

**Discussion of the Proposed Gas IM Rule:
Comparison of Costs and Discussion of Benefits
Draft, to date, July 22, 2003**

How will Costs and Benefits of the Proposed Rule be evaluated and compared?

This discussion of the proposed gas pipeline integrity management (IM) rule compares the costs and benefits of integrity management requirements associated with four alternatives:

- (a) provisions of the Pipeline Safety Improvement Act of 2002 (PSIA-2002), signed on December 17, 2002, with no changes such as might be made in a rule,
- (b) postulated provisions of a rule that only incorporates requirements of PSIA-2002 in the regulations, and allows RSPA/OPS to exercise the waiver authority in the statute,
- (c) provisions of the NPRM, and
- (d) anticipated provisions of the final IM rule.

What is the Result of the Cost Comparisons?

The remainder of this paper will discuss the benefits for the four cases described above. The analysis of costs is described in a companion paper. Here we will skip to the bottom line in the comparison of costs and benefits.

The costs shown on the table below have been estimated on a consistent basis, using the same unit costs and compatible assumptions. The costs and assumptions have changed since the regulatory analysis supporting the proposed rule (i.e., NPRM), as a result of public comments. For that reason, the costs of implementing the NPRM have been re-estimated here.

Comparison of Costs and Benefits
(Costs in billions)

Scenario	Estimated benefits	Estimated 20-year Total Cost	Cost Savings from Previous Scenario	Cumulative Cost Savings from Scenario 1
1. No Rule (PSIA-2002)	\$0.8 + (a)	\$10.9 (b)	\$0	\$0
2. Rule Implementing PSIA-2002	\$0.8 + (a)	\$10.9	\$0	\$0
3. NPRM (Updated Costs)	\$0.8 + (a)	\$10.3 (c)	\$0.6	\$0.6
4. Anticipated Rule	\$0.8 + (a)	\$4.7	\$5.6	\$6.2

Notes:

- (a) The estimated benefit of \$0.8 billion associated with all four cases is the estimate of the impact of integrity management in reducing the historically observed incident rate. There are additional benefits, as described below, for which values have not yet been estimated
- (b) The “No Rule” (strict Statute) case is only slightly more costly than the NPRM because the savings associated with allowing CDA in the NPRM are partially offset by the longer reassessment interval for DA allowed by the Statute.
- (c) New information on unit costs associated with implementing integrity management has led to a significant increase in estimated costs for implementing the NPRM over that reported in the draft regulatory analysis for the NPRM.

The table clearly shows three important facts.

1. The reduced cost associated with promulgating the anticipated rule relative to leaving operators to implement the provisions of the PSIA-2002 without the changes made in the rule is considerable (\$6.2 billion).
2. The provisions in the anticipated rule lead to a greater reduction in costs than those in the NPRM (\$5.6 billion).
3. Costs associated with the provisions of the PSIA-2002 are marginally higher than those associated with the NPRM (\$0.6 billion).

Thus, the table above demonstrates that the cost of implementing the anticipated rule is greatly reduced from that associated with implementing the requirements in the PSIA-2002. There are three reasons why operator’s implementation of PSIA-2002, in and of itself, would be somewhat more costly than the anticipated rule.

- 1) If the only new requirements were those in PSIA-2002, the HCA definition would be that in the final HCA rule. Based on responses to questions posed in the preamble to the IMP NPRM, OPS is considering changes to that earlier rule both

by offering a second way to define HCAs for pipelines near clusters of residences, and by modifying the definition of “identified sites”. These changes, which have already been included in the \$4.7 billion estimate, have been estimated to reduce cost of the rule by about 43%.

- 2) OPS is considering changing integrity assessment requirements for pipeline operating at stress levels below 30% SMYS, again based on comments received in response to questions posed in the preamble in the IMP NPRM. These changes will have the effect of significantly lowering the cost for operators.
- 3) As in the IMP NPRM, OPS will continue to allow the use of Confirmatory Direct Assessment (CDA) under certain conditions in which this alternative assessment technology is considered appropriate. (CDA is an assessment process related to direct assessment. It was developed by OPS as a more cost-effective method for operators to satisfy the seven-year reassessment requirement in PSIA-2002. Without this technology, the costs of implementing integrity management would be considerably higher.)

Initial industry estimates of the impact of these latter two changes, *which use assumptions somewhat different than those in the regulatory analysis*, indicate that they could reduce costs by as much as \$960 million over 20 years. The PSIA-2002 does not include CDA as one of the allowable assessment methods. It can be included in the rule, because of provisions in the PSIA-2002 that allow DOT to specify alternative methods that will provide an equal or greater level of safety.

What Benefits can be Quantified?

A benefit associated with implementing integrity management requirements is an anticipated reduction in the frequency of pipeline accidents, and their resulting consequences. The consequences of interest are deaths, serious injuries and property damage. RSPA/OPS uses standard DOT assumptions to establish a monetary value for deaths (\$3 million) and serious injuries (\$500,000). Operators report property damage after accidents. RSPA/OPS has found that these reports often understate the amount of damage, and are not always updated with new information. In estimating the potential benefit for this rule, RSPA/OPS considered the total number of deaths, serious injuries, and property damage reported from transmission pipeline accidents over 17 years (1986-2002). Reported property damage estimates were doubled, to account for underreporting. The total value of accident consequences over that period averaged \$56.63 million per year.

RSPA/OPS does not expect that implementing integrity management requirements will eliminate all serious pipeline accidents. RSPA/OPS does expect that these actions will significantly reduce their frequency of occurrence. RSPA/OPS also expects that accident consequences, absent new requirements, would be likely to increase over the next 20 years as the population in close proximity to pipelines increases. The regulatory analysis estimates that the annual benefit from reducing deaths, serious injuries, and property damage from transmission pipeline accidents is on the order of \$40 million. Over 20 years, this totals \$0.8 billion.

What Difficult-to-Quantify Benefits will accrue from Implementing Integrity Management Requirements?

The principal non-quantified benefit discussed in the regulatory analysis supporting the proposed rule was the improvement in public confidence that will result from implementing integrity management programs. This benefit can manifest itself in several different ways with considerable economic benefit to the public. Five concepts that were not considered in the regulatory analysis supporting the proposed rule for quantifying additional benefits are described below.

The first three of these concepts would result from implementing substantive requirements for assuring pipeline safety by any method. The last two benefits result from improved confidence in pipeline integrity on the part of the regulator, which will enable positive regulatory decisions to be made, which will only happen if the rule is published.

1. *Economic Impact of Inability to Meet Future Demands for Gas*

Use of natural gas in the U.S. is expected to significantly increase in the next 20 years – from about 23 Trillion Cubic Feet per year (TCF) today to approximately 35 TCF at the end of the period. In addition, the growth in demand in specific markets such as New York, the Southeastern and Southwestern states, Florida and California will very likely far outstrip the average growth in demand. More pipeline capacity will likely be needed to move this additional gas, especially to serve the special high-growth markets. Public opposition could make it difficult (impossible in some cases) to site and construct new pipelines. RSPA/OPS believes that implementing integrity management will contribute to improved public confidence, that this increased confidence will facilitate siting and construction of new pipelines, and that increasing pipeline capacity to supply critical market demand will be more difficult without it.

Rigorously quantifying the effect of curtailing the expansion of future gas supply would require an extensive econometric analysis. The analysis would need to model the entire U.S. gas transmission pipeline infrastructure. It would need to include assumptions regarding when and where new pipelines might be needed over the next 20 years. These assumptions would be highly speculative, and the results of the analysis would therefore have very large uncertainties.

A rough approximation of the adverse impact of reduced gas transportation capacity to critical growth markets might be made by assuming that a lack of public confidence results in a deficit in needed new pipeline construction and therefore a shortfall in transportation capacity of some assumed magnitude (e.g., 10 percent). It should be possible to estimate the cost to the economy of such a shortfall. The calculation could be repeated, assuming different rates of growth in demand and several different capacity shortfalls. This would address any concerns that the demand is simply being overstated to demonstrate added economic benefit from the proposed rule. OPS expects that the

costs to the economy from a postulated transportation capacity deficit would be large. This number could be used to illustrate the potential benefits of the rule, although the difficulties in estimating the magnitude of the effect makes it difficult to claim that the rule will result in some precise level of benefits.

Failure to achieve and maintain public confidence can impact the ability to install the additional needed gas transportation capacity. In the extreme, it could prevent expansion of gas supply to one or more of the markets where additional gas will be in critical demand. Inability to supply the gas needed in the future could have a significant detrimental effect on the U.S. economy. Avoiding those impacts is a significant benefit of the gas pipeline IM rule.

Very preliminary estimates indicate that the adverse economic impact associated with no rule could be on the order of \$1 to \$5 billion per year as a result of this factor.

2. *Potential to Avert a Very High Consequence Accident*

Pipeline operators display a broad spectrum of effectiveness in their operational practices. One area in which practices vary considerably is corrosion control on aging pipelines. Additionally, even large pipeline operators with significant resources to devote to safety have experienced significant events (e.g., Duke at Edison and El Paso at Carlsbad). These factors suggest there is a possibility that, absent the IM Rule, an accident considerably more severe than those experienced to date could occur during the next twenty years. Implementing the law, alone, may prevent future high consequence accidents, but certain provisions of the rule will have a great impact on averting high consequence accidents:

- (1) Repair criteria are specified in the rule in a very precise manner, going beyond any industry consensus standards. We know from experience that aggressive repair criteria have had greater impact than other safety actions. Many lines that had accidents in the 1990s had been tested, but operators, by themselves, were not making best use of the available data.
- (2) The rule requires a threat-by-threat evaluation of the pipeline to focus on those threats of significance.
- (3) The rule requires applying lessons learned from assessing covered pipe segments to similar pipeline not in HCAs. These provisions respond to recommendations of the National Transportation Safety Board, and will significantly expand the impact of the rule.
- (4) The rule requires gathering, monitoring and reporting of measures of performance that will allow operators, regulators and the public to observe the downward trends in the number of significant defects in gas pipeline.
- (5) Preventive and mitigative measures required by provisions in the proposed rule will significantly reduce the likelihood of accidents caused by time-independent events such as those caused by third-party damage. These provisions will have particular benefit in areas where significant growth is expected, with attendant excavations and

potential for pipeline damage. This type of accident would not be addressed by implementing the provisions of the law alone.

A probabilistic analysis of the likelihood of a spectrum of serious accidents together with an estimate of the range of consequences resulting from these accidents could allow estimation of additional benefits (i.e., in excess of those estimated from the range of accidents experienced to date) to accrue to the gas IMP Rule.

Such an analysis could include consideration of the possible juncture of four factors that would increase the likelihood and consequences of a possible accident: (a) the presence of operators demonstrating lower than typical operational effectiveness, (b) the presence of piping that has historically experienced higher than typical incident rate, (c) the presence of areas of larger than average economic growth near a gas transmission pipeline, and (d) potential lapses in the effectiveness of practices that prevent deterioration of pipeline with age. The risk of significant economic consequences of a future incident in an area where these four factors come together could be very significant during the next twenty years.

Whether, and how much, pipeline accident frequency or consequences might increase is difficult to estimate. The data on the OPS web site for 1986 to 2002 do not show any notable trend. If the effects of the Carlsbad accident in 2000 are excluded, the data show a slight decreasing trend in consequences and a reasonably steady rate of occurrence of incidents. Although in the absence of the IM rule industry restructuring and loss of technical expertise may ultimately increase the rate and consequences of incidents, the historic data do not support any such an assumption.

The treatment of benefits resulting from reduction in accident consequences in the regulatory analysis supporting the proposed rule already considers one source of possible increases. As described above, the analysis considered the monetary value of avoiding the deaths, serious injuries, and property damage experienced in the preceding 17 years. The analysis concludes that the annual benefit if all accidents in the recent historical record were eliminated would be approximately \$56 million.

The analysis discusses the possibility that consequences of future accidents could increase, and acknowledges that the integrity management rule is not expected to eliminate all accidents. Nevertheless, the analysis concludes that the benefit from avoiding deaths, serious injuries and property damage that would otherwise result from accidents avoided by the IM rule is on the order of \$40 million per year. This is 75 percent of the historical level. This 75 percent assumption inherently includes a number of factors. These include an expectation that provisions in the proposed rule to require that lessons learned from assessing covered pipe segments be applied to similar pipeline, not in HCAs, will significantly expand the effectiveness of the rule.

It should be noted that data from the hazardous liquid pipelines assessed under the IM rule are showing a large number of “immediate repair” conditions identified and repaired (376 immediate repair conditions discovered and repaired for the approximately 60,000

miles of pipe assessed). While the results of liquid pipeline inspections cannot easily be extrapolated to gas pipeline, it is clear that the integrity management rules are causing operators to identify and repair large numbers of significant defects. Finding and fixing defects in gas pipelines will certainly help improve pipeline integrity.

3. *Avoiding Costs of Unexpected Supply Interruption*

Public comments received in response to the proposed rule pointed to the cost impact of the Carlsbad accident on California as justification for this rule. The Carlsbad accident resulted in curtailment of natural gas supply to California. The cost increases resulting from this curtailment were only part of the broader costs associated with energy trading and other issues affecting the 2000 energy price problems in California. A FERC evaluation concluded, however, that evidence “strongly implies that the Carlsbad rupture contributed significantly to extraordinarily high California spot gas prices.”¹ The FERC study infers that the effect of the Carlsbad rupture was an increase in gas prices of approximately \$5 per thousand cubic feet. This amounts to approximately \$17.25 million per day for California. If such a reduction continued for two months, the total effect would be slightly over \$1 billion. FERC has stated to RSPA/OPS that avoiding unexpected gas supply interruptions would be a major benefit to the U.S. economy.

The regulatory analysis supporting the proposed rule also noted that the cost to operators to make a scheduled repair (*i.e.*, after identifying degradation requiring repair) is much less than the cost to make repairs in an unexpected accident situation. The analysis described this benefit qualitatively, but did not attempt to assign a monetary value to it. Recent information gathered on gas transmission pipelines indicates that typical costs to repair defects found by inspection range from about \$20,000 to \$60,000, depending on whether service must be interrupted to effect the repair. The cost of unplanned recovery from a leak can be up to an order of magnitude higher. The cost of recovering from a major pipe failure can be two or more orders of magnitude higher (*i.e.*, in excess of \$5 million).

Quantifying the avoided cost of potential accident-induced supply interruptions as a benefit should be accompanied by estimation of the cost of supply interruptions that may occur as a result of implementing the rule. There is a potential for such treatment to significantly increase the estimated costs. While the exact number is under debate, a recent study by EEA under contract to INGAA has estimated the cost to consumers associated with supply restrictions over the first twenty years following implementation of the proposed rule would be \$12.4 billion. Several assumptions have been made in the EEA/INGAA analysis that could cause the predicted cost to swing significantly up or down, including:

¹ “Final Report on Price Manipulation in Western Markets: Fact-Finding Investigation of Potential Manipulation of Electric and Natural Gas Prices”, Docket No. PA02-2-000, Prepared by the Staff of the Federal Energy Regulatory Commission, March 2003.

1. That the operators have perfect knowledge of each other's assessment plans so they can plan an optimum assessment schedule. This assumption could clearly lead to an under-prediction of consumer cost impacts.
2. That the mix of assessment techniques used by operators during the time when the baseline assessments overlap the first reassessment will be the same as for the baseline. This assumption ignores the fact that the rule would allow use of Confirmatory Direct Assessment (CDA) for reassessment of most lines during that overlap period. CDA results in much less disruption of gas service. This assumption will lead to a significant over-prediction of consumer costs.
3. That the cost of all gas will follow the spot market price. In reality much of the gas supply is delivered under long-term agreements for which costs are more stable.
4. That there would be no regulatory means for operators to avoid supply interruptions. Provisions in the PSIA-2002 allow waivers from required reassessment schedules to mitigate supply impacts. This waiver provision provides operators added flexibility in avoiding supply interruptions.

OPS strongly believes that this waiver authority represents a significant tool in our ability to help relieve supply impacts. This tool, combined with additional rule changes being considered related to (a) eliminating constraints on the use of direct assessment, (b) the expanded role of confirmatory direct assessment, and (c) use of preventive and mitigative measures on low stress pipelines for intermediate assessments, will certainly help prevent or relieve gas supply impacts resulting from the rule.

4. *Potential to Provide the Technical Justification to Increase Allowed Pipe Stress During an Energy Emergency*

Promulgation of the Gas IMP Rule will clearly increase the level of hard knowledge operators and regulators have of the physical condition of existing pipelines. Experience gained over the decade following promulgation of the rule should demonstrate its effectiveness in reducing the likelihood of serious incidents. A higher level of confidence in the condition of pipelines will result, within the pipeline community as a whole and in the public.

Higher confidence on the part of the regulator could allow positive regulatory decisions that would help alleviate future energy emergencies. Increased confidence resulting from an improved knowledge of the condition of the pipeline could be used to support regulatory decisions to allow increased pressure (therefore stress) operation during an emergency such as that experienced in California two years ago. Allowing operation at 80% SMYS as opposed to the current limit of 72% SMYS would increase the throughput of existing pipelines by at least 11%, thereby helping to fill the energy gap during shortages. The increased regulator confidence that would allow these decisions will only result from a situation in which:

- (1) operators are required to implement the consensus national standards governing integrity management programs,

- (2) the consistency and quality of implementation can be known (i.e., by regulatory oversight),
- (3) lessons learned are applied to the entire pipeline, where necessary, and
- (4) performance can be trended (i.e., by the performance measures)

Each of these factors will be assured through provisions in the rule.

OPS has authority under risk management or waiver provisions to allow such increases in pressure. Exercising this authority requires that OPS have confidence in the integrity of pipelines and in operator practices for assuring that integrity. OPS would not expect to achieve the necessary high level of confidence if there is no rule, and operators simply implement the statute. Under those conditions, such information as would become available would lack the qualification and consistency to support regulatory decisions to increase allowable pressures. This benefit would thus not accrue to any of the implementation options that did not include a rule.

The economic benefits of increased flexibility in using existing transportation capability to fill emergency energy needs could, as demonstrated in California, have very significant economic benefits.

5. *Potential to Provide the Technical Justification to Support Operator Exemptions from Class Location Regulations through Risk Management*

At present the gas pipeline industry spends on the order of \$100 million per year replacing pipe to satisfy existing class location requirements. The argument presented above on the likely impact of the gas IMP rule on public and regulatory confidence implies that several years experience with the effectiveness of the IMP Rule in preventing incidents in HCAs should provide the confidence to support selective relaxation of the class location regulations based on existing risk management authority. Significant potential savings could accrue to the industry over even a decade during which pipe replacement requirements are selectively relaxed based on the increased confidence in pipeline integrity provided by the Gas IMP Rule. Here, again, what is most important is the confidence of the regulator, which is unlikely to be achieved without the regulatory structure and oversight afforded by a rule.

OPS has experience with approving exemptions to class location regulations. During the 1990s, OPS conducted the Risk Management Demonstration Program and the System Integrity Inspection Pilot Program. Fifteen operators with mature risk management systems participated in these programs. Several applied for exemptions from class location requirements on the basis of their risk/integrity management programs. OPS found that the documented basis submitted by even these operators was not sufficiently robust to justify the exemptions. OPS had to work with the operators to improve their programs and their documentation to support their exemption requests. The lessons learned in these programs have been incorporated into the integrity management rule. It is far more likely that operators complying with this rule will have a robust basis for

requesting exemptions from class location requirements than would be the case if there were no integrity management rule.

If we anticipate that ten years following promulgation of the rule will be required for the regulatory community to develop sufficient confidence in the integrity of gas pipelines to support selective granting of exemptions from pipe replacement, and that no more than half of the scheduled replacements will be exempted, then the benefit over the remainder of the 20 years after publishing the rule would be \$0.5 billion.