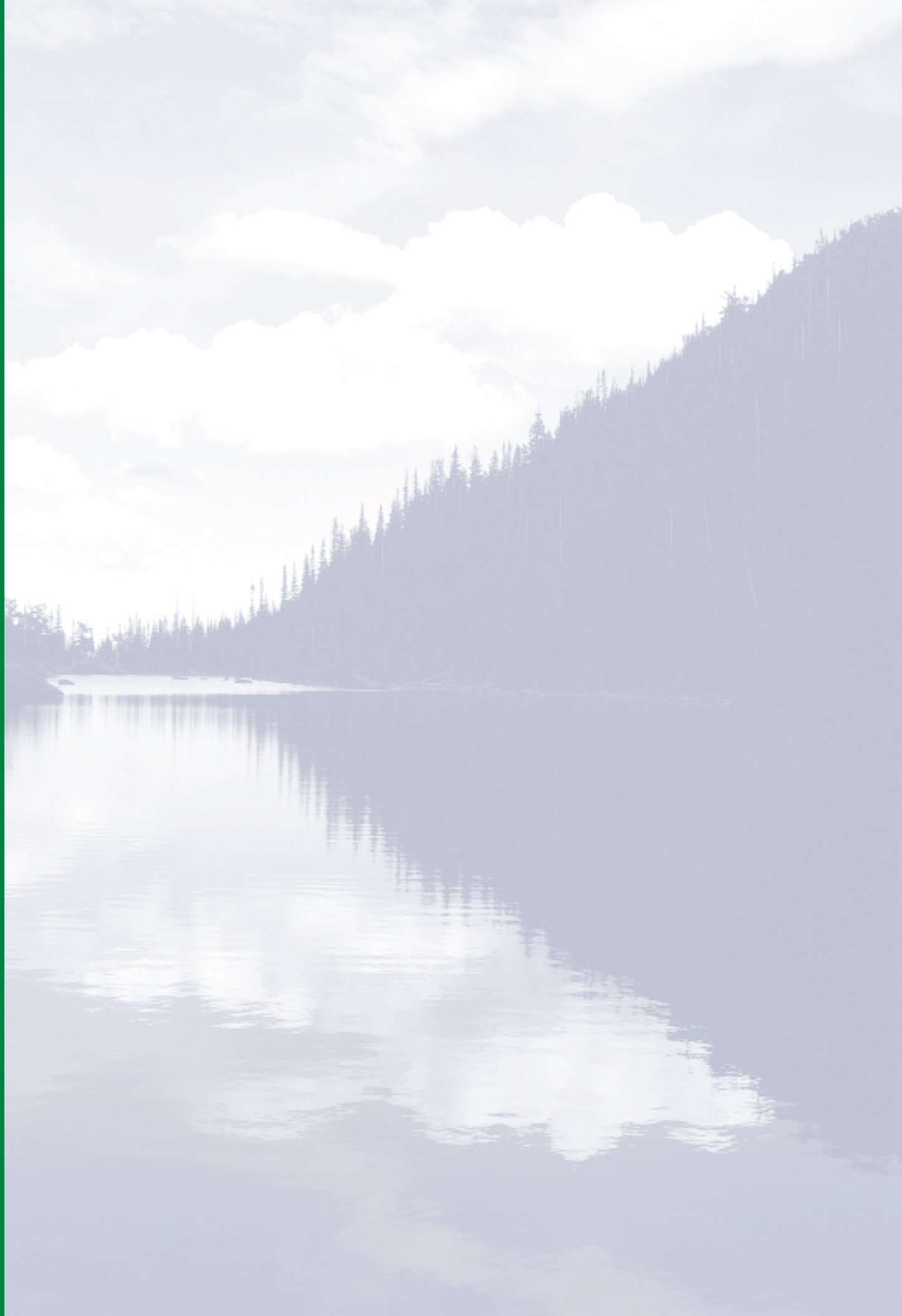


US EPA ARCHIVE DOCUMENT

# Appendices





# Appendix A: Information Sources and Methodology

This report relies on the cumulative information from a number of sources. The sections below describe these sources with brief descriptions of the methodologies involved in developing them.

## Sponsor's Reports

Project sponsors prepare quarterly, midyear, or annual reports as required by the individual project final project agreements (FPAs). For more information on these reports, please visit EPA's Project XL Web site at <http://www.epa.gov/projectxl>.

## EPA Progress Reports

EPA Progress reports provide an overview of the status of projects implementing FPAs for one year or more. EPA develops these reports with the assistance of the project sponsors and co-regulators; and the stakeholders who are direct participants in the projects have the opportunity to review them. The progress reports include (1) a background section briefly describing the facility's project and anticipated environmental benefits; (2) a description of the regulatory flexibility offered by EPA and other regulatory agencies; (3) a summary of innovations and potential system change; (4) the status of commitments made by the facility; (5) a review of the progress in environmental performance; (6) a summary of the stakeholder involvement for the project; (7) names and organizations of the project contacts; and (8) a six-month outlook section. These progress reports are available on the Internet via EPA's Project XL Web site at <http://www.epa.gov/projectxl>.

## Stakeholder Involvement Reports

In September 1998, Resolve, Inc., prepared a report entitled *Evaluation of Project XL Stakeholder Processes* (EPA-100-R-98-009). This report provided a review of the design and conduct of the stakeholder processes at four of the initial projects (Intel, Weyerhaeuser, HADCO, Merck). The report described the involvement of stakeholders in FPA negotiation and implementation, with information on national and local stakeholder perspectives about their role. It also outlined the various models developed by company sponsors and reported stakeholder perspectives on the processes as gathered in a stakeholder survey.

In 1999, EPA initiated a second extensive evaluation, which was conducted by the Southeast Negotiation Network. Project XL Stakeholder Involvement Evaluation (October 2000) covers eight projects in various stages of negotiation or implementation (Andersen, Atlantic Steel, Witco, ExxonMobil, HADCO, Intel, New England Universities Laboratories, and Department of Defense Vandenberg Air Force Base). It considers the early dynamics of stakeholder processes in projects developing their FPA, stakeholder satisfaction and effectiveness of involvement for projects that had recently signed their agreements, and the status of ongoing involvement in projects that have been underway for at least one year.

## Other EPA Reports

The Project XL Preliminary Status Report (September 1998) examined three projects in implementation for at least one year as of January 1998: Berry, Intel, and Weyerhaeuser. The report covers the projects' initial results on innovation and system change, as well as progress in meeting FPA commitments, stakeholder participation outcomes, environmental performance, and lessons learned.

The Project XL 1999 Comprehensive Report (October 1999) provides an overview of the status of 14 projects, as well as program-wide results and lessons learned. It also presents technical and policy information on 25 innovations sorted by core functions. Information compiled in progress reports, focus groups, stakeholder reports, and other documentation and information gained through the experience of EPA staff is synthesized and described. The report follows up the work started in the Preliminary Status Report.

The Project XL 2000 Comprehensive Report (November 2000) was divided into two volumes. *Volume 1—Directory of Regulatory, Policy, and Technology Innovations* presents the innovations and lessons learned organized by how they relate to the seven core functions that EPA typically performs to carry out its mission to protect human health and the environment. *Volume 2—Directory of Project Experiments and Results* provides a status report of the more than 50 projects and proposals Project XL has supported to date.

## Other Reports

In 2000, the National Academy of Public Administration (NAPA) commissioned independent research studies that assessed innovation efforts by EPA, states, communities and businesses, and others to improve the effectiveness and efficiency of environmental management programs. Environment.gov: Transforming Environmental Protection for the 21st Century, released in November 2000, is a report that summarizes results of 17 research studies, which examined efforts by the EPA, states, communities, businesses, and others to improve the effectiveness and efficiency of environmental protection. The report makes recommendations based on the studies and on other information and recommends to EPA and Congress how to continue the process of innovation, learning, and revitalization of the nation's commitment to environmental protection. One of the reports focused on the Massachusetts Department of Environmental Protection's Environmental Results Program. Presented in Appendix B, Focus Group Highlights, are some adaptations of NAPA's findings with respect to the Environmental Results Program.

## Project Focus Groups

EPA conducted focus groups in December 1998, January 1999, and January 2000 for various projects. Focus group participants included company employees, co-regulator representatives (typically state and local government), citizen and non-government organization stakeholders, and EPA Headquarters and regional staff. Project-specific protocols were distributed to participants prior to each focus group conference call. During the focus groups, participants gave opinions on (1) the ease and effectiveness of the project implementation process; (2) the value of the project to their organization; and (3) the opportunities to apply information gained from the projects more broadly. These are part of an annual program evaluation cycle for Project XL and serve as an opportunity for project participants to provide feedback to EPA on any aspect of their experience in developing and implementing a project. A list of the focus groups and their participants as well as focus group highlights is presented in Appendix B.

## Appendix B: Focus Group Highlights

### Andersen Corporation

FOCUS GROUP CONDUCTED IN AUGUST 1999

| Name             | Organization                                       |
|------------------|----------------------------------------------------|
| Andrew Ronchak   | Minnesota Pollution Control Agency                 |
| Kirk Hogberg     | Andersen Corporation                               |
| Libby Johnston   | Andersen Corporation                               |
| Jon Bloomberg    | Bloomberg & Podpeskar (Andersen Counsel)           |
| Jim Kellison     | Chair, Andersen Stakeholder Committee              |
| Carol Wiessner   | Minnesota Center for Environmental Advocacy        |
| Brian Barwick    | EPA Region 5                                       |
| Rachel Rineheart | EPA Region 5                                       |
| Mark Kataoka     | EPA Office of General Counsel                      |
| Carol Holmes     | EPA Office of Enforcement and Compliance Assurance |
| Nancy Birnbaum   | EPA Office of Reinvention                          |

### Issues Needing Resolution

- Certain stakeholders were concerned that Andersen was not accountable to the Community Advisory Committee (CAC) and that the CAC needed greater opportunity to develop overall goals of the stakeholder process.
- Certain stakeholders wished that their concerns not directly related to the XL project would have been more thoroughly addressed during the XL discussions.
- It has been difficult to adequately explain technical aspects of the project to CAC members.
- One stakeholder emphasized that the generally positive reception to the project by the CAC was due mainly to the fact that the CAC membership was weighted in favor of Andersen supporters.
- MPCA prefers a more extensive role in developing and implementing XL projects.

- Furnishing participants with an outline and the goals of the project, a detailed time line, and a description of what to expect from the stakeholder involvement process at the beginning of the project would have been valuable.

### Lessons Learned

- EPA noted that Andersen's ability to listen and react to community concerns helped make the stakeholder involvement effort a success.
- It is important for stakeholders to understand their roles in the stakeholder process.
- One stakeholder emphasized that the CAC's complete access to information was very important and led to a greater trust in the stakeholder process.
- EPA should have spent more time explaining to stakeholders the reasons its review process continually delayed project development.
- EPA decision-makers must be well informed and prepared to participate in key decisions in order for projects to develop in an effective and timely manner.
- Face-to-face meetings appear to have been more effective than electronic and telephone communications.

## Atlantic Steel Site, Jacoby Development Corporation

FOCUS GROUP CONDUCTED IN 1999

| Name             | Organization                                                                           |
|------------------|----------------------------------------------------------------------------------------|
| Mike Brandon     | Chairman, Home Park Community Improvement Association                                  |
| Dan Cohen        | City of Atlanta, Principal Planner, Current Planning                                   |
| Connie Cooper    | EPA, Region 4                                                                          |
| Michelle Glen    | EPA, Region 4                                                                          |
| Brian Hagar      | Sierra Club                                                                            |
| Brian Leary      | Project Lead, CRB Realty (Jacoby)                                                      |
| Shannon Powell   | Midtown Alliance                                                                       |
| Randy Roark      | Urban designer and manager of the Home Park Charette (Georgia Institute of Technology) |
| Mike Replogle    | Federal Transportation Director, Environmental Defense                                 |
| Bernadette Smith | Home Park Community Improvement Association                                            |
| Tim State        | Home Park Community Improvement Association                                            |
| Tim Torma        | EPA Headquarters                                                                       |

### Issues Needing Resolution

- Major project milestones are slightly behind schedule. Due to minor setbacks, the construction of the 17<sup>th</sup> Street Bridge/Extension has been delayed for a year. Jacoby expects to remain on-track in meeting its scheduled commitments however, and bridge construction is expected to begin in December 2001.

### Lessons Learned

- Since the Atlantic Steel redevelopment project is still in its early stages, the principal lesson to be learned is whether smart growth strategies can be applied to brownfields and transportation projects, such that air quality and other environmental performance can be improved, as part of an overall community revitalization plan.

- A number of stakeholders were not satisfied with the stakeholder involvement process. They felt the process was unclear from the beginning, did not provide a sufficient forum for input, and was managed as a formality. To avoid this problem in the future, Jacoby will sponsor additional public meetings and encourage more direct stakeholder involvement.

## Crompton Corporation

(FORMERLY WITCO CORPORATION)

FOCUS GROUP CONDUCTED IN DECEMBER 1998

| Name            | Organization                                         |
|-----------------|------------------------------------------------------|
| Okey Tucker     | OSi Specialties                                      |
| Tony Vandenberg | OSi Specialties                                      |
| Brenda Gotanda  | Manko, Gold & Katcher                                |
| Lucy Pontiveros | West Virginia Department of Environmental Protection |
| Jon McClung     | West Virginia Department of Environmental Protection |
| Tad Radzinski   | EPA Region 3                                         |
| Beth Termini    | EPA Region 3                                         |
| Nancy Birnbaum  | EPA Office of Environmental Policy Innovation        |
| Sherri Walker   | EPA Office of Environmental Policy Innovation        |
| Jim McKnight *  | Citizen Stakeholder                                  |
| Michele Aston * | EPA Office of Air Quality Planning and Standards     |

\* These persons were unable to attend the scheduled focus group and so were either interviewed separately or asked to submit written comments.

### Issues Needing Resolution

- Crompton incorporated a section into the waste minimization/pollution prevention (WM/PP) study that described regulatory barriers to implementing some of the study's findings, which will need to be addressed.
- Crompton needs to evaluate additional WM/PP opportunities identified in the study relative to other facility projects competing for capital funds.
- Federal and state agency stakeholders expressed interest in seeing greater participation in the XL project from the six surrounding communities. Currently only one community representative is involved in the project, but

EPA and the West Virginia Department of Environmental Protection would like to see a minimum of one representative from each community.

### Lessons Learned

- During the development of the FPA, project participants should:
  - Simplify the process;
  - Show more trust for each other;
  - Involve program offices early and throughout;
  - Meet face-to-face on a frequent basis;
  - Draft the legal implementation document and the FPA at the same time;
  - Keep the FPA simple; put the details in the legal implementation document;
  - Speed EPA Headquarters review times; and
  - Work from drafted language (it is easier than discussing general concepts).
- EPA should encourage other project sponsors to include WM/PP studies in XL projects.
- One stakeholder noted that the key to community participation results from understanding local culture.
- Two community stakeholders noted that it would have been positive if EPA had interacted more with local officials earlier in the project.
- A company stakeholder emphasized that the Crompton XL project provided a means for EPA and Crompton to learn how to work together more effectively.
- For a variety of possible reasons, sometimes community residents simply will not participate in an XL project despite noteworthy efforts made by the project sponsor to encourage it.

## Department of Defense Vandenberg Air Force Base (AFB)

FOCUS GROUP CONDUCTED IN JANUARY 2000

| Name                    | Organization                                        |
|-------------------------|-----------------------------------------------------|
| Monte McVay             | Vandenberg AFB                                      |
| John Gunderson          | Vandenberg AFB                                      |
| Lt. Col. Scott Westfall | Vandenberg AFB                                      |
| Nancy Wilhausen         | Tetra Tech (Vandenberg AFB contractor)              |
| Peter Cantle            | Santa Barbara County Air Pollution Control (APCD)   |
| Jerry Schiebe           | Santa Barbara County APCD                           |
| Dave Romano             | Santa Barbara County APCD                           |
| Ron Tan                 | Santa Barbara County APCD                           |
| Maureen Sullivan        | Department of Defense (DoD), Pentagon               |
| Col. John Coho          | DoD, Pentagon                                       |
| Joe Wilson              | DoD, Pentagon                                       |
| Sara Segal              | EPA Region 9                                        |
| John Walser             | EPA Region 9, Air Office                            |
| Will Garvey             | EPA Federal Facilities Restoration and Reuse Office |
| Walter Walsh            | EPA Office of Environmental Policy Innovation       |

### Issues Needing Resolution

- As of January 1999, the identification of 10 tons of emission reductions was behind schedule. After further evaluation and research for emission reduction opportunities from stationary sources, Vandenberg AFB calculated that this goal would not be achieved with the remaining budget and milestone schedule. Therefore, on August 25, 1999, Vandenberg AFB presented an alternative proposal to meet this goal, which includes the purchase of 12 tons of emission reduction credits (ERCs) from another source with the balance of Environmental Investment (ENVVEST) program funds to be applied to Vandenberg AFB's Mobile Source Reduction Program.
- Vandenberg AFB is updating the original emissions reduction plan submitted to the District pursuant to the first FPA milestone requirement. The original plan was partially approved by the District on February 28, 1998. This

plan is being updated to reflect inclusion of the alternative implementation strategy and will be submitted to the District in the fall of 2001. The purchased ERCs will be applied to the fifth program milestone. Upon receipt of the updated emission reduction plan, the District shall be asked to review, approve, and forward the plan to EPA Region 9 for inclusion in the State Implementation Plan (SIP) for the purpose of fulfilling ENVVEST program goals. In January 2002, EPA Region 9 will be forwarded the final emission reduction plan for review. The review and SIP approval process could take several months.

- Overall EPA, participating Vandenberg AFB personnel and board members of both the Citizens Advisory Board (CAB) and Community Advisory Council (CAC) were satisfied with the process leading up to the signing of the FPA. However, CAB and CAC board members expressed interest in seeing greater opportunities for citizen involvement.
- During FPA development, EPA was concerned about the heavy reliance upon preexisting Vandenberg community boards, which possibly precluded participation of citizens not associated with the base or county agencies.
- One stakeholder expressed a desire to see an increased level of communications between stakeholders as well as more lead time for stakeholders to consider ideas and proposals affecting the project.
- Due to staff shortages in EPA Region 9, there has been a decreased amount of stakeholder communication and facilitation activities undertaken by the region for this project.
- Since Vandenberg AFB's pollution prevention manager had to spend most of his time on XL/ENVVEST during the first 18 months of the project, there were other pollution prevention opportunities the base could not pursue.
- Even though the project is designed to significantly reduce, if not eliminate, the possibility of citizen lawsuits, the potential for them created anxiety among those in DoD wanting to try innovative approaches.
- The FPA negotiation process needs to be streamlined. The involvement of too many people slowed negotiations, and the DoD chain of command is long. Support from EPA and DoD headquarters offices is important during initial negotiations.
- Participants need to know early in the negotiation process their roles and responsibilities and understand which regulations cannot be changed.
- Active support from EPA Headquarters is needed throughout implementation.
- The project probably could not have happened without the EPA/DoD Memorandum of Agreement.
- The FPA allows for continued flexibility during project implementation, which will help in overcoming obstacles.
- True research and development is costly and time consuming.
- There is a perception by many other DoD installations that the ENVVEST program is a tool for avoiding Title V requirements, though this is not the case.

### Lessons Learned

- From the DoD perspective, the cost of developing the project was very high and may ultimately outweigh the benefits. This happened, in part, because this was the first XL/ENVVEST project.
- EPA and DoD have different approaches to, and definitions of, stakeholder involvement.
- The concept of federal facilities broadening community involvement beyond cleanup and restoration is worthwhile.

- The different public stakeholder advisory board members felt the stakeholder involvement process was a success. Overall, they felt that the issues were reasonably straightforward and that the project as a whole did not require their intense review.
- Early on, one environmental group expressed concerns about the proposed elimination of the facility's Title V major source status. The group was soon after satisfied with Vandenberg AFB's response to the questions and concerns raised and decided not to participate further in the project.
- Vandenberg's positive reputation in the community may have reduced nearby community members' interest in the project.
- One stakeholder emphasized the need to ensure that the stakeholder group more accurately reflects a cross-section of the community.

### Lessons Learned

- EPA had difficulty obtaining agreement from its internal enforcement offices during the development of the FPA. Internally, EPA must be able to balance the priorities of the XL program offices with the priorities of the enforcement office.
- Some of the environmental reporting requirements are seen as excessively burdensome and could be streamlined. EPA has since suspended the quarterly status reports because the minutes from the monthly stakeholder meetings provide sufficient information.
- Hosting more than one public meeting to identify stakeholders and technical experts would have been useful.
- The community gained confidence in ExxonMobil through its willingness to interact with the community. The quick, candid dialogue with the stakeholder panel facilitated this trust.
- Certain stakeholders felt that more time should have been spent at the beginning of the project to clarify the roles of the stakeholders participating in the process.
- It can be difficult to identify all parties and the decision maker for each party wishing to participate.
- One stakeholder noted that if agreement is reached regarding what the contaminated site will be used for before or during the site investigation and removal stages, the amount of time needed for the removal and remediation process can be reduced.
- Projects can run more smoothly and efficiently with organized stakeholder involvement.

## ExxonMobil Corporation

FOCUS GROUP CONDUCTED DECEMBER 1999

| Name               | Organization                                  |
|--------------------|-----------------------------------------------|
| Art Chin           | ExxonMobil USA                                |
| John Hannig        | ExxonMobil USA                                |
| Tom Bass           | West Virginia DEP                             |
| Melissa Pennington | EPA Region 3                                  |
| Michael Cummings   | Fairmont Community Liaison Panel              |
| Nick Fantasia      | Fairmont Community Liaison Panel              |
| David Nicholas     | EPA Headquarters                              |
| Katherine Dawes    | EPA Office of Environmental Policy Innovation |
| Greg Ondich        | EPA Office of Environmental Policy Innovation |
| Ian Penn           | EPA Office of Environmental Policy Innovation |

### Issues Needing Resolution

- One stakeholder noted that the required environmental reports do not keep up with the actual work taking place and therefore cannot serve as EPA enforcement records.
- Inability to determine whether a nearby artificial wetland can legally be removed has caused delays.

- One stakeholder emphasized the need to have buy-in from all major parties before moving further into the stakeholder process.
- Electronic reporting provides real-time communication and expedites review.
- Another stakeholder emphasized the value of having experts from different agencies involved to enable the community to better understand the different issues.

## HADCO Corporation

FOCUS GROUP CONDUCTED DECEMBER 1998

| Name                 | Organization                                                  |
|----------------------|---------------------------------------------------------------|
| Lee Wilmot           | HADCO Corporation                                             |
| George Frantz*       | EPA Region 1                                                  |
| Ken Rota*            | EPA Region 1                                                  |
| Aleksandra Dobkowski | EPA Region 2                                                  |
| James Sullivan       | EPA Region 2                                                  |
| Ken Marschner        | New Hampshire<br>Department of Environmental<br>Services      |
| Larry Nadler         | New York State Department<br>of Environmental<br>Conservation |
| Sam Sage             | New York Local Stakeholder                                    |
| Suganthi Simon       | EPA Office of Reinvention                                     |

\* These persons were unable to attend the scheduled focus group and so were either interviewed separately or asked to submit written comments.

## Issues Needing Resolution

- HADCO must improve communications with its stakeholder by providing them with information on the sludge tests and analysts.
- Although the delisting process has been delegated to the regions, regional staff will continue to need the expertise of Headquarters delisting staff during the implementation of the HADCO project.
- Putting contracts in place between HADCO and appropriate metal smelters is taking longer and is more complex than anticipated. Waste

processors and metal smelters seem to be part of a horizontally integrated market, leading to delays in HADCO obtaining the new contracts necessary to implement the project.

## Lessons Learned

(FROM FOCUS GROUP DISCUSSIONS IN JANUARY 1999)

- Waste processors and metal smelters seem to be part of a horizontally integrated market, leading to delays in HADCO obtaining the new contracts necessary to implement the project. Attempts to put contracts in place between HADCO and appropriate metal smelters were more complex than anticipated.
- Due to a delegation of the delisting process from EPA Headquarters to EPA regions, the delisting process was greatly streamlined from an average of four to six years to an average of 180 days. Therefore, HADCO no longer needed to rely on the XL process to expedite the delisting request.
- This experiment would have greatly benefited from an up-front analysis of the economic and administrative structures of the copper recycling and reclamation market.

## Lessons Learned

(FROM FOCUS GROUP DISCUSSIONS IN DECEMBER 1998)

- Data collection has taken more time than anticipated.
- Clear project goals outlined in a pre-proposal phase will provide for a smoother negotiation process and shorten the time spent on developing the FPA.
- Clear lines of communication and a decision-making process should be established early on in the negotiations and should be understood and accepted by all project participants.
- Stakeholder outreach and education should be as extensive as possible to attract stakeholders and ensure their continued participation.

- The project structure should have been planned in more detail to ensure that complete interaction was achieved between all parties. Since the project involves multiple jurisdictions—two states, two EPA regions, and EPA Headquarters—some participants felt as though their necessary involvement was not always appropriate.
- Stakeholders want more resources (e.g., paid travel) in order to be better involved and more knowledgeable about the different facilities involved.
- The use of communications technology, such as teleconferencing, is a valuable asset for a project that may involve multiple facilities in different locations and may serve to increase involvement of private citizens.
- EPA Headquarters' knowledge of Resource Conservation and Recovery Act (RCRA) waste regulations was important to project negotiations and will continue to be important during project implementation.
- Involvement of EPA's upper management can help move negotiations along and can improve the decision-making processes.
- Building a consensus among the involved EPA offices at critical junctures of a project must be effectively facilitated by EPA Headquarters to sustain project momentum.

### Intel Corporation

FOCUS GROUP CONDUCTED IN DECEMBER 1998

| Name              | Organization                                |
|-------------------|---------------------------------------------|
| Jim Larsen        | Intel Corporation                           |
| Gregg Workman     | Arizona Department of Environmental Quality |
| Jo Crumbaker      | Maricopa County, Arizona                    |
| Pat Sampson       | City of Chandler, Arizona                   |
| Barbara Knox      | Community Advisory Panel                    |
| Jim Lemmon        | Community Advisory Panel                    |
| David Matusow*    | Community Advisory Panel                    |
| Colleen McKaughan | EPA Region 9                                |

FOCUS GROUP CONDUCTED IN DECEMBER 1999

| Name              | Organization                                  |
|-------------------|-----------------------------------------------|
| Jim Larsen        | Intel Corporation                             |
| Steve Brittle     | Local Citizen                                 |
| Jim Lemmon        | Local Citizen                                 |
| Greg Workman      | Arizona Department of Environmental Quality   |
| Jo Crumbaker      | Maricopa County, Arizona                      |
| Pat Sampson       | City of Chandler, Arizona                     |
| Colleen McKaughan | EPA Region 9                                  |
| Katherine Dawes   | EPA Office of Environmental Policy Innovation |

\* These persons were unable to attend the scheduled focus group and so were either interviewed separately or asked to submit written comments.

### Issues Needing Resolution

(FROM FOCUS GROUP DISCUSSIONS IN DECEMBER 1998 AND DECEMBER 1999)

- Certain stakeholders feel that Intel has limited their influence over the project. For example, Intel's decision to change from using arsenic to arsine gas in one of its processes was made without consulting the stakeholder team. Several stakeholders noted that more consultation would have been appropriate.
- Certain local industries have noted that not being granted the same regulatory flexibility as Intel is unfair. Some wish to be granted the same level of regulatory flexibility, without necessarily going through the same process. However, several stakeholders strongly object to such action.
- Some stakeholders would prefer that a greater emphasis be placed on water consumption and waste minimization instead of water recycling and waste reduction.
- Most stakeholders believe that greater public participation would improve the project. However, several barriers have prevented this, including lack of time, appropriate level of technical understanding, and resources (including funds for citizen reimbursement and technical support).

- One stakeholder had major concerns about the public availability of timely and detailed information on process changes initiated by Intel. While the specific concern was addressed by Intel through sharing more detailed information about the process change, the stakeholder is still uncomfortable with the long-term implications of this form of public participation. The stakeholder wants more technical details to be available to the public, as well as the technical assistance to interpret it, so that the community can evaluate the potential impacts on health and the environment and influence the company's decision-making process for choosing among different available technologies or chemicals.
- Except for the small stakeholder team, the public has not shown interest nor attended public meetings. While there is speculation as to why this is the case (the project is too technical in nature for sustained interest; the sponsor already has the broad trust of the community regarding the project; the public does not have enough access to information in order to be active), the reasons for this trend are not yet well understood.
- Stakeholders stated that project reports could be improved by more narrative descriptions of the company's Design for the Environment commitment, the basis of the air quality standards, and the water and hazardous waste portions of the project.
- There are continuing stakeholder concerns about the state standards, (i.e., the Arizona Ambient Air Quality Guidelines), as applied to the fence line standards used for the project.
- It is important to set ground rules and deadlines at the beginning of the stakeholder process and to make efforts to ensure that all stakeholders fully understand them.
- FPA development could have been expedited if earlier in the process public stakeholders had received education and training on environmental terminology and issues and on the technical and business characteristics of the semiconductor industry.
- Public stakeholders report high costs in terms of their personal time, since they are volunteers.
- Without ongoing technical assistance, the general public's ability to understand the impacts of the project's changes on human health and the environment is limited.
- Through the process of developing the agreement, Intel and the regulatory agencies have developed a better understanding of stakeholder concerns and resource needs to participate in environmental projects.
- The air permit approach is probably applicable to other semiconductor manufacturing facilities, but might not be practicable for facilities that experience frequent changes in air emission levels.
- In reference to the introduction of SDS arsine technology, citizens noted that the FPA process worked the way it was intended.
- Report centralization is a good practice.

## Lessons Learned

(FROM FOCUS GROUP DISCUSSIONS IN DECEMBER 1998 AND DECEMBER 1999)

- Stakeholder concerns can be addressed by providing sufficient information. For example, even though stakeholders were notably concerned about Intel's decision to switch to arsine gas, stakeholder concerns were relieved after Intel made considerable efforts to address them.

## Jack M. Berry, Inc.

FOCUS GROUP CONDUCTED IN DECEMBER 1998

| Name           | Organization                                   |
|----------------|------------------------------------------------|
| Charlie Fast   | Cargill, Inc.                                  |
| Ernie Caldwell | Jack M. Berry, Inc.                            |
| Jacki McGorty* | Florida Department of Environmental Protection |
| Chad Carbone*  | EPA Office of Environmental Policy Innovation  |
| Michelle Glenn | EPA Region 4                                   |
| Zylpha Pryor   | EPA Region 4                                   |

\* These persons were unable to attend the scheduled focus group and so were either interviewed separately or asked to submit written comments.

### Lessons Learned

- Ultimately, for the Berry project to have gotten back on track, each organization involved would have had to make a new or renewed commitments, with well-defined roles and responsibilities of each partner and a new clear time line for accomplishing the various tasks involved.
- While the organizations involved had different perspectives about the project's implementation, all of them agreed on the following: testing the Comprehensive Operating Permit (COP) concept is *still* a good idea; FPAs for XL projects need to describe the steps that should be taken by the signatories should a change in a facility's owner or operator occur; and EPA needs to clarify XL's incentives to attract and maintain the interest of a small business like Berry.
- For all XL projects, the commitment of all parties, the division of responsibility, and timelines must be very clear from the beginning. Also, the EPA and state regulators must make an accurate assessment of the resources available and the internal capabilities of company to implement the project.
- If a facility management and changeover occurs during a project, the EPA and state regulators must start working with the new company as soon as possible to ease the project's transition.

- XL FPAs must include language that spells out the time frame for making a decision about proceeding with the project when the management of the facility changes.

## Massachusetts Department of Environmental Protection (MA DEP) Environmental Results Program

(ADAPTED FROM RESEARCH PAPER FOR THE NATIONAL ACADEMY OF PUBLIC ADMINISTRATION IN JUNE 2000)

### Issues Needing Resolution

- EPA has been working with MA DEP on its application for delegation of Environmental Results Program (ERP) dry cleaning programs pursuant to §112(l) of the Clean Air Act (CAA). The Massachusetts ERP for dry cleaners differs from the federal program in that dry cleaners are required to retain records for three years versus the five years required under the federal program. In its application for delegation, MA DEP will be asking the region to make a determination that ERP for dry cleaners is at least equivalent to the federal program on the grounds that the dry cleaning ERP covers a broader universe than the federal program; imposes the use of leak detection devices in addition to the perception method required by federal law; and goes beyond the federal program in requiring dry cleaners to submit annual certifications of compliance under CAA, RCRA, and the Clean Water Act.

### Lessons Learned

- MA DEP found it difficult to develop "pure" performance standards. Many of the regulatory standards resemble general permits or those with source-specific standards. These standards are based on technology or performance, or some of both.
- Building on the success of the Massachusetts Printing Partnership, MA DEP's effort to include a more complete universe of firms in each sector has leveled the playing field between firms complying with regulations and those that have gained a competitive advantage by ignoring their regulatory responsibility.

- Stakeholder relationships are important. MA DEP's involvement of stakeholders was key to getting the ERP program off the ground. The initial design group consisted of members of EPA, environmental advocacy groups, business and industry, consulting firms, and the legal community. However, after the first 18 months the group has not met on a regular basis. In order to sustain ERP, MA DEP has recognized the need for continued stakeholder involvement and support. As a result, MA DEP has assigned sector managers to develop communications plans to improve communication with and among stakeholders after sector implementation.

### Merck & Company, Inc.

FOCUS GROUP CONDUCTED IN DECEMBER 1998

| Name              | Organization                                    |
|-------------------|-------------------------------------------------|
| Ted Jett          | Merck & Co., Inc.                               |
| Stephen Klevickis | Merck & Co., Inc.                               |
| Stephen Tarnowski | Merck & Co., Inc.                               |
| Larry Simmons     | Virginia Department of Environmental Quality    |
| Mike Kiss         | Virginia Department of Environmental Quality    |
| Christi Gordon    | National Park Service, Shenandoah National Park |
| Betty Sellers     | Elkton Community                                |
| Cecil Rodrigues   | EPA Region 3                                    |
| Robin Moran       | EPA Region 3                                    |
| Nancy Birnbaum    | EPA Office of Environmental Policy Innovation   |

FOCUS GROUP CONDUCTED IN JANUARY 2000

| Name        | Organization                                  |
|-------------|-----------------------------------------------|
| Ted Jett    | Merck & Co., Inc.                             |
| Greg Ondich | EPA Office of Environmental Policy Innovation |
| Eric Marsh  | EPA Office of Environmental Policy Innovation |

### Issues Needing Resolution

- It is unclear how this project will address the recently issued pharmaceutical Maximum Available Control Technology (MACT) requirements. Merck, EPA, and the State of Virginia are working to ensure that XL project flexibility gains can continue under these recently issued regulations.
- Because the facility-wide caps do not place an individual subcap on volatile organic compounds (VOCs), the community and National Park Service are concerned about the potential impacts of increased VOC emissions. Actual VOC emissions will be tracked closely, and VOC impact analyses will be updated as needed.
- Stakeholders believed that it was premature to try to identify barriers to project implementation in 1998, since Merck's Prevention of Significant Deterioration (PSD) permit has just been issued by the Commonwealth of Virginia.

### Lessons Learned

- Technical support for community stakeholders is needed early in the process.
- EPA needs to communicate clear goals at the beginning of project development negotiations.
- Third-party facilitation would have helped the negotiation process.
- Transaction costs for community stakeholders were particularly high.
- An incentive-based permit provided Merck with the motivation to purchase the lowest emission technology available.
- Community stakeholders felt that they were not included in some crucial negotiations.
- For this XL project, stakeholders did not anticipate the delay in securing a natural gas supply. Nonetheless, the conversion was completed before the August 2000 deadline.

Stakeholders caution others to anticipate worst-case scenarios and build in time for potential delays.

- The stakeholders did not anticipate the length of time needed to secure a natural gas supply connection to the boilers. The delay led to more limited interaction between Merck and some of the stakeholder groups, including the National Park Service and local community members, presumably due to a lack of information to report.

## Molex Corporation

FOCUS GROUP CONDUCTED IN DECEMBER 1999

| Name            | Organization                                        |
|-----------------|-----------------------------------------------------|
| Paul Eckerson   | Molex Corporation                                   |
| Bill Gilley     | Nebraska Department of Environmental Quality (NDEQ) |
| Gerardo Talero  | City of Lincoln, Nebraska                           |
| Miles Takaki    | World Resources Corporation (Stakeholder)           |
| Allen Moser     | World Resources Corporation (Stakeholder)           |
| David Doyle     | EPA Region 7                                        |
| Bob Richards    | EPA Region 7                                        |
| Katherine Dawes | EPA Office of Environmental Policy Innovation       |
| Ian Penn        | EPA Office of Environmental Policy Innovation       |
| Mitch Kidwell   | EPA Office of Environmental Policy Innovation       |
| Greg Ondich     | EPA Office of Environmental Policy Innovation       |
| Jim Lounesbury  | EPA Headquarters                                    |
| Marilyn Jude    | EPA Headquarters                                    |
| Christine Mason | EPA Headquarters                                    |

## Issues Needing Resolution

- The two-year temporary variance was set to expire on August 7, 2000. EPA and NDEQ have granted an additional six-month variance. Molex has formally requested a two-year extension to continue the XL project under increased production. A decision by NDEQ and EPA on extending the variance an additional two years is expected after Molex has completed the final report.

## Lessons Learned

- One stakeholder suggested that it would have been more helpful to give EPA Region 7, as opposed to EPA Headquarters, greater responsibility over the project.
- All parties involved in FPA development should know their roles and responsibilities at the beginning of FPA development.
- Late involvement of national groups delayed implementation of the project. However, this may have been avoided if EPA had encouraged national stakeholders to hold discussions with local stakeholders from the beginning of the project.
- One stakeholder noted that the project may have advanced more smoothly if more time was spent up front talking through the issues.

## New England Universities' Laboratories

FOCUS GROUP CONDUCTED IN 1999

| Name            | Organization                                                                  |
|-----------------|-------------------------------------------------------------------------------|
| Tom Balf        | Nexus Environmental Partners (formerly ML Strategies)                         |
| Dan Brannegan   | Pfizer, Inc.                                                                  |
| Kathleen Butler | Community resident, University of Vermont                                     |
| Karen Deady     | Director, Environment, Health and Safety, University of Massachusetts, Boston |
| John DelaHunt   | The Colorado College                                                          |
| George Frantz   | EPA Region 1                                                                  |
| George Hawkins  | EPA Region 1                                                                  |
| Suzanne Howard  | Project Lead, Boston College                                                  |
| Anne Kelly      | EPA Region 1                                                                  |
| Jim Miller      | Massachusetts Department of Environmental Protection                          |
| Ed Schoener     | Ecologia                                                                      |
| Ralph Stuart    | Project Lead, University of Vermont                                           |
| Wayne Thomann   | Duke University                                                               |
| Fay Thompson    | University of Minnesota                                                       |
| Sherri Walker   | EPA Headquarters                                                              |
| Zehra Schneider | University Project Lead, University of Massachusetts, Boston                  |
| Graham          |                                                                               |

## Issues Needing Resolution

- Some lab-based stakeholders believe that EPA has placed too many restrictions that are similar to existing regulations. They would like EPA staff to be more proactive at reducing the constraints that limit creative and innovative solutions for the projects.
- Stakeholders from the national meetings feel that EPA's position on the types of allowable treatment within labs and storage areas, the definition of what constituted a "lab unit," and issues associated with on-site storage and the "arbitrary" 90-day limit for accumulating waste have yet to be successfully addressed.
- There is a lack of participation among external stakeholders, likely due to a lack of stakeholder focus on hazardous waste compared to other issues that involve the campuses and the community members. Efforts continue to be made to involve external stakeholders.
- Some national stakeholders suggested routine updates on project developments or a stakeholder follow-up meeting to keep them updated and more involved.
- Local stakeholders were able to achieve their goal of increasing awareness among laboratory personnel through internal processes.
- Several stakeholders noted that the numerous rewrites of the project agreement were inefficient.

## Lessons Learned

The national meetings were viewed as constructive, meaningful, and important experiences. Most stakeholders involved felt that they were able to contribute effectively.

- The e-mail listserv works to provide internal and external stakeholders with updates and an opportunity to comment both on the XL project and on other health, safety, and environmental topics of interest.
- For discussing particulars of the project and focusing on a dialogue on the project, stakeholders participate more when using a professional conference type format.
- Most environmental groups lack the funds and time to participate extensive stakeholder processes. A stakeholder commented that the involvement by nonprofit organizations was insufficient and suggested that they should be funded in order to more fully participate.

## Weyerhaeuser Company Flint River Operation

FOCUS GROUP CONDUCTED IN DECEMBER 1998

| Name             | Organization                                        |
|------------------|-----------------------------------------------------|
| Frank Wohrley    | Weyerhaeuser Flint River Operation                  |
| Terrell Aldridge | Weyerhaeuser Flint River Operation                  |
| Willard Parker   | Weyerhaeuser Flint River Operation                  |
| Mark Johnson     | Weyerhaeuser, Atlanta, Georgia                      |
| Harland Cofer    | Georgia Southwestern University (Local Stakeholder) |
| David Word       | Georgia Environmental Protection Division           |
| Bob Donaghue     | Georgia Pollution Prevention Assistance Division    |
| Lee Page         | EPA Region 4                                        |
| Michelle Glenn   | EPA Region 4                                        |
| Karrie Jo Shell  | EPA Region 4                                        |
| Nancy Birnbaum   | EPA Office of Environmental Policy Innovation       |

FOCUS GROUP CONDUCTED IN DECEMBER 1999

| Name            | Organization                                        |
|-----------------|-----------------------------------------------------|
| Gary Strandburg | Weyerhaeuser Flint River Operation                  |
| Frank Worhrley  | Weyerhaeuser Flint River Operation                  |
| Mark Johnson    | Weyerhaeuser Flint River Operation                  |
| Gary Risner     | Weyerhaeuser Flint River Operation                  |
| Harland Cofer   | Georgia Southwestern University (Local Stakeholder) |
| Lee Page        | EPA Region 4                                        |
| Steve Shedd     | EPA Region 4                                        |
| Katherine Dawes | EPA Office of Environmental Policy Innovation       |
| Greg Ondich     | EPA Office of Environmental Policy Innovation       |
| Ian Penn        | EPA Office of Environmental Policy Innovation       |

### Issues Needing Resolution

(FROM FOCUS GROUP DISCUSSIONS IN DECEMBER 1998)

- The delays in conducting feasibility studies for the air emissions and part of the solid waste portions of the project have occurred in part because Weyerhaeuser has a set budget and

must prioritize staff time. Also, it takes time to get the permits needed to initiate and conduct the studies.

- Three energy conservation projects—the recovery boiler sootblower system, power boiler advanced controls, and the turbo generator exhaust pressure control—are currently in progress to improve the efficient use of steam in the plant. Weyerhaeuser decreased steam usage in the first half of 2001 and plans to replace the steam-driven chiller in the pulping unit with a more efficient unit.
- At this time, it is not known how much cost savings Weyerhaeuser will gain through implementing the dual emissions cap as a result of facility expansion, because no expansion is planned at this time.

### Lessons Learned

(FROM FOCUS GROUP DISCUSSIONS IN DECEMBER 1998)

- Site visits early in FPA negotiations helped to build trust and educate regulators about facility operations.
- Stakeholders want more education (i.e., technical assistance) early in the FPA negotiation process.
- Including permit language in FPA appendices was very important for smooth implementation of the project commitments by Weyerhaeuser, EPA, and the state.
- Conducting studies on changes to manufacturing processes takes more time than the project participants expected.
- The facility has a set budget, and therefore staff time has to be prioritized for implementing different parts of the FPA, particularly the voluntary and feasibility study commitments.

## Appendix C: Glossary

**300-millimeter Wafers:** 300-millimeter wafers manufactured at a high-volume production manufacturing facility represent a technological advance in semiconductor chips over the standard 200-millimeter (8-inch) wafers that are used in many semiconductor manufacturing plants today. 300-millimeter chips offer over twice as much surface area over the conventional chips and will reduce manufacturing costs per wafer by more than 30 percent.

**Adsorbable Organic Halogens (AOX):** AOX is a measurement of the amount of organic halogens present in water. In paper manufacturing, organic halogens are commonly byproducts of chlorine bleaching processes. The AOX value is expressed in equivalent chlorine.

**Aerobic:** Life or processes that require, or are not destroyed by, the presence of oxygen. (See: Anaerobic.)

**Aluminum Chemical Vapor Deposition Process:** A dry process used by previous generation semiconductor device technologies. Vapor deposition technologies include processes that put materials into a vapor state via condensation, chemical reaction, or conversion and then coat a product with that material.

**Anaerobic:** Life or processes that occur in, or are not destroyed by, the absence of oxygen.

**Area of Contamination (AOC):** A non-discrete land area on which there is generally dispersed contamination.

**Asbestos-Containing Waste Materials (ACWM):** Mill tailings or any waste that contains commercial asbestos and is generated by a source covered by the Clean Air Act Asbestos National Emissions Standards for Hazardous Air Pollutants (NESHAPS).

**Attainment Area:** A designated geographic area considered to have air quality as good as or better than the National Ambient Air Quality Standards

(NAAQS) as defined in the Clean Air Act. An area may be an attainment area for one pollutant and a nonattainment area for others.

**Baseline Standard:** The measure by which future environmental performance can be compared.

**Best Management Practice (BMP):** Methods that have been determined to be the most effective, practical means of accomplishing a given goal.

**Biochemical Oxygen Demand (BOD):** A measure of the amount of oxygen consumed in the biological processes that break down organic matter in water. The greater the BOD, the greater the degree of pollution.

**Biodegradable:** Capable of decomposing under natural conditions.

**Black Liquor:** A byproduct of the paper pulping process; spent cooking liquor that has been separated from the pulp produced by the Kraft, soda, or semi-chemical pulping process.

**British Thermal Unit (Btu):** Unit of heat energy equal to the amount of heat required to raise the temperature of one pound of water by one degree Fahrenheit at sea level.

**Brownfield:** Abandoned, idled, or underused industrial and commercial facilities/sites where expansion or redevelopment is complicated by real or perceived environmental contamination. They can be in urban, suburban, or rural areas.

**Carbon Monoxide (CO):** A colorless, odorless, poisonous gas produced by incomplete fossil fuel combustion.

**Catalytic Oxidation:** Catalytic oxidation is an alternative technology used in selective applications to greatly reduce emissions due to volatile organic compounds (VOCs), hydrocarbons, odors, and opacity in process exhaust. VOCs are thermally destroyed at high temperatures by using a solid catalyst. Catalyst systems used to oxidize VOCs typically use metal oxide.

**Categorical Industrial User:** An industrial user that is subject to national categorical pretreatment standards promulgated by EPA.

**Categorical Pretreatment Standard:** Limitations on pollutant discharges to publicly owned treatment works (POTWs) promulgated by EPA in accordance with Section 307 of the Clean Water Act, that apply to specific process wastewater discharges of particular industrial categories [40 CFR § 403.6 and 40 CFR Parts 405-471].

**Chemical Oxygen Demand (COD):** A measure of the oxygen required to oxidize all compounds, both organic and inorganic, in water.

**Clean Air Act (CAA):** The CAA is the comprehensive federal law that regulates air emissions from area, stationary, and mobile sources. This law authorizes EPA to establish National Ambient Air Quality Standards (NAAQS) to protect public health and the environment.

**Clean Water Act (CWA):** The CWA sets the basic structure for regulating discharges of pollutants to waters of the United States. The law gives EPA the authority to set technology-based effluent standards on an industry basis and continues the requirements to set water quality standards for all contaminants in surface waters. The CWA makes it unlawful for any person to discharge any pollutant from a point source into navigable waters unless a National Pollutant Discharge Elimination System (NPDES) permit is obtained under the Act.

**Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA):** CERCLA is the legislative authority for the Superfund program funds and carries out EPA solid waste emergency and long-term removal and remedial activities. These activities include establishing the National Priorities List (NPL), investigating sites for inclusion on the list, determining their priority, and conducting and/or supervising cleanup and other remedial actions.

**Conditional Delisting:** Use of the petition process to have a facility's toxic designation rescinded.

**Conformity:** A Clean Air Act (CAA) requirement intended to ensure that new transportation investments do not jeopardize air quality in nonattainment and maintenance areas. According to the CAA, no transportation activity can be funded or supported by the federal government unless it conforms to the purpose of a state's air quality plan. An EPA rule describing the criteria and procedures for determining conformity is found in 40 CFR parts 51 and 93.

**Continuous Emission Monitoring (CEM):** Continuous measurement of pollutants emitted into the atmosphere in exhaust gases from combustion or industrial processes.

**Criteria Air Pollutants:** The Clean Air Act (CAA) requires EPA to set National Ambient Air Quality Standards (NAAQS) for certain pollutants known to be hazardous to human health. EPA has identified and set standards to protect human health and welfare for six criteria air pollutants—ozone, carbon monoxide, total suspended particulates, sulfur dioxide, lead, and nitrogen oxides. EPA must describe the characteristics and potential health and welfare effects of these pollutants.

**Dioxin:** Any one of a family of compounds known chemically as dibenzo-p-dioxins. Concern about dioxin arises from their potential toxicity as a contaminant in commercial products. Tests on laboratory animals indicate that dioxin is one of the more toxic synthetic compounds.

**Discharge Monitoring Report (DMR):** Facilities that discharge wastewater directly from point sources to surface waters must submit DMRs under National Pollution Discharge Elimination System (NPDES) wastewater permitting.

**Dredge/Dredging:** Removal of mud from the bottom of water bodies. This can disturb the ecosystem and causes silting that kills aquatic life. Dredging of contaminated muds can expose biota to heavy metals and other toxics. Dredging activities may be subject to regulation under Section 404 of the Clean Water Act (CWA).

**Ecological Risk Assessment:** The application of a formal framework, analytical process, or model to estimate the effects of human action(s) on a natural resource and to interpret the significance of those effects in light of the uncertainties identified in each component of the assessment process. Such analysis includes initial hazard identification, exposure and dose response assessments, and risk characterization.

**Effluent:** Wastewater, treated or untreated, that flows out of a treatment plant, sewer, or industrial outfall. Generally refers to wastes discharged into surface waters.

**Electroplating Operations:** Involves plating various metals onto printed wiring boards and computer components that provide electronic interconnection.

**Emergency Planning and Community Right to Know (EPCRA):** Also known as Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA), EPCRA was enacted by Congress as the national legislation on community safety. This law was designated to help local communities protect public health, safety, and the environment from chemical hazards.

**Emissions Cap:** A limit designed to prevent projected growth in emissions from both existing and future stationary sources from exceeding any mandated levels. Generally, such provisions require that any emission increase from equipment at a facility be offset by emission reductions from other equipment under the same cap.

**End-of-Pipe:** Generally refers to technologies, such as scrubbers on smokestacks and catalytic convertors on automobile tailpipes, which reduce the emission or discharge of pollutants to the environment after they have formed. May also refer to monitoring or sampling activities that occur after pollutants have been formed.

**Engineering Evaluation/Cost Analysis (EE/CA):** The EE/CA is a flexible document tailored to identify and analyze the scope, goals, objectives, and effectiveness of a non-time-critical removal action. It contains only those data necessary to iden-

tify the selection of a response alternative and relies on existing documentation whenever possible.

**F006 Listing:** Wastewater treatment sludge produced from nonspecific electroplating processes and operations designated as hazardous waste under the Resource Conservation and Recovery Act (RCRA).

**Feasibility Study (FS):** Analysis of the practicability of a proposal; e.g., a description and analysis of potential cleanup alternatives for a site such as one on the National Priorities List (NPL). The feasibility study usually recommends selection of a cost-effective alternative. It usually starts as soon as the remedial investigation is underway; together, they are commonly referred to as the "RI/FS."

**Flexible Fuel Vehicle (FFV):** A vehicle specially designed to use multiple fuels, such as methanol, ethanol, and regular unleaded gasoline in any combination from a single tank. The vehicles have a special sensor on the fuel line that detect the ratio of fuels in the tank. The vehicle's fuel injection and ignition timing are adjusted by an on-board computer to compensate for the different fuel mixtures.

**Fly Ash:** Noncombustible residual particles expelled by flue gas.

**Fugitive Emissions:** Emissions not caught by a capture system.

**Gasification:** Conversion of solid material such as coal into a gas for use as a fuel.

**Global Positioning System (GPS):** A precise surveying system based on a set of satellites that orbit about 12,000 miles above the earth. On earth, a hand-held specialized computer, a portable GPS receiver, can receive a signal from a GPS satellite above the horizon. The receiver then calculates absolute position, with accuracy that is usually within a few feet, or better.

**Greenfield:** Greenfields are generally parkland, previously undeveloped open space, or agricultural lands, located near the outskirts of towns, cities and larger metropolitan areas. (See: Brownfield.)

**Hazardous Air Pollutants (HAPs):** Air pollutants that are not covered by the National Ambient Air Quality Standards (NAAQS) but that may have an adverse effect on human health or the environment. Such pollutants include asbestos, beryllium, mercury, benzene, coke-oven emissions, radionuclides, and vinyl chloride.

**Hazardous Waste:** Byproducts of society that can pose a substantial or potential hazard to human health or the environment when improperly managed. Hazardous waste possesses at least one of four characteristics (ignitability, corrosivity, reactivity, or toxicity) or appears on special EPA lists.

**Hydrogen Chloride:** Hydrogen chloride is a non-combustible compound that is highly soluble in water. In aqueous solution, it forms hydrochloric acid. Hydrochloric acid is used to make and clean metals, to make chloride dioxide for the bleaching of pulp and other chemicals, to make phosphate fertilizers and hydrogen, to neutralize basic systems, to treat oil and gas wells, to conduct analytical chemistry, and to remove scale from boilers and heat-exchange equipment.

**Hydrogen Fluoride:** Hydrogen fluoride, or hydrofluoric acid, is a colorless gas or fuming liquid. It is a chemical intermediary for fluorocarbons, aluminum fluoride, cryolite, uranium hexafluoride, and fluoride salts. It is used in fluorination processes, as a catalyst, and as a fluorinating agent in organic and inorganic reactions. It is used to clean cast iron, copper, and brass; remove efflorescence from brick and stone; or sand particles from metallic castings.

**Indirect Discharge:** Introduction of pollutants from a non-domestic source into a publicly owned waste-treatment system. Indirect dischargers can be commercial or industrial facilities whose wastes enter local sewers.

**Industrial User:** Any non-domestic source that introduces pollutants into a municipal wastewater collection system [40 CFR 403.3(h)].

**Influent:** Water, wastewater, or other liquid flowing into a reservoir, basin, or treatment plant.

**Interference:** A discharge which, alone or in conjunction with a discharge from other sources, both (1) inhibits or disrupts a publicly owned treatment works (POTW) and (2) therefore is a cause for violation of any requirement of the POTW's National Pollutant Discharge Elimination System (NPDES) permit (including an increase in the magnitude or duration of a violation).

**International Organization for Standardization (ISO) 14000:** ISO 14000 is primarily concerned with environmental management. The ISO 14000 series sets out the methods that can be implemented in an organization to minimize harmful effects on the environment caused by pollution or natural resource depletion.

**Kraft Mill:** Any industrial operation that uses an alkaline sulfide solution containing sodium hydroxide for a cooking liquor and sodium sulfide in its pulping process.

**Land Disposal Restrictions (LDR):** Rules that require hazardous wastes to be treated before disposal on land to destroy or immobilize hazardous constituents that might migrate into soil and groundwater.

**Lignin:** Organic substance that acts as a binder for the cellulose fibers in wood and certain plants and adds strength and stiffness to the cell walls. It imparts considerable strength to the wall and also protects it against degradation by microorganisms.

**Low-emitting Vehicles (LEVs):** A vehicle that emits 0.075 g, or less, of hydrocarbons per mile.

**Maximum Available Control Technology (MACT):** The emission standard for air pollution sources requiring the maximum reduction of hazardous emissions, taking cost and feasibility into account. Under the Clean Air Act (CAA) Amendments of 1990, the MACT must not be less than the average emission level achieved by controls on the best performing 12 percent of existing sources, by category, of industrial and utility sources.

**Metallization:** The fabrication step in which proper interconnection of circuit elements is made. The act or process of imparting metallic properties to something.

**Methanol:** An alcohol that can be used as an alternative fuel or as a gasoline additive. Poisonous if ingested.

**Methyl Chloride:** A colorless flammable gas. Used in the production of chemicals, as a solvent and refrigerant, and as a food additive. Mildly toxic if inhaled.

**Mobile Source:** Any non-stationary source of air pollution such as cars, trucks, motorcycles, buses, airplanes, and locomotives.

**“The MON”:** The National Emission Standard for Hazardous Air Pollutants (NESHAP) for the source category “Miscellaneous Organic Chemical Production and Processes.” Some examples of these processes are the production of explosives, photographic chemicals, polyester resins, paints, coatings, and adhesives.

**Multimedia:** Several environmental media, such as air, water, and land.

**National Ambient Air Quality Standards (NAAQS):** Standards established by EPA under the Clean Air Act (CAA) applicable to outdoor air throughout the country.

**National Emissions Standards for Hazardous Air Pollutants (NESHAPs):** Emissions standards set by EPA for air pollutants not covered by National Ambient Air Quality Standards (NAAQS) that may cause an increase in fatalities or in serious, irreversible, or incapacitating illness. Primary standards are designed to protect human health, and secondary standards are designed to protect public welfare (e.g., building facades, visibility, crops, and domestic animals).

**National Pollutant Discharge Elimination System (NPDES):** A provision of the Clean Water Act (CWA) that prohibits the discharge of pollutants into waters of the United States unless a special permit is issued by EPA, a state, or, where delegated, by a tribal government on an Indian reservation.

**National Priorities List (NPL):** EPA’s list of the most serious uncontrolled or abandoned hazardous waste sites identified for possible long-term

remedial action under the Superfund program. The list is based primarily on the score a site receives from the Hazard Ranking System. EPA is required to update the NPL at least once a year. A site must be on the NPL to receive money from the Trust Fund for remedial action.

**New Source Performance Standards (NSPS):** Uniform national EPA air emission and water effluent standards that limit the amount of pollution allowed from new sources or from modified existing sources.

**New Source Review (NSR):** A Clean Air Act requirement that State Implementation Plans must include a permit review that applies to the construction and operation of new and modified stationary sources in nonattainment areas to ensure attainment of national ambient air quality standards.

**Nitrogen Oxides (NO<sub>x</sub>):** Air pollutants that are the result of photochemical reactions of nitric oxide in ambient air. Typically, they are the product of combustion from transportation and stationary sources. They are a major contributor to the formation of tropospheric ozone, photochemical smog, and acid deposition.

**Nonattainment Area:** A designated geographic area that does not meet one or more of the National Ambient Air Quality Standards (NAAQS) for the criteria pollutants designated in the Clean Air Act (CAA). (See: Attainment.)

**Non-time-critical Removal (NTC):** Those removals where, based on the site evaluation, the lead agency determines that a removal action is appropriate and that there is a planning period of more than six months available before on-site activities begin.

**Organic Compounds:** Naturally occurring (animal or plant-produced) or synthetic substances containing mainly carbon, hydrogen, nitrogen, and oxygen.

**Particulate Matter (PM):** Fine liquid or solid particles, such as dust, smoke, mist, fumes, or smog, found in air or emissions.

**Pass-through:** A discharge that exits a publicly owned treatment works (POTW) into waters of the United States in quantities or concentrations which, alone or in conjunction with other discharge sources, is a cause of a violation of any requirement of the POTW's National Pollutant Discharge Elimination System (NPDES) permit (including an increase in the magnitude or duration of a violation).

**Perfluorinated Compounds (PFCs):** Compounds in which all the hydrogen atoms are replaced by fluorine. PFCs are greenhouse gases and are expected to have long atmospheric lifetimes.

**Phosphine:** A colorless, flammable gas that is slightly soluble in water. It is used as an intermediate in the synthesis of flame retardants for cotton fabrics, as a doping agent for n-type semiconductors, a polymerization initiator, and a condensation catalyst.

**Plant Site Emission Limits (PSELs):** Facility-based emission caps that allow production changes and facility expansion without recurring air quality permit reviews.

**Point Source:** A stationary location or fixed facility from which pollutants are discharged; any single identifiable source of pollution; e.g., a pipe, ditch, ship, ore pit, factory smokestack.

**Pollution Prevention:** 1. Identifying areas, processes, and activities that create excessive waste products or pollutants in order to reduce or prevent them through alteration or eliminating a process. Such activities, consistent with the Pollution Prevention Act of 1990, are conducted across all EPA programs and can involve cooperative efforts with such agencies as the Departments of Agriculture and Energy. 2. EPA has initiated a number of voluntary programs in which industrial or commercial "partners" join with EPA in promoting activities that conserve energy, conserve and protect water supply, reduce emissions or find ways of utilizing them as energy resources, and reduce the waste stream.

**Potentially Responsible Party (PRP):** A PRP is the owner or operator of a contaminated site, or the person or persons whose actions or negligence may have caused the release of pollutants and contaminants into the environment, requiring a remedial action response under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the Superfund Amendments and Reauthorization Act of 1986 (SARA). The PRP is potentially liable for the cleanup costs in order to compensate the government for its remediation expenditures.

**Premmanufacture Notice:** Section 5 of the Toxic Substance Control Act (TSCA) regulates anyone who plans to manufacture or import a "new" chemical substance for commercial purposes. Under section 5, EPA requires notice before manufacture or importation of non-exempt substances so that EPA can evaluate whether the chemical substance poses a threat to human health or the environment. This notice is called a premanufacture notice (PMN).

**Pretreatment:** Processes used to reduce, eliminate, or alter the nature of wastewater pollutants from non-domestic sources before they are discharged into publicly owned treatment works (POTWs).

**Prevention of Significant Deterioration (PSD):** Standards aimed at keeping areas that are in compliance with National Ambient Air Quality Standards (NAAQS) from backsliding.

**Printed Wiring Board (PWB):** A device that provides electronic interconnections and a surface for mounting electronic components.

**Production Unit Factor (PUF):** A production-based performance measure.

**Radiolabel:** To tag (a hormone, an enzyme, or other substance) with a radioactive tracer.

**Record of Decision (ROD):** A ROD documents the remedy decision for a site or operable unit. The ROD certifies that the remedy selection process has followed the requirements of CERCLA and the National Contingency Plan (NCP) and discusses the technical components of the remedy. The ROD also provides the public with a consolidated source of information about the site.

**Regulated Asbestos-containing Material (RACM):** Under the Asbestos National Emissions Standards for Hazardous Air Pollutants (NESHAP), RACM is defined as (1) friable asbestos material, (2) Category I non-friable Asbestos Containing Material (ACM) that has become friable, (3) Category I non-friable ACM that will be or has been subjected to sanding, grinding, cutting or abrading, or (4) Category II non-friable ACM that has a high probability of becoming or has become crumbled, pulverized, or reduced to powder by the forces expected to act on the material in the course of demolition or renovation operations.

**Remedial Action:** Remedial actions are actions documented in the Record of Decision (ROD) that are taken at National Priorities List (NPL) sites to eliminate or reduce the pollution to levels which prevent or minimize the release of hazardous substances so that they do not migrate or cause substantial danger to public health or welfare, or the environment. An example is to remove hazardous constituents from groundwater using pump and treat technologies.

**Remedial Investigation (RI):** An in-depth study designed to gather data needed to determine the nature and extent of contamination at a Superfund site, establish site cleanup criteria, identify preliminary alternatives for remedial action, and support technical and cost analyses of alternatives. The remedial investigation is usually done with the feasibility study. Together they are usually referred to as the “RI/FS.”

**Remining:** The surface mining of previously mined and abandoned surface and underground mines to obtain remaining coal reserves.

**Remote Monitoring Station:** Self-contained multi-detector electronic instruments installed at remote locations in creeks and other water bodies to assess ambient water quality and detect real-time changes of dissolved oxygen, pH, conductance, and temperature.

**Removal Action:** A short-term federal response to prevent, minimize, or mitigate damage to the public or the environment at sites where hazard-

ous substances have been released. Examples of removal actions are excavating contaminated soil, erecting a security fence, or stabilizing a berm, dike, or impoundment. Removal actions may also be necessary in the event of the threat of release of hazardous substances into the environment such as taking abandoned drums to a proper disposal facility.

**Resource Conservation and Recovery Act (RCRA):** Passed in 1976, RCRA gives EPA the authority to control hazardous waste from “cradle-to-grave.” This includes the generation, transportation, treatment, storage, and disposal of hazardous waste. RCRA also set forth a framework for the management of nonhazardous wastes. RCRA enables EPA to address environmental problems that could result from underground tanks storing petroleum and other hazardous substances. RCRA focuses only on active and future facilities and does not address abandoned sites.

**Safe Drinking Water Act (SDWA):** A law established to protect the quality of drinking water. This law focuses on all waters actually or potentially designated for drinking use, whether from aboveground or underground sources. The Act authorizes EPA to establish safe standards of purity and requires all owners or operators of public water systems to comply with primary (health-related) standards. State governments, which assume this power from EPA, also encourage attainment of secondary standards (e.g., water clarity).

**Semi-chemical Mill:** A mill that produces pulp using a combination of both chemical and mechanical pulping processes, with or without bleaching.

**Sludge:** A semisolid residue from any of a number of air or water treatment processes; this can be a hazardous or non-hazardous waste.

**Sludge Dryers:** A piece of equipment that reduces the volume and weight of the semisolid sludge wastes by drying and reducing the water content of the sludge.

**Smelter:** A facility that melts or fuses ore, often with an accompanying chemical change, to separate its metal content. Its emissions generally cause pollution. “Smelting” is the process involved.

**State Implementation Plan (SIP):** EPA-approved state plans for the establishment, regulation, and enforcement of air pollution standards.

**Stationary Source:** A fixed-site producer of pollution, mainly power plants and other facilities using industrial combustion processes. (See: Point Source.)

**Sulfur Dioxide (SO<sub>2</sub>):** SO<sub>2</sub> gases are formed when fuel containing sulfur (mainly coal and oil) is burned and can be formed during metal smelting and other industrial processes. SO<sub>2</sub> is associated with acidification of lakes and streams, accelerated corrosion of buildings and monuments, reduced visibility, and such adverse health effects as inhibition of breathing, respiratory illness, and aggravation of existing cardiovascular disease.

**Sulfuric Acid:** Sulfuric acid is a clear, colorless, oily, and odorless liquid. It is also known as sulphine acid and hydrogen sulfate. Its main use is in phosphate fertilizer production. It is also used to manufacture other acids, explosives, dyestuffs, parchment paper, glue, wood preservatives, and lead-acid batteries in vehicles. It is used in the purification of petroleum, the pickling of metal, electroplating baths, nonferrous metallurgy, and production of rayon and film; and as a laboratory reagent.

**Superfund:** The program operated under the legislative authority of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the Superfund Amendments and Reauthorization Act of 1986 (SARA) that funds and carries out EPA hazardous waste emergency and long-term removal and remedial activities. These activities include establishing the National Priorities List (NPL), investigating sites for inclusion on the list, determining their priority, and conducting and/or supervising cleanup and other remedial actions.

**Sustainable Forestry Initiative™ (SFI):** The SFI is a comprehensive program of forestry and conservation practices designed to ensure the continuing sustainable management of forestlands. The SFI was developed nationally through the American Forest and Paper Association (AF&PA), whose

members produce 90 percent of the paper and 60 percent of the lumber produced in America today. Compliance with the SFI guidelines is mandatory for AF&PA companies to retain AF&PA membership.

**Title V of the Clean Air Act:** Establishes a federal operating permit program that applies to any major stationary facility or source of air pollution. The purpose of the operating permits program is to ensure compliance with all applicable requirements of the Clean Air Act (CAA). Under the program, permits are issued by states or, when a state fails to carry out the CAA satisfactorily, by EPA. The permit includes information on which pollutants are being released, how much may be released, and what kinds of steps the source's owner or operator is taking to reduce pollution, including plans to monitor the pollution.

**Total Kjeldahl Nitrogen (TKN):** TKN is defined functionally as organically bound nitrogen. TKN is the sum of free ammonia and organic nitrogen compounds which are converted to ammonium sulfate. Organic nitrogen includes such materials as proteins, peptides, nucleic acids, urea and numerous synthetic organic compounds.

**Total Suspended Solids (TSS):** A measure of the suspended solids in wastewater, effluent, or water bodies, determined by tests for "total suspended nonfilterable solids."

**Toxic Release Inventory (TRI):** Database of toxic releases in the United States compiled from "Section 313 reports" required by the Superfund Amendments and Reauthorization Act of 1986 (SARA) Title III.

**Toxic Substances Control Act (TSCA):** A law enacted by Congress in 1976 to give EPA the ability to track the 75,000 industrial chemicals currently produced or imported into the United States. EPA repeatedly screens these chemicals and can require reporting or testing of those that may pose an environmental or human-health hazard. EPA can ban the manufacture and import of those chemicals that pose an unreasonable risk.

**Transitional Low-Emitting Vehicle (TLEV):**

A vehicle that emits 0.125 g, or less, of hydrocarbons per mile.

**Transportation Control Measure (TCM):**

TCMs include a variety of measures used to reduce motor vehicle emissions, primarily reducing the amount of vehicle miles traveled (VMTs). These can include carpool and vanpool programs, parking management, traffic flow improvements, high occupancy vehicle lanes, and park-and-ride lots.

**Variance:** Government permission for a delay or exception in the application of a given law, ordinance, or regulation.

**Vehicle Miles Traveled (VMT):** A measure of the total amount of miles traveled by vehicle within a region.

**Volatile Organic Compounds (VOCs):** Any organic compound that easily evaporates and participates in atmospheric photochemical reactions, except those designated by EPA as having negligible photochemical reactivity.

**Wastewater:** Spent or used water from a home, community, farm, or industry that contains dissolved or suspended matter.

**Wastewater Treatment Sludge:** The sludge that is produced from the treatment and removal of pollutants of wastewater.

**Watershed:** The land area that drains into a stream; the watershed for a major river may encompass a number of smaller watersheds that ultimately combine at a common point.

**“Wet” Demolition Method:** A demolition technique specified in the Asbestos National Emissions Standards for Hazardous Air Pollutants (NESHAPs) requirements to limit the release the asbestos particulates.