

# Pipeline Safety R&D at the Office of Pipeline Safety

International Pipeline Conference

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# Pipeline Safety R&D: Questions

- What are we trying to accomplish through the R&D program?
- What are the elements of our management approach? Goals?
- On what R&D topics are we focusing?
- How have we distributed resources to date?
- How will we know whether the program is succeeding?

# What are We Trying to Accomplish Through the R&D Program? Pipeline Safety R&D Mission

To sponsor research and development projects focused on *providing near-term solutions* that will increase the *safety, environmental friendliness, and reliability* of the Nation's pipeline transportation system

# What are We Trying to Accomplish Through the R&D Program? Strategic Objectives

- Developing technology that supports the OPS regulatory mission;
- Focusing on near-term technology development needs and opportunities;
- Conducting an effective program of technology transfer and communication with stakeholders;
- Maximizing the return on the R&D investment by coordinating activities with other sources of R&D funding, including other federal agencies;
- Efficiently and effectively managing the R&D program.

# What are the Elements & Goals of Our Management Approach?

	<u>Management Elements</u>	<u>Management Goals</u>
1.	Effective and Efficient Program Management	Efficient and effective management of the R&D program
2.	Coordination and Collaboration with Other Stakeholders	Stakeholders role: identify technology gaps and coordinate R&D activities
3.	Communication of R&D Program Activities, Results, and Impacts	Effective communication of program activities, results, and successes
4.	Technology Transfer and Application of Results	Effective and rapid deployment of technology from the R&D program

# What are the Components of our Management Approach?

- Identification of R&D needs
- Integration with our regulatory mission
- Leveraging limited resources
- R&D project selection & procurement
- R&D project management
- Assessment of contribution (peer review)
- Technology transfer
- Measuring program effectiveness

# R&D Topical Areas: Program Elements (1/2)

- Damage prevention
- Pipeline assessment and leak detection
- Defect characterization and mitigation
- Improved design, construction and materials

# R&D Topical Areas: Program Elements (2/2)

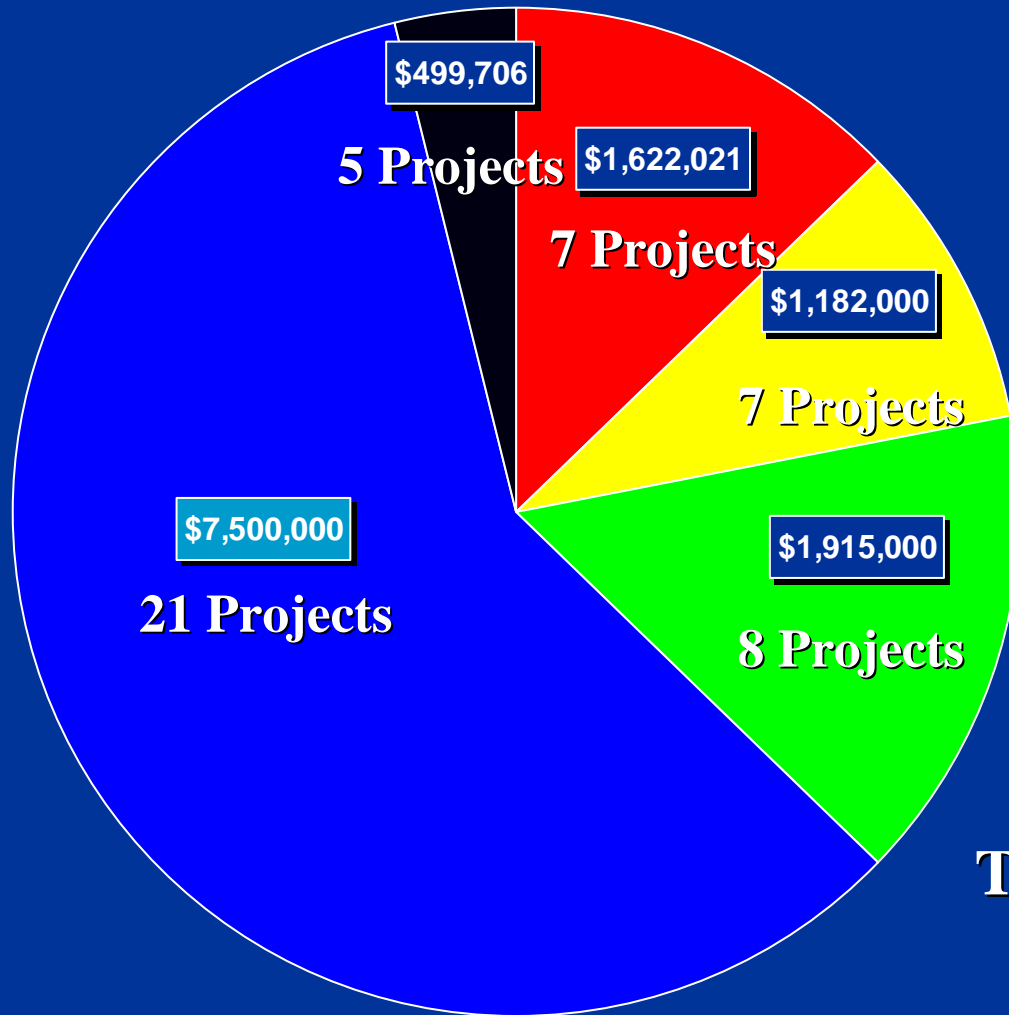
- Systems for pipeline mapping and information management
- Enhanced operation controls and human factors management
- Risk management and communication
- Safety issues for emerging technologies



# R&D Topical Areas: Program Elements & Goals

	<u>Program Elements</u>	<u>Program Element Goals</u>
1.	<b>Damage Prevention</b>	Reducing the number of incidents and accidents resulting from excavation damage and outside force
2.	<b>Pipeline Assessment &amp; Leak Detection</b>	Identifying and locating critical pipeline defects using inline inspection, direct assessment and leak detection
3.	<b>Defect Characterization and Mitigation</b>	Improving the capability to characterize the severity of defects in pipeline systems and to mitigate them before they lead to incidents or accidents
4.	<b>Improved Design, Construction, &amp; Materials</b>	Improving the integrity of pipeline facilities through enhanced materials, and techniques for design and construction
5.	<b>Systems for Pipeline Mapping and Information Management</b>	Enhancing the ability to prevent and respond to incidents and accidents through management of information related to pipeline location (mapping) and threats definition
6.	<b>Enhanced Operation Controls and Human Factors Management</b>	Improving the safety of pipeline operations through enhanced controls and human factors management
7.	<b>Risk Management &amp; Communications</b>	Reducing the probability of incidents and accidents, and mitigating the consequences of hazards to pipelines
8.	<b>Safety Issues for Emerging Technologies</b>	Identifying and assessing emerging pipeline system technologies for opportunities to enhancing their safety

# Element-Level Funding: BAAs & Small Business Innovation Research



- BAA #1 (March 2002)
- BAA #2 (June 2002)
- BAA #3 (Dec 2002)
- BAA #4 (Jan 2004)
- SBIRs (Phase I)

**Total Projects Awarded Since March 2002**

**48**

**Total OPS Funding\***

**Approx. \$12,518,727**

**Total Industry Co-Funding\***

**Approx. \$18,068,475**

\* Final award amounts from BAA #4 have not yet been determined

# Turning R&D Results into Impacts - Setting Goals

- OPS is using “*program logic modeling*” to define performance objectives for program elements and to begin the process of technology transfer.
- Components of a Program Logic Model
  - **Activities:** The projects being conducted in the R&D program
  - **Outputs:** The results anticipated at the conclusion of the projects.
  - **Customers Reached:** The stakeholders who are expected to use or benefit from the results.
  - **Short-Term Outcomes:** The beneficial effects of R&D project outputs that could occur within five years of completion of the work.
  - **Long-Term Impacts:** The longer-term consequences for the public of having conducted the R&D as related to the mission of OPS.

# Example of a Program Logic Model

- **Goal:** reduce incidents from outside force
- **Activity:** damage prevention & leak detection technology development and demonstration
- **Output:** new methods for locating pipe and detecting leaks
- **Customer reached:** pipeline operators, pipeline suppliers, suppliers of detection equipment
- **Short-term outcomes:** proof-of-concept for new technology, technology being deployed
- **Long-term impacts:** fewer incidents

# Program Driver, Collaborators, and Controls

- Pipeline Safety Improvement Act (PSIA) of 2002 (driver)
- Joint Government/Industry R&D Forum, Interagency Coordination Meetings (collaboration)
- Blue Ribbon Panel, Pipeline Safety Advisor Committees, GAO, OMB (controls)

# Defining Documentation

**Interagency  
R&D  
Five-Year  
Program Plan  
for Pipeline  
Safety and  
Integrity  
(Complete)**

**OPS R&D  
Program  
Strategic Plan  
(Final Draft)**

**OPS R&D  
Program  
Performance  
Plan  
(Final Draft)**

# R&D Program MIS: Features & Benefits

- Paperless processing:
  - BAA through project selection
  - Overall reduction in time: solicitation to award
- Tracking & accountability features:
  - Linking project activities with financial requirements
  - Notification for approaching milestones
- Rapid query functions for information requests

# OPS R&D Program Contacts

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Visit us at <http://primis.rspa.dot.gov/rd>



# **Backup Slides**

# Management Oversight Process

1. Identifying gaps and technology needs focusing on priority requirements.
2. Managing the individual projects effectively and efficiently to successful conclusion.
3. Planning and implementing specific steps for demonstrating newly-developed technologies and utilizing R&D results.
4. Coordinating activities with other federal or state agencies and industry organizations with guidance from stakeholder groups.
5. Widely communicating and disseminating the results of the R&D program.
6. Using expertise and tools of analysis to identify technology opportunities and synergies between programs.

# Topics Covered in Defining Documentation

- Program Elements
- Program Goals
- Program Logic Models
- Performance Measures
- Peer Review Role & Approach
- Management Oversight Approach
- Approach: Collaboration, Coordination, Co-Fund
- R&D Results Dissemination
- Technology Demonstration & Transfer

# Peer Review of Projects

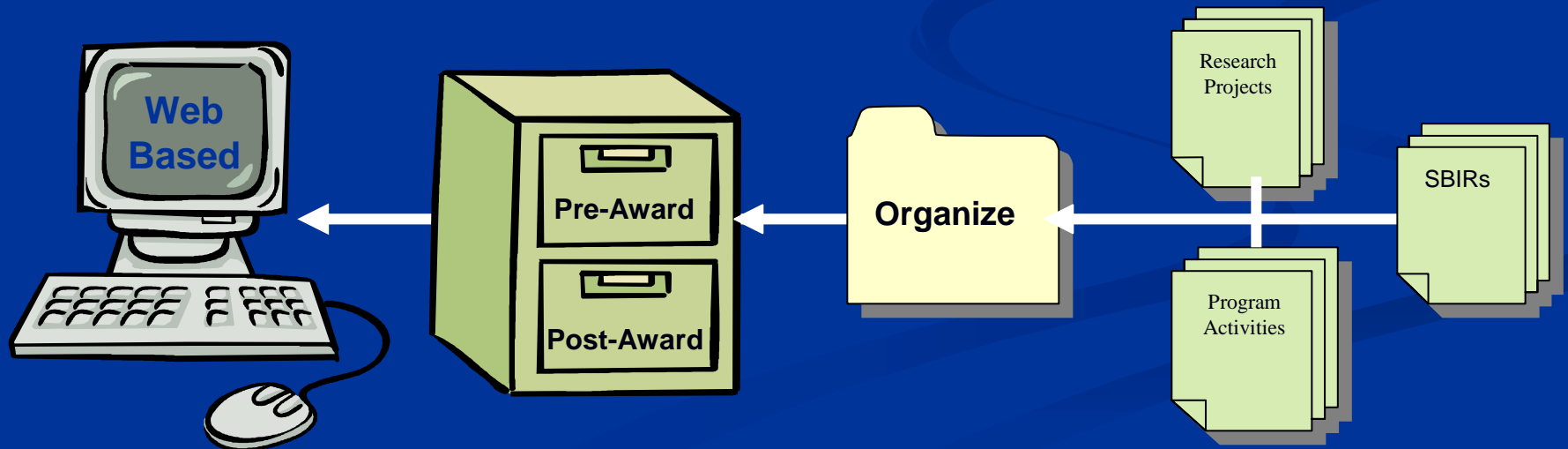
- Relevance of projects to the pipeline safety mission
- Soundness of the technical approach and design of the project
- Effectiveness and efficiency of project management
- Appropriateness of the plan for technology transfer
- Coordination of the project with related efforts
- Quality of the results

# R&D Program Efficiency Measures

1. Percent of OPS R&D projects satisfying project performance objectives
2. Ratio of OPS R&D funding to number of OPS R&D staff participation (FTE)
3. Fraction of OPS R&D funding to total R&D funding on OPS projects
4. Percent of R&D projects competitively funded
5. Percent of OPS R&D funding that is one year or less in duration
6. Percent of OPS R&D funding that is one to two years in duration
7. Percent of OPS R&D funding that is greater than two years in duration

# Office of Pipeline Safety Research & Development Program's

## Management & Information System (MIS)



# Management Information System (MIS)

OPN Research and Development: DTRS56-04-BAA-0002 - Microsoft Internet Explorer

OPN Research and Development

DTRS56-04-BAA-0002

Welcome to the online research solicitation submission system for the Department of Transportation's Office of Pipeline Safety

Pipeline Safety Research and Development -- Damage Prevention; Leak Detection; Enhanced Pipeline Operations, Controls, and Monitoring; Improved Materials Performance, and Other Safety Improvements

**SPECIAL NOTE:** This announcement will be open for white paper submission through **March 3, 2006** or unless otherwise awarded. The announcement is purely paperless and requires registration before the submission of your white paper. You will then receive a user ID and password via email to a private and secure location for uploading your white paper. The period for registration expires on **February 27, 2006** or 5 working days prior to and of this announcement.

The purpose of the BAA is to select research projects to assure the long-term integrity and security of the nation's gas and hazardous liquid pipeline network. A team of experts will review white papers submitted in response to this announcement and offers will be advised of the outcome and anticipated follow-up from this review as it is completed.

More information is available below:

[Register for DTRS56-04-BAA-0002](#) [Q & A](#)

All inquiries concerning the announcement shall be directed to the OPN Office of Contracts and Procurement, ATTN: Mr. William D. Osterberg, Contracting Officer, Telephone: (202) 365-6342; email: [william.osterberg@dot.gov](mailto:william.osterberg@dot.gov)

For questions or problems with the Registration or Application of the Web Site, please email Randy Pearson at [randy.pearson@dot.gov](mailto:randy.pearson@dot.gov)

Announcement Details  
DTRS56-04-BAA-0002  
U.S. Department of Transportation, Research and Basic Program Administration, Office of Contracts and Procurement

OPN Research and Development: Registration Page - Microsoft Internet Explorer

OPN Research and Development

Registration Page

Entity Form

Organization/Entity Name

Address/Street of Organization/Entity

Entity Type

For Profit  
 Educational/University  
 Other Non-Profit  
 Government - Federal  
 Government - State  
 Government - Local

Homeing Address

Small Business? (as defined by SBA)  Yes  No  
 New Firm? (as defined by SBA)  Yes  No  
 DUNS# (Federal Ac. ID#)

Summary of Types of Research Performed: For information only. This does not constrain what white papers you can take action on.

Principal Contact Data

Last Name:  First Name:   
 Job Title:

OPN Research and Development: White Paper Review - Microsoft Internet Explorer

Recuse Yourself for this White Paper

No.	Review Criteria	Score	Strengths	Weaknesses
1.	Officer's understanding, and description, of the "state of the art" in the research area the officer is preparing to address.	Score: <input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5 1 = Unacceptable, 5 = Excellent	<input type="text"/>	<input type="text"/>
2.	The scientific and technical merit of the proposal to advance pipeline safety.	Score: <input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5 1 = Unacceptable, 5 = Excellent	<input type="text"/>	<input type="text"/>
3.	The adequacy and feasibility of the technical approach and realism of cost estimate.	Score: <input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5 1 = Unacceptable, 5 = Excellent	<input type="text"/>	<input type="text"/>
4.	Technical experience and capabilities of the officer in federal research program.	Score: <input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5 1 = Unacceptable, 5 = Excellent	<input type="text"/>	<input type="text"/>
5.	Time line to implement the proposed technologies and concepts into practice in the pipeline industry (one to three years preferable).	Score: <input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5 1 = Unacceptable, 5 = Excellent	<input type="text"/>	<input type="text"/>
Overall Comments:		Total Score:		<input type="text"/>

OPN Research and Development: My Reviews for DTRS56-04-BAA-0002 - Microsoft Internet Explorer

OPN Research and Development: Robert Smith

My Reviews for DTRS56-04-BAA-0002

Message DTRS56-04-BAA-0002 (URL for DTRS56-04-BAA-0002) (Information for Reviewed) (Manage BAA) (White Papers) (BAA PDF) (Open Submissions) (Research Tables)

White Paper Reviews by Robert Smith, sorted by: My Score (Sorted By Focus Area)

NO.	Title	Project Title	Co-PI/PIs (Contractor) Name	White Paper File	Score
1.	<a href="#">WPR05</a>	General Electric Global Research	Third Party Damage: High Probability Area Identification	<a href="#">[View/Download...]</a> 96,473 byte (PDF)	22
2.	<a href="#">WPR01</a>	General Electric Global Research	Third Party Damage: Field Prototype and Demonstration	<a href="#">[View/Download...]</a> 113,277 byte (PDF)	21
3.	<a href="#">WPR04</a>	Engineering Mechanics Cooperative of Colorado	Failure Analysis: Role of Pipe with High Charge Transition Temperature	<a href="#">[View/Download...]</a> 235,363 byte (PDF)	20
4.	<a href="#">WPR20</a>	C-PEC Technologies	EFFECTIVENESS OF PREVENTION METHODS FOR OCCUPATION DAMAGE	<a href="#">[View/Download...]</a> 141,251 byte (PDF)	18
5.	<a href="#">WPR17</a>	Center for Underground Infrastructure Research & Education, Michigan State University	Investigation on New Technologies, Professional and Educational Requirements for Damage Prevention during Horizontal Directional Drilling	<a href="#">[View/Download...]</a> 998,532 byte (DOC)	18
6.	<a href="#">WPR10</a>	Eastman Kodak Company	RF Metrics for Adoption of SAM Detection Technology	<a href="#">[View/Download...]</a> 47,638 byte (DOC)	18
7.	<a href="#">WPR15</a>	Integrity Supply & Training	The Mutual Influence Bridge for Pipeline Inspection - Enhanced Pipeline Inspection Technologies & Risk Assessment	<a href="#">[View/Download...]</a> 571,744 byte (DOC)	17



# OPS R&D Website

<http://primis.rspa.dot.gov/rd>

RD Home Page - Microsoft Internet Explorer

Address: <http://primis.rspa.dot.gov/rd>

## Research & Development

U.S. Department of Transportation

**R&D Home**

Welcome to OPS's pipeline safety Research and Development website. This site is dedicated to the collaboration and dissemination of Research and Development information related to Pipeline Safety.

OPS conducts and supports research to support regulatory and enforcement activities and to provide the technical and analytical foundation necessary for planning, evaluating, and improving the pipeline safety program. OPS is sponsoring research and development projects focused on providing near-term solutions that will increase the safety, clearness, and reliability of the Nation's pipeline system.

Recent R&D projects are focused on: leak detection; detection of mechanical damage; damage prevention; improved pipeline system controls, monitoring, and operations; and improvements in pipeline materials. These projects are addressing technological solutions that can quickly be implemented to improve pipeline safety.

In 2003, a study by the General Accounting Office (GAO) found that OPS's R&D program is aligned with OPS's mission and pipeline safety goals.



U.S. Department of Transportation - Research and Development Program Administration - Office of Pipeline Safety

<http://primis.rspa.dot.gov/rd/rd001.htm>

Project Map - Microsoft Internet Explorer

Address: <http://primis.rspa.dot.gov/rd/rd001.htm>

## Recent R&D Projects Map

U.S. Department of Transportation

The symbols on the following map indicate the locations of research firms conducting projects for the Office of Pipeline Safety. Click these symbols to display further project information.



Legend:
 

- Leak Detection
- Damage Prevention
- Material Science
- Control Systems
- Operations
- Other

U.S. Department of Transportation - Office of Pipeline Safety (100000)

RD001

OPS Research and Development - Microsoft Internet Explorer

Address: <http://primis.rspa.dot.gov/rd/rd001.htm>

## Query by Category

Pipeline Type/Location	Risk Analysis Methods	Pipeline Condition/Pipeline Activities
<ul style="list-style-type: none"> <li>Onshore Transmission Pipeline                             <ul style="list-style-type: none"> <li>Gas Pipeline</li> <li>Liquid Pipeline</li> </ul> </li> <li>Arctic</li> <li>Offshore</li> <li>Liquefied Natural Gas/LNG</li> <li>Marine Gas Distribution</li> <li>Storage</li> <li>Other Pipeline Types                             <ul style="list-style-type: none"> <li>CO<sub>2</sub></li> <li>Drainage</li> <li>Marine</li> <li>Hydrogen</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Fracture Analysis</li> <li>Damage Consequence Assessment</li> <li>Consequence Analysis</li> <li>Risk Assessment</li> <li>Incident/Event Cause Analysis</li> </ul>	<ul style="list-style-type: none"> <li>Pipeline Condition                             <ul style="list-style-type: none"> <li>Internal Corrosion</li> <li>External Corrosion</li> <li>Stress Corrosion Cracking</li> <li>Manufacturing Defects</li> <li>Installation Defects</li> <li>Regimes</li> <li>Outside Force Damage</li> </ul> </li> </ul>
	<b>Regulatory Issues</b> <ul style="list-style-type: none"> <li>Damage Prevention</li> <li>Public Safety</li> <li>Pipeline Design/Construction</li> <li>Pipeline Mapping/Location</li> <li>Emergency Response</li> <li>Incident Reporting</li> <li>Data Quality</li> <li>Right-of-Way</li> </ul>	<ul style="list-style-type: none"> <li>Cathodic Protection</li> <li>Equipment Failure</li> <li>Pipeline Maintenance</li> <li>Pipeline Hydrates</li> <li>Pipes/Rehabilitation</li> <li>Generator Sites</li> <li>Excavation Techniques</li> </ul>
<b>Inspection and Assessment Technologies</b> <ul style="list-style-type: none"> <li>Leak Detection</li> <li>Automated Monitoring</li> <li>In-Line Inspection/Logging</li> <li>Hydrostatic Testing</li> <li>Direct Assessment</li> <li>Emerging Technology</li> <li>Non-destructive Testing/Evaluation</li> <li>Remote Sensing</li> </ul>		<b>Processes/Tools</b> <ul style="list-style-type: none"> <li>Quality Assurance</li> <li>Change Management</li> <li>Integrity Management</li> <li>LELAs</li> <li>Computer-Aided Tools</li> <li>Performance Measures</li> <li>One-call Systems</li> <li>Types of Study                             <ul style="list-style-type: none"> <li>Literature Review</li> <li>Study Project</li> <li>International Comparisons</li> </ul> </li> <li>Types of Project                             <ul style="list-style-type: none"> <li>Systems Development</li> </ul> </li> </ul>

OPS Research and Development - Microsoft Internet Explorer

Address: <http://primis.rspa.dot.gov/rd/rd001.htm>

## OPS Research and Development

### Baseline Study of Alternative In-Line Inspection Vehicles

U.S. Department of Transportation

**Project Categories**

- In-Line Inspection/Logging
- External Corrosion
- Internal Corrosion
- International Comparisons

**Project Description**

The purpose of this research is to conduct a baseline study of alternative ILI vehicles that might be able to separate ungrapple pipelines. The researchers will: (1) document the status of ungrapple pipelines and mitigation options; (2) document design of ILI devices being used in other industries; (3) identify options to inspect transmission and distribution lines; (4) document current ILI systems in the U.S. and abroad; and (5) determine minimal tool capability in other related industries (nuclear, water, plant protection).

**Cost**

- Total Project Proposal \$80,000.00

**Status History**

Project initiated in October 2002. Project duration of 9 months. Third-quarter 2003 status report posted. 9/20/03. Final Report and Close-out Presentation posted November 2003.

**Attachments**

- Report: ILI\_1st\_0719\_01\_LawTS\_Public.pdf (177,049 bytes)
- Report: ILI\_2nd\_07\_01\_MayTS\_Public.pdf (33,900 bytes)
- Third-quarter 2003 status report from Southwest Research Institute: Report: ILI\_3rd\_07\_01\_200302\_Public.pdf (11,306 bytes)
- Report: ILI\_Download\_Oct19\_2003\_Public.pdf (2,936,294 bytes)

Fast Facts	
Research Entity:	Southwest Research Institute
COPIA:	Arade Van Nguyen
Contract #:	DTES99-CE-T-0084
OPS Library No.:	Unknown
Contact Info:	Mr. Janice Jackson 6220 Outback Road San Antonio, Texas 78249 Email: <a href="mailto:annj@swri.org">annj@swri.org</a> <a href="http://www.swri.org">http://www.swri.org</a>
Collaborators:	El Paso Pipeline Company Pipeline Research Council International, Inc. (IRCI)
<b>Financial Data</b>	
Study Order:	Current
Cost Year Started:	2002
End Year:	2003
Budget Allocation Type:	Unknown
Published by:	OPS
Co-Funders:	Co-Funded by El Paso Pipeline Company and IRCI for \$40,000