

FLAIM JOINT INDUSTRY PROJECT

MINUTES OF MEETING NO. 6

February 18 & 19, 1997

Prepared by

PARAGON ENGINEERING SERVICES

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- Agenda and overheads of meeting
- Safety Assessment of Management Systems (SAMS) Project Correspondence List
- Memo regarding Payments to UCB Personnel
- Method B Safety Management Systems Evaluations - Marine Terminals
- Copy of letter from John Van Meter, Paragon, to Professor Bob Bea, UCB

MEETING MINUTES - February 18 - 19, 1997	MEETING LOCATION: Doubletree Hotel, New Orleans, Louisiana		
	ISSUE DATE: 6/2/97	PROJECT: FLAIM Joint Industry	JOB NUMBER: 95127
	AUTHOR: D.B. McCafferty	REVIEWED BY: Ken Arnold	PAGE: 1 of 1

DISTRIBUTION

Organization

Name, Office Location

American Bureau of Shipping

Dr. William H. Moore, New York

California State Lands Commission
Chevron Technology Corporation
Health & Safety Executive, United Kingdom

Dr. Malcolm Sharples, Houston
Capt. Scott D. Schaefer, Long Beach, CA
Mr. J.S. McNamara, San Ramon, CA
Mr. Derek Pratt, Bootle, Merseyside
Mr. John King, Bootle, Merseyside ENGLAND

Mineral Management Service
National Energy Board of Canada

Dr. Charles Smith, Herdon, VA
Dr. Ibrahim Konuk, Calgary, Alberta, CANADA
Mr. Duncan R. Smith, Ottawa, Ontario, CANADA
Mr. R. Stewart Wood, Bellaire, TX

Texaco

Mr. Donald Rodman, New Orleans, LA

University of California, Berkeley

Prof. Robert Bea

Mr. Derek Hee

Dr. Karlene Roberts

Paragon Engineering Services

Dr. R. Brady Williamson

Mr. Frank Amato, New Orleans

Mr. Ken Arnold, Houston

Mr. Jay Hoyle, Houston

Ms. Denise McCafferty, Houston

Mr. John Van Meter, Houston

File 95127

**FLAIM II Joint Industry Project
MINUTES OF MEETING No. 6
February 18 and 19, 1997**

1.0 MEETING COMMENCEMENT AND ATTENDEES

Discussion led by Denise McCafferty

A meeting was held to discuss the project status of the FLAIM II Joint Industry Project on February 18 and 19, 1997, at the Texaco offices in New Orleans, Louisiana. The meeting began at 1:00 p.m. Tuesday, recessed at 5:00 p.m., reconvened at 8:30 a.m. on Wednesday, and ended at about 5:00 p.m., Wednesday. The Agenda and overhead presentation materials for the meeting are attached to this document. Attendees were as follows:

TUESDAY ATTENDEES

Organization	Representative
California State Lands Commission, Long Beach	Scott Schaefer
Chevron	S.L. Fu
Health and Safety Executive	John King
National Energy Board of Canada	Ibrahim Konuk
	Duncan Smith
Paragon	Denise McCafferty
Texaco	Don Rodman
	Stewart Wood
University of California, Berkeley	Derek Hee

WEDNESDAY ATTENDEES

Organization	Representative
California State Lands Commission, Long Beach	Scott Schaefer
Chevron	S.L. Fu
Health and Safety Executive	John King
National Energy Board of Canada	Ibrahim Konuk
	Duncan Smith
Minerals Management Service	Charles Smith
Paragon	Denise McCafferty
	Ken Arnold
Texaco	Stewart Wood
University of California, Berkeley	Derek Hee

2.0 REVIEW OF AGENDA AND BUDGET INFORMATION

The meeting was opened by Denise McCafferty with a discussion about the plan for the day. The Technical Advisory Committee members expressed the desire to amend the agenda due to the fact that Don Rodman would like to provide feedback to the Committee on the Year 1 Report and that he would not be able to attend the meeting on Wednesday. The following topics and time-frames were established as a framework for the Tuesday meeting:

- Budget Discussion 1:30 - 2:30 pm
- Comments on Year 1 Report 2:30 - 3:45 pm
 Sections 1 -- 5
- Comments on Report Section 6 3:45 - 5:00 pm

Denise McCafferty presented data concerning expenditures for the project. This information is included in the overheads attached to these meeting minutes. A few questions arose about the payments made to University of California at Berkeley (UCB) personnel. Denise took an action item to further investigate what payments have been made and the totals for those payments. Derek Hee agreed to assist by checking his records of payments and would ask the professors to do the same. However, certain facts were established and presented. Paragon Engineering Services had sent 4 sets of invoices to FLAIM Sponsors and three sets of payments had been received. For the fourth set, all but two of the seven members had paid prior to the meeting (that is, with California State Lands Commission and American Bureau of Shipping being the outstanding invoices). The personnel at UCB had been sent payments for the first three sets of invoices, however funds were owed for an additional portion of fees. The original payments were provided based on six FLAIM Sponsors. Since National Energy Board of Canada had recently joined the project, an additional percentage would need to be forwarded to UCB personnel.

3.0 DISCUSSION ON YEAR 1 REPORT

Discussion by Tuesday participants

An open discussion was conducted amongst all present concerning the Year 1 FLAIM Report. The following text is a summation of the major points of that discussion.

Stewart Wood felt that the report does describe the methodologies that were developed during the project. However, he believed the report could be enhanced by adding a section that introduces the idea of two methods and text that would emphasize that there is no one right way to conduct such analyses.

John King stated that throughout the project there have been good brains looking at this and it has been proven there is no right method. HSE has recognized this and allows for different approaches to safety management by their operators in the North Sea.

Ibrahim Konuk felt the report does not provide sufficient background and it does not introduce the problem that the project is trying to address. He also believes that reference should be made in the report to the difficulty that organizations might encounter when creating assessment methodologies for risk and for safety management.

The discussion changed at this point with the Sponsors reflecting on the initial and subsequent purposes of the project. S.L. Fu asked the group the following questions: What is the objective of the project? How, as a project, have we gotten to this point? He reiterated that FLAIM I looks at fire and life safety, and that originally it was his understanding that we wanted to combine FLAIM I with the thought processes included within API RP75. He felt that during the project too much time was spent discussing risk assessment. He believes that risk assessment should not be the objective of our project and this emphasis may have caused a split in the thinking during the project.

S.L. Fu continued to comment on his experience with the project. He stated that he believed that significant results came out of the development of the Minimal Basic Question set. He saw this set of questions as good because it looked across different regulations and yet included human and organizational factors concerns. As far as the methodology developed at UCB, he did not like the approach used for the evaluation of the Areas of Concern. S.L. believed that any further investigations into concerns (after applying the Minimal Basic Question set) should focus on Safety Management Systems rather than focusing on the facility or equipment in the facility. He asked the group: What is it we are trying to evaluate? In his opinion, through the FLAIM project the methodology should evaluate physical elements, Safety Management Systems, and Human and Organizational Factors.

The group then began to discuss their opinions of the materials developed to date. Scott Schaefer stated that he did not believe in the Areas of Concern approach but that he is happy with the Minimal Basic Question approach.. S.L. responded that the Minimal Basic Questions will provide an organization with an evaluation and the Areas of Concern and other factors are not needed. Scott responded that he will use the detailed criteria in the Safety Management System Evaluation Tool to do further investigations.

John returned the group discussion to more philosophical issues and asked how does one know if he or she is concentrating on the wrong things? He felt that such uncertainty may be a result of the tendency to focus on evaluating the physical aspects of facilities.

Ibrahim stated he would like to have Don Rodman and Stewart Wood's opinion about what should be the focus of the project. He believed that a project of this modest size can do different things. We could have a checklist. He felt we have tried to derive numbers with the Gamma Knife. He does not believe deriving numbers should be a goal. Maybe we should try a simple decision analysis. Another alternative, he suggested, would be to compile a

section on the big picture, the problem, what has been done up to this point, and not concentrate on furthering methodology with the remaining project budget.

As far as where the future of the project and the expenditure of project money should be allotted, the following comments were made. Don Rodman felt that the risk assessment portion is not useful to Texaco as an operator. He believes MMS is looking for a tool to help identify problems in the Human and Organizational Factors area rather than a tool related to classical risk assessment. Ibrahim felt that Chapters 1 and 2 of the Year 1 Report need to have elaboration to provide the sponsors with detailed and useful information and thus these should be included as future tasks

Discussion occurred about what the Sponsors believe had been gained by them and their organizations during the project. John stated that he felt we were trying to get at a generic audit system. But, also we learned a lot through the project. The value of the project to HSE is the thinking process. Don said Texaco's awareness of Human and Organizational Factors has changed in the last year as a result of their involvement in the project.

As the discussion returned to where future efforts should be for the project, Ibrahim questioned what tools already exist beyond acronyms and stated that these need to be further explained in the Final Report text. S.L. feels that everyone is happy with the Minimal Basic Questions. These seem to cover Human and Organizational Factors. He recognized that UCB has made efforts to provide additional information beyond the points in the Minimal Basic Question by providing Organizational Factors and Operating Team Factors. His question to the group was, "Do we believe both methodologies work?"

In response to this question, various people provided opinions. Stewart's response was that depending on whom you ask you will get different opinions. Don felt that Texaco can say

these are two valid methodologies. Denise believed that the two methods accomplished different things. Don said that as a result of the project, there are two methodologies that can be used by Project Sponsors.

The discussion moved to considering whether field testing of the methodologies was possible and whether it would prove beneficial to the Sponsors. John did not think we can provide a sufficient test in the time allotted for this project. Don felt that all testing would allow some tweaking of the two methods but not necessarily new insights that could lead to improvements. Ibrahim felt that testing for the sake of testing to validate would not work.

The purpose of the assessment tools was then discussed by the group. Don responded that the ideas about the use of the tools have changed over time. The industry and MMS are not looking for a short form of risk assessment. John King said that in his opinion the methodologies developed are not likely to be used by regulatory agencies.

4.0 DISCUSSION ON IMPROVEMENTS FOR THE FINAL REPORT

(Get away from FLAIM name)

Presentation by Denise McCafferty

The initial point of discussion in this section of the meeting was the desire to change the project name. Project Sponsors elaborated about what we should call the project. Since the scope of the project has change so greatly over time and the project had moved away from the initial idea that Bill Gale's FLAIM work would be field tested it seemed appropriate that the project find a new title.

As far as the material that should be included in the Final Report, Denise questioned whether a clear objective or set of objectives is actually stated in the Year 1 Report. The group decided that we, the project, need to state objectives for each tool and mention there are two

methods, with similarities and differences in each method, put all this in front, and then come up with names for each method.

Other pertinent points were that sponsors made concerning the Final Report were the need to:

- Reorganize the report contents so the material is more logical, comprehensible and readable
- Take out references to UCB and Paragon
- Mention that the Sponsors felt a generic assessment system for platforms and marine terminals is needed by industry and government

It was emphasized that as a Project, we need to forget the history and just talk about what we are doing and explain it within the scope of the project via the Final Report. It became apparent that a letter needs to be provided to S.L. to explain that the scope of the project has been changed.

Since Scott stated that CSL intends to take the products of the project to evaluate 80 terminals in California and they would like UCB to provide a section on how to train assessors. The topics they feel they would need elaboration and training material for in the Final Report to meet this need would be:

- Learning objectives
- How to assess 1-7
- Physical Qualities for marine terminals

- Safety Management Systems - modified Basic Minimal Questions to apply to terminals
- Detailed criteria in questions.

In response to Scott's statement, Don stated his support for the further development of material for the assessment of marine terminals. He also supported the idea of developing training materials for this if the budget allowed.

5.0 ISSUES FOR WEDNESDAY AND SYNOPSIS OF TUESDAY

Discussion led by Denise McCafferty

The Tuesday portion of the meeting ended with the identification of topics to be discussed the following day. These included:

- Field Testing? Should it occur?
- Whether to change front end of the report to introduce the history and options available. How do we get here? Write a basis for this project/effort.
- Prioritize remaining tasks and ideas for tasks -- What do we want to do next? Should additional efforts be made for marine terminals to bring the tools for evaluation in line with those provided for terminals?
- Should we include definitions in the document and give a copy of the report on disk in Microsoft Word format when delivering the Final Report?.

A synopsis of Tuesday's discussions was also developed before the meeting was adjourned. These were as follows:

1. Provide new chapter at the beginning of the report:

- Objective of project
 - Result was two methods (amongst the many that were developed)
- Objectives of both techniques
- Elaborate on what other approaches (tools) have been used
 - Interviews with other companies?
 - Workshop with invited speakers
- Show through writing that this is a difficult problem (we further proved this fact)
- Take out reference to UCB and Paragon in report (be positive)

2. Initial Objective for Wednesday Meeting:

- Prioritize what is to be done and stay within budget

3. Provide review of Tuesday's discussions including budget, progress reports, and decisions to be given on Wednesday.

6.0 WEDNESDAY ISSUES

Discussion led by Denise McCafferty

The meeting was opened by Denise McCafferty with a discussion about the plan for the day. The following topics and time-frames were established as a framework for the Wednesday meeting:

- Prioritizing Future Tasks 11:00 am - 12:00 noon
- Prioritize And Set Time Line 12:45 pm - 3:30 pm
- Meeting 3:30 pm - 4:30 pm

After a brief review of the material presented to the Sponsors on Tuesday and a review of outstanding issues from the discussions on Tuesday, the meeting was opened up for comments about the project and its direction. Charles Smith felt the point of the project was to take onshore techniques and apply them to a similar problem offshore. He is unsure whether this objective has been met. Scott made a request about an outcome he would like to see from the project. CSL recently had people go through training with UCB on the topic on human and organizational factors and would like a training outline like Professor Bob Bea used recently to be included within the Final Report of the SAMS Project.

At this point, Denise reminded the Sponsors that it was very important that we prioritize, as a group, what we want for the future for the project including whether we wanted to provide a training write-up on the topic of HOF for the California State Land Commission.

Charles shifted the discussion to state that he would like information and feedback from the Operators if they use these methods. He questioned whether a project task should be to conduct interviews with the Project Operating companies and other Operators about what

types of HOF and SMS evaluations they currently conduct. He felt that such process could help to meet MMS's needs for information about what industry is doing in these areas. Ken Arnold questioned whether this could fall within Peter Velez's efforts now on SEMP. Charles stated that he feels the whole area of performance measures and HOF is current and therefore worth considering as an area of inquiry for the project.

7.0 INITIAL DECISIONS ON WEDNESDAY AFTERNOON

Discussion led by Denise McCafferty

Through discussion, some initial decisions about the future of the project were made. These included:

- No, field testing will not add value of validity
- Beef up coverage of marine terminals with Paragon's method to make comparable to platforms
- Revisit financing and include determining fair compensation for UCB
- Include definitions in report
- Provide report on diskette (Word)
- Visit confidentiality clause
 - Check with ABS, Texaco, Chevron
 - Place statement on cover for period of confidentiality (Stewart Wood {Texaco} by March 1, 1997)
- New project name needed (to Bill Gale's relief!)
- New name for two methods

- In first chapter, discuss similarities and differences in two approaches
- Reorganize report to be more “user-friendly”
- Forget history -- just say what we did

8.0 MATERIAL TO BE INCLUDED IN CHAPTER 1

Discussion led by Denise McCafferty

As the discussions continued, the Project Sponsors stressed that one deficiency of the Year 1 report was that the text did not really convey the “BIG PICTURE” or an overview of the Project. They stated material is need for the Final Report that defines the scope of the project, objectives of the project, and something that introduces the fact that as a result of the project two methods were developed. The chapter would also introduce those methods. To better define the expectations of the Sponsors for this newly defined chapter, a flip chart was set up and an outline for the chapter was worked up. The points from that outline, as agreed by all present, are presented in numbers 1, 2, 3, 4, and 5 below. Items that were later modified or deleted are shown but crossed out.

1. Objective;

- a. To develop a generic Safety Management assessment method ~~concentrated on process safety, including Safety Management Systems~~ that looks at hydrocarbon risks. It was within the scope to ensure HOF was part of SMS approach.
- b. The arena for evaluations was platforms and marine terminals. This ~~tool~~ project did not concentrate on risks associated with traditional safety concerns (backs, fingers, etc.)

- c. Other approaches:
 - interviews

2. Define risk, assessment
 - Discuss the importance of concepts like probability of failure
 - Risk has many meanings
 - Qualitative measures and approaches for defining probability of failure
 - Quantitative measures and approaches -- probability of failure combined with the consequence of failure results in a number or value being assigned to represent risk.

3. Discuss types of tools that were evaluated during the project. These should include:
 - QRA
 - HAZOPs
 - SMS
 - FLAIM I
 - CCPS
 - RP 75
 - MANAGER
 - Petersen's Work
 - Bird's Work

4. For each of the tools listed above, outline the following:
 - What is the theory?
 - How is it applied?
 - Why is this tool rejected as a model for our project?

5. Clarify about SMS and how it relates to engineering controls. Also discuss how HOF is included in SMS. Denise will include a practitioner's view of techniques.

Denise offered the following questions about SMS as being important and which should be given answers in the report itself: What is it? What does it do? She also discussed the similarities and differences of the two methods presented in the Year 1 report and how this information should be presented in the Final Report.

During further discussion about the new initial chapter to be included in the report, the Sponsor agreed that the text should introduce the methods we have developed during the project and that to accomplish this both UCB and Paragon should write a paragraph outlining their views and later, Denise should compile and edit these for the report. Also, Sponsors conveyed that the initial chapter should include text about the similarities and differences of the two methods with UCB and Paragon to drafting versions of this and Paragon compiling the final version.

At this point, the discussions included consideration of Charles Smith's request that interviews be conducted with Operating companies about their approaches to risk assessment

and safety management, but it was decided that this task would not be included within the scope of SAMS.

Other changes to the Year 1 report were:

- For the text in the Year 1 Chapter 2, it was decided to flip the numbers (or scoring) on MBQ scores. (from 1-7, to 7-1)
- For the text currently in Chapter 4 of the Year 1 Report, provide a bridge between Physical Qualities and Safety Management System with text to explain how the two can be used together for making determinations about safety at a facility.

9.0 CANDIDATE TASKS FOR FINALIZING WORK ON PROJECT

Discussion led by Denise McCafferty

At this point in the meeting, candidate tasks relating to the future of the project were defined. These are summarized in the bulleted list below:

- Writing initial chapter --
- Reorganize current material and make positive
- Training outline for both methods (key and generic material described under CSL tasks)
- ~~Recommendations~~
- Findings and Conclusions

- Guidance document for P-method
- Final meeting -- 1 day Symposium
- CSL
 - Training outline based on UCB material
 - Physical Qualities
 - Customize SMS material
 - Detailed criteria into question form

10.0 DECISIONS ON TASKS TO FINALIZE PROJECT AND PRIORITIES ASSIGNED TO TASKS

Discussion led by Denise McCafferty

The final decisions reached at the February meeting were as follows:

1. Writing initial chapter: Include material listed in following bulleted points
 - **BIG PICTURE** Scope, objectives, introduce our methods
 - Other approaches to problem including risk assessment approaches, HAZOPs
 - Discussion was held on conducting interviews with organizations about other approaches but this was rejected during the discussions
 - Material to be included about Safety Indexing Methods and Safety Management System evaluation approaches and the discussions should answer the following questions:

- What is it?
 - What does it do?
 - Similarities and differences of two methods developed during this project

- 2. Reorganize current material and make positive

- 3. Findings and conclusions

- 4. Task to support Cal State Lands and further develop marine terminals efforts
 - Training outline based on UCB material
 - Physical Qualities
 - Customize SMS material
 - Detailed criteria into question form

- 5. Final meeting -- 1 day Symposium by invitation
 - Fifty (50) participants
 - Hold two meetings: one in California, one in Houston
 - Target Date for Houston meeting -- December 1997 and perhaps link with SPE
Advanced Technology Workshop

Rejected Tasks

- Training outline for both methods (key and generic material described under CSL tasks)
- Recommendations
- Guidance document for P-method

11.0 TARGET DATES FOR TASK COMPLETIONS

Discussion led by Denise McCafferty

Denise's CSL visit for Marine Terminals SMS Evaluation Questions	April 15
Finalize Marine Terminals/CSL Evaluation Tools (Paragon)	Mid-June
Initial Draft Materials due to Paragon from UCB	July 15
Training Outline developed by UCB due to Paragon	Aug. 1
Draft Final Report to Sponsors	Aug. 15
Comments due back to Paragon from Sponsors on Final Report	Sept. 15
UCB Materials for resolving Final Report Comments due to Paragon	Oct. 10
Final Report due to Project Sponsors	Oct. 31



FLAIM II Project Meeting

February 18th & 19th, 1997

Paragon Engineering Services, Inc.

Meeting Agenda - Tuesday



-
- **Tuesday February 18th**
 - 1:00p Opening of Meeting
 - 1:30p Review of Budget
 - 3:00p Break
 - 3:15p Comments on Report
 - 4:30p Wrap Up for Day
 - 5:00p End Day 1

Paragon Engineering Services, Inc.

Meeting Agenda - Wednesday



-
- Wednesday February 19th
 - 8:30a Assemble
 - 9:00a Review of Day 1
 - 9:30a Comments on Report
 - 10:15a Break
 - 10:30a Comments on Report
 - 12:00n Lunch
 - 1:00p Way Forward
 - 3:00p Break
 - 3:15p Way Forward
 - 4:00p Conclusions

Paragon Engineering Services, Inc.

Invoices To Date



-
- Four (4) sets of invoices sent to initial six participants on the following dates:
 - November 15, 1995
 - April 2, 1996
 - August 2, 1996
 - November 4, 1996
 - Invoice sent to NECB on November 26, 1997 for \$30K

Paragon Engineering Services, Inc.

Receipts to Date



-
- To date, all invoices paid with the exception of three November invoices to Chevron, CSL, MMS
 - Receipts to date equal \$240K
 - Outstanding amount equals \$30K

Paragon Engineering Services, Inc.

Future Invoices



-
- Future invoices to be sent to original 6 participants on:
 - March 1, 1997
 - at Final Report
 - Final invoice to NECB to be sent for \$ 30K on March 1, 1997
 - To be invoiced amounts equal \$ 150K

Paragon Engineering Services, Inc.

Paragon Expenditures to Date



-
- Database
 - 302.50 hours \$ 12,100.00
 - Engineering
 - 2951.00 hours \$ 247,343.75
 - Technical/Support
 - 646.00 hours \$ 22,187.00
-
- TOTALS \$ 281,630.75
(3899.50 hours)

Paragon Engineering Services, Inc.

Highlights of Paragon Expenditures



Employee	# of Hours
• Denise McCafferty	1114.0
• Owen Tibbets	1258.5
• Hokan Linden	302.5
• John Van Meter	181.0
• David Arnold	167.5
• Jay Hoyle	138.5

Paragon Engineering Services, Inc.

Paragon's Reimbursement



• Totals	\$ 281,630.75
• Reimburse d	\$ 67,247.00
<i>Paragon Contribution</i>	
<hr/>	
• New Total	\$ 214,383.75

Paragon Engineering Services, Inc.

Payment Agreement with UCB by Year



• With seven (7) participants:	
– RG Bea	\$ 11,250.00
– KA Roberts	\$ 7,250.00
– RB Williamson	\$ 3,500.00
– DD Hee	\$ 24,000.00
<hr/>	
– TOTAL	\$ 46,000.00

Paragon Engineering Services, Inc.

Payment Agreement with UCB for Project



- With seven (7) participants:

– RG Bea	\$ 22,500.00
– KA Roberts	\$ 14,500.00
– RB Williamson	\$ 7,000.00
– DD Hee	\$ 48,000.00

– TOTAL	\$ 92,000.00
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Paragon Engineering Services, Inc.

Payments to UCB



- Payments to Date

– RG Bea	\$ 21,893.87
– KA Roberts	\$ 7,285.72
– RB Williamson	\$ 9,000.00
– DD Hee	\$ 25,254.25

– TOTAL	\$ 63,254.25
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- UCB will not be paid fixed amount from November invoices until all payments are received

Paragon Engineering Services, Inc.

Payments to UCB
(continued)



-
- Derek Hee is paid every two weeks for tax purposes
 - Professors are paid once Paragon receives all payments from Sponsors
 - To date, Professors and Derek only paid in accordance with payment schedule for six participants
 - Special pay arrangements between RG Bea and Derek Hee

Paragon Engineering Services, Inc.

Total Expenditures to Date



• Paragon	\$ 281,630.75
• UCB	\$ 63,433.84
• Expenses	\$ 19,291.66
<hr/>	
• Subtotal	\$ 364,356.25
• Reimburs't	\$ 67,247.00
<hr/>	
• TOTAL	\$ 297,109.00

Paragon Engineering Services, Inc.

Budget versus Expenditures



• Total Budget	\$ 420,000.00
• Expenditures	\$ 297,109.25

• Remaining	\$ 122,890.75
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(Please note expenditures covers period from May 95 through February 9, 1997)

Paragon Engineering Services, Inc.

Highlights



-
- Paragon has spent \$ 30K since December 1, 1996 until February 9, 1997 in Engineering Fees
 - Synopsis
 - Received \$ 240 K
 - Billed \$ 270 K
 - Spending -\$ 27, 109.25

#280 up to 4th
Invoice w/
Canada
included

Paragon Engineering Services, Inc.

Safety Assessment of Management Systems (SAMS) Project Correspondence List - (formerly FLAIM II)

Table 1: Project Sponsors

Name and Job Title	Organization & Address	Phone & Fax Numbers	E-mail Address
Dr. William Moore Consultant, Technology	American Bureau of Shipping Two World Trade Center, 106th Floor New York, NY 10048	(212) 839-5143 (Tel) (212) 839-5130 (Fax)	wmoore@eagle.org
Dr. Malcolm Sharples Vice President Technology & Business Development	American Bureau of Shipping ABS Plaza 16855 Northchase Drive Houston, TX 77060-6008	(713) 873-0700 (Main) (713) 874-6513 (Direct) (713) 874-7514 (Fax)	msharples@eagle.org
Mr. J.S. McNamara	Chevron Petroleum Technology Company Offshore Structures 6001 Bollinger Canyon Road L3110 PO Box 5045 San Ramon, CA 94583	(510) 842-8514 (Tel) (510) 842-8626 (Fax)	mcjh@chevron.com
Mr. Shein-Liang Fu (replaced by McNamara) Engineering Advisor	Chevron Petroleum Technology Company Offshore Structures 6001 Bollinger Canyon Road PO Box 5045 San Ramon, CA 94583	(510) 842-8170 (Tel) (510) 842-8626 (Fax)	sfsf@chevron.com
Mr. John King Operations Manager	Health & Safety Executive Offshore Safety Division Operations Branch Room 425, Merton House Stanley Road, Bootle Merseyside L20 3DL UNITED KINGDOM	011 44 151 951 3107 (Tel) 011 44 151 951 3158 (Fax)	@hse.gov.uk
Mr. Derek Pratt Health & Safety Executive	Health & Safety Executive Offshore Safety Division Operations Branch Room 425, Merton House Stanley Road, Bootle Merseyside L20 3DL UNITED KINGDOM	011 44 151 951 4000 (Tel) 011 44 151 951 3098 (Fax)	
Dr. Charles Smith Research Program Manager Offshore Minerals Management	Minerals Management Service Technology Assessment and Research Branch 381 Elden Street, MS 4700 Herndon, VA 22070-4817	(703) 787-1559 (Tel) (703) 787-1555 (Fax)	smithc@smmp.mms.gov

Safety Assessment of Management Systems (SAMS) Project Correspondence List - (formerly FLAIM II)

Name and Job Title	Organization & Address	Phone & Fax Numbers	E-mail Address
Dr. Ibrahim Konuk Supervising Engineer	National Energy Board Engineering Branch 311-6th Avenue SW Calgary, Alberta T2P 3H2 CANADA or 1502 Markland Street Columbus, OH 43235	(403) 292-6911 (Tel) (403) 292-5876 (Fax)	75144.1015@compuserve.com konuibra@neb.gc.ca
Mr. Duncan R. Smith Advisor, Hydrocarbon Resources	Natural Resources Canada Frontier Lands Management Division 580 Booth Street, 17th Floor Ottawa, Ontario K1A 0E4 CANADA	(613) 992-1001 (Tel) (613) 943-2274 (Fax)	duncan.smith@es2.es.emr.ca
Mr. Martin L. Eskijian Senior Engineer, Petroleum Structures	State of California California State Lands Commission 330 Golden Shore, Suite 210 Long Beach, CA 90802-4246	(310) 499-6312 (Tel) (310) 499-6317 (Fax)	eskijim@slc.ca.gov
Mr. Kevin Mercier Asst. Division Chief	State of California California State Lands Commission 330 Golden Shore, Suite 210 Long Beach, CA 90802-4246	(310) 499-6312 (Tel) (310) 499-6317 (Fax)	merciek@slc.ca.gov
Capt. Scott Schaeffer Supervisor	State of California California State Lands Commission 330 Golden Shore, Suite 210 Long Beach, CA 90802-4246	(310) 499-6312 (Tel) (310) 499-6317 (Fax)	schaefs@slc.ca.gov
Mr. Don Rodman Environmental Health and Safety Manager	Texaco Exploration and Production Inc. Offshore Division PO Box 60252 New Orleans, LA 70160 0252 OR 400 Poydras Street New Orleans, LA 70130 3245	(504) 593-4688 (Tel) (504) 595-1417 (Fax)	rodmadl@texaco.com

Safety Assessment of Management Systems (SAMS) Project Correspondence List - (formerly FLAIM II)

Name and Job Title	Organization & Address	Phone & Fax Numbers	E-mail Address
Mr. R. Stewart Wood Process Specialist Technology Division	Texaco Inc. Offshore Engineering Department 4800 Fourmace Place Bellaire, TX 77401-2324 or PO Box 430 Bellaire, TX 77402-0430	(713) 432-3218(Tel) (713) 432-3290 (Fax)	woodrs@texaco.com

Safety Assessment of Management Systems (SAMS) Project Correspondence List - (formerly FLAIM II)

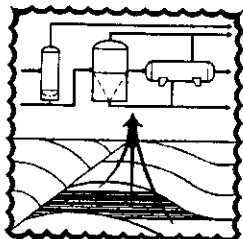
Table 2: University of California, Berkeley Staff

Name and Job Title	Organization & Address	Phone & Fax Numbers	E-mail Address
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	Home: 60 Shuey Drive Moraga, CA 94556	(510) 631-1587 (Hm)	
Mr. Derek Hee Graduate Student Researcher	University of California Department of Civil Engineering 215 McLaughlin Hall #1712 Berkeley, CA 94720-1712	(510) 642-5672 (Tel) (510) 643-8919 (Fax) (510) 642-0735	ddhec@uclink2.berkeley.edu
	Home: 2136 Santa Clara Ave. - Apt. E Alameda, CA 94501	(510) 748-0383 (Home)	derekhee@aol.com
Dr. Karlene Roberts Professor	University of California Haas School of Business 545 Student Services Bldg., #1900 Berkeley, CA 94720-1712	(510) 642-5221 (Tel) (510) 642-4700 (Fax)	karlene@haas.berkeley.edu
Dr. R. Brady Williamson Professor of Engineering Science	University of California Department of Civil and Environmental Engineering Fire Safety Engineering Science 773 Davis Hall Berkeley, CA 94720-1710	(510) 642-5308 (Tel) (510) 525-3009 (Fax)	williamson@ce.berkeley.edu

Safety Assessment of Management Systems (SAMS) Project Correspondence List - (formerly FLAIM II)

Table 3: Paragon Engineering Service, Inc. Staff

Name and Job Title	Organization & Address	Phone & Fax Numbers	E-mail Address
Mr. Frank Amato	Paragon Engineering Services 150 James Drive East, Suite 170 St. Rose, LA 70087	(504) 463-5632 (Tel) (504) 467-7400 (Fax)	famato@paraengr.com
Mr. Ken Arnold President	Paragon Engineering Services 13939 Northwest Freeway, Suite 121 Houston, TX 77040-5196	(713) 462-8828 (Tel) (713) 462-6524 (Fax)	kamold@paraengr.com
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PARAGON
ENGINEERING SERVICES
INCORPORATED

13939 NORTHWEST FREEWAY
SUITE 121
HOUSTON, TEXAS 77040
TELE: 713/462-8828
MAIN FAX: 713/462-6524

INTEROFFICE MEMO

DATE: May 21, 1997
TO: Rene Singleton
FROM: Jay Hoyle *JH*
SUBJECT: **Payments to UCB Personnel**
PES Job 95127

Please make payments to the personnel as follows for the FLAIM Joint Industry Project:

Robert G. Bea	\$3,750.00	For 3/97 Participant invoices
Karlene Roberts	\$2,416.67	For 3/97 Participant invoices
Robert Brady Williamson	\$1,166.67	For 3/97 Participant invoices

xc: JVM, DBM, JTH, file

cc: DBM
KEA
JVM

FLAIM JOINT INDUSTRY PROJECT

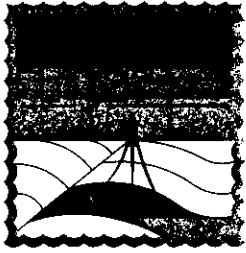
**PROJECT ACCOUNTING
CURRENT PERIOD**

APRIL 1, 1997 THROUGH MAY 4, 1997

Item	Current Period		Project-to-Date			Project Budget
	Invoices	Receipts	Charges	Invoices	Receipts	
Participants Invoiced 11/15/95				\$ 60,000	\$ 60,000	
Participants Invoiced 4/2/96				\$ 60,000	\$ 60,000	
Participants Invoiced 8/2/96				\$ 60,000	\$ 60,000	
Participants Invoiced 11/01/96		\$ 20,000		\$ 60,000	\$ 60,000	
Canadian NEB Invoiced 11/26/96				\$ 30,000	\$ 30,000	
Participants Invoiced 3/6/97		\$ 90,000		\$ 90,000	\$ 90,000	
Univ. California Payment for Services			\$ 8,476			\$ 92,000
Paragon Charge for Services			\$ 7,090			\$ 230,000
Direct Expenses			\$ 162			\$ 28,000
Consultants (including expenses)						\$ 70,000
Paragon Contribution (Charges not billed)						\$ (67,247)
Total	\$ 0	\$ 110,000	\$ 15,728	\$ 360,000	\$ 360,000	\$ 420,000

Notes:

(1) Paragon Contribution reflects charges absorbed by Paragon primarily in promotion and development of the FLAIM Project; these charges are beyond the budget and have not been reimbursed by the Project.



PARAGON

ENGINEERING SERVICES
INCORPORATED

13939 NORTHWEST FREEWAY
SUITE 121
HOUSTON, TEXAS 77040-5196
(713) 462-8828
FAX (713) 462-6524

June 3, 1997

SAMS (FORMERLY FLAIM II) SPONSORS AND PARTICIPANTS:

Reference: Paragon Job Number 95127

Enclosed for your information, please find a draft copy of the New Marine Terminals Safety Management Systems Questionnaire.

A handwritten signature in cursive script that reads "Kim Colt". The signature is written in black ink on a white background.

Kim Colt for Denise McCafferty

cc: FILE 95127

**Table 4.5.2.2a, Method B Safety Management Systems Evaluation - Marine Terminals
General and Detailed Questions
Management and Organizational Issues**

General Sub-Categories	General Questions	Detailed Questions
1. Safety & Environmental Policies	Do both a written safety policy and a written environmental policy exist, are these policies endorsed by upper-level management and widely distributed, and are employees generally aware of and follow the policies' contents? (Bird & Germain; Petersen; Harrison)	<ul style="list-style-type: none"> • Are the safety and environmental policies reviewed and updated? • Are the revisions distributed and employees made aware of the fact that the policies have been revised? • Does the environmental policy include a commitment to environmental loss control and environmental protection, and is it reviewed annually? • Do these policies include a commitment to Human Factors? • Are safety meetings required and held on a regular basis, and do these meetings address any changes in the contents of the policies, environmental issues, and Human Factors issues?
2. Safety & Environmental Culture	Are assessments conducted for safety behaviors, environmental knowledge, and attitudes at all organizational levels, e.g., clerical, management, operations, and any other personnel? (Krause, Hidley & Hodson; Geller; Harrison)	<ul style="list-style-type: none"> • Do company audits require an audit of the safety and environmental management systems? • Is there evidence of a long-standing process safety and an environmental loss control management program, e.g., documentation?
3. Management Structure Includes Health, Safety and Environmental Issues	Has the company established a management structure that clearly sets forth responsibilities for health, safety, and environmental issues and ensures that people with overall accountability do not have conflicting objectives (e.g., safety or environmental versus production)? (Bird & Germain; Petersen; Harrison)	<ul style="list-style-type: none"> • Is there a Joint Safety Committee in existence with representation from both hourly and management personnel? In addition, does this committee review environmental issues? • Is there an individual who reports to top management regarding health, safety, and environmental issues? • Are the safety and environmental functions independent from the inspection functions? • Are safety and environmental objectives set yearly and tracked on an ongoing basis, and is this data made available to all levels of personnel? • Does a training department exist that includes someone directly responsible for training in safety and environmental-related issues?
4. Management Responsibilities and Accountability for Safety and Environmental Concerns	Does each individual manager's performance review include safety, environmental and loss control issues as a major component of the assessment? (Petersen; Harrison; Bird & Germain)	<ul style="list-style-type: none"> • Do managers have objectives for safety, environmental and loss control, and are these managers held accountable for the safety performance, environmental issues, and loss control, and conformance to safety and environmental regulations of their team?

**Table 4.5.2.2a, Method B Safety Management Systems Evaluation - Marine Terminals
General and Detailed Questions (continued)
Management and Organizational Issues (continued)**

General Sub-Categories	General Questions	Detailed Questions
5. Management Monitoring for Health, Safety, and Environmental Issues	Does the company ensure that periodic audits and reviews occur for safety and environmental statistics, measures, and job descriptions; and that the results are discussed at management meetings? (Bird & Germain; Petersen; Harrison; CCPS; Krause, Hidley & Hodson)	<ul style="list-style-type: none"> • Do management meeting agendas include a discussion of health, safety, and environmental issues? • Does management review both safety and environmental studies and statistics? • Does management ensure that job descriptions do not have conflicts between the objectives of the position and the safety and environmental requirements of that position? • Is there a formal method for reviewing the effects of organizational changes?
6. Resources Exist for Health, Safety, and Environmental Issues	Does the company designate safety and environmental personnel within the organization and provide funding for such positions and for both safety and environmental studies, audits, and equipment? (Bird & Germain; Petersen; Harrison)	<ul style="list-style-type: none"> • Do safety and environmental personnel exist, and do these persons have human and organizational factors expertise and knowledge of environmental issues and loss control? • Are budgets set aside specifically for safety and environmental conformance, including resources for programs, studies, staff, equipment, and any additional training required to comply with safety and environmental regulations?
7. Defined Communications Channels for Safety and Environmental Concerns	Has the company established a formal means for personnel to report safety concerns or potential environmental hazards? (Geller; Harrison)	<ul style="list-style-type: none"> • Are company personnel informed of who to report either safety or environmental concerns and ideas, problems, and difficulties to beyond their immediate supervisors? • Are records maintained when safety or environmental concerns are reported? • Is there a formal follow-up method to reply to an employee concern and is it documented?

**Table 4.5.2.2a, Method B Safety Management Systems Evaluation - Marine Terminals
General and Detailed Questions (continued)
Management and Organizational Issues (continued)**

General Sub-Categories	General Questions	Detailed Questions
<p>8. Safety Manuals and Environmental Information</p>	<p>Do Safety Manuals or handbooks that outline potential safety and environmental hazards and loss control/mitigation measures exist and are they available at work locations? (SEMP; CCPS; Harrison)</p>	<ul style="list-style-type: none"> • Does the company have a safety and environmental handbook that employees can put in their pockets for quick reference if field work is part of their job description? • Do the manuals and/or handbooks appear to be used and updated on a regular basis. • Is the content of the safety manual periodically reviewed and updated and endorsed by management, and are the safety manuals updated when changes are made? • Does an environmental loss control reference manual exist, and if so, is it reviewed annually, updated, and endorsed by management? • Do requirements exist for defining proper basic attire and PPE for personnel and visitors? • Are visitors made aware of the locations of safety manuals, environmental loss control reference manuals, and provided with a field safety handbook if it exists? • Are visitors made aware of any environmental hazards that may exist?
<p>9. Safety and Environmental Promotions</p>	<p>Does the company conduct safety and environmental awareness promotions (as evidenced by signs or meetings), is the staff aware of these promotions, and are these programs' effectiveness periodically evaluated? (Bird & Germain; Harrison)</p>	<ul style="list-style-type: none"> • Are safety and environmental promotions evaluated for their effectiveness? • When new information is available concerning the worksite and corporate safety performance, is the staff informed, and is the information distributed properly? • Are steps taken to inform staff of risks (both environmental and safety related) associated with activities and inventories? • Does a system exist to reward safety performance or environmental awareness and does this system provide methods of discipline for unsafe performance, either related to safety on the job or neglect of potential environmental loss control issues?

**Table 4.5.2.2a, Method B Safety Management Systems Evaluation - Marine Terminals
General and Detailed Questions (continued)
Hazards Analysis**

General Sub-Categories	General Question	Detailed Questions
1. Policy	Does the company have a general policy statement, either at the corporate or local level, that specifies when a hazards analysis is required and provides guidelines for selecting the study methodology, conducting the analysis, and choosing team members? (SEMP 3.1 & 3.5; API RP14J)	<ul style="list-style-type: none"> • Does the company have specific guidelines concerning hazards analysis, and is responsibility for the Hazards Analysis program defined? • Do the hazards analysis guidelines address frequency requirements, selection of study methodology, details for conducting the analysis, and choice of team members? • Is funding provided for hazard analysis studies?
2. Policy or Procedure	Does the company specify the objectives of a hazards analysis, including the need to identify the hazards of the process, review past incidents for potential catastrophic consequences, and evaluate the consequences of engineering and administrative controls failures? (SEMP)	<ul style="list-style-type: none"> • Are objectives for the hazards analysis specified by the company, including the need to identify the hazards of the specific process? • Is hazard identification training required for operators and maintenance personnel? • Are past incidents concerning potential catastrophic consequences and administrative controls failures reviewed and evaluated?
3. Schedule	Does the company have a policy or procedure that defines a rationale, priority order, and schedule for completing hazards analysis for existing facilities (from the most complex system to the simplest, from the systems considered highest-risk to those considered lowest), and does that policy or procedure define time frames for revalidations for hazards analyses? (SEMP 3.3.1, 3.4)	<ul style="list-style-type: none"> • Are hazards analyses performed prior to simultaneous operations, and are necessary changes implemented prior to simultaneous operations? • Are provisions in scheduling made to allow high-risk activities to be assessed before low-risk activities?
4. Documentation	Does the hazards analysis policy or procedure specify the documentation that is required for the study and the way the study will be documented, and does this policy also state that the hazards analyses and supporting materials will be retained for the life of the facility? (SEMP 3.6)	<ul style="list-style-type: none"> • Does the hazards analysis policy or procedure specify required documentation for the study and a format for this documentation? • Does the policy state that all hazards analyses and supporting data will be retained for the life of the facility?

**Table 4.5.2.2a, Method B Safety Management Systems Evaluation -Marine Terminals
General and Detailed Questions (continued)
Hazards Analysis (continued)**

General Sub-Categories	General Question	Detailed Questions
5. Methodology	Is the company's current hazards analysis thorough, is the methodology used appropriate (for type, age and complexity of facility) or in compliance with API RP 14J or similar industry standards, and has a review of a typical hazards analysis been made? (SEMP 3.3, 3.4, 3.5, 3.6; PFEER 5; HSEMS 3.4.4, 3.4.1; Company X #2; Op Team #7)	<ul style="list-style-type: none"> • Does the review cover, at a minimum, toxic gases, high and low temperatures and pressures, ambient conditions, flow, level, chemical hazards, relief, spill response equipment and materials, and erosion/corrosion? • Does the review cover operational history and fuel inventory type and volumes history? • Does the review for human factors and ergonomics concerns include operations and maintenance; shift rotations, extended schedules and staffing; communications related to work conducted under work permit system; and escape routes? • Does the human factors review cover adequacy and reliability of controls and displays? • Did the human factors review answer alarm system adequacy questions such as: <ul style="list-style-type: none"> * In high noise areas, are visual indications of critical alarms provided (H₂S, fire, gas, etc.)? * Are critical safety and operations alarms discriminable from routine operations alarms? * Are alarm systems designed to prevent defeat or disabling? * Are alarms provided for fire, gas, etc.? * Are means provided in this location to alert personnel to major hazards or emergency events occurring in other parts of the facility?
6. Layout and Configuration	Does the hazards analysis include an evaluation of whether the terminal was designed such that the risk of fire and explosion is reduced? (SEMP 2.2, 2.3, 3.2; API RP 14J)	<ul style="list-style-type: none"> • Is an evaluation performed of the structural integrity of the terminal, including any structural damage or weakness that may have occurred due to a functional or environmental event? • Are reviews of layout performed for fire compartmentation, location of personnel shelters/refuges, separation of potential fuel and ignition sources, and emergency escape routes?
7. Hazard and Risk Reduction	Has the company addressed and implemented, where appropriate, the conclusions of the hazards analysis? (HSEMS 3.4.2, 3.4.3, 3.4.6; Company X #2)	<ul style="list-style-type: none"> • Is a tracking system used for addressing and implementing , where appropriate, the conclusions of the hazards analysis?

**Table 4.5.2.2a, Method B Safety Management Systems Evaluation -Marine Terminals
General and Detailed Questions (continued)
Hazards Analysis (continued)**

General Sub-Categories	General Question	Detailed Questions
<p>8. Process Design/Safety Information</p>	<p>Does the following documentation exist: piping and instrumentation diagrams (which specify acceptable set points and upper and lower limits for temperature and pressure, as appropriate) and mechanical and facilities design information; and are set points and limits available at the corporate and local levels and current; and does evidence exist that the appropriate mechanical design and facility design information was used during the hazards analysis? (SEMP 2.2 & 2.3; HSEMS 3.3.7.1.D2; PFEER 21; Company X #6)</p>	<ul style="list-style-type: none"> • Is the Hazards Analysis information readily available? • Are details regarding materials of construction available, updated, and replaced with updated copies? • Are Piping and Instrumentation Diagrams available, updated, and replaced with updated copies? • Does information regarding electrical classification exist? • Are design codes and standards employed? • Are all applicable regulations made available and abided by? • Do material and energy balances exist where appropriate? • Are equipment arrangement drawings available? • Do equipment specifications exist, and are they updated and distributed in a controlled manner? • Is a corrosion detection and prevention system in place? • Is a description of safety systems and their design in place (e.g., alarms, interlocks, emergency evacuation routes, fire protection systems, fire and gas detection or suppression systems such as fire water, deluge, or halon, etc.)?
<p>9. Communication of Hazards Analysis Results</p>	<p>Is information concerning hazards identified during a hazards analysis, and are recommended actions for control of hazards communicated to appropriate personnel in a timely manner? (SEMP 3.6)</p>	<ul style="list-style-type: none"> • Are conclusions of management's decisions for recommendations resulting from Hazards Analysis made available? • Is a reporting mechanism in place for errors relating to environmental hazards? • Is information on hazards and hazard studies available? • Are records of management's decisions retained and readily available to employees to view upon request?

**Table 4.5.2.2a, Method B Safety Management Systems Evaluation - Marine Terminals
General and Detailed Questions (continued)
Management of Change**

General Sub-Categories	General Questions	Detailed Questions
1. Policy	Does the company have a general policy statement, both at the corporate and local level, that specifies what constitutes a modification or change with regard to facilities or personnel and outlines required analysis to be completed before the implementation of a change, and does this policy address both permanent and temporary change requirements and state the requirements for maintaining accurate safety, environmental, and design information? (SEMP 4.1)	<ul style="list-style-type: none"> • Are specific criteria provided in written material on what constitutes a change? • Are specific criteria in place concerning replacement in kind? • Are specific criteria provided in writing on safety and environmental reviews? • Are specific criteria for temporary changes in place? • Is documentation in place regarding what constitutes a major, minor, or temporary change and what the process is for each type of change? • Are a formal initiation and approval policy and defined procedures for change requests in place? • Are responsibilities for follow-up and updating organizational documentation, procedures, and training defined?
2. Documentation	Does the policy or procedure specify the documentation that is required for a particular type of change and that which is required in the change packages? (SEMP 4.1)	<ul style="list-style-type: none"> • Are change forms available? • Is detailed information available for requesting or implementing a change? • Is a change package retained for a specified time period at the terminal prior to forwarding to headquarters and are steps taken to ensure that all terminal personnel review each package? • Are change packages retained at headquarters for an extended period? • Are change packages available for review by terminal personnel for review upon request? • Do any changes or modifications have an impact on the loss control program?
3. Change in Facilities	Does the company ensure that risks are identified, evaluated, and managed when changes in facilities are made? (SEMP 4.2; HSEMS 3.5.4.11; Company X #5; and FLAIM B5.3, B8.4)	<ul style="list-style-type: none"> • Does a review of changes for human factors and ergonomic concerns occur? • Does a mechanism for engineering review prior to change implementation exist? • Do these change reviews take place when system or equipment functions change? • Are applicable changes or past changes reviewed following operational or environmental events?

**Table 4.5.2.2a, Method B Safety Management Systems Evaluation - Marine Terminals
General and Detailed Questions (continued)
Management of Change (continued)**

General Sub-Categories	General Questions	Detailed Questions
4. Change in People	Does the company take into account the possible effects of personnel changes and organizational changes in terms of risks and manage these effectively (including the use of contractors)? (SEMP 4.3; HSEMS 3.5.4.I2; ISM 6.3; Company X #5; FLAIM B5.3, B8.4)	<ul style="list-style-type: none"> • Is a review of changes conducted for necessary communication or reporting modifications? • Are changes in supervision and contacts reviewed?
5. Environmental Review	Does the company's safety and environmental management program require that the commissioning process include an environmental review for new and modified facilities? (SEMP 9)	<ul style="list-style-type: none"> • Is detailed information on completing environmental reviews available? • Are checks made for compliance with codes and standards? • Does confirmation exist that any facility or system modifications were built as designed? • Do criteria exist for the amount of time required and the type of hazards analysis needed depending on the type of change? • Before start-up, does verification that all hazard recommendations are resolved occur? • Before start-up, are checks completed for adequacy of procedures for start-up and commissioning, operating, maintenance, and testing (including checks that modifications of existing procedures or the loss control manual occurred, if needed)? • Do operator training, environmental checks, and equipment testing take place?
6. Communication and Training	Does the company ensure that changes are accompanied by training and communications, including updating of relevant procedures or practices, before the commissioning of new or modified facilities? (SEMP 4.4, 5.3, 7.4; HSEMS 3.3.6; ISM 6.7)	<ul style="list-style-type: none"> • Is training provided on identifying process, safety and environmental hazards that could occur due to implementing the proposed changes? • Does a method exist to ensure that all relevant personnel are informed of changes?
7. Authorization of Changes	Does a policy or procedure specify the authorization requirements for changes, the people who are qualified to authorize changes, and the requirement that changes cannot occur before authorization, and does such material outline any differences in the authorization process based on whether the change is permanent or temporary? (SEMP 4.4g)	<ul style="list-style-type: none"> • Are provisions for temporary changes in place? • Before a temporary change can become permanent, does a formal review of the change occur? • Is there an expiration date for temporary changes; how is it enforced?

**Table 4.5.2.2a, Method B Safety Management Systems Evaluation - Marine Terminals
 General and Detailed Questions (continued)
 Management of Change (continued)**

General Sub-Categories	General Questions	Detailed Questions
8. Safety & Environmental Information	Does the policy or procedure require the review of safety and environmental information before a change is made and outline the way modifications to this information will occur as the result of a change? (SEMP 4.4e)	<ul style="list-style-type: none"> • Is the level of documentation sufficient on the terminal for terminal-approved changes (e.g., temporary changes)? • Is a system in place to ensure that the terminal has all up-to-date copies of related regulations, standards, and codes?

**Table 4.5.2.2a, Method B Safety Management Systems Evaluation - Marine Terminals
General and Detailed Questions (continued)
Operating Procedures**

General Sub-Categories	General Questions	Detailed Questions
1. Content of Operating Procedures	Does the company have procedures that address the following operations: start-up, normal operations, temporary operations, emergency shutdown and isolation, and normal shutdown? Are procedures available for simultaneous operations such as combinations of cargo loading, discharging, transfers, bunkering, or operations involving multiple products? (SEMP 5.2; FLAIM B8.1.2)	<ul style="list-style-type: none"> • Are environmental and operating concerns covered in formal procedures? • Is there a standard for the quality of documentation? • Is a formal procedure used for updating and distributing procedures? • When a procedure is created or updated, is it suitable for operators (language, detail matches equipment labels, diagrams, drawings, etc.)? • Are checklists used for routine tasks? • Are responsibility and authority defined for changes to procedures? • Are procedures reviewed by operators prior to issue (procedure verification and validation)?
2. Consequences of Deviations	Are operating limits for environmental concerns included in procedures, and are consequences of deviations from limits documented along with steps required to correct or avoid deviations? (SEMP 5.2c)	<ul style="list-style-type: none"> • Are responsibilities and authority defined for high-consequence operations and maintenance tasks? • Are the contents of environmental warnings, comments, and notes made available and clearly understood by personnel? • Are operating limits for environmental concerns defined by numerical values? • Does the definition of environmental issues include spills and release concerns as well as wind, weather and current limits?
3. Temporary Changes	In the general policy statement, is there information that specifies what constitutes a modification or change with regard to temporary procedural changes (or temporary procedures)? Is the policy or statement available to personnel both at the corporate and local level? Is the required analysis for authorizing a temporary change outlined in the policy and is the analysis completed before the implementation of a change?	<ul style="list-style-type: none"> • Does a method exist for requesting temporary procedure changes? • What time limits exist on temporary procedure changes? • Does documentation of temporary procedure changes occur? • Are responsibilities and authority clearly defined for changes to procedures, both permanent and temporary?
4. Periodic Review	When the company periodically reviews operating procedures in terms of validity for current and actual operating practice, do these reviews ensure that the procedures are written according to the level of experience, understanding, and knowledge of the user and that the procedures are easy to read? (SEMP 5.3; HSEMS 3.5.3)	<ul style="list-style-type: none"> • What link exists to ensure that all items from the management of change program are appropriately reflected in procedures? • How are procedures reviewed following near misses or incidents? • Prior to re-issue, is a review of procedures by operators conducted (procedure verification and validation)? • After staff reduction, what type of review is required for needed procedural changes? • Is a time period specified for when periodic review must occur of procedures?

**Table 4.5.2.2a, Method B Safety Management Systems Evaluation - Marine Terminals
General and Detailed Questions (continued)
Operating Procedures (continued)**

General Sub-Categories	General Questions	Detailed Questions
5. Plan Preparation	<p>Does written guidance exist for preparing plans, procedures and instructions, and does this guidance identify the need for assigning qualified personnel to this preparation task? (ISM 7)</p>	<ul style="list-style-type: none"> • Does a writer's manual exist? • Does the company have a method for requesting changes to procedures? • Before a change is implemented, is it checked against process safety information? (e.g., metallurgy, pressures, temperatures, flows, etc.)
6. Follow-Through	<p>Does the company ensure that operating procedures are understood and followed? Company X #4; FLAIM B5.2)</p>	<ul style="list-style-type: none"> • Is a follow-up method defined for requested changes, including time limits for safety and environmental items? • When changes to procedures are made, are the changes accompanied by training?
7. Document Control	<p>Does the company have a system for controlling policies, procedures, and plans such that:</p> <ul style="list-style-type: none"> • These documents are available at relevant locations • Changes are reviewed and authorized before distribution (SEMP 5.3) • Changes are communicated to appropriate personnel (SEMP 5.3) and • Obsolete documents are promptly removed? (ISM 11; HSEMS 3.3.7.2; FLAIM B8.1.2) 	<ul style="list-style-type: none"> • Does an operations manual and emergency/contingency plan exist, and is it kept current with relevant regulations and available to all personnel? • Are materials describing operations and other necessary manuals readily available to any personnel? • How would an employee be able to tell that a procedure is the most current version? • Do distribution lists exist to ensure that all required parties receive information, and is any type of follow-up conducted to ensure that the most current information is in fact in the manual or procedures? • What is the availability of current drawings like process flow diagrams (PFDs) and piping and instrumentation diagrams (P&IDs) at the terminal? • Are warnings, comments, and notes explained to relevant personnel, contractors, and visitors?

**Table 4.5.2.2a, Method B Safety Management Systems Evaluation - Marine Terminals
General and Detailed Questions (continued)
Safe Work Practices**

General Sub-Categories	General Questions	Detailed Questions
<p>1. Safe Conduct of Work Activities</p>	<p>Regarding Safe Conduct of Work Activities, do the company's safe work practices apply to all modes of operation, including maintenance and modification activities as well as simultaneous operations, and do these practices meet current regulatory requirements and consider and manage hazards and risks during the following activities:</p> <ul style="list-style-type: none"> • Opening of equipment or piping • Lockout and tagout of electrical and mechanical energy sources • Hot work and other work involving ignition sources • Confined space entry (SEMP 6.2; FLAIM B5.1, B8.1.2) 	<ul style="list-style-type: none"> • Do the Safe Work Practice procedures cover isolation (electrical, mechanical, pneumatic, hydraulic), opening pressurized process or utility equipment or piping, bypassing safety equipment, and environmental issues? • Does documentation specify safety-critical and environmentally critical items and special requirements for taking equipment out of service (e.g., fire and gas detectors, emergency isolation valves, shutdowns, pressure and temperature switches, relief valves)? • Does a policy on control of access to the terminal for contractors, visitors, and corporate personnel exist? • Does a mechanism exist for allowing or preventing bypass of detector or safety interlocks? Are decisions documented when bypasses are permitted? Is there a mechanism for ensuring that bypasses do not become permanent by default? • Does modification of Safe Work Practices occur for simultaneous operations? • What type of formal mechanism (logs) exists for transfer of information between shifts? • What type of formal mechanism (logs) exists for transfer of information between crews? <ul style="list-style-type: none"> * operations to maintenance including contractors * maintenance to maintenance or contractors * terminal to vessel • What type of formal mechanism (logs) exists for transfer of information between supervisors? • Are personnel held accountable for maintaining logs? • Does the crew change on a different day than the supervisor? • Are inspections of work areas planned and conducted? • Is a system in place for log-keeping for specific safety-related and environmentally related and critical operational parameters? • Are logs kept for routine information? • Is room provided in logs for narratives concerning shift operations and maintenance? • Is equipment labeled? • Does a clear policy exist on illness, substance abuse, etc.? • Is refusal to work for safety reasons or environmental concerns allowable?

**Table 4.5.2.2a, Method B Safety Management Systems Evaluation - Marine Terminals
General and Detailed Questions (continued)
Safe Work Practices (continued)**

General Sub-Categories	General Questions	Detailed Questions
2. Work Permit or Authorization	Is a work authorization system used in conjunction with specific work practices to ensure adequate communications during work activities, and does the work authorization system address steps to be taken for providing information concerning unfinished work at shift change or crew change? (SEMP 6.2)	<ul style="list-style-type: none"> • Is a log kept on active work permits? • Does a policy exist regarding frequency of renewal of work permits? • Are work permits visible in a central area and at a local area while a permit is open? • Are all permits logged for retention? • Are inspections performed before and after maintenance by operations personnel? • What, if any, personal protective equipment (PPE) and other safety requirements for maintenance are specified on permits? • Are environmental concerns covered prior to issuing or renewal of work permits? • Does the supervisor or designee check that all permit requirements are met prior to starting work?
3. Control of Inventories and Material	Do written materials outline what inventories exist? Do these specify what special precautions to be taken by personnel to avoid environmental damage and personnel exposure to toxic or hazardous materials? Are these written materials available at the local level? (SEMP 5.2d, 6.3)	<ul style="list-style-type: none"> • Do documentation and procedures exist for monitoring, tracking, and replenishing inventory? • Is a system in place for labeling and/or sign posting for hazardous materials? • Are reactive chemicals separated and segregated appropriately? • Are flammables stored away from sources of heat and ignition?
4. Hazard Communications	Does the company have a hazardous communications program for providing information regarding hazards to personnel, such as: <ul style="list-style-type: none"> • Making Material Safety Data Sheets (MSDSs) available • Marking containers or equipment containing hazardous materials • Providing signs in areas where hazards may be present • Designating on safe work permits the personal protective equipment that is needed for hazards? (SEMP 6.3)	<ul style="list-style-type: none"> • Where hazards may be present, are signs posted? • Are bulk chemicals and their containers and other additives labeled according to hazardous potential? • Is equipment containing hazardous materials labeled accordingly?

**Table 4.5.2.2a, Method B Safety Management Systems Evaluation - Marine Terminals
 General and Detailed Questions (continued)
 Safe Work Practices (continued)**

General Sub-Categories	General Questions	Detailed Questions
5. Contractor Selection	Does the company obtain and evaluate information regarding a contractor's accident record and training program and use this information in contractor selection? (SEMP 6.4; HSEMS 3.3.5; Company X #8)	<ul style="list-style-type: none"> • Is training in work practices, safety rules, and environmental hazards provided for contracted tasks? • Is a formal orientation required on applicable parts of emergency and response plans? (including reporting, routes, alarm sounds, etc.) • Is an orientation on terminal-specific emergency response features provided? (e.g., shutdown switches, phones, muster/assembly points, etc.) • Is there an expiration date assigned to training to prompt periodic refresher training? • What type of provision is made for discipline where non-compliance with safety rules exists? • Are contractors required to demonstrate compliance with environmental regulatory requirements?

**Table 4.5.2.2a, Method B Safety Management Systems Evaluation - Marine Terminals
General and Detailed Questions (continued)
Training & Selection**

General Sub-Categories	General Questions	Detailed Questions
1. Initial Training	Does the company ensure that initial training takes place as appropriate and that this training is documented? (SEMP 7.2.1)	<ul style="list-style-type: none"> • Do defined training requirements and progression for new hires exist at all levels (operators, maintainers, managers)? • Does a method exist for assigning jobs to persons with prior experience based on demonstration of required skills and knowledge (operators, maintainers, managers)? • What types of basic safety and environmental training (e.g., orientation to emergency systems, evacuation, reporting hazards, safety policy, etc.) are provided prior to beginning work at the terminal? • Is first aid training required as appropriate prior to beginning work at the terminal? • Is basic firefighting training required as appropriate prior to beginning work at the terminal?
2. Operator Training	Has the company established a formal training program for operations staff that includes clear definition of required skills and knowledge for each position, and does this program also require that operators are assessed for competence and periodically receive refresher training?	<ul style="list-style-type: none"> • Do job descriptions exist? • Is basic skills training provided specifically by job category? • Are critical tasks per job identified? • Is a Task Analysis maintained for critical tasks? • What types of safety and environmental training (e.g., production shutdowns, emergency response, evacuation, etc.) are provided at the terminal? • How are required skills and knowledge identified per job? • What learning objectives are identified for each training module? • Are these learning objectives tied to critical tasks, skills, and knowledge? • Is each operator trained in diagnostic skills? • How is competence assessed? Is there criteria or testing established to determine when someone has the skills and knowledge sufficient for completing tasks? • When training is provided, is assessment of the sufficiency of the training by the trainee a part of the training course (feedback from courses)? • How is training documented?
3. Operating Instructions	Do personnel and contractors receive training in implementing operating instructions pertaining to their job assignments? (SEMP 7.1, 7.5)	<ul style="list-style-type: none"> • Is there an assessment of understanding of training material either through oral or written examination or hand on demonstration? • Are minimum "pass" criteria set for assessment of understanding?

**Table 4.5.2.2a, Method B Safety Management Systems Evaluation - Marine Terminals
General and Detailed Questions (continued)
Training & Selection (continued)**

General Sub-Categories	General Questions	Detailed Questions
4. Hazards Training	Is training in the hazards of the process before undertaking work in the facility required for all personnel and contractors, and is training concerning simultaneous operations and hazard communications to appropriate personnel provided? (SEMP 7.1, 7.5, 8.5)	<ul style="list-style-type: none"> • Does training include process basics training that covers possible process and environmental hazards for operators and maintenance personnel? • Are all personnel trained in hazard identification skills as they apply to the terminal work area? • Is formal training in safety and environmental issues required by a regulatory agency, and if so, has this training been conducted? • How is an assessment for understanding determined? Are tests given either through oral or written examination or hand on demonstration? • Are minimum "pass" criteria required for understanding of training material?
5. Safe Work Practices	Do all personnel and contractors receive training in safe work practices pertaining to their job assignments? (SEMP 7.2.1c, 7.5, 8.5)	<ul style="list-style-type: none"> • Is all training completed and documented for various safe work practices before the work starts? • Are short courses for training experienced personnel or refresher training provided (including pre-assessment of knowledge)? • Is there a method for assessment of understanding? • Are minimum "pass" criteria for understanding required?
6. Emergency Response and Evacuation	Are all personnel, including contractors, required to receive training in emergency response and evacuation? (SEMP 7.1, 7.5, 10.4)	<ul style="list-style-type: none"> • Is there a method for establishing competence on emergency response tasks of a general nature (e.g., use of fire extinguishers, rescue, etc.)? • Is orientation training documented for terminal-specific emergency response and evacuation procedures, including individuals' roles and reporting status? • Is training provided for designated members of emergency management teams?

**Table 4.5.2.2a, Method B Safety Management Systems Evaluation - Marine Terminals
General and Detailed Questions (continued)
Training & Selection (continued)**

General Sub-Categories	General Questions	Detailed Questions
<p>7. Maintenance and Mechanical Integrity</p>	<p>What mechanism does the company have in place to verify that the personnel and contractors who are responsible for maintenance tasks and/or mechanical integrity inspections and testing have received appropriate craft training - and, where appropriate, hold required certifications - before conducting such tasks? (SEMP 7.2.1, 7.5, 8.5)</p>	<ul style="list-style-type: none"> • Do job descriptions exist? • Is basic skills training identified by job category? • Is identification of special training or certifications required? • How are critical tasks per job identified? • Is there a Task Analysis of critical tasks? • How are skills and knowledge per job identified? • Are learning objectives identified for each training module? • Are these learning objectives tied to critical tasks, skills, and knowledge? • Is the maintenance personnel trained in diagnostic skills? • How is an assessment for competence conducted? Is there criteria or testing established to determine when someone has the skills and knowledge sufficient for completing tasks? • How are contractor and vendor personnel performance monitored? • What criteria exist for evaluating acceptable performance of contractors and vendors? • Does a method exist for documenting and reporting deficient performance? • What type of record-keeping is provided for contractor, vendor and supplier performance?

**Table 4.5.2.2a, Method B Safety Management Systems Evaluation - Marine Terminals
General and Detailed Questions (continued)
Training & Selection (continued)**

General Sub-Categories	General Questions	Detailed Questions
<p>8. Topic-Specific Training</p>	<p>Do personnel and contractors receive specific training where appropriate in:</p> <ul style="list-style-type: none"> • Safety and anti-pollution devices (33 CFR 154.735 and 310, HSEMS 3.3.4.2g; FLAIM B8.3) • Fixed crane operations and maintenance. (API RP 2D; 30 CFR 250.20; HSEMS 3.3.4.2i; FLAIM B8.3) • Moveable cranes (e.g., cherry pickers) and forklift operations and maintenance? • General emergencies. (e.g., personnel overboard, loss of power, security emergencies, etc. (FLAIM B8.3) • Environmental protection and pollution control including booming (33 CFR 154.310; HSEMS 3.3.4.2f, g, h) • Spill or release reporting and containment including knowledge of contingency plans (33 CFR 154.710) • Welding, cutting and burning. (30 CFR 250.52), <p>(SEMP 7.2.2; 7.5; 30 CFR 250 Subpart O; HSEMS 3.3.4.2e, f, g, h; FLAIM B8.3)</p>	<ul style="list-style-type: none"> • Is specific training provided for escape, evacuation, and survival? • What requirements exist for terminal-specific safety training? • Is special training required for simultaneous operations including cargo loading, discharging, transfers, bunkering, or operations involving multiple products? • Is a method in place for incident reporting and investigation? • How is staff polled for their training needs?
<p>9. Hazardous Materials</p>	<p>Do personnel and contractors receive training on handling hazardous materials in accordance with Material and Safety Data Sheets (MSDS) information? (SEMP 6.3; 7.5)</p>	<ul style="list-style-type: none"> • Is training provided for specific hazardous materials and their handling including as appropriate hydrogen sulfide, benzene, MTBE, toluene, etc.? • Is an assessment performed for competence? Is there criteria or testing established to determine when someone has the skills and knowledge sufficient for completing tasks?
<p>10. Personal Protective Equipment (PPE)</p>	<p>Is training provided on the proper use of personal protective equipment to appropriate personnel? (SEMP 6.3; 7.5)</p>	<ul style="list-style-type: none"> • How is competence assessed? Is there criteria or testing established to determine when someone has the skills and knowledge sufficient for properly fitting and using their personnel protective equipment?

**Table 4.5.2.2a, Method B Safety Management Systems Evaluation - Marine Terminals
General and Detailed Questions (continued)
Training & Selection (continued)**

General Sub-Categories	General Questions	Detailed Questions
11. Procedures	Does the company ensure that personnel and contractors receive training on procedures and changes in procedures, as appropriate? (SEMP 7.4, 7.5; HSEMS 3.3.6; ISM 6.7)	<ul style="list-style-type: none"> • Is training and orientation provided to visitors, including emergency response, muster/assembly, and alarms for terminal specifics? • Is a review performed of safety rules and work practices for contractors and visitors at the terminal? • What type of documentation provides evidence that contractors and visitors have received and understood orientation briefing? • How are contractor concerns handled (e.g., method for identifying training deficiencies)?
12. Training Documentation and Refresher Training	Is all training documented, and is appropriate refresher training scheduled and conducted? (SEMP 7.3, 7.5)	<ul style="list-style-type: none"> • Is training orientation provided to visitors? Is it documented, and are records retained? • Are the results of incident investigations and audits fed back to the training department? • Are updates of training based on feedback, audits, and incidents? • Do the refresher training programs emphasize critical tasks and operations?
13. Management Training	Does the company ensure that facility management personnel has been formally trained on safe work practices and emergency and contingency plans for hazard prevention and response? (ISM 5, 6.1, 6.2, 6.4, 6.5, 6.6)	<ul style="list-style-type: none"> • Are management training programs in place on leadership, communications, personnel management, process safety, and environmental management? • Do supervisory personnel receive supervisory training, including conflict management? • Is there formal training in communication procedures for normal and emergency conditions? • Are training needs identified by the supervisor in yearly performance reviews?

**Table 4.5.2.2a, Method B Safety Management Systems Evaluation - Marine Terminals
General and Detailed Questions (continued)
Training & Selection (continued)**

General Sub-Categories	General Questions	Detailed Questions
14. General Training and Selection	Has the company established a formal training and selection program for all categories of personnel, and does the program clearly define requirements for positions and the need for assessment for competence?	<ul style="list-style-type: none"> • Does a matrix or document exist with overviews of types of training and training needs by category? • Is a listing of job categories available? • Do job descriptions exist? • What is the formal selection process for personnel? • Is there a formal method for determining staffing levels? Is a workload assessment conducted as a means for determining minimum staffing levels? • When staff reductions are necessary, is an assessment conducted for minimal staffing requirements? Is retraining provided for remaining personnel after reductions with regard to new responsibilities or tasks? • Do staff rotations, shift rotation, shift schedules, and rules for extended work-hour limits exist? • For all formal and on-the-job training, is assessment of the sufficiency of the training by trainee part of the training course (feedback from courses)? • Are special programs designed to ensure that training personnel are knowledgeable about training techniques themselves and have necessary knowledge of skills for topics that are providing?

**Table 4.5.2.2a, Method B Safety Management Systems Evaluation - Marine Terminals
General and Detailed Questions (continued)
Mechanical Integrity**

General Sub-Categories	General Questions	Detailed Questions
<p>1. Quality Assurance Strategy</p>	<p>Does the company have a program that assures that critical equipment is procured, fabricated, and installed in accordance with appropriate quality standards and specifications? (SEMP 8; ISM 10; PFEER 19; HSEMS 3.5.2; Company X #3)</p>	<ul style="list-style-type: none"> • Does a listing of safety-critical equipment/parts exist? • What criteria exist for acceptance or rejection of received parts or equipment? • Is there a listing of equipment and components received and inspected, and does the list indicate the results of those inspections? • Is there a system for supplier and vendor qualification criteria or specifications? • Are lists maintained for qualified vendors, service companies, and personnel? • Are checks made against the results of inspections for quality and vendor/supplier performance? • How are deficiencies monitored, and is there a method for reporting deficiencies to vendors/suppliers? • What criteria exist for disqualifying a vendor or supplier due to poor performance? • Are code and standard compliance records available? • Are equipment specifications, with reference to standards and codes, used for design and selection? • Are procedures in place for ordering, purchasing, receiving, and completing inventories for equipment and parts? • Do purchasing specifications exist that refer to safety, environmental, or loss-control related issues for critical products, equipment, materials, and services?

**Table 4.5.2.2a, Method B Safety Management Systems Evaluation - Marine Terminals
General and Detailed Questions (continued)
Mechanical Integrity (continued)**

General Sub-Categories	General Questions	Detailed Questions
2. Policy	Does the company have a policy that requires that a list of critical equipment be established? Does it state that reviews will be conducted to assess ongoing mechanical reliability, remaining life, and suitability of critical equipment and facilities, depending on service? Does this policy also state that methods, intervals, criteria, and limits be established for testing and inspection? (SEMP 8.5, 8.6)	<ul style="list-style-type: none"> • Are management reviews of maintenance backlogs required and do they occur? What process is in place to ensure that action is taken to reduce or eliminate maintenance backlogs? In particular, are such reviews required and conducted for the inspection of safety-critical and potential environmental related items? • Are maintenance procedures issues addressed (e.g., content, availability, language, expectations, etc.)? • Does a listing of safety-critical equipment exist? • Does a listing of potential safety, environmental, and loss-control related equipment exist? • Are maintenance/inspection histories reviewed for trends by management? Are inspection schedules modified based on historical data? • Are requirements defined for outside maintenance contractor qualifications?
3. Mechanical Reliability - Containment	Does the company regularly assess, test, and inspect equipment containing hydrocarbons and other hazardous material to assure integrity, and do these efforts include testing material compatibility and reviewing wall thickness for service conditions, including erosion and corrosion? (SEMP 8.5; API 510; ISM 10.3, 10.4; PFEER 19.4; FLAIM B2.5, B3)	<ul style="list-style-type: none"> • Does a listing of safety-critical equipment exist? • Does a listing of potential safety, environmental and loss-control related equipment exist? • Is a vapor control system in place, and if so, is it designed, installed, operated and being maintained in accordance with appropriate regulations and codes? • Are precautions taken during maintenance and operations for systems where pyrophoric iron sulfide may accumulate? • Do criteria exist for acceptable limits for equipment? • Are equipment specifications with reference to standards and codes available and used for design and selection? • Are records of equipment installation kept and maintained? • Do specifications for installation exist? • Are manufacturer/supplier documents readily available to personnel?
4. Mechanical Reliability - Rotating Equipment	Does the company have a preventative and/or predictive maintenance program for rotating equipment in critical service? (SEMP 8.5)	<ul style="list-style-type: none"> • What criteria exist regarding acceptable operating limits for rotating equipment integrity? • Are records of installation, testing and inspection kept and maintained? • Are manufacturer/supplier documents readily available to personnel?

**Table 4.5.2.2a, Method B Safety Management Systems Evaluation - Marine Terminals
General and Detailed Questions (continued)
Mechanical Integrity (continued)**

General Sub-Categories	General Questions	Detailed Questions
5. Mechanical Reliability - Pressure Relief	Does the company regularly assess, test, and inspect equipment related to pressure relief to ensure that relief can occur when necessary? (SEMP 8.5)	<ul style="list-style-type: none"> • Are there equipment specifications with reference to design basis and standards and codes used for design and selection (including documentation of relief and vent calculations)? • What criteria exist for acceptable limits for equipment? • Does a listing of relief and vent equipment exist? • Are records of installation, testing, calibration, cleaning, and repair kept and maintained? • Are manufacturer/supplier documents readily available to personnel?
6. Mechanical Reliability - Shutdown Systems, both Emergency and Process	Does the company regularly assess, test, and inspect shutdown systems to ensure reliability? (SEMP 8.5)	<ul style="list-style-type: none"> • Do acceptance criteria exist for shutdown devices, including listings of set points and operating limits? • Are there specifications with reference to standards and codes used for design and selection? • Does a listing of safety-critical devices exist? • Does a listing of potential safety, environmental and loss-control related equipment exist? • Does the schedule for testing and calibration reflect safety and environmental priorities? • Are records kept of installation, testing, calibration, adjustments, and periods when equipment is taken out of service or not functioning? • Are manufacturer/supplier documents readily available to personnel?
7. Mechanical Reliability - Emergency Response Systems	Does the company regularly assess, test, and inspect fire fighting, spill control / containment, vessels and other equipment used for emergency response? (SEMP 8.5)	<ul style="list-style-type: none"> • Are there equipment specifications with reference to standards and codes and regulations used for design and selection? • Does a listing of safety-critical equipment exist? • Does a listing of potential environmental and loss-control related equipment exist? • Are there periodic documented checks of Emergency Response Systems such as alarms, emergency lighting, spill equipment, communications devices, etc.? • Are records of installation maintained? • Are manufacturer/supplier documents kept available for personnel?

**Table 4.5.2.2a, Method B Safety Management Systems Evaluation - Marine Terminals
General and Detailed Questions (continued)
Mechanical Integrity (continued)**

General Sub-Categories	General Questions	Detailed Questions
8. Reliability - Life Saving and Evacuation Devices	Does the company regularly assess, test, and inspect equipment associated with evacuation devices including life rafts, personal floating devices, etc.? (SEMP 8.5)	<ul style="list-style-type: none"> • Are equipment specifications with reference to standards and codes and regulations used for design and selection? • Does criteria exist for acceptable limits for equipment? • Does a listing of safety-critical equipment exist? • Are there periodic documented checks of life saving and emergency devices?
9. Spare Parts	Has the company identified critical spare parts and included these on an inventory, and does the company ensure that these parts are available within acceptable time limits? (Organization #8)	<ul style="list-style-type: none"> • Are spare parts readily accessible to operations and maintenance personnel? • Do criteria exist for acceptance or rejection of parts? • Is an inventory control system in place? • How is ordering/inventory monitored to identify possible deficiencies in the inventory list or availability of spare parts? • Are procedures in place for ordering, purchasing and receiving spare parts? • Does a listing of safety-critical equipment/parts exist? • Does a listing of potential environmental and loss-control equipment/parts exist? • Is there a list of approved vendors and suppliers? • Are manufacturer/supplier documents including manuals readily accessible to personnel?
10. Documentation	Is documentation concerning assessment methods and procedures, acceptance criteria, and the results of tests and inspections kept; and is information concerning replacement of equipment, instruments, and components documented and retained for a minimum of two years? (SEMP 8.6)	<ul style="list-style-type: none"> • Are maintenance procedures in place, including preventative maintenance plans, testing and inspection procedures and records, fire protection maintenance records, deficiency correction records, and installation instructions or specifications? • Are records kept on outside maintenance contractor qualifications? • Are records kept of maintenance, testing and inspection personnel? • Are there records of compliance with appropriate standards and codes? • Are equipment histories maintained? • Do schedules for inspection and testing exist? • Are piping system records kept? • Is control system information readily available? • Are relief and vent records maintained? • Are an instrument index and specifications kept and maintained?

**Table 4.5.2.2a, Method B Safety Management Systems Evaluation - Marine Terminals
General and Detailed Questions (continued)
Mechanical Integrity (continued)**

General Sub-Categories	General Questions	Detailed Questions
11. Deficiencies	If equipment deficiencies are judged to be outside limits (as defined in the process safety or environmental information)? Are these deficiencies corrected before further use or corrected in a safe and timely manner after necessary steps to assure safe operations have been taken? (SEMP 8.6)	<ul style="list-style-type: none"> • Are there acceptance criteria for critical equipment and parts? • Does a noncompliance/deficiency documentation method exist? • Are there corrective action procedures? • Are records of corrective actions taken? • Are there records of deficiencies available that were identified by regulatory agencies? Is there evidence of corrective actions? • Are maintenance-related schedules revised based on inspection and test results? • Does a method exist for tagging and logging out of service items when deficiencies are found?
12. Review and Authorization of Changes	What system for reviewing and authorizing changes in procedures, tests and inspections exists, and is it aimed at managing hazards and risks? (SEMP 8.5)	<ul style="list-style-type: none"> • Does the change package refer to standards and codes? • Does management review backlogs of maintenance or inspection for safety-critical or environmentally critical items?

**Table 4.5.2.2a, Method B Safety Management Systems Evaluation - Marine Terminals
General and Detailed Questions (continued)
Emergency Response**

General Sub-Categories	General Questions	Detailed Questions
1. Emergency Response and Evacuation Plans	Does the company have emergency response and contingency plans in place for losses of containment, including releases, fires and explosions, and spills? Do these plans or policies outline the company's philosophy and the components of appropriate responses (e.g., for fire: whether to stand and fight, evacuate, etc.)? (SEMP 10.1; ISM 1.4.5; PFEER 6,12; Organization #4; FLAIM B8.2)	<ul style="list-style-type: none"> • What are the requirements for ensuring competence of individuals in emergency response and checking familiarity with plans? • Do emergency plans include instruction for various types of emergencies, including spills? • What are the contents of the Emergency Plans (organizational chart, maps, possible hazards, resources for assistance, necessary phone numbers, etc.)? • Are the Emergency Response and Evacuation Plans accessible and up-to-date? • What are the steps for spill response and escape and abandonment procedures and routes? • What procedures exist for accounting for personnel at assembly points? • Is there any requirement for protocol or training for communications in reporting or managing emergencies? • Are there contingencies in the Emergency Plan for first aid responders (minimum per facility, their role in emergency, reporting station, etc.)?
2. Emergency and Contingency Response Equipment	Do the emergency response and contingency plans identify emergency equipment that should be available for use during response?	<ul style="list-style-type: none"> • Are signs posted or marked for evacuation routes? • Are signs posted and markings maintained for emergency equipment (extinguishers, stretchers, hoses, escape packs, personal breathing apparatus, etc.)? • Are the number of emergency shutdown locations sufficient and are they readily accessible? Are emergency shutdown locations sufficiently marked? • Does emergency lighting for evacuation routes exist?
3. Emergency Management Authority and Compliance with Regulations	Do the emergency or contingency plans assign authority to appropriate qualified person(s) and address emergency reporting and response, complying with the most current revision of one or more of the following regulations (as applicable): <ul style="list-style-type: none"> • Emergency evacuation plans. (USCG-33; CFR 146.140) • Oil Spill Contingency plan (USCG) • Pipeline emergency plans. (USDOT-49; CFR 192, 195; SEMP 10.2; ISM 8; FLAIM B6.2, B8.3)? 	<ul style="list-style-type: none"> • Does the Emergency Plan clearly identify individual responsibilities in an emergency, including those of people who actively manage situations, operators of critical equipment, and first aid responders? • Is technical support available and designated, if needed, during an emergency?

**Table 4.5.2.2a, Method B Safety Management Systems Evaluation - Marine Terminals
General and Detailed Questions (continued)
Emergency Response (continued)**

General Sub-Categories	General Questions	Detailed Questions
4. Emergency Control Center or Incident Command Center	<p>Has a Center been designated for each facility, and does the Center include the following:</p> <ul style="list-style-type: none"> • Emergency Action Plan • Oil Spill Contingency Plan • Safety and Environmental Information? (SEMP 10.3) 	<ul style="list-style-type: none"> • Are Emergency Response and Evacuation Plans accessible and up-to-date? • Is the Center designated and equipped with safety and environmental information (MSDSs, communications equipment, copies of emergency and environmental response plans)?
5. Revision Process for Plans	<p>Are the actual persons who will respond to loss-of-containment situations (including releases, fires, explosions, spills and other contingencies) included in the review of plans for such events, and does a mechanism exist for these personnel to provide comments regarding such plans to management? (PFEER 8)</p>	<ul style="list-style-type: none"> • Is there a periodic review of the Emergency Plan? • Is a mechanism for requesting changes in place and understood by all personnel affected? • Are records of corrective actions from drills or audits provided for revision of the Emergency Plan? Is there evidence of revisions based on suggested corrective actions? • Does the designee for endorsing the evacuation plan ensure that the plan is current with regulations and practices? • Is feedback provided on acceptance/rejection of requested changes?
6. Drills	<p>Does the company have drills that are effective in regard to testing plans and correcting weaknesses? (SEMP 10.4; PFEER 8)</p>	<ul style="list-style-type: none"> • What is the minimum requirement for drill frequency, and what types of drills are held by year? • Does documentation of results of drills exist? • Are drill results evaluated? • Are corrective actions following drills implemented and documented? • Does management review drill results?
7. Communications	<p>Are emergency warnings for fires and explosions in the facility audible and, where appropriate, visual? (PFEER 11) (PFEER 11.2 - types of visual and acoustic warning signals)</p>	<ul style="list-style-type: none"> • Does emergency plan documentation of contacts and phone numbers exist, and is it accessible to personnel? • Does the plan address alternatives if certain contacts are unavailable? (Note: Phone trees may be used to assign contact responsibilities.) • Is there a protocol or training provided on communications for reporting or managing an emergency? • Is appropriate agency notification included in communications reporting requirements?

**Table 4.5.2.2a, Method B Safety Management Systems Evaluation - Marine Terminals
General and Detailed Questions (continued)
Emergency Response (continued)**

General Sub-Categories	General Questions	Detailed Questions
<p>8. Emergency Equipment and Systems</p>	<p>Has the company evaluated fire and life protection systems and provided adequate protection? (FLAIM B7)</p>	<ul style="list-style-type: none"> • Is there periodic inspection and necessary calibration or repairs for the following systems: <ul style="list-style-type: none"> • Fire water distribution systems • Fire water hose stations, hydrants, and monitors • Fixed fire water spray/deluge systems and sprinkler systems • Fire fighting foam systems • Fixed and portable chemical fire suppression systems - including liquids, gaseous agents, and powders • Dry chemical agents • Fire detection systems • Combustible gas detection systems • Alarm and communication systems • Emergency power and lighting • Emergency shutdown (ESD) systems • Pressure relief and vapor depressuring (blowdown) systems • Oil spill control provisions (e.g., absorbent pads, sawdust, etc.) • Thermal robustness and passive fire protection systems • Design for explosion protection • Personal protective and safety equipment (e.g., personal breathing apparatus, protective clothing, fire blankets, etc.) • Communications equipment? • Is there documentation on inspections and are expiration dates assign to the inspected equipment?

**Table 4.5.2.2a, Method B Safety Management Systems Evaluation - Marine Terminals
General and Detailed Questions (continued)
Investigation and Audit**

General Sub-Categories	General Questions	Detailed Questions
1. Investigation Policy	Does the company have procedures in place to promptly investigate, document, and report all accidents and incidents with qualified personnel to help prevent similar occurrences? (SEMP 11.1; ISM 1.4.3, ISM 1.4.4, ISM 9; HSEMS 3.6.5; Company X #9; HSEMS 3.6.4)	<ul style="list-style-type: none"> • What are the requirements for personnel to receive training on investigation methods? • Is a representative from a regulatory agency invited to participate in any investigations? • Does a mixed-discipline team investigate? • Is there a system in place for near-miss reporting? • Are undesired environmental events formally reported and investigated? • Do confidential reporting procedures exist? • Are time limits defined to report, investigate, and follow-up on accidents and incidents?
2. Investigation	<p>Do company investigations address the following:</p> <ul style="list-style-type: none"> • The nature of the accident or incident • The factors that contributed to the accident or incident and the mitigation actions that should be taken to prevent or minimize the effects of a recurrence • Recommended actions identified as a result of the investigation? (SEMP 11.2)	<ul style="list-style-type: none"> • Is an investigation procedure/form available? • Are reporting requirements defined? • Are root causes defined via a formalized method? • Is suggested corrective action documented?
3. Investigation Follow-Up	Does the company distribute findings of an accident or incident investigation to appropriate personnel and similar facilities, and are procedures in place to ensure that corrective actions are completed? (SEMP 11.3; HSEMS 3.6.6)	<ul style="list-style-type: none"> • Are patterns and statistics monitored and reviewed? • Do the results go to a Joint Safety Committee? • Are results of incidents, conclusions, and corrective actions distributed to all levels? • Are incidents and suggested corrective actions reviewed by management? • Are unresolved incident reports reviewed at management meetings? • Is implementation of corrective actions monitored?
4. Investigation Record Retention	Does the company ensure that accident and incident investigation documentation is retained for a minimum of two years? (SEMP 11.3)	<ul style="list-style-type: none"> • Are appropriate records retained on accidents and incident investigations for at least previous two years?

**Table 4.5.2.2a, Method B Safety Management Systems Evaluation - Marine Terminals
General and Detailed Questions (continued)
Investigation and Audit (continued)**

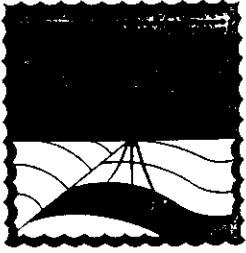
General Sub-Categories	General Questions	Detailed Questions
5. Auditing System	Does the company have a system in place to ensure that periodic audits of the safety and environmental management system are conducted, including reviews of hazards analysis, management of change, mechanical integrity, operating procedures, training, safe work practices, emergency response, and investigation systems? (SEMP 12.1)	<ul style="list-style-type: none"> • Does the audit policy and procedure define: <ul style="list-style-type: none"> • the team for the audit • the required training for the team • the extent of the audit • the documentation that is required • other important requirements (including the audit schedule)?
6. Auditing Personnel	Are audits conducted by personnel who are independent of the areas being audited? (SEMP 12.1; ISM 1.4.6, ISM 12; HSEMS 3.6.2, 3.7.1; FLAIM B8.1.1, B8.1.3 [Safety Assurance Program])	<ul style="list-style-type: none"> • Is a multi-disciplinary team responsible for auditing? • Is a representative from a regulatory agency invited to participate in any or all audits? • Do the auditors have a working knowledge of risk assessment principles?
7. Audit Reporting	Does the company have procedures in place to ensure that audit findings are provided to appropriate personnel, that actions are taken to resolve inadequacies, and that audit reports are retained until the completion of the next audit? (SEMP 12.2; HSEMS 3.6.3)	<ul style="list-style-type: none"> • Do audit findings include strengths and noncompliances? • Are corrective actions documented? • Are audit findings tracked?
8. Schedule	Was an initial audit conducted within two years of the initial implementation of the process safety management program, and is the interval between audits less than four years? (SEMP 12.1)	<ul style="list-style-type: none"> • Is there a method for tracking for compliance with the auditing schedule?
9. Reviewing	Does the company's senior management, at appropriate levels, review audit results to ensure that findings and resolutions are satisfactory in terms of managing hazards and risks, and are similar reviews given for company policies? (SEMP 12.2; HSEMS 3.7.2)	<ul style="list-style-type: none"> • Are the results of an audit, including strengths, noncompliances, and suggested corrective actions, reviewed by management?

**Table 4.5.2.2a, Method B Safety Management Systems Evaluation - Marine Terminals
General and Detailed Questions (continued)
Reference Codes and Sources**

Code	Description
API	American Petroleum Institute
API RP	American Petroleum Institute Recommended Practice
API RP 14J	
Bird & Germain	Bird, Frank E., Jr., and George L. Germain, <i>Practical Loss Control Leadership</i> . Loganville, Georgia: DNV Loss Control Management. 1985.
CCPS	Center for Chemical Process Safety of the American Institute of Chemical Engineers. <i>Guidelines for Auditing Process Safety Management Systems</i> . New York: American Institute of Chemical Engineers, 1993.
CFR	Code of Federal Regulations
Company X	A major oil company's safety management systems audit
FLAIM	Gale, W.E., Jr., Bea, R.G., and Williamson, R.B. "FLAIM, Fire and Life Safety Assessment and Indexing Methodology, Final Report to the US Department of the Interior, Minerals Management Service, Technology Assessment and Research Branch." Department of Civil Engineering, University of California, Berkeley, 1994.
Geller	Geller, E. Scott. <i>Working Safe: How to Help People Actively Care for Health and Safety</i> . Radnor, PA: Chilton Book Company, 1996.
Harrison	Harrison, P.I. <i>Organizational, Management and Human Factors in Quantified Risk Assessment (Report 2)</i> . Sudbury, Suffolk, England: Health & Safety Executive Research Report No. 34/1992.
HSEMS	International Organization for Standardization. <i>International Standard for the Development of Safety, Health and Environmental Management for Oil and Gas Production Operation and Facilities (ISO/CD 14 690)</i> . New York: International Organization for Standardization.
ISM	International Maritime Organization. <i>International Management Code for the Safe Operation of Ships and for Pollution Prevention: International Safety Management Code, Resolution A.741 (18)</i> . London, England, 1993.
Krause, Hidley & Hodson	Krause, T.R., J.H. Hidley, and S.J. Hodson. <i>The Behavioral Based Safety Process: Managing Involvement for an Injury-Free Culture</i> . New York: Van Nostrand Reinhold, 1990.
Op Team & Organization	<p>Research including</p> <ul style="list-style-type: none"> • Libuser, Carolyn B., and Karlene H. Roberts. "The Development of a Conceptual Model for Risk Mitigation." Thesis, University of California, Berkeley, 1995. • Bea, R.G., and K.H. Roberts. "Human and Organization Factors (HOF) in Design, Construction, and Operation of Offshore Platforms" (OTC 7738). Paper presented at the 27th Annual Offshore Technology Conference, Houston, Texas, 1-4 May 1995.

**Table 4.4.2.2a, Method B Safety Management Systems Evaluation - Marine Terminals
 General and Detailed Questions (continued)
 Reference Codes and Sources (continued)**

Code	Description
	<ul style="list-style-type: none"> <li>Boniface, D.E. "An Analytical Methodology to Assess the Risks and Countermeasures for Human and Organizational Error in the Marine Industry." Thesis submitted in partial satisfaction of the requirements of the degree of Master of Engineering, Department of Naval Architecture and Offshore Engineering, University of California, Berkeley, 1996.
Petersen	Petersen, Dan. <i>Human-Error Reduction and Safety Management</i> . New York: Garland STPM Press, 1982.
PFEER	Health and Safety Commission. <i>Prevention of Fire and Explosion, and Emergency Response on Offshore Installations</i> . Sudbury, Suffolk, England: HSE Books, 1995.
SEMP	American Petroleum Institute. <i>Recommended Practices for Development of a Safety and Environmental Management Program for Outer Continental Shelf (OCS) Operations and Facilities (API RP 75)</i> . Washington, DC: American Petroleum Institute, 1993.
UKOOA	United Kingdom Offshore Operators Association
USCG	United States Coast Guard
USDOT	United States Department of Transportation



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April 10, 1997

University of California at Berkeley
Department of Civil Engineering
215 McLaughlin Hall #1712
Berkeley, CA 94720-1712

Attention: Professor Robert Bea

Reference: 95-127

Dear Professor Bea:

At the FLAIM Project meeting February 17-18th, 1997, held in the Texaco office in New Orleans, Louisiana, the FLAIM Sponsors requested that Paragon Engineering Services, Inc., personnel revise the name, scope, and tasking for the Project. The new project name and acronym is Safety Assessment of Management Systems or SAMS. During that meeting, attendees cooperated to define the project scope and tasks necessary for completion to finalize the project. Priorities were set against tasks and responsibilities for tasks were set. The tasks defined for University of California at Berkeley personnel included are:

- 1.0 Write a statement which defines the objective of the UCB method and provide material which gives an overview of the method. It is also requested that you determine a name by which your method can be referred to in the report text. All this information will to be included in the initial (introductory) chapter of the Final Report. Provide a synopsis of the difference, as you see it, between the two methods proposed in the Year 1 Report. The primary responsibility for this task is to be assigned to Derek Hee with appropriate supervision by Professor Bea, and Drs. Roberts and Williamson. Preliminary Draft is due July 15, 1997, with the draft to be submitted to Sponsors due August 1, 1997.
- 2.0 Input and revision to the Chapter 1 material from the Year 1 Report for inclusion in the Final Report: The primary responsibility for this task is to be assigned to Derek Hee with appropriate supervision by Professor Bea, and Drs. Roberts and Williamson. Preliminary Draft due July 15, 1997, and the draft to be submitted to Sponsors due August 1, 1997.
 - 2.1 Provide further details beyond the information included in Chapter 1 of the Year 1 report concerning other approaches to risk assessment, safety indexing methods, and safety management system evaluation. Such material should be thorough and explain why it was necessary, in your opinion, to attempt to develop a new methodology for safety indexing. The discussion should include but not be limited to the following techniques:

- Quantitative Risk Assessment
- Hazard Analysis techniques such as HAZOP, Event Trees, Fault Trees, Failure Modes and Effects
- Safety Indexing Methods, including FLAIM I and HESIM
- Safety Management Systems Assessment methods including discussion on approaches suggested by CCPS; API RP75; PFEER; ISO; ISM; the MANAGER technique from HSE; Petersen; Bird & Germain; Geller; Krause, Hidley & Hodson, Bellamy & Geyer; and Harrison

2.2 It is the understanding of the Project Sponsors' that UCB personnel are familiar with the methods in 2.1 above and those reviewed during the FLAIM II project. The Project Sponsors also expect that any information or reviews conducted by Derek Hee for similar projects related to the pursuit of his Doctoral degree be included within the revised material UCB provides. For each of the bulleted areas listed in section 2.1 above, the following questions should be answered:

1. What is the theory behind the technique or method?
2. How is it applied?
3. Who (with what background, training or credentials necessary) would conduct such an analysis?
4. What type of results are obtained from the analysis or technique?
5. Why was it rejected as the model for our project?

3.0 Revise and rewrite material on UCB method to provide more detail and explanation of the scientific basis of the method for Chapter 4 of the Final Report. Note that the attached material relating to the UCB method is presently called Method A. This title will change, if requested, to the name of your choice. The primary responsibility for this task is to be assigned to Derek Hee with appropriate supervision by Professor Bea, and Drs. Roberts and Williamson. However, we expect that Dr. Roberts would provide the greater input and supervision for items 3.3 and 3.4 outlined below. Preliminary Draft due July 15, with the draft to be submitted to Sponsors due August 1, 1997.

Include in this rewritten material any insights, revisions or updates that have resulted from Derek Hee's and UCB's involvement with similar research or development projects like SAMS. Restructure the material to match the outline below and address the following points:

3.1 INTRODUCTION

- Describe in general how the method works and how focusing on 5 AOC's provides the insight needed into Human and Organizational Factors

3.2 IDENTIFYING AND EVALUATING AOC

- Describe the purpose, importance and reason and scientific basis for identifying AOC's.
Provide further details on each hazard evaluation method presently listed, as well as other common industry accepted techniques such as Quantitative Risk Assessment, Event Tree, Fault Tree, What-If Analysis, Checklist Analysis, and What-If Checklist Analysis. Include in the discussion the basis and use of other hazards analysis techniques, how they could also be used for identifying AOC,

and the reason these methods were not chosen by UCB for the FLAIM/SAMS project.

- Describe how guidance and techniques accepted in the Oil/Gas Industry is related to the concept of risk analysis, hazards analysis and identifying areas of concern in facilities. This explanation would include discussions of API recommended practices and specifications like (but not limited to) API 14C and API 14J and API 2C. It would also cover how other organization view risk, hazards analysis and identifying areas of concern. Such organizations and the relevant literature produced by those organizations would include AIChE, CCPS, CMA, etc.
- Describe in detail how the concepts of Human and Organizational Factors will relate to the concept of identifying Areas of Concern? Provide details on all relevant HOF literature relating to safety management, risk, and hazards analysis.
- Describe in detail your chosen methodology for identifying areas of concern, the scientific basis for your technique and a detailed rationale describing why reviews of certain company supplied documents are necessary for the success of identifying areas of concern.
- Describe the scientific basis or mathematical purpose of identifying five areas of concern to further analyze. Why not four or seven or ten? What are the criteria for deciding exactly how many AOC to analyze or if more than five are possible to evaluate which AOC will be chosen for further evaluation and which rejected.
- Describe in detail how the Minimal Basic Questions will be used in the identification of areas of concern and what is done with the answers to the questions. Explain how the Minimal Basic Questions relate to Safety Management Systems. Provide details about how the analysis you conducted using the Minimal Basic Questions will provide insights about a company's Safety Management Systems and how feedback on your findings will be provided to the company where a facility has been evaluated.

3.3 OPERATING TEAM FACTORS

- Describe in detail the research background relating to the various operating team factors.
- Explain the selection process for choosing the particular factors you use.
- Describe how scoring is derived for each factor during an evaluation.
- Describe how the factors relate to your concept of attributes.
- Explain how questions are derived during your analysis of areas of concern based on the operating team factors.

3.4 ORGANIZATIONAL FACTORS

- Describe in detail the research background relating to the various organizational factors.
- Explain the selection process for choosing the particular factors you use.
- Describe how scoring is derived for each factors during and evaluation.
- Describe how the factors relate to your concept of attributes.
- Explain how questions are derived during your analysis of areas of concern based of the operating team factors.

- 3.5 **CALCULATION OF RELATIVE RISK AND STANDARD DEVIATION**
- Describe the various formulas, statistical measures and calculations used in your method and the basis and purpose of these.
- 3.6 **REDUCING RELATIVE RISK**
- Expand on ideas that currently appear in section 3.3.4.3.3 in Section 3.0 Method A (attached).
- 3.7 **COMPUTER PROGRAM**
- Determine if the amount of detail currently provided in Section 3.0 Method A as attached will serve to increase the reader's understanding of your technique.
- 3.8 **TABLE TOP EXERCISE**
- Rewrite the material provided for the Year 1 Report to show how the items above in 3.2, 3.4 & 3.5 were followed to arrive at the results. Put results and conclusions for the table top exercise at the end of this section. Use objective language to explain the results and ensure that conclusive statements are not based on opinion. Based on the results obtained in the Table Top Exercise, answer the question "What did we know after this exercise that we did not know before and how was this knowledge used to change HOF is treated at the subject facility?"
- 4.0 **Write Findings and Conclusions from your perspective for the project. Limit this material to objective statements rather than opinion. This material is to be included in the last chapter of the report. The primary responsibility for this task is to be assigned to Derek Hee with appropriate supervision by Professor Bea, and Drs. Roberts and Williamson. Preliminary Draft due July 15, 1997, with the draft to be submitted to Sponsors due August 1, 1997.**
- 5.0 **Develop a training outline to be included in the Final Report. The outline would be based on courses previously given at California State Lands Commission offices on the topic of Human and Organizational Factors. The length and detail of the training course should be appropriate to a one-day course. The primary responsibility for this task is to be assigned to Professor Bea with appropriate input and assistance by Derek Hee, and Drs. Roberts and Williamson. The Preliminary Draft is due July 1, 1997, and the draft is due for submission to Sponsors August 1, 1997. The outline would include but not be limited to material on the following topics:**
1. Accidents including but not limited to Piper Alpha and Ocean Ranger
 2. Regulations relating to Risk and Process Safety Management:
 - SEMP (API RP 75)
 - ISM Code
 - ISO Code, ISO/CD 14 690
 - PFEER
 3. Introduction to Human and Organizational Factors (Overview)
 4. Specific Human and Organization Factors Topics
 - Process Auditing
 - Safety Culture
 - Risk Perception
 - Emergency Preparedness
 - Command and Control

- Training
- Communications
- 5. Human and Organizational Concerns
 - Resources
 - Requisite Variety
- 6. Introduction to Safety Management System Topics
 - Management and Organizational Issues
 - Hazards Analysis
 - Management of Change
 - Operating Procedures
 - Safe Work Practices
 - Training
 - Mechanical Integrity
 - Emergency Response
 - Investigation and Audit.

As you know, Paragon has decided to fund your efforts at agreed contract amounts for the second year. As a result, we expect that the detail and quality of work received from you will be at a level that meets the expectations of both Paragon Engineering Services and the collective Project Sponsors. We will require you to produce a product, specifically the portions of the Final Report outlined in this letter, that is satisfactory. This will require written resolution of comments sent to you by either Paragon Engineering Services or by the Project Sponsors by the deadlines outlined in this letter. Please note that Draft Final Report Materials will be sent out by Paragon to the Sponsors on August 15, 1997. If you have any questions about these requirements or the scope of work as assigned to you, please document those concerns and forward them to me for consideration.

Sincerely,



John Van Meter

DBMcC:kmc