



THE SECRETARY OF TRANSPORTATION  
WASHINGTON, D.C. 20590

JAN 29 2007

The Honorable Daniel K. Inouye  
Chairman  
Committee on Commerce,  
Science, and Transportation  
United States Senate  
Washington, DC 20510

Dear Mr. Chairman:

Enclosed is the U.S. Department of Transportation's Pipeline and Hazardous Materials Safety Administration's Report on the Qualification of Pipeline Personnel, as required by 49 U.S.C. § 60131(h) as added by the Pipeline Safety Improvement Act of 2002, Public Law 107-355.

The Act requires the U.S. Secretary of Transportation to report on the status and results to date of the regulations on the qualification of pipeline personnel issued under the Act. As directed by section 13(b) of Public Law 107-355, the Report includes the results of the pilot program on certifying individuals who use computer-based systems to operate pipelines.

An identical letter and report has been sent to the Co-Chairman of the Senate Committee on Commerce, Science, and Transportation, the Chairman and Ranking Member of the House Committee on Energy and Commerce, and the Chairman and Ranking Member of the House Committee on Transportation and Infrastructure.

Sincerely yours,

A handwritten signature in cursive script that reads 'Mary E. Peters'.

Mary E. Peters

Enclosure



THE SECRETARY OF TRANSPORTATION  
WASHINGTON, D.C. 20590

JAN 29 2007

The Honorable Ted Stevens  
Co-Chairman  
Committee on Commerce,  
Science, and Transportation  
United State Senate  
Washington, DC 20510

Dear Senator Stevens:

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JAN 29 2007

The Honorable John D. Dingell  
Chairman  
Committee on Energy  
and Commerce  
U.S. House of Representatives  
Washington, DC 20515

Dear Mr. Chairman:

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THE SECRETARY OF TRANSPORTATION  
WASHINGTON, D.C. 20590

JAN 29 2007

The Honorable Joe Barton  
Ranking Member  
Committee on Energy  
and Commerce  
U.S. House of Representatives  
Washington, DC 20515

Dear Congressman Barton:

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THE SECRETARY OF TRANSPORTATION  
WASHINGTON, D.C. 20590

JAN 29 2007

The Honorable James L. Oberstar  
Chairman  
Committee on Transportation  
and Infrastructure  
U.S. House of Representatives  
Washington, DC 20515

Dear Mr. Chairman:

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Mary E. Peters

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THE SECRETARY OF TRANSPORTATION  
WASHINGTON, D.C. 20590

JAN 29 2007

The Honorable John L. Mica  
Ranking Member  
Committee on Transportation  
and Infrastructure  
U.S. House of Representatives  
Washington, DC 20515

Dear Congressman Mica:

Enclosed is the U.S. Department of Transportation's Pipeline and Hazardous Materials Safety Administration's Report on the Qualification of Pipeline Personnel, as required by 49 U.S.C. § 60131(h) as added by the Pipeline Safety Improvement Act of 2002, Public Law 107-355.

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Enclosure



U.S. Department Of Transportation  
Pipeline and Hazardous Materials Safety Administration

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**REPORT TO CONGRESS:**  
**QUALIFICATION OF PIPELINE PERSONNEL**

December 17, 2006

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

## Executive Summary

The Pipeline Safety Improvement Act of 2002<sup>1</sup> (PSIA 2002) requires the Secretary of Transportation to transmit a report to Congress on the current status and results of the personnel qualification regulations by December 17, 2006. The Department of Transportation's Pipeline and Hazardous Materials Safety Administration (PHMSA) issued these regulations in 1999 and amended them in 2005 to reflect passage of PSIA 2002.<sup>2</sup> Throughout this report, we refer to these personnel qualification regulations as the operator qualification (OQ) regulations. The OQ regulations require pipeline operators to develop qualification programs and to qualify their personnel. The PSIA 2002 requires the Secretary to develop standards and criteria for qualification programs - including several specified elements, to review the qualification programs of pipeline operators, and to verify compliance.

During the three years following the enactment of PSIA 2002, PHMSA satisfied these mandates by completing an extensive program to assure the public and ourselves that people doing safety work on pipelines are qualified to do the work. The PHMSA prepared for implementing the program by documenting clear expectations for operator programs and involving stakeholders in designing the evaluation structured around a set of standards.

- Within four months of the enactment of PSIA 2002, PHMSA completed a series of four public meetings where stakeholders agreed on the standards and criteria for judging the adequacy of OQ programs. The standards and criteria are in the form of inspection protocols and responses to frequently asked questions.
- The PHMSA posted these standards and criteria on its website and interacted with operator trade associations and OQ service providers to clarify regulatory expectations of pipeline operators.
- The PHMSA used these standards and criteria to train and qualify Federal and State personnel to inspect operator OQ programs. There are 371 personnel now trained and qualified to carry out OQ program inspections. The PHMSA accomplished training and qualification of inspectors through the innovative use of computer-based training and testing.
- The PHMSA amended the regulations to require operators to conduct "training as appropriate" and to disallow the use of observation of on-the-job performance as a sole method of evaluating qualifications. The amendment also requires operators to make their OQ programs available for review by PHMSA and State pipeline safety agencies and to notify PHMSA and the State pipeline safety agencies of significant changes to their OQ programs.

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<sup>1</sup> 49 U.S.C. § 60131(h); Pub. L. No. 107-355, December 17, 2002.

<sup>2</sup> 49 C.F.R. part 192, subpart N; 49 C.F.R. part 195, subpart G; as added by 49 Fed. Reg. 46865 (Aug. 27, 1999) and amended by 70 Fed. Reg. 10335 (Mar. 3, 2005).

- Recognizing the limited resources of the smallest operators, PHMSA, State pipeline safety agencies, and trade associations developed a model plan and compliance guidance to assist these operators in developing OQ programs to meet the regulations.

While it is too early to attribute performance trends solely to the OQ program with any certainty, The PHMSA has recently observed a reduction in the number of incidents and accidents attributed to operator error. We have gathered operator performance information both by inspecting OQ programs and by exploring progress at two public meetings. Major results from our program include the following:

- The PHMSA and State pipeline safety agencies completed initial inspection of OQ programs for all federally-regulated operators and most State-regulated operators. The PHMSA and the State pipeline safety agencies assembled electronic records of the inspection results using electronic inspection forms uploaded to an online OQ database.
- By December 31, 2005, Federal and State inspectors recorded 3,908 inspections in the database. This represents more than 99 percent of gas and hazardous liquid transmission pipeline mileage and more than 95 percent of distribution pipeline mileage. The PHMSA and the State pipeline safety agencies use these records to evaluate overall industry compliance.
- Both Federal and State inspectors use the spectrum of enforcement tools available to them to improve safety performance by moving non-compliant operators into compliance with the regulations. During headquarters inspections of operator programs, Federal inspectors identified needed corrective action in 148 of the 221 inspections conducted prior to the congressionally mandated date of December 31, 2005. The PHMSA chose enforcement action appropriate to the corrective action needed. The PHMSA issued 37 notices alleging violation of regulations, 119 notices alleging procedural inadequacy not amounting to violation, 29 proposed civil penalties, 30 proposed compliance orders, and 19 Warning Letters or Letters of Concern for less serious deficiencies. The total amount of civil penalty assessed was \$1,195,800. The most frequent violation identified was operator deficiencies in assuring individuals can recognize and react to abnormal operating conditions. Operators typically remedied these deficiencies by carrying out supplemental training. Operators modified their programs to address other types of deficiencies identified.
- The National Association of Pipeline Safety Representatives provided information on non-compliance from headquarters inspection of operator programs in 29 States. These States identified 2,332 notices of probable noncompliance, 789 notices of amendment, 153 letters of concern, and 54 civil penalties amounting to \$173,525. As with Federal inspections, operators modified their programs to address identified deficiencies.
- As evidence of the effectiveness of these efforts, operators and their service providers have shown a strong willingness to quickly address inspection findings and improve their OQ programs.

- The PHMSA and our State partners were also key participants in the development of a comprehensive national consensus standard on pipeline personnel qualification. This standard, issued in September of 2006, will serve as a resource to enable operators to improve performance by strengthening their OQ programs.

The PHMSA conducted a public meeting on December 15, 2005 to reveal information about the efforts completed and significant resources committed by the industry to establish, maintain, and continuously improve OQ programs. The meeting explored the results achieved to date. Especially important among these results is an early indication of a reduced number of incidents and accidents attributed to operator error. Operators have reported the following results clearly attributable to the program:

1. Improved operational ability and safety.
2. Increased training of employees and contractors with concomitant improvement in knowledge and skills of individuals performing covered tasks.
3. Improved operating and maintenance procedures for many operators.
4. Increased awareness and understanding of applicable regulatory requirements.

Events attributable to human error and to operator excavation damage have been on a downward trend over the past five years. Because the number of such events is small, and because operator programs continue to mature, it is too soon to attribute these trends with great certainty to the OQ program.

The PSIA 2002 also directs the Secretary to conduct a pilot program for certifying the qualifications of individuals who operate computer-based systems for controlling the operations of pipelines and to include the results of the pilot program in this report to Congress. On the basis of the pilot program, PHMSA concludes a nationally administered standard certification test for controller qualifications would provide limited value due to the diversity in control room equipment and the differences in tasks the controllers perform. The PHMSA found validating the adequacy of controller-related processes, procedures, training and the controllers' credentials would improve management of control rooms, enhancing safety for the public and pipeline employees. The PHMSA identified, and is considering options to address several areas in which additional measures could enhance control room safety and minimize risk associated with fatigue and man-machine interaction. These areas include annual validation of controller qualifications by senior level executives of pipeline companies, clearly defined responsibilities for controllers in responding to abnormal operating conditions, the use of formalized procedures for information exchange during shift turnover, and clearly established shift length combined with education on strategies to reduce the contribution of non-work activities to fatigue. Other options under consideration include sponsoring a workshop to promote best practices and developing a generic simulation tool to assist small operators in training their controllers.

The PHMSA has learned several lessons during this process. We plan to act on these lessons through modest revision of existing OQ regulations and the publication of additional guidance to

promote more consistent understanding of regulatory expectations among operators. We also plan further updating action on measures to enhance controller performance and to implement those measures we believe will provide the best opportunity to improve safety. These changes are part of the continuing PHMSA effort to promote improved safety performance through institutionalization of OQ programs and continuous improvement of regulatory and operator practices, including management of pipeline control.

## Contents

<b>SECTION 1: PROGRAM OVERVIEW .....</b>	<b>1</b>
1.1 Pipeline Safety Improvement Act of 2002.....	1
1.2 Establishing Standards and Criteria.....	1
1.3 American Society of Mechanical Engineers (ASME) Standard on Pipeline Personnel Qualification.....	2
1.4 Inspection Preparation .....	2
1.5 Inspection Results .....	3
1.6 Direct Final Rule Incorporated Statutory Changes for OQ.....	4
1.7 December 2005 Public Meeting on OQ .....	5
<b>SECTION 2: INSPECTION OBJECTIVES AND APPROACH.....</b>	<b>7</b>
2.1 Clarifying Expectations through Protocols and Frequently Asked Questions .....	7
2.2 OQ Inspector Training and Testing .....	7
2.3 Small Operator Guidance and State Initiatives .....	8
2.4 Periodic Reset Meetings.....	9
2.5 OQ Database .....	9
2.6 Consistency of Federal Enforcement.....	9
<b>SECTION 3: INSPECTION STATUS AND RESULTS.....</b>	<b>10</b>
3.1 Stages of Enforcement .....	10
3.2 Treatment of "Training as Appropriate" .....	10
3.3 Initial Inspection Results (2002-2003).....	10
3.4 Inspections through 2005.....	10
3.5 Completeness of Inspections .....	11
3.6 Field Verification .....	12
<b>SECTION 4: IMPACT ON OPERATIONS .....</b>	<b>13</b>
4.1 OQ Programs and Small Operators.....	13
4.2 Initial Qualification and Requalification of Employees and Contractors.....	13

4.3	Completeness of Covered Task Lists.....	14
4.4	Suspension of Qualifications .....	14
4.5	Records Retention.....	14
4.6	Compliance Actions .....	15
4.7	Institutionalizing OQ.....	15
4.8	Operator Awareness and Management Involvement .....	16
4.9	Feedback Following the December 2005 Public Meeting on OQ.....	16
<b>SECTION 5: FUTURE EFFORTS.....</b>		<b>17</b>
5.1	Continuing Inspections of Operator Qualification Programs.....	17
5.2	Monitoring Performance.....	17
5.3	Clarification of OQ Regulations .....	17
<b>SECTION 6: PILOT ON CERTIFYING PIPELINE CONTROLLERS.....</b>		<b>20</b>
<b>ATTACHMENT 1: HISTORY OF OPERATOR QUALIFICATION (OQ) REQUIREMENTS.....</b>		<b>22</b>
<b>ATTACHMENT 2: MAJOR OQ ISSUES IDENTIFIED AT JANUARY 2003 PUBLIC MEETING.....</b>		<b>28</b>
<b>ATTACHMENT 3: OPERATOR QUALIFICATION RULE PROCESS FLOW.....</b>		<b>29</b>
<b>ATTACHMENT 4: RESULTS FROM SURVEYS AND FEEDBACK FOLLOWING THE DECEMBER 2005 PUBLIC MEETING .....</b>		<b>30</b>

### Tables

Table 1. Initial Inspections	11
Table 2. Top Ten Overall Inspection Issues	11
Table A.1-1 Timeline of Key Actions on Operator Qualification	23
Table D.1.-1. Detailed Survey Results	31

### Figures

Figure C.1-1. Operator Qualification Rule Process Flow	29
Appendix: List of Acronyms	vii

**List of Acronyms**

ASME	American Society of Mechanical Engineers
CBT	Computer-Based Training
DOT	Department of Transportation
FAQs	Frequently Asked Questions
INGAA	Interstate Natural Gas Association of America
NAPSR	National Association of Pipeline Safety Representatives
NPRM	Notice of Proposed Rule Making
NTSB	National Transportation Safety Board
OQ	Operator Qualification
PHMSA	Pipeline and Hazardous Materials Safety Administration
PSIA 2002	The Pipeline Safety Improvement Act of 2002
SCADA	Supervisory Control And Data Acquisition

## **Section 1: Program Overview**

The industry and regulatory communities have worked over the years to prevent operator error and the possible damage to public safety, property, and the environment, which can result. Three incidents in the 1980s caused the National Transportation Safety Board (NTSB) to recommend the development of qualification requirements for pipeline personnel carrying out safety duties required by regulation. In addition, Congress directed regulatory action on Operator Qualification (OQ) in statutes enacted in 1992, 1996, and 2002. This section contains an overview of PHMSA program following the Pipeline Safety Improvement Act of 2002 (PSIA 2002). Attachment 1 presents a more detailed version of the history of the OQ regulations.

### **1.1 Pipeline Safety Improvement Act of 2002**

The PSIA 2002, enacted on December 17, 2002, added a new section titled "Verification of Pipeline Qualification Programs" to existing pipeline safety law.<sup>3</sup> This section requires standards, criteria, and elements for qualification programs for individuals performing covered tasks. PSIA 2002 directs the Secretary to add standards, criteria, and elements for these qualification programs; to review the qualification programs of pipeline operators; and to verify compliance. Among other aspects, the section requires:

- A program to provide training as appropriate to ensure certain individuals performing covered tasks have the necessary knowledge and skills to perform the tasks in a manner ensuring the safe operation of pipeline facilities.
- Notice to the Secretary when an operator of a pipeline facility significantly modifies a program.
- Inclusion of the elements of evaluation and qualification, requalification, and training within qualification programs by December 17, 2004.

The new section on OQ in PSIA 2002 is built on a program underway as the result of the OQ regulations issued in 1999. The 1999 OQ regulations were the product of a negotiated rulemaking undertaken by an advisory committee comprised of 14 organizations that met 8 times between May 1997 and February 1999. The OQ regulations require operators to develop and implement a written qualification program including a covered task list with completion of initial qualifications by October 28, 2002.

The PSIA 2002 also directs the Secretary to conduct a pilot program for certifying the qualifications of individuals who operate computer-based systems for controlling the operations of pipelines and to include the results of the pilot program in this report to Congress.

### **1.2 Establishing Standards and Criteria**

In June 2002, before the enactment of PSIA 2002, PHMSA decided to structure inspection of operator compliance with the OQ regulations using the approach developed for integrity management programs. This approach uses protocols to guide inspectors as they examine OQ programs. Operators know what to expect through publication of these protocols and the development and publication of responses to frequently asked questions (FAQs).

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<sup>3</sup> 49 U.S.C. § 60131.

Between August and October 2002, PHMSA used the initial version of the OQ inspection protocols to conduct fact-finding visits to 16 large and small operators of gas or hazardous liquid pipelines. The PHMSA revised this initial set of protocols based on results of these visits. To clarify regulatory expectations for operators, PHMSA posted the set of inspection protocols with a newly developed set of responses to FAQs on the internet.

Following the initial inspections, pipeline operators and industry organizations identified concerns with using the protocols and the responses to FAQs to support enforcement of the OQ regulations. The PHMSA distilled these concerns into 13 issues. After a series of four public meetings in early 2003, PHMSA and the industry resolved many of the issues. The PHMSA revised the protocol set and responses to FAQs in April 2003 and has used this revised guidance in subsequent inspections of operator OQ programs.

As an outgrowth of this process, PHMSA and pipeline industry representatives committed to develop a national consensus standard on pipeline personnel qualification. The goal was to address outstanding issues and to establish a comprehensive technical basis for personnel qualifications.

### **1.3 American Society of Mechanical Engineers (ASME) Standard on Pipeline Personnel Qualification**

The ASME B31 Code for Pressure Piping Standards Committee formed the B31Q Project Team on Qualification of Pipeline Operators to develop the national consensus standard. The B31Q Project Team met for the first time in August 2003, and included representatives from regulatory agencies, contractors, unions, and all three industry sectors – hazardous liquid, gas transmission, and local distribution companies.

The B31Q Project Team met regularly over 21 months to reach consensus on the outstanding issues. The team developed a covered task list with a non-mandatory appendix. The appendix facilitates consistent implementation of the consensus standard and provides the foundation for portable qualifications of contractor individuals. Portable qualifications allow a contractor qualified to perform covered tasks for one pipeline company to qualify readily to perform them for another pipeline company.

On December 17, 2004, PHMSA conducted a Public Meeting to summarize for all stakeholders the status of activities in meeting the Congressional directive. During this meeting, participants expressed various perspectives on the need for greater visibility of a major standard development effort such as B31Q. Because of these comments, ASME took the unprecedented action of calling for public comment on the draft of B31Q prior to its completion. Comments offered during this review were instrumental in finalizing the standard.

ASME published B31Q as a national consensus standard in September of 2006.

### **1.4 Inspection Preparation**

PSIA 2002 directed PHMSA to expand the anticipated inspection for compliance with the OQ regulations to include a review of OQ programs for conformance with the standards and criteria,

and for compliance with the elements of the law. The law required completion of these inspections by December 17, 2005. This directive required many inspectors to carry out these specialized inspections in a limited time.

The PHMSA took actions to ensure inspectors are qualified to conduct thorough and consistent inspections of OQ programs. The PHMSA's Office of Training and Qualifications prepared a computer-based training module on OQ and delivered it to State pipeline safety programs and PHMSA Regional Offices in early October 2003. Federal and State inspectors were required to pass a test based on this computer-based training before conducting OQ inspections. The PHMSA used this module to reinforce training of Federal inspectors between December 2000 and February 2001, and to update them on the use of the inspection protocols. The program has trained and qualified 371 inspectors (76 Federal and 295 State) to carry out inspections of OQ programs.

The PHMSA also established an OQ database to capture the results of OQ inspections conducted by both Federal and State inspectors. The database facilitated planning and management of resources to support completion of inspections by the congressionally mandated date.

### **1.5 Inspection Results**

The PHMSA and State pipeline safety agencies completed initial inspections of OQ programs of all federally-regulated operators as well as the programs controlling the vast majority of State-regulated pipelines. While the inspections identified numerous compliance issues, the results from inspections and follow up interactions with operators indicate operators and their service providers are very willing to improve their OQ programs by quickly addressing inspection findings. Section 4 is a more expansive discussion of the impact of the OQ regulation.

The PHMSA and State pipeline safety agencies assembled electronic records of inspection results using electronic inspection forms downloaded to an online OQ database. As of December 31, 2005, Federal and State inspectors recorded 3,908 inspections in the database. The PHMSA and the State pipeline safety agencies use these records to evaluate overall industry compliance. The inspection results contained in the OQ database represent more than 99 percent of gas and hazardous liquid transmission pipeline mileage and more than 95 percent of distribution pipeline mileage.

Perhaps the most surprising initial result of the inspections was 15 percent of the operators inspected did not have an OQ program at the beginning of the inspection effort. These operators are typically small intrastate municipal operators, master meter operators, and liquid propane operators. Recognizing the limited resources of the smallest operators PHMSA, State pipeline safety agencies, and trade associations developed a model plan and compliance guidance to assist small operators in developing OQ programs. Inspectors communicated the availability of the model plan and compliance guidance when they inspected small operators. Following initial inspections, the smallest operators moved toward full compliance. Section 2.3 and Section 4.1 describe materials and programs designed to help the small operators achieve compliance.

Other important findings include the following:

- More than 34 percent of operators inspected had deficiencies in their programs, subsequently corrected, related to the ability of individuals to recognize and react to abnormal operating conditions.
- Twenty-eight percent had deficiencies, subsequently corrected, relating to the qualification of contractors.
- Inspectors initially identified deficiencies in nearly 30 percent of programs inspected, for which we required correction.

Both Federal and State inspectors use the spectrum of enforcement tools available to them to improve safety performance by moving non-compliant operators into compliance with the regulations. During headquarters inspections of operator programs, Federal inspectors identified needed corrective action in 148 of the 221 inspections conducted by December 31, 2005. The PHMSA chose enforcement action appropriate to the corrective action needed. The PHMSA issued 37 notices alleging violation of regulations, 119 notices alleging procedural inadequacy not amounting to violation, 29 proposed civil penalties, 30 proposed compliance orders, and 19 Warning Letters or Letters of Concern for less serious deficiencies. The total amount of civil penalty assessed was \$1,195,800. The most frequent violation identified was operator deficiencies in assuring individuals can recognize and react to abnormal operating conditions. Operators typically remedied these deficiencies by carrying out supplemental training. Operators modified their programs to address other types of deficiencies identified.

The National Association of Pipeline Safety Representatives provided information on non-compliance from headquarters inspection of operator programs in 29 States. These States identified 2,332 notices of probable noncompliance, 789 notices of amendment, 153 letters of concern, and 54 civil penalties amounting to \$173,525. As had occurred following Federal inspections, operators modified their programs to address identified deficiencies.

Operators have typically been very responsive in addressing identified deficiencies. For example, the State of Louisiana conducted two municipal operator inspections in early 2004 and found deficiencies in the OQ program used by more than 100 municipal and master meter operators. The Louisiana Gas Association and the Louisiana Department of Natural Resources sponsored a joint OQ seminar, which led to quick improvement of the OQ programs of these operators. Various industry-sponsored organizations have responded rapidly to assist operators with OQ implementation. For example, the Consortium on Operator Qualification, Northeast Gas Association, and Midwest Energy Association quickly incorporated activities designed to prevent excavation damage on their covered task lists when they noted the need to do so.

#### **1.6 Direct Final Rule Incorporated Statutory Changes for OQ**

The PHMSA alerted pipeline operators to the changes to OQ programs made by PSIA 2002 in an advisory bulletin.<sup>4</sup> On March 3, 2005, PHMSA issued a direct final rule titled, "Pipeline Safety:

<sup>4</sup> ADB 04-05, 69 Fed. Reg. 69028 (November 26, 2004).

Operator Qualifications; Statutory Changes.”<sup>5</sup> This direct final rule amended the OQ regulations for consistency with changes in program requirements made by PSIA 2002.

### **1.7 December 2005 Public Meeting on OQ**

The PHMSA conducted a public meeting on OQ programs on December 15, 2005, followed by a comment period.<sup>6</sup>

The PHMSA opened the meeting by stating the following goals for the meeting:

- To ensure PHMSA has a robust record on OQ enhancements and effectiveness for the report to Congress.
- To reach agreement on remaining efforts needed to provide assurance that workers are qualified to perform tasks affecting pipeline safety or integrity, including consideration of:
  - Adequacy of practices to verify the quality of new construction,
  - Added specificity to training and evaluation intervals,
  - Guidance on other areas of concern identified during inspections.

The key question addressed at the meeting was, “Is further action needed, or are the actions accomplished over the past three years sufficient to provide assurance that pipeline personnel are qualified?”

Participants and commenters provided extensive information about the effort put into development of OQ programs. Pipeline operators have committed significant resources to establish and maintain OQ programs and believe these expenditures have proven valuable. The discussion at the meeting revealed an early indication of a reduced number of incidents and accidents attributed to operator error. While it is too early to definitively attribute performance trends solely to the OQ program with any certainty, operators have reported the following accomplishments clearly attributable to the program:

- Improved operational ability and safety.
- Increased training of employees and contractors with accompanying improvement in knowledge and skills of individuals performing covered tasks.
- Improved operating and maintenance procedures for many operators.
- Increased awareness and understanding of applicable regulatory requirements.

Participants and commenters offered varied views about the need for additional regulations, especially concerning expanded requirements about new construction. However, most agreed

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<sup>5</sup> 70 Fed.Reg.10332.

<sup>6</sup> A transcript of the meeting, the presentations, and comments are in docket no. 19857 at <http://dms.dot.gov>.

that minor changes and enhancements to the regulation and clarifications of the existing requirements could enhance OQ programs. These minor changes would include additional specification of when operators should provide training and when operators should requalify their personnel. There was agreement that the ASME B31Q standard under development by the American Society of Mechanical Engineers (ASME) would provide excellent guidance.

## **Section 2: Inspection Objectives and Approach**

Despite the long history of development of OQ programs, the period between PHMSA's mid-2002 decision to take a systems approach and the 2005 date set in PSIA 2002 for completing the initial inspections was relatively short. Completing all inspections in a professional manner required meeting several objectives, including: clarification of expectations for operators, development of a qualified Federal and State inspection force, and promotion of consistency in the inspection and enforcement processes. The inspection process used by PHMSA and State pipeline safety agencies met or exceeded these objectives and addressed the mandates established by Congress.

### **2.1 Clarifying Expectations through Protocols and Frequently Asked Questions**

As used by PHMSA, protocols are the standard methodology used to conduct inspections of regulated entities to determine compliance with the regulations. The PHMSA works with State pipeline safety agencies to assure that inspection protocols are clear, allow consistent use by inspectors, and support identification of violations and areas for improvement.

The OQ protocols provide the standards and criteria mandated by PSIA 2002. The OQ protocols produce the same level of consistency in inspection as protocols provide in inspection of integrity management programs.

The OQ inspection protocols consist of questions guiding investigation of program elements. Eighteen questions support the eight major program elements shown in Attachment 3. A ninth element addresses operator compliance with qualification requirements in a field or on-the-job setting.

In addition to protocols, PHMSA has a set of frequently asked questions (FAQs) and associated responses to clarify regulatory expectations. These FAQs further support consistent compliance of operator programs with requirements.

### **2.2 OQ Inspector Training and Testing**

Part of the challenge in ensuring consistency of inspections was ensuring the competency and consistency of both Federal and State inspectors performing OQ inspections. Another part of the challenge resulted from the sheer magnitude of the task, reviewing OQ programs of more than 7,500 large and small operators<sup>7</sup> in two years.

The PHMSA used a computer-based training module to train and qualify Federal and State inspectors to perform the specialized inspections of OQ programs. The PHMSA required all inspectors to complete the training successfully and to pass a test administered by its Office of Training and Qualifications. The PHMSA provided each inspector who successfully completed the training and testing access to the OQ database. This enabled the inspector to download and view national information and to upload the results from the inspector's own inspections. Section

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<sup>7</sup> The number of operators exceeds the number of inspections conducted because some operators, particularly affiliated companies, share the use of an OQ program.

2.5 further discusses this database. The PHMSA qualified 371 inspectors (76 Federal and 295 State employees) to conduct OQ inspections.

### **2.3 Small Operator Guidance and State Initiatives**

One finding from the inspections, the relatively higher percentage of non-compliance by the smallest operators, pointed to a need to provide more guidance to these operators. A team of individuals representing the hazardous liquid and natural gas pipeline industries and the PHMSA and State pipeline safety agencies developed guidance for small system operators. This guidance consisted of the following:

- A list of definitions to assist in understanding the OQ regulations.
- A model plan for compliance with the OQ regulations.
- A "How to Guide" to develop and maintain OQ programs.
- Guidance material explaining the OQ inspection protocols and their use in reviewing an operator's OQ program.

A small system operator following this guidance to develop and maintain its OQ program is likely to achieve the same level of safety as a larger operator. This result comes from the nature of a small system operator. Some of the characteristics of a small system operator include the following:

- The pipeline system is less complex than those of larger operators.
- A small system operator usually has five or fewer individuals performing covered tasks.
- Small system operators have less complex management structures.
- There are few, if any, management layers between the person administering the OQ program and the personnel performing covered tasks.

The model plan used was that developed by the Iowa Association of Municipal Utilities to assist their members in achieving compliance with the OQ regulations.

In addition to the model plan and guidance previously described, State pipeline safety agencies have initiatives to assist small operators in achieving compliance. The following are examples of these initiatives:

- Arizona provides continuing education on regulatory programs and requirements for the approximately 1,000 small master meter operators in Arizona, and assists these operators with developing written OQ programs and qualification of individuals.

- New Mexico has a sample covered task list for small operators and assists those with programs found deficient during the initial inspection with improvements to the programs.
- Based on deficiencies identified in early municipal operator inspections, Louisiana has educated operators on OQ requirements and has provided them with the information needed to implement their programs correctly.

Other States, such as Oklahoma, Minnesota, Kentucky, and Georgia have active municipal operator associations that assist their members and other operators by providing solutions to OQ program requirements. In addition, the American Public Gas Association's Safety and Integrity Foundation has entered into a cooperative agreement with PHMSA to develop specialized training and qualification programs to help the smallest operators achieve full compliance.

#### **2.4 Periodic Reset Meetings**

The PHMSA and State pipeline safety agencies performing OQ inspections hold periodic reset meetings for the inspection staff. The purpose of these meetings is to gather broad perspectives on the effectiveness of the inspection process to drive improvements. The meetings result in additional guidance for issues found during inspections and updated inspection materials.

#### **2.5 OQ Database**

The PHMSA has established an OQ database to assemble information about all PHMSA and State inspections of OQ programs. Only trained and qualified inspectors and management in PHMSA and State pipeline safety agencies can access the data. Inspectors use electronic forms of the protocols to document inspection findings in a systematic way. The database allows PHMSA to analyze inspection results and provide statistical information and insight on the types and numbers of issues identified during the inspections. Section 3 of this report discusses summaries of inspection results from this database.

#### **2.6 Consistency of Federal Enforcement**

The PHMSA's primary objective is to improve safety performance through regulatory compliance. To promote improved performance, PHMSA uses various enforcement tools to address deficiencies found during inspection. The most serious deficiencies are likely to be the failure to include key elements of the OQ regulations in written programs or to follow key elements in implementation.

By the end of 2005, PHMSA notified 67 percent of the operators inspected of the need to correct deficiencies in their OQ programs. Approximately 32 percent of these involve a Notice of Probable Violation alleging non-compliance with prescriptive requirements of the OQ regulations. About 70 percent of these Notices of Probable Violation propose assessment of a civil penalty for the non-compliance. However, most notices of deficiencies in OQ programs are Notices of Amendment rather than Notices of Probable Violation. A Notice of Amendment informs an operator of inadequacies in procedure that do not amount to a violation of the regulations. The Notice of Amendment allows an operator to correct the inadequacies before they become more serious, possibly causing safety problems resulting from violation of the regulations.

### **Section 3: Inspection Status and Results**

This section summarizes the status of PHMSA's inspection efforts, what PHMSA has learned about the adequacy of operator compliance efforts, what PHMSA has done to address deficiencies in implementation, and the results of the PHMSA inspection effort.

#### **3.1 Stages of Enforcement**

The PHMSA has rigorously inspected compliance of OQ programs with OQ regulations by using the inspection protocols. The protocols serve several purposes. They clarify for the pipeline operators what PHMSA expects for compliance with the key elements of the regulations. In addition, the protocols reflect provisions in the regulation and establish the prescriptive bases on which PHMSA will consider enforcement action for deficiencies. As pipeline operators become more familiar with expectations for OQ programs satisfying the OQ regulations, PHMSA anticipates full compliance. The PHMSA will not hesitate to initiate enforcement to achieve compliance.

#### **3.2 Treatment of "Training as Appropriate"**

Operator training is an important means to assure proper qualification. The 1999 OQ regulations did not explicitly address training, but "required" it as a part of proper qualification. The PHMSA has investigated operator training practices since the initial inspections conducted in 2002. PSIA 2002 added "training as appropriate" as one of the mandated elements of OQ programs. The inspection protocols have explicitly included training as an enforceable requirement for all operator programs since December 17, 2004.

#### **3.3 Initial Inspection Results (2002-2003)**

In 2002 and 2003, PHMSA inspected 35 OQ programs of a wide range of operators, ranging from a hazardous liquid operator with less than 100 miles of pipeline to an interstate gas transmission operator with almost 50,000 miles of pipeline. The early inspections found two common deficiencies: the inappropriate use of an individual's work performance history as the sole basis for qualification and the failure to verify the ability of individuals to recognize and react to abnormal operating conditions.

The sole use of work performance history review is acceptable as a "transitional" evaluation method, provided an operator has substantive supporting documentation. "Grandfathering" existing workers without documented basis for their qualification is not acceptable. In these early inspections, PHMSA found OQ programs with more than 3,000 employees "grandfathered" without supporting documentation. Some OQ programs used review of work performance history as the sole basis for qualification. Some of these same programs also failed to evaluate personnel on handling abnormal operating conditions.

#### **3.4 Inspections through 2005**

Table 1 shows a summary of the number of operator programs inspected by PHMSA and State pipeline safety agencies, the total mileage, and the number of qualified employees and contractors represented by the OQ programs inspected. Table 2 shows the top ten program deficiencies identified during these inspections. The program deficiencies associated with

Protocol 8.02 have only been measured since December 17, 2004, as this is a requirement of PSIA 2002.

**Table 1. Initial Inspections**

	Number
OQ programs inspected	3,908 programs
Interstate pipeline covered by programs	311,116 miles
Intrastate pipeline covered by programs	1,507,117 miles
Employees qualified by programs	109,513 individuals
Contract employees qualified by programs	110,353 individuals

**Table 2. Top Ten Overall Inspection Issues**

Rank	Number	%	Protocol Description	No.
1	1342	34.4%	Recognition of and Reaction to Abnormal Operating Conditions	4.02
2	448	30.3%	Notification of Significant Program Changes to Regulatory Agencies	8.02
3	1153	29.5%	Program Performance and Improvement	6.01
4	1152	29.5%	Documentation of Qualifications for Individuals Performing Covered Tasks	3.01
5	1150	29.5%	Evaluation Method(s) (Demonstration of Knowledge, Skill and Ability)	2.02
6	1129	28.9%	Development of Covered Task List	2.01
7	1120	28.7%	Written Qualification Program	1.05
8	1098	28.1%	Contractor Qualification	1.02
9	1084	27.8%	Covered Task Performance by Non-qualified Individual	3.02
10	1073	27.5%	Application and Customization of "Off-the-shelf Programs" and Evaluation Intervals	1.01

### 3.5 Completeness of Inspections

The PHMSA and State pipeline safety agencies completed initial inspection of OQ programs of all federally-regulated operators as well as most State-regulated operators. The PHMSA and the State pipeline safety agencies assembled electronic records of the inspection results using electronic inspection forms uploaded to an online OQ database. As of the congressionally mandated date of December 31, 2005, there were 3,908 inspections recorded in the database. The OQ programs addressed in these inspections cover individuals working on more than 99 percent of gas and hazardous liquid transmission pipeline mileage and more than 95 percent of distribution pipeline mileage.

Most of the inspections cover the elements of the OQ regulations as delineated in the protocols; about 5 percent are less complete. They result from State inspectors conducting OQ inspections on intrastate systems before the adoption of the inspection protocols. These pre-protocol inspections are typically limited to determining whether the operator prepared a written OQ program by the required date of April 27, 2001. All but one State pipeline safety agency (with resource restraints) subsequently conducted inspections based on the protocols.

There are some other limitations in the data entered by State pipeline safety agencies. Some did not identify State-regulated operators or add data indicating inspection of each operator. Many State pipeline safety agencies have inspected municipal operators and larger distribution operators, but have not inspected master meter operators and liquid propane operators (for example, shopping centers, apartment complexes, prisons, schools). The PHMSA estimates State pipeline safety agencies have either not inspected or not entered data with respect to about 4,000 small operators. These operators account for no more than 1 percent of the total mileage subject to the OQ regulations.

### **3.6 Field Verification**

The PHMSA has developed a field inspection process to verify the findings of the initial inspections. This field verification involves observing individuals performing covered tasks and evaluating their qualifications. The PHMSA makes this field inspection process available to State pipeline safety agencies for their use in performing field inspections. The PHMSA and State inspectors conducted field inspections for 25 percent of the OQ programs to date. These inspections are a primary element in ongoing regulatory evaluation of operator compliance status.

## **Section 4: Impact on Operations**

The PHMSA conformed successful implementation of the OQ regulations resulted in all operators having -

1. A functioning OQ program.
2. Qualification and subsequent requalification of individuals (employees and contractors).
3. Identification of all covered tasks.
4. A basis for suspending qualifications when appropriate.
5. Availability and retention of required records, documentation, and bases for actions and decisions.
6. Appropriate compliance actions to ensure the remediation of identified deficiencies in one or more areas of the operator's program.

The subsequent discussion addresses the realization of these desired impacts.

### **4.1 OQ Programs and Small Operators**

The PHMSA regulations require operators to have a written program in place by April 27, 2001. Inspection results from the OQ database indicate approximately 15 percent of operators did not have an OQ program at the time of the initial inspections. Most of these operators are small intrastate municipal operators, master meter operators, and liquid propane operators. A few small transmission operators also failed to have OQ programs. Some of these operators did not know about the OQ regulations; some lacked resources to develop a program.

The PHMSA and State pipeline safety agencies dealt with operators lacking OQ programs in various ways including enforcement action and technical assistance. The technical assistance reduced the resource burden of compliance with educational and other written materials, hands-on consultation, and training. Some States, like Arizona, actively engage small operators in educational programs on pipeline safety to ensure compliance with requirements. Other States partner with municipal associations in educating operators on regulatory requirements or providing assistance in developing OQ model programs. In addition, PHMSA has a cooperative agreement with the American Public Gas Association's Safety and Integrity Foundation. Through the agreement, PHMSA provides funds for outreach to small operators on training and qualification programs for common covered tasks.

### **4.2 Initial Qualification and Requalification of Employees and Contractors**

Most of the inspection findings related to individual qualifications focused on the initial qualification process. The most prevalent issue related to initial qualification was the failure to evaluate an individual's ability to recognize and react to abnormal operating conditions. This failure resulted in enforcement action.

Qualification starts with an evaluation of the knowledge and skills necessary to perform applicable tasks. Inspections addressed deficiencies involving inadequate specification of evaluation methods applicable to the covered tasks, or the use of evaluation methods that are superficial, inadequate, or inconsistent with requirements of operations and maintenance procedures.

#### **4.3 Completeness of Covered Task Lists**

Operators do not always have covered task lists clearly identifying all safety tasks needed for operation of the pipeline. Failure to identify a needed safety task or to include it on a covered task list results in a failure to qualify the individuals performing it. Most operators rapidly correct a covered task list when the inspection reveals a deficiency. One task missing from many covered task lists is excavation. Operators have damage prevention programs, but often do not require the individual charged with monitoring excavation activities to be qualified. Following inspections of several operators early in the inspection process, at least three operator consortia and third-party qualification organizations formally included excavation within their covered task lists.

To reinforce the need for operators to consider excavation activities in their OQ programs, PHMSA issued an advisory bulletin, entitled "Notice to Operators of Natural Gas and Hazardous Liquid Pipelines to Integrate Operator Qualification Regulations into Excavation Activities," on January 17, 2006. This bulletin alerts pipeline operators of the need to integrate the OQ regulations into their marking, trenching, and backfilling operations to prevent excavation damage mishaps.

#### **4.4 Suspension of Qualifications**

The OQ regulations require operators to have, in their written programs, provisions to re-evaluate an individual's qualifications under certain circumstances. An operator must reevaluate if the operator has reason to believe the individual's performance of a covered task contributed to a pipeline failure.<sup>8</sup> An operator must also re-evaluate an individual if the operator has other reason to believe that the individual is no longer qualified to perform a covered task. Many operator programs did not clearly define the qualification status of an individual in one of these categories. After inspections identify these issues, operators normally take prompt corrective action to implement acceptable practices.

#### **4.5 Records Retention**

The OQ regulations contain prescriptive requirements to maintain records of original personnel qualifications and the original written program. The initial inspections revealed some deficiencies in this area.

The PHMSA has addressed shortcomings in recordkeeping and record retention through the enforcement process. Inspectors have increased operator awareness of what an operator needs to do to ensure the availability of required records in the future.

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<sup>8</sup> Specifically, a pipeline incident as defined in 49 C.F.R. part 191 or a pipeline accident as defined in 49 C.F.R. part 195.

#### 4.6 Compliance Actions

The PHMSA initiated some form of enforcement for 67 percent of operators inspected. State pipeline safety agencies have initiated various actions regarding deficiencies by intrastate operators. These range from violations that include the imposition of civil penalties to agreements leading to correction of identified issues in operator programs. The PHMSA confirms operators are aggressively modifying their OQ programs to resolve these noncompliances.

#### 4.7 Institutionalizing OQ

Pipeline industry efforts to determine how best to manage operator qualification began well before the OQ regulations were issued in 1999. Perhaps the most constructive approach, one taken by many operators, is to organize themselves in groups having common interests. These groups work to develop consistent approaches to OQ (typically called "solutions"). The following are examples of these efforts:

- A regional consortium of operators known as the Midwest Energy Association held their first meeting in 1992. At the time, PHMSA was considering issuing regulations on training. The Midwest Energy Association is now a national OQ solution provider dispensing training and qualification materials to over 800 associated entities.
- In 1998, gas distribution companies in the New England States formed the Northeast Gas Association. Currently 31 distribution companies, 26 master meter operators and 188 contractors use the Northeast Gas Association's common OQ solution.
- In 1999, an *ad hoc* group of hazardous liquid operators came together and formed the Consortium on Operator Qualification to initially address common issues with contractor qualifications and standardization of methodology to address OQ. Over 40 operators participate regularly in the consortium's activities.

Operator associations such as the Kentucky Gas Association, the Iowa Association of Municipal Utilities, the Georgia Municipal Association, and others offer additional OQ solutions. These solutions vary from common OQ written programs with a covered task list, to training modules addressing covered tasks and other regulatory requirements. Operator associations in many States feature conferences and seminars on OQ requirements. Available solutions do not focus solely on large operations. They also address the needs of small, one-to-two-person operations without the resources of the larger operators.

Industry associations also have been active for many years in promoting solutions to OQ ranging from regional conferences focusing on OQ issues and solutions to interactions with their membership on improvements in OQ programs. These efforts typically continue to evolve to reflect regulatory expectations and insights in how best to manage OQ.

The industry has taken another step toward institutionalizing OQ by issuing the national consensus standard on the Qualification of Pipeline Operators - ASME B31Q in September of 2006. This standard and its non-mandatory appendices provide internally consistent guidance for operators to consider in their efforts continuously to improve their OQ programs. The

December 17, 2004, PHMSA Public Meeting represented a critical juncture in development of this standard. Following that meeting, ASME took the unprecedented action of calling for public comment on the draft of B31Q prior to its completion. Comments offered during this review were instrumental in strengthening and finalizing the standard.

#### **4.8 Operator Awareness and Management Involvement**

The various means used to clarify expectations lead to significant increases in operator awareness of OQ issues at all levels of the operator's organization. Most importantly, evidence exists that regulatory action has resulted in OQ programs receiving increased management attention and involvement.

#### **4.9 Feedback Following the December 2005 Public Meeting on OQ**

Several industry associations and the National Association of Pipeline Safety Representatives (NAPSR) provided the results of surveys of their membership. Attachment 4 contains a summary of these surveys. The surveys revealed the following:

- The industry continues to devote significant resources to compliance with the OQ regulations: to establish OQ programs, to train individuals to perform assigned covered tasks, and to maintain a workforce with individuals qualified to perform safety functions.
- Numerous industry associations and *ad hoc* OQ working groups have developed comprehensive and consistent covered task lists. In the interest of continuous improvement, these groups work to update these lists based on input from participating operators and interaction with regulators.
- Evidence is beginning to accumulate on the decline of incidents and accidents caused by operator error.

The PHMSA is planning a limited set of additional requirements and clarifying guidance to resolve remaining inconsistencies and gaps in operator programs. These will include OQ requirements on training and reevaluation intervals incorporating specificity accepted in industry. In addition, PHMSA proposes to require operators to have a process for verifying the integrity of pipeline construction. This process could include quality control practices, inclusion of construction tasks in operator qualification programs, or post-construction tests of integrity. The PHMSA will address other issues identified during inspections through clarification of regulatory expectations, probably by using an advisory bulletin.

## **Section 5: Future Efforts**

During the past several years, PHMSA, State pipeline safety agencies, and the pipeline industry made significant progress qualifying individuals who perform tasks affecting pipeline safety or integrity. Nonetheless, PHMSA and State pipeline safety agencies will continue efforts to ensure performance reaches the desired level. Planned future activities include:

- Continuing inspection of operator OQ programs.
- Limited additional OQ requirements in regulation.
- Further clarifying guidance designed to assure consistent understanding of regulatory expectations.

### **5.1 Continuing Inspections of Operator Qualification Programs**

The PHMSA is integrating OQ field inspections into its standard inspection process to determine if individuals qualified under operator programs have the knowledge and skills necessary to perform their assigned covered tasks, and are able to recognize and react to abnormal operating conditions. Field inspections of OQ within standard inspections will ensure the continued quality of operator programs.

The PHMSA is also conducting additional inspections of OQ programs with significant deficiencies found in the initial inspections. This will determine whether operators have made needed improvements in their OQ programs.

Finally, efforts are underway to improve the integration of the standard inspections with the newer systems inspections such as integrity management and operator qualification. The results of this integration will determine the form and course of future OQ inspections.

The PHMSA makes information about its inspection process available to State pipeline safety agencies to assist them in conducting continuing inspections of State-regulated operators having operations in several states. In addition, PHMSA is carrying out periodic reset meetings with its State partners to explore how we can improve the clarity and consistency of the inspection process by upgrading protocols, guidance, frequently asked questions, and training.

### **5.2 Monitoring Performance**

Ultimately, the safety performance of operators should reflect the impact of the OQ regulations. PHMSA and State pipeline safety agencies continue to monitor trends in incidents and accidents to assure all OQ programs lead to the desired results.

### **5.3 Clarification of OQ Regulations**

The PHMSA developed a concept paper on regulatory needs to address remaining issues with the OQ regulations. At the December 2005 public meeting and in a subsequent Federal Register

notice,<sup>9</sup> PHMSA encouraged comments by the industry and public on a path forward to address the remaining issues with the OQ requirements. The concept paper proposed the following regulatory and non-regulatory changes and clarifications:

### 5.3.1 Regulatory Changes

The PHMSA is considering three possible changes to the regulations:

- Training – The OQ regulations require only that an OQ program include training “as appropriate.” The PHMSA is considering providing additional specificity. In addition to including training “as appropriate,” an OQ program would include training in particular circumstances. These circumstances are instances when:
  - An individual has never performed an assigned covered task.
  - There is a substantial change to a covered task, such as the use of new equipment or procedures that makes previous training no longer adequate.
  - An individual has failed to requalify on a covered task after an accident.

In addition, an operator would have to ensure training in damage prevention for individuals performing excavation for the operator. Excavation damage remains a major concern in pipeline failures.

- Reevaluation intervals – The OQ regulations now require an operator to identify the tasks for which reevaluation is required and the intervals for reevaluation. The PHMSA is considering requiring an operator to set maximum intervals for reevaluation for every task. These intervals would not exceed five years. Operators may find a shorter absolute maximum interval of three years easier to administer.
- New construction – PHMSA is considering a possible change to the pipeline safety standards (not necessarily the OQ regulations) to require an operator to have a process to verify the integrity of new construction. Errors in constructing a pipeline can result in failures, costly repairs, and increased maintenance costs. The process for verifying integrity of new construction could include the following:
  - Using accepted quality control practices during construction.
  - Including new construction tasks in OQ programs.
  - Using integrity verification methods such as pressure testing and nondestructive testing.

### 5.3.2 Non-Regulatory Changes

Other clarifications, possibly by advisory bulletin, will enhance an operator’s understanding of the requirements:

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<sup>9</sup> 71 Fed. Reg. 648 (January 5, 2006).

- Emergency response – Clarify the requirement to include emergency response tasks in OQ programs. An operator needs to have qualified personnel available to handle actions necessary to ensure pipeline safety.
- Abnormal operating conditions – Clarify the need for an operator to identify and periodically review the operator's list of abnormal operating conditions to aid in compliance.

Twenty-eight industry trade associations, pipeline operators, a trade union, a State regulator, and an industry service provider submitted comments to the docket on the issues in the concept paper. Most commenters support the regulatory changes dealing with training and evaluation intervals. Commenters do not see the need to increase regulatory requirements for new construction beyond the current provisions for ensuring safety and integrity of new construction.

Most commenters support clarifying the treatment of abnormal operating conditions in OQ programs through guidance material. Many commenters express concerns about clarifying emergency response tasks. Some commenters say clarification may inappropriately broaden emergency response covered tasks to include traffic control, boom deployment, or interface with emergency response officials. Others worry that clarification may inappropriately restrict the capability of a first responder who is not OQ qualified to perform valve manipulations, pump control, or emergency shutdown device activation in a critical situation.

With few exceptions, industry representatives do not support adoption as a regulation, either in whole or by reference, of the ASME B31Q standard. Commenters support PHMSA's recognition of the standard as suitable guidance for developing an acceptable OQ program. The trade union commenter, however, encourages PHMSA to consider creating a standardized list of covered tasks. The trade union also encourages a system to improve portability of qualifications, which is the ability of an individual qualified by one company to work for another without having to requalify. The adoption of the B31Q standard provides both.

## **Section 6: Pilot on Certifying Pipeline Controllers**

The PSIA 2002 requires the Secretary of Transportation to conduct a pilot program for certifying the qualifications of individuals who operate computer-based systems for controlling the operations of pipelines. These individuals are commonly called controllers. Controllers frequently use computer-based systems called supervisory control and data acquisition (SCADA) systems to control pipeline operations.

The PHMSA conducted an extensive and thorough project on certification of controllers that includes the pilot program.

The diversity in pipeline control rooms and SCADA operations prompted PHMSA to develop a strategy for ongoing stakeholder interaction. The PHMSA established a focus group comprised of representatives from the public, academia, industry, trade associations, and State and Federal government. The focus group provided a forum for input and discussion. Communication efforts also included numerous presentations to trade associations, industry, PHMSA's technical advisory committees, and the National Transportation Safety Board (NTSB).

The public workshop held on June 27, 2006, was especially valuable in gathering information, ideas, and opinions from a broad assortment of stakeholders. Other information sources were the Federal Aviation Administration, the Federal Railroad Administration, the Environmental Protection Agency, the Nuclear Regulatory Commission, and a mid-Atlantic regional electric transmission administrator, PJM. The PHMSA also contacted SCADA system vendors, and simulator and hydraulic modeling specialists. The PHMSA reviewed accident and incident history, safety-related condition reports, public inquiries, and approximately 30 recommendations made by the NTSB since 1976, either directly or indirectly related to SCADA systems. The PHMSA reviewed control room operations with numerous operators having diverse operating characteristics. In addition, PHMSA examined the cognitive skills natural gas and hazardous liquid pipeline controllers need; and participated in subject matter expert discussions regarding controllers during the development of ASME B31Q.

A key facet of this project was the voluntary and gracious cooperation provided by three pipeline operators participating in the pilot program: Pacific Gas & Electric Company, Buckeye Partners, and Colonial Pipeline Company. The PHMSA developed an assessment guide to test the training and qualification programs of these companies and the thoroughness of their procedures applicable to controllers as they relate to pipeline safety and integrity. The companies participating in the pilot program further studied selected topical areas to identify additional ways to improve control room procedures and controller skills and performance.

While there are differences in operating requirements between hazardous liquid and natural gas pipelines, the cognitive skills the controllers need are similar. Hazardous liquid operators generally expect their controllers to detect and react to abnormal conditions more quickly than natural gas operators. The control rooms for both natural gas and hazardous liquid pipelines may only have one controller on duty at a time. Most control room operations consist of 12-hour rotating shifts and operate 24 hours a day, 7 days a week. This working environment requires implementation of fatigue mitigation strategies.

A nationally administered standard certification test for controller qualifications would provide limited value due to the diversity in control room equipment and the differences in tasks the controllers perform. However, validating the adequacy of controller-related processes, procedures, training, and the controllers' credentials would improve management of control rooms, thereby enhancing safety for the public and pipeline employees.

The Department has identified several areas for enhancing the safety performance of control rooms and is considering how best to address each. The areas for enhancement include the following:

- Clearly define the roles and responsibilities of controllers to ensure their prompt and appropriate response to abnormal operating conditions.
- Formalize procedures for recording critical information and for exchanging information during shift turnover.
- Establish shift lengths and schedule rotations to protect against the onset of fatigue; educate controllers and their supervisors in fatigue mitigation strategies and how non-work activities contribute to fatigue.
- Periodically review SCADA displays to ensure controllers are getting clear and reliable information from field stations and devices.
- Periodically audit alarm configurations and handling procedures to provide confidence in alarm signals and to ensure controller effectiveness.
- Involve controllers when planning and implementing changes in operations, and maintain strong communications between controllers and field personnel.
- Determine how to establish, maintain, and review controller qualifications, abilities, and performance metrics, with particular attention to response to abnormal operating conditions.
- Analyze operating experience including accidents and incidents for possible involvement of the SCADA system, controller performance, and fatigue.
- Validate the adequacy of controller-related procedures and training, and the qualifications of controllers, possibly annually through involvement by senior level executives of pipeline companies.

In addition, the Department is considering the following actions:

- Planning events to enhance communication with other modes of transportation regarding control room lessons learned.

- Sponsoring workshops for pipeline operators to share best practices.
- Encouraging the development of consensus-based best practices to promote controller success.
- Initiating a research and development project to establish a web-based generic simulation tool to help train controllers of smaller pipeline operators.

### **Attachment 1: History of Operator Qualification (OQ) Requirements**

Preventing operator error and the resultant consequences to public safety, property and the environment has always been an objective of the oil and gas pipeline industry. Incidents in 1985 and 1986 caused the NTSB to insist on the development of qualification requirements for pipeline personnel carrying out safety duties required by regulation. The following table summarizes the history following those events until the time of this report. This attachment presents an expansive version of the history of OQ requirements.

**Table A.1-1 Timeline of Key Actions on Operator Qualification**

KY and MN Ruptures and Fires	Apr 27, 1985-Jul 8, 1986
NTSB Recommendation P-87-2	Feb 18, 1987
Advance Notice of Proposed Rulemaking on OQ (52 Fed. Reg. 9189)	Mar 23, 1987
Enactment of law adding regulatory mandate for certification and testing for qualification	Oct 24, 1992
NTSB classifies P-87-2 as Open-Unacceptable	May 11, 1993
NPRM Proposing Training for Pipeline Personnel (59 Fed. Reg. 39506)	Aug 3, 1994
Trade associations petition for withdrawal of NPRM	Feb 1, 1995
Regulatory Reinvention Initiative	March 4, 1995
Enactment of law modifying regulatory mandate on OQ	Oct 12, 1996
Notice of Intent to conduct negotiated rulemaking (61 Fed. Reg. 34410) and Notice of Withdrawal of NPRM (61 Fed. Reg. 34413)	Jul 2, 1996
Notice of 1 <sup>st</sup> negotiated rulemaking committee meeting in Apr 1997 (62 Fed. Reg. 7985)	Feb 21, 1997
NPRM on OQ (63 Fed. Reg. 57268)	Oct 28, 1998
Final Rule on OQ establishing the OQ Regulations (64 Fed. Reg. 46853)	Aug 27, 1999
Deadline for operators to complete & make written OQ programs available for inspection	Apr 27, 2001
Correcting Amendments to OQ Regulations (66 Fed. Reg. 43523)	Aug 20, 2001
Preliminary Federal and State inspections to confirm presence of written programs	2001
NTSB testimony to Congress and Classification of P-87-2 as Closed-Unacceptable	Feb 12, 2002
Deadline for operators to qualify all Individuals performing covered tasks on pipelines	Oct 28, 2002
First inspections begin	Dec 2002
Enactment of PSIA 2002	Dec 17, 2002
1 <sup>st</sup> PHMSA public meeting on OQ in San Antonio, TX	Jan 22, 2003
2 <sup>nd</sup> PHMSA public meeting on OQ in Houston, TX	Feb 25-27, 2003
3 <sup>rd</sup> PHMSA public meeting on OQ in Mesa, AZ	Mar 24-26, 2003
4 <sup>th</sup> PHMSA public meeting on OQ in Atlanta, GA	Apr 21-23, 2003
Revised protocols available for inspections of OQ programs	Apr 15, 2003
Final protocols available	Jul 22, 2003
Computer based training module shipped to inspectors	Oct 8, 2003
OQ inspections integrated into regular PHMSA/State inspection programs	Jan 2004
PHMSA public meeting on OQ in Washington, DC	Dec 16, 2004
Direct Final Rule incorporating the PSIA 2002 changes in the law (70 Fed. Reg. 10332); corrections (70 Fed. Reg. 34693)	Mar 3, 2005
PHMSA public meeting on OQ in Washington, DC	Jun 15, 2005
PHMSA public meeting on OQ in Washington, DC	Dec 15, 2005
Deadline for PHMSA to complete OQ inspections	Dec 17, 2005
End of public comment period on ASME B31Q Pipeline Personnel Qualification Standard	Jan 4, 2006

### **A1.1 NTSB's 1987 Recommendation on OQ**

Following an investigation of the Texas Eastern Gas Pipeline Company ruptures and fires at Beaumont, KY, on April 27, 1985, and Lancaster, KY on February 21, 1986, NTSB issued a pipeline accident report on February 18, 1987 (NTSB/PAR-87/01). In that report, NTSB recommended regulations on OQ:

#### **P-87-02**

*"Amend 49 CFR Parts 192 and 195 to require that operators of pipelines develop and conduct selection, training, and testing programs to annually qualify employees for correctly carrying out each assigned responsibility which is necessary for complying with 49 CFR Parts 192 or 195 as appropriate."*

In response, the agency issued an advance notice of proposed rulemaking.<sup>10</sup> The notice invited public comment on the need for additional regulations or a certification program to address the qualification of personnel who design, construct, operate, or maintain pipelines.

In commenting to the notice, the NTSB pointed to 110 recommendations it had issued on training deficiencies of pipeline workers, based on various pipeline accidents between 1975 and 1986. The NTSB commented specifically on the need for regulations to require pipeline operators to

- Identify each employee whose successful accomplishment of assigned responsibilities or tasks was a necessary part of an operator's actions to comply with the Federal pipeline safety regulations.
- Perform analyses to identify the tasks, jobs, and responsibilities of each employee that related to Federal pipeline safety regulations.
- Identify specific training methods to provide each employee with ample knowledge to effectively carry out applicable jobs, tasks, and responsibilities identified in the analyses.
- Identify methods used in evaluating the effectiveness of the training, including the identification of standards for acceptance.
- Document the training provided for each employee and training evaluation.

### **A1.2 Statutory mandates and first proposed rule**

Change to the pipeline safety law in 1992,<sup>11</sup> established a requirement for standards requiring the training and certification for qualification of pipeline employees performing operations and maintenance functions on pipeline facilities.

On May 11, 1993, the NTSB reiterated its 1987 recommendation on training, qualification, and testing requirements. Because of the delay in rulemaking on OQ, the NTSB classified the agency response to the recommendation as "Open – Unacceptable Response."

<sup>10</sup> 52 Fed. Reg. 9189 (Mar. 23, 1987).

<sup>11</sup> Pub. L. No. 102-508 (Oct. 24, 1992).

On July 27, 1994, PHMSA issued an NPRM proposing qualification standards for pipeline employees.<sup>12</sup> Comments by the NTSB urged the expedited completion of the rulemaking. Comments by the pipeline industry characterized the proposed rule as a “training rule,” by emphasizing an initial step rather than the desired end result of qualification. The American Gas Association, the American Public Gas Association, and the Southern Gas Association petitioned for a withdrawal of the NPRM. In response, PHMSA withdrew the NPRM and announced its intention to conduct a negotiated rulemaking on OQ.

In the meantime, Congress again spoke to the need for operator qualification in 1996 legislation reauthorizing the pipeline safety program, but modified the regulatory mandate slightly.

### **A1.3 Negotiated Rulemaking**

The PHMSA established a negotiated rulemaking advisory committee comprised of representatives of 14 organizations to prepare a proposal for rulemaking, consider comments, and prepare a draft final rule. The committee met eight times between May 1997 and February 1999.

On October 27, 1998, PHMSA issued a new NPRM based on the committee's recommended language. The NTSB noted the NPRM failed to include requirements for training and testing. PHMSA issued a final rule on August 27, 1999.

### **A1.4 PHMSA Action to Implement the OQ Regulations**

The PHMSA and several State agencies performed initial inspections of some operators to determine whether they had a written OQ program. These initial inspections served as preparation for more comprehensive compliance inspections after October 28, 2002, the date by which operators must qualify their personnel.

The PHMSA recognized the benefits of the system approach to inspections of integrity management programs for hazardous liquid pipelines. The approach improves an operator's understanding of what to expect and provides greater consistency in the inspections. In July 2002, PHMSA decided to use a similar approach to inspections of the OQ programs.

The PHMSA developed the initial version of the protocols and an inspection process flowchart describing the nine elements of inspection for a comprehensive inspection.

To clarify regulatory expectations for operators, PHMSA posted the inspection protocols and a supplementary set of responses to FAQs on its website. Initial inspections validated the protocol set.

### **A1.5 Changes made by PSIA 2002**

On December 17, 2002, the PSIA 2002, added a new section to the pipeline safety law on OQ programs.<sup>13</sup> Some of the key provisions and dates identified in this section are:

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<sup>12</sup> 59 Fed. Reg. 39506.

<sup>13</sup> 49 U.S.C. § 60131.

- A direction to DOT to have standards and criteria for qualification programs by December 17, 2003.
- A requirement for operators to develop a qualification program complying with the standards and criteria by December 17, 2004.
- A requirement to include a process for examining or testing qualifications in a qualification program.
- A requirement to provide training, as appropriate, to ensure that individuals performing covered tasks have the necessary knowledge and skills to perform the tasks in a manner that ensures the safe operation of pipeline facilities.
- A direction to DOT to review each pipeline operator's OQ program for compliance to the standards and criteria by December 17, 2005.

#### **A1.6 Public Meetings on OQ**

Following the initial inspections based on the protocols and the FAQs, pipeline operators and industry organizations identified significant concerns with how PHMSA intended to inspect and enforce provisions of the OQ regulations. These concerns, contained in a list of 13 issues, were the focus of a public meeting in San Antonio in late January 2003. The list of 13 issues is found at Attachment 2. About 600 people, representing industry organizations, operators, vendors, contractors, unions, Federal and State regulatory agencies, and the general public, attended this meeting.

The PHMSA held additional public meetings in February, March, and April to reach common understanding on the 13 issues between the pipeline industry and the regulatory community. The meetings resolved some questions, but differences between the two groups remained. In an effort to resolve the remainder, PHMSA and pipeline industry representatives committed to the development of a national consensus standard on pipeline personnel qualification. A consensus standard addresses issues and provides a comprehensive technical basis for personnel qualifications.

#### **A1.7 ASME Standard on Personnel Qualification**

The pipeline industry approached ASME seeking a sponsor for the development of a national industry consensus standard for pipeline personnel qualification. The ASME B31 Code for Pressure Piping Standards Committee formed the B31Q Project Team on Qualification of Pipeline Operators. This project team met for the first time in August 2003 and began the task of crafting a technically based standard for the qualification of pipeline personnel.

The B31Q Project Team included representatives from regulatory agencies, contractors, unions, and all three industry sectors – hazardous liquid, gas transmission, and local distribution companies.

The project team met regularly over a period of 21 months to reach consensus on the outstanding issues. The product includes non-mandatory appendices, which provide in-depth guidance and

models to assist pipeline operators both large and small in developing their personnel qualification programs. One of these non-mandatory appendices includes a covered task list to facilitate consistent implementation and provide the foundation for portable qualifications of contractor employees.

**A1.8 December 2004 Public Meeting on OQ**

The PHMSA held a public meeting on December 17, 2004, to provide updates on the status of the ASME B31Q standard on Personnel Qualification and the findings of Federal and State inspections of operator qualification programs.

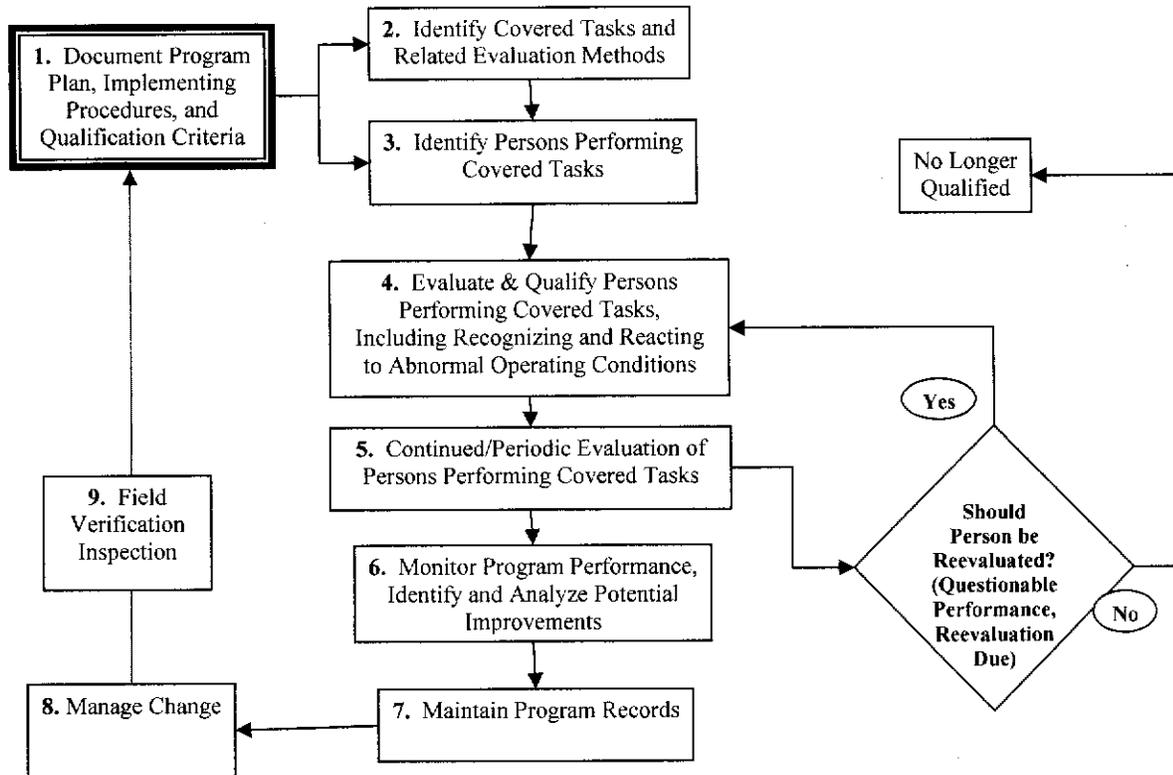
Many participants expressed concern about the potential for the ASME B31Q standard to be overly prescriptive. While industry commenters voiced support for the standard in concept, they also voiced concern that, if adopted into regulation, the standard could require costly changes to existing programs without corresponding safety value. In addition, adoption could reduce the ability of operators to address unique features of their pipeline operations in qualification programs. There was a call to ASME from all sectors, public, industry, and regulators to open up the draft standard to an unprecedented public review. ASME agreed to a review, which produced 1,118 comments on all aspects of the draft standard from interested parties.

## **Attachment 2: Major OQ Issues Identified at January 2003 Public Meeting**

1. Inspections need to include evaluation of “how” operators address rule requirements.
2. Evaluation for knowledge, skills, and physical capability.
3. Reevaluation interval.
4. Criteria for small operators.
5. Guidance for direction and observation of non-qualified personnel performing covered tasks.
6. Noteworthy practices.
7. Distinction between maintenance and new construction.
8. Treatment of emergency response.
9. Additions to covered task list.
10. Extent of documentation.
11. Treatment of training.
12. Abnormal operating conditions.
13. Identification of persons contributing to an incident or accident.

### Attachment 3: Operator Qualification Rule Process Flow

Figure C.1-1. Operator Qualification Rule Process Flow



## **Attachment 4: Results from Surveys and Feedback Following the December 2005 Public Meeting**

### **A4.1 American Gas Association Survey**

Thirty-two American Gas Association member companies, representing 44.5 million gas services provided input to the Association's survey. The gas services in the survey represent 74 percent of the national total. The individual companies ranged from 4,700 services to 4.2 million services. This shows the survey represented large and small gas utilities.

Highlights from the survey included the following:

- Annual OQ program management costs \$19 million.
- Annual OQ training costs \$91 million.
- The infrastructure has matured at both the State and Federal levels. More than 50 percent of the operators use all or part of a commonly used covered task list. The OQ programs and task lists have been cooperatively developed by many organizations including:
  - Midwest Energy Association.
  - Northeast Gas Association.
  - Pennsylvania Gas Association.
  - Kentucky Gas Association.
  - Safety and Compliance, Inc.
- Performance metrics were presented showing the average employee is qualified for 29 tasks; the average employee receives 28 hours of training annually for OQ tasks; requalification test failure rates are 2.1 percent and the average company maintains 16,700 qualification records annually.
- Incidents involving operator error since the full implementation of the OQ regulations in 2002 are only 6.2 percent of the total incidents reported. By the third quarter of 2005, the number has decreased to an annualized rate of 1.2 percent.

### **A4.2 Association of Oil Pipe Lines Survey**

The Association of Oil Pipe Lines is an unincorporated trade association representing the owners and operators of pipelines carrying crude oil and refined petroleum products throughout the United States and Canada. The Association's members represent the majority of the oil pipeline industry and are responsible for transporting over 85 percent of the crude oil and petroleum product moved in the United States measured in barrel miles.

The Association conducted a survey indicating personnel qualification programs meeting the OQ regulations are expensive, averaging \$160,000 per member respondent. These programs are labor intensive requiring an average of five full-time equivalent personnel to implement each OQ

program. Each OQ program includes a large number of covered tasks and subtasks, an average of approximately 116 per member responding to the survey.

The vast majority of members of the Association of Oil Pipe Lines responding to the survey:

- Participate in an industry group that shares best practices.
- Include emergency response and excavation in their program.
- Reevaluate assigned tasks every three years or less.
- Consider training necessary in numerous circumstances and provide an average of 52 hours of training annually.
- About one-third of members responding use their qualification programs in new construction (other regulations and processes verify the safety of new construction).
- Over one-half of the members responding have developed performance measures for personnel qualification.

**Table D.1.-1. Detailed Survey Results**

**Detailed Survey Results – 36 Respondents – 1/20/2006**

Survey Items	%	Yes	No
1. Average full-time equivalent personnel involved in maintenance & implementation of OQ program.	5.11/35 Respondents		
2. Has software or electronic subscription been purchased or licensed for OQ?		32	4
3. If yes, what is the estimated annualized cost?	\$532,396/31 respondents		
4. Annual cost of OQ training/qualification materials?	\$5,193.50/32 respondents		
5. Do you participate in an industry group that shares "best practices" in OQ?		30	6
6. Do you require qualified individuals to perform covered tasks for new construction?		12	24
7. Have you addressed emergency response in your OQ program?		27	9
8. Are excavation tasks included in your covered task list?		28	8
9. Percentage of tasks assigned for each requalification interval:			
One Year	4.20%		
Two Years	2.00%		
Three Years	88.30%		
Four Years	1.00%		
Five Years	3.60%		
More Than Five Years	0.90%		
10. Which of the following do you consider to determine whether training is needed?			
<input type="radio"/> Seeking qualification for a covered task not previously performed?		33	3
<input type="radio"/> Seeking qualification for a covered task outside their knowledge and skills?		34	2
<input type="radio"/> Qualification has been suspended or revoked?		35	1
<input type="radio"/> Fails an evaluation for qualification.		35	1
<input type="radio"/> Requires new or different knowledge or skills to perform a covered task?		34	2

**Detailed Survey Results – 36 Respondents – 1/20/2006**

Survey Items	%	Yes	No
○ Will utilize new equipment to perform a covered task?		31	5
○ Will utilize a new procedure to perform a covered task?		33	3
11. Do you review and update your OQ program on a periodic basis?		36	0
12. If yes, what is the average?	13.3 months/ 36 respondents		
13. Total number of employees qualified under OQ?	9,604/36 respondents		
14. Total number of covered tasks and subtasks identified in your program?	4,193/36 respondents		
15. Total number of qualification records?	229,911/34 respondents		
16. Average hours of training per employee per year?	51.72 Hrs/31 respondents		
17. Have you developed performance measures for OQ?		20	16

**A4.3 Interstate Natural Gas Association of America (INGAA) Survey**

The Interstate Natural Gas Association of America is a trade association representing interstate natural gas transmission pipeline companies. Its members operate over 205,000 miles of the country's total natural gas transmission piping.

- 17 INGAA members responded.
- Members operating 199,911 miles responded (95 percent).
- These members have 9,409 employees in their OQ programs.
- Each employee has an average of 18 covered tasks.
- The members responding spend \$9.16 million on OQ program per year.
- There are 4.7 full time equivalent employees administering an OQ program for each 100 employees in the program.
- 11 companies use an industry standardized task list.
- Of the distinct tasks for each of the OQ qualified employees, the majority of requalification intervals are three years, and none exceed 5 years.
- The number of requalification failures varies among the reporting companies and appears to be a function of the type of requalification process. About one-half of the respondents reported less than 1 percent failures on requalification, but two respondents reported greater than 9 percent failures.
- In responding to a question asking what a company considers in determining whether training is needed, members provided the following answers:

- Seeking qualification for a covered task not previously performed? Yes: 15/No: 1.
- Seeking qualification for a covered task outside their knowledge and skills?  
Yes: 14/No: 2.
- Qualification has been suspended or revoked? Yes: 17/No: 0.
- Fails an evaluation for qualification? Yes: 17/No: 0.
- Requires new or different knowledge or skills to perform a covered task?  
Yes:16/No: 1.
- Will utilize new equipment or procedures to perform a covered task? Yes:16/No: 0.

Only 1.4 percent of the natural gas transmission incidents reported since 2002 have identified operator error as the cause. Classifying the cause as operator error may result from a variety of factors, including having an unqualified person performing a job, lack of sleep, ergonomic conditions, drugs and alcohol, and mental state. The Association believes improving the level of qualifications of employees only partially contributes to the reduction of reportable incidents with operator error as the cause.

#### **A4.4 National Association of Pipeline Safety Representatives Survey**

The National Association of Pipeline Safety Representatives surveyed member State pipeline safety program representatives on the need to enhance the OQ regulations. Of the total of 51 programs, 22 responded. The survey and the results are as follows:

- Do you believe any enhancements should be made to the existing OQ regulations?  
7 Yes/15 No.
- Should the following be addressed by revised regulations or advisory bulletins?
  - New construction? 10 Yes/12 No.
  - Requalification intervals? 8 Yes/14 No.
  - Training? 8 Yes/14 No.
  - Emergency response? 11 Yes/11 No.
  - Abnormal operating conditions? 10 Yes/12 No.

#### **A4.5 Summary and Docketed Comments**

These survey results support PHMSA's conclusions that the OQ regulations and attendant inspection process has been effective in improving operator compliance with the intent and the spirit of the rule.

At the level of individuals performing covered tasks, PHMSA believes, along with the pipeline industry, that OQ requirements have made a substantial difference regarding individuals performing covered tasks. Individuals gain increased knowledge and improvement in skills to perform covered tasks correctly, without error (for example, reports of employees who appreciate training processes, recognition that they learned things about correct task performance they did not know before). Operators have improved O&M procedures. Operators are more aware of regulatory requirements.

Comments from industry associations and individual operators during the December 2005 public meeting and subsequently on the docket supported this view, as exhibited by the following sample of comments:

- An operator commented, “Our general impression of the effectiveness of the current Operator Qualifications process is that it has improved our operational ability and safety. While it can be said our more experienced employees have not gained significant new skills under the process, it can certainly be said they better understand the underlying reasons for the way they perform their tasks. Current Operator Qualification efforts are most beneficial with new employees. The formal training we now require gives them the background that makes the on-the-job experience meaningful with greater understanding. Older and newer employees now better recognize abnormal operating conditions and react in a more uniform and better way as a result of OQ training.”
- Another operator commented that, “Prior to the promulgation of [CFR] Part 192 Subpart N and Part 195 Subpart G, [we] fundamentally believed that [our] employees and contractors were technically qualified to perform their work assignments on [our] pipeline facilities. This belief was based on existing employee training program requirements, pipeline incident data, and operational records. While implementation of our OQ program, through its documented processes, has essentially validated that we did have a qualified workforce, it has also helped to reinforce and improve our employees’ recognition and reaction to abnormal operating conditions. In addition, it has increased awareness of the important role that training plays in preparing new employees for qualification and experienced employees on ever changing job requirements.”
- An operator identified how it chose to extend its OQ program beyond regulatory requirements. The operator adds subject matter expert criteria and identification, improves operating and maintenance procedures, includes formal training and certification of evaluators, incorporates task-specific abnormal operating conditions into operating and maintenance procedures, and includes quality assurance activities and performance measures.
- An industry association concluded, “One of the major issues of a new rulemaking, especially a performance based rule, is the understanding of the intent of the rule. It appears that the educational material, frequently asked questions and protocols were effective in communicating the intent of the regulation to [our] survey respondents. There were minor misunderstandings on the intent and implementation of the rule and those misunderstandings were cleared up after the first audit.”