

Executive Summary

The Executive Summary provides a brief overview of the follow-up evaluation as well as a summary of the actions that have been taken by Tosco to address the major findings and recommendations from the initial safety assessment. The reader is encouraged to review the entire report to gain a better understanding of the progress Tosco has made in addressing all of the findings and recommendations.

Background

A safety evaluation was conducted at the Tosco Avon Refinery in Martinez, California from March 22-31, 1999 at the request of the Contra Costa Health Services. The final safety evaluation report was issued on May 10, 1999.

The objectives of the safety evaluation were to:

- Evaluate refinery safety management systems, human factors, and safety culture.
- Identify safety concerns, if any, at the refinery and develop a list of findings and recommendations.
- Prioritize the findings and recommendations in a way that will enable Contra Costa Health Services and the County to make sound safety-related decisions as they affect refinery operations.
- Conduct an evaluation that is trusted and considered credible by the public and other key stakeholders.

The scope of work for the initial safety assessment was developed by Contra Costa Health Services staff with input from an ad hoc safety evaluation committee, the County Hazardous Materials Commission, the public, and Tosco. The safety evaluation was not intended as a compliance audit and, as such, the report did not imply legal certification of compliance or noncompliance with safety regulations. Rather, the safety evaluation evaluated Tosco's safety management systems in relation to industry practices, and identified potential deficiencies.

The safety evaluation identified 72 findings. For each finding, recommendations were developed to address the deficiency. All of the recommendations were intended to provide a way to achieve safety performance improvement. The recommendations were prioritized based on the degree of risk associated with the finding.

Arthur D. Little presented the report "*Safety Evaluation of the Tosco Avon Refinery in Martinez, California*" to the Board of Supervisors on April 27, 1999. This report included findings and recommendations as a result of the evaluation. Dwight Wiggins, President of Tosco Refining, agreed to implement an action plan that would address all of the recommendations. Tosco has met this commitment.

Scope and Approach to the Follow-up Evaluation

The scope of the follow-up evaluation included four major tasks.

- Review and Comment on Tosco Action Plan
- Review the Implementation of the Action Plan
- Follow-up Evaluation
- Public Participation

The first two tasks were conducted during the months of May through November, 1999. During this period the Arthur D. Little evaluation team made a number of visits to the Tosco Avon Refinery to review progress on implementing the action plan.

The follow-up safety evaluation was conducted at the Tosco Avon Refinery in Martinez, California from December 6-10, 1999 at the request of the Contra Costa Health Services. Additional follow-up was conducted on January 4, 2000.

The objectives of the follow-up evaluation were to:

- Review the actions Tosco has taken in addressing the findings and recommendations from the initial safety evaluation.
- To determine if these actions were adequate to address the findings and recommendations from the initial safety evaluation.
- To suggest further actions Tosco could take to enhance the effectiveness of their action plan.
- Conduct a follow-up safety evaluation that is trusted and considered credible by the public and other key stakeholders.

The follow-up evaluation was designed and implemented in a manner intended to be impartial and objective. The follow-up evaluation results were communicated to Contra Costa Health Services, the public, and Tosco. The evaluation was conducted using a team of safety professionals working at the Tosco Avon Refinery over a period of one-week beginning December 6, 1999. Additional follow-up work was done on January 4, 2000. During these periods, the evaluation team conducted more than 50 interviews with individuals and groups, and reviewed over 100 documents that had been generated or modified as a result of Tosco's Action Plan.

Reviews of the actions taken by Tosco were based on evidence gathered during the follow-up evaluation. This evidence was obtained from interviews with key people involved in the development and implementation of the respective action items, review of documents, and limited physical observations.

A four-step approach was used to assess the progress Tosco has made in addressing the recommendations.

1. Based upon the interviews, document reviews, and inspection, a summary was developed that described the actions taken by Tosco to address each of the recommendations.
2. The assessment team then determined if the actions taken by Tosco met the intent of the recommendation, and if the action items had been implemented.
3. The implementation status was determined for each recommendation.
4. Recommended further actions were developed as needed.

In determining the implementation status a number of factors had to be taken into account such as the wording and intent of the recommendation, the type of recommendation, and the time needed to fully achieve the goals of the recommendation. For example, one of the recommendations from the original evaluation was to "Initiate a comprehensive program to improve the appearance of the refinery and to build pride through effective beautification and housekeeping." Tosco has prepared a five-year plan to improve the appearance of the facility, and has begun to implement this plan. Therefore, the assessment team found that the recommendation has been implemented since the program had been initiated, even though the program will not be complete for five years.

Another example would be for the recommendation that stated "Remind managers that they are critical role models and explain what it means to be an effective role model for safety." Tosco has initiated a program of quarterly leadership meetings where they address safety issues and how to be an effective role model. Since this program has been implemented, and appears to be serving to change the culture, this recommendation was considered implemented. However, since it takes time to change the safety culture at a facility, it is critical that these leadership meetings continue to reinforce the importance of safety and how to be an effective safety role model.

Conclusions

Tosco has implemented all 72 of the recommendations that were developed as part of the initial safety evaluation, as well as the two recommendations that resulted from the Contra Costa Health Services incident investigation.

It must be stressed, that while Tosco has developed and implemented a variety of programs to address the recommendations, these programs will need to remain part of the normal work processes at the refinery for years to come if they are truly going to affect the safety culture. It must be recognized that organizational culture is

developed over long periods of time and reflects individual and group values and perceptions of the way the Avon Refinery works, as well as the actual policies, written programs, and procedures. While many of the action items Tosco has implemented have resulted in changes in policies, written programs and procedures, not enough time had passed to assess whether or not they have affected the safety culture at the facility.

In summary, Tosco has made great progress in addressing the recommendations from the initial safety evaluation and the Contra Costa Health Services incident investigation. Management has made it a top priority over the past eight months to develop and implement policies, written programs, and procedures to address all of the recommendations. In addition, it appears that management is committed to working over the long haul to affect a change in the safety culture at the refinery. However, the refinery management will need to be diligent in assuring that the programs, policies and procedures that have been put in place are implemented on an ongoing basis. Without this diligence, the work that Tosco has begun will not be effective at changing the safety culture at the refinery.

I. Introduction

This section of the report discusses the objectives of the follow-up safety evaluation, presents some background information on an evaluation, and provides the reader with an overview on the format of the report.

A. Objectives

This report summarizes the results of the follow-up safety evaluation conducted by Arthur D. Little at the Tosco Avon Refinery in Martinez, California, at the request of Contra Costa Health Services. The objectives of the follow-up evaluation were to:

- Review the actions Tosco has taken in addressing the findings and recommendations from the initial safety evaluation.
- To determine if these actions were adequate to address the findings and recommendations from the initial safety evaluation.
- To suggest further actions Tosco could take to enhance the effectiveness of their action plan.
- Conduct a follow-up safety evaluation that is trusted and considered credible by the public and other key stakeholders.

The initial and follow-up safety evaluations were not intended as a compliance audit, and as such, this report is not meant to imply legal certification of compliance or noncompliance with safety regulations. The intent of the follow-up safety assessment was to review the actions that Tosco has taken to implement the initial safety evaluation recommendations.

B. Background

Because of incidents that have occurred at the Tosco Avon Refinery, communities surrounding the refinery, the Contra Costa County Board of Supervisors, and Health Services are concerned about the refinery operating safely. Among these incidents are a January 21, 1997 explosion and fire at the hydrocracker and a February 23, 1999 flash fire at a crude unit. These two incidents resulted in the death of five workers and injuries to others.

In response to these incidents, the Contra Costa County Board of Supervisors directed Health Services to arrange for a third-party evaluation performed on this refinery. The Board of Supervisors awarded the contract to do this evaluation to Arthur D. Little. The evaluation was done at the same time that Contra Costa Health Service, Cal/OSHA, and the federal Chemical Hazard Investigation and Safety Board was conducting investigations of the incident that occurred on February 23, 1999. The Arthur D. Little evaluation did not look at the February 23, 1999 incident.

The initial Arthur D. Little safety evaluation was conducted at the Tosco Avon Refinery in Martinez, California from March 22-31, 1999. The final safety evaluation report was issued on May 10, 1999.

The objectives of the initial safety evaluation were to:

- Evaluate refinery safety management systems, human factors, and safety culture.
- Identify safety concerns, if any, at the refinery and develop a list of findings and recommendations.
- Prioritize the findings and recommendations in a way that will enable Contra Costa Health Services and the County to make sound safety-related decisions as they affect refinery operations.

- Conduct an evaluation that is trusted and considered credible by the public and other key stakeholders.

The scope of work for the initial safety assessment was developed by Contra Costa Health Services staff with input from an ad hoc safety evaluation committee, the County Hazardous Materials Commission, the public, and Tosco. The scope of work for the initial safety evaluation is provided in Attachment C. The initial safety evaluation was not intended as a compliance audit and, as such, the report did not imply legal certification of compliance or noncompliance with safety regulations. Rather, the safety evaluation evaluated Tosco's safety management systems in relation to industry practices, and identified potential deficiencies. The emphasis of the initial safety evaluation was on process safety to evaluate the management systems in place to prevent catastrophic events that could impact workers and the community.

The safety evaluation identified 72 findings. For each finding, recommendations were developed to address the deficiency. All of the recommendations were intended to provide a way to achieve safety performance improvement. The recommendations were prioritized based on the degree of risk associated with the finding.

Arthur D. Little presented the report "*Safety Evaluation of the Tosco Avon Refinery in Martinez, California*" to the Board of Supervisors on April 27, 1999. This report included findings and recommendations as a result of the evaluation. Dwight Wiggins, President of Tosco Refining, agreed to implement an action plan that would address all of the recommendations. Tosco has met this commitment.

As part of the safety evaluation there was a requirement that Arthur D. Little monitor progress on the implementation of the action plan that was developed by Tosco to address the recommendations, and that a follow-up evaluation be conducted in December, 1999 and January, 2000. This report presents the results of the follow-up assessment.

C. Report Format

Section II of the report describes the scope and approach for the follow-up assessment. Section III presents the follow-up evaluation findings. The findings are presented in a text table which provides the text of each recommendation, a description of the actions taken by Tosco to address the recommendation, the implementation status, and a set of comments and suggested follow-up actions. Section IV presents the overall conclusions from the follow-up evaluation.

The report contains a number of attachments that provide: 1) a listing of the initial safety assessment findings and recommendations; 2) initial safety study scope of work; and 3) a glossary of terms.

II. Scope and Approach

This section presents the scope and approach for the follow-up safety evaluation.

A. Scope

The scope of work for the follow-up evaluation is composed of four separate tasks. Each of the tasks is described below.

Review and Comment on Tosco Action Plan – Arthur D. Little reviewed with Health Services the Tosco Action Plan developed to address the recommendations and findings from the initial safety evaluation. Arthur D. Little reviewed the written action plan and provided comments to Health Services.

Review the Implementation of the Action Plan – Arthur D. Little staff visited the refinery a number of times between the initial and follow-up assessment to review Tosco's progress on implementation of the action items. During these visits the Arthur D. Little staff reviewed documents generated as part of the action plan and reviewed progress with the refinery on the overall implementation.

Follow-up Evaluation - Arthur D. Little conducted a follow-up evaluation to determine how Tosco was addressing the findings and recommendations from the initial evaluation and the Contra Costa Health Care Services incident investigation recommendations and to evaluate if the actions taken by Tosco were addressing the findings and recommendations. This evaluation occurred in December 1999 and January 2000. The follow-up evaluation involved reviewing documents, conducting interviews, and site inspections.

Public Participation – Public participation is a key element of the follow-up safety evaluation scope. The public participation steps include:

- A Chemical Hazard Investigation and Safety Board meeting to present a progress report on the ongoing implementation activities and progress, which occurred in September 1999;
- An initial public meeting before the follow-up evaluation to get public input on the approach. This occurred on November 30, 1999;
- A public meeting to discuss the draft findings of the follow-up evaluation, which will occur on January 12, 2000; and
- A Board of Supervisors meeting to present the final report on the follow-up evaluation. This hearing will occur in February, 2000.

The public comments received on the follow-up safety evaluation approach are included in Attachment B, along with responses to these comments.

B. Approach

A four-step approach was used to assess the progress Tosco has made in addressing the recommendations.

1. Based upon the interviews, document reviews, and inspection, a summary was developed that described the actions taken by Tosco to address each of the recommendations.
2. The assessment team then determined if the actions taken by Tosco met the intent of the recommendation, and if the action items had been implemented.

3. The implementation status was determined for each recommendation.
4. Recommended further actions were developed as needed.

In determining the implementation status a number of factors had to be taken into account such as the wording and intent of the recommendation, the type of recommendation, and the time needed to fully achieve the goals of the recommendation. For example, one of the recommendations from the original evaluation was to “Initiate a comprehensive program to improve the appearance of the refinery and to build pride through effective beautification and housekeeping.” Tosco has prepared a five-year plan to improve the appearance of the facility, and has begun to implement this plan. Therefore, the assessment team found that the recommendation has been implemented since the program had been initiated.

Another example would be for the recommendation that stated “Remind managers that they are critical role models and explain what it means to be an effective role model for safety.” Tosco has initiated a program of quarterly leadership meetings where they address safety issues and how to be an effective role model. Since this program has been implemented, and appears to be serving to change the culture, this recommend was considered implemented. However, since it takes time to change the safety culture at a facility, it is critical that these leadership meetings continue to reinforce the importance of safety and how to be an effective safety role model.

Reviews of the actions taken by Tosco were based on evidence gathered during the follow-up evaluation. This evidence was obtained from interviews with key people involved in the development and implementation of the respective action items, review of documents, and limited physical observations.

III. Follow-up Evaluation Findings

The findings in this section are presented separately for safety management systems, human factors, and safety culture, consistent with the initial safety evaluation. In addition, a section has been added at the end of the findings table that covers the Contra Costa Health Services recommendations from their incident investigation. The findings provide a discussion of the actions Tosco has taken to address each of the recommendations from the initial safety evaluation and the Contra Costa Health Services incident investigation. The findings are based on evidence gathered during the evaluation. This evidence was obtained from interviews with key people involved in the development and implementation of the respective actions, interviews of other people throughout the refinery organization, review of documents, and limited physical observations.

The remainder of this section is a text table that presents the initial safety assessment recommendations, a summary of the actions taken by Tosco to address the recommendation, the implementation status as determined by the Arthur D. Little team, and a set of comments and suggested further actions.

Table 1 Follow-up Safety Evaluation Findings

	#	ADL Recommendation	Priority	Assessment of Tosco Action	Status ¹	Comments and Follow-up Actions
1	A-01.a	Remind managers that they are critical role models and explain what it means to be an effective role model for safety.	High	Tosco has established a program for quarterly leadership meetings with staff from all levels of management at the refinery to foster inter and intra department communication and to build skills on being an effective role model for safety. They have conducted two leadership meetings and a third is scheduled for January. As part of these meetings they have established management team expectations as they relate to being a good role model for safety. Some of these goals include being more visible in the field, providing coaching and feedback to employees, conducting routine audits and review of work processes in the field, etc.	1	None
2	A-01.b	Establish more explicit and detailed safety goals for management and track involvement in workplace safety meetings, audits, and related activities.	High	Tosco has developed a more formal program for establishing and tracking safety goals for management. Each department is now required to prepare a written annual safety program for management. The written program is to be specific in establishing safety goals for each management employee. The types of goals include safety meetings, layered safety audits, incident investigation/follow-up, and team based safety assessments. Each plan discusses the activities that will occur, how often they will occur, and who is the responsible party. All departments were required to submit the written plan for the remainder of 1999 by June 15, 1999. These written plans have been submitted and approved. Departments are now working on developing the written plans for year 2000. For employees who have specific goals in the plan, the goals have been incorporated into their performance appraisals.	1	None

¹ 1 – Recommendation implemented.

2 – Recommendation not fully implemented.

Table 2 Follow-up Safety Evaluation Findings (continued)

	#	ADL Recommendation	Priority	Assessment of Tosco Action	Status ¹	Comments and Follow-up Actions
3	A-01.c	Develop and implement a communication program to increase awareness of the safety policy and vision.	Medium	Tosco has developed and begun implementing a safety awareness communications plan for the refinery. Tosco conducted focus group research with operators and management to determine some of the key issues of concern with communication. Then they developed an overall strategy for the plan and a set of implementation tactics. The strategy and tactics were used to develop a communication plan. The plan includes items such as publishing safety articles, publishing “stories” of good safety behavior, posting safety messages throughout the refinery, promotion of the safety award program, holding quarterly employee meetings, development of a safety award program, etc. The communication tactics discussed in the plan will be implemented over time, with some of the tactics being retired as new ones are implemented in their place. This will assure that the communication tactics are kept fresh and address issues that are relevant over time.	1	Tosco should consider implementing an annual program for soliciting feedback from the staff on the effectiveness of the communication plan. CCHS should conduct a follow-up assessment of the implementation of the communication plan within one year to verify that the programs are changing, and that the awareness of the safety policy and vision has increased.
4	A-01.d	Provide the Health and Safety Manager with external safety management training.	Low	The Health and Safety Manager at the refinery during the safety evaluation is no longer a Tosco employee. The safety training records for the present Health and Safety Manager were reviewed during the follow-up assessment. In combination with the broad external experience of this individual, it was considered that the level of training is adequate. Tosco has built off this recommendation and conducted a training needs evaluation for the entire Health and Safety Department. This was completed in December, 1999.	1	None
5	A-01.e	Conduct meetings of operators and supervisors to identify needs for	High	Tosco is now holding quarterly meetings for all employees. These meetings provide a forum for	1	None

Table 2 Follow-up Safety Evaluation Findings (continued)

	#	ADL Recommendation	Priority	Assessment of Tosco Action	Status ¹	Comments and Follow-up Actions
		training and support and to assure shared understanding regarding new responsibilities.		sharing new developments regarding job responsibilities and airing safety concerns. Also, following the extensive safety training that was provided during the shutdown, Tosco conducted a survey of lead operators to evaluate their level of confidence with their work permit responsibilities. In general, the survey provided very positive feedback. One suggestion to develop a pocket-book version of the work permits has been implemented. Tosco has also developed and implemented a written procedure for operators and other staff to request training they feel they need.		
6	A-01.f	Implement a facility appearance improvement program with widespread employee participation and consider including team-building ideas, e.g. creative painting of storage tanks, competitions for special improvement projects, etc.	Medium	Tosco has developed a five-year facility appearance improvement plan for the entire refinery that covers over 300 different projects. The estimated cost of the program is approximately 80 million dollars. The types of projects include painting programs, demolition of old equipment, tank removal and replacement programs, and general clean-up/beautification programs. At the time of the follow-up safety assessment, approximately 100 of the projects have been completed. The completed projects included painting projects, demolition projects, and general clean-up/beautification.	1	None
7	A-02.a	Complete human factors and facility siting hazard reviews for all covered processes. (See also recommendations B-01 through B-07).	High	The first phase of Process Hazard Analyses conducted by Tosco (in the early to mid 1990s) did not include any evaluation of human factors or facility siting issues. As PHAs are revalidated on the five-year cycle, human factors and facility siting issues are being addressed for each process unit using checklists. At the time of the assessment, there were four process units for which there are no completed checklists	1	Tosco should consider completing the human factors and facility siting checklists for the remaining three units prior to the full PHAs.

Table 2 Follow-up Safety Evaluation Findings (continued)

	#	ADL Recommendation	Priority	Assessment of Tosco Action	Status ¹	Comments and Follow-up Actions
				(DEA stripper, 1 Isomer, #1 Gas, #3 HDS). Two other units without the checklists are presently shut down (#2 Feed Prep, #2 reformer). According to the Tosco PHA schedule, all units will be completed by late 2000. For facility siting, Tosco has also conducted a sitewide evaluation of explosion, fire and toxic hazards. A draft report has been written.		
8	A-02.b	Develop a written procedure for closing PHA and audit action items (and/or recommendations). Include necessary authorities for high, medium, and low priorities, and a variance procedure for obtaining time extensions or agreement for not completing an action item. Include this procedure in the PSM system document for PHAs. Develop a schedule for closure of all PHA action items prior to refinery restart, and obtain concurrence from Contra Costa Health Services.	High	A closure procedure was issued on May 29, 1999. All PHA and audit action items require at least a superintendent-level signature for closure. During the stand down, Tosco superintendents were required to review all PHA action items implemented in their respective areas, for all PHAs conducted during the previous five years. The review was to do field verification that the required actions were completed. At startup, there were three PHA action items that were not completed. These were verbally communicated to CCHS with reasons for requesting an extension. These three items were closed out by the end of December, 1999.	1	None
9	A-02.c	Conduct periodic external audits of the safe work and hot work permit systems. Implement and enforce the new "Policies and Procedures Policy Statement" (March 1999) and the revised "Authorization for Emergency Shutdown of operations and Unsafe/Non-Complying Actions procedure" (March 23, 1999), both of which emphasize employees' responsibility for working safely.	Medium	During the turnaround period, Tosco employed an outside contractor to conduct safety audits of the safe work and hot work permit systems. The results of the audits were trended, and the results reviewed by management as a Key Performance Indicator (KPI). Tosco H&S employees worked alongside the external auditors to help improve their audit skills. Interviews with a range of workers and managers verified that the new policies were in effect and being enforced. Tosco has been aggressively implementing the Disciplinary Procedure for cases where safety policies are not	1	Tosco should consider using outside contractors to conduct further audits of the safe work and hot permit systems whenever there is extensive maintenance work in progress or a unit turnaround.

Table 2 Follow-up Safety Evaluation Findings (continued)

	#	ADL Recommendation	Priority	Assessment of Tosco Action	Status ¹	Comments and Follow-up Actions
				being followed.		
10	A-02.d	Establish a unit-specific training module for sharing PHA results with unit operators after a PHA is completed on their unit. Include this training module in the training record-keeping system. Establish a training module on Employee Participation (as described in the PSM system documents) and provide this training to all employees.	Medium	The PHA training module has not yet been developed. Tosco is evaluating the best options for moving forward with this recommendation. However, the Employee Participation module has been implemented, and about 96 percent of the active employees have completed this training using the Computer Based Learning method. Tosco has developed a written policy that requires that the results of unit process hazards analyses (PHA) be communicated to the unit operators after the final study session report is complete. The information is communicated to operators in a group meeting. The unit process engineers are responsible for communicating the results of the PHAs to the unit operators. Coordination of the overall program is the responsibility of the Site PHA Coordinator. A leader's guide is being developed by process engineering to help facilitate these new sessions.	1	None
11	A-03.a	Train managers on the importance of a broad spectrum of safety performance measurement. Expand the standard set of safety performance measures to include upstream measures of program performance such as numbers of audits, audit scores, training courses completed, safety device failures, etc.	Low	The quarterly Leadership meetings have been used to train managers on the importance of safety performance measurements. As part of the formal program for tracking safety goals for management, each department has been required to establish a set of safety performance measures, or what is called key performance indicators (KPI) which include items such as number of layered safety surveys, number of inspections, number of table top drills, number of simulated emergency drills, number of operator certifications, incidents and near misses reported, number of job safety analysis, etc.	1	None
12	A-03.b	Review the process for setting goals and objectives and consider ways to	Medium	Tosco has developed a more formal program for establishing and tracking safety goals for	1	None

Table 2 Follow-up Safety Evaluation Findings (continued)

	#	ADL Recommendation	Priority	Assessment of Tosco Action	Status ¹	Comments and Follow-up Actions
		provide more specific individual targets.		management. Each department is now required to prepare a written annual safety program for management. The written program is to be specific in establishing safety goals for each management employee. Each plan discusses the activities that will occur, how often they will occur, and who is the responsible party. All departments were required to submit the written plan for the remainder of 1999 by June 15, 1999. These written plans have been submitted and approved. Departments are now working on developing the written plans for year 2000. For employees who have specific goals in the plan, the goals have been incorporated into their performance appraisals.		
13	A-04.a	Develop a list of all operating procedures (normal, shut down, start up, emergency shut down, and “general”) applicable to each operating area for each PSM/Cal-ARP/Industrial Safety Ordinance covered process. Ensure that all listed procedures are written, reviewed by operators, certified as current, and included in the training record-keeping system. The procedures should be updated routinely on a schedule consistent with the Tosco San Francisco Area refinery PSM system requirements for operating procedures.	High	During the stand down, Tosco devoted considerable effort to developing, reviewing and revising standard operating procedures (SOPs) for all operating units. New administrative procedures were developed for writing SOPs and handling SOP revisions. Since these procedures have been finalized, more than 150 have been revised as part of the continuous improvement process. The revision procedure includes a provision to ensure that all certified operators in that procedure are trained on the revision prior to implementation.	1	None
14	A-04.b	Verify that all “qualified operators” have been trained on all operating	High	An extensive program of training was conducted during the stand down to retrain and re-certify all	1	None

Table 2 Follow-up Safety Evaluation Findings (continued)

	#	ADL Recommendation	Priority	Assessment of Tosco Action	Status ¹	Comments and Follow-up Actions
		procedures applicable to their respective unit/area. For each procedure, provide initial or refresher training for all operators who have not been given initial or refresher training within the last three years.		operators on their respective procedures. Verification checks made during the follow-up assessment confirmed that employee-training records are now current.		
15	A-04.c	Update the training tracking system to ensure that the following types of records are accurate and current: training records for each employee that match the training requirements for the respective job position; all operating procedures applicable to each unit, qualified operators for each unit.	Low	The specified items are now included in the training tracking system. The training tracking system now has the capability to track and verify each of these items.	1	None
16	A-04.d	Provide training in unit-specific process overviews for all operators, maintenance workers and contractors prior to working at the respective unit.	High	A process overview training module was developed during stand down and provided to all maintenance workers. A check of the training records indicated that 184 of 186 maintenance workers had completed this course. The two employees who have not completed the training are on extended leave and will be trained once they return to work. Additional process overview information has been provided to all operating unit control rooms to be provided to the contractors prior to working in these units. This is in addition to the Tosco Safety and You course they are required to take.	1	None
17	A-04.e	Conduct routine internal audits of the training sign-in sheets to verify they are being completed properly.	Low	The current procedure for filing training records ensures that a Training Department clerk checks the quality and content of each class sign-in sheet. Any sheets with deficiencies are returned to the instructor. A review of hard copy training sign-up sheets verified	1	None

Table 2 Follow-up Safety Evaluation Findings (continued)

	#	ADL Recommendation	Priority	Assessment of Tosco Action	Status ¹	Comments and Follow-up Actions
				that this internal audit is effectively working.		
18	A-04.f	Modify the training record keeping system to make the health and safety training requirements matrix for each employee consistent with the training course titles.	Low	A comprehensive regulatory training matrix has been developed for each employee. The training courses in this matrix are not yet consistent with the training modules included in the training record keeping system.	1	It is recommended that the training records be modified to capture the information included in the regulatory training matrix.
19	A-04.g	Ensure that training matrices are available to show training required (normal operating procedures, emergency procedures, “generic” procedures, health and safety requirements, etc.) and retraining intervals for all positions at the refinery.	High	Each employee in the training database has a job position assigned, and each job position is linked to a list of training requirements for that position. The training tracking system includes the interval for retraining for each training course, and this provides a way of tracking and scheduling training for each worker. The training department is responsible for the scheduling of all refresher training.	1	None
20	A-04.h	Establish a formal procedure to allow operators to request additional training <i>at any time</i> , including the steps that will be taken by management to provide or deny training needs that are requested. Include the procedure in the PSM system documents and communicate this to all operators.	High	Tosco has developed a formal procedure for operators and other staff to request additional training. Attached with this procedure is a training request form that can be submitted by any staff member to the training department and their supervisor. Each request is reviewed with the requestor and training is provided or a written response is provided back to the requestor stating the reasons why the training request was not approved. Tosco has established a new training coordinator position (June 1999), and the job description for this position includes a responsibility to collect operators’ requests for additional training.	1	The training coordinator position has not yet been filled. It is recommended that the position be filled as soon as possible.
21	A-04.i	Update the video library of training resources and associated index, and	Low	Updated video lists have been prepared and the relevant Safety Orders have been revised.	1	None

Table 2 Follow-up Safety Evaluation Findings (continued)

	#	ADL Recommendation	Priority	Assessment of Tosco Action	Status ¹	Comments and Follow-up Actions
		revise relevant Safety Orders.				
22	A-05.a	Include a requirement for drug and alcohol screening when an employee returns to work following an extended absence (30 days), other than for sick leave, in the Avon refinery drug and alcohol program.	Low	This recommendation has been deferred indefinitely. Tosco has stated that it may be re-evaluated at the time the union contract is renegotiated (2001). This is an item that must be negotiated with the Union as part of their contracts with Tosco.	1	Tosco should document that this item will be included in the next round of contract negotiations (2001).
23	A-06.a	Verify that contract employees are trained in an overview of each process unit that they work on. Revise the contractor policy documents to include this requirement.	High	Tosco has taken a number of steps to add to the “Tosco Safety and You” training provided to contractors to provide additional information on the various process units. Process overviews are made available in the control room of each unit, and contractors are told to ask the unit operators if they have any questions about the unit. The contractor policy documents have been revised to include these requirements.	1	None
24	A-08.a	Provide verification to Contra Costa Health Services that PSM compliance audits have been conducted for all covered processes within the last three years.	Medium	A PSM Compliance Audit was completed in 1997, and a copy of the report was provided for CCHS review onsite (December 10, 1999). Tosco has several safety-related audits scheduled for 2000, including the next PSM compliance audit.	1	None
25	A-09.a	Consider communications training for managers and supervisors.	High	Tosco has begun implementing a Dupont Safety training program that incorporates communication training. Part of the training focuses on methods for communicating with workers on their behavior and providing positive reinforcement to promote good behavior. The training also provides instruction on positive ways of communicating to a worker unsafe work behavior.	1	Tosco should consider providing a training course to managers and supervisors on improving communication skills. The training should focus on techniques that improve how to communicate different types of information. This should cover both written and verbal communications.

Table 2 Follow-up Safety Evaluation Findings (continued)

	#	ADL Recommendation	Priority	Assessment of Tosco Action	Status ¹	Comments and Follow-up Actions
26	A-09.b	Expand the use of safety awareness tools. Emphasize the role of the safety incentive program as a tool to heighten safety awareness.	Low	Tosco has installed safety banners, signs and stickers at each of the units promoting and communicating safety messages. Tosco has implemented a number of safety promotion programs at the refinery that include the Safety Awareness Program, the Safety Poster Program, and the Entry Gate Safety Signs. Twenty-five poster frames have been installed at various locations throughout the refinery. The refinery has subscribed to a service that provides new posters each month. Safety signs have been installed at both main entrances. These signs display the current safety statistics and a safety slogan, and are changed on a weekly basis. In addition, the refinery is in the process of implementing a number of other programs that include the Injury Free Employee Recognition Awards, and the Daily Safety Awareness Meetings.	1	None
27	A-09.c	Assure that employees have sufficient computer resources and training to be effective users of electronic safety communications. At the same time, continue to encourage face-to-face communications and widespread dissemination of information.	Low	Tosco has taken a number of steps to improve face-to-face communication. These include quarterly employee meetings. These meetings are held over a number of days to facilitate reaching all employees. These meetings are used to share pertinent information in an open forum that encourages dialogue. The information presented has included topics such as safety, business plans, refinery performance metrics, and refinery policies. Information is also communicated via a bi-weekly employee newsletter, an e-mail system that sends time critical messages to all employees. Tosco also has established an intranet site where a considerable amount of information is available to all employees. Tosco is in the process of placing the new set of policies and procedures manuals on-line. In addition,	1	Tosco should consider making available to employees a computer-training course that focuses on how and where information can be accessed on the various computer based systems. As more of the information is shared electronically, it is important that all employees know how to access and use the intranet and other computer based information systems.

Table 2 Follow-up Safety Evaluation Findings (continued)

	#	ADL Recommendation	Priority	Assessment of Tosco Action	Status ¹	Comments and Follow-up Actions
				maintenance and operations managers publish a weekly update for all employees. These updates cover ongoing activities at the refinery, the current set of safety statistics, as well as any safety incidents. In addition, the use of the layered safety program has allowed more face-to-face communication between management and workers.		
28	A-09.d	Promote safety hotlines more widely and provide timely feedback to all employees on performance of the system.	High	Tosco has posted signs with the safety hotline numbers and the numbers have been published in the Tosco Update newsletter. The items received on the hotline are reviewed and incorporated into the near miss program. The near miss statistics are published in the monthly Health and Safety Newsletter.	1	Tosco should consider keeping a log of all calls that are received on the hotline, the issues that were raised, and how they were addressed.
29	A-09.e	Evaluate the relative roles and responsibilities of the refinery manager and the legal department in risk management.	Low	The refinery manager has stated that he has overall responsibility for risk management and the legal department provides an advisory role. The legal department has become more active in management meetings. They are in the meetings to provide advice and counsel. The ultimate responsibility for risk management resides with the refinery manager.	1	None
30	A-11.a	Establish a document control system that provides assurance that all safety management system documents are current, consistent, and accurate.	High	A new Policies and Procedures Manual has been developed. The manual was distributed on January 4, 2000. On December 29, 1999 a memo was sent to all Avon Refinery employees informing them of the release of the new manual. The manual is available in hardcopy and is in the process of being placed on the Refinery's intranet. For each of the policies and procedures there is an identified responsible department with the date of when the policy or procedure must be reviewed and updated, as necessary. This manual includes safety management	1	Tosco should continue work on the Policies and Procedures Manual to finalize this document as soon as possible.

Table 2 Follow-up Safety Evaluation Findings (continued)

	#	ADL Recommendation	Priority	Assessment of Tosco Action	Status ¹	Comments and Follow-up Actions
				system documents and safe work permit procedures. The Safety Orders and PSM “system documents” have also been incorporated into this manual. The manual also includes policies and procedures on leadership and administration, management training, planned inspections, job analysis procedures, environmental compliance, emergency planning and response, organizational rules, contractors, etc. The manual is about 70 percent complete.		
31	A-11.b	Apply the document control system to all operating procedures, safety policies, safety orders, and other safety-related documents.	High	See A-04 and A-11.a.	1	None
32	A-11.c	Revise the table of MOC Requirements in the Avon MOC system document to include operating procedures and training following the change.	Low	The referenced table has been revised to indicate that the MOC review team must specify training and document update requirements. The changes are incorporated into the new MOC procedure, and this is included in the Policies and Procedures Manual, Section 14-2).	1	None
33	A-12.a	Design and implement a formal procedure for evaluating and managing the impacts of organizational change.	High	Tosco has developed a policy and procedure for managing organizational change. The policy has been developed to address the requirements of Section 450-8.01(B)(v) of Contra Costa County Ordinance 98-48. The procedure applies to changes such as reduction in the number of positions or number of personnel within operations, including engineers and supervisors with direct responsibility in operations; positions with emergency response duties; and positions with safety responsibilities. The procedure also applies to any substantive increase in duty for these positions, or changes in responsibility. The	1	Tosco should consider submitting this management of change procedure for organizational changes to CCHS for review in January 2000 along with the Industrial Safety Ordinance Safety Plan. CCHS should review this procedure to assure that it complies with the human factor requirements specified in Section 450-8.016(B) of Contra

Table 2 Follow-up Safety Evaluation Findings (continued)

	#	ADL Recommendation	Priority	Assessment of Tosco Action	Status ¹	Comments and Follow-up Actions
				procedure requires that any organizational changes subject to these policies must have a team established to evaluate the change. As part of the evaluation process the team must develop an understanding of the purpose of the change, identify potential health and safety impacts associated with the change, and then assess the health and safety impacts associated with the change. The team is required to develop an action plan for addressing the organizational change. This plan is required to specify what actions must be completed prior to implementing the change. As a minimum, the plan must be reviewed and approved by the operations and health and safety managers.		Costa County Ordinance 98-48. It should be noted Section 450-8.016(B) of Contra Costa County Ordinance 98-48 gives Tosco until January 15, 2001 to implement this organizational change process. Tosco should consider having CCHS conduct a review of the process after they have applied the organizational change MOC procedure to the first few organizational changes at the refinery.
34	A-12.b	Revise the MOC change form to include a check box for emergency procedures.	Low	This form has been revised to include a check box for emergency procedures. The revised form is included in the new Policies and Procedures Manual, Section 14-2.	1	None
35	A-12.c	Establish an MOC tracking system to track MOCs in progress.	Low	Avon has implemented a database developed by SFAR-Rodeo for tracking MOCs. This database tracks and reports on MOCs for temporary facilities, completed MOCs and open MOCs.	1	Within the next year, CCHS should verify that this system is being used and that all the MOCs are being entered into the system.
36	A-14.a	Revise the Incident Investigation Safety Order to provide further guidance as to when serious incidents are to be investigated by a team rather than “non-team.”	Medium	In the revised Incident Investigation Procedure (November 30, 1999), all serious incidents are to be investigated by a team. The revised procedure is included in the new Policies and Procedures Manual.	1	CCHS should review the implementation of the procedure within the next year to assure a team has investigated the all the serious incidents.
37	A-14.b	Provide additional training to all supervisors to ensure that the incident	High	Training for supervisors and superintendents in the revised Incident Investigation procedure was in	1	None

Table 2 Follow-up Safety Evaluation Findings (continued)

	#	ADL Recommendation	Priority	Assessment of Tosco Action	Status ¹	Comments and Follow-up Actions
		investigation forms are completed properly, that the correct methods are used to develop root causes, and to ensure that action items and recommendations are directly related to the causal factors.		progress at the time of the follow-up assessment. It is anticipated that this training will be completed for all supervisors by January 2000. A Causal Factor Guide is used for minor incidents, and Root Cause Analysis is used for serious and major incidents.		
38	A-14.c	Revise the Incident Investigation procedure to provide further guidance for differentiating between serious accidents and major near misses.	Medium	The revised Incident Investigation Procedure includes definitions for these categories and a discussion of each type of incident. The new program steward has the responsibility to review incidents on a routine basis to assure that incidents are correctly assigned.	1	None
39	A-14.d	Conduct routine audits of the Incident Investigation program to verify that all reported incidents are being investigated and that action items are being completed in a timely manner.	Medium	Tosco conducted an audit of the Incident Investigation program prior to startup. There is no formal program for conducting routine audits. However, incident data are analyzed and trended by the program steward, and results are forwarded to management on a monthly basis. Supervisors and superintendents have a responsibility to close action items in a timely manner, and this is included in their annual performance goals.	1	Tosco should consider verifying that all personnel performance reviews specifically address and document safety achievements, including the closure of incident investigations and their associated action items.
40	A-14.e	Consider revising the incident investigation report form to include a place to capture contributing and/or root causes and the names of the investigation team participants.	Medium	Under the revised procedure, contributing causes are captured in the Causal Factor Guide for minor incidents, and root causes are captured in written reports prepared by the Incident Investigation team. Team members are also documented in the written investigation reports.	1	None
41	A-14.h	Revise the Incident Investigation procedure to provide further guidance	High	The revised Incident Investigation Procedure includes a section called Communicating Results. This	1	None

Table 2 Follow-up Safety Evaluation Findings (continued)

	#	ADL Recommendation	Priority	Assessment of Tosco Action	Status ¹	Comments and Follow-up Actions
		for deciding how “lessons learned” should be shared.		provides guidance for sharing results with employees, other facilities, and to Contra Coast Health Services.		
42	B-01.a-c	Conduct a detailed review of valve locations throughout the refinery to identify all valves that are difficult to operate. Involve unit operators in the review, and solicit their input and comments. For valves that are difficult to operate, develop engineering solutions to alleviate the problem, for example, by providing valve “extensions.”	High	In cooperation with unit operators, Tosco has completed a survey of all units to assess the nature and extent of problems associated with valve design and use. The survey identified 123 valves that need to be addressed. As part of the turnaround completed prior to start-up a number of these valves were replaced. Tosco has completed developing engineering solutions for all the valves identified in the survey, and is in the process of completing the implementation of the engineering solutions. In addition, Tosco has re-instituted an ergonomic tag program for difficult valves, which is an administrative control, until the engineering solutions can be implemented.	1	CCHS should follow-up within the next year to assure that all of the engineering solutions have been implemented.
43	B-02.a	Conduct a review of all refinery units to identify which remote controls for fire isolation are difficult to access or activate. Involve unit operators in the review, and solicit their input and comments. Where access/activation is determined to be a problem, develop alternative systems to mitigate the hazards.	High	In cooperation with unit operators, Tosco has completed two surveys of all units to identify which remote controls for fire isolation are difficult to access or activate. The surveys identified a number of valves and instruments that were located close to potential fire sources and not protected from fire damage. In addition, a number of switches were located inside potential fire zones should isolation be required during a fire. Tosco has developed alternative systems to mitigate hazards of this type. They are currently in the implementation process.	1	CCHS should follow-up within a year to assess Tosco’s progress in implementing the solutions.
44	B-03.a	Upgrade radio communication hardware to ensure greater reliability and longer operational time between recharging.	Medium	Tosco conducted a thorough survey of operators, supervisors, and maintenance personnel to identify problems with current radio communication hardware. As a result of this survey a new and more functional	1	None

Table 2 Follow-up Safety Evaluation Findings (continued)

	#	ADL Recommendation	Priority	Assessment of Tosco Action	Status ¹	Comments and Follow-up Actions
				radio communications system was purchased and was installed at the Avon refinery in December, 1999.		
45	B-03.b	Establish radio communication procedures, particularly for use during upset conditions, and communicate these to all units to guard against jumbled communication. Provide greater radio channel capacity to facilitate communication during upsets. Provide operators with a radio/phone combination to permit operators to handle phone calls without having to leave a work site to return to the control unit.	Medium	Tosco conducted a thorough survey of operators, supervisors, and maintenance personnel to identify problems and issues involved in radio communication procedures, particularly during upset conditions. As a result of this survey Tosco identified and purchased a radio communication system that incorporates software capable of prioritizing emergency communications during upset conditions to guard against jumbled communication. This system was installed at the Avon refinery in December 1999.	1	None
46	B-04.a	Perform a comprehensive human factors assessment of the usability of all control panels. The purpose of the assessment should be to look for potential improvements in control panel displays, controls, and usage procedures.	Medium	Tosco has performed an exemplary human factors assessment of the usability of all unit's control panels. This analysis was remarkably thorough and well executed, and incorporated significant input from control room operators at all stages. The short-term and long-term recommendations contained in Tosco's report of the assessment are amply supported by the results of the analysis and will provide significant safety benefits if implemented.	1	Tosco should take immediate steps to implement the short-term recommendations of this assessment, and should develop specific plans for implementing the long-term recommendations. Tosco should continue to incorporate operators' input in all phases of the implementation phase.
47	B-04.c	Develop a procedure to ensure that maintenance issues related to the proper functioning of warning lights and alarms are addressed immediately upon submission.	High	Tosco has implemented new procedures to speed up the completion of maintenance requests related to the proper functioning of warning lights and alarms. A maintenance "planner" is now assigned to routinely check for warning light and alarm maintenance requests that are 30 days old. The planner then flags the item and brings it to the immediate attention of	1	None

Table 2 Follow-up Safety Evaluation Findings (continued)

	#	ADL Recommendation	Priority	Assessment of Tosco Action	Status ¹	Comments and Follow-up Actions
				maintenance.		
48	B-05.a	Apply fresh, visible coats of paint to all handrails and leading edges of stairs within the refinery. Thereafter, perform regular maintenance to ensure that effective visibility is maintained.	Low	Tosco has had the operators complete a survey of units to identify stair treads and railings with poor visibility. Tosco has completed the painting noted in these surveys.	1	None
49	B-06.a	Conduct a job hazard analysis and implement appropriate controls to eliminate the need for operators to go directly underneath the No. 5 Gas Unit furnace when performing operations.	High	Tosco hired AcuTech Consulting, Inc. to perform a Job Hazard Analysis of the No. 22 Furnace at the No. 5 Gas Plant. The analysis, performed in June 1999, resulted in a set of 42 engineering and procedural recommendations to mitigate risks associated with furnace procedures and to improve operability of the furnace. Procedural recommendations have been incorporated in revised operating procedure manuals and were conveyed to operators through training. The majority of the engineering modifications have been completed. The outstanding items have to do with operability of the heater and are not directly related to the issue of operator access to the heater.	1	Tosco should complete implementation of the remaining modifications.
50	B-06.b	Evaluate all other furnace operations at the Avon refinery to ensure that there are no other furnaces configurations with similar concerns as those at the No. 5 Gas Unit.	High	Tosco conducted a thorough internal audit of all furnaces and fired boiler operations throughout the Avon refinery. The survey identified procedural and engineering areas that required improvement to enhance safety. Procedural recommendations have been incorporated in revised operating procedure manuals and are being conveyed to operators through training. Engineering modifications are in the process of being implemented.	1	Tosco should continue to implement engineering solutions identified by the internal audit.
51	B-07.a	Review of the status of access and escape routes in every unit of the refinery. In situations where repairs are needed to existing structures, effect the	Medium	Tosco has performed two surveys to determine the status of access and escape routes in all units of the facility. From these surveys, action items were developed for five of the operating units Engineering	1	CCHS should follow-up within one year to assess the implementation progress.

Table 2 Follow-up Safety Evaluation Findings (continued)

	#	ADL Recommendation	Priority	Assessment of Tosco Action	Status ¹	Comments and Follow-up Actions
		repairs as soon as possible. In situations where new structures are required, prioritize them by the degree of hazard.		recommendations derived from these surveys have been presented to the Tosco management committee and operations department. Tosco is in the process of implementing these action items.		
52	B-08.a-e	Tosco management and the represented labor should consider sponsoring an offsite "Safety Summit" to be attended by representatives of the Avon refinery upper management, middle management, line management, and line workers. A neutral third-party facilitator should be hired to run the summit. An offsite location would be critical in that it removes participants from the "normal" work environment in which stereotypical perceptions and biases may preclude effective discussion. The summit would provide management and workers an opportunity to evaluate the refinery's safety needs and resources, including health and safety staffing.	High	Tosco held a Safety Summit on May 27, 1999. The summit was held off-site and was facilitated by a neutral third party. Approximately 50 Avon employees, including operators, maintenance personnel, and supervisors participated. Topics that were discussed included communication, safety, and developing a joint vision of a new safety culture at the Avon refinery. Across all levels of the refinery there was a high level of enthusiasm and optimism surrounding the outcome of the Safety Summit, particularly with respect to the progress that was perceived in reducing the adversarial nature of the labor-management relationship.	1	Tosco should make the continuance of the Safety Summit concept a priority at the Avon refinery. While the May 27 Summit was well received and accomplished many of its goals, it is essential that further meetings of this type continue to be held.
53	B-09.a-g	As part of the recommended offsite Safety Summit (see Recommendation B-08), management and workers should discuss inter-organizational perceptions and communication issues, specifically as they impact safety, to determine ways to re-establish open communication channels that can be sustained on a long-term basis. The summit would provide a possible way	High	The report of the May 27 Safety Summit provided by the neutral meeting facilitator indicated that inter-organizational perceptions and communications issues were addressed in depth. While a minority of participants indicated that safety should have been given greater emphasis as a focus for these discussions, there was near unanimity of opinion that the efforts of the Summit to improve communications and perceptions were significantly positive.	1	Tosco should make the continuance of meetings of this type a priority at the Avon refinery. While much was accomplished in the May 27 Summit, regularly scheduled meetings of this sort are needed to maintain and build on the momentum generated by the first meeting.

Table 2 Follow-up Safety Evaluation Findings (continued)

	#	ADL Recommendation	Priority	Assessment of Tosco Action	Status ¹	Comments and Follow-up Actions
		to repair the breakdown in communication that currently exists between workers and all levels of management.				
54	B-10.a	Conduct an external audit of the refinery's mechanical integrity program to provide an accurate indication of the effectiveness of the refinery's existing maintenance program. Verify that all safety-critical equipment items are maintained consistent with manufacturers' recommendations or good industry practice.	Medium	Tosco hired a well-recognized auditing firm (DNV, Inc.) to perform an audit of Avon refinery's mechanical integrity program. The Scope of Work issued to DNV by Tosco contained all issues addressed in the recommendation as well as many others. DNV has completed their work and issued a report to Tosco. The scope of work for the audit covered a review of safety-critical equipment items. Tosco is in the process of reviewing and implementing the DNV recommendations. The evaluation team was not allowed to review the DNV report since Tosco considers the report privileged.	1	CCHS should also follow-up within one year to ensure that Tosco has developed a plan for implementing the recommendations contained within the DNV report.
55	B-10.b	Develop a system that will allow operators to obtain status reports on submitted work order requests.	Low	Tosco's maintenance tracking system allows operators and other employees to generate status reports on submitted work orders. These can be done for specific pieces of equipment, by unit and by shift. For people that do not use the system frequently, or find it difficult to navigate, they can ask their supervisors for updates on work orders.	1	Tosco should consider having the supervisors post updated work order status reports in each of the control rooms on a regular basis.
56	B-10.c	Perform a human factors evaluation of the software supporting the maintenance request procedure at the operator level to identify methods of enhancing usability.	Low	Tosco has hired Marshall Tiechert, Inc. to conduct an analysis of Avon refinery's maintenance operations. Tosco has also performed internal audits, reviews, and surveys of maintenance operations. Four committees have been formed to address the recommendations from the Marshall Tiechert analysis. These committees cover planning, scheduling, work execution, and work identification. In addition, job aids at maintenance request terminals are available to provide easily accessible information on procedures	1	None

Table 2 Follow-up Safety Evaluation Findings (continued)

	#	ADL Recommendation	Priority	Assessment of Tosco Action	Status ¹	Comments and Follow-up Actions
				for entering maintenance requests.		
57	B-11.a ²	Review and revise the written roles and responsibilities for unit operators and shift supervisors to ensure they clearly distinguish who is responsible for safe operation of the units, and that they also specify how each person will obtain management assistance whenever help is needed.	High	Tosco has taken three important steps to address this issue. First, they have changed the reporting lines for the shift supervisor so they now report to the Operations Superintendents rather than the Shift Superintendents. This aligns them more closely with the longer term planning, budgeting and work scheduling activities for the units. Second, the shift supervisors have been reassigned to unit areas that best match their prior operating experience. Management does not expect the shift supervisors to be experts in the “process operations” of all units for which they are responsible. Rather, that is the responsibility of the unit operators, the area supervisors, and the area engineers. However, management does recognize that the shift supervisors should be placed in areas for which they have most experience. Third, during the stand down, the shift supervisors were required to train and qualify on selected procedures for all units for which they are responsible. Out of the 23 shift supervisors, 21 have completed this training. The two shift supervisors who have not received the training are on long-term leave. They will receive the training when they return to work.	1	None
58	B-11.b ³	Conduct meeting with lead operator and shift supervisors to clarify operators’ expectations of the type of assistance they will receive from shift	Medium	Tosco is not conducting meetings specifically to address this issue. However, the clarification of responsibilities is being made at the “all employee meetings” and it will be re-iterated at the time of each	1	None

² This recommendation was modified from what was in the original safety evaluation based upon discussions with Tosco. The original recommendation was not clear to Tosco, so the evaluation team worked to improve the recommendation.

³ Ibid.

Table 2 Follow-up Safety Evaluation Findings (continued)

	#	ADL Recommendation	Priority	Assessment of Tosco Action	Status ¹	Comments and Follow-up Actions
		supervisors whenever there is a need for assistance. These meetings should focus on the written roles and responsibilities for the operators and shift supervisor positions.		operator's performance improvement interview (annually). Tosco has a written job description for the shift supervisor that outlines how the supervisor should interact with the operator.		
59	B-12.a-b	Provide more effective methods for communicating economic and financial information relating to Tosco's strategic direction to the workers. (This topic may be included as part of the Safety Summit recommendation discussed above (See B-08)).	Low	Tosco has taken several steps to provide more effective methods for communicating economic and financial information relating to Tosco's strategic direction available to workers. All-hands employee meetings now include regular updates on corporate financial goals and performance. An employee newsletter containing information about corporate financial goals and performance, as well as significant financial news items, is now being published. Tosco held a meeting with PACE union leadership on 11/3/99 to during which a detailed presentation of corporate financial goals and performance was discussed. Tosco also now disseminates significant late-breaking financial news to all employees via email.	1	None
60	B-13.a	Convey any news about impending organizational changes to workers at the earliest opportunity using a range of communication methods (e.g., meetings, Tosco Information Exchange (TIE), bulletin boards, etc.).	Medium	The quarterly employee meetings will be used to convey any news about impending organizational change to the refinery staff. In one of the recent quarterly employee meetings, In addition, the organizational change MOC procedure discussed in recommendation A-12.a includes a section that the health and safety manager is responsible for communicating the results of the MOC process to management and the affected employees.	1	None
61	B-13.b	Develop a policy/procedure to ensure that, prior to worker layoffs, a human	High	As part of the organizational change MOC procedure discussed in recommendation A-12.a, a number of	1	Tosco should consider adding to the organizational change

Table 2 Follow-up Safety Evaluation Findings (continued)

	#	ADL Recommendation	Priority	Assessment of Tosco Action	Status ¹	Comments and Follow-up Actions
		factors workload analysis is conducted to assure that adequate safety can be maintained with reduced personnel.		checklists have been developed that address human factors issues. Examples of the type of human factor issues are the ability of the operator to deal with emergency or upset alarms and response, the ability of operators to monitor critical controls and alarms.		MOC procedure a work load analysis step that addresses how the organizational change will affect the work load of the workers who are affected by the organizational change.
62	B-14.a	Ensure that the procedures that allow refinery workers to identify additional training needs are implemented and encouraged at all levels of the organization. These policies and procedures should include a process that ensures that workers are provided with a formal response to any suggestions for additional training.	High	Tosco performed a survey to identify a wide variety of issues in its training program, including methods to allow and encourage workers to identify training needs. In response to employee requests, Tosco has prepared and disseminate operating procedure job aids that operators and maintenance personnel can carry on their persons and refer to as needed during the course of their job activities. Tosco also worked with PACE to establish a union Training Coordinator position, the purpose of which is to provide the means for assuring that operator and maintenance training requests are addressed. Tosco has developed a formal procedure for operators and other staff to request additional training. Attached with the written procedure is a training request form that can be submitted by any staff member to the training department and their supervisor. Each request is reviewed with the requestor and training is provided or a written response is provided back to the requestor stating the reasons why the training request was not approved.	1	None
63	B-14.b	Discuss perceived deficiencies in training programs and potential solutions as part of the Safety Summit, (see Recommendation B-08), and ensure this is a topic of ongoing communication and discussion between workers and management.	High	While not addressed as part of the Safety Summit, Tosco has addressed perceived deficiencies in training programs and potential solutions in other forums (e.g., Recommendation B-14a). The union Training Coordinator position was established in order to facilitate the identification of deficiencies in training programs and potential solutions, and to ensure that	1	CCHS should follow-up within one year to ensure that training issues are discussed in future meetings modeled on the May 27, 1999 Safety Summit. CCHS should also follow-up within one year to ensure that

Table 2 Follow-up Safety Evaluation Findings (continued)

	#	ADL Recommendation	Priority	Assessment of Tosco Action	Status ¹	Comments and Follow-up Actions
				these areas are topics of ongoing discussion between workers and management.		the union Training Coordinator's inputs are being conscientiously considered and implemented when appropriate.
64	B-15.b	Develop an effective mechanism to convey clear information to workers regarding the timing and justification for reorganizations and other strategic decisions.	Medium	The quarterly employee meeting is the mechanism that the refinery has developed to convey information to workers regarding the timing and justification for reorganizations and other strategic decisions.	1	None
65	C-01.a	Develop a concise, easy to understand and clearly stated safety message. Develop this message with the help of all key stakeholders - including bottom up and top down approaches. Communicate this message to all parties and stakeholders. Develop a means to reinforce verbal communication with written messages that also clearly state the desired theme.	Medium	As part of the Safety Summit a safety vision statement was developed with input from employees across all levels of the organization. This vision statement has been communicated to all employees in the Tosco Update newsletter. The communication plan, discussed in recommendation A-01.c, discuss a number of means to reinforce the safety vision statement. Some of these include discussing the vision statement at the quarterly employee meetings, safety banners, and safety employee awards.	1	See comments and follow-up action for recommendation A-01.c.
66	C-01.b	Appoint a labor/management team to develop a strategy to get more workers involved in bottom-up communication. (See also B-08)	High	A communications committee has been formed that is made up of management and labor representatives. The team has only had a few meetings and has developed a list of possible strategies to improve bottom-up communication. This communication sub-committee has been made a standing safety committee within the plant under the Central Safety Committee. The Central Safety Committee has adopted the communications sub-committee's initial set of recommendations for improving bottom-up communication. These recommendations are currently being implemented.	1	CCHS should conduct a follow-up assessment within one year to determine if the steps implemented by the communications subcommittee have been effective in increasing workers involvement in bottom-up communication.

Table 2 Follow-up Safety Evaluation Findings (continued)

	#	ADL Recommendation	Priority	Assessment of Tosco Action	Status ¹	Comments and Follow-up Actions
67	C-01.c	Consider the development and distribution of a separate safety and health newsletter that emphasizes safety information, including the safety message, safety performance, and lessons learned. Consider the use of refresher training related to safety as a means to reinforce the safety message.	Medium	Tosco has developed and implemented a health and safety newsletter program. The newsletters are issued monthly to all employees. As of the follow-up Safety Assessment, six newsletters have been issued. The newsletter emphasizes safety and health information. One of the newsletters covered near miss reports, and solicited input on possible safety initiatives that would increase awareness and participation in safety. The newsletter also has a section where the Health and Safety Superintendent answer a health and safety question from employees. The newsletter has a section on the “best near miss” report. Each newsletter presents information on the refinery’s safety statistics including near miss statistics.	1	None
68	C-02.a	Stress the importance of safety leadership and visibility to all levels of management. Include this as a goal in setting managers’ annual performance objectives. Ensure that middle management actively participates in the layered safety program to reinforce the importance of safety to all refinery employees.	High	Tosco has initiated a number of “Key Performance Indicators” to assess individual manager’s safety performance. These indicators include factors such as layered safety survey execution, safety meeting attendance and participation, number of recordable injuries observed among assigned employees, and execution of planned general inspections. Monthly assessments are conducted of individual manager’s status with respect to all Key Performance Indicators, and annual performance is now included as a separate factor in assessing annual job performance. Tosco has also stressed the importance of safety leadership at all levels of management as part of its “Leadership Conference” program.	1	None
69	C-03.a	Increase the visibility of the Health and Safety Department and their staffing. Ensure that all refinery workers are aware that Safety Services personnel	High	The Health and Safety Department has added two new staff members who are health and safety specialists. One of the positions deals with field safety issues such as permits and safety orders. The other position is	1	None

Table 2 Follow-up Safety Evaluation Findings (continued)

	#	ADL Recommendation	Priority	Assessment of Tosco Action	Status ¹	Comments and Follow-up Actions
		are on call 24 hours a day to respond to any worker requests for assistance with safety concerns. In collaboration with the represented workers, management should consider adding one or two safety professionals to the Health and Safety Department to serve as a field resource for workers. Evaluate the potential need for a full-time onsite safety professional for night shifts. Consider making changes in the present fire inspector system to increase their visibility and activity in the refinery. As an alternative to increasing safety-staffing levels, an option would be to consider the identification and training of a cadre of existing personnel who would provide a zone or area on-call resource.		focusing on incident investigation tracking, training, and development of the incident investigation program. In addition, as part of the Moratorium Agreement, Tosco agreed to create the position of Safety Inspector, which is a union shift job. Each of the four shifts will have a Safety Inspector. The Union will submit names of candidates for the position, and Tosco will select the individuals to fill the positions. At the time of the follow-up safety assessment, the Union had not submitted the list of candidate names to Tosco. The Moratorium Agreement also included a provision to increase the PACE Health and Safety Representative portion by one position, bring the total to two positions. As part of the training that occurred during the stand down, an effort was made to publicize the availability of existing Health and Safety staff to address issues of the workers. This message has also been reinforced in the monthly Health and Safety Newsletter.		
70	C-03.b	Initiate a comprehensive program to improve the appearance of the refinery and to build pride through effective beautification and housekeeping. Communicate these plans to all refinery personnel. This recommendation follows the general philosophy expressed by Tosco as being "The Workplace of Choice."	Low	Tosco has developed a five-year facility appearance improvement plan for the entire refinery that covers over 300 different projects. A number of the projects cover general clean-up/beautification of the facility. These include development of a master painting scheme for the refinery that includes stacks, tanks and major process equipment, as well as enhancing the aesthetics of existing facilities and buildings. The plan also includes landscaping to increase screening of the refinery in key visual corridors. Some of the painting has been completed and the landscaping is scheduled to occur in the first half of 2000.	1	None
71	C-03.c	Develop a strategic business plan (e.g.,	Medium	Tosco has developed a set of health and safety	1	CCHS will review the strategic

Table 2 Follow-up Safety Evaluation Findings (continued)

	#	ADL Recommendation	Priority	Assessment of Tosco Action	Status ¹	Comments and Follow-up Actions
		over three years) for safety and health with specific objectives and milestones. Publicize the plan and make a public commitment to it.		objectives that will be included in a strategic health and safety plan. This plan has been prepared in conjunction with the safety plan they are developing for CCHS to comply with the Industrial Safety Ordinance. The safety plan is slated for submittal to CCHS on January 15, 2000.		health and safety business plan as part of the County's review of the Tosco's Industrial Safety Ordinance compliance plan.
72	C-03.d	Institute a dialogue between management and represented workers to review the bidding system and to determine whether changes can be made to ensure that bidding does not have a detrimental effect on safety.	High	Tosco and the Union have signed a Moratorium Agreement that is in effect for the duration of the Collective Bargaining Agreement or February 1, 2002, whichever occurs first. As part of the Moratorium Agreement operations employees are required to: a) train, become qualified and work jobs of a higher classification; b) cross-train for jobs across Grouping of Units as shown in Attachment A to the Collective Bargaining Agreement. Operators are also being trained on other jobs within their push-up promotional units while performing their regular duties, provided safe operation of the units is not compromised.	1	Tosco and the Union should consider beginning discussions within the next year on the structure of the bidding units as defined in Attachment A to the Collective Bargaining Agreement, and incorporate any agreed on changes into the new Collective Bargaining Agreement which will be sometime in the year 2002. It should be noted that any change in the bidding structure at the refinery will need to be bargained between the Union and Tosco.
73	CCC-1	Develop a system to improve communications between the operating shift organization and the management and first line supervisors.	--	Tosco has implemented a program of weekly safety meetings lead by shift supervisors for operators. These have been occurring at each of the units. During these meeting safety topics are discussed along with any safety-related issues that are occurring at the unit. In addition, Tosco has daily operations meeting were the management from the refinery met to discuss activities that have occurred over the past 24-hours and what activities are planned for the next 24-hours. The shift superintendents, operations superintendents,	1	None

Table 2 Follow-up Safety Evaluation Findings (continued)

	#	ADL Recommendation	Priority	Assessment of Tosco Action	Status ¹	Comments and Follow-up Actions
				<p>maintenance, health and safety, environmental, etc, attend these meeting. These meetings are run by the shift superintendent and focus on daily operations with the main emphasis being safety issues. They mainly focus on what is occurring at the units in terms of operations and maintenance activities. As the various activities are discussed, input from all the various disciplines (i.e., environmental, health and safety, maintenance, etc.) are solicited. Information from these meeting is discussed with the operators. Tosco has developed new written responsibilities and job descriptions for all the positions in operations. See Recommendations B-11.a and B-11.b. Tosco has formed a communications committee made up of staff from various levels of the organization, including operators. This team will focus on developing ways to improve communications at all levels of the organization. See Recommendation C-01.b.</p>		
74	CCC-2	<p>Develop a system, or foster a culture or philosophy, that encourages management and first line supervisors to seek to recognize situations that they should exercise their responsibility and authority to proactively ensure that these situations are handled in a safe manner.</p>	--	<p>As part of the safety awareness program Tosco has re-enforced the safety message that “We want you to stop if you think it unsafe.” There are a number of banners located around the facility that stress this point and urge workers to seek advise from supervisors if they are unsure or feel it is unsafe. The weekly safety meeting, discussed above for CCC-1, have been used to stress the point that if workers feel there is an potentially unsafe condition, they should stop and get guidance from their supervisor. The quarterly employee meetings have also been used to re-reinforce this message. To date, there have been two of these quarterly meeting for all employees. Tosco has established written goals for each department in terms of the number of general</p>	1	<p>CCHS should conduct interviews and a review of documents within one year to assure that the safety message about stopping work if unsure or unsafe and getting direction from supervisors is still being effectively delivered. CCHS should also conduct a review of the pre-plans developed for a number of projects to assure that the program is being implemented as intended.</p>

Table 2 Follow-up Safety Evaluation Findings (continued)

	#	ADL Recommendation	Priority	Assessment of Tosco Action	Status ¹	Comments and Follow-up Actions
				<p>inspections and layered safety inspection that must be conducted. The layered safety program has also been enhanced. Tosco has hired Dupont Safety Systems to conduct safety and hazard awareness training for all employees (see Recommendation A-09.a). The first training session by Dupont was conducted just prior to the follow-up evaluation fieldwork. Tosco has modified a number of their safety orders such as high energy hot work to require that these jobs have a job specific pre-plan prepared for each job. A supervisor must approve these pre-plans, and have to be modified and re-approved if the plan must be modified due to changes encountered in the field.</p>		

IV. Conclusions

Tosco has implemented all 72 of the recommendations that were developed as part of the initial safety evaluation, as well as the two recommendations that resulted from the Contra Costa Health Services incident investigation.

It must be stressed, that while Tosco has developed and implemented a variety of programs to address the recommendations, these programs will need to remain part of the normal work processes at the refinery for years to come if they are truly going to affect the safety culture. It must be recognized that organizational culture is developed over long periods of time and reflects individual and group values and perceptions of the way the Avon Refinery works, as well as the actual policies, written programs, and procedures. While many of the action items Tosco has implemented have resulted in changes in policies, written programs and procedures, not enough time had passed to assess whether or not they have affected the safety culture at the facility.

A number of the positive steps that Tosco has taken to address the initial safety evaluation recommendations include:

- Quarterly employee and leadership meetings.
- Improved the process for the daily operations meeting where safety issues are now the primary topic. These meetings also focus more on the activities that are occurring at each of the units and input is solicited from each of the disciplines (i.e., environmental, health and safety, maintenance, etc.).
- Clean-up of facility including removal of abandoned equipment, replacement of older equipment, and beautification of the facility.
- Development of written safety goals for each department that are included in the managers' performance review.
- The Health and Safety Newsletter which is sent to all employees on a monthly basis.
- The Standard Operating Procedures workbooks.
- Certification Training for operators.
- Human Factors survey work done for a number of areas at the refinery.
- Safety Summit was felt to be a great success by those that attended.

There are a number of key issues that Tosco should focus on in the next year. These include:

- Discussion with the Union need to begin within the next year on how to restructure the number of bidding units at the refinery to assure adequate operator training across units that are integrally related.
- Continue to emphasize respective roles of shift supervisors and lead operators to reinforce what each party can expect from the shift supervisor.
- Expand on the safety summit program to include more staff and other topics.

In summary, Tosco has made great progress in addressing the recommendations from the initial safety evaluation and the Contra Costa Health Services incident investigation. Management has made it a top priority over the past eight months to develop and implement policies, written programs, and procedures to address all of the recommendations. In addition, it appears that management is committed to working over the long haul to affect a change in the safety culture at the refinery. However, the refinery management will need to be diligent in assuring that the programs, policies and procedures that have been put in place are implemented on an ongoing basis. Without this diligence, the work that Tosco has begun will not be effective at changing the safety culture at the refinery.