U.S. Environmental Protection Agency
Science Advisory Board

Final Minutes of Public Meeting July 6, 2004

Committee: Environmental Engineering Committee of the U.S. Environmental Protection Agency's Science Advisory Board (SAB). (See attached Roster)

Date and Time: July 6, 2004 from 1-5 Eastern Time (See attached Federal Register Notice)

Location: Third Floor Conference Suite, 1025 F Street Northwest, Washington, D.C.

Purpose: The purpose of this meeting was to discuss potential FY2005 activities.

Materials Available: The following materials were distributed before the meeting: agenda; proposed project descriptions for the EPI Suite Review, the Sustainability Research Plan advisory, and the proposed Industrial Ecology Framework initiative.

Attendees: The sign-in sheets and a Panel roster are attached to the minutes. There were about two dozen people present during various parts of the meeting. Committee members, Dellinger, Dzomback, Eighmy, Kim, Lifset, McFarland, Powers, Shaw, and Smith were present at the beginning of the meeting; Crittenden joined about 2:15. Vu, Maciorowski, White, and Jones of the SAB staff were present at the beginning, Stallworth joined about 2:30, and Fort about 3:45. Agency Staff present included Patel, Libelo, Bauer, Allen, Lingle, Hecht, Richards and Zimmerman.

Summary

The meeting went largely according to the agenda (attached) except that more than the planned time was taken for some presentations and the meeting, therefore, ran late.

The following decisions were made at the meeting:

1. The DFO was asked to provide the Committee with basic information on the Agency's Quality System.

2. The Committee is willing to advise on the Sustainability Research Plan, through a mechanism to be worked out later.

3. The DFO will ask Diana Bauer for her overheads.

The following summary provides more detail on these items.

Dr. Vu welcomed the Committee and the Agency presenters, then briefed the Committee on projects that would be likely to be undertaken by the Committee (or subsets of the Committee) in FY2005 and on the fate of its Industrial Ecology Framework Initiative. She introduced Dr. Maciorowski, Associate Director for Science, and Mr. Albores, Deputy Director for Management.

Dr. McFarland thanked Vu and White, welcomed the Committee and thanked them for attending. He reminded people that this is a public meeting and minutes will be prepared. The general purpose it to provide the EEC with briefings on EPI Suite (a series of computer models used by the Agency to predict factors influencing the fate and transport of chemicals), the June 3-4 SAB Board meeting at which FY2005 proposed projects (including the EEC's IE Framework) were discussed, and Sustainability. He introduced the speakers, Neil Patel and Laurence Libelo of OPPT.

(1) **Neil Patel**, Associate Director of the Economics, Exposure and Technology Division, Office of Pollution Prevention and Toxics (OPPT), provided an overview of the Office of Pollution Prevention and Toxic Substances (OPPTS). (See his handouts) OPPTS develops national strategies for toxic substances control and promotes pollution prevention and the public's right to know about chemical risk. It includes the Office of Pesticide Programs (OPP), the Office of Pollution Prevention and Toxics (OPPT), and the Office of Science Coordination and Policy (OSCP).

OPP regulates the use of all pesticides in the US and establishes maximum levels for pesticides residues in food, among other tasks. OSCP coordinates within OPPTS and is also responsible for biotechnology and endocrine disruptors. OPPT is responsible for assuring that industrial chemicals for sale and use in the US do not pose unacceptable risks to human health or the environment. The office accomplishes this through pollution prevention, safer chemicals, risk reduction, risk management and public understanding.

Dellinger asked about the dividing between OPPT and OSW on industrial chemicals. Patel responded that OSW deals more with the end of the industrial life of the chemical. Accidental fires or releases would be dealt with yet another office in the Office of Solid Waste and Emergency Response (OSWER).

The Toxic Substances Control Act (TSCA) is the primary statute for much of what OPPT does. It provides authority to gather information on new and existing chemical substances and mixtures, require testing of chemicals, screen and control unreasonable risks of new and existing chemicals, and coordinate with other Federal agencies. OPPT manages "existing" and "new" chemicals. Existing chemicals were placed on an inventory in 1977. Anything else is new. Pesticides are dealt with by OPP. Pharmaceuticals by the Federal Drug Administration (FDA). Dr. Vu clarified that a chemical with multiple uses would go to several offices or agencies. OPPT looks at the whole life cycle, interacting and coordinating as needed. The other program offices – Office of Air and Radiation (OAR), the Office of Water (OW), and OSWER – will deal with the old chemicals as legislated. For new chemicals OPPT conducts a 90-day review (about 2000 per year).

Lifset asked who looks at pharmaceuticals at the end of pipe. Maciorowski replied that EPA program offices were originally set up by statute. The Toxic Substances Control Act is the catch all. Pharmaceutical and personal care products use issues are largely dealt with by FDA, but EPA acquires jurisdiction when they enter the environment. EPA and USDA are addressing these now in a research mode. Vu noted that, when the Board met in Chicago last year, the regional people indicated that waste pharmaceuticals in the environment were an issue. McFarland and Lifset expressed an interest in water quality issues resulting from pharmaceutical consumption. Maciorowski repeated that this is currently being dealt with in a research mode. Pharmaceuticals are being dealt with in a case by case process.

Lifset asked whether OPPT consider products which are deliberately dissipative (such as paints) that wear out by design. Patel responded that they do and that the Design for the Environment unit within OPPT is forming a partnership with manufacturers and users to address these materials. TSCA gives them authority to gather the necessary data.

OPPT includes offices that address: the pre-manufacturing review of new industrial chemicals, testing, assessment and risk reduction of existing industrial chemicals; management of "national chemicals" like asbestos and lead named in TSCA; plays a role in international chemical management, pollution prevention advocacy; and partnerships such as the High Production Volume (more than a million pounds) Challenge involving about 2000 chemicals, Green Suppliers Network, DfE, and Green Chemistry.

Dzombak asked whether the Emergency Planning and Community Right-to-Know Act (EPCRA) had been affected by Homeland Security Issues. Patel responded that EPA had established an Office of Homeland Security that works with the Homeland Security Agency. OSWER implements parts of EPCRA. Dzombak senses that, in contrast to the 1990s, the information made available to the public is being reduced rather than expanded. Vu said that EPCRA gave the Agency the authority to give the public information about chemicals. The Toxic Release Inventory (once in OPPT, now in Office of Environmental Information) is one example. In ORD, Tim Oppelt, former Director of the National Risk Management Research Laboratory, now heads the Homeland Security Research Center which focuses on keeping water bodies (not just reservoirs) safe from terrorism and decontaminating buildings. There is a Homeland Security Research Strategy. Patel speculates that the websites that were shut down were shut down for security reasons and there seemed to be general agreement on this.

Kim asked what, for a particular chemical, triggers OPPT activity. Patel responded that ALL new chemicals get reviewed. As far as existing chemicals, if there is knowledge through research or private studies that a chemical could propose unreasonable risk to health and the environment TSCA Section 8 requires this be reported to EPA. Sometime studies are done and reported in the literature, such as on chemicals found in breast milk, that might lead the Agency to think there is a concern.

Under the PMN program, if they don't have enough information to decide a chemical is safe, they can hold it until the manufacturer develops the data. Risk can vary with exposure. If there is a significant new use with higher exposure and therefore higher risk, they can require more information from the manufacturer by rule.

Not every chemical approved in PMN review gets put into commerce; EPA tracks this by requiring a Notice of Commencement when a chemical does enter commerce.

EPA has made available tools, like the PBT profiler, that help industry identify chemicals that are likely to fail PMN review before they are submitted.

Dzombak asked about how open the PMN program is. Patel responded that most of the information is Confidential Business Information. EPA could share anything that is not claimed as confidential. Dzombak asked how they develop a sense of confidence in the public that they are doing a good job? Patel said they have developed a data base over 30 years on tens of thousands of new chemicals that allows them to

use chemical structure to predict risk

Vu said that EPI Suite is a predictive model. On the toxicity side the Agency has developed structure activity relationships as a predictive tool. The Agency can also require new information. Dzombak said it was a very quiet program. Maciorwoski contrasted that OPP can ask for anything it wants, whereas under TSCA, the Agency has to show there is a reason to believe there is a risk before it can ask for more data. This is why the predictive tools have been developed.

Dzombak thinks there have been notable failures (MTBE).

Lifset observed that a great number of substances fall under confidential business information and asked what the public can find out? What's left that is accessible to the public? Patel speculated that virtually everything can be claimed as CBI by the manufacturer. Sometimes the Agency challenges Industry's claim that something is CBI.

For new chemicals, the burden on the Agency is to show there may be significant risk, for existing chemicals, the Agency must show there is significant risk.

Smith asked, whether, if you provided some treatment to an existing hazardous waste so it could be used in commerce, would it fall under RCRA or TSCA. Patel said it would not fall under TSCA and Vu qualified this by saying "unless it generated new chemicals." Powers explored this issue a little further as it relates to pollution prevention. Patel says that OPPT and OSWER are trying to work with industry to develop safer chemicals. Vu gave the methyl mercury example where every office in the Agency has their hands on it, as well as other agencies, because it falls under so many different statutes. You don't have one agency looking holistically at one chemical. That's why coordination is necessary. Lifset asked if OPPT had reviewed something that was a waste and is now a feedstock. Patel couldn't think of an example.

(2) **Laurence Libelo** spoke on EPI Suite.

Libelo thanked the SAB for agreeing to review EPI Suite. OPPT evaluates new chemicals. Often there is very little data, perhaps just a melting point. Therefore, they have developed a lot of tools to estimate basic physical chemical property information that can be fed into transport and fate or other models. EPI Suite was developed by SRI.

EPI Suite is <u>not</u> what we ordinarily think of as an environmental model. It provides input parameters for environmental models. EPI Suite is a popular modeling suite. It is publicly available on the EPA website and is used by industry, universities, research organizations, federal government, state and local government, and non-OPPT EPA as well as OPPT.

The name comes from Estimation Programs Interface (EPI Suite) and the basic idea is that, if test data is available . . . USE IT!

EPI Suite estimates physical-chemical (pchem) properties and environmental fate and transport parameters using a single entry of chemical structure or CAS number, if available. It also has a data base of properties for about 25000 chemicals. The suite tuns chemical property and fate models sequentially.

If there's data, EPA would rather you used it. By having the data base, it will give you the real data and a reference, as well as a prediction. The data is also used to revise the model. The data base includes all the values from the literature, sometimes multiple values for a single chemical and relies on the user to decide which value to use. Crittenden doesn't think stereochemistry is addressed and gave thalidomide as an example where the stereo-isomer strongly affects toxicity.

EPI Suite is a windows-based platform using SMILES Code, which is a way of writing a chemical structure so it can be typed on a typewriter. Crittenden says this is why EPI Suite can't consider stereo-chemistry. EPI Suite will show structure, which lets you check your SMILES code if you started out with a structure. You can enter a single chemical or a batch of chemicals. You can run specific sub-programs (such as melting point) or all of them. The help function gives history about the equations, references and revisions.

EPI Suite contains 6 pchem routines to estimate: melting point, boiling point, vapor pressure, octanol-water coefficient, KOW (a partitioning factor), water solubility, organic carbon partition coefficient, Henry's Law constant, bioconcentration factor. EPI Suite also runs five fate or partitioning models using input calculated earlier or using user-specified inputs. There are different types of models within EPI Suite, including expert judgement.

Powers asked how well the model does? Libelo responded that it depends on the kind of chemical, for some it is better than 90%, for others close to 80%. They recognize they need error bars for the estimates, but are finding it difficult for practical reasons when reported values can vary by three orders of magnitude.
A good strong recommendation that it needs to be done would help them.

Dzombak asked whether sensitivity analysis was routine. In the development of the regression equations, yes, but not in model implementation. It would be good to carry the quality of fit information forward. Libelo thinks most people will get an order of magnitude value out of EPI Suite. Dzombak said that would be good. Crittenden, saying that Dzombak opened the door on sensitivity analysis, one could also consider how it affects risk. EPA could adopt the strategy of the Intergovernmental Panel on Climate Change which spent a long time thinking about how to convey the likelihood of global climate change to the public.

McFarland asked Libelo about implementation of the Agency's Quality System and its requirement that the Agency produce and use data of known quality. Libelo responded that they approach the problem by providing information with which to re-create the model. They have matched model estimations to measurements, especially to data collected by the Europeans. Patel says this is mandatory in the Agency and OPPT works closely with OEI to follow its guidance.

Libelo demonstrated EPI Suite using 1-chlorohexane and showed that there was measured data for many of the properties. He ran the model so they could compare the measured and estimated values.

Dzombak asked whether all they could ask for was structure from the manufacturers. Yes, this is a statutory restriction.

(3) **Diana Bauer** of ORD/NCER asked the Committee to shift gears from EPI Suite to Sustainability. There is a small pocket of people at EPA helping the Agency

think about how to protect the environment in the future, using a systems framework. Today, she will talk about these activities in ORD and how they connect to similar activities elsewhere. Derry Allen will talk about other Agency programs. They are in a preliminary stage and welcome the Committee's feedback.

In terms of philosophy, in the last 30 years EPA has done a good job cleaning up the environment, but projected expansions of the economy and population put additional pressures on the environment, making the job for the next 30 years challenging. Progress means understanding how the environment, economy and society connect with each other. Therefore ORD wants to pursue the science and engineering research that will allow EPA to protect the environment over the next 30 years.

They have identified themes such as forward-looking, multi-media, and preventative; balancing the environmental goals with economic and social goals; ensure the quality, availability and viability of resources; environmentally benign technologies; stimulating innovation through the education of new scientists and engineers; think more broadly in terms of incentives, not just regulations; collaboration at the local, regional and global scales.

In terms of initiatives, EPA has a small program. Since Alan Hecht joined as Director of Sustainability at ORD, they have started a Collaborative S&T Network for Sustainability that yielded 130 proposals. Bauer, Lingle, Richards, and Zimmerman are in the National Center for Environmental Research which runs many grants programs. This one differs in its emphasis on partnerships. There is a P3 Award (People, Prosperity and Planet) for a student design competition on sustainability; awardees get a school year to develop their designs. A solicitation is currently open on benchmarking the integration of sustainability into engineering curriculum at US Institutions of higher education. There are also some "educating the educator" workshops and a website. They are thinking in an interagency way, having formed a Subcommittee on science and Technology for Sustainability under the Council on the Environment and Natural Resources (CENR), which, in turn, sits under the White House's OSTP. They have an MOU with DOE, collaborate on Green Chemistry with NIST, have an ongoing research partnership with NSF, etc. They welcome suggestions on how to collaborate further with folks outside the Agency. Smith mentioned the United States Business Council for Sustainable Development (http://www.usbcsd.org)

Concerning the research strategy, which is in the early stages, they are thinking in terms of three systems domains: Industry and Materials Flow, Ecosystems, and Community and the Built Environment.

Bauer used a visual with the following boxes in a line: Resource Extraction, Materials Processing, Product Manufacture, Product Use, Collecting & Processing, and Waste Disposal, each contributing to air, water and land pollution. It showed opportunities for recycle, re-manufacturer, and reuse. Smith asked about the drivers. For OSW waste is front and center. Different areas have different levels of concern about solid waste. Product design people are very far from the reality of the end of life. Air absorbs a HUGE amount of pollution, especially if you think about carbon dioxide, far exceeding what is disposed of on land. They have not yet worked out what the incentives are.

Allen commented that there are many groups of actors, many of whom act independently and have to be approached on their own terms. Within industry many

people are finding that you can make bigger profits through wasting less. Sometimes incentives push different groups in different directions and, perhaps, a tweak or two could help a lot.

Powers said that one of her frustrations with the CS & RCRA MYPs is that the research money owes something to each of its funding sources. In the case of sustainability, what are the drivers? Bauer said they are talking to the EEC today so that they can help EPA with that question in a world where no one above them is telling them to look at sustainability and aren't likely to. Dzombak had a suggestion based on the system domains. Have you thought about priorities? What's the most un-sustainable activity in the US, where the greatest change could be made? He drew an analogy to DOE's Industries of the Future program which focuses on making these industries more efficient. If EPA could identify the top ten targets for sustainability improvement, they might get more for the little resources available. Bauer responded that there was a need for people and expertise in the domains. Allen says they haven't done it, they've been walking around it building tools that could help them do it, and it is a good idea. Smith spoke about consumer electronics. The issue is that you need to design for recycle and reuse. We are all in infancy and the US is behind Europe. Lifset amended Dzombak's suggestion so that it wasn't Worst First, but Most Clearly Demonstrate Efficacy of the Approach. Eighmy mentioned the Netherlands and their building decree. There's a Johnny Appleseed quality to it and also a paradigm shift.

Bauer returned to the Communities/Built Environment Domain where their thinking is not as well developed yet as in the other domains. Built Environment, Mobility & Travel Decisions, and Environmental Quality fall in here.

You can also look at the sectors within the domains and where they overlap. Regional and Urban planning, for example falls into both Ecosystems and Communities/Built Environment.

One way to organize the work is by using a matrix of domains and other factors, such as goals. They can also lay their research plans into the matrix.

She asked for input on how they could enhance and improve their sustainability efforts in general, whether there were any suggestions on the research strategy, whether there were any suggestions for better connections and collaborations inside or outside EPA, and what role can and should the SAB play.

Dellinger thinks that the breakthroughs will come in the inter-disciplinary areas because otherwise people will stick with the same old ways of doing things. You need to get information on where the problems are and what the manufacturing processes are so researchers can start working. It is had to get your arms around this.

Dzombak thinks the inductive approach, starting with specific examples, is the way to go. He knows about dirty businesses, though such as metals, mining. When you look at those or at road making you can start thinking how to make things better.

Lifset asked about exemplars. Bauer's responded with a reference to the NRC report, *Our Common Journey*, which she sees as the strongest single influence. The industrial sector has a number of good publications like *The Weight of Nations*. They also want to think about spatial planning and the built environment. The industrial literature doesn't have a sophisticated understanding of the ecological implications.

ORD is interested in the intersections. She hasn't seen anything strong at the intersections yet.

(4) **Derry Allen** spoke particularly about Material Flow Accounts (see handout). He referenced the same graphic of the flow of materials that Bauer had, noting that EPA had done a good job addressing the little "air, land, water" arrows one by one. He looked to the benefits of taking to a systems approach. Materials flow accounts are just a way of keeping score. Because what gets measured gets managed, it is important to be able to put numbers on it. MFAs also make it possible to talk to lots of different kinds of people about the problems in the environment. They are a good communications tool.

In the 1930s the US began to put together the first economic accounts; now we can hardly think of making policy without reference to them. There's no reason we can't do the same for materials, but it will take a while.

MFA's could help in three major areas of public policy

1. Improve economic, trade and national security, and technology development policy by enhancing our understanding of the material basis for the economy.

2. Improve natural resource policy (minerals, forest products, fuel, etc.) By enriching system-wide, life-cycle information on the status and trends of materials sources and uses, final disposition and other aspects of supply/demand.

3. Improve environmental policy by helping to identify categories of pollutant sources, develop materials-based and product-based environmental strategies and promote reuse of what is currently discarded.

It turns out most countries collect most of the information that would be needed but don't routinely assemble MFAs. OECD had a workshop on Materials Flows and Related Indicators with the result that this year they put together a project "3R" (Reduce, Reuse, Recycle). Countries will be invited to prepare case studies for collective discussion.

He referenced the NRC's *Materials Count* which said pretty much what OECD did – Just Do It!

At the EEC's last meeting there was considerable discussion of the Resource Conservation Challenge, which is a compatible way of thinking. Where is it you can work with various industries and sectors and find ways that make everyone interested in changing things? It is difficult, because a lot of the people who are trying to do this have only worked in regulatory programs. He thinks there is progress and that the Committee might want to hear about it at its next meeting.

Dzombak explained that EPA does have experience with mass balance, the engineer's name for materials flow. He cited mercury as an example and said that there were issues about getting organizations to provide data and agree upon data. He noted that portions of materials balances might be kept secret as a matter of national security. (see earlier discussion of EPCRA, also DOD may have ideas about this). Allen responded that he had seen portions of a mercury balance, but never a complete

materials balance.

Kim spoke to mercury. He works at Ford which had a mercury discharge problem at a plant where they did not use mercury. They found the source was sulfuric acid being used to adjust pH. Many of the activities that Allen and Bauer discussed relate to industrial operations. Bauer says that they get poor information from industry. Kim noted that industry has little incentive to collect and provide the information and is fearful about providing information that could result in enforcement and compliance questions. They have less trouble with this in Europe. Resolving this is important.

Kim thinks a sustainable future depends on global climate change. What is EPA's position? Ford has accepted it. When will EPA? Will carbon dioxide be considered? Allen responded that global climate change is a sticky area in U.S. policy and so the sustainability people at EPA are focusing elsewhere.

Kim did not see the environmental systems management research program at NRMRL in the CS & RCRA MYPs. Will it be addressed in the Sustainability Research Strategy?

Bauer spoke to the environmental systems management research program at NRMRL, some of which fits into the water quality multi-year plan. They haven't really figured out where everything goes yet. One issue is that, historically, the NRMRL program has been well connected to the pollution prevention grants program. NRMRL has broadened the scope of its research. Lingle expanded by saying that the Sustainability Strategy would cover both the HQ and NRMRL activities. Powers asked about a Bauer diagram of existing multi-year plans and what could be covered by the Sustainability Strategy. She asked if a different structure would be better for what Bauer is trying to do. Bauer responded it is challenging to work with the historic structure, but the necessity also provides an opportunity to bring those people along.

Smith tries to do MFAs within Alcoa and it is very difficult because everyone is very busy. But, everyone understands it! It would be good to link costs to it, not just costs of disposal, but costs of long-term effects. Cost information would help you set priorities and develop incentives for the modification of production. The German government took a serious look at stormwater which resulted in tax incentives for flat roofs to become green roofs . . . and now 10% of them are.

McFarland thanked Allen and Bauer, noting the issues resonate well with the EEC. Allen had noted places where EEC could help, including with the Strategic Plan. The EEC is fairly familiar with Strategic Goal #3 which includes sustainability.

(5) Chair **Michael McFarland** spoke to the June 3-4 SAB Board meeting and the discussion of initiatives. The EEC had hoped that its emerging contaminants proposal might be paired with an IHEC proposal, but this is not to be. The IHEC proposal deals more with health indicators and monitoring and is not well suited to the merger. However, IHEC and EHC Chair, Rebecca Parkin was supportive of the emerging contaminant proposal.

The EEC's Nitrogen Project, which was scoped last year, was approved. Dr. Vu said the SAB has in mind to form an ad hoc panel, which Dr. Galloway will chair. Those interested in serving should let the chair and DFO know and an FR will be published inviting nominations from the public.

There was Board interest in proposals from Rejeski on EPA research in the new industrial age and Theis on nanomanufacturing. It was suggested that they be merged, with nanomanufacturing being used as a case example. A subgroup of the Board, headed by Rejeski, will also work with Maciorwoski to develop a workshop on nanomanufacturing for the SAB Annual Meeting in December, to which the whole EEC will be invited. Crittenden noted ES&T is coming out with a special issue on nanotech. Barb Karn knows about this. If EEC members are interested, let DFO know. Right now it is very early, but December is coming fast. Crittenden mentioned the nano center at Rice. EPA also put out an RFP on this very issue. Rice is an NSF Center. Vu said SAB would work with people in NCER.

The EEC's Industrial Ecology Framework Proposal resonated with the Board, especially with the economists. McFarland, Theis, Thomas, Freeman, and Kling met with Stallworth and White on the afternoon of June 4 to refine the proposal to include more about costs and economics. The also raised questions about whether the two proposed industries were the best. The DFO redrafted the proposal in response; Freeman has commented on this, asking about why non-hazardous wastes and why the emphasis on intra- as opposed to inter- industrial waste sharing.

McFarland said the economists are interested AND believe there are factors that affect materials flows that weren't incorporated in the draft proposal which, if they were incorporated, would make it much stronger. Vu wanted to make the Committee more familiar with the process. Every year we ask each Committee and the members of the Board to come up with ideas. Last year EEC came up with the Nitrogen Project. Everyone thought it was a good idea, but wanted it scoped out more with Agency and Board to be sure it was doable and feasible. It took some months to get it approved. Similarly, people like this Industrial Ecology Framework. Not only are the economists on the Board interested, but OSWER is. September would be ideal, but if it takes longer, it takes longer. The EEC already has the Sustainability Research Strategy and the EPI Suite to do.

What industries are chosen makes a difference. Derry Allen offered his assistance in selecting case studies, particularly where EPA already has data or where there is a natural customer for the result. If there is a customer, then that might ease the resource constraints. He also thinks that collecting and displaying relevant MFA data will be useful.

Lifset looked at the feedback and felt conflicted. While the cost data are important, he is afraid the pursuit of marginal cost data will overwhelm the rest of the effort. The EEC project is an amalgam of two proto-projects, one on Subtitle D Industrial Wastes. We know something about Subtitle C Wastes, but we don't know much about Subtitle D. He thought of this as something of an experiment to find out how much we don't know by looking at these industries. While he'd love to know more about electronics, he knows from Yale's Waste Electronics and Equipment, that there's a lot of heat and little late in this area. There's only one data set in the whole world that they've been able to get their hands on. We should craft a project which is achievable within the resources available. Some of these reasons weren't articulated in the proposal.

Vu advised that, if EEC doesn't agree, we need to respond to the economists.

In theory, it would be possible to have two complementary projects – one for the

economists and one for the engineers, but it would take some upper level architecture to make sure they really complemented one another.

Vu recommends defining the problem and the steps. Ask, is it practical, are their customers, is there data? All this is pat of the scoping. She thinks the economists are pretty busy and might not actually be available to do the work. McFarland seems glad we can take more time for scoping.

Eighmy was pleased by the comments. He thinks they can be worked through while still remaining true to the essential elements of the original proposal. We can elaborate on why non-hazardous waste and so forth.

Smith would like cost incorporated because it is the driver. He agrees with Lifset that including costs complicates the project, but he thinks it adds a lot to the utility of the project.

There was a discussion of workload issues. Kim asked whether the EEC could handle more than two projects a year. McFarland responded that the CS & RCRA MYP review was underway, the EPI Suite review is coming up probably in November or December, the EEC has been invited to comment on the Sustainability Research Strategy. He thinks this is why Vu is allowing us to stretch out the scoping phase for Industrial Ecology. He doesn't think that we will have two projects coming at once, but there will be one after another.

Vu tries to keep the workload to 3 projects per DFO per year. Travel is a big budget item. The SAB has a lot of intellectual capacity. Translating it into action can be a difficult matter.

Powers asked about the workload for a consultation or a review. Vu said they are different. The consultation provides individual input, but no report writing.

After thanking the members for their efforts, Dr. McFarland adjourned the meeting at 5:30 p.m.

Respectfully Submitted: Certified as True:

_____***/Signed/***_____ _____***/Signed/***_____
Ms. Kathleen White Dr. Michael J. McFarland, Chair
Designated Federal Official CS & RCRA MYP Advisory Panel
Environmental Engineering Committee

Attachments (paper)
1. Federal Register Notice
2. Agenda for the meeting
3. Sign in Sheets
4. Committee roster
5. Email approving minutes