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**PIPELINE OPERATOR QUALIFICATION**

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**Kent Denny, Daron Moore, Bernie Selig**

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## **Introduction**

The hazardous liquid and natural gas pipeline industries have been required to develop and implement Operator Qualification (OQ) programs since the federal Office of Pipeline Safety (OPS) issued the OQ rule in 1999. This rule is a performance-based rule that does not contain significant prescriptive requirements. Due to an unfortunate, high profile accident where operator error or lack of qualification was considered a root cause, Congress, in the Pipeline Safety and Improvement Act of 2002, mandated that OPS develop standards, or protocols, for these programs.

In response to the Act, the pipeline industry and OPS jointly agreed to a strategy that would meet the requirements of Congress. This strategy consists of a short-term solution—including the issuance of protocols, supplementary guidance, and frequently asked questions—and a long term solution, which includes the development of a national consensus based standard and an amended operator qualification rule. To assist in this effort, the industry commissioned an investigation into what other industries require for personnel qualifications.

This article provides a brief summary of those investigations and outlines in some detail the strategy for the industry and the regulator to move toward more effective regulation and implementation of OQ in the future.

## **Personnel Qualification Requirements of Five Industries**

Four industries were chosen to compare OQ requirements to pipeline industry requirements. Two are transportation industries and two are energy-related industries.

The Maritime industry as it is regulated by the US Coast Guard (USCG) and the Railroad industry as it is regulated by the Federal Railroad Administration (FRA) were both until very recently parallel organizations to OPS within the Department of Transportation.\* The Petrochemical industry, as it is regulated by the Occupational Health & Safety Administration (OSHA), and the Nuclear industry, as it is regulated by the Nuclear Regulatory Commission (NRC), represent the energy industries. While these industries and the pipeline industry have numerous regulators, we chose the regulator in each industry that is responsible for worker and public safety for this comparison.

Sixteen regulatory requirements directly related to personnel qualifications were chosen for comparison, based largely on the issues recently under consideration by OPS and the

industry. Additionally, nine regulatory implementation and effectiveness measures were compared. Tables I & II provide summarized results for some of those issues.

The data gathered for these investigations came from industry experts, regulators, and industry practitioners—all in the field of personnel qualification. The industry’s safety records are derived from statistics kept by each industry or applicable governmental agency. The risk characterizations are qualitatively derived from this and several other studies, and include both safety and environmental risks.

\* The USCG has been recently transferred to the Department of Homeland Security.

### Compared Industries

During our discussions with the various contributors to this investigation, information was obtained that provides additional insight into each industry’s personnel qualifications activities.

### National Railroads – FRA

Railroad operators are required to submit reports of accidents to FRA. From the FRA Web site:

	<u>2000</u>	<u>2001</u>
Train Accidents	2,983	3,023
Casualties	12,580	11,956
Fatalities	937	971

DOT states that approximately 50 percent of the rail-related fatalities are “trespasser” related.

No amount of personnel qualification can mitigate “trespasser” accidents. Similarly, no amount of personnel qualification can eliminate true third party damage, which is the primary cause of \_\_\_ percent of pipeline incidents. In both cases, active prevention methods, not personnel qualification, are the most effective incident prevention factors.

### Merchant Fleet – USCG

All ships personnel must renew their papers every five years. No re-qualification is required, if the person has had satisfactory job experience.

The following are results of safety incidents for the merchant fleet within USCG jurisdiction:

	<u>2000</u>	<u>1999</u>	<u>1998</u>	<u>1997</u>
<u>Number of Incidents</u>	3,791	4,036	4,374	4,198
<u>Fatalities</u>	32	57	71	50

## **Petrochemical Industry – OSHA**

OSHA regulates through compliance audits. Plants with poor records are identified for more frequent audits.

As with the other industries, OSHA measures effectiveness through the use of incident data. Figure 1 shows the primary causes of incidents over an extended period of time. Note that operational error accounts for 28 percent of all incidents.

## **Nuclear Power Plants – NRC**

The NRC's responsibilities include the safety of workers and the public, as well as the protection of the environment, primarily from a radiological hazard perspective.

There have been no fatalities or injuries recorded due to nuclear power plant incidents.

## **Pipeline Industry Perspective:**

Operator Qualification regulations apply to all segments of the pipeline industry; hazardous liquid, gas transmission, gas distribution, master meter, and contractors/unions.

From a safety/risk perspective, the pipeline industry, which supplies 50 percent of the nations' energy, is a low-risk, safe industry. With more than two million miles of gas and liquid pipeline, there was an average of 18 deaths per year in the past four years for all three segments of the industry. Figure 2 details the number of operator incidents over a four-year year period and shows that \_\_\_\_ percent of the total number of reported incidents were due to operator error. In all three sectors of the industry, operator error accounted for less than 10 percent of all incidents. While it is recognized that operator error can be a contributing cause to some larger percentage than the reported cause, it is still not a major contributor to pipeline accidents.

Clearly, while operator qualification is a valid issue, the existing data shows that a balanced approach to OQ would serve the industry and the regulator best. That would enable both the industry and the regulator to optimize the use of limited resources to improve the safety of the pipeline industry.

OPS issued the pipeline OQ regulation in 1999 and it was performance-based (each operator to develop their own program with limited requirements). Since then, the Pipeline Safety and Improvement Act of 2002 was passed, which includes a provision for OPS to develop standards for OQ.

OPS responded to the Act's requirements by developing inspection protocols and guidelines jointly with industry. Through a series of OQ public meetings, OPS and the industry developed the contents of the protocols for the existing regulation. These protocols have already been used on actual OPS audits of selected operators. To date, the results have been satisfactory from both the OPS' and industry's perspectives.

During the public meetings, 13 issues were identified that required resolution in order to finalize the protocols. These included such items as: the scope of inspections versus what is written in the rule; evaluation of knowledge, skill, and ability; re-evaluation interval determination; defining maintenance versus new construction; and how to handle abnormal operating conditions. Many of these items were favorably resolved. Those that were not resolved will be, by mutual agreement, resolved in an OQ consensus standard to be developed within the next year. This standard will form the foundation for an amended OQ rule, much like the ASME B31.8S standard for gas pipeline integrity management is forming the foundation for the gas pipeline integrity management rule.

As a result of the discussions during these OQ public meetings, OPS and industry have agreed on a strategic approach to the future of OQ, which includes the following:

- Complete the development of inspector protocols and guidelines for the existing regulation with industry participation.
- Develop a consensus-based standard for pipeline personnel qualification. The American Society of Mechanical Engineers (ASME) has agreed to sponsor the standard under the same Board on Pressure and Technology Codes and Standards that has responsibility for ASME's B31.4 and B31.8 standards. This standard will be called B31Q, Personnel Qualification for Pipeline Operators.
- OPS and the state regulators have committed significant resources to the development of the standard. Several issues, discussed above, were left unresolved in the development of the protocols and these are to be addressed in the standard.
- When the standard is completed (scheduled for the end of the second quarter of 2004), OPS will review the existing OQ rule and amend the rule to incorporate the standard by reference, thus making it a part of the amended rule. This strategy is consistent with the gas pipeline integrity management rule strategy of developing a technically sound standard upon which a subsequent rule can be based.

It is the belief of both OPS and the pipeline industry that this strategy will not only meet the requirements of the Act, but also facilitate an amended OQ rule that will provide better prescriptive and performance language for operators' compliance while enhancing pipeline safety.

### **Conclusions:**

Although each of the four compared industries is unique, the comparison of their regulatory requirements was a useful study for the pipeline industry and will be given

strong consideration through the standard-writing process. Based on the study, the following areas have been identified for particular consideration:

- 1) Each industry uses the task-oriented qualification process
- 2) The four industries utilize “tiered” qualifications, with the most significant tasks requiring greater qualifications and shorter re-qualification intervals. For example, control room operator requirements are much more stringent than most maintenance tasks
- 3) Operator qualification for new construction is not included in any of the industries
- 4) Documentation requirements are not extensive, requiring documentation of OQ programs and personnel qualifications

Based on the facts presented and in comparison to the other industries, pipeline industry personnel qualification programs that can be effective in reducing operator error incidents and improve safety would include the following elements:

- SCADA operator training, possibly including classroom and simulator training, with prequalification every three years.
- Training and/or qualification requirements for other highly safety-related tasks.
- Significantly lesser training and qualification requirements for other safety or integrity tasks, with longer requalification periods of up to five years or more.
- Each qualified individual must demonstrate the knowledge, skills, and ability to perform his or her task. How this is achieved can vary with the task.
- Existing metrics, documenting incidents by cause, should be sufficient to measure program effectiveness.
- Pipeline operators should be encouraged to pursue root cause analyses to determine if operator error is a contributing cause to incidents or near incidents.
- An industry consensus standard for personnel qualification should be developed. Such a standard will obviate the need for individual companies to justify many of the aspects of their programs and could assist OPS in effectively regulating OQ.

ASME is presently in the process of organizing the Special Working Group under the auspices of B31 that will develop B31Q, Pipeline Personnel Qualification. The standard will specify the requirements for the qualification of individuals performing safety- or integrity-related tasks for the operation and maintenance of gas and hazardous liquid pipelines that are subject to ASME B31.4 and B31.8. The goal is to complete the standard by mid-2004. OPS will then amend the OQ rule and incorporate the standard into the rule.

Both OPS and the entire pipeline industry have committed to collaborate effectively to make this process work. If OQ is a significant issue for you and your company, keep track of OQ progress on either [www.primis.rspa.dot.gov/oq](http://www.primis.rspa.dot.gov/oq) or [www.sgalink.org](http://www.sgalink.org).