

Non-Structural BMP Workshop
January 26, 2006, 8:00-12:00am
Jefferson Room, PacWest Center

Attendees

Dave Kliewer, BES, Environmental Policy Division
Patrice Mango, BES, MS4 Section
Jim Middaugh, BES, Science Fish and Wildlife Division
Linda Dobson, BES, Sustainable Stormwater Program
Dawn Sanders, BES, Portland Harbor Superfund Program
Eugene Lampi, BES, Fanno/Tryon Watershed
Frank Wildensee, BES, MS4 Section
Atina Casas, BES, Investigations and Monitoring
Jane Kelly, BES Development Services
Gordon Feighner, BES, Business Services
Mike Rosen, Watershed Division
Chris Prescott, BES, Science Fish and Wildlife
Krista Reininga, URS Corporation
Dave Felstul, Herrera Environmental
Chip McConnaha, Jones and Stokes
Amber Clayton, BES, MS4 Section - recorder

Introductions, logistics, ground rules – Dave Kliewer

People in attendance introduced themselves. Dave K. announced meeting logistics and general ground rules for the meeting. Ground rules included: everyone has an equal say, everyone is responsible for contributing, respect, that there are no bad ideas, try to be concise (share time), encourage others, and to help Dave with the overall process.

Meeting purpose and desired outcome – Dave Kliewer

Dave K. provided the meeting purpose: to facilitate expert discussion, provide a common Best Management Practice (BMP) foundation, to fill in BMP effectiveness information gaps, to confirm and document current information, and to document and qualify decisions made. This is not a meeting to decide BMP interactions (i.e. BMPs in series) or to develop BMP alternatives.

Dave K. said the desired outcome this meeting process would be a complete list of all BMPs, including effectiveness ranges, default effectiveness values, any qualifiers for that data, and confidence levels; and information needed to document the decision-making process and the data used for each range/value. Several meetings might be required to achieve that outcome.

Schedule needs and deadlines – Patrice Mango

The City's municipal stormwater permit (NPDES MS4) requires the city to set "benchmarks" for EPA-approved TMDL parameters. The benchmarks are expressed as an overall effectiveness of the Stormwater Management Plan (SWMP) in terms of potential future pollutant load reduction. It's not a numeric effluent limit, so we aren't

out of compliance if we don't meet the benchmarks, but we will need to show ongoing adaptive management to continue progress towards meeting the benchmarks. We have done significant modeling on the structural BMPs, but we all recognize the importance of nonstructural BMPs such as public education, operations and maintenance and erosion control practices. May 1st is the deadline for submitting the revised SWMP (including benchmarks) to DEQ; this also includes putting the SWMP out for a 30-day public comment period. The public comment period is currently scheduled for February 21st through March 23rd. We won't be done with the non-structural BMP process by the public comment period, so we'll caveat the existing benchmark approach, acknowledging that it only includes structural BMPs and note that we'll continue to work on non-structural BMPs. In September 2008, we have another permit submittal (permit renewal application) in which we assess how we did in meeting benchmarks and what we will do to address deficiencies (if any).

In addition, there are currently two legal challenges pending: a Land Use Board of Appeals case and a 9th Circuit Court case, both of which are asking for numeric effluent limits (end of pipe standards) for municipal stormwater outfalls. Chris asked if the petitioners in the court cases were asking for a concentration based numeric limit or an ultimate load. Patrice replied that the UIC permit had complicated that question in requiring stormwater to meet drinking water standards prior to entering the sump. On a street, stormwater might be required to meet two different standards. By setting numeric standards for stormwater discharges to groundwater, that might create a similar expectation to discharge to surface water. Dawn added that for the Portland Harbor Superfund Program, DEQ is using drinking water and human consumption standards as screening levels.

Uses for the BMP information – Dave Kliever

Dave K. said that it is important to quantify BMP effectiveness to evaluate actions from both a municipal stormwater program and watershed management perspective. Eugene added that it was also important for TMDL implementation – the municipal stormwater piece is a small portion of the overall allocation. Dawn added that this will also help the Superfund Program – EPA indicated they might want to try a TMDL approach for the Portland Harbor.

Stormwater and BMP background – Dave Kliever

Dave referred to Frank's work to characterize pollutants in stormwater (see Pollutants of Concern handout). The pollutants have been grouped into categories of sediment, field, metals, nutrients, organics and other. Frank added that this list didn't include pollutants of concern from the Superfund perspective. Dawn replied that the list of pollutants of concern hasn't been finalized by EPA, but would look at the list to see if any could be added.

Jane asked if it would be meaningful to identify sources of these pollutants. Frank replied that there was a column that included some generalized sources, but some of these pollutants have multiple and varied sources. Dave K. added that a 1991 EPA report provided some information on stormwater pollutant sources. Jane referenced work done

by the San Francisco region EPA that identified large parking lots as a major contributor of pollutants. Chris added that source identification might be more effective when we discuss where to locate specific BMPs. Dave F. added that many of the metals are also naturally occurring.

Dave K. grouped mechanisms of stormwater management (see BMP Stormwater Management Mechanisms handout) by water quality, water quantity and habitat. All of these have complex interactions.

Dave K. provided a list of BMP restrictions (see BMP Use Limiting Factors handout); not all BMPs can be used in all circumstances. Linda added that these are usually site specific, and not general restrictions. Jane recommended adding public utilities, street trees, public access and safety to the limiting factors. Krista recommended adding life cycle costs as a factor. Eugene recommended adding public understanding, which is related to public education and awareness, but could hinder implementation of specific BMPs if not understood. Chris suggested that the attractive nuisance risk also apply to fish and wildlife.

Dave provided a summary of potential BMPs, both structural and nonstructural (see Potential BMPs handout). Each BMP was given a relative benefit (high/med/low) to environmental conditions (water quality, water quantity and habitat) and a relative cost (high/med/low) per volume managed. Each BMP was listed with the types of management mechanisms supported. Dave based this chart on his own professional experience. Linda requested some time to provide feedback on the handout – her group has some monitoring data that might be useful. She had some specific questions about some of the BMP groupings and suggested that anything with vegetation get at least a medium for habitat benefits. Frank replied that stormwater planter boxes were generalized as filters because of the ACWA Rangers¹ work to summarize existing published data. Dave F. thought wet ponds were better than dry ponds at habitat values and also water quality. Frank suggested another metric of cost per pound of pollutant removed, but Dave K. replied that for the non-structural BMPs this would be very difficult to measure. Other BMPs may belong on this list.

Dave provided a hierarchy for decision-making (see Making Decisions in the Workshop handout). One of the comments provided by the Stormwater Advisory Committee during the benchmarking process is that they wanted to see justifiable data, not just best professional judgment – there is general nervousness in going beyond published statistical data, but we might need to in this circumstance. Krista asked if a possible outcome of the workshop was that the group still didn't feel comfortable making those estimations without more data? She suggested that if the goal of the BMP data is for selecting BMPs for watershed planning, she felt comfortable ranking BMPs against one another. If the goal of the BMP data is to come up with specific loads estimates, she was not as comfortable. Dave replied that he felt that there was still enough information

¹ The Stormwater and Water Quality subcommittees of the Oregon Association for Clean Water Agencies (ACWA) (the Rangers) worked to provide a common set of structural BMP data for meeting MS4 permit requirements amongst Phase I jurisdictions.

available on which to base some decision-making, documenting that process and providing qualifiers or conditions where necessary. Eugene added that both regulatory and watershed management processes are adaptively managed, which allows for change when better information becomes available, although with regulatory management there are more compliance concerns.

These are also matters of geography and scale. Some concerns are site or region specific while others are from a broader perspective. Concerns about variability change with the scale of the assumptions. Providing for low and high values with qualifiers and conditions will produce a range of effectiveness for BMPs.

Available BMP information – Mark Liebe

Mark walked through the current benchmarking approach for the MS4 permit (see “Structural” BMPs In the MS4 Context handout). All of this information has been presented in some form to the Stormwater Advisory Committee. This work has highlighted the importance of BMP performance (alone and in series) and the high variability of the data. This work builds on the database provided by the ACWA Rangers, which was more constrained to statistically valid data. The MS4 benchmarking ended up using a tiered BMP approach based on available data on general BMP types. Some BMP data showed a reduction in effluent concentrations while others showed a percent reduction. Flow removal BMPs usually showed a percent removal based on the pollutants removed with that flow. Similar decisions will probably need to be made with nonstructural BMPs (percent removal vs. effluent concentrations).

The URS 303(d) report and the Benchmark Report – Krista Reininga

Krista summarized other aspects of the benchmarking process (see URS – Handouts for BMP Effectiveness Workshop handout), including the two permit required documents: a benchmark methodology and a 303(d) evaluation.

Review Felstul Report – Dave Felstul

Dave Felstul summarized his work (see Technical Memorandum: Non-Structural Stormwater BMP Assessment and Appendix A: Output from Non-Structural Spreadsheet Model handouts). He looked at work done by the Center for Watershed Protection (CWP), especially their Watershed Treatment Model (WTM). He looked to see if the model could be applied to Portland and concluded that the WTM is adaptable and could be used. It recommends developing a separate model for each basin in the City, but since the GRID model has already done that, you could take some concepts of the WTM model and apply it to the GRID model. The WTM provided for variability of data and practices under a “discount” concept. The WTM model did not address all of the pollutants of concern or BMP effectiveness over time. For example, if you take full credit for structural BMP activities, there would be no need for O&M activities; but if you assume some decrease in effectiveness in structural BMPs over time, you can take credit for O&M activities since they help retain effectiveness of those structural BMPs.

Many of these nonstructural BMPs might be measured in percent removal. Nonstructural BMPs include source control, where structural BMPs are mostly treatment. It’s very

difficult to get good data on the effectiveness of public education – people tend to answer surveys unrealistically. Mark Jockers at Clean Water Services has done several public involvement campaigns in which they measured feedback (i.e. 3000 flyers sent out and approximately 8% follow through via website visits or phone calls for more information). This doesn't necessarily mean that 8% actually implement, but it does show follow-through. Mike asked if there were better ways to design the survey to get more accurate information. He also asked about individuals that might be able to implement information without needing to follow up with a phone call and how those people might be counted. Dave F. replied that programs with more one-on-one effort (Master Gardener, etc) show a higher percentage of effectiveness, but those are usually very limited in scope and most public involvement efforts are flyers in utility bills and are very broad in scope and audience.

The pollutant load reduction calculations were grouped by general land use over a five-year period. Chris asked why downspout disconnection was considered a nonstructural BMP; he would consider it a structural BMP. Dave F. replied that this was trying to measure the general outreach and education program, not the structural impacts. Krista asked if the load reduction estimates from each of the nonstructural BMPs were added for a total load reduction estimate. Dave F. replied that since many of the nonstructural BMPs were independent (i.e. pet waste programs have little impact on lawn care practices) they could be treated as additive.

There was more available data in transportation related BMPs because they tended to have structural components. Dawn Hottenroth worked with the Bureau of Maintenance to get general data. Individually a catch basin, or inlet, might not have that much of an impact, but given the number of catch basins in the city, cumulatively it would make a difference. Similarly, it would take a huge increase in O&M activities to see a large increase in effectiveness. Krista asked if the base loads that were being used to develop load reductions were comparable to loads that we're seeing in the field. Dave F. replied that the baseline data was from the WTM and could be modified if more local data is available, but in a lot of areas, data isn't available. Krista replied that the baseline loads from the model should be compared to the existing benchmarking work to see if the baselines are comparable. If the benchmarking baseline is lower, then the load that is subtracted should also be adjusted downward. Mark added that the GRID model has a spatial component (where the BMPs are applied) and a temporal component (when the BMPs are applied); you need to start with a general accounting to compare relative reductions. Dave F. said that geography and regionality does matter. He did not carry forward some of the data referenced in the WTM model because the data was not robust enough. Adaptive management process does allow for improvement and modification, but you need a well-structured process that can be modified to determine pollutant load reductions.

Krista said that the additive process doesn't work for transportation related nonstructural BMPs, such as street sweeping and catch basin cleaning, because those are impacted by adjacent land uses. For example, if applying residential BMPs, street sweeping would not be as effective because the processes are not completely independent since that some

of the pollutant load to the street comes from adjacent properties; a percentage removal might be more realistic. Dave F. replied that the interactions are complex; there could be a discount factor for adjacent land use. Mark added that you could include a maintenance frequency based on street classification.

Eugene agreed with Dave's approach, but it doesn't give credit for load reductions prior to structural BMPs. There seems to be no benefit for nonstructural BMPs "upstream" of structural BMPs. Dave F. added that taking an effluent concentration approach reduces the need for nonstructural BMPs. Right now, structural BMPs cover a small percentage of the MS4 drainage of some watersheds. Jim added that there were connections to TMDL implementation for this work. Frank added that the effluent concentration approach could be limited to structural BMPs. Dave K. added that if the influent concentration is impacted by nonstructural BMPs, you could reduce the effluent concentration. Dave F. recommended only using percentage removal to be consistent throughout; it can get complicated when you start mixing effluent concentration and percent removal. Mark added that there are areas where he could couple the WTM concept with the GRID model.

Estimate BMP effectiveness – Dave Kliever

Dave K. suggested some simplification in order to compare like things; for example, if you're addressing one metal through BMPs, you're probably addressing other metals. Dave K. grouped the BMPs into structural and nonstructural (see Structural BMP Effectiveness Table and Non-Structural BMP Effectiveness Table handouts). Linda asked if the categories and generalizations were up for discussion; she was concerned with vegetated systems lumped in with non-vegetated systems. Dave F. replied that if you break the BMPs down by their management mechanisms, some vegetated and nonvegetated systems might have similar mechanisms for reducing pollutants. Frank added that availability and similarity of data led to some of the grouping during the ACWA Ranger process. If there was good local data, they overrode the national data. Linda added that she might have some data that could supplement this work.

Dawn asked if there was the possibility to adjust this during the permit period. Dave K. replied that the permit does allow for an adaptive management process through annual compliance reports and again in the permit renewal submittals.

Mark added that the unit of lbs/year might be difficult to model. Dave F. replied that some of the data available for nonstructural BMPs was available as a total lbs/year, but it would also have a spatial component. He also tried to consider how people would actually report program data.

Dave K. said that the group needs to determine the conditions favoring low and high values. Dawn added that many of the 303(d) parameters were listed under the structural BMPs but not the nonstructural. Dave K asked if they could use a generalized TSS process and if they could rely on TSS to carry those values? Dave F. added that he looked at established data to develop relationships for TSS surrogates.

Dawn said that some of this data could be collected by existing programs.

Dave K. said that there were still significant gaps on both lists of BMPs (structural and non-structural). He was open for suggestions for prioritization. Eugene suggested that given the MS4 deadlines to focus on TMDL parameters. Dawn said that they should be able to take credit for the resources used for individual site load reductions in the Portland Harbor. Dave K. suggested looking at public involvement and education as a multiplier effect on other BMPs (such as making other BMPs more effective). There might be small individual impact, but citywide, it could be significant. Specific outreach activities would have additive effects, but general campaigns would have a multiplier effect. Eugene replied that the overall number (only a 1% increase) seems low. Dave F. replied that awareness does not always indicate a change in behavior. Dave K. added that this multiplier refers to more generalized campaigns, as opposed to specific outreach on a specific topic which would still be individual. Chris added that education is also difficult because it's such a long-term investment. Frank said that applying a multiplier to a structural BMP didn't make any sense since we've already applied a concise confidence interval. Dave K. replied that that might be included as part of the discussion on how BMPs work in series. Dave F. said that the multiplier effect might work better with nonstructural BMPs than structural. Dawn also mentioned that we know education programs are valuable and necessary and showing an effect that is so low could convey the wrong message. It could also imply that we are inappropriately allocating resources among BMPs.

Jim suggested including greenstreets and revegetation programs in the priority for more specific discussion since they are important in moving towards a watershed approach. Dave F. suggested sediment manholes since they provide upstream treatment to structural BMPs. Frank added that the city does have values for that BMP, but they weren't used by the ACWA Rangers. That is also more specific to the UIC program; the data is also variable on their effectiveness. Patrice would like to see a parameter based focus and a TMDL approach. She suggested erosion control because it targets TSS. Dave K. added that DEQ relies heavily on TSS as a surrogate. Frank added that TSS was used as a surrogate in the MS4 benchmarking process for the Columbia Slough TMDL parameters PCBs, dioxin, dieldrin, and DDT/DDE based on its use in the 1200-COLS permit.

Eugene suggested private site management, such as catch basin cleaning or parking lot management.

Next Steps – Dave Klierer

Dave suggested a smaller subgroup work on proposals for the next meeting from the above priority suggestions. If anyone has additional BMPs or parameters to consider, please get those to Dave K. Frank said that he would double check the effectiveness ranges on the structural BMPs in Dave's tables for errors. Jim suggested working on the high/low value conditions; the default values might vary by location. The subgroup volunteers were Dave Klierer, Frank Wildensee, Eugene Lampi, Patrice Mango, and Tim Kurtz (volunteered by Linda Dobson).

The next meeting will be February 6th, from 1-5pm in the Ponderosa Pine Room. [Dave Kliewer might postpone this date given progress by the subgroup on developing proposals and intermediate work products]

Non-Structural BMP workshop (Part II)
March 7, 2006, 8:30 – 11:30 a.m.
Ponderosa Room, Portland Building, 10th Floor

Attendees:

Dave Kliewer, BES, Environmental Policy Division
Dawn Sanders, BES, Portland Harbor Superfund Program
Jim Middaugh, BES, Science Fish and Wildlife Division
Mark Liebe, BES, Technical Services Section
Chris Prescott, BES, Science Fish and Wildlife
Tim Kurtz, BES, Willamette Watershed
Frank Wildensee, BES, MS4 Section
Eugene Lampi, BES, Fanno/Tryon Watershed
Chip McConnaha, Jones and Stokes
Dave Felstul, Herrera Environmental
Krista Reininga, URS Corporation
Amber Clayton, BES, MS4 Section – recorder

Meeting agenda, meeting purpose and desired outcome, January workshop recap, subgroup summary – Dave Kliewer

Dave K. presented the meeting agenda and the purpose of today's meeting: to address discussion items from the revised BMP effectiveness tables for structural and non-structural BMPs. Dave K. summarized the January 26th meeting and the materials presented there. After that meeting, a subgroup met to further complete the BMP effectiveness tables for structural and nonstructural BMPs

Review of distributed materials – Dave Kliewer

Much of the data in the structural BMP table originated from the work done through the ACWA Rangers; some data have been modified by BES staff to closer fit BES data. The BMPs are categorized by BMP type (which aligns the process with the GRID Model). It will be possible to reclassify the information by contaminant or pollutants of concerns. There are concerns about choosing an effluent concentration approach because it is difficult to express effectiveness of most non-structural BMPs with effluent concentration. Mark said that the GRID model can track multiple BMPs per grid cell – it chooses the BMP with the lowest effluent concentration for the constituent of concern (i.e. if there are three BMPs present in the cell, GRID would choose the most restrictive BMP for each pollutant of concern, such as TSS or toxics). Frank said that GRID does not account for improved performance of overlapping BMPs or BMPs in series (one BMP may help another work better, but the relationship is not linear; concerns about double-counting). To account for this synergistic effect of BMPs in series, we could potentially use the high end of the effectiveness range (lower end of the effluent concentration). Mark said that the GRID model does not currently predict or help optimize BMP choices but could be used for such a purpose in the future.

Dawn asked how the group would deal with TMDL listed organics. Frank replied that they were going to use TSS as a surrogate.

Dave Kliewer said in-stream or habitat BMPs were not included because those go beyond source and structural controls to actually predict in-stream conditions. Those factors are being considered part of the next steps by Jim Middaugh's team.

Chip asked about the accuracy of the temperature values listed under the zoning and buffer protection BMP types listed with the institutional/code modifications on the nonstructural BMP effectiveness table. Dave K. replied that Frank had looked at the TMDL documentation on temperature and shading and used best professional judgment. The default values on the table are Frank's, and the conditional values are Dave Kliewer's. Chip asked if more modeling or monitoring could be done. Jim said that they had used the Heat Source model on the Freeway Lands Company, but the results were highly variable. Chris said that the riparian and in-stream BMPs had the challenge of trying to predict in-stream behavior.

Dawn pointed out that the Willamette River should not be listed on the temperature nonstructural BMP – the size (large) and orientation (north/south) of the Willamette meant that the water body would not see that kind of improvement and shouldn't be compared to the Slough (smaller and east/west orientation). Frank agreed that the table needed to be refined. Chris asked if there was a temperature model for the Slough. Frank said that he had referenced the TMDL for the Slough.

Dave Kliewer explained the last two columns on the structural BMP effectiveness table. Some of the BMPs are reported as percent removal, some are reported as effluent reduction. The columns are the conditions needed and a conversion method for moving between the two.

Dawn asked if lumping streets and highways on the land use table was appropriate. Frank replied that the UIC program would be looking at roadway classification and traffic volume in their monitoring. Dawn suggested being more specific in the land use data. Frank said that there probably is existing data and there will be more soon to segregate it out further.

Items for discussion – Dave Kliewer

Dave Kliewer led the group through each of the discussion items on the agenda.

Dave Kliewer discussed the "certainty" column. Percentage ranges were assigned to values of H (75-100%), M (25-74%), and L (5-24%) to reflect the amount of certainty assigned to individual BMP effectiveness. Given the high level of variability, do any of the BMP's deserve an "H"? Dave Felstul said that they had also looked at the regionality of the existing data and that they would tend to give more certainty to information from the Northwest. Most of the BMPs that had warranted a "H" were those that reduced quantity of runoff, such as downspout disconnections. Chip asked if there was any plan or process to deal with the prevalence of "L" values. Jim asked if there could be a discount rate applied to reflect that low certainty. Krista said that the ASCE database, which was used by the ACWA Rangers to supply the initial structural BMP effectiveness, was a national dataset and perhaps they should look at the robustness of the data. Dave Felstul said that for the Seattle Public Utility street sweeping study, they ended up limiting the existing monitoring data down to the neighborhood level to reduce the variability. Chris said that using a national database has a wider range of variability because of the geographic spread. Krista compared the difference to that between master

planning and site planning. Chip suggested looking at the theoretical basis and the local application of the data. Frank said that where possible greater weight was given to local data especially where the national data had obvious problems (e.g. dissolved and total metals).

Dawn asked about documentation of the decision-making process. Frank said that he had documented the decisions he made. Tim said that there was a concern that if a BMP had low certainty, it wouldn't be used. Dawn said that certainty could be assigned for more than one reason.

Dave Kliewer discussed the public education multiplier. He explained the reasoning behind the small multiplier: public education doesn't act independently; it can boost the value of other BMPs. Jim suggested that effective public education might mean that you need fewer structural BMPs. Frank suggested an alternative approach of applying a multiplier to the land use runoff concentrations in areas where no structural BMPs are present. Krista asked if that would alter baseline data; if public education was being applied when the land use monitoring data was collected. Jim suggested a hybrid approach of the two. Dawn agreed, saying that the outreach done as part of the industrial stormwater program makes a huge difference, and there's currently no way to measure those prevention efforts. Jim said that there is a need by management to show the impact of nonstructural BMPs. Eugene said that the effect of nonstructural BMPs needs to be shown, even if there is low individual impact.

Dave Kliewer asked about resolving the contradictory usage of different effectiveness measures – percent removal, total pounds removed, effluent concentrations, and the per unit removals. Eugene said that it would depend on the scale of the site specific planning and that there are concerns about liability in applying specific numbers. It would probably be most useful to summarize percent removals by category or types of BMPs. For more specific benchmark applications and site planning, it might be appropriate to use more specific data. Dave Kliewer said that the data would be available for project specific design and that the final report recommendations would include a summary for planning level analysis.

Eugene suggested focusing on a few of the major constituents, such as TSS, to see if some agreement can be found. TSS is tied to many of the metals and is used as a surrogate for many of the other constituents. Appropriate surrogate parameters were discussed and chosen for the final report.

Jim asked about temperature modeling for stormwater. Frank replied that stormwater isn't specified in the TMDLs as causing temperature problems.

Dave Kliewer asked if the default values for prevention and treatment were appropriate. For prevention, the default is the status quo. Dawn said the default values for street sweeping might be assuming a higher level of activity than actually occurs. Jim said that the street maintenance information was based on submittals to NOAA. Krista asked about assumptions on types of sweepers and areas swept. Dave Felstul said that they assumed that the sweepers used were the low efficiency sweepers available in Portland. Dave Kliewer said that this default might change as budgets change.

Chip said that the “low” and “high” effectiveness mean different things in the structural and nonstructural BMP tables. There could also be a difference between effectiveness and intensity – something could be highly effective, but not applied very frequently. There are also concerns about timing of activities and seasonal storms – if the first fall storms are seen to have higher pollutant loading, some activities should be done more frequently in late summer to lessen that pollutant loading. Jim said the notion of intensity could help define the ranges of effectiveness. Dave Felstul said that the underlying nonstructural worksheet includes frequency, which impacts overall effectiveness.

Dave Kliewer asked about the appropriateness of extrapolated values and best professional judgement. The riparian buffers are treated similar to stormwater filters. Chris said that they vegetated swales might be more realistic. Frank disagreed, saying that the riparian buffers don't act like linear conveyance systems. Chip said that it also depended on the nature of the vegetation. Dave Felstul said that Washington Department of Transportation was doing some studies of different highway filters that might be good to look at. Chip added that studies have shown that urban riparian buffers are less effective than non-urban buffers.

Dave Kliewer said that several categories in the nonstructural BMP effectiveness table were found to be too variable and episodic and were too unpredictable at this scale. They have highly localized impacts. Jim asked if there could be a land use based reduction possible. Chip asked if there could be a risk-based approach, such as industrial land on low laying riparian property. Mark said that spills could be predicted from a risk-based approach. Dave Felstul said that the existing land use runoff values would not incorporate spills and assume a “no-spill” situation. Dave Kliewer said that the pollution prevention activities assume no increase and there has to be program improvements to show actual decreases. Dave Felstul said that a total pounds reduction approach could summarize this kind of episodic events, but it wasn't good at averaging over a land use category. Jim said that it was important for the recommendations to not diminish the value of important and required programs.

Dave Kliewer summarized the uses of this data. Dawn asked what kind of data on TMDL parameters could be gathered from the Portland Harbor monitoring. They have lots of catch basin data at individual sites, but it shows a high variability.

Next steps – Dave Kliewer

Dave said that the draft report with recommendations would be available to the internal group within the next month and a half, following the process on the agenda. Krista said that with pending litigation, this approach should be legally reviewed prior to outside distribution.