"Shocking?" Evidence Mounts from Alaska and Elsewhere that BP's Inadequate North Slope Performance Should Have Been No Surprise to Public Officials or Monitors

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North Slope Corrosion Problems Fit Industry Pattern: Substandard Performance on the Trans-Alaska Pipeline and Elsewhere Places Workers, Environment and Nation's Oil Supply at Undue Risk

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Update to a March 15, 2006 Preliminary Report on BP's North Slope Oil Spills and Partial Prudhoe Bay Shutdown

Prepared for the Alaska Forum for Environmental Responsibility

Richard A. Fineberg

September 3, 2006

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–––––––––– Conclusions and Recommendations ––––––––––-

Conclusions

In the aftermath of the BP's North Slope shutdown, Dr. Richard Pike, President of Great Britain's Royal Society of Chemistry, suggested five questions that should be posed for petroleum company executives and their boards regarding corrosion:

- What is your corrosion management process?
- What has been your experience of corrosion during the last twenty years, what were the outcomes, and how were lessons learned disseminated?
- How does information flow from readings taken on site by technicians, through to analysis and decision-making at senior management level?
- What is your 'corrosion model' for predicting where damage might occur, and how often and in what way is this challenged and verified?
- How does all this compare with international best practice?

According to Dr. Pike, "[t]he future will need to address improved handling of data and problem-solving, new materials, corrosion-resistant surfaces and linings, and better understanding and inhibition of corrosion mechanisms throughout the oil supply chain." Dr. Pike's observations are based on more than two decades in the petroleum and petrochemical industry, including audit investigations of corrosion incidents. In hindsight, it appears that Coffman Engineering was trying to address some of these questions over BP's objections in 2001.

At the August 18 hearing of the Alaska State Legislature's Resource Committees, stated that BP's corrosion problem "leaves no question that there is a need for State regulation of the design, construction, installation, operation and maintenance of critical oil and gas infrastructure in Alaska." As suggested at the outset of this report, events surrounding BP's North Slope corrosion program are a manifestation of a management system that is characteristically tardy in identifying and addressing its operational problems. Detailed reports on TAPS – the 800-mile cross-country pipeline whose ownership and

–––––––––– Conclusions and Recommendations ––––––––––
(Continued)

management mirrors that of the sprawling production enclave at Prudhoe Bay –suggest that four root causes lie at the heart of this problem:

- Lax government oversight;
- lack of timely, accurate field information;
- cost-cutting pressures by owners (and upward-bound, office-bound mid-level managers);
- engineering myopia or bias in the weighting assigned to decision-making inputs regarding prevention and mitigation measures.

From this broader, systemic perspective, BP's corrosion program should be viewed as a manifestation of a pattern of behavior that transcends personalities and transcends BP, placing North Slope workers, the environment and a significant portion of the West Coast's oil supply at undue risk.

Recommendations

1. Congress should commission a functional audit by an independent body to determine whether the North Slope production and delivery system is operated in a manner that:
   - prevents conditions that erode margins of safety;
   - provides timely detection and response to problems; and
   - has the capability to learn from experience and adapt to changing conditions.

(After the 1989 *Exxon Valdez* oil spill, Congress authorized – but never funded – an audit of North Slope transportation systems.)

2. Congress should establish a Citizens' Oversight Group (COG), funded by the North Slope production and transportation operations, to ensure, through citizen and community involvement, that this important energy system is maintained and operated in a manner that safeguards the natural resources of Alaska and ensures the safety of continued oil production and shipment. By developing the expertise to evaluate the efforts and accomplishments of the operators and their monitors, it is anticipated that the COG would help combat the systemic operational and ovesight problems identified in this analysis. (State and federal authorizing agencies rejected a similar proposal for TAPS when they renewed state and federal right-of-way leases for the TAPS in 2002-2003.)

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"Shocking?" Evidence Mounts from Alaska and Elsewhere that BP's Inadequate North Slope Performance Should Have Been No Surprise to Public Officials or Monitors

In an hilarious but probably unconscious imitation of Detective Renault in the 1942 film classic *Casablanca,* Alaska Senator Ted Stevens declared August 17 that he was "shocked" to learn of BP's failures that led to the oil spills and partial shutdown at the nation's largest oil field. Over the years, the senator lamented, he had taken his colleagues to the North Slope of his home state time and again. There, Stevens said, the industry, state and federal monitors assured the politicians that "this is the safest area in the world, and how it's been maintained, and how they've got special procedures to check for corrosion and erosion and any sludge inside the pipeline.

"As a matter of fact, it just wasn't done," Stevens said. The senator said he was surprised and deeply disturbed to learn at this late date that company officials unknowingly allowed corrosion to eat away up to 81 percent of the steel walls of some of its major arteries at Prudhoe Bay – well over the limit at which pipe is supposed to be repaired or replaced.[1]

The Senator Should Have Known

Ironic movie Detective Renault knew what he was doing when he declared, just before the dealer handed him his roulette winnings in a Casablanca night club, that he was "shocked, shocked to find out that gambling is going on here." If Senator Stevens was truly shocked by the extent of the corrosion problems at Prudhoe Bay when he lashed out at BP and its government regulators, the chair of the Senate Commerce, Science and Transportation Committee, which oversees pipeline safety, has only himself to blame. For years, BP workers had risked their jobs to send word to the company's top executives that, due to cost-cutting pressures, the nation's largest oil field was in danger of a catastrophic event that could injure or kill workers, harm Alaska's environment and cut off a major portion of the West Coast oil supply and state revenues. These warnings frequently mentioned BP's problems with corrosion, which will be discussed in greater detail below. But first, consider some of the publicly available information that the passionately pro-development Stevens chose to ignore:

- In 1999, the dangers of corrosion on non-regulated pipelines were so significant that BP entered into an agreement with the Alaska Department of Environmental Conservation (ADEC) to develop a work plan, hold semi-annual work sessions with ADEC and file an annual progress report with the agency. Also that year, 77 BP workers at Prudhoe Bay signed a letter to BP Chairman Lord John Browne in an effort to warn their boss that the nation's largest oil field was at risk of a major accident because managers bent on cost-cutting refused to heed their concerns about safety. Citing "two fatalities and a well-pad burn to the ground within the last few months," the workers asked, "When will the body count, capital destruction

and loss of production be enough to halt this dead-end course?" They didn't mention corrosion in that letter, but later they would.[2]

- In January 2001, corrosion problems again were among the items listed by concerned BP North Slope technicians relayed to BP Chairman Lord John Browne by Charles Hamel of Alexandria, Virginia, who frequently serves as a conduit for the health, safety and environmental concerns of beleaguered North Slope workers. According to that letter, "(w)e are way behind on our corrosion inspection and repair."[3]

- In March 2002, BP North Slope worker and health and safety officer Bob Burkett listed his numerous efforts to contact monitoring agencies about his concerns – including corrosion – in a letter to two of Senator Stevens' colleagues, Democratic Senators Joseph Lieberman and Bob Graham. Burkett, then due to retire shortly, also gave a lengthy broadcast interview in which he discussed his numerous concerns.[4]

- In a 2004 letter, Hamel wrote to BP board environmental safety subcommittee chair Walter Massey to warn of "cost cutting, causing serious corrosion damage" that contributed to worker fears of "a catastrophic event."[5]

- On January 20, 2005, Hamel sent a letter to Senator Stevens discussing BP's of other safety problems on the North Slope. That letter concluded with the warning that "money saving 'Russian Roulette' risks taken are jeopardizing the vital North Slope crude deliveries to the lower 48."[6]

- This writer's March 15 preliminary analysis of the Prudhoe Bay oil spill that began in late February and was discovered March 2, 2006 documented and discussed BP's resistance to past government suggestions that the Prudhoe Bay operator beef up its field pipeline corrosion maintenance and leak detection procedures. That report also discussed BP's past problems in Alaska, including criminal pollution.

Based on this record (and borrowing from that droll French martinet who bedeviled Humphrey Bogart in Casablanca): This writer is "shocked, shocked" that Senator Stevens now pretends dismay that federal officials failed to risk the senator's well-known wrath by aggressively monitoring the nation's largest oil field. Maybe Senator Stevens, who has been calling environmentalists names for years while ignoring their concerns, just didn't want to know.

But the senator's latest bid to become the focus of late-night television comics is only one part of the North Slope corrosion story. BP's early August announcement of more corrosion and new, smaller spills and the triggered shutdown of Prudhoe production, drew scores of national reporters to Alaska. As agency, congressional and press investigators dig for and pore over BP's astonishing performance failures on the North Slope, these key questions emerge:

- What are the lessons are to be learned from this episode?
- Is it reasonable to assume that BP and public officials will act on them?
- Is this just BP's problem?

Development advocates – including, most recently, Interior Secretary Dirk Kempthorne – answer the latter two questions in the affirmative; the record suggests they are once again fooling themselves in their unswerving advocacy of northern oil development.

Lessons Unlearned

In this writer's estimation, the March spill and the current partial shutdown of Prudhoe Bay are simply the latest manifestation of the huge gap between promise and practice that is characteristic of Alaska North Slope and Trans-Alaska Pipeline System (TAPS) operations. As discussed frequently in this writer's reports, the oil industry in Alaska is chronically too slow to identify problems and, once identified, too slow to address them. Four root causes lie at the heart of this syndrome and the current problems on the North Slope:

- Lax government oversight;
- lack of timely, accurate field information;
- cost-cutting pressures by owners (and upward-bound, office-bound mid-level managers);
- engineering myopia or bias in the weighting assigned to decision-making inputs regarding prevention and mitigation measures.

While BP currently takes the heat, the British oil giant is one of three transnational oil companies that control approximately 95 percent of North Slope production and own a roughly similar share of TAPS (the other two are ConocoPhillips and ExxonMobil). Their collective failure in Alaska is nothing new. In 1989, when the tanker *Exxon Valdez* ran aground in Prince William Sound, the nation watched as the industry's promised rapid and effective spill response failed to materialize for several agonizing days as the nation's worst oil spill killed hundreds of hundreds of thousands of birds and animal residents of Prince William Sound, bringing fisheries to crashing halt from which recovery has been painful and slow.

The oil industry's institutional failures in Alaska were spelled out clearly in this writer's 2002 analysis of operational shortcomings on TAPS. That report takes on new significance in light of BP Chairman Lord John Browne's selection last April of Bob Malone to head BP's North American operations. The personable and energetic Malone dealt with TAPS from BP's Alaska pipeline office before taking the reigns of that operation as President of the Alyeska Pipeline Service Company, which nominally owns and operates TAPS, in 1996. Without question, he is one of the most enlightened oil executive the industry has sent to Alaska. But it takes more than personality and intention to alter the ingrained patterns of behavior of a major oil company.

In 1997, Alyeska President Malone issued a slick, 28-page color booklet promising that TAPS would achieve something called "operational excellence" by the year 2000. But the pipeline Malone left behind in 2000 looked nothing like an organization that had achieved excellence. These astonishing photographs (which graced the covers of this writer's 2002 report) – each, like the one above, taken on TAPS in 2000 – are among the many examples of operational failures in 2000 documented and discussed in this writer's 2002 report; each demonstrates the clear and troubling discrepancy between the stated

intentions of oil industry executives and the industry's performance in Alaska over more than three decades of northern Alaska operations.

To be sure, Malone struggled to change a corporate culture that arrogantly rejected employee concerns when cost cutting caused performance failures. And he achieved some success in improving critical hardware at the Valdez Marine Terminal. Nevertheless, when he left in 2000, TAPS public relations efforts concealed a mass of bungled problems. Then, in the fall of 2001, the seventh TAPS re-start problem in as many years was delayed by three separate small oil spills. That set of problems was overshadowed two weeks later when a miscreant put a bullet into the pipeline north of Fairbanks. Although Alyeska had boasted for years that it could respond immediately to such an event, oil spewed into the nearby trees for 36 hours, blackening and destroying nearly two acres of trees, before spill responders could stop the leak.

Despite these and numerous other indications that TAPS managers were chronically too slow to identify problems and too slow to fix them, once identified, state and federal officials ignored the concerns of the environmental community lamely renewed the TAPS right-of-way lease for 30 years without adopting any provisions to improve Alyeska's performance (for background report and documentation, see Chapter 3 of this writer's 2002 report on TAPS and the articles and testimony attached to the article on this writer's web site, "TAPS Lease Renewal — Opportunity Lost").

More recently, in 2005, the Chief Operating Officer of Alyeska – the only top official from the Malone's tenure who tried to deal objectively with employee concerns -- left the pipeline company nine days after presenting a list of 101 risks to TAPS operations. As this writer pointed out in a November 2005 article, two of the most senior and respected members of the TAPS field maintenance squad also left Alyeska after voicing repeated concerns about operational problems, and the Strategic Reconfiguration "makeover" is literally hundreds of millions of dollars over budget and years behind schedule.

A Bad Actor in a Regulatory Maze

As more information about the situation at Prudhoe Bay emerges, the scope and potential consequences of BP's mismanagement in Alaska becomes increasingly clear. Likewise the role of lax government oversight and enforcement.

Bad Actor: The current round of North Slope corrosion problems couldn't have come at a worse time for BP. On the morning of August 3, BP Chairman Lord John Browne, accompanied by newly-minted North American chief Malone and BP Exploration (Alaska) President Steve Marshall, stopped in Fairbanks on his way to Prudhoe Bay. Lord Browne told a breakfast gathering of approximately 200 people that "[t]he last 15 months have not been easy or comfortable for us." He named the tragic explosion that killed 15 and injured approximately 170 other workers at a Texas City refinery in 2005, the March oil spill at Prudhoe Bay caused by corrosion that went undetected for five days and turned out to be the largest in the history of North Slope operations and the federal Commodities Futures Trading Commission (CFTC) is investigating BP traders for the alleged illegal price–fixing of propane.

Lord Browne mentioned only the highlights of the problems that were sullying BP's carefully nurtured image of environmental and social consciousness. By the end of August, another federal price-fixing investigation was underway: The CFTC is now conducting a second, separate investigation of BP's gasoline pricing practices as petroleum prices rose during 2003 and 2004.[7] Meanwhile, BP was facing law suits over allegedly shoddy maintenance and environmental practices at its Carson City refinery in California, and at a chemical plant in Illinois.[8] In any event, in Fairbanks on the morning of August 3, Lord Browne's mission appeared to be damage control. There was no hint that just three days later BP would announce plans for an immediate shutdown of the Prudhoe Bay field. But on August 6, the with the disclosure of BP's second big North Slope corrosion problem in half a year and the Prudhoe shutdown, the spotlight that flickered briefly on Prudhoe Bay in March began shining steadily and hard on BP's performance there.

Regulatory Maze: That light cast shadows – and some light – on the dark corner of lax oversight by government monitors. Before identifying the erstwhile agency protectors of the public interest, it is necessary to describe the world in which they work. In these days of light-handed regulation and legislative budget cuts, they are encouraged to accept industry representations rather than do their own investigations. Moreover, they are caught in something of a Catch-22. They are subject to chronic pressure from elected officials whose entrenched position is that Alaska's oil operations are safe and environmentally sound, and to criticism from the likes of Senator Stevens when that fallacious notion crumbles. In this regard, it is noteworthy that in 2002 the two ADEC spill prevention and response team leaders responsible for the North Slope oversight and enforcement resigned after they were stripped of their supervisory authority. One was Industry Preparedness and Pipeline Program Manager Susan Harvey, who worked for ARCO on the North Slope before coming to ADEC in 1999. Although she refused to discuss her situation publicly, in advising her colleagues of her decision to leave ADEC in March 2002, Harvey saod that she planned to focus her professional career "on technical work, where sound scientific analysis and engineering principals are honored as the main determinants for real, measurable environmental improvements, rather than political solutions."[9]

On the **North Slope**, a patchwork quilt of government regulatory mechanisms is supposed to ensure safe and environmentally sound petroleum production and pipeline operations. Well operations are overseen by the Alaska Oil and Gas Conservation Commission (AOGCC), while the Department of Natural Resources Division of Oil and Gas monitors surface operations. The U.S. Department of Transportation's Pipeline and Hazardous Materials Safety Administration (PHMSA) regulates oil pipelines operating under high pressure whose operations might affect either areas of high environmental consequence or population. Federal and state oil spill prevention and response programs brings the U.S. Environmental Protection Agency and the Alaska Department of Environmental Conservation (ADEC) into play.

On **TAPS**, the dozen or so state and federal agencies with statutory authority on the 800-mile TAPS right-of-way is coordinated by a state-federal umbrella group known as the Joint Pipeline Office (JPO). As documented in this writer's 1996 and 2002 reports on TAPS, with a few notable exceptions, JPO has institutionalized rather than combated lax oversight. Ironically, one of those exceptions is corrosion control on TAPS. JPO also

exercises jurisdiction over the relatively few miles of North Slope oil lines that operate on land requiring a state or federal right-of-way, rather than within a leased oil field. But, as discussed above, only a few are regulated as pipelines.

On August 18 – weeks after the second corrosion problem was discovered – the state's JPO representatives served belated notice that they would join their federal counterparts seeking jurisdiction over the low-pressure transit lines like the ones that were causing the unexpected problems at Prudhoe Bay.[10]

BP's Two Corrosion Surprises

Last March, BP acknowledged that corrosion had caused the largest oil spill in the history of Prudhoe Bay in a low-pressure transit line that carried processed crude oil – with most of the water and contaminants removed – between two gathering facilities. Of the 1,500 miles of pipe that BP maintains on the North Slope, transit lines like the one that leaked constitute about 22 miles.[11] At that time, BP expressed surprise, maintaining that the company's corrosion management program was "excellent." Company officials also termed the performance of the leak detection system, which had issued alarms several days before the spill, "unacceptable." For reasons discussed in this writer's March 15 preliminary analysis, neither position seemed tenable. Corrosion – a well-known enemy of oil field operations because it methodically eats through pipeline walls when conditions are right – does not happen overnight. It was difficult to imagine how a program that failed to accomplish its purpose – in this case, the identification and mitigation of corrosion problems – could be considered excellent. And in view of BP's documented resistance to upgrading its field leak detection system, the company's lame labeling of that system's performance as unacceptable struck this writer as hypocritical.

When BP announced its decision to shut down Prudhoe Bay August 6, the triggering events centered around another low-pressure transit line more than six miles away from the site of last winter's spill. According to BP's press release, the company was shutting down production at Prudhoe due to "discovery of unexpectedly severe corrosion and a small spill . . . estimated at 4 to 5 barrels."[12] Stopping production at the nation's largest oil field for a five-barrel spill? Background information about corrosion and closer examination of the events between the spill BP discovered March 2 and the problems that triggered the shutdown announced August 6 may help the reader make sense of this extraordinary event.

About Corrosion. Corrosion (the loss of metal due to a chemical or electrochemical reaction with the environment) is one of the major hazards facing both oil fields and pipelines. In addition to water, gases such as carbon dioxide, hydrogen sulfide or oxygen itself can cause pipeline corrosion; solids and bacteria can exacerbate this process. Pipelines face threats from both external and internal corrosion.[13] The latter – now the prime suspect in BP's transit line problems – is a particularly serious problem in mature fields like Prudhoe Bay, where water is re-injected to displace oil. Even after water is removed at a processing facility, small quantities are liable to remain, leading to rapid corrosion inside the pipe. The primary agents are dissolved oxygen, carbon dioxide and hydrogen sulfide. The latter is generated by sulfate-reducing bacteria that may be introduced during water injection. Microbe-induced corrosion is particularly fast acting and is liable to occur under deposits that build up on pipeline walls.[14]

Various chemicals may be used to fight internal corrosion. These include biocides to kill bacteria, corrosion inhibiting chemicals and emulsifiers to limit the separation of oil and water, may be injected. The success of these efforts is monitored by a variety of means. Where pipes can be accessed from the outside, ultrasonic testing may be used to estimate wall thickness. Metal coupons can be inserted into the pipe and removed periodically to measure their corrosion. Transported oil can be sampled to investigate whether it is picking up iron salts created when corrosion eats the steel wall. The best weapon against corrosion is a cylindrical device known as a pig that can be inserted into a pipeline to clean or inspect it. To insert a pig or remove it from a pipeline, special chambers called pig traps with isolation valves at each end must be constructed. Since 1936, pipeline workers have been sending cleaning and scraping pigs through pipelines periodically to remove deposits that build up within a pipeline, creating ideal conditions for internal corrosion. Instrumented or "smart" pigs, still in their infancy in the early 1990s when corrosion was discovered on the North Slope and on TAPS, use various advanced technologies to assess pipeline integrity, either by examining pipeline curvature or measuring wall thickness.[15]

Between March and August. In the wake of the pipeline spill discovered March 2, it emerged that BP had not sent a smart pig through to inspect the line that failed since 1998. The leak occurred at a low point in the 3.1-mile, 34-inch diameter elevated line where it dipped into the ground to enable caribous to cross. It was theorized that sludge may have built up at that point, but nobody knew because BP had not been running cleaning pigs, either. Because that line – a transit line between gathering centers – operates at low pressure, regulators had not formally required pig inspection. And because gathering centers are supposed to clean and remove most impurities, BP believed sludge and corrosion should not have been a problem on lines carrying processed oil from the gathering centers. On March 15, PHMSA issued an after-the-fact corrective action order (CAO) telling BP to send cleaning and inspection pigs through the transit lines at Prudhoe Bay. One area of concern was the transit lines on the eastern side of the field, where the last smart pigging, in 2000, had failed to produce useful information. To ensure the safety of those transit lines, PHMSA gave BP three months to install pig launching and recovery facilities and conduct cleaning and inspection. Federal officials told Congress that lax state oversight prompted them to step in.[16])

What about the leak detection system (LDS)? It will be recalled that BP, after refusing to upgrade to a best available technology standard, now termed that old system's performance "unacceptable," but more information on the LDS would have to wait for BP's investigation report. That analysis, originally scheduled for release March 17, was delayed for a month. On April 14, BP's incident investigation report was finally released. The 168-page report was conducted by a mix of investigators that included a team leader from outside the BP system and an ADEC representative.[17] The report presented data from the corrosion program inspections indicating that bacterial-induced corrosion was a "likely factor" in causing the spill. However, the report said, the increased corrosion observed between 2004 and 2005 did not compromise the line's fitness for service. Rather, the report concluded, the identified increase in corrosion had prompted BP to increase its external inspections, and to schedule a smart pig run for 2006. Unfortunately, the report concluded, the leak occurred before the scheduled inspections discovered the extent of the corrosion.[18]

Data in BP's investigation report confirmed that the inadequate LDS issued four alarm warnings in the five days before the spill was finally detected by an employee driving through the area; moreover, in January and February 2006 the LDS was issuing alarms at a greatly increased rate over preceding months, requiring that the system be turned off and re-set twice every three days. However, the section on leak detection concluded, the operators were correct in concluding the alarms were false because the LDS was simply not capable of detecting a leak below a rate of approximately 1,000 barrels per day.[19]

The Incident Investigation Report made no effort to explain why the LDS warnings were perfunctorily over-ridden for several days after the spill began. How could this possibly happen when the Prudhoe Bay operators were on notice that corrosion was on the increase, causing external inspections and a smart pig run to be scheduled for the 3.1-mile GC-2transit line? After a corrosion briefing by BP staff August 22 failed to resolve this question, this writer requested a follow-up meeting to understand what BP operators were thinking when they ignored the leak detection system warnings. On August 23, in a follow-up teleconference interview with personnel at Prudhoe Bay, the leak detection specialist on duty at Prudhoe confirmed that the alarms identified in the report indeed required the operator to "take action." But the required "action" was to enter the alarm on a daily report that security inspectors would (presumably) read before they made their daily rounds, driving miles on cold, isolated roads. But if the security inspector took the alarm seriously when the operators believed it was probably another false alarm from an inadequate LDS (and even if the spill were in a section of pipe running parallel to a road) the inspector would have a difficult time seeing a spill over the snow berm. This fact was confirmed, BP personnel noted, by the difficulty workers specifically dispatched to find the leak had finding the leak, even after the petroleum odor was noted by a worker who happened to be driving by on the morning of March 2, five days after the largest oil spill in the history of North Slope field operations had begun. Discussion with BP workers revealed another problem: they said they did not know at the time that oil could migrate beneath the snow without coming to the surface; based on previous spill history, they should have been aware of this possibility.[20]

The incident investigation report was more notable for what it didn't cover than for what it did. A short list of the report's shortcomings includes the following:

- Several readers of the 168-page report noted the absence of recommendations or lessons learned.
- Although microbial-induced corrosion is understood to occur when sludge builds up, the BP's investigative report did not discuss whether BP had used cleaning pigs to remove that sludge.
- The carefully edited conclusions to the lengthy discussion of the leak detection system in the body of the report didn't make the report's conclusion.

According to press reports, a federal grand jury was examining whether the failures of BP's anti-corrosion program could be laid to criminal violations of environmental laws. Under the circumstances, perhaps it is understandable that BP's delayed incident investigation report seemed to be trying to prove that everyone did everything right. But the reason for an incident report is to find out what went wrong. Due to the report's shortcomings, questions about BP's systemic failures remain unanswered.

BP was slow running the pigs required by federal monitors in the March COA. Apparently sludge had built up in that pipeline to the point that a smart pig couldn't get through. Because the transit lines carry processed oil, from which impurities have been removed, BP thought sludge would not be there in significant quantities. But it was. There was no place within the Prudhoe Bay pipe system where the sludge could be conveniently deposited and the strainers on the Alyeska pumps couldn't handle it. Prompted by a detailed inquiry from Rep. John Dingell, on July 20 PHMSA issued an amended CAO. The pipeline agency concluded that "BP has failed to meet its continuing responsibility to pursue all available options" and ordered immediate cleaning and instrument pigging of the North Slope transit lines.[21]

It was the second belated federal hammer that forced BP to run pigs through the low-pressure transit lines on the eastern half of Prudhoe Bay. The required pig run found 16 anomalies – localized pockets of severe corrosion – that other inspection measures had overlooked. In the face of these extraordinary results, BP began removing insulation to conduct direct inspections. According to the accounts of BP personnel, Lord Browne left the Slope before the new indications of scattered but severe corrosion were confirmed by inspection and the small leak was spotted at one of the problem areas identified by the federally-required smart pig run.

Developments Since the August 6 Shutdown

On August 18 – the day after U.S. Senator Stevens professed his shock and dismay – the State Legislature's House and Senate Resources Committees held a joint hearing in Anchorage to learn more about North Slope corrosion problems.[22] The state's fiscal interest in BP's operation was demonstrated by the fact that a significant part of the hearing was devoted to estimating the effects on state coffers of BP's deferred North Slope production. In an accommodation with a revenue-hungry state and an oil-hungry nation, BP had already pulled back from shutting in the entire 400,000 barrels of production from Prudhoe Bay, but the field's eastern side, where the new problems were discovered after the PHMSA order, would remain shut down for an indefinite period. The Alaska Department of Revenue estimated that, despite an estimated drop in production of 21 million to 69 million barrels during the current state fiscal year, the increase in state revenue from the controversial new petroleum profits tax passed by the Legislature at the end of its second special session Aug.10 would still leave the state coffers anywhere from $0.308 billion to $3.23 billion ahead of the Spring 2006 (pre-shutdown) forecast. The range in estimates depended on two things: the price of oil and how fast BP returns to full production.[23]

The second time around, BP no longer claimed that the company's corrosion program was "excellent." Rather, BP Exploration President Steve Marshall acknowledged in his prepared statement that, "since March, we identified a gap in our corrosion inspection system and we will correct it." He was accompanied by Dr. Bill Hedges, whose slides proclaimed that BP's anti-corrosion effort was "acknowledged within BP as very comprehensive program." To show how internal corrosion attacks specific locations, Hedges handed legislators a half-section of heavy steel pipe, approximately a foot long and 12 inches in diameter. The inside wall was missing a hemispherical chunk of steel, larger than an ice cream scoop, which cut almost all the way through the 3/8"-thick steel

wall. The rest of the pipe appeared to be normal. BP's take-away message: although internal corrosion can strike anywhere, BP was spending more than $70 million annually to combat the problem on the North Slope.

A variety of state officials told what they were doing in response to BP's problems. Alaska Oil and Gas Conservation Commission Chair John Norman called BP's corrosion problem "a wakeup call for all of us." The problem, he pointed out, was not limit to transit-line corrosion. BP's corrosion problem, he said, "leaves no question that there is a need for State regulation of the design, construction, installation, operation and maintenance of critical oil and gas infrastructure in Alaska."[24]
While AOGCC Chair Norman's warning indicated that the North Slope problem was far broader than corrosion, the presentations of his regulatory colleagues raised questions as to whether the state regulators are up to the challenge. For example:

- ADNR Commissioner Mike Menge described how his department and the JPO proposed to deal with the system-wide problem identified by AOGCC Norman. In addition to belatedly seeking expanded authority over long-unregulated North Slope pipelines, Menge said, JPO would beef up its oversight program by using risk-based monitoring and ensuring that BP's quality assurance and quality control programs were capable of ensuring system integrity.[25]

  Menge's plan sounded good, but JPO has consistently failed on precisely those tasks on TAPS. For example, JPO lamely acquiesced in the approval of a quality program that its field officers found did not pass the basic requirements of an effective quality program in 1996. Six years later, in 2002, JPO approved Alyeska's state and federal right-of-way authorizations for renewal without instituting measures to ensure improvement of dubious past performance. Key to the latter approval was a series of documents called Comprehensive Monitoring Reports whose sanguine conclusions were contradicted time and again by the field reports of JPO personnel.[26]

- Alaska Attorney General David Marquez tendered a sternly-worded letter to BP's Marshall, supported by two subpoenas to North Slope operators, requiring them "to preserve all documents that may be relevant to corrosion at Prudhoe Bay." The state, Marquez said, intends investigate and hold the responsible parties fully accountable for any losses the state might incur. While working with BP to facilitate all remedial efforts, the Attorney General declared, the state would not waive its rights to pursue potential civil or criminal actions.[27]

  Attorney General Marquez spent most of his professional life working for the oil industry he is now challenging. According to his official biography, Marquez began his legal career doing legal work for the Trans-Alaska Pipeline prior to construction, later became General Counsel of Alyeska Pipeline Service Company and worked for North Slope producer ARCO (predecessor to ConocoPhillips) as an Associate General Counsel for over 20 years. During that period he served in a various capacities that included Vice President and Chief Counsel for ARCO Alaska and Vice President of External Affairs and Environment, Health and Safety.[28]

- ADEC Commissioner Kurt Fredriksson presented legislators a package of six handouts about the agency's role on the North Slope. When asked by a legislator whether ADEC had personnel on the North Slope, Commissioner Fredriksson responded that "we do have people stationed on the Slope." He said the ADEC personnel worked out of an office they shared with other agencies. On further questioning, he said the spill response people were from the Fairbanks office, supplemented by other down-state operations monitors, and an air inspector.

  Inquiries to ADEC following the hearing gave a different picture of ADEC's North Slope staffing. According to one ADEC staffer, in a good year, the Fairbanks office will have a spill response specialist on the North Slope three to five days a month. Responders are typically dealing with a spill and are not involved in inspections and other prevention functions, such as those whose importance AOGCC Chair Norman and ADNR Commissioner Menge had stressed. A phone call to ADEC's air quality unit revealed that the North Slope air quality position has been vacant since June 1.

Subsequent to the August 18 state hearing, information surfaced that sheds new light on the role played by ADEC – and by state monitors – in the North Slope corrosion problem. In 1999, BP agreed to work with the state to develop a program to manage corrosion on the non-regulated North Slope common carrier pipelines.[29] That program called for reports on current and projected maintenance and monitoring practices, as well as semi-annual work sessions with ADEC. In 2001, ADEC commissioned Coffman Engineers to review BP's corrosion reports, starting with the company's corrosion report on its program during 2000. The Coffman report on BP's North Slope corrosion program for 2000, released in January 2002, included the following principal conclusions:

- BP "has demonstrated a clear commitment to corrosion control;"
- BP "has developed a comprehensive program of monitoring and inspection;"
- "internal pipeline corrosion trends for GPB West (where the March spill occurred) have been steadily improving since 1993 and are currently at their lowest levels in 12 years;" and
- The BP "report and presentation materials were a positive step towards meeting the expectations outlined in the Commitment to Corrosion Monitoring Plan."[30]

None of the statements quoted above from the January 2002 public report were contained in the Executive Summary of Coffman's November 2001 "final draft." Rather, these salutory phrases replaced critical language to which BP had objected. In contrast to the plaudits for BP, the Executive summary of Coffman "final draft" contained statements such as the following, which were removed from the published report:

- BP "stated its intent is to 'to [*sic.*] report openly, good or bad. . .' the results of its corrosion management programs. However, the reporting style makes it difficult to develop a qualitative understanding of . . . [BP's] corrosion strategy. Program results have been reduced and factored; conclusions are hard to report without making inferences with regard to the underlying reasoning and strategy. The metrics chosen to report results make comparisons to industry peers difficult to quantify."

- "While the . . . report and presentation of materials were an initial attempt to meet the expectations outlined in the Commitment to Corrosion Monitoring plan, it does not provide the information necessary for detailed technical analysis."[31]

When he posted the earlier version of the report on the internet August 26, Chuck Hamel also released a March 20, 2006 analysis of the difference between the reports by a former Alyeska and BP engineer, along with a copy of BP's November 2001 concerns and recommendations for deletions.[32] At this late date, there is no need to referee the differences of professional opinion or style that led BP to challenge the Coffman draft report. Suffice it to say that some of the substantive criticisms apparently purged from the final report at BP's request might have helped BP close the gaps that BP has belatedly acknowledged in its corrosion program before the problems came to a head in 2006. Throughout the November 2001 version of the report, Coffman noted the need for more specific data and consistent metrics on corrosion rates and pipe wall loss. Moreover, the earlier report posed specific questions that were dropped from the final report, apparently in response to BP's suggestion. For example, in its draft report Coffman Engineering asked:

- Are there plans to install/reconfigture EOA (Eastern Operating Area) pipelines for smart pigs?
- How are lines selected for smart pigging and what is the recur frequency of inspection?

The differences in the two versions of this report have been identified as a focus of a federal grand jury probe into BP's conduct.[33]

Conclusions

In the aftermath of the BP's North Slope shutdown, Dr. Richard Pike, President of Great Britain's Royal Society of Chemistry, suggested five questions that should be posed for petroleum company executives and their boards regarding corrosion:

- What is your corrosion management process?
- What has been your experience of corrosion during the last twenty years, what were the outcomes, and how were lessons learned disseminated?
- How does information flow from readings taken on site by technicians, through to analysis and decision-making at senior management level?
- What is your 'corrosion model' for predicting where damage might occur, and how often and in what way is this challenged and verified?
- How does all this compare with international best practice?

According to Dr. Pike, "[t]he future will need to address improved handling of data and problem-solving, new materials, corrosion-resistant surfaces and linings, and better understanding and inhibition of corrosion mechanisms throughout the oil supply chain." Dr. Pike's observations are based on more than two decades in the petroleum and petrochemical industry, including audit investigations of corrosion incidents. In hindsight, it appears that Coffman Engineering was trying to address some of these questions over BP's objections in 2001.

At the August 18 hearing of the Alaska State Legislature's Resource Committees, stated that BP's corrosion problem "leaves no question that there is a need for State regulation of the design, construction, installation, operation and maintenance of critical oil and gas infrastructure in Alaska." As suggested at the outset of this report, events surrounding

BP's North Slope corrosion program are a manifestation of a management system that is characteristically tardy in identifying and addressing its operational problems. Detailed reports on TAPS – the 800-mile cross-country pipeline whose ownership and management mirrors that of the sprawling production enclave at Prudhoe Bay –suggest that four root causes lie at the heart of this problem:

- Lax government oversight;
- lack of timely, accurate field information;
- cost-cutting pressures by owners (and upward-bound, office-bound mid-level managers);
- engineering myopia or bias in the weighting assigned to decision-making inputs regarding prevention and mitigation measures.

From this broader, systemic perspective, BP's corrosion program should be viewed as a manifestation of a pattern of behavior that transcends personalities and transcends BP, placing North Slope workers, the environment and a significant portion of the West Coast's oil supply at undue risk.

Recommendations

1. Congress should commission a functional audit by an independent body to determine whether the North Slope production and delivery system is operated in a manner that:

- prevents conditions that erode margins of safety;
- provides timely detection and response to problems; and
- has the capability to learn from experience and adapt to changing conditions.

(After the 1989 *Exxon Valdez* oil spill, Congress authorized – but never funded – an audit of North Slope transportation systems.)

2. Congress should establish a Citizens' Oversight Group (COG), funded by the North Slope production and transportation operations, to ensure, through citizen and community involvement, that this important energy system is maintained and operated in a manner that safeguards the natural resources of Alaska and ensures the safety of continued oil production and shipment. By developing the expertise to evaluate the efforts and accomplishments of the operators and their monitors, it is anticipated that the COG would help combat the systemic operational and ovesight problems identified in this analysis. (State and federal authorizing agencies rejected a similar proposal for TAPS when they renewed state and federal right-of-way leases for the TAPS in 2002-2003.)

Endnotes

[1] Richard Mauer, "BP failure 'shocked' Stevens – Spills: The senator lambasts the North Slope operator for careless oil production," *Anchorage Daily News*, Aug. 18, 2006, p. B-1.

[2] "Commitment to Corrosion Monitoring" (in "Charter for Development of Alaska's North Slope," Dec. 2, 1999; copy provided by ADEC to Alaska State House and Senate Resources Committees, Aug. 18, 2006); letter to Sir John Browne from Concerned Prudhoe Bay Operators and Maintenance Personnel,, Jan. 14, 1999 (posted by Chuck Hamel at http://www.anwrnews. com).
[3] Letter from Concerned Operating Technicians (at Prudhoe Bay) to Charles Hamel, Jan. 10, 2001; forwarded to Sir John Browne, April 11, 2001 (http://www.anwrnews.com).

[4] William Burkett, "Statement of William B. Burkett Production Operator for BP Exploration (Alaska) to Chairman Joseph Lieberman and Chairman Bob Graham - 03.04.2002" (http://www.anwrnews.com).

[5] Sheila McNulty, "UK: BP given earlier warning of corrosion," *Financial Times,* Aug. 8, 2006; and Andy Rowell, "BP: Only Itself to Blame For Alaskan Fiasco" (http://priceofoil.org).

[6] Charles Hamel, Letter to Senator Ted Stevens, Jan. 20, 2005 (http://www.bpconcerns.4t.com).

[7] Rebecca Bream, "BP faces two US probes over trading," *Financial Times*, August 30, 2006.

[8] Carson City: "Southern Calif. refinery pays $31 million in fines and fees to settle emissions violations lawsuit," Capitol Reports (Environmental "News Link"), March 23, 2005; and Miguel Bustillo, "In In $184-Million Lawsuit, AQMD Alleges That BP Failed to Fully Inspect Refinery for Leaks," Los Angeles Times, Jan. 21, 2005. Joliet: Ameet Sachdev, "Upkeep pattern seen in BP woes: Safety, environmental incidents suggest poor systems, critics say," *Chicago Tribune*, Aug. 13, 2006 (re: *BP Amoco Chemical Company v. Flint Hills Resources, LLC*, U.S. District Ct., Northern Dist. Of Illinois, Eastern Division [Case No. 05C 5661]).

[9] Susan L. Harvey, "|To: All Industry Preparedness and Pipeline Program (IPPP) Staff," March 4, 2002 (Harvey's letter and press coverage are available at http://www.alaskaforum.org).

[10] Michael L. Menge (Commissioner, ADNR), "Ensuring System Integrity," presented to the Alaska State Senate and House Resources Committees, Aug. 18, 2006. (See also, "Regulators propose JPO for upstream," *Petroleum News*, Aug. 27, 2006, p. 8.)

[11] The 3.1-mile, 34-inch diameter pipeline is identified as the GC-2 or the OT-21 Transit Line.

[12] BP Exploration Alaska, Inc., "BP to shutdown Prudhoe Bay oil field: Company acts in response to spill, unexpected corrosion" (news release), Aug. 6, 2006.

[13] Adapted from: W. Kent Muhlbauer, *Pipeline Risk Assessment Manual* 1992, pp. 53-105; Dr. Richard Pike (Chief Executive, Royal Society of Chemistry), "Why Oil Companies Must Grasp the Corrosion Issue" (unpublished manuscript), circa August 2006; and Dr. Bill Hedges (Manager, Corrosion Strategy and Planning, BP Exploration Alaska), Aug. 18, 2006 (presented to the Alaska State House and Senate Resource Committees).

[14] "BP Corrosion Management;" "Why Oil Companies Must Grasp the Corrosion Issue."

[15] "Why Oil Companies Must Grasp the Corrosion Issue;" Robert O. Anderson, Fundamentals of the Petroleum Industry (University of Oklahoma Press, 1984), pp. 30-31; discussions with Alaska pipeline engineers.

[16] Pipeline and Hazardous Materials Safety Administration, Office of Pipeline Safety (U.S. Dept. of Transportation), ""CORRECTIVE ACTION ORDER" (In the Matter of BP Exploration [Alaska)] Inc., Respondent; CPF No. 5-2006-5015H), March 15, 2006; Kristen Nelson, "BP: Bypass lines possible on east side," *Petroleum News,* Aug. 27, 2006; additional information from various interviews and press accounts.

[17] BP Exploration (Alaska), Inc. "GC-2 TRANSIT LINE SPILL – Prudhoe Bay Western Operating Area, March 2, 2006 – INCIDENT INVESTIGATION REPORT," April 14, 2006, pp. 2 and Appendix D (Terms of Reference).

[18] "Incident Investigation Report," pp. 33-34.

[19] "Incident Investigation Report," pp. 16, 21, 22.

[20] Briefings and interviews with BP personnel, Aug. 18-23, 2006.

[21] Pipeline Safety and Hazardous Materials Safety Administration, Office of Pipeline Safety (U.S. Dept. of Transportation), "AMENDMENT No. 1 TO CORRECTIVE ACTION ORDER," (In the Matter of BP Exploration [Alaska], Inc., Respondent; CPF No. 5-2006-5015H), July 20, 2006; and letter from Thomas J. Barrett (Administrator, Pipeline and Hazardous Materials Safety Administration) to the Honorable John Dingell (Ranking Member, Committee on Energy and Commerce, U.S. House of Representatives), July 26, 2006.

[22] Statements and other documents provided at the hearing of the Alaska State House and Senate Resource Committees in Anchorage August 18, 2006 are available on-line at the Senate Resources Committee page of the Alaska State Legislature's Majority Organization web site (http://www.akrepublicans.org/senres/index.php).

[23] Alaska Dept. of Revenue, "Prudhoe Bay Shutdown Impacts," p. 6. ADOR estimated that, despite the Prudhoe shutdown, the increased revenue from the revision to the state's petroleum production tax passed by the Legislature in a Special Session Aug. 10 would put the state ahead of last spring's forecast by $308 million to $999 million at ADOR's forecast price of $53.60 per barrel. ADOR also estimated that if the $75.05 futures price on the day the Legislature passed the bill prevailed, the state would come out ahead $2.0 billion to $3.23 billion ahead of the earlier forecast. The latter figures compare to lost production revenue due to the shutdown estimated at $0.816 billion to $2.041 billion. (See also: Kristen Nelson, "Prudhoe shutdown could cost state $2B," *Petroleum News,* Aug. 27, 2006, p. 9.)

[24] John K. Norman (Chair, Alaska Oil and Gas Conservation Commission), "Alaska Oil and Gas Conservation Commission testimony to Join Senate and House Resources Committee Meeting," August 18, 2006, p. 5.

[25] "Ensuring System Integrity," p. 15. (See also, "Regulators propose JPO for upstream," PNA, Aug. 27, 2006, p. 8.)

[26] For background on JPO's approval of Alyeska's quality program in 1996, see the author's *Pipeline in Peril: A Status Report on the Trans-Alaska Pipeline*, 1996 (esp. Ch. 5 and Ch. 12); for JPO's role in the 2002 right-of-way renewal, see this writer's 2002 report on TAPS (esp. Ch. 3) and the articles and testimony attached to the article on this writer's web site, "TAPS Lease Renewal — Opportunity Lost," cited above.

[27] Letter from David W. Marquez (Alaska Attorney General) to Steve Marshall (President, BP Exploration [Alaska] Inc.), "Re: Prudhoe Bay Unit Corrosion Issues and Partial Shutdown," Aug. 17, 2006.

[28] Alaska Department of Law, "About the Attorney General" (accessed Aug. 25, 2006 at http://www.law.state.ak.us/department/ag.html).

[29] The cooperative anti-corrosion program was part of promises BP made to the State of Alaska in securing support for the ARCO-BP merger in 1999. In the train of events set in motion by that merger, in 2000 Phillips Petroleum (now ConocoPhillips) acquired ARCO's North Slope holdings, while BP assumed the role of sole operator of the Prudhoe Bay field, whose eastern half was formerly run by ARCO.

[30] Coffman Engineers, *Corrosion Monitoring of Non-Common Carrier North Slope Pipelines: Technical Analysis Of BP Exploration (Alaska) Inc. – Commitment to Corrosion Monitoring Year 2000 for Greater Prudhoe Bay, Endicott, Badami and Milne Point* (ADEC Contract Number 18-6000-02), January 2002, p. 2.

[31] Coffman Engineers, *Corrosion Monitoring of Non-Common Carrier North Slope Pipelines: Final Draft Technical Analysis Of BP Exploration (Alaska) Inc. – Commitment to Corrosion Monitoring Year 2000 for Greater Prudhoe Bay, Endicott, Badami and Miline Point* [*sic.*] (ADEC Contract Number 18-6000-02), received by ADEC Nov. 2, 2001, pp. 2-3.

[32] In August 2006 Hamel posted both versions of the Coffman Engineers review of BP's 2000 corrosion program, an analysis of the differences between the two and the statement of concerns BP prepared for ADEC in November 2001 at http://www.pogo.org.

[33] Jim Carlton, "Report Criticizing BP's Controls Is Investigated After Alterations," *Wall Street Journal,* August 25, 2006, p. A2.

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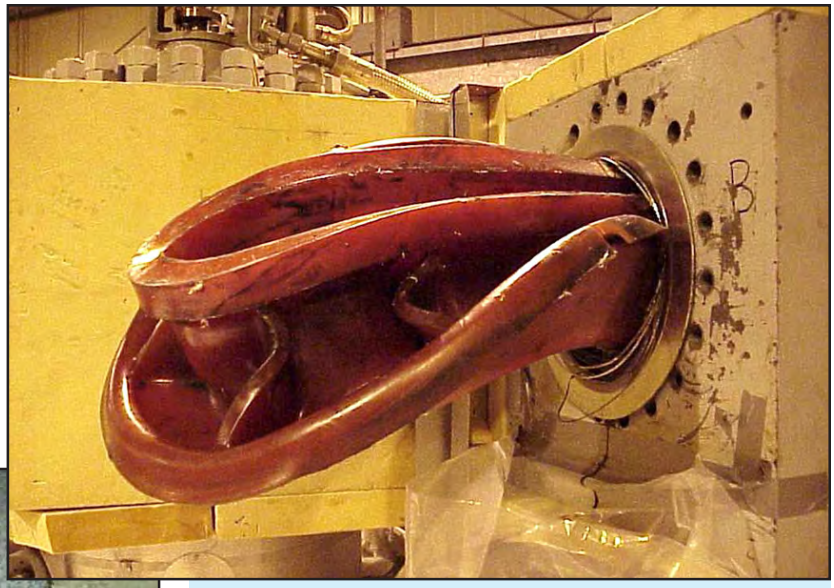
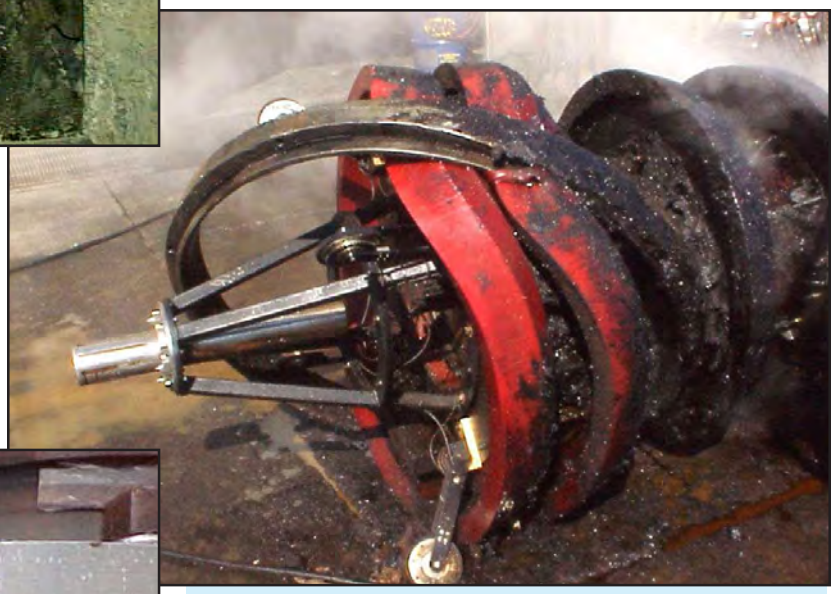
“We will achieve operational excellence by the year 2000.”

~ Bob Malone, President
Alyeska Pipeline Service Co., 1997



Valdez, January 2000: 48-inch diameter scraping cups of errant cleaning pig squeeze through 16” valve after damaging Thompson Pass backpressure system.

Near Copper Center, August 2000: Alyeska discovers construction-era damage—gouges in the steel that had been covered up with cement.



Valdez, July 2000: Instrument pig with 500-lb. Steel ring ripped from a check valve near Fairbanks and carried 350 miles to Valdez.

Valdez, November 2000: A technician mistakenly attaches bonding strap to loading arm at Berth 4 resulting in a “near miss” spark.

The Emperor's New Hose:

How Big Oil Gets Rich Gambling with Alaska's Environment

A Status Report on the Trans-Alaska Pipeline System

Atigun Pass, MP 170

Atigun Pass, 2000. MP 170.

By Richard A. Fineberg

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