Peer Review Report

Pipeline & Hazardous Materials Safety Administration

Pipeline Safety Research & Development Program

Peer Reviews Conducted
April 24, 2013

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EXECUTIVE SUMMARY

The Pipeline and Hazardous Materials Safety Administration's (PHMSA) Pipeline Safety Research and Development (R&D) Program is holding annual structured peer reviews of active research projects since 2006 in accordance with mandates by the Office of Management and Budget (OMB) and the Office of the Secretary of Transportation (OST) to maintain research data quality. PHMSA holds these reviews virtually via teleconference and the Internet saving time and resources. This execution is also working well with panelists, researchers, Agreement Officers' Technical Representatives and project co-sponsors. Most impressively, the PHMSA approach facilitates attendance from all U.S. time zones, Canada and Europe.

The annual 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 2013 peer review panel consisted of two retired government and one independent technical consultant.

Six research projects were peer reviewed by expert panelists using 13 evaluation criteria. These criteria were grouped within the following five evaluation categories:

1. Project relevance to the PHMSA mission.
2. Project management.
3. Approach taken for transferring results to end users.
4. Project coordination with other closely related programs.
5. Quality of project results.

The rating scale possibilities were "Ineffective," "Effective," "More than Effective" or "Very Effective." During the April 2013 review, the average program rating between all the evaluation categories was "Very Effective." For this year, 5 projects were rated "Very Effective" with 1 project ranked as "More than Effective." The average sub-criteria scoring were also rated very high and underpin these findings. The majority of peered projects and the overall program rating is up to "Very Effective" from the 2012 rating of "More than Effective." Table 4 summarizes the overall program performance based on the summary of the reviewed projects. Table 5 itemizes the project ranking order, where projects of the same score have an equal ranking. Additional details are available in Section 7 and Tables 4, 5 and in Appendix C 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 found in Appendix A.

1.0 Introduction

The purpose of this document is to report findings from the research peer reviews held April 24, 2013 for PHMSA's Pipeline Safety Research and Development Program. The findings and recommendations in this report are derived 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 reviews and for all influential and highly influential information that the OA plans to disseminate in the foreseeable future.

Through the Information Quality Act[1], Congress directed the 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, that prescribe 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 these peer reviews is to uncover technical problems to keep projects on target or aligned with stakeholder needs and to give technical guidance using technically competent and independent, objective experts. These reviews are held annually for active research projects and usually occur in the second quarter of each calendar year.

2.0 Research Program Background

PHMSA regulates safety in the design, construction, operation and maintenance, and spill response planning for over 2.6 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. Additionally PHMSA aims to reduce spills that harm the environment.

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."

PHMSA has regulatory responsibility for the safety of natural gas and hazardous liquid pipelines. Beginning in 2001, PHMSA began strengthening its role in assuring the safety of the Nation's pipeline system in numerous ways, including promulgating new regulations on integrity

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

management.[2,3,4] These 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 expanded the support for the PHMSA Pipeline Safety R&D Program in 2002.[5] As authorized by Congress, PHMSA sponsors 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 contributes directly to the PHMSA mission by pursuing three program objectives:

1. Fostering the 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.
3. Promoting and improving the state of knowledge for pipeline safety officials so industry and regulatory managers and PHMSA pipeline safety field inspectors can make better decisions with safety issues and resource allocation.

The R&D Program is organized around seven 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.

[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 Element	**Program Element Goal**
1.	Damage Prevention	Reduce the likelihood of incidents and accidents resulting from excavation damage and outside force.
2.	Pipeline Assessment and Leak Detection	Identify and locate critical pipeline defects using inline inspection, direct assessment, and leak detection.
3.	Defect Characterization and Mitigation	Improve the capability to characterize the severity of defects in pipeline systems and to mitigate them before they lead to serious incidents or accidents.
4.	Improved Design, Construction, and Materials	Improve the integrity of pipeline facilities through enhanced materials, and techniques for design and construction.
5.	Enhanced Operation Controls and Human Factors Management	Improve the safety of pipeline operations through enhanced controls and human factors management.
6.	Risk Management & Communications	Reduce the probability of incidents and accidents, and mitigate the consequences of hazards to pipelines.
7.	Safety Issues for Emerging Technologies	Identify and assess emerging pipeline system technologies for opportunities to enhance safety.

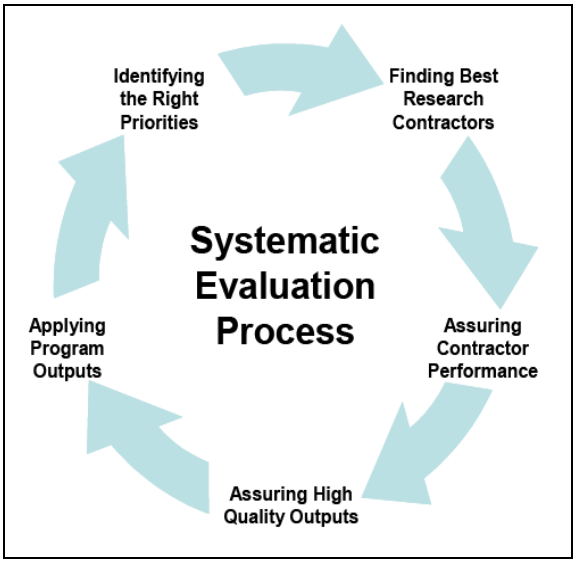
More information on the program strategy is outlined in the R&D Program Strategic Plan and on the program website at http://primis.phmsa.dot.gov/rd/

Research Program Quality

While the program addresses the general strategy, a systematic evaluation process has been 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. Please visit http://primis.phmsa.dot.gov/rd/evaluation.htm to view more information on this process.

Figure 1. Systematic Evaluation Process



The quality of the research projects is first established while identifying the right priorities. This roadmapping at joint Government and industry R&D forums and other meetings collaboratively identifies the right priorities and structures the projects to meet end user technical needs. This allows government and industry pipeline stakeholders to agree on the technical gaps and challenges for future R&D. It also minimizes 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 composed of representatives from Federal and State agencies, industry operators, and trade organizations uses strong evaluation criteria to review research white papers and proposals.

PHMSA uses its Management Information System (MIS) to assure that 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 that 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 Agreement Officers' Technical Representatives (AOTRs) who are trained, certified, and designated to each project in accordance with 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 which means that the results are used by end users.

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 and panelists can range from academics to active and/or retired personnel from regulators, academics, independent consultants and standards developing organizations.

The 2013 peer review panel consisted of two retired government and one independent technical consultant. Table 2 identifies the panelists.

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

Table 2. Peer Review Panelists

	Name	Affiliation
1	Richard Fields	Department of Commerce, National Institute of Standards and Technology (retired)
2	Paul Martin	Department of the Interior, Minerals Management Service (Now, the Bureau of Safety and Environmental Enforcement) (retired)
3	Ayman Eltaher	Independent Technical Consultant

4.0 Panelist Charge

The Peer Review Panelist charge, initially developed in December 2005 and revised annually, 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 whether the scientific and technical studies 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 review focused, high-level presentations from researchers addressing 13 evaluation criteria within five specific evaluation categories. Presentations are scheduled to take no more than 20 minutes followed by ten minutes for panelist questions including any possible written public questions. In its entirety, the review of each project by the panelists should occupy approximately 2.5 hours. This entails the time to

review project background information including reporting, the advance copy of the review slides, 30 minutes of review and questioning from the panel and the time in post review including possible follow up questioning, consensus review meeting and review of the peer review report. 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. Scorecards for rating performance on the specific categories are provided to the panelists. Each category has equal rating from one to five. The scorecard included the following questions in five performance categories:

1. Project relevance to PHMSA mission.

- How well does the project illustrate its relevance for enhancing pipeline safety and or protecting the environment?
- How well does the project address its relevance to research program goals (technology gap, consensus standard or produce general knowledge)?

2. Project management.

- How well is the project making progress toward the work scope objectives and the PHMSA goals?
- How well is the project being managed (on budget and schedule)?

3. Approach taken for transferring results to end users.

- Is there a plan for dissemination of results, including publications, reporting?
- How much end user involvement is incorporated into the work scope?
- For results that may include marketable products and technologies, are commercialization or U.S. Patent plans established?

4. Project coordination with other related programs.

- Does the project build on, or make use of, related or prior work?
- Is the work of the project being communicated to other related research efforts?
- Has consideration been given to possible future work?

5. Quality of project 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 presented in such a manner as to be useful for identified end users?

Essentially, projects rating well on these criteria are expected to have a high likelihood of success in the objectives they were designed to accomplish.

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

Table 3. Peer Review Rating Conversion	
Rating Scale	
Very Effective	4.5 - 5.0
More than Effective	3.0 – 4.4
Effective	1.9 - 2.9
Ineffective	0.0 – 1.8

The rating scale is defined to illustrate how well a project is addressing the goals of the peer review.

Very Effective
The most clarity of method in accomplishing the purpose; producing the intended or expected result in a superior manner.

More than Effective
Better, clearer and more distinct in accomplishing the purpose; producing the intended or expected result in more than a satisfactory manner.

Effective
Adequate to accomplish the purpose; producing the intended or expected result in a satisfactory manner.

Ineffective
Not effective; not producing desired results; ineffectual or lacking in the details to support a satisfactory desired outcome.

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 April 2013 review varied among welding, corrosion mitigation, biofuels, technological, and general knowledge focused projects. A short description of each peer reviewed project is found in Appendix D.

7.0 Peer Review Findings

During the April 2013 review, the average program rating among all the evaluation categories was “Very Effective.” For this year, 5 projects were rated “Very Effective” with 1 project ranked as “More than Effective.” The average sub-criteria scoring were also rated very high and underpin these findings. The majority of peered projects and the overall program rating is up to

"Very Effective" from the 2011 rating of "More than Effective." Table 4 summarizes the overall program performance based on the summary of the reviewed projects. Table 5 itemizes the project ranking order, where projects of the same score have an equal ranking.

At the time of the reviews, the majority of the projects were approximately 90-100 percent complete with a remaining couple 70 to 80 percent complete.

The panelists made several recommendations in the course of the review. These recommendations were categorized into "Strong" and "Weak" points and were associated with each project. However, none of these comments identified critical actions required to salvage a project from failing, but recommended actions to further improve upon good performance.

Appendix C, Table 6 itemizes the strong and weak points collected from all 6 projects reviewed by the three panelists. These points were consistent among several panelists and are reflected in the scoring of multiple evaluation categories. Any specific recommendations will be disseminated to researchers and AOTRs as necessary so individual decisions on scope changes can be determined.

Table 4. Summary of Total Average Score & Rating for the Review Categories and Sub-Criteria		
Review Categories and Sub-Criteria	**Score**	**Rating**
1. Project relevance to PHMSA mission.	**4.9**	**Very Effective**
1.1. How well does the project illustrate its relevance for enhancing pipeline safety and or protecting the environment?	4.9	Very Effective
1.2. How well does the project address its relevance to research program goals (technology gap, consensus standard or produce general knowledge)?	4.9	Very Effective
2. Project Management.	**4.6**	**Very Effective**
2.1. How well is the project making progress toward the work scope objectives and the PHMSA goals?	4.6	Very Effective
2.2. How well is the project being managed (on budget and schedule)?	4.6	Very Effective
3. Approach taken for transferring results to end users.	**4.7**	**Very Effective**
3.1. Is there a plan for dissemination of results, including publications, reporting?	4.7	Very Effective
3.2. How much end user involvement is incorporated into the work scope?	4.7	Very Effective
3.3. For results that may include marketable products and technologies, are commercialization or U.S. Patent plans established?	4.8	Very Effective
4. Project coordination with other related programs.	**4.8**	**Very Effective**
4.1. Does the project build on, or make use of, related or prior work?	4.9	Very Effective
4.2. Is the work of the project being communicated to other related research efforts?	4.6	Very Effective
4.3. Has consideration been given to possible future work?	4.8	Very Effective
5. Quality of project results.	**4.7**	**Very Effective**
5.1. Are the intended results supported by the work performed during the project?	4.7	Very Effective
5.2. Are the intended results consistent with scientific knowledge and/or engineering principles?	4.8	Very Effective
5.3. Are the intended results presented in such a manner as to be useful for identified end users?	4.6	Very Effective
Program Summary:	**4.7**	**Very Effective**

Table 5. Summary Ranking & Rating of Individually Reviewed Research Projects					
Rank	**Project ID**	**Project Title**	**Contractor**	**Rating**	**Score**
1	DTPH56-10-T-000009	MWM-Array Characterization of Mechanical Damage and Corrosion	JENTEK Sensors, Inc.	Very Effective	4.9
1	DTPH56-11-T-000003	Comprehensive Study to Understand Longitudinal ERW Seam Failures	Battelle Memorial Institute	Very Effective	4.9
1	DTPH56-10-T-000014	Selection of Pipe Repair Methods	Operations Technology Development	Very Effective	4.9
2	DTPH56-10-T-000021	Advanced Learning Algorithms for the Proactive Infrasonic Pipeline Evaluation Network (PIGPEN) Pipeline Encroachment Warning System	Physical Sciences, Inc.	Very Effective	4.7
3	DTPH56-08-T-000019	Advanced Development of Proactive Infrasonic Gas Pipeline Evaluation Network	Northeast Gas Association/NYSEARCH	Very Effective	4.6
4	DTPH56-10-T-000001	Cost-Effective Techniques for Weld Property Measurement and Technologies for Improving Weld HE and IGSCC Resistance for Alternative Fuel Pipelines	University of Tennessee	More than Effective	4.4

8.0 PHMSA Official Response to Panelists Findings and Recommendations

The CY 2013 reviews were the eighth structured peer review of PHMSA's 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. The panel indicated that some immediate actions can be taken to further safeguard research projects in achieving contractual milestones. These recommendations are summarized in Appendix C, Table 6. PHMSA will address specific recommendations with the project co-sponsor and the researcher and will use these to improve the likelihood that project scopes can achieve proposed goals. The official PHMSA response memorandum can be found in Appendix A.

PHMSA will continue refining the annual peer review process as needed and by incorporating feedback submitted by the researchers and peer review panelists. Other specific recommendations from panelists will be disseminated to researchers and AOTRs.

A number of initiatives are planned to provide further guidance on commercialization of technology projects and better coordination with projects strengthening standards. These program initiatives will bring transparency to the panel's recommendations. PHMSA can still make improvements even with high annual ratings.

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

JUL 16 2013

MEMORANDUM FOR THE RECORD

From: Jeffrey D. Wiese, Associate Administrator for Pipeline Safety

Subject: Pipeline Safety Research Program Peer Reviews, April 24, 2013

SUMMARY

The Pipeline and Hazardous Materials Safety Administration (PHMSA) is pleased with the process for conducting these reviews as well as with the findings and recommendations provided by the peer review panelists. The average quality rating for the reviewed projects improved from "More Than Effective" in CY 2012 to "Very Effective" in CY 2013, which is the highest possible rating and indicates that these projects are performing well and are on track to deliver the desired results. In addition, a number of suggestions were identified by the panelists for maintaining or improving research quality.

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

PHMSA will continue refining the process, the review criteria, and the guidance so future review outcomes better support our goals.

RECOMMENDATION

The PHMSA Pipeline Safety Program accepts the findings and recommendations summarized in the Peer Review Report.

The Associate Administrator for Pipeline Safety

APPROVED: _____

DISAPPROVED: _____

COMMENTS: _____

DATE: JUL 16 2013

APPENDIX B

Peer Review Panelist Bios

Richard Fields; Ph.D.

Related Experience:

R. J. Fields has conducted metallurgical research and participated in mechanical test standards development activities for nearly 40 years. He is currently the US representative on the Ductility Subcommittee of ISO, Chairman of the American Society of Testing and Materials (ASTM) Subcommittee on Ductility and Formability, and an active member of the ASTM Fire Resistive Steel Task Group and the National Materials Advisory Board's Committee on Corrosion Prevention Standards for Ductile Iron Pipe. He received a Bronze Medal from the Bureau of Standards for his research on fracture and crack arrest in high strength steels and a Silver Medal from the Department of Commerce for research on mechanical properties and modeling. From 2002 until 2004, he was the principal technical investigator on metallurgical aspects of the congressionally mandated investigation of the collapse of the World Trade Center Towers. He has performed research and written numerous papers relevant to the prediction of fracture behavior in pipeline steels. In particular, he was principal author on National Institute of Standards and Technology (NIST) Report 89-4136 written at the request of Senators Bond and Danforth entitled "An Assessment of the Performance and Reliability of Older Electric Resistance Welding (ERW) Pipelines". He was appointed by Secretary of Transportation E. Dole to the Office of Pipeline Safety's Hazardous Liquid Pipeline Safety Committee and served for six years, three of these as secretary. He was also part of a research team that developed experimental and analytical methods to assess the high rate fracture and crack arrest behavior of high strength pipeline steels.

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 1977 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 programs for the US Navy, the Federal Railroad Administration, the National Transportation Safety Board, and the Nuclear Regulatory Commission. More recently, R. J. Fields was Group Leader for the Materials Performance Group in NIST's Metallurgy Division.

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. 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 available on request.

Professional Society Membership:

R. J. Fields is a member of ASTM International and the American Academy of Mechanics.

Paul E. Martin; B.S., & M.B.A.

Retired in 2003 as Chief, Engineering and Research Branch for the former Minerals Management Service (Now, the Bureau of Safety and Environmental Enforcement) of the US Department of the Interior, where he directed the research activities for 8 years for the Technology Assessment and Research and Oil Spill Response Research programs. These programs were responsible for identifying and funding research activities with universities, private companies, and Government research laboratories to assess safety-related activities associated with all aspects of offshore oil and gas operations. He served on the Industry Advisory Board for the Offshore Technology Research Center for Texas A&M University, Industry Advisory Board for the Potential Gas Committee for the American Gas Association, and consultant for the Technology & Management Services, Inc. in the evaluation of proposed research proposals for the Research Project to Secure Energy for America (RPSEA).In his 34 years with the Department of the Interior, Mr. Martin also served as Chief of the Resource Evaluation, Regional and District Supervisory positions charged with overseeing drilling operations off the Atlantic coast, as well as numerous staff positions in the MMS Gulf of Mexico offices. He graduated from West Virginia University in 1970 with a BS in Petroleum Engineering and earned a Masters of Business Administration degree from Loyola University of New Orleans in 1978.

Ayman Eltaher; Ph.D., P.E., C.Eng., FIMarEST

Dr. Eltaher has more than 20 years of experience in engineering, of which more than 12 years have been devoted to research in geotechnical and structural mechanics and dynamics, soil-structure interaction and pipeline and riser engineering. He has more than 3 years of practical experience with concrete and steel design of super-structures and foundations of residential and commercial buildings, as well as, soil testing, reporting and analyzing soil stratification for inland and offshore sites. More than 7 years of experience with offshore structural design, analysis and plan review, mainly of steel buildings and foundations and anchors of floating structures, as well as, analysis and design of subsea structures and pipelines. In the last 7 years, he expanded his experience to pipeline and riser engineering and research.

In ABS, Dr. Eltaher was involved with infra and super-structural designs of a great number of

structural and geotechnical projects, in different parts of the world (offshore GoM, West Africa, Australia, Brazil, etc.), different geotechnical conditions, and geologic settings. Examples of projects he worked on are Shell's Brutus, BP's Na Kika, Horn Mountain and Holstein, Kerr-McGee's Nansen, Boomvang, Red Hawk and Constitution, several of Petrobras's FPSO's, and many more.
As the Deputy Manager of the Advanced Engineering Group (AEG) of J P Kenny, Dr. Eltaher participated in the analysis, design and/or review of subsea structures, pipelines and/or piles and suction piles for projects like BP's Horn Mountain, Dorado, and Subsea Flowline and SPS standardizations; Helix's Phoenix Export Line PLETs; and ExxonMobil's Hibernia Offloading System. He also performed specialized studies such as strain localization and structural reliability studies for BP's XHPHT pipelines. He worked as the Technical Lead in a gas injection study for Husky's White Rose field and in an upheaval buckling study for Chevron.

Dr. Eltaher currently is the global Engineering Technical Authority of MCS Kenny; where he is responsible for the integrity of the quality of the engineering work within the company and across different disciplines.

APPENDIX C

Table 6 – Peer Reviewed Project Strong and Weak Points

(In Agenda Order)

Project Title	Strong Points	Weak Points
MWM-Array Characterization of Mechanical Damage and Corrosion - *JENTEK Sensors, Inc.*	Very relevant to PHMSA mission challenges. High likelihood of commercialization. Builds well off of prior work. Strong end user involvement. Well disseminated papers and reports.	No major points noted.
Cost-Effective Techniques for Weld Property Measurement and Technologies for Improving Weld HE and IGSCC Resistance for Alternative Fuel Pipelines – *University of Tennessee*	Testing regime very well matched to expected pipeline conditions. Builds well off of prior work. Strong involvement from ASME.	Schedule difficulties are apparent. More information would be useful on what portions of ASME hydrogen piping standard would be impacted by project results. More correlation needed to compare to field conditions. More narrative should be provided on why certain tests were conducted and not others related to the hydrogen embrittlement threat.
Advanced Development of Proactive Infrasonic Gas Pipeline Evaluation Network – *Northeast Gas Association/ NYSEARCH*	Promising results. Strong end user involvement. Builds well off of prior work and from overcoming early setbacks. High likelihood of commercialization.	Proprietary considerations aside, need more information disseminated on capabilities. Related project by PSI did much better job with elaboration.
Advanced Learning Algorithms for the Proactive Infrasonic Pipeline Evaluation Network (PIGPEN) Pipeline Encroachment Warning System – *Physical Sciences, Inc.*	Builds well off of prior work. Strong end user involvement. Logical strengths illustrated in algorithm development.	Looking for more information on project management in particular project costs to date in executing the scope.
Comprehensive Study to Understand Longitudinal ERW Seam Failures – *Battelle Memorial Institute*	Promising results. Strong end user involvement. Good communication with other related efforts. Early project challenges were resolved due to good project leadership.	No major points noted.
Selection of Pipe Repair Methods - *Operations Technology Development NFP*	Good job of showing lineage to prior work and connection to possible future work. Directly related to standards. Strong project management keeping costs and timeline as originally proposed.	Looking for some expert opinion on comparing these results to other non-composite type repair methods.

APPENDIX D

Peer Review Project Summaries
(In Agenda Order)

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

MWM-Array Characterization of Mechanical Damage and Corrosion

JENTEK Sensors Inc.

This project will advance the JENTEK Meandering Winding Magnetometer (MWM) -Array technology to provide quantitative characterization of corrosion and mechanical damage. This includes characterization through coatings/insulation; followed by higher resolution imaging with coatings/insulation removed. For mechanical damage, quantitative characterization includes geometric variations and multidirectional residual stresses (near the surface and deeper within the pipeline). In addition, this project will develop capability to detect cracks at damage sites. For corrosion, enhanced high resolution imaging of both external and internal corrosion will be developed for specific applications to support life management decisions. This team will build on demonstrated MWM-Array (and MR-MWM-Array) detection capabilities to deliver substantially enhanced characterization of damage and practical means for implementation. Matching funding will be provided by Chevron, BP, TransCanada, PRCI, GDF Suez and others.

Cost-Effective Techniques for Weld Property Measurement and Technologies for Improving Weld HE and IGSCC Resistance for Alternative Fuel Pipelines

The University of Tennessee

Comprehensive knowledge of mechanical properties of pipeline steels in high-pressure hydrogen is essential for the structural integrity of a pressurized hydrogen transport system. This project focuses on obtaining much needed data on fracture toughness and fatigue life for weld regions. For testing of weld regions, cost-effective testing techniques developed in previous federal-funded programs will be further refined and applied to investigate the effects of pressure and temperature on the degradation of weld fracture toughness in high-pressure hydrogen. A novel cost-effective low-frequency fatigue test apparatus will be developed to determine the weld fatigue life under realistic in-service cyclic loading frequencies of hydrogen pipelines. These property data will be critical to support industry consensus standards for hydrogen transport via pipeline, and to support the design and maintenance operation by pipeline operators. In addition, advanced welding techniques will be demonstrated to control the weld residual stress and to tailor the weld microstructure for improving weld resistance to Hydrogen Effects and Inter Granular Stress Corrosion Cracking.

Advanced Development of Proactive Infrasonic Gas Pipeline Evaluation Network
Northeast Gas Association/NYSEARCH

The primary objective of this project is to advance the PIGPEN technology to pre-production status by completing development of advanced algorithms, field testing in a range of pre-production scenarios and developing practical procedures for deploying and utilizing the technology. This effort will address PHMSA's and Industry's need to develop technology that will monitor encroachment and prevent damage while construction equipment is digging and/or boring.

Advanced Learning Algorithms for the Proactive Infrasonic Pipeline Evaluation Network (PIGPEN) Pipeline Encroachment Warning System
Physical Sciences Inc.

Physical Sciences Inc. (PSI), with American Innovations Ltd. (AI) and NYSEARCH, are addressing the technology gap of Early Warning Damage Prevention Monitoring Systems, specifically Advanced Development of Algorithms for Detecting Digging Threats and Avoiding Alarms. This research will implement and evaluate self-training algorithms in the Proactive Infrasonic Gas Pipeline Evaluation Network (PIGPEN) autonomous distributed seismic sensor system. PIGPEN provides real-time warning of unauthorized right-of-way encroachment and excavation activity near a pipeline. Early warning enables a response to the potential intrusion in time to prevent pipeline damage, and thus preclude the additional cost and risk of repairs. The ideal PIGPEN alarm system would activate an intruder notification with 100% reliability and no false alarms. The project will enhance reliability by enabling PIGPEN to learn the characteristics of its local environment and optimize its intruder detection algorithms based on learned experience. Field tests are expected to demonstrate better than 97% alarm reliability with few false alarms.

Comprehensive Study to Understand Longitudinal ERW Seam Failures
Battelle Memorial Institute

The objective of the proposed project is to assist PHMSA in favorably closing National Transportation Safety Board (NTSB) Recommendation P-09-1 arising from the Carmichael MS pipeline rupture involving an ERW seam, which directed that PHMSA conduct a comprehensive study of ERW pipe properties and the means to assure that they do not fail in service. Three primary objectives –

1. Integrate industry and PHMSA data to quantify vintage seam failure statistics with focus on LFERW seams;
2. Understand longitudinal ERW seam failures and on that basis quantify the effectiveness of inspection and hydrotesting to manage integrity and ensure safety to avoid/eliminate catastrophic failures; and
3. Combine outcomes of the first two objectives to help favorably close NTSB Recommendation P-09-1

Selection of Pipe Repair Methods

Operations Technology Development

The research project will establish procedures and perform long-term tests to evaluate the performance of metallic and composite pipe repair methods, improve the selection and installation of the repair methods, and ultimately reduce the risks associated with faulty or ineffective repairs. The results will allow operators to properly select repair systems based on sound engineering tests. Working with the manufacturers will accelerate the implementation of the results that the industry needs regarding the products' long-term reliability. The work will benefit industries with transmission lines as well as utility distribution lines. The benefit of the results will not only be useful for the natural gas industry but will extend to cover liquid transmission pipes.

APPENDIX E

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 2013 peer reviews was Mr. Robert Smith of PHMSA.

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