

ORD Strategic Plan 2000

Perspectives on the Future of Environmental Research: Shaping EPA's Research Strategy for the 21st Century

June 3, 1999

Meeting Summary

One June 3, 1999, the Environmental Protection Agency's Office of Research and Development (ORD), convened a diverse assembly of experts to identify key drivers and trends in science, technology, and environmental protection over the next 10-15 years. In its effort to develop a long-term Strategic Plan, ORD invited trade associations, professional societies, other governmental agencies, and non-government organizations to share their perspectives on the future of science, technology, and environmental protection to identify critical environmental research needs.

Opening Remarks

Dr. Norine Noonan, Assistant Administrator for the Office of Research and Development, opened the meeting by welcoming all participants and thanking them for their interest and assistance in ORD's Strategic Plan 2000 (SP2K) process. She noted that ORD has had a Strategic Plan since 1994 and is looking forward to including stakeholder input as ORD charts its future with SP2K.

Dr. Noonan encouraged participants to take a big-picture look at issues shaping the future, and in particular, the trends in science, technology, and the environment. Dr. Noonan challenged everyone to think broadly as they discuss the issues that we will be facing in the 21st century and beyond. Dr. Noonan also extended the opportunity to provide input via the SP2K e-mail box: sp2k.ord@epa.gov.

SP2K Overview

Deborah Dietrich, Director of ORD's Office of Resources Management and Administration, gave a brief overview of the SP2K activities. She explained that SP2K is part of a four stage strategic management process: 1) visioning; 2) strategic planning; 3) assessing and aligning; and 4) implementation, and that ORD plans to have completed a working draft of its Strategic Plan in September 1999. Ms. Dietrich emphasized that the key feature to this process is organizational and stakeholder involvement.

Welcome Keynote Speaker

Jonathan Lash, President, World Resources Institute, delivered the welcome keynote address. Mr. Lash challenged ORD to investigate the trends and drivers that will affect environmental protection in the future and carefully consider how these trends are important to ORD. Mr. Lash then provided an overview of issues and trends to consider when thinking about the future of environmental protection. A summary of Mr. Lash's comments can be found in Appendix A.

Break-Out Session #1

Meeting participants worked in five facilitated break-out groups to discuss trends in science and technology. Participants were randomly assigned to groups to ensure a representative mix of viewpoints in each group. Each group examined the following topics: 1) major science and technology trends anticipated in the next 10-15 years, and 2) effects of those trends on EPA and ORD. The facilitators and note takers recorded each group's responses. Detailed notes for each group can be found in Appendix B. In addition, ORD advisors attended each session and generated themes to be reported to the group in the meeting's wrap-up. These themes can be found in Appendix E.

Lunch Keynote Speaker

Dr. Rosina Bierbaum, the Associate Director for Environment, White House Office of Science and Technology Policy, delivered the keynote speech during a buffet lunch. She spoke about the most important challenges that the United States will face in future environmental protection and identified strategies to address them. Dr. Bierbaum commented that the key themes of the challenges we face include an increased complexity and interrelation of environmental problems and the need to investigate cumulative effects on ecosystems. A summary of Dr. Bierbaum's comments can be found in Appendix C.

ORD's Vision and Goals

Timothy Oppelt, Director of ORD's National Risk Management Research Laboratory, gave a brief presentation on the outcomes that ORD has developed to date in the SP2K process: ORD's vision, core purpose, and five draft goals. He noted that ORD will be integrating this Strategic Plan with other ORD and EPA planning activities, including the agency's Government Performance and Results Act (GPRA) goals. Mr. Oppelt stated that ORD will use input gathered from its stakeholders to make sure SP2K is on the right track. The next step in the process is to involve ORD Labs, Centers, and Offices in developing the "meat" of the draft goals.

Break-Out Session #2

Meeting participants rotated to five different facilitated break-out groups for the afternoon session to discuss trends in environmental protection and their impact on EPA and ORD. The facilitators and note takers recorded each group's responses. Detailed notes for each group can be found in Appendix D. In addition, ORD advisors attended each session and generated themes to be reported to the group in the meeting's wrap-up. These themes can be found in Appendix E.

Wrap-Up and Closing

Dr. William Farland, ORD's Director of the National Center for Environmental Assessment, closed the meeting by thanking participants for providing valuable input to inform ORD's strategic planning process. He reminded participants of the opportunities for future input, including the SP2K e-mail box (sp2k.ord@epa.gov). Dr. Farland also reviewed the themes generated from the morning and afternoon sessions. A summary of these themes can be found in Appendix E.

Appendix A:

**Welcome Keynote Speaker
Jonathan Lash**

Welcome Keynote Speaker

Jonathan Lash

World Resources Institute

What should ORD's mission be within EPA?

Reducing Risk — setting priorities and strategies for environmental protection.

Attach as much importance to reducing ecological risk as to reducing human risk.

Integrate the approach.

Consider space and time.

ORD needs to consider the following questions:

What are the trends and drivers?

Which of these are important?

There are consequences of current environmental issues/problems that will need consideration:

In the next 50 years, agricultural land will grow 50% in developed countries.

Water depletions will become a factor.

Coral reefs are degrading due to heavy development of land.

There will be a decrease in fish stocks.

10-15% of the world's species will be committed to extinction over next 30 years, indicating a need for biodiversity services.

There may be a nitrogen cycle buildup in certain ecosystems.

Global carbon dioxide concentration will increase.

The effects of annual changes in precipitation will need to be addressed.

We will need to address vector-borne diseases like malaria, schistosomiasis, and dengue.

Future trends influencing environmental protection:

Soil degradation.

— low soil till or no soil till results in water retention, less erosion, and nitrogen retention.

Communication technologies are rapidly changing.

— Satellite cellular phone networks will cover the globe.

— The volume of Internet traffic will increase by a factor of 50.

Global forest loss.

Information technologies may result in:

— Eco-efficiency.

— New policy tools.

— System Based Standards.

— Civil Accountability.

Appendix B:

Break-Out Session #1 “Trends in Science and Technology”

Group A

Participants

Chris Bernabo	RAND Environmental Science and Policy Center
Gaylen Camera	American Industrial Health Council
Marge Cavanaugh	National Science Foundation
Steve Cohen	Society of Toxicology
Allan Ford	American Chemical Society Task Force on Environmental Research
David Friedman	American Forest and Paper Association
Mosi Kitwana	International City/County Management Association
Cheryl Morton	Chemical Manufacturers Association
James Reisa	The National Academies
Pat Tallarico	Marasco Newton Group (Facilitator)
George Alapas	ORD (Advisor)
Karen Weiss	Marasco Newton Group (Note Taker)

Imagine 15 years into the future. ORD has taken a leading role in science policy and EPA is receiving an award. For what achievement is this award?

Communicating Science More Broadly and More Precisely.

Right now, the percentage of EPA's budget in this area is reducing and EPA needs to maintain/improve budget.

Some communities don't support the environment very well and they need assistance in this area.

Environmental Watchdog/Yardstick Award.

ORD could play the role to assessing how well other offices are doing, moving ORD toward becoming an independent watchdog, a group that measures environmental and public health, the effects of regulations, and whether plans have achieved their objectives.

The research role/question here would be how to set up a series of experiments for each of the major agency actions to test how they're working, changing each EPA action into a testable hypothesis.

Independence may be the key to this — ORD is political and will never be totally independent.

Good Coordination Award.

There may be a need in the future for sharing information and conducting research collaboratively among the agencies that do R&D.

Agencies will need to work together on common problems instead of working independently and work together from the beginning of the investigation, instead of at the end.

There is an integration/coordination role — ORD could facilitate joint planning and coordination of programs.

This would be a change for ORD — how many times has ORD gotten involved in research where other agencies involved and ORD says coordination among agencies has been informal, ad hoc, or a one shot affair.

Global Thinking.

The role of US as the center of environmental problems will be disappearing and EPA's activities need to be more globally centered.

For example, the State Department, in signing treaties and agreements will have to be more in tune with ecological impacts and account for eco/political implications.

Account for political implications and economic forces.

Tools for Risk Assessment/Characterization.

Much of the research is not being interpreted in a way that everyone is in agreement — EPA will need to do a better job of communicating interpretations to communities.

Community Based Solutions.

\$0.80 of every \$1 is spent on the state level — communities come to the state and local governments to request environmental assistance/tools.

Part of the challenge for EPA/ORD will be to provide tools to help diffuse contentiousness with good information.

What are the trends in science and technology that will promote/enhance these kinds of activities discussed above?

Information technology.

Post-normal science.

The role of science is fundamentally changing.

There are many right answers depending on the values of the people, ecosystems — human values is where it's headed.

Globalization.

Most of the students in graduate schools in US are non-citizens — this will globalize our research.

Science is losing credibility.

There are too many hired guns — too many pushing private agendas.

The problem for ORD is the perception that they're "cooking the books."

ORD needs to win the neutral objectivity award — the reason for ORD to exist is to be the little voice of objectivity — precautionary principle is an issue and there is a need to strengthen the SAB.

There is a need to make sure academic awards place science first — there is a conflict between curiosity-driven research and research driven by national priorities.

Person-specific pharmaceutical cures.

Individual designer drugs will be developed to be personally adapted to solve everyone's problems, including genetic.

What will environmental protection mean in the context of the relationship among genetic health, environmental factors and individual-specific cures.

Environmental genome project — NIEHS.

Knowledge creation vs. information creation.

There is a need to integrate information (knowledge creation) into the research program, not generate more information.

ORD's role is to increase knowledge creation to give data meaning to all of its users.

Revolution of risk assessment because of genetic information.

We don't know what that means yet — through analytical technology, we've identified pesticides in foods, but there has been no mention of pesticide levels and the effect of those levels.

Public understanding of the limitation of science.

Knowledge theory.

Knowledge is not absolute/truth, it evolves — the next level of wisdom is to deal with the knowledge.

What do you pursue?

Better partnerships.

Industry/environmental groups are taking action to help communities to understand information and make decisions — TRI, endocrine disruptors, product stewardship.

These activities need to be coordinated.

Science should be accepted at face value independent of the source.

If it passes peer review, it should be accepted.

The minority views get elevated for balance — how do you verify objectivity?

Where does the "Good Housekeeping Seal of Approval" come from? — EPA doesn't listen to the SAB.

Greater dependence of industry on other organizations for basic research.

Industry R&D money going down — the movement in industry is to define environmental perfection to correcting from the regulatory sense of compliance — industry may feel that it doesn't need R&D.

Who is going to do it? — there will be a need for ORD to develop partnerships.

Will EPA develop incentives for companies to do more research? — there will be a need for follow-up and commercialization.

Are there areas where EPA could be caught off guard by technology?

Genetic engineering issues.

Food quality protection.

Global climate change.

Treaty for preventing significant harm — what does this mean?

Understanding of individual emissions.

Ecosystems focus.

Right now, the focus is on industry.

Surprise environmental disaster.

The “Three Mile Island of global warming.”

Overreaction.

Political “things.”

“Items of the year” — pressures put on EPA for which they are not prepared.

Children’s health and aging.

How could ORD put retired boomers to work? — inviting retired people to do sampling and analysis — partnerships with local community leaders and organizations/coalitions that monitors whole local areas.

Also water sampling and weather.

GLOBE project — school children — peer communication and education.

ORD needs to develop standards for environmental information networks.

Community certification — legitimacy — who can be coordinator — decisions different for each community — provide tools to give guidance to this activity.

Smart growth.

Ties into all environmental issues — we need to do something with growth smarter (i.e., commutes).

If this gets coordinated by a regional authority a process will be needed for guidance/direction as a result of the proliferation of information.

Establishing credibility.

Everyone (states, communities) is going in different directions.

Someone has to be credible enough to set the process, but not set the answer (e.g. how do you assess acid rain for the states).

There is a need for a credible process and measure outcomes.

Green manufacturing.

There are many things that the US doesn't like to manufacture that are made outside the States and brought in — there are few environmental standards that can be applied to the manufacturing process across international boundaries.

ORD needs to give decision makers global impacts.

Global awareness issue.

Attitudes of US and European consumers on biotech foods — US is on the forefront of biotech R&D but may hit a brick wall because foreign markets will be closed unless there is a more credible regulatory watchdog function — there will be a consumer backlash unless there is a safety insurer.

The consumer is beyond data to values.

What does ORD need to acquire in order to meet these challenges?

More scientists.

Award less grants.

60% of ORD will retire in next 10 years.

Can the civil service workforce keep pace with the changes in science and technology?

Diversified staff.

Less pure science — recruit staff with skills in the social sciences, anthropology, statistics.

Globalization — current grad school population.

ORD needs a staff consistent with the credibility that it needs to attain/keep/promote.

Focus on small/local problems.

Sea grass growing, monarch butterfly, fresh water a contaminant to sea water, mercury (mitigation).

Outward focus.

Helping the rest of the world instead of just providing answers/information — training.

Change the organization's structure to put labs where people actually use/need them.

Exposure information/assessment.

While there is hazard information available, there is little information on exposures.

Exposure information is more relevant to controlling/managing risks.

For 30 years, ORD didn't look at indoor exposures, as a result, there is an unrealistic assessment of what the exposures are.

With the increase in bio technology, there will be a need for biomonitoring.

Through advances in technology, GPS, not only will we be able to measure contaminants and exposures, but we will also be able to assess human activity patterns — behavior and exposure.

There is also a need to assess cumulative risk — multiple chemicals in multiple routes of exposure.

Adaptation.

Since we're going to have to adapt, we will need to do more work in understanding and coping with adaptation.

This applies to global climate, as well as other environmental problems/issues.

Group B

Participants

Jim Bus	Chemical Manufacturers of America
H.H. Cheng	Sol Science Society of America
Jim E. Cox	American Society of Heating, Refrigeration, and Air Conditioning Engineers
Charlie Ingram	National Association of State Departments of Agriculture
Suneel Kapur	Department of Energy
Paul M. King	Air and Waste Management Association
David Mongillo	American Petroleum Institute
Steve Nelson	American Association for the Advancement of Science
Nancy Ragsdale	Department of Agriculture — Agricultural Research Service
Don Scavia	National Oceanic and Atmospheric Association
Mary Tamberrino	Marasco Newton Group (Facilitator)
Dan Murray	ORD (Advisor)
Stephanie Hector	Marasco Newton Group (Note Taker)

What will ORD win awards for 15 years from now?

ORD will win an award for understanding environmental issues and for communicating those issues to the world-wide public.

ORD will have developed a process allowing collaboration between government (all agencies), industry, non-governmental organizations, and public stakeholders.

This process includes prioritization of issues and communication to Congress.

Process and decisions are based on the highest quality science.

ORD will have developed and put in a place observing monitoring systems that will allow system scale adaptive management.

ORD will win an award for thorough, advanced planning based on anticipated future events.

ORD's successes in 15 years are linked to decisions made in the next 5 years.

ORD's effort in the years ahead might move away from a chemical focus towards an ecological focus.

ORD will win an award for setting the agenda for environmental science, not reacting to it.

Lead the "science world."

Have scientific community buy into the process of a "new thinking."

What are the trends in science and technology that are going to effect EPA/ORD?

1. Increasing privatization of Research and Development.
 - Commercial driven
 - Product driven
 - Short term
2. Decreasing Scientific Literacy.
 - May lead to an over emphasis on other influences (political, economic, and social), and an under emphasis on science.
3. Rising importance of synergistic effects of media/influences on ecosystems and human health.
4. Emphasis on partnership and collaboration among scientific organizations versus command and control.
5. Integration of multi-disciplinary approaches (hard sciences, social sciences, industry).
 - Issues can't be dealt with alone.
 - It isn't practical for the magnitude of today's issues.
6. Movement away from sole reliance on the single investigator model of research.
 - Academia and regulatory agencies look only at single focused areas, but they need to integrate (in order to get industries, etc. involved) because they are too broad to tackle alone.
 - Problem: industries are buying the universities (privatization of industry).
7. Explosion of IT and Communication Technology.
8. Revolution measurement technologies.
9. Computing capacity.
 - Scientists are limited to the computers capacity in several aspects.
10. Challenge of interpreting and digesting data.
 - Verify results of model with reality (e.g., chemical effects on cancer).
11. Amount of science needed to understand risk assessment is exploding.
 - e.g., Food Quality Protection Act (FQPA) — demands placed on EPA went beyond what science was ready to provide.
12. Need differently trained scientists.
 - To reflect trends, not today's obstacles.

13. Collision of science and technology are not compatible.
Technology is very fast, science needs more time to interpret.
Technology outruns the science.
Scientists are not given the time and energy because they are so flooded with information due to technology.
14. Career reward systems don't allow flexibility.
Science becomes so short sighted because of funding and granting systems (e.g., publications favor small, quantitative not integrative problems that are not breakthrough).
Incremental science is low risk and greatly funded, while breakthrough science is high risk and not funded enough.
15. Funding paradigm is detrimental.
The funding paradigm for research must change.
Geared towards political needs (especially Congress).
Fund science that brings in money (what the sponsors want to fund—e.g., corporations).
16. Need to develop communicating science, not just “data-dumps.”
Ability to come to an understandable bottom line rather than just dumping information.
Communication is a huge problem.

How can EPA address and adjust to these trends?

Develop, capture and use networks and tools to collect, monitor and develop data.
Capture the tools that are being created by academia and put towards EPA use.

ORD can produce a framework to gather, understand, and interpret data.
Must be able to determine relevant data.

Go beyond media-specific stove pipes and force integration.
Funding initiatives may be an option.

Taking longer term perspective, rather than just a few years.
The problem here is the pressure from the budget system.

Think seriously about the alignment of staff.
Will require hard decisions.
Is current staff trained for future science.
Can address this by establishing connections with other agencies (strategic partnerships) to use their skill sets complementarity.
Mechanism to do the above:

OSTP (build upon this).
Congress funding non-contradictory initiatives.
Bring down the initiative to the bench level.
Focus on the science that will lead to sustainable use of technology.

ORD focus on research that supports policy and stay away from product driven.

(Pertaining to Trend 1) ORD reach out more to private sector.
Discuss priorities and focus to lead to non-duplication of efforts.
Ability to use information more quickly and efficiently.
Relates to setting agenda.

(Pertaining to Trend 2) ORD needs to participate in a consortium to address scientific literacy.
Study by NAS?
Addresses on two levels:
Kids.
Adult learners.
Go beyond information dissemination and give the public cogent material.

(Pertaining to Trend 3) Put science in place to evaluate technologies and their adverse impact and benefits.
Must use open-ended science to evaluate technologies.
Must work with other agencies to do so.

(Pertaining to Trend 6) Make scientists look at integrative issues.
Funding may help.
Change the reward system and then use it (reward with real money).
Avoid being self-contained by reaching out to the scientific community.

(Pertaining to Trend 7) Take information and convert it into knowledge and the share that knowledge .
Go beyond that science to system approach — accountability and implications — scale up models to fit other variables.

(Pertaining to Trend 11) ORD needs to establish safe risk levels.
Go beyond noting the risk of any single chemical.

(Pertaining to Trend 12) ORD needs to establish traineeships modeled on different skill acquisitions.
Must be in small numbers.
Hard to change faculty.
University model.
Must start small.
Again, must realign the funding paradigm and the reward issue.

(Pertaining to Trend 13) ORD needs to help communicate science in order to keep science in the forefront along with technology.

Must be a consistent role for science in ORD.

ORD must declare that science is important so that the message is clear.

Final Thoughts

EPA has to believe that ORD can provide them with decisions on science and the regulatory process.

ORD must still sell themselves to EPA for credibility.

Group C

Participants

Thomas Casadevall	U.S. Geological Survey
Mary-Ellen Devitt	LGU Agriculture and National Resource
Dave MacKenzie	North Eastern Regional Association of State Experimental Station Directors
Peter Ortner	National Oceanic and Atmospheric Administration
Ari Patrinos	Department of Energy
Susan Turner	American Chemical Society
Tom Sinks	Centers for Disease Control, Department of Health and Human Services
Joe Willmore	Marasco Newton Group (Facilitator)
Linda Tuxen	ORD (Advisor)
Tara Galloway	Marasco Newton Group (Note Taker)

Where do you see ORD fifteen years in the future?

Maintaining links with other scientific, state, universities and federal agencies.
ORD will function as a key player in the mix.

EPA will move toward broader environmental issues (i.e., agriculture).

EPA will enable sensible and creative biotechnology and flora adaptation (i.e., sequestration).

ORD will improve their risk assessment role in the future with accurate exposure to:
Human susceptibility.
Change in population.
Precision of the risk assessment model.
Validate models.

Looking at short- and long-term trends through establishing a Council for Environmental Quality.
EPA will have a new role with broader issues (i.e., land use) — identifying gaps with trends and establishing what we know as compared to what we need to know.

Enabling sensible and creative regulation for biotechnology and mediation.

Working with ORD instead of region offices.
ORD could establish different offices strong programs with top scientists.

Encouraging regulation on sound data, balance, and risk.

Attracting top flight scientists as researchers for employment (“pure” v “applied”).

ORD needs to increase visibility of environmental science among students. The work must be stimulating.

ORD scientists have an obligation to relay a particular role to the public.

ORD must communicate research to broader community public.

ORD needs to redefine risk management education.

The majority of the chemists will be immigrants to the US.

Working in the area of social economic research.

ORD must have the ability to answer technical questions.

Is ORD responsible for social economic research? If not, who is?

What will the trends in science and technology be in the next 15 years?

Integration of USGS disciplines.

Information technology should be integrated into existing schemes (i.e., salt and sea in California).

Integration of disciplines and experts to solve problems is also necessary.

Integration of technologies and science.

In the future we will have a real time monitoring system with the integration of technology.

Information systems will advance sensors.

There will be a form of human tracking, such as DNA on a chip which will be implanted in humans.

Science must be more interdisciplinary and expand over a larger scale.

Social economic topic is important in respect to the scientific impact.

Expansion of socioeconomic issues especially relating to GPRA.

Development of energy efficient alternatives to fossil fuels.

Renewable resources and alternative fuel sources will be established.

Globalization.

Internet access will become more universal.

Intelligence and understanding of information will impact globally.

Environmental Ethics/ Justice ORD must be ethical counsel.

The majority of the chemists will be immigrants to the US.

Data standardization must be collected and merged more effectively.

Ninety-five percent of the relevant data collection is done outside EPA by private or municipal sector and never entered a universal system.

Compliance funding will increase at state level.

Increase in live tissue and genetics of Eco-system components for understanding diversity.

Precision with exposure to genetic disposition.

Increase in technology and education for the general public.

The development of an environmental report card/environmental monitoring.

Questions still remain as to when this will be done, who will participate and, where data will be collected.

Further advancement of transportation technology.

New energy technologies for transportation.

Fewer drivers and more telecommuters.

Establish intelligent highways.

Nuclear technology must consider the low dose rates.

Need for basic research that deals with cleanup.

Technology should be available.

Need for better communication and education.

There may be questions regarding less/more nuclear use.

Opportunity for ORD to construct a population lab.

ORD will play a major role in population intervention and refining technology for human health.

Instead of moving to the suburbs the population will move back toward the city, reverse sprawl.

ORD will have a better understanding of human health risks.

Merge risk management and risk assessments.

Predictive of risk exposure.

Utilization of military capabilities for civilian purpose.

For example, a global sensor scale or remote sensor of the earth could be developed to look at hundreds synoptic photos of the globe.

Expansion of Digital Sensing Information.

Agricultural will experience more precise treatments of land with remote sensing technology.

Global agricultural demand for food use, we will seek out agricultural land all over the world.

Precision of land treatments — we currently treat the field the same with monitoring and mapping contents in the soil.

Biotech agricultural/biosystems for a waste pharmaceuticals.

Agricultural production will either increase in intensity or expand over a larger area.

Invasive species will impact international trade resulting in extreme consequences.

Green Chemistry — less chemical pollution.

Chemists will learn how to move more toward green chemistry by recycling chemicals and redesigning them to non pollutants.

Environmental Refugees.

Mass migrations might occur as a result of water availability, climate change and environmental degradation around the world — individuals will seek new places to live.

There is a question as to how prepared we are to deal with this.

Increased precision on climate issues.

Industry will be forced to act by government.

What new skills and capabilities must ORD obtain to be successful in the future?

Molecular biological advancement.

Systems science and complex systems emerging.

Incorporation of social-economics.

Data base management, infomatics, IS development.

Establishment of a cross disciplinary liaison.

Additional hiring of communications specialists.

Policy research analysts.

Economic impact capabilities.

Global perspective skills.

Possible ORD coordinated foreign presence.

State Department is a poor mechanism for international representation.

Establishment of an embassy on global issues.

Global presence equals identifying new technology for EPA's programs.

Investigation of ORD's role as researchers or "The Science Agency."

Must have a focused role in the future.

Must keep eyes and ears open for advancements outside the US.

Establish a definition for R&D role.

Group D

Participants

David Blockstein	Committee for the NIE
Kerry Bolognese	National Association of State Universities and Land Grant Colleges
Joe Bordogna	National Science Foundation
John Festa	American Forest and Paper Association
Mike Miller	Electric Power Research Institute
Paulo Cezar Pinto	Pan American Health Organization
Greg Planicka	National Environmental Policy Institute
Mark Reeves	Oak Ridge National Laboratory
Jack Sullivan	American Water Works Association
Debi McGhee	Marasco Newton Group (Facilitator)
Jay Messer	ORD (Advisor)
John E. Lawrence II	Marasco Newton Group (Note Taker)

It is 2014 and ORD has just won an award for excellence from the National Academy of Sciences. What did ORD win the award for?

Excellence in research that enabled the inciting of harm avoidance.

As a result, there is no need for ORD's type of research and ORD has been put out of business.

Improved risk assessment.

ORD improved risk management technology via chemical and biological technology's flexible ways of improving assessment and remediation.

Leading programs holistically — health and ecological.

Using integrated assessments and focus on legitimate priorities.

Refocusing research programs on high priority risk programs (i.e., multiple risk integration).

Improving quality of life sustaining environments.

Develop a set of indicators devised to show better quality of life.

Working with industry sectors to solve technological problems through sponsored research.

Developed and implemented a science and education plan for the EPA workforce.

Provide a scientific basis for environmental stewardship; incentives; flexibility; compliance and monitoring measurements.

Creating an effective, long term environmental monitoring activity adapted world wide — a report card on the environment.

What are the trends in science and technology? How did (can) ORD/EPA get to the point of winning an award?

ORD's role as an industry focal point/facilitator.

Become a planning, monitoring, controlling research organization- look outside - take advantage of academia and other resources; get out of research itself.

EPA scientists need to be the ones to guide the research of the industry and other agencies.

Coordination, partnerships with private sector, working groups, training, interagency partnerships.

Create cooperative research units with universities.

Industry, academia and government need to work together more efficiently.

ORD needs to focus on development and coordination with other areas of the industry.

Focus research on policy issues - let others do specifics on technologies; incentives; policy and training.

Create a permanent database of key stakeholders (internal and external) and contact on a regular basis.

Become a service center for states and localities.

Provide better communication, guidance and context to key stakeholders.

Link research and education within the agency.

Provide leadership to lead the creation of databases.

Main theme — ORD should take on a stronger leadership role

ORD's role should be to set the standards for the industry.

ORD should be the focal point for the private sector, the public sector, and the academic community.

ORD should look at trends in science to help establish their mission rather than focusing on the crisis of the day.

ORD processes/procedures

Perform research through competition (open research to the open market place).

Facilitated collaboration/collaborative competition.

Aggressive investment in monitoring.

Develop a computational tool for modeling chemical to release ratio.

Resource planning focused research.

Use and leverage IT advantages.

ORD should look to the future in determining direction rather than “dealing” with the crisis of the day.

Create incentives for industry for harm avoidance.

Shift from a standard regulatory mode to a philosophical one to help obviate regulation once it is “no longer necessary.”

ORD leadership should encourage cross fertilization of program offices.

Collect, monitor and analyze information. The actually use it. (Helpful in predicting trends).

ORD should be involved in the development of and application of IT tools.

Main theme — defining ORD's role within the scientific industry.

Removing scientists from ORD's staff and research from its agenda would help to define the leadership role they agreed that ORD should take.

Focusing on establishing processes and procedures is more advantageous than trying to overlap actual research.

It may be necessary to retain scientists in order to give credibility to any recommendations ORD might make.

An organization of bureaucrats may not inspire any confidence from the scientific community in ORD's leadership ability.

Miscellaneous

Microbial issues need to be addressed.

Biology and chemistry need to be connected — ecological and human health concerns.

Use virtual reality to show the public how environmental issues effect the public.

Create a measuring instrument for individuals — easily transported — education about what these numbers would mean to the individual.

Develop an understanding of what is happening on an individual basis and then combine into a broad based goal.

Main theme — specific ideas for ORD actions for helping to define its leadership role.

Help the general public understand their goals via strong IT presentations.

Determine better ways to integrate biological and chemical research as it deals with the goals of ORD and EPA.

Appendix C:

**Lunch Keynote Speaker
Dr. Rosina Bierbaum**

Lunch Keynote Speaker

Dr. Rosina Bierbaum

White House Office of Science and Technology Policy

The most important challenges the U.S. will face in environmental protection are:

1. Climate Change — understanding, mitigating, and adapting to it.
2. Protecting Biodiversity and Ecosystem Integrity.
3. Water Quality and Quantity.
4. Limiting Impact of Natural Hazards.
5. Protecting Air Quality.
6. Decreasing Exposure to Toxins.
7. Stratospheric Ozone Depletion.

Approaches to dealing with these challenges:

1. Interlinkages — move away from thinking in a single agency/single industry mind set, from being reactionary to being anticipatory — sustainable development.
2. Scale — study problems at the appropriate level (local/regional/global) and apply the appropriate tools.
3. Study Extremes — evaluate the tails of problem distribution (e.g., causes of droughts, floods, storm surges, pest outbreaks) to understand thresholds.
4. Consequences — determine what changes in the ecosystem mean to society and translate them into societal relevance.
5. Partnerships — define research agenda and research outcomes in concert with stakeholders (e.g., Particulate Matter Standard Revision, Endocrine Disruptors).
6. Assessment — determine the known and unknown, develop near and long term strategies to address the unknown, inform policy makers on how to manage given unknowns, and increase the public's scientific literacy. Assessment will become increasingly important as problems relate to each other and become more complex.

Common themes identified on emerging environmental issues:

Increase in problem complexity.

Increase in interrelation of problems.

Need to investigate cumulative effect on the ecosystem caused by different environmental problems.

Need to look at the impact of the sum of regulations on the ecosystem.

Need to think about the overlay of climate change and ecosystem loss.

Need to develop an multi-media approach to address interdisciplinary and anticipatory issues.

Appendix D:

Break-Out Session #2
“Trends in Environmental Protection”

Group E

Participants

H.H. Cheng	Soil Science Society of America
Cheryl Morton	Chemical Manufacturers Association
Mark Reeves	Oak Ridge National Laboratory
Susan Turner	American Chemical Society
Tom Sinks	Centers for Disease Control, Department of Health and Human Services
Pat Tallarico	Marasco Newton Group (Facilitator)
George Alapas	ORD (Advisor)
Karen Weiss	Marasco Newton Group (Note Taker)

What are the economic, social, and political trends impacting environmental protection?

Urge for the right to know.

Initially this trend started because of the lack of support for EPA — EPA wasn't doing its job and the public could do it better; once information was provided, it snowballed into the desire for more and more information.

Stakeholders, including industry and environmental, community, and local groups are demanding information not just on chemicals and pollutants, but on their effects as well. Information has created a competitive environment — measure of how we're doing — knowledge is power and the more data becomes public, the more it will be used.

There has also been a movement from individual interest to group/collective interest — States and citizens groups are banding together (e.g. Minnesota environmental impact studies) and their need for information is driven by the whole rather than individual.

Implications of “Urge for Right to Know” for EPA/ORD:

There will be more demand for useful/understandable information; right now there is a lot of information, but it is not very well integrated.

There will be a need for forethought on usefulness of the data; right now there is little priority given to how the data will be used at the outset — data collected for compliance.

Pressure to have information more timely — there is a need real time information — EPA's data is very old (3-5 yrs).

ORD needs to have a clear role in the appropriate use of the data and its interpretation — using information in the context within which it was developed and setting some parameters in the design of the experiment.

Political priority-setting.

Politicals identify specific issues that they're interested in and drive the EPA's resources to those priorities — this may not be the best way to set priorities.

Sometimes the right to know is used to legitimize the political activity and priority setting

There is also the use of the “environment” as a political means to drive EPA.

Increasing importance of international agreements.

Globalization and biodiversity.

Increasing control by states.

In some cases, states are being given some authority to run programs that were once federally run (e.g., welfare reform).

In the states that control environmental regulations, there may be more than one party conducting research.

This may be positive with the more the more people doing the research, the better — opportunities for involvement are good, rather than a top-down one size fits all solution.

This situation may not be cost efficient and may end up with competing models.

Including more in research than just risk assessment.

Need for ORD/EPA to prove itself in the area of strong/sound science.

EPA made industry comply with regulations, the question is where is the science foundation behind the regulations.

GPRA is a good example of demonstrating the output.

Evaluation makes sense—determining effectiveness, making improvements, demonstrating that what your doing is the right thing.

In many cases, the right to know is answering the question of how effective we are.

Environmental questions are complex and in many cases, the technical side isn't key — it the sociological parameters of acceptance are — information needs to be put into context.

Need to integrate the social considerations into the analysis.

Community concern/affected parties — problems become apparent in litigations — who is going to pay for what.

Technical revolution in science.

Having science catch up with advances in instrumentation.

Issues with how we communicate/get information across.

There are implications for staffing, funding, and the technical side of science and communication.

Influence of the media.

Traditionally, the media picks up the horror stories, not that steps have been taken to make the environment cleaner/safer.

There are implications for ORD/EPA in terms of training media/public relations people and providing information on “big picture” issues and leaving other issues to states/locals.

EPA should have a higher level, overall focus, providing big picture information — how priorities are identified, developing a National Environmental Research Agenda.

EPA should also be able to develop some kind of guidelines in order to bridge the gap between EPA priorities (big picture) and state/local priorities (specific actions) so that every group is not developing their own guidelines and standards.

Export of businesses.

Moving businesses to other countries to have less stringent environmental regulations.

Effect of good economic conditions and the university situation on EPA.

In a time of a good economy, it will be very difficult to keep good scientists.

In addition, universities are finding it very hard to get good research support — funding is for short-term projects and the schools are not able to support/fund domestic graduate students — as a result, there will be more international students, because their governments will support them.

The implication for ORD is that this pool of international graduate students is its future staff.

In addition, university research is not individual science now, it's team-based — it is also not geared in the way to look at things like 30 year effects.

Greater attention on the research funding area.

Funding more long-term projects — ensuring pool of future science is adequate — how it can be more effective in getting things done.

ORD needs to look at the balance of extramural/intramural funding and coordination — mission vs. future (building constituency vs. building pool of scientists) — today's group of scientists is based on what was available for funding in the past 30 years.

Environmental Justice.

ORD/EPA role — to understand where we are, look into different options — R&D fits with Environmental Justice in terms of exposure assessment and differential susceptibility.

Individual behavior.

People want a clean environment, but they don't want to change their own behavior.

While the government won't regulate behaviors, EPA/ORD could develop education and outreach programs (e.g., radon).

One possibility is for ORD to grow a behavior lab to work with all the program that have concerns about social concerns in light of regulations.

Preventing emerging problems.

How can we manage our resources so that we prevent problems and develop options to avoid the problems in the first place.

How do we decide when to stop the program — when we do not need to focus on the program any more, and redirect funds to another.

Attributional fraction analysis — describe data that tell us how chemicals play a role in disease/death/cancer — percentage to environment — environment, air, water, pollution — cancer is not the only endpoint — others include reproductive, asthma.

Ecosystem vs. human protection.

What is viewed to be most beneficial?

Some view people as part of the environment — there is a tension that EPA is using this more and more to gain resources and to develop its programs and there are people out there that would protect the environment without regard to people.

The trend toward human health and away from ecosystem protection has been a conscious choice.

There is also a tension between animal rights and research, although new technologies may minimize this.

Non-traditional areas.

Redirect resources toward some non-traditional areas like suburban sprawl, agriculture, and global climate, or capitalize on other agencies that are doing this research (e.g., urban runoff far exceeds impact from farm runoff — runoff travels right onto sidewalk and into river — build a good framework and database for urban runoff information).

ORD may need to come up with the technical solutions — individual organizations will not do it unless they are regulated — ORD could use economic incentives for use (e.g., CRADA — Cooperative Research and Development Act).

Global economics.

This is the driver for the agreements we get into, not regulation.

There is a need to develop some knowledge and technology transfer/sharing or economic incentive.

World population issues.

If we want to deal with environmental issues on a global level, population has to be addressed. Countries like India and China have concerns about population growth and its impact on the environment, but the U.S. will not address this issue.

Pace of research.

The pace of research in the U.S. is faster than other countries.

Sharing technology/research (most of the time via the Internet) with the world — puts some U.S. companies at a competitive disadvantage, especially when information is generated at the company level — why should we do all of the work and not be able to take full advantage of it.

ISO 14000.

Are we being driven to environmental protection by standards in which we are not a player in the development.

Should EPA/ORD be involved to get our ideas in there.

In order for ORD to collaborate in examining the standards (most of these standards are business practices — innovative tech being used by industry), ORD could consider partnerships with World Bank, State Department, other countries in terms of a two-way exchange of tech transfer, best practices.

What are the top priorities/most critical drivers as seen by the group?

Big picture — national research agenda.

Research funding areas.

Evaluation effectiveness — in conjunction with right to know.

International agreements.

Behavior change — how to influence as opposed to regulate.

Group F

Participants

Christopher Bernabo	RAND Environmental Science and Policy Center
David Blockstein	Committee for the NIE
Gaylen Camera	American industrial Health Council
Mary-Ellen Devitt	LGU Agriculture and Natural Resource Science and Faculty
Allan Ford	American Chemical Society Task Force on Environmental Research
Charlie Ingram	National Association of State Departments of Agriculture
Michael Miller	Electric Power Research Institute
Steven Nelson	American Association for the Advancement of Science
Ari Patrinos	Department of Energy
John Sullivan	American Water Works
Mary Tamberrino	Marasco Newton Group (Facilitator)
Dan Murray	ORD (Advisor)
Stephanie Hector	Marasco Newton Group (Note Taker)

What are the major trends developing over the next 15 years that are relevant to environmental protection(include social, economic, and political)?

Globalization.

Environmental research is poorly supported globally.

There is limited use of United States regulations vis a vis global issues.

Currently, science is regulatory and limited to the United States, but that must change because the whole world is involved in science and invention.

There is a declining power of the Nation State and the balance of power in multi-national organizations is changing.

The evaluation of power is moving from the federal government to the state government.

Genetic engineering.

Works in this field will include such topics as bio-remediation, biological process control, and biotechnology versus chemical technology.

Movement away from use of government-money to market-driven money.

Environmental research is becoming an incentive-based, niche market.

EPA/ORD should look for a fee structure to pay for environmental protection, but still look to the federal government for research.

Margin of error for activity related to environmental research will be smaller because the pressures are much greater.

Competition for natural resources

e.g., Alaska is exporting tankers full of water to China at the expense of ecological factors).

Improved predictive capabilities.

We must use the improved predictive capabilities that will result from scientific advances (except maybe econometric ability).

It is important that value is added to the collected data.

Other federal agencies will continue to be major players in environmental protection and in R&D.

Environmental protection is in the mission of most agencies (e.g. energy, interior, agriculture, etc.).

Supply and demand for environmental protection is abundant.

NASA and DOD have had the largest budgets for environmental protection.

Capacity of information technology is improving.

For example, inter-layering complex data is now possible on desk top computers.

Reduced cost has made equipment more accessible to all. (Both graduate and undergraduate students have amazing research capabilities.)

Diverse scientific workforce.

The workforce will continue to be diverse because more than 50% of the U.S. population is born outside the country, therefore bringing globalization to schools and the scientific community.

Civil accountability.

The decentralization concept is further enhanced.

Will lead to diversification.

High focus on accountability (i.e., Congress may stifle research).

Risk taking in research has declined because only successes are rewarded.

Changing demographics of United States and world population.

The education level (declining), age distributions, and the number and size of households are results of changing demographics.

The mix of world decision making is getting enormously broad.

There is increasing influence on developing countries.

Nationally, we are experiencing a population movement as well (Sun Belt).

What implications will these driving forces have for EPA/ORD?

EPA will only be one entity in environmental protection.

Information sharing and collaboration.

Differentiation of roles.

EPA/ORD needs to be a better player in the international arena.

Cooperative agreements (example- European community has a compatible agency- lets work with them).

Have global context in everything that they do.

There is going to be a much greater need for science.

Accommodate diverse needs for information.

Accommodate for more decision makers — at different levels — with different needs.

Different information will be needed the more global things become.

EPA/ORD needs to get involved in understanding the environmental issues of genetic engineering.

EPA/ORD must understand the activities of the other federal agencies, and then act in accordance with what they do, rather than in competition.

Perhaps interagency grants.

Don't want to compete with other agencies missions (waste of time and money).

ORD's Strategic Planning Goals need to be developed in conjunction with the goals of other agencies.

EPA/ORD needs to create mechanisms for renewable intellectual capital.

Refresh staff via interagency personal activities.

Trades with industry and international communication.

EPA must take advantage of the intellectual knowledge and capacity of scientists as a whole.

EPA needs to tap into and synthesize accumulated knowledge that exists across the nations.

EPA/ORD should improve communication to the public on science issues, and on the implications of their findings.

Tell public how it effects them.

Hire people to communicate the data to local people in lay language (need scientific extroverts).

Needs to be written in public documents as well as in scientific journals.

EPA/ORD needs to find ways of listening to the public.

Communication works two ways.

EPA/ORD needs to help the public differentiate between perception of risk and true risk.

A gap can affect overly restrictive regulations.

What will different stakeholders need from EPA/ORD (Industry, State/Local Governments, Tribes, NGOs, International Organizations)?

ORD needs more clout in EPA (i.e., regulation setting).

Sound science needs to be sound.

EPA's credibility is susceptible because they are the "police".

Need environmental information that they can trust and are able to understand where the science comes from (understand that it has not been manipulated).

ORD needs more independence from EPA.

EPA/ORD needs an open decision making process.

Will enable people to see the pure scientific information that went into decision-making.

Will reduce distrust.

Promote the feeling that regulations are justified with their own science and data.

Need pure, ubiquitous, and apparent peer-reviewed process (this has improved).

Address lagging perception of ORD (based on old reputation).

Perception of EPA is always behind the reality of ORD.

Intellectual resources for state/local government and industry.

EPA should be part of, but not the sole participant of federal environmental information consortium.

Host sabbaticals.

Consult with industry.

Need a link to more information.

Need to have a continuation of a strong EPA library system.

Public Outreach.

Need a regular process for communication.

Identifiable people as liaisons.

Periodic opportunities for constituents to be asked about needs.

EPA/ORD must report back to constituents on meeting their needs.

EPA should strive to be permeable/accessible, not a "Black Box."

Industry (agribusiness) wants collaboration and trusting work relationships to achieve voluntary compliance.

If they give information to EPA/ORD, they want that information protected, not used against them.

Recognize role of regulations.

Establish a research agenda that drives into the future.

Research needs to drive regulations (not visa versa).

Group G

Participants

Kerry Bolognese	National Association of State Universities and Land Grant Colleges
Jim Cox	American Society of Heating, Refrigeration, and Air Conditioning Engineers
David Friedman	American Forest and Paper Association
Suneel Kapur	Department of Energy
Dave MacKenzie	North Eastern Regional Association of State Experimental Station Directors
Paulo Cezar Pinto	Pan American Health Organization
Nancy Ragsdale	Department of Agriculture/Agricultural Research Service
Joe Willmore	Marasco Newton Group (Facilitator)
Linda Tuxen	ORD (Advisor)
Tara Galloway	Marasco Newton Group (Note Taker)

What type of trends do you see in the next 10 years for environmental protection?

Increase of population growth.

Impacts of transportation, waste, and pathological organisms.

Industry being environmentally enlightened with profits in their economic interests.

Some problems with using alternatives to regulation (e.g, attorneys).

More standard setting and efforts to reach standard setting through voluntary efforts.

Taxes on pollution, carbon tax, and incentives for lack of pollution.

Technology trends.

Market forces may drive technology (i.e., carbon tax energy intensive industries to push technology toward solutions).

There will be partnership for new vehicle technology.

An increase in technology could lead to global competition.

DOE and OIT are pushing for energies of the future — energy star programs.

Technology is there but something needs to be done to push it into the market.

Information technology provides tools for EPA foundation to solve problems — increase in computer modeling.

Global issues will be the dominant factor in more international work.

Establishment of an Environmental Report Card.

Access to information will be astounding.

We need a better educated public — good citizenship — civic responsibilities — educate public that achieving zero risk in relation to health is impossible.

There will be more access to information, the key will be determining how to make it usable. Educational institution and the public will be more involved.

Diverse client groups with access to information.

Water, air, and food related groups.

Clients will link their research to the effects on human health.

Prioritizing problems will be essential.

Universal dissemination of electronic information.

Currently, it is not easy to get information from ORD.

NOAH has improved its database.

There is a need for a systematic method to obtain information (and not through personal relationships).

There is also a need for better communication through EPA Divisions.

Information will be less one way in the future.

Less work for stakeholders and greater benefit from stakeholder involvement.

Potential regulatory actions.

Less adversarial relationships.

Peer review.

Integrate analysis review or key indicators for collaboration/links.

EPA is accountable to stakeholders.

GPRA will shift accountability issues, force measures, and impact dollars.

How does research deal with all of these trends? Are agencies favored over the other?

Environment will prosper and R&D will be a priority.

ORD must stay current.

Industry R&D currently decreasing in funding other sources for R&D in the future.

Most industries take research and apply it.

However, some research is moving more toward private sector.

The global trend may result in dramatic changes in how the government manages R&D.

Many federal agencies will have to find their niche in the environment.

There will be less long term research.

GPRA will drive research to the short term and something dramatic will happen as a result.

There will be no major structural changes within the Federal system.

EPA could address this through coordination of research efforts across agencies.

Overlap might be a good thing — all agencies have their own research needs.

Organization theory problem — there may be solutions to this.

There will be more risk driven risk perception assessments.

There will be more multi-disciplinary centers and partnerships.

More public and private collaboration on research.

International collaboration on environmental research.

Interesting competition between large and small grant programs could arise.

What should ORD do in the future?

Develop a staffing plan for the next 15 years.

Purchase equipment in regard to information technology.

Develop high speed transmission systems.

Partner with other organizations.

Establish a liaison sector.

Establish industry groups (i.e., DOE).

Enhance outreach capabilities through strategic partnerships with extensions (stakeholders) because the network is there.

Establish stakeholders involvement process.

Collaborate with agriculture ecosystems work — pesticides and concentrated animal feeding operation.

The cost of research will drive collaboration.

Develop think tank for population problem.

Support more long term research growth with a grant program.

Support NSF budget and grants for extramural research.

Sell long term value for what states can not provide.

Plan for multi-disciplinary research.

Incorporate economic and social sciences.

Train good managers.

Utilize national labs to solve problems.

Recruit interdisciplinary and more diverse staff.

Environmental justice bigger priority.

Global work force will be able to help address international linkages.

Consider how work will change.

Result of information technology — More analytical software, more team work.

Virtual organisms.

Improve research in space and technology.

Group H

Participants

Jim Bus	Chemical Manufacturers of America
Tom Casavedall	U.S. Geological Survey
Marge Cavanaugh	National Science Foundation
Steve Cohen	Society of Toxicology
Paul King	Air and Waste Management Association
Mosi Kitwana	International City/County Management Association
Peter Ortner	National Oceanic and Atmospheric Administration
Greg Planicka	National Environmental Policy Institute
Debi McGhee	Marasco Newton Group (Facilitator)
Jay Messer	ORD (Advisor)
John E. Lawrence II	Marasco Newton Group (Note Taker)

“What are the social, political, and economic trends in environmental protection over the next 15 years?”

Social Trends.

Movement away from a chemical impact perspective (also need to look at human impact perspective).

A shift in emphasis to coastal issues?

Expansion of urban areas, look at air, water, and land use.

Need for education of the public. Enhance education and education needs.

The public will continue to look to the government for guidance and regulation.

Link scientific literacy and the prospect of scientific literacy (becoming more active in promoting science to the public).

Industry looking at using recycle analysis more.

The public is not/may not be willing to pay for the cost of environmental protection..

Political Trends.

The chemical industry needs to assume some responsibility.

State and local involvement will be increased by tapping state and local knowledge, getting feedback from those entities to set the national agenda.

The civil accountability of industry is not necessarily bringing about good scientific discovery.

Civil accountability is happening, however not necessarily to the benefit of the environment.

The industry has become and will continue to be a global one.

Environmental protection is a global issue and will continue to grow.

An increased role for EPA/ORD to provide expertise to the local levels — building capacity — EPA as a facilitator — the agency will contribute to a process that is started at the state and local level.

Economic Trends.

Environmental issues are driving trade issues and markets and other economic decisions.
Industry looking at using recycle analysis more.
The lack of funding is forcing agencies to share.
The industry has become and will continue to be a global on.
Environmental protection is a global issue and will continue to grow.
The incremental cost of reaching the next lever will be great.
The public is not and may not be willing to pay for the cost of environmental protection.
The public is not willing to pay for the cost of environmental protection.
The concentration of people is going to continue to effect environment
Clean fuel cell technology.

What are the implications for EPA? ORD?

EPA will need to become an advisor to the industry.
ORD will need to do a better job with communications.
Develop stronger partnerships with other agencies.
Shift in workforce expertise.
Need employees to be flexible, team oriented communicators, globally oriented.
There will be a need to export ORD/EPA expertise to other countries.
Encourage companies to become more involved with the environment and industry.
Development of better monitoring systems helps to improve quality of data.
Better measurement tools and goals can spur voluntary compliance.
More real-time monitoring can help to prevent certain trends.
More and more data available; unsure how to handle it all.
Science will have to be broader thinking. Don't focus just on single risk.
Difficulty in recruiting and retaining qualified personnel.
ORD scientists should go out into the schools to help communicate the scientific issues.
Team based training.
There needs to be some kind of common rule of measure for the different types of media.
Examine the potential for risk reduction.

What are the prospects of harmonization between the industry and political encouragement? Or how do we get by the single media focus?

Look at different funding mechanisms (private sector dollars can be recruited with valuable information).
Need to think beyond incremental thinking. Look at the larger picture.
Need to form interdisciplinary teams. Create teams that don't just focus on one discipline.
Help to create a broader view of implications from findings.

Appendix E:

**Wrap-Up
Advisors' Summary of
Break-Out Sessions #1 and #2**

Break-Out Session #1 — “Trends in Science and Technology”

Advisor Observations

Group A

Science must be credible.
People want to know what the science means.
Individual variation/susceptibility important.
Thinking is going global.
Collaboration/cooperation expected.

Group B

Public expects EPA to be a science leader.
Need for balanced program.
— short/long term.
— basic/applied.
Expectation for expanded expertise.
Information explosion will present challenges.

Group C

Focus will be on a global scale.
Science needs to be defined broadly.
Public expects better data collection, management, and communication.

Group D

Public expects EPA to lead environmental science partnership.
Anticipate problems; avoid harm.
Focus on highest science priorities.
EPA should lead environmental monitoring, information technology, and education.

Break-Out Session #2 — “Trends in Environmental Protection”

Advisor Observations

Group E

Performance Measurement — need to demonstrate effectiveness.

Balanced Portfolio.

— health vs. eco.

— in-house vs. extramural.

— big picture vs. short-term.

Next generation of scientists.

— funding support for new Ph.D.’s.

— new skill mix needed.

— ability to relate to public, educate.

Urge for “right to know.”

— more users of environmental data.

— want real-time information.

— gather data with use in mind.

Group F

Globalization — multinational companies, instant communication, changing demographics.

Shift of “power” — from federal government (EPA) to states, local, “community” groups.

GPRA rules — scrutiny of ORD research could drive ORD to “low risk” applied research over “high risk” basic research.

What will ORD need to do?

Be a more informed, active, and leading player in federal environmental research.

Be more active internationally.

Better communicate the use of its research.

Provide scientifically “pure” input to EPA.

Be a technical resource to states, locals, decision-makers.

Institutionalize communication with stakeholders to get input and provide feedback.

Group G

Increase of ecological stressors due to population rise; impacts of population growth on all systems (human waste/transportation/land use/habitat/pathological organism outbreaks).

Research to address complex multi-media environmental problems through multi-disciplinary approaches and multi-organization partnerships.

Research on global issues, but while the responsibility is global — the accountability is to the American taxpayer.

Group H

What is measured is managed (TRI).

Build state and local technical capacity — tech transfer.

Chemical threats will become relatively less important than growth/biology.

Globalization of environmental protection.

Rely on partnerships.

ORD science skills for 2000 — flexible, team-oriented, communicator, global viewpoint.