

***Mechanical Integrity Program Consent Order
Progress Evaluation of Tier II Recommendations
for the Valero Delaware City Refinery*
in Delaware City, Delaware***

Closure Notice No. 4

Written by:

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Working Draft Report Submitted: April 10, 2007
Final Report Submitted: May 14, 2007

This work was performed by ABSG Consulting Inc. for the Valero Delaware City Refinery under proposal number PROP-618-01.

**On September 1, 2005, Premcor Inc. merged with and into Valero Energy Corporation, a Delaware corporation. As a result of the merger, The Premcor Refining Group Inc. (Premcor) became a wholly owned subsidiary of Valero Energy Corporation. Premcor remains a legal entity and operator of the Delaware City Refinery. However, because Premcor does business in Delaware under the trade name "Valero Delaware City Refinery," the name "Valero" is used in this report.*

NOTICE

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ABS Consulting and its employees, subcontractors, consultants, and other assigns cannot, individually or collectively, predict what will happen in the future. ABS Consulting personnel made a reasonable effort, based on the information supplied to us and the scope of work defined by Valero and the Delaware Department of Natural Resources and Environmental Control, to help Valero identify opportunities to improve its mechanical integrity (MI) program and related systems. If the suggestions in this report are followed, the likelihood of MI-related accidents occurring at the Valero Delaware City Refinery (DCR) should decrease. However, even if the suggestions in this report are followed, accidents may still occur. Moreover, the actions associated with implementing the suggestions in this report may subject Valero employees or their assigns to unforeseen hazards. Therefore, Valero personnel should carefully review the suggestions before implementing them to determine whether they are in Valero's best interest. ABS Consulting accepts no liability for any incident or regulatory impact that occurs at the Valero DCR or at any other Valero facility.

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EXECUTIVE SUMMARY

In 2002, Motiva Enterprises, LLC (Motiva), on behalf of the Delaware Department of Natural Resources and Environmental Control (DNREC), contracted with ABSG Consulting Inc. (ABS Consulting), an engineering consulting firm that specializes in safety and reliability analysis, to conduct an evaluation of the mechanical integrity program at the Delaware City Refinery (DCR). The evaluation began with requested documents being provided by Motiva to ABS Consulting on May 7, 2002, and continued through a series of visits to the refinery between May 20, 2002, and August 16, 2002. ABS Consulting issued a draft report in September 2002 documenting the results of this evaluation, for review and comment by Motiva and DNREC. ABS Consulting then issued a final report in March 2003.

Motiva and DNREC subsequently entered into a negotiated consent order (CO) documenting Motiva's agreed response to some of the recommendations contained in the March 2003 final report. The CO was signed by Motiva and DNREC on December 12, 2003, and approved by the Delaware Court of Chancery on January 12, 2004.

The CO classified the recommendations by priority, with Tier I (higher priority) actions required to be completed in accordance with an implementation schedule that established specific deadlines over a 3-year period. Tier II (lower priority) actions are required to be completed by the end of the 3-year period. This report addresses the Tier II actions.

The CO required (1) annual implementation progress reports for the Tier II actions from Motiva and (2) annual audits to be conducted by an independent third-party organization, over the 3-year period covered by the CO. In May 2004, Motiva sold the DCR to The Premcor Refining Group, Inc. On September 1, 2005, Premcor Inc. merged with and into Valero Energy Corporation, a Delaware corporation. As a result of the merger, The Premcor Refining Group Inc. (Premcor) became a wholly owned subsidiary of Valero Energy Corporation. Premcor remains a legal entity and operator of the Delaware City Refinery. However, because Premcor does business in Delaware under the trade name "Valero Delaware City Refinery," the name "Valero" is used in this report. Thus, Valero is bound by the terms of the CO and the contract with ABS Consulting to perform these audits.

Valero was required by the CO to deliver its third annual Tier II progress report to ABS Consulting by January 12, 2007. ABS Consulting received this report (dated January 9, 2007) at its offices in Wilmington, Delaware, prior to January 12, 2007.¹ ABS Consulting concludes that the DCR satisfied the Tier II reporting requirements established by the CO.

¹ In addition, Valero elected to issue a nonmandatory interim Tier II progress report on July 18, 2006, and ABS Consulting issued a corresponding audit report on November 28, 2006, based on that progress report. Thus, while this is the report on the third annual Tier II audit, it is the fourth Tier II closure notice.

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ABS Consulting was required by the CO to conduct an audit by February 26, 2007, to verify the work described in the most recent DCR Tier II progress report. Mr. Walt Frank and Mr. Randy Montgomery of ABS Consulting conducted the bulk of the onsite portion of this audit at the DCR on January 15 through January 19, 2007, and January 22 and January 23, 2007. Mr. Frank made several more part-day visits to the refinery, and both auditors had extensive telephone and e-mail communications with refinery staff throughout the balance of January and through February 26, 2007.

ABS Consulting was further required by the CO to issue a report by April 12, 2007, documenting the results of its audit. Because of the volume of data required to be reviewed, and the detailed deliberations necessary to determine compliance or noncompliance with CO requirements in this, the last annual audit, ABS Consulting was not able to issue the draft report to Valero for its review and comment until April 10, 2007. The CO allows Valero up to 15 days to review the draft report, and ABS Consulting received Valero's comments by e-mail on April 24, 2007. After consideration of Valero's comments, ABS Consulting is issuing this final report of the final annual Tier II progress audit on May 14, 2007. ABS Consulting emphasizes (as we communicated to DNREC on April 9, 2007) that the delivery of this final report beyond the April 12, 2007, deadline was due to our delay, and not Valero's.

ABS Consulting has concluded, based upon the observed progress made through February 26, 2007, that the DCR has complied with all the CO Tier II applicable requirements.

ABS Consulting would like to acknowledge the progress made to date under the CO at the DCR. As this report details, considerable efforts have been devoted to implementing the requirements of the CO. We have consistently found the DCR staff to be open and supportive of our audit efforts and desirous of the successful implementation of the requirements of the CO and the realization of the benefits of doing so.

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1. INTRODUCTION

In 2002, Motiva Enterprises, LLC (Motiva), on behalf of the Delaware Department of Natural Resources and Environmental Control (DNREC), contracted with ABSG Consulting Inc. (ABS Consulting), an engineering consulting firm that specializes in safety and reliability analysis, to conduct an evaluation of the mechanical integrity (MI) program at the Delaware City Refinery (DCR). The evaluation began with requested documents being provided by Motiva to ABS Consulting on May 7, 2002, and continued through a series of visits to the refinery between May 20, 2002, and August 16, 2002. ABS Consulting issued a draft report in September 2002 documenting the results of this evaluation, for review and comment by Motiva and DNREC. ABS Consulting then issued a final report in March 2003.

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The CO classified the recommendations by priority, with Tier I (higher priority) actions required to be completed in accordance with an implementation schedule that established specific deadlines over a 3-year period. Tier II (lower priority) actions are required to be completed by the end of the 3-year period. This report addresses the Tier II actions.

The CO required (1) annual implementation progress reports for the Tier II actions from Motiva and (2) annual audits to be conducted by an independent third-party organization, over the 3-year period covered by the CO. In May 2004, Motiva sold the DCR to The Premcor Refining Group, Inc. On September 1, 2005, Premcor Inc. merged with and into Valero Energy Corporation, a Delaware corporation. As a result of the merger, The Premcor Refining Group Inc. (Premcor) became a wholly owned subsidiary of Valero Energy Corporation. Premcor remains a legal entity and operator of the Delaware City Refinery. However, because Premcor does business in Delaware under the trade name "Valero Delaware City Refinery," the name "Valero" is used in this report. Thus, Valero is bound by the terms of the CO and the contract with ABS Consulting to perform these audits.

This report documents ABS Consulting's observations and conclusions from the third annual audit of the Tier II work.²

²In addition, Valero elected to issue a nonmandatory interim Tier II progress report on July 18, 2006, and ABS Consulting issued a corresponding audit report on November 28, 2006, based on that progress report. Thus, while this is the report on the third annual Tier II audit, it is the fourth Tier II closure notice.

***2. COMPLIANCE WITH SCHEDULE DEADLINES FOR PROGRESS
REPORT AND AUDIT***

Valero was required by the CO to deliver its third annual Tier II progress report to ABS Consulting by January 12, 2007. ABS Consulting received this report (dated January 9, 2007) at its offices in Wilmington, Delaware, prior to January 12, 2007.

ABS Consulting was required by the CO to conduct an audit by February 26, 2007, to verify the work described in the DCR Tier II progress report. Mr. Walt Frank and Mr. Randy Montgomery of ABS Consulting conducted the bulk of the onsite portion of this audit at the DCR on January 15 through January 19, 2007, and January 22 and January 23, 2007. Mr. Frank made several more part-day visits to the refinery, and both auditors had extensive telephone and e-mail communications with refinery staff throughout the balance of January and through February 26, 2007.

Because of the volume of data required to be reviewed, and the detailed deliberations necessary to determine compliance or noncompliance with CO requirements in this, the last annual audit required by the CO, ABS Consulting was not able to issue the draft report to Valero for its review and comment until April 10, 2007. The CO allows Valero up to 15 days to review the draft report, and ABS Consulting received Valero's comments by e-mail on April 24, 2007. After consideration of Valero's comments, ABS Consulting is issuing this final report of the final annual Tier II progress audit on May 14, 2007. ABS Consulting emphasizes (as we communicated to DNREC on April 9, 2007) that the delivery of this final report beyond the April 12, 2007, deadline was due to our delay, and not Valero's.

3. EVALUATION OF COMPLIANCE WITH CO REQUIREMENTS FOR MI PROGRAM UPGRADES

This report is the fourth in a series of reports prepared by ABS Consulting to evaluate the progress of the DCR in implementing the Tier II requirements of the CO. All Tier II requirements were required to be completed within 3 years after the effective date of the CO. In prior reports³, ABS Consulting addressed only the CO requirements reported on by the DCR in its Tier II progress reports.

The scope of this fourth and final audit required by the CO differed markedly from prior audits because it addressed every Tier II requirement in the CO. Activities, previously determined to have been completed, were reexamined to reconfirm that activities “remained completed.” For example, if the CO required that a procedure be prepared to address a certain mechanical integrity (MI) activity, this last audit sought to determine whether the procedure was still in use. For ongoing activities, the audit sought to determine whether the activities continued to be implemented in a fashion that met or exceeded the level of performance required to support the conclusion that the requirements of the CO had been satisfied.

The 3-year retrospective for all CO requirements associated with this final audit necessitated the review and careful analysis of a considerable amount of information to ensure that the interests of both DNREC and the DCR were represented in a fair and balanced fashion.

Table 1 lists (1) all the Tier II tasks specified by the CO, (2) observations made by ABS Consulting related to the means of the DCR’s compliance with the relevant CO requirements, and (3) ABS Consulting’s conclusions as to whether the DCR was in compliance with the requirements at the time of the audit. To provide a historical perspective on the DCR’s efforts and ABS Consulting’s past assessments of the progress for each Tier II requirement, a summary of the content from the past reports for each Tier II requirement has been included.

As documented in Table 1, ABS Consulting concluded, based upon the progress observed through the conclusion of the current audit, that the DCR had complied with all the CO Tier II applicable requirements.

During the course of the audit, ABS Consulting identified possible opportunities for enhancing the implementation of the programs and initiatives covered by the audit, some of which are documented in this report. ABS Consulting has verbally shared other such observations with the

³ Prior ABS Consulting reports and their dates of issue:
1st Tier II, March 14, 2005
2nd Tier II, March 3, 2006
Interim Tier II, November 28, 2006

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DCR and notes the receptivity of the DCR to such suggestions. Such observations in no way constitute noncompliances with the CO requirements, and our suggestions must not be construed as attempts on the part of ABS Consulting to broaden the obligations imposed upon the DCR by the CO.

In this, and the accompanying Tier I audit report (ABS Consulting report 618.10-01), ABS Consulting cites two factors that we perceive to have been particularly important to the progress the DCR has made in improving its MI program during the course of the CO. These are:

1. In item 49.b of this Tier II audit report, ABS Consulting cites the FERRET database as a pivotal factor in the success of a number of MI-related initiatives at the DCR and suggests that FERRET, or a similarly configured and implemented action tracking database, is essential to ensuring the continued success of these initiatives. For this reason, ABS Consulting urges the DCR to approach with caution any substantive changes to the FERRET system.

2. In item 39.b of the accompanying Tier I audit report, ABS Consulting cites the assignment of a senior Fixed Equipment Department (FED) inspector to peer review inspection reports (IRs) as being one of the most significant factors in addressing issues related to the quality of IRs. It is noted that increased oversight by this same individual has resulted in improvements in other FED initiatives, such as the temporary repair program (see item 46.b in the accompanying Tier I audit report). ABS Consulting recommends that this role be maintained and provided the priority and resources necessary to sustain these important functions.

ABS Consulting would also like to cite the EMPRV inspection database (see item 42 in the accompanying Tier I audit report) and the routine maintenance process (RMP), (see item 51 in this report) as notable practices. We believe that the MI program will continue to benefit from the continued diligent implementation of both of these initiatives.

Finally, ABS Consulting would also like to cite a third factor, which is not directly tied to a particular Tier I or Tier II requirement. In implementing the CO, the DCR elected to staff a position providing for enhanced oversight and coordination of the remedial MI activities required by the CO. We believe that this oversight and coordination role has been a crucial factor in the progress made under the CO. ABS Consulting is not necessarily suggesting that this position be retained after CO requirements have been completed. However, we believe that this situation graphically illustrates the importance of a strong management review function in any process safety management (PSM) system. The American Institute of Chemical Engineers' Center for Chemical Process Safety provides extensive guidance for the implementation of a management review function as part of a PSM system in its recent publication *Guidelines for Risk Based Process Safety*.

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Table 1 Mechanical Integrity Consent Order Audit Results

Consent Order Tier II Applicable Requirements	Observations/Basis for Audit Conclusions	Audit Conclusions
49. Management of the FERRET Database		
<p>a. Develop a mechanism(s) for prioritizing efforts to reduce the FERRET overdue items, allowing for more critical tasks to be addressed first.</p>	<p>In this final Tier II audit, ABS Consulting notes that the DCR had previously established a schedule for completion of the overdue FERRET items and aggressively resolved all items ahead of that schedule.</p> <p>While the DCR did informally prioritize efforts to address overdue FERRET items (e.g., placing greater emphasis initially on inspection-related FERRET items), it did not develop and report on a formalized prioritization mechanism.</p> <p>It is noted that the CO did not establish specific deadlines for the completion of individual Tier II applicable requirements but, rather, stipulated that they be completed “in a time frame consistent with and supportive of the Tier I applicable requirements and the Tier II Work.” ABS Consulting <u>does not</u> find the basis for an assertion that the absence of a formalized prioritization mechanism had a deleterious impact on the timely resolution of the overdue FERRET items.</p>	<p>In its fourth Tier II progress report (issued January 10, 2007), the DCR asserts that this requirement “is no longer applicable as there are currently no overdue FERRET items.” ABS Consulting concurs.</p>
<p>b. Provide required completion dates for unscheduled FERRET PEI inspection recommendations.</p>	<p>The first Tier II audit report (issued March 14, 2005) identified three FERRET items that did not have assigned due dates. In addition, a significant number of inspection reports were noted for which multiple recommendations had been incorporated into a single FERRET item, creating the potential for mismatched due dates within a single FERRET item. For example, for one FERRET item containing two recommendations, the first recommendation had been implemented and the FERRET item was closed out. However, the second recommendation remained open, resulting in a temporary repair remaining in place beyond its authorized duration.</p> <p>Because of these anomalies, ABS Consulting was unable to concur with the DCR’s assertion that the applicable requirements for this item had been satisfied at that time. The DCR subsequently implemented (1) the practice of more frequent auditing of the FERRET database and (2) the policy that multiple tasks could be included in the same FERRET item only if the same individual was responsible for follow-up and it was appropriate to assign a single due date to all tasks.</p> <p>The second Tier II audit report (issued March 3, 2006) confirmed that the specific issues documented in the first Tier II audit report had been resolved.</p> <p>During the second audit, eight FERRET items were identified where the due date had been modified from the date documented in the original inspection report recommendations. The basis for these deferrals was investigated, and it was confirmed that Fixed Equipment</p>	<p>In the first Tier II audit report (issued March 14, 2005), ABS Consulting concluded that the Tier II applicable requirements for this action item had not been satisfied at that time.</p> <p>The second Tier II audit report (issued March 3, 2006) concluded that the Tier II applicable requirements for this item (i.e., providing completion dates for previously unscheduled FERRET inspection-related recommendations) had been satisfied.</p> <p>The observations during the final Tier II audit indicate that the implementation of the FERRET database at the DCR continues in a fashion that satisfies the intent</p>

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Table 1 Mechanical Integrity Consent Order Audit Results (cont'd)

Consent Order Tier II Applicable Requirements	Observations/Basis for Audit Conclusions	Audit Conclusions
	<p>Department (FED) inspectors had been provided a role in the decisions to change the due dates. The deferral decisions included evaluation of any potential MI considerations.</p> <p>During subsequent Tier I and Tier II audits, including this final Tier II audit, ABS Consulting spot checked the FERRET database (e.g., by selecting a sampling of inspection reports and confirming the appropriate entry of the recommendations into FERRET or by searching for FERRET items with revised due dates and confirming the technical basis for the changes). Such inquiries have found no systemic issues with the implementation of the FERRET database.</p> <p>During this final Tier II audit, ABS Consulting learned that the DCR was considering changes in the implementation of the FERRET system. One such change, for example, was for the Operations department to screen FED IR recommendations to discriminate between recommendations having a direct bearing on MI (such recommendations <u>would</u> be entered into FERRET) and other recommendations that were perceived to be related to operational or non-MI maintenance issues (such recommendations <u>would not</u> be entered into FERRET).</p> <p>ABS Consulting continues to believe that the FERRET database has been a pivotal factor in the success of a number of MI-related initiatives at the DCR and that FERRET, or a similarly configured and implemented action tracking database, is essential to ensuring the continued success of these initiatives. For this reason, ABS Consulting urges the DCR to approach with caution any substantive changes to the FERRET system, such as the one described above.</p>	<p>underlying this action item.</p>
<p>c. Implement specific goals, by department, to address the FERRET overdue items in a timely manner.</p>	<p>The second Tier II audit report (issued March 3, 2006) noted that goals (deadlines) had been established for each department and that all but three departments had already met or exceeded their goals (i.e., resolved all overdue FERRET items earlier than required by their deadline). Of the remaining three departments, two departments had a March 31, 2007, deadline, and one department had a July 1, 2007, deadline to work off all overdue items. Interviews indicated that once a department had reduced its backlog of overdue FERRET items to zero, DCR management was reinforcing its expectations that there would be no new delinquent items.</p> <p>During this final Tier II audit, ABS Consulting was informed that the DCR had worked off the last of the overdue FERRET items for all departments ahead of schedule, completing this effort on October 30, 2006.</p>	<p>In the second Tier II audit report (issued March 3, 2006), ABS Consulting concluded that the Tier II applicable requirements for this item had been satisfied (i.e., goals had been established for each department). However DNREC, based upon concerns that some of the goals/deadlines extended beyond the scheduled completion date for the CO, did not concur with the closure of this item.</p> <p>In its fourth Tier II progress report (dated January 10, 2007), the DCR</p>

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Table 1 Mechanical Integrity Consent Order Audit Results (cont'd)

Consent Order Tier II Applicable Requirements	Observations/Basis for Audit Conclusions	Audit Conclusions
		<p>asserted that this applicable requirement “is no longer applicable as there are currently no over due FERRET items.”</p> <p>It is ABS Consulting’s opinion that the underlying intent of this applicable requirement has been satisfied, based upon the observations that the original backlog of overdue FERRET items has been worked off and that concerted emphasis to avoid any new FERRET delinquencies continues to be maintained at the DCR.</p>
<p>d. If risk-based decision making is used in prioritizing the execution of the FERRET overdue items, ensure that the individuals or teams making the decisions are properly trained in the methodology. Provide sufficient oversight to ensure that comparable risks prompt comparable decisions.</p>	<p>While the DCR did informally attempt to address higher risk FERRET items on a higher priority (e.g., placing greater emphasis initially on inspection-related FERRET items), it did not develop and report on a formalized risk-based decision-making mechanism.</p> <p>It is noted that the CO did not require the use of risk-based decision making; only that appropriate training be given if risk-based decision making was used. ABS Consulting <u>does not</u> find the basis for an assertion that the absence of a formalized risk-based decision-making mechanism had a deleterious impact on the timely resolution of the overdue FERRET items.</p>	<p>In its fourth Tier II progress report (dated January 10, 2007), the DCR asserted that this applicable requirement “is no longer applicable as there are currently no over due FERRET items.” ABS Consulting concurs with this statement.</p>
<p>50. Managing and Implementing Process Safety Initiatives ("PSIs")</p>		
<p>a. Develop a procedure to ensure that the results of the layer of protection analysis ("LOPA") are reflected in other work processes, including the reliability-centered maintenance tasks and the protective instrumentation initiative procedures.</p>	<p>During the second Tier II audit (report issued March 3, 2006), ABS Consulting found that DCR’s standing instruction 2.9.19, <i>Management of Safety Instrumented Systems</i>, integrated the conduct of the layer of protection analysis (LOPA) into the process hazard analyses (PHAs). Section 7 of this standing instruction addresses the conduct of hazard and operability (HAZOP)/LOPA analyses and describes how the PHA results (identifying required safety instrumented system [SIS] needs) are communicated to the SIS representative for implementation.</p> <p>An interview with the SIS representative confirmed his role in the (1) detailed design of the SIS program to meet performance requirements, (2) creation of maintenance and test procedures (including the specification of testing intervals), and (3) support of the SIS testing effort.</p>	<p>As noted in the second Tier II audit report (issued March 3, 2006), ABS Consulting concluded that the Tier II applicable requirements for this action had been satisfied.</p> <p>The observations during this final Tier II audit indicate that the DCR continues to follow standing instruction 2.9.19, satisfying the intent underlying this action item.</p>

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Table 1 Mechanical Integrity Consent Order Audit Results (cont'd)

Consent Order Tier II Applicable Requirements	Observations/Basis for Audit Conclusions	Audit Conclusions
	<p>During this final Tier II audit, ABS Consulting discussed the status of the LOPA program with the current SIS representative and refinery's PSM coordinator. These individuals indicated that LOPA studies are being performed during the PHA revalidations and that several recent PHA revalidations (e.g., six to eight revalidations) have included LOPA studies. Also, these individuals indicated that LOPA studies for the remaining refinery units are scheduled to be completed in 2008.</p> <p>In addition, DCR personnel interviewed mentioned that Valero is currently working on a corporate standard for performing LOPA studies (i.e., draft corporate document titled, <i>IPL Analysis Procedure</i>). This corporate-level standard provides additional details on performing LOPA studies, including responsibilities for performing the LOPA studies and managing the study results (i.e., ensuring that the findings of the LOPA studies are incorporated into the maintenance and test programs).</p>	
<p>b. Develop a procedure by which the DCR's PSI Steering Committee reviews and revises, where necessary, the implementation schedule for the PSIs, and oversees compliance with the schedule.</p>	<p>The second Tier II audit report (issued March 3, 2006) noted that the PSI initiatives described in the original MI audit report (issued in March 2003) had undergone some modifications with the ownership changes at the DCR, but still addressed the core objectives described in the original MI audit report. The revised initiatives were subsequently referred to as the PSM/RMP initiatives. Initiative 'owners' report progress and status to the PSM/RMP Steering Committee monthly and are accountable to this committee for conformance to implementation schedules.</p> <p>During this final Tier II audit, interviews and the review of last year's minutes of the monthly PSM/RMP Steering Committee meetings indicated the continued active involvement of refinery management in the oversight of the implementation of the PSM/RMP initiatives.</p>	<p>As noted in the second Tier II audit report (issued March 3, 2006), ABS Consulting concluded that the Tier II applicable requirements for this action had been satisfied.</p> <p>The observations during the final Tier II audit indicate that the PSM/RMP Steering Committee continues to monitor and steward the PSM/RMP initiatives, satisfying the intent underlying this action item.</p>
<p>51. Inspection, Maintenance and Turnaround Activities</p>		
<p>a. In connection with its review of the maintenance backlog, Motiva shall rank, according to risk, all outstanding maintenance work orders and shall establish standards of measurement for each "OEMI Team" to track the performance of the outstanding maintenance tasks. The standards shall, at a minimum, provide a means of measuring maintenance backlog and</p>	<p>The outstanding maintenance work orders have been risk ranked in accordance with the requirements of the routine maintenance process (RMP), and such ranking is incorporated in the planning process for all new work orders (see 51.d).</p> <p>During this final Tier II audit, significant attention was given to the review of maintenance backlog statistics. ABS Consulting believed that this was particularly appropriate considering the conversion from the Maximo computerized maintenance management system to SAP, which occurred in mid-2006.</p> <p>The DCR has established two related criteria for monitoring the size of the maintenance backlog: (1) at least 80% of the work requests in the system for each area should have</p>	<p>Based on the results of this final Tier II audit, it is ABS Consulting's opinion that the DCR is compliant with the Tier II applicable requirements for this action item.</p>

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Table 1 Mechanical Integrity Consent Order Audit Results (cont'd)

Consent Order Tier II Applicable Requirements	Observations/Basis for Audit Conclusions	Audit Conclusions
<p>monitoring the effectiveness of the work prioritization process.</p>	<p>been through the maintenance planning process and (2) the cumulative backlog of planned work refinerywide should not exceed 20 weeks. The criteria are related in that unplanned work cannot be reflected in the cumulative backlog statistics.</p> <p>Data provided by the DCR through the end of February 2007 show that the refinery is approaching the percent planned goal. While data for the refinery as a whole were slightly above 80% planned, two of seven process areas were 60 to 70% planned and two other areas were just under 80%. For that same month, the total backlog for all crafts was 21.1 weeks, just over the goal of 20 weeks.</p> <p>It is noted that there is considerable variability in the data, particularly the cumulative backlog, from month to month. For example, the backlog was as low as 16.4 weeks in December. Considering that the refinery is still exercising a relatively new system, ABS Consulting believes that the DCR has made good progress toward achieving its new goals (which had been finalized in the fourth quarter of 2006).</p> <p>As noted above, work orders are risk ranked, and are prioritized for completion according to the risk ranking. As long as the risk prioritization is followed, the age of a particular work order is a secondary consideration (i.e., older work orders should be lower priority work). This fact notwithstanding, ABS Consulting paid special attention to one particular group of work orders – the legacy work orders carried over from Maximo to SAP. These are unique since, because of SAP system constraints, the original Maximo initiation dates for these work orders could not be carried over into SAP. In other words, there is no convenient way to track the true age of these work orders.</p> <p>Approximately 3,750 legacy Maximo work orders were carried over into SAP. These work orders have been risk ranked and are being worked according to their priorities. As of the end of January 2007, only about 440 of these older work orders remained open. For comparison, approximately 3,000 work orders are typically open in SAP at any time. ABS Consulting believes that the DCR has made good progress in working off these legacy work orders in the 7 months since the startup of the SAP system.</p>	

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Table 1 Mechanical Integrity Consent Order Audit Results (cont'd)

Consent Order Tier II Applicable Requirements	Observations/Basis for Audit Conclusions	Audit Conclusions
<p>b. Revise the DCR's turnaround planning guidelines to require documentation of the justification for all turnaround deferrals greater than ninety (90) days.</p>	<p>During the second Tier II audit (report issued March 3, 2006), ABS Consulting reviewed DCR's newly developed turnaround (TA) deferral procedure FED-3G, <i>Deferment of Scheduled Turnarounds</i>. This procedure, formally issued on April 15, 2005, was developed in conjunction with the decision-making process for deferring the spring 2005 TAs for the CCR, reformer area, tetra/feed prep, and desulfurizer train 1 units. This procedure provided guidelines for the (1) initiation of the deferral request, (2) analysis of technical information to determine if the deferral was technically appropriate, and (3) approval of the deferral.</p> <p>In addition, during the second Tier II audit, DCR and ABS Consulting personnel discussed the procedure in detail and identified some possible procedure improvements that would more accurately reflect the TA decision-making process that had been demonstrated by the DCR. For example, in the spring 2005 TA review, the DCR had considered the following additional technical information that was not explicitly identified in the procedure:</p> <ul style="list-style-type: none"> • Testing schedule for pressure safety valves (PSVs) • Testing schedule for safety-critical instruments, including SISs • Maintenance needs for critical rotating equipment • Potential environmental compliance issues (e.g., permit-required inspections or tests) • Deadlines for removal of temporary repairs • Repairs that were to be completed during the originally scheduled turnaround • Recommendations with completion/implementation dates associated with the originally scheduled turnaround date (e.g., FERRET items with turnaround due dates) <p>ABS Consulting suggested that the DCR revise the turnaround deferral procedure to include (1) a more comprehensive listing of technical information required to be used during the deferral analysis and (2) a requirement that a record of the technical information analyzed be included as part of the deferral process records.</p> <p>Considering the strength of the demonstrated practice, and <u>in the belief that the DCR had concurred with the proposed further enhancements of the deferral procedure</u> to match the practice, ABS Consulting concluded that the DCR was in compliance with this Tier II requirement at that time.</p> <p>During this final Tier II audit, ABS Consulting determined that the standing instruction had been updated on March 15, 2006, to specify the departments required to be represented in the <u>initial</u> TA deferral review meeting and to establish that the TA Planning Department representative would facilitate the meeting and document its results. However, other potential upgrades discussed with DCR personnel during the second Tier II audit had not been incorporated into the turnaround deferral procedure. ABS Consulting now</p>	<p>As noted in the second Tier II audit report (issued March 3, 2006), ABS Consulting concluded that the Tier II applicable requirements for this requirement had been satisfied at that time.</p> <p>Based on the results of this final Tier II audit, it is ABS Consulting's opinion that the DCR has complied with the Tier II applicable requirements for this action item.</p> <p>However, the current procedure leaves significant opportunities for better controlling the risk associated with TA deferrals. ABS Consulting recommends that the DCR consider the recommendations in this report and that further independent review of the implementation of the TA deferral review process follow once these improvements have been made.</p>

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Table 1 Mechanical Integrity Consent Order Audit Results (cont'd)

Consent Order Tier II Applicable Requirements	Observations/Basis for Audit Conclusions	Audit Conclusions
	<p>understands, based upon recent discussions with DCR staff, that the March 15, 2006, revisions to the procedure were specifically made in lieu of the modifications discussed by ABS Consulting and DCR staff during the second Tier II audit – as the DCR’s attempt to satisfy the intent underlying the prior joint discussions.</p> <p>As part of the final Tier II audit, ABS Consulting confirmed that the DCR was still using FED-3G, reviewed three completed TA deferral forms, and examined overlaps between the TA deferral process and the administration of (1) the temporary repair (TR) procedure, (2) the pressure vessel internal inspection program, and (3) the SIS testing program.</p> <p>ABS Consulting found that the available documentation indicated that the three TA deferrals reviewed were likely conducted consistent with the DCR’s interpretation of the requirements of the March 15, 2006, revision of the standing instruction. However, existing documentation and discussions with DCR staff leave unclear whether the <u>practice</u> followed in conducting the TA deferral reviews was consistent with the seemingly sound practice described by the DCR during the second Tier II audit. Consequently, ABS Consulting believes that significant opportunity remains for improving the review process to ensure that the MI risks associated with deferring turnarounds are identified, evaluated, and understood by DCR management. ABS Consulting repeats below its suggestions from the second Tier II audit report and cites examples of why we continue to assert the need for these changes:</p> <ol style="list-style-type: none"> 1. <u>Provide a more comprehensive listing of technical information required to be used during the deferral analysis.</u> All three of the deferral forms reviewed were executed using the March 15, 2006, revision of the form. While this version of the form required representation by the Instrumentation group at the initial deferral review meeting, TAs for units 21 and 32 were deferred even though none of the SISs in these units had yet been tested. Consistent with the fixed equipment focus of FED-3G, none of the three approved deferral forms made any reference to SIS testing schedules, and records provided by the TA planner for units 21 and 32 made no reference to consideration of SIS testing. (As discussed in item 44.b in the accompanying Tier I audit report, ABS Consulting concluded that the DCR is noncompliant with the requirements in 44.b, due in part to its failure to properly defer these, and other, SIS tests when appropriate.) While there is a separate SIS test deferral form, ABS Consulting believes that it would be appropriate for those evaluating the risks associated with the overall TA deferral decision to be aware of the impact of the deferral on the SIS testing schedule. 2. <u>Require that a record of the technical information analyzed be included as part of the deferral process records.</u> Section 3 of the TA deferral approval form requires: “List all 	

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Table 1 Mechanical Integrity Consent Order Audit Results (cont'd)

Consent Order Tier II Applicable Requirements	Observations/Basis for Audit Conclusions	Audit Conclusions
	<p>equipment required to have an extension to the inspection interval or adverse operational concern which would compromise reaching the new targeted date.” Based upon the DCR’s comments made on the draft of this report (April 23, 2007, letter from Pat Covert to Walt Frank), and based upon recent conversations with DCR staff, we understand that it is the DCR’s position that the lists of equipment provided on the three subject TA deferral forms represented all the equipment that fell under the requirement cited above – even though some other equipment items had their inspection or repair due dates changed to reflect the new TA schedules.</p> <p>This assertion by the DCR is based, in part, upon the DCR’s contention that changing the due date of an inspection or a repair (to reflect the TA deferral) is not an “extension to the inspection interval” or an “adverse operational concern” if (1) the due date was originally set arbitrarily to coincide with the scheduled start of a TA and (2) the new due date is still within an allowable time interval that can be justified based upon a relevant industry standard (such as API 570). Consider the hypothetical example of a piping segment with a wall that has been thinned by corrosion. Based upon measured corrosion rates, this particular piece of pipe must be replaced within 4 years (before the piping corrodes to its minimum safe thickness). The pipe is currently scheduled to be replaced in 2 years, at the next scheduled TA. However, if the TA is deferred by 1 year, causing the replacement to be similarly delayed, the DCR would not regard the change in the due date for the piping replacement to be a deferral – since the actual “deadline” for replacing the pipe is 4 years. Nevertheless, the refinery has accepted the incremental risk of operating 1 year longer with a thinning pipe that is approaching the end of its safe service life. A similar rationale was discussed in item 40.b in the accompanying Tier I audit report with respect to the administration of pressure vessel inspection schedules.</p> <p>Also, even though FERRET records indicated approximately 60 inspection-related FERRET recommendations for units 29.1, 32, and 42 and approximately 16 inspection-related FERRET recommendations for unit 21 that had changes made in due dates in conjunction with the TA deferrals, no mention of these were made on the TA deferral approval forms. In the April 23, 2007, comment letter, the DCR notes that the “DCR has a recent proven record of tracking and working FERRETs per their due dates. It was not envisioned by the TA deferral procedure to include FERRETs.” In conversations, the DCR has also asserted that some of the original FERRET due dates had been arbitrarily set to coincide with the originally anticipated TA dates and that, similar to the logic above, later due dates were technically justifiable. In the DCR’s perspective, the changes were not deferrals – just changes in the due dates.</p> <p>ABS Consulting recognizes that the DCR often conducts considerable analysis when confirming a suitable technical basis for such due date changes – which the DCR does not</p>	

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Table 1 Mechanical Integrity Consent Order Audit Results (cont'd)

Consent Order Tier II Applicable Requirements	Observations/Basis for Audit Conclusions	Audit Conclusions
	<p>view to be deferrals. However, we regard any postponed inspection or repair to entail some incremental MI risk, however slight. Each technical analysis has some potential for being based upon inaccurate data or for yielding an erroneous conclusion. ABS Consulting believes that it would be appropriate for those evaluating the risks associated with the overall TA deferral decision to be aware of the number and potential significance of the delayed inspections and repairs.</p> <p>ABS Consulting asserts that the principle intention of the TA deferral review process, as generally practiced within industry, is to provide decision makers with the information and perspective necessary to make a judgment about the cumulative risks associated with the inspections and repairs that would be delayed by the requested TA deferral. Presumably, for the deferral review process to be relevant, there must be some level of risk that should warrant denial of the deferral request. It is not clear to ABS Consulting that the current process adequately provides this perspective. As the deferral procedure is currently being implemented, the approvers of the TA deferral may not have before them a comprehensive list of inspections and repairs that would be delayed. It was noted that one of the leadership team members who ultimately authorizes deferrals stated that he had been working under the presumption that he was being presented just such a comprehensive list.</p> <p>While ABS Consulting concedes that the current version of FED-3G does not require consideration of SIS testing schedules, ABS Consulting and DCR staff, in discussing the prototype TA deferral review (i.e., the spring 2005 TA review) concurred that consideration of the impact on SIS testing was part of a sound TA review practice. The fact that the SIS standing instruction provides an independent mechanism for deferring SIS tests does not, in itself, add to the risk perspective provided to the decision maker who is considering the prudence of a particular TA deferral – if that decision maker is unaware of the deferred tests.</p> <p>Similarly, ABS Consulting understands the DCR’s confidence in the FERRET system. However, ABS Consulting and DCR staff, in discussing the spring 2005 TA review concurred that consideration of the FERRET recommendations that would be impacted was part of a sound TA review practice. Being potentially unaware of 60 delayed FERRETs does not add to the risk perspective provided to the decision maker who is considering the prudence of a particular TA deferral.</p> <p>In summary, during the second Tier II audit, DCR staff described a TA deferral review process that ABS Consulting and the DCR staff jointly concluded was ostensibly robust and effective. These discussions identified the need to modify the TA deferral review procedure to better reflect the review process that had been prototyped. Based upon our</p>	

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Table 1 Mechanical Integrity Consent Order Audit Results (cont'd)

Consent Order Tier II Applicable Requirements	Observations/Basis for Audit Conclusions	Audit Conclusions
	<p>understanding of the nature of the intended procedure revisions, we deemed the DCR to be compliant with the applicable Tier II requirements at that time.</p> <p>The DCR subsequently, and in good faith, made revisions to the procedure, believing that those revisions satisfied the intent agreed to during the second Tier II audit. ABS Consulting observes that the DCR has continued to devote considerable effort to implementing and improving the TA deferral review process, and ABS Consulting does not find a basis for concluding that the DCR is out of compliance with the applicable requirements of this action item. However, the procedure, as it is currently written and as it is being interpreted, is not fully consistent with the spring 2005 TA review protocol and, ABS Consulting believes, offers significant opportunities for better control of the risk associated with TA deferrals.</p> <p>ABS Consulting strongly urges the DCR to expand the focus of the review process and procedure to include at least those considerations addressed in the review process that DCR staff and ABS Consulting jointly endorsed during the second Tier II audit. ABS Consulting also suggests the need for further independent review of the implementation of the TA deferral review process once these improvements have been made.</p>	
<p>c. Review and, where required, revise or establish machinery and/or equipment repair procedures to reflect improvements in the work process.</p>	<p>During the first Tier II audit (report issued March 14, 2005), ABS Consulting reviewed the machinery and equipment repair procedures that the DCR had identified to satisfy this requirement. During this review, ABS Consulting found that the DCR personnel had focused their review efforts on rotating equipment and, more specifically, on pumps. DCR explained that its rationale for limiting the procedure reviews to rotating equipment was based on the wording of the mechanical integrity application paragraph of the OSHA PSM regulation 29 CFR 1910.119(j)(1), in which the only machinery item explicitly defined is pumps.</p> <p>Based on this perception, the DCR reviewed the procedures that were currently in place to help ensure proper repair of rotating equipment. A DCR review team, which included a Maintenance Superintendent, a Technical Support Engineer, and a Reliability Engineer, completed this review. This review team identified six procedures related to rotating equipment. Also in response to this review, the DCR developed and implemented seven new rotating equipment procedures, as repair cards, as well as a general procedure covering major overhaul of process compressors.</p> <p>At the time of the first Tier II audit, the DCR had made significant progress in developing and establishing repair procedures for rotating equipment; however, the DCR had not reviewed existing repair procedures for other types of equipment (e.g., instruments, heaters) and machinery (e.g., blowers, agitators) whose failure could impact process safety. Therefore, ABS Consulting concluded that the DCR had not performed the reviews needed</p>	<p>As noted in the first Tier II audit report (issued March 14, 2005), ABS Consulting concluded that the Tier II applicable requirements for this requirement had not been satisfied at that time.</p> <p>As noted in the interim Tier II audit report (issued November 28, 2006), it was ABS Consulting's opinion that the DCR had complied with the Tier II applicable requirements for this action.</p> <p>Based upon the observations during this final Tier II audit, it is ABS Consulting's opinion that the DCR has complied with the Tier II applicable requirements for this</p>

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Table 1 Mechanical Integrity Consent Order Audit Results (cont'd)

Consent Order Tier II Applicable Requirements	Observations/Basis for Audit Conclusions	Audit Conclusions
	<p>to determine if existing machinery and equipment repair procedures needed to be revised or if new or additional repair procedures were needed. In addition, ABS Consulting suggested the need for the DCR to broaden the scope of its equipment and machinery repair procedure program to encompass all equipment whose failure could impact process safety.</p> <p>During the interim Tier II audit (report issued November 28, 2006), ABS Consulting learned that the DCR had established a committee in February 2006 to manage this procedure development effort. This committee also developed and implemented an overall procedure that provides maintenance department personnel with guidelines for determining whether a written procedure is needed for a maintenance activity.</p> <p>In addition, DCR personnel stated that each maintenance department systematically reviewed its current procedures related to repair and maintenance of machinery and equipment. To verify that these reviews were completed, ABS Consulting met with three different maintenance departments to discuss the review process and its results. ABS Consulting found that the three different maintenance departments had completed their reviews and compiled or developed machinery and equipment repair procedures. ABS Consulting personnel also interviewed craftsmen to ensure that they were aware of, and have access to, these written procedures, and that they agreed that the written procedures currently available were sufficient. All the craftsmen interviewed were aware of the written procedures, knew how to access the written procedures, and believed that the written procedures were sufficient.</p> <p>During this final Tier II audit, ABS Consulting met with DCR maintenance personnel from the rotating equipment and instrumentation departments to determine what changes (if any) to machinery and equipment repair procedures had been made since the interim Tier II audit. ABS Consulting found that the instrument group had not added or modified any of the previously identified repair procedures. During the review of rotating equipment maintenance procedures, ABS Consulting found that several new procedures had been developed and implemented at the request of department personnel.</p>	<p>action.</p>

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Table 1 Mechanical Integrity Consent Order Audit Results (cont'd)

Consent Order Tier II Applicable Requirements	Observations/Basis for Audit Conclusions	Audit Conclusions
<p>d. Motiva shall develop and implement a training program to orientate affected personnel to the Reliability and Maintenance Process ("RAMP") System and the associated functions and responsibilities of each affected position under the RAMP system.</p>	<p>During the second Tier II audit (report issued March 3, 2006), ABS Consulting learned that the RAMP system had been renamed the Routine Maintenance Process (RMP). However, RMP still contained the same basic maintenance practices described in the original RAMP system (i.e., it consisted of 13 discreet steps that provided an overall maintenance practice for routine maintenance work).</p> <p>During the second Tier II audit, ABS Consulting found that training on the RMP process consisted mainly of (1) involving current DCR employees who would use RMP in the development of RMP, (2) implementing a MAXIMO/SAP help desk intended to assist maintenance personnel in implementing RMP and to train new maintenance and operations employees on RMP, and (3) developing training guides for the four job positions that are the primary RMP users.</p> <p>To verify the effectiveness of the above-mentioned training activities, ABS Consulting interviewed eight maintenance department employees (including two newer employees who were not involved in the RMP development meetings) regarding the RMP training they had received. All employees interviewed indicated that the training on the RMP steps related to performing maintenance work was adequate (i.e., RMP steps 1 through 10). However, interviews with maintenance department personnel indicated that the training on step 11 – Complete Work, Step 12 – Measure, Evaluate, and Improve Work, and Step 13 – Close Work had not been completed and/or was not adequately covered. In addition, the training schedule provided by the DCR indicated that training on these steps had not been completed.</p> <p>During the interim Tier II audit (report issued November 28, 2006), ABS Consulting found that the refinery's computerized maintenance management system (CMMS) had switched from Maximo to SAP. This switchover began in the spring of 2006 and resulted in extensive training on SAP and a review of RMP. As part of this training, DCR developed and implemented new and additional training materials and work process documents. These new training materials and work process documents included core SAP training documents and "swim lane" documents that provided RMP flowcharts for different types of maintenance work covered by RMP (e.g., emergency – priority 1 work, urgent – priority 2 work, routine – priority 3 work, and preventive maintenance work). These swim lane documents graphically depict the RMP steps and the RMP responsibilities for these different types of maintenance work.</p> <p>In addition, the RMP document (except for the measure, evaluate, and improve work step) was finalized by the RMP committee and approved by the DCR management. DCR employees who have responsibilities for, or interface with, RMP were provided 1-hour orientation training on the RMP document. This training included a review of the RMP</p>	<p>As noted in the second Tier II audit report (issued March 3, 2006), ABS Consulting concluded that the DCR had not, at that time, fully complied with the Tier II applicable requirements for this action.</p> <p>As noted in the interim Tier II audit report (issued November 28, 2006), it was ABS Consulting's opinion that the DCR had complied with the Tier II applicable requirements for this action.</p> <p>Based upon the observations during this final Tier II audit, it is ABS Consulting's opinion that the DCR has complied with the Tier II applicable requirements for this action.</p>

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Table 1 Mechanical Integrity Consent Order Audit Results (cont'd)

Consent Order Tier II Applicable Requirements	Observations/Basis for Audit Conclusions	Audit Conclusions
	<p>model, an overview of each RMP step, and a review of the routine – priority 3 work process. This training also included training on RMP steps 11 and 13.</p> <p>To verify the completion of the RMP and SAP training, ABS Consulting reviewed training records and found that the DCR had provided the RMP orientation training to more than 60 DCR personnel and appropriate personnel from DCR’s maintenance contractors. ABS Consulting personnel also interviewed DCR personnel in different job functions regarding their understanding of RMP and their RMP responsibilities. Based on these interviews, DCR personnel at all levels of the organization appeared to clearly understand RMP and their RMP responsibilities.</p> <p>Finally, ABS Consulting found that the DCR was working on the measure, evaluate, and improve work step of RMP, but this step had not been completed primarily because of the switchover of the CMMS from Maximo to SAP. This switchover caused the DCR to reevaluate the planned maintenance performance metrics because SAP maintains and reports maintenance data differently from Maximo. In addition, the switchover to SAP required that open work orders in Maximo be entered into SAP. This resulted in assigning new origination dates for any open work orders (i.e., the legacy work orders now carry the date they were entered into SAP as their origination date); therefore, the date that work orders were actually generated was not maintained. This change in origination dates skews some of the maintenance performance metrics (e.g., average days to complete routine – priority 3 work orders). While this RMP step is important, it was not essential for ensuring proper management of maintenance work; therefore, ABS concluded that the DCR had satisfied the underlying intent for this action item.</p> <p>During this final Tier II audit, ABS Consulting again reviewed the implementation of the RMP process, including training of personnel. This review identified four new employees whose RMP training status was reviewed. ABS Consulting found that the two new directors, who were assigned to their positions just before the interim Tier II audit, had received one-on-one training on RMP. The other two new employees who were assigned to their positions several weeks prior to the final Tier II audit had not yet received RMP training. (Note: It is ABS Consulting’s opinion that the fact that these two individuals had not yet received RMP training is <u>not</u> indicative of untimely response.)</p> <p>Finally, ABS Consulting inquired about training on the recently implemented RMP step – Measure, Evaluate, and Improve Process (MEI). DCR personnel stated that this step was rolled out to maintenance planners and maintenance team leaders in September and October 2006. (Note: The first measurements were compiled in November 2006.) These individuals were notified via e-mail, which appeared to be an appropriate training method for this change in RMP</p>	

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Table 1 Mechanical Integrity Consent Order Audit Results (cont'd)

Consent Order Tier II Applicable Requirements	Observations/Basis for Audit Conclusions	Audit Conclusions
<p>e. Motiva shall continue to perform existing vibration analysis monitoring and associated activities until the reliability-centered maintenance program is implemented</p>	<p>During the second Tier II audit (report issued March 3, 2006), ABS Consulting found that the DCR had completed the reliability-centered maintenance (RCM) analyses for all 13 refinery units, and the RCM analyses results had been implemented in 10 of the 13 units. The RCM analyses results implemented typically consisted of two vibration analysis activities: (1) weekly basic vibration readings (e.g., velocity, acceleration) of all rotating equipment via the IntelaTrac[®] system and (2) monthly full-spectrum vibration analyses of critical rotating equipment using the SKF vibration analyzer.</p> <p>During the second Tier II audit, the DCR indicated that the RCM analysis results for rotating equipment were not yet implemented in two nonhydrocarbon processing units (i.e., the wastewater treatment plant and the utilities area) and in the blenders. Therefore, this Tier II action item required that the DCR continue the legacy monthly vibration analysis program in these areas until the RCM results had been implemented. Based on record reviews, ABS Consulting found that the monthly vibration analysis had not been consistently performed in these three units.</p> <p>During the subsequent interim Tier II audit report (report issued November 28, 2006), ABS Consulting reviewed the implementation of the IntelaTrac[®] program and the monthly vibration analysis for the three areas in which the implementation of the RCM analysis results had been identified as deficient during the second Tier II audit. This review found that the (1) weekly vibration readings via the IntelaTrac[®] program had been implemented for the rotating equipment in the wastewater treatment plant, utilities area, and blenders and (2) monthly vibration analyses for rotating equipment in these three areas were being performed by the rotating equipment department.</p> <p>During this final Tier II audit, ABS Consulting reviewed the implementation of the IntelaTrac program and the vibration analysis program by the rotating equipment department. The review of the IntelaTrac program revealed that the weekly vibration analyses, in general, are being performed as required. In fact, the performance of the IntelaTrac program has been so good that the DCR has recently tightened the program's monitoring metrics. To verify implementation of the IntelaTrac vibration readings, ABS Consulting randomly selected rotating equipment from various units for review. This review found that the weekly vibration analyses were being consistently performed for operating equipment.</p> <p>ABS Consulting also reviewed the implementation of the vibration analysis program that is managed by the rotating equipment department. This review sought verification of the implementation of the vibration analysis in the three units previously found to be deficient and in six randomly selected units (i.e., crude, cat cracker, alky/poly, desulfurizing, SHU,</p>	<p>As noted in the second Tier II audit report (issued March 3, 2006), ABS Consulting concluded that the DCR had not complied with the Tier II applicable requirements for this action at that time.</p> <p>As noted in the interim Tier II audit report (issued November 28, 2006), it was ABS Consulting's opinion that the DCR had complied with the Tier II applicable requirements for this action at that time.</p> <p>Based upon the observations during this final Tier II audit, and considering the DCR's corrective actions in January and February, it is ABS Consulting's opinion that the DCR is currently compliant with the Tier II applicable requirements for this action. However, ABS Consulting recommends that the sustainability of the current practices be monitored for an appropriate period.</p>

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Table 1 Mechanical Integrity Consent Order Audit Results (cont'd)

Consent Order Tier II Applicable Requirements	Observations/Basis for Audit Conclusions	Audit Conclusions
	<p>and CCR units). A review of the three units previously found to be deficient revealed that the program had been appropriately implemented. However, the review of the vibration analysis program for the six randomly selected units found that vibration analysis on several rotating equipment items was not being consistently performed.</p> <p>In follow-up, ABS Consulting and the DCR rotating equipment department personnel met to confirm this finding and discuss its cause(s). During this discussion, it was found that some vibration routes had not yet been developed and implemented for the ether, alky/poly, CCR, coker, and blender units. In addition, DCR personnel stated that the performance of vibration analyses during the fall of 2006 was hindered by the (1) improper management of the vibration technician vacation time (i.e., both vibration technicians were out on vacation for numerous weeks during the fall) and (2) involvement of the vibration technicians in the startup of the new coker scrubber rotating equipment. Based on these observations, the DCR was not in compliance with the requirements for this action when the onsite portion of the final Tier II audit was completed.</p> <p>In response to this observation, the DCR rotating equipment department developed and implemented a corrective action plan. This corrective action plan included completing the development of any missing vibration analysis routes and implementing a new vibration route scheduling and tracking system. Since the completion of the onsite portion of the final Tier II audit, the DCR has provided ABS Consulting with vibration analysis data for the entire refinery for January and February 2007. ABS Consulting's review of these data found that vibration analyses are now being consistently performed on operating rotating equipment for all units. Based on the urgency with which corrective actions were developed and implemented and the apparent completeness of the vibration analyses during the first two months of 2007, ABS Consulting now believes that the DCR has complied with the requirements of this action. However, continued monitoring of the implementation of this program may be warranted to confirm the sustainability of its implementation.</p>	

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Table 1 Mechanical Integrity Consent Order Audit Results (cont'd)

Consent Order Tier II Applicable Requirements	Observations/Basis for Audit Conclusions	Audit Conclusions
52. Process Hazards Analysis ("PHA")/Process Safety Management ("PSM") Work Process		
a. Develop a protocol for prioritizing the outstanding PHA recommendations. Continue to implement existing procedures for resolving open PHA recommendations.	<p>During the first Tier II audit (report issued March 14, 2005), ABS Consulting observed that the DCR had developed and implemented the <i>PHA Recommendation Resolution Protocol</i>, dated July 16, 2003.</p> <p>Multidisciplinary teams had been formed for each operating unit, incorporating members from the process engineering, instrumentation, reliability, operations, and controls groups. These teams met periodically (approximately monthly) to review the status of open PHA recommendations.</p> <p>The DCR continued to make progress in resolving the backlog of open PHA recommendations. At the time of the first Tier II audit, approximately 100 recommendations remained open, down from approximately 425 recommendations open in April 2004.</p> <p>During this final Tier II audit, ABS Consulting noted that the DCR continued to implement the <i>PHA Recommendation Resolution Protocol</i> and that, consistent with the DCR's goal that there be "zero overdue FERRET items," there were no past-due PHA recommendations.</p>	<p>As noted in the first Tier II audit report (issued March 14, 2005), ABS Consulting concluded that the DCR had complied with the Tier II applicable requirements for this action item at that time.</p> <p>Based upon the observations during this final Tier II audit, it is ABS Consulting's opinion that the DCR has complied with the Tier II applicable requirements for this action item.</p>
b. Review recommendations proposed for rejection to ensure that a technical review and management consideration is given to the merits of the recommendations, and that recommendation resolution is reviewed in connection with PHA revalidation.	<p>During the first Tier II audit (report issued March 14, 2005), ABS Consulting noted that all open PHA recommendations were being reviewed monthly by the multidisciplinary teams as described in 52.a. Each recommendation was being tracked until it was either resolved or closed out, based upon one of four criteria:</p> <ol style="list-style-type: none"> (1) The recommendation is not required for process safety; (2) The analysis upon which the recommendation is based contains material factual errors; (3) An alternative means of achieving the intent of the recommendation has been implemented; or (4) The recommendation is infeasible (i.e., no reasonable or technical solution exists). <p>It was also noted that the <i>DCR Procedure On Conducting Process Hazard Analysis (PHA)</i> required that revalidation PHAs include review of the status of resolution of the recommendations from the prior PHAs.</p> <p>During this final Tier II audit, ABS Consulting noted that the DCR continued to implement the <i>DCR Procedure On Conducting Process Hazard Analysis (PHA)</i>.</p>	<p>As noted in the first Tier II audit report (issued March 14, 2005), ABS Consulting concluded that the DCR had complied with the Tier II applicable requirements for this action item at that time.</p> <p>Based upon the observations during this final Tier II audit, it is ABS Consulting's opinion that the DCR has complied with the Tier II applicable requirements for this action item.</p>

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Table 1 Mechanical Integrity Consent Order Audit Results (cont'd)

Consent Order Tier II Applicable Requirements	Observations/Basis for Audit Conclusions	Audit Conclusions
<p>c. Review criteria used to select members of the DCR PHA team to ensure that the team includes an appropriate mix of expertise.</p>	<p>As noted in the first Tier II audit (report issued March 14, 2005), the <i>DCR Procedure On Conducting Process Hazard Analysis (PHA)</i> provided criteria used to select members for DCR PHA teams. ABS Consulting determined that the criteria met the minimum essential PHA team requirements outlined by the OSHA PSM standard and the EPA RMP rule (i.e., expertise in engineering, process operations specific to the process being evaluated, and knowledge of the PHA methodology being used). The roles of additional team members providing additional expertise were defined in the procedure, and such additional team members were used on an as-needed basis.</p> <p>During this final Tier II audit, ABS Consulting noted that the DCR continued to implement the <i>DCR Procedure On Conducting Process Hazard Analysis (PHA)</i>.</p>	<p>As noted in the first Tier II audit report (issued March 14, 2005), ABS Consulting concluded that the DCR had complied with the Tier II applicable requirements for this action item at that time.</p> <p>Based upon the observations during this final Tier II audit, it is ABS Consulting's opinion that the DCR has complied with the Tier II applicable requirements for this action item.</p>
<p>d. Develop an action plan to address all outstanding recommendations from the DCR's 1999 PSM Compliance Audit.</p>	<p>During the second Tier II audit (report issued March 3, 2006), ABS Consulting reviewed documentation of the resolution of these previously outstanding recommendations and had concerns with regard to the means documented for the resolution of several recommendations. Consequently, ABS Consulting did not believe it was appropriate to declare that the DCR was compliant with the Tier II applicable requirements for this action item.</p> <p>During the interim Tier II audit (report issued November 28, 2006), ABS Consulting reviewed documentation of the implementation of each of the items judged to have been unresolved during the second Tier II audit and found that each had subsequently been resolved.</p> <p>While there was no follow-up of this action item required during this final Tier II audit, ABS Consulting noted that, as documented above, there were no past-due audit recommendations.</p>	<p>As noted in the second Tier II audit report (issued March 3, 2006), ABS Consulting concluded that the DCR had not complied with the Tier II applicable requirements for this action at that time.</p> <p>As noted in the interim Tier II audit report (issued November 28, 2006), it was ABS Consulting's opinion that the DCR was compliant with the Tier II applicable requirements for this action.</p> <p>Based upon the observations during this final Tier II audit, it is ABS Consulting's opinion that the DCR continues to satisfy the intent underlying this action item.</p>

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Table 1 Mechanical Integrity Consent Order Audit Results (cont'd)

Consent Order Tier II Applicable Requirements	Observations/Basis for Audit Conclusions	Audit Conclusions
53. Management of Change ("MOC") Work Process		
a. Finalize and issue the DCR's updated MOC Standing Instruction.	<p>As noted in the first Tier II audit (report issued March 14, 2005), an update to standing instruction SI 2.9.18, <i>Management Of Change (MOC)</i>, had been issued on December 18, 2002.</p> <p>During this final Tier II audit, ABS Consulting confirmed that the standing instruction was still in effect and that it had been updated on January 16, 2006.</p>	<p>As noted in the first Tier II audit report (issued March 14, 2005), ABS Consulting concluded that the Tier II applicable requirements for this requirement had been satisfied at that time.</p> <p>Based upon the observations during this final Tier II audit, it is ABS Consulting's opinion that the DCR continues to satisfy the intent underlying this action item.</p>
b. Motiva shall develop and implement a training program to orient affected personnel to the updated MOC Standing Instruction and the associated functions and responsibilities of each affected position thereunder.	<p>As noted in the first Tier II audit (report issued March 14, 2005), an MOC training program had been developed and implemented as a module in the computer-based Active Learner training system. Records of the training initially given on the MOC module were reviewed. In addition, it was confirmed that the MOC module is part of the training required for technical new hires.</p> <p>During this final Tier II audit, ABS Consulting confirmed that an active training program remains in effect. However, it was noted that the training records reviewed indicated that several members of the PSM/RMP Steering Committee had not taken the 2006 MOC refresher training.</p>	<p>As noted in the first Tier II audit report (issued March 14, 2005), ABS Consulting concluded that the Tier II applicable requirements for this requirement had been satisfied at that time.</p> <p>This final Tier II audit confirmed that the MOC training program remains in effect and, thus, the DCR remains compliant with the Tier II applicable requirements for this action.</p> <p>However, ABS Consulting suggests that the DCR consider steps to ensure that, as a leadership example, all PSM/RMP Steering Committee members take the MOC refresher training.</p>

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Table 1 Mechanical Integrity Consent Order Audit Results (cont'd)

Consent Order Tier II Applicable Requirements	Observations/Basis for Audit Conclusions	Audit Conclusions
<p>c. Motiva shall develop and implement a MOC audit process, including standards of measurement required by the PSI, to track the implementation and effectiveness of the MOC Standing Instruction.</p>	<p>During the second Tier II audit (report issued March 3, 2006), ABS Consulting determined that the refinery was auditing on a monthly basis three performance indicators that evaluated whether or not:</p> <ul style="list-style-type: none"> • The MOC/PSSR paperwork has been fully executed and properly authorized before the change was placed in service • Work orders requesting a change were properly identified as requiring an MOC • Temporary changes were restored to normal condition prior to the expiration date on the temporary MOC <p>ABS Consulting concurred with the selection of the above indicators as an appropriate initial audit process.</p> <p>During this final Tier II audit, ABS Consulting confirmed that the audit process remains in effect, and that the data for 2006 showed that each metric was trending toward 100% success.</p> <p>As noted in the March 3, 2006, report, the DCR may yet find it advantageous to identify other audit criteria to supplement or replace those above, once audit and feedback efforts have established the proper behaviors with respect to the above.</p>	<p>As noted in the second Tier II audit report (issued March 3, 2006), ABS Consulting concluded that the DCR had complied with the Tier II applicable requirements for this action at that time.</p> <p>This final Tier II audit confirmed that the MOC audit program remains in effect and, thus, the DCR remains compliant with the Tier II applicable requirements for this action.</p>
<p>54. Incident Investigation ("TOP") Work Process. Enhancements to the TOP incident investigation program should be considered to:</p>		
<p>a. Develop criteria for establishing target dates for implementing incident investigation recommendations.</p>	<p>As noted in the first Tier II audit (report issued March 14, 2005), Standing Instruction SI 2.1.9, <i>Incident Investigation</i>, was revised on April 7, 2004, to include an appendix outlining the risk matrix-based approach to be used in guiding the setting of completion dates for incident investigation recommendations. However, interviews with DCR staff revealed that only about 30% of the recent incident investigation reports requiring recommendation risk ranking had been so ranked.</p> <p>During the second Tier II audit (report issued March 3, 2006), ABS Consulting noted that the risk-based approach had been removed and that Appendix II, "Recommended Guidelines for Setting Target Dates," had been added to SI 2.1.9, <i>Incident Investigation</i>, with appropriate references to its use in the text of the procedure. The recommended criteria appeared reasonable and included consideration of those situations (1) requiring immediate implementation to abate an imminent hazard or (2) where implementation might be delayed by the need for design, capital funding, or unit shutdowns. Consideration of the implementation of alternative measures in these latter cases was addressed. For "routine" situations, a guideline of no more than 6 months was suggested by the appendix.</p>	<p>As noted in the first Tier II audit report (issued March 14, 2005), ABS Consulting concluded that Tier II applicable requirements for this action item had not yet been satisfied.</p> <p>As noted in the second Tier II audit report (issued March 3, 2006), ABS Consulting concluded that the DCR had complied with the Tier II applicable requirements for this action at that time.</p> <p>Based on the results of this final Tier II audit, it is ABS</p>

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Table 1 Mechanical Integrity Consent Order Audit Results (cont'd)

Consent Order Tier II Applicable Requirements	Observations/Basis for Audit Conclusions	Audit Conclusions
	<p>The SOP revision was implemented just prior to the second audit; therefore, it was not possible to review a significant number of recommendations scheduled in accordance with the new criteria to assess its application.</p> <p>During this final Tier II audit, ABS Consulting observed that target dates were being established in accordance with Appendix II of the standing instruction, and that the target dates appeared to be appropriate.</p>	<p>Consulting's opinion that the DCR has complied with the Tier II applicable requirements for this action item.</p>
<p>b. Provide additional incident investigation training to affected DCR personnel.</p>	<p>As noted in the second Tier II audit (report issued March 3, 2006), TOP investigator training was conducted in April 2004 and February 2005. In addition, the DCR had implemented a program of annual awareness training for all new employees, and quarterly luncheon meetings/seminars were conducted for TOP investigators.</p> <p>A program had been implemented for hourly investigators where they were rotated off their shift assignments for a 4-week period. During this period they worked with Safety Department staff as full-time investigators and receive appropriate on-the-job training.</p> <p>Finally, a program to provide all plant staff with 8 hours of TOP investigator training was scheduled to begin in February 2006.</p> <p>During this final Tier II audit, ABS Consulting was informed that the DCR had begun implementation of the Impact incident reporting and investigation documentation software. Impact training had been provided to those personnel who would be using the new software.</p> <p>In addition, TOP refresher training had been provided to all employees during the second quarter of 2006.</p>	<p>As noted in the second Tier II audit report (issued March 3, 2006), ABS Consulting concluded that the DCR had complied with the Tier II applicable requirements for this action at that time.</p> <p>Based upon the observations during this final Tier II audit, it is ABS Consulting's opinion that the DCR has complied with the Tier II applicable requirements for this action.</p>

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Table 1 Mechanical Integrity Consent Order Audit Results (cont'd)

Consent Order Tier II Applicable Requirements	Observations/Basis for Audit Conclusions	Audit Conclusions
<p>c. Develop a procedure providing for the completion and review of incident investigation reports in a timely manner.</p>	<p>As noted in the second Tier II audit (report issued March 3, 2006), a review of revised SI 2.1.9, <i>Incident Investigation</i>, indicated that it did not explicitly establish expectations for what constituted the timely completion and review of incident investigation reports. ABS Consulting recognized that hard-and-fast time limits could not reasonably be established because some incidents and their investigation can be quite complex. However, ABS Consulting recommended that guidelines be established in the SOP for what constituted a reasonable, good-faith effort to complete the investigation and subsequent management review in a timely manner.</p> <p>During the subsequent interim Tier II audit report (report issued November 28, 2006), ABS Consulting determined that further revisions to SI 2.1.9 had provided appropriate guidance and expectations for what constituted the timely completion and review of incident investigation reports.</p> <p>During this final Tier II audit, ABS Consulting reviewed incident investigation records to monitor the timeliness of incident report completion and review. A significant number of reports completed in the second half of 2006 had not been, in ABS Consulting’s opinion, completed and reviewed in a timely manner. For example, some reports circulated for review contained recommendations with target implementation dates appropriately established as discussed in item 54.a. However, the proposed target implementation dates had passed while the reports were still circulating for review and approval.</p> <p>DCR staff reported that this problem had been recognized and that the site leadership team had adopted a new practice of meeting as a team to review and approve incident reports. ABS Consulting believes this practice will, if continued, address the problems observed with respect to delays in report review.</p> <p>During the term of the CO, the incident investigation program has been impacted by staff turnovers (at both the TOP coordinator and program ‘owner’ levels). It has undergone a number of program enhancements; with such enhancements often being implemented a relatively short time prior to an ABS Consulting audit (as was the case with the recent implementation of the leadership team joint reviews, described above). As a consequence of these factors, ABS Consulting has often reviewed the program during, or shortly after, a period of transition.</p> <p>ABS Consulting believes that the requirements in the SI, when more effectively implemented by the leadership team’s new review practices, satisfy the CO requirement that the DCR “Develop a procedure providing for the completion and review of incident investigation reports in a timely manner.” However, we recommend that the sustainability and impact of the new policy be monitored for an appropriate period.</p>	<p>As noted in the second Tier II audit report (issued March 3, 2006), ABS Consulting concluded that the DCR had not complied with the Tier II applicable requirements for this action at that time.</p> <p>As noted in the interim Tier II audit report (issued November 28, 2006), it was ABS Consulting’s opinion that the DCR was compliant with the Tier II applicable requirements for this action.</p> <p>Based on the results of this final Tier II audit, it is ABS Consulting’s opinion that the DCR’s practices, at this time, comply with the Tier II applicable requirements for this action. However, ABS Consulting recommends that the sustainability of the current practices be monitored for an appropriate period.</p> <p>DCR staff has proposed further modifications to SI 2.1.9 to tighten expectations with respect to what constitutes a timely review. ABS Consulting supports such further improvements to the procedure.</p>

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Table 1 Mechanical Integrity Consent Order Audit Results (cont'd)

Consent Order Tier II Applicable Requirements	Observations/Basis for Audit Conclusions	Audit Conclusions
<p>d. Develop a mechanism(s) to link the incident investigation and equipment inspection program to ensure that, where appropriate, causes of MI problems are identified and resolved.</p>	<p>During the interim Tier II audit (report issued November 28, 2006), ABS Consulting noted that the current practice at the DCR was:</p> <ul style="list-style-type: none"> • MI-related recommendations from incident investigations were assigned to unit inspectors for resolution • A formalized distribution list had been established for Fixed Equipment Department (FED) inspection reports and failure analysis reports conducted by offsite contractors. The distribution included relevant representatives of the reliability department, operations, maintenance, and technical departments (including process engineering). This supplemented other communications that occur between FED inspectors and representatives of these departments and helped ensure that MI problems were flagged for further investigation, where warranted. <p>During this final Tier II audit, ABS Consulting observed that this practice remains in effect.</p>	<p>As noted in the interim Tier II audit report (issued November 28, 2006), it was ABS Consulting's opinion that the DCR had complied with the Tier II applicable requirements for this action.</p> <p>Based upon the observations during this final Tier II audit, it is ABS Consulting's opinion that the DCR remains compliant with the Tier II applicable requirements for this action.</p>