

**GAO**

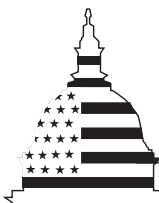
Report to the Ranking Minority  
Member, Committee on Energy and  
Commerce, House of Representatives

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August 2002

# PIPELINE SAFETY AND SECURITY

## Improved Workforce Planning and Communication Needed



**G A O**

Accountability \* Integrity \* Reliability

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## Abbreviations

DOT	Department of Transportation
OPS	Office of Pipeline Safety
RSPA	Research and Special Programs Administration



G A O

Accountability \* Integrity \* Reliability

United States General Accounting Office  
Washington, DC 20548

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August 26, 2002

The Honorable John D. Dingell  
Ranking Minority Member  
Committee on Energy and Commerce  
House of Representatives

Dear Mr. Dingell:

The Office of Pipeline Safety (OPS), within the Department of Transportation's (DOT) Research and Special Programs Administration (RSPA), is implementing a new approach to overseeing the safety of a 2.2-million-mile network of pipelines in the United States that transports potentially dangerous materials, including hazardous liquids, such as oil, and natural gas. Traditionally, OPS has carried out its oversight responsibility by issuing minimum safety standards and enforcing them uniformly across all pipelines. To better focus on safety risks that are unique to individual pipelines, OPS has been exploring a risk-based approach to overseeing pipeline safety since the mid-1990s and is now implementing this approach. This initiative—termed “integrity management”—requires pipeline operators, in addition to meeting minimum safety standards, to develop programs to assess, evaluate, and mitigate any risks to pipeline segments where a leak or rupture could have significant consequences, such as near highly populated areas. To address security concerns after September 11, 2001, OPS advised pipeline operators to consider potential terrorist threats to their pipelines in their assessments of pipeline risks. In addition to the integrity management initiative, OPS is implementing several actions to collect better data on pipeline incidents in order to improve its oversight of the pipeline industry and help evaluate the performance of the integrity management approach.

You asked us to examine what OPS has done and plans to do to implement this new approach, which differs significantly from OPS's traditional oversight activities. Accordingly, we examined OPS's (1) steps to implement the integrity management approach, (2) challenges in implementing this approach, (3) plans for obtaining the resources and expertise needed to oversee pipeline safety under integrity management, and (4) major initiatives to improve the quality of its data on pipeline incidents.

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## Results in Brief

OPS has to complete several important steps to implement its integrity management approach within an ambitious, self-imposed schedule. The agency began applying this new regulatory approach to hazardous liquid pipelines in 2000 by issuing final rules requiring operators of these pipelines to develop integrity management programs. OPS now plans to finalize integrity management requirements for natural gas transmission pipelines and to inspect the programs of more than 1,000 hazardous liquid and natural gas transmission pipeline operators. Although OPS may take until 2006 or later to complete these steps, the agency's schedule for the next 2 years is particularly challenging. For example, OPS plans to

- issue proposed and final rules to establish requirements for integrity management programs for natural gas transmission pipeline operators by spring 2003,
- conduct comprehensive inspections—each of which takes about 2 weeks—of the programs for over 200 hazardous liquid pipeline operators from summer 2002 through fall 2004, and
- prepare to conduct comprehensive inspections of the programs for about 830 natural gas transmission pipeline operators from summer 2004 to summer 2006.

While implementing its integrity management approach, OPS must also perform ongoing oversight duties, such as inspecting the construction of new pipelines and investigating pipeline incidents. Although OPS officials believe that the agency can achieve this ambitious schedule with the assistance of state pipeline safety inspectors, the schedule leaves little margin for error if OPS is to meet its time frame. For example, agency officials acknowledge that they have prepared protocols for comprehensive inspections of hazardous liquid operators under a tight schedule in order to start these inspections in summer 2002, as planned.

In addition to meeting its ambitious schedule, OPS faces a number of other challenges in implementing this new regulatory approach. These challenges include (1) enforcing the integrity management requirements consistently and effectively, (2) ensuring that natural gas transmission pipeline operators use assessment methods appropriately, (3) establishing an inspection interval for natural gas transmission pipelines, (4) measuring and reporting on the effectiveness of the approach, and (5) developing and implementing an approach for overseeing pipeline security. OPS is pursuing a variety of actions to address these challenges. For example, the agency has developed detailed guidance for inspectors to use in reviewing operators' integrity management programs to help ensure that enforcement decisions will be consistent, is preparing a proposed integrity

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management rule for natural gas transmission pipelines that will include proposed requirements on assessment methods and inspection intervals for these pipelines, and is developing protocols for reviewing operators' security programs. However, although some hazardous liquid pipeline operators have begun to implement their integrity management programs, OPS has not yet established uniform performance measures for these programs. OPS officials told us that they intend to establish such measures, which would allow the agency to track the progress of these programs in improving pipeline safety, by the end of 2002. OPS also needs to resolve several issues related to its approach for overseeing pipeline security. For example, OPS needs to determine how best to use its own and its state partners' resources for carrying out this oversight because the agency does not anticipate obtaining additional resources for this purpose.

OPS's efforts to identify the resources and expertise needed to implement its integrity management approach are hampered by the lack of an up-to-date assessment of current and future staffing and training needs and an examination of the workforce's deployment across the organization—essential elements of a “workforce plan.”<sup>1</sup> Although OPS has estimated the number of inspectors it needs to hire to implement its integrity management approach and has developed a curriculum to train federal and state inspectors, its resource estimates are outdated and cover only the initial phases of implementation. In addition, OPS has not communicated its intentions for involving its state partners in implementing the integrity management approach. Although the agency believes it will need to augment its own resources with those of states to effectively implement integrity management, OPS officials have acknowledged that the agency's efforts to communicate with state partners have been limited. This limited communication has left some states unsure of the roles they will play. OPS is acting to resolve some of these issues, but a workforce plan—including updated multiyear resource estimates—would help the agency better plan for future resource needs. Furthermore, a strategy for communicating with states would help OPS to effectively involve its state partners in the implementation of the integrity management approach.

In the past, OPS has experienced a number of problems with the completeness and accuracy of its data on pipeline incidents, which the

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<sup>1</sup>U.S. General Accounting Office, *Human Capital: A Self-Assessment Checklist for Agency Leaders*, GAO/OCG-00-14G (Washington, D.C.: September 2000).

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agency uses in overseeing pipeline safety. For example, OPS's incident report forms used a limited number of cause categories—"other" accounted for about one-fourth of all pipeline incidents—and OPS did not have a procedure for following up with operators to ensure that their incident reports included any necessary revisions. OPS is implementing several initiatives to improve the completeness and accuracy of its data, which, if effectively implemented, should help the agency improve its oversight of pipeline safety. For example, OPS has revised its incident report forms to include more than 3 times as many cause categories, has assigned inspectors to review forms and follow up with operators, and has proposed to require an annual report from hazardous liquid operators. The agency plans to have most of the initiatives implemented for 2002 data. OPS plans to use the improved data to, among other things, help develop performance measures for the integrity management approach, focus its oversight efforts on the greatest risks to pipeline safety, and prioritize research and development projects. According to some state and federal government and industry officials, these initiatives address OPS's underlying data problems and will enable the agency to better understand the causes of incidents and improve its oversight of pipeline safety.

Although OPS has efforts under way to address several challenges it faces in implementing its new regulatory approach, the lack of a workforce plan and strategy for communicating with its state partners puts it at risk of not being able to overcome these challenges and effectively implement this approach on schedule. Therefore, we are recommending that OPS prepare a workforce plan that includes updated current and future resource estimates and develop a strategy for clearly communicating with its state partners about the role that they will play in implementing the integrity management approach. In commenting on a draft of this report, DOT officials noted that OPS recognizes the need for workforce planning and improved communication with the states, as we recommended. They also provided information on the agency's current and planned efforts in these areas. DOT's comments are reprinted in appendix I.

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## Background

Pipelines transport about 65 percent of the crude oil and refined oil products and nearly all of the natural gas in the United States. Table 1 shows the three primary types of pipelines that form a 2.2-million-mile network across the nation.

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**Table 1: Hazardous Liquid and Natural Gas Pipeline Mileage in the United States**

<b>Type of pipeline</b>	<b>Description</b>	<b>Approximate miles in the United States (thousands)</b>
Hazardous liquid	Transports crude oil to refineries and refined oil products, such as gasoline, to product terminals	159
Natural gas transmission	Transports natural gas over long distances from sources to communities	325 <sup>a</sup>
Natural gas distribution	Transports natural gas throughout the communities to consumers	1,850

<sup>a</sup>This mileage figure includes onshore and offshore transmission pipelines as well as some gathering lines, which collect natural gas from producing wells and carry the product to a natural gas transmission pipeline.

Source: OPS data.

Pipelines are inherently safer than other modes of freight transportation for hazardous liquids and natural gas. Although an average of about 24 fatalities resulted from pipeline incidents each year from 1989 through 2000, this number is relatively low compared with the number of fatalities from other forms of freight transportation. On average, about 66 people die each year in barge incidents, about 590 in railroad incidents, and about 5,100 in truck incidents. Despite the relative safety of pipelines, pipeline incidents can have tragic consequences, as evidenced by the pipeline ruptures in Bellingham, Wash. (1999), and Carlsbad, N. Mex. (2000). These incidents, which caused 15 fatalities, highlight the importance of pipeline safety.

OPS develops, issues, and enforces regulations to ensure the safe transportation of hazardous liquids and natural gas by pipeline. In fiscal year 2002, OPS employed about 135 people, over half of whom were pipeline inspectors. In addition, state agencies have roles in pipeline safety. In general, OPS retains full responsibility for inspecting and enforcing regulations on interstate pipelines but certifies states to perform these functions for intrastate pipelines.<sup>2</sup> Certified states are allowed to impose safety requirements for intrastate pipelines that are stricter than the federal regulations. In 2002, 48 state agencies, the District of Columbia, and Puerto Rico were certified for intrastate natural gas pipeline inspections, and 13 state agencies were certified for intrastate hazardous liquid pipeline inspections. OPS also uses some states to help inspect

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<sup>2</sup>See 49 U.S.C. 60105.

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interstate pipelines. These states, or “interstate agents,” inspect segments of interstate pipelines within their boundaries. However, OPS handles any enforcement actions identified through inspections conducted by these interstate agents. In 2002, 11 states were acting as interstate agents—2 states for hazardous liquid pipelines, 5 states for natural gas pipelines, and 4 states for both types of pipelines. In total, there are about 400 state pipeline safety inspectors trained to assist OPS in overseeing pipeline safety within their states.

OPS has traditionally carried out its oversight responsibility by establishing minimum standards in its regulations and enforcing them uniformly across pipelines.<sup>3</sup> However, this uniform regulatory approach does not account for differences in the risks faced by individual pipelines. For example, pipelines located in the Pacific Northwest states are susceptible to damage from geologic hazards, such as landslides, but OPS’s uniform, minimum regulations do not address this risk.

Recognizing that pipeline operators face different risks depending on such factors as location and the products they carry, OPS began exploring the concept of a risk-based approach to pipeline safety in the mid-1990s. In 1996, the Accountable Pipeline Safety and Partnership Act included provisions for DOT to establish a demonstration program to test a risk-based approach.<sup>4</sup> As a result, OPS established the Risk Management Demonstration Program, which went beyond the agency’s traditional regulatory approach by allowing individual companies to identify and focus on the unique risks to their pipelines. Partly on the basis of OPS’s experience with the demonstration program, the agency moved forward with a new regulatory approach—termed integrity management—to supplement uniform, minimum regulations. In a May 2000 report, we recognized the potential benefits of a risk-based approach to pipeline safety; however, we expressed concern that OPS did not have performance measures in place to demonstrate the effectiveness of the Risk Management Demonstration Program or the resulting integrity management approach.<sup>5</sup>

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<sup>3</sup>See 49 C.F.R. pts. 190-199 (2002).

<sup>4</sup>P.L. No. 104-304, 110 Stat. 3793 (1996).

<sup>5</sup>U.S. General Accounting Office, *Pipeline Safety: The Office of Pipeline Safety Is Changing How It Oversees the Pipeline Industry*, [GAO/RCED-00-128](#) (Washington, D.C.: May 15, 2000).



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The integrity management approach requires individual pipeline operators to develop programs to systematically identify and address risks to the segments of their pipelines that could affect “high consequence areas” where a leak or rupture would have the greatest impact, including highly populated or environmentally sensitive areas.<sup>6</sup> OPS designed the integrity management approach to achieve greater safety by allowing individual operators flexibility in tailoring their programs to the characteristics of their pipelines. This flexibility is reflected in performance-based requirements, which allow operators to determine the most appropriate processes and technologies to use in their integrity management programs, subject to OPS’s review. For example, operators may use a variety of techniques for assessing pipeline integrity and analyzing these results and other available information about the conditions of their pipelines. In addition, OPS’s integrity management program requirements include prescribed elements that provide some consistency among integrity management programs. For example, OPS requires all hazardous liquid pipeline operators to conduct a baseline assessment of the integrity of all pipeline segments that could affect high consequence areas, periodically reassess the integrity of these pipeline segments, take prompt action to address any anomalies found during the assessments that threaten the integrity of the pipeline, and develop measures of the program’s effectiveness. After September 11, 2001, OPS advised pipeline operators also to consider potential terrorist threats to their pipelines in their assessments of pipeline integrity.<sup>7</sup>

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## OPS Has Set an Ambitious Schedule for Implementing Integrity Management

OPS has to complete several important steps to implement its integrity management approach under an ambitious self-imposed schedule, including finalizing requirements for integrity management programs and inspecting the programs of more than 1,000 hazardous liquid and natural gas transmission pipeline operators. Although it may take OPS until 2006 or later to complete these steps, the agency’s schedule for the next 2 years is particularly challenging.

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<sup>6</sup>For hazardous liquid pipelines, a “high consequence area” is defined as a populated area, an area unusually sensitive to environmental damage, or a commercially navigable waterway. See 49 C.F.R. 195.450 (2002). For natural gas transmission pipelines, OPS has developed a definition that focuses on populated or frequented areas. See 67 Fed. Reg. 1108, 1114 (Jan. 9, 2002).

<sup>7</sup>See 67 Fed. Reg. 2136, 2137 (Jan. 16, 2002).

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To finalize the requirements for integrity management programs, OPS plans to issue proposed and final rules establishing these requirements for natural gas transmission pipeline operators by spring 2003.<sup>8</sup> The agency has already issued separate rules establishing requirements for hazardous liquid pipelines.<sup>9</sup> OPS is issuing separate rules for the different types of pipeline operators because of differences in the products carried by their pipelines, the types of risks faced, and the configuration of the pipelines. For example, hazardous liquid pipelines are more subject to metal fatigue, which can increase the risk of pipeline failure, than gas pipelines because they experience a greater number of pressure cycles. However, hazardous liquid pipelines also tend to be more uniform in size than natural gas pipelines, which makes it easier for them to accommodate internal inspection devices to detect corrosion. These differences have implications for the requirements for integrity management programs, such as the types of assessment methods that operators can use to identify risks to their pipelines and the appropriate intervals between required safety assessments.

OPS chose to issue the rule for operators of large hazardous liquid pipelines (those with 500 or more miles of pipeline) first because it needed more information on how integrity management principles should be applied to smaller hazardous liquid pipelines and natural gas transmission pipelines. Consequently, OPS issued requirements for operators of large hazardous liquid pipelines in December 2000 and similar requirements for operators of small hazardous liquid pipelines (those with less than 500 miles of pipeline) in January 2002. OPS anticipates issuing a proposed rule for operators of gas transmission pipelines by the end of summer 2002 and a final rule in spring 2003.

In addition to completing the requirements, OPS needs to inspect the integrity management programs developed by more than 1,000 individual operators of hazardous liquid pipelines and natural gas transmission pipelines. OPS has developed and begun to implement the following four-

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<sup>8</sup>OPS is considering issuing requirements for integrity management programs for operators of natural gas distribution pipelines after the agency completes the rulemaking process for natural gas transmission pipelines.

<sup>9</sup>The final rule for OPS's integrity management program for large hazardous liquid pipeline operators was published in December 2000. See 65 Fed. Reg. 75378 (Dec. 1, 2000) (to be codified at 49 C.F.R. pt. 195). The final rule for small hazardous liquid pipeline operators was published in January 2002. See 67 Fed. Reg. 2136 (Jan. 16, 2002).

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phased approach for reviewing and monitoring the programs for 65 operators of large hazardous liquid pipelines.

- Phase 1: From January through April, 2002, OPS conducted “quick hit” inspections of each operator’s identification of pipeline segments that could affect high consequence areas to determine if the operator had correctly identified these segments. OPS also reviewed documents describing how each operator intends to implement all elements of an integrity management program to determine whether the operator was making satisfactory progress in developing a program.
- Phase 2: From August 2002 through November 2004, OPS plans to conduct “comprehensive” inspections of each operator’s more fully developed integrity management program, including each operator’s plans for conducting an initial assessment of the safety of its pipelines. OPS estimates that each inspection will require about 2 weeks.
- Phase 3: After completing phase 2, OPS plans to monitor operators’ progress on their programs through periodic inspections. OPS anticipates that each operator will be inspected at least once every 2 years.
- Phase 4: Concurrently with the other phases, OPS plans to review and respond to notifications from operators of changes in their programs.<sup>10</sup> For example, an operator is required to notify OPS if it cannot repair any anomaly that affects the integrity of the pipeline within the time frame specified in the rule.<sup>11</sup>

OPS is conducting and planning a variety of activities aimed at carrying out these four phases, including developing inspection protocols and providing training to federal and state inspectors on conducting the inspections. OPS anticipates using a similar phased approach to review and monitor the programs for operators of small hazardous liquid and natural gas transmission pipelines.<sup>12</sup>

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<sup>10</sup>OPS plans to review all notifications received from operators and to respond in a timely manner to those in which it finds the proposed approach unacceptable.

<sup>11</sup>OPS requires operators to prioritize repairs in three categories: repair immediately, repair within 60 days, or repair within 6 months. See 49 C.F.R. 195.452(h)(4)(2002).

<sup>12</sup>However, the agency may combine the inspections in phases 1 and 2 for these pipelines if the agency determines that it would be more efficient and equally effective to have one inspection.

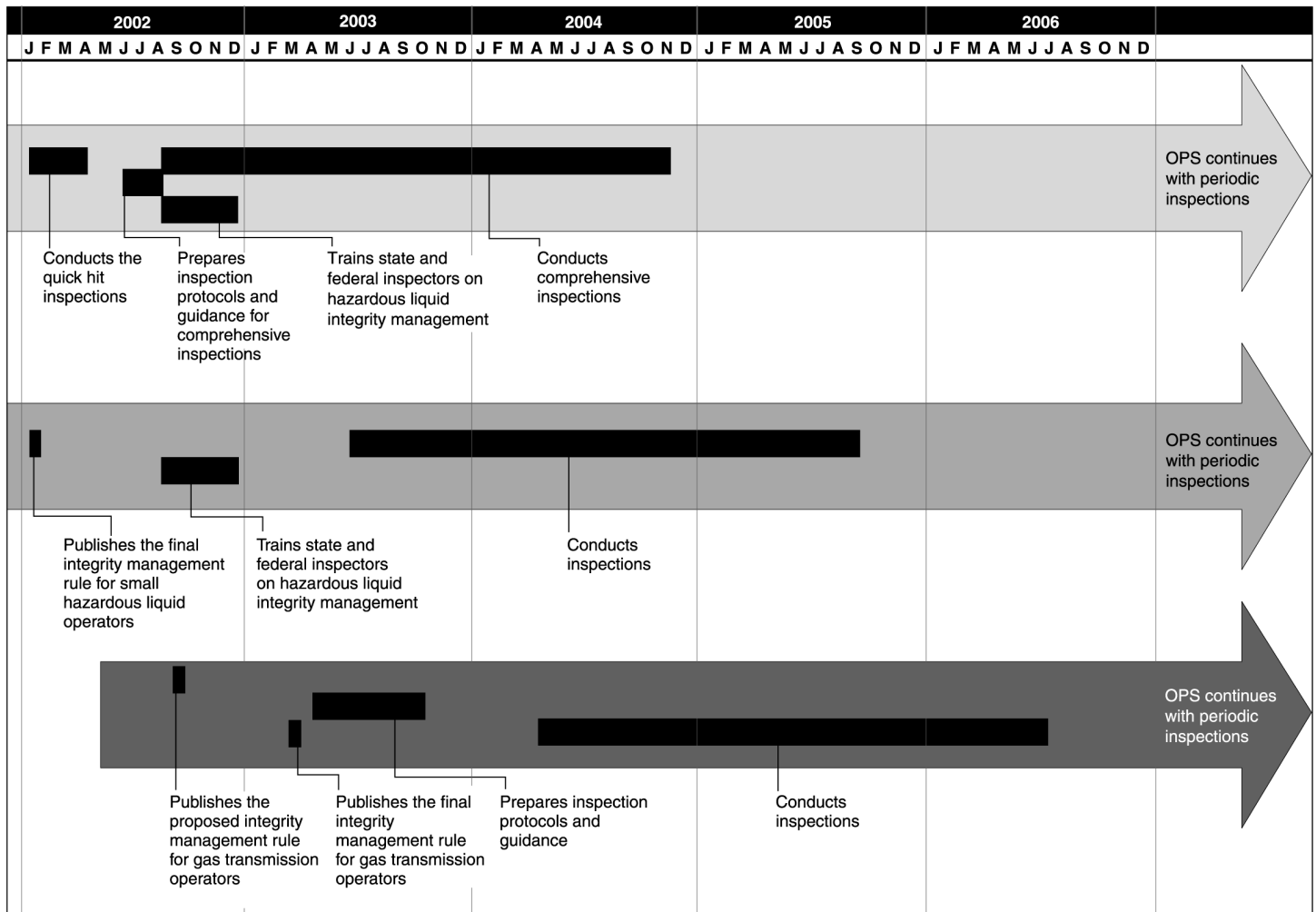
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According to OPS officials, OPS's schedule for implementing the integrity management approach is ambitious and presents a significant challenge. For the 65 operators of large hazardous liquid pipelines, OPS plans to conduct all of the comprehensive inspections within 4 years of issuing the final rule requiring integrity management programs for these operators. If OPS issues the final rule for integrity management programs for natural gas transmission pipelines in spring 2003, as it anticipates, and follows a similar schedule for conducting comprehensive inspections, then the agency will not complete inspections of these pipelines before spring 2006. However, because there are about 60 more interstate natural gas transmission pipeline operators than hazardous liquid operators that OPS will need to inspect, it may take the agency longer to complete these inspections. During this time frame, OPS also has to perform ongoing oversight activities, such as conducting standard inspections, investigating incidents, and inspecting pipeline construction.<sup>13</sup> Figure 1 shows a time line for the steps that OPS must complete to implement integrity management for large and small hazardous liquid pipelines and gas transmission pipelines.

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<sup>13</sup> OPS's standard inspections verify whether pipeline operators are in compliance with minimum safety standards. They include "unit inspections" of an individual operating unit of a company's pipeline system as well as "systemwide inspections" of all of a company's related operating units.

**Figure 1: Time Line for OPS's Implementation of the Integrity Management Approach**



Large liquid operator integrity management
  Small liquid operator integrity management<sup>a</sup>
 Gas transmission operator integrity management<sup>a</sup>

<sup>a</sup>This time frame assumes that OPS will issue the final rule for integrity management programs for natural gas transmission pipelines in spring 2003 and will follow a schedule for conducting inspections of small hazardous liquid and gas transmission operators similar to the inspections for large hazardous liquid operators.

Source: GAO analysis of information provided by OPS.

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According to OPS officials, the agency is implementing integrity management under an ambitious time frame because it wants to emphasize to operators the importance of evaluating and improving the safety of their pipelines. In addition, OPS's integrity management approach fulfills some long-standing congressional mandates and recommendations of the National Transportation Safety Board (the Safety Board), and the agency wants to address concerns about the amount of time it has taken to fulfill these mandates and recommendations.<sup>14</sup> Although the schedule is ambitious, OPS officials believe the agency can meet its time frame by hiring additional federal inspectors, using contractor support, and relying on state pipeline safety inspectors to conduct integrity management inspections for intrastate pipelines. However, as shown in figure 1, the next 2 years leave little margin for error if OPS is to follow its schedule. For example, agency officials acknowledge that they have prepared protocols and guidance for comprehensive inspections under a tight time frame in order to meet their target date for starting these inspections.

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## OPS Faces Additional Challenges in Implementing the Integrity Management Approach

In addition to meeting its ambitious schedule, OPS faces a number of other challenges in implementing its integrity management approach. Some challenges—such as enforcing the requirements for integrity management programs consistently and effectively, and measuring and reporting on the effectiveness of the integrity management approach—are more urgent for hazardous liquid pipeline operators because they have begun implementing their programs. Other challenges—such as ensuring that operators use pipeline safety assessment methods appropriately and establishing an inspection interval—have been addressed in OPS's requirements for integrity management programs for hazardous liquid pipelines and must now be resolved for natural gas transmission pipelines before OPS can issue a final rule for these pipelines. In addition, since September 11, 2001, OPS faces the challenge of developing an approach to overseeing pipeline security, including how to incorporate security into its integrity management and standard inspections of pipeline operators.

OPS is taking a variety of actions to address these challenges as hazardous liquid pipeline operators are implementing their individual programs.

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<sup>14</sup>For example, OPS is issuing its integrity management rules partially in response to a 1987 Safety Board recommendation that the agency require pipeline operators to periodically inspect pipelines. See U.S. General Accounting Office, *Pipeline Safety: Progress Made, but Significant Requirements and Recommendations Not Yet Complete*, [GAO-01-1075](#) (Washington, D.C.: Sept. 28, 2001).

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However, in attempting to meet its ambitious schedule for implementing the integrity management approach for hazardous liquid pipeline operators, OPS has not yet required these operators to adopt standardized measures for monitoring the performance of their programs or to provide the agency with the results of such measures. Agency officials told us that they intend to establish such requirements by the end of 2002 and are considering ways to report performance measurement data to local officials. OPS also needs to resolve several issues related to its approach for overseeing pipeline security. For example, OPS will need to determine how best to use its existing resources, as well as those of its state partners, for carrying out security oversight because the agency does not anticipate obtaining additional resources for this purpose.

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### Enforcing the Integrity Management Requirements Consistently and Effectively

In implementing its integrity management approach, OPS faces the challenge of enforcing compliance with the program's flexible requirements consistently and effectively—a much more difficult task than enforcing compliance with uniform minimum safety standards, as OPS has traditionally done. According to representatives of the pipeline industry, environmental organizations, and states, inspectors will face difficulties in judging the adequacy of complex integrity management processes that will vary from company to company. For example, under the integrity management rules, operators must analyze risks for each pipeline segment that could affect high consequence areas in order to identify actions needed to enhance public safety or environmental protection. Operators may choose from a range of actions, such as improving leak detection systems or installing shut-off valves to limit the amount of product released during a leak or rupture, but they must implement those actions they have identified as necessary. It will be challenging for inspectors to determine the adequacy of operators' risk analyses because, although the rule specifies some risk factors that operators should consider, it allows them to choose from a wide variety of methods for conducting risk analyses. Furthermore, because inspections will be conducted by five regional offices and 48 state partners, it will be challenging for OPS to ensure that inspectors make consistent judgments nationwide.

OPS officials have told us that their main goal in implementing the integrity management rules is to develop a nationally consistent approach for inspecting operators' integrity management programs. The agency is taking a number of steps aimed at ensuring consistency, including

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- completing a set of detailed inspection protocols and guidance designed to provide clear criteria to inspectors for evaluating the adequacy of operators' actions and making enforcement decisions;
  - putting together inspection teams of staff from multiple regions, including its most experienced inspectors, as well as external experts and state representatives; and
  - requiring all OPS and state inspectors who will conduct integrity management inspections to complete a set of relevant training courses.

According to OPS officials, the development and use of detailed protocols and guidance for conducting integrity management inspections are their most important means for ensuring the consistency of inspectors' decisions during these inspections. OPS has developed an initial set of protocols and guidance for the comprehensive inspections of operators of large hazardous liquid pipelines. The agency plans to pilot test the use of these protocols in its first five comprehensive inspections, which are scheduled for August through October, 2002. The agency intends to make necessary adjustments to the protocols and guidance on the basis of this pilot testing and to revise them periodically afterward on the basis of further experience with its inspections.

OPS, according to some environmental organization representatives, may face particular difficulties in enforcing its integrity management rules because operators may disagree with enforcement actions pertaining to flexible requirements in the rules.<sup>15</sup> OPS officials told us that they intend to vigorously enforce the integrity management rules, levying fines for serious violations, to ensure that operators comply with the requirements. After conducting 40 quick hit inspections of hazardous liquid pipeline operators, the agency has decided to take enforcement actions in 36 cases. OPS anticipates that about half of these actions will be notices of amendment and the other half will be notices of probable violation. Notices of amendment cite inadequate operator procedures and require operators to make needed improvements. Notices of probable violation generally contain a proposed compliance order requiring companies to take action to correct the violations found and may propose fines.

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<sup>15</sup>In response to concerns that we and others raised, OPS began an effort in 2000 to strengthen the enforcement of all its rules, including increasing the use of fines. See U.S. General Accounting Office, GAO/RCED-00-128 and *Pipeline Safety: Status of Improving Oversight of the Pipeline Industry*, [GAO-02-517T](#) (Washington, D.C.: Mar. 19, 2002).



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According to OPS officials, the agency anticipates that many operators will question integrity management enforcement actions, but it has prepared for this challenge by increasing its enforcement staff. It also plans to establish a new Enforcement Office, which will formulate enforcement policies and review enforcement actions to ensure consistency, and it plans to provide more training on enforcement issues for inspector and enforcement staff. OPS officials have stressed that they have been under tight time frames in developing an inspection and enforcement approach for large hazardous liquid pipelines and that this approach will evolve over time, as the agency implements the approach for small liquid and gas transmission pipelines.

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### Ensuring That Natural Gas Pipeline Operators Use Assessment Methods Appropriately

Because the methods typically used for assessing the integrity of hazardous liquid pipelines are either not currently suitable for a large portion of natural gas pipelines or would interrupt the supply of gas to customers, OPS faces the challenge of ensuring that natural gas transmission pipeline operators use alternative assessment methods appropriately. Integrity management programs for hazardous liquid pipeline companies allow the use of two primary assessment methods: (1) internal inspection devices, or “smart pigs,” that run inside the pipeline to detect anomalies, such as corrosion, metal loss, or damage to the pipeline, and (2) hydrostatic testing, a process of draining the pipeline, filling it with water, and increasing the pressure of the water to test the strength of the pipeline. Both methods have limited applications for testing natural gas transmission pipelines. Specifically, one industry association estimates that smart pigs cannot move through about half of gas transmission pipeline mileage because of such pipeline features as variations in diameter, sharp bends, and valves that do not fully open. Hydrostatic testing, which interrupts the supply of natural gas to consumers for up to 3 weeks per test, may leave communities without an energy source because natural gas transmission pipelines have minimal storage facilities.<sup>16</sup> Although integrity management programs for hazardous liquid pipeline operators allow the use of alternative safety assessment methods, they also specify that any other method must provide an equivalent level of

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<sup>16</sup>For assessments using smart pigs, the flow of gas generally has to be reduced by about 30 percent for 1 day.

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protection and that operators must notify OPS before conducting the assessment.<sup>17</sup>

As an alternative to smart pigs and hydrostatic testing, OPS is considering allowing gas transmission pipeline operators to use a method called “direct assessment” to assess the integrity of their pipelines. Direct assessment consists of four steps:

- Preassessment. The pipeline operator analyzes information about the physical characteristics of the pipeline—such as the coating material, soil moisture, and past leaks—to determine whether direct assessment is appropriate, what threats are likely to be present and significant, where these threats are likely to occur, and what tools should be used to inspect the areas of the ground above the pipeline where the threats are likely to occur.
- Indirect inspections. The operator uses one or more inspection tools to examine the pipeline through the soil in areas identified during the preassessment. For example, to identify corrosion on the exterior surface of a pipeline, an operator walks over the areas of the pipeline holding a tool that takes readings through the soil to assess the condition of the pipeline’s surface. Separate passes over the pipeline with two or more different types of tools are generally required to get an accurate assessment.
- Direct examinations. Using the results of the aboveground examination, the operator digs holes at intervals along the pipeline to examine suspected problem areas. After the holes have been dug, the pipeline can be examined visually and with diagnostic equipment, such as tools that measure the thickness of the pipe, to determine whether the operator needs to repair the pipeline or take other corrective action. For safety reasons, the pressure of the natural gas within the pipeline is generally reduced by about 25 percent during this step.
- Postassessment. The operator integrates and analyzes the information gathered during the three previous steps to determine whether additional excavations are necessary and how often pipeline segments should be reassessed.

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<sup>17</sup>See 49 C.F.R. 195.452(j)(5)(2002).

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Like other assessment methods, direct assessment has some limitations. For example, direct assessment has been proven reliable in detecting only one threat to the integrity of pipelines—external corrosion—while smart pigs can identify a wide range of threats to the integrity of pipelines, such as external corrosion, internal corrosion, and metal loss from external damage.<sup>18</sup> State pipeline safety officials and some natural gas pipeline company representatives we spoke with are concerned about the limitations of direct assessment and believe that its use should be closely monitored. For example, the Texas Railroad Commission’s pipeline safety section requires intrastate pipeline operators to obtain approval from the office if they plan to use direct assessment to assess the safety of their pipelines.<sup>19</sup> To obtain approval, the operators must present evidence at a hearing that this method is a valid choice for the circumstances of the pipeline and receive approval from the commission.

OPS officials explained that the agency has ongoing research activities focused on advancing the state of the art of direct assessment technology. Agency officials expect to issue a proposed rule by the end of this summer for integrity management requirements for natural gas transmission pipeline operators, which will address how direct assessment should be treated as an assessment method.

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## Establishing an Inspection Interval for Gas Pipelines

Establishing an appropriate interval between the safety inspections that operators are required to make of gas pipelines is likely to be a complex and controversial challenge for OPS because the agency must strike a balance between the existing industry standards, which allow intervals of up to 20 years, and shorter intervals. Although the appropriate interval for individual pipelines could vary with their circumstances, OPS is including a maximum interval in the requirements for integrity management programs to ensure that all operators conduct their inspections within a reasonable time frame. For hazardous liquid pipelines, OPS requires

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<sup>18</sup>External corrosion is the only threat for which industry standards for the application of direct assessment have been developed.

<sup>19</sup>Texas has implemented an integrity management program for intrastate pipeline operators. It is the only state with an intrastate integrity management program.

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inspections at least once every 5 years.<sup>20</sup> For natural gas transmission pipelines, longer intervals could be justified for several reasons:

- Pressure fluctuations, which can weaken a pipeline, are less frequent.
- Thicker pipeline walls or operation at lower pressure is already required in high consequence areas<sup>21</sup> under the existing uniform requirements.
- Internal corrosion is less likely because natural gas contains a minimal amount of moisture.
- Fewer storage facilities exist, therefore, interrupting the flow of gas to conduct inspections of the pipeline would have a greater impact on customers.

Because of these differences, the industry standards for natural gas pipeline integrity management programs (published by the American Society of Mechanical Engineers) allow maximum inspection intervals from 5 years to 20 years, depending on the type of assessment method and test procedures used and the operating pressure of the pipeline.<sup>22</sup> For higher pressures, the maximum interval is 5 years for less stringent methods and procedures (e.g., using direct assessment and excavating a sample of potential problem areas) or 10 years for more stringent methods and procedures (e.g., using direct assessment and excavating all problem areas). For lower pressures, the maximum interval is 20 years using any type of assessment method and the most stringent test procedures.

According to some pipeline industry and environmental group representatives, the maximum inspection interval for natural gas transmission pipelines should be limited to between 5 and 10 years to allow for a “worst-case” scenario. However, industry representatives noted that longer inspection intervals could be justified more for natural gas pipelines than for hazardous liquid pipelines, given the differences in their characteristics. For example, they cited the greater possibility of damage

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<sup>20</sup>Variance from the 5-year interval is allowed in two limited situations, provided the operator provides notification and justification to OPS. These situations are when there is an engineering basis for a longer period and when the best technology needed to assess the segment is temporarily unavailable. See 49 C.F.R. 195.452(j)(4) (2002).

<sup>21</sup>In a notice of proposed rulemaking, OPS proposed a definition of high consequence areas for natural gas transmission pipelines that is based on populated and frequented areas. See 67 Fed. Reg. 1108, 1114 (Jan. 9, 2002).

<sup>22</sup>These standards, which provide guidance to natural gas operators on how to implement integrity management programs, were developed by a task force that included representatives from the natural gas pipeline industry, OPS, and the Safety Board.

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to liquid pipelines from pressure fluctuations and internal corrosion and noted that external corrosion can threaten both types of pipelines. One natural gas transmission pipeline operator told us that it would take 12 years for a worst possible case of external corrosion to damage a pipeline enough to cause a failure. According to this operator, a 10-year inspection interval would allow time for pipeline operators to detect and repair such a worst case before it resulted in an incident.

OPS is trying to achieve a balance between these arguments as it prepares the proposed rule on integrity management for gas transmission pipelines. For the proposed rule, OPS is considering a maximum inspection interval of 5 or more years for pipelines assessed by direct assessment and 10 years for pipelines inspected by smart pigs or hydrostatically tested. For pipelines that operate at lower pressure, OPS is considering allowing inspection intervals that are longer than 10 years.

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## Measuring and Reporting on the Effectiveness of the Integrity Management Approach

OPS faces the challenge of establishing performance measures to determine the overall effectiveness of the integrity management approach and monitor the progress of individual operators' programs. Such performance measures would assist in determining the impact of the integrity management approach on pipeline safety and identifying needed improvements. OPS officials told us that the agency has identified some performance measures for integrity management, intends to require operators to report the results of these measures to the agency, and is considering ways to report performance measurement information to local officials and the public.

According to OPS officials, the agency has developed measures of the overall effectiveness of the integrity management approach on the basis of its data on pipeline leak and rupture incidents and will start publicly reporting these measures by early 2003.<sup>23</sup> Some recent improvements in OPS's incident data, such as new requirements for operators to report on whether incidents occurred in high consequence areas, should allow OPS to use these data to measure the overall performance of the integrity management approach in reducing incidents in these areas.<sup>24</sup> (OPS's efforts to improve these data are discussed later in this report.) For example, the

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<sup>23</sup>According to OPS officials, these measures will be included in DOT's budget proposal and performance plan for fiscal year 2004.

<sup>24</sup>These incident data are accessible to the public through OPS's Web site.

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agency intends to measure the effectiveness of integrity management by tracking reductions in the number of significant pipeline incidents and in the volume of oil spilled in high consequence areas. However, because operators of large hazardous liquid pipelines did not begin implementing their integrity management programs until 2002 and other types of pipeline operators will not begin implementing their programs until subsequent years, it will be some time before OPS can analyze trends and determine the impact of the integrity management approach on safety.

OPS also intends to develop new requirements for operators to report uniform performance measures for their individual integrity management programs. OPS's current integrity management rules for hazardous liquid pipelines require operators to develop performance measures for their programs, but the rules do not specify what measures they should use. As a result, these measures will not be consistent, and therefore OPS will not be able to use these data to develop industrywide measures or to compare the performance of operators. OPS and industry officials have told us that the development of consistent performance measures for operator integrity management programs has been difficult because of a lack of agreement on which measures can be standardized. OPS officials have recently worked with both the hazardous liquid and gas transmission pipeline industries to identify performance measures for integrity management programs that can be standardized, such as the numbers of integrity assessments conducted and repairs completed. OPS intends to modify its integrity management requirements for liquid pipeline operators by the end of 2002 to include a requirement that operators adopt these standardized measures and make the results of these measures available to OPS.<sup>25</sup> Until these operators start providing such standardized data to OPS, the agency's ability to monitor and compare the performance of operators' integrity management programs, some of which began in spring 2002, will be limited. The agency also intends to include similar requirements for gas transmission pipeline operators in the proposed and final integrity management rules for these pipelines, anticipated by spring 2003. OPS intends to require that hazardous liquid as well as natural gas

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<sup>25</sup>These measures would be made available to OPS electronically, either through a company Web site or a computer (modem) connection.

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transmission operators start making these standardized performance measurement data available to the agency in 2004.<sup>26</sup>

Although OPS intends to make industrywide measures on the effectiveness of the integrity management approach available on its Web site and in public reports, the agency has not yet determined what measures of individual operators' performance will be made publicly available or how this information will be communicated. The Safety Board and some public interest organizations have recommended that pipeline operators provide more information to the public about their safety operations. In response, the hazardous liquid and gas transmission pipeline industries, with the encouragement of OPS, are developing joint guidelines for operators on communicating safety information about their pipelines to the public and expect to finalize these guidelines by the end of 2002. At that time, OPS plans to consider whether to adopt all or part of these guidelines as regulations. However, the guidelines will not address what information operators should provide to state and local officials and the public about their integrity management programs. The liquid and gas pipeline industries intend to develop additional guidelines on this issue after finalizing their initial guidelines, and OPS plans to consider incorporating these additional guidelines as requirements after they are finalized. In addition to this industry initiative, OPS is currently considering alternatives for reporting information on the performance of individual operators' integrity management programs. Because operators want to protect information that may pose a security risk if publicly distributed, OPS officials have told us that they are considering developing a system that would make information on individual operators' performance available to local officials who need it, but not to the general public.

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<sup>26</sup>In spring 2002, the American Petroleum Institute began to collect similar data from hazardous liquid operators on a voluntary basis. However, the institute intends to use these data for industrywide analyses and does not intend to report information on individual operators' programs.

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## Developing and Implementing an Approach for Overseeing Pipeline Security

Since September 11, 2001, OPS has faced the challenge of ensuring that operators are taking appropriate actions to protect their pipeline systems from acts of terrorism.<sup>27</sup> To address this challenge, OPS has been developing an approach for overseeing pipeline security that does not involve the development of new regulatory requirements. Under this approach, OPS and state inspectors will review operators' pipeline security programs to determine whether they follow guidelines developed by the pipeline industry with OPS's participation and review. The agency intends to conduct these reviews as part of its comprehensive inspections of integrity management programs as well as its ongoing standard inspections of pipelines.<sup>28</sup> These reviews will focus on how operators are managing security risks at critical facilities, because the agency will expect operators to have more rigorous security practices in place at these facilities.<sup>29</sup> OPS is developing protocols for conducting these security reviews, but it still needs to resolve several issues to fully develop and implement its security oversight approach.<sup>30</sup>

Currently, OPS's regulations have few specific requirements pertaining to security. The agency has decided not to develop new security regulations because it believes that progress can be achieved more quickly by encouraging companies to voluntarily improve their security practices following industry guidelines. In addition, OPS officials are concerned that the inherent openness of the rulemaking process would require the agency to publish sensitive information, such as definitions of critical facilities and specific protective measures. Furthermore, RSPA's Office of the Chief Counsel has determined that OPS currently has enough statutory and regulatory authority to take enforcement actions if it finds that security at

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<sup>27</sup>The responsibility for oversight of pipeline security may change in the future. DOT's Transportation Security Administration was created in November 2001 and has statutory responsibility for the security of all modes of transportation, although it has focused its initial efforts on aviation security. In June 2002, the President proposed legislation to create a new Department of Homeland Security. Under this proposal, federal responsibilities for securing transportation systems would be transferred to this department.

<sup>28</sup>OPS gathered some preliminary information on operators' security practices immediately after September 11, 2001, through a survey of major pipeline operators.

<sup>29</sup>A critical facility is one whose failure would have a high consequence.

<sup>30</sup>OPS has undertaken a number of other security-related initiatives since September 11, 2001. For example, the agency has worked with the Department of Energy, the Federal Energy Regulatory Commission, state pipeline agencies, and industry to address issues related to rapid response and recovery of pipeline service in the event of an attack and has solicited research and development proposals to protect pipeline infrastructure.



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a critical pipeline facility is inadequate. Industry representatives told us that they prefer a nonregulatory approach, citing concerns about the need for flexibility in designing security programs suitable for each facility. However, some state pipeline safety officials, as well as some Members of Congress, have suggested that new security regulations may be needed to ensure that operators improve their security programs and practices. Legislation has been proposed that would require DOT to prescribe standards for pipeline security programs and approve or disapprove each operator's program on the basis of their adherence to these standards.<sup>31</sup>

Before fully implementing its security oversight approach, OPS must reach agreement with pipeline operators on certain aspects of its security reviews, including the identification of critical pipeline facilities.<sup>32</sup> A representative of the hazardous liquid pipeline industry told us that pipeline companies are concerned about this issue because of the cost of increased security at critical facilities, particularly if higher threat levels are declared. OPS has worked with the pipeline industry to develop guidance on how to determine which pipeline facilities are critical and what protective measures need to be taken at these facilities for various threat levels.<sup>33</sup> According to OPS officials, during security reviews of individual operators, OPS and state inspectors will review whether each operator has appropriately applied this guidance to its facilities. OPS must also reach agreement with the pipeline industry on what sensitive company security information inspectors will need to examine when reviewing pipeline security programs. Industry representatives have told us that operators are reluctant to share such information with OPS because the agency may not be able to prevent its public disclosure under

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<sup>31</sup>Pipeline Infrastructure Protection to Enhance Security and Safety Act, H.R. 3609, 107th Cong. (2001).

<sup>32</sup>We have previously reported that the identification of critical facilities is important for prioritizing protection efforts. See U.S. General Accounting Office, *Homeland Security: A Risk Management Approach Can Guide Preparedness Efforts*, [GAO-02-208T](#) (Washington, D.C.: Oct. 31, 2001).

<sup>33</sup>In March 2002, the Office of Homeland Security announced the creation of a Homeland Security Advisory System in order to disseminate information on the risk of terrorist attacks. The system includes five levels of threat to characterize this risk and associated suggested protective measures. The office has requested comments on the system and plans to finalize it by September 2002. 67 Fed. Reg. 12047 (Mar. 18, 2002).

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the Freedom of Information Act.<sup>34</sup> OPS officials have told us that they will try to address such concerns by having inspectors review sensitive documents on-site and take with them only those documents they need.

OPS will also need to determine how best to deploy its existing resources as well as those of its state partners for carrying out pipeline security oversight, because it does not anticipate obtaining additional resources for this purpose. This effort will involve determining the role of state inspectors in conducting security reviews and identifying the training that OPS and state inspectors will need to conduct these reviews. OPS officials have told us that states will play a key role in conducting these reviews, but some state pipeline safety officials have told us that they have not received clear guidance from OPS on their role in security oversight. One official noted that states have very limited resources and would need additional staff to conduct security reviews of pipeline operators. Furthermore, several state officials emphasized to us that their inspectors would need security-related training to be able to conduct security reviews of pipeline operators. However, according to an official of the Transportation Safety Institute, which trains OPS and state inspectors, the institute has not yet developed such training for these inspectors.

OPS officials have told us that the agency's next step in developing its security oversight approach is to communicate with its state partners regarding their role in implementing this approach. The agency intends to work with states in refining its protocols for security reviews and in developing security-related training for OPS and state inspectors. However, the lack of a workforce plan and a strategy for communicating with its state partners, as discussed in the next section of this report, may hamper OPS's ability to ensure that it has the resources and expertise it needs to oversee pipeline security and that it is effectively involving states in this effort.

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<sup>34</sup>Some legislation has been proposed that would protect such information. For example, H.R. 4 and H.R. 3609 would allow the Secretary of Transportation to withhold information on pipeline vulnerabilities from public disclosure. Energy Policy Act of 2002, H.R. 4, Secs. 741-783, 107th Cong. (2002) and Pipeline Infrastructure Protection to Enhance Security and Safety Act, H.R. 3609, 107th Cong. (2001).

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## OPS's Plan for Obtaining Resources and Expertise Is Not Complete or Adequately Communicated to State Partners

OPS's efforts to ensure it has the resources and expertise needed to implement its integrity management approach are hampered by the lack of an up-to-date assessment of current and future staffing and training needs and an examination of the workforce's deployment across the organization—essential elements of a workforce plan.<sup>35</sup> Although OPS has estimated the number of inspectors it needs to hire to implement its integrity management approach and has developed a curriculum to train federal and state inspectors, the agency has not prepared a workforce plan—an important component of successful human capital management. Furthermore, the resource estimates are outdated and cover only the initial phases of implementation. Also, although OPS says it will need to augment its own resources with those of states to implement integrity management, the agency has acknowledged that its efforts to communicate with states about their role in integrity management have been limited. This limited communication has left some states uncertain of their role and uncertain about whether they will be prepared to carry out their expected responsibilities under OPS's integrity management approach. OPS has several initiatives that may address some of these issues, such as using teams of inspectors and developing inspection protocols and guidance, but no initiative to estimate its long-term resource needs. Finally, while the agency intends to hold some discussions with states about their role in integrity management, it lacks a strategy for communicating how it will involve states in implementing this new regulatory approach.

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## OPS Lacks a Workforce Plan

OPS is hampered in its efforts to ensure that it has the resources and expertise to successfully implement its integrity management approach by the lack of a workforce plan. By workforce planning, we mean the short- and long-term strategies to identify OPS's current and future staffing needs; the appropriate workforce deployment across the agency; the knowledge, skills, and abilities needed for staff to implement integrity management; and the training to fulfill these needs. OPS has estimated that it needs to hire 28 inspectors by fiscal year 2003, an increase of 50 percent from fiscal year 2001, to inspect approximately 1,000 individual integrity management programs for hazardous liquid and gas transmission operators. This estimate is in addition to the approximately 100 of about 400 state inspectors that OPS plans to train and use to assist with inspecting integrity management programs, although some states may

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<sup>35</sup> [GAO/OCG-00-14G](#).

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need to hire additional inspectors. OPS based these estimates on the proposed integrity management rule for operators of large liquid pipelines. However, OPS made several significant changes between the proposed and final rules but did not adjust its estimates to account for these changes.<sup>36</sup> The following are examples of the outdated and incomplete components of OPS's resource estimates:<sup>37</sup>

- OPS added inspections to its implementation process. The agency based its resource estimates on the assumption that inspectors would perform one inspection but has since revised its procedures to include two different inspections. This change should have increased the original resource estimates.
- Resource estimates cover only the first two phases of a four-phase implementation process. According to OPS officials, their ultimate goal is to hire enough inspectors to carry out the third and fourth phases—conducting inspections every 2 years and responding to notifications from operators of changes in integrity management programs. However, OPS has not determined its resource needs for the third and fourth phases.

According to OPS officials, they informally updated their resource estimates for integrity management for each fiscal year budget request but did not document the changes.

Furthermore, OPS does not have an agencywide estimate of the resources it needs to maintain its entire range of pipeline safety oversight activities. In addition to the new integrity management inspection responsibilities, OPS must still conduct its standard inspections. However, OPS could not tell us how the coordination of time and resources for all types of inspections will take place. Because OPS has not created a workforce plan, it is unclear how the implementation of its integrity management approach will affect the resources it needs to fulfill other obligations.

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<sup>36</sup>OPS's proposed rule was published in April 2000, 65 Fed. Reg. 21695 (Apr. 24, 2000), and the final rule was published in December 2000, 65 Fed. Reg. 75378 (Dec. 1, 2000).

<sup>37</sup>OPS's original resource estimates are also miscalculated. By incorrectly multiplying numbers, for example, OPS estimated that 1,640 work weeks were required in the regions for implementing the small liquid integrity management rule, but the corrected figure is 2,495.

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Another important element of a workforce plan is training. OPS has developed a training curriculum designed to prepare state and federal inspectors for successfully implementing the integrity management approach. The agency is working with the Transportation Safety Institute to design and teach several new training courses specifically on OPS's hazardous liquid integrity management approach. OPS anticipates that about 180 inspectors (80 federal and 100 state) will complete the training by spring of 2003. The training involves classroom courses and on-the-job training. The classroom training involves eight core classes, which have already been taken by most state and federal inspectors, and an additional seven classes specifically designed for integrity management. The additional classes cover such issues as the requirements and basic concepts of using smart pigs to assess the integrity of pipelines and integrity management program inspection and compliance requirements. For on-the-job training, OPS is using a "team approach" to conduct integrity management inspections, in which trainees will attend inspections led by OPS's senior inspectors who have been involved in all phases of implementing the integrity management approach. Each team will consist of staff from multiple regions, including its most experienced inspectors and inspectors-in-training, as well as external experts. Starting in August 2002, when OPS will begin its comprehensive inspections of hazardous liquid operators, state representatives will also be included in these teams. This approach will allow senior inspectors to serve as mentors to the trainees, provide on-the-job training, and help inspectors make the transition to this new approach. When OPS finalizes the rule on the gas transmission integrity management requirements, inspectors will require additional training.

OPS's training may help ensure that inspectors have the technical expertise to conduct integrity management inspections, but making the transition to this new approach may present a challenge for some inspectors. Pipeline operators, industry associations, environmental organizations, and OPS officials acknowledge that the integrity management approach represents a fundamental shift in how OPS oversees the pipeline industry. Federal and state inspectors that are accustomed to following an approach for inspecting pipelines for compliance with uniform standards will now have to evaluate programs that are unique to individual operators. One OPS regional office official stated that this new approach "will require a different thought process," and that not making the transition adequately could result in inconsistent inspections between OPS regions and states. However, according to OPS headquarters officials, the agency's detailed inspection protocols and

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## OPS Has Not Adequately Communicated Its Plans to State Partners

guidance as well as inspector training will help ensure that integrity management inspections are conducted consistently.

OPS officials told us that they will use the assistance of state pipeline safety inspectors to achieve their ambitious schedule for inspecting the integrity management programs of pipeline operators, but OPS has had only limited communications with its state partners about their role in implementing integrity management. This limited communication could result in states not being adequately prepared to meet the demands of the integrity management approach. State pipeline safety inspectors are an invaluable resource for OPS because they are familiar with pipeline safety issues unique to their states and can improve safety by increasing the frequency and thoroughness of inspections of pipeline operators. OPS plans to leverage federal and states' resources to inspect the integrity management programs of more than 1,000 hazardous liquid and gas transmission operators. For example, states will be primarily responsible for inspecting the programs of an estimated 156 intrastate hazardous liquid and 520 intrastate gas transmission operators.

Despite the important role of the states, state pipeline officials we spoke with said that they have had little to no communication with OPS about how states will be involved in integrity management inspections. For example, one state's officials assumed OPS would contact them to participate in the quick hit inspection, but these officials did not know that states were being excluded from these inspections. OPS did not allow state inspectors to participate in the quick hit inspections because the agency felt it would be too difficult to coordinate the inspections within its self-imposed time frame.<sup>38</sup> OPS's apparent lack of communication with states leaves some states unsure if they will have the resources and expertise to meet the demands of the integrity management initiative. State officials told us that they are unsure how many of their inspectors will be trained by OPS over the next few years, and that they do not know enough about OPS's integrity management approach to determine whether they need to change some of their own in-house training, hire more inspectors, or both. One state's officials said that, because OPS has not provided any information to their state, they could only speculate about states' roles under the published final rule and could not justify requests

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<sup>38</sup>OPS made an exception in the case of Texas by allowing Texas inspectors to accompany OPS on the quick hit inspections, mostly because Texas has its own integrity management rule.

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for additional resources in preparation for the new integrity management approach. Another state official said that, given the availability of training in the past, it could take about 10 years to train just that state's inspectors. When we raised this concern to OPS officials, they responded that the agency has changed its training schedule and will be capable of training more people.

Although OPS has described its relationship with its state partners as an important component of the integrity management program, OPS officials acknowledge that in their initial phase of implementing integrity management, they have not focused on communicating with states regarding their plans for implementing the new approach. The officials explained that they have delayed communicating this information to states because states were not involved in the first phase of implementation, which included quick hit inspections of hazardous liquid operators. OPS officials further noted that since September 11, 2001, their communications with states have focused on security-related issues. (However, as previously described, some state pipeline safety officials told us that they have not received clear guidance from OPS on their role in security oversight.) According to agency officials, they are starting to contact states that will be involved in their first comprehensive inspections of hazardous liquid operators, scheduled to begin in August 2002, and will communicate further with states about their role in integrity management as these inspections continue. In addition, OPS officials explained that the agency plans to hold an annual meeting with states in September 2002 and a planning exercise with states in January 2003; both of these events will provide opportunities for OPS to communicate with states about their role in the integrity management initiative. However, these annual meetings do not address the need for OPS to formally communicate with states throughout the implementation process in order to effectively coordinate the use of both federal and state inspectors.

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## OPS Is Taking Action to Improve Data Quality

Obtaining complete and accurate data on reportable pipeline incidents is important to OPS for monitoring operators' safety performance, identifying safety trends, and planning future initiatives. Under the integrity management approach, useful and reliable data are also important, because OPS is using its data to, among other things, measure the effectiveness of this approach in improving pipeline safety. According

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to a joint government and industry task force report on hazardous liquids,<sup>39</sup> complete and accurate information on pipeline incidents is essential for the successful implementation of a risk management system.

In the past, we, the Safety Board, DOT's Office of the Inspector General, and others have identified problems with the completeness and accuracy of OPS's data. For example, as we testified earlier this year, OPS's former incident report forms included so few cause categories (seven or fewer, depending on the form) that about one-fourth of all pipeline incidents were attributed to "other" causes—a category too broad for useful analysis. In addition, OPS's incident forms did not provide for collecting data on hazardous liquid spills of less than 50 barrels or for measuring the total impact of an incident, particularly its damage costs. In addition, OPS did not require liquid pipeline operators to submit data on the characteristics of their pipeline infrastructure (e.g., age or size), which it needed to analyze trends and compare the operators' safety performance, nor did it collect complete data from natural gas pipeline operators. Finally, OPS did not have a procedure for following up with operators to ensure that their incident reports included any necessary revisions.

To improve the completeness and accuracy of its data, OPS is undertaking several initiatives, most of which it plans to have implemented for the collection of 2002 data. To more accurately determine the causes of incidents, OPS revised its incident report forms in 2001 and early 2002 for natural gas transmission and hazardous liquid incidents, respectively, to include 25 categories of causes. The agency plans to revise the form for natural gas distribution incidents by the end of 2002. The revised forms for hazardous liquid operators also require these operators to report spills of 5 gallons or more (instead of 50 barrels or more) and to provide more complete information on the total costs of an incident. To enable it to better analyze trends and compare operators' performance, OPS revised its annual report forms for natural gas transmission pipeline operators for 2001 data and intends to revise these forms for natural gas distribution pipeline operators for 2002 data. In July 2002, the agency proposed instituting annual reports for liquid pipeline operators for 2002 data. To ensure that operators complete incident reports in an accurate and timely manner, OPS has assigned an inspector in each region to review incident

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<sup>39</sup>The Joint Government/Industry Risk Assessment Quality Team, *Risk Management within the Liquid Pipeline Industry*, sponsored by OPS and the American Petroleum Institute, June 20, 1995.



report forms for completeness and accuracy. It has also instituted new electronic notification procedures to ensure that operators submit revised incident reports, if necessary. These and other major data improvement initiatives are summarized in table 2.

**Table 2: OPS's Data Quality Initiatives**

<b>Data problem</b>	<b>Initiative</b>	<b>Status of initiative</b>
Data provided on incident reports were not complete or accurate.	Revise incident report forms to include more cause categories, a wider range of hazardous liquid spills, and more information on total costs of an incident; revised forms also use electronic notification procedures to ensure completeness.  Inspector in each region will be responsible for regularly reviewing incident reports for relevance, completeness, and accuracy.	Gas transmission and hazardous liquid forms revised in 2001 and early 2002 for 2002 data.  Revision of gas distribution form expected to be completed by the end of 2002 and usable to collect 2003 data.  Existing staff will be used in 2002 to review incident reports while new inspectors are being hired and trained.
Data to analyze trends and compare operators' performance were not sufficient.	Revise existing annual report forms for natural gas pipeline operators to require more information (e.g., pipeline mileage, age, and type).  Institute annual reports for hazardous liquid pipeline operators.	Form for natural gas transmission annual report revised in 2001 for 2001 report.  Form for natural gas distribution annual report expected to be revised by the end of 2002, in time to collect data for 2002 report.  New form for hazardous liquid annual report expected to be finalized in 2002, in time to collect data for 2002 report.
OPS staff made errors entering data from operators' reports into OPS's database.	Have operators file reports electronically to eliminate errors and expedite filing.	Direct electronic filing by operators began in January 2002.
States collect data in different formats, limiting OPS's ability to compare and consolidate data from different states.	Establish a team to develop uniform data elements and reporting procedures.	Completion expected by the end of 2003.
OPS lacks complete understanding of the causes of incidents, which is needed to focus oversight efforts on the greatest risks.	Hire contractors to analyze incident causes—focus in 2002 is on the consequences of incidents on gathering lines and the benefits of increasing the regulation of gathering lines.	Contractors to provide reports by the end of 2002 and on a regular basis thereafter.

Source: GAO analysis of information provided by OPS.

According to OPS officials, OPS plans to use the data that it collects to, among other things, help measure the effectiveness of its integrity management approach, focus its oversight efforts on the greatest risks to pipeline safety, and prioritize research and development projects. One performance measure that OPS plans to develop using the new incident report forms is the number of high consequence areas affected by pipeline incidents. This number should decrease over time as operators focus their

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efforts on these areas through their integrity management programs. To focus its oversight efforts on the greatest risks, OPS plans to analyze the improved data on incident causes to better understand the greatest safety risks and deploy staff accordingly to address these risks. OPS also plans to use the data on incident causes to identify the research and development projects that are most critical to improving pipeline safety.

Although OPS's initiatives appear to address past criticisms, government and industry officials believe it is too early to say whether further improvements are needed. According to the Safety Board, state pipeline safety officials, industry groups, and pipeline operators, OPS's initiatives address the agency's underlying data problems and will enable OPS to better understand the causes of incidents so it can focus its efforts to improve safety. However, officials from the Safety Board noted that these initiatives are merely a first step, and they emphasized that OPS should periodically reassess its forms and procedures and take steps to revise them as necessary. In addition, a state pipeline safety official noted that although there are now 25 cause categories on the incident forms, there will still be some uncertainty, since operators have the option of choosing "other." Finally, officials from industry groups told us that it will be several years before OPS has sufficient data for analyzing trends in incidents.

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## Conclusions

OPS is aggressively pursuing its integrity management approach and taking action to improve the quality of its data. If properly implemented, these initiatives should improve pipeline safety. However, OPS still has significant challenges to overcome in implementing its new regulatory approach. Although OPS is carrying out a variety of activities aimed at overcoming these challenges, the agency lacks a workforce plan containing current and future resource estimates for these initiatives. The absence of such a plan could hamper OPS's ability to meet its ambitious time frames and successfully implement its new regulatory approach. Furthermore, OPS does not have an effective strategy for communicating with its state partners and, as a result, these states may not be fully aware of the role OPS expects them to play in implementing integrity management and may not be adequately prepared for this role. If states are not adequately prepared, OPS will probably not be able to meet its ambitious time frame for inspecting pipeline operators' integrity management programs. Finally, the lack of a workforce plan and strategy for communicating with states may hamper OPS's ability to ensure that it has the resources and expertise it needs to oversee pipeline security and that it is effectively involving states in this effort.

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## Recommendations for Executive Action

- We recommend that the Secretary of Transportation direct OPS to
- develop a workforce plan that contains an updated assessment of OPS's current and future staffing and training needs and an examination of the workforce's deployment across the organization and
  - develop a strategy for communicating to the states what role they will play in conducting integrity management inspections and other oversight activities.

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## Agency Comments and Our Evaluation

We provided a draft of this report to DOT for its review and met with DOT officials, including OPS's Associate Administrator, to obtain their comments. In addition, DOT's Assistant Secretary for Administration provided written comments, which are reprinted in appendix I. The DOT officials generally agreed with the draft report's recommendations. Regarding workforce planning, they noted that OPS intends to formulate detailed plans for the longer term after it has completed the final integrity management rule for gas transmission pipelines. While we are encouraged that OPS intends to develop a workforce plan, we believe that the agency needs to ensure that its planning efforts encompass both its short-term and long-term staffing and training needs. In particular, the agency should develop a strategic workforce plan now in order to establish a solid foundation for implementing integrity management and accomplishing its mission and programmatic goals. Such a plan should identify the resources and expertise OPS needs to carry out its initiatives, including how it will leverage its resources with those of its state partners. A workforce plan will help the agency meet its ambitious time frame for implementing the integrity management approach and address challenges it faces in doing so. OPS should monitor and periodically update the plan to address changing needs.

Regarding communicating with the states, the DOT officials explained that OPS is trying to define what role the states will play in integrity management inspections and is currently engaged in discussions with states regarding their involvement in this initiative. Although we believe that this is a step in the right direction, the agency needs to formulate and adopt a strategy for communicating with its state partners that will help ensure that the agency effectively involves states in integrity management and other oversight efforts over the longer term.

OPS officials also provided some technical clarifications, which we have incorporated in this report as appropriate.

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## Scope and Methodology

To examine OPS's steps to implement the integrity management approach, identify the challenges OPS faces in implementing this approach, and assess OPS's plans for obtaining the resources and expertise needed to oversee pipeline safety under this approach, we reviewed OPS documents, analyzed OPS's resource estimates, visited states, and interviewed OPS and pipeline industry officials as well as others with pipeline safety expertise. OPS documents that we reviewed included the proposed and final rules that establish the integrity management requirements, comments on the proposed rule, OPS's documentation on its plans for implementing the integrity management approach, and OPS's resource estimates and training schedule. We analyzed OPS's resource estimates to determine their accuracy and consistency. We also visited state pipeline agencies in Texas, Washington, New York, and Virginia. We chose to visit these states because their pipeline oversight agencies are among the most active of OPS's state partners in implementing the integrity management approach. For example, officials in these states provided comments on OPS's proposed integrity management rules and/or have been involved in efforts to develop integrity management program requirements. In addition, Texas has its own integrity management rule for natural gas and hazardous liquid pipeline operators. We also conducted in-person and telephone interviews with the following: representatives from state and national pipeline industry associations; officials at several pipeline companies; pipeline safety officials in those states we visited; representatives from environmental advocacy organizations; officials from the Environmental Protection Agency and the National Transportation Safety Board; representatives from Cycla Corporation, a contractor that is working for OPS on some components of implementing integrity management; a representative from the Transportation Safety Institute, which provides the training for state and federal pipeline safety inspectors; and officials from OPS's headquarters and five regions.

To determine OPS's major initiatives to improve the quality of its data on pipeline incidents, we reviewed and compared the agency's new data-collection forms with its previous forms. We also interviewed officials working for pipeline companies that fill out these forms. We interviewed officials from the Safety Board and the DOT Office of the Inspector General, OPS officials who implement the data-collection activities, representatives from pipeline industry associations, and state pipeline agency officials.

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We conducted our work from November 2001 to July 2002 in accordance with generally accepted government auditing standards.

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As arranged with your office, unless you publicly announce its contents earlier, we plan no further distribution of this report until 30 days after its date. At that time, we will send copies of this report to congressional committees and subcommittees with responsibilities for transportation safety issues, the Secretary of Transportation, the Administrator of the Research and Special Programs Administration, and the Director of the Office of Management and Budget. We will make copies available to others upon request. In addition, this report will be available at no charge on the GAO Web site at <http://www.gao.gov>.

If you or your staff have any questions about this report, please contact me at (202) 512-2834 or [guerrerop@gao.gov](mailto:guerrerop@gao.gov). Key contributors to this report were Susan Fleming, Judy Guilliams-Tapia, Michael Horton, Wyatt Hundrup, and Sara Vermillion.

Sincerely yours,

A handwritten signature in black ink, appearing to read 'Peter F. Guerrero', with a long horizontal flourish extending to the right.

Peter F. Guerrero  
Director, Physical Infrastructure Issues

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# Appendix I: Comments from the U.S. Department of Transportation

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**U.S. Department of  
Transportation**

Assistant Secretary  
for Administration

400 Seventh St., S.W.  
Washington, D.C. 20590

August 7, 2002

Mr. Peter Guerrero  
Director  
Physical Infrastructure Issues  
U.S. General Accounting Office  
441 G Street N.W.  
Washington, D.C. 20548

Dear Mr. Guerrero:

We appreciate the opportunity to provide comments on the U.S. General Accounting Office (GAO) draft report regarding the status of efforts by the Research and Special Program Administration's (RSPA) Office of Pipeline Safety (OPS) to implement its Integrity Management Program and improve the quality of data on pipeline incidents. OPS has achieved significant progress in both its integrity and data initiatives.

Setting and enforcing higher pipeline safety standards through the Integrity Management Program is already producing results for hazardous liquid pipelines. RSPA demonstrated that it is prepared to enforce these standards with its recently completed "quick hit" inspections. These inspections:

- Included all large hazardous liquid pipeline operators,
- Covered over 70,000 miles of pipelines, and
- Resulted in enforcement actions on 85 percent of those operators.

At a recent public meeting in July, OPS unveiled its new complete inspection protocols for the comprehensive hazardous liquid pipeline inspections and answered many implementation questions. We wish to emphasize:

- OPS received overwhelmingly positive feedback from inspectors and industry representatives alike regarding the effectiveness of the protocols in achieving consistent enforcement of the hazardous liquid Integrity Management Program.
- OPS is staffed, organized, and prepared to fully and effectively implement its final rules.
- The Integrity Management Program incorporates key attributes recommended by the National Transportation Safety Board and mandated by Congress, to ensure that pipelines continue to operate as safely as possible.

OPS is dedicated to completing the remaining tasks according to plan. The proposed rule for natural gas transmission pipelines is nearly completed. OPS is working with state agencies and the industry to fine tune performance measures.

To ensure that state partners are aware of their roles, OPS is finalizing policy documents to clarify expectations. Our comprehensive discussions with state pipeline safety partner agencies are:

- Clarifying a vision for state inspectors' participation in integrity management inspections,
- Identifying state needs,
- Addressing training needs for state personnel,
- Improving overall communications, and
- Making the Integrity Management Program plan review more efficient.

OPS has also been pursuing a logical, building block approach to formulating detailed workforce plans. Detailed inspection protocols are the basis for understanding the scope of tasks ahead, along with the inspection time and resources required. While OPS is finalizing the notice of proposed rulemaking on natural gas transmission pipelines, it is premature to detail inspection protocols. Similarly the training program, which is underway for hazardous liquids, can only be developed for natural gas once the final rule is completed. Once all of the critical building blocks come together, OPS will use these elements to complete analytically based workforce planning to ensure that long-term needs are met. While OPS has the resources it needs for the current workload, it is clear that additional inspection resources are needed to conduct inspections for both the Integrity Management Program and other traditional inspection and oversight activities. The President requested significant additional inspection resources for this purpose for FY 2003.

While the GAO draft report recognized OPS' data improvement efforts, it should be noted that RSPA has several initiatives to improve the completeness and accuracy of its data to improve its oversight of pipeline safety. Specifically, OPS has:


- Issued the first rulemaking requiring an annual report for hazardous liquid pipelines – an essential step in improving the completeness and value of pipeline data, and
- Modified incident and accident report forms to better reflect incident causes.

Overall, OPS is dedicated to effectively implementing the Integrity Management Program and the data improvements. Work is complete in many key areas and is underway to address remaining issues. While its schedule is ambitious and the challenges formidable, OPS has already demonstrated it is up to the challenge.

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Once again, we appreciate the opportunity to offer these comments. Please contact Martin Gertel on 202-366-5145 with any questions.

Sincerely,



Melissa Allen



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