FIRE SAFETY UPDATE REVIEW

OF THE

ALYESKA VALDEZ MARINE TERMINAL

JUNE 2001

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Prepared For:

Prince William Sound
Regional Citizens' Advisory Council
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1.0 INTRODUCTION

At the request of the Prince William Sound Regional Citizens Advisory Council (RCAC), A.J. Semenza and Orville M. "Bud" Slye, Jr., P.E. of Loss Control Associates, Inc. (LCAI), conducted a fire safety review of the Valdez Marine Terminal (VMT) on June 18-21, 2001.

The visit was conducted to review progress on completion of fire safety recommendations contained in the January 6, 2000 report, *Fire Protection System Assessment Alyeska Valdez Marine Terminal.* This report, prepared by LCAI and A.J. Semenza for RCAC, outlined a number of fire protection recommendations for improvement of the Terminal fire safety systems, equipment and emergency response and fire team operations. In addition, Fire Team Manning, Fire Brigade Training and a proposed Fire Fighting Exercise for Fall 2001 with the VMT and City of Valdez Fire Departments were included in this years review.

Discussions were held with the VMT Fire Team and management personnel, engineering and maintenance specialists, operational personnel, the Valdez Fire Department Chief D. Blackburn, and the Alaska State Fire Marshal representative to the Joint Pipeline Office (JPO) Dan Diehl. A closeout meeting was held with RCAC Valdez personnel and with VMT management to provide a briefing on observations, findings and recommendations to be included in this report.

2.0 EXECUTIVE SUMMARY

Significant progress has been made since the June 2000 review. A number of programs and projects have been initiated to correct maintenance and operational problems in water based fire protection systems. Procurement was initiated for new protective clothing, fire fighting equipment and fire trucks. This major progress was a positive reinforcement of Alyeska's recognition of the priority for effective fire protection measures in VMT.

Reviews focused on special concerns have been conducted at the terminal since the June 2000 visit. In September 2000, a review was conducted of progress with maintenance and performance of water based fire protection systems with an emphasis on efforts to clear plugged storage tank foam fire protection systems. Jumpers were installed between the crude and foam inlet lines to the tanks to flush foam distribution piping spiders to assure that the lines were clear and to prevent plugging. The September meeting also focused on the progress of repairs to the fire water system and interior lining of critical fire water piping at the pump house and distribution lines. In addition, initial engineering studies on the arrangement of foam system upgrades for the East Metering Building were discussed and planning for a test of the proposed proportioning system arrangement for the Metering Buildings was discussed.

In March 2001, a full flow test of the foam system in the East Metering Building was conducted. O.M. Slye, Jr. and A.J Semenza observed the tests representing RCAC. The test demonstrated the viability of the proposed foam system design using a modified foam proportioning system, increased foam concentrate supply tanks and the existing oscillating foam monitor system originally provided for building protection.

During the June 2001 visit it was determined that substantial progress has been made in a number of key areas. Fire protection system maintenance has improved with most of the backlog of open work orders completed. Two fire system engineers have been assigned to assist the fire team in review and analysis of fire protection system maintenance. Two new fire trucks and personal protective equipment has been delivered and clothing has been assigned to personnel. The East and West Metering Building foam system upgrades are under design and planned for installation in the fall.

The potential exists however for a reduction in the level of maintenance performance. Management is planning to turn over to operations groups the responsibility to perform Preventative Maintenance from the Fire Team. There is a potential that PM performance will be less than what is now provided by the fire team. Recommendations are included in the report on fire system maintenance performance and methods for consideration to assure continued high visibility of fire system operational readiness.

Fire protection of the Marine Wharves was reviewed during this VMT visit. The fire protection system on the wharves appears to be less than adequate for the fire exposure that will occur should a fire spill occur between the wharf and a tanker. Shore systems will be a key element in wharf protection and the installed systems have minimal fire fighting capacity for the hazard of a spill fire on the water with fire exposure to the wharf supports. A fire protection engineering study of the fire protection for wharves 4 and 5 is being recommended to determine the adequacy and suitability of the fire protection system to protect the wharf from fire exposure of a spill fire.

3.0 FIRE PROTECTION SYSTEM MAINTENANCE

3.1 Current Practice and Performance

Outstanding work orders for fire protection system repairs and maintenance have been drastically reduced to a few items awaiting parts and/or completion. The Fire Team has assigned a full time Fire Systems Engineer to monitor PM's and Passport System reporting. In addition, a Maintenance Engineer assigned to fire system PM and maintenance activities is located in a trailer office adjacent to the office of the Fire Chief. Routine communication between the Fire Chief and the two engineers is helpful to smooth and effective communications on repair and maintenance issues. In order to coordinate the PM effort, the Fire Chief has initiated a routine meeting to coordinate all stakeholder efforts to maintain and/or repair the fire protection systems. These "TOP 5" meetings are an effective tool in coordinating efforts, providing visibility of repair and maintenance activities and also advising the Fire Chief and the Fire Team of

impairments, problems in completing repairs or other vital data essential to effective use of the fire protection systems. The TOP 5 meetings have been an effective tool to achieve a smooth completion of difficult maintenance and repair operations on the fire protection systems.

3.2 Maintenance Responsibility

VMT management plans to return the responsibility for performing PM's on fire protection systems to plant operations groups. Fire protection systems (pumps, foam systems, hydrants, firewater monitors and fire mains) are "owned" by the operating area in which the systems are installed. These operating group "owners" are primarily responsible for the operation of the equipment during an emergency, so it is obvious that knowledge of the equipment will be an asset in assisting the emergency responders (the Fire Team).

However, a shift of primary PM responsibility for equipment to operating group owner personnel is being considered. This change in responsibility has the potential to result in less effective maintenance or unidentified impairments which could directly affect fire control and extinguishment capability. This conclusion is based on past experience at VMT and at other large facilities in the US and overseas locations. Because of the potential direct exposure to fire and explosion hazards should the fire systems not operate properly, Fire Team members have a personal interest in the proper operation of fire protection systems. Operational personnel are generally more focused on processing or oil movements equipment and will focus on that equipment which is associated with maintaining day to day operations. As a result, experience shows that fire protection equipment gets less attention and maintenance and operation of that equipment can deteriorate over time. Fire Team members reported that attempts to schedule PM's jointly with operational personnel have not been successful. This reception indicates a lack of enthusiastic acceptance of the responsibility for continuing the current level of maintenance for these important fire protection systems. Recommendations are included on measures for maintaining the current high level of maintenance capability in fire systems regardless of ownership.

3.3 Maintenance Management

In order to be fully advised on the performance and availability of fire protection systems, the Fire Chief has conducted routine meetings to coordinate fire protection system maintenance and major projects. These meetings, known as the "TOP 5", bring together all operating group fire system owners, the Fire Team, engineering, project groups, and planning groups in a joint coordination meeting. During the meetings, problems are discussed and solutions advocated to gain resolution and action to mitigate impairments and gain input from stakeholders on timing, scheduling and other related issues. The TOP 5 meeting is especially important for those projects which are in engineering where quality issues, scheduling, and other related issues can seriously delay implementation without constant Fire Team vigilance to gain resolution. Such

coordination meetings should continue as the responsibility for PM development and implementation is shifted from the fire team to operations groups.

3.4 Technical Assistance

The management of maintenance of fire protection systems has been upgraded by the assignment of two fire systems engineers to assist the Fire Team. The fire systems engineer reviews PM performance, timing, and effectiveness. A monthly report will be made to the Fire Chief on uncompleted work, timing, and other related issues. A maintenance engineer assigned to the fire systems by the primary fire systems operational group (OM&S) is physically located in the Fire Team office area. The maintenance engineer analyzes PM activities for the fire systems and provides assistance in scheduling of maintenance, PM implementation and results reporting.

3.5 Tank Foam Systems

The crude oil storage tanks are protected by a sub-surface foam system, which includes an inlet line and a manifold within the tank connecting piping to a hub-manifold. The lines were found plugged from deposits of waxy material from the oil. In the summer of 2000 jumpers were installed to flush crude oil into the foam system to clear the lines. A number of tests and demonstrations were conducted during the summer of 2000 to assure that the new systems would be effective. The Alaska State Fire Marshal has required that the systems be cleaned annually and reported to the Joint Pipeline Office to verify the readiness of the foam systems. An inspection was made of representative jumpers to verify the installation of the systems. Details of tests of each jumper were provided for review and the draft operation procedure to flush the foam lines was reviewed and commented upon during the site visit. Completing tank foam systems flushing before fall 2000 is being recommended. The procedures and installed jumpers and equipment appear more than adequate to protect the tanks and assure that the foam systems will be operable for foam injection.

3.6 Red Tag System

In the initial January 2000 report, consideration of a tag, lock or seal system to control access to critical fire protection systems was recommended. Details on access controls and management of impairments of fire protection systems is contained in NFPA 25, *Inspection, Testing and Maintenance of Water-Based Fire Protection Systems.* A recommendation is included to implement this system which is especially critical since the operational groups will assume responsibility for the systems and there is not currently a system for reporting of impairments and maintenance to the Fire Team.

3.7 East and West Metering Buildings Foam System Upgrades

As discussed above, tests were held in March 2001 to determine the suitability of proposed improvements to the foam proportioning system. As a result of these tests it was determined that the application of foam in the buildings was in excess of the

minimum required amounts required by National Fire Protection Association Standard 11, *Low Expansion Foam Systems.* The design of the proportioning system and foam concentrate storage system are being prepared and installation by fall 2001 is anticipated. Both buildings will be upgraded substantially improving the protection of these vital buildings.

3.8 Wharf Fire Protection

The wharf structures are highly susceptible to fire exposure from a spill fire on the water under the pier deck. Early intervention for fire protection to cool exposed steel and initiate fire control is needed to assure against early failure of product lines and the structure. Ship board systems and monitors from tugs and escort vessels are not likely to be effective due to restrictions on gaining access to the shore side of a tanker at the wharf. In addition, response time to apply foam on a spill fire is likely to be too slow to implement an effective fire attack to counter the exposure of the structure to fire which will result in early structural failure. A recommendation is being included to conduct a fire protection engineering study of wharf protection to assure full protection of shore assets from credible fire events at the pier head.

4.0 FIRE TEAM MANNING

One of the areas reviewed was the current Fire Team manning. VMT has a full time Fire Chief and two full time Assistant Chiefs who are either working or are on call 24 hours a day, seven days a week. The Chief and Assistant Chief are supplemented by a contract Fire Team consisting of 12 fire fighters. On each 12-hour shift three contract fire fighters are on duty. VMT also has 60+ volunteer fire brigade members. Additionally, all VMT employees, with the exception of administrative assistants, are trained to the incipient level of OSHA's 1910.156 Standard.

The Fire Chief and his Assistant Chiefs are well qualified, highly motivated, well trained individuals who provide the overall leadership for the emergency response organization. However, the contract fire team process has not been working out as originally designed due to the high turnover rate caused by individuals seeking higher wages and better benefits. Many of these fire fighters are opting to take fire department entrance exams in order to secure employment with larger career fire departments. In some cases there have been contract fire fighters that have opted to take an Operator's position with VMT because of the higher pay. This situation has caused a multitude of problems particularly in the area of training and is frustrating to the Chief and his Assistant Chiefs. Many hours of training are required to get these people proficient and able to carry out their assigned tasks. In order to keep a stable work force in this area VMT management needs to consider compensating these individuals at a rate competitive with Operators or entry-level career fire fighters.

The volunteer brigade currently provides 60+ personnel who augment the full time organization. This number is presently sufficient, however, an evaluation should be

done to determine how to maintain this desired level since the work force is getting older and some members no longer want to participate in this capacity. The future might require a combination of volunteers and mandatory assignments to keep manning at desired levels.

5.0 FIRE TRAINING

There are some deficiencies that need to be addressed in the current fire-training program. Overall attendance by the volunteer fire fighters is down which can be attributed to several factors:

5.1 Live Fire Training

VMT no longer has on site live fire training. The live fire training facility has been abandoned to accommodate the site for a new administration building. Consideration should be given to opening a site previously used for live fire fighting training located adjacent to the west tank farm. Having an on site live fire training facility is important to maintain the fire brigade's skills in dealing with real emergencies and can also help with the overall morale of the organization.

5.2 Repeat Training

Because of the high turnover rate in the contract fire fighting organization, a great deal of time is being spent on training new fire fighters in fire fighting as well as routine duties. This has caused fire trainers (Assistant Chiefs and others) to provide training that many of the more experienced fire fighters have already had thereby deferring the more advanced training they should be receiving.

5.3 Availability for Training

In conversations with several people within the fire fighting emergency response organization it appears that overall morale is down. Some of this is a result of a lack of support by middle managers for the emergency response organization. An example of this is that some managers are not making volunteers available to attend training citing operating priorities as the reason. This problem can be overcome by better planning and insuring that enough manpower is available which could require overtime to make people available for mandatory fire training sessions.

5.4 Valdez City Fire Department Training

Valdez Municipal Fire Department (VFD) training, which was scheduled to be ongoing, has been deferred due to the other problems already mentioned in the training process. Once those problems are resolved every effort should be made to develop an ongoing training program, if only annually, with VFD.

6.0 PROPOSED FIRE TRAINING EXERCISE

There is an ongoing discussion with RCAC and VMT on conducting a fire training exercise later this year. The first step would be to develop a Steering Committee comprised of VMT's Fire Chief, VFD's Fire Chief, a representative from the State Fire Marshal's Office, a representative from JPO and the RCAC Fire Protection Consultants (Slye and Semenza). The Steering Committee would develop the exercise and parameters for measuring the exercise that would include the effectiveness of the fire-training program, evaluation of the Incident Management System, and assessment of the interaction of the abilities of the two fire departments (VMT and VFD). Other areas that would be evaluated would be fire ground accountability procedures and the ability to communicate between all emergency responders. If authorized, the first Steering Committee meeting should take place in July 2001 with the proposed exercise occurring in late September or early October 2001.

7.0 RECOMMENDATIONS

7.1 Maintenance Controls and Procedures

Establish controls and procedures to assure inclusion of the Fire Team and Fire Chief in the process of monitoring, evaluating and determining effectiveness of maintenance of water based fire protection systems. As a minimum, the Fire Team should be advised of all repairs, modifications, or impairments to the fire protection system as required by NFPA 25, *Inspection, Testing and Maintenance of Water-Based Fire Protection Systems*.

7.2 System Coordination Meetings

Continue to conduct critical fire system coordination meetings (similar to the TOP 5 meetings) with all stakeholders to schedule, coordinate and maximize attention to fire protection system modifications, repairs, maintenance or design.

7.3 Change-Over Training Procedures

Review turnover procedures, practices and training associated with a change-over of responsibility for PM's of fire protection systems. The review should include means of assuring middle management support, proper training and orientation of the vital role of fire protection systems in fire safety of VMT.

7.4 Foam Spider Flushing Reporting

Implement the PM's for the tank foam system jumpers and finalize the first year report to JPO on or about September 2001.

7.5 Red Tag Reporting System for Impairments

Establish a “red tag” reporting system for fire system impairments and access control. The system should meet requirements of NFPA 25, *Inspection and Maintenance of Water-Based Fire Protection Systems*, to provide approval and notification to the Fire Team of any changes in the operating condition of fire protection systems.

7.6 Wharf Fire Protection

Implement a fire protection engineering study of the fire protection for Wharves 4 and 5. The study should evaluate the extent of fire hazard to the effective operation of the pier from identified fire hazards on the loading pier. Based on the identified hazards, fire protection system and operational procedures should be developed to reduce the potential fire exposure to an acceptable level for continued operation of the Wharves.

7.7 Fire Fighter Turnover

Review the causes for a high turnover rate in fire fighters in the Fire Team and implement the necessary modifications to the current salary rate to obtain a competitive rate with that of operators or entry-level career fire fighters in Alaska.

7.8 Volunteer Fire Brigade

Conduct an evaluation of the volunteer fire brigade to determine means to maintain sufficient manning and participation in the brigade. Mandatory assignments might be considered as one approach to keep manning at desired levels.

7.9 Fire Fighter Training

Upgrade fire training for volunteer fire fighters, the Fire Team and the Valdez Fire Department by the following measures:

7.9.1 Establish a live fire training area on the site, possibly adjacent to the west tank farm using the former fire training area.

7.9.2 After consideration and implementation of corrective action as recommended in 7.7, implement additional training for fire fighters to assure continued competency.

7.9.3 Upgrade planning and scheduling of volunteer fire fighter training to assure attendance, minimum conflict with conflicting priorities of volunteer supervisors. Supervisors should be provided with sufficient manpower to allow for overtime to make personnel available for mandatory fire training sessions.

7.10 Fire Exercise

Develop a steering committee to develop a joint exercise between the VMT and VFD. The exercise should be conducted to evaluate effectiveness of the fire-training program, the Incident Management System, and assess the interaction of the abilities of the two fire departments. Other areas for evaluation would be fire ground accountability procedures and communication between emergency responders. Sufficient time should be provided to allow for a proposed exercise occurring in late September or early October 2001.