DOE/RL-2004-63

TYPE A

ACCIDENT INVESTIGATION

OF THE

JULY 15, 2004

HANFORD 200 EAST AREA

FALL FATALITY

August 2004

United States
Department of Energy
P.O. Box 550,
Richland, Washington 99352

DISCLAIMER

This report is an independent product of the Type A Accident Investigation Board appointed by Keith A. Klein, Manager, Richland Operations Office, U.S. Department of Energy.

The Board was appointed to perform a Type A investigation of this accident and to prepare an investigation report in accordance with DOE Order 225.1A, *Accident Investigations*.

The discussion of facts, as determined by the Board, and the views expressed in the report are not necessarily those of the Department of Energy and do not assume and are not intended to establish the existence of any legal causation, liability, or duty at law on the part of the U.S. Government, its employees or agents, contractors, their employees or agents, or subcontractors at any tier, or any other party.

This report neither determines nor implies liability.

RELEASE AUTHORIZATION

On July 16, 2004, I received delegated authority from the Acting Undersecretary for Energy, Science, and Environment, U.S. Department of Energy (DOE) to appoint a Type A Accident Investigation Board to investigate the July 15, 2004, accident.

On July 16, 2004, the DOE-RL Deputy Manager, on my behalf, appointed a Type A Accident Investigation Board to investigate the July 15, 2004, accident at the Hanford 200 East Area. The Board's responsibilities have been completed with respect to this investigation. The analysis process, identification of causal factors, and development of judgments of need were performed during the investigation in accordance with DOE Order 225.1A, *Accident Investigations.*

I accept the findings of the Board and authorize the release of this report for general distribution.

Keith A. Klein
Manager
Richland Operations Office

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On July 15, 2004, an employee of All Mobile Transporting & Repairs (AMTR) was found motionless at the bottom of a ladder with a serious head injury. There were no eyewitnesses to the apparent fall. The evidence indicated the employee was standing on the ladder approximately five to six feet off the ground, removing sheet metal screws from the aluminum trim of a mobile office that was being prepared for transport off the Hanford Site. On July 12, 2004, the AMTR employee underwent out patient surgery with general anesthesia and reportedly collapsed twice the next evening. The AMTR employee had medical conditions, which may have contributed to the apparent fall.

The Type A Accident Investigation Board specifically reviewed the authorities, accountability, and roles and responsibilities of the DOE and contractor organizations, and management systems as they may have contributed to the accident. The Board determined both DOE-RL and FHI believed they had only very limited accountability, roles and responsibilities for work performed by non-government contractors on the Hanford Site beyond providing safe access. The work giving rise to this incident was performed by non-government workers as a result of DOE-RL transfer of title to an excess mobile office to the Community Reuse Organization (CRO). The CRO sold the mobile office to a commercial company prior to CRO accepting possession. The commercial company then contracted with AMTR to retrieve the mobile office from Hanford (DOE property) and transport it to a new location in the community. Although the presence of AMTR on DOE-RL property may appear to have been solely for non-DOE commercial purposes, DOE received the benefit of excess property removal that it would have otherwise had to accomplish by contract.

DOE Headquarters Management, Budget and Evaluation issued Acquisition Letter 95-06 and Personal Property Letter 970-1 to DOE-RL in 1995. The provisions of these letters were considered guidance and were not incorporated into the FHI contract or DOE-RL procedures. If the provisions had been implemented, AMTR would likely not have been on site on July 15, 2004, as the mobile office would have been moved to a CRO controlled location by Hanford forces and the work performed by AMTR on the day of the accident would not have been required.

Integrated Safety Management was not applied to this type of work activity because the work was not performed by a subcontract under the Project Hanford Management Contract (PHMC). Therefore, the tenets of safety management integrating environment, safety and health into work planning, hazards analysis, development of controls, and work execution were not flowed down and applied to this activity commensurate with the risk and complexity of the work. If CRO or AMTR activities had been subject to the tenets of Integrated Safety Management, the Accident Investigation Board concluded this accident may have been preventable.

The overall objective of the PHMC Integrated Environment, Safety and Health Management System Description is to “DO WORK SAFELY” while ensuring protection of the workers, the public, and the environment. Also DOE-RL has the expectation that

work will be conducted safely on the Hanford Site. To accomplish this, FHI had formal and informal procedures in place to protect site visitors by requiring hosting, site access orientation, and job hazard analysis processes. These were not implemented at a level of rigor to ensure work planning and execution commensurate with the risk and complexity of the work being performed by AMTR.

FHI appeared to take some responsibility for this work activity by imposing a Hanford Site Operations Task-Specific Safety and Site Access Plan that provided generic information related to site access, safety, and security requirements for owners and their contractors when they took possession of property from the Hanford Site. This was done even though FHI stated they had no ownership or accountability for non-government commercial work. The Board concluded, FHI did not attempt to resolve the apparent ambiguity in the management contract regarding application of Integrated Safety Management to non-government commercial work on the Hanford Site.

DOE-RL and its contractors have taken actions to determine if appropriate controls are in place and implemented so a similar accident would be unlikely. These actions included issuing two letters to FHI (04-AMSE-0047, dated July 20, 2004 and 04-AMCP-0403, dated July 28, 2004) and one letter to Bechtel Hanford, Inc. (BHI) (04-AMRC-0175, dated July 28, 2004). Theses letters directed the contractors to immediately review all industrial work performed by any subcontractor or vendor that involves industrial hazards or work controls to ensure adequate flow down of requirements, adequate oversight of the subcontracted or vendor work, and subcontractor/vendor safety performance evaluation. DOE-RL is reviewing grants, lease agreements, easements, permits, interagency agreements, etc., (which allow site access) to determine if a similar situation exists and/or if additional controls are needed.

DOE-RL confirmed through telephone conversations that no other property movements were scheduled on July 16, 2004, once the contractual relationship of the activity was determined. After review of activities described in letter 04-AMSE-0047, FHI notified DOE-RL that an upcoming activity for FHI to remove excessed steam piping would not be supported until directed by DOE-RL. Additionally, after reviewing the grant and associated documents and the response by FHI, DOE-RL formally notified FHI that no further property transfer offsite would be allowed until further notice.

TABLES, FIGURES, AND EXHIBITS

AMTR	All Mobile Transporting & Repairs
CFR	Code of Federal Regulations
CH2M HILL	CH2M HILL Hanford Group, Inc.
CPR	Cardiopulmonary Resuscitation
CRO	Community Reuse Organization
DEAR	Department of Energy Acquisition Regulation
DOE	U.S. Department of Energy
DOE-EH	U.S. Department of Energy, Office of Environment, Safety and Health
DOE-EM	U.S. Department of Energy, Office of Environmental Management
DOE-ORP	U.S. Department of Energy, Office of River Protection
DOE-RL	U.S. Department of Energy, Richland Operations Office
EMS	Emergency Medical Services
EMT	Emergency Medical Technicians
ES&H	Environment, Safety, and Health
FHI	Fluor Hanford, Inc.
IS&H	Industrial, Safety and Health
ISMS	Integrated Safety Management System
JHA/AJHA	Job Hazards Analysis/Automated Job Hazards Analysis
LLC	Limited Liability Corporation
MO	Mobile Office
ORPS	Occurrence Reporting and Processing System
OSHA	Occupational Safety and Health Administration
PHMC	Project Hanford Management Contract
POC	Point of Contact
PPE	Personal Protective Equipment
RIMS	RL Integrated Management System
S&AP	Safety and Access Plan
TARC	Tri-Cities Asset Reinvestment Company, LLC
TRIDEC	Tri-City Industrial Development Council
WAC	Washington Administrative Code
WISHA	Washington Industrial Safety and Health Act

The Accident

On the morning of Thursday, July 15, 2004, a non-government contractor employee of All Mobile Transporting & Repairs (AMTR) was found motionless at the bottom of a ladder with a serious head injury. It was believed the employee had been standing on the ladder, using a battery-powered drill, to remove sheet metal screws from aluminum trim on Mobile Office 392 (MO-392). Although there were no eyewitnesses to the event, it appeared the AMTR employee fell from the ladder.

On July 16, 2004, the Acting Undersecretary for Energy, Safety, and Environment, U.S. Department of Energy (DOE), delegated authority to the Manager, DOE Richland Operations Office (DOE-RL), to appoint a Type A Accident Investigation Board (Board) to investigate this accident in accordance with DOE Order 225.1A, *Accident Investigations*. The Acting Manager, DOE-RL, appointed a Board on the same date. Copies of both memorandums appear in Appendix A.

Background

The Hanford Site encompasses 586-square miles along the Columbia River in southeastern Washington state. The site was a plutonium production complex with nine nuclear reactors and associated processing facilities and is now the world's largest environmental cleanup project. Fluor Hanford, Inc. (FHI) administers the site's Asset Disposition Program for the DOE-RL pursuant to the terms of the Project Hanford Management Contract (PHMC), under the programmatic direction of the DOE Headquarters' Office of Environmental Management.

The Tri-Cities Industrial Development Council (TRIDEC), a not-for-profit, community based organization that addresses economic development needs for Benton and Franklin counties in southeastern Washington state, functions as the Community Reuse Organization (CRO). The CRO acts as the community's sole voice to DOE for economic development issues. MO-392 had been "excessed in place" as part of the Hanford Site cleanup process. The Community Reuse Organization (CRO) sold MO-392 to a commercial company prior to CRO accepting possession. The commercial contractor contracted with AMTR to retrieve MO-392 from Hanford (DOE property) and transport it to a new location in the Tri-Cities community. Consequently, the work giving rise to this incident was performed by non-government workers as a result of DOE-RL transfer of title to MO-392 to the CRO.

On July 15, 2004, a non-government contractor employee working for AMTR was on the Hanford Site preparing MO-392 for removal when the accident occurred.

Results and Analysis

The Board determined through interviews, medical records, and consultations with an occupational medical doctor that the AMTR employee had medical conditions that may have led to the employee's fall from the ladder. In addition, the high temperature conditions present on the day of the accident and the employee's questionable heat acclimatization may have aggravated the AMTR employee's medical conditions. AMTR neither had, nor was required to have, an occupational medical screening program. The employee did not disclose some of his medical conditions to his employer to allow accommodations to be considered.

The Board identified issues with work control practices associated with AMTR's activities. Ladder use issues were identified with regard to employee training, carrying a load, three point contact while ascending or descending (possible OSHA non-compliances), and ladder labeling/lashing (WISHA non-compliances). Ladder use could have been enhanced by using a step ladder, a helper, or a tool belt. AMTR's heat stress management was determined informal and unregimented. Selection of personal protective equipment was not consistent with work activities. Pre-job safety meetings were not conducted. All controls could have been formalized through a disciplined task specific hazard analysis and control specification, but AMTR did not conduct one, instead relying upon experience of their workforce. The Board concluded any or all of the above issues could have been contributing causes to the event.

The Board specifically reviewed the authorities, accountability, and roles and responsibilities of the DOE and contractor organizations, and management systems as they related to the accident. The Board determined both DOE-RL and FHI believed they had only very limited accountability, roles and responsibilities for work performed by non-government contractors on the Hanford Site beyond providing safe access.

Headquarters issued Acquisition Letter 95-06 and guidance document Personal Property Letter 970-1 to DOE-RL in 1995. The provisions of these letters were not incorporated into the PHMC, dated August 6, 1996, or subsequent DOE-RL procedures. DOE-RL has had conversations with DOE Headquarters regarding the excess in place practice. If the provisions had been implemented, AMTR would likely not have been on federally controlled property on July 15, 2004, as MO-392 would have been moved to a CRO controlled location by Hanford forces and the conditions existing at the time of the accident would not have been encountered by AMTR. The practices used in the personal property asset disposition process should be reviewed across the Department.

The tenets of Integrated Safety Management were not applied to the AMTR work activity because the work was not performed pursuant to a subcontract under the PHMC. Therefore, the tenets of safety management integrating environment, safety and health into work planning, hazards analysis, development of controls, and work execution were not flowed down and applied to this activity commensurate with the risk and complexity of the work.

The overall objective of the PHMC Integrated Environment, Safety and Health Management System Description is to "DO WORK SAFELY" while ensuring protection of the workers, the public, and the environment. Also, DOE-RL has the expectation that work will be conducted safely on the Hanford Site. To accomplish this, FHI had formal and informal procedures in place to protect site visitors by requiring hosting, site access orientation, and job hazard analysis processes. In this instance, these processes were not implemented at a level of rigor to ensure work planning and execution commensurate with the risk and complexity of the work.

DOE-RL and FHI did not develop and implement formal procedures for controlling CRO personal property excess. Additionally, the informal FHI desktop procedure and Safety and Site Access Plan used for controlling this work were not followed.

Conclusion

This accident may have been preventable had the basic elements of integrated safety management dealing with work planning, hazard analysis, development of controls, and work execution been applied to and implemented by the CRO contractor.

DOE-RL did not clearly state their authorities, accountability, roles and responsibilities for commercial work performed by CRO non-government contractors on the Hanford Site. Consequently, there was a lack of clear understanding with regard to responsibilities for safe work practices of commercial non-government work activities on the Hanford Site.

FHI imposed a Safety and Access Plan that provided generic information related to site access, safety, and security requirements for commercial contractors when they took possession of CRO property from the Hanford Site. This was done even though FHI stated they had no responsibility or accountability for this type of work activity, thus revealing an apparent ambiguity in FHI's obligations under the PHMC contract. FHI did not report the apparent ambiguity in the management contract regarding application of Integrated Safety Management to commercial non-government work activities on the Hanford Site.

Had DOE-RL moved MO-392 to the CRO controlled area with FHI forces or subcontractors, it would have been subject to the tenets of integrated safety management.

DOE-RL and FHI did not develop and implement formal procedures to specify roles and responsibilities in controlling the CRO personal property asset disposition process. The use of informal processes resulted in the loss of opportunities to prevent the accident.

Based upon these conclusions, the Board developed Judgments of Need, that when completed, should prevent recurrence of the event. A table providing the Judgments of Need follows.

Root Cause: FHI and AMTR did not apply and AMTR did not implement the basic elements of safety management practices dealing with work planning, hazard analysis, development of controls, and work execution to accomplish this task.

CONCLUSIONS	JUDGMENTS OF NEED
DOE-RL did not clearly state their authorities, accountability, roles and responsibilities for commercial work performed by CRO non-government contractors on the Hanford Site, resulting in a lack of clear understanding within DOE-RL and FHI with regard to those responsibilities. DOE-RL and FHI did not provide oversight to assure safe work practices in the execution of the asset disposition program with respect to non-government contract activities. FHI roles and responsibilities in procedures for management of non-government contactor activities on site were not clearly understood.	U.S. Department of Energy, Office of Environment, Safety and Health (DOE-EH), with line management, General Counsel, and Management, Budget and Evaluation, needs to identify DOE Policy for authorities, accountability, and roles and responsibilities for non-government work activities at DOE sites. DOE-EH, with line management, General Counsel, and Management, Budget and Evaluation, needs to identify DOE Policy for the safe performance of work and application of the principles of Integrated Safety Management to activities on DOE property that are precipitated by other than contract instruments. DOE-RL and FHI need to resolve and clearly define authorities, accountability, and roles and responsibilities for non-government work activities conducted on the Hanford Site.
DOE-RL did not implement the provisions of Acquisition Letter 95-06 and Personal Property Letter 970-1.	DOE Management, Budget and Evaluation needs to assess implementation and provide appropriate guidance to field elements on DOE Acquisition Letter 95-06 and Personal Property Letter 970-1. DOE-RL needs to assess the implementation of Acquisition Letter 95-06 and Personal Property Letter 970-1 into local procedures. DOE-RL needs to flow down Personal Property Asset Disposition provisions into the PHMC as appropriate.

CONCLUSIONS	JUDGMENTS OF NEED
FHI did not report an apparent ambiguity in the management contract regarding application of Integrated Safety Management to non-government contracts. DOE-RL and FHI did not develop and implement formal procedures to specify roles and responsibilities in controlling the personal property asset disposition process. Persons involved in implementation of the safety plan did not recognize their role in performing the task specific hazards analysis.	FHI needs to review its formal and informal processes to resolve the applicability of integrated safety management to non-government contract activity on the Hanford Site. DOE-RL and FHI need to develop the personal property asset disposition process by formalizing procedures, implementing procedures, training staff, and assessing program performance. Detailed procedures should include: - Application of Integrated Safety Management tenets - Expectations for CRO contractors - Interfaces with all Hanford organizations involved in the process and the CRO. - Roles and Responsibilities.
DOE-RL and FHI did not assure that visitors to the site received the proper badge and level of safety training for task(s) to be performed. FHI did not develop and implement interface controls defining roles and responsibilities for individuals (government or non-government) while on site.	DOE-RL and FHI need to assure the site access process is effective and enforced to provide the proper badges and level of safety awareness for visitors doing work on the Hanford Site. FHI needs to clearly define a process for establishing interface and integration with site forces for visitors coming on site.
Site employees did not recognize the condition of the worker was sufficiently affected to exercise stop work.	Hanford Site management needs to review the expectation for stop work with regard to employee fitness for duty to ensure employees recognize an obligation to stop unsafe activities.

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1 INTRODUCTION

1.1 BACKGROUND

On the morning of Thursday, July 15, 2004, a non-government contractor employee of All Mobile Transporting & Repairs (AMTR) was found motionless at the bottom of a ladder with a serious head injury. It was believed the employee had been standing on the ladder, using a battery-powered drill, to remove sheet metal screws from aluminum trim on MO-392. Although there were no eyewitnesses to the event, it appeared the AMTR employee fell from the ladder.

On July 16, 2004, the Acting Undersecretary for Energy, Safety, and Environment, U.S. Department of Energy (DOE), delegated authority to the Manager, DOE Richland Operations Office (DOE-RL), to appoint a Type A Accident Investigation Board to investigate this accident in accordance with DOE Order 225.1A, *Accident Investigations*. The Acting Manager, DOE-RL, appointed a Board on the same date. Copies of both memoranda appear in Appendix A.

1.2 FACILITY DESCRIPTION

The 586-square-mile Hanford Site is located along the Columbia River in southeastern Washington state. A plutonium production complex with nine nuclear reactors and associated processing facilities, Hanford played a pivotal role in the nation's defense for more than 40 years, beginning in the 1940s with the Manhattan Project. Today, Hanford is engaged in the world's largest environmental cleanup project, with a number of overlapping technical, political, regulatory, financial, and cultural issues.

Physical challenges at the Hanford Site include more than 50 million gallons of high-level liquid waste in 177 underground storage tanks, 2,300 tons of spent nuclear fuel, 12 tons of plutonium in various forms, about 25 million cubic feet of buried or stored solid waste, and about 270 billion gallons of groundwater contaminated above drinking water standards. These challenges are spread out over about 80 square miles and located in more than 1,700 waste sites and about 500 contaminated facilities.

The DOE Office of Environmental Management (DOE-EM) has two federal offices at Hanford, DOE-RL and the Office of River Protection (DOE-ORP). Each office oversees separate contracts held by private companies. Approximately 11,000 people conduct Hanford work with a site annual budget of about $2 billion dollars (in Fiscal Year 2003). Access to the Hanford Site is controlled by Fluor Hanford, Inc. (FHI) through the Project Hanford Management Contract (PHMC) it holds with DOE-RL.

As the Hanford Site cleanup progresses, equipment and facilities once used to support mission activities become excess to the remaining mission. MO-392, the location of the accident, was one such facility. Located in the central Hanford 200 East Area, in the midst of an area controlled by CH2M HILL Hanford Group, Inc. (CH2M HILL) for DOE

DOE-ORP, MO-392 sat on an asphalt pad among other mobile offices and was used as a support facility for Hanford personnel supporting Tank Farm activities.

FHI manages personal property asset disposition for Hanford in accordance with its existing contract, PHMC Section C.4.2. CH2M HILL, original owner of MO-392, notified FHI that MO-392 was no longer needed in support of DOE mission activities. At the completion of its useful life for the Tank Farm activities, DOE-RL transferred title to MO-392 to the Tri-Cities Asset Reinvestment Company, LLC (TARC) through the Economic Development Agreement. TARC sold MO-392 to a commercial contractor. AMTR was contracted by the purchaser (Two Rivers Terminal) to disassemble the mobile office and remove it from the Hanford Site. (Exhibit 1-1)

1.3 SCOPE, PURPOSE, AND METHODOLOGY

The Board began its investigation on July 20, 2004, and completed the investigation and submitted its final report to the Manager, DOE-RL, on August 23, 2004. The Board reviewed and analyzed the circumstances surrounding the accident to determine its cause including deficiencies, if any, in safety management systems and understand lessons learned to reduce the potential for recurrence of similar accidents.

In addition, the Board was requested to specifically address the role of DOE and the contractor organizations' management systems as they may have contributed to the accident; ownership processes; host and contractor safety processes; medical conditions and response; and application of lessons learned from similar accidents within DOE.

The Board conducted its investigation using the following methodology:

- Facts relevant to the accident were gathered through interviews, document and evidence reviews, and examination of physical evidence.
- Event and causal factor charting, along with barrier analysis and change analysis techniques, were used to analyze the facts and identify the cause(s) of the accident.
- Based on the analysis of information gathered, judgments of need were developed for corrective actions to prevent recurrence.

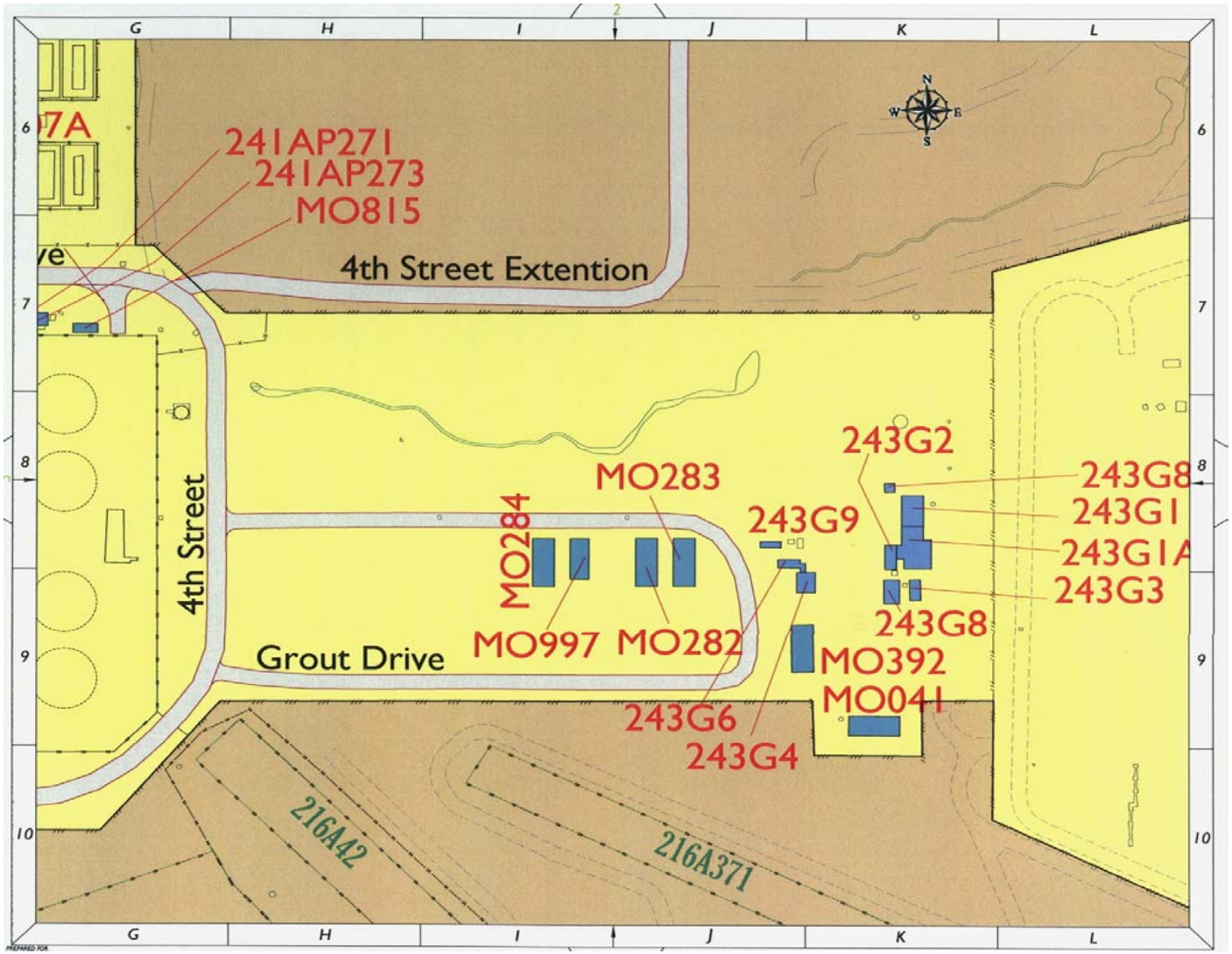

Exhibit 1-1, Map of work location.

Accident Investigation Terminology

A causal factor is an event or condition in the accident sequence that produces or contributes to the occurrence of the accident. There are three types of causal factors:

1. *Direct cause(s),* the immediate event(s) or conditions(s) that caused the accident

2. *Root cause(s),* the causal factor(s) that, if corrected, would prevent recurrence of the same accident or similar accidents

3. *Contributing causes,* factors that collectively with other causes increase the likelihood of an accident, but that individually did not cause the accident.

Events and causal factors analysis includes charting, which depicts the logical sequence of events and conditions (causal factors) that allowed the event to occur, and the use of deductive reasoning to determine events or conditions that contributed to the accident.

Barrier analysis reviews hazards, the targets (people or objects) of the hazards, and the controls or barriers that management systems put in place to separate the hazards from the targets. Barriers may be physical, such as equipment design or protective clothing, or elements of management, such as training and supervision. The following information is included in the Barrier Analysis Table:

1. What is a barrier?
2. How did each barrier perform?
3. Why did a barrier fail?
4. How did a barrier affect the incident?

Change analysis is a systematic approach that examines planned or unplanned changes in a system that caused undesirable results related to the accident. The following information is included in the Change Analysis Table:

1. Accident situation?
2. Prior, ideal, or accident free situation?
3. Difference?
4. Evaluation of the effect?

2 THE ACCIDENT

2.1 BACKGROUND AND ACCIDENT DESCRIPTION

2.1.1 Accident Overview

On July 15, 2004, at approximately 1150, a non-government contractor employee of AMTR, assigned to remove sheet metal screws from the trim on the side of a mobile office, was discovered motionless at the bottom of a ladder from which he was working. Although there were no eyewitnesses to the event, evidence at the scene indicated the AMTR employee had fallen from the ladder. Attempts to revive the AMTR employee at the scene were unsuccessful. The AMTR employee was transported to Kadlec Medical Center in Richland, Washington, where he was pronounced dead on arrival at 1236.

On July 16, 2004, the DOE-RL Acting Manager appointed a Type A Accident Investigation Board to determine the cause of the accident in accordance with DOE Order 225.1A, *Accident Investigations*, and to analyze the causal factors, identify root causes, and determine judgments of need to prevent recurrence of this accident.

2.1.2 Background

The Hanford Economic Transition Partnership for Economic Development, established in 1994, increases private sector involvement in cleanup of the DOE Hanford Site and supports regional economic development. This was established through the implementation of the Hall Amendment (Section 3155 of Public Law 103-160, National Defense Authorization Act). The intention of the Hall Amendment is to mitigate adverse economic consequences that might otherwise arise from the closure of DOE facilities. Led by DOE-RL, the program mitigates the economic impact of cleanup completion on the local and regional economy. Led by DOE-RL, the Hanford Economic Transition Partnership for Economic Development mitigates the economic impact of cleanup completion on the local and regional economy.

The DOE-RL personnel work closely with the local community to help foster economic diversification. DOE-RL has provided more than $21 million in community transition grants to the cities of Richland, Kennewick, and Pasco (Tri-Cities) through the Tri-City Industrial Development Council (TRIDEC), a not-for-profit, community based organization that addresses economic development needs of Benton and Franklin counties in southeastern Washington state.

As specified in the 3161 Grant[1], TRIDEC functions as the Community Reuse Organization (CRO). The CRO acts as the community's sole voice to DOE for economic development issues. TRIDEC provides community requests for assistance in economic

[1] Section 3161 of the National Defense Authorization Act for Fiscal Year 1993 required the Secretary of Energy to develop a work force restructuring plan for a defense nuclear facility to mitigate the impact of work force changes on workers and the Cities/Citizens/Entities/Tribes affected by the activities of the Hanford Site.

diversification and community transition activities to DOE-RL. Assistance includes requests to access surplus site personal property and grant funding for community transition projects. TRIDEC formed a limited liability corporation (LLC) called the TARC in April 1999. A signed Memorandum of Understanding between DOE-RL and TARC established conditions under which personal property may be transferred from DOE-RL to TARC. TARC uses excess personal property for either direct placement to local or recruited companies, or sells the property and reinvests the proceeds into Hanford-related or community economic development initiatives.

DOE-RL has contracted with FHI to manage the personal property excess disposition with limited exception for the Hanford Site. FHI's scope includes screening all surplus personal property (goods, materials, rolling stock) for use by other government agencies and programs. Property that is not dispositioned through the screening process is made available to TARC for local economic development.

Through the process described above, DOE-RL transferred title to MO-392 to TARC on February 2, 2004. TARC sold MO-392 to Two Rivers Terminal on June 14, 2004. MO-392 was to be moved from the Hanford Site by AMTR for Two Rivers Terminal. (Exhibit F-1) MO-392 was in an area CH2M HILL manages for DOE-ORP.

FHI provided a copy of the *Hanford Site Operations Task-Specific Safety and Site Access Plan (Short Form), Revision 0, 3/17/03* (Safety and Access Plan) to Two Rivers Terminal. The document contained language specifying that it was for use in identifying job hazards and controls. On June 30, 2004, Two Rivers Terminal and AMTR completed, signed to accept, and faxed the Safety and Access Plan to the FHI Hanford Site point of contact (POC). Acceptance of the Safety and Access Plan meant that the information on the plan was true and correct, and parties agreed to abide by requirements of this plan as approved. (Exhibit F-2)

On July 1, 2004, the Hanford Site Operations Industrial, Safety and Health (IS&H) safety representative approved the Safety and Access Plan. Approval meant that the task-specific Safety and Access Plan had been reviewed and accepted (as amended if applicable) for work on the Hanford Site. Although the form included an expectation in the Hazardous Control Measures section to contact the Hanford Site Operations IS&H safety representative through the FHI Hanford Site POC prior to submittal of the form, neither Two Rivers Terminal, nor AMTR did so. Also on July 1, 2004, the AMTR owner traveled to the 200 East Area to inspect MO-392.

On July 7, 2004, the FHI Hanford Site POC met the AMTR owner and employee at Hanford Central Badging where they received visitor badges valid through July 9, 2004. The FHI Hanford Site POC led them out to the job site, pointed out the emergency staging area in case of sirens or evacuation, and another mobile office (MO-283) where they could go for shade, water, and restrooms. (Exhibit 1-1) The discussion did not include a review of the task-specific hazards or hazard controls. The AMTR owner and employee began work on July 7, 2004, and worked approximately four hours. The AMTR owner and employee returned to the work site on July 8 and 9, 2004, to continue

disassembly and worked approximately four hours each day removing a large deck that was around MO-392.

On July 12, 2004, the AMTR employee underwent out-patient surgery with general anesthesia. On July 13, 2004, the AMTR owner and employee reported to Hanford Central Badging where they received visitor badges valid through July 15, 2004. They worked for approximately four hours at MO-392 on July 13, 2004. Later that day at home, the AMTR employee was observed vomiting, collapsing twice, and he stopped taking medication.

On July 14, 2004, the AMTR owner and employee worked for approximately four hours on MO-392. On July 15, 2004, the AMTR owner and employee arrived at MO-392 at about 0730. As the morning progressed until the time of the accident, environmental conditions were as follows.

Time	Temperature	Relative Humidity	Wet Bulb Globe Temperature
0700	80F	38%	74F
0800	84F	33%	78F
0900	89F	28%	80F
1000	93F	25%	82F
1100	94F	24%	84F
1200	98F	22%	83F

That morning, the AMTR owner and employee were observed placing wood blocks under MO-392, using hand jacks, and moving wood decking materials onto a trailer. The AMTR owner reported they were taking breaks approximately every 30 minutes. At about 0900, the AMTR employee walked to MO-283 and filled a water bottle. A worker located in MO-283 had a discussion with the AMTR employee wherein the AMTR employee remarked about the heat, having felt dizzy twice while working that morning, and having had surgery on July 12, 2004. The AMTR owner later stated that he was not aware of the surgery, sickness, or dizziness.

The FHI Hanford Site POC visited MO-392 at approximately 1015 to exchange keys to door locks on MO-392 with the AMTR owner. The FHI Hanford Site POC stated the AMTR employee looked pale and hot, and offered water to the AMTR owner and employee. They declined as they had their own water. At approximately 1115, the AMTR owner and employee had lunch outside MO-392 for approximately 20 minutes. After lunch, the AMTR employee walked to MO-283 and filled a water bottle. The AMTR employee remarked again about the heat and how he wished he could remain in the air conditioned trailer.

2.1.3 Accident Description

After returning from MO-283, the AMTR employee returned to MO-392 and was instructed to remove the trim from the south side of the mobile office. The AMTR owner entered MO-392 and continued disassembly work. At approximately 1150, the AMTR

owner went outside to check on the AMTR employee when he no longer heard the power drill the employee was using. The AMTR owner discovered the AMTR employee motionless at the bottom of the ladder. The AMTR employee was in the fetal position on his right side, wearing a hardhat, with a cordless drill lying near his left side.

Observations made at the accident scene revealed nine sheet metal screws had been removed from the trim. One screw remained at the transition between the brown and white siding, approximately 10 feet off the ground, potentially placing the AMTR employee's feet approximately five to six feet off the ground. The nine screws were found scattered around the accident scene.

Based on the evidence at the scene and testimony from the AMTR owner and first responders, the Board believes the AMTR employee fell from the ladder. This is based on the extent of the head injury, scattered arrangement of the nine screws around the ladder, and position of the body at the base of the ladder. This is also supported by the Benton County Sheriff's corporal testimony of his analysis of the scene.

2.1.4 Evaluation of Placement and Use of the Ladder

The Board conducted an evaluation of the ladder used in the accident and its use. No eyewitnesses observed the AMTR employee deploy or use the ladder, and the movement of the ladder by fireman No. 1 introduces a measure of error on ladder placement. (Exhibits 2-1, 2-2, and 2-3)

The Safety and Access Plan that AMTR was required to sign for site access invoked Occupational Safety and Health Administration (OSHA) and Washington Administrative Code (WAC) compliance. The Board, therefore, analyzed use of the ladder in the accident situation in comparison to 29 CFR 1926.1053 and WAC 296-155-480 (both cover the use of ladders). FHI and CH2M HILL procedures were examined for ladder usage and compared to site practices in order to examine potential lessons learned. (Table 2-1)

Testimony, review of photographs, and inspection of the accident scene provided the following detail. The ladder was located at the south end of MO-392, propped against the wall with both feet firmly placed and the top rails in contact with the wall directly below the peak. The top of the ladder was not secured. The area is a wide expanse of level asphalt with one speed bump half way between the center line and west side of the building. Loose gravel, dirt, or liquids were not present. The length of the ladder was 14 feet, 2 inches and the center peak of the gable end of MO-392 was 13 feet, 10 inches. With these measurements, the ladder (in its most vertical position) would reach four inches above the peak of the roof. Inspection by the Board and the Benton County Sheriff's Corporal indicated that no activity had occurred on the roof.

The first step in the evaluation was to determine if the AMTR employee had set up the ladder correctly. The Board considered several possible positions of the ladder based on testimony. The ladder was visually inspected and measured, and photographs were taken

to document its condition and probable placement. The ladder inspection revealed the ladder feet had adequate rubber and were secure to the side rails per 29 CFR 1926.1053(b)(7). (Exhibit 2-4) The side rails and rungs were tight, clean, and free of any oil or debris per 29 CFR 1926.1053(b)(2).

The ladder had been maintained in the position established by fireman No. 1 as verified by photographs taken by the Benton County Sheriff's Deputy. Fireman No. 1 provided testimony that the ladder had been repositioned to within a few inches of the original location. Measurements taken from this configuration were compared to OSHA requirement.

> Section 1926.1053(b)(5)(i) states "non-self supporting ladders shall be used at an angle such that the horizontal distance from the top support to the foot of the ladder is approximately one-quarter of the working length."
>
> Calculations for proper ladder setup (4:1 ratio)
> working length of ladder 14'-2"= 170",
> Horizontal distances = 170"/4 approx. 42.5" or 3'-6.5"

The Board's measurements placed the ladder at three and a half feet from MO-392. In this placement, the top rails were approximately eight inches below the peak and the rungs were level. The three and a half feet horizontal distance from the wall of MO-392 was in keeping with the "one-quarter of the working length" requirement.

29 CFR 1926.1053 (b)(21) states "Each employee shall use at least one hand to grasp the ladder when progressing up and/or down the ladder." 29 CFR 1926.1053 (b)(22) states, "An employee shall not carry any object or load that could cause the employee to lose balance and fall." These two requirements are commonly called "three point contact." The location of the drill and the scattered arrangement of screws found at the scene implied that the AMTR employee potentially held nine sheet metal screws (previously removed) in one hand and the drill in the other. It is unknown whether the AMTR employee was stationary, ascending, or descending the ladder at the time of the accident. With both hands occupied, it would have been difficult to maintain three point contact while ascending or descending the ladder. Failure to maintain three point contact could have been a contributing cause to a fall.

FHI procedure HNF-RD-7769 Rev. 2, *OSHA Compliance*, provides direction to comply with 29 CFR 1926 with no further explanation. The CH2M HILL procedure, TFC-ESHQ-S_STD-01, Rev. A, *Portable Ladders*, generally provides instruction in terms similar to 29 CFR 1926, but also provides a significant expansion in terms of management expectation and responsibility.

WAC 296-155-480 repeats 29 CFR 1926.1053 requirements word for word in most cases, but includes additional requirements. Pertinent to this investigation, WAC 296-155-480 (2)(v) states, "When working from a ladder, the ladder shall be secured at both

top and bottom." It is common site practice to secure ladders at top and bottom, although not specified by procedure.

The ladder safety instructions on the side rails were faded beyond legibility except for one that instructs the user to set up the ladder properly to prevent falls resulting in injury or death. WAC 296-155-480 (2)(l)(ii) requires metal ladders to be identified as being conductive.

Another common site practice is the use of alternative equipment to ladders when working at height. Site forces apply Integrated Safety Management by selecting equipment not only for the scope of work being performed but with the intent of doing work as safely as possible. For many activities where individuals work above six feet, man lifts and scaffolding are used even when not required. Workplace hazards are reduced by use of this alternative equipment.

29 CFR 1926.1053 (b)(4) states, "Ladders shall be used only for the purpose for which they were designed." For the activity involved in the accident, site forces would consider an extension ladder inappropriate for the task. AMTR, as a two-man operation, maintained limited equipment inventories and regulation does not require the use of man lifts and scaffolding in applications similar to MO-392.

Conclusion

The AMTR employee, while working on the ladder, was in non-compliance with WAC 296-155-480 (2)(v) as the top of the ladder was unsecured and with WAC 296-155-480 (2)(l)(ii) as labels on the ladder were illegible. Additionally, there were potential non-compliances with 29 CFR 1926.1053 [(b)(21) and (b) (22)]. Assuming the AMTR employee was holding equipment and materials in both hands, three point contact could not have been maintained, and the objects could have unbalanced the AMTR employee. Finally, there was a potential non-compliance 29 CFR 1926.1060 identified for ladder training.

Accident Condition	Table 2-1 Compliance with Ladder Safety Procedures and Standards				Compliance
AMTR	**OSHA**	**WISHA**	**PHMC**	**CH2M HILL**	
FHI Safety and Access Plan required AMTR to comply with 29 CFR 1926, and WAC.	**29 CFR 1926.1053** **(b) Use.** The following requirements apply to the use of all ladders, including job-made ladders, except as otherwise indicated:	**WAC 296-155-480** **(2) Use**. The following requirements apply to the use of all ladders, including job-made ladders, except as otherwise indicated:	**HNF-RD-7769** **OSHA Compliance** This Level 1 Requirements Documents applies to all work performed under the PHMC where occupational safety and health standards apply. **1.** Comply with the following worker protection requirements: **b.** Title 29 CFR 1926, "Safety and Health Regulations for Construction."	**TFC-ESHQ-S_STD-01, REVA, *Portable Ladders,* Feb 26, 2003** **A refers to Attachment A: Ladder Usage**	FHI Safety and Access Plan required AMTR to comply with 29 CFR 1926, and WAC.
Ladder was not used to access roof as determined by inspection of the Benton County Sheriff's Department and the Board.	**(b)(1)** When portable ladders are used for access to an upper landing surface, the ladder side rails shall extend at least 3 feet (.9 m) above the upper landing surface to which the ladder is used to gain access; or, when such an extension is not possible because of the ladder's length, then the ladder shall be secured at its top to a rigid support that will not deflect, and a grasping device, such as a grabrail, shall be provided to assist employees in mounting and dismounting the ladder. In no case shall the extension be such that ladder	**(2) (a)** When portable ladders are used for access to an upper landing surface, the ladder side rails shall extend at least 3 feet (.9 m) above the upper landing surface to which the ladder is used to gain access; or, when such an extension is not possible because of the ladder's length, then the ladder shall be secured at its top to a rigid support that will not deflect, and a grasping device, such as a grabrail, shall be provided to assist employees in mounting and dismounting the ladder. In no case shall the extension be such that ladder deflection under a load would, by itself, cause the ladder to slip off its support.		**A 2.** Non self supporting portable ladders being used for temporary access must extend a minimum of three feet past the intended landing, unless a secured grasping device (e.g., grab rail) is provided.	Not Applicable. This requirement is directed at ladder use to gain access to roofs, platforms etc. and does not explicitly discuss securing the ladder at the top in all cases. **(see the WISHA(2)(v)**.

Accident Condition	Table 2-1 Compliance with Ladder Safety Procedures and Standards				Compliance
AMTR	**OSHA**	**WISHA**	**PHMC**	**CH2M HILL**	
	deflection under a load would, by itself, cause the ladder to slip off its support.				
Ladder was clean, dry and free of oil, grease, or other slipping hazards.	**(b)(2)** Ladders shall be maintained free of oil, grease, and other slipping hazards.	**(2) (b)** Ladders shall be maintained free of oil, grease, and other slipping hazards.		**A1** Do ensure that shoes, hands, gloves, and portable ladder steps/ rungs are free of oil, grease, mud, or other substances that may pose a slipping hazard.	Compliant
AMTR used a standard metal ladder. AMTR employee weight was ~170 1bs. Label showing rating was faded and unusable	**(b)(3)** Ladders shall not be loaded beyond the maximum intended load for which they were built, nor beyond their manufacturer's rated capacity.	**(2)** (**c)** Ladders shall not be loaded beyond the maximum intended load for which they were built, nor beyond their manufacturer's rated capacity.		**A1** Do use portable ladders within their established load carrying capacity classification, taking into consideration the stress which may be exerted while performing the task. **A1** Do maintain stability and prevent overload by positioning only one person at a time on portable ladder steps/rungs.	Compliant
AMTR used a 20 ft metal extension ladder	**(b)(4)** Ladders shall be used only for the purpose for which they were designed.	**(2) (d)** Ladders shall be used only for the purpose for which they were designed.		**A1** Do use portable ladders only for the purpose for which they are designed	Compliant. Use of alternative equipment may have been advisable (man lift, scaffolding, or stepladder).
By testimony, ladder was found in a stable position against the wall.	**(b)(5)(i)** Non-self-supporting ladders shall be used at an angle such that the horizontal distance from the top support to the foot of the ladder is approximately one-quarter of the working length of the ladder (the distance along the ladder between the foot and the top support)	**(2) (e) (i)** Non self-supporting ladders shall be used at an angle such that the horizontal distance from the top support to the foot of the ladder is approximately one-quarter of the working length of the ladder (the distance along the ladder between the foot and the top support).		**A1** At a pitch so that the horizontal distance from the top support to the foot of the ladder will be approximately one forth the vertical distance between these points.	Presumed compliant based on testimony and board analysis. However, ladder was moved by accident responders.
Not Applicable	**(b)(5)(ii)** Wood job-made ladders	**(2) (ii)** Wood job-made ladders with			Not Applicable

Accident Condition	Table 2-1 Compliance with Ladder Safety Procedures and Standards				Compliance
AMTR	**OSHA**	**WISHA**	**PHMC**	**CH2M HILL**	
	with spliced side rails shall be used at an angle such that the horizontal distance is one-eighth the working length of the ladder.	spliced side rails shall be used at an angle such that the horizontal distance is one-eighth the working length of the ladder.			
Not Applicable	**(b)(5)(iii)** Fixed ladders shall be used at a pitch no greater than 90 degrees from the horizontal, as measured to the back side of the ladder.	**(2) (iii)** Fixed ladders shall be used at a pitch no greater than 90 degrees from the horizontal, as measured to the back side of the ladder.			Not Applicable
Ladder was on a stable, level asphalt surface with no loose material around the base.	**(b)(6)** Ladders shall be used only on stable and level surfaces unless secured to prevent accidental displacement.	**(2) (f)** Ladders shall be used only on stable and level surfaces unless secured to prevent accidental displacement.		**A1** Do not attempt to support a portable ladder on boxes, barrels, or similar makeshift devices, or fasten/tie two or more ladders together to achieve greater working height **A1** Do place the supporting legs of the portable ladders on a substantial and level base.	Compliant
Asphalt surface was dry with no loose material (gravel, dirt). The ladder feet were in good condition.	**(b)(7)** Ladders shall not be used on slippery surfaces unless secured or provided with slip-resistant feet to prevent accidental displacement. Slip-resistant feet shall not be used as a substitute for care in placing, lashing, or holding a ladder that is used upon slippery surfaces including, but not limited to, flat metal or concrete surfaces that are constructed so they cannot be prevented from becoming slippery.	**(2) (g)** Ladders shall not be used on slippery surfaces unless secured or provided with slip-resistant feet to prevent accidental displacement. Slip-resistant feet shall not be used as a substitute for care in placing, lashing, or holding a ladder that is used upon slippery surfaces including, but not limited to, flat metal or concrete surfaces that are constructed so they cannot be prevented from becoming slippery.		Not mentioned	Compliant

Accident Condition	Table 2-1 Compliance with Ladder Safety Procedures and Standards				Compliance
AMTR	**OSHA**	**WISHA**	**PHMC**	**CH2M HILL**	
No door or entryways were located on the south side of MO-392. The ladder was found in a stable position against the wall. South of MO-392 was an open area with no obstructions for several yards.	**(b)(8)** Ladders placed in any location where they can be displaced by workplace activities or traffic, such as in passageways, doorways, or driveways, shall be secured to prevent accidental displacement, or a barricade shall be used to keep the activities or traffic away from the ladder.	**(2) (h)** Ladders placed in any location where they can be displaced by workplace activities or traffic, such as in passageways, doorways, or driveways, shall be secured to prevent accidental displacement, or a barricade shall be used to keep the activities or traffic away from the ladder.		**A1** Do setup portable ladders away from unlocked or unguarded doors that may open toward the ladder., and away from moving vehicles/equipment	Compliant
The area was clear at top and bottom.	**(b)(9)** The area around the top and bottom of ladders shall be kept clear.	**(2) (i)** The area around the top and bottom of ladders shall be kept clear.		**A1** Do maintain the base and top landing (as applicable) around all portable ladders in a clear and unobstructed manner.	Compliant
Both rails were resting equally on the side of the Mobile office based on testimonies of the first responders.	**(b)(10)** The top of a non-self-supporting ladder shall be placed with the two rails supported equally unless it is equipped with a single support attachment.	**(2) (j)** The top of a non self-supporting ladder shall be placed with the two rails supported equally unless it is equipped with a single support attachment		**A1** Do position non-self supporting ladders as follows: With the weight equally distributed between the two side rails.	Compliant (Based on testimony of the first responders)
Ladder was found in a stable configuration against the wall, but no one witnessed AMTR employee's actions while on the ladder.	**(b)(11)** Ladders shall not be moved, shifted, or extended while occupied.	**(2) (k)** Ladders shall not be moved, shifted, or extended while occupied.		**A1** Do not shift, reposition, or extend portable ladders when the ladder is occupied.	Unknown
No energized lines were located in the vicinity. All electrical connections to MO-392 had been disconnected. Labels on ladder were	**(b)(12)** Ladders shall have nonconductive siderails if they are used where the employee or the ladder could contact exposed energized electrical equipment, except as provided in 1926.951(c)(1) of this part.	**(2) (l)** Ladders shall have nonconductive side rails if they are used where the employee or the ladder could contact exposed energized electrical equipment, except as provided in the following: **(i)** Portable metal or other portable		**A1** Do not use metal or metal-reinforced portable ladders when the ladder is occupied.	Non-compliant on WAC (2)(ii) "conductive" warning was illegible, however, no lines were energized in the vicinity

Accident Condition	Table 2-1 Compliance with Ladder Safety Procedures and Standards				Compliance
AMTR	**OSHA**	**WISHA**	**PHMC**	**CH2M HILL**	
illegible.		conductive ladders shall not be used on or near energized line or equipment except where nonconductive ladders present a greater electrical hazard than conductive ladders. A greater electrical hazard would be static electricity such as might be found in extra high voltage substations. **(ii)** All conductive or metal ladders shall be prominently marked and identified as being conductive. **(iii)** All conductive or metal ladders shall be grounded when used near energized lines or equipment			
Not Applicable	**(b)(13)** The top or top step of a stepladder shall not be used as a step	**(2) (m)** The top or top step of a stepladder shall not be used as a step.		**A1** Do use a portable ladder of sufficient length to avoid having to stand on the top two steps of a stepladder or top four rungs of a non self supporting ladder.	Not Applicable
Not Applicable	**(b)(14)** Cross-bracing on the rear section of stepladders shall not be used for climbing unless the ladders are designed and provided with steps for climbing on both front and rear sections.	**(2) (n)** Cross-bracing on the rear section of stepladders shall not be used for climbing unless the ladders are designed and provided with steps for climbing on both front and rear sections.		**A1** Do use stepladders in the fully open position with the locking devices (braces) set , and using the steps provided.	Not Applicable
AMTR inspection process unknown. Board inspection indicated that the ladder was in good physical condition.	**(b)(15)** Ladders shall be inspected by a competent person for visible defects on a periodic basis and after any occurrence that could affect their safe use.	**(2) (o)** Ladders shall be inspected by a competent person for visible defects on a periodic basis and after any occurrence that could affect their safe use.		**3.4** Managers and supervisors ensure a competent person inspects ladders for visible defects on a periodic basis and after any occurrence that could affect their safe use. Frequency of scheduled periodic	Unknown

Accident Condition	Table 2-1 Compliance with Ladder Safety Procedures and Standards				Compliance
AMTR	**OSHA**	**WISHA**	**PHMC**	**CH2M HILL**	
				inspections is not to except 12 months and is determined by factors such as: type and rate of use, complexity of the work activity, associated hazards	
The ladder was not marked as defective. No structural defects were detected.	**(b)(16)** Portable ladders with structural defects, such as, but not limited to, broken or missing rungs, cleats, or steps, broken or split rails, corroded components, or other faulty or defective components, shall either be immediately marked in a manner that readily identifies them as defective, or be tagged with "Do Not Use" or similar language, and shall be withdrawn from service until repaired.	**(2) (p)** Portable ladders with structural defects, such as, but not limited to, broken or missing rungs, cleats, or steps, broken or split rails, corroded components, or other faulty or defective components, shall either be immediately marked in a manner that readily identifies them as defective, or be tagged with "do not use" or similar language, and shall be withdrawn from service until repaired.		**3.7** Personnel will perform a pre-use inspection on ladders prior to each use. If structural defects are found, mark the ladder as defective or tag it with "Do Not Use," or similar language and take it out of service to be safely destroyed.	Compliant
Not Applicable	**(b)(17)** Fixed ladders with structural defects, such as, but not limited to, broken or missing rungs, cleats, or steps, broken or split rails, or corroded components, shall be withdrawn from service until repaired. The requirement to withdraw a defective ladder from service is satisfied if the ladder is either: **(b)(17)(i)** Immediately tagged with "Do Not Use" or similar language; **(b)(17)(ii)** Marked in a manner that readily identifies it as	**(2) (q)** Fixed ladders with structural defects, such as, but not limited to, broken or missing rungs, cleats, or steps, broken or split rails, or corroded components, shall be withdrawn from service until repaired. The requirement to withdraw a defective ladder from service is satisfied if the ladder is either: **(2) (i)** Immediately tagged with "do not use" or similar language; **(2) (ii)** Marked in a manner that readily identifies it as defective; **(2) (iii)** Or blocked (such as with a plywood attachment that spans several		**See 3.7 above**	Not Applicable

Accident Condition	Table 2-1 Compliance with Ladder Safety Procedures and Standards				Compliance
AMTR	**OSHA**	**WISHA**	**PHMC**	**CH2M HILL**	
	defective; **(b)(17)(iii)** Or blocked (such as with a plywood attachment that spans several rungs).	rungs).			
No repairs were evident.	**(b)(18)** Ladder repairs shall restore the ladder to a condition meeting its original design criteria, before the ladder is returned to use.	**(2) (r)** Ladder repairs shall restore the ladder to a condition meeting its original design criteria, before the ladder is returned to use.		**See 3.7 above**	Not Applicable
Not Applicable	**(b)(19)** Single-rail ladders shall not be used.	**(2) (s)** Single-rail ladders shall not be used.		Not discussed	Not Applicable
Unknown	**(b)(20)** When ascending or descending a ladder, the user shall face the ladder.	**(2) (t)** When ascending or descending a ladder, the user shall face the ladder.		**A1** Do face the portable ladder while ascending or descending, using both hands to grip the side rails.	Unknown
Unknown. However, equipment and materials scattered at base of ladder and the progress made on the task being performed imply that the AMTR employee had material in both hands. It is unknown whether AMTR employee was stationary, ascending or descending.	**(b)(21)** Each employee shall use at least one hand to grasp the ladder when progressing up and/or down the ladder. **(b)(22)** An employee shall not carry any object or load that could cause the employee to lose balance and fall.	**(2) (u)** Employees shall not ascend or descend ladders while carrying tools or materials that might interfere with the free use of both hands.		**A1** Do face the portable ladder while ascending or descending, using both hands to grip the side rails.	Non-Compliant. Presumed non-compliant based on equipment and materials scattered around base of ladder and progress made on task.
Ladder was not secured at the top. The base of the ladder was in good condition. Assumption is that		**(2) (v)** When working from a ladder, the ladder shall be secured at both top and bottom.			Non-Compliant Practice on site is to secure the ladder at the top; however, FHI and CH2MHILL procedures do not specifically indicate this.

Accident Condition	Table 2-1 Compliance with Ladder Safety Procedures and Standards				Compliance
AMTR	**OSHA**	**WISHA**	**PHMC**	**CH2M HILL**	
the AMTR employee was working on the ladder.					Practice on site is to have a helper steady the ladder on the first ascent until ladder is securely fastened at the top and on last descent after ladder has been unsecured. FHI and CH2MHILL procedures do not specifically indicate this.
Not Applicable		**(2) (w)** No type of work shall be performed on a ladder over twenty-five feet from the ground or floor that requires the use of both hands to perform the work, unless a safety belt is worn and the safety lanyard is secured to the ladder.			Not Applicable
Not Applicable		**(2) (x)** Any work that requires wearing eye protection, respirators, or handling of pressure equipment shall not be performed from a ladder more than twenty-five feet above the surrounding surface.			Not Applicable

Exhibit 2-1, Ladder base at 3 ½ feet from MO-392, south wall.

Exhibit 2-2, Ladder base at 3 ½ feet from MO-392, south wall

Exhibit 2-3, Faded label on ladder used at MO-392, south wall.

OSHA PORTABLE LADDER SAFETY "USE" INFO
29CFR1926.1053
LADDERS

(b) Use: The following requirements apply to the use of all ladders, including job-made ladders, except as otherwise indicated:

(1) When portable ladders are used for access to an upper landing surface, the ladder side rails shall extend at least 3 feet (.9 m) above the upper landing surface to which the ladder is used to gain access; or, when such an extension is not possible because of the ladder's length, then the ladder shall be secured at its top to a rigid support that will not deflect, and a grasping device, such as a grabrail, shall be provided to assist employees in mounting and dismounting the ladder. In no case shall the extension be such that ladder deflection under a load would, by itself, cause the ladder to slip off its support.

(2) Ladders shall be maintained free of oil, grease, and other slipping hazards.

(3) Ladders shall not be loaded beyond the maximum intended load for which they were built, nor beyond their manufacturer's rated capacity.

(4) Ladders shall be used only for the purpose for which they were designed.

(5) (i) Non-self-supporting ladders shall be used at an angle such that the horizontal distance from the top support to the foot of the ladder is approximately one-quarter of the working length of the ladder (the distance along the ladder between the foot and the top support). (ii) Wood job-made ladders with spliced side rails shall be used at an angle such that the horizontal distance is one-eighth the working length of the ladder. (iii) Fixed ladders shall be used at a pitch no greater than 90 degrees from the horizontal, as measured to the back side of the ladder.

(6) Ladders shall be used only on stable and level surfaces unless secured to prevent accidental displacement.

(7) Ladders shall not be used on slippery surfaces unless secured or provided with slip-resistant feet to prevent accidental displacement. Slip-resistant feet shall not be used as a substitute for care in placing, lashing, or holding a ladder that is used upon slippery surfaces including, but not limited to, flat metal or concrete surfaces that are constructed so they cannot be prevented from becoming slippery.

(8) Ladders placed in any location where they can be displaced by workplace activities or traffic, such as in passageways, doorways, or driveways, shall be secured to prevent accidental displacement, or a barricade shall be used to keep the activities or traffic away from the ladder.

(9) The area around the top and bottom of ladders shall be kept clear.

(10) The top of a non-self-supporting ladder shall be placed with the two rails supported equally unless it is equipped with a single support attachment

(11) Ladders shall not be moved, shifted, or extended while occupied.

(12) Ladders shall have nonconductive siderails if they are used where the employee or the ladder could contact exposed energized electrical equipment, except as provided in 1926.951(c)(1) of this part.

(13) The top or top step of a stepladder shall not be used as a step.

(14) Cross-bracing on the rear section of stepladders shall not be used for climbing unless the ladders are designed and provided with steps for climbing on both front and rear sections.

(15) Ladders shall be inspected by a competent person for visible defects on a periodic basis and after any occurrence that could affect their safe use.

(16) Portable ladders with structural defects, such as, but not limited to, broken or missing rungs, cleats, or steps, broken or split rails, corroded components, or other faulty or defective components, shall either be immediately marked in a manner that readily identifies them as defective, or be tagged with "Do Not Use" or similar language, and shall be withdrawn from service until repaired.

(17) Fixed ladders with structural defects, such as, but not limited to, broken or missing rungs, cleats, or steps, broken or split rails, or corroded components, shall be withdrawn from service until repaired. The requirement to withdraw a defective ladder from service is satisfied if the ladder is either: (i) Immediately tagged with "Do Not Use" or similar language; (ii) Marked in a manner that readily identifies it as defective; (iii) Or blocked (such as with a plywood attachment that spans several rungs).

(18) Ladder repairs shall restore the ladder to a condition meeting its original design criteria, before the ladder is returned to use.

(19) Single-rail ladders shall not be used.

(20) When ascending or descending a ladder, the user shall face the ladder.

(21) Each employee shall use at least one hand to grasp the ladder when progressing up and/or down the ladder.

(22) An employee shall not carry any object or load that could cause the employee to lose balance and fall.

Exhibit 2-4

2.1.5 Evaluation of Heat Stress Controls and Fitness for Duty

There is no specific OSHA regulation for heat stress. OSHA directs in the "General Duty Clause" [Section 5(a) of the Occupational Safety and Health Act of 1970], that "Each employer (1) shall furnish to each of his employees employment and a place of employment which are free from recognized hazards that are causing or are likely to cause death or serious physical harm to his employee."

OSHA maintains a standard interpretations section on their web page where they answer questions on OSHA requirements. OSHA responded to a previous inquiry concerning heat stress in the workplace as follows:

"OSHA does not have a specific regulation regarding heat stress. However, feasible and acceptable methods can be used to reduce heat stress hazards in work places. These include, but are not limited to:

1. Permitting workers to drink water at liberty;
2. Establishing provisions for a work/rest regimen so that exposure time to high temperatures and/or the work rate is decreased;
3. Developing a heat stress program which incorporates the following:
    a. A training program informing employees about the effects of heat stress, and how to recognize heat related illness symptoms and prevent heat-induced illnesses.
    b. A screening program to identify health conditions aggravated by elevated environmental temperatures.
    c. An acclimation program for new employees or employees returning to work from absences of three or more days.
    d. Specific procedures to be followed for heat-related emergency situations
    e. Provisions that first aid be administered immediately to employees displaying symptoms of heat-related illness."

OSHA publication 3154 provides heat stress control recommendations in a printable Heat Stress Card available for general use. (Appendix F-5, OSHA Heat Stress Card)

WAC standards did not include specific heat stress control requirements. However, WAC 296-307-10020, *What must an employer do to prevent heat-related illness?* states "You must take the appropriate measures to prevent heat-related illnesses that may be caused by employees wearing any required personal protective equipment."

FHI and CH2M HILL have similar formal heat stress control procedures (HNF-PRO-121 and TFC-ESHQ-S_IH-C-07, respectively) based on DOE Order 440.1, *Worker Protection management for DOE Federal and Contractor Employees*, which invokes American Conference of Government Industrial Hygienists standards. Both programs implement controls based upon factors including clothing, worker acclimatization, work demand categorization, and Wet Bulb Globe temperature. Controls include structured

work/rest regimens, personal protective equipment with cooling capabilities, and monitored water intake.

FHI and CH2M HILL employees are provided general heat stress training in Hanford General Employee Training and have specific computer-based training on heat stress for employees and supervisors involved with work where heat stress can be a factor. AMTR received neither general nor computer-based training on heat stress, and they had no heat stress training of their own. FHI and CH2M HILL have occupational medical screening programs that assess worker fitness for the hazards they will face during work activities, and request employees disclose medical conditions that may cause work limitations.

The Safety and Access Plan (Long Form) (Exhibit F-4) used previously by FHI, included Attachment I, Activity Hazard Analysis Sample. This table included temperature extremes as a potential hazard and preventive measures, such as "Heat Stress Program and monitoring will go into effect at 80° F." At the time of the accident the air temperature was approximately 98° F and the Wet Bulb Globe temperature approximately 83° F. Although AMTR took frequent breaks, drank water, and suspended work prior to the hottest portions of each day, their program was not structured to consider worker clothing, acclimatization or specific Wet Bulb Globe temperatures, and did not include structured work/rest regimens.

AMTR documented no formal employee conduct expectations that would require employees to notify management of work limitations. OSHA/WISHA do not require, and AMTR did not have an occupational medical screening program. The AMTR employee did not disclose medical information which, if known by his management, should have resulted in accommodations for the employee's condition. The Board learned (through interviews, medical records, and consultations with an occupational medical doctor) the AMTR employee had medical conditions. The medical conditions, combined with the high temperature conditions present on the day of the accident and the employee's questionable heat acclimatization, may have led to the AMTR employee's fall from the ladder. The AMTR owner, unaware of the employee's medical condition and not recognizing signs of heat stress, did not alter his informal heat stress program to accommodate the employee's limitations.

Conclusion

AMTR's unstructured heat stress control program was not counter to any OSHA or WISHA requirements. However, had worker acclimatization, clothing selection, and Wet Bulb Globe temperatures (readily available on the Hanford Site) been considered, structured work/rest regimens could have been established that would have reduced worker physical stress.

AMTR did not provide heat stress training that may have increased worker awareness of heat related hazards, and FHI did not offer available training to AMTR during site access training/orientation.

2.2 EMERGENCY RESPONSE AND MEDICAL TREATMENT

At approximately 1150, the AMTR owner, who was working inside MO-392, went outside to check on the AMTR employee and discovered him on the ground, wearing his hardhat, at the base of the ladder. After an initial evaluation of the AMTR employee's condition, the AMTR owner began CPR. At approximately 1152, the AMTR owner shouted to MO-282 resident No.1 to call 911. MO-282 resident No. 1 returned to MO-282, notified co-workers that a man was down, and directed one co-worker to call 911. The directed co-worker placed the call at 1154. Simultaneously, MO-282 resident No. 2 ran the several hundred feet to the accident scene, assessed the AMTR employee's condition, removed his hardhat, and took the lead for administering CPR at approximately 1155. The AMTR owner aided him.

Other CH2M HILL personnel in the area also contributed to the initial response. At approximately 1200, the Director of Waste Feed Operations Radiological Control oversaw emergency response activities at the scene and notified the CH2M HILL Shift Operations Manager who had cognizance of the geographical area. The Shift Operations Manager responded to the scene to coordinate response. Several other MO-282 personnel relayed information back and forth between the accident scene and the 911 caller in MO-282. Additionally, CH2M HILL personnel went to the corners of Grout Drive, 4th Street, and Canton Avenue to direct emergency response vehicles to the accident scene.

An alarm was received at the 200 Area Fire Station at 1156 and Hanford Fire Department emergency medical services were dispatched. At 1204, four Hanford Fire Department Emergency Medical Technicians (EMT) arrived at the scene, supported by five firefighters. The EMTs took over CPR and placed the AMTR employee on a backboard for transport. At 1210, Hanford Fire personnel transported the AMTR employee to Kadlec Medical Center in an ambulance, administering advanced life support en route. At 1235, the ambulance arrived at Kadlec Medical Center and the AMTR employee was pronounced dead on arrival at 1236. A subsequent medical examination determined the AMTR employee had sustained a basal skull fracture and a laceration on the back of his head.

Two Hanford Patrol officers arrived at the scene directly behind the Hanford fire vehicles and established scene control. Two Benton County Sheriff's Deputies arrived at 1257 and established the area as a possible crime scene.

DOE-RL management was notified of a potential fatality at 1239. The acting Assistant Manager for Safety and Engineering dispatched Facility Representatives No. 1 and No. 2 to the scene of the accident at approximately 1300. Facility Representatives No. 1 and No. 2 arrived at the Hanford Patrol boundary that had been established at Grout Drive and 4th Street in separate vehicles at approximately 1350.

Conclusion

The Board concluded the initial emergency and medical response were timely and well coordinated. However, one opportunity for improvement was identified. Although the actions taken by the AMTR owner and MO-282 resident No. 2 were commendable, adequate measures were not taken in this case to prevent exposure to blood borne pathogens or communicable diseases. Mouth-to-mouth resuscitation was conducted without the use of personal protective measures to prevent contact and spread of blood present at the scene.

2.3 INVESTIGATIVE READINESS AND ACCIDENT SCENE PRESERVATION

Hanford patrolmen No. 1 and No. 2 arrived at the scene at 1205 and immediately set up a perimeter to control personnel and vehicular traffic into and near the accident scene. Personnel not providing aid to the AMTR employee were asked to step back from the scene, but remain for statements.

At approximately 1205, fireman No. 1 moved the ladder from the mobile office wall and laid it on the ground to eliminate a hazard to first responders in the area. The fireman took care to place the ladder on the ground with the right foot in the original position. After the ambulance left with the AMTR employee (1210), Hanford patrolmen No. 1 and No. 2 established a boundary around the scene with yellow barrier tape. Fireman No. 1 returned the ladder to the wall using the ladder's foot as reference. The portable drill, which had reportedly been within inches of the AMTR employee's left hand, was moved several feet away during the initial response.

Benton County Sheriff's Deputy and Corporal arrived at the accident scene at 1257 and Hanford Patrol turned over control of the scene. The Corporal established the area as a crime scene while he conducted an investigation. The Benton County Sheriff's Corporal climbed the ladder to determine its stability and check the roof after the Deputy had taken photographs. The Corporal indicated it was apparent no activity had occurred on the roof for some time and concluded the AMTR employee had fallen from the ladder based on placement of sheet metal screws and body position. The Benton County Sheriff's Corporal collected the AMTR employee's hardhat and shirt as evidence, released the scene from potential criminal investigation, and turned over control of the scene to Hanford Patrol at approximately 1410.

As more Hanford Patrol units arrived, a second control point was established. The original boundaries were established near MO-392 and vehicular traffic was controlled at the paved road (Grout Drive). Refinement of the barrier included establishing points of control at the two ends of the Grout Drive and 4th Street.

At 1301, the DOE-RL Deputy Manager notified the Acting Chief Operating Officer, DOE-EM. The Acting Assistant Manager for Safety and Engineering dispatched Facility Representatives No. 1 and No. 2 to the scene of the accident and selected a DOE-RL

employee to act as the interim accident investigation chairperson during the initial response.

Facility Representatives No. 1 and No. 2 arrived at the Hanford Patrol boundary that had been established at Grout Drive and 4th Street in separate vehicles at approximately 1350. The Facility Representatives were given clearance to proceed within approximately five minutes of arrival, but were held at the perimeter (established at the east end of Grout Drive) until the Benton County Sheriff's Office had completed its investigation.

Facility Representative No. 2 took photographs while waiting for permission to enter the scene. The Benton County Sheriff's Office turned over the scene to Hanford Patrol at 1410. The Hanford Site Operations IS&H safety representative was allowed access to the scene. The Facility Representatives were made to wait until 1420 while Hanford Patrol ran a check on their credentials. During this delay, the Hanford Site Operations IS&H safety representative interviewed the AMTR owner alone.

Both Facility Representatives collected initial statements from witnesses. Some of the interviews included participation by the Hanford Site Operations IS&H safety representative.

The interim accident investigation chairperson requested that DOE assume control of the scene and named Facility Representative No. 1 point of contact for scene access. Hanford Patrol remained at the scene. Facility Representative No. 2 left the scene at 1520 to process the initial photographs and report to management.

At about 1530, the interim accident investigation chairperson established Hanford Patrol scene control requirements. At 1550, Facility Representative No. 1 was released as POC and those duties were assumed by the interim accident investigation chairperson. Hanford Patrol continued to maintain the boundary with 100 percent coverage until 2230 as instructed by the DOE-RL interim accident investigation chairperson. After 2230, 100 percent coverage was reduced to hourly checks. This decision was made because photographs had been taken, evidence had been removed, and equipment had been moved from the original positions. The scene remained taped off.

On July 16, 2004, preparation for the accident investigation continued with selection of the Board members and review of the governing DOE orders and directives. DOE-RL received delegation to conduct the Type A accident investigation from Acting Undersecretary of Energy, Science and Environment. DOE-RL management, desiring a level of independent review, selected Mr. Theodore A. Wyka Jr. from DOE HQ, DR-1, as the official Board Chairperson[2] and appointed a Board consisting of both on site and off site expertise. The sanctioned Board included DOE-RL Facility Representative No. 1, an OSHA subject matter expert, and three trained and experienced accident investigators. The appointment memorandum is included in Appendix A.

[2] Memorandum: KA Klein to DK Garman, Appointment of a Type A Accident Investigation Board, dated July 16, 2004, 04-AMSE-0046.

Hanford Patrol maintained hourly checks of the accident scene through Tuesday, July 20, 2004. At that time, the scene was returned to 24 hour coverage upon request from the Board Chairperson until all Board members could view the scene and complete initial interviews. The POC for scene access was transferred to the Board Chairperson. Additional photographs were taken of the accident scene. The scene was released from 24-hour surveillance at 1645 on July 22, 2004, and the ladder and drill were placed in safe keeping.

Conclusion

The Board concluded investigative readiness and accident scene preservation was generally acceptable. However, one opportunity for improvement was identified: personnel with duties to respond to accident scenes were impeded from accessing the accident scene, compromising their ability to assure appropriate custody, control, and scene preservation.

3 ACCIDENT FACTS AND ANALYSIS

This section addresses the facts related to the accident, along with the results of the Board's analysis. The Board presents this information in terms of the Integrated Safety Management System core functions and guiding principles, which comprise the fundamental DOE safety and health policies.

3.1 PHYSICAL HAZARDS, CONTROL, AND RELATED EVENTS

3.1.1 Define the Scope of Work

Effective work execution begins with the preparation of a well-defined scope of work that translates mission and requirements into terms those who are to accomplish the work can clearly understand. The definition of work scope must provide sufficient detail to support hazard analysis, and development and implementation of controls at the task level. To fulfill its responsibilities, line management must determine the work to be performed and be accountable for understanding it as completely as possible through every phase of the work cycle.

DOE-RL has operated an excess process for over 40 years. The operation was revised in the mid-1990s to include cooperation with a designated CRO. DOE-RL assigned scope to FHI to manage the excess process for the Hanford Site and the day-to-day interfaces with the CRO per PHMC Section C.4.2., *Infrastructure Services*. The excess operation has been managed as a centralized function for all Hanford contractors with excess property consolidated at a single location. At the same time, excess in place has been a practice at Hanford for many years.

"Excess in place" occurs when third parties that purchase or are granted personal property come on site, prepare, and transport property off site. Through the practice of excessing

property in place, AMTR gained access to the site to remove the Two Rivers Terminal-owned mobile office. There is no specific clause within the PHMC contract that grants or prohibits the practice of excess in place. DOE-RL and the local community benefit significantly from this practice.

Acquisition Letter 95-06 and Personal Property Letter 970-1 provide DOE direction implementing the Hall Amendment (Section 3155 of Public Law 103-160, *National Defense Authorization Act*). Acquisition Letter 95-06 provides authority to DOE field offices to establish CROs. The CRO acts as the sole community voice to DOE for economic development and sponsors community activities to offset the impact of DOE downsizing. Personal Property Letter 970-1 provides guidance concerning the transfer of DOE personal property. The CRO has been granted rights to surplus personal property from the Hanford Site. Personal Property Letter 970-1 states when DOE and the CRO agree on a transfer "….DOE will transfer the property to the CRO and move it to an area controlled by the CRO."

The intention of the Hall Amendment and subsequent instruction is to mitigate adverse economic consequences that might arise from the closure of DOE facilities. TARC, as agent of the local CRO, and DOE-RL signed a Personal Property Transfer Implementation Plan in 1999 implementing DOE Personal Property Letter 970-1. This Implementation Plan included most provisions of 970-1, but did not include the provision to move property to a CRO controlled area.

The Implementation Plan also did not discuss the concept of excess in place. However, the claims liability clause in the Implementation Plan states: "TARC agrees to save the government […] harmless from any and all claims, […] arising out of […] the removal, storage, use of or transfer of personal property while in, upon or about the Hanford Site of which the property sold or offered for sale is located, while going to or departing from such area, or while the property is held in storage on or off the Hanford Site prior to transfer to a third party."

Personal property management was strongly impacted by introduction of the Hall Amendment. Provisions of the amendment were not consistent with existing property management requirements. For several years, local and national authorities have debated the details of meeting the amendment's intent. DOE-RL has had conversations with DOE Headquarters regarding the excess in place practice. This debate has delayed the formation and implementation of the final policy and procedures for governance of Acquisition Letter 95-06 and Personal Property Letter 970-1. In the interim, DOE-RL and FHI continued to provide surplus government personal property to the CRO without formal procedures.

The process for excessing property to the CRO has evolved in alignment with the national debate without formal procedures. DOE-RL (in conjunction with DOE-HQ, TARC, FHI and General Services Administration) has, for several years, had a new draft Personal Property Transfer Implementation Plan that addresses existing practices and discusses the excess in place activity. The lack of a consensus on how to implement the

Hall Amendment has prevented finalization of this draft plan and supporting procedures. The end result was no formal DOE-RL procedure for excessing property to the CRO.

CH2M HILL decided to excess MO-392 in September 2003. MO-392 was turned over to the FHI Asset Control organization in January 2004. The DOE-RL property manager transferred title of MO-392 to TARC in February 2004. Utilities and other services were disconnected in May 2004. FHI Asset Control prepared the final documentation for transition of MO-392 to TARC during June 2004. TARC sold MO-392 to Two Rivers Terminal through their auction agent, Vail International, also in June 2004. Two Rivers Terminal hired AMTR to disassemble and move MO-392 based upon AMTR's past access and knowledge of the Hanford Site.

The AMTR scope of work, as quoted below, was defined by the simple terms of its contract with Two Rivers Terminal:

> "Take off deck and haul
> Take off skirting. Put on tires and axles and hitches
> Take off trim inside and outside
> Unblock and separate both halves
> Box in 6 mill [sic] plastic to transport
> Transport from Hanford to new location
> Sit [sic] home back up and level
> Put in 14 tie-downs
> Reskirt with new metal."

The scope of work provides an accurate description of the work being performed. It also illustrates the basic nature of the work.

Conclusion

DOE-RL did not ensure the personal property disposition provisions were defined and flowed down to the contractor, as appropriate, and implemented. (Acquisition Letter 95-06 and Personal Property Letter 970-1.) If the Personal Property Letter 970-1 provision to move property to an area controlled by the CRO had been implemented, Hanford Site forces would have moved MO-392.

DOE-RL and FHI did not develop and implement formal procedures to specify roles and responsibilities in controlling the CRO personal property asset disposition process. The use of informal processes resulted in the loss of opportunities to prevent the accident.

3.1.2 Hazards Analysis

The objective of the hazard analysis process is to understand task-specific hazards that may affect the worker, the public, and the environment. Each level of hazard analysis forms the foundation for a more detailed analysis; that is, a hazard analysis for facility operation, maintenance or modification is, in turn, used as the basis for an activity-level or task-specific hazard analysis. Hazard identification and analysis must occur at each

phase of the work cycle to which the analysis applies, and is dependent upon the adequate and full definition of the activity or task to be performed. If the activity or task is not fully identified or defined, an adequate task-specific hazard analysis cannot be performed.

The FHI Asset Control provided the Safety and Access Plan (a standardized form) to companies that purchased DOE-RL personal property through the excess process. The standardized form provided generic information related to site access, safety, and security requirements for buyers when they moved property from the Hanford Site. The FHI Property Specialist provided a Safety and Access Plan to Two Rivers Terminal following their purchase of MO-392. Two Rivers Terminal and AMTR were responsible for completing the Safety and Access Plan, as required in the Plan. The Plan allowed them to attach any specific applicable requirements in addition to OSHA and WAC requirements. The Hanford Site Operations IS&H safety representative approved the Safety and Access Plan prior to the commencement of work.

FHI had a sophisticated computer-based Job Hazard Analysis/Automated Job Hazard Analysis (JHA/AJHA) Program that would have been employed as part of a work package had site forces moved MO-392 off site to the CRO. However, since this work was not assigned to site forces, the FHI Asset Control organization believed they had limited responsibility for safety oversight of AMTR and the FHI JHA/AJHA Program was not used.

The Safety and Access Plan required a pre-job safety meeting at the work location prior to the commencement of work to ensure all persons involved were thoroughly familiar with the elements of the Safety and Access Plan. On July 7, 2004, the FHI Hanford Site POC led the AMTR owner and employee to the job site, where work commenced on MO-392. However, a pre-job safety meeting to review task specific hazards with Hanford safety and health professionals was not conducted.

Prior to November 2002, the standardized Safety and Access Plan included a checklist with hazards and mitigation. The standardized Safety and Access Plan approved for disassembly and transport of MO-392 included neither a checklist nor identified hazards or mitigation. In this instance, removing the checklist from the Safety and Access Plan reduced the rigor of the hazards identification process.

General site hazards were identified, analyzed, and factored into the site orientation/training process associated with access badging. As discussed in Section 3.1.4, AMTR personnel were provided a badge and a level of site orientation/training inconsistent with their activity level and visit duration.

Conclusion

Roles and responsibilities in procedures for management of non-government contactor activities on site were not clearly understood.

All persons involved in implementation of the safety plan failed to recognize the need to perform the task specific hazards analysis.

DOE-RL and FHI failed to assure that visitors to the site received the proper badge and level of safety training for task(s) to be performed.

3.1.3 Develop and Implement Controls

The objective of developing and implementing controls is to identify and provide the full range of controls (i.e., engineering, administrative, and personal protective equipment) consistent with the level and nature of the hazards that could be encountered during task performance. The development and implementation of work controls assumes the contractor had adequately identified the hazards associated with the defined scope of work. Since no formal hazard analysis was performed as discussed in 3.1.2, many of the controls were based on the ideal case or work packages used by FHI for similar projects.

FHI supplied a Safety and Access Plan to Two Rivers Terminal at the time of MO-392 purchase. The Safety and Access Plan specified "General requirements in the owner's/contractor's safety procedures, 29 CFR 1910, 29 CFR 1926, the Washington Administrative Code (WAC), and/or the provisions of the Safety and Access Plan shall be adhered to except where otherwise directed in this plan." Development of specific controls was left to the owner/contractor. However, the Safety and Access Plan stated that the Hanford Site Operations IS&H safety representative would help the owner/contractor assess potential hazards, impacts, and requirements prior to submittal of the form, but neither Two Rivers Terminal nor AMTR contacted the Hanford Site Operations IS&H safety representative. Representatives of Two Rivers Terminal and AMTR signed the Safety and Access Plan on June 30, 2004, (without adding any additional hazard assessment or controls) acknowledging agreement to abide by the requirements of the Safety and Access Plan as approved.

On July 1, 2004, the completed Safety and Access Plan was provided to the Hanford Site Operations IS&H safety representative. The Safety and Access Plan could accommodate additional attachments for permits, certifications, training, documentation, etc., as conditions of approving the Safety and Access Plan. The Hanford Site Operations IS&H safety representative had the opportunity to add controls that could assist the AMTR owner and employee avoid hazards. No controls were added to the Safety and Access Plan. The Hanford Site Operations IS&H safety representative approved (with signature) the Safety and Access Plan needed to prepare MO-392 for transport and removal from the Hanford Site. The Hanford Site Operations IS&H safety representative's approval means the task-specific Safety and Access Plan has been reviewed and accepted (as amended, as applicable) for work on the Hanford Site.

The Safety and Access Plan further specified a pre-job safety meeting at the work location before the commencement of work to ensure all persons involved understood the elements of the Safety and Access Plan. The FHI Hanford Site POC provided a general orientation when the AMTR owner and employee arrived at the work location. A pre-job safety meeting identified in the Safety and Access Plan was not conducted by the Hanford Site Operations IS&H safety representative.

The Board concluded, task-specific hazard controls were neither developed nor implemented for the AMTR work activities. AMTR performed work from July 7, 2004, until the day of the accident without a task-specific hazard analysis having been conducted. The Safety and Access Plan approved for the AMTR work specified no controls beyond 29 CFR 1910, 29 CFR 1926, and the WAC. Examples of missing controls at the time of the accident included the following:

- The approved Safety and Access Plan did not specify heat stress controls. Although the owner of AMTR ensured frequent breaks in the shade and water intake, the controls were not applied systematically, and did not take into account that the AMTR employee was less acclimatized to extreme heat conditions than the owner. The Board determined the AMTR employee had exhibited signs of heat stress throughout the morning of the accident, but had not expressed concern to his manager. In addition, the AMTR owner could have changed the work assignment had he known of the employee's medical condition.

- Hazard controls normally include a specification of personal protective equipment. On the day of the accident, the AMTR employee was wearing tennis shoes instead of construction boots or similar acceptable footwear identified in OSHA 1926. Additionally, safety glasses are often recommended by drill manufacturers during drilling and screwing operations to prevent objects from flying into the worker's eyes. The AMTR employee did not wear safety glasses and the hardhat he wore was designed to protect his head from falling objects, not a head injury from a fall.

- 29 CFR 1926.1060 requires employers to provide ladder training. Ladder training for the AMTR employee could not be verified by the Board. (Exhibit F-3)

- The extension ladder was not used appropriately. The WAC 296-155-480 (2)(v) requirement to secure the top of the ladder while working was not met. Additionally, the AMTR employee potentially did not maintain three point contact.

- A pre-job safety meeting, which provided another opportunity to discuss task specific hazards and controls, was never conducted. The requirement for a pre-job safety meeting was specified in the Safety and Access Plan.

- The need to contact the cognizant Shift Operations Manager was not pointed out by the host as was required by the informal asset relocation desktop procedure. Therefore, AMTR did not contact the Shift Operations Manager, and the Shift

Operations Manager was not aware of AMTR's presence on site. The Board learned (through interviews) CH2M HILL issued heat advisories for July 15, 2004, and established heat stress controls for work. Had AMTR contacted the cognizant Shift Operations Manager, this precaution could have been provided to AMTR, and a more formalized heat stress management practice may have been implemented. Further, coordinating work activities through the Operations Shift Office would have assured impacts between AMTR work activities and Tank Farms work activities were assessed and accommodated.

Conclusion

The unstructured approach to managing hazards resulted in a missed opportunity to identify and implement controls to prevent the accident.

3.1.4 Perform Work Within Controls

As the Hanford managing contractor for CRO activities and for site access, FHI was responsible for facilitating access to MO-392 for AMTR. FHI administers the Hanford Site access process for DOE in accordance with implementing procedure HNF-PRO-412, Rev. 6, *Security Badges*. HNF-PRO-412 provides badging requirements for Hanford employees, contractors, consultants, vendors, and visitors. Personnel who are considered visitors receive a 20-page pamphlet (known as General Employee Radiological Training) containing general information for which they sign acknowledging receipt. Hanford employees, contractors, consultants, or vendors take four-hour, interactive, computer-based training (known as Hanford General Employee Training) providing greater detail and a knowledge verification process.

AMTR's sponsor (the FHI Hanford Site POC) and the FHI Administrative Security Office considered the AMTR employees visitors. HNF-PRO-412 (Section 5.11) specified a procedure for obtaining and wearing a Self-Expiring Visitor Badge. Two of the criteria were as follows:

- "Visitor badges are issued to non-employees who: Require access to the Hanford Site for seven days or less;" and

- "Visits are authorized only when they…Will not pose any significant risk to the visitor, sponsor, or to other personnel or property."

AMTR performed industrial work over the course of several weeks. The FHI Hanford Site POC could have chosen to obtain permanent security badges for the AMTR personnel in accordance with the HNF-PRO-412 (Section 5.10) procedure. However, the Security Badge Request Form was not clear on how to obtain a badge for visitors. In addition, although the Security Badge Request Form had data fields accommodating a visitor request for a badge, HNF-PRO-412 does not specify use of the Security Badge Request Form for visitors.

Rather than documenting discrepancies in HNF-PRO-412, the FHI Hanford Site POC and FHI Administrative Security personnel requested and issued self-expiring (less than seven days) visitor badges each week AMTR worked, allowing them to receive the 20-page orientation pamphlet each time they received badges, and never take the four-hour computer based training.

Interviews with both FHI and DOE-RL security management indicated a lack of awareness of how the visitor badging request process was implemented in instances such as the one described for AMTR. These inquiries revealed that such an implementation would result in personnel accessing and conducting work on site without the level of site orientation/training management expected.

As discussed in Section 3.1.3, neither the FHI Hanford Site POC nor AMTR made contact with site forces responsible for operational oversight of the MO-392 area. Although *Fluor Hanford Asset Transition Desktop Procedure for Asset Transition to the Tri-Cities Asset Reinvestment Company, LLC*, Rev 2, required contacting site forces, the procedure was informal, unapproved, and per testimony was not used by the FHI Hanford Site POC. Also as identified in Section 3.1.1, the FHI site access and badging procedure, HNF-PRO-412, *Security Badges*, Rev 6, did not provide explicit requirements to make contact with site forces.

Both the FHI work management procedure (HNF-PRO-12115, Rev 5) and the CH2M HILL work control procedure (TFC-OPS-MAINT-C-01, Rev E-4) required Operations Management to schedule work ensuring compatibility with other currently released work activities, release work, and ensure proper control implementation. This would promote Operations Management awareness of activities being conducted. CH2M HILL Shift Operations Managers confirmed an expectation that work and other activities within their operational jurisdiction be coordinated through their office. MO-392 was located within the CH2M HILL geographical jurisdictional area, but no procedure was in place requiring AMTR to coordinate with CH2M HILL Shift Operations Managers. The site badge office did not inform AMTR they needed to contact site forces. There were no signs posted in the 200 East Area telling visitors to check in with the Shift Operations Manager.

DOE Order 414.1A, *Quality Assurance*, states "Work must be performed to established technical standards and administrative controls using approved instructions, procedures, or other appropriate means." DOE-RL and FHI have not implemented formal procedures for CRO activities because of the ongoing debate on the Hall Amendment, discussed in Section 3.1.1 of this report. A draft revision to the Personal Property Transfer Implementation Plan has been developed that reflects the national debate and current site practices including excess in place; but, this document has remained in draft since 2001. In like manner, FHI has developed an informal desktop procedure that manages CRO activities. Site forces appeared to be operating to the intent of these draft documents.

HNF-PRO-144, *Disposition of Excess Property* states property will be transferred to the FHI excess receiving area and excess in place is not discussed. DOE-RL and FHI

management were aware that personal property was excessed in place. By excessing in place, FHI was not in compliance with HNF-PRO-144.

The five core functions of the Integrated Safety Management System serve to ensure safety is effectively considered and implemented during all aspects of work activities. The failure of any one of the core functions will result in the failure to fully accomplish the subsequent core function. For example, if the scope of work was not fully and effectively identified, it would be impossible to develop a clear understanding of the task-specific hazards that could be present in the work area. Similarly, less than adequate performance in task-specific hazards analysis would preclude the effective development and implementation of work controls to address those hazards.

Safety controls must be identified and implemented before starting work. The Safety and Access Plan was completed, approved, and AMTR's work commenced without complying with a number of requirements specified in the Safety and Access Plan. First, neither Two Rivers Terminal nor AMTR assessed potential hazards and impacts or specified task specific safety requirements prior to submitting the plan. Second, the Hanford Site Operations IS&H safety representative was not contacted for assistance as the Safety and Access Plan recommended. Third, the Hanford Site Operations IS&H safety representative did not take the opportunity to attach specific conditions for performance of work prior to approving the Safety and Access Plan. Lastly, a pre-job safety meeting was not conducted at the work location prior to commencement of work to ensure all persons involved were thoroughly familiar with the elements of the Safety and Access Plan.

The Board identified a history of poor compliance with Safety and Access Plans for CRO activities. The Board reviewed the Safety and Access Plans for excess property removed by the CRO related activities in calendar year 2003. Of the seven Safety and Access plans provided to the Board, three were not approved by the Hanford Site Operations IS&H safety representative for work, although the removal work was completed. One was approved by telephone and three were approved by signatures of the Hanford Site Operations IS&H safety representative prior to the commencement of work. None of the seven Safety and Access Plans contained a task-specific hazard analyses. The site access process and Safety and Access Plan, as implemented, did not assure visitors to the Hanford Site were fully aware of specific hazards while conducting work on the Hanford Site.

The work activities performed by AMTR were being performed in accordance with the scope of work set forth in their contract with Two Rivers Terminal (see contract scope in section 3.1.1 of this report). Work was performed without incident July 7-9, 2004, and July 13-14, 2004.

The AMTR employee's risk to illness or injury from a lack of awareness of the hazards and controls may have been compounded by the non-disclosures of his medical condition and recent dizziness to the AMTR owner. Despite no specific requirement in either OSHA or WISHA that an employee report a medical condition not related to on the job

injury or illness, the Board believes this risk could have been lessened through the objective analysis of an on site safety manager/professional, or properly trained owner/supervisor regarding the employee's fitness for duty.

On July 15, 2004, three separate Hanford workers talked with the AMTR employee. These exchanges provided opportunities for Hanford personnel to recognize and act on the AMTR employee's physical duress. At approximately 0900, the AMTR employee talked with a CH2M HILL employee in the MO-283 lunchroom, where he told the CH2M HILL employee he was hot, had felt dizzy as he bent over twice that morning, and had just had surgery on July 12. At approximately 1015, the FHI Hanford Site POC visited the AMTR personnel at the work site and noted the AMTR employee looked pale and hot, and offered both AMTR workers water. After his lunch, the AMTR employee again entered MO-283 for water and remarked how hot the outside temperature was and how he wished he could remain in the air conditioned trailer. None of the CH2M HILL employees had safety oversight responsibility for the AMTR employee.

HNF-PRO-3468, *Stop Work Responsibility*, Rev 2, for FHI employees, states, "Employees are expected to report any activity or condition, which they believe, is unsafe. Notification should be made to the affected worker(s) and then to the supervisor or his/her designee at the location where the activity or condition exists. After notification, resolution of the issue resides with the responsible supervisor." TFC-ESHQ-S_SAF-C-04, *Stop Work Authority*, Rev B-1, for CH2M HILL employees, states, "Stop work for any activity that creates an imminent danger condition, or for other serious hazards…Stop work is initiated by notifying your supervisor, or if time and circumstances do not permit this, then notifying the supervisor or employee/subcontractor who is in danger." It is unclear whether site forces personnel recognized sufficient indications of physical duress to invoke Stop Work in any of the instances, but the opportunity was present.

Conclusion

DOE-RL and FHI did not develop and implement formal procedures to specify roles and responsibilities in controlling the personal property asset disposition process. Further, DOE-RL's use of uncontrolled processes did not provide assurance that CRO activities were properly controlled.

Lack of a pre-job safety meeting allowed work to be performed without proper hazard identification and controls.

AMTR and FHI did not comply with the requirements in the Safety and Access Plan reducing assurance that all persons involved were aware of the physical and environmental hazards, and that all identified hazards were properly mitigated.

AMTR was in the Hanford 200 East Area without the knowledge of the cognizant Shift Operations Managers, who had information related to Heat Stress Alerts published earlier in the day. Those alerts were not communicated to AMTR.

The accident may have been prevented if any of three site workforce personnel (who came in contact with the AMTR employee on the morning of July 15, 2004,) recognized sufficient indications of physical duress to exercise Stop Work authority or express concern about the AMTR employee's condition to their management or AMTR's management.

DOE-RL and FHI did not assure that visitors to the site received the proper badge and level of safety training for task(s) to be performed.

FHI did not develop and implement interface controls defining roles and responsibilities for individuals (government or non-government) while on site.

3.1.5 Feedback and Improvement

Feedback and improvement were not applied to the performance, management, or control of the tasks associated with this accident. Several of the previously identified controls could have provided DOE complex-wide feedback and improvement opportunities to AMTR.

FHI manages a mature lessons learned program. Lessons learned are collected and applied at all levels of the FHI organization. Points of contact are established within each organization to both disseminate lessons to their organizations and to collect lessons from their organizations. The collected lessons are disseminated, as applicable, within Hanford and may be forwarded to the DOE complex and national Lessons Learned organizations. Information gathered by the organization POC is derived from the job task hazard analysis process, which is applied to all work activities. The job task hazard analyses process includes application of lessons from past performance and requires participants to analyze the current work scope for new lessons.

Specific to this incident, the Safety and Access plan required a pre-job safety meeting. For Hanford Site work, lessons learned would have been discussed during the pre-job safety meeting. The missed interaction between AMTR and the CH2M HILL Shift Operations Manager eliminated another opportunity to disseminate lessons learned.

The Board identified many sources of information related to heat stress that had been provided to various Hanford organizations during April, May and June 2004. For example, a six page safety discussion of heat disorders, including brief explanations of heat stress, heat cramps, heat exhaustion and heat stroke was provided to employees at all FHI Deactivation and Decommissioning operations in April. Another useful discussion of heat stress and heat exhaustion was found in the June 25, 2004, FHI Plutonium Finishing Plant Z-News letter. Additional heat stress hazard information was available from other Hanford contractor organizations. These were not available to AMTR.

The Board ran a search for ladder accidents in the Occurrence Reporting Process System and analyzed lessons learned, applicable to the work scope, which could have been shared with AMTR. In the 18 months from January 2003 to July 15, 2004, falls from ladders resulted in 18 reports and 21 occurrences in the DOE Complex. These occurrences were sorted by fixed and portable ladders. The eight fixed ladder incidents were not included in the analysis leaving 10 other occurrences.

TABLE 3-1, OCCURRENCE REPORTING PROCESS SYSTEM SEARCH				
	REPORT NO.	TITLE	DESCRIPTION	DIRECT CAUSE
1	ALO-AO-BWXP-PANTEX-2004-0044	Employee Injury at Building 11-59	PANTEX Plant: A tier subcontractor employee using a 10-foot stepladder, struck by ductwork, fell from ladder. Fractured left ankle.	Job scoping did not identify special circumstances or conditions. Infrequently performed steps are performed incorrectly.
2	ALO-LA-LANL-HEMACH PRES-2003-0001	Coronado Wrecking employee falls from ladder and receives compound fracture on right leg	LANL: Coronado Wrecking & Salvage Co. Inc. employee fell from a stepladder, fracturing right leg, when a pipe section fell and tipped ladder over.	(No cause listed.)
3	CH-AA-ANLE-ANLEPFS-2004-0004	Further Evaluation of Injury Results in Diagnosis of Fractured Left Ankle	ANL EAST: Plant facility & Service (PFS) maintenance mechanic missed bottom stop of an 8-foot step ladder while carrying material.	- Inattention to work, carrying ductwork, loss of three point contact while descending - Insufficient job information was passed between shifts
4	ID--BBWI-ATR-2003-0004	Employee Fall From Ladder	INEEL: An ATR operator was found on floor with pain in left hip. He had fallen 6 feet off a ladder that was tied off and inspected. The operator was leaning outside the working footprint of the ladder.	- Inattention to detail, working outside the ladder footprint - Employee failed to review the general hazards and mitigation requirements in the work package
5	OAK--LLNL-LLNL-2004-0007	Personal Injury/Fractured Elbow (TSF/B-453)	LLNL: Sub-subcontractor construction worker fell approximately four feet from a ladder and fractured elbow. The worker is a foreman/plumber with 40 years experience. He is the trainer for ladder safety. / on 3rd rung of ladder (see causes).	Unknown

TABLE 3-1, OCCURRENCE REPORTING PROCESS SYSTEM SEARCH				
	REPORT NO.	TITLE	DESCRIPTION	DIRECT CAUSE
6	OAK--SU-SLAC-2002-0004	Fall From Ladder at Sector 20	STANFORD: SLAC subcontractor fell off extension ladder injuring elbow and knee. Fell approximately 6 ½ feet when top of ladder moved.	- Inattention to detail; top of ladder moved - Contributing cause; no training
7	OAK--SU-SLAC-2003-0001	Employee fell off of ladder	SLAC (Type B): SLAC employee fell from an A frame stepladder receiving head injuries.	- Direct cause—loss of footing/slip - Root cause—line manager's unstructured approach to work
8	ORO--BNFL-K31-2003-0002	Worker Breaks Arm in K-31	OAK RIDGE: Worker using a 10-foot stepladder instead of a man lift fall from ladder as pipe falls. Did not use best equipment.	Improper equipment selection/man left was available. The work instruction did not directly indicate specific work techniques. Management did not properly identify the hazards.
9	ORO--BWXT-Y12SITE-2003-0002	Employee Injury - Fall From Ladder	OAK RIDGE: Y-12 employee fell from 8-foot fiber glass stepladder. Employee was approximately five feet off the ground and struck his head on the concrete floor. (why analysis) became dizzy, previously on Meds.	Assumed personnel error, no sign of equipment failure.
10	RFO--KHLL-771OPS-2003-0008	Near Miss - Worker Fell Off Ladder While Performing D&D Work	ROCKY FLATS: Subcontractor employee fell off a ladder while performing D&D. 10-foot portable step ladder cutting with sawzall. Equipment kicked back knocking the worker off balance causing the employee to fall 7 feet landing on the left side of his body.	Work organization/planning deficiency, selection of equipment.

Approximately 50 percent of the occurrences noted in Table 3-1 involved subcontractors or contractors brought onto DOE sites. The occurrences can be linked to poor or no job hazard information and/or training, equipment selection and attention to detail; i.e., three point contact while ascending or descending a ladder.

The Safety and Access Plan, as written, allowed non-government contractors to attach a task specific hazards analysis if needed. Earlier versions of the Safety and Access Plan, prior to November 2002, included a task specific hazards identification list. (Appendix F-4) The hazards identification list included 38 conditions (e.g., electrical work, falling hazards, temperature extremes, and vehicular traffic) that were used to assess potential hazards while performing the work activity, and a short description of the mitigation that would be used. The task specific hazards list was removed from the Safety and Access Plan in a November 2002 revision, in response to complaints that the form was too cumbersome to use. FHI thought this change would be beneficial, reducing the complexity of the Safety and Access Plan and shifting responsibility and ownership to the contractor. In this case, the checklist may have identified hazards that could have prevented the accident, such as heat stress and fitness for duty.

DOE-RL and FHI oversight processes were examined in relationship to this accident. No direct safety oversight of the AMTR work or other CRO activities was identified. FHI did not include CRO activities in any oversight activity. Additionally, no program specific oversight was identified except for host/visitor interactions. The DOE-RL Facility Representative Program had not been made aware of CRO activities. Although DOE-RL internal reviews had examined site infrastructure programs including property management, CRO activities were not specifically addressed or recognized.

Because both DOE-RL and FHI thought they had very limited accountability, roles and responsibilities for CRO contractor activities, neither organization performed safety oversight of CRO contractor activities. However, oversight of Hanford Site personnel/program activities with regard to asset disposition and visitor access processes could have identified many of the deficiencies identified in this report.

Conclusion

DOE-RL and Hanford contractors did not effectively apply feedback and improvement in the performance, management, control of the tasks associated with this accident.

DOE-RL and FHI did not provide oversight to assure safe work practices in the execution of asset disposition program with respect to non-government contract activities.

3.1.6 Management Systems

The Transfer of Access Government Property graphic (Figure 3-1) depicts Hanford management systems and interrelationships that were inherent to the transfer of excess

government property (MO-392) to the CRO. This figure illustrates the flow down of Integrated Safety Management, the relationships established through the Hanford Economic Transition Partnership for Economic Development, and the property management process as implemented in this accident scenario.

Integrated Safety Management System Flow Down

DOE implemented the Integrated Safety Management System through the contracting process. Both DOE-RL and DOE-ORP included Department of Energy Acquisition Regulation (DEAR) Clause 970.5223-1 into their respective contracts with FHI and CH2M HILL. The DEAR Clause required flow down of the requirements for Integrated Safety Management into all subcontracts and sub-tier contracts. The work performed by AMTR was under contract to the owner of MO-392, Two Rivers Terminal, and unrelated to any subcontract or sub-tier contract to either FHI or CH2M HILL. No safety and health requirements were included in the contract Two Rivers Terminal had with AMTR for this work. DOE-RL believed AMTR was expected to comply with WISHA for safety of its employees. AMTR was not required to implement Integrated Safety Management and it did not.

FHI management was aware Integrated Safety Management requirements were not contractually passed to contractors not under contract to them or their sub-tier contractors, and such a requirement was not within the scope of the PHMC contract. FHI Asset Control organization used an informal document (the Safety and Access Plan) to convey minimum safety and health requirements to non-government contractors (or individuals) entering the Hanford Site to retrieve property acquired through the TARC re-investment program. The Safety and Access Plan required the non-government contractor to adhere to 29 CFR 1910, 29 CFR 1926, and the WAC while working on the Hanford Site. The Safety and Access Plan stated the contractor(s) signing the Safety and Access Plan did so accepting the Safety and Access Plan as their own safety plan. The Hanford Site Operations IS&H safety representative was responsible to approve the Safety and Access Plan prior to the commencement of work.

The Safety and Access Plan as written allowed non-government contractors to attach a task specific hazards analysis if needed. Earlier versions of the Safety and Access Plan, prior to November 2002, included a task specific hazards identification list. The hazards identification list included 38 conditions (e.g., electrical work, falling hazards, temperature extremes and vehicular traffic) that were used to assess potential hazards while performing the work activity, and a short description of the mitigation that would be used. The task specific hazards list was removed from the Safety and Access Plan in a November 2002 revision, in response to complaints that the form was too cumbersome to use. FHI intended this change to be beneficial, reducing the complexity of the Safety and Access Plan and shifting responsibility and ownership to the contractor. In this case, the checklist may have identified hazards that could have prevented the accident, such as heat stress and fitness for duty.

The Board could not determine the ownership of the Safety and Access Plan or the authority for approval of the Safety and Access Plan. The Safety and Access Plan was provided by FHI to Two Rivers Terminal, signed by AMTR and Two Rivers Terminal accepting it as their safety plan, and approved by the Hanford Site Operations IS&H safety representative. The roles, responsibilities and authorities of those signing the Safety and Access Plan were not clear. The Hanford Site Operations IS&H safety representative approved the Safety and Access Plan (by signature) because it was properly completed; that is, the other signatures were complete on the Safety and Access Plan. The Safety and Access Plan was an informal, uncontrolled document as were the procedures that guided its use. The Safety and Access Plan did not reflect the rigor established, or expected, of mature Integrated Safety Management System program implementation used to assure the safe conduct of work.

FHI interpreted their responsibilities to non-government contractors under the PHMC in two ways. In the first instance, FHI denied that it had any responsibility to such contractors, and in the second, FHI initiated the informal Safety and Access Plan to assist non-government contractors. This contradiction in FHI's actions, under the terms of the PHMC, gave rise to a potential contract ambiguity. Contractors who discover ambiguities in their contract responsibilities have a duty to inform the federal contracting officer and request clarification. If FHI had notified DOE-RL of this ambiguity in the application of Integrated Safety Management to non-government contractors, DOE-RL would have been required to issue clarification or accept FHI's interpretation of its responsibilities.

Hanford Economic Transition Partnership for Economic Development

The relationships depicted in Figure 3-1 are discussed below. A DOE-RL grant established TRIDEC as the CRO in 1994. In 1999, DOE-RL and TARC (as the directed representative of the CRO [TRIDEC]), established a Personal Property Transfer Implementation Plan. The plan was set to expire in five years (June 2004) and was not renewed prior to that date. The Personal Property Transfer Implementation Plan implements the provisions in Personal Property Letter 970-1, which states DOE will transfer property to the CRO and move it to an area controlled by the CRO. As discussed in Section 3.1.1, all involved parties have been negotiating a revision to the Personal Property Transfer Implementation Plan. DOE-RL, FHI, and TARC were operating to the draft Personal Property Transfer Implementation Plan without formal procedures.

DOE-RL transferred the title to MO-392 to TARC on February 2, 2004. MO-392 was sold by Vail International, Inc., auctioneers acting on behalf of TARC, to Two Rivers Terminal on June 14, 2004. Two Rivers Terminal contracted with AMTR to transport MO-392 from Hanford to a new location (not named in the contract) on June 30, 2004. AMTR visited the Hanford Site multiple times beginning July 1, 2004 to disassemble and remove MO-392.

Excess Personal Property Management and Disposition

On June 28, 1995, DOE issued Acquisition Letter 95-06, which included Personal Property Letter 970-1. The Personal Property Letter included a provision: "If the CRO and the DOE agree on the amount of consideration, the DOE will transfer the property to the CRO and move it to an area controlled by the CRO." DOE-RL neither implemented the Acquisition Letter into local procedures (a requirement of the RL Integrated Management System) nor were provisions of the Acquisition Letter incorporated into the PHMC. DOE-RL transferred title to MO-392 to TARC and MO-392 was excessed in place. DOE-RL has had conversations with DOE Headquarters regarding the excess in place practice. However, the PHMC procedure, HNF-PRO-144, does not allow excess in place.

FHI manages personal property asset disposition for Hanford in accordance with its existing contract, Section C.4.2. CH2M HILL, original owner of MO-392, notified FHI that MO-392 was no longer needed in support of DOE mission activities. CH2M HILL initially turned over MO-392 without terminating services. Because of the physical condition of MO-392, FHI requested clarification of its contractual roles and responsibilities to "Provide receipt and disposition services for personal property assets no longer required in the support of the Hanford mission," in letter FH-0303340, dated September 10, 2003. DOE-RL formally responded to the FHI request in letter 04-AMRC-0022, dated April 5, 2004. CH2M HILL completed deactivation of MO-392 in May 2004.

Meanwhile, MO-392 was declared excess personal property on September 11, 2003. FHI accepted MO-392 on December 19, 2003 for processing. After the required screening period, DOE transferred title of MO-392 to TARC on February 2, 2004.

Conclusion

Roles and responsibilities with regard to administering CRO activities were not clearly defined or understood. The transition from CH2M HILL to FHI was troubled by misunderstandings on the condition MO-392 needed to be in for transition. CH2M HILL initially turned over MO-392 without terminating services.

FHI did not formalize the Safety and Access Plan and other informal desktop procedures. Therefore, the opportunity to reduce the risk to visitors performing work on the Hanford site was missed.

FHI did not report an apparent ambiguity in the management contract regarding application of Integrated Safety Management to CRO activities.

DOE-RL and FHI used informal procedures to establish and manage safety for CRO related work performed on site. DOE-RL and FHI accepted the performance of unstructured work on the Hanford Site.

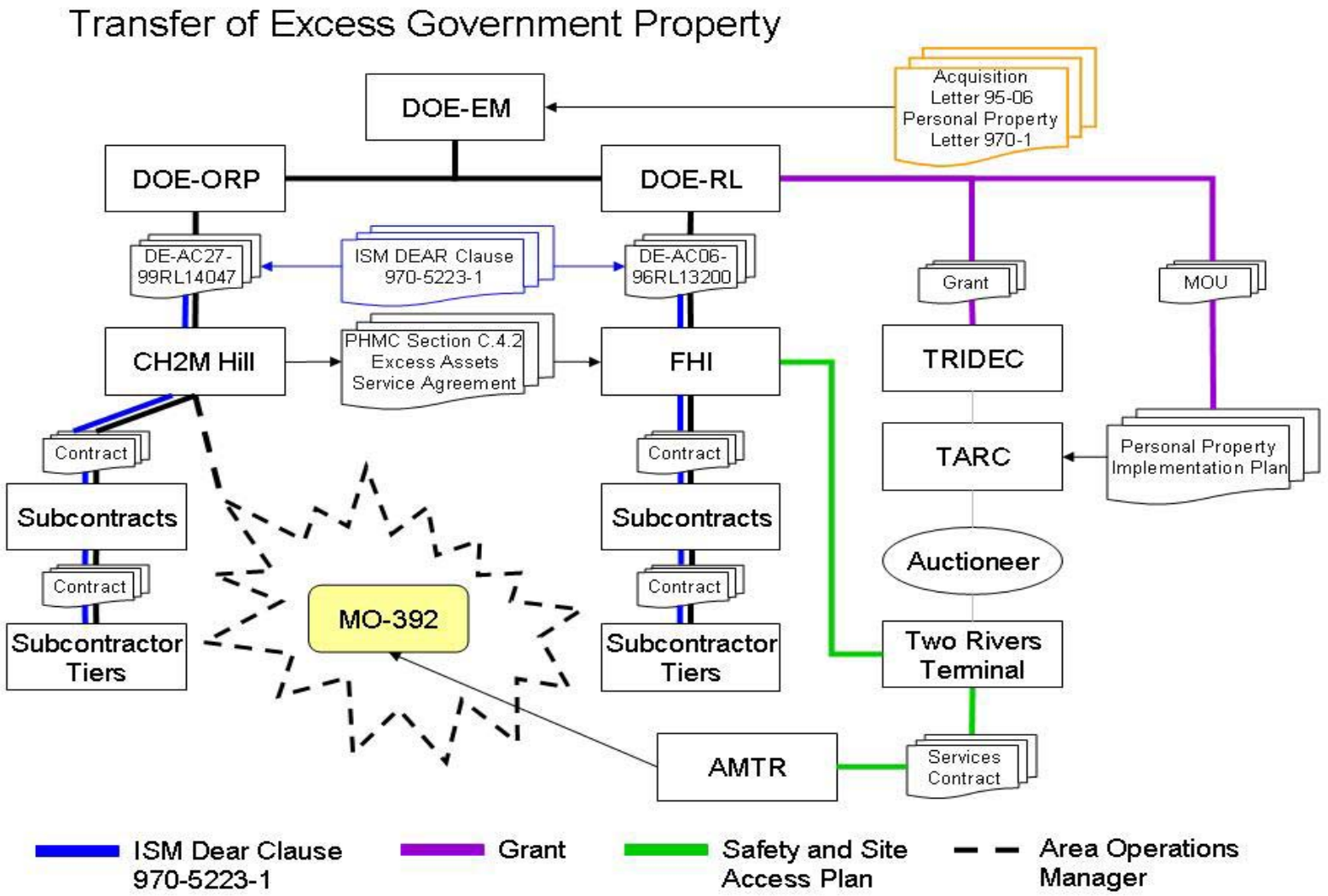
Transfer of Excess Government Property
DOE-EM
Acquisition
Letter 95-06
Personal Property
Letter 970-1
DOE-ORP
DOE-RL
DE-AC27-
99RL14047
ISM DEAR Clause
970-5223-1
DE-AC06-
96RL13200
Grant
MOU
CH2M Hill
PHMC Section C.4.2
Excess Assets
Service Agreement
FHI
TRIDEC
Contract
Contract
TARC
Personal Property
Implementation Plan
Subcontracts
Subcontracts
Auctioneer
Contract
Contract
MO-392
Subcontractor
Tiers
Subcontractor
Tiers
Two Rivers
Terminal
AMTR
Services
Contract
ISM Dear Clause
970-5223-1
Grant
Safety and Site
Access Plan
Area Operations
Manager

Figure 3-1

3.2 Barrier Analysis

Barrier analysis is based on the premise that hazards are associated with all tasks. A barrier is any management or physical means used to control, prevent, or impede the hazard from reaching the target (i.e., persons or objects that a hazard may damage, injure, or harm). The results of the barrier analysis are integrated into the events and causal factors chart to support the development of causal factors. Appendix C contains the complete Barrier Analysis of physical and management barriers that did not perform as intended and thereby contributed to the accident.

3.3 Change Analysis

Change analysis examines planned or unplanned changes that caused undesirable results related to the accident. This process analyzes the difference between what is normal, or expected, and what actually occurred before the accident. The results of the change analysis conducted by the Board are integrated into the events and causal factors chart to support the development of causal factors. Appendix D contains the Change Analysis, which reinforces the Barrier Analysis.

3.4 Causal Factors Analyzed

The Events and Causal Factors Analysis is a systematic process that uses methods to determine Causal Factors of an accident. Causal Factors are the significant events and conditions that produced or contributed to the Direct Cause, the Contributing Causes and the Root Cause(s) of the accident. Tier Diagrams in Appendix B contains the Board's Direct, Contributing and Root Causes. This investigation followed the processes described in the DOE Workbook, Conducting Accident Investigations, Revision 2, where the Direct, Contributing and Root Causes are defined as:

> Direct Cause - the immediate events or conditions that caused the accident. The Board concluded, based upon the best available evidence, that the direct cause was that the worker fell from a ladder.
>
> Root Causes - causal factors that, if corrected, would prevent recurrence of the same or similar accidents. The Board identified the root cause of this accident as:
>
> FHI and AMTR did not apply and AMTR did not implement the basic elements of safety management practices dealing with work planning, hazard analysis, development of controls, and work execution to accomplish this task.
>
> Contributing Causes - events or conditions that collectively with other causes increased the likelihood of an accident but that individually did not cause the

accident. Appendix E contains the Events and Causal Factors Analysis. Other contributing factors are identified in Appendices B, C, and D.

4 JUDGMENTS OF NEEDS

Judgments of Need are managerial controls and safety measures believed necessary to prevent or minimize the probability of a recurrence. They flow from the causal factors and are directed at guiding managers in developing corrective actions. The Executive Summary identified the Judgments of Need. The conclusions and Judgments of Need are provided in Table 4-1.

Root Cause: FHI and AMTR did not apply and AMTR did not implement the basic elements of safety management practices dealing with work planning, hazard analysis, development of controls, and work execution to accomplish this task.

Table 4-1, Judgments of Need

CONCLUSIONS	JUDGMENTS OF NEED
DOE-RL did not clearly state their authorities, accountability, roles and responsibilities for commercial work performed by CRO non-government contractors on the Hanford Site, resulting in a lack of clear understanding within DOE-RL and FHI with regard to those responsibilities. DOE-RL and FHI did not provide oversight to assure safe work practices in the execution of the asset disposition program with respect to non-government contract activities. FHI roles and responsibilities in procedures for management of non-government contactor activities on site were not clearly understood.	DOE-EH (with line management, General Counsel, and Management, Budget and Evaluation) needs to identify DOE Policy for authorities, accountability, and roles and responsibilities for non-government work activities at DOE sites. DOE-EH (with line management, General Counsel, and Management, Budget and Evaluation) needs to identify DOE Policy for the safe performance of work and application of the principles of Integrated Safety Management to activities on DOE property that are precipitated by other than contract instruments. DOE-RL and FHI need to resolve and clearly define authorities, accountability, and roles and responsibilities for non-government work activities conducted on the Hanford Site.
DOE-RL did not implement the provisions of Acquisition Letter 95-06 and Personal Property Letter 970-1.	DOE Management, Budget and Evaluation needs to assess implementation and provide appropriate guidance to field elements on DOE Acquisition Letter 95-06 and Personal Property Letter 970-1. DOE-RL needs to assess the implementation of

Table 4-1, Judgments of Need	
CONCLUSIONS	JUDGMENTS OF NEED
	Acquisition Letter 95-06 and Personal Property Letter 970-1 into local procedures. DOE-RL needs to flow down Personal Property Asset Disposition provisions into the PHMC as appropriate.
FHI did not report an apparent ambiguity in the management contract regarding application of Integrated Safety Management to non-government contracts. DOE-RL and FHI did not develop and implement formal procedures to specify roles and responsibilities in controlling the personal property asset disposition process. Persons involved in implementation of the safety plan did not recognize their role in performing the task specific hazards analysis.	FHI needs to review its formal and informal processes to resolve the applicability of integrated safety management to non-government contract activity on the Hanford Site. DOE-RL and FHI need to develop the personal property asset disposition process by formalizing procedures, implementing procedures, training staff, and assessing program performance. Detailed procedures should include: - Application of Integrated Safety Management tenets - Expectations for CRO contractors - Interfaces with all Hanford organizations involved in the process and the CRO. - Roles and Responsibilities.
DOE-RL and FHI did not assure that visitors to the site received the proper badge and level of safety training for task(s) to be performed. FHI did not develop and implement interface controls defining roles and responsibilities for individuals (government or non-government) while on site.	DOE-RL and FHI need to assure the site access process is effective and enforced to provide the proper badges and level of safety awareness for visitors doing work on the Hanford Site. FHI needs to clearly define a process for establishing interface and integration with site forces for visitors coming on site.
Site employees did not recognize the condition of the worker was sufficiently affected to exercise stop work.	Hanford Site management needs to review the expectation for stop work with regard to employee fitness for duty to ensure employees recognize an obligation to stop unsafe activities.

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5 BOARD SIGNATURES

Theodore Wyka, Jr.* Date: August 23, 2004
DOE Accident Investigation Board
U.S. Department of Energy
Washington, DC

Douglas Abramson* Date: August 23, 2004
DOE Accident Investigation Board
U.S. Department of Energy
Washington, DC

William McQuiston* Date: August 23, 2004
DOE Accident Investigation Board
NE-ID/U.S. Department of Energy
Idaho Operations Office

Kerry Scherman Date: August 23, 2004
DOE Accident Investigation Board
U.S. Department of Energy
Richland Operations Office

John E. Cavanaugh, Jr. Date: August 23, 2004
DOE Accident Investigation Board
U.S. Department of Energy
Richland Operations Office

Craig R. Richins* Date: August 23, 2004
DOE Accident Investigation Board
U.S. Department of Energy
Richland Operations Office

*DOE Trained Investigator

6 BOARD MEMBERS, ADVISORS, AND STAFF

BOARD MEMBERS

Ted (Theodore) Wyka, Jr. Chairperson
Doug (Douglass) Abramson, Member
Bill (William) McQuiston, Member
Kerry Schierman, Member
John Cavanaugh Jr., Member
Craig Richins, Member

BOARD SUPPORT

Dr. Loren Lewis, Occupational Medicine Advisor
Tony Weeks, Legal Advisor
Joanne Shadel, Administrative Coordinator
Gary Loiacono, Security Advisor
Linda Burk, WebOps, Editorial Support
Raelynn Soldat, WebOps, Report Support
Connie Eckard, Public Affairs Consultant

Accident: An unwanted transfer of energy or an environmental condition which, due to the absence or failure of barriers or controls, produces injury to persons, damage to property, or reduction in process output.

Accident Investigation: The systematic appraisal of unwanted events for the purpose of determining causal factors, subsequent corrective actions, and preventive measures.

Accident or Emergency Response Team: A team or teams of emergency and accident response personnel for a particular site. This team may be composed of a number of teams from the site, such as local police and firefighter units, emergency medical personnel, and hazardous material teams.

Analysis: The use of methods and techniques for arranging data to: (a) assist in determining what additional data are required; (b) establish consistency, validity, and logic; (c) establish necessary and sufficient events for causes; and (d) guide and support inferences and judgments.

Analytical Tree: Graphical representation of an accident in a deductive approach (general to specific). The structure resembles a tree; that is, narrow at the top with a single event (accident) and then branching out as the tree is developed, and identifying root causes at the bottom branches.

Appointing Official: A designated authority responsible for assigning accident investigation boards for Type A and Type B investigations, with responsibilities as prescribed in DOE Order 225.1A, *Accident Investigations*, Paragraph 5.d.

Barrier: Anything used to control, prevent, or impede energy flows. Common types of barriers include equipment, administrative procedures and processes, supervision/management, warning devices, knowledge and skills, and physical objects.

Barrier Analysis: An analytical technique used to identify energy sources and the failed or deficient barriers and controls that contributed to an accident.

Board Chairperson: The leader who manages the accident investigation process, represents DOE in all matters regarding the accident investigation, and reports to the appointing official for purposes of the accident investigation.

Board Members: A group of three to six DOE staff members assigned to investigate an accident. This group reports to the board chairperson during the accident investigation.

Causal Factor: An event or condition in the accident sequence necessary and sufficient to produce or contribute to the unwanted result. Causal factors fall into three categories:

- Direct cause
- Contributing cause
- Root cause.

Cause: Anything that contributes to an accident or incident. In an investigation, the use of the word "cause" as a singular term should be avoided. It is preferable to use it in the plural sense, such as "causal factors," rather than identifying "the cause."

Chain of Custody: The process of documenting, controlling, securing, and accounting for physical possession of evidence, from initial collection through final disposition.

Change: Stress on a system that was previously in a state of equilibrium or anything that disturbs the planned or normal functioning of a system.

Change Analysis: An analytical technique used for accident investigations, wherein accident-free reference bases are established, and changes relevant to accident causes and situations are systematically identified. In change analysis, all changes are considered, including those initially considered trivial or obscure.

Conclusions: Significant deductions derived from analytical results. Conclusions are derived from and must be supported by the facts, plus results from testing and analyses conducted. Conclusions are statements that answer two questions the accident investigation addresses: what happened and why did it happen? Conclusions include concise recapitulations of the causal factors (direct, contributing, and root causes) of the accident determined by analysis of facts.

Contributing Cause: An event or condition that collectively with other causes increases the likelihood of an accident, but that individually did not cause the accident.

Controls: Those barriers used to control wanted energy flows, such as the insulation on an electrical cord, a stop sign, a procedure, or a safe work permit.

Direct Cause: The immediate events or conditions that caused the accident.

DOE Accident Investigator: An individual who understands DOE accident investigation techniques and has experience in conducting investigations through participation in at least one Type A or Type B investigation. Effective October 1, 1998, DOE accident investigators must have attended an accident investigation course of

instruction that is based on current materials developed by the Office of Deputy Assistant Secretary for Oversight.

DOE Operations: Activities funded by DOE for which DOE has authority to enforce environmental protection, safety, and health protection requirements.

DOE Site: A tract either owned by DOE, leased, or otherwise made available to the Federal government under terms that afford DOE rights of access and control substantially equal to those it would possess if it held the fee (or pertinent interest therein) as agent of and on behalf of the government. One or more DOE operations/program activities carried out within the boundaries of the described tract.

Energy: The capacity to do work and overcome resistance. Energy exists in many forms, including acoustic, potential, electrical, kinetic, thermal, biological, chemical, and radiation (both ionizing and non-ionizing).

Energy Flow: The transfer of energy from its source to some other point. There are two types of energy flows: wanted (controlled—able to do work) and unwanted (uncontrolled—able to do harm).

Event: An occurrence; something significant and real-time that happens. An accident involves a sequence of events occurring in the course of work activity and culminating in unintentional injury or damage.

Events and Causal Factors Chart: Graphical depiction of a logical series of events and related conditions that precede the accident.

Eyewitness: A person who directly observes the accident or the conditions immediately preceding or following the accident.

Fatal Injury: Any injury that results in death within 30 calendar days of the accident.

Field Element: A general term for all DOE sites (excluding individual duty stations) located outside the Washington, D.C., metropolitan area.

General Witness: A person with knowledge about the activities prior to or immediately after the accident (e.g., the previous shift supervisor or work controller).

Hazard: The potential for energy flow(s) to result in an accident or otherwise adverse consequence.

Heads of Field Elements: First-tier field managers of the operations offices, the field offices, and the power marketing administrations (Administrators).

Human Factors: The study of human interactions with products, equipment, facilities, procedures, and environments used in work and everyday living. The emphasis is on human beings and how the design of equipment influences people.

Investigation: A detailed, systematic search to uncover the "who, what, when, where, why, and how" of an occurrence and to determine what corrective actions are needed to prevent a recurrence.

Investigation Report: A clear and concise written account of the investigation results.

Judgments of Need: Managerial controls and safety measures necessary to prevent or minimize the probability or severity of a recurrence of an accident.

Lessons Learned: A "good work practice" or innovative approach that is captured and shared to promote its repeated application. A lesson learned may also be an adverse work practice or experience that is captured and shared to avoid recurrence.

Limited Scope Investigation: An accident investigation chartered by the Assistant Secretary for Environment, Safety and Health that is reduced in scope, duration, and resources from that normally associated with a Type A or Type B investigation.

Non-government Contractor: A company performing commercial work for their own benefit or contracted to another company, neither of which have contracts with the government nor are otherwise funded through government appropriations.

Occurrence: An event or condition that adversely affects or may adversely affect DOE or contractor personnel, the public, property, the environment, or the DOE mission.

Occurrence Reporting and Processing System (ORPS): The reporting system established and maintained for reporting occurrences related to the operation of DOE facilities.

Point of Contact: A DOE staff member who is assigned the role of liaison with the Accident Investigation Program Manager in the Office of Security Evaluations (EH-21), who administers the accident investigation program. In this role, the point of contact ensures that site readiness teams are trained in collecting and maintaining initial accident investigation evidence and that their activities are coordinated with accident and emergency response teams.

Principal Witness: A person who was actually involved in the accident.

Readiness Team: Trained personnel who are available to perform initial investigative response activities immediately after an accident. They are responsible for initiating the

accident investigation, maintaining the integrity of evidence before the accident investigation board arrives, and supporting the board after its arrival.

Requirements Verification Analysis: A validation technique that determines whether the logical flow of data from analysis to conclusions and judgments of need is based on facts. This technique is conducted after all the analyses are completed.

Root Cause: The causal factor(s) that, if corrected, would prevent recurrence of the accident.

Root Cause Analysis: Any methodology that identifies the causal factors that, if corrected, would prevent recurrence of the accident.

Target: A person, object, or animal upon which an unwanted energy flow may act to cause damage, injury, or death.

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Appendix A

Delegation of Authority Memorandum

Board Appointment Memorandum

Resources Memorandum

Appendix B

DOE Management Tier Diagram

FHI Management Tier Diagram

AMTR Management Tier Diagram

Appendix C

Barrier Analysis

Appendix D

Change Analysis Worksheet

Appendix E

Events and Causal Factors Analysis

Appendix F

Supporting Documents

Department of Energy
Washington, DC 20585
July 16, 2004

MEMORANDUM FOR: KEITH A. KLEIN, MANAGER
RICHLAND OPERATIONS OFFICE

FROM: DAVID K. GARMAN, ACTING UNDERSECRETARY
ENERGY, SAFETY AND ENVIRONMENT

SUBJECT: DELEGATION OF AUTHORITY TO CONDUCT A TYPE A ACCIDENT INVESTIGATION OF A CONTRACTOR FATALITY ON THE HANFORD SITE

DOE Order 225.1A, *Accident Investigations*, designates the Assistant Secretary for Environment, Safety and Health (EH-1) as the DOE official responsible for appointing accident investigation boards to investigate serious accidents occurring at DOE facilities or operations. Further, the Order authorizes EH-1 to delegate Type A Investigation Board appointment and investigatory authority to the Head of a Field Element.

This memorandum delegates authority for appointing a Type A Accident Investigation Board, and conducting a formal investigation of the fatality while removing excess trailers from the site, to your office. The investigation should be conducted in accordance with the requirements of DOE O 225.1A. Although appointment and investigatory authority is delegated to your office, EH is required to review the final draft investigation report before it is transmitted to the appointing official, and EH's comments should be resolved by the Accident Investigation Board Chairperson before the report is finalized. EH can provide a trained Accident Investigator to assist or advise you in this investigation. In addition, EH maintains responsibility for developing and disseminating lessons-learned from this accident. Consequently, lessons-learned as a result of this accident should be forwarded to EH-1 for inclusion in communications to DOE and NNSA field elements.

EH will be in contact with respect to providing a trained AI advisor. I may be reached on 202-586-9220, or your staff may contact Raymond Hardwick, Deputy Assistant Secretary for Facility Safety at (202) 586-4693.

cc:
Kyle McSlarrow, S-2
Linton F. Brooks, NA-1
Lee Otis, GC-1
Jeannie Lopatto, PA-1
Rick Dearborn, CI-1

RL-F-1325.8 (02/98)

United States Government — Department of Energy

memorandum

Richland Operations Office

DATE: JUL 16 2004

REPLY TO ATTN OF: AMSE:KMS/04-AMSE-0046

SUBJECT: APPOINTMENT OF A TYPE A ACCIDENT INVESTIGATION BOARD

TO: David K. Garman, Acting Undersecretary
for Energy, Safety, and Environment
S-3, HQ

By the authority you have delegated to me, I hereby establish a Type A Accident Investigation Board to investigate an accident which occurred at the Hanford Site on July 15, 2004. I have determined it meets the requirements established for a Type A accident investigation in DOE O 225.1A, ACCIDENT INVESTIGATIONS, dated September 29, 1997.

I appoint Theodore A. Wyka, Jr., DR-1, DOE-HQ, as the accident board chairperson. The board members will be:

William C. McQuiston, ID, Accident Investigator
Craig R. Richins, RL, Accident Investigator
John E. Cavanaugh, RL, Occupational Safety and Health
Kerry M. Schierman, RL, Facility Representative

Dr. Loren Lewis, AdvanceMed Corporation, Hanford, will serve as an occupational medicine advisor to the board. The board will be assisted by other advisors, consultants and support personnel as determined by the chairperson.

The scope of the board's investigation will include, but is not limited to, identifying all relevant facts; analyzing the facts to determine the causes of the accident; developing conclusions; and determining the judgments of need that, when implemented, should prevent an accident recurrence. The investigation will be conducted in accordance with DOE O 225.1A and will specifically address the role of DOE and contractor organizations, and management systems as they may have contributed to the accident. The scope will also include ownership processes, host and contractor safety processes, medical conditions and response, and the application of lessons learned from similar accidents within the Department.

The board will provide my office, via Doug S. Shoop, with periodic reports on the status of the investigation, but will not include any conclusions until an analysis of all the causal factors has been completed. Draft copies of the factual portion of the investigation report will be submitted to Fluor Hanford, Inc., Tri-City Asset Reinvestment Company, Two Rivers Terminal, and All Mobile Transporting and Repair, for a factual accuracy review prior to report finalization.

The report should be provided to me for acceptance within 30 calendar days from the date of this memorandum. Discussions of the investigation and copies of the draft report will be controlled until I authorize release of the final report.

If you have questions, please contact me, or your staff may contact Doug S. Shoop, Acting Assistant Manager for Safety and Engineering, on (509) 376-0180.

for Keith A. Klein
Manager

cc: P. M. Golan, EM-2
I. R. Triay, EM-3
T. A. Wyka, DR-1
W. C. McQuiston, NE-ID
Dr. Loren Lewis,
AdvanceMed Corporation

RL-F-1325.6 (02/98)

United States Government **Department of Energy**

memorandum

Richland Operations Office

DATE: JUL 2 2 2004

REPLY TO ATTN OF: AMSE:JRS/04-AMSE-0049

SUBJECT: RESOURCES NEEDED TO SUPPORT TYPE A ACCIDENT INVESTIGATION BOARD

TO: Keith A. Klein
Manager

As chairperson for the Hanford 200 Area Fall Fatality Accident Investigation Board, I have added Doug Abramson, Accident Investigator, as a board member. In addition, I have identified the following support staff needed to complete the investigation.

Tony Weeks, Legal Advisor
Connie Eckard, Public Affairs Consultant
Joanne Shadel, Administrative Coordinator
Gary Loiacono, Security Advisor

I also anticipate the need for court recording, photography services, word processing and technical editing support. Doug Shoop and his staff are in the process of obtaining the aforementioned resources. If you have any questions, please contact me directly.

Theodore A. Wyka, Jr.
Chairperson

DOE Management Tier Diagram

DOE Management Tier Diagram		
Level	**Causal Factor**	**Causes**
Senior Management	• Failure to move property to a CRO controlled area allowed the accident to occur in a federally controlled area. (BA-1) • If property had been transferred to the CRO controlled area, the accident would not have occurred in a federally controlled area. (CA-14)	DOE-RL did not implement the provisions of Acquisition Letter 95-06 and Personal Property Letter 970-1.
	• The unstructured approach to managing hazards resulted in a missed opportunity to identify and implement controls to prevent the accident. (BA-16) • Integrated Safety Management Systems provide a formal, organized process whereby people plan, perform, assess, and improve the safe conduct of work. (CA-12) • Integrated Safety Management is the standard by which all contractors perform work safely. (CA-13)	DOE-RL did not clearly state their authorities, accountability, roles and responsibilities for commercial work performed by CRO non-government contractors on the Hanford Site, resulting in a lack of clear understanding within DOE-RL and FHI with regard to those responsibilities.
	• DOE's use of uncontrolled processes provided no assurance that personal property be moved to the CRO without moving it to an area controlled by the CRO. (BA-15)	DOE-RL did not develop and implement formal procedures to specify roles and responsibilities in controlling the personal property asset disposition process.
Mid-level Management	• The repeated use of visitor badges did not ensure that AMTR received the intended level of training and orientation commensurate with their onsite function. (BA-6)	DOE-RL did not assure that visitors to the site received the proper badge and level of safety training for task(s) to be performed.
	• Failure to include non-government contractor oversight presented a lost opportunity to assure the safe conduct of work. (BA-17)	DOE-RL did not provide oversight to assure safe work practices in the execution of the asset disposition program with respect to non-government contract activities.
Supervisor		
Worker		
Direct Cause	Worker fell from ladder.	

FHI Management Tier Diagram

Root Cause: FHI did not apply the basic elements of safety management practices dealing with work planning, hazard analysis, development of controls, and work execution to accomplish this task.

FHI Management Tier Diagram		
Level	**Causal Factor**	**Causes**
Senior Management	• The unstructured approach to managing hazards resulted in a missed opportunity to identify and implement controls to prevent the accident. (BA-16) • Integrated Safety Management systems provide a formal, organized process whereby people plan, perform, assess, and improve the safe conduct of work. (CA-12) • Integrated Safety Management is the standard by which all contractors perform work safely. (CA-13) • Personnel are able to easily identify and check in with site forces having operational control of the area (CA-16)	FHI did not report an apparent ambiguity in the management contract regarding application of Integrated Safety Management to non-government contracts. FHI did not develop and implement interface controls defining roles and responsibilities for individuals (government or non-government) while on site.
Mid-level Management	• The repeated use of visitor badges did not ensure that AMTR received the intended level of training and orientation commensurate with their on site function. (BA-6) • Failure to formalize the Safety and Access Plan removed the ability of management to identify and accept risk of "visitors" performing work on the Hanford Site. (BA-13) • Unclear roles and responsibilities provided an opportunity for failure to implement requirements. (BA-13) • A checklist aids the contractor in identifying and analyzing hazards. (CA-11) • Failure to include non-government contractor oversight presented a lost opportunity to assure the safe conduct of work. (BA-17) • Shift Operations Manager coordinates safety, operational, and environmental impacts with AMTR. (CA-8) • Shift Operations Manager is aware of AMTR presence and is able to coordinate safety, operational, and environmental impacts with AMTR. (CA-8)	FHI did not develop and implement interface controls defining roles and responsibilities for individuals (government or non-government) while on site. FHI did not assure that visitors to the site received the proper badge and level of safety training for task(s) to be performed. FHI did not develop and implement formal procedures to specify roles and responsibilities in controlling the personal property asset disposition process. FHI did not provide oversight to assure safe work practices in the execution of the asset disposition program with respect to non-government contract activities.

FHI Management Tier Diagram		
Level	**Causal Factor**	**Causes**
Supervisor	•	
Worker	• Non-government contractor's safety plans receive the benefit of site experience in hazards management and lessons learned. (CA-10) • The appropriate controls and safety awareness for the task are established and documented. (CA-6) • A competent pre-job safety meeting provides increased assurance of workers' awareness of hazards while performing work. (CA-7) • The lack of task-specific hazard identification resulted in a missed opportunity to identify and control hazards. (BA-2) • Lack of a pre-job safety meeting allowed work to be performed without proper hazard identification and controls. (BA-8) • Execution of Stop Work Authority would have prevented the accident. (BA-10) • Failure to comply with the requirements in the Safety and Access Plan reduced assurance that all persons involved were aware of the physical and environmental hazards, and that all identified hazards were properly mitigated. (BA-11) • Worker control and awareness would have been improved; coordination with site forces may have improved communication on heat stress alerts to AMTR. (BA-7)	All persons involved in implementation of the safety plan did not recognize the need to perform the task specific hazards analysis. Roles and responsibilities in procedures for management of non-government contactors activities on site were not clearly understood. Site employees did not recognize the condition of the worker was sufficiently affected to exercise stop work.
Direct Cause	The worker fell from ladder.	

All Mobile Transporting & Repairs Tier Diagram

Root Cause: AMTR did not apply and implement the basic elements of safety management practices dealing with work planning, hazard analysis, development of controls, and work execution to accomplish this task.

AMTR Tier Diagram		
Level	**Causal Factor**	**Causes**
Owner	• Worker would have three point contact when ascending and descending ladder. The helper increases stability of the ladder. Helper prevents or mitigates fall by recognizing physical duress. Helper provides resuscitation. (CA-2) • Employer modifies or restricts work assignments to accommodate the worker's medical condition. (CA-3) • AMTR's informal heat stress program allowed worker to perform functions under increased physical stress. (BA-4) • The appropriate controls and safety awareness for the task are established and documented. (CA-6) • Failure to comply with the requirements in the Safety and Access Plan reduced assurance that all persons involved were aware of the physical and environmental hazards, and that all identified hazards were properly mitigated. (BA-12) • The lack of task-specific hazard identification resulted in a missed opportunity to identify and control hazards. (BA-2) • A competent pre-job safety meeting provides increased assurance of workers' awareness of hazards while performing work. (CA-7) • Lack of a pre-job safety meeting allowed work to be performed without proper hazard identification and controls. (BA-9) • Use of a man lift would have mitigated the consequences of a fall. (CA-1) • The non-government contractor's safety plans receive the benefit of site experience in hazards management and lessons learned. (CA-10)	Owner did not apply and implement the basic elements of safety management practices associated with work planning, hazard analysis, development of controls, and work execution. Owner did not ensure that the employee was aware of the hazards and controls necessary to perform work safely. Owner did not take advantage of the offer to contact Hanford Site Operations IS&H safety representative for consultation.

AMTR Tier Diagram		
Level	**Causal Factor**	**Causes**
Worker	• Improper use of the ladder may have contributed to fall. (BA-10)	Worker non-compliance with WISHA and potential non-compliances with OSHA ladder use requirements may have been causal factors in this accident.
	• Inappropriate footwear may have contributed to the worker's fall. (BA-3)	The worker failed to wear appropriate footwear for work in a construction area.
	• The worker's failure to disclose medical conditions prevented his manager from compensating for them. (BA-5).	The worker's failure to disclose medical conditions prevented his manager from compensating for them.
Direct Cause	Worker fell from ladder.	

BARRIER ANALYSIS			
HAZARD		**TARGET**	
What Were the Barriers?	**How Did Each Barrier Perform?**	**Why Did the Barrier Fail?**	**How Did the Barrier Affect the Incident?**
DOE will transfer the property to the CRO and move it to an area controlled by the CRO. (*Reference Acquisition Letter 95-06 and Property Planning Letter 970-1 dated June 28, 1995*.)	Hanford Site workers did not move property to CRO controlled area prior to turn over.	DOE-RL agreement with the CRO included provisions for assuming control of property "in place" in contrast to provisions of the acquisition letter.	Failure to move property to a CRO controlled area allowed the accident to occur in a Federally controlled area. (BA-1)
Identify task-specific hazards. (Ref: Safety and Access Plan)	Task-specific hazards were not formally identified.	Safety and Access Plan required task-specific hazard identification, but it was not performed.	The lack of task-specific hazard identification resulted in a missed opportunity to identify and control hazards. (BA-2)
Use of footwear (29 CFR 1926)	AMTR employee wore inappropriate footwear.	Contribution of footwear to accident unknown.	Inappropriate footwear may have contributed to the worker's fall. (BA-3)
Heat stress program (OSHA General Duty Clause 5.a)	AMTR's informal program did not ensure that current environmental conditions, hydration, employee medical conditions, and recommendations for employee's rest regimen were considered in assigning work.	AMTR did not detect symptoms of heat stress displayed by the employee.	AMTR's informal heat stress program allowed worker to perform functions under increased physical stress. (BA-4)
Fitness for duty (OSHA General duty clause 5.b)	Worker failed to communicate medical conditions that would impact performance. AMTR owner demonstrated awareness of some of the employee's health issues and, at one point, placed restrictions on employee.	Worker wanted to keep working. AMTR management was aware of some, but not all, of employee's health concerns. Medical evaluation program was not required due to size of company.	The worker's failure to disclose medical conditions prevented his manager from compensating for them. (BA-5).

BARRIER ANALYSIS			
HAZARD		**TARGET**	
Access controls are used to assure appropriate safety orientation (Ref: HNF-PRO-412)	The repeated use of visitor badges did not ensure that AMTR received the intended level of training and orientation commensurate with their on site function. The badging process did not prevent AMTR from receiving the incorrect type of badge. The site access orientation and training are not intended to be task specific hazards analysis.	Implementing safety orientation through the badging process for visitors and workers was inappropriately applied. The Badging Office tries to accommodate Hosts by offering less than prescribed badging to allow visitors on site as a convenience.	The repeated use of visitor badges did not ensure that AMTR received the intended level of training and orientation commensurate with their on site function. (BA-6)
A host was assigned to Hanford Site visitors to assure safety, site access and other requirements were communicated and understood. (Ref: HNF-PRO-412)	The host assigned to AMTR did not assure proper orientation training was provided, coordinate with site forces, and obtain an appropriate type of site access badge.	The host believed AMTR had the knowledge, skills, and abilities to accomplish the work task. Formal procedures for the hosting process were not clear on how to assess and assure the proper site access badge and site orientation and training are selected. Formal procedures did not require the host to notify site forces of AMTR's site presence.	AMTR owner and employee did not receive the proper level of training and were not integrated into the work and not controlled. Worker control and awareness would have been improved; coordination with site forces may have improved communication on heat stress alerts to AMTR. (BA-7)

BARRIER ANALYSIS			
HAZARD		**TARGET**	
Site forces interface was used to improve safety awareness for environmental conditions. HNF-PRO-412 Fluor Hanford Asset Transition Desktop Procedure for Asset Transition to Tri-Cities Asset Reinvestment Co., LLC, Rev. 2.	Not used	Formal procedures for the host function were not clear for the host to notify nearby facilities of the presence of workers in their area of control. Visual or physical means (signs or maps) were not provided to assure personnel entering an area contact the site forces in control of the area. Informal desk instruction requiring notification to site forces was not used. AMTR's work activities were not integrated with planned work in the 200 East Area.	AMTR was in the Hanford 200 East Area without the knowledge of site forces, who had information related to Heat Stress Alerts published earlier in the day. Those alerts were not communicated to AMTR. (BA-8)
Perform pre-job safety meeting (ref safety plan , HNF-GD-14047)	No pre-job safety meeting was held. Host communication was informal.	Informal host communication included neither current environmental conditions nor work-related hazards.	Lack of a pre-job safety meeting allowed work to be performed without proper hazard identification and controls. (BA-9)

BARRIER ANALYSIS			
HAZARD		**TARGET**	
Use ladder properly: -Secure ladder properly -Angle of ladder - Three point contact - Carrying a load - Ladder labeling - Ladder training (29 CFR 1926.1053(b)), (29 CFR 1926.1060), WAC 296-155-480 (2)(v), WAC 296-155-480 (2)(1)(ii)	Top of ladder was unsecured. The board determined that the angle of the ladder was set at required four to one ratio. Three point contact was not maintained when using the ladder. Worker carried drill. The instruction label on the ladder was illegible. Unknown	It was not used. The ladder was positioned correctly. Worker used hands to carry the drill and screws. Unknown Label had faded and could not be read. No evidence of the worker having received ladder training.	Improper use of the ladder may have contributed to fall. (BA-10)
Stop Work Authority (Hanford Site employees) (HNF-PRO-3468, Rev. 2; TFC-ESHQ-S_SAF-C-04 rev b)	Site employees did not invoke stop work authority.	Site employees who may have recognized AMTR employee's condition/physical duress did not exercise stop work authority	Execution of Stop Work Authority would have prevented accident. (BA-11)

BARRIER ANALYSIS			
HAZARD		**TARGET**	
Procedural compliance is mandatory. Formal procedures were used to implement the core functions of Integrated Safety Management to accomplish the asset disposition program in a safe manner. {Ref Hanford Site Operations Task-Specific Safety and Site Assess Plan (short form)} Fluor Hanford Asset Transition Desktop Procedure for Asset Transition to Tri-Cities Asset Reinvestment Co., LLC, Rev. 2.	Safety and Access Plan was not fully complied with: - Pre-job safety meeting was not conducted with AMTR. - Task specific hazard analysis was not conducted. - Hanford Site Operations IS&H safety representative: • was not contacted • did not visit work site • did not participate in pre-job safety meeting • provided perfunctory approval.	Task specific hazard analysis and pre-job requirements of the Safety and Access Plan were not met. Hanford Site Operations IS&H safety representative did not take an active role. Roles and responsibilities for the Hanford Site Operations IS&H safety representative and FHI Hanford Site POC were not documented.	Failure to comply with the requirements in the Safety and Access Plan reduced assurance that all persons involved were aware of the physical and environmental hazards, and that all identified hazards were properly mitigated. (BA-12)
Procedures used to control the work process(s) were formal and controlled to assure risk is accepted at the proper level of management. {Ref Hanford Site Operations Task-Specific Safety and Site Assess Plan (short form)} Fluor Hanford Asset Transition Desktop Procedure for Asset Transition to Tri-Cities Asset Reinvestment Co., LLC, Rev. 2.	The Safety and Access Plan was an uncontrolled form. The Safety and Access Plan was changed without formal approval of management. Management was aware of the Safety and Access Plan form change and did not act to assure compensatory measures were in effect to protect workers (visitors – AMTR). The Safety and Access Plan was used "traditionally" without formal implementation and acceptance by management. Informal desktop procedures were used that failed to assure tenets of Integrated Safety Management were implemented.	Management allowed the use of informal procedure to establish and manage safety for work performed on site.	Failure to formalize the Safety and Access Plan removed the ability of management to identify and accept risk of "visitors" performing work on the Hanford Site. Unclear roles and responsibilities provided an opportunity for failure to implement requirements. (BA-13)

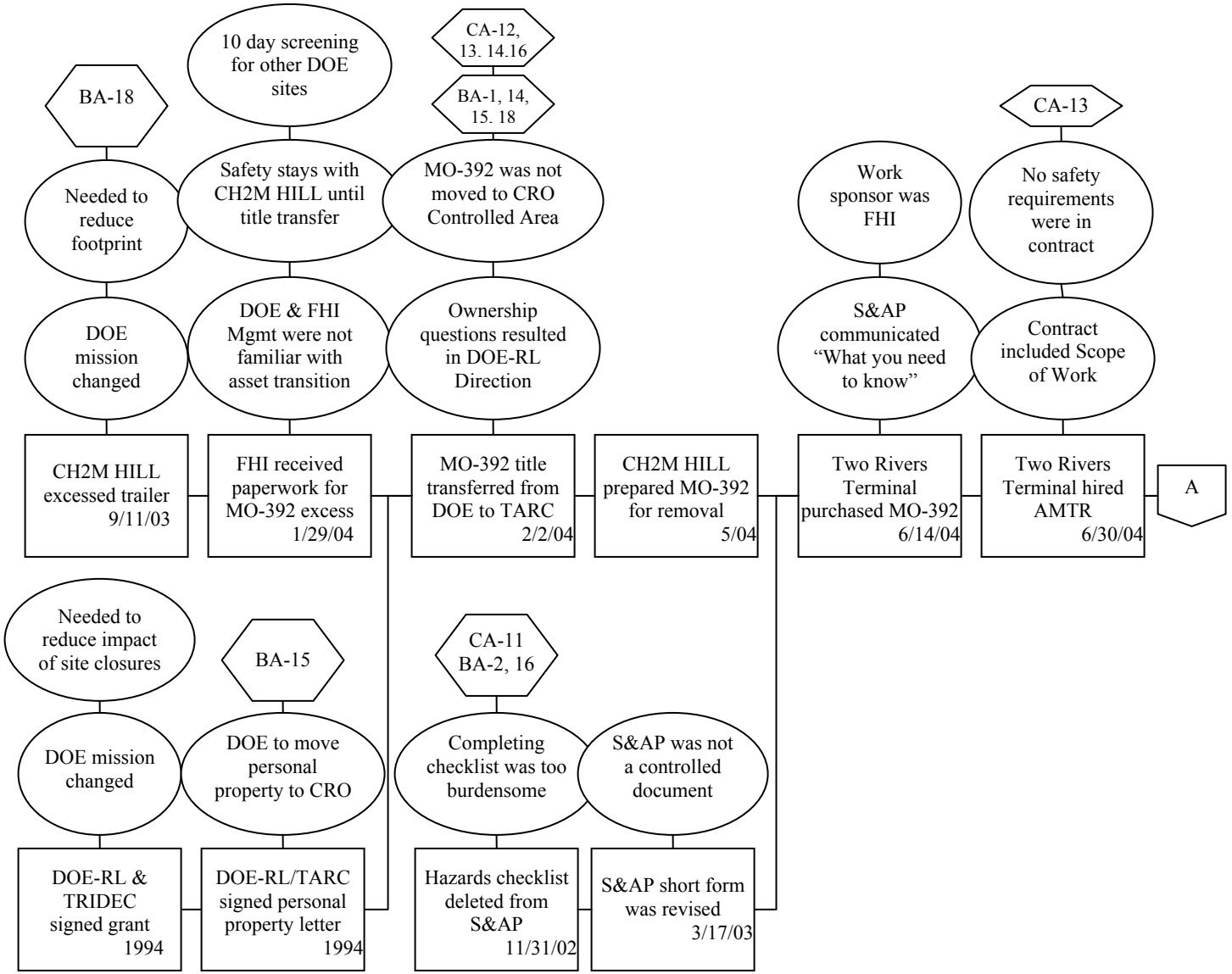
BARRIER ANALYSIS			
HAZARD		**TARGET**	
FHI procedures controlling asset disposition are formalized. (ref: HNF-PRO-144, Section 5.2)	FHI inconsistently applied requirements to arrange for transportation of property. The Asset Disposition program was not managed in a manner compliant to its procedures.	The FHI Hanford Site POC used an informal instruction to supplement formal procedures to accomplish excess property disposition. The formally established procedures did not ensure roles and responsibilities were clear and methods to excess personal property to TARC were understood by the FHI Hanford Site POC.	Failure of FHI to move the personal property to a CRO controlled location required Two Rivers Terminal to arrange for transport of non-government personal property off site. (BA-14)
DOE-RL Asset Disposition procedures provided appropriate controls on the disposition of excess personal property to the CRO in accordance with Acquisition Letter 95-06 and Personal Property Letter 970-1.	Formal procedures were neither in the RL Integrated Management System (RIMS) nor in organizational specific acquisition and asset management procedures.	DOE-RL management failed to comply with RIMS requirement to document all DOE-RL activities. Oversight of the RIMS process did not identify this omission.	DOE's use of uncontrolled processes provided no assurance that personal property be moved to the CRO without moving it to an area controlled by the CRO. (BA-15)
Integrated Safety Management is fully implemented to the activity level. Safety management systems provide a formal, organized process whereby people plan, perform, assess, and improve the safe conduct of work. (48 CFR 970.5223-1) DOE P 450.5, *Line Environment, Safety and Health Oversight*.	Tenets of Integrated Safety Management were not applied to non-government contractors performing non-government work on the Hanford Site.	DOE and FHI did not apply Integrated Safety Management to all work conducted on site, to protect the public, worker, and the environment.	The unstructured approach to managing hazards resulted in a missed opportunity to identify and implement controls to prevent the accident. (BA-16)
Oversight of non-government contractor work on site. DOE P 450.5, *Line Environment, Safety and Health Oversight*	No oversight activities covered access, documentation, or work processes for non-government contractor work.	Management failed to identify and include work performed by non-government contractors in oversight planning and execution.	Failure to include non-government contractor oversight presented a lost opportunity to assure the safe conduct of work. (BA-17)

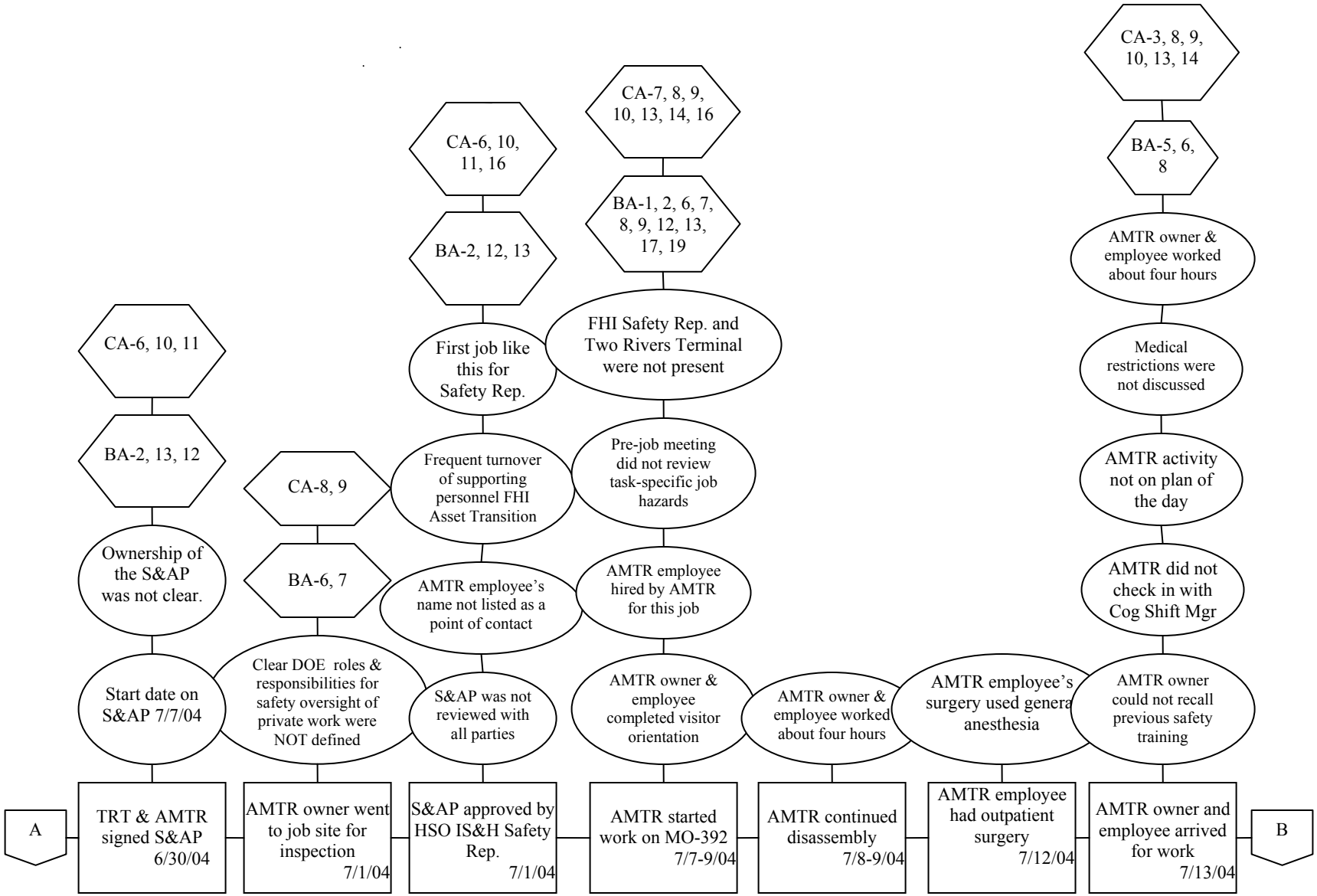
BARRIER ANALYSIS			
HAZARD		**TARGET**	
Systems and processes are in place to assure risk is managed and accepted by the appropriate level of management.	Management did not demonstrate a clear understanding of the procedures used in the asset disposition process. Management did not demonstrate a clear understanding of the agreements and processes used to transfer personal property to TARC, the CRO designated representative. DOE-RL and FHI management did not demonstrate an understanding of how their staff was accomplishing the personal property transfer.	DOE-RL and FHI management failed to assure processes, implementing requirements, were documented and followed. DOE-RL and FHI management assumed tasks were completed in a compliant, satisfactory, and appropriate manner. Roles and responsibilities were not clearly defined or understood.	Management at all levels informally authorized the excess in place approach to accomplish personal property disposal. The use of informal procedures did not assure management was aware of and accepted the risk to excess in place in this instance. (BA-18)

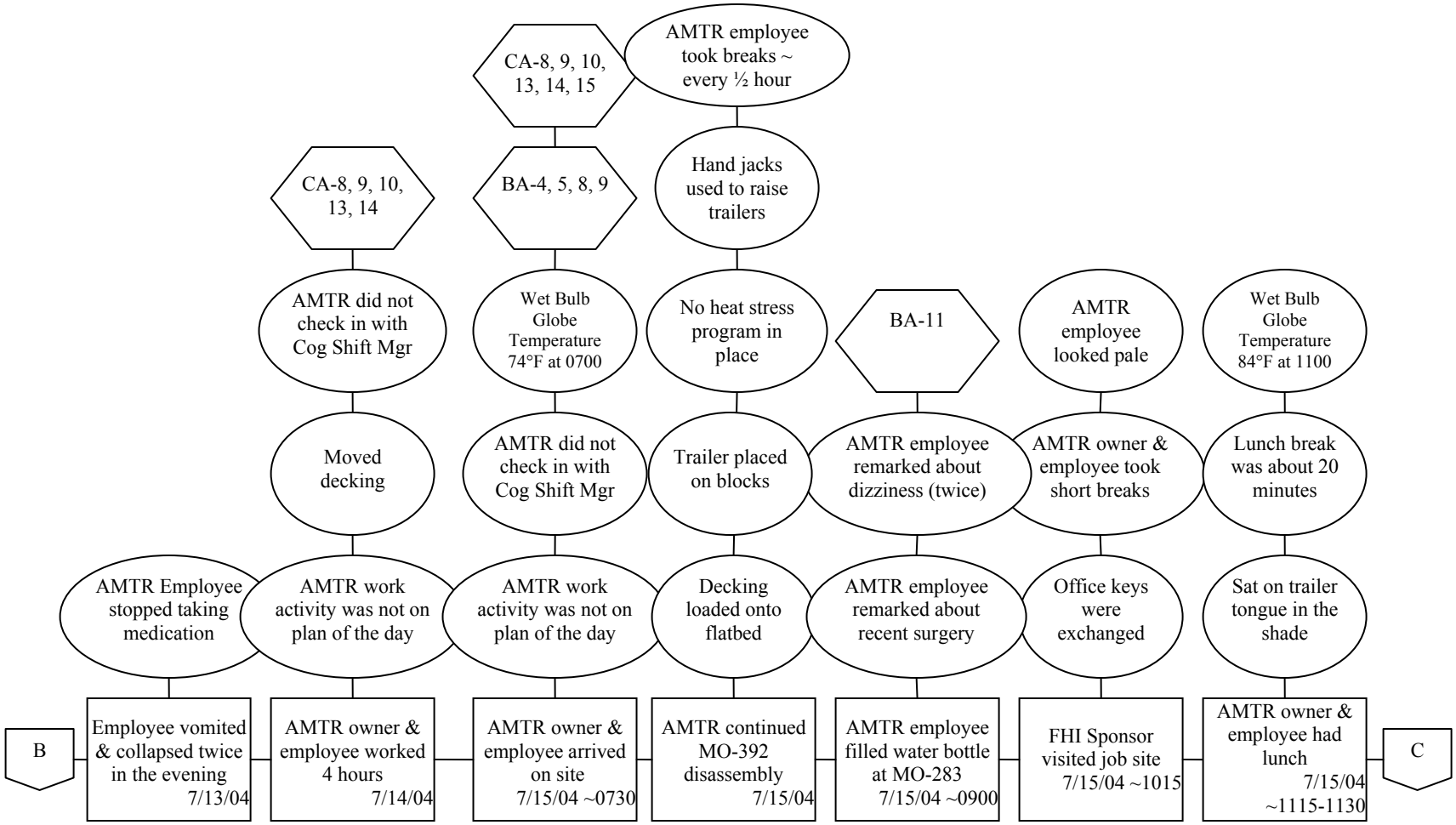
Change Analysis Worksheet			
Accident Situation	**Prior, Ideal, or Accident-Free Situation**	**Difference**	**Evaluation of Effect**
The worker used a ladder to reach the screws in the trim.	In an ideal situation, a man lift is used in place of the ladder.	A man lift provides protection from a fall from heights and a work platform.	Use of a man lift would have mitigated the consequences of a fall. Use of a man lift eliminates the need for three point contact ladder usage requirement while carrying tools. (CA-1)
The worker performed tasks alone, on a ladder.	A helper is stationed at the base of the ladder to assist with work tasks.	A helper could manage equipment and hardware, and stabilize the ladder. A helper might recognize symptoms of physical duress in the worker. A helper could make a timely call for help or administration of first aid or CPR.	Worker would have three point contact when ascending and descending ladder. The helper increases stability of the ladder. Helper prevents or mitigates fall by recognizing physical duress. Helper provides resuscitation. (CA-2)
The worker did not inform his employer of medical conditions that could affect his ability to work safely.	All workers report medical conditions that could affect their ability to work safely.	The employer was aware of limitations of employee.	Employer modifies or restricts work assignments to accommodate the worker's medical condition. (CA-3)
The worker did not use a tool belt.	The worker used a tool belt.	The worker's hands are free to ascend and descend ladder, maintaining.	The worker used three point contact, lessening the potential for a fall. (CA-4)
The instruction labels on the ladder were illegible.	The instruction labels on the ladder are legible and the worker reads them and complies.	Legible labels provide the worker with instructions for the correct setup and use of the ladder.	The ladder is setup properly and used in accordance with instructions. (CA-5)
No task specific hazard analysis was conducted by the Hanford Site Operations IS&H safety representative and AMTR.	Task specific hazard analysis is performed with assistance from Hanford Site Operations IS&H safety representative and documented in the Safety and Access Plan.	Task specific hazards and controls are identified.	The appropriate controls and safety awareness for the task were established and documented. (CA-6)
No pre-job safety meeting was conducted with the Hanford Site Operations IS&H safety representative; task specific hazards or controls were not reviewed.	The Hanford Site Operations IS&H safety representative participates in the pre-job safety meeting. A pre-job safety meeting includes a discussion of task specific hazards and controls with the	The inclusion of appropriate staff provides competence commensurate with responsibilities for identification of hazards. Task specific hazards are reviewed and appropriate controls established.	A competent pre-job safety meeting provides increased assurance of workers' awareness of hazards while performing work. (CA-7)

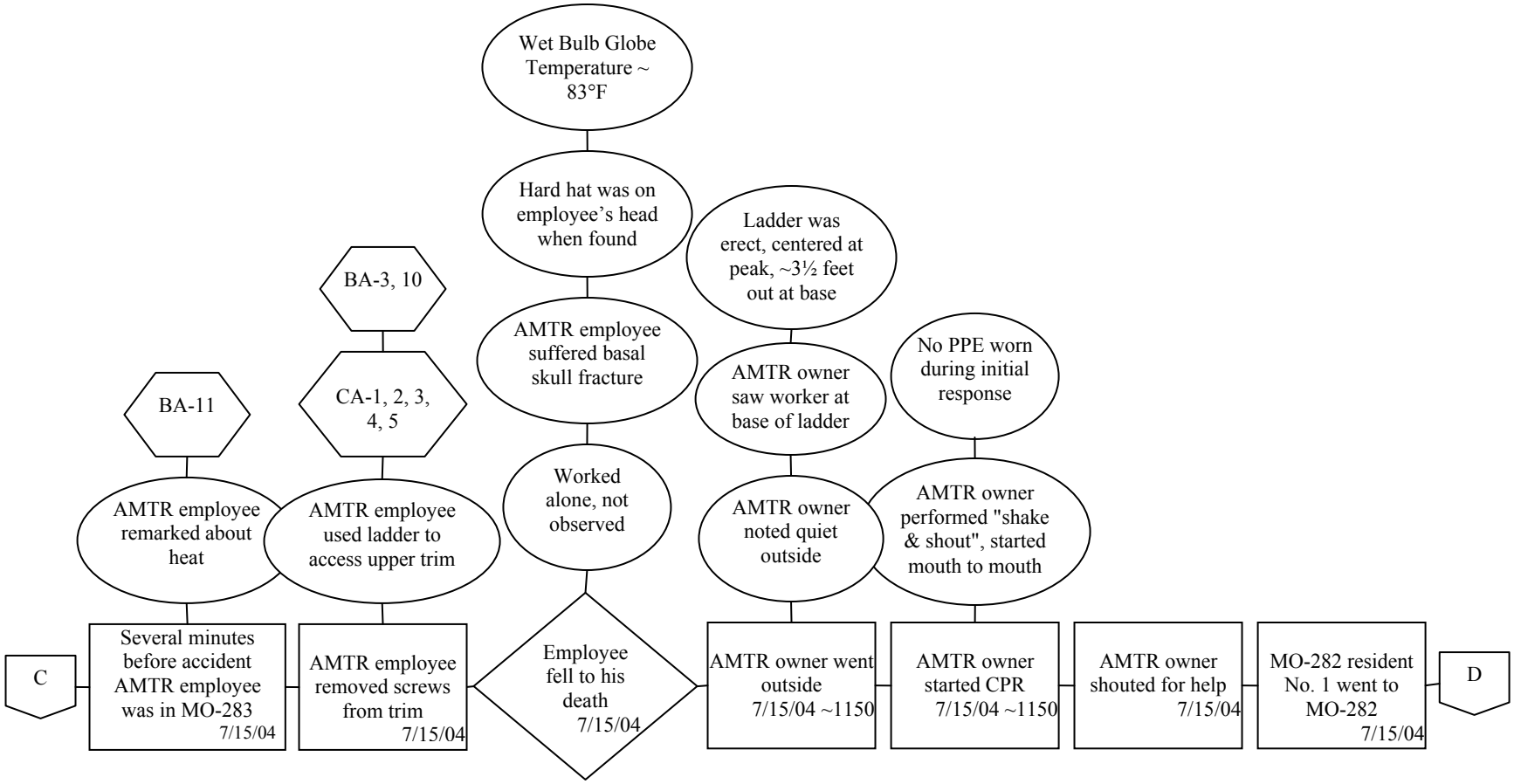
Change Analysis Worksheet			
Accident Situation	**Prior, Ideal, or Accident-Free Situation**	**Difference**	**Evaluation of Effect**
	appropriate personnel.		
The Shift Operations Manager was not aware of the activities associated with this job.	The host coordinates with the Shift Operations Manager and AMTR reports daily to shift operation manager.	The Shift Operations Manager is aware of work activities and potential impacts. AMTR is made aware of area safety, operational, and environmental concerns.	Shift Operations Manager coordinates safety, operational, and environmental impacts with AMTR. Shift Operations Manager is aware of AMTR's presence and therefore is able to coordinate safety, operational, and environmental impacts with AMTR. (CA-8)
Personnel involved in the work activity could not easily identify which site forces had operational control over the area of the job.	A mechanism exists for personnel to determine which site forces have operational control over the work site.	Personnel conducting work on site would know who has operational control over their work area.	Personnel are able to easily identify and check in with site forces having operational control of the area. (CA-9)
Completion of Safety and Access Plans for non-government contractors is a matter of routine with little analysis of hazards.	Safety and Access Plans for non-government contractors are completed with the same rigor as those for on site contractors.	The rigor of specific, real-time assessment of hazards provides greater awareness of potential risk and provides a mechanism for communicating lessons learned.	Non-government contractor's safety plans receive the benefit of site experience in hazards management and lessons learned. (CA-10)
The Safety and Access Plan was modified in response to customer input and the revised form did not contain a specific hazards checklist.	A prior version of the Safety and Access Plan contained a hazards checklist.	The hazards checklist facilitated identifying controls for safe work.	Checklist aids the contractor in identifying and analyzing hazards. (CA-11)
Tenets of Integrated Safety Management were not applied to the conduct of this work activity.	Integrated Safety Management is applied to all work on site.	The use of Integrated Safety Management formalizes the approach to work resulting in controls appropriate for the hazards associated with the work activity.	Integrated Safety Management systems provide a formal, organized process whereby people plan, perform, assess, and improve the safe conduct of work. (CA-12)
Requirements to implement Integrated Safety Management were not included in contract or agreement to non-government contractors conducting work on	Requirements of Integrated Safety Management are formally applied to all contractors working on site.	All contractors working on the Hanford Site implement Integrated Safety Management whether through contract or agreement including all subsidiary arrangements.	Integrated Safety Management is the standard by which all contractors perform work safely. (CA-13)

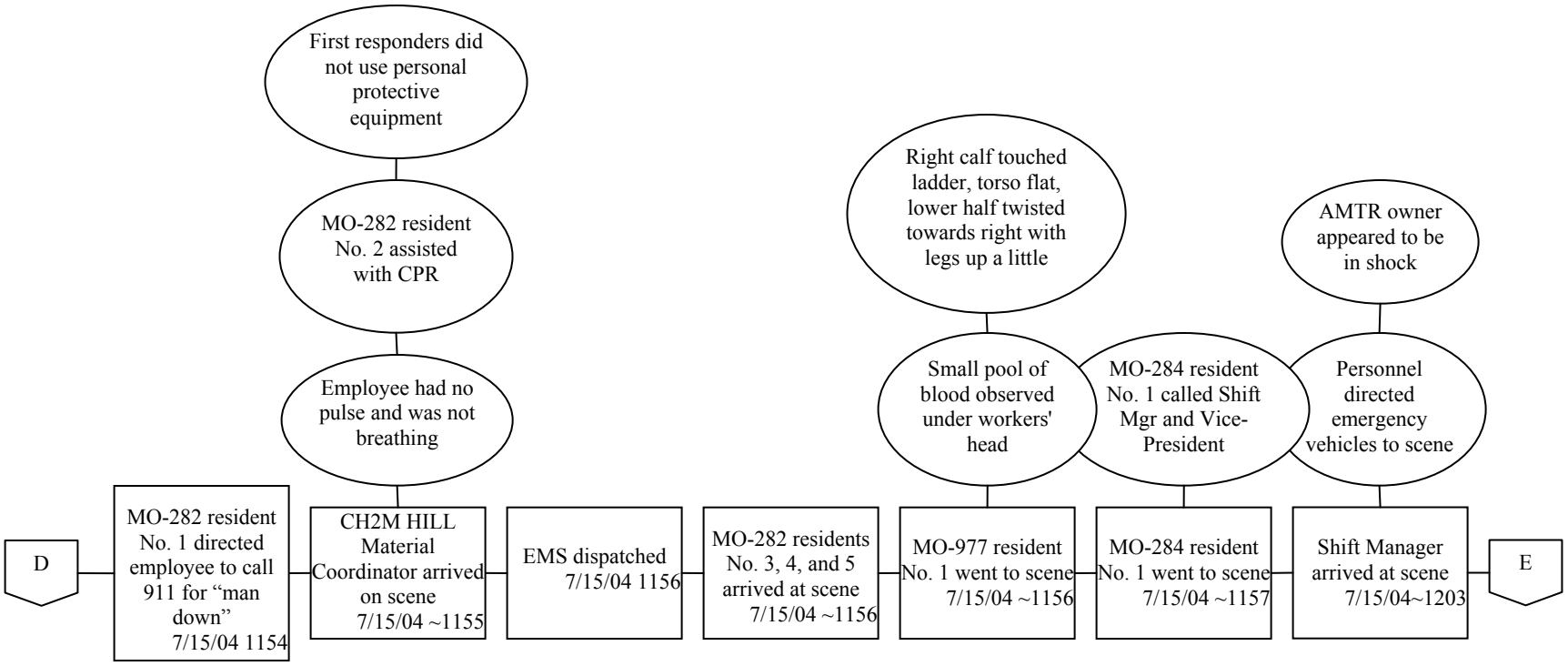
Change Analysis Worksheet			
Accident Situation	**Prior, Ideal, or Accident-Free Situation**	**Difference**	**Evaluation of Effect**
site.			
Property was not removed to CRO controlled area.	Property is delivered to a CRO controlled area.	AMTR would not have been on federally controlled property.	If property had been transferred to the CRO controlled area, the accident would not have occurred on federally controlled property. (CA-14)
AMTR applied an informal heat stress program.	A structured heat stress program, based on accepted industry practice, is used.	A structured heat stress program ensures that current environmental conditions, hydration, employee medical conditions, and recommendations for worker rest regimen were considered in assigning work.	The work activities are controlled and personnel monitored to minimize heat stress. (CA-15)
The workforce of DOE-RL and FHI was undergoing frequent change. FHI Asset Control was reorganized seven times in four years, reducing numbers of personnel and combining work tasks. DOE Assistant Managers were in acting roles for short periods of time (< ten months).	The federal and contractor work force is stable. Personnel have a good understanding of their roles and responsibilities, and authorities and limitations.	Roles and responsibilities are clear and understood during times of change to assure risk is managed properly.	Roles and responsibilities are documented, clear, and understood. Workers conduct activities within the defined scope of formally documented processes and procedures. (CA-16)

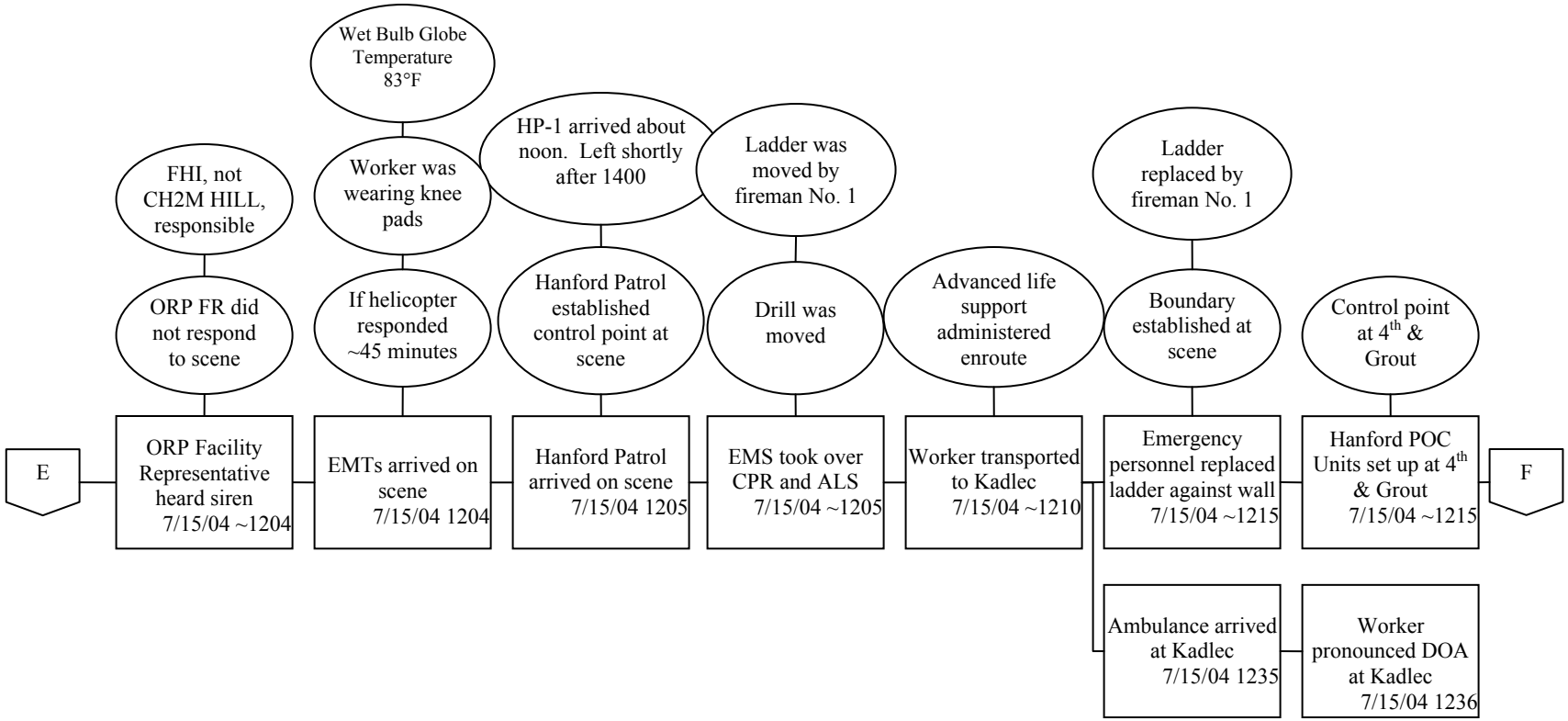

10 day screening for other DOE sites
CA-12, 13. 14.16
BA-1, 14, 15. 18
BA-18
CA-13
Needed to reduce footprint
Safety stays with CH2M HILL until title transfer
MO-392 was not moved to CRO Controlled Area
Work sponsor was FHI
No safety requirements were in contract
DOE mission changed
DOE & FHI Mgmt were not familiar with asset transition
Ownership questions resulted in DOE-RL Direction
S&AP communicated "What you need to know"
Contract included Scope of Work
CH2M HILL excessed trailer 9/11/03
FHI received paperwork for MO-392 excess 1/29/04
MO-392 title transferred from DOE to TARC 2/2/04
CH2M HILL prepared MO-392 for removal 5/04
Two Rivers Terminal purchased MO-392 6/14/04
Two Rivers Terminal hired AMTR 6/30/04
A
Needed to reduce impact of site closures
BA-15
CA-11 BA-2, 16
DOE mission changed
DOE to move personal property to CRO
Completing checklist was too burdensome
S&AP was not a controlled document
DOE-RL & TRIDEC signed grant 1994
DOE-RL/TARC signed personal property letter 1994
Hazards checklist deleted from S&AP 11/31/02
S&AP short form was revised 3/17/03

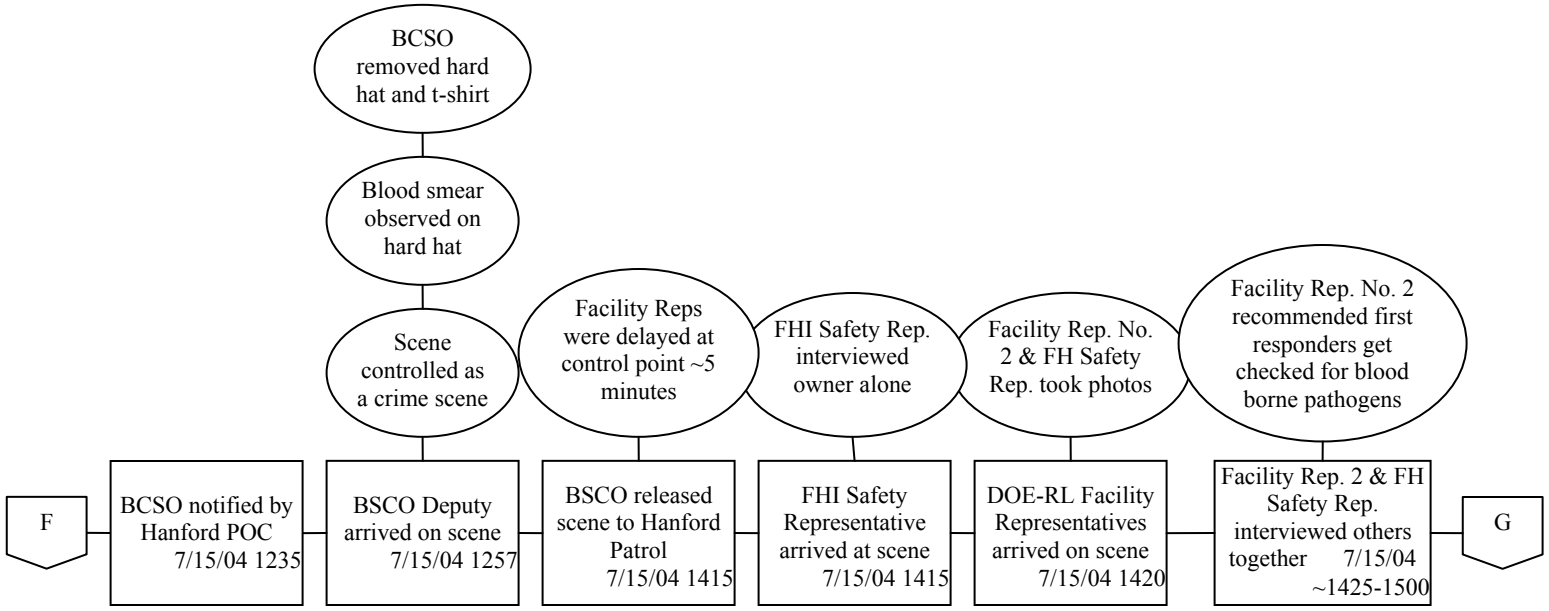

CA-3, 8, 9, 10, 13, 14
BA-5, 6, 8
AMTR owner & employee worked about four hours
Medical restrictions were not discussed
AMTR activity not on plan of the day
AMTR did not check in with Cog Shift Mgr
AMTR owner could not recall previous safety training
CA-7, 8, 9, 10, 13, 14, 16
BA-1, 2, 6, 7, 8, 9, 12, 13, 17, 19
FHI Safety Rep. and Two Rivers Terminal were not present
Pre-job meeting did not review task-specific job hazards
AMTR employee hired by AMTR for this job
AMTR owner & employee completed visitor orientation
AMTR owner & employee worked about four hours
AMTR employee's surgery used genera anesthesia
CA-6, 10, 11, 16
BA-2, 12, 13
First job like this for Safety Rep.
Frequent turnover of supporting personnel FHI Asset Transition
AMTR employee's name not listed as a point of contact
S&AP was not reviewed with all parties
CA-8, 9
BA-6, 7
Clear DOE roles & responsibilities for safety oversight of private work were NOT defined
CA-6, 10, 11
BA-2, 13, 12
Ownership of the S&AP was not clear.
Start date on S&AP 7/7/04
A
TRT & AMTR signed S&AP 6/30/04
AMTR owner went to job site for inspection 7/1/04
S&AP approved by HSO IS&H Safety Rep. 7/1/04
AMTR started work on MO-392 7/7-9/04
AMTR continued disassembly 7/8-9/04
AMTR employee had outpatient surgery 7/12/04
AMTR owner and employee arrived for work 7/13/04
B


CA-8, 9, 10, 13, 14, 15
AMTR employee took breaks ~ every ½ hour
CA-8, 9, 10, 13, 14
BA-4, 5, 8, 9
Hand jacks used to raise trailers
AMTR did not check in with Cog Shift Mgr
Wet Bulb Globe Temperature 74°F at 0700
No heat stress program in place
BA-11
AMTR employee looked pale
Wet Bulb Globe Temperature 84°F at 1100
Moved decking
AMTR did not check in with Cog Shift Mgr
Trailer placed on blocks
AMTR employee remarked about dizziness (twice)
AMTR owner & employee took short breaks
Lunch break was about 20 minutes
AMTR Employee stopped taking medication
AMTR work activity was not on plan of the day
AMTR work activity was not on plan of the day
Decking loaded onto flatbed
AMTR employee remarked about recent surgery
Office keys were exchanged
Sat on trailer tongue in the shade
B
Employee vomited & collapsed twice in the evening 7/13/04
AMTR owner & employee worked 4 hours 7/14/04
AMTR owner & employee arrived on site 7/15/04 ~0730
AMTR continued MO-392 disassembly 7/15/04
AMTR employee filled water bottle at MO-283 7/15/04 ~0900
FHI Sponsor visited job site 7/15/04 ~1015
AMTR owner & employee had lunch 7/15/04 ~1115-1130
C


Wet Bulb Globe Temperature ~ 83°F
Hard hat was on employee's head when found
Ladder was erect, centered at peak, ~3½ feet out at base
BA-3, 10
AMTR employee suffered basal skull fracture
No PPE worn during initial response
BA-11
CA-1, 2, 3, 4, 5
AMTR owner saw worker at base of ladder
Worked alone, not observed
AMTR employee remarked about heat
AMTR employee used ladder to access upper trim
AMTR owner noted quiet outside
AMTR owner performed "shake & shout", started mouth to mouth
C
Several minutes before accident AMTR employee was in MO-283 7/15/04
AMTR employee removed screws from trim 7/15/04
Employee fell to his death 7/15/04
AMTR owner went outside 7/15/04 ~1150
AMTR owner started CPR 7/15/04 ~1150
AMTR owner shouted for help 7/15/04
MO-282 resident No. 1 went to MO-282 7/15/04
D


First responders did not use personal protective equipment
MO-282 resident No. 2 assisted with CPR
Employee had no pulse and was not breathing
Right calf touched ladder, torso flat, lower half twisted towards right with legs up a little
AMTR owner appeared to be in shock
Small pool of blood observed under workers' head
MO-284 resident No. 1 called Shift Mgr and Vice-President
Personnel directed emergency vehicles to scene
D
MO-282 resident No. 1 directed employee to call 911 for "man down" 7/15/04 1154
CH2M HILL Material Coordinator arrived on scene 7/15/04 ~1155
EMS dispatched 7/15/04 1156
MO-282 residents No. 3, 4, and 5 arrived at scene 7/15/04 ~1156
MO-977 resident No. 1 went to scene 7/15/04 ~1156
MO-284 resident No. 1 went to scene 7/15/04 ~1157
Shift Manager arrived at scene 7/15/04~1203
E


Wet Bulb Globe Temperature 83°F
FHI, not CH2M HILL, responsible
Worker was wearing knee pads
HP-1 arrived about noon. Left shortly after 1400
Ladder was moved by fireman No. 1
Ladder replaced by fireman No. 1
ORP FR did not respond to scene
If helicopter responded ~45 minutes
Hanford Patrol established control point at scene
Drill was moved
Advanced life support administered enroute
Boundary established at scene
Control point at 4th & Grout
E
ORP Facility Representative heard siren 7/15/04 ~1204
EMTs arrived on scene 7/15/04 1204
Hanford Patrol arrived on scene 7/15/04 1205
EMS took over CPR and ALS 7/15/04 ~1205
Worker transported to Kadlec 7/15/04 ~1210
Emergency personnel replaced ladder against wall 7/15/04 ~1215
Hanford POC Units set up at 4th & Grout 7/15/04 ~1215
F
Ambulance arrived at Kadlec 7/15/04 1235
Worker pronounced DOA at Kadlec 7/15/04 1236


BCSO removed hard hat and t-shirt
Blood smear observed on hard hat
Scene controlled as a crime scene
Facility Reps were delayed at control point ~5 minutes
FHI Safety Rep. interviewed owner alone
Facility Rep. No. 2 & FH Safety Rep. took photos
Facility Rep. No. 2 recommended first responders get checked for blood borne pathogens
F
BCSO notified by Hanford POC 7/15/04 1235
BSCO Deputy arrived on scene 7/15/04 1257
BSCO released scene to Hanford Patrol 7/15/04 1415
FHI Safety Representative arrived at scene 7/15/04 1415
DOE-RL Facility Representatives arrived on scene 7/15/04 1420
Facility Rep. 2 & FH Safety Rep. interviewed others together 7/15/04 ~1425-1500
G

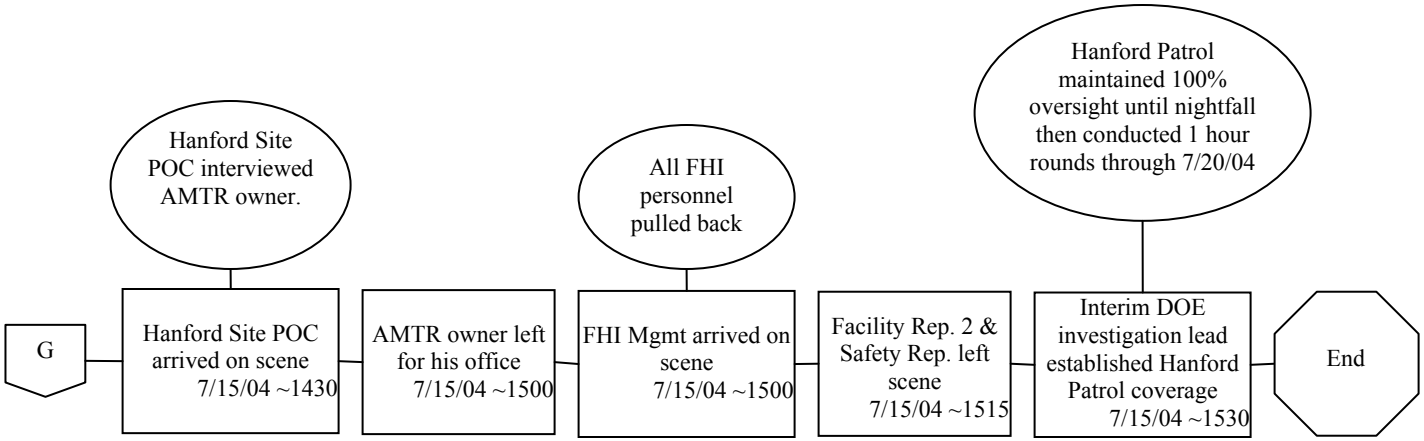

Hanford Patrol maintained 100% oversight until nightfall then conducted 1 hour rounds through 7/20/04
Hanford Site POC interviewed AMTR owner.
All FHI personnel pulled back
G
Hanford Site POC arrived on scene 7/15/04 ~1430
AMTR owner left for his office 7/15/04 ~1500
FHI Mgmt arrived on scene 7/15/04 ~1500
Facility Rep. 2 & Safety Rep. left scene 7/15/04 ~1515
Interim DOE investigation lead established Hanford Patrol coverage 7/15/04 ~1530
End

Exhibit F-1 Accident Event Chronology

Date	Time	Event
September 2003	Unavailable	CH2M HILL Hanford Group excessed MO-392.
December 29, 2003	Unavailable	FHI received documentation for MO-392 from CH2M HILL.
February 2, 2004	Unavailable	MO-392 title was transferred from DOE to TARC.
May 4, 2004	Unavailable	CH2M HILL prepared MO-392 for removal.
June 14, 2004	Unavailable	Two Rivers Terminal purchased MO-392.
June 30, 2004	Unavailable	Two Rivers Terminal hired AMTR.
June 30, 2004	Unavailable	Two Rivers Terminal and AMTR signed the Hanford Site Operations Task-Specific Safety and Site Access Plan (Short Form).
July 1, 2004	Unavailable	AMTR owner went to job site for inspection.
July 1, 2004	Unavailable	Hanford Site Operations IS&H safety representative signed the Hanford Site Operations Task-Specific Safety and Site Access Plan (Short Form).
July 7, 2004	Unavailable	AMTR owner and employee received visitor orientation pamphlet at Central Badging and received visitor badges valid through July 9, 2004.
July 7, 2004	Unavailable	AMTR started work on MO-392. Worked four hours.
July 8, 2004	Unavailable	AMTR owner and employee worked four hours.
July 9, 2004	Unavailable	AMTR owner and employee worked four hours.
July 12, 2004	Unavailable	AMTR employee underwent exploratory surgery.
July 13, 2004	Unavailable	AMTR owner and employee received visitor badges at Central Badging valid through July 15, 2004.
July 13, 2004	Unavailable	AMTR owner and employee worked approximately four hours on MO-392.
July 13, 2004	Evening	AMTR employee vomited once, collapsed twice, at home, after work.
July 14, 2004	Unavailable	AMTR owner and employee worked approximately four hours on MO-392.
July 15, 2004	~ 0730	AMTR owner and employee arrived on site.
July 15, 2004	Unavailable	AMTR owner and employee placed wood blocks under MO-392 using hand jacks and moved wood decking materials onto a trailer.
July 15, 2004	~ 0900	AMTR employee filled water bottle at MO-283 and complained of dizziness.

Date	Time	Event
July 15, 2004	~ 1015	FHI sponsor visited the job site.
July 15, 2004	~ 1115 – 1135	AMTR owner and employee had lunch outside MO-392.
July 15, 2004	~ 1140	AMTR employee filled water bottle at MO-283 and discussed heat with mobile office resident.
July 15, 2004	~ 1145	AMTR employee removed screws from trim.
July 15, 2004	~ 1145	AMTR employee fell to his death.
July 15, 2004	~ 1150	AMTR owner went outside to check on employee and discovered him on the ground.
July 15, 2004	~ 1150	AMTR owner started CPR on employee.
July 15, 2004	~ 1152	AMTR owner asked MO-282 resident No. 1 to make 911 call.
July 15, 2004	1154	MO-282 resident No. 1 called 911.
July 15, 2004	~ 1155	MO-282 resident No. 2 arrived on scene and resumed CPR.
July 15, 2004	1156	Emergency medical services were dispatched.
July 15, 2004	~ 1200	CH2M HILL Radiological Control Manager called Shift Operations Office.
July 15, 2004	1204	Hanford Fire Department Emergency Medical Technicians arrived on scene.
July 15, 2004	1205	Hanford Patrol officers arrived on scene.
July 15, 2004	~ 1205	Hanford Fire Department Emergency Medical Technician No. 1 took over CPR.
July 15, 2004	~ 1205	Hanford Fire Department Fireman No. 1 moved ladder from wall.
July 15, 2004	1210	AMTR employee was transported to Kadlec Medical Center.
July 15, 2004	~ 1215	Hanford Fire Department Fireman No. 1 put ladder back against wall.
July 15, 2004	1235	Ambulance arrived at Kadlec Medical Center.
July 15, 2004	1236	AMTR employee was pronounced dead on arrival at Kadlec Medical Center.
July 15, 2004	1257	Benton County Sheriff Deputy arrived at scene and took over control of the scene.
July 15, 2004	~ 1410	Benton County Sheriff Deputy completed investigation and returned control of the scene to Hanford Patrol.
July 15, 2004	~ 1410	Benton County Sheriff Deputy removed evidence and left the scene.
July 15, 2004	~ 1530	The interim accident investigation chairperson established Hanford Patrol scene control requirement coverage.

Exhibit F-2, Safety and Access Plan (Short Form)

Hanford Site Operations Task-Specific Safety and Site Access Plan (Short Form)

This task-specific safety and site access plan provides safety-related requirements and site access information and requirements specific to the scope of work and Hanford Site work location(s) described herein. General requirements contained in the owner's/contractor's safety procedures (as applicable), 29 CFR 1910, 29 CFR 1926, the Washington Administrative Code (WAC), and/or the provisions of this plan shall be adhered to except where otherwise directed in this plan.

This plan is to be completed and submitted by the owner/contractor. The Hanford Site Operations (HSO) Industrial Safety and Health (IS&H) organization will review the plan and approve it, with or without additional requirements. The owner/contractor is required to accept the plan as approved prior to commencement of work. Submittal of proposed plans and all other contact with Hanford Site personnel/organizations shall be through (or as directed by) the Hanford Site Point of Contact (HSPOC) designated below. Proposed plans should be submitted to the HSPOC at least one week prior to owner/contractor desired work commencement date. If owner/contractor have other documentation that they would like to submit in lieu of all or part of this plan, the HSPOC should be contacted. A pre-job safety meeting will be held at the work location prior to the commencement of work to ensure all persons involved are thoroughly familiar with the elements of this plan.

In this plan, Owner is defined as the owner of record of material/equipment to be removed from the Hanford Site, and Contractor is defined as any contractor(s) the owner has hired to perform any part of such removal.

OWNER/CONTRACTOR PROVIDED INSURANCE

The owner/contractor must provide proof of insurance policies in the amount of $1,000,000 commercial general liability and vehicle liability prior to commencement of work. The HSPOC may grant a waiver of the amount or the necessity of insurance coverage if a timely request is made prior to desired date of access.

POINTS OF CONTACT

Person or Company Name	Point of Contact (Person)	Phone #
Owner:		
Contractor(s):		
Hanford Site Point of Contact		

LOCATION AND DESCRIPTION OF WORK ACTIVITIES:

Work Start Date:	Work End Date:

HAZARD CONTROL MEASURES

The HSO IS&H safety representatives listed below will help owner/contractor assess potential hazards, impacts, and requirements prior to submittal of this plan. Contact with the safety representatives should be made through the HSPOC unless otherwise directed. All injuries shall be reported to HSO IS&H at 376-3297 or 521-6870.

Hanford Site Operations Task-Specific Safety and Site Access Plan (Short Form)

BADGING/SECURITY REQUIREMENTS
Most sections of the Hanford Site require visitors to obtain a security badge prior to access. To obtain a temporary security badge (up to seven days), the applicant must be a U.S. citizen and at least 18 years of age. To apply for a security badge, applicants should submit their name (as it appears on the picture ID that will be used when picking up the badge) and date of birth to the HSPOC at least two working days prior to required access. Badges are to be picked up at the security location specified by the HSPOC. A valid picture ID with date of birth (driver's license, passport, etc.) will be required to obtain the badge.

WORK AREA HOUSEKEEPING
Upon completion of the work scope, the owner/contractor shall leave the work area in a clean, neat condition.

WORKING HOURS
Advance approval by the HSPOC is required any time the owner/contractor desires to perform work on other than regular day shift.

EMERGENCY ACTION AND RESPONSE
If an emergency situation develops which requires evacuation of the work area, steps must be taken to ensure the safety of the workers. These steps will be described at the pre-job safety meeting, as well as any required response to scheduled Hanford Site practice drills or alarms. Fire and emergency services may be contacted by dialing 911 (if cellular phone, ask for Hanford), or by dialing 373-3800.

APPROVAL
This task-specific Safety Plan has been reviewed and accepted (as amended, if applicable) for work on the Hanford Site by HSO IS&H.

Safety Representative	Signature	Date

ADDITIONAL REQUIREMENTS
Any additional permits, certifications, training, documentation, etc., required by the safety representative as conditions of approving this safety plan are attached. Any and all requirements must be satisfied prior to the commencement of work.

ACCEPTANCE
I hereby confirm that the information above is true and correct and agree to abide by the requirements of this Plan as approved.

Owner/Contractor Representative Name and Title	Signature	Date

Exhibit F-3, OSHA Section 1926.1060

Section 1926.1060
Training Requirements

(a) The employer shall provide a training program for each employee using ladders and stairways, as necessary. The program shall enable each employee to recognize hazards related to ladders and stairways, and shall train each employee in the procedures to be followed to minimize these hazards.

(1) The employer shall ensure that each employee has been trained by a competent person in the following areas, as applicable:
(i) The nature of fall hazards in the work area;
(ii) The correct procedures for erecting, maintaining, and disassembling the fall protection systems to be used.
(iii) The proper construction, use, placement, and care in handling of all stairways and ladders;
(iv) The maximum intended load-carrying capacities of ladders; and
(v) The standards contained in this subpart.

Exhibit F-4, Safety and Access Form (long form)

Hanford Site Operations Task-Specific Safety and Site Access Plan

This task-specific safety and site access plan provides safety-related requirements and site access information and requirements specific to the scope of work and Hanford Site work location(s) described herein. General requirements contained in the owner's/contractor's safety procedures (as applicable), 29 CFR 1910, 29 CFR 1926, the Washington Administrative Code (WAC), and/or the provisions of this plan shall be adhered to except where otherwise directed in this plan.

This plan is to be completed and submitted by the owner/contractor. The Hanford Site Operations (HSO) Industrial Safety and Health (IS&H) organization will review the plan and approve it, with or without additional requirements. The owner/contractor is required to accept the plan as approved prior to commencement of work. Submittal of proposed plans and all other contact with Hanford Site personnel/organizations shall be through (or as directed by) the Hanford Site Point of Contact (HSPOC) designated below. Proposed plans should be submitted to the HSPOC at least one week prior to owner/contractor desired work commencement date. Any significant changes to an approved plan shall be documented and the amended plan resubmitted to HSO IS&H for approval, or approved in the field, at the discretion of HSO IS&H. If owner/contractor have other documentation that they would like to submit in lieu of all or part of this plan, the HSPOC should be contacted. A pre-job safety meeting will be held at the work location prior to the commencement of work to ensure all persons involved are thoroughly familiar with the elements of this plan.

In this plan, Owner is defined as the owner of record of material/equipment to be removed from the Hanford Site, and Contractor is defined as any contractor(s) the owner has hired to perform any part of such removal.

COMPANY INFORMATION

Name	Point of Contact	Phone #
Owner:		
Contractor(s):		

COGNIZANT PERSONNEL

Owner/Contractor	Phone #
Job Foreman:	
Other:	
Hanford Site	**Phone #**
Point of Contact: **Susan Raymond**	376-7064, 521-1444 cell

SCOPE OF WORK

Breakdown and description of work activities:

Work Start Date:	Work End Date:

Hanford Site Operations Task-Specific Safety and Site Access Plan

LOCATION
Identify work location(s) on Hanford Site:

HAZARD CONTROL MEASURES
Owner/contractor shall identify potential hazards associated with activities required in the performance of this scope of work and will also specify preventive measures that will be utilized to mitigate those potential hazards (i.e. safe work practices and control measures). The Known or Potential Hazards/Impacts checklist below (or acceptable substitute documentation) is to be completed to satisfy this requirement. An Activity Hazard Analysis (AHA) showing a number of common activities, their potential hazards, and their respective preventive measures has been provided (Attachment I) for use as a guide in completing the checklist. All injuries shall be reported to HSO Industrial Safety and Health at 376-3297 or 521-6870.

KNOWN OR POTENTIAL HAZARDS/IMPACTS			
Activity or Condition	Y	N	**Preventive Measures** (Use additional sheets if necessary)
1. Confined Space Entry			
2. Cutting/Welding			
3. Roof Work			
4. Fall Hazard (elevated surface)			
5. Excavation/Trenching (any mechanical or hand excavation)			
6. Environmental Impact			
7. Hazardous Materials or Chemical Products			
8. Respiratory Hazards			
9. Electrical Hazards			
10. Lock and Tag			
11. Scaffolding			
12. Aerial lifts			
13. Asbestos handling			
14. Lead handling			
15. Temperature extremes			

KNOWN OR POTENTIAL HAZARDS/IMPACTS			
Activity or Condition	**Y**	**N**	**Preventive Measures** (Use additional sheets if necessary)
16. Noise			
17. Insufficient Lighting			
18. Animals/Insects			
19. Dust			
20. Flammable/Combustible Materials			
21. Ladders			
22. Wet/Slippery Floors or Surfaces			
23. Uneven Terrain			
24. Adjacent Water Hazard			
25. Vehicle Traffic			
26. Forklift Operation			
27. Heavy Equipment			
28. Hoisting/Rigging Operation			
29. Manual Lifting			
30. Power Tools			
31. Pinch Points			
32. Falling Objects			
33. Sharp Objects			
34. Oversize (Over 8'6" wide or 14' high) and Overweight Loads			
35. Overhead Obstructions			
36. Site Control (Signs, Barricades, Road Closures, Etc.)			
37. Remote Work Area			

KNOWN OR POTENTIAL HAZARDS/IMPACTS			
Activity or Condition	**Y**	**N**	**Preventive Measures** (Use additional sheets if necessary)
38. Other			

BADGING/SECURITY REQUIREMENTS

Most sections of the Hanford Site require visitors to obtain a security badge prior to access. To obtain a temporary security badge (up to seven days), the applicant must be a U.S. citizen and at least 18 years of age. To apply for a security badge, applicants should submit their name (as it appears on the picture ID that will be used when picking up the badge) and date of birth to the HSPOC at least two working days prior to required access. Badges are to be picked up at the security location specified by the HSPOC. A valid picture ID with date of birth (driver's license, passport, etc.) will be required to obtain the badge.

Those personnel that will need access to the Hanford Site for more than seven days will in most cases be required to complete Hanford General Employee Training a 2-4 hour Hanford Site training course and obtain a picture security badge. The HSPOC should be notified at least one week prior to required access to ensure access is granted.

Security personnel will provide additional information on Hanford site security practices and restrictions when a badge is picked up at the specified security location.

WORK AREA HOUSEKEEPING

The owner/contractor shall at all times keep the work area in an orderly condition free from accumulations of waste materials or rubbish. Upon completion of the work scope, the owner/contractor shall leave the work area in a clean, neat condition. The owner/contractor shall not schedule supplies and/or equipment for delivery to the work area until they are in place at the work area.

WORKING HOURS

Advance approval by the HSPOC is required any time the owner/contractor desires to perform work on other than regular day shift.

SECURE LOADS

Special permits do not authorize the operation of any vehicle without having the load securely fastened and protected against shifting or falling in accordance with RCW 46.61.655, and WAC 468-38-200.

COMMUNICATIONS

A primary and back-up means of communication for owner/contractor field crewmembers at multiple sites have been established as described below.

Type of Communication	Primary Means	Back-Up Means
Communications with fire and emergency services	911 (if cellular phone, ask for Hanford)	509 373-3800
Communications among field crewmembers at multiple sites.		

EMERGENCY ACTION AND RESPONSE
If an emergency situation develops which requires evacuation of the work area, steps must be taken to ensure the safety of the workers. These steps will be described at the pre-job safety meeting, as well as any required response to scheduled Hanford Site practice drills or alarms.

OWNER/CONTRACTOR PROVIDED INSURANCE
The owner/contractor must provide proof of insurance policies in the amount of $1,000,000 commercial general liability and vehicle liability prior to commencement of work. The HSPOC may grant a waiver of the amount or the necessity of insurance coverage if a timely request is made prior to desired date of access.

APPROVAL
This task-specific Safety Plan has been reviewed and accepted (as amended, if applicable) for work on the Hanford Site by HSO IS&H.

Safety Representative	Signature	Date
Lynn Sant (509) 521-6287 (South of Wye Barricade)		
Gene Teal (509) 539-2254 (North of Wye Barricade)		

ADDITIONAL REQUIREMENTS
Permits, certifications, training, documentation, etc., required by the safety representative as a condition of approving this safety plan. Any and all requirements must be satisfied prior to the commencement of work.

ACCEPTANCE
I hereby confirm that the information above is true and correct and agree to abide by the requirements of this Plan as approved.

Owner/Contractor Representative Name and Title	Signature	Date

FIELD AMENDMENTS

Amendments initiated in the field by the safety representative based on conditions or ongoing experience with the scope of work. Amendments are relatively minor in nature, and initials by the safety representative, person in charge at the work site, and the owner/contractors representative are required.

	Initial

Attachment I
Activity Hazard Analysis Sample
(Can be more detailed)

Activity	Potential Hazards	Preventive Measures
General construction activities	1. Slips, trips, or falls on walking and working surfaces	○ Maintain clean work areas by following good housekeeping procedures ○ Be alert for uneven terrain and steep slopes ○ Wear slip resistant footwear when walking/working on slippery surfaces ○ Watch for ice build-up when temperatures dictate, and promptly clear ice and snow from walking and working surfaces
	2. Exposure to high noise from heavy equipment and power tools	○ Safety will determine the need for hearing protection and conduct monitoring if needed. ○ Hearing protection will be worn while operating or working near heavy equipment ○ All equipment will be equipped with manufacturer's required mufflers
	3. Ladders	○ User will inspect ladder for visible defects prior to use. ○ When ladders are used for access to an upper landing surface, the side rails must extend at least 3 feet above the upper landing surface. ○ Make sure the ladder is about 1 foot away from the vertical support for every 4 feet of ladder height between the foot and the top support. ○ Keep a three-point grip on the ladder at all times (two hands and one foot or one hand and two feet) ○ Ladders must have nonconductive side rails if they are used where the worker or the ladder could contact exposed energized electrical equipment. ○ When ascending or descending a ladder, the worker must face the ladder. ○ Slip-resistant feet must not be used as a substitute for the care in placing, lashing, or holding a ladder upon slippery surfaces.
	4. Portable electrical tools	○ Inspect for guards, electrical cords, plugs, grounds, and function. ○ All outside work will be with ground fault circuit interrupters. (GFCI) ○ Ring test abrasive wheels
	5. Back injury from lifting heavy loads	○ Site personnel will be instructed on proper lifting techniques ○ Mechanical devices should be used to reduce manual handling of materials ○ Team lifting should be utilized if mechanical devices are not available ○ Follow procedures outlined in (contractorbuyer) Project Work Rules booklet
	6. Hazardous chemicals brought to the Site.	○ Implement hazard communication program for chemicals brought to the site ○ Material Safety Data Sheets shall be maintained in the project trailer ○ All employees shall be trained in Hazard Communication ○ All containers shall be properly labeled ○ Appropriate PPE for chemical handling and use shall be provided
	7. Vehicular Traffic in work area	○ Spotters will be used when backing up trucks, heavy equipment and earth moving equipment in congested areas.

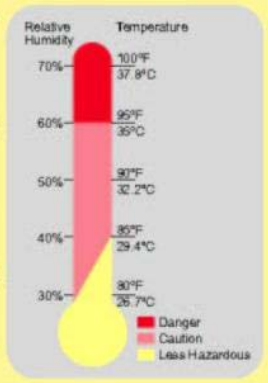
Activity	Potential Hazards	Preventive Measures
		○ Orange traffic vests shall be worn in areas of traffic, construction vehicles, and roadways. ○ Hanford Site Traffic Engineer will be notified two weeks in advance of planned road closure or detour.
	8. Temperature Extremes	○ Cold weather gear and frequent warm-up breaks will be implemented for personnel will be conscious of their own limitations and monitor workload ○ Crews will take heat stress breaks as necessary ○ Heat Stress Program and monitoring will go into effect at 80 degrees F
	9. Overhead hazards	○ Personnel will be required to wear hard hats that meet ANSI Standard Z89.1 in all construction areas, and areas with overhead hazards
	10. Dropped objects	○ Steel toe boots meeting ANSI standard Z41 will be worn in all construction areas
	11. Spills/fire	○ Spill and absorbent materials will be readily available ○ Employees will be instructed as to proper fueling techniques ○ Fuel nozzle and hose will be secured in holder after use ○ Fuel caps will be secured after fueling operations ○ Fuel tanks and equipment will be grounded and bonded during fueling operations ○ Smoking and open flames are not permitted in fueling/greasing areas ○ 20 pound ABC type fire extinguishers will located within 75 foot of fueling/greasing areas
Loading/unloading Operations	1. Forklift	○ Use qualified forklift driver ○ Select a truck of sufficient capacity to handle determined load ○ Complete required inspection and maintenance of the forklift ○ Provide adequate clearances in load movement ○ Use lifting attachments with approval of the truck manufacturer ○ Determine if floor load rating is compromised by the weight of materials and forklift ○ If handling of unstable loads is anticipated, require means to secure loads.
	2. Trailer	○ Inspected per DOT requirements (annual) ○ Load plan (limitations, type of dunnage, & how secured) is attached as a sketch and with description. ○ Permits are required if load greater than 8′ 6″ wide, or exceed 22,000 pounds on a single axle, 43,000 pounds on tandem axles or over 14′ high. ○ $1,000,000 liability insurance for cost of any accident due to operation of oversize load.
	3. Mobile Crane	○ A copy of last annual inspection will be available. ○ Designated competent person will inspect all machinery and equipment before use. ○ Rated load capacities shall be conspicuously posted on all equipment. ○ Will operate within manufacturer's specifications and limitations. ○ Minimum clearance of 10 feet shall be maintained between electrical lines and any part of crane.

Exhibit F-5, OSHA Heat Stress Card

The Heat Equation

HIGH TEMPERATURE + HIGH HUMIDITY + PHYSICAL WORK = HEAT ILLNESS

When the body is unable to cool itself through sweating, serious heat illnesses may occur. The most severe heat-induced illnesses are heat exhaustion and heat stroke. If left untreated, heat exhaustion could progress to heat stroke and possible death.



U.S. Department of Labor
Occupational Safety and Health Administration
OSHA 3154
2002

Heat Exhaustion

What are the symptoms?

HEADACHES; DIZZINESS OR LIGHTHEADEDNESS; WEAKNESS; MOOD CHANGES SUCH AS IRRITABILITY, CONFUSION, OR THE INABILITY TO THINK STRAIGHT; UPSET STOMACH; VOMITING; DECREASED OR DARK-COLORED URINE; FAINTING OR PASSING OUT; AND PALE, CLAMMY SKIN

What should you do?

- Act immediately. If not treated, heat exhaustion may advance to heat stroke or death.
- Move the victim to a cool, shaded area to rest. Don't leave the person alone. If symptoms include dizziness or lightheadedness, lay the victim on his or her back and raise the legs 6 to 8 inches. If symptoms include nausea or upset stomach, lay the victim on his or her side.
- Loosen and remove any heavy clothing.
- Have the person drink cool water (about a cup every 15 minutes) unless sick to the stomach.
- Cool the person's body by fanning and spraying with a cool mist of water or applying a wet cloth to the person's skin.
- Call 911 for emergency help if the person does not feel better in a few minutes.

Heat Stroke–A Medical Emergency

What are the symptoms?

DRY, PALE SKIN WITH NO SWEATING; HOT, RED SKIN THAT LOOKS SUNBURNED; MOOD CHANGES SUCH AS IRRITABILITY, CONFUSION, OR THE INABILITY TO THINK STRAIGHT; SEIZURES OR FITS; AND UNCONCIOUSNESS WITH NO RESPONSE

What should you do?

- Call 911 for emergency help immediately.
- Move the victim to a cool, shaded area. Don't leave the person alone. Lay the victim on his or her back. Move any nearby objects away from the person if symptoms include seizures or fits. If symptoms include nausea or upset stomach, lay the victim on his or her side.
- Loosen and remove any heavy clothing.
- Have the person drink cool water (about a cup every 15 minutes) if alert enough to drink something, unless sick to the stomach.
- Cool the person's body by fanning and spraying with a cool mist of water or wiping the victim with a wet cloth or covering him or her with a wet sheet.
- Place ice packs under the armpits and groin area.

How can you protect yourself and your coworkers?

- Learn the signs and symptoms of heat-induced illnesses and how to respond.
- Train your workforce about heat-induced illnesses.
- Perform the heaviest work during the coolest part of the day.
- Build up tolerance to the heat and the work activity slowly. This usually takes about 2 weeks.
- Use the buddy system, with people working in pairs.
- Drink plenty of cool water, about a cup every 15 to 20 minutes.
- Wear light, loose-fitting, breathable clothing, such as cotton.
- Take frequent, short breaks in cool, shaded areas to allow the body to cool down.
- Avoid eating large meals before working in hot environments.
- Avoid alcohol or beverages with caffeine. These make the body lose water and increase the risk for heat illnesses.

What factors put you at increased risk?

- Taking certain medications. Check with your health-care provider or pharmacist to see if any medicines you are taking affect you when working in hot environments.
- Having a previous heat-induced illness.
- Wearing personal protective equipment such as a respirator or protective suit.