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

Submitted by

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EXECUTIVE SUMMARY

Coffman Engineers, Inc. has been charged with reviewing the 2000 corrosion program report submitted by BP Exploration (Alaska) Inc. (BPXA) to the Alaska Department of Environmental Conservation (ADEC). The report outlines the measures undertaken to mitigate corrosion in BPXA's non-common carrier North Slope pipelines. In addition, Coffman reviewed the presentation materials from the April 2001 Meet & Confer session. The goal of this review is to examine the corrosion program report, gain a qualitative understanding of BPXA's corrosion control program and identify recommendations for improvement to the content and extent of topics covered.

BPXA has demonstrated a clear commitment to corrosion control. BPXA has developed a comprehensive program of monitoring and inspection. Reported results indicate internal pipeline corrosion trends for GPB West have been steadily improving since 1993 and are currently at their lowest levels in 12 years. BPXA has made a significant commitment to corrosion inhibitor testing and development, as well as reducing the number of products to a more manageable selection.

BPXA reports coupon corrosion rates as "Annualized Percentage < 2 mpy." These coupon corrosion rates increased slightly in 2000 for well flow lines, drill site gathering lines, and produced water injection lines while they decreased slightly in the seawater injection lines. The average magnitude of the coupon corrosion rate change is not presented, however the majority, 51+%, has rates below the 2mpy threshold. BPXA has analyzed the causes relating to the coupon corrosion rate increases and has taken steps to reverse the trends.

Compared to 1999, inspection results for well lines show increases in the number of locations reporting damage to the pipe wall in all injection (PWI/SWI/WMI) service categories, conversely three-phase production well lines are relatively flat and are at their lowest levels in the period reported (1995-2000).

Presently, external corrosion is a significant risk to pipeline integrity for BPXA. External corrosion under insulation was reported as the cause for both leaks in 2000 and two additional leaks in 2001. The need for additional resources for external corrosion management should be re-examined.

The BPXA report and presentation materials were a positive step towards meeting the expectations outlined in the Commitment to Corrosion Monitoring plan. BPXA and ADEC have committed to better define reporting metrics and deliverables for future reports.

COMMITMENT TO CORROSION MONITORING

The Charter agreement between the State of Alaska, BPXA and PAI required the development of a "performance management program for the regular review" of the corrosion monitoring and related practices for the non-common carrier North Slope pipelines. As a result of the subsequent meetings, the annual reporting requirements were defined as follows.

A. Annual bullet item reporting the progress of the Charter Agreement corrosion related commitments.

B. A general overview of the previous year's monitoring program.

C. Metrics which depict coupon and probe corrosion rates.

D. Metrics which characterize chemical optimization activities.

E. Metrics which depict the number and type of internal/external inspection done and, as applicable, the corrosion increases/rates and corresponding inspection intervals.

F. Metrics which characterize the quantity and type of repairs made in response to the internal/external inspections done per the above paragraph.

G. Metrics which depict the numbers and types of corrosion and structural related spills and incidents.

H. A forecast of the next year's monitoring activities in terms of focus areas and inspection goals. These forecasts cannot be viewed as binding, as corrosion strategies are dynamic and priorities will change over the course of the year. However, changes in focus will be communicated to ADEC during the semi-annual meeting described above.

ADEC contracted with Coffman Engineers, Inc to provide a technical analysis of the information presented in the annual report and determine if there are any specific corrosion or pipeline structural issues which warrant further review or corrective action. In addition to the annual report, Coffman reviewed the presentation materials from the April 2001 Meet and Confer Session.

CORROSION CONTROL STRATEGY

This section outlines the strategy presented in the report and presentation. It is divided into internal and external corrosion strategies and describes the monitoring, inspection and mitigation components. The current program status is presented in a subsequent section.

Internal Corrosion Strategy

Monitoring & Inspection

BPXA uses probes, coupons and numerous inspection methods to monitor internal corrosion throughout the field. It is unclear how the coupons are analyzed and how the data are weighted. The target, or action, limit for coupons is 2 mils per year (mpy). The target, or action, limit for probes is based on location and is between 0.5 mpy and 10 mils per year.

BPXA employs manual and automated RT and UT inspection techniques. The report discusses the limitations of the various inspection methods and BPXA has a clear understanding of their strengths and weaknesses. Wall losses less than 10 mils (0.010") are difficult to detect reliably using RT. The target, or action, limit for inspection is "zero detectable corrosion."

The data generated from the monitoring and inspection programs are reviewed weekly and in-depth reviews are made at the end of each quarter. If target values are exceeded, there is an investigation and possible repair/replacement/mitigation.

Lastly, BPXA discusses the use of Magnetic Flux Leakage (MFL) pigging technology. MFL pigging allows an operator to inspect the entire length of pipe for both internal and external corrosion indications and can be a significant tool for determining the actual fitness for purpose of a pipeline. In future reports, a more in-depth discussion about the MFL pigging strategy (location, frequency, results, etc.) would be helpful.

Mitigation

Internal corrosion at BPXA is controlled primarily by corrosion inhibitor application and secondarily by erosional velocity controls and well start-up procedures (slide 6). Other engineering tools, such as design, material selection, coating selection, etc., are also used by BPXA to control corrosion.

Chemical optimization is an on-going task for BPXA. As promising new inhibitors are developed they are tested on a small scale initially, followed by a larger scale test, and if successful, used within the facilities. Several products have been developed in the past years. BPXA's strategy is to inject inhibitor volumes until coupon corrosion rates of less than 2 mpy are achieved.

External Corrosion Strategy

External corrosion under wet insulation is a concern for all North Slope producers. The vast majority of pipelines is above ground and thermally insulated. Snow and water can be forced under the insulation where pipe segments are joined and field applied insulation was installed. These areas are known as weld-packs. When the line is warm and the water trapped under the insulation is above freezing, corrosion cells can form. Corrosion under insulation is likely to require an ongoing commitment of resources throughout the life of the field.

Monitoring & Inspection

BPXA is currently managing 1/3 of a million weld-packs (slide 15) between GPB and ACT. Presently, there are no monitoring techniques used for this corrosion mechanism. This places greater emphasis on the inspection program. Inspection methods for corrosion under insulation are radiographic and visual. TRT (tangential radiography), C-scan fluoroscopy and MFL smart pigging, eddy current, and digital radiography are used in conjunction with visual inspection to detect corrosion under insulation. The weld-pack locations are externally identifiable, so the precise location of possible corrosion cells is known in advance. This mechanism can be expected to be active throughout the rest of the field life. In addition, BPXA is also using two new technologies for inspecting the below grade, cased pipeline crossings; electromagnetic and guided wave inspection.

Mitigation

[illegible]

CORROSION PROGRAM STATUS

Risk

[illegible]

Internal Corrosion Management

[illegible]

[illegible]

Monitoring of Inspection

[illegible]

- changes in pull frequencies in the produced water system not a reduction in locations,
- reduction in the number of coupons in the production well lines, primarily upstream of chemical injection, and
- wells that are in long term shut-in.

The number of coupon locations per service category (PW/SW/3-phase, etc.) would be beneficial for clarifying performance of the coupon monitoring program. Coupon grading usually contains a judgment-based analysis of the coupon surface condition as well as objective pit depth and weight loss measurements. A discussion detailing how coupons are evaluated by BPXA would be beneficial, as it is apparent that there are differences in the way various operators perform this function.

Table 13 reports "Leaks and Saves" by year. Saves outnumber leaks by approximately 10:1 with overall leak/save ratios running from a low of 88% to a high of 97% achieved in 2000. The change is due to inspection, BPXA found defects before they became leaks. It would be helpful, in future reports, to know the cause of the leak (internal vs. external, isolated pit or network). Some discussion of how the defect was dealt with would also be beneficial; for instance was the defect sleeved or was the pipe segment replaced.

Mitigation

BPXA runs an extensive and proactive corrosion inhibitor development program. Table 6 shows the progression of corrosion inhibitor products over time. Six inhibitor formulations were used across the GPB in 2000. Table 7 shows the produced water volume treated and the inhibitor concentration per year. The field-wide average inhibitor concentration required for mitigation (coupon corrosion rates < 2mpy) has risen from a low of 106 ppm in 1995 to a high of 149 ppm in 2000. BPXA reports that even though water volumes remain relatively flat, water-cuts have increased along with flow velocities (increased gas handling is cited) requiring an increase in inhibitor concentration over time. Continuous trials are run seeking to improve inhibitor performance and cost effectiveness.

External Corrosion Management

There are approximately 185,000 weld-packs in the GPB. Slide 4 states the two corrosion related pipeline leaks it experienced in 2000 were due to external corrosion under insulation. Inspections in the year 2000 identified approximately 500 locations (out of 13,274 inspected) where damage increased due to external corrosion under insulation. Figure 5 shows that for the last four years between 4% and 8% of all the locations inspected with TRT yielded external corrosion damage. Table 8 displays the recur frequency for external corrosion under insulation inspections, recur inspection frequencies are assigned by pipeline operating temperature. Pipeline age and wall thickness are also factors that may need to be evaluated in this context.

During 2000, BPXA repaired 28 locations due to external corrosion and only 7 locations due to internal corrosion. External corrosion will require an ongoing commitment of resources by BPXA for the life of the field. The inspection effort appears to be changing the focus from, off-pad cross-country lines to the on-pad weld packs. In 2000, BPXA inspected 7,632 on-pad weld-packs and 5,642 off-pad weld-packs for external corrosion. However, there were 20,420 (~50%

more) inspections for internal corrosion. External corrosion inspection levels do not seem to be consistent with the current relative risk of an internal vs. external corrosion event. The need for additional resources for external corrosion management should be re-examined.

While it is difficult to be exact, it appears there have been inspections on ~70,000 weld-packs, or 38% of the total (185,000) and ~5% show external pipe wall damage detected. Of the 500 locations found in 2000, there were 28 repairs, or ~6% of damaged locations. If the same percentages are applied to the remaining population there are approximately 5,700 weld-packs with potential pipe wall damage and almost 300 potential repairs to be made.

There are 1,800 below grade, cased piping segments in 350 crossings. Below grade piping is affected by both of the internal and external corrosion mechanisms reported above. Since the below grade locations are cased and buried, excavation of the location or inline inspection (not available on every pipeline) are the only certain methods of defect assessment at this time. Currently, two techniques (electromagnetic pulse and guided wave) are being investigated that allow a degree of defect detection without requiring excavation. During 2000, 200 to 300 below-grade segments were inspected and there were 3 segments either replaced or repaired. The overall total number of inspected segments to date was not reported. Extrapolating the 2000 results to the entire population, there may be several areas that could require repair.

RECOMMENDATIONS:

Recommendations for areas that warrant further review or information that should be included in future reports are as follows:

1. It would be beneficial if results reported by BPXA to ADEC were presented in a format using metrics that are mutually agreed upon by PAI, BPXA and ADEC.
2. Inspection and monitoring data quality would benefit from being reported using a consistent definition of each service category. For example, when coupon monitoring results for produced water injection wells are reported, it would be useful to see a summary of inspection results for the same service category (i.e. produced water injection wells). BPXA did report inspection results for well lines by service category, but it is not always apparent that the service category definitions used for monitoring results is the same as that used for inspection.
3. If smart pig runs were made on non common carrier pipelines, inclusion of the results would be useful. Table 3 indicates smart pigs were run on non-common carrier pipelines in the GPB but no results were presented.
4. A discussion of details pertaining to how coupons are analyzed and ranked would be beneficial.
5. A summary leak/repair history for a five year period would be useful. Include: service category, internal/external corrosion, and physical pipe information (diameter, wall thickness, and years in service).
6. In addition to the field-wide average inhibitor concentration discussions, provide some case specific examples. For instance, if BPXA has an individual line or

gathering system that requires significantly more (or less) inhibitor than the field wide average, it would beneficial to report these exceptions.

7. If maintenance pigging is a part of the corrosion mitigation effort, then discussing the pigging intervals and program details for various service categories would be useful.

8. BPXA reports no current structural issues or concerns in the 2000 report. Other operators on the North Slope report subsidence and jacking issues in areas affected by permafrost thawing around well bores. BPXA's experience in this regard would be beneficial.

CONCLUSIONS

The BPXA report and presentation demonstrates a proactive commitment to mitigate corrosion of non-common carrier pipelines, and were a positive step towards meeting the expectations outlined in the Commitment to Corrosion Monitoring plan. BPXA and ADEC have committed to better define reporting metrics and definitions for future reports.

Results show that overall pipeline internal corrosion trends have been steadily improving since 1993 and are currently reported to be at the lowest levels in 12 years. However, internal corrosion rates increased slightly in 2000 in some production gathering systems and produced water injection systems. BPXA has taken corrective steps for those systems and hopes to measure improvements in the coming year.

External corrosion is a significant risk to BPXA pipeline integrity. Both leaks reported for 2000 and 2001 were due to external corrosion. Additional resources may be required to achieve the same level of corrosion control as demonstrated for internal corrosion.

BP's Ineffective Corrosion Monitoring Program on the North Slope of Alaska

Analysis provided by *BPCONCERNS.com*
March 20, 2006

I. PURPOSE:

This analysis is the first in a series of reports and exposes which will be developed and posted by *BPCONCERNS.com* to identify and reveal publicly, errors, miscalculations, and when appropriate, allegations and evidence of intentional violations and neglect by BP and others in the oil industry.

II. THE PLAYERS:

BP, formerly known as British Petroleum, is a major multinational oil company that posted record annual profits for 2005 at $19.3 billion up 25 per cent compared with 2004. BP is the majority owner of the Trans Alaska Pipeline, as well as the majority owner and operator of the North Slope of Alaska. BP in Alaska is known as BP Alaska Exploration Inc. or "BPAXP" but will be identified in this analysis as "BP". Also, for the purposes of this analysis, the state agency responsible for oversight of BP in Alaska is the Alaska Department of Environmental Conservation, Division of Spill Prevention and Response, which will be identified merely as "ADEC."

III. SUMMARY:

In late 2001, Coffman Engineers Inc. was hired under contract by ADEC to review the BP North Slope Corrosion Monitoring program and provide a report. *BPConcerns.com* recently discovered that Coffman Engineers issued two reports to ADEC. The initial Coffman report was highly critical of BP and was reportedly suppressed by ADEC due to extreme pressure by BP to do so, and the second report, reportedly heavily edited and revised at BP's direction, is the "official" report that the Alaska state agency, ADEC acknowledges. In Section VIII we will compare details in the two reports.

IV. RECENT HISTORY:

As reported extensively in the national media over the past several weeks, the flawed BP corrosion program was allowed the largest spill ever on the North Slope to occur, spilling in excess of 267,000 gallons. Even by BP's own reluctant admission, this spill was caused by internal corrosion.

How did this massive spill occur, especially in light of the recently exposed detailed Coffman report that warned the State of Alaska in 2001 of inadequate BP corrosion monitoring and control? Why didn't ADEC act then? The study and subsequent report was to be prepared and provided to ADEC by the aforementioned independent third-party entity, Coffman Engineers[1]. Few people, outside select DEAC and BP personnel, realize

there were actually two Coffman Engineers reports issued to ADEC but only one was made public. Why was the first Coffman report suppressed?

V. TWO CONFLICTING COFFMAN REPORTS:

Coffman Engineers did indeed produce an initial, well-researched, complete but succinct eleven page report, almost devoid of ambiguity, including significant but not burdensome details, footnotes, and references. For the purposes of this analysis it will be identified as the "First Coffman Report."[2] This "First Coffman Report" identified numerous deficiencies with BP's North Slope corrosion monitoring program. The second report was heavily edited and revised with direct BP influence and for the purpose of this analysis, is identified as "BP Revised Second Report." The "BP Revised Second Report" was reduced from the original eleven pages to eight pages, a number of key problems that were identified were redacted, and major expository evidence was "revised" that were identified in the earlier "First Coffman Report."

VI. BP EXPRESSED DISSATISFACTION TO ADEC:

In a previously unreleased BP document, "BP Response to Coffman Final Draft" dated November 2001, BP displays a show of power and influence over Alaska regulators, by first dismissing and degrading the results documented in the "First Coffman Report" and then pressuring ADEC to make the extreme revision of the Coffman Engineers "First Report" to make it less "negative." It has been alleged that ADEC Director Larry Dietrick complied with BP's demands without question.

BP demanded that Coffman Engineers, Inc. dilute the most damning comments, remove whole negative sections of the report, and revise the entire report, as BP noted, "The whole tone of the report [First Coffman Report] seems extremely negative ...and "[presents] very few positive references." BP went on to quickly upbraid ADEC Director Larry Dietrick for the report, "It would be more appropriate if the report was worded as a request for more information and suggested actions or options to be investigated." ADEC was extremely compliant to BP's demands and allegedly intimidated Coffman Engineers to rewrite the report with BP's changes incorporated.[3]

VII. ADEC CALLS FOR DRASTIC REVISIONS OF REPORT AT BP's REQUEST

The following conflicting findings in the two reports demonstrate the duplicity of BP and the danger of the alleged complicity of ADEC Director Mr. Dietrick with Mr. Mach. Please see excerpts from the Coffman "First Report" (blue heading) and the corresponding revised findings in the "BP Revised Report" (red heading). All comments are verbatim from the two reports unless cited otherwise.

VIII. COMPARISON OF THE TWO REPORTS

EXECUTIVE SUMMARY EXCERPT from "First Coffman Report":

BPXA [BP Exploration Alaska] stated intent to '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 the basis for their corrosion strategy. Program results have been reduced and factored; conclusions are hard to report without making inferences with regard to the underlying reasoning or strategy. The metrics chosen to report results make comparison to industry peers difficult to quantify. No discussion of the underlying program strategy is included other than to say, 'Our corporate goals are no accidents, no harm to people and no damage to the environment.

EXECUTIVE SUMMARY EXCERPT, from corresponding section in the "BP Revised Report":

BPXA has demonstrated a clear commitment to corrosion control. BPXA has developed a comprehensive program of monitoring and inspection.

:

:

EXECUTIVE SUMMARY EXCERPT from "First Coffman Report":

The actual magnitude of the corrosion increase is not reported and subsequent damage to the pipe wall due to increased corrosivity is not quantified.
External corrosion inspection levels are not consistent with the relative risk of an internal vs. external corrosion event.
No differentiation between weight loss and pitting corrosion are discussed.
No statistics on the extent of corrosion defects were reported.
Without knowing the baseline corrosion trend within its production system it is difficult to judge the effectiveness or value of the [corrosion] inhibition program.
Lastly, the [BP] Work Plan required a summary overview of ongoing structural concerns [pipeline structural integrity]. Structural issues beyond corrosion were not addressed in either the report or the presentation.

EXECUTIVE SUMMARY EXCERPT, from corresponding section in the "BP Revised Report":

All of the comments from the "First Report" (directly above) were struck from the "BP Revised Second Report" so there are no corresponding comments.

EXCERPT FROM BODY OF "First Coffman Report":

While the BPXA report and presentation 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. (Emphasis added)

Corresponding section in the "BP Revised Report":

The BPXA report and presentation materials were a positive step towards meeting the expectations outlined in the Commitment to Corrosion Monitoring plan.

EXCERPT FROM BODY OF "First Coffman Report":

With the exception of corrosion under insulation the report does not discuss risk assessment protocols or risk based inspection.

Corresponding section in the "BP Revised Report":

It is clear that a form of risk based resource allocation is used by BPXA

EXCERPT FROM BODY OF "First Coffman Report":

BPXA reports its inspection results for internal corrosion as 'percent of inspection increases'. Unfortunately only the percentage of inspections which show increases in damage is reported; not the magnitude of the wall loss.

Corresponding section in the "BP Revised Report":

Deleted from BP Revised Report.

EXCERPT FROM BODY OF "First Coffman Report":

Reportedly, these issues [problems with corrosion inhibitor and manpower reduction] *have been rectified and they expect to be back on-track in 2001.*

Corresponding section in the "BP Revised Report":
The problem was identified and these issues have been addressed, and they expect to be back on track in 2001.[4]

EXCERPT FROM BODY OF "First Coffman Report":

BPXA should include the results of smart pig runs if smart pig runs were made
(Emphasis added)

Corresponding section in the "BP Revised Report":

If smart pig runs were made then inclusion of the results would be useful.[5]
(Emphasis added.) This is more misleading semantics. Please see footnote 3 and 4 for further information.

EXCERPT FROM BODY OF "First Coffman Report":

Does BPXA pig every non-common carrier pipeline of suitable diameter?
Are there plans to install/reconfigure BOA pipelines for smart pigs?
Are baseline smart pig runs performed on newly commissioned lines?
How are lines selected for smart pigging and what is the repair frequency of inspection?
What were the service categories of the lines inspected and how did this inspection data compare to that gathered by other inspection techniques?

Corresponding section in the "BP Revised Report":

If maintenance pigging is a part of the corrosion mitigation effort, then discussing the pigging intervals and program details for various services would be useful.

EXCERPT FROM BODY OF "First Coffman Report":

The reporting style and corrosion metrics used in the subject report makes it difficult to develop a qualitative understanding of the basis and underlying strategies employed by BPXA. The BPXA report was comprehensive in scope but lacked sufficient data for a technical analysis.[6] (See footnote 6 for explanation of why the phrase "comprehensive in scope" was used.)

Corresponding section in the "BP Revised Report":

The BPXA report and presentation demonstrates a proactive commitment to mitigate corrosion of non-common carrier pipelines and were a positive step towards meeting the expectations outlined in the Commitment to Corrosion Monitoring plan.

EXCERPT FROM BODY OF "First Coffman Report":

Structural issues were not discussed and need to be included in future reports. Pipeline sagging due to support member frost-jacking, wind induced vibration, subsidence, and snow loading in pipelines already at risk due to pipe-wall thinning need to be addressed.

Corresponding section in the "BP Revised Report":

BPXA reports no current structural issues or concerns to the 2000 report.[1] (Emphasis added)

Section IX. CONCLUSIONS:

BP obviously influenced the DAEC to dilute the original Coffman Report to improve the "tone" with "positive" comments and removal of the "negative" to portray BP's corrosion efforts in a more favorable light. Unfortunately, this also removed the very points that might have prevented the current spill and future spills. Especially troublesome is the revelation that BP and ADEC have been completely informed and aware of the potential for internal corrosion leaks since at least 2001. We should not be surprised that the recent spill occurred and we should expect more as this system ages and BP continues to reduce costs and manpower.

SECTION X. RECOMMENDATIONS:

1. An independent audit by the State of Alaska to examine the documents referenced in this *BPCOMMERNS.com* analysis:
   a. All Coffman Engineers Inc. submittals to ADEC.
   b. All documents, notes, diaries, emails or other communications related to this issue held by Larry Dietrick, ADEC Director.
   c. All documents, notes, diaries, emails or other communications related to this issue held by BP personnel that communicated with Larry Dietrick, ADEC Director.
2. Self disclosure by the ADEC to the United States Environmental Protection Agency and cooperation with any and all Investigators including Federal Criminal Investigators on this issue.

-Analysis by Glen Plumlee, former BP Analyst

[1] Coffman Engineers Inc. analysis of BP Corrosion Monitoring of Non-Common Carrier Main Slope Pipelines – 2000 Commitment to Corrosion Monitoring – ADEC Contract No. 18-6000-02

[2] This "First Coffman Report" can be found in ADEC historical documents, under the ADEC file of Coffman Engineers, November 2001 Final Draft, Contract No. 18-6000-02.

[3] The ADEC and BP documentation described in this analysis can be requested, and received, typically free of charge, by using the Alaska State version of the Freedom of Information Act, that is, if the originals have not been "inadvertently" destroyed or lost by the agency in question. In the near future a link and examples of past, successful freedom of information requests submitted by concerned Alaska citizens will be provided on this site free to be used as a guide as needed. We will also include U.S. Federal Freedom of Information Act request examples, information, and links.

[4] Please notice the revision of the phrase, "Repeatedly have been rectified" used in the first report that was changed in the BP revised report to read, "The problem was identified and issues have been addressed." The first report implied that although repeatedly the problem had been rectified it was still in question by Coffman Engineers. In the second revised BP the wording was softened and states that the "issues" (not "problems") were "addressed" (not "rectified") indicating that they may have misled regulators in earlier BP reports and presentations. Semantics of this sort are very typical in oil industry reports and white papers.

[5] The words "should" and "shall" have very precise definitions in the oil industry regulations and standards. The phrase "would be useful" indicates an afterthought and not even a recommendation. That is not what Coffman Engineers originally had in mind when they used the word "should". It was meant as a recommendation. This is well understood in oil industry documentation.

[6] Again, this is a common technique in oil industry and popularly called "cover 'em up with paper", therefore the qualifying statement by Coffman Engineers, that BP provided a "comprehensive report" but it still "lacked sufficient data." This was a generous and respectful way for the author of the report to notify BP that the ploy to turnover large amounts of documents but no real data had not influenced his findings.

[7] The use of the word "current" allows a future escape from responsibility. Using "current" is another word device used in the oil industry to provide cover if future problems do occur, e.g., total failure of a pipeline due to the snow load, wind, embrittlement, etc. described in the "First Coffman Report."