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## RD&T Program Overview 2007

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# RD&T Program Overview

Pipeline and Hazardous Materials Safety Administration



PHMSA FY2007 RD&T Program Review Meeting  
May 23, 2007

# PHMSA Mission

Has public responsibility for safe and secure movement of hazardous materials to industry and consumers by all transportation modes, including highway, rail, air, water, and the nation's pipelines.

# PHMSA Supports DOT Goals

<b>DOT Strategic Goal</b>	<b>Pipeline</b>	<b>HAZMAT</b>
Safety	X	X
Reduced Congestion	<i>Indirect</i>	X
Global Connectivity		X
Environmental Stewardship	X	X
Security	<i>Indirect</i>	X
Organizational Excellence		

# RD&T Overview

## **Pipeline Safety RD&T Program Mission:**

To sponsor research and development projects focused on providing near-term solutions that will improve the safety, reduce environmental impact, and enhance the reliability of the Nation's pipeline transportation system.

## **Hazardous Materials Safety RD&T Program Mission:**

To conduct technical and analytical studies, evaluations, and testing that provide the foundation for hazardous materials transportation regulations, enforcement, and emergency response.

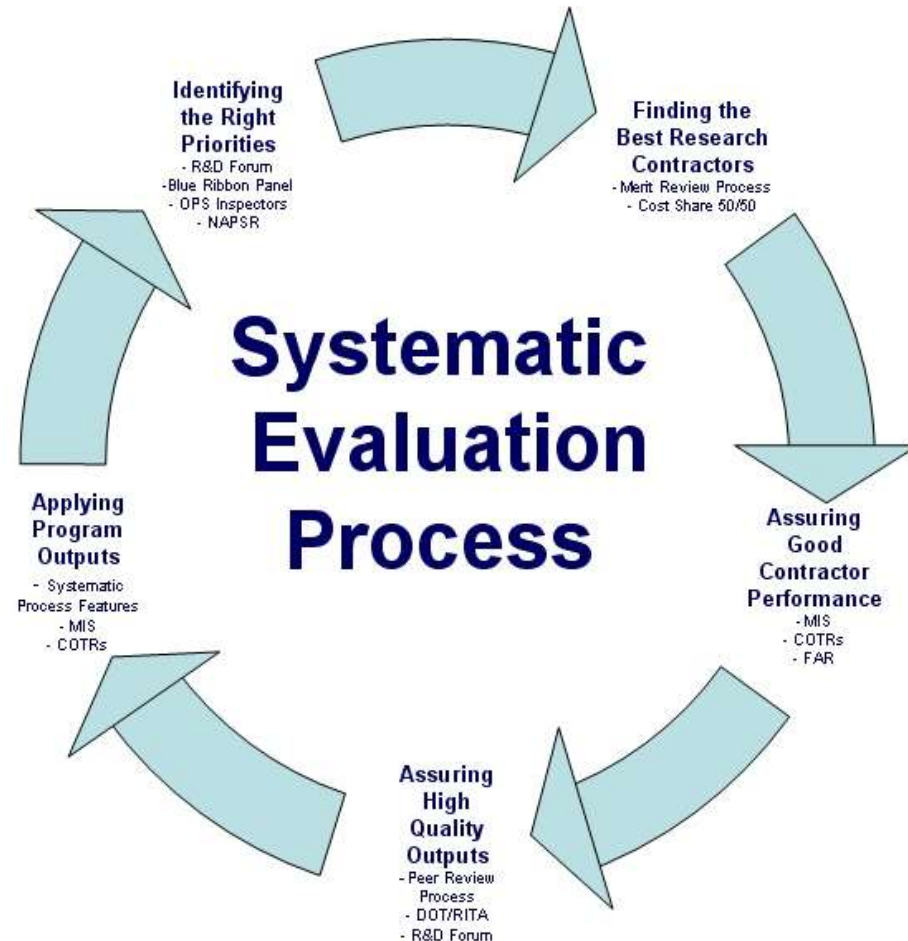
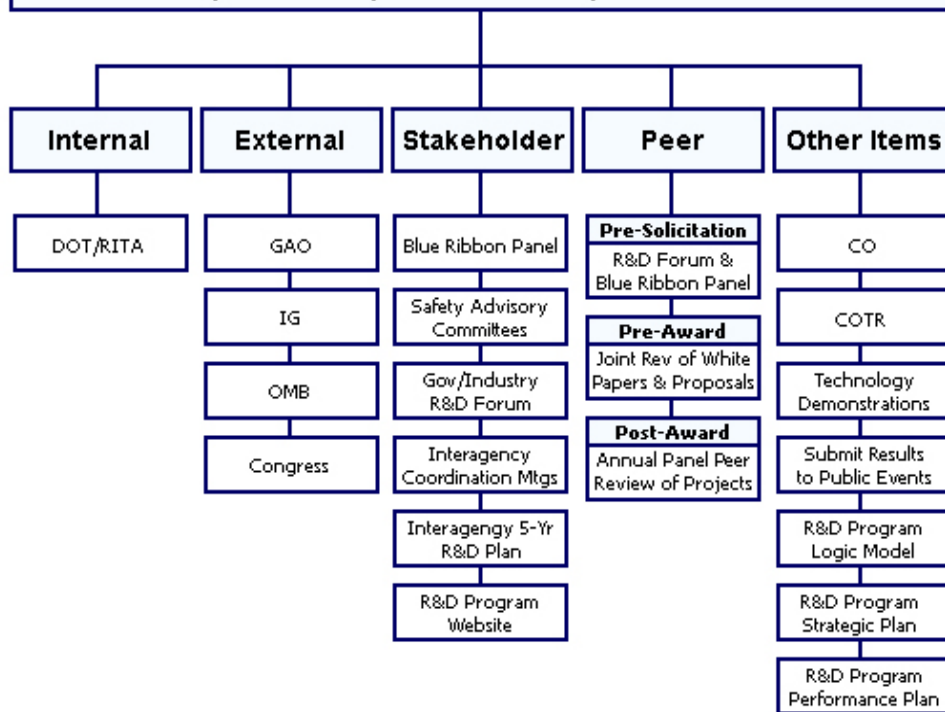
# PHMSA RD&T Program Appropriations

<b>Budget Category</b>	<b>FY-2007 Thousands of Dollars (CR - Enacted)</b>	<b>FY-2008 Thousands of Dollars (Proposed)</b>
Damage Prevention & Leak Detection	\$3,794	\$1,105
Enhanced Operations & Controls	\$1,931	\$734
Improved Materials Performance	\$2,133	\$649
Mapping & Information Systems	\$1,235	\$1,262
<b><i>Pipeline Safety Totals:</i></b>	<b>\$9,093</b>	<b>\$3,750</b>
Research and Analysis	\$638	\$262
Research and Development	\$1,829	\$1,761
Cooperative Research (Hwy Trust Fund)	\$968	\$915
<b><i>HAZMAT Safety Totals:</i></b>	<b>\$3,435</b>	<b>\$2,938</b>
<b>PHMSA Totals:</b>	<b>\$12,528</b>	<b>\$6,688</b>

# Pipeline Safety RD&T

# 1. External Stakeholder Involvement In Developing Research Agendas

## PHMSA Pipeline Safety R&D Program Internal, External, Stakeholder, & Peer Reviews





# 1. External Stakeholder Involvement

## *“Elements of Implementation”*



**Transparent & consistent process for involving external stakeholders in the development of program agendas and priorities...**

*Yes, steps 1 & 2 of this process identify the right priorities and find the best researchers with complete stakeholder collaboration.*

# 1. External Stakeholder Involvement

## “Elements of Implementation”

The image shows two side-by-side screenshots of the PHMSA website. The left screenshot is titled "R&D Workshops, Forums, & Briefings" and lists various events. The right screenshot is titled "Pipeline R&D Forum - February 2007" and provides details about the event. A red arrow points from the "New" section of the left page to the "Pipeline R&D Forum" page. A red box highlights a link in the right page that says "Click here to view the 2007 Government and Industry Pipeline R&D Forum Report" and "Click here to view the Feedback results". A red arrow points from this box to the "Workshop, February 7, 2007" section of the right page.

**R&D Workshops, Forums, & Briefings**

In establishing R&D policy and in developing a national pipeline research agenda, PHMSA systematically seeks out information and informal opinion using a spectrum of public events such as workshops, forums and public meetings. These public events bring together representatives from federal, state, and foreign governments along with domestic and foreign operators of natural gas and hazardous liquid pipeline systems and the trade organizations that represent them. At these events information and opinions are shared to help clarify key challenges facing industry and government, to share information on current research efforts, and to identify new research that has the potential to meet present and future challenges.

**Workshops:**

- Mechanical Leakage Technical Workshop - February 29-March 1, 2006
- Advanced Welding & Joining Technical Workshop - January 25-26, 2006
- Advanced Coating R&D for Pipelines and Related Facilities - June 9-10, 2005
- International Workshop on Advanced Research and Development of Coating - April 14-15, 2004
- Stress Corrosion Cracking (SCC) Workshop - December 2, 2003
- Direct Assessment Workshop - November 4, 2003
- International Offshore Pipeline Workshop 2003 - February 25-29, 2003
- Workshop on Marine and On- Shore Factor Disciplines - April 8-11, 2002
- R&D Workshop - November 27, 2001

**Forums:**

**New:**

- Pipeline R&D Forum - February 7-8, 2007
- Pipeline R&D Forum - March 22-24, 2005
- Pipeline R&D Forum - December 11-12, 2003

**Briefings:**

- IS& Briefing - April 29-25, 2002

**Pipeline R&D Forum - February 2007**

The Government/Industry Pipeline R&D Forum was held in New Orleans, Louisiana (on February 7-8, 2007). The 2 day event included approximately 200 representatives from Federal, State and international government agencies, public representatives, research funding organizations, standards organizations, and pipeline operators from the U.S. and overseas. Forum documents are available below. If your connection is slow, try downloading the file by right clicking on the link) before opening.

The forum brought government and industry pipeline stakeholders together for the following purpose(s):

1. To develop a consensus agenda of technical gaps & challenges for future R&D;
2. To identify both short and long term research objectives for pipeline transmission and gas distribution pipelines;
3. Conduct basic road mapping on identified technical gaps so solicited research is addressing the need effectively; and
4. Provide details of the ultimate research gaps so appropriate and users are factored into project scopes.

Click here to view the 2007 Government and Industry Pipeline R&D Forum Report  
Click here to view the Feedback results

**Workshop, February 7, 2007**

**Welcome / Opening Remarks:**

Forum Moderator: Jeff Wason  
Vice President, Administrator for Pipeline Safety, DOT/PHMSA

**Remarks on Energy Pipeline:**

Speaker: Vice Admiral Thomas J. Barrett, USCGC Ret.  
Administrator, DOT/PHMSA

**Process for responding to stakeholder recommendations...**

*Yes, all public events are run by steering committee, integrate consensus comments, post reports, presentations and proceedings and survey feedback from attendees.*

# 1. External Stakeholder Involvement

## “Indicators of Implementation”

**Yes**

**Yes**

**Yes**

**Yes**

Public announcement of upcoming reviews/events.

Posting proceedings, recommendations & reports.

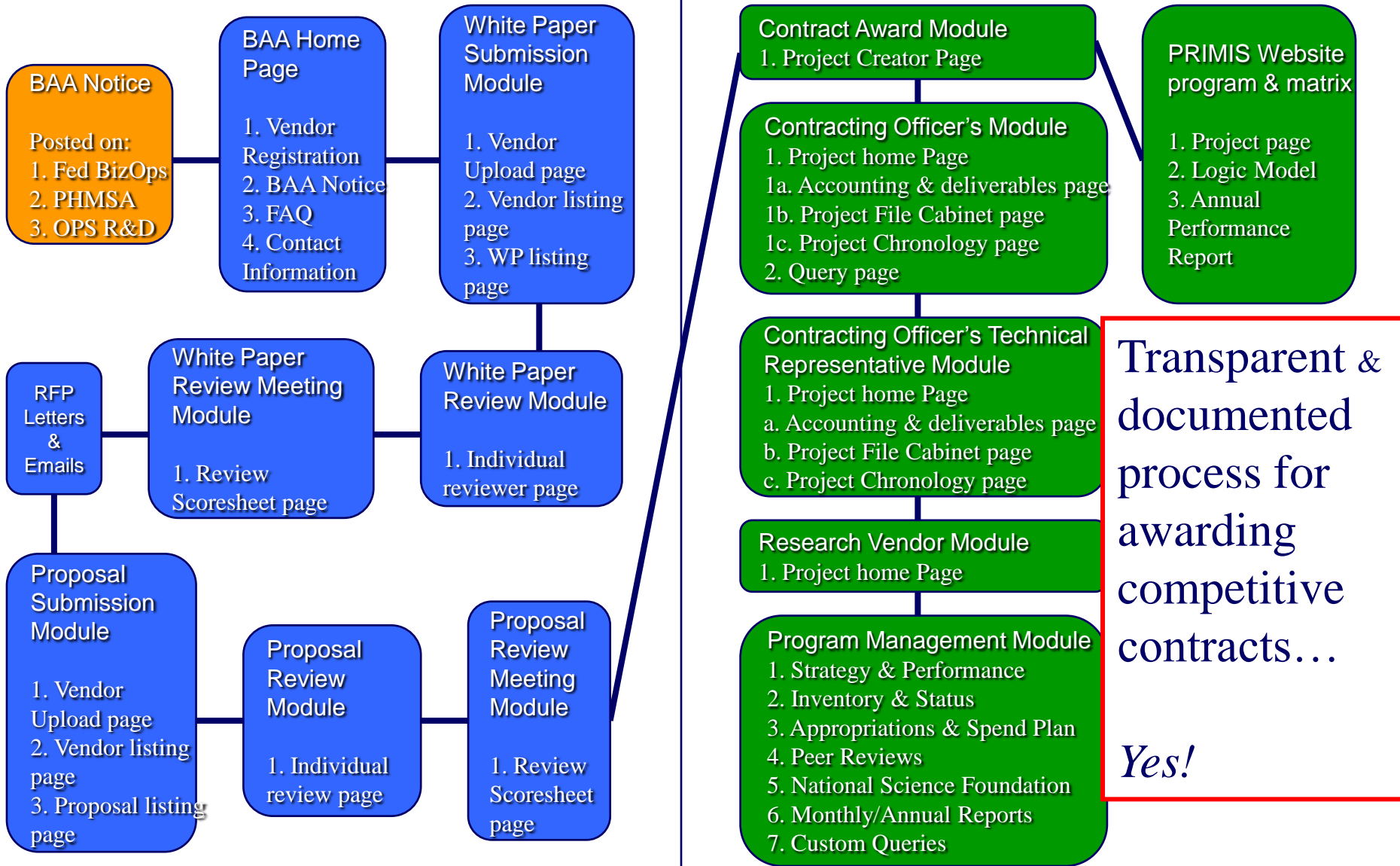
Posting OA's response to stakeholder recommendations.

# 2. Merit Review of Proposals

## *“Elements of Implementation”*

### Pre-Award

### Post-Award





# 2. Merit Review of Proposals

## “Indicators of Implementation”

The screenshot displays the PHMSA Research and Development program review interface. The interface is divided into several panes. On the left, there is a 'DTPH56-07-BAA-00001 - Welding and Joining Solicitation' pane with a detailed description of the program. In the center, a 'Review of Proposal 59 (WP #272) by Chris McCowan' pane shows a checklist of review criteria with checkboxes and scores. On the right, a 'Proposal Scorecard for DTPH56-07-BAA-00001 - Welding and Joining Solicitation' pane displays a table of proposals with columns for proposal number, title, proposer name, and various scores. A red arrow points from the 'Review of Proposal' pane to the 'Proposal Scorecard' pane. Another red arrow points from the 'Review of Proposal' pane to the 'Improving Weld Design in High Strength Steel Pipe' section of the solicitation document on the left.

**Public announcement of contracts on FedBizOpps.gov...**

*Yes, PHMSA Procurement posts solicitations on FedBizOpps.gov. We insert web link in public announcement, sending submissions to automated paperless system.*



# 3. Independent Evaluation of Research

## *“Elements & Indicators of Implementation”*

**Annual Panel Peer Review of PHSMA Pipeline Safety Research Projects**

**Listing of Annual Peer Reviews**

No.	Date	Peer Reviewer	Comments	Project Status	Priority	Impact	Relevance	Timeliness	Quality	Cost
1	February 7-9, 2008	Paul J. O'Neil	Yes	01	01	0	0	0	0	0
2	March 27-30, 2007	Paul J. O'Neil	Yes							

**Peer Review Report, February 7-9, 2008, Washington, DC**

**Program Averages - Review Categories and Sub-Criteria**

Category	Score	Rating
1. Is the project relevant to the mission of the member's office of pipeline safety?	4.00	Very Effective
1.1. Does the project have the potential for enhancing pipeline safety or protecting the environment?	4.00	Very Effective
1.2. Does the project support regulatory, standards development, safety activities, or pipeline demonstration?	4.00	Very Effective
1.3. Does the project address a technology gap or address an existing or potential technology?	4.00	Very Effective
2. Is the project well designed?	4.00	Very Effective
2.1. Was the project well defined and planned?	4.00	Very Effective
2.2. Is the project well managed?	4.00	Very Effective
2.3. Is the project well documented and well written?	4.00	Very Effective
2.4. Is the project well organized and well planned?	4.00	Very Effective
2.5. Is the project well organized and well planned?	4.00	Very Effective
2.6. Is the project well organized and well planned?	4.00	Very Effective
2.7. Is the project well organized and well planned?	4.00	Very Effective
2.8. Is the project well organized and well planned?	4.00	Very Effective
2.9. Is the project well organized and well planned?	4.00	Very Effective
2.10. Is the project well organized and well planned?	4.00	Very Effective
3. When is the approach taken in technology transfer?	4.00	Very Effective
3.1. Is there a plan for dissemination of results, including publications, reports, and posters?	4.00	Very Effective
3.2. Has a plan been developed for the application of the results to the field?	4.00	Very Effective
3.3. Have efforts been made to promote the application of the results to the field?	4.00	Very Effective
3.4. Have efforts been made to promote the application of the results to the field?	4.00	Very Effective
3.5. Have efforts been made to promote the application of the results to the field?	4.00	Very Effective
3.6. Have efforts been made to promote the application of the results to the field?	4.00	Very Effective
3.7. Have efforts been made to promote the application of the results to the field?	4.00	Very Effective
3.8. Have efforts been made to promote the application of the results to the field?	4.00	Very Effective
3.9. Have efforts been made to promote the application of the results to the field?	4.00	Very Effective
3.10. Have efforts been made to promote the application of the results to the field?	4.00	Very Effective
4. Is the project well coordinated with other related projects?	4.00	Very Effective
4.1. Does the project have an up-to-date work plan?	4.00	Very Effective
4.2. Are the project's activities coordinated with other related projects?	4.00	Very Effective
4.3. Are the project's activities coordinated with other related projects?	4.00	Very Effective
4.4. Are the project's activities coordinated with other related projects?	4.00	Very Effective
4.5. Are the project's activities coordinated with other related projects?	4.00	Very Effective
4.6. Are the project's activities coordinated with other related projects?	4.00	Very Effective
4.7. Are the project's activities coordinated with other related projects?	4.00	Very Effective
4.8. Are the project's activities coordinated with other related projects?	4.00	Very Effective
4.9. Are the project's activities coordinated with other related projects?	4.00	Very Effective
4.10. Are the project's activities coordinated with other related projects?	4.00	Very Effective
5. Is the project's quality high quality?	4.00	Very Effective
5.1. Are the technical results quality of the work performed during the project?	4.00	Very Effective
5.2. Are the technical results quality of the work performed during the project?	4.00	Very Effective
5.3. Are the technical results quality of the work performed during the project?	4.00	Very Effective
5.4. Are the technical results quality of the work performed during the project?	4.00	Very Effective
5.5. Are the technical results quality of the work performed during the project?	4.00	Very Effective
5.6. Are the technical results quality of the work performed during the project?	4.00	Very Effective
5.7. Are the technical results quality of the work performed during the project?	4.00	Very Effective
5.8. Are the technical results quality of the work performed during the project?	4.00	Very Effective
5.9. Are the technical results quality of the work performed during the project?	4.00	Very Effective
5.10. Are the technical results quality of the work performed during the project?	4.00	Very Effective
Average Category Score and Rating	4.00	Very Effective

**Adherence to OMB guidelines... Yes**

**Systematic/independent/expert review process... Yes**

**Process to use results for future decisions..**

*Yes, formal contract modifications, closure for convenience and further expert review*

# 4. Performance Measurement

## *“Elements of Implementation”*

**Single or multi-year objectives (outcome measures)...**  
*No, a different approach utilized*

### Pipeline Safety Elements & Possible Products

	<u>Program Elements</u>	<u>Possible Products &lt; 5 years</u>
1.	Damage Prevention	<ul style="list-style-type: none"> <li>• Subsurface mapping technology</li> <li>• Pipe detection technology for HDD</li> <li>• ROW monitoring technology</li> </ul>
2.	Pipeline Assessment and Leak Detection	<ul style="list-style-type: none"> <li>• Expanded use of Direct Assessment</li> <li>• New &amp; more powerful inspection technology</li> <li>• Robotic inspection platforms</li> </ul>
3.	Defect Characterization and Mitigation	<ul style="list-style-type: none"> <li>• New models to characterize damage</li> <li>• New protocols to streamline repairs</li> </ul>
4.	Improved Design, Construction, and Materials	<ul style="list-style-type: none"> <li>• Strain based design standards</li> <li>• New construction methods</li> <li>• Better pipeline coating</li> <li>• Expanded use of composites</li> </ul>
5.	Systems for Pipeline Mapping and Information Management	<ul style="list-style-type: none"> <li>• Aerial mapping systems</li> <li>• GPS integration into aerial mapping</li> </ul>
6.	Enhanced Operation Controls and Human Factors Management	<ul style="list-style-type: none"> <li>• New human factor protocols for pipeline monitoring and control operations</li> </ul>
7.	Risk Management & Communications	<ul style="list-style-type: none"> <li>• New models to assess risk</li> <li>• Improved knowledge for first responders</li> </ul>
8.	Safety Issues for Emerging Technologies	<ul style="list-style-type: none"> <li>• New knowledge of hydrogen economy impacts</li> <li>• New knowledge of LNG safety</li> </ul>

# 4. Performance Measurement

## *“Elements of Implementation”*

**Measurable annual milestones (outputs)...**

*Yes, reportable retrospectively and for future*

### **Technology:**

- Projects addressing (status/funding & links to public project page)
- Demonstrated (yes or no with link to public report)
- Commercialized (yes or no with company name and contact)

### **Consensus Standards:**

- Projects addressing (status/funding & links to public project page)
- Standard Developing Organization (SDO) Name
- Consensus Standard Name and Number
- Used in whole or in part (yes or no with pdf letter documenting from SDO)

### **Promoting Knowledge:**

- Projects addressing (status/funding & links to public project page)
- Number of U.S. Patents filings
- Number of submitted Conference Papers/Journal Articles
- Number of Public Events Stakeholders Reached
- Number of Website Hits/Visits



# 4. Performance Measurement

## *“Indicators of Implementation”*

**Documentation of outcome measures in performance plans/reports...**

*RD&T Performance report in final draft and to be posted on Website <http://primis.phmsa.dot.gov/rd/performance.htm>*

**Documentation of annual output measures in performance plans/reports...**

*Via the website, 3 sets of interactive program objective tables will provide real-time and or annual*

# 5. RD&T Coordination

## *“Elements of Implementation”*

DOT – Safety & Environment Goals

Goals Address Mission	<b>Pipeline Safety R&amp;D Mission</b>	To sponsor research and development projects focused on providing near-term solutions that will improve the safety, reduce environmental impact, and enhance the reliability of the Nation’s pipeline transportation system.					
	<b>Research Program Goals</b>	<p>“To drive improvements in”</p> <ul style="list-style-type: none"> <li>• Pipeline Damage Prevention and Leak Detection</li> <li>• Pipeline Operations, Controls, and Monitoring</li> <li>• Material Performance and Other Pipeline Safety Improvements</li> </ul>					
Objectives Drive Goals	<b>Research Program Objectives</b>	Fostering Development of New Technologies		Strengthening Regulatory Requirements and Consensus Standards		Promoting Knowledge for Decision Makers	
		<b>Desired Impact Performance Measures</b>	Number of projects contributing to objectives	54	Number of projects contributing to new or revised industry standards	52	Number of projects contributing to objectives
Impacts Support Objectives	<b>Desired Impact Performance Measures</b>	Number of projects demonstrating new technologies	27	Number of projects addressing PHMSA regulations	48	Number of final reports publicly available	23
		Number of projects filing for U.S. Patents	11	Number of projects addressing NTSB Recommendations	5	Number of conference papers presented	25
		<b>Process Features</b>	Categorizing projects for mission relevance		Categorizing projects for mission relevance		Categorizing projects for mission relevance
Processes Underpin Impacts	<b>Process Features</b>	Technology transfer process		Consensus standard integration process		Peer review process for qualifying output quality	
		Peer review process for qualifying output quality		PHMSA regulatory program integration process		Monitoring projects for contractual performance	
		Monitoring projects for contractual performance		Peer review process for qualifying output quality		Contractual requirement for submitting conference papers	
		Contractual requirement to notify PHMSA of U.S. patent		Monitoring projects for contractual performance			

# 5. RD&T Coordination

## “Elements of Implementation”

### Consistency with RD&T strategies identified in the DOT Strategic & RD&T Plan.

Yes

DOT Goals	RD&T Strategies
<p><b>Safety</b> Enhance public health and safety by working toward the elimination of transportation-related deaths and injuries</p>	<ul style="list-style-type: none"> <li>•Conduct and support research to understand and address the causal factors and risks in accidents and to anticipate future safety risks in all transportation modes</li> <li>•Conduct and support research to determine the most effective ways of mitigating the consequences of transportation accidents and incidents in all modes</li> <li>•Support safety rulemaking by assessing the potential safety impacts of new transportation technologies, vehicles, concepts, designs, and procedures</li> </ul>
<p><b>Environmental Stewardship</b> Promote transportation solutions that enhance communities and protect the natural and built environment</p>	<ul style="list-style-type: none"> <li>•Conduct and support research to understand the various impacts of transportation activities on the natural and built environment and communities and to advance technologies and concepts to mitigate those impacts</li> <li>•Conduct and support research on ways to improve the environmental review process to achieve the timely delivery of transportation projects</li> </ul>

### Coordination with relevant OA’s agencies and partners.

Yes, Full participation with RITA and one on one communication with relevant OAs when issues arise. Pipeline Safety Improvement Act of 2002 mandated interagency coordination with DOC/NIST and DOE/NETL. DOI/MMS also incorporated and interagency coordination meetings held quarterly.

# 5. RD&T Coordination

## *“Indicators of Implementation”*

### **Identification of the RD&T strategies supported**

*Yes, Safety 1.1 & 1.2 and Environment 1.1, Participation with RITA & OST data calls to procurement offices*

### **Documentation of coordination efforts in program budgets, plans, reports, or briefings**

*Yes, EXHIBIT V-2, RD&T Budget Request, EXHIBIT V-3, Support for Secretarial and Administration RD&T Priorities, EXHIBIT V-3, Adherence to OMB R&D Investment Criteria. Program website documents all federal/state/local/foreign coordination and posts all PSIA 2002 reports to Congress (FY 2002-2008).*

# Hazardous Materials Safety RD&T

# Hazmat Elements & Possible Products

	<u>Program Elements</u>	<u>Possible Products &lt; 5 years</u>
1.	Emergency Response	<ul style="list-style-type: none"> <li>• Development of 2008 Emergency Response Guidebook (ERG).</li> <li>• Development of AEGLs in support of the ERG.</li> </ul>
2.	Incident Database Design and Analysis	<ul style="list-style-type: none"> <li>• Examination of trends, costs, and root-cause analysis to provide a basis for regulatory changes.</li> </ul>
3.	Packaging Design	<ul style="list-style-type: none"> <li>• Development of nondestructive testing techniques and failure analysis.</li> </ul>
4.	Performance Packaging Testing	<ul style="list-style-type: none"> <li>• Continued testing of performance packaging to ensure regulatory requirements are met.</li> </ul>
5.	Hazard Identification	<ul style="list-style-type: none"> <li>• Lithium battery (primary and secondary) testing.</li> </ul>
6.	Risk Assessment / Risk Management	<ul style="list-style-type: none"> <li>• Examination of procedures for selecting routes for spent nuclear fuel.</li> <li>• Risk characterization and risk communication studies.</li> </ul>
7.	Consequence Modeling	<ul style="list-style-type: none"> <li>• Studies and analyses for specific hazardous materials.</li> </ul>
8.	Security	<ul style="list-style-type: none"> <li>• Development of tools for this evolving area.</li> </ul>

# 2007 Key Projects

- 2008 Emergency Response Guidebook
  - \$90,000 funded in 2007
- American Exposure Guideline Levels (AEGLE) Support
  - \$95,000 funded in 2007
- Cylinder Testing
  - \$12,000 funded in 2007
- Loading/Unloading Workshop
  - \$25,000 funded in 2007
- Information Technology (including Intermodal Database)
  - \$589,000
- Hazardous Materials Fusion Center – Cooperative Agreement
  - Pending funding for 2007

# **Hazardous Materials Transportation Cooperative Research Program**

- **SAFETEA-LU requires PHMSA to enter into a contract with the National Academy of Sciences to carry out the 9 research projects called for in Special Report 283.**
- **Funding of \$1,250,000 for each of fiscal years 2006 through 2009 is authorized from the Highway Trust Fund for these purposes.**
- **Our intent is to conduct specific research projects while testing the viability of a cooperative hazmat transportation research program**
- **Stakeholder interest, involvement, and feedback is vital during the pilot**
  - **Participation on stakeholder oversight board (met 11/30 to 12/01/06)**
  - **Participation on project panels (formed for initial projects)**



# Hazardous Materials Transportation Cooperative Research Program

- **Four projects selected by a stakeholder oversight board as research topics funded by the first two years of the pilot program**
- **1. HM-02, Hazardous Materials Transportation Incident Data for Root Cause Analysis**
  - **\$300,000**
  - **15 months with work expected to begin around October 1, 2007**
  - **Objective:**
    - The objectives of this research are to (1) develop a set of practical recommendations for methods to improve the availability and quality of hazardous materials transportation incident data, (2) identify gaps and redundancies in reporting requirements, and (3) provide an estimate of the under-reporting of serious incidents.

# Hazardous Materials Transportation Cooperative Research Program

- **2. HM-03, A Guide for Assessing Emergency Response Needs and Capabilities for Hazardous Materials Releases**
  - **\$350,000**
  - **18 months with work expected to begin around October 1, 2007**
  - **Objective:**
    - The objective of this project is to develop a guide for conducting assessments of emergency response needs and capabilities for hazardous materials releases. The guide shall address four elements: (a) conducting state, regional, and local hazardous material emergency response needs assessments; (b) developing, maintaining, and sharing capability assessments; (c) aligning assessed needs with various levels of capability; and (d) identifying shortfalls where additional/different capabilities are warranted. The guide will include recommended methods for monitoring and recording changes in response capability over time, in order to avoid a static snapshot. In cases where there are gaps in existing techniques or necessary data for the needs or capability assessments, this research will identify research needs to address them.

# Hazardous Materials Transportation Cooperative Research Program

- **3. HM-04, Emerging Technologies Applicable to Hazardous Materials Transportation Safety and Security**
  - **\$350,000**
  - **15 months with work expected to begin around October 1, 2007**
  - **Objective:**
    - The objectives of this project are to (1) develop a list of near-term (less than 5 years) and longer-term (5–10 years) technologies that are candidates for use in enhancing the safety and security of hazardous materials transportation, as applied by shippers, carriers, emergency responders, or government regulatory and enforcement agencies; (2) identify emerging technologies that hold the greatest promise of being introduced during these near- and longer-term spans; and (3) identify potential impediments to and opportunities for their development, deployment, and maintenance (e.g., technical, economic, legal, and institutional). This research will review generic technologies and will not evaluate specific name-brand products.

# Hazardous Materials Transportation Cooperative Research Program

- **4. HM-01, Hazardous Materials Commodity Flow Data and Analysis**
  - **\$300,000**
  - **18 months with starting date to be determined at release of RFP**
  - **Objective:**
    - The main objective of this project is to produce a guidebook for conducting hazardous materials commodity flow surveys to support local risk assessment, emergency response preparedness, and resource allocation and to support analyses across jurisdictional boundaries. This guidebook should be targeted at transportation planning and operations staff at the local and regional levels, as well as local and regional personnel involved in hazardous materials training, and emergency response. All relevant modes of transportation, all relevant classes of divisions of hazardous materials, and the effects of seasonality on hazardous materials movements should be discussed.

# Program Review Areas

- External Stakeholder Involvement
  - HMCRP, AEGL, Loading/Unloading, ERG
- Merit Review of Proposals
  - All research goes through a competitive process
    - HMCRP, AEGL
- Independent Evaluation of Research
  - Most research goes through a peer review process
    - HMCRP
- Performance Measurement
  - Results used in development of program performance measures
- RD&T Coordination
  - HMCRP, Loading/Unloading
    - Website RD&T Outreach under development

# PHMSA RD&T Contacts

**Additional project information is available by contacting:**

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