

BP Concerns/Comments on the Final Draft Coffman Engineers Report

Corrosion Monitoring of Non-common Carrier North Slope Pipelines

ADEC Contract Number 18-6000-02

Introduction

In the original discussions with ADEC, the intent of the process to fulfill the Corrosion Monitoring commitment under the charter was supposed to be a collaborative and cooperative effort, and this is still BP's preferred approach. However, the nature of the comments and style of the Coffman Engineers Final Draft report, that BP believes is misleading, has forced BP to respond to their Final Draft.

This document highlights our concerns regarding misperceptions or misinterpretations we feel have been made in the review of our report. We are willing to review and revise sections of BP's report where there are valid issues, however, our impression is that overall the review of our report was biased and unduly negative. This paper details BP's main objections and comments on the Coffman Engineers Final Draft Report but, as noted above, we would have, and still would prefer to work differently with ADEC on this issue.

General Observations

- The whole tone of the report seems extremely negative, and is inconsistent with prior conversations and discussions with ADEC in which the fulfillment of the commitments II A 6 and 7 was envisioned as being a constructive and collaborative effort between the companies and the state.
- The Coffman report presents many negative findings and characterizations, and very few positive references to BP's report or its content. This does not appear to be a balanced review of the document or its content when there are many positive trends reported.
- The fulfillment of the charter commitment was intended to be done in consultation with ADEC and to date there has been no consultation with Coffman regarding the Coffman report so that any questions from the Coffman engineers could be addressed. This is the process proposed in the Coffman Technical Proposal.
- The report is inconsistent with the initial feedback from ADEC.
- Many of the recommendations/comments are worded as if the report is a compliance document that is enforceable. It would be more appropriate if the report was worded as a request for more information and suggested actions or options to be investigated.

Front Cover

- Milne Point is misspelled on the front cover.

Executive Summary

- **Paragraph 2** implies that BP has not reported openly – such an implied accusation needs to be substantiated as the contents of the report, by any reasonable measure, provide the information necessary for a qualitative understanding. Also, as noted in the Coffman report 'The BPXA Report was comprehensive in scope' which indicates there was more than adequate information to conduct a qualitative assessment.
- **Paragraph 2** states that it is difficult to develop a qualitative understanding of the BP program based on the report yet the Coffman Engineers report provides a section entitled 'Corrosion Control Strategy' on page 3 through page 5 or approximately 20% of the overall report length.

- **Paragraph 2** is critical of the performance metrics used in the BPXA report. However, the performance management metrics presented in the BPXA report are accepted statistical process control (SPC) metrics found in any quality process such as the ISO series or in the general performance management literature such as that provided on the web by National Institute of Standards and Technology (NIST), Statistical Engineering Division (SED), Engineering Statistics Handbook, www.itl.nist.gov/div898/handbook. In general, SPC provides many performance management tools and reporting methodologies including, but not limited to, non-conformance ratios such as those given in the BP report, Engineering Statistics Handbook Section 6.3.3.2. This performance management methodology contrasts with the three references provided by Coffman Engineers,

ISO 8044 which is a list of corrosion terms and definitions in four languages that does not include the terms 'Performance Management' or 'Metric.'

ASTM G15 is a similar list of corrosion terms and definitions as ISO 8044 and is also silent on the terms 'Performance Management' or 'Metric.'

NACE RP0690 is a recommended practice that defines the data fields for a database system designed to assess the compatibility of engineering materials for a wide range of environments. Again, it is not designed for performance management of a corrosion control program.

- **Paragraph 2** states that the report and presentation contain no discussion of the underlying program strategy. However, the corrosion management strategy matching pipeline life to field life is very clearly stated and referenced on pages 810 which provides specific targets and discusses the relationship between monitoring, inspection and overall corrosion management, pages 24-26 discuss the inspection program in detail and slides 3-6 summarized the information for the Meet and Confer session in April 2001 as 'Maintain existing infrastructure throughout existing field life, (for) future satellite development (and) future gas production' with the aspiration of 'No Harm, no accidents, no damage to the environment.'
- **Paragraph 3** As discussed in the presentation, the corrosion mechanism, which, if uncontrolled, presents the greatest potential for environmental impact is internal corrosion from CO₂. With the control of internal corrosion the next most impacting corrosion mechanism is external corrosion. Therefore the statement that 'external corrosion inspection level is not consistent with the relative risk' is misleading since the internal inspection program is an integral part of the internal corrosion management program as a whole. This is an area where if Coffman Engineers had taken the opportunity to consult with BP staff, clarification would have improved the content of the Final Draft.
- **Paragraph 4** Knowledge of the corrosion inhibitor efficiency and/or baseline corrosion trend is of limited utility since the effectiveness of the program is demonstrated by low corrosion rates and ultimately by lower repair and leak/spill rates, not from corrosion inhibitor efficiency. This recommendation should be amended, again, it is an area where if Coffman Engineers had taken the opportunity to consult with BP staff, clarification would have improved the quality of the Final Draft.
- **Paragraph 7** '...does not provide the necessary information for a detailed technical analysis...' There is no requirement for BP to provide such information nor is it within the scope of work defined for Coffman. As defined in the Work Plan, the Meet and Confer sessions are to provide a 'summary overview' and the annual report is to provide 'metrics which depict or characterize' issues, no fixed format was prescribed. The RFP from ADEC requests Coffman to 'Perform a comprehensive technical analysis of the specific information presented in the reports...' in paragraph (c) of the scope of work and in

Coffman's Technical Proposal Task 1 is defined as 'A comprehensive technical analysis of the March 2001 reports provided by PAI and BPXA be made. The primary source of data for these analyses will be the reports provided by BPXA and PAI.'

- **Omission** At the very end of the Coffman report it states 'The corrosion program results outlined in the report submitted to ADEC demonstrate a clear commitment by BPXA to mitigate corrosion and its impact to the environment and the field assets.' This is a very significant finding yet is omitted in its entirety from the Executive Summary. There is therefore a lack of balance in the report. A balanced report would have commented on both the positive and the negative findings and therefore have supported those activities that should be perpetuated as well as identifying potential gaps.
- **Errors/Inaccuracies** There are numerous misperceptions, misinterpretations and technical mistakes in the Coffman report, these are detailed below.

Commitment to Corrosion Monitoring Page 3

- **Paragraph 1** The actual wording from the Charter Agreement is 'BP and ARCO will, in consultation with ADEC, develop a performance management program for the regular review of BP's and ARCO's corrosion monitoring and related practices for non-common carrier North Slope pipelines operated by BP or ARCO.'

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- **Monitoring and Inspection Paragraph 2** The inference in the last sentence is incorrect, the target or action limit is any detectable corrosion activity found in the inspection data, not greater than 10 mils as reported by Coffman.
- **Mitigation – Paragraph 6** states that the target inhibitor concentration is 150 ppm, this is incorrect. The system is controlled to a corrosion rate of 2 mpy and sufficient corrosion inhibitor is added to achieve that target. The resultant average field wide corrosion inhibitor concentration happens to be ~150 ppm for 2000 but, as can be seen from Table 7 of the 2000 BP Report this value has changed over time as the corrosivity of produced fluids at GPB has changed.

Corrosion Program Status Page 5

- **Risk – Paragraph 1** 'Judgment or experiential based protocols suffer from a lack of continuity; oil fields with production lifetimes in excess of half a century or more require a codified set of protocols...' This is an opinion of Coffman but is stated as a fact. Programs benefit from regular review/changes and our programs are always being revised to keep pace with changing field conditions.
- **Internal Corrosion Control – Paragraph 1** '...only the percentage of inspections which show increases in damage is reported; not the magnitude of the wall loss.' BP was charged with reporting corrosion-monitoring data. Magnitude of wall loss is of limited utility in the management of corrosion and as such was not included in the Work Plan for reporting on inspection results, reference Part 2, Section E of the Work Plan.

Fitness-for-Service (FFS) efforts, where magnitude of wall loss is clearly an important consideration, are reported under the leak, save and repair metric again as per the Work Plan, Part 2 Section F. Corroded areas are evaluated for FFS to recognized industry standards.

Corrosion Program Status Page 6

- **Internal Corrosion Control – Paragraph 1** No attempt is made to quantify the possible extent...' The word 'quantify' should be replaced with 'report' as BP did quantify it, but did not report it directly. However, this seems to be an unnecessary criticism on

the part of Coffman as the Final Draft report then goes on in the following paragraph to note 'Inspections have not detected any appreciable increase due to lower than normal inhibitor concentration in the three phase piping.'

- **Monitoring and Inspection** Table 13 of the BP 2000 Report shows the Leak/Save history for the last 5 years and the leak cause for the year 2000. The Coffman Report then finds fault with the BP 2000 Report for not reporting pre-2000 leak causes. However, it is clear from the scope Work Plan Scope agreed with ADEC that the detailed leak causes are only required for the prior calendar year – see introductory comments for Section 2 of the Work Plan.
- **Mitigation – Paragraph 1** The reasons for the use of different corrosion inhibitors across the field is discussed on page 31 of the 2000 BP Report and again on slide 21 of the April Meet and Confer session.

Recommendations

- **Recommendation 1** As discussed earlier the recognized industry standards and practices given as examples by Coffman Engineers are of little relevance to the overall Charter Agreement commitment of agreeing a performance management program and performance metrics. The examples given by Coffman are,

ISO 8044 which is a list of corrosion terms and definitions in four languages that does not include the terms 'Performance Management' or 'Metric.'

ASTM G15 is a similar list of corrosion terms and definitions as ISO 8044 and is also silent on the terms 'Performance Management' or 'Metric.'

NACE RP0690 is a recommended practice that defines the data fields for a database system designed to assess the compatibility of engineering materials for a wide range of environments. Again, it is not designed for performance management of a corrosion control program.

Therefore this recommendation should be deleted or modified to reflect the agreed action plan from Meet and Confer II.

- **Recommendation 5** This is not a recommendation but series of questions and/or requests for additional information or clarification, therefore, this recommendation should be deleted.
- **Recommendation 6** This recommendation has only limited utility in improving the performance of the corrosion inhibition program since the calculation of corrosion inhibitor efficiency is not used in corrosion management where it is the corrosion rate that is controlled. BP manages to a corrosion rate and demonstrates the value of the inhibitor program by the corrosion monitoring and inspection programs, leaks/saves and repair rates not by the corrosion inhibitor efficiency, which is measure useful primarily for comparing corrosion inhibitor products.

Also, coupon removal from live systems should never be undertaken lightly and only done where the value of the data justifies the associated risk. We will never expose our workforce to unnecessary risk and therefore given the dubious nature of the data that would be generated this is an unnecessary risk and will not be undertaken.
- **Recommendation 7** This recommendation appears to confuse two different aspects of the coupon program. The 'no meaningful data' refers to the fact that these coupons are upstream of the chemical injection location on the 3 phase production system and therefore do not reflect the inhibited system corrosivity – this is clearly explained on page 11 of the BP 2000 Report. The under-reported corrosion rate refers to the coupons in the produced water system, page 10, and is as a consequence of the time required to build-

up surface deposits on newly installed coupons, this is being addressed through the doubling of the exposure period.

It appears that two different issues and two different systems are being confused and therefore the recommendation should be deleted.

- **Recommendation 9**This is beyond the agreed scope of the report Work Plan that very clearly states that the report should cover the prior calendar year – introduction to Section 2 of the Work Plan – and therefore should be removed. The data for 1996 onward for leak/saves and other metrics was provide voluntarily as a courtesy and to help provide context.
- **Recommendation 10**Again, as per recommendation 9, this is beyond the scope of the agreed reporting guidelines included in the Work Plan and therefore should be removed.
- **Recommendation 11**This data is not generated and therefore cannot be reported. The data is not generated because it provides no additional useful information that would help in improving the corrosion control in the produced water system since the partitioning characteristics of the upstream inhibitor are predefined and unalterable. Therefore this recommendation should be removed.
- **Recommendation 14**This recommendation needs to be clarified, as the wording is unclear as to what is being recommended. If Coffman Engineers is requesting an understanding of how BP allocates resources then it is unacceptable as it is BP's responsibility based on our broad definition of risk and cannot be discussed with Coffman/ADEC.

Additionally, one of the standards used as an example, ASTM 2081 Standard Guide for Risk Based Corrective Action, is not relevant as the scope of the document is for '...conducting risk-based corrective action (RBCA) at chemical release sites based on protecting human health and the environment. The RBCA is a consistent decision-making process for the assessment and response to chemical releases.' Therefore the standard is not relevant for the intended application.

Conclusions– Page 10

The conclusions should be re-written to reflect the issues/concerns raised in the prior notes and points with the exception of the last paragraph which should also be included in the Executive Summary. Of particular concern, and noted elsewhere,

- Coffman were requested to conduct a 'technical analysis' of the data presented in the report and this has not been done as per the RFP from ADEC or Coffman's technical proposal. The Coffman Final Draft appears to be more of a critique than an objective analysis of the BP 2000 report.
- The metrics presented in BP's 2000 report are well-understood measures for process control and improvement that Coffman have made no attempt to understand or improve upon. Instead, Coffman has chosen to cite 3 irrelevant standards in the recommendations.
- Coffman's report could have been improved substantially if BP had been consulted for clarification/explanation. This is exemplified by the repeated reference to inhibitor concentration and efficiency as opposed to the resultant corrosion rate, which is actually the most important parameter in reducing spills and the environmental impacts of corrosion.