

**EPA Region 10 Science Integration for Decision Making Fact-Finding Interviews
December 8, 2009
1200 6th Avenue, Seattle, Washington**

Five members of the SAB Committee on Science Integration for Decision Making conducted six interviews in EPA Region 10: Drs. Rogene Henderson, Wayne Landis, and Thomas Theis conducted the interviews in person and Drs. Penelope Fenner-Crisp and John Giesy participated by phone. For each interview, Dr. Vanessa Vu, Director of the SAB Staff Office, provided a brief introduction to the purpose of the interview and the Designated Federal Officer, Dr. Angela Nugent, took notes to develop a summary of the conversation. All interviewees were provided a copy of the committee's Preliminary Study Plan in advance.

Dr. Vu noted in each interview that the purpose of the interview was to help SAB Committee members learn about Region 10's current and recent experience with science integration supporting EPA decision making so that the SAB can develop advice to support and/or strengthen Agency science integration efforts. Dr. Vu thanked participants for taking time for the interviews and thanked Dr. Roseanne Lorenzana for serving as liaison with the SAB Staff Office in planning the interviews and Mr. Don Martin for serving as facilitator.

EPA Region 10 Scientist Participants (8:30-9:30 a.m. Session)

Mr. Don Martin, facilitator, ecologist, Office of Water and Watershed, Coeur d'Alene office

Ms. Allison Hiltner, Superfund Remedial Project Manager, Office of Environmental Cleanup

Mr. Bruce Duncan, ecological risk assessment, Office of Environmental Assessment

Dr. Dana Davoli, human health risk assessment, Office of Environmental Assessment

Ms. Denise Baker-Kircher, remedial project manager, Office of Environmental Cleanup

Mr. Larry Gadbois, Hanford project manager, Office of Environmental Cleanup

Ms. Sheila M. Eckman, Unit Manager, Office of Environmental Cleanup

SAB members began the discussion by asking Region 10 staff to identify their principal customers. One scientist working on Superfund issues identified the Department of Energy facility owner at Hanford as his principal customer because that organization must implement EPA's decisions. Interested stakeholders are the other major customer. Other scientists working on Superfund issues responded that EPA decision makers, specifically Superfund program managers, are the principal customers. Still others viewed the question more broadly; the "bugs and bunnies" and everyone affected by the contamination EPA is addressing are customers. In EPA's dredging program, which addresses disposal of dredged materials, the ports and entities responsible for dredging are major customers.

In response to an SAB question, scientists commented on collaboration with science partners in Canada. EPA scientists have collaborated on risk assessments and sit on technical workgroups on problems of interest to the Region and Canada. Some regional experts focus on transboundary issues.

Interviewees discussed the nature of policy and science interactions in the region. One interviewee noted that each site remediation project and each Project Manager is unique. Project managers can approach sites "how they wish, within frameworks and guidelines." There is no cookie-cutter approach to science integration. As a general rule, however, good interaction requires repeated, ongoing interactions between scientists and project managers.

Effective integration of science depends, in part, on the level of controversy associated with decisions. Science has been effectively integrated in dredging decisions where a decision has had a limited effect or is perceived as having limited effects. In contrast, work in Puget Sound on dioxins and furans sparked a debate over risk across the scientific community, within affected agencies, and in the regulated community. The policy debate overshadowed effective discussion of the science issues. When an outcome is potentially costly, science integration supporting policy can be difficult.

From one scientist's perspective, Region 10 integrates new science into decisions fairly effectively. Scientists can facilitate this process by getting involved early at the problem formulation stage, discussing risk assessment and risk management options from the start of a project.

Region 10 is unique because it interacts with more tribes than any other region (over 250 tribes) and tribal work underscores that all tribes are different. Tribes hold different opinions about how EPA should conduct risk assessments and take their culture into account. As a result, Region 10 scientists look at exposure routes (e.g., fish consumption) and ecological values that others regions don't address. The region often must address situations where tribes criticize EPA for not cleaning up sites to the extent the Tribes desire.

SAB members asked interviewees to comment on the source of the science used by the region. Scientists responded that the region has some "really good people who do science but not a lot of them." Regional scientists are primarily conduits for scientific information. They identify scientists outside the region who can provide needed information and "scrape up people who can oversee that science." Many interviewees agreed that "we're doing a lot of work without a lot of people" and voiced concern that the region will not have enough people and time to oversee all the science generated outside EPA.

ORD only provides limited science support for the region. Because ORD does not have enough scientists to devote to all the Superfund projects, Region 10 scientists reach out to other organizations. They often use science generated by the Army Corps of Engineers.

To maximize consistency in the use of science across sites, where Region 10 "can't be involved in ground-level analysis," regional scientists look for consistency in application of Superfund risk assessment guidelines and frameworks. Scientists appreciate consistency in toxicity data and use the Integrated Risk Information System (IRIS) database and other kinds of toxicity provided by ORD and program offices, following the hierarchy of data sources established by the Office of Solid Waste and Emergency Response. Regional scientists focus their attention on exposure analysis, reviewing, in many cases, exposure data provided by responsible parties. Regional scientists primarily focus on assuring a good sample design,

reviewing data, reviewing preliminary evaluations, and making decisions to acquire additional data. Integration of the final exposure information with hazard information and other needed science input for decisions, by contrast, is relatively easy.

For exposure analysis, the Superfund scientists use environmental fate and transport models appropriate for a specific site. Sometimes models are EPA models; sometimes models are available in the open literature; and sometimes they are run by contractors working for the Potentially Responsible Parties. Interviewees were not familiar with the modeling database managed by the Council for Regulatory Environmental Models.

The discussion then turned to uncertainty characterization in the science supporting clean-up decisions. EPA scientists must provide scientific information that "fits into a decision framework" and that focuses on effective decision making. Although EPA policy requires identification of a no observed effects level and lowest observable adverse effect level, scientists generally expect a clean-up value to lie between the no observable effect level and the lowest observable adverse effect level. Where there are uncertainties associated with detection levels, assessments should describe the key uncertainties. Sometimes EPA may be able to address uncertainties through monitoring requirements. At other times, addressing uncertainties will have to wait until science or policy evolves.

Although scientists acknowledged limitations in EPA's IRIS toxicity values, they welcomed a policy that required Regions to use those values, where available. Without those values, EPA regional scientists would face contentious issues over hazard, as well as challenges over exposure assessments particular to each clean-up site. EPA would face issues of fairness and consistency across sites. The Region does, however, consider special circumstances that would make use of IRIS values inappropriate. One example is exposure to PCBs and dioxin through mother's milk. Because IRIS does not contain short-term toxicity values, Region 10 used Minimal Risk Level values generated by the Agency for Toxic Substances and Disease Registry.

Two scientists commented on the potential use of biomarkers for exposure assessments. As a practical matter, they noted problems in identifying populations for biomarkers and problems interpreting biomarker data. The current state of the practice is to identify biomarkers linked to another endpoint routinely used for regulation, but few precedents exist. EPA does not have established policy on biomarkers. The National Oceanic and Atmospheric Administration (NOAA) advocates use of biomarkers, but EPA resists. EPA is not looking for the lowest possible response from an organism; EPA is not prepared to deal with that kind of information and instead seeks information that can be used as a basis for regulatory decisions.

SAB members asked scientists to comment on how they receive feedback on the science supporting Agency decisions, especially since much of the information is generated outside EPA. Interviewees responded "lots of people are watching us" and providing feedback. Tribes, states, Potentially responsible parties, technical advisory groups, communities, and other federal agencies provide feedback. EPA tries to provide open, transparent science. Scientists and non-scientists outside EPA question the science underlying EPA's decisions and EPA considers this feedback.

The session concluded with a discussion of impediments to the effective integration of science to support decision making. Scientists called for more resources to plan and conduct the science needed to support decision making. One scientist called for more internal checks on external science. Another scientist noted needs for improved hardware and software. In some cases, project managers are not equipped to run models developed by Potentially responsible parties.

Interviewees were asked to consider whether the region had a need for a more systematic approach to stakeholder interaction. One scientist responded that she makes a strong effort to bring tribes into human health risk assessment on tribal lands or on their usual and accustomed hunting and fishing areas. She involves tribes throughout the technical analysis and takes advantage of available funds for this purpose. Tribes sometimes challenge EPA to address cumulative risk and integrate tribal culture into EPA decisions. EPA does not have policy and guidance for this purpose and EPA staff "don't know how" to address these often-expressed needs.

Other interviewees acknowledged that EPA does not have a systematic framework for interacting with communities, but Region 10 tries to be transparent and scientists are experimenting with different models. For the Duwamish project, the project manager is sharing every draft of science assessments with a wide audience. Because "people see things really early...and some drafts are in process and not worth reviewing," she did not recommend this approach for all projects. Superfund has very limited requirements for public involvement. An interviewee noted that public involvement often strengthens Agency science because it helps raise important questions. Sometimes, however, the public has difficulty distinguishing between science and policy. EPA needs to "be vigilant" and keep science and policy distinct.

EPA Region 10 Scientist Participants (9:45-10:45 a.m. Session)

- Mr. Don Martin, facilitator, ecologist , Office of Water and Watershed, Coeur d'Alene office
- Mr. Ben Cope, modeling/environmental engineer, Office of Environmental Assessment
- Mr. Brian Nickel. Engineer-in-Training, water quality permit writer, Office of Water and Watersheds
- Ms. Carla Fisher, Corrective Action Project Manager/Permit Writer, Office of Air, Waste and Toxics
- Mr. David Bray, Special Assistant to the Director, Office of Air, Waste and Toxics
- Mr. David C. Croxton, Watershed Unit Manager, Office of Water and Watersheds
- Ms. Gretchen Hayslip, aquatic biologist/water quality monitoring, Office of Environmental Assessment
- Ms. Lisa Olson, National Pollutant Discharge Elimination System (NPDES) permit writer, Washington NPDES Oversight Coordinator, Office of Water and Watersheds
- Ms. Lynne McWhorter, Environmental Impact Statement review, Office of Ecosystems, Tribal and Public Affairs,
- Mr. Michael J. Szerlog, supervisory scientist, Office of Ecosystems, Tribal and Public Affairs

Regional scientists began the discussion by describing the kinds of decisions they are involved in and the sources of science input for those decisions. A water quality permit writer described her job as determining the amount of pollutant allowed to be discharged. The science she needs comes from the regulated entity, states, and tribes. She uses EPA's in-stream water quality criteria and narrative criteria for chemicals for which there are no formal quantitative water quality criteria. EPA generally receives stakeholder input when permits are offered for public comment. Stakeholder comment, especially comment from tribes and other who know waterbodies and fisheries well, can be quite helpful to EPA. If a permit is particularly complex, EPA might seek comment "up front" from interested parties. The National Marine Fisheries Service and Fish and Wildlife Service typically provide input, when there are Endangered Species Act concerns. In general, scientists agreed that EPA makes water quality decisions based on site-specific science primarily created by others and then monitors to check that requirements are met.

In the context of the waste program, project managers rely on the Region's Office of Environmental Assessment. Project managers also have ongoing discussions with the facility and the state and/or tribes and review risk assessments developed by the regulated facility. EPA takes public comment on proposed decisions and comments are often received on the science involved in a decision. There is no formal external peer review of site-specific science. Our peer review process sometimes includes the site-specific science, but it's not an external-EPA process.

For Environmental Impact Statements, regional scientists review predictions and analyses developed by other federal agencies. In cases where reviews involve highly technical issues, such as mining analyses, EPA sometimes contracts out the review.

A representative of the Region's Office of Environmental Assessment described how his office assists decision makers when an issue is complicated or controversial. His office builds water quality models to support major projects, as in the Snake or Klamath rivers. These water quality models receive independent peer review and funds are set aside for this purpose. Modeling experts often provide comment as part of the public comment process. He noted that he had not used the clearinghouse provided by EPA's Council on Regulatory Environmental Models (CREM). In general, the modeling community "gravitates" towards a few well accepted, well maintained models appropriate for application to particular water bodies. He has suggested that these models be added to the CREM list.

A regional scientist described the wide range of decisions made by the region's air program, which is drawn into decisions at the local, regional, and global scale. Many decisions have a scientific underpinning and involve analyses to predict the results of potential action on air pollution. The program principally uses "canned programs," i.e., established models and tools described in the Code of Federal Regulations. A key science issue involves the underlying data to be used in models. One current challenge involves a decision about permitting multiple exploratory drilling operations north of the Arctic Circle. EPA has no air quality models for over water north of the Arctic Circle and no meteorological data for the area in question. The decision to be made involves short-term deadlines, huge financial implications, a high level of community interest, with technical experts on every side. Although the air program is known as

a "data rich program," in this case, monitors are not in place where they are needed and decision makers are "torqued around the axle trying to make decisions with almost no science to deal with." The region would like to ask the regulated entity to provide more science, but the permittee "wants a permit as soon as they can with the lowest cost."

Other interviewees also discussed impediments to using the best science available. One engineer noted that the water quality program relies on available numeric criteria, but many criteria are over twenty years old and some are out of date. EPA is vulnerable to challenge where there are no quantitative criteria and EPA must interpret a narrative criterion (e.g., "no toxics in toxic amounts"). Another interviewee noted that self monitoring requires relying on the regulated entity to conduct water samples and interpret results. Some states have accreditation problems and some small dischargers, such as treatment plan operators may not be prepared or equipped to conduct sampling adequately.

Other interviewees noted that it would be helpful to improve public and stakeholder perception of scientific uncertainties. Another interviewee emphasized the importance of planning. If EPA were able to "get ahead of the curve and engage early enough to conscientiously design and conduct needed monitoring" to anticipate new permits, EPA could use that science for decision making and be better able to handle controversial issues. An interviewee also noted the importance of separating policy from science issues and communicating clearly the difference to the public.

In terms of resources, an interviewee noted the region's need for a geochemist and additional modelers. She also noted the particular time pressures of the NEPA program, which gives EPA 45 days to review an Environmental Impact Statement. With limited staff resources, she found it difficult to recognize science gaps in complex and varied statements.

Despite the barriers, interviewees communicated that "what's important is that we do the best science we can." In the case of the Arctic Circle air permit, for example, where needed data is missing, regional scientists are providing conservative estimates of the worst-case scenario. This analysis, which will likely impact permits for drilling, will constrain oil companies, and may motivate them to collect the needed empirical data..

The discussion concluded with a brief exchange on workforce issues. Interviewees noted that Region 10 generally supported training needs, but that there is a real need for regional scientists to get more advanced degrees. They expressed concern about increased "contracting out" regional science. There have been few recent hires, but when there is an opening, the regional carefully considers the expertise needed. In response to a question about social science, interviewees responded that the region would not generally expand into this area without an initiative and a "good regulatory framework" from Washington. Participants noted that many environmental decisions are made by states, which have "less science support than we do." Interviewees noted that interaction with universities in the region is generally *ad hoc*. The region generally interacts with local universities only if they already have research underway on a common problem.

Interviewees noted that their interactions with ORD are limited. The RCRA program, for example, does not have "a lot of money for ORD support" and generally gets more active support from the Corps of Engineers. The Superfund program benefits from a large budget supporting ORD scientists. Interviewees expressed frustration that ORD has focused in general on longer-term research and not on "real-world" development needs of the regions. Interviewees were not aware of ORD's Science to Achieve Results program or its grantees in the region.

Discussion with the Regional Economist, Mr. Elliott Rosenberg (11:00 - 11:20 a.m.)

In the brief discussion the regional economist noted that only Regions 5 and 10 had economists. In Region 10, he pursues two kinds of activities: financial analyses for enforcement and compliance decisions and economic analyses, primarily for NEPA reviews. He is currently developing BART guidance (Best Available Remediation Technology), in consultation with economists in OAR's Office of Air Quality Planning and Standards, to determine whether use of BART will interfere with a firm's viability.

He noted that it is difficult to be the sole economist in Region 10, because the region does not typically think to include him when economic issues arise since the focus is primarily on environmental science. He takes the initiative to pursue environmental economics issues in collaboration with other federal agencies, especially the Fish and Wildlife Service, U.S. Geological Service, and National Oceanic and Atmospheric Administration, which has a program that involves environmental economists and human dimension scientists in decisions. EPA has a different culture, almost a sense that "economics will spoil our good science." He noted that although "lot of economics isn't prescribed by policy at the regional level," good environmental management involves social science.

He noted that it would be valuable to integrate concepts of ecosystem services into the work of the region and involve social sciences and decision sciences into regional efforts in the Willamette Valley and Puget Sound.

EPA Region 10 Scientist Participants (12:45-1:45 pm Session)

Mr. Don Martin, facilitator, ecologist, Office of Water and Watershed, Coeur d'Alene office

Mr. John Palmer, Office of Water and Watershed

Mr. Bernie Zavala, Hydrogeologist, Office of Environmental Assessment

Ms. Carla Fromm, water quality, Idaho Operations Office

Ms. Erika Hoffman, Office of Ecosystems, Tribal and Public Affairs

Mr. Greg Kellogg, Alaska Operations Office

Mr. Leigh Woodruff, Idaho Operations Office

Dr. Tracie Nadeau, environmental scientist, Washington Operations Office, Office of Ecosystems, Tribal and Public Affairs

SAB members began the discussion by asking participants to describe what they do and where they get their science. A scientist working in the Superfund program described how the science he used was "home grown." For the sites he works on, he characterizes ground water flows, conducts an investigation, and presents managers with a conceptual site model of where

groundwater is flowing. He has developed relationships with ORD scientists in Ada, Oklahoma and Las Vegas and "reaches out to them" when he needs help. He also draws on a network of peer scientists working on Superfund issues through a national workgroup. He participates in EPA's Groundwater Forum, which includes hydrogeologists from all 10 regions, who meet together twice a year. In addition, he interacts with technical staff in EPA's Office of Water.

Another scientist described her work in an Operations Office. For National Pollutant Discharge Elimination System (NPDES) permits and for Environmental Impact Assessment reviews, she works with the Office of Environmental Impact Assessment. A current assessment involves impacts on endangered snails in the Snake River. For that review, the region conducted a literature survey of possible impacts. There is a limited data set and limited resources for the scientific review of a complex issue (i.e., the New Zealand mud snail is also pushing the endangered snail from its habitat). She voiced concern for the limited review possible for the region and acknowledged that the region was not equipped to conduct a cumulative ecological assessment.

Other scientists discussed reliance on science provided by permittees. One described working with the aquaculture industry, for example, to help identify limits for phosphorus.

An interviewee described how science issues can change in response to new legal interpretations. He described how a recent Supreme Court Decision had changed requirements for data showing a link to waters of the United States before Clean Water Act requirements apply. As a result, enforcement cases involve collection of large amounts of data to establish the jurisdiction of the Clean Water Act before case development. Regional scientists would prefer to focus time and resources on hydrology and vegetation impacts and lost ecosystem services.

One scientist in the water program discussed how the region needed information on mercury at several different scales to determine water quality impairments for writing permits. Local information on mercury levels in fish and water is needed. The region also needs science at a global level to understand mercury deposition originating from Asia and Europe. EPA must understand global mercury issues so that it doesn't "make the wrong decisions about regulating local emissions." For this issue, regional scientists get information from program offices, from the U.S. Geological Service, the "premier science agency working on mercury," and from the international scientific community. A representative from Region 10 attends international biennial scientific conferences on mercury,

Another scientist described working with EPA's Office of Water on approval of state water quality standards and NPDES permits. These permits generally involve scientific analysis of effects on endangered species and consultations on section 7 of the Endangered Species Act. Typically, there is never enough information to make decisions with confidence about endangered species. There are different sources of scientific analyses: Region 10's Office of Environmental Assessment, the Office of Water, the Fish and Wildlife Service, and NOAA. The Endangered Species Act and Clean Water Act deal with risk differently; EPA scientists look for consensus, where possible. They have sought out areas of agreement and have tried to codify them, providing a useful, common source of knowledge. One example is guidance developed with affected states and the Fish and Wildlife Service that codified knowledge about temperature

and salmon. In contrast, one area of major differences is metal impacts on fish. There is a wide range of science perspectives. Regional scientists focus on what can be done, despite the differences, to minimize impacts on the environment. Working with management, they try to negotiate an action that everyone can live with. In general, the Endangered Species Act requires that EPA focus more sharply on specific endpoints than water quality standards that more generally protect a designated use.

A regional scientist spoke of efforts to characterize uncertainties in developing water quality standards for toxics. He noted that when EPA develops a quantitative risk assessment, it is most comfortably protecting the median, more comfortable with central tendencies, rather than protecting one end of the spectrum.

A scientist offered a three-party typology for thinking about regional science. For the first category, she noted that analysts must consider the scale of questions being asked, i.e., whether they are for specific sites or whether they are national in scope. For low-profile Superfund sites, there is generally ample time and money to develop the science needed. For the second category, national decisions, there may also be time to develop the science needed. For the third category, site-specific decisions where EPA does not have the resources and times it might have for a Superfund site, EPA may use first principles, but people generally want site-specific information.

The interviewees then discussed their interactions with ORD and the use of ORD science for Region 10 decisions. An air program scientist spoke of the lack of funding in ORD for mercury research, which was, she said, a "serious problem for us." Region 10 has sought to undertake research on mercury methylation, but hasn't found a partner or funding through ORD for this potentially valuable research.

Another scientist spoke of her own "incredibly productive collaboration" with ORD's Corvallis laboratory over many years. She acknowledged, however, that it is difficult to get support or collaboration from ORD if regional needs are not included in ORD's five-year plan. In addition, ORD rewards its scientists for academic publications, not regional support. She noted that regions and programs must work diligently to explain the context for needed science; that effort can make productive collaborations possible. The difficulties involved in collaboration underscore the need for more scientists in region and program offices.

Another interviewee noted the cumbersome nature of ORD's multi-year planning process. He investigated significant time and effort in cross-regional efforts to communicate regional research needs for ground water programs. The process is beginning to show results, but the effort "moved very slowly."

Other scientists emphasized the needs to build relationships beyond EPA and to seek research support other than from ORD. She recommended that regional scientists should reach out to the Forest Service and other agencies, because other organizations have larger research budgets. It takes time, however, to build effective collaborations and individual regional staff may lack the time and resources to do so.

Participants then spoke about human resource needs for regional scientists. One interviewee spoke of difficulties planning for future science training, since programs can be whip-sawed by politics or Supreme Court decisions that can change the science needs for a program. Another scientist noted that technical staff stay abreast of developing science and "keep themselves aware and flexible based on their own individual personality." Another participant stated that he relies on information exchanged in EPA's national workgroups and that there were very limited training funds.

Several scientists observed that the region has "valued having in-house scientific expertise less and less." The region increasingly hires generalists. It increasingly has fewer program and national experts; lack of storm water expertise is an example. The region has increasingly contracted out science activities. Another scientist commented that time pressures prevent scientists from reading the latest journal articles, knowing who to contact for technical information, and even arranging for contract support.

EPA Executive Team Participants (2:00 - 3:30 p.m. Session)

Mr. Tim Hamlin, Associate Regional Administrator
Ms. Christine Psyk, Associate Director Office of Water & Watersheds
Mr. Richard (Rick) Albright, Director, Office of Air, Waste & Toxics
Ms. Ann Williamson, Associate Director, Office of Environmental Assessment
Ms. Lori Cohen, Acting Director, Office of Environmental Cleanup
Mr. Anthony (Tony) Barber, Director, EPA Oregon Operations Office (by phone)
Mr. Rick Parkin, Acting Director, Office of Ecosystems, Tribal and Public Affairs
Ms. Lauris Davies, Associate Director, Office of Compliance and Enforcement
Ms. Ann Prezyrna, Deputy Regional Counsel, Office of Regional Counsel
Ms. Marcia Combes, Director EPA Alaska Operations Office

The executive managers began by discussing how they make decisions and incorporate science. One manager noted that the Office of Environmental Assessment challenges programs to ask permittees for information needed for decisions. Decision makers need to manage information flowing from multiple sources, both inside and outside the regional office.

Another executive manager spoke of how science permeates everything the region does. In the case of a permit being reviewed for the North Slope, a permittee assembled data but lacked good meteorological data, which makes the permitting process much more challenging. The permit applicant modeled air quality impacts of the project, and a scientist in the region's Office of Environmental Assessment conducted an independent analysis as a check and ran different scenarios. Permit engineers review the permit application and prepare the permit and supporting documentation. Chemists in Region 10's Office of Environmental Assessment conduct quality assurance reviews of the applicant's sampling plan and negotiate needed revisions.

An executive manager in the Superfund program discussed how science underlies clean-up decisions. The region identifies key human health threats. The regional laboratory analyzes chemical warfare agents and works on advanced analytical methods. Superfund actions require consideration of risk and exposure pathways, long and short-term impacts within the framework of the nine Superfund criteria. Key questions are: what does science show about impacts and

what would be protective? The Superfund program requires a five-year follow-up on remedial actions, which necessitates evaluation of any new information.

An executive manager in the water program noted limited authority and funds for EPA to generate data for permits. Instead, permittees provide EPA with data and information to support permit decisions. She noted that EPA has guidance that helps regional staff evaluate the quality of science received from permittees. Guidance for Quality Assurance and Quality Control as well as peer review of reports and analyses help guarantee the quality of science. One obstacle was that sometimes the same data can be interpreted quite differently by different scientists. If there is great uncertainty, because data is limited, EPA tries to be conservative in its interpretation. "If there's more information, we could provide more flexibility." If a regulated entity understands that providing more information may provide them with more flexibility, they may provide additional information to build a more complete scientific picture of environmental impacts.

Executive managers spoke of the challenge in making decisions under uncertainty. For some "sticky issues," (e.g., PCBs, dioxins, and furans), EPA never has adequate science information to satisfy all parties, and must make decisions in the face of uncertainty. The region uses its limited internal resources "to cut down uncertainty," but a executive manager noted that the region is losing expertise and "actually are in dangerous situation." He noted that EPA used to do water and air monitoring, but that regional resources for ambient monitoring have been almost eliminated. Experts are retiring and some current reviewers don't have the needed level of experience. It is dangerous because EPA sometimes makes regulatory decisions on science provided from outside the region, without a basis for evaluation.

An SAB member asked whether regional managers had received training in making decisions in the face of uncertainty to promote more consistent decision making. Executive managers responded that they had not taken specific courses in that subject area. Many executive managers, however, have engineering training. Executive managers learn through the course of their career to use judgment to make good decisions. Decision makers must use judgment in the context of political pressure, drawing on support systems within the agency. Decision makers have different modes for building support for decisions. One manager related the example of regulating chlorine and dioxin discharge from paper mills. This was a difficult decision for Region 10 and required advance work with program offices to build consensus and support. Region 10 was the only region to issue a TMDL for dioxins and furans. Other regions addressed the issue facility-by-facility. EPA was not consistent across the nation, but Region 10 had strong support for its approach.

An executive manager observed that one set of unknowns involves the level of toxic substances in the ambient background. She asked how decision science would help, when EPA is not sure about the level of dioxin or lead in the background.

The executive managers discussed cumulative risk assessment as the "next big challenge." EPA does not have tools to conduct cumulative risk assessments. Superfund risk assessments focus on single contaminants. EPA does not address the total set of risks (e.g., food sources, multi-media sources at a site, and other life stresses) that may be of interest to a

community. One manager noted that Region 10 does consider whether a number of similar projects in an area are ongoing or proposed. It does consider whether a single permit should be looked at within the context of other particular projects in line to be permitted.

Another member observed that EPA scientists do indeed have tools for assessing cumulative risks, but EPA is not equipped to deal with the results. Region 10 risk assessors have looked at cumulative risk from various contaminants, life impacts, and multiple exposure, but the Superfund process is not designed to deal with these multiple analyses for cumulative risk.

The executive managers addressed planning for future human resource needs for regional scientists. One manager responded that Region 10 does succession planning. The region anticipates likely future retirements for key positions. For example, for a retiring, world-class water-quality modeler, the region filled behind him and allowed the new person to "team with him" to learn on the job. That kind of hiring is desirable, but not always possible.

The region has a small number of new positions to fill every year and considers each hire carefully in light of unmet needs across the region. Regional managers have also shifted personnel into new lines of work, although retraining individuals depends on the personality of the individual. The executive managers noted success in hiring qualified, civic-minded people in recent years.

The executive managers discussed innovative strategies to stimulate their workforce. They partner with the private sector, reach out to other federal agencies, and interact with universities.

An SAB member asked about how regions provide stakeholders with opportunities for input in science processes early in projects. Managers described several approaches. A dredging project in Puget Sound involving dioxin, for example, has a very active process for engaging stakeholders. There were six or seven meetings and technical workgroups before developing a framework and early dissemination of a draft framework, followed by multiple meetings. In this case, stakeholders have interpreted data differently from each other and EPA. It was frustrating because "advanced stakeholder input (is) giving ammunition to resist us."

Region 10 had a different experience in Oregon, where a stakeholder group voiced concern over a low fish consumption rate being used to determine a water quality standard. The stakeholder group was very sophisticated and worked with states and tribes, so that the state of Oregon adopted a higher fish consumption rate that would protect the tribes. Effectiveness of stakeholder processes depends on the knowledge and ability of the stakeholder to "stay at the table" and understand the legal process.

In the air program, EPA faces challenges from oil and gas companies seeking permits and native communities who are likely to fight permits affecting off-shore resources.

A manager capped off the conversation by reflecting that the region is driven to use science by the questions it has to answer, and not by the pursuit of knowledge in the holistic sense. The Region is focused on solving present issues, and not preventing future issues or

planning for how to address them. As a result, for example, the region does not develop or use science to address pharmaceuticals, flame retardants, or personal care products for which EPA has no guidance. He noted that science helps the region "answer questions others ask of us; it does not help us frame questions or actions to take." Other managers agreed that the region used science to solve problems and did not conduct research per se.

The meeting concluded with a discussion of two other topics: traditional environmental knowledge and economics. The executive managers noted that tribes ask the region to integrate tribal knowledge in decision making. In the NEPA and air programs, managers treat comments about tribal knowledge as one kind of stakeholder input that often influences the options chosen. A manager described Region 10's tribal council, which meets two times per year. It is difficult to factor traditional knowledge into EPA's decision process and systematically act on it. Managers talked about the possibility of drawing on anthropologists expert in indigenous knowledge systems. A manager noted that the Office of Pesticide Programs has developed the Tribal Lifeline Model that factors traditional and western knowledge together.

The executive managers briefly discussed the role of economics and economists in the regional programs. One manager noted that economics is important in decisions on regional haze decisions pertaining to best available retrofit technology and affordability. These analyses are complex and require attention from the regional economist, or two senior environmental employees, or a contractor. Other managers agreed that analyses of ability to pay are important for enforcement decisions. Cost can also be considered in the Wetlands 404 program, which calls for a determination of the least environmentally damaging practical solution. Cost can be considered.

Meeting with the Acting Regional Administrator (Ms. Michelle Pirzadeh) and Acting Deputy Regional Administrator (Mr. Daniel Opalski) (4:00 - 4:30 p.m)

The Acting Regional Administrator and Deputy were asked to assess the use of science in Region 10. The Acting Regional Administrator responded that different programs would provide different answers. Region 10 has recently tried to enhance the profile of science in the region through the regional science steering committee, chaired by the directors of the Office of Environmental Assessment and Alaska Operations Office. Region 10 is also in the process of completing accreditations of the regional laboratory.

The region is also trying to introduce new practices to highlight the importance of science. Decision makers now hear directly from science experts in the region before making a Superfund clean-up decision. The change ensures that information for decision makers is not funneled through the remedial project manager. The decision maker can also share how science is being used in deliberations, something important for interdisciplinary teams to understand.

Public comment plays an important role in Region 10. So many issues attract a diverse set of interested parties that "energetic debate" fills an important role when time doesn't allow for peer review. People come to public forums and expect to be listened to. There are 271 federally recognized tribes and native Alaskan villages. Some have sophisticated capabilities, as well as a well as dedication to communicating native knowledge.

In regard to relationships with ORD, the expectation is that staff have strong relationships with ORD and make the most of them. The Regional Administrator's office does not have executive-level interactions or briefings with ORD. The Acting Regional Administrator noted past efforts by the lead region for ORD to strengthen real-time support from ORD. She expressed interest in follow up on that effort.

When asked to comment on impediments to using science for decision making, the Acting Deputy Regional Administrator described the pending decision on permits for the outer continental shelf. The stakes are high, and EPA's mandate is to use data to protect National Ambient Air Quality Standards based on science. EPA lacks background ambient air monitoring data for drilling 60 miles off shore. Existing ambient monitoring data is not representative. The permittee is characterizing EPA is overly conservative in its proposed permit condition, which require the applicant to submit representative monitoring data or impose costly controls. Without scientific data, decision making is difficult and raises questions about EPA's credibility.

The acting RA and acting DRA spoke of the difficulties in making decisions, when EPA has disinvested in monitoring. It is easy to reduce monitoring because the benefits are in the future. But many decisions are impaired because needed monitoring that's accessible and integrated doesn't exist.

In terms of human resources, the region recently created supervisory positions for interdisciplinary scientists. This change represents a culture change for Region 10. It will be useful for scientists to have managers who have technical training. The leadership team noted that Region 10 has conducted some succession planning and planning for diversity, but need to reserve more time to think ahead to those issues. Regional managers are seeking cross-training for employees. They are looking for creative ways to support core programs and reinvest in the technical base supporting core functions.

The leadership team (executive managers) noted that they cannot staff all expertises needed to address emerging issues. The Acting Regional Administration expressed the wish that "we could rely on centralized expertise in ORD where we need it, when we need it." In her view, that would be better than building capability in every region.

SAB members asked about regional use of social science, risk communications, economics, stakeholder involvement, behavioral science, decision science, and science to understand tribal relations. The Acting Regional Administrator noted that stakeholder involvement and decision making was a focus in Region 10. The SAB members had not met directly with staff focused on these functions. Region 10 also has tribal coordinators who focus on the cultural of regional interactions with tribes. The region has developed the North Slope Communication Protocol, which provides guidance on how to communicate science to native communities at the subsistence level and how to interact with them.

The Acting Deputy Regional Administrator acknowledged that the region does not have a lot of "credentialed focus" in the social science, but that it had "many hobby-level practitioners." These areas of expertise have not been formally considered in hiring decisions. He noted that his

past experience in Region 10 validated the importance of training in risk communication. Region 10 may not have credentialed experts, but it does have sensitivity to the issues of interest to the SAB. The Acting Regional Administrator noted that the region has engaged its regional economist in projects across the region and, because regional needs are different than when he was hired, is working on redefining needs for economic expertise. Region 10 also has used an Intergovernmental Personnel Agreement to place a tribal member in the Regional Administrator's Office as a senior tribal policy advisor. This individual advises on how best to work with Tribal Governments and has been very valuable.