Peer Review Report

Pipeline & Hazardous Materials Safety Administration

Pipeline Safety Research & Development Program

Peer Reviews Conducted
March 27-29, 2007

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EXECUTIVE SUMMARY

The Pipeline and Hazardous Materials Safety Administration's (PHMSA) Pipeline Safety Research and Development (R&D) Program held its first structured peer review of active research projects in February 2006 and the most recent peer review on March 27-29, 2007. Mandates by the Office of Management and Budget (OMB) and the Office of the Secretary of Transportation (OST) govern these reviews and are keeping PHMSA "Green" with research data quality. Conducting peer reviews via teleconference and the Internet is working well with panelists and researchers and facilitated attendance from all U.S. time zones.

The peer review continues to build on an already strong and systematic evaluation process developed by PHMSA's Pipeline Safety R&D Program and certified by the Government Accountability Office. The peer review panel consisted of nine government and industry experts. Four of the nine panelists are active government representatives from the National Institute of Standards and Technology and the Minerals Management Service. The remaining five panelists are retired government and industry personnel who have active roles as peers for the American Society of Mechanical Engineers (ASME), National Association of Corrosion Engineers (NACE), and other standards developing organizations.

Twenty seven active research projects were peer reviewed by expert panelists using 23 evaluation criteria. These criteria were grouped within the following six evaluation categories:

1. Is the project still relevant to the PHMSA mission?
2. Is the project well designed?
3. Is the project still well managed?
4. What is the approach taken for transferring results to end users?
5. Is the project well coordinated with other closely related programs?
6. Is the project producing high quality results?

The rating scale possibilities were "Ineffective," "Moderately Effective," "Effective," or "Very Effective." During the March 2007 review, the average program rating was "Very Effective" for each of the above six evaluation categories. Twenty-six projects were rated "Very Effective," with only one project rating "Effective." Sub-criteria scoring ranged between "Effective" and "Very Effective." Additional details are available in Section 7, Tables 3 and 4 of this report.

PHMSA is very satisfied with the process performed to conduct these reviews, as well as the findings and recommendations provided by the panelists. PHMSA accepts the findings and recommendations summarized in the report. The official PHMSA response memorandum is in Appendix A.

These reviews are held annually for active research projects and occur in the second quarter of each fiscal year.

1.0 Introduction

The purpose of this document is to report findings from the research peer reviews held March 27-29, 2007 for PHMSA's Pipeline Safety Research and Development Program. The findings and recommendations in this report derive from the scoring and comments collected from the peer review panelists.

Department of Transportation (DOT) Operating Agencies (OA) are required to develop and execute a systematic process for peer review plan for all influential and highly influential information the OA plans to disseminate in the foreseeable future.

Through the Information Quality Act[1], Congress directed Office of Management and Budget (OMB) to "provide policy and procedural guidance to Federal agencies for ensuring and maximizing the quality, objectivity, utility, and integrity of information, (including statistical information) disseminated by Federal agencies." A resulting OMB Bulletin, titled "Final Information Quality Bulletin for Peer Review," was issued prescribing required procedures for Federal programs.

The Office of the Secretary of Transportation (OST) produced procedures governing modal implementation of this OMB Bulletin. These procedures, as well as the OMB Bulletin, serve as the basis and justification for the PHMSA Pipeline Safety R&D Program peer reviews.

The purpose of peer reviews is to uncover any technical problems or unsolved issues in a scientific work product with technically competent and independent, objective experts. Peer review of a major scientific work product that will have the imprimatur of the Federal Government needs to be incorporated into the upfront planning of any action based in the work product. This includes obtaining the proper resources commitments (reviewers and funds), then establishing realistic schedules.

2.0 Research Program Background

PHMSA regulates safety in the design, construction, operation and maintenance, and spill response planning for over 2.3 million miles of natural gas and hazardous materials pipelines. It is focused on the continual reduction in the number of incidents on natural gas and hazardous liquid pipelines resulting in death, injury, or significant property damage and also aims to reduce spills that can cause environmental harm.

The vision of the PHMSA Pipeline Safety R&D Program is to support the pipeline safety mission of PHMSA, which is "to ensure the safe, reliable, and environmentally sound operation of America's energy transportation pipelines." The mission of the PHMSA Pipeline Safety R&D Program is "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."

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[1] Pub. Law. No. 106-554-515(a)

PHMSA has regulatory responsibility for the safety of natural gas and hazardous liquid pipelines. Over the past several years, PHMSA has strengthened its role in assuring the safety of the nation's pipeline system in numerous ways, including promulgating new regulations on integrity management.[2,3,4] These new regulations, together with the new inspection processes being used by regulators to evaluate operator compliance, rely on operator access to new technologies that support improved safety and integrity performance, and on regulator access to information on the appropriate use and limitations of these technologies. To address the need for new integrity-related technologies and information on the validity of these technologies, Congress has recently expanded the support for the PHMSA Pipeline Safety R&D Program.[5] As authorized by Congress, PHMSA is sponsoring research and development projects focused on providing near-term solutions that will increase the safe, reliable, and environmentally sound operation of America's energy transmission and distribution pipelines.

The R&D program is designed to fully support achievement of the PHMSA mission. It manages achievement of its mission by promulgating regulations, inspecting operators for compliance with these regulations, and taking enforcement action as appropriate. The R&D Program contributes directly to the PHMSA mission by pursuing three program objectives:

1) Fostering development of new technologies that can be used by operators to improve safety performance and to more effectively address regulatory requirements;

2) Strengthening regulatory requirements and related national consensus standards; and

3) Improving the state of knowledge of pipeline safety officials so industry and regulatory managers and PHMSA pipeline safety field inspectors can use this knowledge to better understand safety issues and to make better resource allocation decisions, leading to improved safety performance.

The R&D Program is organized around eight R&D program elements. Each program element has associated safety issues, technology needs or gaps, and R&D opportunities. Ongoing and future planned projects are linked to at least one of these program elements. The program elements reflect the responsibilities of DOT in the Five Year Interagency R&D Program Plan[6] and guidance from pipeline experts and stakeholder groups.

Program goals are associated with each program element. The goals define the desired outcomes for the R&D projects. Each goal bears a direct relationship to longer-term enhancement of pipeline safety. Table 1 identifies these program elements and the improvements desired.

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[2] "Pipeline Integrity Management in High Consequence Areas for Hazardous Liquid Operators" (49 CFR Part 195); Rules effective May 29, 2001, and February 15, 2002 . <http://primis.phmsa.dot.gov/iim/ruletextamended.htm>
[3] "Pipeline Safety: Pipeline Integrity Management in High Consequence Areas (Gas Transmission Pipelines)"; Final Rule. December 15, 2003. < http://primis.phmsa.dot.gov/gasimp/docs/GasTransmissionIMRule.pdf>
[4] "Pipeline Integrity Management in High Consequence Areas (Gas Transmission Pipelines)". Final Rule (as amended), May 26, 2004. <http://primis.phmsa.dot.gov/gasimp/docs/FinalRuleAmended_gas_full.pdf>
[5] Pipeline Safety Improvement Act of 2002 < http://ops.dot.gov/Pub_Law/107_cong_public_laws.pdf>
[6] Five Year Interagency R&D Program Plan < http://primis.phmsa.dot.gov/rd/psia.htm

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

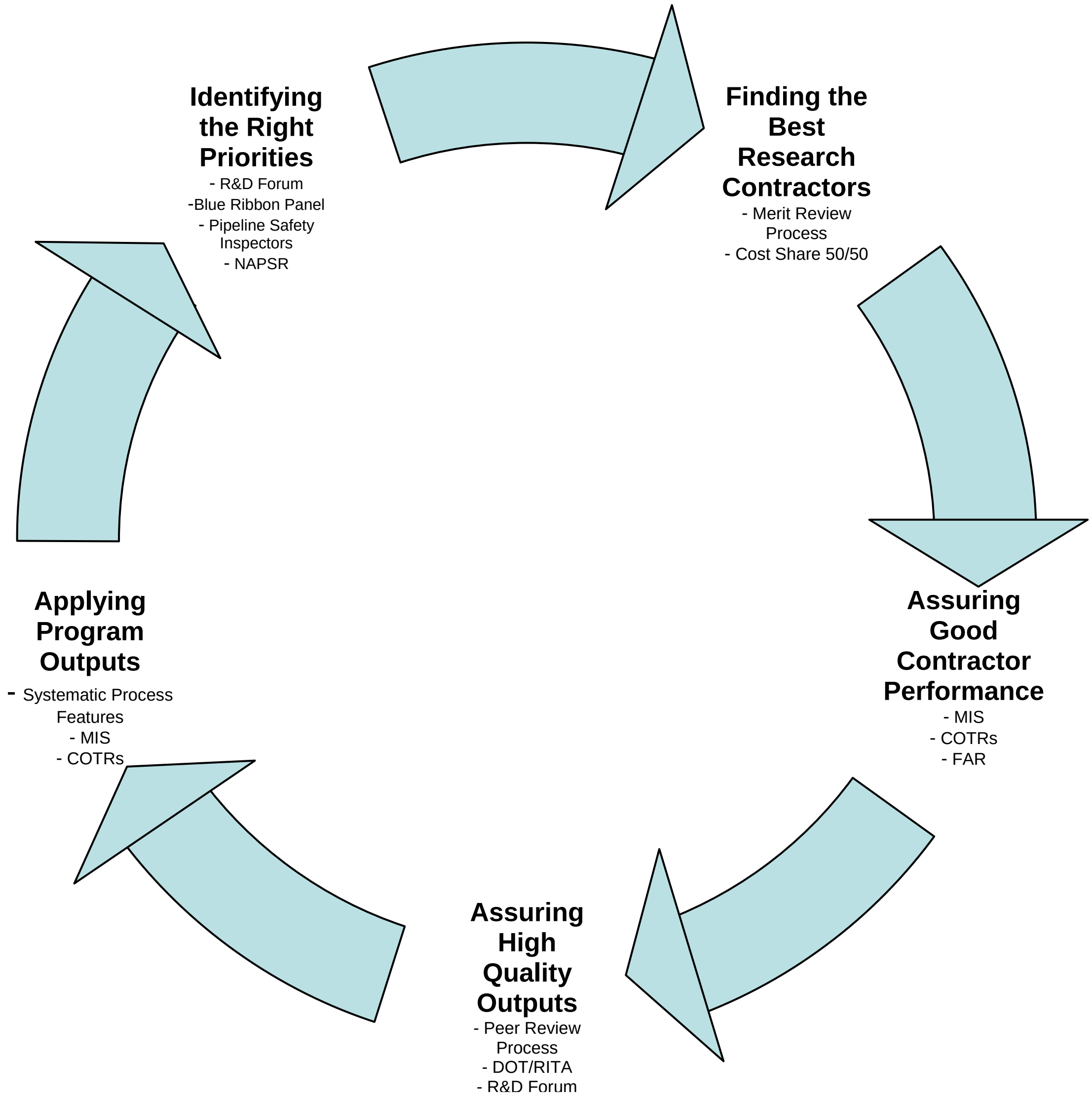
More information on the program strategy is outlined in the R&D Program Strategic Plan and on the program website at http://primis.phmsa.dot.gov/rd/ .

Research Program Quality

While the program was addressing strategy, a systematic evaluation process was designed and implemented for raising and validating program quality. The process contains five steps and follows research projects from their inception to their resulting implementation. Each step of this systematic process ensures that project outcomes will be of high quality, relevant to PHMSA's mission, and applied to the appropriate end users.

Figure 1 identifies the steps in the systematic evaluation process and how it follows the lifecycle of research projects.

Figure 1. Systematic Evaluation Process



The quality of the research projects is first established while identifying the right priorities. This pre-solicitation input at joint government and industry R&D forums and other meetings collaboratively identifies the right priority and structures projects to meet end user technical needs. This allows government and industry pipeline stakeholders to develop a consensus on the technical gaps and challenges for future R&D. It also reduces duplication of programs, leverages funds, broadens synergies and factors ongoing research efforts with other agencies and private organizations.

Appropriate priority and good project design are refined while finding the best research contractors. A merit review panel comprised of representatives from Federal and State agencies, industry operators, and trade organizations uses strong evaluation criteria to review research white papers and proposals. In addition, a 50 percent cost share between the government and industry is required which forces researchers to organize with credible groups increasing the credibility and applicability of the proposed work.

PHMSA uses its Management Information System (MIS) to assure awarded projects are performing well. The MIS electronically monitors and tracks contractor performance as the project moves toward completion. This system provides the necessary oversight so specific contractual milestones and contract accounting are systematically followed as prescribed in the award documents. The system design improves and maintains program quality, efficiency, accounting and accountability. Additional oversight is provided by Contracting Officer's Technical Representatives (COTRs) who are trained, certified, and designated to each project in accordance to the Federal Acquisition Regulations.

The peer review is designed to further improve quality and keep research projects on track to meet their ultimate goal(s). If the first three steps of the systematic evaluation process are applied correctly and efficiently, PHMSA pipeline safety research projects have a higher probability of being successful.

3.0 Peer Review Panelists

Peer review panelists are chosen based on three criteria: expertise, balance, and independence. Specifics for choosing panelists are derived from the OMB Bulletin. Panelists can range from academics to active and or retired pipeline personnel from operators, regulators and industry trade organizations.

The panel consisted of nine government and industry experts. Four of the nine panelists are active government representatives from the National Institute of Standards and Technology and the Minerals Management Service. The remaining five panelists are retired government and industry personnel who have active roles as peers for the American Society of Mechanical Engineers (ASME), National Association of Corrosion Engineers (NACE), and other standards-developing organizations. The non-government and retired panelists were contracted using honoraria to participate in the review process.

Each panelist provided a short biography describing their work history and qualifications of technical knowledge. These biographies are in Appendix B.

Table 2. Peer Review Panelists		
	Name	**Affiliation**
1	Tom Siewert	Department of Commerce, National Institute of Standards and Technology
2	David McColskey	Department of Commerce, National Institute of Standards and Technology
3	Chris N. McCowan	Department of Commerce, National Institute of Standards and Technology
4	Richard Fields	Department of Commerce, National Institute of Standards and Technology (retired)
5	Dennis W. Hinnah, P.E.	Department of the Interior, Minerals Management Service
6	Joe C. Bowles, Jr., P.E.	Past President of National Association of Corrosion Engineers
7	Louis Hayden Jr., P.E.	Lafayette College
8	Thomas J. O'Grady II, P.E.	BP Exploration (Alaska), Inc.
9	T. Randall Webb	National Association of Corrosion Engineers

4.0 Panelist Charge

The Peer Review Panelist charge, developed in December 2006, is provided to each panelist prior to the review. It contains specific instructions regarding what is expected in terms of their review. This charge is important for the following reasons:

1. It focuses the review by presenting specific questions and concerns that PHMSA expects the peer reviewers to address.
2. It invites general comments on the entire work product. The specific and general comments should focus mostly on the scientific and technical studies that have been applied in a sound manner.

The charge is a separate document not attached to this report. It is publicly available for each year's review at http://primis.phmsa.dot.gov/rd/annual_peer_review.htm and may be revised after researcher and panelist post-review feedback.

5.0 Scope of the Peer Review

During the annual peer review of projects, the members of the panel see focused, high-level presentations from researchers addressing 23 evaluation criteria within six specific evaluation categories. Presentations are no more than 30 minutes with five minutes of panelist questions and five minutes of possible written public questions. An underlying R&D Program objective is not to compare one project to another, but to provide the best assessment of each project's performance addressing the specific criteria. A scorecard for rating performance on the specific categories is provided. Each category has equal rating from one to five. The scorecard included the following questions in six performance categories:

1. Is the project still relevant to the PHMSA mission?
    - Is the project still relevant for enhancing pipeline safety or protecting the environment?
    - Does the project support rulemaking, statutory requirements, inspection activities, or stakeholder recommendations?
    - Does the project address a technology gap or consensus standard or general knowledge?

2. Is the project well designed?
    - Does the project have appropriate objectives and milestones?
    - Are the deliverables well defined?
    - Is the scope of work clear, limited, and well defined?
    - Are the capabilities of the project team appropriate to the work?
    - Has the project a well designed plan for transferring results to end users?

3. Is the project still well managed?
    - Does the project have an up-to-date work plan?
    - Is the project making progress toward the scope and the PHMSA goals?
    - Is the project being managed on budget and schedule?

4. What is the approach taken for transferring results to end users?
    - Is there a plan for dissemination of results, including publications, reporting, and patents?
    - How much end user involvement is incorporated into the work scope?
    - Have efforts been made to protect the intellectual property in a manner that allows for the greatest public impact?
    - For results that may include marketable products and technologies are commercialization plans established?

5. Is the project well coordinated with other closely related programs?
    - Does the project build on, or make use of, related or prior work?
    - Is the project work being communicated to other related research efforts?
    - Has consideration been given to possible future work?
    - Is the project coordinated with related projects or programs in PHMSA, industry, or other government agencies?

6. Is the project producing high quality results?
    - Are the intended results supported by the work performed during the project?
    - Are the intended results consistent with scientific knowledge and/or engineering principles?
    - Are the intended results appropriate for the resources expended?
    - Are the intended results presented in such a manner as to be useful for identified end users?

These criteria will provide a numeric rating, which will be converted and illustrated as "Ineffective," "Moderately Effective," "Effective," or "Very Effective." This rating conversion is illustrated in Table 3.

Table 3. Peer Review Rating Conversion	
Rating Scale	
Very Effective	3.9 - 5.0
Effective	2.6 - 3.8
Moderately Effective	1.3 - 2.5
Ineffective	0.0 - 1.2

6.0 Associated Research

Specific research project subject matter will vary from one annual peer review to another. Generally, subject matter falls within the eight program elements shown in Table 1. Technical issues usually address metallurgical, structural, technological, and risk-based subjects commonly seen in the pipeline industry.

The research peered during the March 2007 review varied among metallurgical, technological, and general knowledge focused projects. Specific technical subjects addressed corrosion, welding, fracture mechanics and material property issues. Projects focusing on technology included new tools for external and internal pipeline inspection, monitoring pipeline rights of way, and cased crossings. Research for general knowledge involved projects addressing risk assessment for natural gas distribution pipelines, and human factors, fatigue and control room design.

A short description of the peer reviewed projects is found in Appendix C.

7.0 Peer Review Findings

On March 27-29, 2007, 27 research projects were peer reviewed by nine expert panelists using 23 evaluation criteria. The rating scale possibilities were "Ineffective," "Moderately Effective," "Effective," or "Very Effective." Review findings show a program rating of “Very Effective” for each of the six evaluation categories. Twenty-six projects were rated “Very Effective,” with only one project rating “Effective.” Sub-criteria scoring ranged between “Effective” to “Very Effective.” Table 4 itemizes the project ranking order, where projects of the same score have an equal ranking.

At the snapshot of the March review, 27 research projects were at an average stage of 52 percent complete. The panelists made several recommendations in the course of the review. These recommendations were categorized into “Strong” and “Weak” points and associated for each project. Having these high ratings precluded the need for itemization of recommendations on specific research projects. None of these comments identified critical actions required to salvage a project from failing, but recommended actions further improve upon good performance.

Table 5 itemizes the strong and weak points collected from the nine panelists. These points were consistent with several panelists and are reflected in the scoring of the fifth evaluation category. Specific recommendations will be disseminated to researchers and COTRs so individual decisions on scope changes can be determined.

Some panelists suggested releasing guidance on technology transfer could bring better project alignment to the objective of Review Category 4. Project scope expansion to better document coordination with other programs measures could bring better alignment to Review Category 4 objectives.

Table 3. Summary of Total Average Score & Rating for the Review Categories and Sub-Criteria		
Review Categories and Sub-Criteria	**Score**	**Rating**
1. Is the project still relevant to the PHMSA mission?	**4.5**	**Very Effective**
• Is the project still relevant for enhancing pipeline safety or protecting the environment?	4.7	Very Effective
• Does the project support rulemaking, statutory requirements, inspection activities, or stakeholder recommendations?	4.4	Very Effective
• Does the project address a technology gap or consensus standard or general knowledge?	4.5	Very Effective
2. Is the project well designed?	**4.4**	**Very Effective**
• Does the project have appropriate objectives and milestones?	4.4	Very Effective
• Are the deliverables well defined?	4.4	Very Effective
• Is the scope of work clear, limited, and well defined?	4.4	Very Effective
• Are the capabilities of the project team appropriate to the work?	4.7	Very Effective
• Has the project a well designed plan for transferring results to end users?	4.3	Very Effective
3. Is the project well managed?	**4.2**	**Very Effective**
• Does the project have an up-to-date work plan?	4.2	Very Effective
• Is the project making progress toward the scope and the PHMSA goals?	4.2	Very Effective
• Is the project being managed on budget and schedule?	4.1	Very Effective
4. What is the approach taken for transferring results to end users?	**4.2**	**Very Effective**
• Is there a plan for dissemination of results, including publications, reporting, and patents?	4.2	Very Effective
• How much end user involvement is incorporated into the work scope?	4.4	Very Effective
• Have efforts been made to protect the intellectual property in a manner that allows for the greatest public impact?	4.0	Very Effective
• For results that may include marketable products and technologies are commercialization plans established?	4.0	Very Effective
5. Is the project well coordinated with other closely related programs?	**4.0**	**Very Effective**
• Does the project build on, or make use of, related or prior work?	4.4	Very Effective
• Is the project work being communicated to other related research efforts?	3.8	Effective
• Has consideration been given to possible future work?	3.9	Very Effective
• Is the project coordinated with related projects or programs in PHMSA, industry, or other government agencies?	3.9	Very Effective
6. Is the project producing high quality results?	**4.3**	**Very Effective**
• Are the intended results supported by the work performed during the project?	4.3	Very Effective
• Are the intended results consistent with scientific knowledge and/or engineering principles?	4.3	Very Effective
• Are the intended results appropriate for the resources expended?	4.3	Very Effective
• Are the intended results presented in such a manner as to be useful for identified end users?	4.3	Very Effective
Total Average Scoring and Rating:	**4.3**	**Very Effective**

Table 4. Summary Ranking & Rating of Individually Reviewed Research Projects					
Rank	**Project ID**	**Project Title**	**Contractor**	**Rating**	**Score**
1	DTRS56-04-T-0003	Human Factors Analysis of Pipeline Monitoring and Control Operations	Battelle Memorial Institute	Very Effective	4.8
2	DTRS56-05-T-0002	Design, construction and demonstration of a robotic platform for the inspection of unpiggable pipelines under live conditions	Northeast Gas Association	Very Effective	4.7
2	DTPH56-06-T-000019	Augmenting MFL Tools with Sensors That Assess Coating Condition	Battelle Memorial Institute	Very Effective	4.7
3	DTRS56-05-T-0002	Design, Construction and testing of a segmented MFL sensor for use in the inspection of unpiggable pipelines	Northeast Gas Association	Very Effective	4.6
3	DTPH56-06-T-000010	Internal Corrosion Direct Assessment Detection of Water	CC Technologies, Inc.	Very Effective	4.6
3	DTPH56-06-T-000013	Guidelines for the Identification of SCC Sites and the Estimation of Re-Inspection Intervals for SCCDA	Pipeline Research Council International	Very Effective	4.6
4	DTPH56-06-T-000001	Demonstration of ECDA Applicability and Reliability for Demanding Situations	Gas Technology Institute	Very Effective	4.5
4	DTPH56-06-T-000018	Dissecting Coating Disbondments	CC Technologies, Inc.	Very Effective	4.5
4	DTPH56-06-T-000021	Method for Qualification of Coatings Applied to Wet Surfaces	CC Technologies, Inc.	Very Effective	4.5
5	DTPH56-06-T-000020	Phase Sensitive Methods to Detect Cathodic Disbondment	Gas Technology Institute	Very Effective	4.4
6	DTPH56-06-T-000014	Validation and Documentation of Tensile Strain Limit Design Models for Pipelines	Pipeline Research Council International	Very Effective	4.3
6	DTPH56-06-T-000017	Improved In-field Welding and Coating Protocols	Gas Technology Institute	Very Effective	4.3
7	DTPH56-05-T-0001	Understanding Magnetic Flux Leakage (MFL) Signals from Mechanical Damage in Pipelines	Electricore, Inc.	Very Effective	4.2
7	DTPH56-06-T-000012	ECDA for Unique Threats to Underground Pipelines	CC Technologies, Inc.	Very Effective	4.2
7	DTPH56-06-T-000007	Ultra-Low Frequency Pipe and Joint Imaging System	Northeast Gas Association	Very Effective	4.2
7	DTPH56-06-T-000023	Effect of Surface Preparation on Residual Stress in Multi-layer and Other Pipeline Coatings	NOVA Research & Technology Centre	Very Effective	4.2

Rank	Project ID	Project Title	Contractor	Rating	Score
8	DTPH56-05-T-0003	Corrosion Assessment Guidance for Higher Strength Pipelines	Electricore, Inc.	Very Effective	4.1
8	DTPH56-06-T-000011	Guidelines for Interpretation of Close Interval Surveys for ECDA	CC Technologies, Inc.	Very Effective	4.1
8	DTPH56-06-T-000015	Pipeline Integrity Management for Ground Movement Hazards	Pipeline Research Council International	Very Effective	4.1
8	DTPH56-06-T-000022	External Pipeline Coating Integrity	Texas Engineering Experiment Station	Very Effective	4.1
9	DTPH56-06-T-000002	Define, Optimize and Validate Detection and Sizing Capabilities of Phased-Array Ultrasonics to Inspect Electrofusion Joints in Polyethylene Pipes	Edison Welding Institute, Inc.	Very Effective	4.0
9	DTPH56-06-T-000003	Characterization of Stress Corrosion Cracking Using Laser Ultrasonics	Intelligent Optical Systems, Inc.	Very Effective	4.0
9	DTPH56-06-T-000006	Long Term Monitoring of Cased Pipelines Using Long-Range Guided-Wave Technique	Northeast Gas Association	Very Effective	4.0
9	DTPH56-06-T-000016	Investigate Fundamentals and Performance Improvements of Current In-Line Inspection Technologies for Mechanical Damage Detection	Pipeline Research Council International	Very Effective	4.0
10	DTPH56-06-T-000005	Differential Impedance Obstacle Detection Sensor (DIOD) – Phase 2	Gas Technology Institute	Very Effective	3.9
10	DTPH56-06-T-000016	Development of Dual Field MFL Inspection Technology to Detect Mechanical Damage	Pipeline Research Council International	Very Effective	3.9
11	DTPH56-06-T-000004	Plastic Pipe Failure, Risk, and Threat Analysis	Gas Technology Institute	Effective	3.8

Table 5. Summary of Strong and Weak Point Recommendations	
Strong Points	**Weak Points**
• Close technical support and coordination with industry end users	• Technology demonstrations need to be part of all projects developing technology
• Technology demonstrations are applied with most project scopes	• Improve researcher documentation of coordination with standard-developing organizations and expand literary searches for other relevant efforts
• High relevance to the mission of the PHMSA's Office of Pipeline Safety	• Improve coordination with other related projects within PHMSA and other related programs
• Project are mostly well designed	• Expand technology developments to all pipeline types and sizes
• Projects are mostly well managed	• Improve validation of models through field trials
• Technology transfer is working well on some projects	• Improve the clarity of researcher intellectual property plans for technology development projects
• Projects are producing high quality results	• Disseminate more to other regulators such as FERC
• Project impacts addressing several industry challenges	• Expand research scope to address offshore application where applicable

8.0 PHMSA Response to Panelists Findings and Recommendations

Being the second structured peer review of its pipeline safety R&D program, PHMSA is satisfied with the process for conducting these reviews as well as the findings and recommendations provided by the peer review panelists. PHMSA accepts these findings and recommendations summarized in the report. No immediate actions are required for protecting peered research projects from not achieving contractual milestones. The official PHMSA response memorandum can be found in Appendix A.

PHMSA will continue refining the annual peer review process from feedback submitted by the researchers and peer review panelists. Since none of the reviewed projects were rated "Ineffective" or "Moderately Effective", no immediate project modifications are warranted. Specific recommendations from panelists will be disseminated to researchers and COTRs. The researchers, COTRs and research co-sponsors will decide if any scope changes are warranted.

A number of initiatives were recently implemented to ensure projects are well coordinated with other related programs and with end users. These initiatives address many of the weak points provided by the panelists. They also improved the program rating in Category 4 (…transferring results to end users…) from the February 2006 reviews.

In addition, the guidance and presentation template provided to the researchers will be revised. This will improve the manner in which questions are answered, support effective reviews by the panelists and raise project and program quality.

APPENDIX A

PHMSA Acceptance Memo

U.S. Department
of Transportation
**Pipeline and Hazardous
Materials Safety
Administration**

1200 New Jersey Ave., S.E.
Washington, DC 20590

MEMORANDUM FOR THE RECORD

From: Stacey L. Gerard, Assistant Administrator/Chief Safety Officer

Subject: Pipeline Safety Research Program Peer Reviews, March 27-29, 2007

SUMMARY

The Pipeline and Hazardous Materials Safety Administration (PHMSA) is pleased with the process for conducting these reviews, as well as the findings and recommendations provided by the peer review panelists. The panel saw no immediate action to safeguard peer reviewed research projects from not achieving contractual milestones. In addition, the average quality rating of the projects was "Very Effective," The highest possible rating.

PHMSA will use feedback submitted by researchers and panelists to refine the process for holding annual peer reviews. Since none of the reviewed projects were rated "Ineffective" or "Moderately Effective," no immediate project modifications are warranted. Specific recommendations from panelists will be disseminated to researchers and Contracting Officer's Technical Representatives (COTRs). The researchers and COTRs will decide if any scope changes are warranted.

RECOMMENDATION

PHMSA accepts the findings and recommendations summarized in the Peer Review Report.

The Assistant Administrator/Chief Safety Officer

APPROVED: SG

DISAPPROVED: ____________

COMMENTS: ____________

DATE: 8-22-07

APPENDIX B

Peer Review Panelist Bios

Tom Siewert

Education:

B.S.	Applied Math and Phys.	Univ. of Wis.- Milw.	1969
M.S.	Materials Science	Univ. of Wis.- Madison	1973
Ph.D.	Metallurgy	Univ. of Wis. - Madison	1976

Experience:
Government: Leader of structural materials, welding, then process sensing and modeling groups at NIST since 1984.
Publications in the areas of joining, cryogenic properties, nondestructive evaluation, and mechanical properties
Leadership in conference and workshop organization committees, Active in various societies.

Industry: Supervisory Research Engineer, then Manager of Research and Development, Alloy Rods (welding filler metal developer) 1976 to 1984.

Academic: Active with a number of Universities
Teaching short courses in Materials, Welding, and NDE for OSHA inspectors (OSHA Training Institute), about 20 one-day courses since 1989.
Adjunct Professor and Research Scientist in the Metallurgical and Materials Engineering Department, CSM

Professional Society Memberships
- American Society for Metals

American Society for Testing and Materials
American Welding Society
- International Institute of Welding
- Welding Journal Reviewer

Active Committee Work
American Society for Testing and Materials
- A01 Steel
- E28 Mechanical Testing
- E07 Nondestructive Evaluation

American Welding Society
- American Council of the IIW
- International Standards Activities Committee
- Government Affairs Activity Committee

Richard Fields

Education:
Undergraduate degrees in Chemistry and Metallurgical Engineering were awarded to R. J. Fields in 1971 by the University of Pennsylvania in Philadelphia. He received a Masters in Engineering and Applied Physics from Harvard University in 1973 and a PhD in Engineering Materials from Cambridge University in 1978 in England.

Work History:
From 1977 until 2004, R. J. Fields worked at the National Bureau of Standards/ National Institute of Standards and Technology (NIST). He retired in May of 2004, and now works for KT Consulting on a contract with NIST. Highlights of his career include 6 years as a Supervisory Metallurgist managing the Time Dependent Failure Group in NBS's Fracture and Deformation Division. This group ran the metallographic facilities as well as carrying out mechanical testing research for the US Navy, the Federal Railroad Administration, the National Transportation Safety Board, and the Nuclear Regulatory Commission. He was appointed twice (total of 6 years) to the Office of Pipeline Safety's Hazardous Liquid Pipeline Safety Committee and served as secretary for three years.

Recently, R. J. Fields also supervised the Materials Performance Group in NIST's Metallurgy Division for three years. Part of this group of 11 professionals runs the US national hardness standardization facility, certifying primary hardness standards. As the supervisor of the Materials Performance Group, he started a program on sheet metal forming with the auto industry. This is now the largest program in the Division.

From 2002 until 2004, he was the technical lead on metallurgical aspects of the congressionally mandated investigation of the collapse of the World Trade Center Towers. He also started a program on modeling bullets and armor for the National Institute of Justice and a program on fire resistant structural steels. He has an extensive list of publications, patents, and awards.

Professional Society Membership:
R. J. Fields is a member of the Metallurgical Society of AIME, ASTM International, and the American Academy of Mechanics.

Louis E. Hayden Jr, PE

Louis Hayden has over 35 years of experience as a mechanical engineer, project manager and vice president of engineering. This experience has been in the design, analysis, fabrication, installation, start-up and maintenance of industrial piping and equipment Systems have included above and below ground piping and pipelines in process plants, fossil and nuclear power plants, transmission pipelines and industrial manufacturing facilities. He has managed and directed the manufacturer of high yield pipeline pipe fittings and developed new pipeline closure and flange products as well as managed the efforts of new product development and research groups.

Currently a consulting mechanical engineer and adjunct professor of mechanical engineering at Lafayette College, Easton, PA. Previous employers have been Fluor Corp., Houston; Brown&Root Inc., Houston; Tube Turns, Inc., Louisville; Victaulic Corp., Easton, PA.

Member of ASME B31 Piping Standards Committee since 1985
Vice Chair ASME B31 Piping Standards Committee 1990-1993 and 2001-2004
Chairman ASME B31 Piping Standards Committee 1993-2001
Member ASME Board on Pressure Technology Codes and Standards 1993-2005
Vice Chair ASME Board on Pressure Technology Codes and Standards 2005-present
Chairman ASME Task Group for development of B31.12 Hydrogen Piping and Pipeline Code.
Member Board on Pressure Technology Codes and Standards Materials for Hydrogen Service Task Group

Thomas J. O'Grady II, P.E.

Over 30 years experience in all phases of mechanical design and project engineering of pipelines, drill sites and oil and gas processing facilities in the Arctic. Providing engineering direction for a full range of technical services, with particular emphasis in the areas of pressure piping and pipelines, valves, pressure vessels and heat exchangers, stress analysis, material selection, coatings and insulation, and fabrication methods.
Education
Bachelor of Science - Mechanical Engineering, University of Alaska Fairbanks
Master of Science - Engineering Management, University of Alaska Fairbanks
WORK HISTORY

2007 BP Exploration (Alaska)., Technical Authority – Designated Business Unit Subject Matter Expert for piping, pipelines, valves, tanks, vessels, heaters and heat exchangers for BP.

1999-2007 VECO ALASKA, INC., Provided design and construction support for pipelines throughout Alaska, from the oil and gas wells on the North Slope to the Alyeska Pipeline Terminal in Valdez. Performed plant and facility piping design and analysis for pump stations, compressor stations, separation and injection facilities, and offshore platforms. Conducted failure investigation and analysis for facilities from Alaska to Greenland. Prepared client specifications for piping, pipelines, tanks, vessels, heaters and heat exchangers for BP Exploration (Alaska) and ConocoPhillips Alaska.

1976 – 1999 ARCO ALASKA, INC. (Atlantic Richfield Company), Progressed from Construction Engineer at Prudhoe Bay, to Resident Engineer in contractors' offices in Pasadena and Tulsa, to company Subject Matter Expert for piping and pipelines, located in Anchorage, Alaska. Wrote company specifications for design, materials, fabrication, installation, and inspection of piping and pipelines. Worked with manufacturers throughout the world to develop and qualify materials and equipment for use in the arctic. Supervised an ARCO engineering group working directly on projects from $1 million to $10 million and through engineering contractors for projects from $10 million to $500 million.

1975 – 1976 UNIVERSITY OF ALASKA FAIRBANKS Geophysical Institute, Field Assistant. Performed field studies along the Alaskan Arctic Coast, from Barrow to the Canadian border, to establish a winter construction baseline for Arctic Gas Pipeline Company.
1973 – 1975 MARTIN SWEETS COMPANY, Louisville, Kentucky, Engineer. Designed production line equipment to be used in the manufacture and handling of urethane foam
Professional
ASME B31 Pressure Piping Standards Committee - Member
ASME B31.4 Liquids Pipelines Subcommittee – Vice-Chair
ASME B31 Mechanical Design Technical Committee - Member
ASME B31.12 Hydrogen Piping and Pipelines Committee - Member
ASME A13 Scheme for Identification of Piping Systems Committee - Member
ISO TC67-SC02 Working Group 13 for ISO 13623 Pipeline Transportation Systems - Convener.

David McColskey

David McColskey, a Physical Scientist at the National Institute of Standards and Technology, has over 39 years experience as a materials researcher. This experience has been in the measurement of properties of materials in a variety of environments (cryogenic to elevated temperatures, gaseous hydrogen, and gaseous and liquid oxygen), on a variety of specimen scales (micrometer-size thin films to 9-meter-long wide-plate specimens) and on a variety of materials (ferrous and non-ferrous alloys, glass-fiber, graphite-fiber and aramid-fiber composites and combinations of each of these). He has experience in NDE measurement techniques, specifically acoustic emission on bridge steels and on composite tubulars for offshore risers. He has been principal investigator of several projects, including the Superconducting Magnetic Energy Storage (SMES) composite insulator program, and he led the NIST-Boulder effort in the analysis of the steels for the World Trade Center collapse investigation. He is currently co-PI on the establishment of a standard test method for the use of fire-resistant steels in high-rise construction and is co-PI on the establishment of a high pressure hydrogen test facility at NIST-Boulder under a proposed Hydrogen Initiative. In addition, he is co-PI on the existing DOT/PHMSA funded research effort on high-strength pipeline steels. He has authored or co-authored numerous papers on properties of materials, acoustic emission, and thin-films for electronic packaging.

He is currently an active member of ASTM E28 and has served as a U.S. delegate to ISO Committee TC164 on Mechanical Properties Testing.

Joe C. Bowles, Jr.,P.E.

Forty-nine years experience in all aspects of pipeline corrosion control (external-underground/submerged, internal, and atmospheric). Served as Manager of Corrosion Control for major pipeline company with more than 19,900 miles of pipeline, onshore and off-shore, 96 compressor stations, off-shore platforms and meter stations. Established and supervised the operations, maintenance, budget, construction, design, and monitoring for nine subsidiaries.

Served as President of NACE International for the 1996-97 term and as a Director for eleven years. Received the NACE International Distinguished Service Award in 1990, and the NACE International Technical Achievement Award in 1992. A member of nine Technical Practices Committees.

A Registered Professional Engineer in Corrosion Engineering, in state of California, and a certified Corrosion Specialist with NACE International.

Participated as a member of Pipeline Research Committee (Corrosion Supervisory Committee), and Gas Research Committee, (Biocorrosion Task Group).

Authored and presented numerous papers on pipeline corrosion control.

T. Randall Webb

I have more than 25 years of corrosion control experience obtained through education and employment with a gas distribution utility and a corrosion engineering firm. I have an extensive background in cathodic protection testing, design, and installation.

After working for five years in the power industry, I went to work for a corrosion engineering firm. While working for this firm, I performed testing on, design and installation of cathodic protection systems for pipelines, tanks (internal, external, below ground, and above ground), well casings, docks, and other structures. I also performed design and installation for lightning protection and structure grounding. After going to work for Southwest Gas in 1990, I developed and taught two-two week training courses for the corrosion technicians. I was responsible for the Corrosion Control Training, Policies, Procedures, Material Specifications and Operator Qualification for corrosion personnel. I have been active in NACE International serving on a number of task groups developing recommended practices, serving a term on the Public Affaires Committee and the Annual Program Coordinating Committee for NACE symposia. I have become a NACE International instructor teaching several cathodic protection classes.

Chris N. McCowan

Approximately 18 years of experience in evaluating the microstructure and fractures surfaces of base metals and welds, and relating these features to mechanical properties and failure criteria. My experience is based both on evaluating failed specimens from mechanical tests (fracture toughness, tensile, impact, fatigue, etc) and components that failed in service. My research has included work on high strength steel, stainless steel, micro alloy steel, aluminum, indium, and copper. Materials Research Engineer *(*1984 – Present): National Institute of Standards and Technology, Materials Reliability Division

B.S. Metallurgical Engineering, New Mexico Institute of Mining, 1984
M.S. Degree in Metallurgical Engineering, Colorado School of Mines, 1987

Dennis W. Hinnah, P.E.

Dennis Hinnah, P.E. is a Petroleum Engineer with the U.S. Department of the Interior, Minerals Management Service (MMS). He has over 23 years of onshore and offshore oil and gas pipeline engineering experience with the U.S. Department of the Interior. He currently works for the MMS Alaska Outer-Continental Shelf Region's Office of Field Operations. Since arriving in Alaska in 1997, he has participated in the regulatory technical review of the design of BP's Northstar Project buried subsea oil and gas pipelines and several exploration projects in the Alaskan Beaufort Sea. He has coauthored papers on pipeline issues for the Offshore Technical Conference and International Pipeline Conference.

Mr. Hinnah is the MMS representative to the Federal/State Joint Pipeline Office in Alaska, serves on the MMS national pipeline team, and the federal task force for the Alaska Gas Pipeline. He is on the International Organization for Standardization Committee developing the first international engineering standard for arctic offshore structures and has advised the Russian and Kazakhstan governments on regulating arctic offshore oil and gas activities.

Prior to moving to Alaska, Mr. Hinnah advanced from engineer to manager of the U.S. Bureau of Mines helium gas storage field and transmission pipelines. The storage facility is located in Texas with pipelines in Texas, Oklahoma, and Kansas. He was responsible for the design, construction, operations, and maintenance on over 500 miles of crude-helium and natural gas pipelines, the injection and production gas wells as well as the gas storage reservoir management. While there, he was responsible for integrating a computerized Supervisory Control and Data Acquisition system over the entire system. The helium facility is a unique government activity that has been in operation since the 1920's.

Mr. Hinnah received a Bachelors Degree in Geological Engineering from the University of Mo. at Rolla in 1982. Since then he has completed graduate courses in Arctic Engineering and Business Administration. He has received two National Society of Professional Engineer's Federal Engineer of the Year awards. The first was in 1995 from the U.S Bureau of Mines and the second was in 2002 from the Minerals Management Service.

Ronald W. Haupt

Ronald W. Haupt has over forty-five years of professional experience in civil/structural and mechanical engineering, principally in the design, analysis, and maintenance of industrial process and energy-related structures, equipment, piping, pipelines, and supports. In his last twenty years as a consultant, he has performed piping and pipeline failure analyses, reviewed cold spring and critical systems erection procedures, been involved in the development of ASME code vessel and piping design and construction rules, and evaluated pipeline fitness for service criteria and pipeline repairs. Further, he has developed guidelines for seismic design of mechanical and electrical equipment, provided creep and high pressure (in excess of 5,000 psi) piping design services, developed layouts, designed, and repaired high pressure/high temperature power and process piping systems and cross-country gas and liquid pipelines, and developed and given power and process piping and pipeline design and analysis seminars for the ASME and private companies. Mr. Haupt holds Bachelor and Master of Science degrees from Stanford University and Massachusetts Institute of Technology, respectively, is a registered professional engineer in California and South Carolina, and is an active member in numerous national codes and standards writing committees (both ASME and ASCE), including the ASME B31 Code for Pressure Piping.

APPENDIX C

Peer Review Project Summaries

Additional summaries and publicly available reports are available at:
http://primis.phmsa.dot.gov/matrix/

Internal Corrosion Direct Assessment Detection of Water

CC Technologies Inc.

The objective is to develop a method to use with ICDA to detect water in non-piggable lines. This method will be low cost and will entail introduction of small wireless sensors capable of detecting water inside pipelines that flow with the gas stream..

Guidelines for Interpretation of Close Interval Surveys for ECDA

CC Technologies Inc.

The objective is to develop guidelines that: 1. Improve prioritization of CIS indications, and 2. create more uniform CIS data interpretation. There is a need to establish an understanding of the CIS profile data beyond the existing interpretation of the off-potential values (in/out of compliance).

ECDA for Unique Threats to Underground Pipelines

CC Technologies Inc.

There are two primary objectives of the proposed research: 1. Conduct research to complement ECDA protocol by including assessment of threats posed by alternating current and excessive cathodic protection. The second objective is to establish the limitations to applicability to the ECDA indirect assessment techniques under stray current conditions.

Guidelines for the Identification of SCC Sites and the Estimation of Re-Inspection Intervals for SCCDA

Pipeline Research Council International

The objective is to develop a set of quantitative guidelines for predicting where and when SCC might be an integrity threat for gas and liquid hydrocarbon pipelines. These guidelines would complement other methodologies, such as the NACE RP0204, ASME B31.8S, and the CEPA Recommended Practices. These guidelines are aimed at improving the industry's ability to locate SCC in the field where the in-ditch protocols detailed in NACE RP0204 would be followed. In addition, the quantitative nature of the proposed guidelines would allow more-informed estimation of the re-inspection interval for repeat DA procedures.

Demonstration of ECDA Applicability and Reliability for Demanding Situations
Gas Technology Institute

The objective is to identify and demonstrate External Corrosion Direct Assessment (ECDA) technologies for demanding pipeline situations (cased and non-cased crossings, pipe with shielded coatings, segments with stray currents or interferences from other pipelines). The deliverable will be a published procedure (best practice) for ECDA that allows the identification of ECDA techniques for each situation. The results will be fed into industry standards and recommended practices (e.g., ASME and NACE) to assure the fastest possible implementation.

Phase Sensitive Methods to Detect Cathodic Disbondment
Gas Technology Institute

The objective is to develop a phase sensitive technology that could detect coating disbondment on steel pipe from above ground, thus locating potential corrosion failure points. The system would consist of two components, a stationary signal generator that is attached to a test point and a detector that is carried along the pipeline. Sinusoidal or pulse excitation signals may be used. A wireless link between the generator and the detector provides accurate synchronization. An abrupt change of signal phase is expected at the disbondment.

Plastic Pipe Failure, Risk, and Threat Analysis
Gas Technology Institute

The objective of the research is to determine the failure risks and threats to plastic gas pipes by conducting failure analyses including a root-cause analysis to identify defects that lead to failure initiation and growth and prioritizing the risks and threats using risk assessment techniques and to identify an inspection technology to mitigate plastic pipe failures, risks and threats.

Design, construction and demonstration of a robotic platform for the inspection of unpiggable pipelines under live conditions
Northeast Gas Association

The objective of the project (part of a three project Consolidated R&D Program) is to develop a robotic platform (TIGRE) that will allow the inspection of presently unpiggable transmission pipelines. The platform, which is based on a locomotor developed for another robotic application in gas pipelines (Explorer; developed for visual inspection of distribution mains), will be able to propel itself independently of flow conditions, and will be able to negotiate all obstacles encountered in a pipeline, such as mitered bends and plug valves. The robot will be powered by batteries, which will have the capability of being recharged during operation by extracting energy from the gas flow. The operator will have live control of the robot using two-way through-the-pipe wireless communication, thus eliminating the need for any tether. The platform will be equipped with a segmented MFL sensor, also able to negotiate all pipeline obstacles, for

NDE of the pipeline. The sensor will be developed through a parallel project, which is part of this Consolidated Program.

Design, Construction and testing of a segmented MFL sensor for use in the inspection of unpiggable pipelines

Northeast Gas Association

The objective of the project (part of a three project Consolidated Program) is to develop a segmented Magnetic Flux Leakage (MFL) sensor and respective module for integration in a robotic platform (TIGRE; being developed through a parallel project, which is part of this Consolidated Program) that will allow the inspection of presently unpiggable transmission pipelines. The sensor will cover only a portion of the pipe's internal surface but should be able to provide the same level of sensitivity and accuracy as a state of the art MFL sensor used in smart pigs. Through multiple passes of the pipe, or through rotation and translation of the sensor down the pipe, the entire surface of the pipe will be inspected.

Augmenting MFL Tools with Sensors That Assess Coating Condition

Battelle Memorial Institute

The objective is to develop new sensors and instrumentation that could work with currently available MFL in-line inspection tools to detect external coating disbondment. Much like the bore diameter sensor and inertial guidance systems that are being added to MFL tools, these sensors would not add substantial cost or complexity to a normal MFL survey. Moreover, coating assessment during in-line inspection will help pipeline owners assess the general health of the coating protecting their pipeline system.

Human Factors Analysis of Pipeline Monitoring and Control Operations

Battelle Memorial Institute

The objective is to systematically apply human factors research and development techniques in meeting two objectives. First, the study will establish an understanding of those human factors that adversely affect the safety, reliability, and efficiency of pipeline monitoring and control operations. Second, guidelines will be developed that can be used by industry to identify human factors problem areas in their operations and develop continuous improvement strategies to improve the effectiveness of pipeline monitoring and control.

Pipeline Integrity Management for Ground Movement Hazards

Pipeline Research Council International

The project objective will address large scale ground movement events related to landslides, long term slope movement and ground subsidence. The objective of the proposed effort will develop recommendations on engineering practices with respect to the assessment of these large scale ground movement geohazards, and guidance to define appropriate and sufficient pipeline design and operational measures for the mitigation of large scale ground displacement effects on buried pipelines.

Corrosion Assessment Guidance for Higher Strength Pipelines
Electricore, Inc.

The project objective is to extend present guidance for assessing corrosion metal loss defects to material grades from X70 to X100 by: 1. Improve an operator's ability to determine the severity of damage from localized corrosion and its reduction on pipeline operating pressures; 2. Develop comprehensive and consistent methods for locating and assessing corrosion in the field; 3. Create better tools and procedures for assessing, managing, and mitigating external force and mechanical damage threats; 4. Provide a sound basis for establishing the interval between successive integrity management assessment; and 5. Address and improve the prevention of pipeline failure due to third party damage.

Development of Dual Field MFL Inspection Technology to Detect Mechanical Damage
Pipeline Research Council International

The objective of the project is to establish the capability of the dual magnetic field MFL technology to detect mechanical damage and discriminate between critical and benign anomalies. This project will entail building a dual magnetization MFL tool and testing in an operating pipeline.

Investigate Fundamentals and Performance Improvements of Current In-Line Inspection Technologies for Mechanical Damage Detection
Pipeline Research Council International

The objective of the project is to evaluate existing in-line inspection tools for detecting, discriminating, and characterizing mechanical damage. The main benefit is to help industry manage the threat of delayed mechanical damage and document the relative value of existing technology versus additional technology, such as the proposed dual field technique, in characterizing mechanical damage and discriminating defects from benign anomalies.

Define, Optimize and Validate Detection and Sizing Capabilities of Phased-Array Ultrasonics to Inspect Electrofusion Joints in Polyethylene Pipes
Edison Welding Institute, Inc.

The objective is to define the detection and sizing capabilities of current state-of-the-art phased-array technique for non-destructive inspection of electrofusion and saddle lap-joints in polyethylene gas distribution pipelines. Additional tasks include the development of an optimized phased-array procedure and determination of the performance of the technique and proposed improvements.

Characterization of Stress Corrosion Cracking Using Laser Ultrasonics
Intelligent Optical Systems, Inc.

The objective of the proposed effort is to apply the proven technologies of laser ultrasonics and finite difference simulation toward the development of a tool that can provide the ability to map the SCC colonies accurately and provide spatially precise 3-dimentional data, and to develop an application that can do so in an efficient manner in the field.

Understanding Magnetic Flux Leakage (MFL) Signals from Mechanical Damage in Pipelines

Electricore, Inc.

The objective of the project is to provide understanding, identification, and characterization of the MFL signals arising from the geometric and residual stress components to enhance the reliability of employing MFL tools for mechanical damage detection.

Method for Qualification of Coatings Applied to Wet Surfaces

CC Technologies Inc.

The objective is to develop a test methodology which addresses the application of rehabilitation and repair coatings on wet surfaces is proposed. The method will encompass the extremes of wet surface coating application, namely a continuously wet and cold surface.

Dissecting Coating Disbondments

CC Technologies Inc.

The objective is to examination of numerous coated pipeline segments; characterize the properties and microstructural features of both disbonded and well bonded regions on each segment received. The project results are expected to determine what really causes a pipeline coating to disbond and fail.

Improved In-field Welding and Coating Protocols

Gas Technology Institute

The objective is to reduce premature coating failures of in-field welded and coated pipeline sections/appurtenances. The project team will survey/summarize current in-field welding/coating practices and interactions and develop protocols to improve welding-coating coordination. The team will weld and coat test sections using the existing and improved protocols and validate improvements with accelerated corrosion/coating tests. A set of clear/concise recommendations will be submitted for incorporation into consensus guides and recommended practices

Effect of Surface Preparation on Residual Stress in Multi-layer and Other Pipeline Coatings

NOVA Research & Technology Centre

The project objective is to improve the performance of multi-layer coatings through an understanding of the factors that affect the level of residual stress in the coating and the consequences for coating disbondment. This improved understanding is expected to 1. Lead to the identification of improved methodologies for surface preparation and coating application, 2. Enable the evaluation of construction or in-service damage on the long-term integrity of the pipeline and, consequently, 3. Result in a greater acceptance by the North American pipeline industry for the use of these inherently safer, advanced coating systems

External Pipeline Coating Integrity
Texas Engineering Experiment Station

The project objective is to systematically investigate the root-cause for coating disbondment and to optimize material properties and coating thicknesses for coating integrity via the following specific steps: 1. Study of effect of surface preparation, cleanliness, anchor profile on initial coating adhesion and adhesion degradation rate; 2, Measurements, analysis, and modeling of the built-in residual stresses of multi-layer coatings and; 3. Prediction of coating disbondment and Recommendation of approaches for preparation of a new generation of multi-layer pipeline coatings

Validation and Documentation of Tensile Strain Limit Design Models for Pipelines
Pipeline Research Council International

The project objective covers the following goals: 1. Obtain high quality experimental data to allow the effects of the most important parameters on the tensile strain capacity of pressurized pipes; 2. Using the experimental data, and building on previous work, determine the accuracy of existing models (FEA and other engineering models) to predict full-scale results, make initial modifications to improve model accuracy and identify requirements for next generation model developments; 3. Prepare initial recommended procedures, for design and material testing, for establishing project-specific, tensile strain limits for pipelines designed using strain based design methods; and 4. Develop next generation tensile strain limit models and strain-based design procedures.

Ultra-Low Frequency Pipe and Joint Imaging System
Northeast Gas Association

The objective is to develop, test and independently assess the commercial viability of a pre-commercial pipe and joint imaging system. Through this project, this product will be further developed, tested and demonstrated to prospective commercial partners that it can locate pipes and cast iron joints in all types of soils, including some of the most difficult soils for imaging; clay soils. As an added feature, this product will locate with accuracy both the horizontal and vertical position of the pipe or underground facility and it will distinguish pipes from other underground clutter in dense environments that are typical of suburban or urban areas.

Differential Impedance Obstacle Detection Sensor (DIOD) - Phase 2
Gas Technology Institute

The project objective is to develop a Differential Impedance Obstacle Device tool that can be coupled with a pipeline drill rig to detect pipeline obstacles in the drill path. The final deliverable is a device that can be commercialized. GTI will conduct a series of in-ground tests to prove that the DIOD can detect obstacles of at least three different materials (plastic, ceramic and metal) in at least three different soil materials (loam, sandy soil, and third type of soil) and demonstrate that the sensor is robust enough to withstand HDD conditions.

Long Term Monitoring of Cased Pipelines Using Long-Range Guided Wave Technologies
Northeast Gas Association

The project objective is to validate the effectiveness of the magnetostrictive sensor (MsS)-based guided-wave technique for long-term structural health monitoring (SHM) of "cased lines" at road crossings for External Corrosion Direct Assessment (ECDA) and Internal Corrosion Direct Assessment (ICDA). The main technical objectives are to develop the capability of defect characterization and long-term condition monitoring of the cased-section of pipelines at road crossings using the long-range guided-wave inspection, and to evaluate and validate the capability in the field.

APPENDIX D

The Peer Review Coordinator (PRC) organizes, coordinates, monitors, and facilitates the annual panel peer review. The PRC is the main contact for panelists and the researchers involved with a peer review and for public inquiries. The PRC for the March 27-29. 2007 peer reviews was Mr. Robert Smith of PHMSA.

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