, water, land and products) in the 1998 inventory equaled 28-kg. The amounts may seem small, but they are actually large when one considers them relative to the 0.7 ppt standard mentioned previously.

Pathways for dioxin entry into the food chain were then discussed. Dioxins can be introduced to the aquatic food chain via runoff, erosion and direct discharge. Bioaccumulation and bioconcentration does occur. They can be introduced to the terrestrial food chain via deposition onto terrestrial plants and crops.

Dioxins are transported among the media (air, water and soil) with fluxes occurring between media. The interactions are complex and not fully understood. Dioxin transport among media has not been studied in detail in the literature. The UH team completed an extensive literature review for this project. Transport mechanisms in air include stack emissions, atmospheric transport and atmospheric deposition (vapor/particle partitioning, dry deposition and wet deposition). Transport mechanisms in water include effluent discharge of dioxin, equilibrium partitioning with some of the pollutant becoming dissolved and some becoming attached to suspended solids. The dioxin can then impact fish and other species.

Dioxin can be transformed via several processes including: 1) photolysis (results in the shortest half-life, but rarely occurs as dioxins are not often exposed to light), 2) photooxidation, 3) hydrolysis and 4) biodegradation (results in a longer half-life, but is the most common transformation process).

Dr. Rifai then presented a map of the segments included in this TMDL. She stated that most of the data came from segments 1001, 1005, 1006 and 1007. Color maps are available for distribution.

The US EPA has published Standard Industrial Classification (SIC) code data. The UH team used these codes to query permit data for the Houston area. They then created a short list (the list may not be complete) of likely sources of dioxin in the Houston area. These sources include medical waste incineration, paper bleaching, PVC production, chlorinated solvent/pesticide/herbicide production, metals refining, oil refining, incinerators and municipal wastewater treatment plants.

A map was presented showing potential sources of dioxin to water in TNRCC Region 12. Of the segments listed for this TMDL, segment 1001 has 17 potential sources, segment 1005 has 12 potential sources, segment 1006 has 64 potential sources, segment 1007 has 30 potential sources, segment 2426 has 5 potential sources, segment 2427 has 14 potential sources, segment 2429 has 1 potential source, segment 2430 has 2 potential sources and segment 2436 has 2 potential sources.

A map of potential dioxin sources to air for TNRCC Region 12 was also presented. As seen on the map, a majority of those sources occur in southern Harris County along the Houston Ship channel.

Dr. Rifai presented a colored map of fish and sediment sampling locations in the Houston Ship Channel (the maps are available for distribution). There is not much sediment data in existence, therefore, H-GAC was asked to obtain a 2001 sediment data baseline. This led to the contract with PBS&J mentioned earlier in Todd Running's report.

Historical data for tissue samples in segment 1001 was presented. It should be noted that the data was not statistically analyzed because there was not a significant number of samples. Additionally, the data were collected by different people using varying

collection and quantification techniques. Looking at the data one might say many concentrations exceeded the 0.7 ppt standard. One might also infer that concentrations are greater upstream than they are downstream.

Mean TEQ-WHO₉₈ in segment 1005 (for the years 1989-1996) was presented. The sample number was too small for statistical analysis. Total TEQ-WHO₉₈ measurements in segment 1005 show no large change in upstream versus downstream concentrations (with the exception of blue crab samples). Mean TEQ-WHO₉₈ in segment 1006 showed that blue crab samples had a concentration of 15 ppt compared to concentrations of 2-9 ppt for fish species.

A review of tissue sample concentrations yielded no discernible trend due to a small number of data points. Data for tissue samples in segment 2426 showed that catfish tissues yielded a greater concentrations of dioxin than did tissue samples for red drum, flounder and black drum.

Historical data collected in Gulf Coast Waste Disposal Authority (GCWDA) and Donohue Industries studies were found to be the most consistent with regards to time and methodology. This data was, therefore, analyzed separately from the historical agency data. Additionally the GCWDA/Donohue data was normalized to percent lipids yielding slightly better information than the historical agency data. The data showed greater concentrations in catfish samples (approximately 15 ppt).

GCWDA collected hardhead catfish tissue samples at the Lynchberg ferry from 1992-1999. This data yielded concentrations greater than 10 ppt for every sample gathered. It is uncertain if the data are bimodal and significant.

Annual average TEQ-WHO₉₈ from GCWDA/Donohue tissue studies appear to yield bimodal peaks. More than 80% of tissue samples exceeded the standard.

Dioxin concentrations in sediment samples were presented. The data was collected in the main channel, the San Jacinto River and Patrick Bayou during the period 1993-1994. The data were not collected in relation to the Patrick bayou study currently underway. Patrick Bayou samples yielded higher concentrations than the other two sample locations. Concentrations appear to be decreasing in the direction of the Houston Ship Channel. **Broach** asked if there was a sediment screening level to compare this data. **Rifai** replied, no. Regarding sampling point 15b on the graph, **Koenig** asked if there was any explanation why there was such a high TEQ-WHO₉₈ and no TCDD. **Palacheck** replied that they have been unsure as to the actual location of the sampling site.

Rifai then presented a slide showing mean concentrations in effluent samples for Patrick Bayou. Concentrations were compared to the MCL of 0.03 ppt. **Tischler** stated that the comparison should not be made since the 0.03 ppt MCL standard is a drinking water standard and the effluent values did not come from drinking water sources. He stated that table 3 of the human health criteria may be a more applicable measure of comparison for this effluent data. **Rifai** agreed to look into it and make the appropriate changes to the graph.

A slide detailing dioxin concentrations in effluent samples (GCWDA/Donohue study) was presented. **Rifai** acknowledged that the graph shows an effort has been made to decrease dioxin effluent concentrations over time (1994-2000). **Tischler** stated that the

unit of measure for concentration should be parts per quadrillion rather than parts per trillion. He also stated that this was GCWDA data only, not Donohue data. He requested that Donohue's name be removed from the slide. **Rifai** replied that she was certain that the data are correct. She added that she would like to sit down with Donohue to over the data. **Palachek** added that the data came from the TNRCC database. **Tischler** stated that the concentrations were actually 1000 times lower than the graph implied. **Rifai** replied, no, the concentrations are higher by a factor of 1000 – this needs to be clarified.

Rifai then presented dioxin data reported to the TNRCC through permit applications and stated that the majority of permittees are reporting very small quantities. She then presented a summary of the presentation and conclusions.

Proposed activities for Phase II include:

- Analysis of data (tissue and sediment) collected by CRP to assess current level of contamination
- Additional tissue, effluent and sediment data collection (from H-GAC/PBS&J contract)
- Identify model(s) to be used for dioxin load allocation
- Evaluate additional sources (collect effluent or air data)
- Identify changes (if any) in TNRCC dioxin program management to facilitate TMDL implementation
- Participate in stakeholder involvement
- Identify facilities that may benefit from pollution prevention programs

Koenig asked if Rifai had seen any evidence of transport models in existence. **Rifai** replied no, they are still looking. Intermedia processes are complex. A suite of models may be required to look at the entire picture.

Dr. Chu stated that in addition to effluent and stack monitoring, nonpoint source (NPS) monitoring might need to be added to the work plan list. **Rifai** replied, yes, because of wet deposition, NPS runoff might need to be monitored. We might target a pilot study to determine if this is an issue.

Broach asked about the firmness of using the 0.7 ppt tissue standard as a target. **Palachek** replied that it depends on the risk level, fish consumption rate, lipid content of the fish and the bioaccumulation factor used.

Michael Collins (?) asked if the group should look at picking relative assumptions. **Palachek** asked based on TDH or TNRCC? **Collins** replied that is just it – how does it compare to the EPA assumptions for the October 2001 rule? **Koenig** stated that TNRCC standards have been back calculated from tissue standards. **Tischler** added that the evaluation of appropriate water standards is part of the TMDL process and it is complex. This must be dealt with between the TDH and the TNRCC. The appropriate bioaccumulation factor must be determined. It may not be the same number as used by the EPA or state. Fish tissue and sediment data are a starting point. **Palachek** replied that it might be a part of Phase II. **Tischler** replied that it has to be – the weakest and most important link is the sediment ? tissue link leading to bioaccumulation up the trophic levels. **Rifai** added that we might even see concentrations get smaller rather than larger. **Tischler** agreed.

Rifai stated that it was always assumed that the health based standard is the basis for the TMDL. **Tischler** agreed, but stated that the appropriate linkages between sediment and tissue must be established.

Shead added that the transport process for dioxin entering the sediment must also be established. On a different note she noticed a possible bias in the health-based standard. The standards appear to be based on male weight rather than on the weights of females and people of color (social groups who often eat more than the average number of fish upon which the standards are based).

Chuck Wempler asked if macroinvertebrates had been thought of for sampling, since they are a food source for fish. **Tischler** stated that data collection would most likely need to happen. The EPA described that methodology in their new report. **Rifai** stated that methodology is what they intended to use. **Tischler** added that the EPA used a lot of Great Lakes data in that report. He said that it might help to summarize some of that information for this group. **Koenig** asked, do you want some qualification or calculations? **Shead** replied no equations but that she would rather see some of the conceptions that go into the calculations.

Wood stated that looking at sediments is a Pandora's Box. There may be a need to place a perspective on the health standard.

Shead stated that in locations where dioxins are no longer discharged, there is evidence of improvement in water quality. Historical sources are not the only factor. Continuing sources must be addressed. **Rifai** replied, yes, that is why permit data is being used. **Collins (?)** stated that the question must be answered: if direct discharge is lowered, will it have a lowering effect on tissue concentrations?

Tischler asked if the reports could be placed on the web in .PDF format. He stated that the TNRCC data on effluents is flawed, please fix prior to web posting. **Rifai** added that they would like to get the data correct. Anyone finding inconsistencies in the report can e-mail Dr. Rifai at rifai@uh.edu. Please cc: Pris Weeks (weeks@cl.uh.edu) and Carl Masterson (carl.masterson@hgac.cog.tx.us). Monica Suarez's e-mail is msuarez2@jetson.uh.edu.

Luis Sueiro asked if Dr. Rifai was proposing that entities other than UH or TNRCC collect effluent data. **Rifai** answered yes, other people can offer to do it. The TNRCC can do it or they can contract out. The best solution would be for people to offer it. However, there is an extensive quality assurance process.

Tischler suggested that before any NPS data is collected, it would be best to run it by the stakeholders. **Koenig** agreed and added that the same should go for sediment and water data collection as well. **Tischler** added that a quality assurance plan should be attached to it.

5. **Weeks** then asked if there were activities other than the following that needed to be addressed: 1) Send out the report for comment and 2) get straight on units (ppt versus ppq). She added that a final Phase I meeting should probably be held prior to the submission of the next technical report. It might be best to look at the Phase II workplan internally and then have the stakeholders comment – possibly in early March.

Approved 3/1/2001

Koenig suggested that a small technical subgroup of the stakeholder panel be brought together to review the Phase II work plan, but invite the whole group to meet to go over it. The group decided that an afternoon meeting at UHCL would be acceptable to for such a meeting.

Meeting Adjourned

Note:

The draft UH technical reports are now available on the H-GAC website for stakeholder review at <http://www.hgac.cog.tx.us/resources/wq/dioxin/dioxin.html>