



SMALL BUSINESS INNOVATION RESEARCH PHASE I

Program Solicitation No. D700001M1

ISSUE DATE: November 15, 1996

CLOSING DATE: January 15, 1997 *

* CAUTION - Late Submissions, Modifications and Withdrawals:
See Section V, Paragraph K

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EPA Small Business Innovation Research Phase I

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I. PROGRAM DESCRIPTION

A. The Environmental Protection Agency invites small business firms to submit research proposals under this program solicitation entitled "Small Business Innovation Research (SBIR) Program." 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.

B. EPA is interested in research on advanced concepts in scientific and engineering areas, particularly where the research may serve as a base for technological innovation. The proposed research must address a single research topic of the solicitation or an important segment of a research topic. Only proposals addressing a single research topic, and so indicated on the cover sheet, will be reviewed. Multiple proposals from the same offeror addressing different topics are acceptable if they are not duplicates of the same research principle modified to fit the topics. If such duplicates are submitted, only one will be reviewed. Refer to Sections III, IV, and VIII for additional requirements.

The same proposal may not be submitted under more than one topic. However, an organization may submit separate proposals on different topics or different proposals on the same topic under this solicitation. Where similar research is discussed under more than one topic, the offeror should choose the topic whose description appears more relevant to the proposer's research concept. Offerors may respond to any of the topics or to specific subtopics within them. Research may be carried through the construction and evaluation of a laboratory prototype.

To reiterate, any proposal addressing more than one research topic, failing to identify the research topic by letter symbol (see Pages 28-43, Section VIII) on the cover page,

or is a duplicate of the same research principle modified to fit a topic, will not be reviewed at all.

This solicitation is for Phase I only.

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

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 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.

2. PHASE II. Phase II proposals may only be submitted by Phase I award winners within the same agency. Phase II is the principal research or R&D effort. Funding shall be based upon the results of Phase I and the scientific and technical merit and commercial potential of the Phase II proposal. The objective is to continue the research or R&D initiated under Phase I. Phase II proposals can only be submitted to the Federal participating agency that awarded Phase I of the effort. Phase II awards 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. 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 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.

It is anticipated that each Phase II proposal will be evaluated in accordance with the following criteria to determine the results of Phase I and the scientific and technical merit and commercial potential of the proposal.

CRITERIA

1. The technical approach to accomplish Phase II along with anticipated Agency and commercial benefits that may be derived from the research. The latter includes consideration of the offeror's SBIR or other research commercialization record, Phase II and Phase III funding commitments from private sector or non-SBIR funding sources, and other commercialization potential indicators.

2. The adequacy of the proposed effort and its relationship to the fulfillment of requirements of the research topic.
3. The scientific and technical merit of the proposed approach and its incremental progress toward topic solution.
4. Results of Phase I and degree to which the Phase I objectives were met.
5. Adequacy of facilities available to accomplish the proposed research.
6. The qualifications of the proposed principal/key investigators supporting staff and consultants.

3. PHASE III. Where appropriate, there will be a third phase which is funded by:

- a. Non-federal sources of capital for commercial applications of SBIR funded research or research and development,
- b. The federal government by follow-on non-SBIR awards for SBIR derived products and processes for use by the federal government,
- c. Non-SBIR federal sources for the continuation of research or research and development that has been competitively selected using peer review or scientific review criteria.

Agencies which intend to pursue research, research & development or production developed under the SBIR Program will give special acquisition preference including sole source awards to the SBIR company which developed the technology. The Phase III funding agreement will be with non-SBIR funds.

C. ELIGIBILITY. Each concern submitting a proposal must qualify as a small business for research or R&D purposes at the time of award. In addition, the primary employment of the principal investigator must be with the small business concern at the time of 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 an SBIR contract, will become a less-than-half-time employee of the university. By the same token, a principal investigator who appears to be a staff member of both the applicant/offeror organization and another employer must submit a letter from the second employer stating that, if awarded an SBIR contract, he/she

will become a less-than-half-time employee of such organization. Also for both Phase I and Phase II, the research or R&D work must be performed in the United States. "United States" means the fifty states, the Territories and possessions of the United States, the Commonwealth of Puerto Rico, the Trust Territory of the Pacific Islands, and the District of Columbia.

D. All inquiries concerning this solicitation shall be submitted to the following email address:

peelee.kathryn@epamail.epa.gov

If email is not available to you, written or telephone inquiries may be directed to:

Kathryn Peele/SBIR-I
 U.S. Environmental Protection Agency
 Contracts Management Division (MD-33)
 Research Triangle Park, N.C. 27711
 (919) 541-5293

Potential offerors are encouraged to communicate via email.

II. DEFINITIONS

For purposes of this solicitation, the following definitions apply:

Research or Research and Development: 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.
- (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.

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 funded in whole or in part by the Federal Government.

Subcontract: Any agreement, other than one involving an employer-employee relationship, entered into

by a Federal Government funding agreement awardee calling for supplies or services required solely for the performance of the original funding agreement.

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

- (1) Is independently owned and operated, is not dominant in the field of operation in which it is proposing, has its principal place of business located in the United States and is organized for profit;
- (2) Is at least 51 percent owned, or in the case of a publicly owned business, at least 51 percent of its voting stock is owned by United States citizens or lawfully fully admitted permanent resident aliens; (if this applies, appropriate documentation must be submitted.)
- (3) Has, including its affiliates, a number of employees not exceeding 500, and meets the other regulatory requirements found in 13 CFR Part 121. Business concerns, other than investment companies licensed, or state development companies qualifying under the Small Business Investment Act of 1958, 15 U.S.C. 661, et. seq., are 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 or 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. The term "number of employees" is defined in 13 CFR 121. Business concerns include, but are not limited to, any individual, partnership, corporation, joint venture, association or cooperative.

Socially and Economically Disadvantaged Small Business Concern: A socially and economically disadvantaged small Business concern is one that is:

- (1) At least 51 percent owned by (i) an Indian tribe or a native Hawaiian organization, or (ii) one or more socially and economically disadvantaged individuals, and
- (2) Whose management and daily business operations are controlled by one or more socially and economically disadvantaged individuals.

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

- (1) Black Americans
- (2) Hispanic Americans
- (3) Native Americans
- (4) Asian-Pacific Americans
- (5) Subcontinent Asian Americans
- (6) Other groups designated from time to time by SBA to be socially disadvantaged; or
- (7) Any other individual found to be socially and economically disadvantaged by SBA pursuant to section 8(a) of the Small Business Act, 15 U.S.C. 637(a).

Women-Owned Small Business Concern: A small business concern that is at least 51 percent owned by a woman or women who also control and operate it. "Control" in this context means exercising the power to make policy decisions. "Operate" in this context means being actively involved in the day to day management.

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

United States: The 50 States, the Territories and possessions of the United States, the Commonwealth of Puerto Rico, the Trust Territory of the Pacific Islands, and the District of Columbia.

Commercialization: The process of developing markets and producing and delivering products for sale (whether by the originating party or by others); as used here, commercialization includes both government and commercial markets.

III. PROPOSAL PREPARATION INSTRUCTIONS AND REQUIREMENTS

A. Proposals submitted in response to this Phase I of the SBIR program shall not exceed a total of 25 pages, one side only, including cover page, budget and all enclosures or attachments. Pages should be of standard size (8 1/2" x 11"; 21.6cm x 27.9 cm) with 2.5 cm margins and type no smaller than 10 point font size. No additional attachments, appendices or references beyond the 25 page limitation shall be submitted. Proposals in excess of the 25 page limitation shall not be considered for review or award. A letter of transmittal is not necessary. If one is furnished, it must not be attached to every copy of the proposal. If a letter of transmittal is attached to every copy of the pro-

posals, 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 and complete Appendix A as page 1 of each copy of each proposal. No other cover is permitted. All pages must be consecutively numbered. The original of the cover sheet must, at a minimum, contain the pen-and-ink signatures of the proposed principal investigator(s) and the authorized organizational official.

C. ABSTRACT OR SUMMARY

The offeror shall complete Appendix B as page 2 of each proposal. The technical abstract should include 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 project summary of successful proposals will be published by EPA and, therefore, must not contain proprietary information.

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.

2. PHASE I TECHNICAL OBJECTIVES. State the specific objectives of the 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. A detailed description of the Phase I R/R&D plan. The plan should indicate what will be done, where it will be done and how the R/R&D will be carried out. Phase I R/R&D should address the objectives and the questions cited in D.2 above. The methods planned to achieve each objective or 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.

- a. State the anticipated results of the proposed approach if the project is successful (Phase I and II). A discussion of cost-effectivity is paramount, especially comparing the state-of-the-art approaches with the proposed approach.
- b. 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 should 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. POTENTIAL POST APPLICATIONS. Briefly describe:

- a. Whether and by what means the proposed project appears to have potential commercial application.
- b. Whether and by what means the proposed project appears to have potential use by the Federal Government, if any.

10. SIMILAR PROPOSALS OR AWARDS. A firm may elect to submit proposals for essentially equivalent work under other federal program solicitations, or may have received other federal awards for essentially equivalent work. In these cases, a statement must be included in each such proposal indicating:

- a. The name and address of the agencies to which proposals were submitted or from which awards were received.
- b. Date of proposal submission or date of award.
- c. Title, number, and date of solicitations under which proposals were submitted or are planned to be submitted, or awards received.
- d. The specific applicable research topics for each proposal submitted or award received.
- e. Title of research projects.
- f. Name and title of project manager or principal investigator for each proposal submitted or award received.
- g. Discussion of how the proposed work differs from the essentially equivalent work.

11. PRIOR SBIR PHASE II AWARDS. If the small business concern has received more than 15 Phase II awards 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. In addition, the concern must document the extent to which it was able to secure third phase funding to develop concepts resulting from previous second phase SBIR awards. (This required proposal information shall not be counted toward proposal pages count limitation.)

E. COST BREAKDOWN/PROPOSED BUDGET

Complete the budget form in Appendix C. Photocopy the form for the required 6 copy 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. This will count as a page in the 25 page limit.

F. QUALITY ASSURANCE NARRATIVE STATEMENT

Offerors must state whether or not their proposal involves environmentally related measurements or data generation. If it does, a quality system must be described that complies with the requirements of ANSI/ASQC E4, "Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs" (available for purchase from the American Society for Quality Control, phone 1-800-248-1946, item T55). This Quality Assurance Narrative Statement should not exceed two pages and will be included in the 25 page limitation for the proposal. It should, for each item listed below, either present the required information or provide a justification as to why the item does not apply to the proposed research.

1. The data collection activities to be performed or hypothesis to be tested (reference may be made to the specific page and paragraph number in the application where this information may be found); acceptance criteria for data quality (precision, accuracy, representativeness, completeness, comparability).
2. The study design including sample type and location requirements and any statistical analyses that were used to estimate the types and numbers of samples required.
3. The procedures for the handling and custody of samples, including sample identification, preservation, transportation, and storage.
4. The methods that will be used to analyze samples collected, including a description of the sampling and/or analytical instruments required.
5. The procedures that will be used in the calibration and performance evaluation of the sampling and analytical methods used during the project.
6. The procedures for data reduction and reporting, including description of statistical analyses to be used.
7. The intended use of the data as they relate to the study objectives or hypotheses.
8. The quantitative and/or qualitative procedures that will be used to evaluate the success of the project.
9. Any plans for peer or other reviews of the study design or analytical methods prior to data collection.

More detailed information will generally be necessary for Phase II proposals.

IV. METHOD OF SELECTION AND EVALUATION CRITERIA

A. All Phase I and II proposals will be evaluated and judged on a competitive basis. 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.B., any proposal addressing more than one research topic, or 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 B.1 below. These panels will by consensus assign each proposal an adjectival rating of “excellent”, “very good”, “good”, “fair” or “poor”, using the specified criteria. The proposals assigned “excellent” and “very good” ratings, will then be subjected to a programmatic review within EPA to further evaluate these applications in relation to program priorities and balance using the criteria specified in B.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.

B. 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 listed in descending order of importance.

CRITERIA

- a. The scientific/technical quality of the Phase I research plan and its relevance to the stated objectives of the topic.
- b. Innovativeness and Originality.
- c. Qualifications of the Principal Investigator, Supporting Staff and Consultants.
- d. Environmental Benefits Associated with

Proposed Technology or Device, including risk reduction potential.

e. Adequacy of Available Facilities, Equipment and Instrumentation.

f. Commercial Potential of Proposed Technology, considering Expected Market, Competition, Cost—Effectiveness, etc.

2. INTERNAL EPA REVIEW. EPA program managers will utilize the following criteria to select which of the “excellent” and “very good” proposals will be funded. The evaluation criteria “a” through “c” are of equal value.

CRITERIA

- a. How the proposed study fits into EPA’s overall research strategy or program in the topic area.
- b. Whether the study has the potential to strengthen the scientific basis for risk assessment/risk management in the topic area by addressing identified uncertainties in the supporting science.
- c. Whether the results of the study will have broad application or impact large segments of the population.
- d. Whether the proposed research is already being supported by EPA or some other known source.

C. PEER REVIEW

The SBIR proposal evaluation will be conducted by external peer review. All peer reviewers will be required to sign an agreement to protect the confidentiality of all proposal material. A copy of the confidentiality agreement is available upon request.

D. RELEASE OF PROPOSAL REVIEW INFORMATION

After final award decisions have been announced, the technical evaluations of the proposer’s proposal may be provided to the proposer. The identity of the reviewer shall not be disclosed.

V. CONSIDERATIONS

A. AWARDS

The Government anticipates award of approximately 30 firm-fixed-price contracts of up to \$70,000 each including profit. The period of performance for the contracts should not normally exceed six (6) months except where agency needs or research plans require otherwise. Exceptions should be minimized. 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. B. 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.

For Phase II, it is anticipated that approximately 10-20 awards for up to \$225,000 each will be made; however, the current solicitation is for Phase I only. The Government is not obligated to fund any specific Phase II 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. The Contractor shall furnish two (2) copies of a monthly letter report stating progress made. One (1) copy of the report shall be submitted to the Project Officer with one (1) copy to the Contracting Officer. The reports 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 same period.

2. Five copies of a comprehensive final report on the Phase I project must be submitted to the Project Officer by the completion date of the contract. The Contracting Officer shall receive one 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.

C. PAYMENT SCHEDULE

Phase I payments will be made as follows:

18% upon receipt and acceptance of each of the first five monthly reports. The remainder shall be paid upon receipt and acceptance of the final report.

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, provided this information is clearly marked by the offeror with the term "confidential proprietary information" and provided the following legend appears on the title page of the proposal:

"For any purpose other than to evaluate the proposal, this data shall not be disclosed outside the Government and shall not be duplicated, used, or disclosed in whole or in part, provided that if a funding agreement 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 funding agreement. 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 is 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 and without assuming any liability for inadvertent disclosure.

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 acknowledgement 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 patentholder 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. FEE OR 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.

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 agree-

ments. 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. **STANDARDS OF WORK.** Work performed under the contract must conform to high professional standards.
2. **INSPECTION.** Work performed under the contract is subject to Government inspection and evaluation at all times.
3. **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.
4. **DEFAULT.** The Government may terminate the contract if the Contractor fails to perform the work contracted.
5. **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.
6. **DISPUTES.** Any dispute concerning the funding agreement which cannot be resolved by agreement shall be decided by the Contracting Officer with right of appeal.
7. **CONTRACT WORK HOURS.** The awardee may not require an employee to work more than 8 hours a day or 40 hours a week unless the employee is compensated accordingly (e.g., overtime pay).
8. **EQUAL OPPORTUNITY.** The awardee will not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin.
9. **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.

10. **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.

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

12. **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.

13. **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.

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

15. **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 SBIR Program is not a substitute for existing unsolicited proposal mechanisms. Unsolicited proposals shall not be accepted under the 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 EPA SBIR Solicitation has attempted to present basic program requirements and definitions in a concise manner. The following discussion is provided to augment these program requirements and definitions found elsewhere in this EPA SBIR Solicitation.

EPA will review every SBIR offering in detail. A proposal which is not complete cannot be judged. Proposals offering to perform preliminary work such as state-of-the-art, literature, and/or market surveys are not supportable. While computer expert systems, computer models, and computer aided design activities are helpful tools in the early identification of pollution problems and possible solutions, these computer activities cannot have a direct effect on pollution control. They cannot be used in lieu of applied laboratory research to determine the feasibility of a pollution control process. Proposals only offering such computer activities are also unsupportable and considered technically unacceptable. Similarly, proposals which only offer the performance of a design activity cannot be judged as it is impossible to guess what sort of apparatus or process will result. Without a straight-forward description of the process and/or apparatus to be tested, there can be no determination of the scientific and technical quality of the work plan.

It is recognized that any research and development project starts out with a conception on the part of the

inventor, followed by appropriate surveys to rule out duplication and inappropriate process details, finally leading to the process design of a prototype apparatus or process which could be tested to show the feasibility of the concept. This is a paper study up to this point, although some researchers find it useful to do small scale, short term laboratory testing of some portions of the process to guide their thinking on the prototype design and how it would be tested to show its feasibility. All of the foregoing is preliminary work which must be done prior to writing a proposal to EPA's SBIR Program.

The resultant prototype process design can then be described in sufficient detail in a proposal to EPA's SBIR Program to enable a determination of what the pollution control process is and whether or not it is innovative as well as scientifically and technically sound. Further, the work plan must allow the ascertainment of the scientific and technical quality of the testing procedures and schedule proposed, and if it is likely to permit a finding of feasibility if carried out properly.

The requirement that the offeror designate a topic, and only one topic, (see page 3, item I.B. above) is also an absolute necessity. 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 topic.

EPA's Solicitation does not exclude design and development of prototype equipment from the broad definition of research. The offerors must describe their prototype clearly and how it would be tested in detail. EPA's SBIR program does not fund the design of the prototype; only the construction and testing of the prototype as designed can be funded.

K. LATE SUBMISSIONS, MODIFICATIONS, AND WITHDRAWALS OF PROPOSALS - FAR 52.215-10 (AUG 1996)

(a) Any proposal received at the office designated in the solicitation after the exact time specified for receipt will not be considered unless it is received before award is made and it--

(1) Was sent by registered or certified mail not later than the fifth calendar day before the date specified for receipt of offers (e.g., an offer submitted in response to a solicitation requiring receipt of offers by

the 20th of the month must have been mailed by the 15th);

(2) Was sent by mail or, if authorized by the solicitation, was sent by telegram or via facsimile and it is determined by the Government that the late receipt was due solely to mishandling by the Government after receipt at the Government installation;

(3) Was sent by U.S. Postal Service Express Mail Next Day Service-Post Office to Addressee, not later than 5:00 p.m. at the place of mailing two working days prior to the date specified for receipt of proposals. The term "working days" excludes weekends and U.S. Federal holidays;

(4) Was transmitted through an electronic commerce method authorized by the solicitation and was received by the Government not later than 5:00 p.m. one working day prior to the date specified for receipt of proposals; or

(5) Is the only proposal received.

(b) Any modification of a proposal or quotation, except a modification resulting from the Contracting Officer's request for "best and final" offer, is subject to the same conditions as in subparagraphs (a)(1), (2), and (3) of this provision.

(c) A modification resulting from the Contracting Officer's request for "best and final" offer received after the time and date specified in the request will not be considered unless received before award and the late receipt is due solely to mishandling by the Government after receipt at the Government installation.

(d) The only acceptable evidence to establish the date of mailing of a late proposal or modification sent either by U.S. Postal Service registered or certified mail is the U.S. or Canadian Postal Service postmark both on the envelope or wrapper and on the original receipt from the U.S. or Canadian Postal Service. Both postmarks must show a legible date on the proposal, quotation, or modification shall be processed as if mailed late. "Postmark" means a printed, stamped, or otherwise placed impression (exclusive of a postage meter machine impression) that is readily identifiable without further action as having been supplied and affixed by employees of the U.S. or Canadian Postal Service on the date of mailing. Therefore, offerors or quoters should request the postal clerk to place a legible hand cancellation bull's eye postmark on both the receipt and the envelope or wrapper.

(e) The only acceptable evidence to establish the time of receipt at the Government installation is the time/date stamp of that installation on the proposal wrapper or other documentary evidence of receipt maintained by the installation.

(f) The only acceptable evidence to establish the date of mailing of a late offer, modification, or withdrawal sent by Express Mail Next Day Service-Post Office to Addressee is the date entered by the post office receiving clerk on the "Express Mail Next Day Service-Post Office to Addressee" label and the postmark on both the envelope or wrapper and on the original receipt from the U.S. Postal Service. "Postmark" has the same meaning as defined in paragraph (d) of this provision, excluding postmarks of the Canadian Postal Service. Therefore, offerors or quoters should request the postal clerk to place a legible hand cancellation bull's eye postmark on both the receipt and the envelope or wrapper.

(g) Notwithstanding paragraph (a) of this provision, 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.

(h) Proposals may be withdrawn by written notice or telegram (including mailgram) received at any time before award. 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 entitled "Facsimile Proposals." Proposals may be withdrawn in person by an offeror or an authorized representative, if the representative's identity is made known and the representative signs a receipt for the proposal before award.

(I) 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 or other notice of an extension of the closing date, 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. If no time is specified in the solicitation, the time for receipt is 4:30 p.m., local time, for the designated Government office.

VI. SUBMISSION OF PROPOSALS

A. Your proposal shall be submitted with an original and five (5) copies to one of the following addresses by 4:30 p.m., local time, on January 15, 1997:

U.S. MAIL:

**U.S. Environmental Protection Agency
Solicitation No. D700001M1/SBIR Phase I
Closing Date: January 15, 1997 at 4:30 p.m.
Contracts Management Division (MD-33)
Attn: Kathryn Peele
Research Triangle Park, N.C. 27711**

HANDCARRIED/COURIER ADDRESS

**U.S. Environmental Protection Agency
Receptionist, EPA Administration Building
Solicitation No. D700001M1/SBIR Phase I
Closing Date: January 15, 1997 at 4:30 p.m.
Attn: Kathryn Peele/Contracts Mgmt. Division
79 T.W. Alexander Drive
Research Triangle Park, N.C. 27709**

Please note Section V, Paragraph K 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. OTHER INFORMATION SOURCES

A range of information on EPA programs and priorities can be obtained through the EPA worldwide web site at <http://www.epa.gov>.

VIII. RESEARCH TOPICS

Program Scope: The EPA SBIR program is intended to provide the incentive and opportunity for small businesses to undertake cutting edge research that addresses EPA's priority science and technology needs. Research proposals submitted under this solicitation must pertain to EPA's environmental mission and must be responsive to EPA's program interests included in the topic descriptions of this solicitation. Certain types of research proposals will not be accepted under this solicitation, even if they are related to the subject matter defined in the research topics. These include (1) proposals involving anthropogenic radioactive materials, and (2) proposals for application of pesticides, fungicides, fertilizers and other materials for agricultural purposes. Proposals in these areas are principally the responsibility of other agencies.

A. DRINKING WATER TREATMENT

In 1990, EPA's Science Advisory Board ranked pollutants in drinking water as one of the highest health risks meriting EPA's attention due to the exposure of large populations to contaminants such as lead, disinfectant by-products (DBPs), and disease-causing organisms. Disinfectants are used by virtually all surface water systems in the U.S. and by an unknown percentage of systems that rely on ground water. Chlorine has been the most widely used and most cost effective disinfectant. However, disinfection treatments can produce a wide variety of by-products, many of which have been shown to cause cancer and other toxic effects. Recently, there has been concern that water quality can deteriorate dramatically during distribution unless systems are properly designed and operated. While disinfection is an integral part of water treatment, filtration is necessary to reduce pathogen levels and make disinfection more reliable by removing turbidity and other interfering constituents.

Innovation is needed to upgrade existing techniques as well as to develop new approaches to address these problems. Areas of interest include:

- Alternatives to chlorine disinfection, including innovative applications of ultraviolet radiation, for removing pathogenic microorganisms.
- Development of innovative unit processes for removal of organic and inorganic contaminants (such as arsenic), particulate, and cyst-like organisms, particularly for small systems.

- Improved methods for controlling pathogens through coagulation/settling, filtration or other means.
- Drinking water contamination control between the treatment plant and the user; especially considering potential chemical leaching from distribution system materials and surfaces (e.g., pipe materials, protective coatings) as a result of instability, interaction with microorganisms, disinfection agents, and water treatment chemicals.

B. MUNICIPAL AND INDUSTRIAL WASTEWATER TREATMENT AND POLLUTION CONTROL

Research is needed to improve existing wastewater treatment processes which often fail to perform as intended due to unforeseen factors not considered in the plant design, usually related to upsets in the biological process itself; or inefficiencies in chemical treatment processes. Areas of interest include, but are not limited to:

- Process concepts and modifications to enhance reliability of achieving secondary quality effluent from facilities with design flows less than 5 million gallons per day (mgd).
- Cost effective alternatives to the chlorination of outfalls from municipal wastewater treatment plants, emphasizing the identity and characteristics of by-products associated with the alternative treatments.
- More cost effective techniques for removing phosphorus and nitrogen nutrients from municipal wastewater.
- Low cost processes for removing heavy metals (such as chromium, arsenic, lead, and mercury) from industrial wastewater or soil washing effluents. The proposed method must recover heavy metals in a form suitable for reuse, sale, or alternate disposal at approved offsite facilities. Approaches using genetically engineered microorganisms must obtain special clearance for such use. Clearance information may be obtained from EPA's Office of Pollution Prevention and Toxics (contact Ellie Clark at (202) 260-9570).
- Innovative technologies are needed to monitor and treat bilge/ballast water within vessels, especially important for the Great Lakes.

- Nontoxic anti-biofoulers are needed for exotic species such as the zebra mussel which are difficult to control. Development of nontoxic methods to control such species would be a major contribution to the protection of the Great Lakes and many inland lakes.

C. WET WEATHER FLOW TREATMENT AND POLLUTION CONTROL

Research is needed to improve the treatment and control of wet weather discharge of pollutants that occur in urban areas, including municipal, industrial, stormwater, and sanitary sewer discharges. These flows occur when the volume of flows in a separate municipal sanitary sewer system exceeds its capacity, due to unintended inflow and infiltration of storm water. These events are called sanitary sewer overflows (SSOs). Combined sewer overflows (CSOs) occur during wet weather events in some cities in which sanitary and storm sewers have been combined in a single sewer system. EPA in both its 1992 National Water Quality Inventory and its Report to Congress noted that pollution from wet weather discharges is cited by many States as the leading cause of water quality impairment. Based on their reports and other assessments, the EPA has concluded that wet weather discharges from both point and nonpoint discharges are one of the largest threats remaining to water quality, aquatic life, and human health that exist today. Areas of needed research and interest include but are not limited to:

- Development of cost-effective technologies for preventing toxic substances and pollutants from entering the downstream storm or combined sewer/drainage systems.
- Development of monitoring methodologies and equipment to measure the characteristics and impacts of wet weather flows (WWF), including pathogenicity.
- Development of high-rate and high-efficiency WWF treatment technologies suitable for retrofitting existing wastewater treatment plants as well as for new installations.

D. REHABILITATION OF URBAN INFRASTRUCTURE SYSTEMS

The aging condition of our cities and deterioration of infrastructure includes water distribution and sewerage systems. This provides an important research area addressing how to repair and maintain this infrastructure. The costs are staggering; the national investment in sewers

alone approaches \$1.8 trillion. Excessive flow to the sewer system from infiltration and inflow (I/I) robs the capacity of the sewer system and negatively affects proper operation of the entire sewerage system. I/I has caused surcharging of sewers, wastewater treatment plants and pumping stations. Building connections to the street sewers or laterals can contribute as much as 70 - 80% of the infiltration load. With current technology, building connection rehabilitation may not be economically feasible because of the sheer number of connections. Less expensive technologies other than acoustic approaches are needed to detect leaks, forecast structural failures, and repair/ rehabilitate sewers and other utility pipelines such as municipal pressurized water distribution and possibly heat distribution systems.

Areas of needed research and interest include but are not limited to:

- New technologies to construct, maintain, and repair new and existing sewer infrastructure at an acceptable cost.
- New technologies to construct, maintain, and repair new and existing urban utility/steam and water distribution systems infrastructure at an acceptable cost.

E. PREVENTION AND CONTROL OF INDOOR AIR POLLUTION

This topic focuses on indoor air quality engineering research directed at: (1) determining the nature of indoor air emissions and how they contribute to human exposure, and (2) developing cost-effective tools, techniques, technologies, necessary to prevent or reduce individual exposure to indoor air pollutants. Areas of interest include, but are not limited to development of:

- Methods to prevent biocontaminant growth in the indoor environment.
- Air cleaners with improved ability to remove volatile organic compounds from indoor air.
- Improved particulate air filters for residential and commercial heating, ventilating, and air—conditioning (HVAC) systems.
- Innovative, cost-effective techniques for conditioning outdoor ventilation air.

F. PREVENTION AND CONTROL OF NO_x, VOC'S, SO₂, AND TOXIC AIR EMISSIONS

This topic requires new, innovative and cost-effective approaches to prevent and control NO_x emissions from stationary and mobile sources. Also important is control of volatile organic compounds (VOC), toxic air pollutants (TAP), and SO₂ emissions from industrial processes and from fuels, especially where low concentrations of VOC and TAP are present in high flows of offgas which may also contain submicron size particulate matter. Existing activated carbon adsorption or incineration techniques are not of interest.

Areas of interest include, but are not limited to:

- Innovative NO_x controls for stationary or mobile sources outside of combustion modification or catalytic approaches.
- VOC emission controls for area sources such as off-highway vehicles, gasoline marketing operations, surface coating operations, and solvent usage related to consumer and commercial products.
- New, cost effective sulfur oxides control techniques for the large number of smaller SO_x emitters targeted for regulation by States as impacting short-term air quality standards from their relatively high concentration of SO_x in stack gases.
- An advanced system to capture other gaseous contaminants such as acid gases, dioxins, and volatile metals simultaneously with SO_x.
- Cost-effective techniques to control and/or remove toxic air emissions, such as heavy metals, nitroaromatics, and other extraordinarily active mutagens in vent and flue gases from combustion and/or industrial sources are of special interest. These include isocyanates from auto refinish spray painting and brominated flame retardant dust from plastics manufacturing operations.
- Techniques which control multiple pollutants, such as SO₂ and NO_x, or SO₂ and toxic metals, with one process step are also of special interest.

G. TREATMENT, RECYCLING, AND DISPOSAL OF SOLID WASTES, HAZARDOUS WASTES AND SEDIMENTS

Solid and liquid wastes appear in many forms, ranging from municipal solid wastes, which may be incinerated or disposed of in conventional landfills, to hazardous solid and liquid industrial wastes which may require special disposal to prevent aquifer or air contamination. Contaminated sediments now appear to be the main source of toxic contaminants in many bays, lakes, and rivers.

Innovative approaches to address these problems are needed in areas such as the following:

- Improved treatment and disposal of solid and/or liquid hazardous wastes or sediments, including detoxification, solidification, chemical treatment, neutralization, or otherwise fixing organic waste prior to storage in landfills.
- Innovative methods for the operation and control of high temperature waste combustion incinerators which lead to reduced contaminant release through air, water, or residual ash streams
- Advanced hazardous waste destruction techniques using cost-effective thermal, physical, and chemical methods.
- Recovery processes which may enable the economic recovery of valuable components from solid and hazardous waste streams which may then be sold and/or recycled off site.
- Innovative new uses for post-consumer waste materials from municipal or industrial sources to reduce landfill and disposal costs.
- Innovative ways of preventing or treating/detoxifying wastes which may be banned from land disposal, particularly, those containing highly toxic or persistent constituents
- An improved technique for the rapid removal of the paint from a variety of architectural surfaces. The system should soften and/or loosen the paint film and physically strip it from the surface to comply with the Housing and Urban Development (HUD) cleanliness standards. The method should

minimize the generation of small dust or fume particles while capturing the paint film as it is removed. It should be four or five times faster than existing techniques and avoid the use of toxic and or hazardous chemicals, especially volatile organic compounds. The system must produce a surface that can be repainted or include an inexpensive refinishing step to permit refinishing.

H. *IN SITU* SITE REMEDIATION OF ORGANICALLY CONTAMINATED SOIL, SEDIMENTS AND GROUND WATER

Certain locations within the United States have become contaminated with hazardous and toxic organic substances or agents. These contaminants have permeated and adsorbed onto soils, diffused to interstitial saturated zones, dissolved into ground waters and migrated to subsurface aquifers.

In many instances these contaminants have exhibited physical and chemical properties which make them difficult to remove from the environment. They 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.

Proposals are solicited which will result in the development of innovative, cost-effective methods for the treatment or extraction of hazardous organic waste contaminants in situ, using physical, chemical, and biological techniques. Included are techniques which promote mobilization of contaminants in situ to make them more amenable to subsequent *in-situ* treatment or extraction. Biological techniques which utilize genetically engineered microorganisms can be included in this solicitation but will require the proposer to provide any special clearances needed for such projects. Clearance information on genetically engineered bioremediation microorganism use can be obtained from EPA's Office of Pollution Prevention and Toxics (contact Ellie Clark at (202) 260-3402).

In situ treatment technologies to be considered in this topic must meet the following requirements:

1. In all technology to be considered, the soil phase must remain in place although mechanical devices which promote local mixing of the soil may be incorporated in the process.

2. Processes in which ground water is pumped to the surface to add chemical and biological agents or to remove products of subsurface degradation are permissible as long as all degradation processes occur in any one or all of the following layers:
 - a. at the upper surface of the soil,
 - b. in the vadose zone, or
 - c. in the ground water.
3. "On-site" or "pump-and-treat" processes where pollutants are treated or removed from contaminated ground water or air after being brought to the surface are not acceptable.

Innovative approaches to in-situ treatment are needed in areas such as the following:

- Chemical detoxification such as neutralization and dehalogenation.
- Electrochemical decomposition.
- Physical methods for subsurface mixing to enhance mobilization and mass transfer.
- Biotreatment methods in the saturated and unsaturated zone.
- Approaches for degrading or removing dense non-aqueous phase liquids from ground water.
- Improvement in nutrient and chemical reagent delivery systems for biological or chemical methods.

I. TREATMENT OR REMOVAL OF HEAVY METALS AT CONTAMINATED SITES

Environmental contamination at various sites often includes both toxic and hazardous organics and heavy metals. Topic H specifically deals with the organics and Topic I addresses the heavy metal components. Here the goal is to either remove heavy metals from the soil, vadose zone, or groundwater, or to treat in situ by techniques other than conventional fixation or solidification.

Research and development efforts which employ physical, chemical and biological techniques for the mobilization of the heavy metals must describe the subsequent heavy metal removal methods. Treatment of complex mixed wastes, especially containing mercury, cadmium, chromium and arsenic, are of particular interest.

Treatment technologies to be considered in this topic must meet the following requirements.

1. In all technology to be considered, the soil phase must remain in place although mechanical devices which promote local mixing of the soil may be incorporated in the process.
2. "On-site" or "pump-and-treat" processes where heavy metals are removed from contaminated water after being brought to the surface are acceptable.
3. Processes which immobilize or treat contaminants in situ are acceptable.

Opportunities for innovation in the themes listed below are provided as examples only and are not meant to be all inclusive.

- Physical methods for subsurface mixing to enhance mobilization and mass transfer of heavy metals.
- In situ treatment of soils, sediments, and sludges.
- Improvement in nutrient and chemical reagent delivery systems for biological or chemical methods for heavy metals removal.
- Improvement in heavy metal reaction product recovery and separation systems which enhance the commercial value of these products.

J. POLLUTION PREVENTION

Pollution prevention means "source reduction" as defined under the Pollution Prevention Act. The Pollution Prevention Act defines "source reduction" to mean any practice which:

- reduces the amount of any hazardous substance, pollutant, or contaminant entering any waste stream or otherwise released into the environment (including fugitive emissions) prior to recycling, treatment, or disposal; and
- reduces the hazards to public health and the environment associated with the release of such substances, pollutants, or contaminants.

The term includes: equipment or technology modifications, process or procedure modifications, reformulation or redesign of products, and substitution of raw materials. While improvements in housekeeping, maintenance,

training or inventory control may result in pollution prevention, these activities are outside the scope of EPA's SBIR program.

Under the Pollution Prevention Act, recycling, energy recovery, treatment and disposal are not included within the definition of pollution prevention. Some practices commonly described as "in-process recycling" may qualify as pollution prevention. However, recycling is not considered waste reduction if waste exits a process, exists as a separate entity, undergoes significant handling, and is transported from the waste generation location to another production site (perhaps another part of a large plant) for reuse, or to an offsite commercial recycling facility or waste exchange. If a proposal identifies Topic J, POLLUTION PREVENTION, but the work is in fact Treatment or Recycling belonging under Topic G, Treatment and Recycling of Solid Waste, Hazardous Wastes and Sediments, the proposal will be rejected as unacceptable.

While pollution prevention approaches are also appropriate for the agricultural and energy sectors, proposals in these areas should be sent to the U.S. Department of Agriculture and the U.S. Department of Energy SBIR programs respectively. We are particularly interested in proposals that address the six industry sectors under the EPA Common Sense Initiative (CSI): metal finishing, petroleum refining, automotive assembly, printing, electronics, and iron and steel.

Examples of areas of interest include research opportunities for innovation in pollution prevention using the following approaches:

- Closed loop processes: New, preferably simple, no or low emission chrome plating techniques.
- In-Process Recycling: Potential wastes or their components can be reused within existing operations.
- New no or low emission chlorinated solvent vapor degreasing systems for metal plating operations.
- Process Technology and Equipment: Significant changes in the basic technology and equipment of production, including modernization, modification, or better control of process equipment.
- Process Inputs: Changes in raw materials, either to different materials (e.g., water instead of organic solvents) or materials with different specifications (e.g., lower levels of contaminants).

- Novel cost-effective separation methods which result in highly effective separation of useful material from other components in a process stream.
- Development of new bulk materials and coatings with long life that have reduced environmental impact in manufacture or use.
- Improved sensor and multivariate control of manufacturing equipment and systems to reduce waste or emissions.
- Changes in the composition of end products that allow fundamental changes in the manufacturing process or in the use of raw materials.
- Alternative synthetic pathways: The use of
 - catalysis/biocatalysts
 - natural processes such as photochemistry and biomimetic synthesis
 - alternate feedstocks which are more innocuous and renewable (e.g. biomass)
- Alternative reaction conditions: The use of
 - solvents which have a reduced impact on human health and the environment
 - increasing selectivity and reducing wastes and emissions
- Development of new chemicals which are
 - less toxic than current alternatives
 - inherently safer regarding accident potential
 - stable intermediates such as diurethanes or dicarbamates permitting on-site conversion to hazardous isocyanates prior to use, thus preventing accidental release of isocyanates during transportation, storage, and spills.

K. ADVANCED MONITORING AND ANALYTICAL TECHNOLOGIES

The purpose of this program is to advance measurement science by stimulating research on new approaches to solving environmental monitoring and measurement problems. EPA is interested in both remote and in-situ measurements approaches. EPA is also interested in the

adaption or extension of existing techniques from other, non-environmental fields that can provide significant improvements in current environmental measurements.

Specific areas of interest include, but are not limited to, the following:

- Portable measurement technologies that can be used in the field to eliminate packaging and shipping samples to distant laboratories, and yield real time information at a lower cost. Such technologies need to be rugged, sensitive, and suitable for the wide variety of samples that are commonly analyzed including contaminated soils and sediments, industrial wastes, industrial waste waters, and incinerator stack emissions. Ability to measure multiple pollutants simultaneously would be a plus factor. Rapid field tests are also needed by personnel responding to crisis situations such as spills and accidents.
- Improved measurement of microbial pathogens in drinking water systems is of special interest. Current methods for measuring *Cryptosporidium* and *Giardia* frequently produce inaccurate and highly variable data. This contributes to uncertainty of the extent of health risks from exposure to drinking water containing these pathogens including the viability of cysts and oocysts found in drinking water systems. Research is needed to develop practical, low cost, accurate, and specific methods to identify and quantify viable pathogenic cysts and oocysts in raw and finished drinking water systems.

Major improvements in process control, compliance monitoring, and environmental decision making could be made if more accurate, less costly, more rugged techniques were available, including remote sensing devices, which would yield continuous data on pollutant concentrations in environmental media. Examples of situations where advanced continuous monitors are needed include the following:

- Toxic metal (particularly mercury) and/or organic compound emissions from high temperature, complex matrix sources such as incinerators, fossil fuel based power plants, cement kilns, and smelters.
- Release of volatile compounds from complex point sources or area sources such as tanks, pipes, valves, landfills, and contaminated soils under ambient conditions.

- Organic and inorganic toxicants in municipal and industrial waste water and their impact (toxic effects) on receiving waters.
- Measurement of physical, chemical, and biological water quality parameters.
- Measurement of the size distribution and dry mass of inhalable particulate matter (PM 2.5 and PM 10), including semi-volatile organic toxicants and ammonium nitrate in air.
- Mass measurements of particle-bound water in airborne inhalable particulate matter (PM 2.5 and PM 10).

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 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: Proposal Cover Sheet

U.S. Environmental Protection Agency, SOLICITATION NO. D700001M1 SMALL BUSINESS INNOVATION RESEARCH, Phase I

PROPOSAL TITLE: _____

FIRM NAME: _____

MAILING ADDRESS: _____

CITY: _____ STATE: _____ ZIP: _____

AMOUNT REQUESTED:\$ _____ PROPOSED DURATION (PHASE I): 6 MOS
(Not to Exceed \$70,000)

TOPIC (check one)

- A. Drinking Water Treatment
- B. Municipal and Industrial Wastewater Treatment and Pollution Control
- C. Wet Weather Flow Treatment and Pollution Control
- D. Rehabilitation of Urban Infrastructure Systems
- E. Prevention and Control of Indoor Air Pollution
- F. Prevention and Control of NO_x, VOCs, SO₂, and Toxic Air Emissions
- G. Treatment, Recycling, and Disposal of Solid Wastes, Hazardous Wastes, and Sediments
- H. In Situ Site Remediation of Organically Contaminated Soil, Sediments, and Ground Water
- I. Treatment or Removal of Heavy Metals at Contaminated Sites
- J. Pollution Prevention
- K. Advanced Monitoring and Analytical Technologies

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. Do you plan to send, or have you sent, this proposal or a similiar one to any other federal agency? If yes, which? Use acronym(s) for each agency, (e.g.) DOD, NIH, DOE, NASA, etc.,

- 7. Choose one of the following to describe your Organization Type: _____ Individual _____ Partnership
_____ Corporation
- 8. Provide the following information, if known: Tax Identification No: _____ Dun & Bradstreet
Number: _____ Common Parent Name: _____

* for information purposes

Endorsements

Principal Investigator

Type name, indicate Mr., Ms., or Dr.

Title _____

Telephone: _____

Signature: _____

of Principal Investigator

Date: _____

Corporate/Business Official

Type name, indicate Mr., Ms., or Dr.

Title _____

Telephone: _____

Signature: _____

of Corporate/Business Official

Date: _____

PROPRIETARY NOTICE: For any other purpose than to evaluate the proposal, this data shall not be disclosed outside the Government and shall not be duplicated, used or disclosed in whole or in part, provided that if a funding agreement 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 funding agreement. 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 in this proposal subject to this restriction is contained on pages _____ of this proposal.

Appendix B: Project Summary

U.S. ENVIRONMENTAL PROTECTION AGENCY
SMALL BUSINESS INNOVATION RESEARCH PROGRAM
SOLICITATION NUMBER D700001M1
PHASE I - FY 1997

PROJECT SUMMARY: (Limited to one (1) page)

FIRM NAME, ADDRESS, AND TELEPHONE NUMBER:

TITLE OF PROPOSAL:

TOPIC LETTER (A-K):

NAME AND TITLE OF PRINCIPLE INVESTIGATOR/PROJECT MANAGER:

TECHNICAL ABSTRACT: (Limited to 200 words. Must be Publishable)

ANTICIPATED RESULTS/POTENTIAL COMMERCIAL APPLICATIONS: (both Phases I and II) as described by the Awardee. (Limited to space remaining on page)

Appendix C: SBIR Proposal Summary Budget

(Instructions on next page)

TOTAL PRICE

Organization and Address

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

B. OVERHEAD: \$

C. OTHER DIRECT COSTS: \$

D. TRAVEL: \$

E. CONSULTANTS: \$

F. GENERAL AND ADMINISTRATIVE: \$

TOTAL COSTS: \$

G. PROFIT (____ %) \$

SIGNATURE:

This proposal is submitted in response to EPA SBIR Program Solicitation No. D700001M1 and reflects our best estimate as of this date.

DATE

SUBMITTED: _____

INSTRUCTIONS - 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.

This summary does not eliminate the need to 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. (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.

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: Use of EPA Laboratory Facilities

The Office of Research and Development (ORD) National Risk Management Research Laboratory (NRMRL) is willing to work with SBIR contractors to the maximum extent possible to facilitate the performance of EPA SBIR projects. Under mutual agreement and benefit, such arrangements may involve the use of certain Laboratory facilities and/or interaction with EPA Laboratory personnel at no cost to the SBIR contractor.

The address and description of NRMRL is profiled below:

**National Risk Management Research Laboratory
U.S. Environmental Protection Agency
26 West Martin Luther King Drive
Cincinnati, OH 45268
Telephone: (513)569-7418**

The National Risk Management Research Laboratory facilitates advancement of the scientific understanding and the development and application of technological solutions to prevent, control, or remediate important environmental problems that threaten human health and the environment. The Laboratory is the principal entity within the ORD responsible for environmental risk management research related to: characterization of pollutant generation and release; prevention and control of pollution to air, land, and water resources; protection of water quality in public water systems; remediation of contaminated soils and groundwater; and protection of the public health from indoor pollutants.

Land Remediation and Pollution Control: Identifies, develops, evaluates, and demonstrates methods, systems, and technologies to control or remediate contaminated sites and related land areas. Legislation supported by the division includes SARA, RCRA, CWA, TSCA, and FIFRA. Research at the basic level provides new technologies and treatment concepts for innovative solution of current and future land pollution problems. Field evaluation of innovative technologies, covering applied research, demonstration, and verification programs ensures that the environmental industry is developing reliable and cost-effective alternatives for the domestic, federal, and international markets.

Subsurface Protection and Remediation: Responsible for research programs to (1) determine the fate, transport, and transformation rates and mechanisms of pollutants in the subsurface environment including both the unsaturated soil profiles and the saturated zones; (2) to define the processes for characterizing the subsurface environment as a receptor of pollutants; (3) to develop techniques for predicting the effects of pollutants on ground water, soil, and indigenous organisms; and (4) to define and demonstrate the applicability and limitations of using natural processes, indigenous to the subsurface environment, for the protection of this resource from municipal, industrial, and agricultural activities entailing the release of pollutants to the soil or deeper regions of the subsurface.

Air Pollution Prevention and Control: Develops and assesses methods and technologies for characterizing emissions, and preventing or reducing the deleterious effects of air pollutants on human health and welfare, and on the global environment. Conducts fundamental and applied research to develop emission methodologies and models for use in characterizing and estimating the contributions of various air emission sources to stratospheric ozone depletion, global warming, ozone non-attainment, acid deposition and other causes of adverse impacts on the atmosphere; characterize and evaluate sources and technologies for preventing or controlling volatile organic compounds and hazardous air pollutants; characterize and verify the performance of alternative energy technologies; evaluate technologies and systems contributing to stratospheric ozone depletion; characterize and evaluate sources of indoor environmental pollution; develop methods and technologies to reduce concentrations of organic and various soil gases in buildings to background levels; develop, apply, and verify the performance of combustion modification techniques; conduct fundamental combustion research; develop, apply, and verify flue gas cleaning methods and techniques; and perform cost analysis of prevention and control options.

Sustainable Technology: Plans, coordinates, and conducts a national program of multimedia research, development, and demonstration of new and improved methods, technologies, and techniques for integrated pollution management with a priority to reduce or eliminate waste generation at the source with application of pollution prevention technologies to industrial processes. An important part of this effort is the development of new pollution control techniques which can be

applied within a process train or for effluent stream control, and new chemical reactions or green chemistry. Another important Division function is the development of multimedia decision tools with emphasis on cost-benefit analysis. Water Supply and Water Resources: responsible for helping prepare the primary and secondary regulations for drinking water, integrating chemistry, engineering, microbiology, and cost analysis to provide effective, reliable and cost-effective techniques (acquisition, treatment, distribution, and support services) for assuring the delivery of safe drinking water; developing technology and strategies for controlling contaminants such as: (1) agricultural and rural storm runoff; (2) combined sewer overflows; (3) urban storm water and sanitary sewer overflows; (4) underground and aboveground storage tanks; (5) wastewater from small communities, including constructed wetlands; and (6) contaminated sediments; and investigating environmental restoration strategies and technologies.

Technology Transfer and Support: responsible for planning, coordinating, reviewing and conducting a comprehensive program for disseminating scientific and technical information developed by ORD and other environmental research and development organizations.

IMPORTANT!!

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

SIDE ONE: 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 6-9 months, and no information on proposal status will be available until final selection(s) is made. Your proposal has been assigned EPA No. _____-96. (To be filled in by EPA)

Date:

SIDE TWO: Please type the following in the upper left hand corner (return address) and self-address the card to your corporate official:

U.S. EPA
CONTRACTS MANAGEMENT DIVISION MD-33)
RESEARCH TRIANGLE PARK, NC 27711

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE \$300