

Additional instructions may be found at the OAM/RTP web page at
http://www.epa.gov/oam/rtp_cmd/

ENVIRONMENTAL PROTECTION AGENCY

SMALL BUSINESS INNOVATION RESEARCH PHASE I Program Solicitation RFP# PR-NC-06-10207

*Great Lakes Environmental Problems
(EPA Region 5)*

*Environmental Problems in America's Heartland
(EPA Region 7)*

Water and Wastewater Topics (EPA Office of Water)

Critical EPA Research Topics

ISSUE DATE: March 23, 2006

CLOSING DATE: May 24, 2006 *

* **CAUTION** - See Section V., Paragraph J.9(c), Instructions to Offerors, Concerning Late Proposals and Modifications.

Your proposal with an **original and nine (9) copies** (including all appendices) shall be received at one of the following addresses by **12:00 p.m. (Noon) local time on May 24, 2006.**

U.S. MAIL:

U.S. Environmental Protection Agency
Solicitation No. PR-NC-06-10207 - SBIR Phase I
Closing Date: May 24, 2006 at 12:00 p.m. (Noon)
Attention: Marsha Johnson, SBIR Phase I
RTP Procurement Operations Division (D143-01)
Research Triangle Park, NC 27711

HAND-CARRIED/COURIER ADDRESS:

U.S. Environmental Protection Agency
Solicitation No. PR-NC-06-10207 - SBIR Phase I
Closing Date: May 24, 2006 at 12:00 p.m. (Noon)
Attention: Marsha Johnson, SBIR Phase I
RTP Procurement Operations Division (D143-01)
4930 Page Road
Durham, NC 27703

TABLE OF CONTENTS

SECTION	PAGE
I. Program Description	1
II. Definitions	7
III. Proposal Preparation Instructions and Requirements	10
IV. Method of Selection and Evaluation Criteria	15
V. Considerations	17
VI. Submission of Proposals	35
VII. Scientific and Technical Information Sources	37
VIII. SBIR Phase I Research Topics	37
A. Great Lakes Environmental Problems (EPA Region 5)	37
A1. Improving the Great Lakes	38
A2. Control of Air Pollution	40
A3. Monitoring and Remote Sensing	42
A4. Green Buildings	45
B. Environmental Problems in America's Heartland (EPA Region 7)	45
B1. Mining and Mine Waste Management	46
B2. Lead Paint Detection and Removal	48
B3. Agriculture and Rural Community Improvement	49
B4. Management of Animal Feeding Operations	51
C. Drinking Water and Wastewater Management for EPA Office of Water	53
C1. Drinking Water Treatment and Monitoring	53
C2. Pollution Indicators for Beaches and Recreational Waters	53
C3. Water and Wastewater Management	54
D. Critical EPA Research Topics	58
D1. Innovation in Manufacturing for Environmental Protection	58

D2. Nanotechnology	60
D3. Engine and Vehicle Emissions Reduction	61
D4. Solid and Hazardous Waste	63
D5. Homeland Security	64
IX. Submission Forms and Certifications	67

APPENDICES

APPENDIX A - Proposal Cover Sheet
APPENDIX B - Project Summary
APPENDIX C - SBIR Proposal Summary Budget
APPENDIX D - Scientific and Technical Information Sources
APPENDIX E - Commercialization Fact Sheet/Patent Search

SBIR PHASE I SOLICITATION

I. PROGRAM DESCRIPTION

A. The Environmental Protection Agency (EPA) invites small business firms to submit research proposals under this Small Business Innovation Research (SBIR) Solicitation. The SBIR program is a phased process uniform throughout the Federal Government of soliciting proposals and awarding funding agreements for research (R) or research and development (R&D) to meet stated agency needs or missions.

EPA is interested in advanced technologies that address Great Lakes (EPA Region 5) Environmental Problems, Environmental Problems in America's Heartland (EPA Region 7), Drinking Water and Wastewater Management for EPA Office of Water (OW) and Critical EPA Research Topics (Innovation in Manufacturing, Nanotechnology, Solid and Hazardous Waste and Homeland Security). The proposed research must directly pertain to EPA's environmental mission and must be responsive to EPA program interests included in the topic descriptions in this solicitation. (See pages 2 and 3 for a summary listing of all research topics included in this solicitation.) Note that there is overlap between the EPA Homeland Security topic (Topic D5) and topics of the US Department of Homeland Security (DHS). Small businesses that have submitted SBIR proposals to DHS cannot submit the same proposal to EPA. Proposals selected for funding in this topic will be discussed with DHS to insure that duplicate or equivalent proposals are not funded.

In order to facilitate proposal reviews by external peer reviewers with specialized expertise and by EPA technical personnel with focused program needs and priorities, offerors must designate a research topic for their proposal. The same proposal may not be submitted under more than one topic. An organization may, however, submit separate proposals on different topics, or different proposals on the same topic, as long as the proposals are not duplicates of the same research principle modified to fit the topic. If such duplicates are submitted, only one will be reviewed. Refer to Sections IV, V, and VI for additional requirements. Where similar research is discussed under more than one topic, the offeror shall choose the topic most relevant to the proposed research. It is the complete responsibility of offerors to select and identify the best topic for their proposals.

SBIR PHASE I RESEARCH TOPICS

- A. GREAT LAKES ENVIRONMENTAL PROBLEMS (EPA REGION 5)
 - A1. Improving the Great Lakes
 - Cleanup of Contaminated Sediments
 - Mercury Free Products
 - Pharmaceuticals and Personal Care Product Disposal
 - A2. Control of Air Pollution
 - Small Air Pollution Sources
 - Outdoor Wood-Fired Hydronic Heaters and New Fireplace Designs
 - Coal Gasification
 - A3. Monitoring and Remote Sensing
 - Air Pollution Monitoring
 - Hazardous Waste Monitoring
 - Remote Sensing
 - A4. Green Buildings

- B. ENVIRONMENTAL PROBLEMS IN AMERICA'S HEARTLAND (EPA REGION 7)
 - B1. Mining and Mine Waste Management
 - Lead Mining
 - Reducing Areawide Lead Soil Contamination
 - Monitoring Technologies
 - B2. Lead Paint Detection and Removal
 - B3. Agriculture and Rural Community Improvement
 - Environmental Management of Air, Water and Soil
 - Ethanol and Biodiesel Fuels
 - Rural Community Improvement
 - B4. Management of Animal Feeding Operations
 - Waste-to-Energy Gasification Systems

- C. DRINKING WATER AND WASTEWATER MANAGEMENT (EPA Office of Water)
 - C1. Drinking Water Treatment and Monitoring
 - C2. Pollution Indicators for Beaches and Recreational Waters
 - C3. Water and Wastewater Management
 - Source Water Protection
 - Municipal Onsite and Decentralized Wastewater Treatment
 - Water Conservation and Reuse
 - Combined Sewer Overflows and Stormwater
 - Infrastructure Rehabilitation

D. CRITICAL EPA RESEARCH TOPICS

D1. Innovation in Manufacturing for Environmental Protection

D2. Nanotechnology

D3. Engine and Vehicle Emissions Reduction

- Retrofitting Diesel Construction Equipment for NOx Reduction
- Fuel Additives to Reduce Emissions from Gasoline Engines
- New Non-Ethanol and Non-BioDiesel Liquid BioFuels

D4. Solid and Hazardous Waste

- Hazardous Waste Management
- Solid Waste Recycling

D5. Homeland Security

- Decontamination
- Drinking Water and Wastewater Security
- Emergency Response

B. Offerors are responsible for submitting proposals, and any modifications or revisions, so as to reach the Government office designated in this solicitation by the time specified in this solicitation. See Section V, Paragraph J.9(c), Instructions to Offerors, concerning Late Proposals and Modifications.

THIS SOLICITATION IS FOR PHASE I PROPOSALS ONLY.

To stimulate and foster technological innovation, including increasing private sector applications of Federal research or R&D, EPA's program follows the SBIR program's uniform process:

(1) **PHASE I.** Phase I involves a solicitation of proposals to conduct feasibility related experimental research or R&D related to described agency requirements. The objective of this phase is to determine the technical feasibility and preliminary commercialization potential of the proposed effort and the quality of performance of the small concern with a relatively small agency investment before consideration of further Federal support in Phase II. The Government is not obligated to fund any specific Phase I proposal. The maximum dollar amount of awards under this Phase I solicitation is \$70,000 and the term of performance should not exceed six months.

(2) **PHASE II.** Phase II proposals may only be submitted by Phase I awardees invited to submit proposals. Phase II is the principal research or R&D effort and Phase II projects should normally be completed in 24 months. The objective is to continue the research or R&D initiated under Phase I and work toward commercialization of the technology. Phase II awards are expected to include full scale testing of the technology, but may not necessarily complete the total research and development that may be required to satisfy commercial or federal needs beyond the SBIR program. Completion of the research and development may be through Phase III. Please note that the Agency may offer Phase I companies an opportunity to submit their Phase II proposal under Topic D5 to DHS under a separate DHS SBIR Phase II Solicitation. Neither EPA nor DHS is under any obligation to fund any proposal or any specific number of proposals in a given topic. The Agencies may also elect to fund several or none of the proposals in the same topic.

It is anticipated that approximately 10 Phase II awards will be made, each with a dollar amount of \$225,000 and 24 - month term of performance. For Phase II, the Agency is planning to require two Phase II Options: (1) Phase II Commercialization Option under which Phase II offerors shall submit a proposal for \$70,000 additional funding to expand R&D efforts to accelerate the project from full scale testing and demonstration to full commercialization; and (2) Phase II Verification Testing Option under which Phase II offerors shall submit a proposal for up to \$50,000 additional funding to facilitate third party R/R&D verification testing that will improve the quality assurance and quality control (QA/QC) of the technology and accelerate the acceptance and use of improved and more cost-effective technologies. EPA federal funds must be designated strictly for advancing the research related elements of the

project. The entire Phase II proposal including the options will be evaluated together. The Agency would have a unilateral right to exercise the options after EPA's acceptance of the company's option documentation. Documentation for the Phase II Commercialization Option are receipts showing that at least \$100,000 was transferred to the contractor from one or more third party investors, such as a venture capital firm, an individual "angel" investor, state or local funding source, or another company under a partnership, licensing or joint venture arrangement, or any combination of third parties. Documentation for the Verification Testing Option is the signed Commitment Letter with the third party testing organization. The Government is not obligated to fund any specific Phase II proposal.

For technologies awarded Phase I contracts under this solicitation and invited to submit a follow-on EPA Phase II Solicitation, the follow-on Phase II Solicitation will be issued on/about July 28, 2007, and proposals will be due on/about October 18, 2007. For Phase I companies awarded Phase I contracts under EPA Topic D5, the follow-on Phase II Solicitation may be issued by EPA or may be issued by DHS. Solicitations issued by DHS will provide specific instructions. The term of performance is expected to be the same as EPA's 24 months, but the other agency may use grants or contracts and dollar amounts may differ as well. The other agency's Phase II Solicitation may not include the two Phase II Options used by EPA and the Phase II evaluation criteria may differ from that provided below for EPA. The EPA Phase II evaluation criteria will be as follows:

PHASE II CRITERIA

1. Results of Phase I and degree to which research objectives and identified customer needs were met. Demonstration of performance/cost effectiveness and environmental benefits associated with the proposed research, including risk reduction potential.
2. Quality and soundness of the Phase II research plan to establish the technical and commercial viability of the proposed concept as evidenced through technology prototypes or initial commercial demonstrations.
3. Qualifications of the principal investigator, supporting staff and consultants. Time commitment of principal investigator and project team, adequacy of equipment and facilities and proposed budget to accomplish the proposed research. Adequacy of Phase II Quality Assurance Summary.
4. Potential of the proposed concept for significant commercialization applications. The quality and adequacy of the commercialization plan to produce an innovative product, process or device and getting technology prototypes or initial Phase II applications into commercial production and sales.

5. The offeror's SBIR or other research commercialization record. Existence of second phase funding commitments from private sector or non-SBIR funding sources. Existence of third phase follow-on commitments and presence of other indicators of commercial potential of the idea.

(3) **PHASE III.** Where appropriate and needed in order to complete the research and development, there may be a third phase which is funded by:

1. Non-federal sources of capital for commercial applications of SBIR funded research
2. Federal government with non-SBIR federal funds for SBIR derived products and processes that will be used by the federal government.
3. Non-SBIR federal funds for the continuation of research or research and development that has been competitively selected using peer review or scientific review criteria.

C. Each offeror submitting a proposal must qualify as a small business for research or R&D purposes at the time of award of Phase I and Phase II funding agreements. In addition, the primary employment of the principal investigator must be with the small business firm at the time of contract award and during the conduct of the proposed research. Principal investigators who appear to be employed by a university must submit a letter from the university stating that the principal investigator, if awarded a SBIR contract, will become a less-than-half-time employee of the university. Also, a principal investigator who appears to be a staff member of both the applicant and another employer must submit a letter from the second employer stating that, if awarded a SBIR contract, he/she will become a less than half-time employee of such organization. Letters demonstrating that these requirements have been fulfilled shall be submitted prior to contract award to the addressee stated in Section VI of this solicitation. Failure to do so may jeopardize award. Also, for both Phase I and Phase II, the research or R&D work must be performed in the United States. (For definition of the United States, see Section II. J.)

D. **For Phase I the Government anticipates the award of approximately \$2.8M in firm fixed price contracts at approximately \$70,000 each including profit**, but reserves the right to change either the number of awards or the amount of the individual awards depending on the outcome of the selection process. The contractor's period of performance is expected to be 6 months. Source selection will not be based on a comparison of cost or price. However, cost or price will be evaluated to determine whether the price, including any proposed profit, is fair and reasonable and whether the offeror understands the work and is capable of performing the contract.

E. All inquiries concerning this solicitation shall be submitted to the following E-mail address:

johnson.marsha@epa.gov

If E-mail is not available to you, written or telephone inquiries may be directed to:

U.S. Environmental Protection Agency
Attention: Marsha Johnson, SBIR Phase I
RTP Procurement Operations Division (D143-01)
Research Triangle Park, N.C. 27711
Telephone: (919) 541-0952
Fax: (919) 541-1075

Potential offerors are encouraged to communicate via E-mail.

II. DEFINITIONS

For purposes of this solicitation, the following definitions apply:

A. Research or Research and Development (R/R&D): Any activity that is:

(1) A systematic, intensive study directed toward greater knowledge or understanding of the subject studied;

(2) A systematic study directed specifically toward applying new knowledge to meet a recognized need; or

(3) A systematic application of knowledge toward the production of useful materials, devices, and systems or methods, including design, development, and improvement of prototypes and new processes to meet specific requirements.

B. Funding Agreement: Any contract, grant, or cooperative agreement entered into between any Federal Agency and any small business concern for the performance of experimental, developmental, or research work, including products or services, funded in whole or in part by the Federal Government.

C. Subcontract: Any agreement, other than one involving an employer-employee relationship, entered into by an awardee of a funding agreement calling for supplies or services for the performance of the original funding agreement.

D. Small Business Concern: A small business concern is one that, at the time of award of Phase I and Phase II, meets all of the following criteria:

(1) Is independently owned and operated, is not dominant in the field of operation in

which it is proposing, has a place of businesses in the United States and operates primarily within the United States or makes a significant contribution to the US economy, and is organized for profit.

(2) Is (a) at least 51% owned and controlled by one or more individuals who are citizens of, or permanent resident aliens in, the United States or (b) it must be a for-profit business concern that is at least 51% owned and controlled by another for-profit business concern that is at least 51% owned and controlled by one or more individuals who are citizens of, or permanent resident aliens in, the United States.

(3) Has, including its affiliates, an average number of employees for the preceding 12 months not exceeding 500, and meets the other regulatory requirements found in 13 CFR Part 121. Business concerns are generally considered to be affiliates of one another when either directly or indirectly, (a) one concern controls or has the power to control the other; or (b) a third-party/parties controls or has the power to control both.

Control can be exercised through common ownership, common management, and contractual relationships. The term "affiliates" is defined in greater detail in 13 CFR 121.103. The term "number of employees" is defined in 13 CFR 121.106.

A business concern may be in the form of an individual proprietorship, partnership, limited liability company, corporation, joint venture, association, trust, or cooperative. Further information may be obtained at <http://sba.gov/size>, or by contacting the Small Business Administration's Government Contracting Area Office or Office of Size Standards.

E. Socially and Economically Disadvantaged Small Business Concern: A socially and economically disadvantaged small business concern is one that is at least 51% owned and controlled by one or more socially and economically disadvantaged individuals, or an Indian tribe, including Alaska Native Corporations (ANCs), a Native Hawaiian Organization (NHO), or a Community Development Corporation (CDC). Control includes both the strategic planning (as that exercised by boards of directors) and the day-to-day management and administration of business operations. See 13 CFR 124.109, 124.110, and 124.111 for special rules pertaining to concerns owned by Indian tribes (including ANCs), NHOs or CDCs, respectively.

F. Socially and Economically Disadvantaged Individual: A member of any of the following groups:

- (1) Black Americans;
- (2) Hispanic Americans;
- (3) Native Americans (American Indians, Eskimos, Aleuts, or Native Hawaiians);
- (4) Asian-Pacific Americans (persons with origins from Burma, Thailand, Malaysia, Indonesia, Singapore, Brunei, Japan, China (including Hong Kong), Taiwan, Laos, Cambodia (Kampuchea), Vietnam, Korea, The Philippines, U.S. Trust Territory of the

- Pacific Islands (Republic of Palau), Republic of the Marshall Islands, Federated States of Micronesia, the Commonwealth of the Northern Mariana Islands, Guam, Samoa, Macao, Fiji, Tonga, Kiribati, Tuvalu, or Nauru);
- (5) Subcontinent Asian Americans (persons with origins from India, Pakistan, Bangladesh, Sri Lanka, Bhutan, the Maldives Islands, or Nepal); and
 - (6) Other groups designated from time to time by SBA pursuant to Section 124.103 (d) of 13 CFR Ch.1(1-1-02 Edition).

G. Women-Owned Small Business Concern: A small business concern that is at least 51 % owned by and controlled by a woman or women. Control includes both the strategic planning (as that exercised by boards of directors) and the day-to-day management and administration of business operations.

H. Historically Underutilized Business Zone (HUBZone): A small business concern meeting the following requirements:

- (1) Located in a HUBZone area located in one or more of the following:
 - a) A qualified census tract (as defined in Section 42(d)(5)(C)(i)(1) of the Internal Revenue Code of 1986;
 - b) A qualified "non-metropolitan county" (as defined in Section 143 (k)(2)(B) of the Internal Revenue Code of 1986) with a median household income of less than 80 percent of the State median household income or with an unemployment rate of not less than 140 percent of the Statewide average, based on US Department of Labor recent data; or,
 - c) Lands within the boundaries of federally recognized Indian reservations.
- (2) Owned and controlled by one or more US Citizens; and,
- (3) At least 35% of its employees must reside in a HUBZONE.

I. Primary Employment: More than one-half of the principal investigator's time is spent in the employ of the small business concern.

J. United States: The 50 States, the Territories and possessions of the Federal Government, the Commonwealth of Puerto Rico, the District of Columbia, the Republic of the Marshall Islands, the Federated States of Micronesia, and the Republic of Palau.

K. Commercialization: The process of developing marketable products or services and producing and delivering products or services for sale (whether by the originating party or by others) to Government or commercial markets.

L. SBIR Technical Data: All data generated during the performance of an SBIR award.

M. SBIR Technical Data Rights: The rights a small business concern obtains in data generated during the performance of any SBIR Phase I, Phase II, or Phase III award that an awardee delivers to the Government during or upon completion of a Federally-funded project, and to which the Government receives a license.

III. PROPOSAL PREPARATION INSTRUCTIONS AND REQUIREMENTS

A. PROPOSAL PAGE LIMIT

Proposals submitted in response to this Phase I of the SBIR program shall not exceed a total of **25 pages**, one side only. The only exception would be regarding the requirements set forth in Section III.D.12, "Prior SBIR Awards". The **25 pages** shall include the cover page, budget, and all enclosures or attachments. Pages (including enclosures or attachments such as letters of recommendation) should be of standard size (8 ½" x 11"; 21.6 cm x 27.9 cm) with 2.5 cm margins and type no smaller than 10 point font size. All pages shall be consecutively numbered. **Proposals in excess of the 25 page limitation shall not be considered for review or award.** Any additional attachments, appendices or references beyond the 25-page limitation shall result in the proposal not being considered for review or award. A letter of transmittal is not necessary. If one is furnished, it shall not be attached to every copy of the proposal. If a letter of transmittal is attached to every copy of the proposal, it will be counted as page 1 of the proposal. No binders are necessary. If binders are provided, they will be counted as pages even if no printing or writing is thereon.

B. PROPOSAL COVER SHEET

The offeror shall photocopy (or download from the Internet) and complete Appendix A of this solicitation which has the relevant solicitation number as page 1 of each copy of each proposal. **No other cover shall be permitted.** When downloading the solicitation from the Internet, Appendix A may print on no more than two pages, but will only count as one page per Appendix. If Appendix A exceeds two pages, any additional pages will count toward the 25-page limitation. Offerors may reformat the forms to correct spacing and pagination errors, however, identical information shall be provided.

The original of the cover sheet shall contain the pen-and-ink signatures of the principal investigator and the corporate/business official authorized to sign the proposal.

C. PROJECT SUMMARY

The offeror shall complete Appendix B as page 2 of each proposal. Appendix B may be no more than two pages, but will only count as one page per Appendix. If Appendix B exceeds two pages, any additional pages will count toward the 25-page limitation. Offerors may reformat the forms to correct spacing and pagination errors, however, identical information shall be provided. The Project Summary shall include a technical abstract with a brief

description of the problem or opportunity, the innovation, project objectives, and description of the effort. In summarizing anticipated results, the implications of the approach (for both Phases I and II) and the potential commercial applications of the research shall be stated. **THE ABSTRACT (APPENDIX B) IS USED EXTENSIVELY DURING THE EXTERNAL PEER REVIEW AND EPA INTERNAL PROGRAMMATIC REVIEW.** The project summary and proposal title (Appendix B) of successful proposals will be published by EPA and, therefore, must not contain proprietary information. No changes shall be allowed.

D. TECHNICAL CONTENT

Begin the main body of the proposal on page 3. As a minimum, the following shall be included:

1. **IDENTIFICATION AND SIGNIFICANCE OF THE PROBLEM OR OPPORTUNITY.** A clear statement of the specific technical problem or opportunity addressed and the environmental benefits. **INFORMATION ON THE ENVIRONMENTAL BENEFITS ASSOCIATED WITH THE TECHNOLOGY IS A VERY IMPORTANT PART OF THE EXTERNAL PEER REVIEW AND EPA INTERNAL PROGRAMMATIC REVIEW.** Where appropriate, proposals should describe the positive and negative environmental benefits based on an assessment of the full life cycle of the new product or technology. Life Cycle Assessment (LCA) refers to the analysis of impacts throughout all stages of a product or process from production to use to disposal. Integration of a live cycle perspective into the environmental analysis typically considers impacts from raw materials extraction, manufacture, packaging, distribution and disposal.

2. **PHASE I OBJECTIVES.** State the specific objectives of Phase I research and development effort, including the technical questions it will try to answer to determine the feasibility of the proposed approach.

3. **PHASE I WORK PLAN.** This section provides a detailed description of the work plan. The work plan should describe what will be done, where it will be done and how the R/R&D will be carried out. The work planned to achieve each task should be discussed in detail, to enable a complete scientific and technical evaluation of the work plan. A work schedule should also be provided.

4. **RELATED RESEARCH OR R&D.** Describe significant research or R&D that is directly related to the proposal including any conducted by the project manager/principal investigator or by the proposing firm. Describe how it relates to the proposed effort, and any planned coordination with outside sources. Offerors must demonstrate their awareness of key recent research or R&D conducted by others in the specific topic area by providing appropriate references from the literature and other published documents.

5. **KEY PERSONNEL AND BIBLIOGRAPHY OF DIRECTLY RELATED WORK.**

Identify key personnel involved in Phase I including their directly related education, experience and bibliographic information. Where vitae are extensive, summaries that focus on the most relevant experience or publications are desired and may be necessary to meet proposal size limitations.

6. **RELATIONSHIP WITH FUTURE RESEARCH OR RESEARCH AND DEVELOPMENT.** State the anticipated results of the proposed approach if the project is successful (Phase I and II). A discussion of cost-effectiveness is paramount, especially comparing the state-of-the-art approaches with the proposed approach. Discuss the significance of the Phase I effort in providing a foundation for Phase II R/R&D effort.

7. **FACILITIES.** A detailed description, availability and location of instrumentation and physical facilities proposed for Phase I shall be provided.

8. **CONSULTANTS.** Involvement of consultants in the planning and research stages of the project is permitted. If such involvement is intended, it should be described in detail and vitae should be provided.

9. **COMMERCIALIZATION PLAN.** Provide an abbreviated 2-3 page plan related directly to producing an innovative product, process or device and getting it into commercial production and sales. Comprehensive business plans (that are company rather than project oriented) are not desired. The Phase I plan is a roadmap toward producing a detailed Phase II Commercialization Plan which shall be required as part of the Phase II Application.

NOTE: The Small Business Research and Development Enhancement Act of 1992 allows discretionary technical assistance to SBIR awardees. The Agency may provide up to \$4,000 of SBIR funds for technical assistance per award. EPA intends to provide Phase I awardees with technical assistance through a separate EPA arrangement. For Phase I, this assistance will be in addition to the award amount. For Phase II, the law allows each awardee to expend up to \$4,000 per year of the award amount for technical assistance services.

The Phase I plan shall provide limited information on the subjects described below. Explain what will be done during Phase I to decide on applications, markets, production and financing. The Commercialization Plan shall address:

- a. **SBIR Project:** Brief description of the company, its principal field(s) of interest, size and current products and sales. A concise description of the SBIR project and its key technical objectives.
- b. **Commercial Applications:** Potential commercial applications of the research results specifying customers and specific needs that will be satisfied. Have you or do you intend to file for one or more patents as a result of the SBIR project?

- c. **Competitive Advantages:** What is particularly innovative about the anticipated technology or products? (Innovation may be expressed in terms of applications, performance, efficiencies or reduced cost. To determine if your innovation is likely to result in intellectual property that may be legally protected, it helps to conduct a patent search and look for related work being funded by EPA or another Federal agency. A fact sheet on how to search for patents and related federally-funded work is provided in Appendix E.) What significant advantages in application, performance, technique, efficiency, or costs, do you anticipate your new technology will have over existing technology? (In order to assess such advantages, it is useful to compare the anticipated performance of your technology against substitutable products currently being sold or emerging out of R&D. If regulations, industry standards or certifying requirements apply to your technology or product, these provide useful criteria for comparing your anticipated performance with potentially competing technology and products. However, other expressions of end-user needs may also contain important criteria).
- d. **Markets:** What are the anticipated specific markets for the resulting technology, their estimated size, classes of customers, and your estimated market share 5 years after the project is completed and/or first sales? Who are the major competitors in the markets, present and/or anticipated?
- e. **Commercialization:** Briefly describe how you plan to produce your product. Do you intend to manufacture it yourself, subcontract the manufacturing, enter into a joint venture or manufacturing agreement, license the product, etc.? Briefly describe the approach and steps you plan to take to commercialize the research results to significant sales. Do you plan to market the product yourself, through dealers, contract sales, marketing agreements, joint venture, sales representatives, foreign companies, etc.? How do you plan to raise money to support your commercialization plan?

10. **SIMILAR OR CLOSELY RELATED SBIR AWARDS.** If the small business concern has received ANY prior Phase I or Phase II award(s) from EPA or any Federal agency for similar or closely related research, submit name of awarding agency, date of award, funding agreement number, amount and topic or subtopic title. **DESCRIBE THE TECHNICAL DIFFERENCES AND REASONS WHY THE PROPOSED NEW PHASE I RESEARCH IS DIFFERENT FROM RESEARCH CONDUCTED UNDER PRIOR SBIR AWARDS.** (This required proposal information shall be counted toward proposal pages count limitation.)

11. **DUPLICATE OR EQUIVALENT SBIR PROPOSALS.** A firm may elect to submit essentially equivalent work under other Federal Program Solicitations. In these cases, a statement shall be included in each such proposal indicating: the name and address of the agencies to which proposals were submitted or from which awards were received; date of proposal submission or date of award; title, number, and date of solicitations under which proposals were submitted or awards received; specific applicable research topics for each

proposal submitted or award received; titles of research projects; name and title of project manager or principal investigator for each proposal submitted or award received. (This information **shall** count toward proposal pages count limitation.)

12. PRIOR SBIR AWARDS. If the small business concern has received ANY prior Phase II award from any Federal agency in the prior 5 fiscal years, submit name of awarding agency, date of award, funding agreement number, amount, topic or subtopic title, follow-on agreement amount, source and date of commitment and current commercialization status for each Phase II. (This required proposal information shall be included as an attachment to the proposals and **shall not** be counted toward proposal pages count limitation.)

E. COST BREAKDOWN/PROPOSED BUDGET

Complete the budget form in Appendix C and include the completed form immediately after proposal Section D.11. Photocopy the form for the required copies for submission. Incorporate the copy of the budget form bearing the original signature into the copy of the proposal bearing the original signature on the cover page. The completed budget form will count as one page in the 25 page limit. If budget explanation pages are included, they will count toward the 25 page limit. Offerors are encouraged to attend a one-day SBIR Phase I Kick-Off Meeting in Washington, DC and include the travel expenses on the budget form.

F. PHASE I QUALITY ASSURANCE NARRATIVE STATEMENT

Offerors shall state whether or not their proposal involves data collection or processing, environmental measurements, modeling, or the development of environmental technology (whether hardware-based or via new techniques). The Quality Assurance Narrative provides a statement on processes that will be used to assure that results of the research satisfy the intended project objectives. EPA is particularly interested in the quality controls for data generation and acquisition, and how data validation and usability will be verified. This quality assurance narrative statement shall not exceed two pages and will be included in the 25 page limitation for the proposal. For each item below, either present the required information, reference the specific location of the information in the proposal, or provide a justification of why the item does not apply to the proposed research.

1. Identify the individual who will be responsible for the quality assurance and quality control aspects of the research. (Quality assurance (QA) is an integrated system of management activities involving planning, implementation, documentation, assessment, and improvement to ensure that a process, or item is of the type and quality needed for the project. Quality control (QC) is the system of technical activities that measures the attributes and performance of a process or item against defined standards, to verify that they meet the stated requirements.)

2. Discuss the activities to be performed or the hypothesis to be tested and criteria for determining acceptable data quality. (Note: Such criteria may be expressed in terms of

precision, accuracy, representativeness, completeness, and comparability or in terms of data quality objectives or acceptance and evaluation criteria.) Also, these criteria shall be applied to determine the acceptability of existing or secondary data to be used in the project. (In this context, secondary data may be defined as data previously collected for other purposes or from other sources.)

3. Describe the study design. Include sample type(s) and location requirements, all statistical analyses that were or will be used to estimate the types and numbers of physical samples required, *or* equivalent information for studies using survey and interview techniques, *or* describe how new technology will be benchmarked to improve existing processes, such as those used by industry.

4. Describe the procedures that will be used in the calibration and performance evaluation of all analytical instrumentation and all methods of analysis to be used during the project. Explain how the effectiveness of any new technology will be measured.

5. Describe the procedures for the handling and custody of samples, including sample collection, identification, preservation, transportation, and storage, or how the accuracy of test measurements will be verified.

6. Discuss the procedures for data reduction and reporting, including a description of all statistical methods to make inferences and conclusions, with identification of any statistical software to be used; discuss any computer models to be designed or utilized and describe the associated verification and validation techniques.

7. Describe the quantitative and/or qualitative procedures that will be used to evaluate the success of the project, including any plans for peer or other reviews of the study design or analytical methods prior to data collection.

8. The name and title of the company person responsible for tracking compliance of the SBIR contract activities with the requirements of the QA Plan.

A more detailed Proposal Quality Assurance Plan will be required in Phase II. The plan will be required as part of the first monthly report under the Phase II contract.

IV. METHOD OF SELECTION AND EVALUATION CRITERIA

All Phase I proposals will be evaluated and judged on a competitive basis by peer reviewers from outside EPA. Proposals will be initially screened to determine responsiveness. As noted in Section III, proposals exceeding the 25-page limitation will not be considered for review or award. Also, as noted in Section I, any proposal addressing more than one research topic and failing to identify the research topic by letter symbol on the cover page will not be considered for review or award. Proposals passing this initial screening will be reviewed for technical

merit by external peer panels of technical experts, using the technical evaluation criteria described in A.1 below. Each of the criteria are equal in value. These panels will assign each proposal an adjectival rating of “excellent”, “very good”, “good”, “fair” or “poor”, using the specified criteria. Proposals rated “good”, “fair”, or “poor” will not be considered for award. The proposals assigned “excellent” and “very good” ratings, will then be subjected to the programmatic review within EPA, to further evaluate these applications in relation to program priorities and balance using the criteria specified in A.2 below. Each proposal will be judged on its own merit. The Agency is under no obligation to fund any proposal or any specific number of proposals in a given topic. It also may elect to fund several or none of the proposed approaches to the same topic or subtopic.

A. TECHNICAL EVALUATION CRITERIA

1. EXTERNAL PEER REVIEW. The external peer review panels will utilize the following evaluation criteria to rate each proposal. The criteria are of equal importance.

CRITERIA

- a. The scientific and technical significance of the proposed technology and its appropriateness to the research topic. Quality and soundness of the research plan to establish the technical and commercial feasibility of the concept.
- b. The uniqueness/ingenuity of the proposed concept or application as technological innovation. Originality and innovativeness of the proposed research toward meeting customer needs and achieving commercialization of the technology.
- c. Potential demonstration of performance/cost effectiveness and environmental benefits associated with the proposed research, including risk reduction potential.
- d. Qualifications of the principal investigator, supporting staff and consultants. Time commitment of principal investigator and project team, adequacy of equipment and facilities and proposed budget to accomplish the proposed research. Adequacy and quality of the Quality Assurance Narrative Statement.
- e. Potential of the proposed concept for significant commercial applications. Potential for the commercialization plan to produce an innovative product, process or device and to put it into commercial production and sales. Potential market and competition and other financial/business indicators of commercialization potential and the offeror's SBIR or other research commercialization record.

All peer reviewers will be required to sign an agreement to protect the confidentiality of all proposal material, and to certify that no conflict of interest exists between the reviewer and the offeror. A copy of both forms is available upon request; however, the identity of the reviewer

will not be released.

2. EPA PROGRAMMATIC REVIEW. The proposals that received ratings of "excellent" or "very good" by the External Peer Review Panel will be subject to the programmatic review by EPA program managers using the criteria set forth below to select which of the "excellent" and "very good" proposals will be funded. Please note that not all of the proposals rated "Excellent" or "Very Good" will receive a contract award. Projects will not be funded where EPA determines the proposed research is already being supported by EPA or another known source. The evaluation criteria "a" through "c" are of equal value and will be used to evaluate the applications in relation to program priorities, balance and programmatic relevancy.

CRITERIA

- a. The potential of the technology to meet Agency program priorities and to strengthen the overall balance of the SBIR program. How well the technology fits into EPA's overall research strategy or program within the Phase I research topic.
- b. The potential of the technology for significant environmental benefits and for strengthening the scientific basis for risk assessment/risk management in the Agency research topic area.
- c. The potential of the technology to have broad application or to impact large segments of the population.

B. RELEASE OF PROPOSAL REVIEW INFORMATION. After final award decisions have been announced, the technical evaluations of the offeror's proposal will be provided to the offeror. The identity of the reviewer shall not be disclosed.

V. CONSIDERATIONS

A. AWARDS

The Government anticipates award of approximately 40 firm-fixed-price contracts of up to \$70,000 each including profit. It is expected that these contracts will be awarded with a contract start date of March 1, 2007. The period of performance for the contracts should not exceed six (6) months. The primary consideration in selecting proposals for award will be the technical merit of the proposal. Proposals shall be evaluated in accordance with the Technical Evaluation Criteria stated in IV. A. above. Source selection will not be based on a comparison of cost or price. However, cost or price will be evaluated to determine whether the price, including any proposed profit, is fair and reasonable and whether the offeror understands the work and is capable of performing the contract.

This current solicitation is for Phase I only, and the Government is not obligated to fund

any specific Phase I proposal.

Funds are not presently available for this contract. The Government's obligation under this contract is contingent upon the availability of appropriated funds from which payment for contract purposes can be made. No legal liability on the part of the Government for any payment may arise until funds are made available to the Contracting Officer for this contract and until the Contractor receives notice of such availability, to be confirmed in writing by the Contracting Officer.

B. REPORTS

1. All reports shall include the following information: EPA Contract Number; Project Title; and Period covered by the report.

2. The Contractor shall furnish a Monthly Report stating progress made. One (1) copy of the report shall be submitted to the Contract-level Contracting Officer's Representative with one (1) paper copy to the Contract Specialist. The report shall be submitted within 7 calendar days after the end of the reporting period. Specific areas of interest shall include progress made and difficulties encountered during the reporting period, and a statement of activities anticipated during the subsequent reporting period. The report shall include any changes in personnel associated with the project. Also, the first month's report shall contain a work plan and schedule of accomplishments for the subsequent months of the project. The Monthly Report shall include, as an attachment, a copy of the monthly voucher for the same period.

3. One (1) copy of a comprehensive Final Report on the Phase I project must be submitted to the Contract-level Contracting Officer's Representative by the completion date of the contract. The Contract Specialist shall receive one paper copy. This Final Report shall include a single-page project summary as the first page, identifying the purpose of the research, a brief description of the research carried out, the research findings or results, and potential applications of the research in a final paragraph. The balance of the report should indicate in detail the research objectives, research work carried out, results obtained, and estimates of technical feasibility. The report should include a discussion of any commercialization activity carried out during Phase I as well as future commercialization plans.

4. One (1) copy of a publishable (cleared for the general public) 2-3 page Executive Summary of the Final Report for Phase I must be submitted to the Contract-level Contracting Officer's Representative by the completion date of the contract. This special report should be a true summary of the report, including the purpose of the project, work carried out and results. The summary should stress innovativeness and potential commercialization. The Executive Summary will be placed on the EPA SBIR website, and therefore, it should include the specific results the company is willing to release to the public.

C. PAYMENT SCHEDULE - Phase I payments will be made as follows:

Eighteen percent (18%) of the total contract price upon receipt and acceptance of a proper invoice with each of the first five monthly reports. The remainder shall be paid upon receipt and acceptance of the final report. Pursuant to the provisions of FAR 52.232-25, "Prompt Payment", payment will be rendered within thirty (30) days after receipt of a proper invoice.

D. INNOVATIONS, INVENTIONS AND PATENTS

1. LIMITED RIGHTS INFORMATION AND DATA

a. Proprietary Information

Information contained in unsuccessful proposals will remain the property of the offeror. The Government may, however, retain copies of all proposals. Public release of information in any proposal submitted will be subject to existing statutory and regulatory requirements.

If proprietary information is provided by an offeror in a proposal, which constitutes a trade secret, proprietary commercial or financial information, confidential personal information or data affecting the national security, it will be treated in confidence, to the extent permitted by law. This information must be clearly marked by the offeror with the term "confidential proprietary information" and the following legend must appear on the cover page of the proposal:

"These data shall not be not be disclosed outside the Government and shall not be duplicated, used, or disclosed in whole or in part for any other purpose other than evaluation of this proposal. If a funding agreement is awarded to this offeror as a result of or in connection with the submission of these data, the Government shall have the right to duplicate, use, or disclose the data to the extent provided in the funding agreement and pursuant to applicable law. This restriction does not limit the Government's right to use information contained in the data if it is obtained from another source without restriction. The data subject to this restriction are contained in pages _____ of this proposal."

Any other legend may be unacceptable to the Government and may constitute grounds for removing the proposal from further consideration, without assuming any liability for inadvertent disclosure. The Government will limit dissemination of such information to within official channels.

b. Alternative to Minimize Proprietary Information: Offerors shall limit proprietary information to only that absolutely essential to their proposal.

c. Rights in Data Developed Under SBIR Funding Agreements: The Contract will contain a data clause which will provide the following:

SBIR RIGHTS NOTICE (MAR 1994)

These SBIR data are furnished with SBIR rights under Contract No. _____ (and subcontract _____ if appropriate). For a period of four (4) years after acceptance of all items to be delivered under this contract, the Government agrees to use these data for Government purposes only, and they shall not be disclosed outside the Government (including disclosure for procurement purposes) during such period without permission of the Contractor, except that, subject to the foregoing use and disclosure prohibitions, such data may be disclosed for use by support Contractors. After the aforesaid 4-year period the Government has a royalty-free license to use, and to authorize others to use on its behalf, these data for Government purposes, but is relieved of all disclosure prohibitions and assumes no liability for unauthorized use of these data by third parties. This Notice shall be affixed to any reproductions of these data, in whole or in part.

d. Copyrights

With prior written permission of the Contracting Officer, the Awardee normally may copyright and publish (consistent with appropriate national security considerations, if any) material developed with EPA support. EPA receives a royalty-free license for the Federal Government and requires that each publication contain an appropriate acknowledgment and disclaimer statement.

e. Patents

Small business concerns normally may retain the principal worldwide patent rights to any invention developed with Governmental support. The Government receives a royalty-free license for Federal Government use, reserves the right to require the patent holder to license others in certain circumstances, and requires that anyone exclusively licensed to sell the invention in the United States must normally manufacture it domestically. To the extent authorized by 35 U.S.C. 205, the Government will not make public any information disclosing a Government-supported invention for a 4-year period to allow the Awardee a reasonable time to pursue a patent.

E. COST SHARING

Cost sharing is permitted for proposals under this Program Solicitation; however, cost

sharing is not required nor will it be an evaluation factor in consideration of your proposal.

F. PROFIT OR FEE

Reasonable fee (estimated profit) will be considered under this solicitation. For guidance purposes, the amount of profit normally shall not exceed 10% of total project costs.

G. JOINT VENTURES OR LIMITED PARTNERSHIPS

Joint ventures and limited partnerships are eligible provided the entity created qualifies as a small business as defined in this Program Solicitation.

H. RESEARCH AND ANALYTICAL WORK

1. For Phase I, a minimum of two-thirds of the research and/or analytical effort must be performed by the proposing small business concern unless otherwise approved in writing by the Contracting Officer.

2. For Phase II, a minimum of one-half of the research and/or analytical effort must be performed by the proposing small business concern unless otherwise approved in writing by the Contracting Officer.

I. CONTRACTOR COMMITMENTS

Upon award of a funding agreement, the Awardee will be required to make certain legal commitments through acceptance of numerous clauses in Phase I funding agreements. The outline that follows is illustrative of the types of clauses to which the Contractor would be committed. This list should not be understood to represent a complete list of clauses to be included in Phase I funding agreements, nor to be specific wording of such clauses. Copies of complete terms and conditions are available upon request.

1. INSPECTION. Work performed under the contract is subject to Government inspection and evaluation at all times.

2. EXAMINATION OF RECORDS. The Comptroller General (or a duly authorized representative) shall have the right to examine any directly pertinent records of the awardee involving transactions related to this contract.

3. DEFAULT. The Government may terminate the contract if the Contractor fails to perform the work contracted.

4. TERMINATION FOR CONVENIENCE. The contract may be terminated at any time by the Government if it deems termination to be in its best interest, in which case the

Contractor will be compensated for work performed and for reasonable termination costs.

5. **DISPUTES.** Any dispute concerning the funding agreement that cannot be resolved by agreement shall be decided by the Contracting Officer with right of appeal.

6. **EQUAL OPPORTUNITY.** The awardee will not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin.

7. **AFFIRMATIVE ACTION FOR VETERANS.** The awardee will not discriminate against any employee or application for employment because he or she is a disabled veteran or veteran of the Vietnam era.

8. **AFFIRMATIVE ACTION FOR HANDICAPPED.** The awardee will not discriminate against any employee or applicant for employment because he or she is physically or mentally handicapped.

9. **OFFICIALS NOT TO BENEFIT.** No Government official shall benefit personally from the contract.

10. **COVENANT AGAINST CONTINGENT FEES.** No person or agency has been employed to solicit or secure the contract upon an understanding for compensation except bonafide employees or commercial agencies maintained by the Contractor for the purpose of securing business.

11. **GRATUITIES.** The contract may be terminated by the Government if any gratuities have been offered to any representative of the Government to secure the contract.

12. **PATENT INFRINGEMENT.** The Contractor shall report each notice or claim of patent infringement based on the performance of the contract.

13. **AMERICAN MADE EQUIPMENT AND PRODUCTS.** When purchasing equipment or a product under the SBIR funding agreement, purchase only American-made items whenever possible.

J. ADDITIONAL INFORMATION

1. The Program Solicitation is intended for informational purposes and reflects current planning. If there is any inconsistency between the information contained herein and the terms of any resulting SBIR funding agreement, the terms of the funding agreement are controlling.

2. Before award of an SBIR funding agreement, the Government may request the offeror to submit certain organizational, management, personnel, and financial information to assure responsibility of the offeror.

3. The Government is not responsible for any monies expended by the offeror before award of any funding agreement.

4. This Program Solicitation is not an offer by the Government and does not obligate the Government to make any specific number of awards. Also, awards under the SBIR program are contingent upon the availability of funds.

5. The EPA SBIR program is not a substitute for existing unsolicited proposal mechanisms. Unsolicited proposals shall not be accepted under the EPA SBIR program in either Phase I or Phase II.

6. If an award is made pursuant to a proposal submitted under this Program Solicitation, the Contractor will be required to certify that he or she has not previously been, nor is currently being, paid for essentially equivalent work by any agency of the Federal Government.

7. Notwithstanding the relatively broad definition of R/R&D in Section II, Definitions, hereof, awards under this solicitation are limited to APPLIED forms of research. Proposals that are surveys, including market, state-of-the-art and/or literature surveys, which should have been performed by the offeror prior to the preparation of the proposal, or the preparation of allied questionnaires and instruction manuals, shall not be accepted. If such proposals are submitted, they shall be considered as not in compliance with the solicitation intent, and therefore, technically unacceptable.

8. The requirement that the offeror designate a topic, and only one topic, (see page 1, Section I above) is also necessary. EPA receives hundreds of proposals each year and has special teams of reviewers for review of each research topic. In order to assure that proposals are evaluated by the correct team, it is the complete responsibility of the offeror to select and identify the best topic.

9. Instructions to Offerors - Competitive Acquisition (Jan 2004) FAR 52.215-1

(a) *Definitions.* As used in this provision- Discussions are negotiations that occur after establishment of the competitive range that may, at the Contracting Officer's discretion, result in the offeror being allowed to revise its proposal.

“In writing,” “writing,” or “written” means any worded or numbered expression that can be read, reproduced, and later communicated, and includes electronically transmitted and stored information.

“Proposal modification” is a change made to a proposal before the solicitation's closing date and time, or made in response to an amendment, or made to correct a mistake at any time before award.

“Proposal revision” is a change to a proposal made after the solicitation closing date, at the request of or as allowed by a Contracting Officer as the result of negotiations.

“Time,” if stated as a number of days, is calculated using calendar days, unless otherwise specified, and will include Saturdays, Sundays, and legal holidays. However, if the last day falls on a Saturday, Sunday, or legal holiday, then the period shall include the next working day.

(b) *Amendments to solicitations.* If this solicitation is amended, all terms and conditions that are not amended remain unchanged. Offerors shall acknowledge receipt of any amendment to this solicitation by the date and time specified in the amendment(s).

(c) *Submission, modification, revision, and withdrawal of proposals.* (1) Unless other methods (e.g., electronic commerce or facsimile) are permitted in the solicitation, proposals and modifications to proposals shall be submitted in paper media in sealed envelopes or packages (I) addressed to the office specified in the solicitation, and (ii) showing the time and date specified for receipt, the solicitation number, and the name and address of the offeror. Offerors using commercial carriers should ensure that the proposal is marked on the outermost wrapper with the information in paragraphs (c)(1)(i) and (c)(1)(ii) of this provision.

(2) The first page of the proposal must show-

(i) The solicitation number;

(ii) The name, address, and telephone and facsimile numbers of the offeror (and electronic address if available);

(iii) A statement specifying the extent of agreement with all terms, conditions, and provisions included in the solicitation and agreement to furnish any or all items upon which prices are offered at the price set opposite each item;

(iv) Names, titles, and telephone and facsimile numbers (and electronic addresses if available) of persons authorized to negotiate on the offeror’s behalf with the Government in connection with this solicitation; and

(v) Name, title, and signature of person authorized to sign the proposal. Proposals signed by an agent shall be accompanied by evidence of that agent's authority, unless that evidence has been previously furnished to the issuing office.

(3) *Submission, modification, revision, and withdrawal of proposals.* (i) Offerors are responsible for submitting proposals, and any modifications or revisions so as to reach the Government office designated in the solicitation by the time specified in the solicitation. If no

time is specified in the solicitation, the time for receipt is 4:30 p.m., local time, for the designated Government office on the date that proposal or revision is due.

(ii)(A) Any proposal, modification or revision received at the Government office designated in the solicitation after the exact time specified for receipt of offers is “late” and will not be considered unless it is received before award is made, the Contracting Officer determines that accepting the late offer would not unduly delay the acquisition; and--

(1) If it was transmitted through an electronic commerce method authorized by the solicitation, it was received at the initial point of entry to the Government infrastructure not later than 5:00 p.m. one working day prior to the date specified for receipt of proposals; or

(2) There is acceptable evidence to establish that it was received at the Government installation designated for receipt of offers and was under the Government's control prior to the time set for receipt of offers; or

(3) It is the only proposal received.

(B) However, a late modification of an otherwise successful proposal that makes its terms more favorable to the Government, will be considered at any time it is received and may be accepted.

(iii) Acceptable evidence to establish the time of receipt at the Government installation includes the time/date stamp of that installation on the proposal wrapper, other documentary evidence of receipt maintained by the installation, or oral testimony or statements of Government personnel.

(iv) If an emergency or unanticipated event interrupts normal Government processes so that proposals cannot be received at the office designated for receipt of proposals by the exact time specified in the solicitation, and urgent Government requirements preclude amendment of the solicitation, the time specified for receipt of proposals will be deemed to be extended to the same time of day specified in the solicitation on the first work day on which normal Government processes resume.

(v) Proposals may be withdrawn by written notice received at any time before award. Oral proposals in response to oral solicitations may be withdrawn orally. If the solicitation authorizes facsimile proposals, proposals may be withdrawn via facsimile received at any time before award, subject to the conditions specified in the provision at 52.215-5, Facsimile Proposals. Proposals may be withdrawn in person by an offeror or an authorized representative, if the identity of the person requesting withdrawal is established and the person signs a receipt for the proposal before award.

(4) Unless otherwise specified in the solicitation, the offeror may propose to provide any

item or combination of items.

(5) Offerors shall submit proposals in response to this solicitation in English, unless otherwise permitted by the solicitation, and in U.S. dollars, unless the provision at FAR 52.225-17, Evaluation of Foreign Currency Offers, is included in the solicitation.

(6) Offerors may submit modifications to their proposals at any time before the solicitation closing date and time, and may submit modifications in response to an amendment, or to correct a mistake at any time before award.

(7) Offerors may submit revised proposals only if requested or allowed by the Contracting Officer.

(8) Proposals may be withdrawn at any time before award. Withdrawals are effective upon receipt of notice by the Contracting Officer.

(d) *Offer expiration date.* Proposals in response to this solicitation will be valid for the number of days specified on the solicitation cover sheet (unless a different period is proposed by the offeror).

(e) *Restriction on disclosure and use of data.* Offerors that include in their proposals data that they do not want disclosed to the public for any purpose, or used by the Government except for evaluation purposes, shall-

(1) Mark the title page with the following legend: This proposal includes data that shall not be disclosed outside the Government and shall not be duplicated, used, or disclosed-in whole or in part-for any purpose other than to evaluate this proposal. If, however, a contract is awarded to this offeror as a result of-or in connection with-the submission of this data, the Government shall have the right to duplicate, use, or disclose the data to the extent provided in the resulting contract. This restriction does not limit the Government's right to use information contained in this data if it is obtained from another source without restriction. The data subject to this restriction are contained in sheets [insert numbers or other identification of sheets]; and

(2) Mark each sheet of data it wishes to restrict with the following legend: Use or disclosure of data contained on this sheet is subject to the restriction on the title page of this proposal.

(f) *Contract award.* (1) The Government intends to award a contract or contracts resulting from this solicitation to the responsible offeror(s) whose proposal(s) represents the best value after evaluation in accordance with the factors and subfactors in the solicitation.

(2) The Government may reject any or all proposals if such action is in the Government's interest.

(3) The Government may waive informalities and minor irregularities in proposals received.

(4) The Government intends to evaluate proposals and award a contract without discussions with offerors (except clarifications as described in FAR 15.306(a)). Therefore, the offeror's initial proposal should contain the offeror's best terms from a cost or price and technical standpoint. The Government reserves the right to conduct discussions if the Contracting Officer later determines them to be necessary. If the Contracting Officer determines that the number of proposals that would otherwise be in the competitive range exceeds the number at which an efficient competition can be conducted, the Contracting Officer may limit the number of proposals in the competitive range to the greatest number that will permit an efficient competition among the most highly rated proposals.

(5) The Government reserves the right to make an award on any item for a quantity less than the quantity offered, at the unit cost or prices offered, unless the offeror specifies otherwise in the proposal.

(6) The Government reserves the right to make multiple awards if, after considering the additional administrative costs, it is in the Government's best interest to do so.

(7) Exchanges with offerors after receipt of a proposal do not constitute a rejection or counteroffer by the Government.

(8) The Government may determine that a proposal is unacceptable if the prices proposed are materially unbalanced between line items or subline items. Unbalanced pricing exists when, despite an acceptable total evaluated price, the price of one or more contract line items is significantly overstated or understated as indicated by the application of cost or price analysis techniques. A proposal may be rejected if the Contracting Officer determines that the lack of balance poses an unacceptable risk to the Government.

(9) If a cost realism analysis is performed, cost realism may be considered by the source selection authority in evaluating performance or schedule risk.

(10) A written award or acceptance of proposal mailed or otherwise furnished to the successful offeror within the time specified in the proposal shall result in a binding contract without further action by either party.

(11) If a post-award debriefing is given to requesting offerors, the Government shall disclose the following information, if applicable:

(i) The agency's evaluation of the significant weak or deficient factors in the debriefed offeror's offer.

(ii) The overall evaluated cost or price and technical rating of the successful and the debriefed offeror and past performance information on the debriefed offeror.

(iii) The overall ranking of all offerors, when any ranking was developed by the agency during source selection.

(iv) A summary of the rationale for award.

(v) For acquisitions of commercial items, the make and model of the item to be delivered by the successful offeror.

(vi) Reasonable responses to relevant questions posed by the debriefed offeror as to whether source-selection procedures set forth in the solicitation, applicable regulations, and other applicable authorities were followed by the agency.

(10) Organizational Conflicts of Interest (EPAAR 1552.209-71) (May 1994) Alternate I (May 1994)

(a) The Contractor warrants that, to the best of the Contractor's knowledge and belief, there are no relevant facts or circumstances which could give rise to an organizational conflict of interest, as defined in FAR Subpart 9.5, or that the Contractor has disclosed all such relevant information.

(b) Prior to commencement of any work, the Contractor agrees to notify the Contracting Officer immediately that, to the best of its knowledge and belief, no actual or potential conflict of interest exists or to identify to the Contracting Officer any actual or potential conflict of interest the firm may have. In emergency situations, however, work may begin but notification shall be made within five (5) working days.

(c) The Contractor agrees that if an actual or potential organizational conflict of interest is identified during performance, the Contractor will immediately make a full disclosure in writing to the Contracting Officer. This disclosure shall include a description of actions which the Contractor has taken or proposes to take, after consultation with the Contracting Officer, to avoid, mitigate, or neutralize the actual or potential conflict of interest. The Contractor shall continue performance until notified by the Contracting Officer of any contrary action to be taken.

(d) Remedies - The EPA may terminate this contract for convenience, in whole or in part, if it deems such termination necessary to avoid an organizational conflict of interest. If the Contractor was aware of a potential organizational conflict of interest prior to award or discovered an actual or potential conflict after award and did not disclose it or misrepresented relevant information to the Contracting Officer, the Government may terminate the contract for default, debar the Contractor from Government contracting, or pursue such other remedies as

may be permitted by law or this contract.

(e) The Contractor agrees to insert in each subcontract or consultant agreement placed hereunder provisions which shall conform substantially to the language of this clause, including this paragraph, unless otherwise authorized by the Contracting Officer.

(11) Data Universal Numbering System (DUNS) Number, (Oct 2003), FAR 52.204-6

(a) The offeror shall enter, in the block with its name and address on the cover page of its offer, the annotation "DUNS" followed by the DUNS number that identifies the offeror's name and address exactly as stated in the offer. The DUNS number is a nine-digit number assigned by Dun and Bradstreet Information Services.

(b) If the Offeror does not have a DUNS number, it should contact Dun and Bradstreet directly to obtain one. A DUNS number will be provided immediately by telephone at no charge to the offeror. For information on obtaining a DUNS number, the offeror, if located within the United States, should call Dun and Bradstreet at 1-800-333-0505. The offeror should be prepared to provide the following information:

- (1) Company name.
- (2) Company address.
- (3) Company telephone number.
- (4) Line of business.
- (5) Chief executive officer/key manager.
- (6) Date the company was started.
- (7) Number of people employed by the company.
- (8) Company affiliation.

(c) Offerors located outside the United States may obtain the location and phone number of the local Dun and Bradstreet Information Services office from the Internet home page at <http://www.customerservice@dnb.com>. If an offeror is unable to locate a local service center, it may send an e-mail to Dun and Bradstreet at globalinfo@mail.dnb.com.

(12) Central Contractor Registration, (Oct 2003), FAR 52.204-7

(a) Definitions. As used in this clause--

"Central Contractor Registration (CCR) database" means the primary Government repository for Contractor information required for the conduct of business with the Government.

"Data Universal Numbering System (DUNS) number" means the 9-digit number assigned by Dun and Bradstreet, Inc. (D&B) to identify unique business entities.

"Data Universal Numbering System +4 (DUNS+4) number" means the DUNS number

assigned by D&B plus a 4-character suffix that may be assigned by a business concern. (D&B has no affiliation with this 4-character suffix.) This 4-character suffix may be assigned at the discretion of the business concern to establish additional CCR records for identifying alternative Electronic Funds Transfer (EFT) accounts (see the FAR at Subpart 32.11) for the same parent concern.

“Registered in the CCR database” means that--

(1) The Contractor has entered all mandatory information, including the DUNS number or the DUNS+4 number, into the CCR database; and

(2) The Government has validated all mandatory data fields and has marked the record “Active”.

(b)(1) By submission of an offer, the offeror acknowledges the requirement that a prospective awardee shall be registered in the CCR database prior to award, during performance, and through final payment of any contract, basic agreement, basic ordering agreement, or blanket purchasing agreement resulting from this solicitation.

(2) The offeror shall enter, in the block with its name and address on the cover page of its offer, the annotation “DUNS” or “DUNS +4” followed by the DUNS or DUNS +4 number that identifies the offeror's name and address exactly as stated in the offer. The DUNS number will be used by the Contracting Officer to verify that the offeror is registered in the CCR database.

(c) If the offeror does not have a DUNS number, it should contact Dun and Bradstreet directly to obtain one.

(1) An offeror may obtain a DUNS number--

(i) If located within the United States, by calling Dun and Bradstreet at 1-866-705-5711 or via the Internet at <http://www.dnb.com>; or

(ii) If located outside the United States, by contacting the local Dun and Bradstreet office.

(2) The offeror should be prepared to provide the following information:

(i) Company legal business.

(ii) Tradestyle, doing business, or other name by which your entity is commonly recognized.

(iii) Company Physical Street Address, City, State, and Zip Code.

- (iv) Company Mailing Address, City, State and Zip Code (if separate from physical).
- (v) Company Telephone Number.
- (vi) Date the company was started.
- (vii) Number of employees at your location.
- (viii) Chief executive officer/key manager.
- (ix) Line of business (industry).
- (x) Company Headquarters name and address (reporting relationship within your entity).

(d) If the Offeror does not become registered in the CCR database in the time prescribed by the Contracting Officer, the Contracting Officer will proceed to award to the next otherwise successful registered Offeror.

(e) Processing time, which normally takes 48 hours, should be taken into consideration when registering. Offerors who are not registered should consider applying for registration immediately upon receipt of this solicitation.

(f) The Contractor is responsible for the accuracy and completeness of the data within the CCR database, and for any liability resulting from the Government's reliance on inaccurate or incomplete data. To remain registered in the CCR database after the initial registration, the Contractor is required to review and update on an annual basis from the date of initial registration or subsequent updates its information in the CCR database to ensure it is current, accurate and complete. Updating information in the CCR does not alter the terms and conditions of this contract and is not a substitute for a properly executed contractual document.

(g)(1)(i) If a Contractor has legally changed its business name, "doing business as" name, or division name (whichever is shown on the contract), or has transferred the assets used in performing the contract, but has not completed the necessary requirements regarding novation and change-of-name agreements in Subpart 42.12, the Contractor shall provide the responsible Contracting Officer a minimum of one business day's written notification of its intention to (A) change the name in the CCR database; (B) comply with the requirements of Subpart 42.12 of the FAR; and (C) agree in writing to the timeline and procedures specified by the responsible Contracting Officer. The Contractor must provide with the notification sufficient documentation to support the legally changed name.

(ii) If the Contractor fails to comply with the requirements of paragraph (g)(1)(i) of this clause, or fails to perform the agreement at paragraph (g)(1)(i)(C) of this clause, and, in the

absence of a properly executed novation or change-of-name agreement, the CCR information that shows the Contractor to be other than the Contractor indicated in the contract will be considered to be incorrect information within the meaning of the “Suspension of Payment” paragraph of the electronic funds transfer (EFT) clause of this contract.

(2) The Contractor shall not change the name or address for EFT payments or manual payments, as appropriate, in the CCR record to reflect an assignee for the purpose of assignment of claims (see FAR Subpart 32.8, Assignment of Claims). Assignees shall be separately registered in the CCR database. Information provided to the Contractor's CCR record that indicates payments, including those made by EFT, to an ultimate recipient other than that Contractor will be considered to be incorrect information within the meaning of the “Suspension of payment” paragraph of the EFT clause of this contract.

(h) Offerors and Contractors may obtain information on registration and annual confirmation requirements via the internet at <http://www.ccr.gov> or by calling 1-888-227-2423, or 269-961-5757.

(13) Annual Representations and Certifications, (Jan 2005), FAR 52.204-8

(a)(1) If the clause at 52.204-7, Central Contractor Registration, is included in this solicitation, paragraph (b) of this provision applies.

(2) If the clause at 52.204-7 is not included in this solicitation, and the offeror is currently registered in CCR, and has completed the ORCA electronically, the offeror may choose to use paragraph (b) of this provision instead of completing the corresponding individual representations and certifications in the solicitation. The offeror shall indicate which option applies by checking one of the following boxes:

(i) Paragraph (b) applies.

(ii) Paragraph (b) does not apply and the offeror has completed the individual representations and certifications in the solicitation.

(b) The offeror has completed the annual representations and certifications electronically via the Online Representations and Certifications Application (ORCA) website at <http://orca.bpn.gov>. After reviewing the ORCA database information, the offeror verifies by submission of the offer that the representations and certifications currently posted electronically have been entered or updated within the last 12 months, are current, accurate, complete, and applicable to this solicitation (including the business size standard applicable to the NAICS code referenced for this solicitation), as of the date of this offer and are incorporated in this offer by reference (see FAR 4.1201); except for the changes identified below [*offeror to insert changes, identifying change by clause number, title, date*]. These

amended representation(s) and/or certification(s) are also incorporated in this offer and are current, accurate, and complete as of the date of this offer.

<u>FAR</u>			
<u>Clause #</u>	<u>Title</u>	<u>Date</u>	<u>Change</u>

Any changes provided by the offeror are applicable to this solicitation only, and do not result in an update to the representations and certifications posted on ORCA.

(End of provision)

(14) Small Business Program Representations (May 2004) FAR 52.219-1

(a)(1) The North American Industry Classification System (NAICS) code for this acquisition is 541710.

(2) The small business size standard is 500 employees.

(3) The small business size standard for a concern which submits an offer in its own name, other than on a construction or service contract, but which proposes to furnish a product which it did not itself manufacture, is 500 employees.

(b) *Representations.*

(1) The offeror represents as part of its offer that it [] is, [] is not a small business concern.

(2) *[Complete only if the offeror represented itself as a small business concern in paragraph (b)(1) of this provision.]* The offeror represents, for general statistical purposes, that it [] is, [] is not, a small disadvantaged business concern as defined in 13 CFR 124.1002.

(3) *[Complete only if the offeror represented itself as a small business concern in paragraph (b)(1) of this provision.]* The offeror represents as part of its offer that it [] is, [] is not a women-owned small business concern.

(4) *[Complete only if the offeror represented itself as a small business concern in paragraph (b)(1) of this provision.]* The offeror represents as part of its offer that it [] is, [] is not a veteran-owned small business concern.

(5) *[Complete only if the offeror represented itself as a veteran-owned small business concern in paragraph (b)(4) of this provision.]* The offeror represents as part of its offer that is [] is, [] is not a service-disabled veteran-owned small business concern.

(6) *[Complete only if the offeror represented itself as a small business concern in paragraph (b)(1) of this provision.]* The offeror represents, as part of its offer, that--

(i) It [] is, [] is not a HUBZone small business concern listed, on the date of this representation, on the List of Qualified HUBZone Small Business Concerns maintained by the Small Business Administration, and no material change in ownership and control, principal office, or HUBZone employee percentage has occurred since it was certified by the Small Business Administration in accordance with 13 CFR part 126; and

(ii) It [] is, [] is not a joint venture that complies with the requirements of 13 CFR part 126, and the representation in paragraph (b)(6)(i) of this provision is accurate for the HUBZone small business concern or concerns that are participating in the joint venture. *[The offeror shall enter the name or names of the HUBZone small business concern or concerns that are participating in the joint venture: _____.]* Each HUBZone small business concern participating in the joint venture shall submit a separate signed copy of the HUBZone representation.

(c) *Definitions.* As used in this provision--

"Service-disabled veteran-owned small business concern"-

(1) Means a small business concern-

(i) Not less than 51 percent of which is owned by one or more service-disabled veterans or, in the case of any publicly owned business, not less than 51 percent of the stock of which is owned by one or more service-disabled veterans; and

(ii) The management and daily business operations of which are controlled by one or more service-disabled veterans or, in the case of a service-disabled veteran with permanent and severe disability, the spouse or permanent caregiver of such veteran.

(2) Service-disabled veteran means a veteran, as defined in 38 U.S.C. 101(2), with a disability that is service-connected, as defined in 38 U.S.C. 101(16).

"Small business concern," means a concern, including its affiliates, that is independently owned and operated, not dominant in the field of operation in which it is bidding on Government contracts, and qualified as a small business under the criteria in 13 CFR Part 121 and the size standard in paragraph (a) of this provision.

"Veteran-owned small business concern" means a small business concern-

(1) Not less than 51 percent of which is owned by one or more veterans (as defined at 38 U.S.C. 101(2)) or, in the case of any publicly owned business, not less than 51 percent of the stock of which is owned by one or more veterans; and

(2) The management and daily business operations of which are controlled by one or more veterans.

"Women-owned small business concern," means a small business concern --

(1) That is at least 51 percent owned by one or more women; or, in the case of any publicly owned business, at least 51 percent of the stock of which is owned by one or more women; and

(2) Whose management and daily business operations are controlled by one or more women.

(d) *Notice.*

(1) If this solicitation is for supplies and has been set aside, in whole or in part, for small business concerns, then the clause in this solicitation providing notice of the set-aside contains restrictions on the source of the end items to be furnished.

(2) Under 15 U.S.C. 645(d), any person who misrepresents a firm's status as a small, HUBZone small, small disadvantaged, or women-owned small business concern in order to obtain a contract to be awarded under the preference programs established pursuant to section 8(a), 8(d), 9, or 15 of the Small Business Act or any other provision of Federal law that specifically references section 8(d) for a definition of program eligibility, shall --

(i) Be punished by imposition of fine, imprisonment, or both;

(ii) Be subject to administrative remedies, including suspension and debarment; and

(iii) Be ineligible for participation in programs conducted under the authority of the Act.

VI. SUBMISSION OF PROPOSALS

A. Your proposal with an original and nine (9) copies shall be received at one of the following addresses by 12:00 p.m. (Noon), local time, on May 24, 2006.

U.S. MAIL ADDRESS:

U.S. Environmental Protection Agency
Solicitation No. PR-NC-06-10207 - SBIR Phase I
Closing Date: May 24, 2006 at 12:00 p.m. (Noon)
Attention: Marsha Johnson, SBIR Phase I
RTP Procurement Operations Division (D143-01)
Research Triangle Park, NC 27711

HAND CARRIED/COURIER ADDRESS:

U.S. Environmental Protection Agency
Solicitation No. PR-NC-06-10207 - SBIR Phase I
Closing Date: May 24, 2006 at 12:00 p.m. (Noon)
Attention: Marsha Johnson, SBIR Phase I
RTP Procurement Operations Division (D143-01)
4930 Page Road
Durham, NC 27703

IMPORTANT!!! Please note Section V, Paragraph J.9(c) concerning Late Proposals, Modifications of Proposals and Withdrawal of Proposals.

Telegraphic, telecopied or facsimile proposals will NOT be considered for award.

B. Please do not use special bindings or covers. Staple the pages in the upper left corner of the cover sheet of each proposal.

C. All copies of a proposal shall be sent in the same package.

D. The proposal should be self-contained and written with the care and thoughtfulness accorded papers for publication.

VII. SCIENTIFIC AND TECHNICAL INFORMATION SOURCES

(See Appendix D)

VIII. SBIR PHASE I RESEARCH TOPICS

Program Scope: The objective of this solicitation is to increase the incentive and opportunity for small firms to undertake cutting edge, high-risk, or long-term research that has a high potential payoff if the research is successful. Federal support of the front-end research on new ideas, often the highest risk part of the innovation process, may provide small businesses sufficient incentive to pursue such research.

EPA's SBIR program does not fund basic research or literature searches. It is recognized that any research and development project starts out as a concept of the inventor. Basic theoretic research studies and preliminary laboratory testing of the concept are often needed to develop an idea. Literature and other surveys and questionnaires are also needed to rule out duplication and inappropriate research study and process detail, finally leading to the process design of a prototype apparatus or process that could be tested to show the feasibility of the innovation. These basic research activities and preliminary studies should be completed before preparing an SBIR proposal.

- Research Topics: The proposed research must directly pertain to EPA's environmental mission and must be responsive to EPA program interests included in the topic descriptions of this solicitation. The research should be the basis for technological innovation resulting in new commercial products, processes, or services which benefit the public and promote the growth of the small business. This year's SBIR Solicitation is focused on 4 main topic areas: (A) Great Lakes Environmental Problems (EPA Region 5), (B) Environmental Problems in America's Heartland (EPA Region 7), (C) Drinking Water and Wastewater Management (EPA Office of Water (OW)), and (D) Critical EPA Research Topics. Small businesses located anywhere in the USA may submit a proposal for any topic in this solicitation and the proposal can address an environmental topic affecting any geographic area of the US. This solicitation is available from March 23, 2006 until May 24, 2006 on the EPA SBIR website (www.epa.gov/ncer/sbir).

A. GREAT LAKES ENVIRONMENTAL PROBLEMS (EPA REGION 5)

EPA Region 5, headquartered in Chicago, is responsible for environmental protection in Illinois, Indiana, Michigan, Minnesota, Ohio and Wisconsin. Region 5 research topics focus on important problems in these states and the Great Lakes. There are over 6,000 facilities that release over a billion pounds of pollutants to the air, water and land in the Region. In addition, over 80 million acres of agricultural crops and several thousand animal feeding operations lead to stream pollution contributing to hypoxia and fish mortality.

Small businesses anywhere in the nation may submit a proposal for any Region 5 topic and the proposal may address the environmental problem whether the geographic focus is Region 5 or another geographic area in the US. While Region 5 would benefit from contributions directed to most of the topics in this solicitation, Region 5 is emphasizing four topics in this solicitation: (A1) Improving the Great Lakes; (A2) Control of Air Pollution; (A3) Monitoring and Remote Sensing; and (A4) Green Buildings.

A1. IMPROVING THE GREAT LAKES

This topic includes three subtopics: (1) Cleanup of Contaminated Sediments; (2) New Mercury Free Products; and (3) Pharmaceuticals and Personal Care Product Disposal.

CLEANUP OF CONTAMINATED SEDIMENTS

From the Great Lakes to the Delaware River or Puget Sound, hazardous waste contamination of near-shore and other sediments have impacted marine life, disrupted the ecological food chain and resulted in fish advisories to protect human health. Many urban rivers, harbors and bays are much cleaner now, but the sediments have concentrated many persistent bioaccumulative and toxic substances including polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), creosote, pentachlorophenol and heavy metals like arsenic and mercury. Years of dumping by chemical plants, refineries, wood preservers, painting and electroplating shops, shipyards and others have contaminated the sediments.

Dredging has often been the preferred solution, but it is expensive and may have impacts on the ecosystem. Even specialized equipment resuspends some of the contaminated sediment within the water column. There are also challenges associated with disposal of the dredged sediment, particularly when the sediments are extremely contaminated. Areas of needed research include, but are not limited to:

- New technologies for beneficial use of contaminated sediments and/or dredged materials either alone or in combination with other industrial or municipal residuals or agricultural waste.
- Development of technologies that inject materials like highly reactive metal particles, iron oxide, calcium carbonate or nanoparticles and other materials for in-situ cleanup of highly contaminated sediments. Other improvements are needed to accelerate in-situ decontamination, such as using specialized catalysts or coatings or delivering the material more effectively, such as in the form of an emulsion.
- Development of specialized technologies such as in-situ elution or desorption and more effective ways to immobilize, detoxify or remove sediment contaminants. Development of in-situ bioremediation techniques that use a mixture of bacteria, nutrients and sediment conditions to accelerate contaminant detoxification rates.
- Development of cost effective and minimally invasive monitoring technology to measure concentrations of contaminants in sediment hot spots, the relationship between sediment contaminants, particularly arsenic, and uptake of contaminants into

the ecological and human food chain, and the bio-availability of contaminants in sediments.

- Improved sediment capping materials such as reactive core mats where materials like coke-filled carpets are laid on the river bottom to detoxify or bind contaminants to prevent escape from the sediments into the water. Development of new techniques that work in the absence of oxygen deep within sediments and also utilize oxygen to detoxify upper reaches of sediments.

MERCURY FREE PRODUCTS

EPA is concerned about mercury in the Great Lakes and other ecosystems. Mercury has been targeted due to its properties of persistence, bioaccumulation potential, and toxicity. Mercury is found in soil, sediment, ground water, surface water as a result of past and present releases. Mercury can be found in municipal wastes as well. Even when released in very small amounts, mercury accumulates and can cause serious environmental problems that are difficult and expensive to clean up. EPA is interested in new technologies and products that reduce or eliminate mercury. Specific areas of interest include, but are not limited to:

- Marketable mercury-free alternatives to mercury containing flame sensors used in gas ovens and other gas appliances with no electric source.
- Non-mercury alternatives to gastrointestinal tubes used by doctors. Gastrointestinal tubes typically have expiration dates, after which their use must be discontinued.
- Non-mercury alternatives to industrial thermostats.
- Cost competitive non-mercury alternatives for switches and relays.
- Cost competitive non-mercury alternatives for fluorescent lamps mercury vapor lamps, metal halide lamps, high-pressure sodium lamps, and neon lamps.

EPA is most interested in products that eliminate mercury. However, until these products are developed and commercialized, EPA is also interested in recycling products that contain mercury. Technologies are needed for recycling mercury-containing gastrointestinal tubes, industrial thermostats, switches and relays and fluorescent and other mercury lamps.

PHARMACEUTICALS AND PERSONAL CARE PRODUCTS

Certain Pharmaceuticals and Personal Care Products (PPCP) are relatively persistent with little removal at municipal wastewater treatment plants. There is increasing concern about the fate and safety of PPCPs such as diclofenac, amitriptyline, trimethoprim, labetalol, carbamazepine, metoprolol, primidone, propranolol, diltiazem and acyclovir. Residual amounts of pain medications, antibiotic and prescription drugs may reach the Great Lakes and other ecosystems through municipal wastewater systems. EPA is interested in safe disposal methods that avoid contamination of water and in better analytical methods for monitoring PPCPs.

A2. CONTROL OF AIR POLLUTION

A priority problem in EPA Region 5 and beyond is air toxics and fine particulate (PM_{2.5}) air pollution (less than 2.5 micrometers in diameter). Important air pollution priorities include reducing emissions from small air pollution sources with large numbers of establishments, particularly small industrial boilers, auto body and paint shops and restaurants. New technologies are also needed for outdoor wood-fired hydronic heaters and new fireplace designs. This topic also includes opportunities aimed at helping to promote Integrated Gasification Combined Cycle (IGCC) power plants.

SMALL AIR POLLUTION SOURCES

Technologies are needed for small air pollution sources including small industrial boilers, auto body and paint shops and restaurants. Small industrial boilers are an important class of air pollution sources that emit particulate matter and other air pollutants. Auto body shops and paint plants also emit particulates and volatile organics. Restaurants and establishments that use fryers, broilers, grills and other cookers to prepare food products are a problem source of particulates and other air pollutants. Large numbers of small sources collectively become a significant contributor to air pollution. EPA needs include:

- Retrofit and inexpensive air pollution control devices for small oil and coal-fired industrial boilers. These small sources (between 10 and 100 million BTU boilers) are collectively large contributors to PM and other air pollution. EPA is also interested in technologies that help small fabric filters and electrostatic precipitators (ESPs) function more effectively.
- Auto body shops repair automotive bodies and interiors and provide automotive painting and refinishing, emitting particulates and volatile organics. Paint plants mix pigments, solvents and binders into paint and other coating such as stains, lacquers and water repellent coatings. Plants also manufacture paint removers and cleaners. Inexpensive and low maintenance retrofit technologies are needed for auto body shops and paint plants.
- Reformulations of stains and lacquers that reduce volatile organic compounds (VOCs) and particulate matter are also needed. Reformulations may be less expensive and easier to use than retrofit technologies.
- Effective and inexpensive air pollution control devices for restaurants and establishments that use fryers, broilers, grills and other cookers to prepare food products. Simple retrofit technologies are needed to remove particulates (PM_{2.5}), VOCs and other air pollutants. Retrofit technologies need to be inexpensive, easy to operate and low maintenance.

OUTDOOR WOOD-FIRED HYDRONIC HEATERS AND NEW FIREPLACE DESIGNS

There are over 70,000 small (500,000 BTU/hr or less) outdoor wood-fired hydronic heaters

(OWHHs) used to supplement energy for residential and commercial heating and hot water and sales are increasing. Generally, commercially available units utilize poor combustion technology. Incomplete combustion and inefficient OWHH designs produce emissions with high levels of particulate matter, especially during start-up and addition of new fuel. Retrofit technologies and new OWHH designs are needed including:

- Retrofit emission control devices for OWHHs. These technologies need to be simple and easy to operate, inexpensive with low maintenance requirements. Controls are needed to optimize performance during start-up and fuel addition when emissions increase significantly.
- New OWHH designs are needed that improve performance (e.g., increased efficiency) and reduce emissions of particulates and hazardous air pollutants (e.g., polycyclic aromatic hydrocarbons (PAHs), benzene, formaldehyde and dioxins). Current designs are aimed at low cost for residential users and new designs need to be inexpensive with low emissions. Investigation of new more efficient designs of the heater component that exchanges heat from the combustion chamber to the water are sought including those that separate the combustion chamber and the water.
- New fireplace designs are also of interest. These designs need to lower emissions while costing approximately the same as current systems.

COAL GASIFICATION

One of the most challenging problems we face is generating electricity from coal in an environmentally sustainable way. Currently, over 50 percent of electricity comes from coal, and this percentage is unlikely to go down given that the U.S. has 25 percent of the world's proven coal reserves. However, generating electricity from coal is responsible for approximately 2/3 of the U.S.'s sulfur dioxide (SO₂) emissions (which contribute to air pollution problems such as fine particle pollution, acid rain, and regional haze), 1/5 of the nitrogen oxides (NO_x) emissions (which contribute to ozone pollution as well as the problems listed above), over 1/3 of our mercury air emissions, and has potential water consumption/conservation concerns. In addition, coal combustion emits carbon dioxide (CO₂, a greenhouse gas) – worldwide, coal combustion is responsible for 37 percent of anthropogenic CO₂ emissions.

Integrated gasification combined cycle, or IGCC, which uses a gasifier to transform coal (and other fuels) to gas, and then uses a combined cycle power block to generate electricity, is one of the most promising technologies to meet the challenge of generating electricity from coal in an environmentally sustainable way. IGCC has lower emissions and the potential to make carbon capture and sequestration much easier and cheaper than would traditional coal plants. IGCC also has multi-media environmental benefits, as it reduces the amount of water that is used, provides a solid waste stream that can be a useful byproduct and it can use coal and biomass as fuel.

The U.S. Department of Energy (DOE) has helped fund two IGCC demonstration plants, but

commercial deployment faces a number of obstacles – including higher capital costs and higher technology risk relative to other generation technologies but obtaining financing for the project being the most important. EPA is actively working with the DOE and others to address these obstacles and bring IGCC technology to the marketplace. EPA is seeking proposals in the two areas below to help address some of these obstacles:

- Development of innovative hot gas cleanup technology to allow for removal of reduced sulfur (H₂S, COS) and nitrogen (NH₃, HCN) compounds from the fuel gas at gasification operating temperatures. This can dramatically enhance the efficiency of this technology and lower capital and operating costs, by avoiding the need to cool down, with the associated energy loss, in order to use conventional clean-up technologies.
- Development of innovative, affordable technology to remove carbon dioxide from the gasifier effluent for subsequent transport and sequestration. This is critical to allow the continued use of coal without the emissions of CO₂ and its contribution to greenhouse warming.

A3. MONITORING AND REMOTE SENSING

Monitoring and remote sensing technologies are needed to identify pollution problems and emission sources and to protect human health and the environment. This topic includes three subtopics: (1) Air pollution monitoring; (2) Hazardous waste monitoring; and (3) Remote sensing.

AIR POLLUTION MONITORING

Better air pollution monitors are needed for measuring PM coarse fractions, organic vapor quantitative generators, nebulizers for metals and particulate matter, instruments for semi-volatile compounds and mercury. Needs include but are not limited to:

- PM coarse fractions. PM coarse fraction is defined as PM₁₀ to PM_{2.5}.
- Research and development is needed for an organic vapor quantitative generator. The vapor generator would be useful to determine accuracies for methods and monitoring instrumentation for ambient, source and homeland security applications.
- EPA needs a quantifiable nebulizer system to deliver organic/inorganic compounds (i.e., different organic compounds and nitrates, sulfates, ammonia and metals) for use as assessment and calibration devices to challenge air toxics or PM instruments in a field setting. The system should also be able to generate atmospheres that can be deposited onto filters (i.e., 47 mm filters) that can be sent to laboratories that are analyzing air toxics or PM samples.
- Instruments that can quantify semi-volatile compounds (naphthalene and other polycyclic compounds) in a semi-continuous time scale.

- Better analytical methods are needed for volatile organic compounds (particularly lower detection limits for benzene and 1,3-butadiene) and carbonyls. Levels of detection need to be in the sub-ppb level. Improved sampling methods are also needed including samplers that are small, lightweight, portable and deployable in a rugged setting or field operation. Battery operation would be a plus.
- Mercury is considered one of the most important HAPs, as it is listed in the Clean Air Act. It also is important for its ability to be a Persistent Bioaccumulative Toxic (PBT). Mercury can absorb strongly in the Ultraviolet radiation spectrum and Differential Optical Absorption Spectrophotometers (DOAS) have been able to detect mercury. The Agency needs the ability to detect mercury in its many phases. Mercury in the atmosphere can exist as a gas, semi-volatile gas and as a particle. New instruments are needed that can detect mercury in its different phases and quantify it in the parts per billion (ppb) or parts per trillion (ppt) range.
- Passive air sampling devices with multiple sensors for measuring a number of individual air pollutants over weeks or months. Such monitoring networks need to be inexpensive, reusable, easy to deploy, unobtrusive and not require a source of power. Monitoring results should allow for sufficient sampling times per device to yield representative and reliable ambient air pollutant results.

HAZARDOUS WASTE MONITORING

EPA's hazardous waste management programs are seeking better sampling, analysis, and monitoring technologies to advance hazardous waste site cleanup and regulated waste process activities. This area includes technologies to address industrial and waste processes, accurate and cost effective identification and characterization of contaminants at waste sites, monitoring the performance of site cleanup activities and remedies both during construction and also during long-term operations, and techniques to support the closeout of cleanup activities and to support land revitalization beyond site cleanup phases. More information on these needs is available at <http://clu-in.org/programs/21m2/needs.cfm> Areas with significant technology needs and gaps include:

- Continuous Emissions Monitors (CEMs) for use with thermal hazardous waste treatment systems. EPA is seeking technologies or techniques which allow real-time/near real-time ability to measure stack emissions for toxic organic and heavy metal air emissions.
- Sensor technologies for long-term monitoring of groundwater. Chemical specific (e.g., perchloroethene or trichloroethene) in-situ sensors are needed that can be queried remotely multiple times without biofouling or need for maintenance re-calibration. Sensors should meet required pollutant detection levels and be small enough, yet robust and at a reasonable cost to deploy with flux meters and piezometers to characterize change over small vertical and horizontal scales.

- Cost-effective leak detection technologies are needed for small municipal landfills. In addition, sensors are needed to monitor the integrity and effectiveness of slurry walls and liners and passive treatment (e.g., permeable reactive barrier systems).
- Technologies are needed for locating and monitoring the presence and persistence of non-aqueous phase liquids (NAPLs), particularly dense non-aqueous phase liquids (DNAPLs). EPA is seeking non-invasive or minimally invasive technologies that are capable of locating small volumes of DNAPL, characterizing the contamination, assisting with the visualization of the DNAPL relative to features in the subsurface hydrogeology, and supporting the modeling and optimization of treatment systems.

REMOTE SENSING

EPA needs lower cost remote sensing instruments for detection of facility leaks and finding the leak source at the component level. An instrument that can also speciate the chemicals and/or quantify the emission rate will be considered a plus but is not a requirement for application for this proposal. The chemicals of most concerns are highly reactive volatile organic compounds (VOC's). Most of the chemicals of concern are in the mid to long wave infrared (MWIR or LWIR) spectral window. This window is generally defined as the 3-5 : m (MWIR) to 8-13 : m (LWIR). While portable spectrometers exist that can identify leak locations of refinery hydrocarbons, broad range IR spectrometers are needed to identify specific chemicals. Instrumentation must be able to :

- Detect chemicals throughout the medium and longwave infrared spectrum
- Detect emissions at a minimum mass flow rate of 60 grams per hour
- Portable so that it can be maneuvered in relatively tight spaces
- Intrinsically safe for operation in gaseous environment
- Detect low level differences between thermal plumes and atmospheric conditions
- Visualize leaks at the source through interchangeable fixed lenses or zoom feature

Enhancements that will add value to the instrument but are not considered mandatory include the ability to quantify the emission rate of the compound detected and to speciate the chemicals detected. The ability of the instrument to store data in a format compatible with common software analysis programs like ENVI would be a plus.

EPA also needs low cost instruments for fence-line monitoring of fugitive emissions. Many processes in the batch chemical, pharmaceutical, and petroleum refinery industries have fugitive emissions that are not released via stacks. The instrument should be real-time or near real-time for monitoring of toxic organic pollutants downwind at the facility fence line. Instrumentation should be able to:

- Detect multiple chemicals crossing the plant boundary throughout the medium and longwave infrared spectrum
- Compact in size and use non-liquid cooled detectors
- Controlled by advanced software so that the systems can be run by existing normal testing crews

A4. GREEN BUILDINGS

Green building is the practice of: (1) increasing the efficiency with which buildings and their sites use energy, water, and materials; and (2) reducing building impacts on human health and the environment through better siting, design, construction, operation, maintenance, and removal—the complete building life cycle. The many elements of green buildings include energy, water, materials, waste and the indoor environment. Identifying ways to reduce negative multi-media impacts of buildings and construction on human health and the environment is one of the priorities of EPA. Building and construction activities worldwide consume three billion tons of raw materials each year or 40 percent of total global material use. Buildings use one-third of all energy, two-thirds of all electricity and their construction consumes one-fourth of all harvested wood. Health and productivity losses associated with indoor air pollution are estimated to cost tens of billions of dollars annually. Technologies that only involve energy efficiency with no other direct environmental benefit (such as solar energy technologies) are addressed by other agencies and will not be considered. Examples of Green Building research needs include, but are not limited to:

- New green building materials, technologies or processes that cause fewer multimedia environmental problems and have reduced life cycle costs (e.g., recycled content, low toxicity, energy efficiency, biodegradability, and/or durability).
- Methodologies and processes to evaluate costs of constructing green buildings, including LEED-rated buildings. Leadership in Energy and Environmental Design (LEED) is a voluntary green building rating system. (See www.usgbc.org/leed.)
- Real-time measurement of energy and water consumption in buildings.
- Technologies and/or methodologies to improve measurement of indoor environmental quality as well as to assess health and productivity effects.
- Environmentally preferable technologies that reduce the consumption of water and energy in buildings.
- Measuring and improving performance of green building technologies with multiple benefits, including green roofs, underfloor air distribution systems, and daylighting.
- Methodologies to evaluate environmental impacts of building location and siting decisions.

B. ENVIRONMENTAL PROBLEMS IN AMERICA'S HEARTLAND (REGION 7).

EPA Region 7 is responsible for environmental protection in Iowa, Kansas, Missouri and Nebraska. While Region 7 would benefit from contributions directed to most of the topics in this solicitation, Region 7 is emphasizing research topics focused on finding environmental

benefiting technologies that relate to agricultural production and lead mining. Small businesses anywhere in the nation may submit a proposal for any Region 7 topic and the proposal may address the environmental problem whether the geographic focus is Region 7 or any other geographic area in the US. There are four EPA Region 7 topics in this solicitation: (B1) Mining and Mine Waste Management; (B2) Lead Paint Detection and Removal; (B3) Agriculture and Rural Community Improvement; and (B4) Management of Animal Feeding Operations.

B1. MINING AND MINE WASTE MANAGEMENT

This topic includes lead and other hard-rock mining. Mining has created a multitude of environmental challenges. Subsurface drainage and surface runoff from mine sites have negatively impacted water quality in streams. Many abandoned mining sites are being cleaned up as “Superfund” sites. Economical mine management technologies are needed for waste rock disposal sites, tailings impoundments, walls of open pits, abandoned mine workings and spent-ore leach pads. This topic includes the three subtopics: (1) Lead mining; (2) Reducing areawide lead soil contamination; and (3) Monitoring Technologies.

LEAD MINING

From the 1800s until about 1960, mining of lead and zinc sulfides in Missouri and Kansas created mine waste deposits on soil surfaces and waste piles. In Jasper County, Missouri, there were hundreds of lead-zinc mines and 17 smelters. One smelter near Joplin contaminated 7,000 acres with more than 100 million tons of mine waste. Contaminated areas typically support only sparse vegetation and experience severe erosion. Soils have problems with lead, zinc, copper, nickel and other metals, high or low pH, nutrient deficiencies and poor physical properties. Trace metal deposits in contaminated sediments can often be found many miles downstream of these mine waste sites. Soil stabilization using locally available organic wastes has been an attractive remediation technique. Sewage treatment plant biosolids or composted animal manures have been successful, adding nutrients, improving soil properties and reducing bioavailability of metals to grasses, forbs or trees. Pelletized soil amendments have reduced movement of the waste materials from both wind and water erosion. Remediation needs include but are not limited to:

- New protective covers that contain the contaminated soil and provide in-situ treatment of lead and other contaminants. Innovative chemical agents that improve density of vegetation and reduce bioavailability of lead. Improved capping materials where carpet-like materials detoxify or bind lead and other contaminants to prevent escape from the soils and sediment.
- Technologies that inject materials like highly reactive nanoscale particles or other specialized chemicals or coatings that support or accelerate in-situ decontamination of lead soils and sediment. In-situ bioremediation techniques that use a mixture of bacteria, nutrients and contaminated soil/sediment conditions.
- Special high efficiency vacuums and filters for collecting soils contaminated with lead

concentrations over 1,200 ppm.

- Passive control systems that clean the contaminated waste without operators or continual needs for materials or energy. Technology examples include natural and constructed wetlands or permeable reactive barriers.
- Prevention and control technologies that are used to prevent and/or control the generation of leachate that contains lead or other contaminants. Examples include stabilization and solidification, blending and layering.
- New technologies for beneficial use of lead contaminated soil or sediment either alone or in combination with other industrial or municipal residuals or agricultural waste.

REDUCING AREA-WIDE LEAD SOIL CONTAMINATION

New technologies are needed to reduce low and moderate level lead soil contamination that is dispersed over a large geographic area, generally covering several hundred acres to many miles. Most area-wide arsenic and lead soil contamination is from abandoned lead mines or emissions from lead smelters. About 5,000 residences in Jasper County, Missouri have contaminated yard soil above EPA's action level for lead. A 1994 study found that 14 percent of children under seven years old had elevated blood-lead levels. And Region 7 has other areas including parts of Omaha where residential yard soils are contaminated with lead. Clean-up levels of concern are 250 mg/kg lead in soil. Many areas have lead concentrations that are lower than concentrations associated with Superfund sites, but higher than baseline levels. Contaminated residential yard soil is a problem in Region 7. Areas of interest include, but are not limited to:

- Innovative in-situ treatment methods that degrade, remove or immobilize areawide lead contamination of soils. Of special interest are applications of chemical or biological agents or specialized emulsions.
- Phytoremediation techniques that degrade or remove contaminants in processes where fate and transport of chemicals and degradation products are safe.
- Methods that determine bioaccessibility and bioavailability of lead.
- Innovative clean-up technologies for areas along roads and adjacent yards contaminated with lead lost from trucks transporting lead ore and concentrate.

MONITORING TECHNOLOGIES

Monitoring technologies are also needed for mining waste sites. The presence of very large mining sites present significant health and environmental threats requiring cost-effective solutions for monitoring and remediation. Superfund mining sites pose a unique and significant challenge because they often cover a large geographic area and include a very large volume of contaminated media resulting from mining operations. The ability to

characterize and monitor releases from these sites is vital to understanding the risks and developing appropriate remedial approaches.

- EPA needs low-cost, low maintenance monitors and advanced remote-sensing based tools (i.e., air and space borne) for characterizing the extent of contamination at very large mining waste sites, monitoring releases, assessing risks, and planning and implementing remediation measures. These tools should provide information on the location and areal extent of mining activities and related waste piles; on the nature and extent of releases from active and inactive mines; and on contaminants, particularly metals and arsenic, and their concentrations, bioavailability and bioaccessibility.

B2. LEAD PAINT DETECTION AND REMOVAL

Lead is a significant environmental contaminant because it is toxic, persistent, and can be accumulated and stored in biological tissues. Lead may cause behavioral problems, learning disabilities, seizures or death. Children six years old and under are most at risk. Exposure to lead often occurs due to the presence of lead-based paint, lead contaminated dust (particularly from renovations) and lead contaminated soil. Apartments and homes with lead paint are frequently located in Environmental Justice communities and transitional neighborhoods where controlling expense is critical. EPA Regions have been enforcing Lead 1018 and 406(b) Notification requirements on owners and work with them to locate companies for lead abatement work. Renovation and remodeling are major public health concerns.

Approximately 26 million renovations are conducted annually in pre-1978 homes which contain lead based paint. Large amounts of lead dust are produced by most of these renovation activities, and traditional cleaning methods often leave hazardous lead dust. Specific areas of interest include, but are not limited to:

- Professional testing is currently the most accurate way to determine the presence or absence of lead-based paint as defined by EPA in 40 CFR 745.227(h)(1). A new low-cost, reliable tool that can be used by renovation and remodeling contractors to determine where lead-based paint is located is needed to provide a cost effective and faster way to test paint before starting renovation, remodeling, repainting, and related activities.
- Professional testing is currently the most accurate way to detect lead in dust and bare soil. A new low-cost, user friendly assessment tool that can be used by residents to detect hazardous lead levels in these accessible media is needed. The dust tool should reliably detect lead in dust at levels consistent with EPA's definition of dust-lead hazards in 40 CFR 745.65(b) and clearance levels for lead in dust in 40 CFR 745.227(e)(8)(viii). The soil tool should reliably detect lead in soil at levels consistent with EPA's definition of soil-lead hazards at 40 CFR 745.65(c).
- Efficient and cost-effective technologies are needed for stabilizing or removing lead-based paint while minimizing exposure to lead. Specific interests include: (1) developing efficient equipment for abatement (and renovation and remodeling) that generates little dust and debris and (2) improving the efficiency of lead dust clean-up

methods so that the number of clean-up steps can be reduced and passing clearance is a near certainty.

- Efficient and cost-effective technologies are needed for cleanup of soil, specifically in-situ methods for cleaning soil contaminated with lead at levels typical of older urban areas (400 - 1,200 ppm).

B3. AGRICULTURE AND RURAL COMMUNITY IMPROVEMENT

New technologies are needed for conserving and protecting water, air and soil resources associated with agricultural activities and rural communities. Environmental problems vary greatly. Surface water and groundwaters may be polluted with fertilizers and pesticides applied to agricultural areas and crops. Rural community water supplies may contain high levels of nitrates. Wind erosion of soil particulates and other pollutants contributes to air pollution. Soil erosion and stormwater runoff contribute to contaminated sediments and water pollution. This topic includes three subtopics: (1) Environmental management of air, water and soils; (2) Ethanol and Biodiesel Fuels; and (3) Rural community improvement.

ENVIRONMENTAL MANAGEMENT OF AIR, WATER AND SOILS

Two important environmental problems associated with agriculture are nutrients and sediment. Fertilizers applied to agricultural fields sometimes result in excess nutrients (i.e., phosphorus and nitrogen) that move into groundwater or runoff into rivers and other waterways. Nitrogen in the form of nitrates contaminate drinking water supplies drawn from groundwater. Phosphorus increases algal growth. Ammonium becomes adsorbed onto soil and lost with eroding sediment into waterways or the air. Lost soil and sediment affects the use of water, sometimes covering spawning areas and food supplies, reducing sunlight, clogging filters or reducing fish populations. Other agriculture-related problems include salts and salinity and pesticides. Of particular concern are fertilizer mixing facilities and pesticide formulators. Fertilizer ingredients may be lost during mixing, blending, packaging and equipment cleanup. Formulators may lose some ingredients from chemical reactions during mixing as well as during packaging and cleanup. Spills are also a potential problem. EPA needs include, but are not limited to:

- New and improved technologies to reduce losses of soils, fertilizers, pesticides, etc. into groundwaters or surface waters. Examples include new pesticide chemigation application methods and improved droplet application nozzles and systems. This topic area also includes new technologies that reduce water usage and provide more efficient and cost effective irrigation operation.
- Technologies that reduce the loss of soils and particulates into the air. Better ammonium application technologies are needed for reducing air emissions of ammonia.
- New technologies for preventing soil erosion by wind or storm runoff. Additives that enhance soil properties and reduce environmental impacts are of particular interest.

- New materials and coatings that prevent Zebra mussel (or other problem organisms) damage of irrigation components including flow gates, pumps, concrete conduit surfaces and other irrigation equipment.

Cost-effective technologies are also needed to prevent or reduce exposure to fine particulates from heavy smoke from agricultural burning. Prescribed burning is a longstanding efficient and economical land management tool that reduces the prevalence of invasive species and optimizes grassland yield for grazing. Smoke management programs reduce impacts of particulates through air quality and meteorological predictions and prioritization schemes that select areas for burning. Specific areas of interest include, but are not limited to:

- Inexpensive technologies that will provide comparable control of invasive species while promoting grassland yield without grassland burning.
- Inexpensive technologies to automatically monitor and network multiple on-farm meteorological and soil moisture sensor outputs with larger scale synoptic weather station observations for input to a predictive model for smoke management and burn planning purposes.
- Technologies for soil or vegetative treatments that optimize burn efficiency or otherwise minimize smoke emissions while promoting grassland yield.

ETHANOL AND BIODIESEL FUELS

New technologies are converting agricultural materials into biobased products. New ethanol production facilities are converting biomass into fuel, fuel substitutes and fuel additives. Meat rendering, greases and food wastes are used to produce biodiesel products. EPA is interested in developing environmentally friendly technologies that improve efficiency, enhance recovery of waste materials and reduce life-cycle environmental impacts. Needs include, but are not limited to:

- Technologies are needed to improve efficiencies at ethanol production plants, produce new biobased products, convert wastes into new products and further reduce air, water and waste disposal impacts from these plants.
- New, more efficient and cost effective methods for production of biodiesel fuels are also a priority. Sound and economical technologies for utilizing meat rendering, greases and food wastes for biodiesel production are of particular interest.

RURAL COMMUNITY IMPROVEMENT

EPA is interested in new products and technologies that improve the environment in rural communities. Technologies that address air, water or soil pollution problems are of interest. Improvements in drinking water quality, lower particulates and air pollutants, better soil management and improved environmental monitoring systems are needed in rural

communities. Areas of interest include, but are not limited to:

- Rural environmental improvements include new products and technologies that remove nitrates, fertilizer and pesticide residues and other pollutants from small drinking water systems in rural communities. Technologies that reduce losses and improve efficiency of water distribution systems are of interest.
- Better indoor air cleaners for removing dust and particulates from rural buildings. Products that reduce mold problems are also of interest.
- Small, inexpensive and efficient solid waste disposal technologies are needed for rural communities. Technologies that promote beneficial use of waste materials either alone or in combination with agricultural waste materials are of particular interest.

B4. MANAGEMENT OF ANIMAL FEEDING OPERATIONS

Preventing and controlling water and air pollution from animal feeding operations (AFOs) is a major priority. There are environmental problems associated with cattle feedlots, hog operations, dairies and poultry operations that confine large numbers of animals and store wastewater and manure in a contained area for extended periods of time. AFOs are typically conducted on a small amount of land where feed is brought to the animals. Different types of animal feeding operations have similar environmental problems. For example, a single cow produces 120 pounds of wet manure per day or 22 tons of waste per year - a total of more than 30 million tons of waste. (For more information on AFOs, see: www.epa.gov/npdes/afo.)

Animal waste, wastewater and manure need to be treated effectively and systems need to be managed to avoid accidents, spills or excessive runoff into receiving waters. Surface water can be polluted by rainy season stormwater sweeping manure into the nearest ditch or stream, or by leaching of waste material (e.g., nitrates and salts, pathogens -- bacterial and viral, veterinary pharmaceuticals, natural and synthetic hormones and their metabolites) into groundwater. Ammonia, methane, volatile organic compounds (VOCs), hydrogen sulfide and particulate emissions are air pollutants of concern associated with poultry and AFOs. These problems are a priority in Region 7 as well as in many other parts of the US. Examples of technology needs for AFOs include, but are not limited to:

- EPA needs cost-effective AFO technologies that offer cross-media solutions to manure management. Solutions that are media specific should consider impacts on other media. Technologies that offer optimal solutions for the maximum reduction of total environmental impacts are of particular interest to EPA;
- New, cost-effective AFO technologies that reduce water pollution, including development of alternative uses for feedlot and AFO residuals;
- EPA is interested in new AFO additives that do not contain arsenic or other problem contaminants associated with feed additives;

- New, cost effective and efficient technologies to manage AFO wastes, wastewaters and solids, especially those that reduce releases of pathogens, nutrients, veterinary pharmaceuticals (e.g., antibiotics), estrogens and androgens and synthetic steroid hormones such as trenbolone and melangestrol;
- New technologies that reduce air pollution from AFOs, particularly pathogens, ammonia, methane, VOCs, hydrogen sulfide and particulate matter;
- Improvements in land application technologies and practices for AFOs to prevent or reduce surface water and groundwater contamination from animal wastes;
- Cost-effective technologies to monitor potentially affected water bodies, groundwater and soil where animal wastes from concentrated animal feeding operations are managed using best management technologies and nutrient management plans (i.e., land application). The contaminants of concern include pathogens, nitrogen, phosphorus, pharmaceuticals, hormones and metals.

WASTE-TO-ENERGY GASIFICATION SYSTEMS

EPA is also interested in AFO “waste-to-energy” projects that combine energy efficiency with solving the AFO waste management problem. Any material containing carbon can be gasified and many wastes contain carbon and are therefore potential feedstocks to gasification systems. Gasification systems are defined for the purpose of this solicitation as an enclosed thermal device and associated gas cleaning system that does not meet the definition of an incinerator or industrial furnace. These systems: 1) limit oxygen concentrations in the enclosed thermal device to prevent the full oxidization of thermally disassociated gaseous compounds, 2) utilize a gas cleanup system 3) slag inorganic feed materials at temperatures above 2000 F, 4) produce a synthesis gas, and 5) are equipped with monitoring devices that ensure the quality of the synthesis gas produced. (See 67 FR 13684, March 25, 2002 for more details). EPA also notes that there may be other devices or systems that in fact produce a synthesis gas product that may not meet all of the points in the proposed definition above. This does not eliminate such systems from being of interest to EPA. Any technology that can gasify carbon containing waste materials is of interest. Areas of specific interest include:

- Cost effective gasification technologies and systems designed or modified to gasify animal and farm wastes, including wastes from AFOs.
- Waste-to-energy systems may include high efficiency biological systems that produce pipeline quality methane or lower quality gas that can be used on-site to reduce farm energy requirements from outside sources.
- Biological systems may produce an enriched, easily transported feedstock for the above or other digester systems.
- Innovative waste management systems which result in zero or near zero discharge to

the environment which would allow farms to be dispersed onto otherwise non-productive soils.

- Gasification technologies and systems using AFO wastes that are part of another operation or application where technology improvements reduce or improve quality of residuals or significantly improve overall pollutant emission levels.
- C. DRINKING WATER AND WASTEWATER MANAGEMENT FOR EPA OFFICE OF WATER (OW).

EPA's Office of Water (OW) is responsible for protecting our Nation's water. There are three OW topics in this solicitation: (C1) Drinking Water Treatment and Monitoring; (C2) Pollution Indicators for Beaches and Recreational Waters; and (C3) Water and Wastewater Management.

C1. DRINKING WATER TREATMENT AND MONITORING

EPA also needs new treatment and measurement technologies, especially for small systems, for organic and inorganic contaminants, and disease-causing organisms. Microorganisms of concern include Cryptosporidium and other cyst-like organisms and emerging pathogens such as caliciviruses, microsporidia, echoviruses, coxsackieviruses, adenoviruses, and others on the Drinking Water Contaminant Candidate List.

(See <http://www.epa.gov/safewater/mcl.html#mcls>) Areas of interest include, but are not limited to:

- Improved detection and measurement techniques for algal neurotoxins and cytotoxins in drinking water systems.
 - Improved detection and measurement techniques for microbial pathogens that also address viability or infectivity.
- C Development of innovative unit processes, particularly for small systems, for removal or inactivation of contaminants such as arsenic, perchlorate, aluminum, pesticides, and pathogens.
- C Alternatives to chlorine disinfection for inactivating pathogenic microorganisms, including innovative applications of ultraviolet radiation and processes that improve overall effectiveness while using reduced amounts of disinfectant.

C2. POLLUTION INDICATORS FOR BEACHES AND RECREATIONAL WATERS

On April 20, 2004, EPA issued the Clean Beaches Plan under the Beaches Environmental Assessment and Coastal Health (BEACH) Act of 2000. The Clean Beaches Plan implements a strategy for reducing the risks of illness from swimming, bathing and other activities in coastal areas, lakes and rivers that contain disease-causing microbes. In 1996 over 2,500

beaches in the US were posted with warnings or closed for at least one day because the water was contaminated. For more information on the Clean Beaches Plan, visit www.epa.gov/waterscience/beaches/plan.htm

Most disease causing microbes exist in very small amounts and are difficult and expensive to detect in water samples. Indicator organisms (e.g., E. coli, fecal coliforms, enterococci, etc.) have been used for many years to identify where fecal contamination has occurred and therefore where disease-causing microbes may be present. These organisms generally do not cause illness themselves. They have characteristics that make them good indicators that fecal contamination has occurred and that harmful pathogens may be in the water. Areas of needed research include, but are not limited to:

- Rapid analytical methods to identify risk before exposure takes place. Current testing for pathogen presence require 24 to 48 hours of incubation before problems can be detected. Real-time or near-time analytical technologies such as a simple dipstick, color-change test or new instrument for detecting human fecal contamination are needed to provide immediate identification of potential problems. These real-time or near-time results would ideally trigger warnings or at least set in motion a more rigorous monitoring protocol.
- Better indicators of potential presence of enteric pathogens. These technologies should indicate the presence of pathogens that may have longer incubation times, lower infective doses or cause more serious disease than pathogens currently identified with swimming-associated illness.

C3. WATER AND WASTEWATER MANAGEMENT

This topic includes five subtopics: (1) Source water Protection; (2) Municipal Onsite and Decentralized Wastewater Treatment; (3) Water conservation and reuse; (4) Combined Sewer Overflows and Stormwater; and (5) Infrastructure Rehabilitation.

SOURCE WATER PROTECTION

States are faced with major challenges in the restoration and protection of the quality of its surface waters which serve irreplaceable functions in supporting human health and viable ecosystems. Technology is needed to better identify and monitor sources of pollution and protect water quality. Needs under this topic include, but are not limited to:

- Techniques for more rapid and cost-effective detection of sources of hazardous algal blooms, as well as improved methods for measuring cyanobacteria species and toxins.
- Inexpensive and rapid or real-time detection methods for viruses and shellfish toxins such as paralytical shellfish poison (PSP) and domoic acid.
- Cost-effective, remotely operated water quality sampling devices (e.g., data sondes) for use in monitoring water quality which may include addressing locations which are

difficult to access and require self sustaining power supplies and communication devices.

- Sensors for nutrients such as nitrogen and phosphorus that function effectively over widely ranging salinity and turbidity levels typical of estuaries and wastewater effluents. Sensors should require minimal maintenance and service in the field.
 - Automated in-situ sediments monitor that provides accurate suspended sediment concentrations, particle size and fluxes in rivers, lakes, estuaries and wastewater ponds and lagoons. EPA and other Federal agencies are interested in multi-frequency acoustic or other technology that can operate effectively under highly variable sediment concentrations. For more information, visit <http://water.usgs.gov/wicp/acwi/sos>.
 - Cost-effective technologies for the restoration of riparian zones for the purposes of decreasing the impacts of nutrients, clean sediments (suspended and bedded), and pathogens on aquatic ecosystems.
- D. Field analytical methods to detect perchlorate in water samples. Perchlorate has been detected in groundwater and soil across the country. While there is currently no limit for perchlorate, EPA has set a preliminary remediation goal of 3.6 : g/L. There is a need to develop field analytical methods that can achieve this quantitation level and overcome any interferences.

MUNICIPAL ONSITE AND DECENTRALIZED WASTEWATER TREATMENT

Between 1972 and 1996, the Federal government invested more than \$60 Billion to help upgrade and expand municipal wastewater treatment systems to serve more households and to improve plant capacity. The result was a dramatic improvement in water quality in many parts of the U.S. However, the majority of these funds were devoted to the needs of the 75% of the U.S. population that is served by centralized wastewater treatment systems and many of these facilities are now approaching the end of their design life which will likely lead to significant increases in user rates if they are to be properly maintained into the future. The remaining 25% of the U.S. households and 33% of new development are served by on-site and decentralized treatment systems. In some areas of the country, onsite system failure rates are high resulting in water quality and public health concerns, creating a demand for additional centralized treatment systems. At the same time, properly designed, installed, operated and managed onsite and decentralized treatment systems have the ability to provide levels of wastewater treatment and water quality protection comparable to centralized collection and treatment systems. Research is needed to improve existing municipal wastewater treatment processes and treatment and management of septage and sewage sludge (biosolids). Specific areas of interest include, but are not limited to:

- New techniques for identifying failed onsite septic systems (including possible use of remote sensing techniques) and tracking their impacts.

- Cost effective and energy efficient onsite and decentralized wastewater treatment technologies for small urban sources not serviced by existing wastewater infrastructure systems. Ideally, systems should be reliable, have low capital and operating costs, and low maintenance requirements.
- New, cost effective technologies that improve treatment efficiency at municipal wastewater treatment and sludge or septage processing facilities with design flows up to 50,000 gallons per day.
- Cost effective alternatives to the chlorination of municipal wastewater effluents, emphasizing the identity and characteristics of by-products associated with the alternative disinfection technologies.
- Effective technologies for the removal of personal care products, pharmaceuticals, antibiotics, endocrine disrupters and other persistent organic pollutants from wastewater and sewage sludge.
- New, cost effective technologies that improve the energy efficiency of wastewater or sludge treatment or result in the cost-effective recovery or production of useful products from wastewater effluents or residuals.

WATER CONSERVATION AND REUSE

Growing urbanization and development are leading to conflicts in meeting the water demands for domestic, industrial, commercial, and agricultural purposes. Difficulty in developing additional fresh water supplies is leading to more interest in stretching limited existing fresh water supplies through effective conservation measures and the development of alternative sources such as the reuse of reclaimed wastewater effluents for non-potable uses. Numerous programs have been developed to encourage energy and water conservation. Guidelines have also been established to help control a wide range of wastewater reclamation and reuse practices, including use as a water supply for the irrigation of urban areas and agricultural crops, industrial processing and cooling water, commercial uses, recreational and aesthetic impoundments, creation and enhancement of wetlands, stream augmentation, and groundwater recharge. Specific areas of interest include, but are not limited to:

- New, cost effective technologies that significantly improve water use efficiency of water fixtures, appliances, irrigation systems, etc.
- New, cost effective technologies that can help improve the performance and energy efficiency of wastewater treatment practices to produce treated effluents of a quality that allows for reuse as an alternative water supply.
- Water conservation systems and technologies that promote industrial water reuse.

COMBINED SEWER OVERFLOWS AND STORMWATER

Many urban surface waters are impacted by combined sewer overflows and stormwater runoff. CSOs are a leading cause of water quality impairment in many urban areas. Some CSOs discharge raw sewage into rivers which are later used as drinking water supplies. The cost of controlling CSO discharges can be staggering—in some cases hundreds of millions of dollars for small and medium-sized cities. CSO controls need to be cost effective and within the financial limits of communities. The main concern with CSOs is controlling bacteria, floatables, and nutrients. CSOs are characterized as low-quality water with high flow rates, volumes, and suspended solids content. Areas of needed research and interest include, but are not limited to:

- Development of cost effective monitoring technologies and equipment to support stormwater monitoring, including nutrients, metals, pathogens, pathogen indicators, bacteria and other contaminants of concern.
- Development of high efficiency technologies to remove solids and floatables.
- Development of high-rate disinfection technologies which could be used in conjunction with high efficiency solids removal technologies.

EPA also needs new and improved technologies and practices to effectively manage stormwater runoff. Controls may include catchment inlet traps or inserts, oil/grease and debris separators, sedimentation chambers, filtration chambers, and detention/ex-filtration systems. Recommended areas of research and interest include affordable technologies that are simple, compact, and will provide consistent pollutant abatement, particularly for waters containing fine sediment particles or pathogens, nutrients, and salts in the dissolved phase. Ideally, technologies must be rugged to persist in the urban environment and under harsh weather conditions, and must possess low maintenance requirements and good accessibility.

INFRASTRUCTURE REHABILITATION

The aging condition of our cities and deterioration of infrastructure includes water distribution and sewerage systems. It has been estimated that as much as an additional \$23 billion/year for the next 20 years are required to keep the U.S. water and wastewater infrastructure functional and in compliance with applicable water quality regulations. This infrastructure funding gap provides an important research area addressing economic and efficient repair and maintenance of the water and wastewater infrastructure. More effective and less expensive technologies are needed to detect leaks, forecast structural failures, and repair/ rehabilitate sewers and water distribution systems. Areas of needed research and interest include, but are not limited to:

- New technologies to more effectively construct, maintain, and repair new and existing

urban wastewater collection and water distribution infrastructure at an acceptable cost.

- New technologies that significantly increase the life expectancy of wastewater treatment systems, collection or distribution systems or water monitoring equipment.
- New non-leachable/inert pipe and liner materials and relining techniques for water distribution systems that improve performance and life-cycle cost.
- New construction, cleaning, repair, rehabilitation, and replacement techniques and technologies to substantially reduce life cycle cost and failure rates of distribution and collection system pipes and other components (e.g., manholes).
- Inexpensive, minimally invasive techniques for repair of home sewer laterals—the connections between a household plumbing system and the sewer main.
- Physical condition assessment technology improvements for gravity and pressure systems to enable effective and economical detection, location, reporting, and analysis of critical defects, deterioration and failures in drinking water distribution and wastewater collection systems that are not adequately addressed by current approaches (e.g., closed-circuit TV, visual observation, and other in-line or non intrusive methods) or prototypes.

D. CRITICAL EPA RESEARCH TOPICS

Other EPA programs also have critical technology needs and these priorities form this set of topics. These priorities have been developed based on needs identified by EPA program offices including the EPA Office of Solid Waste and Emergency Response, Office of Prevention, Pesticides and Toxic Substances, EPA National Homeland Security Research Center, EPA Regions and states and other priorities such as Executive Order 13329 Encouraging Innovation in Manufacturing. Many of the needs in these topics are part of the Environmental Technology Opportunities Portal (ETOP), a one-stop shop to coordinate and foster development of new, cost-effective environmental technologies. For more information on this program or to join the network of technology developers and technology users, visit the ETOP Website at: www.epa.gov/etop

There are five topics in this part of the solicitation: (D1) Innovation in Manufacturing for Environmental Protection; (D2) Nanotechnology; (D3) Engine and Vehicle Emissions Reduction; (D4) Solid and Hazardous Waste Management; and (D5) Homeland Security.

D1. INNOVATION IN MANUFACTURING FOR ENVIRONMENTAL PROTECTION

Executive Order 13329 ensures that EPA properly and effectively assists the private sector in its manufacturing innovation so as to sustain a strong manufacturing sector in the US economy by

advancing innovation. Manufacturing-related R&D encompasses improvements in existing methods or processes, or wholly new processes, machines or systems. Manufacturing innovation is fostered by R&D of technologies that are aimed at increasing the competitive capability of manufacturing concerns. Four main areas include: (1) Unit process level technologies that create or improve manufacturing processes; (2) Machine level technologies that create or improve manufacturing equipment; (3) Systems level technologies for innovation in the manufacturing enterprise; and (4) Environment or societal level technologies that improve workforce abilities and manufacturing competitiveness. Specific areas of interest include, but are not limited to:

- Manufacturing process changes that utilize green technology to improve process efficiency and reduce pollution. These technologies (e.g., non-traditional material reactors, multi phase extraction, separation or fluid transfer, novel spraying systems, etc.) improve production efficiency and performance while eliminating or minimizing harmful emissions or waste materials.
- New filtration membranes for organic solvent recovery and similar applications.
- Development of technology for solvent free production of chemical products and new or improved catalyst products.
- Many fragrances and colorants have undesirable characteristics. Some of the key ingredients of concern in fragrances may be environmentally toxic/persistent (e.g., ketone), potentially sensitizing (e.g., d-limonene, other terpenes), neurologic (e.g., dibutyl phthalate), or carcinogenic (e.g., citral; methyleugenol). Environmentally preferable fragrances or chemical substitutes for key ingredients are needed for fragrances and colorata.

EPA is working with automobile suppliers and sub-tier suppliers to develop new technologies that will drive environmental improvements while meeting pricing demands. The Automobile Partnership is one partnership under an umbrella network called the Green Suppliers Network (GSN). Also under GSN several similar partnerships are forming. These include partnerships with aerospace, office furniture manufacturing, healthcare products, pharmaceuticals and other industries. EPA is interested in new technologies that simultaneously enhance environmental performance and cost-competitiveness. Such technologies include, but are not limited to:

- Prevention or reuse of paint sludges from captured overspray in automobile painting and use of low volatile organic compounds (VOC) products for purging paint lines and painting guns;
- Alternate filter technologies, reusable filters or new technologies for collection of spray in dry paint booths;

- Machining metals without use of toxic cutting fluids;
- Products that meet design specifications without requiring the use of chemicals such as mercury, cadmium, lead, hexavalent chromium and brominated flame retardants.

Companies seeking assistance with project development in this topic area are encouraged to contact their local National Institutes of Standards and Technology Manufacturing Extension Partnership office at <http://www.mep.nist.gov>.

D2. NANOTECHNOLOGY

Research is needed to apply the principles of nanotechnology to the areas of environmental monitoring and pollution control. Nanotechnology is defined as the creation of functional materials, devices and systems through control of matter at the scale of 1 to 100 nanometers, and the exploitation of novel properties and phenomena at the same scale. EPA is particularly interested in nanotechnologies that reduce the use and release of toxic pollutants, especially persistent, bioaccumulative toxics (PBTs), hazardous air pollutants (HAPs) and volatile organic compounds (VOCs). Nanotechnology is emerging as a technology platform with potential for great environmental breakthroughs and significant commercial applications. This nanomaterials topic area is closely related to other topics in the solicitation. Specific areas of interest include, but are not limited to:

- New nanoporous filters for removal of gaseous pollutants and particulates from contaminated air streams.
- Nanoparticulate catalysts for utilization in VOC treatment devices and related applications.
- Metal free nano-laminated coatings and nanomaterials with smart characteristics including reactive coatings that destroy or immobilize toxic compounds. High surface area nanomaterials for new coatings and environmental applications.
- Development of technology for solvent free production of nanometer size high performance ceramic powders and similar materials.
- Development of microelectromechanical systems (MEMS) and nanotechnology based devices for use in environmental analytical and monitoring instrument devices including sensors and nano-components.
- Development of a personal sampling device for the detection and quantification of airborne nanoparticle exposures. The device should be rugged, accessible and easy to use and is intended for workplace and laboratory settings.

- Nanomaterial sensors for rapid and precise process control and environmental monitoring. EPA is particularly interested in remote, in-situ, real-time and continuous measurement of species at trace (ppt) concentrations. Sensors that utilize lab-on-a-chip technology are also of interest.

D3. ENGINE AND VEHICLE EMISSIONS REDUCTION

In recent years, EPA's Office of Transportation and Air Quality (OTAQ) has established new regulations that reduce nitrogen oxide (NO_x) emissions from new diesel engines and NO_x, total hydrocarbons (THC) and carbon monoxide (CO) from gasoline-fueled vehicles. While new individual engine and vehicle emissions levels have decreased, the emissions from the overall fleet of engines and vehicles are still significant contributors to high ozone levels in many urban areas.

This topic has been developed in cooperation with the Texas Environmental Research Consortium (TERC), Texas New Technology Research and Development (NTRD) Program and the Houston Advanced Research Center (HARC). Collaboration between these Texas programs and SBIR awardees, including assistance with prototype development, demonstration and verification testing programs, is possible in Phase II and beyond. The Texas NTRD program also provides non-SBIR grants for technologies that show potential for commercialization and significant reduction of NO_x emissions. For more information about the Texas NTRD Program, visit their website at: www.tercairquality.org.

This topic includes three subtopics: (1) Retrofitting off-road diesel construction equipment for NO_x reduction; (2) Fuel additives to reduce emissions from gasoline engines; and (3) New non-ethanol and non-biodiesel liquid biofuels.

RETROFITTING DIESEL CONSTRUCTION EQUIPMENT FOR NO_x REDUCTION

The construction industry uses more than two million pieces of diesel-powered off-road (nonroad) equipment across the country. Much of this equipment has a long operational life, often lasting more than 25 to 30 years. About 31 percent of this current equipment have engines manufactured before any emissions standards were in effect, and therefore have no emission controls. Only an estimated 5 percent of construction equipment meets EPA's current standard at the Tier 3 emissions level.

Mobile nonroad diesel powered equipment used by the construction industry, ports, material handling and other industries are significant sources of NO_x emissions. This equipment includes, excavators, crawler tractors/dozers, rubber tire loaders, rollers, tractors/loaders/backhoes, surfacing equipment, graders, material handling equipment, and bore/drilling equipment.

Selective Catalytic Reduction (SCR) Emissions Control Technologies that use urea or ammonia to help reduce NO_x are being developed by some companies but added infrastructure and

complexities associated with ammonia or urea frequently tend to make these technologies less accepted by the construction industry and other users of mobile diesel nonroad equipment.

Phase I Proposals are being sought for demonstrating the economic and technical viability of technologies for use in the construction sector and other sectors. These technologies should be able to reduce NOx emissions without reliance on urea or ammonia. While it is preferable that these new technologies also improve engine or operational performance, they should, at a minimum, not affect equipment warranty, reliability or durability.

There are unique challenges to retrofitting construction equipment with NOx-reducing emissions control technologies. The technologies need to address issues such as extended idle and/or low speed operation periods, vibration, high levels of fugitive dust, space limitations, and visibility that are unique to equipment used by this sector. Retrofit devices that are installed in fuel lines, such as magnets and “molecular alignment” catalysts, will not be considered for funding under this subtopic.

The new technologies should have broad application in order to ensure a sufficiently large enough market to make commercialization successful. Preferably, these technologies that would be developed primarily for the construction sector could also be implemented within the ports, locomotive, marine and on-highway (heavy duty diesel vehicles) sectors. The new technologies should reduce NOx emissions by at least 25 percent.

FUEL ADDITIVES TO REDUCE EMISSIONS FROM GASOLINE ENGINES

Phase I Proposals are sought to demonstrate the technical and economic viability of innovative fuel-based technologies that can reduce nitrogen oxide (NOx), total hydrocarbon (THC) and carbon monoxide (CO) emissions from vehicles powered by gasoline engines.

These innovative low cost gasoline additive technologies should be able to demonstrate reductions in NOx and HC emissions of at least 5%. While 5% appears to represent a small quantity, when incorporated across many vehicles this value provides substantial *fleet-averaged* emissions reductions that can lead to significant improvements in public health in those areas with air quality problems. To demonstrate economic viability, the gasoline fuel additive technology should sell for less than \$0.05 per treated gallon and should not negatively affect the engine/vehicle manufacturer’s warranty or significantly reduce the performance of the vehicle.

NEW NON-ETHANOL AND NON-BIODIESEL LIQUID BIOFUELS

Dependence upon foreign sources of petroleum-based fuels has been an ongoing concern since the 1970s. Work has been done to develop natural gas and other fuel sources to reduce this dependency but additional fuel sources are still needed. Currently, finished motor gasoline represents approximately 50% of the finished petroleum products and 45% of the total crude oil and petroleum products refined in the United States. Fossil fuel consumption is also producing

CO₂ emissions as well as other toxic emissions, such as CO and PM and criteria pollutant emissions, such as NO_x and HC. Regulations are in effect to reduce NO_x, THC, CO and PM emissions but additional technologies are needed to reduce CO₂ emissions. A plant derived biofuel that uses minimal petroleum energy in the production process could be a way of reducing overall CO₂ emissions.

Phase I Proposals are sought to demonstrate the commercial and technical viability of the production and use of a non-ethanol based and non-biodiesel based liquid biofuel. Ideally, this fuel should be synthesized from plant materials using a bacteria digestion process which uses minimal petroleum-based energy in its production. The resulting fuel must be able to operate in internal combustion engines and have the ability/probability to meet federal emission requirements using readily available emissions control technologies, if needed. The fuel must not be more toxic than gasoline or diesel fuels currently sold in the USA; fuels that are less toxic will be favored. Finally, the price of the fuel must be competitive with conventional gasoline or diesel fuel.

D4. SOLID AND HAZARDOUS WASTE

Over 40 million tons of hazardous waste are produced in the United States each year by industrial facilities such as chemical manufacturers, petroleum refineries and electroplaters, as well as by businesses such as dry cleaners and auto repair shops. Innovative approaches are needed for detoxification and remediation of organically contaminated soil and groundwater. In addition, better technologies are needed to recycle solid waste.

HAZARDOUS WASTE MANAGEMENT

Contaminants have permeated and adsorbed onto soils, diffused to interstitial saturated zones, dissolved into ground waters and migrated to subsurface aquifers. In many instances, contaminants have exhibited physical and chemical properties that make them difficult to remove from the environment. Contaminants may exist in subsurface deposits as immobile gums or sludges difficult to access. They may be resistant to normal subsurface chemical and biological degradation processes. They may strongly adsorb on soil structures and be only slightly soluble in aqueous concentrations. Innovative and cost effective technologies are needed in areas including, but not limited to:

- Innovative ex-situ and in-situ treatment technologies for mercury-contaminated soil. Mercury exists as organo-mercury complexes, phenyl mercury, methyl mercury and mixed mercury wastes. Cost effective, innovative technologies are needed to treat, remove, or immobilize these forms of mercury.
- Improved treatment of solid and/or liquid wastes contaminated with PBTs or polycyclic aromatic hydrocarbons (PAHs). Detoxification chemical methods, physical methods for subsurface mixing to enhance mobilization and mass transfer and biotreatment methods

in the saturated and unsaturated zone are of particular interest.

- Approaches for in-situ treatment of dense non-aqueous phase liquids (DNAPL) from the subsurface. Special needs include cost effective in-situ destruction technologies.

SOLID WASTE RECYCLING

This topic includes management, treatment and recycling of municipal and industrial solid waste. Areas of interest include construction and demolition debris and several needs associated with the EPA Resource Conservation Challenge (RCC). Solid waste recycling is a complex and growing industry ripe for innovation both in the collection of recyclable materials and in the processing of those materials into usable goods. Solid waste recycling infrastructure includes more than 12,000 drop-off sites and some 9,000 curbside programs that collect recyclable materials. An estimated 136 million tons of building-related construction and demolition debris are generated annually. The RCC is a major national effort to find flexible, yet more protective ways to conserve our valuable resources through waste reduction and energy recovery. For more information on the RCC, see www.epa.gov/epaoswer/osw/consERVE/index.htm. Areas of interest for innovation include, but are not limited to:

- Technologies and processes for improved recovery of construction and demolition debris.
- Re-designing products and building materials to enhance their recyclability (e.g., recycling-friendly adhesives and better bottle coatings).
- Separation, recovery and recycling of components from computers, printers, monitors and consumer electronics.
- Multiple recovery and recycling of different plastic materials in automobile salvage operations.

D5. HOMELAND SECURITY

There are significant efforts throughout the government to develop and implement homeland security systems. EPA needs improved technologies that detect acts of terrorism, contain and respond to the problem and protect the American people and the environment. This topic includes three subtopics: (1) Decontamination; (2) Drinking Water and Wastewater Security; and (3) Emergency Response.

DECONTAMINATION

One of EPA's goals following the events of September 11, 2001 is to evaluate, characterize and develop tools that can be used to decontaminate and manage hazardous chemical and biological

materials purposefully introduced into buildings and outdoor spaces. Needs include, but are not limited to:

- Accurate and field-rugged ClO₂ monitors for use in monitoring decontamination operations. Also, accurate and field-rugged H₂O₂ monitors and field calibrators for H₂O₂ monitors.
- Biological and chemical decontamination systems that can be applied safely, effectively and quickly at reasonable cost to fully remediate enclosed, semi-enclosed or outdoor facilities (commercial, private or governmental owned), structures, vehicles and other critical infrastructure and equipment. Such methods would need to address decontamination of common indoor and/or outdoor environmental surfaces. Important considerations, in addition to efficacy of decontamination, are materials compatibility, cost, safety, availability, ease of use, expendable supply needs and associated disposal requirements.
- Safe, efficient and cost-effective treatment and disposal methods for biological and/or chemical contaminated waste material.
- Soil/vegetation decontamination methods for pathogens and persistent chemicals released outdoors.

DRINKING WATER AND WASTEWATER SECURITY

Research and development is needed in technologies, equipment, and other tools for drinking water and wastewater systems and their components which consist of drinking water collection, pretreatment, treatment, storage, and distribution systems, and wastewater collection, treatment, sludge disposal or treated wastewater release. This research may address either physical or cyber threats potentially resulting in disablement and disruption in services provided by various-sized systems. Technologies, equipment, and other tools are needed to detect, measure, monitor and warn of the presence of chemical and biological contaminants, contain and treat source and contaminated water, minimize cross connections between drinking water and wastewater systems, and decontaminate water distribution system equipment. These technologies could be used by drinking water and wastewater utility operators, emergency response personnel and other decision officials. Classes of contaminants of concern include: biological organisms (e.g., spores, viruses, bacteria); biotoxins and chemicals (including pesticides, toxic industrial chemicals, chemical warfare agents, persistent, bioaccumulative toxins both metal-based (e.g., mercury) and organic-based (e.g., PCBs)). Ideally, research in this area should also benefit the larger context of safe water even under non-threat situations.

- Technologies for detecting, measuring and monitoring water and wastewater for the presence of chemical, biological and radiological contaminants that could be introduced pre- or post- treatment. These technologies include hand-held, in-line or slip stream

devices that can provide a result in near-real-time and that can be used as part of an early warning system. Research is also needed for improved equipment longevity and reliability under conditions relevant to drinking water or wastewater systems.

- Security systems and technologies including early warning “smart” systems which use detection devices and techniques in combination with computer-based software, to help drinking water and wastewater utility operators identify contaminants in water systems. Research is also needed on software or computer-driven planning tools to provide analysis and operational optimization when a portion of a water system becomes disabled or disrupted.
- Sampling techniques to aid in the confirmation of early warning system responses: when an early warning system is triggered and/or identifies a potentially contaminated volume of water within a water or wastewater system, there is the accompanying need to capture a sample of this volume for confirmatory analysis. Technologies that can accomplish this sampling automatically or semi-automatically are needed.
- Technologies, equipment, and techniques to treat water in the event of a disablement or disruption to a water system. Research is also needed for improved treatment technologies which include point of use/point of entry (POU/POE) treatment devices for individual homes, buildings, and structures and transportable or modular treatment systems which could be employed for the duration of time when water supplies are contaminated or treatment systems are inoperable.
- Technologies, equipment, and techniques to decontaminate water or wastewater that has been contaminated with chemical, biological or radiological, and as appropriate biochemical contaminants, prior to its release for added treatment or to receiving waters.
- Technologies, equipment, and techniques to decontaminate water or wastewater systems and equipment and return them to use with minimal down time and so that they are in compliance with established level of cleanliness with respect to receiving waters.
- Technologies, equipment, and techniques for disposal of residues (e.g., floc, sludge) associated with the above decontamination activities. Research is also needed on technologies, equipment, and techniques to minimize the effects of deliberate disruption of drinking water systems including cross-connection to wastewater systems.

EMERGENCY RESPONSE

EPA needs better tools to respond to homeland security emergencies. Research is needed to develop improved test kits for detecting biological and chemical contaminants. Needs include, but are not limited to:

- Field test kits are needed to rapidly (10 min or less) collect and identify hazardous biological and chemical contaminants on indoor surfaces with very low rates of false positives/negatives. Kits should be sensitive to relevant health effects levels or other levels of concern, easy to use, relatively inexpensive (\$200 or less) and stable during prolonged storage. EPA is interested in field kits for anthrax, smallpox, plague, ricin, botulism toxin and chemical contact poisons (e.g., highly toxic commercial pesticides).

IX. SUBMISSION FORMS AND CERTIFICATIONS

The attached forms, Appendix A - Proposal Cover Sheet, Appendix B - Project Summary, and Appendix C - SBIR Proposal Summary Budget, should be downloaded and printed from the Internet or photocopied, and completed as indicated under Section III, Proposal Preparation Instructions and Requirements. The purpose of these forms is to meet the mandate of law or regulation and simplify the submission of proposals.

Appendix A
U.S. ENVIRONMENTAL PROTECTION AGENCY
SMALL BUSINESS INNOVATION RESEARCH PROGRAM
SOLICITATION NO. PR-NC-06-10207
SBIR PHASE I

PROPOSAL COVER SHEET

PROPOSAL TITLE _____

FIRM NAME: _____

ADDRESS: _____

CITY: _____ STATE: _____ ZIP: _____

AMOUNT REQUESTED:\$ _____

PROPOSED DURATION (PHASE I): 6 MOS

(Not to Exceed \$70,000)

*****Proposals submitted in response to this solicitation will be valid for 300 days*****

RESEARCH TOPIC (check one)

- A1. Improving the Great Lakes
- A2. Control of Air Pollution
- A3. Monitoring and Remote Sensing
- A4. Green Buildings
- B1. Mining and Mine Waste Management
- B2. Lead Paint Detection and Removal
- B3. Agriculture and Rural Community Improvement
- B4. Management of Animal Feeding Operations
- C1. Drinking Water Treatment and Monitoring
- C2. Pollution Indicators for Beaches and Recreational Waters
- C3. Water and Wastewater Management
- D1. Innovation in Manufacturing for Environmental Protection
- D2. Nanotechnology
- D3. Engine and Vehicle Emissions Reduction
- D4. Solid and Hazardous Waste
- D5. Homeland Security

CERTIFICATIONS AND AUTHORIZATIONS: Answer Y(Yes) or N(No)

- 1. The above concern certifies that it is a small business concern and meets the definition as stated in the program solicitation.
- 2. The above concern certifies that a minimum of 2/3 of the research and/or analytical effort will be performed by the proposing firm.
- 3. If the proposal does not result in an award, is the Government permitted to disclose the title and technical abstract page of your proposed project, and the name, address, and telephone number of the official of the proposing firm to any inquiring parties?
- 4. The above concern certifies that it is a woman owned small business concern and meets the definition as stated in the program solicitation.*
- 5. The above concern certifies that it is a socially and economically disadvantaged small business concern and meets the definition as stated in the program solicitation.*
- 6. The above concern certifies it is a HUBZone small business concern and meets the definition as stated in the program solicitation.*
- 7. Do you plan to send, or have you sent, this proposal or a similar one to any other federal agency? If yes, which? Use acronym(s) for each agency, (e.g., DOD, NIH, DOE, NASA, etc.) _____
- 8. Choose one of the following to describe your Organization Type:
 Individual Partnership Corporation LLC
- 9. Provide the following information: Tax Identification No: _____
Dun & Bradstreet Number: _____ Common Parent Name: _____

* For statistical purposes only.

ENDORSEMENTS

Principal Investigator:
Print Name: _____
Title: _____
Telephone: _____
Fax: _____
Email: _____
Signature: _____
Date: _____

Corporate/Business Official:
Print Name: _____
Title: _____
Telephone: _____
Fax: _____
Email: _____
Signature: _____
Date: _____

PROPRIETARY NOTICE: These data shall not be disclosed outside the Government and shall not be duplicated, used or disclosed in whole or in part for any purpose other than evaluation of this proposal. If a funding agreement is awarded to this offeror as a result of or in connection with the submission of these data, the Government shall have the right to duplicate, use, or disclose the data to the extent provided in the funding agreement and pursuant to applicable law. This restriction does not limit the Government's right to use information contained in the data if it is obtained from another source without restriction. The data subject to this restriction are contained on pages _____ of this proposal.

Appendix B
U.S. ENVIRONMENTAL PROTECTION AGENCY
SMALL BUSINESS INNOVATION RESEARCH PROGRAM
SOLICITATION NUMBER PR-NC-06-10207
SBIR PHASE I
PROJECT SUMMARY (Limit to Two Pages)

FIRM NAME, ADDRESS, TELEPHONE AND FAX NUMBER, AND E-MAIL ADDRESS:

Firm Name:

Telephone:

Address:

Fax:

TITLE OF PROPOSAL:

RESEARCH TOPIC LETTER AND DESCRIPTION:

NAME, TITLE AND E-MAIL ADDRESS OF PRINCIPAL INVESTIGATOR/PROJECT MANAGER:

TECHNICAL ABSTRACT, RESULTS, AND POTENTIAL COMMERCIAL APPLICATION
(Limit to 400 Words; Must be Publishable):

Appendix C
SBIR PROPOSAL SUMMARY BUDGET

(See Instructions on Reverse Side)

Organization and Address

A. DIRECT LABOR(PI and other staff, list separately) Hours/Est. Rate: \$

B. OVERHEAD: \$

C. OTHER DIRECT COSTS: (list separately) \$

D. TRAVEL: List purpose and individuals and or title \$

Attend one-day SBIR Kick-Off Meeting in Washington, DC

E. CONSULTANTS: (List Est. Rate and Hours) \$

F. GENERAL AND ADMINISTRATIVE: \$

TOTAL COSTS (Total of A thru F above)

\$ _____

G. PROFIT (____%) Not to exceed 10% of total project costs \$ _____

=====

TOTAL PROJECT PRICE (Total costs + Profit)

\$ _____

PRINT NAME:

TITLE:

SIGNATURE:

DATE SUBMITTED:

This proposal is submitted in response to EPA SBIR Program Solicitation No. PR-NC-06-10207 and reflects our best estimate as of this date.

INSTRUCTIONS FOR APPENDIX C

The purpose of this form is to provide a vehicle whereby the offeror submits to the Government a pricing proposal of estimated costs with detailed information for each cost element, consistent with the offeror's cost accounting system.

If the completed summary is not self-explanatory and/or does not fully document and justify the amounts requested in each category, such documentation should be contained, as appropriate, on a budget explanation page immediately following the budget in the proposal. The form Appendix C will count as one page in the 25 page limit, and any budget explanation pages included will count separately toward the 25 page limit. (See below for discussion on various categories.)

A. Direct Labor - List individually all personnel included, the estimated hours to be expended and the rates of pay (salary, wages, and fringe benefits).

B. Overhead - Specify current rate(s) and base(s). Use current rate(s) negotiated with the cognizant federal negotiating agency, if available. If no rate(s) has (have) been negotiated, a reasonable rate(s) may be requested for Phase I which will be subject to approval by EPA. Offerors may use whatever number and types of overhead rates that are in accordance with their accounting systems and approved by the cognizant federal negotiating agency, if available.

C. Other Direct Costs - List all other direct costs which are not otherwise included in the categories described above, i.e., computer services, publication costs, subcontracts, etc. List each item of permanent equipment to be purchased, its price, and explain its relation to the project.

D. Travel - Address the type and extent of travel and its relation to the project. Include travel expenses for a one-day SBIR Phase I Kick-Off Meeting in Washington, DC.

E. Consultants - Indicate name, daily compensation, and estimated days of service.

F. General and Administrative (G&A) - Same as B. Above.

G. Profit - Reasonable fee (estimated profit) will be considered under this solicitation. For guidance purposes, the amount of profit normally should not exceed 10% of total project costs.

Appendix D

SCIENTIFIC AND TECHNICAL INFORMATION SOURCES

State-of-the-art information, including service and cost details, useful in preparing SBIR proposals or in guiding research efforts may be obtained from the following sources:

National Technical Information Service (NTIS)
5288 Port Royal Road
Springfield, VA 22161
(513) 569-7562

EPA Headquarters Library (3404)
US Environmental Protection Agency
401 M Street, SW
Washington, DC 20460
(202) 260-5922

The Hazardous Waste Collection and Database are available for use in the EPA Headquarters Library, the 10 EPA Regional libraries, EPA laboratories in ADA, OK; Edison, NJ; Las Vegas, NV; Research Triangle Park, NC and the National Enforcement Investigations Center in Denver, CO. The Database runs on an IBM AT/XT or compatible equipment and may be purchased from NTIS using the NTIS order number PB87-945000.

The Environmental Quality Instructional Resources Center
1200 Chambers Road, R.310
Columbus, OH 43212
(614) 292-6717
[Especially related to Drinking Water and Waste Water Treatment]
National Small Flows Clearinghouse (SWICH)
P.O. Box 7219
Silver Spring, MD 20910
1-800-677-9424
[Topic themes include source reduction, recycling, composting, waste combustion, collection, transfer, disposal, landfill gas, and special wastes]

ACCESS EPA (#055-000-00509-5) 1995 Edition

A consolidated guide to EPA information resources, services, and products. It provides access to:

Public information tools
Major EPA dockets
Clearing houses and hot lines
Records management programs
Major EPA environmental database
Library and information services
State environmental libraries

"ACCESS EPA" may be ordered at a cost of \$16.00 each from the U.S. Government Printing Office, New Orders, Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250-7954, or telephone (202)512-1800, or from NTIS using order number PB-147438.

Vendor Information System for Innovative Treatment Technologies (VISITT) Profiles 325 innovative technologies available from 204 vendors to treat ground water in situ, soil, sludges, and sediments. Includes technologies in all stages of development-bench, pilot, or full. VISITT is available at no charge on diskettes compatible with personal computers using DOS operating systems. To order VISITT diskettes and user manual, and to become a registered user, call the VISITT Hotline at 1-800-245-4505.

Appendix E: COMMERCIALIZATION FACT SHEET

(Finding Commercial Products; Conducting a Patent Search; Searching for Federal Research; Standards/Certifying Bodies)

FINDING COMMERCIAL PRODUCTS

The technology you are proposing may already be being sold in the market. There are five web searches recommended as the minimum for determining if the technology is commercially available. In each case, when having trouble look for the FAQs (Frequently Asked Questions) or other advice on searching.

Web Search using General Search Engines

There are around 320 million indexed web pages and the web continues to grow exponentially. One problem with this rate of growth is that no single web search engine is capable of indexing the whole of cyberspace. We recommend using at least one meta-engine and two search engines.

A meta-engine is a search engine which searches other engines that actually catalog or index sites. Examples are Metacrawler, <http://www.metacrawler.com/>, and Dogpile, <http://www.dogpile.com>. We use that search to identify which search engines seem to be producing the best results and then use those engines for more complicated queries which cannot be supported by metacrawler and other meta-engines.

Three engines for more detailed searches at present are Hotbot (<http://www.hotbot.com/>), Yahoo (<http://www.yahoo.com/>) and Google's page (<http://www.google.com>).

When searching, expand or narrow your keywords over time. For example, when searching for "sapphire liquid crystal displays," you may want to broaden to liquid crystal displays or just displays. Also remember to use abbreviations such as LCD.

Thomas Register of American Manufacturers: Long a staple of corporate buyers and market researchers, you can access Thomas Register on-line for free at <http://www.thomasnet.com/>. Once you obtain your free membership, you can search the 155,000 companies by product. You may have to try a few different keywords to get hits.

Hoovers : Hoovers on-line at <http://www.hoovers.com> provides access to profiles on over 12,000 companies. These are the major firms in America, including subsidiaries of foreign operations. By using the keyword search, you can look for companies making products in areas related to your technology. Hoovers provides hypertext links to go to the company's web page. Phone, fax, and street address are also provided. If you cannot find the information on the web, ask for relevant product literature from their marketing departments.

Press Releases: PR Newswire (<http://www.prnewswire.com/>) redistributes corporate press releases. It provides coverage of newly released products that might not otherwise be found on the web.

Patents: We discuss patent searches in the next section of this FactSheet. Look for patents related to your technology, then examine the assignee field. Companies licensing or patenting technology in areas related to your technology are competitors that may be introducing products similar to the one you are considering proposing. Search for their web pages using one of the resources above.

CONDUCTING A PATENT SEARCH

What is a patent? A patent is a right to an invention that is granted by the U.S. Government or a foreign government. It gives the holder an exclusive right to use an invention during a period of time. In the United States, before a patent can be issued, the inventor must demonstrate his or her invention is new and non-obvious. To be new, an invention must not have been known nor made by others in the U.S. The invention also can not have been previously patented or presented in a publication prior to the claimed date on which the invention was made. Patents are handled by the U.S. Patent Office.

Non-obvious is established with reference to what would be obvious to a person of ordinary skill in the relevant technology (or technologies) at the time of the invention. A general rule is that the more complicated the technology and the greater the rate at which it is developing, the higher the skill-level of that hypothetical ordinary person. Non-obvious is determined by examining prior patents, technical publications, and non-secret work being conducted. Usually some aspect of an invention will be non-obvious and thus capable of being patented.

It is important to recognize that different rules apply in different countries. In the U.S., you have one year from the time of first disclosure, use, publication, or sale of an invention to patent the invention. Where more than one person or group makes a claim to be the inventor, the patent goes to the person or group that can demonstrate priority in time. Overseas, the rules are different. Usually the invention must be patented before any public disclosure, use, publication, or sale. In case of a dispute, priority goes to the first person or group to apply for a patent, regardless of who may actually be the inventor. You can, however, get the same overseas priority rights you would get from simultaneously filing overseas and in the U.S. if you file in each relevant country within 12 months of a U.S. patent application.

How to search for U.S. patents: To search the Patent Office go to <http://patents.uspto.gov/index.html>.

The Boolean search capability of the Patent Office enables constructing complicated searches to narrow in on patents of interest. It allows two terms Booleans in the first search, with more complicated queries when refining a search. You can search specific sets of years or the entire database. The advanced search gives you the ability to look in any or all of the fields in the patent -- a very nice feature. Coverage includes all patents issued no later than one week earlier. It includes all utility, design, and plant patents since 1976. Claims and pictures are not included. (See below, Reading Patents.)

The IBM Patent server contains over 2 million patents. Where drawings are part of the patent, they have been scanned in and can be viewed. Off the home page, you have the option of searching from 1995 to present or 1971 to present. Hypertext links on the home page let you search by patent number, use Boolean Logic, or do a text search in various sections of the patent. Try to be as targeted as possible in your search terms. For example, "environmental monitor" will return 42 patents issued in 1995 or later on IBM's server. "Mercury monitor," by comparison, returns only three.

Reading Patents: Once you have found a patent that looks relevant for your interests, examine the abstract and the claims. The abstract provides an overview of what is covered. The claims give you the specific scope of the patent.

There are three paths for finding other patents of interest, once you have found the first one. The first method is to look at the class (or classes) of the patent. You can find patents addressing similar problems by looking in those classes. To fine tune the classes to use, look at a number of relevant patents. Examine

the classes that are listed on the patent. Select those classes that most frequently appear across your sample of patents for further examination.

The second method is to look at the patents cited as references. The final method is to look at patents that reference the one you are examining. By searching text, relevant classes, and patents referred to or referencing relevant patents you can quickly determine if a U.S. patent has issued on a technology of interest. CAUTION: Examining U.S. patents does not assure you the technology has not been patented elsewhere. Further, if the patent is only applied for and has not yet been issued, you will not find it.

SEARCHING FOR FEDERAL RESEARCH

There are two sets of publicly available data on Federal Research. FEDRIP, or Federal Research in Progress, provides access to current civilian agency research. FEDRIP includes:

- Department of Agriculture
- Department of Energy
- Department of Veterans Affairs
- Environmental Protection Agency
- Federal Highway Administration
- National Institutes of Health
- NASA
- National Science Foundation
- US Geological Survey
- National Institute of Standards and Technology
- Nuclear Regulatory Commission
- Small Business Innovation Research

Parts of FEDRIP may be searched for free at The Community of Science, <http://fundedresearch.cos.com/>. Separate databases exist for the National Institutes of Health, NSF, USDA, and the SBIR program -- which means you must do multiple searches. You can also search projects of the Medical Research Council of the United Kingdom. To search all of FEDRIP, go to <http://grc.ntis.gov/fedrip.htm>. There is a \$350 fee.

In addition, by going to an agency's web site, you can find information on their current and/or past awards. The National Technical Information Service (NTIS) is the designated repository of research reports. It contains technical reports and other government-produced information products. The free access parts may be searched at <http://www.ntis.gov/>.

Perhaps the best comprehensive resource for searching is the RAND's RaDiUS at <http://www.rand.org/radius/>. RaDiUS, stands for "Research and Development in the United States." It is the first comprehensive database that tracks in real-time the research and development activities and resources of the U.S. Government. Among its sources are the following: the Catalog of Federal Domestic Assistance (CFDA); USDA's Current Research Information System (CRIS); HHS's Computer Retrieval of Information on Scientific Projects (CRISP) and Information for Management, Planning, Analysis, and Coordination (IMPAC) system; DoD's R-1 and R-2 Budget Exhibits and Work Unit Information Summaries (WUIS); DOE's laboratory information system; the Federal Assistance Awards Data System (FAADS); the Federal Procurement Data System (FPDS); OMB's MAX system; DVA's R&D Information System (RDIS); NSF's Science and Technology System (STIS); and NASA's 507 System.

You must be a Government Contractor to subscribe to RaDiUS. The small business fee is \$1,000 per year per password.

STANDARDS AND CERTIFYING BODIES

If you are going to introduce a commercial product, it most likely will have to meet certain standards and be certified as meeting those standards. For example, we all are familiar with the Underwriter Laboratories seal found on household electrical products -- a certification of safety under normal use. A wide range of bodies creates standards or certifies products. To find relevant standards, we recommend beginning at the American National Standards Institute's "Internet Resources for Standards Developers", located at: <http://www.ansi.org/> The site provides links to U.S. bodies developing standards.

In the U.S., private sector laboratories, like UL commonly do certification. These organizations rely on standards developed by consensus bodies such as the American Society for Testing and Materials (<http://www.astm.org/>) or federal agencies such as EPA. ASTM maintains an International Directory of Testing Laboratories at: <http://astm.365media.com/astm/labs/>. The Directory can be searched by geographic location, lab name, subject area, or keywords.

IMPORTANT!!

IF YOU WISH TO RECEIVE AN ACKNOWLEDGMENT CARD TO CONFIRM RECEIPT OF YOUR PROPOSAL, PLEASE COMPLETE A STANDARD SELF-ADDRESSED STAMPED POSTCARD CONTAINING THE FOLLOWING INFORMATION AND ATTACH TO THE ORIGINAL OF EACH PROPOSAL:

Please type the following and fill in the blanks as appropriate:

This will acknowledge the receipt of your proposal titled:

Topic Letter _____. The evaluation of proposals and the award of SBIR Contracts will require approximately 10 months, and no information on proposal status will be available until final selection(s) is made. Your proposal has been assigned EPA No. _____(to be filled in by EPA).

Date: _____

REVERSE SIDE: Please type the following in the upper left-hand corner (return address) and self-address the card to your corporate official: (Post cards that do not meet postal service standards will not be returned).

U.S. EPA
RTP/POD (D143-01)
RTP, NC 27711

Official Business
Penalty for Private Use \$300

Your Firm Name
Address
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