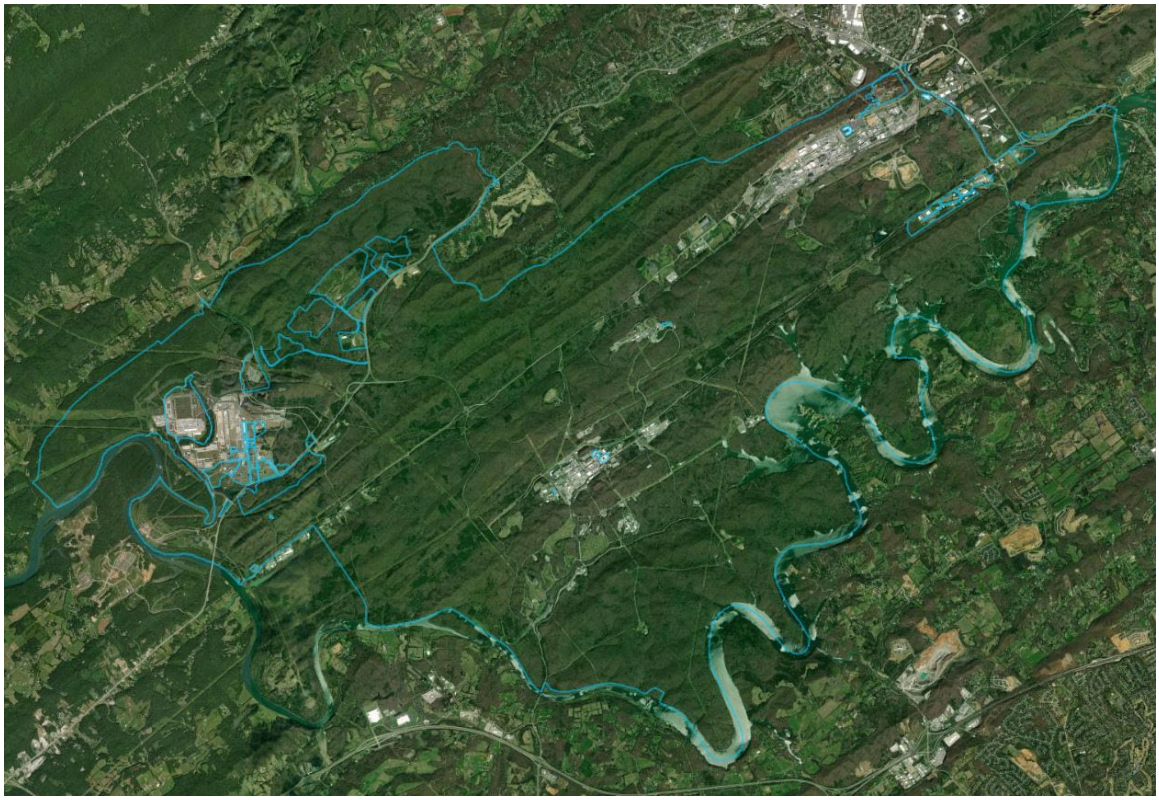
U.S. DEPARTMENT OF ENERGY | Office of Science



# Accident Investigation Report

## Tree Felling Fatality at the Oak Ridge Reservation on August 11, 2023

## November 6, 2023

## DISCLAIMER

On August 14, 2023, Juston K. Fontaine, Deputy Director for Operations, Office of Science, U.S. Department of Energy, appointed an Accident Investigation Board Chairperson with the charge to assemble a team and investigate an accident that occurred during tree limb removal activities on the Oak Ridge Reservation on August 11, 2023. Due to the seriousness of the event and the injuries sustained by the individual, the appointment memorandum charged the Board to conduct the accident investigation in accordance with DOE Order 225.1B, *Accident Investigations*.

The discussion of the facts as determined by the Board and the views expressed in the report do not assume and are not intended to establish the existence of any 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 August 14, 2023, as the Deputy Director for Operations, Office of Science, U.S. Department of Energy, I appointed an Accident Investigation Board Chairperson to investigate the accident that occurred during tree limb removal activities on the Oak Ridge Reservation site on August 11, 2023. This direction was followed up on August 16, 2023, that appointed the remainder of the Board.

The Board's responsibilities have been completed with respect to this investigation. The analysis and the identification of the direct cause, contributing causes, root cause and the Judgments of Need resulting from this investigation were performed in accordance with DOE Order 225.1B, *Accident Investigations,* dated March 4, 2011.

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

Juston K. Fontaine

Digitally signed by Juston K. Fontaine
Date: 2023.11.08 16:30:39 -05'00'

11/8/23

Juston K. Fontaine
Deputy Director for Operations
Office of Science
U.S. Department of Energy

Date

## EXECUTIVE SUMMARY

On Friday, August 11, 2023, two Cortese/Davey employees were trimming trees and cutting down a large dead limb from a Scarlet Oak tree located just outside the perimeter fence line of the Lindsay-Bleu (Gallaher) cemetery located within the Oak Ridge Reservation (ORR).

The Cortese/Davey crew made the final cut to the base of the 57-foot dead limb. When the final cut was made, the dead limb base struck the ground and the top made contact with other trees resulting in the top part of the dead limb breaking into two pieces. Based on physical evidence and interviews, the 10-foot section of the dead tree limb fell towards the ground and struck the helmet of the Cortese/Davey worker, who was making the cut, splitting the safety helmet being worn at the time. The injured Cortese/Davey worker fell onto their left side unconscious. The injured worker was initially transported to Oak Ridge Methodist Medical Center and was subsequently airlifted to the University of Tennessee Medical Center (Level 1 Trauma Center) where they later succumbed to their injuries.

On August 14, 2023, the U.S. Department of Energy (DOE), Office of Science (SC), Deputy Director for Operations (DDO) appointed a DOE Accident Investigation Board (AIB or Board) Chairperson to assemble a team to investigate the event to determine the facts and circumstances related to the event and identify possible weaknesses and opportunities for improvement related to implementation of Integrated Safety Management (ISM) principles. The objective was to analyze the event and determine direct, root, and contributing causes, and from these provide Conclusions (CON) and Judgments of Need (JON).

The Board was faced with certain obstacles in the conduct of the investigation. Specifically, as the investigation progressed, Davey declined to allow personnel interviews by the Board, including one who, being in close proximity to the accident, witnessed it. This limited the Board's ability to evaluate human performance aspects of the event as well as obtain other highly relevant accounts, including an additional eyewitness statement, addressing the circumstances and sequence of events before and during the accident. As a result, certain details provided in this report regarding the event are considered as most likely based on the Board's analysis of available documentation and interviews with other personnel. Unrelated to the event, a change to the DOE Prime Contractor for performing road and grounds maintenance, held by the incumbent contractor at the time of the accident, transitioned to a new contractor shortly after the accident occurred.

The Board determined the two Root Causes of the accident were:

***RC-1***: The prime contractor work planning and control lacked a disciplined and rigorous review process to ensure subcontracted work adequately defined the scope of work, identified and analyzed the hazards, and implemented the controls necessary to mitigate the associated risks.

***RC-2***: The prime contractor and subcontractor failed to adequately communicate known hazards and risks associated with the work, and ensure mitigation measures commensurate with the risk, were in place and understood by those responsible to execute the work.

The root causes and the causal factors, if corrected, would prevent recurrence of the same or similar accidents, and address the charge elements assigned to the Board. The Board identified five JONs noted below representing improvements, that if fully considered beyond the short term, will provide the necessary foundation for the DOE OSO and its ORR contractors and subcontractors to build upon, to reduce the potential for recurrence of similar events. The CONs and JONs are documented in Section 5.0 of this report.

**JON-1**: The prime contractor needs to ensure a work planning and control program is established and capable of producing safe and effective work control procedures.

**JON-2**: OSO needs to ensure prime contractors have established a work planning and control program.

**JON-3**: OSO needs to ensure all contractual and work requirements are properly identified and flowed down to prime and subcontractors.

**JON-4**: Prime contractors need to ensure all contractual and work requirements are properly identified and flowed down to subcontractors.

**JON-5**: OSO needs to clearly define R2A2s for safety and work planning control oversight of Reservation Management activities.

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## ACRONYMS AND SHORTHAND REFERENCES

| | |
|---|---|
| ACLS | Advanced Cardiac Life Support |
| AED | Automated External Defibrillator |
| AHA | Activity Hazard Analysis |
| AIB | Accident Investigation Board |
| ANSI | American National Standards Institute |
| Board | Accident Investigation Board |
| CAS | Contractor Assurance System |
| CNS | Consolidated Nuclear Security, LLC |
| CO | Contracting Officer |
| CON | Conclusion |
| CPARS | Contractor Performance Assessment Reports |
| CPR | Cardiopulmonary Resuscitation |
| CSC | Office of Science – Consolidated Service Center |
| CTF | Central Training Facility |
| D&D | Decontamination and Decommissioning |
| Davey | Davey Tree Expert Company |
| DDO | Deputy Director for Operations |
| DOE | U.S. Department of Energy |
| ECF | Events and Causal Factors |
| EM | DOE Office of Environmental Management |
| EMS | Emergency Medical Services |
| EMT | Emergency Medical Technician |
| ES&H | Environment, Safety and Health |
| ETMC | East Tennessee Mechanical Contractors |
| ETTP | East Tennessee Technology Park |
| FPD | Federal Project Director |
| ISA | International Society of Arboriculture |
| ISM | Integrated Safety Management |
| ISMS | Integrated Safety Management System |
| JHA | Job Hazard Analysis |
| JON | Judgment of Need |
| JTA | Job Task Analysis |

## ACRONYMS AND SHORTHAND REFERENCES (CONT.)

| | |
|---|---|
| LBF | Pounds Force |
| MMC | Methodist Medical Center |
| NOAA | National Oceanic and Atmospheric Administration |
| NNSA | National Nuclear Security Administration |
| ORAU | Oak Ridge Associated Universities |
| OREM | Oak Ridge office of Environmental Management |
| ORFD | City of Oak Ridge Fire Department |
| ORISE | Oak Ridge Institute for Science and Education |
| ORNL | Oak Ridge National Laboratory |
| ORPD | City of Oak Ridge Police Department |
| ORPS | Occurrence Processing and Reporting System |
| ORR | Oak Ridge Reservation |
| OSHA | Occupational Safety and Health Administration |
| O | DOE Order |
| OSO | ORNL Site Office |
| PARS | Performance Assessment Reporting System |
| PPE | Personal Protective Equipment |
| PSS | Plant Shift Superintendent |
| PWS | Performance Work Statement |
| RM | Reservation Management |
| R2A2 | Roles, Responsibilities, Authority and Accountability |
| SC | DOE Office of Science |
| SME | Subject Matter Expert |
| STARRT | Safety Task Analysis Risk Reduction Talk (ETMC tool) |
| TQP | Technical Qualifications Program |
| UCOR | United Cleanup Oak Ridge, LLC |
| U.S. | United States |
| WSHP | Worker Safety and Health Plan |
| WPC | Work Planning and Control |
| Y-12 | NNSA's Y-12 National Security Complex |

# 1.0 INTRODUCTION

## 1.1. Background

On August 11, 2023, a tree trimming accident occurred on the Oak Ridge Reservation in Oak Ridge, TN. During an activity involving the removal of a large dead tree limb, a subcontract worker, age 54, was struck by a portion of the dead limb. The individual sustained serious injuries, including head trauma, which ultimately led to the worker's death.

The United States (U.S.) Department of Energy (DOE), Office of Science (SC), Deputy Director for Operations (DDO) determined an accident investigation should be performed to determine the facts and circumstances related to the accident, as well as any contributing factors. At the time of determination, the criteria in DOE Order (O) 225.1B, *Accident Investigations,* to establish a Federal Accident Investigation Board (AIB or Board) had not been met. However, as noted in the appointment memorandum, "*given the seriousness of the event and the injuries sustained to the individual, as well as the likelihood that the incident may result in the criteria of DOE O 225.1B, Appendix A, item 2.a.(2),*" the DDO formally appointed the Chairperson of the Board on August 14, 2023.

The accident was later found to meet the criteria provided in DOE O 225.1B, Appendix A, Item 2.a.(1): "*any injury or chemical or biological exposure that results in, or is likely to result in, the fatality of an employee or member of the public*." Fatal injury is defined as any injury that results in death within 30 calendar days of the accident.

On August 16, 2023, the DDO amended the initial charge that established the Board to investigate the accident in accordance with DOE O 225.lB and appointed the remaining members of the Board.

The August 14, 2023, and August 16, 2023, appointment memoranda are included as Appendix A in this report.

## 1.2. Site Description

The United States Government originally purchased land for the Manhattan Project in Anderson and Roane Counties in Tennessee during the 1940's, which included the current DOE property known as the Oak Ridge Reservation (ORR). The ORR covers approximately 33,500 acres.

Three large facilities were constructed in this area. The Oak Ridge National Laboratory (ORNL) was established in 1943 as part of the Manhattan Project to pioneer a method for producing and separating plutonium. Other large facilities constructed in the area were the Y-12 National Security Complex (Y-12), whose mission focused on the processing and storage of enriched uranium, and the K-25 uranium enrichment complex. The former K-25 facility has been undergoing deactivation and dismantlement with parts of the former facility made available for beneficial reuse as the East Tennessee Technology Park (ETTP).

Y-12, ORNL, and ETTP (each a fenced facility) cover approximately 12,000 acres. The grounds, roads, tree management and maintenance within these three facilities are the responsibilities of the respective facilities. The management for these activities within the remaining approximately 21,500 acres of the ORR is the responsibility of the Reservation Management (RM) organization within the ORNL Site Office (OSO).

The land originally purchased by DOE included many small cemeteries from family farms and churches. DOE still performs routine cemetery maintenance (access, fence, tree maintenance, grass, etc.) for the cemeteries on DOE property in accordance with Tennessee State Law Title 46. Activities involve tree removal when it creates potentially hazardous conditions for maintenance workers or visitors.

The accident on August 11, 2023, occurred just outside the perimeter fence line of the Lindsay-Bleu (Gallaher) Cemetery on the northeast side. The Gallaher Cemetery numerical designation is number 59. Figure 1-1 provides an aerial view of the ORR, noting the three key DOE areas, as well as the approximate location of the accident.

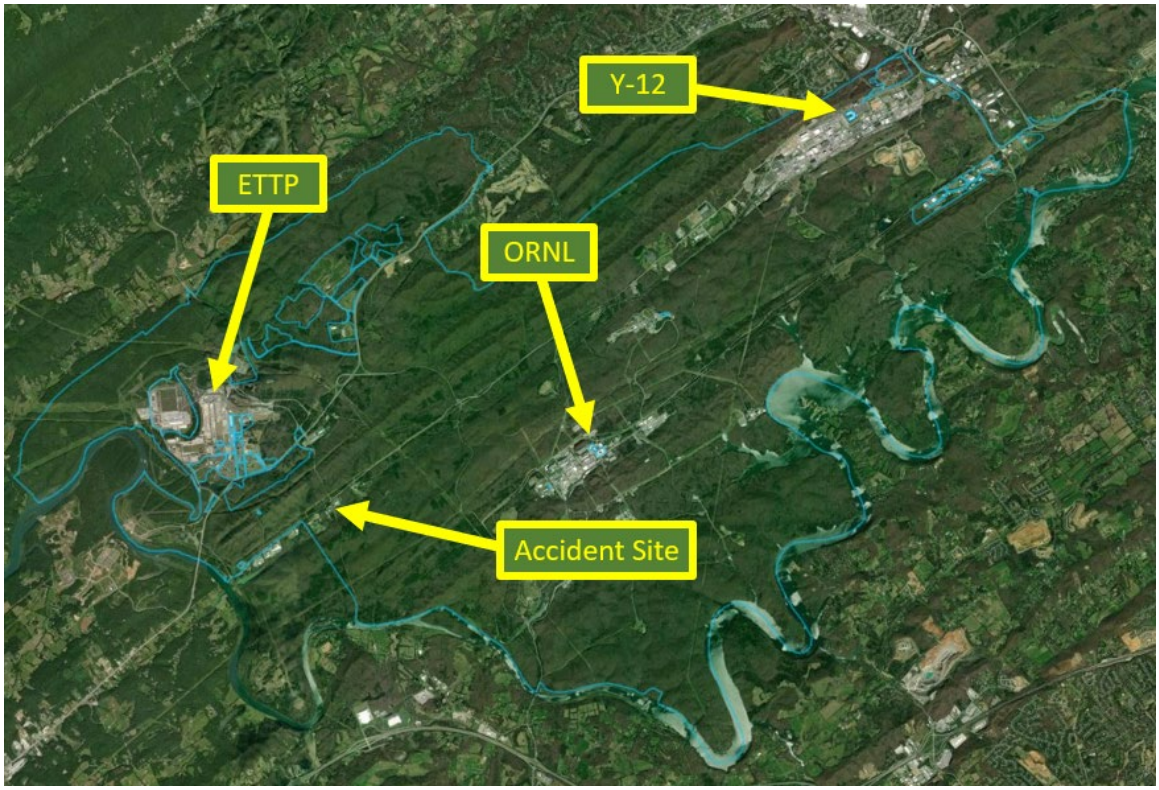



**Figure 1-1. Aerial View of the Oak Ridge Reservation**

## 1.3. Accident Investigation Scope, Conduct, and Methodology

On August 14, 2023, an Accident Investigation Board Chairperson was formally assigned by the DDO. The full Board was assigned by the DDO on August 16, 2023, and began

its activities in Oak Ridge, TN on August 21, 2023. Field activities in Oak Ridge were concluded on September 1, 2023, and the Board completed the report on October 30, 2023. The Board reviewed and analyzed the circumstances surrounding the accident to determine its causes, as charged by the DDO, and to understand lessons learned to reduce the potential for recurrence of similar accidents. These analyses also included an assessment of potential deficiencies in safety management systems.

To determine the facts and circumstances related to the accident, as well as any contributing factors, the DDO, as the Appointing Official, directed the Board to conduct an accident investigation to include a review of any relevant policies, procedures, work practices, or actions related to the accident. This review included, but was not limited to the following:

1. Determine the facts leading up to the accident.

2. Review the adequacy of the immediate response, interim actions, and extent of condition evaluation in response to this accident.

3. Assess the application of the safety program to include processes of training, planning of activities, oversight, safety measures, and the work controls in place.

4. Conduct a causal analysis, using recognized methodologies, as needed, to determine the root and contributing causes of the accident that led to the injury.

5. Evaluate whether broader systemic weaknesses are present in contractual oversight.

The Board consisted of six DOE representatives representing various fields of expertise. The Board Members included personnel with significant operational tenures with DOE as well as subject matter expertise in high-rigor operations, human performance factors, causal analysis, safety culture, and work process and control. The Board Chairperson appointed a Trained Accident Investigator from a list provided by the DOE Office of Environment, Health, Safety & Security. The Board members were assisted by several advisors, subject matter experts and administrative & technical support personnel. The memoranda from the Appointing Official stated the Board Members, in consultation with their respective management, were relieved of all other duties while participating in the Board.

The Board followed the structure for conducting accident investigations as identified in DOE-HDBK-1208-2012, *Accident and Operational Safety Analysis*. The handbook terminology used in DOE accident investigations is defined in Figure 1-2 below.

A **causal factor** is an event or condition in the accident sequence that contributes to the unwanted result. There are three types of causal factors: cause(s), which is the immediate event(s) or condition(s) that caused the accident; root causes(s), which is the causal factor that, if corrected, would prevent recurrence of the accident; and the contributing causal factors, which are the causal factors that collectively with the other causes increase the likelihood of an accident, but which did not cause the accident.

The **direct cause** of an accident is the immediate event(s) or condition(s) that caused the accident.

**Root causes** are the causal factors that, if corrected, would prevent recurrence of the same or similar accidents. Root causes may be derived from or encompass several contributing causes. They are higher-order, fundamental causal factors that address classes of deficiencies, rather than single problems or faults.

**Contributing causes** are events or conditions that collectively with other causes increased the likelihood of an accident but that individually did not cause the accident. Contributing causes may be longstanding conditions or a series of prior events that, alone, were not sufficient to cause the accident, but were necessary for it to occur. Contributing causes are the events and conditions that "set the stage" for the event and, if allowed to persist or re-occur, increase the probability of future events or accidents.

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

**Barrier analysis** reviews the 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 or administrative.

**Change analysis** is a systematic approach that examines planned or unplanned changes in a system that caused the undesirable results related to the accident.

**Error precursor analysis** identifies the specific error precursors that were in existence at the time of or prior to the accident. Error precursors are unfavorable factors or conditions embedded in the job environment that increase the chances of error during the performance of a specific task by a particular individual, or group of individuals. Error precursors create an error-likely situation that typically exists when the demands of the task exceed the capabilities of the individual or when work conditions aggravate the limitations of human nature.

**Figure 1-2. Accident Investigation Terminology**

The investigation was conducted using the following methodology:

- Facts relevant to the accident were gathered and identified through interviews, documents and evidence reviews, and examination of physical evidence, allowing the Board Members to develop the chronology.

- Events and Causal Factors (ECF) charting, barrier analysis, change analysis, and human error precursor analysis techniques were used to analyze the facts, identify the cause(s) of the accident, and draw conclusions.

- Based upon the Conclusions (CONs) drawn, Judgments of Need (JONs) were identified to prevent recurrence.

The Board first met as a group in person at the OSO offices on the campus of ORNL on August 21, 2023, and began document reviews and walkdowns of the accident location. Interviews were conducted with personnel from OSO, Y-12 Fire/Emergency Medical Services (EMS), Office of Science Consolidated Service Center (CSC), National Nuclear Security Administration (NNSA) Central Training Facility (CTF), and East Tennessee Mechanical Contractors (ETMC). From September 4, 2023, through October 30, 2023, the Board had daily virtual meetings to analyze information, evaluate causes and develop CONs and JONs. The Board Chairperson provided periodic updates on the status of the report to the Appointing Official.

## 1.4. Organizational Relationships

Although the ORNL, ETTP, and Y-12 entities are briefly discussed below for completeness, the relationship of these entities to the accident is limited to the accident response, which was in part supported by Y-12 personnel. ORNL assisted with an element of the accident investigation.

The following section provides information for the organizational entities with involvement and responsibilities related to the work performed on the ORR.

### *1.4.1. U.S. Department of Energy, Washington, D.C.*

The DOE is both the owner and regulator of the DOE sites, including the ORR, and maintains responsibility for ensuring that all DOE mission activities, regardless of whether they are performed by DOE Federal employees or by DOE contractors, are performed safely (i.e., protective of the worker, the public, and the environment) and efficiently. DOE is led by the Secretary of Energy who is appointed by the President of the United States.

DOE's mission is to ensure America's security and prosperity by addressing its energy, environmental and nuclear challenges through transformative science and technology solutions. This includes maintaining a safe, secure, and effective nuclear deterrent and reducing the threat of nuclear proliferation, overseeing the United States' energy supply, carrying out the environmental clean-up from the Cold War nuclear mission, and the 17 National Laboratories and other federal assets including the ORR.

### *1.4.2. DOE, Office of Science, Washington D.C.*

The DOE Director for the SC reports to the Undersecretary for Science and Innovation within DOE. SC administers a variety of scientific program areas through multiple program offices managing research at ten National Laboratories, including ORNL. SC's mission is to deliver scientific discoveries and major scientific tools to transform our understanding of nature and advance the energy, economic, and national security of the United States. SC is the Nation's largest federal sponsor of basic research in the physical sciences.

### *1.4.3. DOE, National Nuclear Security Administration*

The Under Secretary for Nuclear Security of the DOE and Administrator of the National Nuclear Security Administration reports directly to the Secretary of Energy. Established by Congress in 2000, NNSA is a semi-autonomous agency within the DOE responsible for enhancing national security through the military application of nuclear science. NNSA maintains and enhances the safety, security, and effectiveness of the U.S. nuclear weapons stockpile; works to reduce the global danger from weapons of mass destruction; provides the U.S. Navy with safe and militarily effective nuclear propulsion; and responds to nuclear and radiological emergencies in the United States and abroad.

### *1.4.4. DOE, Office of Science Deputy Director for Operations, Washington, D.C.*

The DDO is responsible for the effective stewardship and management of ten DOE National Laboratories and their contracts, as well as the ORR. Responsibilities include site office oversight, laboratory policy, safeguards and security, facility and infrastructure management and modernization, the isotope program and operations oversight, including such critical areas as nuclear safety, worker safety and health, and the environment. The DDO is the Head of Contracting Activity for the Management and Operating (M&O) contracts at the ten DOE SC National Laboratories and manages the DOE Site Offices based at the laboratory locations, as well as DDO support organizations located in Washington, DC, Germantown, MD, Oak Ridge, TN, and Lemont, IL.

### *1.4.5. Oak Ridge National Laboratory Site Office, Oak Ridge TN*

The Oak Ridge National Laboratory Site Office or OSO is the local DOE office reporting to the DDO. The OSO, comprised of Federal staff and support service contractors, administers the Prime Contract, maintains situational awareness of operations, and provides oversight of UT Battelle, LLC (UT-B). UT-B is contracted with DOE to manage and operate ORNL. OSO additionally administers the Prime Contract with Oak Ridge Associated Universities (ORAU) for the management and operations of Oak Ridge Institute for Science and Education (ORISE).

Through OSO's RM organization, OSO is responsible for the management and oversight of infrastructure operations across the ORR, including Land Management, Facilities Management, Roads and Grounds, and Utilities Services. These services are performed through several Prime Contracts for roads and grounds maintenance and operations, facility management and delivery of electric, natural gas, potable water, and telecommunications to ORNL and Y-12. Reservation Management is also responsible for stewardship of the ORR, including land use planning and oversight of various environmental requirements associated with DOE land.

### *1.4.6. UT Battelle LLC, Oak Ridge, TN*

UT-Battelle, LLC, was established as a private not-for-profit company for the sole purpose of managing and operating the Oak Ridge National Laboratory pursuant to a Performance Based Management and Operating Contract with the DOE. Formed as a

50-50 limited liability partnership between the University of Tennessee and Battelle Memorial Institute, UT-B is the legal entity responsible for delivering the DOE's research mission at ORNL.

UT-B is responsible for accomplishing the missions and programs assigned by DOE and managing and operating ORNL in accordance with the provisions of the Prime Contract. Included in the contract are provisions for ensuring the safety and health of workers and the public, and the protection and restoration of the environment as fundamental responsibilities of the prime contractor, with appropriate flow down of those requirements to visiting scientists, users, and lower-tiered subcontractors.

### *1.4.7. Y-12 Contractor, Oak Ridge, TN*

Consolidated Nuclear Security, LLC (CNS), manages and operates the Y-12 National Security Complex in Oak Ridge, Tennessee, along with the Pantex Plant in Texas under a single contract with the DOE/NNSA. The Y-12 National Security Complex is one of six production facilities in the NNSA's Nuclear Security Enterprise. Y-12's unique emphasis is the processing and storage of uranium and development of technologies associated with those activities.

### *1.4.8. ETTP, Oak Ridge, TN*

United Cleanup Oak Ridge, LLC (UCOR) is a partnership of Amentum, Jacobs, and Honeywell, working under contract with the DOE Oak Ridge Office of Environmental Management (OREM). Under this contract, UCOR deactivates and demolishes former nuclear facilities as the lead cleanup contractor for DOE's ORR including the ETTP. UCOR's mission includes managing radioactive wastes, maintaining facilities pending their disposition, characterizing hazardous materials and conditions, deactivation and demolition of facilities, and environmental cleanup and restoration for the eventual site transition to public use.

### *1.4.9. East Tennessee Mechanical Contractors (ETMC), Knoxville, TN*

ETMC was awarded a Prime Contract with OSO for all labor, equipment, transportation, overhead, bonding costs, safety oversight, quality control oversight and supervision as required for the management of infrastructure operations across the ORR. Since 1995, the scope of this contract has included maintaining approximately 100 miles of roads and several hundred acres of grounds not directly under the management of the other contractors at the major DOE sites on the ORR. The Prime Contract between OSO and ETMC ended on August 23, 2023, after a transition period to a new contractor which began July 24, 2023.

### *1.4.10. Cortese Tree Specialists (Cortese), Knoxville, TN*

Cortese Tree Specialists (Cortese) was subcontracted by ETMC to furnish all materials, appropriate union labor, and supervision related to the tree felling activities associated with road and grounds maintenance performed at the ORR. Cortese, a local tree

company, was started in 1977 and was acquired by Davey Tree Expert Company (Davey) in 2014 but was allowed to keep the Cortese Tree Specialist name. Davey was started in 1880, is an employee-owned company and has around 9,000 employees. Davey is used for the remainder of this report except when referring to specific documents that use the Cortese name.

### *1.4.11. Accord Federal Services, LLC, Knoxville, TN*

Accord Federal Services, LLC (Accord) is a government services firm specializing in nationwide support to government agencies and their large commercial contractors. Accord was awarded a Prime Contract to OSO for the management of infrastructure operations across ORR which became effective on August 24, 2023, after a one-month transition period from ETMC. A new contract was issued through the normal course of periodic contract rebidding by DOE and was unrelated to the accident.

## 2.0 THE ACCIDENT

### 2.1. Description of Work Activity

The work activity on Friday, August 11, 2023, the day of the accident, involved trimming trees in the vicinity of a cemetery which included cutting down a large dead limb from a Scarlet Oak tree identified as QUCO2 in the September 2016 "*Draft Cemetery Hazard Tree Designation*" report and the May 2023 "*Draft Cemetery Hazard Tree Designation*" report, both of which were prepared by TBC Solutions, Inc. TBC Solutions, Inc. provides contracted support to the ORNL Environmental Protection Services Division which is responsible for the Natural Resource Management Program. These tree designation reports are used by the Oak Ridge Reservation Manager as a tool to assist in the management of problematic trees located on or near the cemeteries associated with their contract. QUCO2 is located just outside the perimeter fence line of the Lindsay-Bleu (Gallaher) cemetery on the northeast side. The Gallaher cemetery numerical designation is number 59 (See Figure 2-1).


**Figure 2-1. Lindsay-Bleu (Gallaher) Cemetery**

The Lindsay-Bleu (Gallaher) cemetery area is within fenced and controlled areas of the NNSA CTF. In order to conduct work in the cemetery area, you must obtain approval from the CTF main (range) office to enter the gated area and individuals are then directed to the cemetery area (See Figure 2-2).

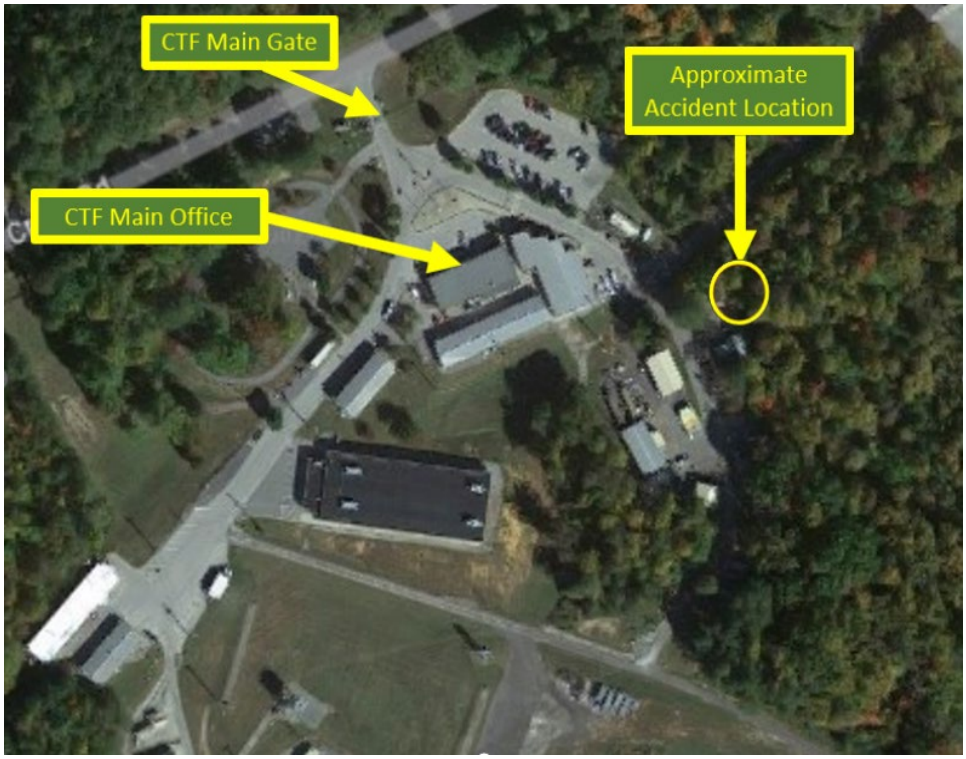



**Figure 2-2. Aerial View of the Accident Scene**

## 2.2. Sequence of Events

According to the National Oceanic and Atmospheric Administration (NOAA) official webpage, on the day of the accident, the Oak Ridge area experienced light winds, dry and normal temperatures for that time of year. The NOAA webpage also reports that approximately 1.5 inches of precipitation had occurred in the Oak Ridge area on the day before the accident.

On Friday, August 11, 2023, two ETMC employees ETW-1 and ETW-2 left the ETMC shop area at approximately 0730[1] to meet the Davey Tree Specialists crew at the CTF (Figure 2-3).


**Figure 2-3. Central Training Facility**

After checking in at the CTF main (range) office, ETW-1, ETW-2 and two Davey workers CoTW-1 and CoTW-2 went to the Gallaher Cemetery #59 to perform the specified tree trimming and to cut down a pre-identified dead limb on tree QUCO2. The morning activities of CoTW-1 and CoTW-2 included using a vehicle mounted elevating and rotating aerial device, commonly referred to as a "bucket truck" to cut cedar branches from another tree located in the front of the cemetery (See Figure 2-4). The cedar branches were then thrown over the cemetery fence next to QUCO2 which was to be worked on later in the day.

ETW-1 and ETW-2 activities included removal and consolidation of the cedar branches and tree trimming waste that had fallen on the ground during the trimming activities.

[1] All times listed in the report are in military time and Eastern Daylight Time


**Figure 2-4. Bucket Truck**

Work then transitioned to the dead limb on QUCO2. Information as to why the bucket truck was not used for removing the dead limb never became available to the Board. However, it was assumed, given the sacred nature of the cemetery and the limited, physical space in which to position and operate the bucket truck, prevented use of the bucket truck, resorting in CoTW-1 and CoTW-2 electing to manually remove the dead limb. The dead tree limb to be cut was approximately 57 feet long with a circumference at the base of approximately 36 inches (See Figure 2-5). CoTW-1 and CoTW-2 tied ropes to the bottom and approximately 14 feet from the top of the dead limb. The upper rigging line had been rigged over a branch of an apparently healthy tree and tied to the dead limb to support the limb after the base was cut so it could be lowered in a controlled manner between a White Oak and a Hickory tree. The bottom rope (tag line) was tied to the bottom of the dead limb above the cut location (See Figure 2-5).

*Note: after the accident, approximately 43 feet of the remaining dead tree limb was still in a generally upright position with the base resting on the ground and the top supported by the upper rigging line and leaning against other trees. Davey employees came to the site to lower the dead limb to a safe configuration on August 24, 2023, with the concurrence and oversight by the AIB. The image in Figure 2-5 was taken after the dead limb was safely lowered and the pieces aligned.*

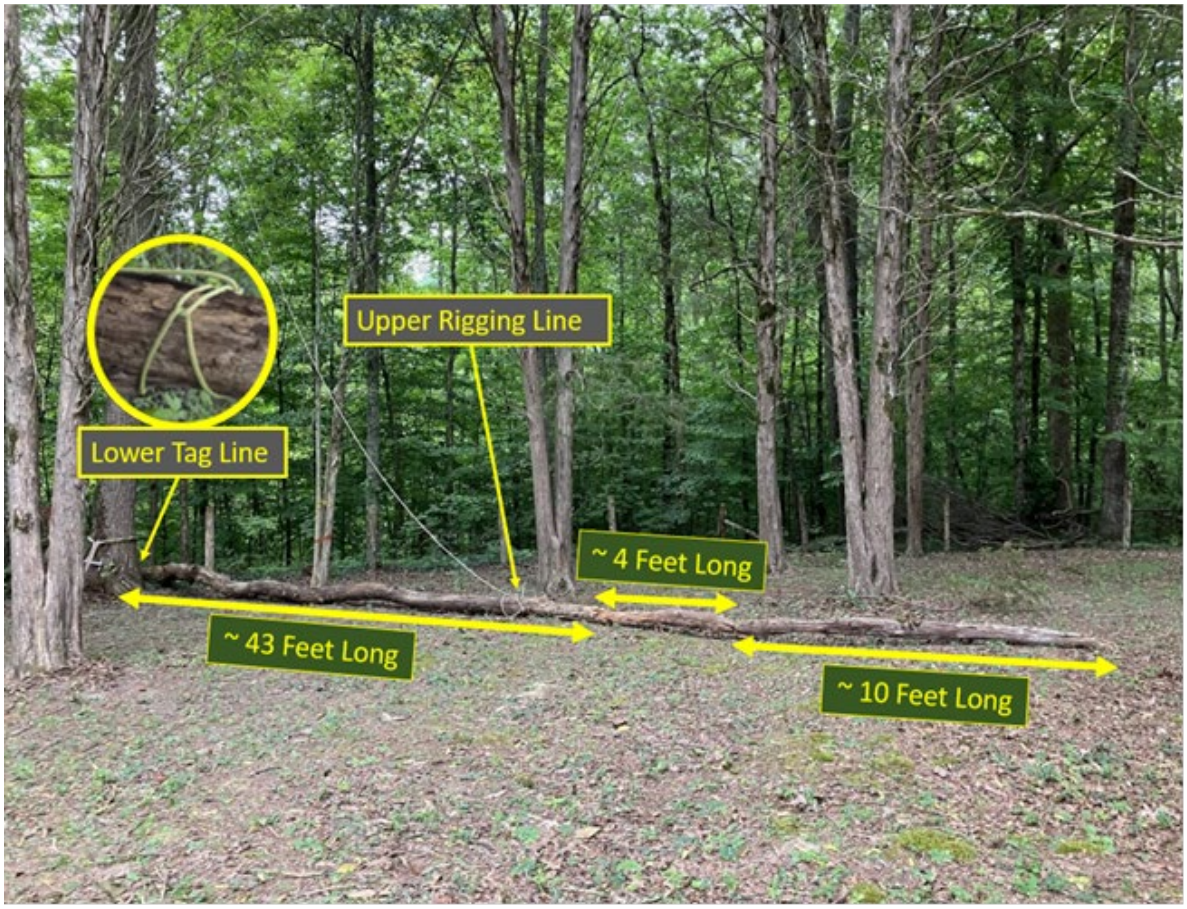



**Figure 2-5. Upper Rigging Line and Lower Tag Line**

ETW-1, ETW-2, CoTW-1 and CoTW-2 stopped work to have lunch at approximately 1230. After finishing lunch, CoTW-1 and CoTW-2 returned to work on QUCO2 at approximately 1300 when CoTW-1 made the final cut to the base of the dead limb. At that time, CoTW-2 was holding the tag line down the hill from the base of the QUCO2. Based on the Board's review of documents and review of physical evidence, it was evident that multiple cuts had been made into the dead limb (see Figure 2-6). However,

the Board could not verify the sequence of the cuts due to the inability to obtain direct witness statements.[2]

**Figure 2-6. Multiple Cuts to Dead Limb**

When the final cut was made, the dead limb base struck the ground and the top portion made contact with other trees resulting in the top 14 foot section, as shown in Figure 2-5,

[2] Although initial documentation from Cortese was obtained from the accident scene and from the initial data requests by the Board, requests to interview Cortese personnel were declined by Davey.

of the dead limb breaking into two pieces (see Figure 2-7). Based on physical evidence and interviews, the 10-foot section of the dead tree limb struck the helmet of CoTW-1.

**Figure 2-7. Top Part of Dead Limb Broken into Two Pieces (Post Accident)**

The Davey-issued Petzl helmet being worn at the time, was split in the front (see Figure 2-8). The helmet was not recovered due to it being placed in the ambulance and delivered with CoTW-1 to the hospital.

Follow on discussions with the Davey Vice President of Health and Safety indicated that CoTW-2's Davey issued helmet would likely be of the same maufacturer and model worn by CoTW-1. An inspection of CoTW-2's helmet determined it was also a Petzl helmet. The helmet was marked inside as meeting ANSI Z89.1 (type 1, class E) requirements which means the helmets are tested to meet a force transmission of 1,000 lbf (pound force to the person). However, it is estimated the 10-foot-long dead limb piece weighing 50 pounds would have an estimated force transmission far in excess of the 1,000 lbf based on the ANSI-Z89.1 force calculation.


**Figure 2-8. Davey Issued Petzl Helmet (photo taken by ORPD)**

Based on the Board's interviews, reviews of documents and inputs from other arborists, Figures 2-9 through Figure 2-12 below are viewed as the most likely sequence of events at the time of the accident, however the actual sequence could not be verified due to the inability to obtain direct Davey witness corroboration.

*Note: Figures 2-9 through 2-12 are a visual representation of the accident and are not drawn to scale.*

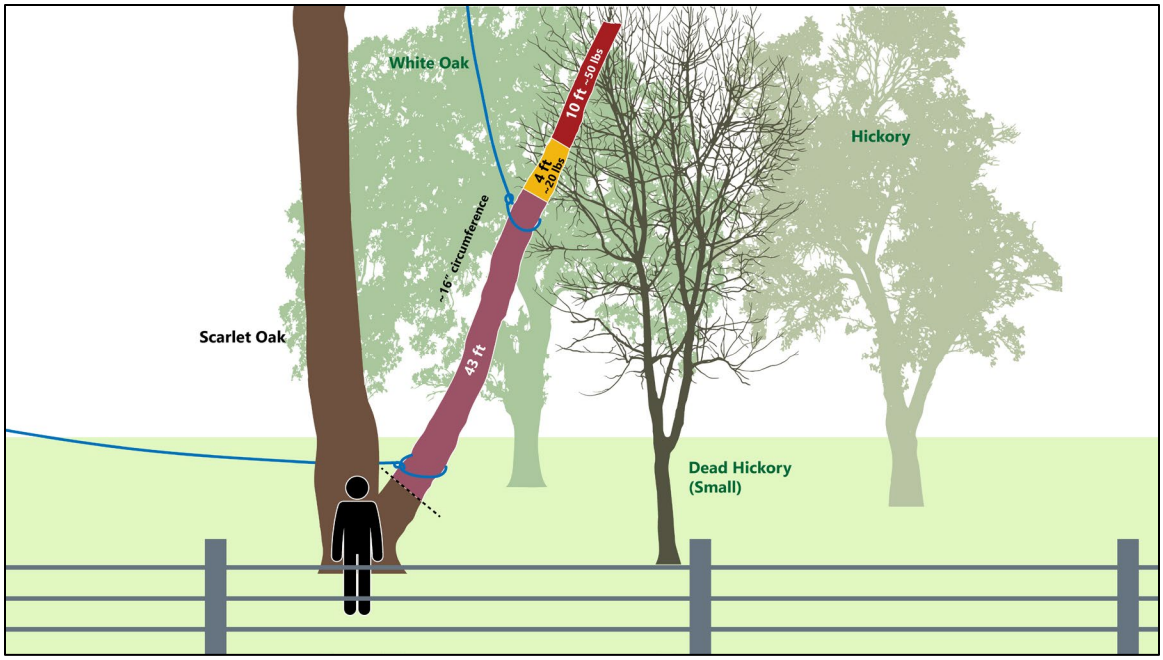



**Figure 2-9. Dead Limb as Last Cut is Made (dashed line)**

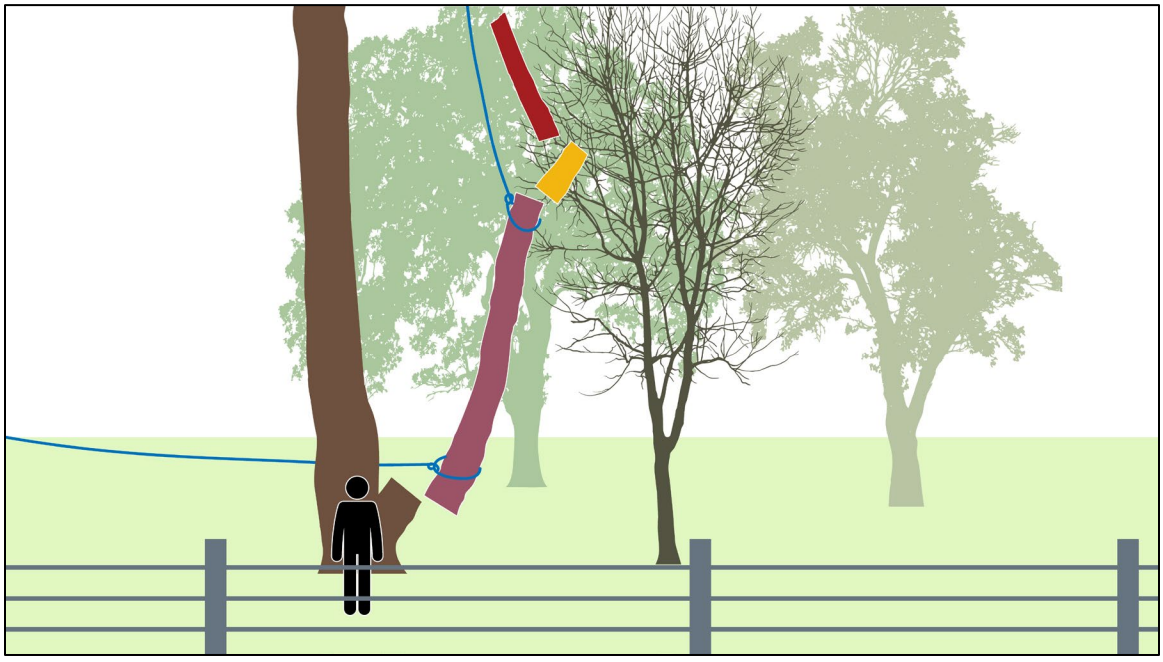


**Figure 2-10. Dead Limb Base Strikes Ground & Top Breaks**

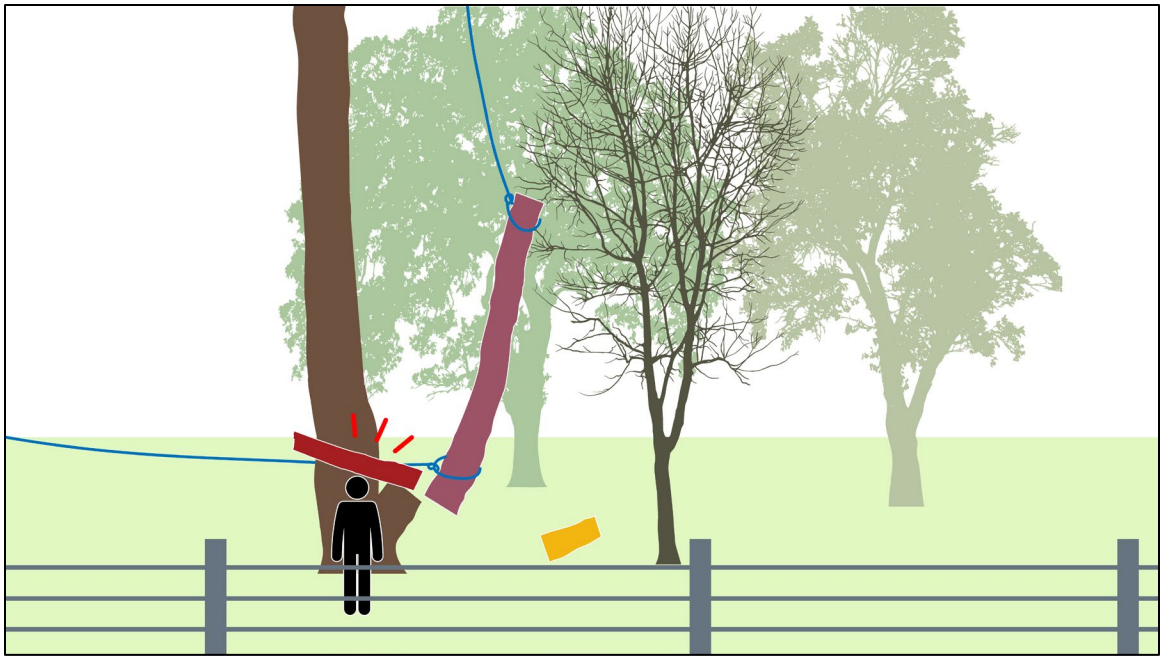


**Figure 2-11. Top of Dead Limb Strikes Worker**

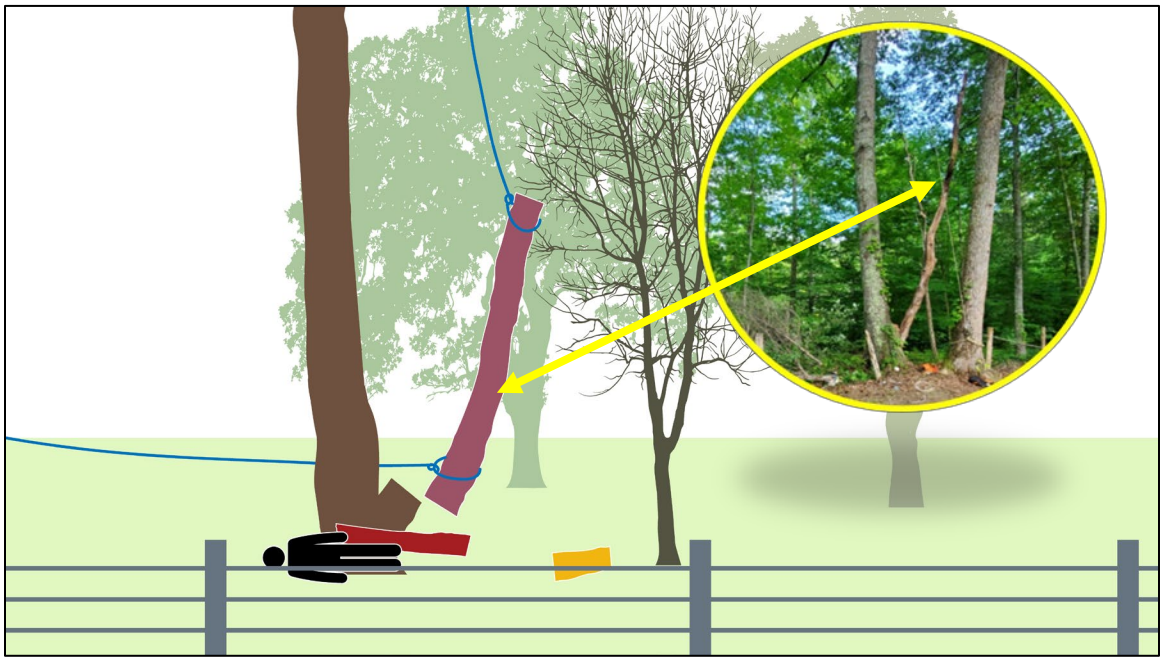


**Figure 2-12. Worker Unconscious on Left Side**

## 2.3. Event Chronology

The event chronology table (Table 2-1) provides a summary of events and is designed to assist with the context around events on the day of the accident as well as events preceding the accident that were viewed by the Board as germane. A detailed depiction of the timeline with additional information associated with this accident is provided in the ECF Chart in Appendix F.

**Table 2-1. Event Chronology Table**

| Date and Time | Event |
|---|---|
| ~9/15/2016 | Tree QUCO2, located in the Lindsay-Bleu (Gallaher) cemetery identified as hazardous by TBC Solutions, Inc. |
| 5/24/2018 | DOE Contract with ETMC for Routine Grounds and Maintenance signed. |
| 1/11/2019 | ETMC Environment, Safety & Health Program / 10 CFR 851 Worker Safety & Health Plan, approved by Manager of the Consolidated Service Center (CSC). |
| 10/28/2019 | Responsibility for RM transfers from the CSC to OSO. |
| 9/28/2021 | Davey near miss accident with woodchipper. ETMC initiated a Safety Standdown. Formal Stop Work initiated by Contracting Officer (CO) within the CSC at the request of RM. |
| 3/6/2023 - 4/28/2023 | TBC Solutions, Inc performs a field assessment of selected cemeteries on the ORR. |
| ~5/15/2023 | Draft Cemetery Hazard Tree Designation Oak Ridge Reservation provided to OSO RM. |
| 5/19/2023 | OSO RM staff met with ETMC and ORNL Forester to conduct onsite meeting and joint walkdown of project to remove imminent and hazardous trees identified in the Draft Cemetery Hazard Tree Designation Report |
| 5/19/2023 | Statement of Work (Rev. 1) Oak Ridge Reservation (ORR) FY 2023 – Hazardous Trees generated. |
| 5/22/2023 | Davey proposal provided to ETMC for tree trimming support. |

| Date and Time | Event |
|---|---|
| 6/20/2023 | Technical evaluation of ETMC price proposal for FY 2023-Hazardous Trees Removal, completed by DOE Contracting Officer Representative (COR) from OSO RM. |
| 6/23/2023 | Task Order for Hazardous Tree removal signed by DOE CO within the CSC. |
| 6/26/2023 | Task Order Number for Hazardous Tree removal signed by ETMC Vice President. |
| 6/28/2023 | Davey Job Hazard Analysis (JHA) prepared for ETMC Roads & Grounds Contract. |
| 8/7/2023 | ETMC Safety Task Analysis Risk Reduction Talk (STARRT) form filled out (dated 8/7 - 8/11). |
| 8/8/2023 | Residential Operations Job Plan / Briefing filled out for Job Description "Felling of various trees using GRCS and rigging." |
| 8/9/2023 | Residential Operations Job Plan / Briefing filled out for Job Description "Felling of poplar on DOE property bordering subdivision." |
| 8/11/2023 (0705) | ETMC conducted plan of day "toolbox safety" meeting/briefing. |
| 8/11/2023 (~0730) | ETW-1 and ETW-2 depart ETMC for CTF to meet with CoTW-1 and CoTW-2. |
| 8/11/2023 (~0900) | CoTW-1, CoTW-2 and ETW-1 sign into CTF main (range) office Visitor Log. ETW-2 was present but did not sign in. |
| 8/11/2023 (~0930 – 1230) | CoTW-1 and CoTW-2 conduct bucket truck operations on cedar tree near Cemetery 59 entrance. ETMC employees pile branches outside cemetery fencing by QUCO2 tree event scene. |
| 8/11/2023 (~1230 – 1300) | CoTW-1, CoTW-2, ETW-1 and ETW-2 take lunch break at work site. |
| 8/11/2023<br><br>~1300 | CoTW-1 and CoTW-2 returned to work on QUCO2 |

| Date and Time | Event |
|---|---|
| **08/11/2023 (~ 1300-1305)** | **CoTW-1 Struck by limb (Accident occurs)** |
| 08/11/2023 (~1300 – 1305) | • ETW-1 yells at ETW-2 in the work truck that CoTW-1 was struck by the piece of the dead limb.<br>• ETW-1 calls 911 from cell phone and reaches Roane County EMS Dispatch. Call is transferred to City of Oak Ridge EMS Dispatch.<br>• CoTW-2 starts Cardiopulmonary Resuscitation (CPR) on CoTW-1.<br>• ETW-1 goes to CTF main (range) office to seek additional medical assistance.<br>• ETW-2 goes to event scene. |
| 08/11/2023 (1305) | CTF Manager receives text stating worker struck by limb. |
| 08/11/2023 (1307) | • City of Oak Ridge EMS Dispatch calls back to ETW-1. Asks if anyone knew CPR. ETW-1 said CPR initiated by CoTW-2.<br>• ETW-1 calls their supervisor.<br>• ETW-1 supervisor calls Y-12 Fire Department/EMS. |
| 08/11/2023 (1318) | • Oak Ridge Police Department (ORPD) notified dispatch they were responding.<br>• Oak Ridge Fire Department Medic 42 arrives CTF Gate |
| 08/11/2023 (1319) | ORFD Heavy Rescue 40 arrives CTF Gate |
| 08/11/2023 (1322 – 1326) | Y-12 Fire/EMS vehicles arrive on-scene. |
| 08/11/2023 (1327) | ORPD arrives on-scene. Observes CoTW-1 being loaded into Medic 42. |
| 08/11/2023 (~1330) | Medic 42 departs scene for Methodist Medical Center (MMC). |
| 08/11/2023 | Medic 42 arrives at MMC. |
| 08/11/2023 | CoTW-1 airlifted from MMC to University of Tennessee Medical Center (Level 1 Trauma Center). |
| 08/11/2023 (1542 – 1543) | OSO RM Assistant Manager and DOE RM Engineer arrive CTF/accident scene, take images and secure the accident scene. |

| Date and Time | Event |
|---|---|
| 08/11/2023 (1551) | ETMC Project Manager provides a status notification to the OSO RM Assistant Manager and COR of event and CoTW-1. |
| 08/12/2023 (1053) | Davey VP of Health and Safety submits Tennessee Department of Labor and Workforce Development (Tennessee Occupational Safety and Health Administration) Notification Form for Hospitalization/Amputations/Loss of Eye for the event on August 11, 2023. |
| 08/14/2023 | CO in the CSC notified of event and subsequently issues a verbal stop work. |
| 08/14/2023 | SC DDO charters an Accident Investigation Board. |
| 08/14/2023 | Formal Stop Work email sent from CO in the CSC to ETMC. |
| 8/15/2023 (1540) | OSO issues initial ORPS report to EHSS via email as ORR has no "facility code" within the ORPS system. |
| 08/23/2023 (1107) | ORR COR provides ORPS update for "SC-RsMg-ORNL-ETMC-99G-2023-0001" to reflect worker fatality. |
| 08/24/2023 | Accord Federal Services assumes Roads and Grounds maintenance contract from ETMC completing a one-month transition period. |

## 2.4 Emergency Response

**Facts:**

At the time of the accident, the ETMC work crew (ETW-1 and ETW-2) were sitting in a work truck when ETW-1 stated they saw the 10-foot section of dead limb hit CoTW-1. They immediately left the truck and ran toward CoTW-1. Before they could get to CoTW-1, CoTW-2, who was holding the tag line for the dead limb, had arrived and was assessing the injured worker's condition. According to the ETMC workers, CoTW-1 was laying on their left side with the 10-foot section of dead limb lying beside them. (see Figure 2-12).

*Note: Figure 2-13 was not taken at the time of the accident. The limb was subsequently moved to this position to reflect the expected location based on documents and images reviewed as well as interview results.*

**Figure 2-13. 10' dead limb position (as recreated)**

*Note: There are slight variations in times stated below as the information was obtained from multiple sources.*

The ETMC workers moved the 10-foot piece of the dead limb so CoTW-2 could gain better access to CoTW-1. ETW-1 called 911 and received Roane County Emergency Management EMS and was subsequently transferred to Oak Ridge EMS.

At 1305, the CTF manager received a text message from the CTF mechanic stating a worker had been struck in the head. ETW-1 proceeded to the CTF main (range) office to seek medical assistance. Upon exiting the CTF main (range) office, ETW-1 met a CTF supervisor who subsequently arranged for prompt gate access for incoming emergency vehicles. The CTF maintenance supervisor also told staff to obtain an Automated External Defibrillator (AED) and head to the scene of the accident.

At 1307, the City of Oak Ridge Emergency Communications Center received a transferred 911 call originally made from a cell phone caller to Roane County EMS

dispatch (per the Emergency Communications Center log). The cell phone caller was ETW-1 who had called from their location at the CTF. ETW-1 then contacted their supervisor and called Y-12 EMS for additional assistance.

At 1307, ETW-1 received a call back from the Oak Ridge EMS Dispatcher (put on speaker) asking if anyone knew CPR. CoTW-2 replied they knew CPR and subsequently began CPR on CoTW-1. CoTW-2 continued CPR until the arrival of Oak Ridge Fire Department (ORFD) EMS personnel.

At 1308, the Y-12 dispatch, Public Safety Answering Point was contacted via phone and at 1309, Y-12 Fire Department personnel were dispatched with nine EMS personnel (firefighter/paramedics) for a report of a "person pinned under a tree." It was noted that a separate radio communication channel was arranged for the response (TAC-2) to ensure clear communication among the responding units.

At 1318 (per CTF video) the ORFD Station 4 Medic 42 arrived at the CTF main gate. The CTF security gate was not open, but facility security was waiting in a golf cart and pulled up to let them inside the facility fence. Upon arriving at the accident scene, the ORFD lead Paramedic immediately evaluated CoTW-1's condition and began treatment. At the same time, a Police Officer with the Oak Ridge Police Department (ORPD) notified dispatch they were responding to CTF.

At 1322 (per CTF video) Y-12 Engine 1 arrived at the CTF main gate with Y-12 Medic 1 arriving at 1323, and Y-12 Rescue 1 arriving at 1326. When Y-12 Paramedics reached the accident scene, ORFD was already providing CPR and Advanced Cardiovascular Life Support (ACLS) to CoTW-1. ORFD Paramedics stated CoTW-1 was not pinned under a tree when they arrived. CoTW-1 was located on their left side with their feet near QUCO2.

Responding EMS personnel from ORFD Station 4 stated they needed to move CoTW-1 from just outside the cemetery fence to provide treatment and prepare CoTW-1 for ambulatory transit to the Methodist Medical Center (MMC) in Oak Ridge. In doing so, they pulled CoTW-1 underneath the fence wire and into the cemetery area. Prior to this action, the 10-foot section of dead limb which had struck CoTW-1, was moved from its landing position and placed against an adjacent tree at an angle. ORFD EMS personnel believed the condition of CoTW-1's helmet would provide valuable information to MMC Emergency Room Physicians in their diagnosis and/or treatment of the patient and elected to take the helmet in the ambulance with them to MMC. Additionally, ORFD EMS personnel took custody of CoTW-1's green identification badge to help MMC staff better identify the injured individual.

CoTW-1's helmet was observed to have been split with a portion of the back still intact (Figure 2-7). Y-12 EMS personnel observed an apparent head injury and a bruise on the upper left chest of CoTW-1. The bruise observation was consistent with a statement made by an ETMC employee during a subsequent interview.

The ORPD Police Officer arrived on scene at 1327 per the officer's report. The ORPD observed the emergency crews treating CoTW-1 and discussed the severity of CoTW-1's condition with the ORFD Captain. The ORPD then notified the Roane County Medical Examiner of the situation.

ORFD Medic 42 departed the scene to transport CoTW-1 to MMC in Oak Ridge. One Y-12 Paramedic and one ORFD Paramedic treated CoTW-1 in the ambulance enroute to MMC. Medic 42 arrived at MMC. CoTW-1 was then transported from MMC via Life Star Air Ambulance to the University of Tennessee Medical Center (Level 1 Trauma Center) in Knoxville, TN and later succumbed to their injuries. CoTW-2, ETW-1 and ETW-2 followed Medic 42 to the MMC ER and then to the University of Tennessee Medical Center.

The ORPD "*Officer Report for Incident 23-19693*," dated August 11, 2023 (included as Appendix I), states ORPD took pictures of the work area set up by the Davey employees. In the report, the officer states, "I noted an anchor line set and ran towards a large tree, which had red spray paint on a large limb, to indicate it would be cut and removed." Also observed was various tree climbing and cutting gear in the area including a chain saw, chainsaw chaps, pole extensions, rope for rigging and helmets and communication devices. ORPD did not note anything abnormal for a work environment.

Per the police report, OPRD also interviewed CoTW-2 at MMC. CoTW-2 stated they saw CoTW-1 cut the limb and thought it was secure on the ground but saw it move and hit CoTW-1 in the head. CoTW-2 stated their task was to manage a "tag line" that was connected to the bottom of the limb and was several yards into the woods (away from the cemetery). CoTW-2 and CoTW-1 wore protective helmets, but CoTW-2 stated, "however the impact from the limb split the helmet in the rear." Based on pictures, the helmet was actually split in the front (Figure 2-7). ORPD also interviewed ETW-1 who stated they were located near the tree and witnessed the limb move, striking CoTW-1 in the head.

**Analysis:**

The actions after the accident taken by ETMC personnel, including moving the 10-foot dead limb piece so CoTW-2 could gain better access to begin emergency medical support; calling 911 and their supervisor to inform them of the accident; and the subsequent call to Y-12 EMS because of their knowledge of CTF's location, aided in EMS providing services without delay.

The maintenance Supervisors decision to tell staff to get the AED from CTF while waiting for first responders was proactive, though it was not used because the ORFD arrived prior to the arrival of the AED.

The communication between the various groups at CTF on August 11, 2023, was effective. These groups include ETMC, CTF and contractor employees who worked

together in getting the necessary EMS resources available to provide emergency medical support to CoTW-1.

The 911 dispatch called back to ETW-1 to ask if anyone knew CPR and CoTW-2 being recently trained and beginning CPR prior to Emergency Responders arriving, provided quicker emergency medical support for CoTW-1.

The CTF Supervisor requested the CTF lead mechanic to have CTF open the gate for the emergency response vehicles to allow for unobstructed access to the accident scene for EMS. Though the gate was not opened prior to EMS' arrival, security was waiting and allowed EMS immediate access to CTF and the accident scene.

The ORFD EMS response to the scene, with the assistance of Y-12 EMS both on scene and in Medic 42 while enroute to MMC, increased the number of paramedics providing emergency medical support to CoTW-1 from one to two paramedics. Due to the severity of the injuries, paramedics conferred and appropriately decided to transport CoTW-1 by ambulance to MMC for necessary medical preparation for airlift. Once cleared by medical professionals, LifeStar then airlifted CoTW-1 from MMC to the UT Level 1 trauma center. Though ORFD and Y-12 Fire Departments paramedics are qualified to respond separately, their teamwork on this response and decision to transport to MMC is noteworthy.

The Y-12 EMS dispatch and Y-12 responding units utilized TAC-2 radio channel for this response which provided clear uninterrupted radio communication. This allowed them to plan how to remove the tree from the injured individual while enroute. Had CoTW-1 been pinned under a tree as reported, this pre-planning could have minimized the amount of time it took the Fire Department to free the injured individual and begin both treatment and transport to a medical facility.

The ORPD responding to the scene and taking numerous pictures and writing a detailed incident report provided additional and valuable information to the AIB that otherwise would have been missed. Specifically, a picture of CoTW-1's helmet assisted the AIB in better understanding the location of the dead limb striking the CoTW-1. The ORPD's incident report also confirmed interview details provided by ETMC employees for the AIB.

Y-12 Fire Department personnel stated in interviews they receive a daily bulletin of high hazard work in their coverage area at ORNL, however, tree trimming/removal is not included on this bulletin. They indicated it would be beneficial to add tree trimming and other hazardous work, along with the associated locations, to this daily bulletin to better assist them in responding to accidents.

The Y-12 Fire Department increased their staffing from nine to eighteen on July 14, 2023. This allows one crew of nine EMS personnel to respond to an accident and the other crew to respond to other accidents as needed. Prior to this change, if the crew of

nine were responding to an event and another call came in, they would have to prioritize their response or split the crew up to respond to both events, both of which decreases the overall quality of response.

Unfortunately, the decision to deny the Board's request to interview Davey employees, one of whom could have provided significant eyewitness information, impeded the Board from obtaining the most comprehensive account of the event, including (presumably) the order in which the tree limb cuts occurred. Interviews would have provided a better understanding of the event, allowing for improved recommendations to prevent recurrence.

**Identified Causal Factors:**

None.

## 2.5 Post-Event Accident Scene Preservation and Interim Actions/Management Response

**Facts:**

The accident occurred in an area whose access is controlled by the CTF. All visitors seeking access to this area must have pre-approval and enter through a normally closed gate. At the entry point visitors identify themselves via microphone and if on the preapproved list, the gate is opened by CTF personnel. Individuals are expected to check in at the CTF main (range) office prior to traveling anywhere in the controlled area.

Based upon the initial inspection of the event scene by AIB Members and multiple interviews conducted thereafter, it appears only minimal changes to the scene occurred. These changes were made by responding personnel in the execution of their emergency medical treatment of CoTW-1.

Initial scene photographs were taken by a responding Oak Ridge Police Department (ORPD) Officer who arrived at the scene at 1327, however, no items were moved during this effort. Based on a review of CTF access logs, subsequent to the departure of all emergency management personnel and the ORPD Officer, it is believed no additional personnel entered the event scene prior to arrival of OSO personnel.

The OSO Assistant Manager and DOE RM engineer arrived at the CTF Main Gate (CTF video) at 1543 and 1542 respectively and proceeded to the accident scene. They took photos of the scene with concurrence from CTF personnel, cordoned off the cemetery area with yellow tape (see Figure 2-14) and directed CTF staff to prohibit access to the area unless specific and individual approval was obtained from OSO RM staff. The OSO Assistant Manager and DOE RM engineer exited the CTF Main Gate at 1600 and had conversations outside the gate until approximately 1615.


**Figure 2-14. Accident Scene Cordoned Off with Yellow Tape**

At the request of family members, and with concurrence of the OSO Assistant Manager, personal items of CoTW-1 and CoTW-2 were removed from the scene and provided back to ETMC on August 14, 2023, for appropriate disposition. Three bags containing personal effects were released and included:

1. Soft sided orange and black lunch box
2. White and Black mesh bag
3. Soft sided black lunch box

No apparent access or changes to scene configuration occurred from this time until the initial visit by the Board on August 21, 2023.

On August 21, 2023, with the concurrence of OSO, the six members of the Board, along with a DOE RM engineer and Board assistant, performed a walkthrough of the accident site to view the condition of the site as left on August 14, 2023. This walkthrough was in support of collecting photographic evidence, as well as discussing site configuration and conditions present at the time of the accident, except those changes previously noted during EMS response. All personnel at the scene that day were advised to ensure no impact was made on any visible evidence and to be watchful for other items which may have been difficult to see given the amount of flora in the area (see Figure 2-15).

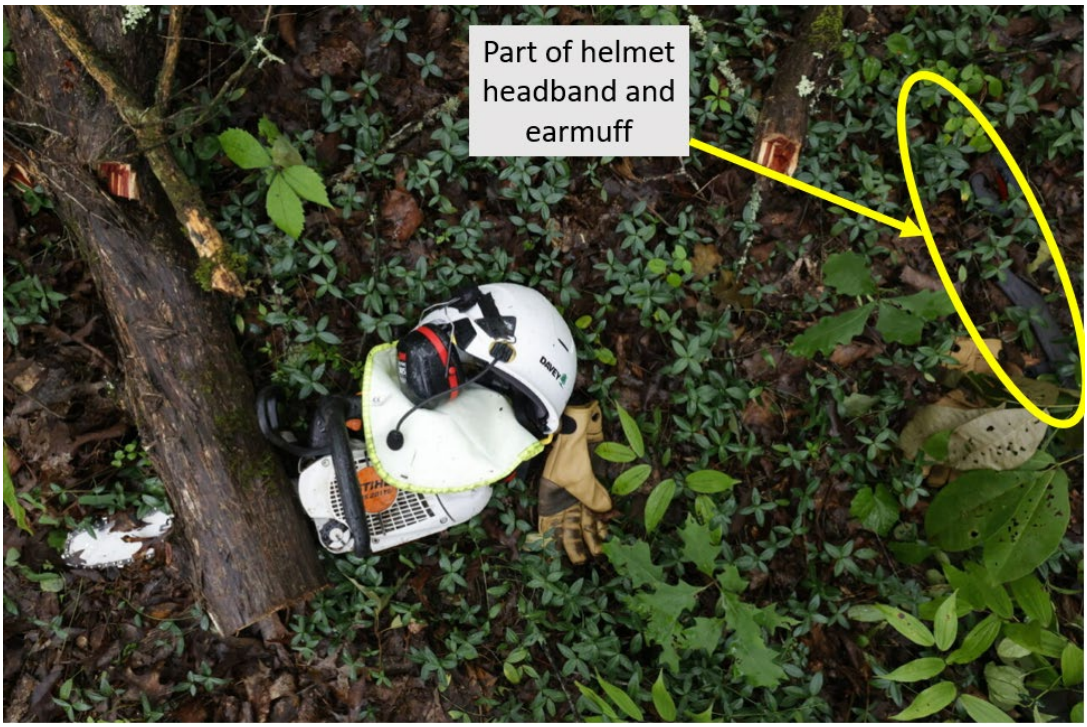



**Figure 2-15. Part of Helmet Headband and Earmuff Hidden with Flora**

During this walkthrough, two distinct and separate pieces of dead limb were identified as likely being involved with the event. This was based upon their similar physical appearance to the large dead limb which had initially been cut, location to the accident scene, and witness interviews (see Figure 2-16). The Board, with support of OSO, scheduled to have these limb pieces weighed, measured, and fit tested to verify if these were one-and-the-same as the main dead limb. Weight testing occurred on August 23, 2023, with the support of ORNL personnel.

**Figure 2-16. Two Distinct and Separate Pieces of Dead Limb**

Though not directly involved or in use at the time of the event, the Cortese Bucket truck had been secured by OSO personnel and was searched and inspected for potential evidence that may have been connected to the event. It was noted several documents were located on the passenger seat and dashboard of the interior of the bucket truck. These documents appeared to provide value to the investigation team and were considered for collection to be scheduled later in the week. Items in the cab of the truck were photographed prior to movement, and then positioned on the truck seat to facilitate discernable and readable images. All items located and photographed in the truck that day remained in the cab until later in the week, when they were taken into custody by the AIB.

On August 23, 2023, two AIB members were accompanied by the DOE RM engineer who went to the event scene to accomplish the following activities:

1. Observe members of the UT-Battelle Riggers and Operators weigh the two pieces of dead limb identified.
2. Measure the various dimensions of the two pieces of dead limb.

3. Conduct a fit test of the two pieces of dead limb to ascertain if these were one-and-the-same as the main dead limb.
4. Formally identify, collect, and take custody of physical evidence associated with the event.

Prior to conducting any work activities, introductions were made with all parties present and a pre-job briefing was performed to establish expected sequence of events including a review of the scene area, positive identification of the two pieces of dead limb to be weighed, best method to allow for weighing the dead limb pieces, and any other concerns. Based upon the limiting factors imposed by the cultural sensitivity of the cemetery, and the Cortese Bucket Truck blocking of the cemetery entrance which would allow the weight handling truck access to the limb, the decision was made to take both dead tree limb pieces to the weight handling truck for weighing, measuring, and fit up. Photos of both dead limb pieces were taken by the AIB members prior to movement. Once completed, both dead limb pieces were hand carried from their original scene location to just outside the cemetery and individually weighed and measured.

The longer dead limb piece weighed ~ 50-lbs (weight included one shackle and two nylon rigging straps) and measured in at approximately ten feet long (see Figure 2-17).

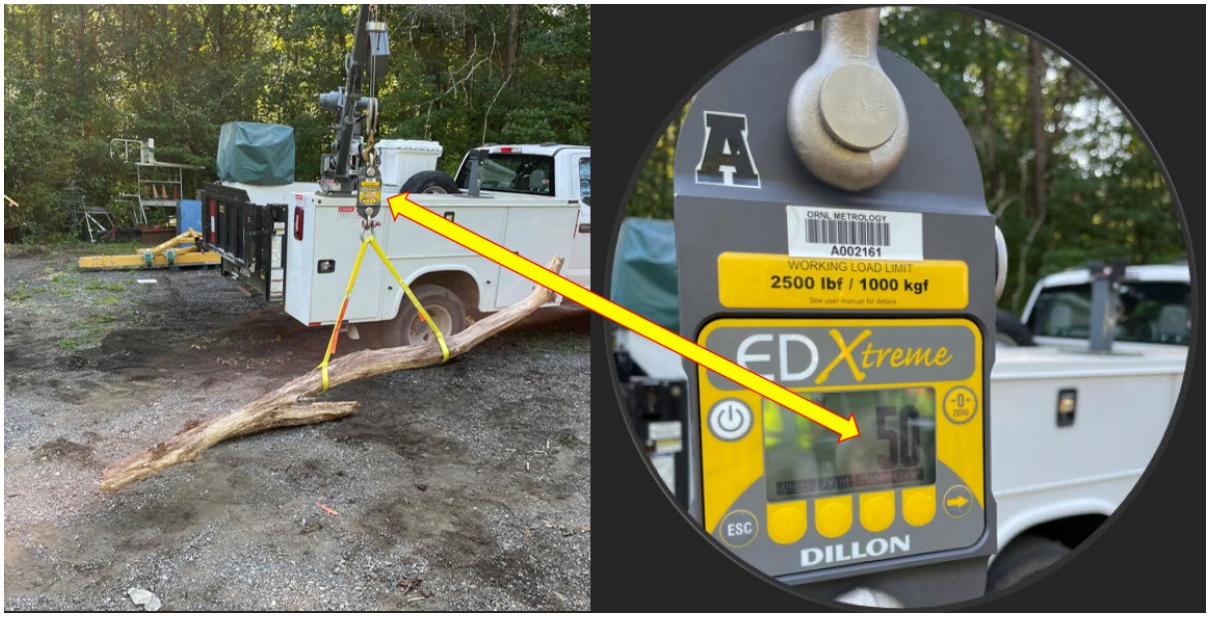



**Figure 2-17. Long Dead Limb Piece**

The shorter limb piece weighed ~ 20-lbs (weight included one shackle and one nylon rigging strap) and measured approximately four feet long (see Figure 2-18).


**Figure 2-18. Short Dead Limb Piece**

The fit test of both limb pieces appeared to match as seen in Figure 2-19. This indicates all three pieces were initially joined.

**Figure 2-19. Fit Test of Both Limb Pieces**

Prior to completing the weighing of the two dead limb pieces, ETMC's Vice President, the Davey Vice President of Health and Safety, and the Owner/CEO of A.R.M Safety Group, LLC., arrived at the area to witness weighing and fit testing of the two dead limb

pieces, as well as observe the collection of physical evidence by the two AIB members. Both the Davey Vice President and Owner/CEO of A.R.M. took photographs of those items collected by the Board members. The Owner/CEO of A.R.M. had been tasked by ETMC's Vice President to assist in ETMC's investigation of the event.

A total of 33 items were inventoried on August 23, 2023. Two of those 33 items were the two Stihl chainsaws involved with the day's work, however, were only administratively inventoried and logged on the Evidence Custody Log. Due to the hazardous materials they contained (i.e., gasoline and oil), both chainsaws were left secured inside the driver side storage panel of the Cortese Bucket Truck (see Figure 2-20). The other remaining items were taken into physical custody by the AIB members and brought back to ORNL Building 4500N, Conference Room 210 in the DOE office suite for safekeeping that same day. During the onsite portion of the investigation, this conference room was under the direct control of the AIB and under AIB lock control.

**Figure 2-20. Two Stihl Chainsaws Left in the Side Storage Panel of Bucket Truck**

Prior to securing both chainsaws, each one was thoroughly examined to determine if either of them warranted being taken into long term custody by the Board. Nothing was indicated. After consultation with all Board members, the Board Chair elected to release both chainsaws, along with the bucket truck and associated equipment, on August 24, 2023.

Six additional pieces of physical evidence were taken into custody by the Board between August 24, 2023, and August 29, 2023. These included the following:

1. ETMC STARRT Cards provided by ETMC Safety Manager

2. Flash Drive and SD Card containing tree accident file (images taken by RM personnel).
3. Flash Drive received by City of Oak Ridge General Counsel containing images taken on the scene by ORPD.
4. Dead Limb Tree Wedge
5. Tag line at base of dead limb
6. Tree rigging gear (total of three items)

On August 24, 2023, the Davey VP of Health and Safety, along with another Davey employee, lowered the remaining dead limb to a safe configuration within the cemetery. This evolution was observed by members of the Board and OSO personnel. (See Figure 2-21).

**Figure 2-21. Remaining Dead Limb Lowered to Safe Configuration**

With the dead limb safely on the ground, this enabled the AIB members to take custody of the larger dead limb tree wedge, later in the week, on August 28, 2023.

Another entry into the event scene occurred on August 29, 2023, when two AIB members took custody of the tag line which had been attached to the base of the originally, approximately 57-foot section of dead limb, as well as the tree rigging gear which consisted of three separate items (stainless steel Port-A-Wrap, black chaffing gear, and rigging line approximately 17 feet long). Due to the physical configuration of the upper rigging line remaining higher up in the canopy, it was not taken into custody but left in place.

A total of 35 items (this excludes the chainsaws previously noted) were physically taken into custody by the Board and stored in Building 4500N, DOE Conference Room 210 until they were released by the Board Chair to the OSO Deputy Manager on September 1, 2023, at approximately 1000. All evidence was re-inventoried prior to transfer from the Board to OSO. An initial inventory was completed by the OSO Deputy Manager prior to taking custody and matched the inventory provided by the Board.

On August 31, 2023, at approximately 1000, AIB members met with arborists to consult on possible mechanisms for the accident including likely or potential cut sequence of the limb. Prior to leaving the event scene, yellow and black caution tape was deployed around the cemetery. At approximately 1130, all personnel were clear of the event scene and the AIB Chair was notified. The AIB Chair then directed the OSO to maintain the scene in a controlled fashion with no entries without both OSO and the AIB approval, pending subsequent direction from the AIB.

## Interim Actions/Management Response

Shortly after the accident occurred, initial notifications were made to the Y-12 Plant Shift Superintendent (PSS) through the 911 calls made at CTF and the accident scene. Y-12 Site Management was then notified. Once it was determined the accident occurred on the ORR, the initial event information was communicated to OSO management as the responsible DOE organization. OSO management and key RM staff attempted to gather additional information and travelled to the accident scene to gather firsthand details. By the time OSO personnel arrived at the accident scene, the injured worker had received initial emergency medical treatment and was being transported to MMC. The OSO RM staff then took images, took actions to preserve the accident scene and control subsequent personnel access to the scene.

Throughout the weekend, OSO continued to gather information and communicate with SC senior leadership and other DOE supporting staff. Based on the significance of the event these conversations concluded that it was appropriate to charter an Accident Investigation Board per the provisions of DOE Order 225.1B.

The initial management actions are summarized in Table 2-2 below.

**Table 2-2. Approximate Timeline of Management Response to Events**

| Date and Time | Event |
|---|---|
| 8/11/2023 (~1305) | Initial 911 call made |
| 8/11/2023 (1318) | Y-12 Deputy Manager notified |

| Date and Time | Event |
|---|---|
| 8/11/2023 (1345) | RM Assistant Manager contacts ETMC Project Manager after hearing voicemail providing accident notification. RM Assistant Manager then notifies OSO leadership. |
| 8/11/2023 (~1400) | RM Assistant Manager received a call from CTF Manager providing information on injury. RM Assistant Manager updates OSO leadership. |
| 8/11/2023 (1429) | Y-12 Site Manager calls OSO Manager who missed the call |
| 8/11/2023 (1503) | Y-12 Site Manager emails OSO Deputy Manager |
| 8/11/2023 (1503) | OSO Manager emails DDO |
| 8/11/2023 (1548) | OSO Asst Manager and DOE RM Engineer arrive at accident scene (based on CTF video) |
| 8/11/2023 (1551) | ETMC notifies RM Assistant Manager and COR via email with a status update. |
| 8/14/2023 | Contracting Officer informed and issues verbal Stop Work order to ETMC |
| 8/14/2023 | Accident Investigation Board established |
| 8/15/2023 (1057) | Contracting Officer issues formal written Stop Work order to ETMC |
| 8/15/2023 (1106) | Contracting Officer issues formal written Stop Work order to Accord (note that Accord had not officially begun work under the Prime Contract at this time) |
| 8/15/2023 (1540) | Initial ORPS report issued via email to EHSS |
| 8/16/2023 | Updated AIB Charter issued with Board Members identified |
| 8/21/2023 | AIB arrives in Oak Ridge and conducts initial site inspection beginning at 1300. |
| 8/23/2023 (1107) | Updated ORPS report issued |

## Analysis:

### Post Event Accident Scene Preservation

Given the location and physical security of where the event occurred significantly aided in the preservation and management of the scene and evidence post-event. Barring

interviews with Davey personnel, only very minor changes to the accident scene occurred between the time of the accident and the initial inspection by the Board. These changes are:

1. Movement of CoTW-1 from outside the perimeter of the cemetery fence line, to just inside the cemetery boundaries.

2. The Petzl helmet worn by CoTW-1 was taken in the ambulance.

3. CoTW-1's ID badge was taken in the ambulance.

4. Three bags (i.e., two soft sided lunch boxes and one black & white mesh bag) containing personal effects were evaluated and transferred to Davey for return to the owners.

Though the 10-foot section of dead tree limb which struck CoTW-1 had been moved, this action was not analyzed, as it would be considered a requirement for CoTW-2 to initiate immediate actions (i.e., ascertain if CoTW-1 was okay, check for vitals, etc.). Further, movement of CoTW-1 from outside the perimeter of the cemetery fence line to just inside it, would also be expected to facilitate better access and treatment of CoTW-1 by responding EMS personnel. This action eliminated the hinderances presented by the cedar brush pile created earlier that morning, the cemetery fencing wire and wood fence posts, as well as the two trees in which CoTW-1 was located between after being struck (see Figure 2-22).

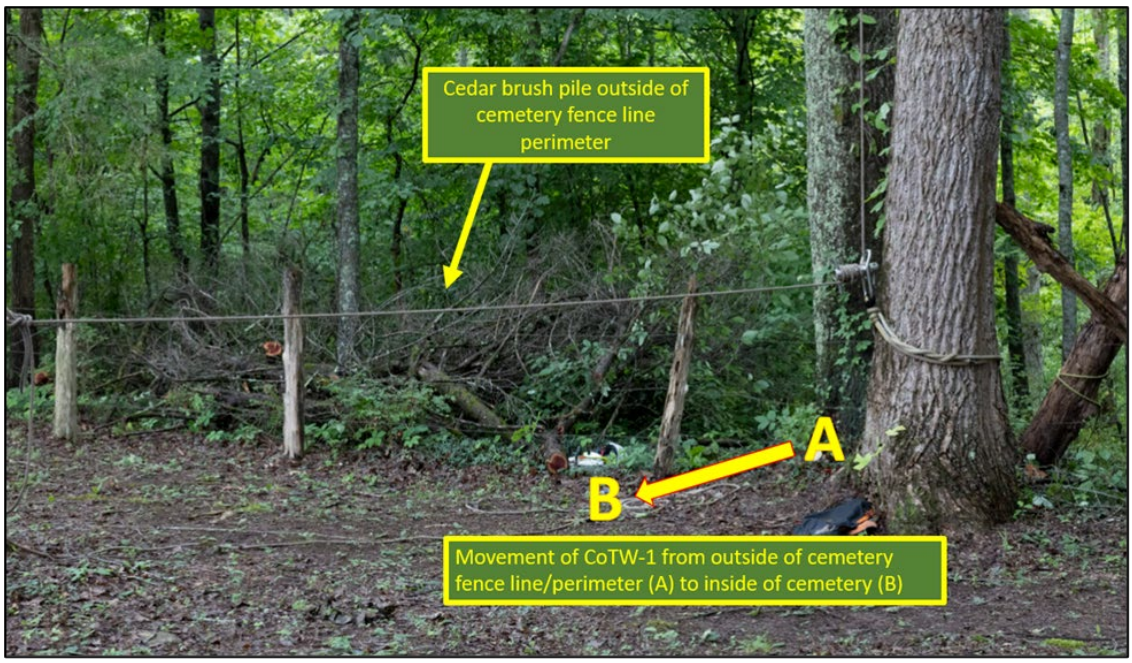



**Figure 2-22. Cedar Brush Pile and Movement of CoTW-1**

Though CoTW-1's Petzl helmet was not provided to the Board for examination, it would be warranted for any associated PPE involved with a traumatic head injury (i.e., hard hat, helmet, etc.), be taken with the victim and provided to the attending physicians to aid in diagnosis of injuries sustained. In this case, CoTW-1's Petzl helmet was removed from the scene, placed in the transporting ambulance, and provided to MMC Emergency Room Staff upon arrival (See Figure 2-23).


**Figure 2-23. Petzl Helmet Worn by CoTW-1 (photo taken by ORPD)**

Additionally, CoTW-1's green identity badge was removed from the scene and sent with the ORFD Medic 42 ambulance. This decision by ORFD Responders better enabled MMC Staff to quickly ascertain who CoTW-1 was, identify potential medical history, and establish connections with family members (see Figure 2-24).


**Figure 2-24. Green Identity Badge of CoTW-1 (photo taken by ORPD)**

Movement of any physical evidence from the scene should always be cautiously considered to reduce the risk of, or limit altering, losing, or destroying any potential information otherwise gained by the investigation Team. However, in this case, both OSO and RM management quickly realized the importance of releasing certain personal effects back to the family members once requested. The detailed photos taken of these items (two soft sided lunch boxes and one mesh bag) and their contents enabled the Board to conclude the items were not needed for further evaluation. These items were then released to Davey to return to the owners. (see Figure 2-25).


**Figure 2-25. Personal Effects and Their Contents**

Overall, the photos taken on August 11, 2023, by the responding ORPD Officer and the DOE RM Engineer, provided the Board with an extensive amount of information and allowed a better understanding of scene conditions on the day of the accident. It also provided knowledge of any movement of evidence as noted. Photos of the helmet and green ID badge confirmed interview information provided by ETMC employees as well as EMS personnel from ORFD and Y-12. Additionally, these photos were crucial in understanding what on-scene evidence (outside of EMS efforts) may have been removed, and any respective involvement they may have had in the accident.

Accident scene preservation for this event is considered noteworthy and had no negative effect on the investigation.

## Interim Actions/Management Response

Through the second call made to Y-12, the Y-12 management was aware of the event by 1318. The ETMC Project Manager attempted contact with the RM Assistant Manager but was only able to leave a voicemail. The ETMC Project Manager also attempted to contact the DOE RM Engineer (the COR for the contract) and was unsuccessful. The RM Assistant Manager heard the voicemail and returned the call ~ 1345 and obtained initial information on the injury. The RM Assistant Manager then notified the rest of OSO leadership of the injury. The information from the ETMC Project Manager to the RM Assistant Manager and the RM COR was reiterated via email at 1551.

Between 1429 and 1503, Y-12 management attempted to notify OSO management regarding the situation (phone and email). The RM Assistant Manager was contacted at ~ 1400 by the CTF Manager. No new information was provided at that time.

The OSO Manager provided prompt notification to the DDO at ~ 1503. An OSO management representative (RM Assistant Manager) and a DOE RM engineer visited the accident scent before 1600 on August 11, 2023, to ensure the scene was preserved and to take images of the area to ensure the best opportunity to capture the as found event scene.

Frequent communications continued throughout the weekend between OSO leadership with SC and EHSS management. Over the weekend it was determined that the conditions were significant enough to warrant the establishment of an Accident Investigation Board. Over the weekend, the AIB Charter was developed, and a Chair selected. The Charter was issued officially on Monday August 14, 2023.

Also, over the weekend an initial ORPS report was prepared and finalized on Monday, August 14, 2023. It was determined at that time however that the ORR did not have an available "facility code" within the ORPS system, so the draft ORPS report was submitted via email to the ORPS system manager within EHSS. This ORPS report was updated on a timely basis after it was determined that injured worker succumbed to their injuries. See Appendix B for the ORPS report.

After the AIB Chair was established, the OSO leadership promptly reached out to the Chair to ensure all support necessary for Board activities was provided and to allow effective and efficient initiation of AIB activities.

**Identified Causal Factors:**

None.

## 3.0 FACTS AND ANALYSIS

### 3.1 Flowdown of Requirements

The objective of this portion of the investigation was to determine if ETMC appropriately flowed down DOE safety requirements to its lower-tier subcontractor, Davey, and to evaluate the implementation of Integrated Safety Management (ISM) and Work Planning and Control (WPC) during the tree clearing projects associated with this accident.

#### *3.1.1 DOE Flowdown of Requirements to ETMC*

**Facts:**

Contract No. 89243118DSC000001, effective May 24, 2018, between the DOE and ETMC includes references to Federal, State, and local laws as well as clauses and DOE Directives. ETMC is required to flow down those requirements to its lower-tier subcontractors where appropriate. Specifically, Section H of the contract, *Special Contract Requirements*, includes clause DOE-H-2053, *Worker Safety and Health Program in Accordance With 10 CFR 851* (OCT 2014), paragraph (a) states,

> "*The Contractor shall comply with all applicable safety and health requirements set forth in 10 CFR 851, Worker Safety and Health Program, and any applicable DOE Directives incorporated into the contract. The Contractor shall develop, implement, and maintain a written Worker Safety and Health Program (WSHP) which shall describe the Contractor's method for complying with and implementing the applicable requirements of 10 CFR 851. The WSHP shall be submitted to and approved by DOE. The approved WSHP must be implemented prior to the start of work. In performance of the work, the Contractor shall provide a safe and healthful workplace and must comply with its approved WSHP and all applicable federal and state environment, health, and safety regulations*."

Section H, Clause DOE-H-2053, paragraph (f) of the contract also states,

> "*The Contractor shall flow down the requirements of this clause to all subcontracts at any tier*."

10 CFR 851 requirements were contained in the ETMC Contract. Additionally, the Performance Work Statement (PWS) for Roads and Grounds Maintenance – Oak Ridge Reservation, dated June 24, 2018, included a list of applicable documents and standards (Section 4.0). However, as the PWS is listed in Section J of the Prime Contract, the PWS and its provisions are also considered part of the contract. For example, Section 4.0 of the PWS listed DOE P 450.4A, *Integrated Safety Management Policy*, as an applicable document. The final ETMC Contract did contain the specific requirement in the DEAR Clause at 48 CFR 970.5223-1, *Integration of Environment, Safety, and Health Into Work Planning and Execution* (DEC 2000), that mandates the inclusion of an Integrated Safety Management (ISM) system applied to hazardous work; however, the Contractor Requirements Document (CRD) from DOE O 225.1B *Accident Investigations*, was not included in either the PWS or the ETMC Contract.

Like OSHA's General Duty Clause (29 USC 654), the Department of Energy has a similar requirement as stated in 10 CFR 851.10 (a) – "*With respect to a covered workplace for which a contractor is responsible, the contractor must: (1) Provide a place of employment that is free from recognized hazards that are causing or have the potential to cause death or serious physical harm to workers*." Also, 10 CFR 851.23 (b) states: "*Nothing in this part must be construed as relieving a contractor from complying with any additional specific safety and health requirement that it determines to be necessary to protect the safety and health of workers*." These sections provide additional industry standards and regulations to be utilized in order to ensure that DOE contractors (and subcontractors) work safely. Some of these standards and regulations would be the American National Standards Institute (ANSI) Z133-2017, *Safety Requirements for Arboricultural Operations*. ANSI Z133-2017 is an essential source of relevant information applicable to generating effective risk assessments. In addition, the Occupational Safety and Health Standard also provides important information regarding trees.

The ANSI Z133-2017 document is a widely referenced set of safety requirements used throughout the tree care/felling industry. Its contents are maintained and updated with input from the International Society of Arboriculture (ISA) and outlines general safety requirements, guidance and recommended safety training for arborists and other workers involved in tree removal operations. Due to the hazards associated with arboricultural work with the potential to cause death or serious physical harm to workers, ANSI Z133-2017 is an essential source of relevant information applicable to generating effective risk assessments.

It is recognized that the work activity performed by Davey on tree QUCO2 was not the complete cutting down of the tree - known as "felling." Rather, it was the removal of a large limb that originated near the base of the main tree trunk. It is the view of the Board that due to the size of the dead limb and its condition, the safety protocols identified in the noted ANSI documents for tree felling were applicable for the Davey conducted activity. Additionally, various documents provided by both ETMC and Davey identified the activity as “felling.”

The AIB noted that, by including 10 CFR 851 in ETMC’s contract, DOE had flowed down safety requirements pertaining to tree felling operations. 10 CFR 851.1 provides for additional industry consensus standards and, therefore, safety requirements from ANSI Z133-2017 are also appropriate to minimize the risk to DOE contractors and subcontractors.

### *3.1.2 ETMC Flowdown of Requirements to Davey*

The AIB noted that ETMC did not include 10 CFR 851 in the contract requirements with its subcontractor, Davey. Furthermore, other arboricultural safety requirements directly or indirectly invoked by 10 CFR 851, such as ANSI Z133-2017, were not included in the language of the contract. ETMC subcontracted the “tree removal of hazardous trees at the various cemetery sites” with Cortese Tree Specialists (Purchase Order # 60043). The purchase order is a one-page document describing the job/purpose of the subcontract as, “Tree Care/Cemetery Sites” and “Tree Removal Oak Ridge Reservation.” The purchase order does not include specific information regarding ETMC’s 10 CFR 851 requirements nor information as to how those requirements are flowed down to the subcontractor (Cortese Tree Specialists).

The proposal (#20046737-1684755212) submitted by Davey included items provided as part of the “Client Guarantee.” Included in the section entitled, “Other Terms and Contract Conditions,” was a condition that states:

> “*TREE CARE STANDARDS: All work is to be performed in accordance with American National Standards Institute (ANSI) Standard Practices for Tree Care Operations*.”

There are two relevant ANSI tree care standards applicable to the work performed by Davey. One standard is ANSI A300, *Tree, Shrub, and Other Woody Plant Maintenance – Standard Practices*. It outlines specific guidelines for making pruning cuts properly

and effectively. The other standard is ANSI Z133-2017, *Safety Requirements for Arboricultural Operations* that, as described above, outlines the general safety requirements for a broad range of arboricultural work.

In fulfillment of the requirements in 10 CFR 851.11, ETMC developed a Worker Safety and Health Program (WSHP), which was last updated and approved by the manager of the DOE Consolidated Service Center (CSC) on January 11, 2019. At that time the RM responsibilities were within the CSC. The scope of the WSHP applies to,

> "*…numerous areas of facility grounds and vehicle maintenance and associated hazards and control measures which may not be specifically relevant to the planned work activities, however these controls will remain in place in the event implementation is necessary due to changing field conditions or changes to the scope of work*."

In Section 3.1, *Subcontractor Involvement*, of the ETMC WSHP, subcontractors are required to acknowledge ETMC's ISMS approach and the ZERO ACCIDENT PERFORMANCE POLICY as part of the contractual agreement. This section also states that,

> "*ETMC will acknowledge and allow work to be performed under a subcontractor's own WSHP, if it has been approved by DOE prior to commencing work. Subcontractors who do not have an approved 10 CFR 851 WSHP will be required to work under ETMC's WSHP*."

Interviews with ETMC managers confirmed that Davey was expected to work under ETMC's WSHP. Specific hazard controls applicable to roads and grounds maintenance activities were included in ETMC's WSHP, (e.g., elevated work/fall protection, hoisting and rigging, electrical safety, etc.). However, tree felling operations were not included in ETMC's WSHP and it therefore lacked the specific safety requirements for the activities assigned to Davey. Davey referenced compliance to ANSI standards in its "Client Guarantee" provided in Purchase Order #60043. The only WSHP review noted by the AIB was approved in 2019 by the CSC when ETMC was initially awarded the Road and Grounds Maintenance contract. No additional updates to the WSHP were submitted by ETMC to either CSC or OSO for review.

**Analysis:**

The contract between DOE and ETMC has clear provisions to contractually flowdown requirements to subcontractors, including safety requirements. The ETMC Worker Safety and Health Program was reviewed and approved by the CSC on January 11, 2019, and provides a generic description of roads and grounds safety and health program requirements, as well as roles and responsibilities under 10 CFR 851. However, the ETMC WSHP does not cover the specific hazards involved in tree felling. Since the WSHP had been implemented in 2019, a process for review had not been established, per 10 CFR 851 requirements, to update and approve WSHP elements annually or to submit documentation to DOE that no changes had occurred. Therefore, the ETMC WSHP was

not effective in covering the safety and health requirements necessary for tree felling. This also challenged effective flowdown of requirements to ETMC's subcontractors.

The subsequent flow-down of 10 CFR 851, the DEAR Clause at 48 CFR 970.5223-1, as well as the applicable tree felling requirements of ANSI Z133.2017 and ANSI A300, were not sufficiently reflected in ETMC's contract with Davey to execute Task Order # 89423123FSC400553, as required by Section 3.1 of the ETMC WSHP. There was no formal submittal of a Davey WSHP and there is no documentation indicating Davey agreed to follow the ETMC WSHP as required. Since the ETMC WSHP is not sufficient for the specific hazards for tree felling work, Davey's adoption of that WSHP was not effective for identifying hazards and implementing adequate controls.

The "Client Guarantee" found in the Davey proposal specifically referred to applicable ANSI Standards (Z133-2017 and A300) for tree felling work. This was not included as part of the flowdown of requirements from ETMC but rather a boilerplate guarantee made by Davey in its proposal (#20046737-1684755212) for the tree removal work for the ORR. Although the contractual requirements were not effectively enumerated in documents exchanged between ETMC and Davey, ANSI requirements were cited by Davey and understood to be applicable to tree felling work.

**Identified Causal Factors:**

As the scope of work increased, no additional measures were taken to identify or assess the increased risk associated with the additional work and previously identified hazards (CF 2)

ETMC had no controls or other avenues in place to ensure their subcontractors were implementing 10 CFR 851 requirements during the performance of work (CF 3)

OSO and ORR failed to verify that ETMC and their subcontractors were implementing 10 CFR 851 requirements during the performance of work (CF 5)

## 3.2. ISM/Work Planning and Controls Application to Tree Trimming Operations

### *3.2.1. Define the Scope of Work*

**Facts:**

Numerous documents were provided to the Board defining high-level scopes of work consistent with tree trimming/felling activities. These high-level documents include the hazardous tree designation reports, price proposals, statements of work and task orders.

TBC Solutions, Inc. produces hazardous trees designation reports for relevant areas of the ORR. As part of this process, a Forester periodically examines the trees located in or near onsite cemeteries and, if appropriate based on the potential hazard, recommends them for removal based on their condition. An updated list of trees recommended for removal is contained in the *Draft Cemetery Hazard Tree Designation – Oak Ridge Reservation* report (both 2016 and 2023) which is periodically updated. The tree

associated with this accident event was identified in both draft reports and was part of the scope of work for the tree removal project subcontracted to Davey.

RM assigned ETMC, through the contractual Statement of Work, the responsibility to plan and execute the removal of 98 hazardous trees in a safe and responsible manner within an agreed-upon scope, cost, and schedule. ETMC subcontracted this work to Davey through a Purchase Order (#60043) signed on July 5, 2023. Other associated documents pertaining to this work also are consistent with manual tree felling being the appropriate scope of work. The JHA submitted by Davey for this work (dated March 1, 2023) stated, "The Work consists of tree removals." The work scope was also described as, "East Ridge/cemetery Fall Trees," on the ETMC STARRT Card filled out by ETMC personnel for the week of August 7, 2023.

For Davey, the AIB was provided Davey Residential Operations Job Plan/Briefings (Davey Job Brief) for August 8, 2023, and August 9, 2023. The only description of the work in the two days are "Felling of various trees, using GRCs + rigging" and "Felling of poplar on DOE property bordering subdivision." GRCs is the acronym for Good Rigging Control System.

**Analysis:**

Defining the work begins at a high level with the development of statement of work documents, task orders, etc. that may have a description of the work to be done. These documents typically are not intended to define the actual work to be performed each day. Instead, a more detailed Activity Hazard Analysis (AHA), or similar document, would be used to define the detailed scope of work each day, the associated hazards, and the controls in place to mitigate those hazards.

A Forester initially identified the hazardous trees to be removed in the September 2016 and again later in the May 2023 Draft Cemetery Hazard Tree Designation reports to provide an appropriate work scope for reducing the risk to maintenance workers and visitors to cemeteries on the ORR. DOE provided the scope of work to be performed in its proposed Statement of Work as a list of approximately 96 trees to be "felled and disposed" at various locations throughout the ORR. Task Orders were then issued by DOE, on May 30, 2023, and June 16, 2023, officially assigning this hazardous tree removal work to ETMC in accordance with the statement of work. ETMC subsequently subcontracted the work to Davey through Task Order # 89423123FSC400553, signed on June 23, 2023, for the "removal of Hazardous Trees throughout the ORR, in accordance with the SOW and associated spreadsheet."

The scope of work has been consistently maintained from the original proposal to remove approximately 96 trees through the generation of task orders. The proposed activity of felling trees was reflected in documents as DOE contracted this work with ETMC and, in turn, ETMC subcontracted this work with Davey. Any additional information regarding work scope, including the type of mechanical equipment to remove the trees (e.g., backhoe, chain saw, etc.) was not provided in these documents. Each of the 96 various

trees presented unique challenges requiring specific means and methods to accomplish this work. These unique challenges include the accessibility of the 96 various trees, the potential obstruction of co-located trees, and the sensitivity to the potential damage to the cemeteries Although the Forester had effectively identified the hazardous trees, a specific scope of work was not created for activity-level work which would have facilitated the required effective hazard analysis, development and implementation of controls, and performance of work in strict adherence with those controls.

**Identified Causal Factors:**

1. As the scope of work increased, no additional measures were taken to identify or assess the increased risk associated with the additional work and previously identified hazards. (CF-2)

2. Increase in scope of work resulted in additional hazards being introduced to the task without adequate hazard analysis (CF-8)

3. Though hazards were identified, controls to mitigate those hazards were not brought forward into a work planning and control process. (CF-11)

4. Hazards and requirements were identified, however, neither were formally brought into work planning and control processes. (CF-12)

5. Though hazards were identified by Davey, ETMC failed to seek additional guidance or strengthen controls to ensure those hazards were appropriately mitigated. This resulted in Davey utilizing a broad Job Hazard Analysis as their work planning and control process. (CF-14)

6. ETMCs work planning and control process lacked a disciplined and rigorous review to ensure that subcontracted work adequately defined the scope of work, identified and analyzed the hazards, and implemented the controls necessary to mitigate the associated risks. (CF-20 and RC-1)

7. ETMCs plan of day had devolved to a point where little to no value was provided in: adequately defining the scope of work for all of those involved with executing it for the day; identifying and analyzing the hazards associated with the work to be performed that day and failed to adequately communicate the controls in place and necessary to mitigate the risks associated with the work planned for the day. (CF-23)

### *3.2.2. Analyze the Hazards*

**Facts:**

The DOE (CSC) approved the ETMC WSHP for work to be performed under the Routine Grounds Maintenance contract. However, neither this Prime Contract nor the ETMC

WSHP identified hazardous tree removal as an activity. The tree trimming hazard work was first introduced with the addition of task order number 89243123FSC400553 and task number 23SC001178 which were amended to the Prime Contract on March 29, 2017. ETMC did not employ tree trimming expertise and instead subcontracted the tree trimming work to Davey.

A Davey JHA was in place, per ETMC's Price Proposal submitted May 30, 2023, prior to commencing this tree removal project. The JHA identified "felling trees" as a job step including "struck-by falling tree/limbs" as an associated hazard.

For the work performed on the day of the event there was the ETMC "Plan of the Day" which took place in the ETMC building at 0705 on August 11, 2023, and was attended by ETW-1 and ETW-2. The document only describes the toolbox safety topic "Stay Focused." No Davey employees were present at this meeting. Additionally, interviews indicated Davey personnel do not participate in ETMC toolbox safety discussions.

Section 6.3, ***Activity Hazard Analysis*** *(AHA)*, of the ETMC WSHP states:

> "*Using the graded approach, an AHA, or other similar document that describes the hazards and controls, shall be prepared on projects for each phase of work, or activity having significant safety or health concerns*."

To address specific work on the day of the event there is an ETMC Safety Task Analysis Risk Reduction Talk (STARRT) card that spans the dates August 7 through August 11, 2023. It describes the work "Fall Trees" at the OR Reservation East Ridge Cemetery. It is signed by ETW-1, ETW-2, and CoTW-2. It is not signed by CoTW-1. There is also an ETMC "Plan of the Day" document.

The AIB was provided with two Davey Job Briefs for August 8, 2023, and August 9, 2023. No Davey Job Briefs were conducted on August 10, 2023, or August 11, 2023, which was the day of the accident. Because of this the board has no evidence that specific task analysis and mitigations were performed by Davey on the date of the accident.

**Analysis:**

Analyzing hazards for the work to be done begins at a high level with a documented list of generalized hazards to be addressed. These documents typically are not intended to analyze the specific hazards on the day of the work. Instead, a more detailed AHA, or similar document, as required by the ETMC WSHP, would be used for the day of work.

The DOE CSC approved the ETMC WSHP for work to be performed under the Routine Grounds Maintenance contract. However, neither the Prime Contract nor the ETMC WSHP identified hazardous tree removal as an activity, so that particular hazardous work was not analyzed at a high level by ETMC, CSC, or OSO during review of the ETMC WSHP. Additionally, there is no evidence available to confirm Davey went through a disciplined process of reviewing and submitting their own WSHP to ETMC for approval

and implementation into the ETMC work planning and control processes. In accordance with Section 3.1, *Subcontractor Involvement,* of the ETMC WSHP, subcontractors who do not have a DOE-approved WSHP will be required to work under ETMC's WSHP. Without their own approved WSHP, Davey would be expected to follow the ETMC WSHP although the WSHP doesn't describe the hazard analysis process for tree felling activities.

There were other high-level documents provided to the Board including the hazardous tree designation reports, statements of work, price proposals, and task orders, identifying hazards of tree trimming/felling.

The Board was provided daily Davey Job Briefs for August 8, 2023, and August 9, 2023. However, Davey did not provide a Davey Job Brief for the day of the accident. Additionally, had a Job Plan/Briefing been provided for the day of the event, it was concluded, based on the two example Davey Job Briefs provided, there would not have been sufficient detail captured in the document to fully analyze the hazards involved with the large dead limb to be removed on the day of the accident.

The only document provided by ETMC, to address work on the week of the event, is the STARRT card spanning the dates August 7 through August 11, 2023. During interviews, ETMC personnel stated the STARRT card, when used in conjunction with the JHA, is equivalent to an AHA. However, the STARRT Card and the JHA lack the specific activity-level hazard analysis sufficient to effectively plan and execute work in the field. ETMC expects all workers, including subcontractors, to sign the card. The form is a two-sided trifold document to identify hazards by checking Yes / No / "N/A" / PPE boxes with a section at the bottom of the card to identify mitigations to hazards.

ANSI Z133-2017 calls out numerous areas where a qualified arborist must be involved in the planning of tree trimming/felling work. The analysis of the event that day indicates there were numerous hazards and error likely precursors in place on the day of the event that may not have been properly analyzed. These include:

1. The large limb had clear signs of severe decay. (This hazard should have been analyzed per ANSI Z133-2017, subsection 3.4.9.)

2. Rigging was low on the limb making it difficult to support the weight of the rain-soaked, decayed limb. (This hazard should have been properly analyzed per ANSI Z133-2017, subsection 8.5.1.)

3. A small dead hickory tree interfered with the clear drop zone. (This hazard should have been analyzed per ANSI Z133-2017, subsection 8.6.1.)

4. No viable escape routes were provided for CoTW-1 who was working in a two-foot-wide space between QUCO2 and the cemetery fence. (This hazard should have been analyzed per ANSI Z133-2017, subsection 8.6.5.)

The STARRT card used at the time of the event is very generic and spans one week's worth of work. There is no written description of the hazards or hazard mitigations related to applicable ANSI Z133-2017 hazards. Instead, there are numerous boxes checked for hazards followed by boxes checked to mitigate the hazards. Additionally, there is a separate section on the STARRT card titled "Hazard Control" where additional boxes can be checked as well as a section to write specific hazards and controls down. This section was not filled in. Also, section M: Other Hazard Controls on the STARRT was blank. See Appendix G.

CoTW-1 had completed all training requirements set forth by Davey (except pesticide training) to be a Davey qualified arborist, Per Davey's *Qualified Residential Arborist "C" Training" book,* Davey considers employees who complete this training to be a qualified Davey arborist. Based on this, CoTW-1 was only a Davey qualified arborist for four months. Additionally, CoTW-2 had a total of four months tree trimming/felling experience but had not completed his Davey arborist qualification. The combined tree felling experience for both Davey employees performing the work on the day of the accident is approximately two years.

This STARRT card is to be filled out daily. For example, on page one, on the right-side, Item #1 reads "Have we discussed the scope of the work to be performed today?" this box is checked. However, this document spans the dates August 7 through August 11, 2023. A documented daily pre-job-brief with detailed hazards and controls should have been written and briefed by a qualified arborist or other similarly trained individual as identified in ANSI Z133-2017 section 3.4 – "Job Briefing and Worksite Setup" and section 8.5 "Rigging," Section 8.6 – "Tree Removal."

Since no documentation was provided to the Board for work performed on the day of the accident, the Board concluded the work was performed relying on skill-of-the-craft.

**Identified Causal Factors:**

1. As the scope of work increased, no additional measures were taken to identify or assess the increased risk associated with the additional work and previously identified hazards. (CF-2)

2. The walkdown identified and located specific hazards, however there was no mechanism in place to allow for mitigation of those hazards via the work planning and control process. (CF-9)

3. Risks identified in the report, were not collectively reviewed and subject to oversight by OSO, RM, and ETMC. This resulted in the less than adequate planning and execution of the work commensurate with the risk. (CF-10)

4. Hazards and requirements were identified, however, neither were formally brought into work planning and control processes. (CF-12)

5. ETMCs work planning and control process lacked a disciplined and rigorous review to ensure that subcontracted work adequately defined the scope of work, identified and analyzed the hazards, and implemented the controls necessary to mitigate the associated risks. (CF-20 and RC-1)

### *3.2.3 Develop/Implement Hazard Controls*

**Facts:**

Davey submitted a JHA identified "felling trees" as a hazardous activity with the potential for the worker to be "struck-by falling trees/limbs" as a specific hazard. The controls listed in the JHA for this activity are listed as follows:

> "Develop and Follow the Six Steps of Precision Tree Felling Plan:
>
> - Risk Assessment (site and tree)
> - Tree-Felling – Height Assessment
> - Tree-Felling – Lean Assessment (Side, Back, Front)
> - Tree-Felling – Escape Routes/Retreat Path
> - Tree-Felling – Notch and Hinge[3] Plan
> - Tree Felling – Back cut plan"

CoTW-1 passed the Davey Residential Arborist Safety Test on April 11, 2023. CoTW-2 had not completed their Davey Qualified Residential Arborist "C" training. Additionally, CoTW-2's tree care/felling experience was approximately four months.

PPE found on site and ETMC witness statements confirm certain hazard controls were in place. PPE found at the scene included helmet, chaps, safety glasses, vest, hearing protection, gloves and fall protection. A rigging and tag line were in place for the dead limb, and communications devices were attached to CoTW-2's helmet and appeared to have been attached to CoTW-1's helmet as well.

Evidence gathered at the scene confirmed the dead limb was severely decayed (see Figure 3-1 below).

[3] Hinge per ANSI Z133-2017 8.6.13.5: Strip of uncut wood fibers created between the face cut or notch and the back cut that helps control direction in tree felling or limb removal (a.k.a. holding wood).

**Figure 3-1. Severely Decayed Limb Pieces**

Also, written hazard controls documented by ETMC to address specific work on the day of the event are limited to the STARRT card spanning the dates August 7 through August 11, 2023. It describes the work "Fall Trees" at the OR Reservation East Ridge Cemetery. It is signed by ETW-1, ETW-2, and CoTW-2. It was not signed by CoTW-1.

**Analysis:**

Developing hazard controls occurs at a high level with the development of documents that may have a description of the work to be done with generalized hazards to be addressed. These documents typically are not intended to deliver the means and methods to address the hazards on the day of the work. A more detailed AHA, or similar document, as required by the ETMC WSHP, would be used the day of work.

The ETMC WSHP does not specifically contain tree trimming/felling safety measures as ETMC does not perform this work and subcontracts it out. The Davey JHA did identify "felling trees" as a job step and identified "struck-by falling tree/limbs" as an associated hazard. Although ETMC received the Davey JHA, they failed to seek additional guidance or strengthen controls to ensure those hazards were appropriately mitigated. This resulted in Davey utilizing a broad JHA for their work planning and control process even though it lacked the specificity needed for daily activity-level work. ETMC also failed to take action because the Davey scope of work was outside their (ETMC's) DOE-approved WSHP.

To address specific work during the week of the event, there was an ETMC STARRT card spanning the dates of August 7 through August 11, 2023. It describes the work "Fall Trees" at the OR Reservation East Ridge Cemetery. It is signed by ETW-1, ETW-2, and CoTW-2. It is not signed by CoTW-1. According to interviews with ETMC staff, it is expected that all workers, including subcontractors, doing work will sign the card.

The AIB was provided with two Davey Job Briefs completed for the work on August 8, 2023, and August 9, 2023 (AHA equivalent). However, no Job Plan/Briefings were completed for August 10, 2023, or August 11, 2023, which was the day of the accident. Because of this the board has no evidence as to what the expected hazard mitigations would be for Davey workers on the date of the accident other than those listed in the Davey JHA.

Because no Davey AHA (or equivalent) was conducted on the day of the event, the Board evaluated the expected controls listed in the Davey JHA. The board found evidence the tree felling work conducted on August 11, 2023, was not performed within the controls specified in Davey's JHA. These controls are called the Six Steps of Precision Tree Felling Plan and are outlined in Section 3.2.3. and are:

- Risk Assessment (site and tree)
- Tree-Felling – Height Assessment
- Tree-Felling – Lean Assessment (Side, Back, Front)
- Tree-Felling – Escape Routes/Retreat Path
- Tree-Felling – Notch and Hinge Plan
- Tree Felling – Back cut plan"

Specifically, it is not clear if an adequate Risk Assessment was performed for the dead limb in accordance with ANSI Z133-2017, subsection 3.4.9, which states,

> "When definite indicators of **decay**, weakly attached branches, or **dead bark are seen**, the **qualified arborist** shall determine if the tree can withstand the forces to be applied during the work." (text was bolded for emphasis)

The intact dead tree limb prior to CoTW-1 cutting, was approximately 57 feet long and had clear indications of severe decay and dead bark. However, the tree had been rigged 43 feet up from the base despite obvious, and severe decay to the entire limb. Based on eyewitness statements, when the final cut was made, the limb came in contact with a Hickory before breaking under its own weight. The requirements for hazards and controls associated during rigging operations are addressed in ANSI Z133-2017, subsection 8.5, *Rigging*, subsection 8.5.1 and states (text was bolded for emphasis),

> "Arborists performing rigging operations shall inspect trees for their integrity to determine whether the trees have any **visible defect** that could affect the operation. If it is determined that the tree poses a **risk of failure** due to the **forces and strains** that will be created by the design of the rigging operation, **an alternate plan shall be used**."

Additionally, CoTW-1 was positioned between QUCO2 and the graveyard fence with roughly two feet separation between the fence and tree. Because of this, adequate escape routes were not provided for CoTW-1 in accordance with the provisions of ANSI Z133 section 8.6.5.1. Had CoTW-1 been positioned on the opposite side of the tree, cedar branches cut down previously would have blocked the second escape route. Because effective escape routes were either not considered during the hazard analysis related to

this activity-level work or effectively executed, CoTW-1 did not have an adequate path to escape the falling dead limb piece were escape possible.

The Board views that the PPE available and in use was appropriate for the tasks to be performed.

There was no documented Tree Felling-Notch and Hinge Plan. Section 3.2.4 discusses the cuts made to the base of the dead limb and how they do not appear to follow best industry practices and ANSI standards for tree trimming/felling activities.

**Identified Causal Factors:**

1. As the scope of work increased, no additional measures were taken to identify or assess the increased risk associated with the additional work and previously identified hazards. (CF-2)

2. ETMC had no controls or other avenues in place to ensure their subcontractors were implementing 10 CFR 851 requirements during the performance of work. (CF-3)

3. The walkdown identified and located specific hazards, however there was no mechanism in place to allow for mitigation of those hazards via the work planning and control process. (CF-9)

4. Risks identified in the report, were not collectively reviewed and subject to oversight by OSO, RM, and ETMC. This resulted in the less than adequate planning and execution of the work commensurate with the risk. (CF-10)

5. Though hazards were identified, controls to mitigate those hazards were not brought forward into a work planning and control process. (CF-11)

6. Hazards and requirements were identified, however, neither were formally brought into work planning and control processes. (CF-12)

7. Hazards and requirements were identified, however, neither were formally brought into work planning and control processes. (CF-13)

8. Though hazards were identified by Davey, ETMC failed to seek additional guidance or strengthen controls to ensure those hazards were appropriately mitigated. This resulted in Davey utilizing a broad Job Hazard Analysis as their work planning and control process. (CF-14)

9. The task order identified the need for removal of hazardous trees, however, OSO failed to verify that adequate controls to mitigate those hazards had been identified through the ETMC work planning and control process and appropriately flowed down to Davey. (CF-15)

10. The work order identified removal of hazardous trees, however, Davey had no other available controls in place to mitigate those hazards through any other work planning and control process. (CF-16)

11. ETMC failed to recognize no other work planning and control documents (i.e., AHA) were in place to mitigate the hazards associated with the removal of the hazardous trees identified in the work order. (CF-17)

12. The task order identified removal of hazardous trees, however, controls to mitigate those hazards such as 10 CFR 851 or ANSI standards, were not brought forward into the ETMC work planning and control process or flowed down to Davey. (CF-18)

13. Davey failed to adequately communicate known hazards and risks associated with the work, and ensure mitigation measures commensurate with the risk, were in place and understood by those assigned to execute the work. (CF-19 and RC-1)

14. ETMCs work planning and control process lacked a disciplined and rigorous review to ensure that subcontracted work adequately defined the scope of work, identified and analyzed the hazards, and implemented the controls necessary to mitigate the associated risks. (CF-20 and RC-1)

### *3.2.4 Perform Work Within Controls*

**Facts:**

The AIB found no evidence the tree felling work conducted on August 11, 2023, was performed within the controls specified in Davey's JHA. These controls are called the Six Steps of Precision Tree Felling Plan and are outlined in Section 3.2.3.

Specifically, escape routes for CoTW-1 were not adequately established. Additionally, based on the position of the tag line found, the appropriate separation distance (worker situated a minimum of two tree lengths of the dead limb being worked on.) both per ANSI guidance, for CoTW-2 from the adjacent occupied work areas was not implemented.

The AIB found no evidence a daily AHA was prepared by ETMC or Davey for this tree felling activity The ETMC STARRT Card listed a date range of "8-7 thru 8-11 – 2023" and contained a checklist for applicable personal protective equipment (PPE) to be worn during tree felling activities. The PPE checked for this work by ETMC personnel was hard hat, boots, glasses, vest, hearing protection, gloves, and fall protection. The AIB found evidence that all PPE was available and worn by Davey personnel with the exception of fall protection, which although available, wasn't needed at the time of the tree felling activity. The ETMC STARRT Card did not list any additional controls to be implemented during this task.

The AIB found no evidence the Residential Operations Job Plan/Briefing was completed for work performed on August 11, 2023. The Board was provided a Job Plan/Briefing for work performed on August 8, 2023, and August 9, 2023. The Purchase Order did not contain any work control information relevant to the specific tree felling activity-level work performed.

The AIB found no other evidence of an activity-level work control document containing formal controls to be implemented during the tree felling activity. The Board concluded that work performed by CoTW-1 and CoTW-2 was done as skill-of-the-craft, which is defined as "the discipline-specific skills, possessed by craft, which can be performed properly without written instructions[4]." Any controls (other than PPE) ultimately used during the performance of this task were informal (i.e., verbally issued) and solely based on the training and experience of the Davey personnel to adequately plan the work in the field according to recognized hazards.

**Analysis:**

Hazard controls are listed in a high-level document like the Davey JHA. These documents typically are not intended to deliver the means and methods to address the hazards on the day of the work. Instead, a more detailed AHA (or similar document) would be used the day of work to better identify hazard controls and then work within those controls for each day of work.

No written Davey Job Brief (AHA equivalent) for work performed on August 11, 2023, was documented or provided to the Board. Because of this, it is not clear if work performed by Davey workers was performed as expected for the specific hazards involved for the removal of the dead limb.

Though an August 11, 2023, Davey Job Brief was not provided to the Board, evidence suggests CoTW-1 was wearing appropriate PPE, for the tasks that day, including a Davey issued Petzl helmet. Helmets are tested according to ANSI Z89.1 requirements to meet a force transmission of 1,000 lbf. The 10-foot part of the dead limb that struck CoTW-1 weighed ~ 50 pounds. Based on the weight and distance travelled, it generated an estimated force to the helmet well in excess of the ANSI-Z89.1 requirements (See figure 3-2) and split after the dead limb piece made contact with the helmet.

[4] DOE-HDBK-1211-2014, "DOE Handbook Activity-Level Work Planning and Control Implementation"


**Figure 3-2. Split to Helmet after the Dead Limb Piece Made Contact (photo taken by ORPD)**

On August 31, 2023, the AIB consulted with arborists at the accident scene to evaluate the cuts made to the base of the dead limb. Figure 3.3 represents a recreation of the cuts as if the dead limb is still in place during the final cut. Figure 3.4 shows numerous cuts to the dead limb including an open face cut with limited "hinge" remaining on the stump, (see arrow in figure 3.4). Figure 3.5 illustrates the expected number and type of cuts (described in ANSI Z133-2017) utilizing an open face notch and back cut with sufficient hinge to fell the dead limb.

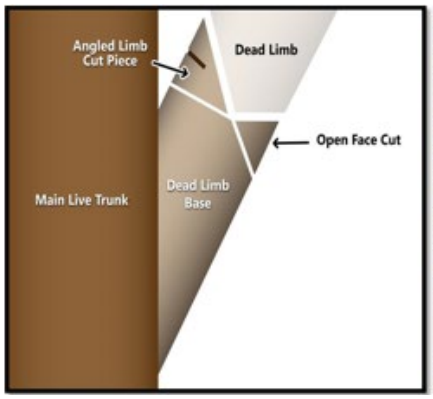



**Figure 3.3 Limb Recreation Cut**


**Figure 3.4 Numerous Cuts**

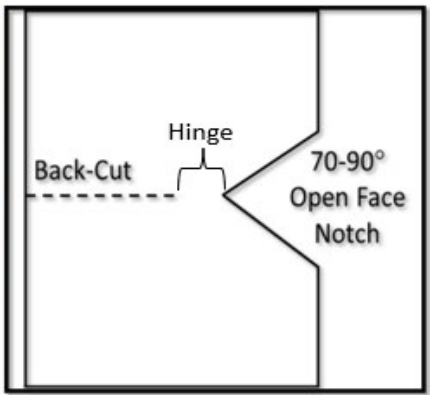



**Figure 3.5 Proper Open Face**

ANSI Z133-2017 describes tree felling operations per the following sections:

8.6.13:

*"When manually felling trees, notches and back cuts shall be made at a height that enables the chain saw operator to safely begin the cut, control the tree or trunk, and have freedom of movement toward a retreat/escape path."*

8.6.13.5:

*"Saw cuts made to form the notch and back cut shall leave suitable* ***hinge wood*** *to adequately control the fall of the tree."* (text was bolded for emphasis)

8.6.13.6:

*"With an open-face notch (greater than 70 degrees), the back cut should be at the same level as the apex of the notch. With a conventional notch or Humboldt notch, the back cut shall be 1 to 2 inches (2.5 to 5 cm) above the apex of the notch to provide an adequate platform to reduce kickback potential of the tree or trunk."*

Based on consultation with tree industry arborists and physical evidence, the Board concluded the manual method chosen to cut the dead limb does not appear to follow industry practices and standards for tree felling.

Additionally, there was a small dead Hickory tree in between the White Oak and Hickory trees the Davey workers were trying to lower the dead limb between. According to the consulting arborists the AIB engaged, this small Hickory was an obstacle to safely perform this task and may have directed the dead limb into the live Hickory tree. After the final cut to the base of the dead limb was made, the dead limb base landed on the ground and the top of the dead limb came to rest against that Hickory tree. In this configuration, the dead limb broke into three pieces. The top piece of the limb that broke fell and struck CoTW-1.

Furthermore, the dead limb had been identified as an "imminent threat" in both the September 2016 and May 2023 Draft Cemetery Hazard Tree Designation reports. The dead tree limb remained in place for seven years before the attempt to remove it in 2023 was initiated utilizing a rigging "work line" (per ANSI definitions) and a tag line. However, according to ANSI Z133-2017 section 8.5.1:

"*Arborists performing rigging operations shall inspect trees for their integrity to determine whether the trees have any visible defect that could affect the operation. If it is determined that the tree poses a risk of failure due to the forces and strains that will be created by the design of the rigging operation, an alternate plan shall be used*."

Evidence collected by the board plus visual inspection by the AIB consulting arborists all confirmed there were obvious and severe visual defects and rot throughout the entirety of the dead limb.

ANSI Z133-2017 8.5.9 states,

"*When establishing a rigging point horizontally distant from the parent limb or main tree stem, the arborist should consider the need to provide additional support to help disperse the force of the proposed rigged load*."

In this instance, there was only one line rigged approximately 40 feet up from the base of the ~57-foot-long dead limb. No rigging lines were provided for the upper part of the dead limb.

Adequate escape routes were not considered nor provided per ANSI Z133-2017, Section 8.6.5.1. Therefore, CoTW-1 could not have utilized an adequate escape route after the final cut was made.

The Board was not provided with any evidence that the steps of the Davey tree felling plan were completed. Since no documentation was provided to the Board for work performed on the day of the accident, the Board concludes the work was performed relying on skill-of-the-craft by workers who may not have been fully capable to perform the work within controls as described in ANSI Z133-2017.

**Identified Causal Factors:**

1. Though hazards were identified, controls to mitigate those hazards were not brought forward into the work planning and control process (CF-1)

2. ETMC had no controls or other avenues in place to ensure their subcontractors were implementing 10 CFR 851 requirements during the performance of work. (CF-3)

3. OSO and ORR failed to verify that ETMC and their subcontractors were implementing 10 CFR 851 requirements during the performance of work. (CF-5)

4. Minimal oversight of ETMC and their subcontractors (CF-6)

5. Unclear R2A2s for the RM Manager to provide safety oversight once they transitioned to the OSO. Since the RM Manager was an SES, OSO did not feel the need to provide specific direction, therefore there was no regular ongoing oversight of RM operations by OSO safety staff. Safety oversite conducted only when requested. (CF-7)

6. Risks identified in the report, were not collectively reviewed and subject to oversight by OSO, RM, and ETMC. This resulted in the less than adequate planning and execution of the work commensurate with the risk. (CF-10)

7. Hazards and requirements were identified, however, neither were formally brought into work planning and control processes. (CF-12)

8. Though hazards were identified by Davey, ETMC failed to seek additional guidance or strengthen controls to ensure those hazards were appropriately mitigated. This resulted in Davey utilizing a broad Job Hazard Analysis as their work planning and control process. (CF-14)

9. ETMCs work planning and control process lacked a disciplined and rigorous review to ensure that subcontracted work adequately defined the scope of work, identified and analyzed the hazards, and implemented the controls necessary to mitigate the associated risks. (CF-20 and RC-1)

### *3.2.5 Feedback and Improvement*

**Facts:**

On September 28, 2021, Davey personnel were involved with the clearing of tree limbs as part of their assigned road and grounds maintenance work activities. For this task, Davey personnel deviated from their assigned scope of work and utilized a woodchipper. A Davey employee became entangled with a tree limb being fed into the chipper and had to activate the emergency e-stop to avoid being pulled into the chipper. ETMC initiated a Safety Stand Down until a review could occur with Davey. ETMC changed its work orientation to specify what equipment was expected to be used on the job site. If changes were required, they would be documented on the STARRT card and signed off. Additionally, the DOE CO issued a formal Stop Work order at the request of RM. The AIB could not find evidence that any effective corrective actions were completed to prevent recurrence of this or similar accident, scope deviation issues, or of lessons learned being incorporated into subsequent work planning documents.

DOE O 226.1B Chg. 1 (Admin Chg.), *Implementation of Department of Energy Oversight Policy*, states that applicable DOE line organizations must assess contractors' Contract Assurance Systems (CAS) through operational awareness activities, assessments, and performance evaluations. Other than the Stop Work order issued by the DOE CO, there is limited evidence that Site Office personnel were aware of feedback from this event or were aware of a corrective action plan implemented to prevent recurrence of this issue. Interviews with OSO management other than the RM Assistant Manager indicated they were not aware of the previous woodchipper accident. No Occurrence Reporting and Processing System (ORPS) report was generated for this accident. Prior to the accident addressed in this report, an organization code did not exist to report Oak Ridge Reservation events into ORPS.

Additionally, on June 30, 2023, there was an accident where an ETMC worker deviated from the approved the work scope and used heavy equipment to move some soil and inadvertently dug up an energized electrical line. An undated, unsigned "Corrective Action Plan with supporting documents" was provided to the Board. An attached accident report also was provided that detailed circumstances that led to damaging the buried electrical conduit. A formal ORPS report was not submitted for this event. There were four corrective actions listed for ETMC to take to "*raise awareness to staff and help prevent future accidents*." The corrective actions focused solely on establishing a

designated work zone and ensuring that workers do not perform activities that extend outside the work zone. There is also a JHA and Electrical Safety Program attached to the Corrective Action Plan. However, contrary to what is stated in the Plan, there is not an AHA attached that is specific to the work done that day.

The ETMC WSHP identifies the role of the Quality Assurance (QA) Representative. Per Section 4.7, a QA Representative is responsible to, "*perform assessments and surveillance of the project activities as necessary*," and "*reviews reports and external QA audits and surveillances and develops corrective action as necessary*."

The AIB found no evidence of assessments conducted by ETMC regarding any road and grounds work including tree felling activities. Additionally, the AIB found no evidence of an ETMC corrective action program.

Feedback and oversight provided by OSO Staff are outlined in Section 3.5 of this report. This includes an overview of the operational awareness activities conducted by OSO Staff assigned to managing the ORR. Additionally, feedback provided by the CSC CO is also included in Section 3.5, specifically performance evaluations of ETMC found in annual Contractor Performance Assessment Reports (CPARs).

**Analysis:**

The DOE/OSO did not provide clear Roles, Responsibilities, Authority and Accountability (R2A2s) to staff for safety oversight of RM operations when ORR responsibilities transferred to OSO in late 2019. Additionally, not all responsibilities related to RM were transferred as the CO responsibilities remained within the CSC. OSO responsibilities for safety oversight are identified in OSO Procedure (OSOP) 226. Because no clear R2A2s for OSO safety staff were in place for ORR operations, safety support was only provided to OSO/RM staff by request. This support was limited to a few specific tasks including a diving operation for a bridge inspection, communications tower work involving climbing, and uninterruptable power supply generator chassis work. Additionally, OSO did not perform annual reviews as required by 10 CFR 851 of the contractor and subcontractor WSHP. They also did not affirm the receipt of contractor provided documentation of no changes needed in the WSHP. Therefore, OSO did not identify and assess the addition of hazardous work involved in tree trimming/felling work.

Opportunities were missed by OSO to provide feedback and improvement after the two significant accidents occurring during reservation work. The first was on September 29, 2021, where Davey workers made a change to the approved work scope and used a chipper to grind up branches. During the work, a Davey employee became entangled with a tree limb being fed into the chipper and had to activate the emergency e-stop to avoid being pulled into the chipper blades. The second was the June 30, 2023, accident where an ETMC worker deviated from the approved the work scope and used heavy equipment to move some soil and inadvertently dug up an energized electrical line.

No information was provided to the Board to suggest that OSO effectively followed up on these events, thus resulting in missed opportunities to provide feedback and improvements to the contractors. Both events demonstrated deficiencies in work planning and control implementation that needed a systemic program review to investigate. Additionally, OSO Operations Division safety staff did not do periodic checks or assessments of ORR reservation contractor and subcontractor work as required by DOE O 226.1B Chg. 1 (Admin. Chg.) to ensure work was proceeding safely as required in the provisions of 10 CFR 851, ANSI Z133-2017, and ANSI A300. OSO operations division safety staff did not attend pre-job briefings and did not review documents such AHAs, permits, etc. Because of this there were missed opportunities to provide feedback on the use and quality of work documents designed to help workers perform tasks safely.

The Board found no evidence ETMC followed the requirements of their WSHP section 6.1, *Employee Feedback and Continuous Safety Improvement*. There is no evidence ETMC performed management assessments, periodic independent assessments by personnel (including subcontractors), and evaluations of work at regular intervals. Had these assessments been done ETMC may have noticed the STARRT cards were not being used appropriately as a daily planning tool, were not being reviewed and signed by all workers and lacked sufficient detail to properly address the hazards for tree trimming/felling activities.

**Identified Causal Factors:**

1. ETMC had no controls or other avenues in place to ensure their subcontractors were implementing 10 CFR 851 requirements during the performance of work. (CF-3)

2. Clear roles for DOE RM Engineers were not defined to establish effective oversight of ORR Contractors, subcontractors and the associated planning and control of work (CF-4)

3. OSO and ORR failed to verify that ETMC and their subcontractors were implementing 10 CFR 851 requirements during the performance of work. (CF-5)

4. Without feedback provided from ETMC, Davey became inconsistent in their administrative documentation of pre-job work activities. (CF-21)

5. This boiler plate form fails to capture and communicate the hazards and associated controls identified in the Davey AHA, specifically, the six precision steps of tree felling plan. (CF-22)

6. ETMCs plan of day had devolved to a point where little to no value was provided in; adequately defining the scope of work for all of those involved with executing it for the day; identifying and analyzing the hazards associated with the work to be performed that day and failed to adequately communicate the controls in place and necessary to mitigate the risks associated with the work planned for the day. (CF-23)

7. Davey failed to adequately communicate known hazards and risks associated with the work, and ensure mitigation measures commensurate with the risk were in place and understood by those responsible to execute the work. (CF-24 and RC-2)

### 3.3. ETMC Oversight (including Subcontractor Oversight) Program

**Facts:**

ETMC's contract with OSO requires ETMC to follow the requirements of 10 CFR 851. ETMC submitted a 10 CFR 851 WSHP which was approved in 2019 by the CSC prior to RM functions transferring from the CSC to OSO. In the ETMC's WSHP, Section 4.4 states the Health and Safety Director is to perform oversight of field work activities. Also, Section 4.5 states the Project Manager is responsible for project oversight inspection, coordination, and review of subcontractor activities. In Section 4.6, the plan states the Operations Manager is to perform oversight of subcontractors. In Section 6.0, Analyze Hazards states work is conducted with the level of oversight determined by the degree of hazard. Based on the interviews, field oversight observations may have been discussed verbally without any documentation by ETMC personnel.

The DOE Contract with ETMC, with an effective date of May 24, 2018, includes references to Federal, State, and local laws. According to the contract, ETMC is required to flow down those requirements to its lower-tier subcontractors where appropriate. Specifically, Section H of the contract, *Special Contract Requirements*, includes clause DOE-H-2053, *Worker Safety and Health Program In Accordance With 10 CFR 851* (OCT 2014), paragraph (a) states, The Contractor shall comply with all applicable safety and health requirements set forth in 10 CFR 851, Worker Safety and Health Program, and any applicable DOE Directives incorporated into the contract. Also, Section H, paragraph (f) of the contract states, "*The Contractor shall flow down the requirements of this clause to all subcontracts at any tier.*"

Also, 10 CFR 851.10 (a) states *"With respect to a covered workplace for which a contractor is responsible, the contractor must: (1) Provide a place of employment that is free from recognized hazards that are causing or have the potential to cause death or serious physical harm to workers;"*

Although 10 CFR 851 requirements were contained in the ETMC Contract, 10 CFR 851 requirements were not flowed down to the Davey subcontract.

The two price proposals provided by Davey state "*All work is to be performed in accordance with American National Standards Institute (ANSI) Standard Practices for Tree Care Operations."*

The 10 CFR 851 requirements invoke ANSI requirements. The Davey proposal requires ANSI Z133-2017, *Safety Requirements for Arboricultural Operations,* as a requirement for this work.

**Analysis:**

The contract between DOE and ETMC has clear provisions to contractually flow-down requirements of 10 CFR 851 including safety requirements to their subcontractors. The ETMC Worker Safety and Health Program had been approved by CSC, however, the subsequent flow-down of those safety requirements were not flowed down in ETMC's contract with Davey to execute the work being performed. Barring this action, Davey was left operating to their own procedures and requirements.

ETMC did not provide the "*project oversight inspection, coordination, and review of subcontractor activities*" required by their WSHP. Since these oversight activities were not conducted by ETMC, there were no opportunities to identify gaps in systemic safety performance, identify associated corrective actions and, ultimately, ensure continuous safety improvement actions are taken to prevent injuries. The lack of effective corrective actions taken in response to the two accidents involving Davey and ETMC employees suggest the work planning and control issues gaps could not be adequately addressed.

**Identified Causal Factors:**

1. ETMC had no controls or other avenues in place to ensure their subcontractors were implementing 10 CFR 851 requirements during the performance of work. (CF-3)

2. Minimal oversight of ETMC and their subcontractors. (CF-6)

3. Hazards and requirements were identified, however, neither were formally brought into the work planning and control processes. (CF-13)

4. Though hazards were identified by Davey, ETMC failed to seek additional guidance or strengthen controls to ensure those hazards were appropriately mitigated. This resulted in Davey utilizing a broad Job Hazard Analysis as their work planning and control process. (CF-14)

5. Without feedback provided from ETMC, Davey became inconsistent in their administrative documentation of pre-job work activities. (CF-21)

6. This boiler plate form fails to capture and communicate the hazards and associated controls identified in the Davey AHA, specifically, the six precision steps of tree felling plan. (CF-22)

### 3.4. Training and Qualification

**Facts:**

CoTW-1 completed the Davey *"Qualified Residential Arborist "C" Training*" book as part of the "*Davey Career Development Program."* CoTW-1 successfully passed the Davey "Residential Arborist Safety Test" as documented on April 11, 2023.

A review of CoTW-1's *"Qualified Residential Arborist "C" Training*" book showed three training requirements were not initialed, however, the overall sections were signed by CoTW-1, the Davey Crew Leader and Manager. The Davey Regional Safety Specialist also initialed the bottom of each section. With the completion of the Arborist C Training, CoTW-1 was considered to be a fully qualified arborist by Davey.

Even though CoTW-1 completed the Davey "*Qualified Residential Arborist "C" Training,"* they are not listed as a Certified Arborist with the International Society of Arboriculture (ISA). A member of the DOE AIB called to verify this with ISA on September 12, 2023, and ISA confirmed this information. DOE, OSHA, the State of Tennessee, and ANSI do not require an ISA Arborist to perform tree trimming/tree removal work, however, the Davey website advertises they employ ISA Certified Arborists.

CoTW-2's "*Qualified Residential Arborist "C" Training Employee*" record/book which is part of the "*Career Development Program,*" documents CoTW-2 began employment with Davey on June 5, 2023, and had two months of prior tree care/felling experience with a separate tree service company. It is germane to the investigation that CoTW-2 completed the Davey First Aid/CPR & Emergency Response Course June 6, 2023.

A copy of CoTW-2's qualification book was reviewed; however, it did not provide pages 3, 4, and 5[5]. These pages document the following:

- p.3 "Manager's Responsibilities"
- p.4 "Employee's Responsibilities"
- p.5 "Crew Leader's/Trainer's Responsibilities"

*Note: This information was taken from CoTW-1's "Residential Arborist "C" Training" book as it is the same revision, July 2012.*

CoTW-2 began working for Davey June 5, 2023, and had two months of previous tree care/felling experience with another company according to the individual's Davey "*Qualified Residential Arborist "C" Training Employee"* book. CoTW-2 started but had not completed all sections in the ground work portion of the "*Qualified Residential Arborist "C" Training"* and was working as a "Trimmer Trainee" until completion of the qualification. Davey expectations for completion time of the "*Qualified Residential Arborist "C" Training" is approximately 6-months.*

Information was not provided to the Board documenting if Davey employees were trained on the ETMC WSHP, the use of ETMC AHA, use of the Davey JHA and ISMS.

[5] The pages were requested by the Board but not provided.

CoTW-1 attended a January 2023 tailgate that included "All Stop," however CoTW-2 was not employed by Davey in January 2023 and had not completed "All Stop" prior to the accident.

Both CoTW-1 and CoTW-2 completed several other Davey training courses which are identified in Appendix C.

ETMC's employees' training records were reviewed and showed no documented training on tree trimming, chain saw safety, or arboriculture. No documentation was provided demonstrating ETMC employees were trained in AHA or JHA use, the ETMC WSHP, ISMS and Stop Work Authority.

The review of training records for the Federal staff indicated the DOE RM Engineer completed the Occupational Safety and Health Administration (OSHA) 10-hour Occupational Safety and Health Training Course in Construction Safety and Health on July 20, 2015. No other OSHA training was documented for any of the DOE RM staff.

**Analysis:**

Though working on his Davey "*Qualified Residential Arborist "C" Training*" qualifications, CoTW-2 had not completed all portions of training on "ground work" prior performing groundwork on August 11, 2023. However, CoTW-2 was assigned to "ground work" and rigging duties the day of the accident. It is not apparent to the Board what specific training or supervised on-the-job experience Davey requires prior to working in the field.

The ETMC Subcontractor's Orientation requires subcontractors to be trained on the ETMC WSHP, however, no documentation was provided to the Board for review. It is not apparent to the Board that ETMC effectively trained and flowed down the requirements of their WSHP to Davey.

Though the ETMC WSHP Section 3.0, *Training*, requires subcontractors be trained on the core functions and guiding principles of the Integrated Safety Management System (ISMS), the training records reviewed provided no documentation that the Davey and ETMC personnel were trained in ISMS.

The lack of AHA and JHA training documentation for both Davey and ETMC employees illustrates the potential that AHA's and JHA's were not effectively utilized for the implementation of ISMS Core Functions. Additionally, there is no documentation that Davey employee CoTW-2 and ETMC employees were trained on Stop Work Authority (All Stop for Davey) as discussed in the WSHP. It is unknown if these employees would have used their Stop Work Authority on August 11, 2023, based on perceived conditions. The lack of training documentation and verification demonstrates a less than effective implementation of 10 CFR 851.25, WSHP training and information requirements.

**Identified Causal Factors:**

1. ETMC had no controls or other avenues in place to ensure their subcontractors were implementing 10 CFR 851 requirements during the performance of work. (CF-3)

2. OSO and ORR failed to verify that ETMC and their subcontractors were implementing 10 CFR 851 requirements during the performance of work. (CF-5)

3. Hazards and requirements were identified, however, neither were formally brought into work planning and control processes. (CF-12)

### 3.5 Site Office Oversight

**Facts:**

OSO's organization structure includes a Manager and Deputy Manager with three organizations subordinate to the Deputy Manager - the Mission Integration and Projects Division, the Operations Division, and the Business Division. This structure is generally consistent with that used by Site Offices for the remaining nine SC national laboratories. However, the OSO organization also includes a fourth organization – Reservation Management. The Assistant Manager for RM reports directly to the OSO Manager rather than to the Deputy Manager as is the case for the other three OSO elements. There were vacancies, at the time of the event, within OSO's organizational structure/approved staffing plan (See organization chart in Figure 3-6 below).

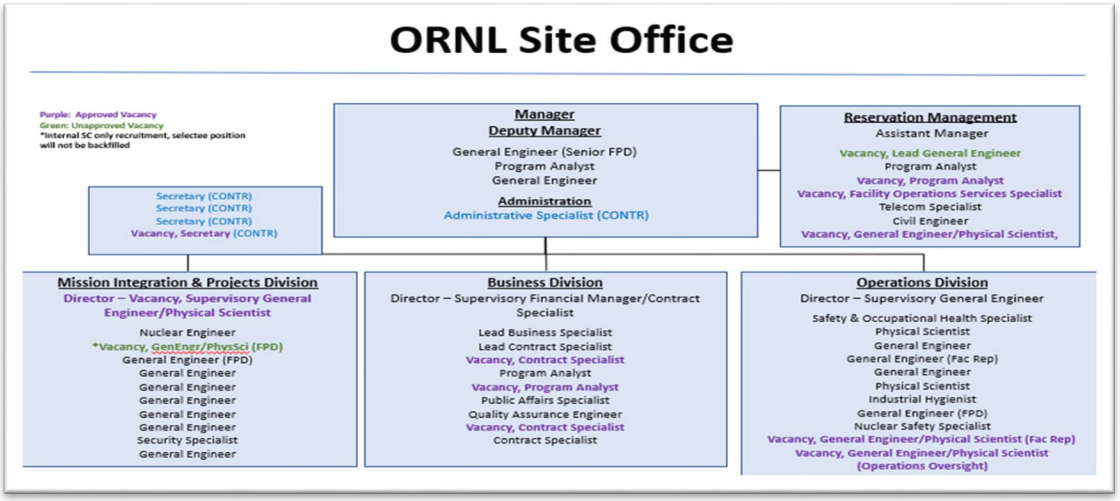



**Figure 3-6. OSO Organizational Chart**

The Operations Division staff provides day-to-day oversight of ORNL contractor operations in addition to performing environment, safety, and health (ES&H) and quality evaluations, audits, and assessments in accordance with DOE and OSO Manager policies and requirements. Oversight areas include safety and health programs, contractor

assurance, safety basis implementation, environmental and waste management, training, quality assurance, transportation, security, and facility startup/restart.

The Business Division provides oversight of business and Prime Contract functions and activities for the Prime Contracts with ORNL and with ORISE, including all activities which require support by a DOE CO. However, all RM activities which require CO actions are executed by qualified COs within the CSC organization rather than OSO.

OSO has a suite of internal procedures to facilitate their delivery of SC's mission objectives and responsibilities. At a high level, OSO responsibilities for safety oversight are identified in OSO Procedure (OSOP) 226. Specifically for worker safety and health programs and implementation, OSO responsibilities include contractor performance evaluation, performing federal oversight self-assessments, and tracking corrective actions and verification of closure when completed. Additional responsibilities for program areas including 10 CFR 851, DOE Corporate Operating Experience Program (DOE Order 210.2A), and ES&H Reporting are assigned to OSO's Operations Division Director, as well as other program responsibilities such as ES&H Oversight (DOE Order 226.1B).

Section 2.1.1.2 of OSOP 226 describes specific field oversight responsibilities for all major job classifications within the Site Office, including Management, Federal Project Directors (FPDs), CO's, Facility Representatives, and Subject Matter Experts (SME). An OSO Director Memorandum, *Oak Ridge National Laboratory Site Office (OSO) Field Monitoring Expectation,* dated February 15, 2021, provides the periodic field oversight expectations for OSO staff positions as described in Figure 3-7 below.

| Field Monitoring Minimum Frequency | Position |
|---|---|
| Weekly | Facility Representatives<br>Project Directors/Coordinators with projects in the construction phase |
| Bi-weekly | Environment, Safety and Health Subject Matter Experts |
| Monthly | Technical Staff<br>Contracts/Business Staff<br>OSO Management |

**Figure 3-7. Periodic Field Oversight Expectations for OSO Staff Positions**

Additionally, OSOP 226, Section 2.1.2.1.1, states:

> "*Assessments will be planned and scheduled based on requirements, analysis of hazards and risks, past performance, and effectiveness of contractor assurance systems for organizations, facilities, operations, and programs.*"

At the time of the accident, there were two OSO RM staff members and one Assistant Manager providing primary oversight of ORR activities. Historically, the RM staff has

obtained additional SME support from the other OSO divisions to assist with projects having unique hazards associated with contracted work (i.e., bridge inspections, diving operations, tower climbing, etc.). Oversight of ORR work is primarily accomplished through field monitoring activities conducted on a weekly basis by RM staff. In these instances, RM staff observe work and document their reviews of contractor (and subcontractor) performance as a formal log entry in the OSO Operational Oversight database. However, interviews with RM staff indicated they had not conducted formal assessments of ETMC as outlined in OSOP 226, Section 2.1.2.1.1. Interviews with the OSO Operations Division staff indicated ORR activities were not part of their EH&S oversight responsibilities. They would assist RM staff if requested, however, the scope of their EH&S assessments did not include ORR contractor or subcontractor work.

The CO for the ETMC contract submitted CPARs annually evaluating the adequacy of ETMC's execution of their Prime Contract with OSO, primarily the maintenance of ORR roads and grounds. The evaluation areas covered in the CPARs were quality, schedule, cost control, management, and regulatory compliance. "Regulatory Compliance" is the evaluation area associated with adherence to OSHA safety standards. ETMC was rated as "Exceptional" for the past four annual evaluations for regulatory compliance with the exception of the 2019-2020 CPARs which rated ETMC as, "Very Good." The CPARs evaluation during the reporting period when ETMC and Davey had the accident with the wood chipper, as described in Section 3.2.5, gave a rating as "Exceptional" despite the noted flaws in adherence to ISMS principles.

**Analysis:**

10 CFR 851 requires annual approval of the prime contractor WSHP or the receipt by DOE of a contractor affirmation of no changes in the WSHP. The OSO did not review the ETMC WSHP once RM activities transferred from the CSC to OSO in 2019 nor affirm the receipt of contractor required annual notification. OSO did not recognize Task Order# 89243123FSC400553 introduced the new hazard of tree trimming/felling and did not realize ETMC's WSHP did not include these hazards or mitigations for these hazards.

The RM staff did conduct routine work observations of the Roads and Grounds activities as outlined in OSOP 226. The nature of these work observations was limited to visual confirmation of employees wearing appropriate PPE, posting of appropriate safety signage, etc. A detailed ISMS review was not conducted for any of these activities other than "performing work within controls." Interviews with OSO Senior Management indicated OSO oversight is scheduled and conducted according to a graded approach.

With very few minor exceptions, OSO operations division subject matter experts did not conduct any oversight activities related to ORR work. A programmatic look at the ETMC work planning and control performance did not occur during the full six-year performance period of the contract. Although this level of oversight matched the graded approach desired by OSO management, it was not an effective approach based on the serious safety hazards inherent in the scope of work assigned to ETMC. Furthermore, OSO staff had the subject matter expertise necessary to identify the ETMC and Davey work planning and control weakness outlined in the analysis in Section 3.2 of the report

but was not used effectively to oversee ETMC and Davey work planning and control. The formal observational awareness activities conducted by RM staff and the CPARs generated by the Contracting Officer only focused on daily PPE use and adherence to general OSHA requirements respectively, as their performance criteria.

In particular, the two prior accidents involving Davey and ETMC employees disregarding their assigned scope of work represented an opportunity missed to determine gaps in the work planning and control programs and implementation. These gaps were allowed to exist due in part to ETMC's lack of adherence to oversight responsibilities outlined in their own WSHP to provide, "project oversight inspection, coordination, and review of subcontractor activities." Tree felling activities are inherently hazardous work with the potential to cause fatal injuries like those related to this accident.

**Identified Causal Factors:**

1. Clear roles for DOE RM Engineers were not defined to establish effective oversight of ORR Contractors, subcontractors and the associated planning and control of work (CF-4)

2. OSO and ORR failed to verify that ETMC and their subcontractors were implementing 10 CFR10 CFR 851 requirements during the performance of work. (CF-5)

3. Minimal oversight of ETMC and their subcontractors (CF-6)

4. Risks identified in the report, were not collectively reviewed and subject to oversight by OSO, RM, and ETMC. This resulted in the less than adequate planning and execution of the work commensurate with the risk. (CF-10)

5. The task order identified the need for removal of hazardous trees, however, OSO failed to verify that adequate controls to mitigate those hazards had been identified through the ETMC work planning and control process and appropriately flowed down to Davey. (CF-15)

## 4.0 CAUSAL ANALYSIS AND RESULTS

### 4.1 Events and Causal Factors Analyses

The Board used several analytical techniques to determine the causal factors of the accident, including Barrier Analysis, Change Analysis, and Event & Causal Factors Analysis. Causal factors are events or conditions necessary to produce or contribute to the accident.

The Board assessed each of the causal factors, categorizing them as either direct, contributing, or root causes. The direct cause is the immediate event or condition that caused the accident. Contributing causes are the events or conditions that collectively increased the likelihood or severity of the accident but did not individually cause the

accident. Root causes are the most basic events or conditions that if eliminated or modified would prevent recurrence of the same or similar accident. The direct, contributing, and root causes, as defined in Figure 1-2, Accident Investigation Terminology, are included at the end of this section.

Based on the causal factors, the Board identified Conclusions (CONs) from which it developed Judgments of Needs (JONs). The CONs and JONs are documented in Section 5.0 of this report.

### *4.1.1. Barrier Analysis*

The purpose of Barrier Analysis is to identify hazards associated with a target in an accident and the barriers that should have been in place to prevent the accident from occurring. For an accident/event to occur, there must be an exposure of the hazard to the target (worker). A hazard is the potential for unwanted energy flow that results in an adverse consequence. A target is a person or object that a hazard may damage, injure, or fatally harm. A barrier is any means used to control, prevent, or impede the hazard from reaching the target, thereby reducing the severity of the resultant accident or adverse consequence. Barriers are a part of a system or work process to protect personnel and equipment from hazards.

When an accident occurs, a hazard comes in contact with a target because barriers either did not exist, were not used, or were not effective in mitigating the hazard.

The Board identified multiple barriers designed to mitigate this event (accident) and similar accidents from occurring. The analysis acknowledged several causal factors related to these barriers. However, some barriers were not adequate to provide for a level of defense-in-depth in the event one or more failed. Though not exhaustive, specific examples of key barriers include:

1. ETMCs Environment, Safety and Health 10 CFR 851 Worker Safety and Health plan (9-12-2018 Rev 3)

This barrier is designed and required to ensure contractors working for DOE sites, provide a place of employment free from recognized hazards causing or having the potential to cause death or serious physical harm to workers. ETMCs WSHP was submitted and approved by CSC for the work being performed for Reservation Management, however, several gaps were identified as noted below:

- No evidence was available to confirm that ETMC policies and objectives of their WSHP requirements were communicated to all subcontractors, nor how or if, they were being implemented by subcontractors working on ETMC projects.
- No evidence indicated ETMC conducted routine audits or ad hoc documented inspections to either verify the subcontractor's DOE approved WSHP consistently met the needs of ETMC projects, or in the absence of, that subcontractors were implementing and complying with ETMCs 10 CFR 851 WSHP requirements.

Even though OSO did not initially approve ETMCs WSHP, they assumed responsibility and had cognizance over the plan upon transfer from CSC. Overall, OSO, RM and ETMC failed to verify if Davey was working to and implementing their own DOE approved WSHP or were working under ETMCs WSHP (see Barrier Analysis, Appendix E for additional analysis).

2. Work Planning and Control Documents

ETMC does not utilize a prescribed work planning and control procedure in which the development, review and approval of a given work package undergoes a specific and routine process. In this case, various documents (barriers) were used to plan and control the work, however, they were not individually or collectively capable of identifying the hazards and implementing the controls necessary to mitigate the hazards. These include but are not limited to the following:

***a) Draft Cemetery Hazard Tree Designation reports (September 2016 and May 2023):***

Both reports identified potential hazard trees (58 trees in September 2016 and 38 in May 2023) as presenting an imminent or likely risk of failure. The hazardous tree involved with this event (QUCO2) was identified in both reports, however, QUCO2 was never called out in any associated work order, AHA or Job Hazard Analysis.

***b) Davey Job Hazard Analysis:***

This 10-page document identifies in part, a six step of precision tree felling plan, to account for escape routes, notch and hinge plan and back cut plan, however, none of these were brought forward into an equivalent AHA for the day of the job.

***c) Davey Residential Operations Job Plan / Briefing:***

It is the expectation of Davey, this form be completed prior to each workday, with the local office retaining the briefings for a rolling 90 days. This form, if used properly, would enable everyone on the site to understand the job description, hazards, and safeguards/controls in place to mitigate the associated risks with the tasks for the day. This form was completed and available for work performed on August 8 and August 9, 2023. Although the AIB requested a copy of this form for the work performed on August 11, 2023, it was not provided.

***d) ETMC Safety Task Analysis Risk Reduction Talk (STARRT):***

IT is the expectation of ETMC, that the STARRT card be reviewed and acknowledged by workers prior to starting work for the day. However, completing this card appears to have been (or became) more of an administrative, low value task than a viable tool in which both ETMC supervisors and workers could use in identifying and discussing daily, safety-related aspects for each job.

Appendix E contains a detailed description of these and additional barriers the Board identified and determined to be ineffective.

### *4.1.2. Change Analysis*

Change analysis examines planned or unplanned changes that cause undesired results or outcomes. Change is anything that disturbs the balance of a system operating as planned. Change can be planned, anticipated, and desired, or it can be unintentional and unwanted. The Change Analysis process compares the difference between what is normal (or ideal) and what occurred.

The Board analyzed multiple changes identified during the investigation, which are detailed in the Change Analysis Worksheet contained in Appendix D. However, the following key changes are summarized as provided below:

***1. Contract oversight of Reservation Management shifted (changed) from the CSC to OSO***

This shift in oversight did not allow the opportunity for OSO personnel to gain a full understanding of RM roles and responsibilities. Without it, OSO was unable to establish clear expectations as to how RM would observe work, conduct assessments, or provide feedback down to subcontractors or back up to DOE. OSO became reliant on previously existing RM processes and procedures in place, specifically work planning and control, with an assumption they were adequate to safely complete the work.

***2. Activity Hazard Analysis***

Neither ETMC nor Davey had completed a written AHA for the work performed on August 11, 2023. Though ETMC had filled out a STARRT card (see Barrier Analysis), it was less than adequate in sufficing as an AHA. Additionally, the Davey Job Brief (equivalent AHA) was not completed or acknowledged by the Davey workers assigned to the task that day. This left personnel on-site that day, to identify their own perceived risks and develop their own mitigation plans without any supervision or oversight.

***3. Job Location***

The work being performed that day did consider and account for the cultural sensitivities inherent with a cemetery. In this case, the hazardous tree (QUCO2) was located approximately two feet outside the rear, perimeter fence line of the Lindsay-Bleu cemetery. Though heavy equipment (i.e., bucket truck, backhoe, etc.) was available to aid in removal of the dead tree limb, it would have required operators to drive over sacred areas of the cemetery. This may have resulted in the dead tree limb being felled manually, which in turn, introduced a higher risk. The

introduction of increased risk was not fully accounted or planned for during the work planning and control process regardless of rigor applied.

***4. Time and Weather***

QUCO2 was identified as a hazardous tree back in September 2016. The 2016 Draft Cemetery Hazard Tree Designation report noted that "*Tree failure can result from the interaction of defects, weather factors, ice or snow loading and/or exposure to ordinary wind and weather conditions. Defects are flaws in a tree that reduce its structural strength.*" Time and weather allowed these interactions to take place for nearly seven years.

Even though financial and contractual limitations are unknown, there is nothing available to understand how the associated risks with this tree (QUCO2) were managed prior to and up to its actual removal. Additionally, there is no evidence to indicate that the increased hazards associated with this tree due to time and weather, were accounted for in any available work planning and control documents.

***5. Jobsite Conditions***

Based on consultation with arborists and physical evidence, the Board has concluded the manual method chosen to cut the dead limb does not appear to follow ANSI practices and standards for tree felling.

### *4.1.3 Events and Causal Factors (ECF) Analysis*

An ECF analysis was performed in accordance with DOE-HDBK-1208-2012, "*Accident and Operational Safety Analysis, Volume 1: Accident Analysis Techniques*." The ECF Chart is initially constructed by plotting the primary chain of events, in a chronological order, that led to the accident (horizontal) and includes the response following the accident.

This is expanded upon using conditions associated with each event (vertically). The events and conditions may or may not contribute to the unwanted result, as determined through the barrier and change analyses.

The ECF chart is in Appendix F.

## 4.2 Direct, Contributing, and Root Causes

The Board assessed the causal factors and determined, based on the definitions included in Section 1.3, as to whether they were a direct cause, individually or collectively a contributing cause and/or a root cause. The direct, contributing, and root causes, as identified by the Board, are included below.

### *4.2.1 Direct Cause*

The direct cause of an accident is the immediate event or condition that caused the accident.

The Board concluded the direct cause of this accident was, while conducting tree felling operations, CoTW-1 was struck in the head by an approximate 10-foot section of dead tree limb, which had fallen from a height of roughly 40 feet and weighing nearly 50 pounds.

### *4.2.2. Contributing Causes*

Contributing causes are events or conditions that collectively with other causes increased the likelihood or severity of an accident, but that individually did not cause the accident.

A total of 21 casual factors were recognized by the Board that foundationally shared common traits. These causal factors and traits were collectively grouped into contributing causes as identified below:

1. ***CC-1***: Mitigation of identified hazards were not brought into the work planning and control process.

2. ***CC-2***: Increase in scope of work resulted in additional hazards being introduced to the task without adequate hazard analysis.

3. ***CC-3***: Failure to ensure or verify implementation of 10 CFR 851 requirements during the performance of work.

4. ***CC-4***: Clearly defined roles and responsibilities were less than adequate (LTA).

A crosswalk of all causal factors and how each one is categorized is contained in Appendix H.

### *4.2.3. Root Causes*

Root causes are causal factors that, if corrected, would prevent recurrence of the same or similar accidents.

The Board identified two root causes of the accident:

1. ***RC-1***: The prime contractor work planning and control lacked a disciplined and rigorous review process to ensure subcontracted work adequately defined the scope of work, identified and analyzed the hazards, and implemented the controls necessary to mitigate the associated risks.

2. ***RC-2***: The prime contractor and subcontractor failed to adequately communicate known hazards and risks associated with the work, and ensure mitigation measures commensurate with the risk, were in place and understood by those responsible to execute the work.

## 5.0 CONCLUSIONS AND JUDGMENTS OF NEED

The direct, contributing, and root causes, were further analyzed by the Board to identify its Conclusions (CONs) and ultimately its Judgments of Needs (JONs). CONs are significant deductions derived from the investigation's analytical results. JONs are the managerial controls and safety measures determined by the Board to be necessary to prevent or minimize the probability or severity of a recurrence. Table 5-1 below summarizes the CONs and JONs as determined by the Board.

Based upon the analysis of the facts associated with this investigation, the Board concluded the accident and resulting fatality stemmed from existing work control procedures that failed to incorporate the core functions of the ISM System. This did not allow for the adequate assessment of existing or newly identified hazards to be properly flowed down to the workers tasked with executing the work. Coupled with unclear roles and responsibilities for oversight, these latent organizational weaknesses allowed the work to be performed without adequate controls commensurate with the hazards involved.

**Table 5-1. Conclusions and Judgments of Need**

| Event Causal Factor #'s | Contributing/Root/Direct Cause(s) | CON No. | JON No. |
|---|---|---|---|
| CF-1, 9-14, 16-19, 21-23 | **CC-1**: Mitigation of identified hazards were not brought into the work planning and control process. | **CON-1**: Existing work control processes failed to incorporate the five core functions of ISMS. | **JON-1**: The prime contractor needs to ensure a work planning and control program is established and capable of producing safe and effective work control procedures.<br><br>**JON-2**: OSO needs to ensure prime contractors have established a work planning and control program |
| CF-2, 8, 15 | **CC-2**: Increase in scope of work resulted in additional hazards being introduced to | **CON-2**: Further developments in work scope failed to | **JON-1**: The prime contractor needs to ensure a work |

| Event Causal Factor #'s | Contributing/Root/Direct Cause(s) | CON No. | JON No. |
|---|---|---|---|
| | the task without adequate hazard analysis | trigger a corresponding assessment of existing or newly created hazards/risk. | planning and control program is established and capable of producing safe and effective work control procedures.<br><br>**JON-2**: OSO needs to ensure prime contractors have established a work planning and control program |
| **CF-3, 5, 15** | **CC-3**: Failure to ensure or verify implementation of 10 CFR 851 requirements during the performance of work. | **CON-3**: There was a systemic failure in ensuring essential work requirements were flowed down and implemented into the work control process. | **JON-3**: OSO needs to ensure all contractual and work requirements are properly identified and flowed down to prime and subcontractors.<br><br>**JON-4**: Prime contractor needs to ensure all contractual and work requirements are properly identified and flowed down to subcontractors |
| **CF-4, 6, 7, 23** | **CC-4**: Clearly defined roles and responsibilities were less than adequate (LTA) | **CON-4**: OSO failed to establish defined roles and responsibilities for the RM work. | **JON-5**: OSO needs to clearly define R2A2s for safety and work planning control oversight of Reservation Management activities |
| **CF-19, 20** | **RC-1**: The prime contractor work planning and control lacked a disciplined and rigorous review process to | **CON-1**: Existing work control processes failed to incorporate the five | **JON-1**: The prime contractor needs to ensure a work planning and |

| Event Causal Factor #'s | Contributing/Root/Direct Cause(s) | CON No. | JON No. |
|---|---|---|---|
| | ensure subcontracted work adequately defined the scope of work, identified and analyzed the hazards, and implemented the controls necessary to mitigate the associated risks. | core functions of ISMS. | control program is established and capable of producing safe and effective work control procedures |
| **CF-24** | **RC-2**: The prime contractor and subcontractor failed to adequately communicate known hazards and risks associated with the work, and ensure mitigation measures commensurate with the risk, were in place and understood by those responsible to execute the work. | **CON-1**: Existing work control processes failed to incorporate the five core functions of ISMS. | **JON-1**: The prime contractor needs to ensure a work planning and control program is established and capable of producing safe and effective work control procedures |
| **CF-25** | **DC-1**: While conducting tree felling operations, COTW-1 was struck in the head by an approximate 10ft section of dead tree limb, which had fallen from a height of roughly 40ft, and weighed nearly 50-lbs. | | |

## 6.0 ACCIDENT INVESTIGATION BOARD MEMBERS SIGNATURES

Rock Aker — Digitally signed by Rock Aker Date: 2023.11.08 12:12:08 -06'00'

Rock E. Aker, CHP — Date
DOE Accident Investigation Board Chairman
U.S. Department of Energy
Office of Science
Deputy Manager, Argonne Site Office

Jason Brustad — Digitally signed by Jason Brustad Date: 2023.11.06 09:59:03 -05'00' — 11/6/23

Jason M. Brustad — Date
DOE Accident Investigator and Board Member
U.S. Department of Energy
Office of ES&H Reporting and Analysis, EHSS-23
Accident Prevention and Investigation Program Manager

CHARLES KREAGER — Digitally signed by CHARLES KREAGER Date: 2023.11.06 09:09:11 -05'00' — 11/6/23

Charles C. Kreager — Date
DOE Accident Investigation Board Member
U.S. Department of Energy
Office of Science, Office of Safety and Security
Environment, Health, and Quality Assurance Program Manager

KAREN KUBIAK — Digitally signed by KAREN KUBIAK Date: 2023.11.06 16:31:55 -07'00' — 11/6/23

Karen A. Kubiak, CIH, CSP — Date
DOE Accident Investigation Board Member
U.S. Department of Energy
Idaho Office of Nuclear Energy

Larry D. Perkins — Digitally signed by Larry D. Perkins Date: 2023.11.06 08:58:18 -05'00' — 11/6/23

Larry D. Perkins — Date
DOE Accident Investigation Board Member
U.S. Department of Energy
Oak Ridge Office of Environmental Management
Director, Operations Management Division

Thomas V. Rizzi

Digitally signed by Thomas V. Rizzi
Date: 2023.11.06 06:49:34 -08'00'

11/6/23

Dr. Thomas V. Rizzi, DC, CSP — Date
DOE Accident Investigation Board Member
U.S. Department of Energy
Office of Science
Deputy Manager, SLAC Site Office

**Board Members**

| | |
|---|---|
| Chairman | Rock E. Aker, CHP<br>U.S. Department of Energy<br>Office of Science<br>Deputy Manager, Argonne Site Office |
| Member | Jason M. Brustad<br>U.S. Department of Energy<br>Accident Investigator<br>Office of EHSS Reporting and Analysis |
| Member | Accident Prevention and Investigation Program Manager<br>Charles C. Kreager<br>U.S. Department of Energy<br>Office of Science<br>Office of Safety and Security<br>Environment, Health, and Quality Assurance Program Manager |
| Member | Karen A. Kubiak, CIH, CSP<br>U.S. Department of Energy<br>Office of Nuclear Energy |
| Member | Larry Perkins<br>U.S. Department of Energy<br>Oak Ridge Office of Environmental Management<br>Director, Operations Management Division |
| Member | Dr. Thomas V. Rizzi, DC, CSP<br>U.S. Department of Energy<br>Office of Science<br>Deputy Manager, SLAC Site Office |

**Advisors/Team Coordinator**

| | |
|---|---|
| Consultant/Advisor | Dr. Michael Ardaiz, MD, MPH, CPH<br>U.S. Department of Energy<br>Chief Medical Officer |
| Consultant/Advisor | Donald Thress<br>U.S. Department of Energy<br>Office of Science<br>Chief Counsel |
| Consultant/Advisor | Steven Terpening<br>U.S. Department of Energy<br>Office of Science<br>Facility Representative – Argonne Site Office |
| Consultant/Advisor | Brandon Whittier<br>U.S. Department of Energy<br>Office of Science<br>Senior Contracting Office – Argonne Site Office |

**Administrative Coordinators**

| | |
|---|---|
| Administrative Coordinator/<br>Technical Editor | Michele D. Knox<br>Oak Ridge National Laboratory |
| Graphic Coordinator | Grant Naeve<br>Project Enhancement Corporation |

# Appendices

# APPENDIX A. Accident Investigation Board Appointment Memoranda

**Department of Energy**
Office of Science
Washington, DC 20585

August 14, 2023

MEMORANDUM FOR ROCK AKER
ARGONNE SITE OFFICE DEPUTY MANAGER
OFFICE OF SCIENCE

FROM: JUSTON K. FONTAINE
DEPUTY DIRECTOR FOR OPERATIONS
OFFICE OF SCIENCE

SUBJECT: Accident Investigation at the Oak Ridge Reservation

BACKGROUND: On August 11, 2023, as part of a tree removal work activity on the Oak Ridge Reservation a serious injury occurred on the job site in Oak Ridge, Tennessee. The work was being performed under a DOE prime contractor East Tennessee Mechanical Contractors through a tree removal service operated by Cortese Tree Specialists. The Cortese employees had tied off a large branch to secure it while cutting the branch away from the main tree trunk when the accident occurred and the worker suffered a severe head impact on his hardhat. He was given CPR, taken to the local Oak Ridge Hospital and then transported by LifeStar to UT Hospital. Cortese Tree Specialists have initiated their fact finding and investigation of the incident.

ACTION: In order to determine the facts and circumstances related to the incident as well as any contributing factors, I am directing that an accident investigation be conducted to identify causal factors, including a review of any relevant policies, procedures, work practices, or actions related to the incident. This review should include, but is not limited to the following:

1. Determine the facts leading up to the incident.
2. Review the adequacy of the immediate response, interim actions, and extent of condition evaluation in response to this incident.
3. Assess the application of the safety program to include processes of training, planning of hazards, oversight, safety measures, and the work controls in place.
4. Conduct a causal analysis, using recognized methodologies, as needed, to determine the root and contributing causes of the incident that led to the injury.
5. Evaluate whether broader systemic weaknesses are present in contractual oversight.

CHARGE: Given the seriousness of the event and the injuries sustained to the individual, as well as the likelihood that the incident may result in the criteria of DOE O 225.1B, Appendix A, item 2.a.(2) (any single accident that results in the hospitalization for more than five calendar days, commencing within seven calendar days of the accident, of one or more DOE, contractor, or subcontractor employees or members of the public due to a serious personal injury or acute chemical or biological exposure), I am formally appointing an Accident Investigation Board (AIB).

You are appointed as the Board Chairperson and are to conduct this investigation in accordance with DOE O 225.1B. In this capacity, you are to lead a DOE investigation team comprised of Federal employees, with federal or contractor subject matter expert support as appropriate, to investigate the incident. This initial memorandum will be followed by subsequent charge, which formally identifies the AIB members, including a qualified accident investigator. The Office of Environment, Health, Safety and Security is assisting to identify individuals that can serve in this capacity.

Please provide a draft report no later than October 16, 2023, which includes findings, causal analysis, and recommendations aimed at identifying and correcting deficiencies that contributed to the tree removal incident as well as any broader programmatic weaknesses or lessons learned that would improve future activities. If, during the course of the review, specific critical items of an urgent nature are identified, please address these issues immediately and provide a summary of findings.

cc:
Jessica Halse, Associate Deputy Director for Operations
Johnny Moore, Site Manager, Oak Ridge National Laboratory Site Office
Todd Lapointe, Director, Office of Environment, Health, Safety and Security

**Department of Energy**
Office of Science
Washington, DC 20585

August 16, 2023

MEMORANDUM FOR ROCK AKER
ARGONNE SITE OFFICE DEPUTY MANAGER
OFFICE OF SCIENCE

FROM: JUSTON K. FONTAINE
DEPUTY DIRECTOR FOR OPERATIONS
OFFICE OF SCIENCE

SUBJECT: Amended Charge for Accident Investigation at the Oak Ridge Reservation

On August 14, 2023, the attached memorandum was issued to establish a DOE investigation team to investigate an incident that occurred as part of tree removal work activity on the Oak Ridge Reservation on August 11, 2023.

At that time, although the incident had not yet met the formal determination criteria for a formal accident investigation, given the seriousness of the event and the injuries sustained to the individual, the attached August 14, 2023, memorandum appointed you as the Accident Investigation Board (AIB) Chairperson for an accident investigation to be conducted in accordance with DOE O 225.1B.

The AIB will be composed of the following additional members:

- Jason Brustad, Office of Environment, Health, Safety & Security – Trained Accident Investigator
- Chuck Kreager, Office of Science
- Karen Kubiak, Office of Nuclear Energy
- Larry Perkins, Office of Environmental Management
- Tom Rizzi, Office of Science

Advisory members or additional expertise specific to the incident from DOE or the National Laboratories may be utilized, if necessary, to ensure appropriate investigation of this incident.

All members of the AIB, by this letter and in consultation with their respective management, are released from their regular duty assignments to serve on the AIB, during the period the AIB is convened.

The action and charge as communicated in the attached memorandum issued on August 14, 2023, remain the same for this appointed AIB.

Attachment

cc:
Jessica Halse, Associate Deputy Director for Field Operations, Office of Science
Todd Lapointe, Director, Office of Environment, Health, Safety & Security
Jason Brustad, Office of Environment, Health, Safety & Security
Chuck Kreager, Office of Science
Karen Kubiak, Office of Nuclear Energy
Larry Perkins, Office of Environmental Management
Tom Rizzi, Office of Science

# APPENDIX B. DOE ORPS Report

| | Report Number | Subject/Title |
|---|---|---|
| 1) | SC-RsMg-ORNL-ETMC-99G-2023-0001 | Employee Injured by Fallen Tree Branch |

SC-RsMg-ORNL-ETMC-99G-2023-0001 UPDATE

## Occurrence Report

**After 2017 Redesign**

Oak Ridge Reservation

(Name of Facility)

Balance-of-Plant - Site/outside utilities

(Facility Function)

ORNL Site Office - Reservation Management

(Site)

East Tennesse Mechanical Contractors

(Contractor)

**Name:** MCGILL, GEORGE ALLEN **Telephone No.:** (865) 576-1787

(Facility Manager/Designee)

**Name:** MCGILL, GEORGE ALLEN **Telephone No.:** (865) 576-1787

(Originator/Transmitter)

**Name:** N/A **Date:** 08/11/2023

(Authorized Classifier (AC))

**Occurrence Report Number:** SC-RsMg-ORNL-ETMC-99G-2023-0001

Employee Injured by Fallen Tree Branch

**Report Type and Date:** UPDATE

| | Date | Time |
|---|---|---|
| Notification: | 08/22/2023 | 13:46 (ETZ) |
| Initial Update: | 08/23/2023 | 11:02 (ETZ) |
| Latest Update: | 10/06/2023 | 12:39 (ETZ) |

Final: (ETZ)

**Report Level: H**

**Division or Project:** OSO - Reservation Management

**Secretarial Office:** SC - Science

**System, Bldg., or Equipment:** Oak Ridge Reservation

**CUI?:** No

**Reviewed for Public Release:**

**Plant Area:** CTF - Grounds

**Date and Time Discovered:** 08/11/2023 14:00 (ETZ)

**Date and Time Categorized:** 08/11/2023 16:00 (ETZ)

**DOE HQ OC Notification:**

| Date | Time | Person Notified | Organization |
|---|---|---|---|
| 08/11/2023 | 15:03 (ETZ) | Juston Fontaine | SC-3 |

**Other Notifications:**

| Date | Time | Person Notified | Organization |
|---|---|---|---|
| NA | NA | NA | NA |

**Subject or Title of Occurrence:** Employee Injured by Fallen Tree Branch

**Reporting Criteria:**

2A(1) - Any occurrence due to DOE operations resulting in a fatality or terminal injury/illness.
2A(3) - Any single occurrence, injury, or exposure resulting in an occupational injury that requires in-patient hospitalization for five or more days, commencing within seven days from the date the injury.

**Description of Occurrence:**

On August 11, 2023, a DOE prime contractor to DOE Reservation Management East Tennessee Mechanical Contractors, Inc (ETMC) and a professional tree removal subcontractor to ETMC, were performing tree clearing operations on the Department of Energy's Oak Ridge Reservation (ORR). The specific location of this work was the Central Training Facility (CTF), 1200 Bear Creek Road, Oak Ridge,

Tennessee. The CTF is located on DOE land, separate and distinct from the primary DOE/NNSA plant sites in Oak Ridge, i.e., the Office of Science's Oak Ridge National Laboratory; NNSA's Y-12 National Production Office; and, the Office of Environmental Managements East Tennessee Technology Park. ETMC's subcontractor was contracted to perform tree clearing work which consisted of trimming and/or felling trees that had previously been identified by internal and external forestry experts as hazards to either property or personnel. ETMC's role was to clear trimmings or fallen trees produced by their subcontractor's work.

At approximately 1:45 p.m. ETMC's Program Manager telephoned DOE Assistant Manager for Reservation Management and reported that an accident had occurred at the above-mentioned work site and that emergency calls were made which resulted in a City of Oak Ridge ambulance and an ambulance from Y-12 arriving on-scene. A subcontractor employee had been transported by ambulance to the hospital with unknown, but apparent serious injuries. According to ETMC's Program Manager, the individual was transported to Methodist Medical Center (time of departure from accident scene unknown at present). At approximately 3:19 p.m., August 11, 2023, ETMC's Program Manager reported to Reservation Management that the subcontractor employee was transported by Life Star helicopter to the University of Tennessee Medical Center in Knoxville, Tennessee. ETMC dispatched its Health and Safety Officer and other ETMC employees to the University of Tennessee hospital.

DOE Reservation Management representatives responded to the accident scene as soon as possible, but after medical personnel had left the scene. Based on initial information received, at approximately 1:15 p.m., two subcontractor employees, located at ground level, were making a final cut to a trunk of a tree. DOE representatives observed that the portion of the tree that was being cut was approximately twelve inches in diameter and forty feet tall. It was tied off at the bottom and top to prevent falling once the final cut was made at the ground level. It was reported that the subcontractor employee was struck in the head.
The accident scene is secured and controlled. DOE has chartered an independent Accident Investigation Board.
UPDATE: this update is to reflect the fatality that has occurred as a result of this incident.

**Is Subcontractor Involved?** Yes

**Name:** Cortese Tree Specialists

**Immediate Actions Taken and Results:** Employee was stabilized and transported to Methodist Medical Center. Job site was secured with pictures taken by Y-12 first responders.

**ISM:**

**Cause Code(s):**

**Description of Cause:**

**Corrective Actions**

(* = Date added/revised since final report was approved.)

**Lessons Learned:**

**Similar Occurrence Report Numbers:**

**HQ Keyword(s):**

08D--OSHA Reportable/Industrial Hygiene - Injury
08E--OSHA Reportable/Industrial Hygiene - Fatality
12H--EH Categories - Injuries Requiring Medical Treatment Other Than First Aid
13A--Management Concerns - HQ Significant (High-lighted for Management attention)
14L--Quality Assurance - No QA Deficiency

**HQ Summary:**

On August 11, 2023, a DOE prime contractor to DOE Reservation Management East Tennessee Mechanical Contractors, Inc (ETMC) and a professional tree removal subcontractor to ETMC, were performing tree clearing operations on DOE's Oak Ridge Reservation. The specific location of this work was the Central Training Facility, which is located on DOE land. The tree clearing work consisted of trimming and/or felling trees that had previously been identified as hazards. At 1:45 p.m., ETMC's Program Manager telephoned DOE Assistant Manager for Reservation Management and reported that an accident had occurred at the above-mentioned work site. An ambulance arrived on the accident scene and transported an injured subcontractor employee to Methodist Medical Center and then, was transported to the University of Tennessee Medical Center with

unknown, but apparent serious injuries. Based on initial information received, two subcontractor employees, located at ground level, were making a final cut to a trunk of a tree. The portion of the tree that was being cut was approximately twelve inches in diameter and forty feet tall. It was tied off at the bottom and top to prevent falling once the final cut was made at the ground level. It was reported that the subcontractor employee was struck in the head. The accident scene was secured and controlled. A fatality has occurred as a result of this incident and DOE has chartered an independent Accident Investigation Board to further address this event.

| | |
|---|---|
| **Facility Representative or Designated DOE Representative:** | |
| **Uploaded Documents:** | **No Files Found** |
| **Updated Report Information:** | 60 Day Update. The employee who was injured on August 11, 2023 succumbed to his injuries. On August 21, 2023, DOE convened an on site Accident Investigation Board. The Accident Investigation Boards mandate was to deliver a final report by October 16, 2023. As of this date, the final report has not been published. |

# APPENDIX C. CoTW-1 and CoTW-2 Training

| Individual | Entity Title | Completion Date |
|---|---|---|
| COTW-1 | Workplace Harassment (Employees outside of CT) Course | 10/7/2022 |
| COTW-1 | Audiogram-Accepted offer | 3/31/2023 |
| COTW-1 | Davey Aerial Tree Rescue | 4/7/2023 |
| COTW-1 | Davey First Aid/CPR Course | 6/6/2022 |
| COTW-1 | CDP Tree Worker Intro Training | 4/15/2023 |
| COTW-1 | Wildfire Prevention Training | 6/6/2022 |
| COTW-1 | Wildfire Prevention Training | 4/7/2023 |
| COTW-1 | Adjustable False Crotch/Working the Spar | 10/7/2022 |
| COTW-1 | TCIA Aerial Rescue | 6/6/2022 |
| COTW-1 | TCIA Aerial Rescue | 4/7/2023 |
| COTW-1 | TCIA Electrical Hazards | 6/6/2022 |
| COTW-1 | TCIA Electrical Hazards | 4/7/2023 |
| COTW-1 | Davey Rigging Kit | 11/2/2022 |
| COTW-1 | Davey Defensive Driving Course | 6/6/2022 |
| COTW-2 | Davey First Aid/CPR Course | 6/6/2023 |
| COTW-2 | Wildfire Prevention Training | 6/5/2023 |
| COTW-2 | Hazcom/Hazmat Residential Program | 6/5/2023 |
| COTW-2 | TCIA Aerial Rescue | 6/6/2023 |
| COTW-2 | TCIA Electrical Hazards | 6/6/2023 |
| COTW-2 | Davey Defensive Driving Course 2022 | 6/5/2023 |

**Information taken from 1/15 Davey training profiles*

# APPENDIX D. Change Analysis Worksheet

| Change Analysis (What Changed?) | What Happened? (Accident Situation) | What Should Have Happened? (Accident Free Situation) | What was different? | Analysis/Discussion | Associated Causal Factors |
|---|---|---|---|---|---|
| ***Contract oversite of RM shifted from CSC to OSO*** | Operational duties of Reservation Management (RM) shifted from CSC to Oak Ridge Site Office (OSO) without OSO having a full understanding of either's roles and responsibilities | OSO would absorb RM with an understanding of operational duties, how work was executed, and the associated roles, responsibilities and oversite provided by Reservation Management. | 1. OSO was unable to provide clear expectations and defined roles and responsibilities for RM with existing procedures/processes in place.<br>2. OSO did not fully consider RM's roles and responsibilities and their respective oversite of prime and sub-contracted work. | 1. OSO became reliant on existing RM processes and procedures in place, specifically work planning and control, with an assumption they were adequate to safely complete the work.<br>2. OSO failed to adequately review and approve the WSHP for RM Prime contracts (i.e., ETMC) and ensure ETMC's WSHP requirements flowed down to their sub-contractors.<br>3. OSO did not establish clear expectations as to how RM would observe reservation work, conduct assessments, or provide contractor/sub-contractor feedback. | CF-4, 6, 7, 15, |
| ***Imminent and hazardous trees re-identified in May 2023*** | DRAFT Cemetery Hazard Tree Designation report (May 2023) re-identified hazardous trees as presenting an imminent or likely risk of failure which were identified previously in September of 2016, but not accounted for in the work planning and control process. | The hazardous trees and associated risks with the removal of the trees would have been adjudicated and mitigated through the work planning and control process. | The identified risks were not adequately mitigated through the work planning and control process consistent with ISMS Core Functions and ETMC Worker Safety and Health Plan. No reference was given to the Draft Cemetery Hazard Tree reports (September 2016 and May 2023) and the increased risk brought about due to time and weather. | 1. ETMC relied on the past successes of Davey to adequately identify and mitigate the risks associated with this and other tree trimming/felling operations. In doing so, they either felt no need, or failed to communicate the addtional data provided by the Hazardous tree designation reports which indicated a higher level of risk for the specific work required to fell tree QUCO2.<br><br>2. ETMC provided Davey no additional considerations to be given the work that day (i.e., copy of the Hazard Tree Designation report) , nor required Davey to provide a specific Activity Hazard Analysis to address known hazards. | CF-1, 2, 9, 10-15 |
| ***Time*** | Work was performed on a tree that was identified as imminent and hazardous almost 7-years ago. | The additional deterioration and corresponding increase level of risk associated with removal of the tree would have been re-evaluated to ensure that the increased risk was met with a corresponding evaluation and implementation of hazard controls. | The hazardous tree identified back in September 2016, became even more hazardous due to the extent of time and associated weathering. | 1. Even though financial and contractual limitations are unknown, there is nothing available to understand how the associated risks with this and other hazarodus trees identifed, were managed up to their actual removal in 2023. Additionally, the restrictive nature of the work location prohibited removal by mechanical means (i.e., bulldozer, backhoe, etc.) and elevated the risk to workers tasked with felling the tree. ETMC and Davey failed to account for this increase in risk during their work planning and control.<br><br>2. In 2016, the contract was IDIQ and ETMC removed trees they could via mechanical means (i.e, bulldozer, backhoe). At that time ETMC, did not take tree QUCO2 because of cultural sensitivities and percieved prohibition on use of a bulldozer/backhoe. | CF-10-18 |
| ***Weather*** | The dead tree limb being worked is more deteriorated and heavier due to the absorption of rainwater but not accounted for in the work planning and control process. | Changes to environmental conditions are continually considered and adjusted for in the work planning and control process. | The dead tree limb being worked that day was likely heavier due to the expedited absorption of rainwater caused by loss of bark and infestation of insect and other organism. The existing work planning and control process was unable to adjust for newly introduced hazards. | No formal mechanism was documented by ETMC or Davey to allow the work crew to adjust for the increased risk (heavier dead limb due to rainwater absorption) brought about by the environmental changes at the work site. This likely increased the amount of force, not only in which the dead limb imposed on the live tree it struck when it was felled, but also increased the amount of force (impact) on CoTW-1's head. | CF-10-18 |
| ***Job Location (cemetery vice normal grounds)*** | Manual tree felling techniques used for a known, hazardous tree. | Heavy equipment used to fell known, hazardous tree. | Tree felling needed to be performed near a culturally sensitive area in which heavy equipment was not a considered option | ETMC and Davey lacked a formal process for the risk evaluation of the work being performed on hazardous trees as identified in 10 CFR 1910 and ANSI Z133. Since heavy equipment was not elected to fell the dead tree limb, they elected to manually fell the limb in one piece without consideration given to taking the limb down in smaller pieces. By not reducing the weight of the dead limb prior to manual felling, the amount of risk was elevated. | CF-10-20, 23, 24 |

| Change Analysis (What Changed?) | What Happened? (Accident Situation) | What Should Have Happened? (Accident Free Situation) | What was different? | Analysis/Discussion | Associated Causal Factors |
|---|---|---|---|---|---|
| ***ETMC Activity Hazard Analysis (AHA)/or other similar documents*** | An AHA/or equivalent document was not prepared for this specific job | An AHA/or equivalent document prepared, reviewed and authorized by management and used by supervisors and workers (contractor and sub-contractor) | No AHA/or equivalent document had been prepared, reviewed and authorized by ETMC | The ETMC STARRT card appears to have been (or become) more of an administrative, low value task than a viable tool in which both ETMC supervisors and workers could use in identifying and discussing daily, safety related aspects for each job assigned. This was noted by the following:<br><br>1. Task Lead Signature/Name Line left blank<br>2. Work Order/Package Number not filled out or appropriate boxes checked.<br>3. Question 7 "How will we ensure that we remain injury free and protect the environment today?" was not checked.<br>4. CoTW-1 did not print or initial.<br>5. STARRT card appears to have covered a full work week vice being used as a daily sign off of work to be performed and the associated hazards.<br>6. Sections K "Lessons Learned / Incidents Covered", L "Other Hazards / Possible Change in Conditions / Error Precursors", M "Other Hazard Controls", O "Barriers and Postings", P "Critical Steps Comments", and R "Feedback and Comments" were all left blank.<br>7. Section Q " Work Area Interfaces" blocks 1 thru 5 are all checked "N" (No) even though ETMC knew they were working with Davey.<br><br>Nothing indicates ETMC employees were briefed daily on the specific hazards present on August 11, 2023. This is not in alignment with ETMC's "WSHP Section 3.1.1 which states, that for each ETMC project, "The Company and subcontractor employees assigned to the project are required to attend "tailgate" or toolbox" meetings, generally held, at the start of each day's work (This may include attending daily project meetings to employees are assigned)." | CF-23 |
| ***Davey Activity Hazard Analysis (AHA)/ or other similar documents*** | An AHA/ or equivalent document was not prepared for this specific job | An AHA/or equivalent document prepared, reviewed and authorized by management and used by supervisors and workers (contractor and sub-contractor) | No AHA/or equivalent document had been prepared, reviewed and authorized by Davey | Davey expectations include the use of a "Davey Residential Operations Job Plan / Briefing" for all jobs conducted. This standard Davey form was not used on August 11, 2023. This resulted in personnel from both ETMC and Davey who were on-site that day to perform the work, to identify their own percieved risks and develop individual mitigation plans without any supervision or oversight. Regardless of use, it would have been inadequate as a stand alone tool to safely execute the work. | CF-21-22, 24 |
| ***Change in Jobsite conditions*** | CoTW-1 encountered jobsite conditions that exceeded their current level of skill of the craft, however, continued working. | CoTW-1 would stop work, notify supervision and re-evaluate jobsite conditions. | CoTW-1 failed to recognize the increasing hazards (risks) while progressivley executing the work. | Based upon Board member discussions with Arborists, the following is known:<br><br>1. The apparent sequencing of cuts indicate CoTW-1 was having difficulty in felling the dead tree limb. Multiple cuts appeared to have been made outside of best practices/industry standards which placed them into an irrecoverable position. Once the backcut was made, the energy of the tree limb was put in motion that could not be recovered from.<br><br>2. Jobsite conditions did not allow for industry standard escape routes (two routes available, 45 degrees either side of the tree being worked). Given the cemetery fence and brush pile developed earlier that morning, there were no viable escape routes for CoTW-1 to utilize in the event worksite conditions deteriorated.<br><br>Unable to recognize these two conditions were working against them, CoTW-1 continued to move forward absent of any guidance provided by work control documents or arborist/other supervision.<br><br>Based on consultation with tree industry experts and the physical evidence available, the cutting of the dead limb does not appear to follow best industry practices and standards for tree felling. | CF-20-24 |

# APPENDIX E. Barrier Analysis Worksheet

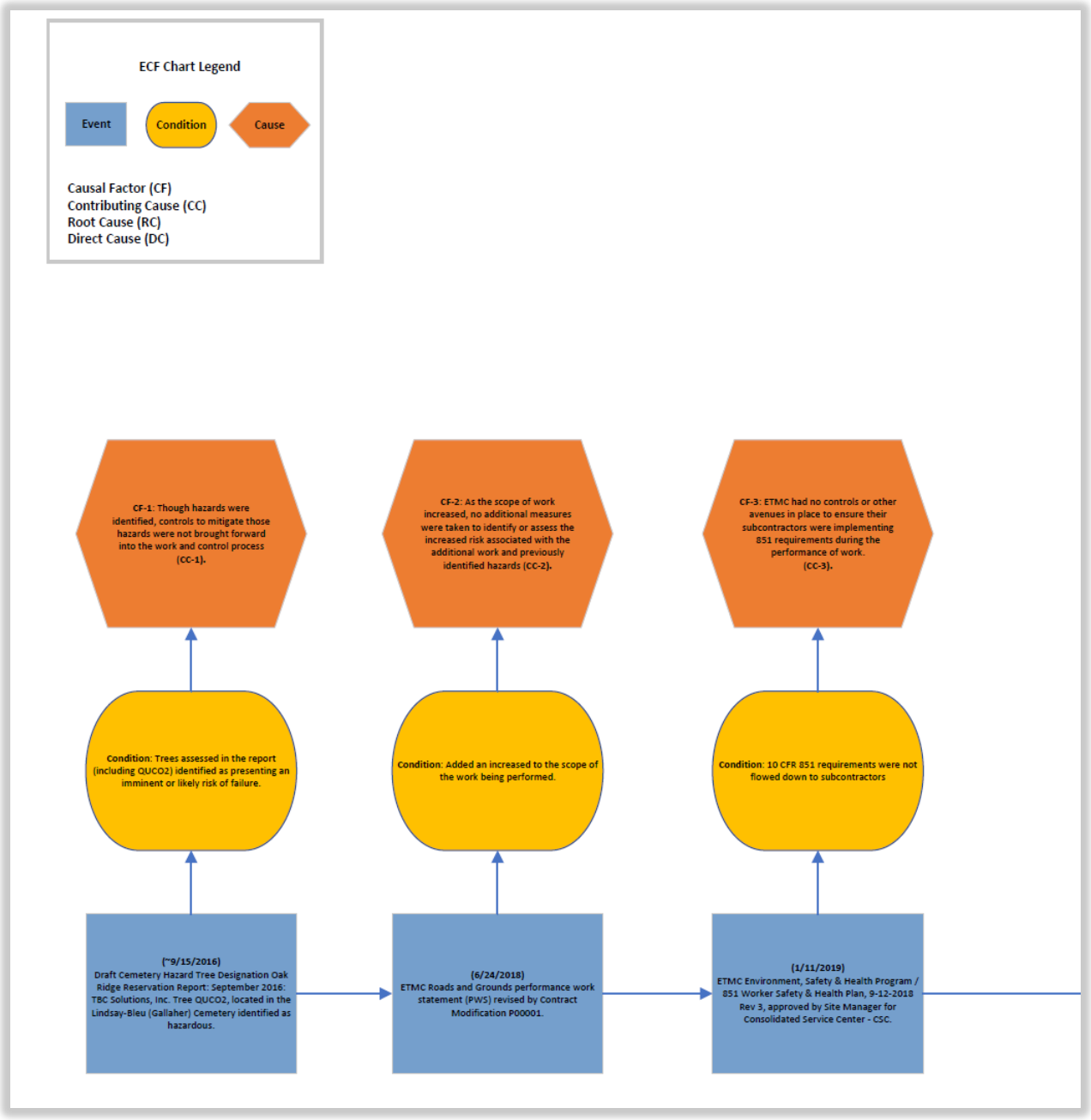
| Hazard/Threat | Target | Barrier | Applicable Section of Barrier | 1. In Place?<br>2. In Use?<br>3. Effective?<br>Yes/No/Partial | Analysis | Associated Causal Factors |
|---|---|---|---|---|---|---|
| Mulitple risks inherent with tree trimming/felling operations | Personnel, facilities (building, electrical, other) | ***American National Standards ANSI Z133-2017 Safety Requirements for Arboricultural Operations*** | Purpose: provide safety standards for arborists and other workers engaged in arbor operations.<br>1. ***Section 3.4:*** *"Job Briefing and worksite setup"*<br>2. **Section 3.4.1**: A qualified arborist shall determine whether direct supervision is needed on a worksite.<br>3. ***Section 3.4.3*** : A job briefing shall be performed by the qualified arborist in charge before the start of each job.<br>4. ***Section 3.4.9*** : When definite indicators of decay, weakly attached branches, or dead bark are seen, the qualified arborist shall determine if the tree can withstand the forces to be applied during the work.<br>5. ***Annex B.5.2*** : "Rigging and Tree Removal". Provide education and training in the identification and removal of hazard trees. | 1. Y<br>2. N<br>3. N | 1. Davey website specifically calls out that all work will be performed In Accordance With (IAW) ANSI Z133 and OSHA standards, however, there is no evidence available to substantiate work performed that day was being executed IAW with any of those standards cited.<br>2. ETMCs subcontract with Davey, states that all work will be done following ANSI Standard practices for tree care operations, however, the Board was unable to verify how those requirements were flowed down to and implemented by Davey.<br><br>ETMC became more reliant on the expertise of Davey to safely plan and perform operations involving tree trimming/felling. As work continued to be performed over the years with limited oversight, adherence and implementation of contractual requirements were not enforced. This barrier was not effective, because it wasn't used. | CF-10-20, 23, 24 |
| Known and/or identified issues are not adequately captured to provide for corrective measures to be assigned, and, tracked to completion | Contractor/Issues Management System | ***Contract 89243118DSC000001 (DOE with ETMC)*** | General | 1. N<br>2. N<br>3. N | 1. An ETMC contractor assurance system or issues management system was not in place to track and manage identified deficencies.<br>2. No evidence is available to suggest that ETMC conducted assessments of Davey work evolutions or captured known issues/deficiencies via other avenues.<br><br>Without a contractor asssurance or issues management system in place, there was no vehicle or avenue available for ETMC or DOE to track and manage safety and/or performance related issues. Absent any kind of tracking system, DOE and ETMC relied on the tribal/corporate knowledge of previous issues to ensure they would eventually be addressed and corrected.<br><br>As a barrier designed to provide feedback and improvement, without being used, is completely ineffective. | CF-8 |
| Lack of accountability regarding DOE ES&H requirements | DOE work being completed safely within the framework of ISMS | ***Contract 89243118DSC000001 (DOE with ETMC)*** | General | 1. Y<br>2. Y<br>3. P | Several items were noted in the contract including:<br>1. There is no specific reference to the Integrated Safety Management System (ISMS).<br>2. The contract fails to define and require the use of qualified and trained personnel in the execution of work.<br><br>Even though DEAR Clause (48 CFR 970.5223) is not contained or referenced within the contract, ETMCs WSHP clearly articulates their commitment to the ISMS approach, and definitively states "the ISMS approach is in continual use for the planning and execution of all ETMC projects and work locations." (Section 2.2.5.a). This project lacked that commitment based upon ETMCs failure to effectively flowdown any core functions of the ISM System. | CF-3, 5, 16-19 |
| Inadequate flowdown of 10 CFR 851 requirements into contractor's or subcontractors WSHP | Work peformed within the parameters/requirements of 10 CFR 851 by all contractor and subcontractors | ***Contract 89243118DSC000001 (DOE with ETMC)*** | ***Section H*** : Special Contract Requirements<br>The DOE contract with ETMC cites that the contractor shall comply with 10 CFR 851, develop, implement and maintain a written WSHP (a) in addition to "The contractor shall flow down the requirements of this clause to all subcontractors at any tier" (f). | 1. Y<br>2. P<br>3. N | ETMCs WSHP specifically addresses 10 CFR 851 requirements and clearly communicates their commitment to, and expectations that work will be performed IAW those requirements, including all subcontracted work.<br><br>Implementation of and compliance with ETMCs 851 WSHP requirements by subcontractors is well defined, specifically, the requirement that all support and subcontractors receive an orientation on the requirements of the 851 WSHP. Additionally, ETMCs WSHP requires subcontractors have an approved DOE 851 WSHP of their own, or in the absence of, shall comply with ETMCs approved 851 WSHP.<br><br>The board was not provided with any evidence to indicate or verify that Davey had an approved 851 WSHP or that they were working to ETMCs 851 WSHP. Conversations with Davey General Counsel indicated they were not even aware of certain requirements related to conducting work with DOE - specifically DOE O 225.1B and further indicated that 10 CFR 851 was not in their contract with ETMC. This indicates a gap in both understanding and flowdown of 851 requirements from ETMC to their subcontractors. | CF-3, 5, 16-19 |
| Unrecognized and/or unreviewed hazards | Mitigating additional hazards introduced by a change in scope of work | ***Task Order 23SC001178*** | Schedule of supplies/services..."removal of hazardous tree" | 1. Y<br>2. Y<br>3. N | This Task Order for the Roads & Grounds contract identifies additional scope to remove hazardous trees, however, the additional hazards associated with the Task Order did not receive an additional safety review by OSO or ORR personnel. | CF-1, 2, 8-20 |

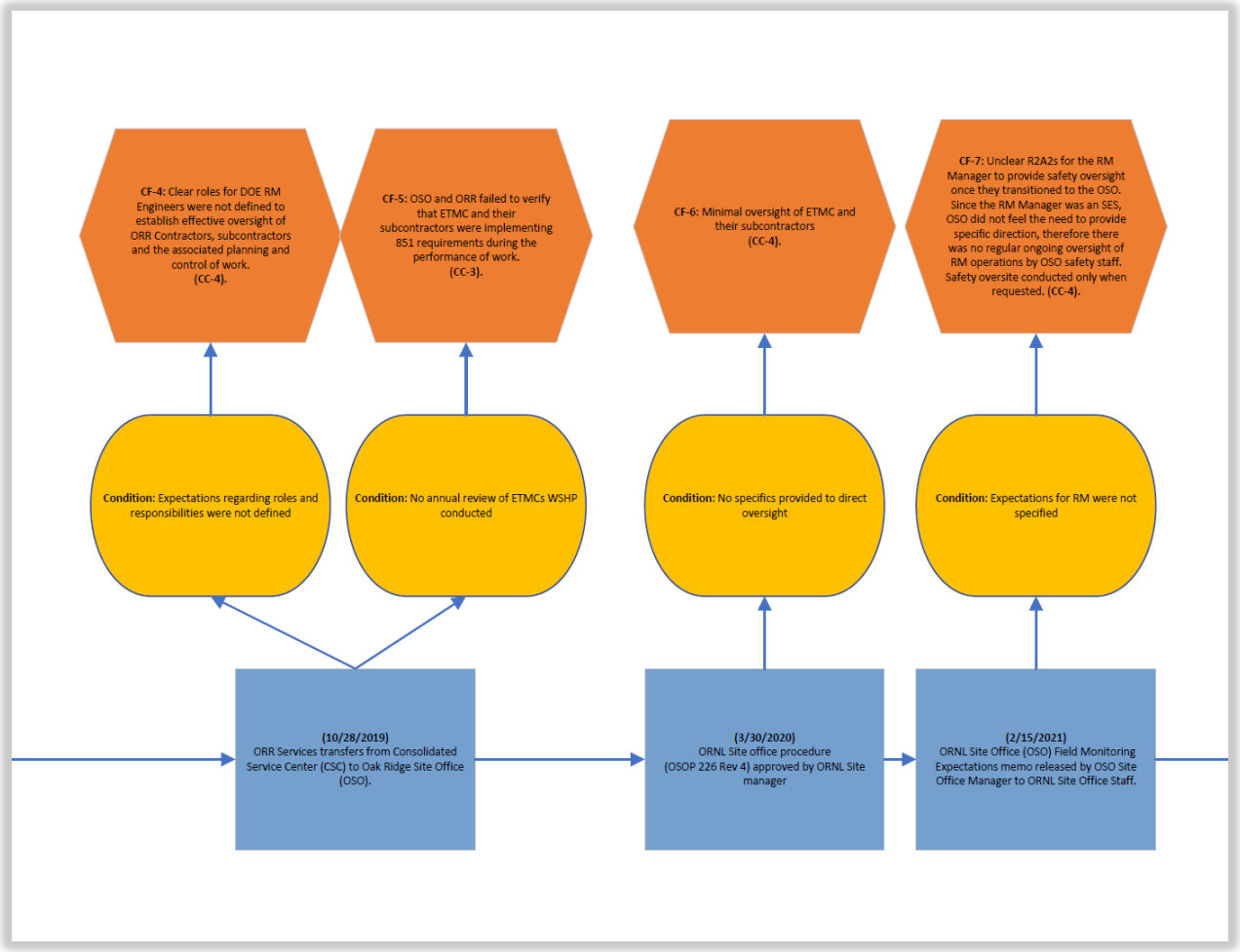
| Hazard/Threat | Target | Barrier | Applicable Section of Barrier | 1. In Place?<br>2. In Use?<br>3. Effective?<br>Yes/No/Partial | Analysis | Associated Causal Factors |
|---|---|---|---|---|---|---|
| LTA implementation of programmatic elements | Personnel performing work in compliance with 10 CFR 851 requirements | **ETMC Environment, Safety and Health 851 Worker Safety and Health plan (9-12-2018 Rev 3)** | ***Section 4.5***: Project Manager is responsible for reviewing sub-contractor activities.<br>***Section 4.7*** : Project Manager will serve as the Project Quality Assurance Representative for the day to day work activities. Responsibilities include:<br>1. Ensuring methods for inspection, testing, and evaluation are performed according to the project specifications as well as recognized industry standards. | 1. Y<br>2. Y<br>3. N | 1. No evidence was available to indicate scheduled assessments were being performed by ETMC in which to provide feedback to both Davey and DOE regarding subcontractor performance.<br>2. No evidence was available to indicate that ad hoc inspections to ensure comformance to project specifications were being completed.<br><br>In either case, neither Davey nor DOE were provided feedback to ensure that performance of work was meeting requirements and expectations (i.e., ANSI Standards, 10 CFR 851, WSHP, etc.) or if needed, that corrective measures were being instituted to allow Davey to come in alignment with applicable directives. | CF-3, 5, 16-19 |
| Vague or unclear standards or requirements | Defined Roles and Responsibilities | **ETMC Environment, Safety and Health 851 Worker Safety and Health plan (9-12-2018 Rev 3)** | ***Section 5.4*** : Pre-Job Briefings (PJB) / Safety Meetings. Workers are required to attend a PJB, one safety meeting prior to each work shift and when a change in the scope of work or personnel are reassigned. This applies to ETMC personnel as well as all sub-contractors. | 1. Y<br>2. Y<br>3. N | 1. Davey personnel do not routinely attend ETMC's 0700 morning meeting.<br>2. ETMC normally "briefs" Davey workers at the job site using the ETMC STARRT Card.<br>3. The expectation of Davey Corporate, is that Davey workers use a "Davey Residential Operations Job Plan / Briefing" prior to conducting work for the day.<br>4. Pre-Job Briefings / Safety Meetings: This section applies to all work activities. Workers will be required to attend a pre-job briefing, one safety meeting prior to each work shift and when a change in the scope of work or personnel are reassigned. This applies to ETMC personnel as well as all sub-contractors.<br><br>Davey personnel did not attend the 0700 ETMC meeting at the ETMC building, nor did the ETMC STARRT card briefing at the job site provide to be adequate, if it was even performed at all.<br><br>No "Davey Residential Operations Job Plan / Briefing" was completed for the work performed on August 11, 2023 even though one was filled out and provided for the work completed on August 8-9, 2023.<br><br>Though not at the job site on the morning of 11 August 2023, the Davey VP of Health and Safety stated a verbal briefing was likely performed in lieu of having a "Davey Residential Operations Job Plan / Briefing" onhand, indicating that Davey Corporate administrative requirements are situationally dependent and left to the discretion of the Davey Team Lead. | CF-4, 6, 7, 23 |
| Subcontractors performing work outside of 851 requirements | Flowdown of 10 CFR 851 requirements to subcontractors | **ETMC Environment, Safety and Health 851 Worker Safety and Health plan (9-12-2018 Rev 3)** | ***Section 3.1*** : Subcontractor Involvement. ETMC will acknowledge and allow work to be performed under a subcontractor's own WSHP, if it has been approved by DOE prior to commencing work. Subcontractors who do not have an approved 851 WSHP will be required to work under ETMC's WSHP.<br>***Section 4.3*** : President/CEO. Policies and objectives of ETMC WSHP requirements are communicated to all subcontractors for implementation by these subcontractors working on ETMC projects.<br>***Section 4.4*** : Health & Safety Director. "...ensure...subcontractor's Health and Safety plans consistently meet the needs of our projects. Routine audits will be conducted to ensure that subcontractors are implementing and complying with our 851 WSHP requirements. Approving subcontractor AHA and performing oversight of field work activities.<br>***Section 5.3*** Subcontractor Selection Criteria. If contractors are not currently working under their own approved DOE 851 WSHP, then all requirements of 10 CFR 851 and other applicable requirements, ETMC's approved 851 WSHP will be flowed down to subcontractors. This document identifies the WSHP requirements that shall be complied with during performance of work by ETMC subcontractors or sub-tier contractors | 1. Y<br>2. Y<br>3. N | 1. Davey did not have an DOE approved 851 WSHP plan nor were they working to, or under, ETMCs 851 WSHP.<br>2. Information obtained from interviews suggested OSO believed that Davey was working under the provisions of ETMC's 851 WSHP, however no documentation exists to confirm this.<br><br>Both DOE and ETMC failed to ensure that Davey had either a DOE approved WSHP or that Davey was working to ETMCs 851 WSHP. | CF-3, 5, 16-19 |
| Multiple hazards to include worker being hurt/struck by falling limb | Worker | ***Davey Job Hazard Analysis (1-17). Prepared: 6/28/2023*** | ***Felling Trees: Controls***<br>Develop and follow the six steps of precision tree felling plan:<br>1. Risk assessment (site and tree)<br>2. Tree felling height assessment<br>3. Tree felling lean assessment (side back front)<br>4. Tree felling escape routes / retreat path<br>5. Tree felling Notch and hinge plan<br>6. Tree felling back cut plan | 1. Y<br>2. N<br>3. N | 1. The JHA developed on 6/28/2023 for ETMC Roads & Grounds, contract number: 89243118DSC000001 provided an overall risk assessment code of "M" (Moderate Risk), however, no original or copy of the JHA was found at the event/work site.<br>2. It is unknown if Davey employees discussed and understood the six step tree felling plan verbally or other.<br>3. ANSI Z133-2017 8.5.9 states, "When establishing a rigging point horizontally distant from the parent limb or main tree stem, the arborist should consider the need to provide additional support to help disperse the force of the proposed rigged load."<br><br>No contents of the Davey JHA made it down or into the Davey Residential Operations Job Plan / Briefing or other for 11 August 2023.<br><br>In this instance, there was only one rigging line approximately 40 feet up to the roughly 57-foot-long dead limb. No rigging was provided for the upper part of the dead limb in which may have secured either one of the pieces or the entire limb in place once it broke.<br><br>Based upon the observable cuts, ANSI guidance and follow-on discussions with arborist and forestry SMEs, the cuts made on the tree limb indicate they were outside of industry standards and expectations. The cuts also suggest CoTW-1 was having difficulties in executing the work. | CF-19, 24, 25 |

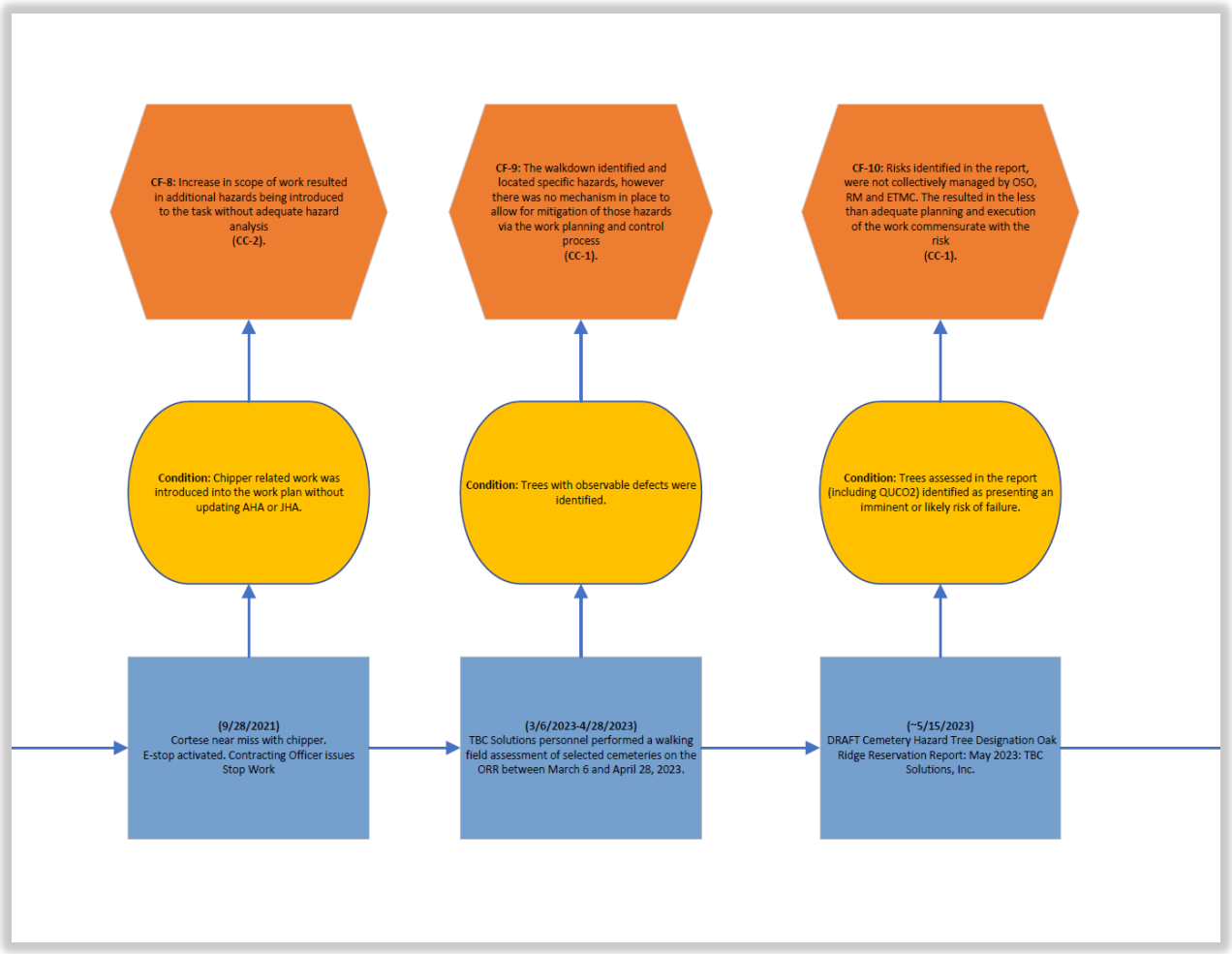
| Hazard/Threat | Target | Barrier | Applicable Section of Barrier | 1. In Place?<br>2. In Use?<br>3. Effective?<br>Yes/No/Partial | Analysis | Associated Causal Factors |
|---|---|---|---|---|---|---|
| Mulitple risks inherent with tree trimming/felling operations | Worker | ***Davey Residential Operations Job Plan / Briefing*** | All | 1. Y<br>2. N<br>3. N | 1. Although a Davey Residential Operatons Job Plan / briefing form was available for work conducted on 8 and 9 August 2023, none was completed for the work conducted on 11 August 2023.<br>2. As stated by the Davey VP of Health and Safety, completion of this form prior to each day's work, is a Davey Corporate expectation.<br>3. This form was completed prior to the work performed to lower the remaining dead tree limb on 24 August 2023.<br>4. On the bottom right hand corner, the form reads "The local office should retain the briefings for a rolling 90 days"<br><br>This form provides both supervisors and workers a job brief template that, if used properly, would enable everyone on the site to understand the job description, hazards, and safeguards/controls in place to mitigate the associated risks with the tasks for the day. It also allows for every Davey work crew member to review each section and sign for by initials to indicate their understanding of specific tasking and the associated hazards. However, based upon discussions with the Davey VP of Health and Safety, use of this form and how they meet their own 90 day retention requirement is unclear especially if briefings are done verbally. | CF-21, 22, 23, 24 |
| Mulitple risks inherent with ETMC operations | Worker | ***ETMC Safety Task Analysis Risk Reduction Talk (STARRT) Card*** | All | 1. Y<br>2. P<br>3. N | The ETMC STARRT card appears to have been (or become) more of an administrative, low value task than a viable tool in which both ETMC supervisors and workers could use in identifying and discussing daily, safety related aspects for each job assigned. This was noted by the following:<br><br>1. Task Lead Signature/Name Line left blank<br>2. Work Order/Package Number not filled out or appropriate boxes checked.<br>3. Question 7 "How will we ensure that we remain injury free and protect the environment today?" was not checked.<br>4. CoTW-1 did not print or initial.<br>5. STARRT card appears to have covered a full work week vice being used as a daily sign off of work to be performed and the associated hazards.<br>6. Sections K "Lessons Learned / Incidents Covered", L "Other Hazards / Possible Change in Conditions / Error Precursors", M "Other Hazard Controls", O "Barriers and Postings", P "Critical Steps Comments", and R "Feedback and Comments" were all left blank.<br>7. Section Q " Work Area Interfaces" blocks 1 thru 5 are all checked "N" (No) even though ETMC knew they were working with Davey.<br><br>Nothing indicates ETMC employees were briefed daily on the specific hazards present on 11 August 2023. This is not in alignment with ETMC's "*WSHP Section 3.1.1 Reiteration, Reinforcement, and Feedback*" which states, that for each ETMC project, "The Company and subcontractor employees assigned to the project are required to attend "tailgate" or toolbox" meetings, generally held, at the start of each day's work (This may include attending daily project meetings to employees are assigned)." | CF-20 |
| Imminent and hazardous trees | Damage to 28 cemeteries within the boundaries of ORR and/or injury to visiting personnel | ***Draft cemetery hazard tree ID by TBC Solutions (September 2016)*** | All | 1. Y<br>2. Y<br>3. N | The draft report identified 58 potential hazard trees as presenting an imminent or likely risk of failure, however, there is nothing to indicate compensatory measures were taken (administratively or other) to mitigate the associated hazards between September 2016 and 11 August 2023. Note: Draft report states "A Final report would be prepared incorporating NRM staff comments on the Draft, in text, tables, and maps."<br><br>No considerations appeared to be given by ETMC for the identifed, imminent hazards in either work planning and control processes. | CF-1, 9-14 16-18 |
| Imminent and hazardous trees | 31 cemeteries within the boundaries of ORR and/or injury to visiting personnel | ***Draft cemetery hazard tree ID by TBC Solutions (May 2023)*** | All | 1. Y<br>2. Y<br>3. N | Thirty-one (31) of these cemeteries were observed to identify trees that may present a potential hazard to the cemeteries and their associated fences. Thirty-eight (38) potential hazard trees were identified, and were were assessed as presenting an imminent or likely risk of failure, and goes on to state, "It is recommended that falling and removal be planned and executed to mitigate the potential hazard presented by the trees identified as presenting an imminent risk of failure."<br><br>Tree QUCO2 was identified as a hazardous tree back in September 2016, however, there is no evidence to indicate this known hazard was mitigated or controlled prior to August 2023 regardless of financial and/or contractual restraints that may have been in play.<br><br>Additionally, time and associated impact of environmental conditions (i.e, rain, bacteria, rot, insect infestation, etc.) likely increased the hazard, however, did not appear to be fully considered during the work planning and control process used by either ETMC or Davey. | CF-1, 9-14 16-18 |

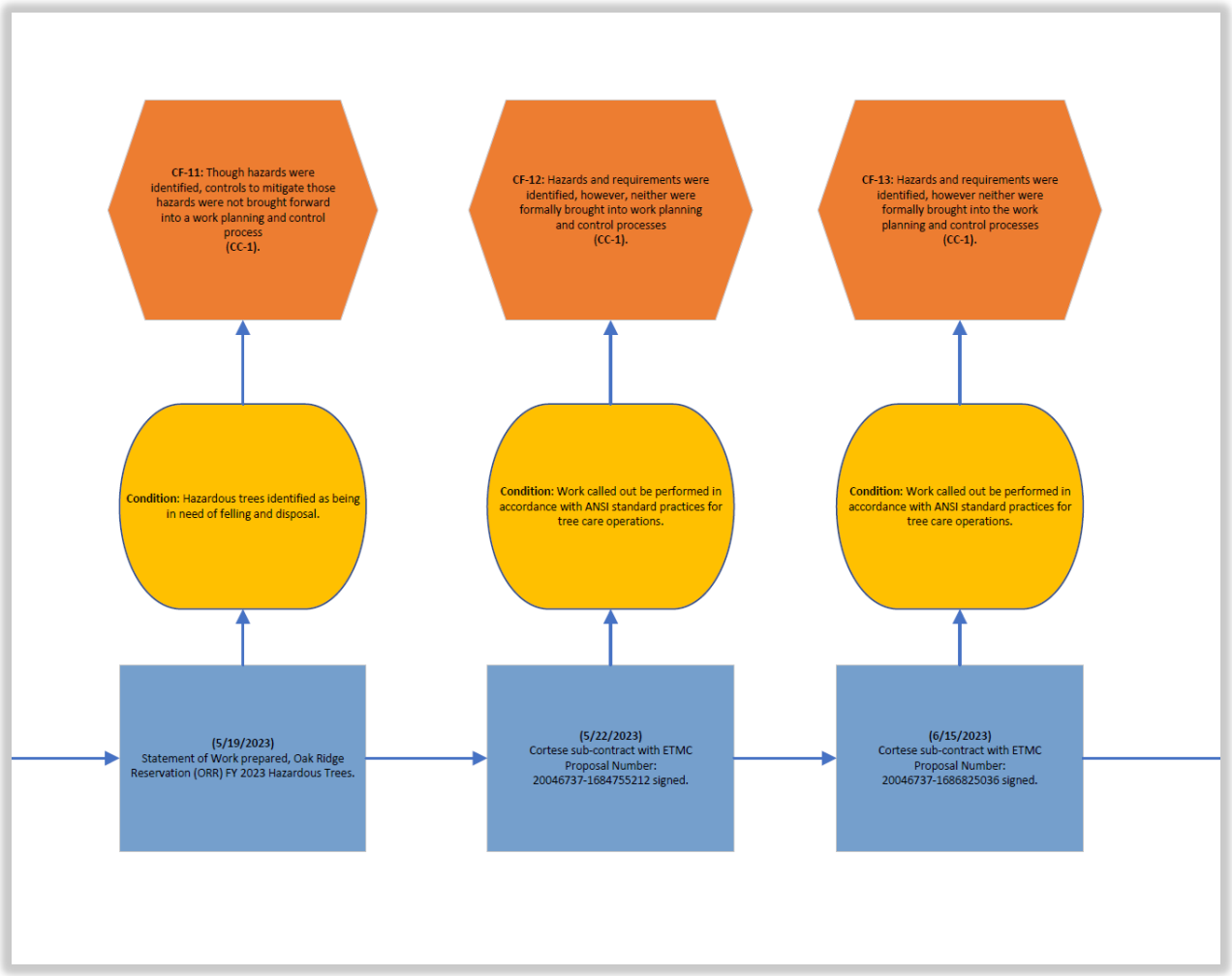
| Hazard/Threat | Target | Barrier | Applicable Section of Barrier | 1. In Place?<br>2. In Use?<br>3. Effective?<br>Yes/No/Partial | Analysis | Associated Causal Factors |
|---|---|---|---|---|---|---|
| Imminent and hazardous trees | Personnel | ***Davey Tree Care Work Order 1376 / 47242531*** | All | 1. Y<br>2. Y<br>3. N | This work order found at the worksite (cab of Davey Bucket Truck), was the only one of two forms of guidance available to the Davey employees assigned to do the work that day. Though reference is made to 98 hazardous trees, there is no other indication alerting the workers to the tree being worked that day (QUCO2) was classified as "imminent and hazardous".<br><br>Although the Davey Tree Care Work Order was not likely designed as such, absent the Davey Residential Operatons Job Plan / briefing form or other AHA, this Work Order appeared to be one of the two, last potential administrative barriers in place that could provide the Davey workers any guidance on work scope, associated hazards and/or mitigation plans. | CF-16-17, 19, 21, 22, 24 |
| Imminent and hazardous trees | Personnel | ***Davey Tree Care Work Order 1376 / 47242528*** | All | 1. Y<br>2. Y<br>3. N | This work order was also found in the cab of the Davey Bucket Truck, and was the only other form of guidance available to the Davey employees assigned to do the work that day. Though reference is made to 98 hazardous trees, there is no other indication alerting the workers to the tree being worked that day (QUCO2) was classified as "imminent and hazardous".<br><br>Although the Davey Tree Care Work Order was not likely designed as such, absent the Davey Residential Operatons Job Plan / briefing form or other AHA, this Work Order appeared to be the last of two potential administrative barriers in place that could provide the Davey workers with any guidance on work scope, associated hazards and/or mitigation plans. | CF-16-17, 19, 21, 22, 24 |
| Injury/Illness | Ensuring personnel performing work IAW DOE/applicable requirements | ***ORNL Site Office Oversight*** | N/A | 1. P<br>2. P<br>3. N | 1. OSO conducts oversite on a risk based approach, however, it was not apparent to OSO that ETMC was outside of 10 CFR 851 requirements with regards to tree trimming/felling operations as per ANSI requirements.<br>2. No clear R2A2s to perform safety oversite of ORR.<br>3. OSOP 226 does not distinguish between ORR, ORISE, and ORNL.<br><br>OSO failed to understand and execute their role in providing oversight to ORR. | CF-4-7, 15 |
| Personnel performing work without sufficient experience and knowledge | Qualified Personnel with sufficient experience commensurate for the task | ***Davey Qualified Residential Arborist "C" Training*** | All | 1. Y<br>2. Y<br>3. P | CoTW-1 completed the Davey "Qualified Residential Arborist "C" Training" and recently passed the "Residential Arborist Safety Test" back on 11 April 2023.<br><br>CoTW-2 had started their "Qualified Residential Arborist "C" Training" on June 6, 2023, and was still considered a "Trimmer Trainee".<br><br>CoTW-1 had only been qualified as a Davey Residential Arborist for 4-months when they were assigned to conduct the work on August 11, 2023. Based upon their recent qualification, several elementary Davey Job Hazard Analysis planning steps were not conducted during the day of the work (see Davey Job Hazard Analysis Barrier above) suggesting the potential gaps in training effectiveness.<br><br>Additionally, CoTW-2 was still under the process of qualifying and likely had not yet acquired the skillsets needed to fully identify the gaps missed in the planning steps and/or execution of the work (i.e., cut sequence, fall zone, etc.). This could not be fully adjudicated as Davey management did not allow CoTW-2 to be formally interviewed by the Board. It is noted, that Davey input would be considered invaluable to understanding the details of this accident, specifically those actions taken just prior to the event, and would likely assist in identifying actions to prevent recurrence. | CF-25 |

# APPENDIX F. ECF Chart

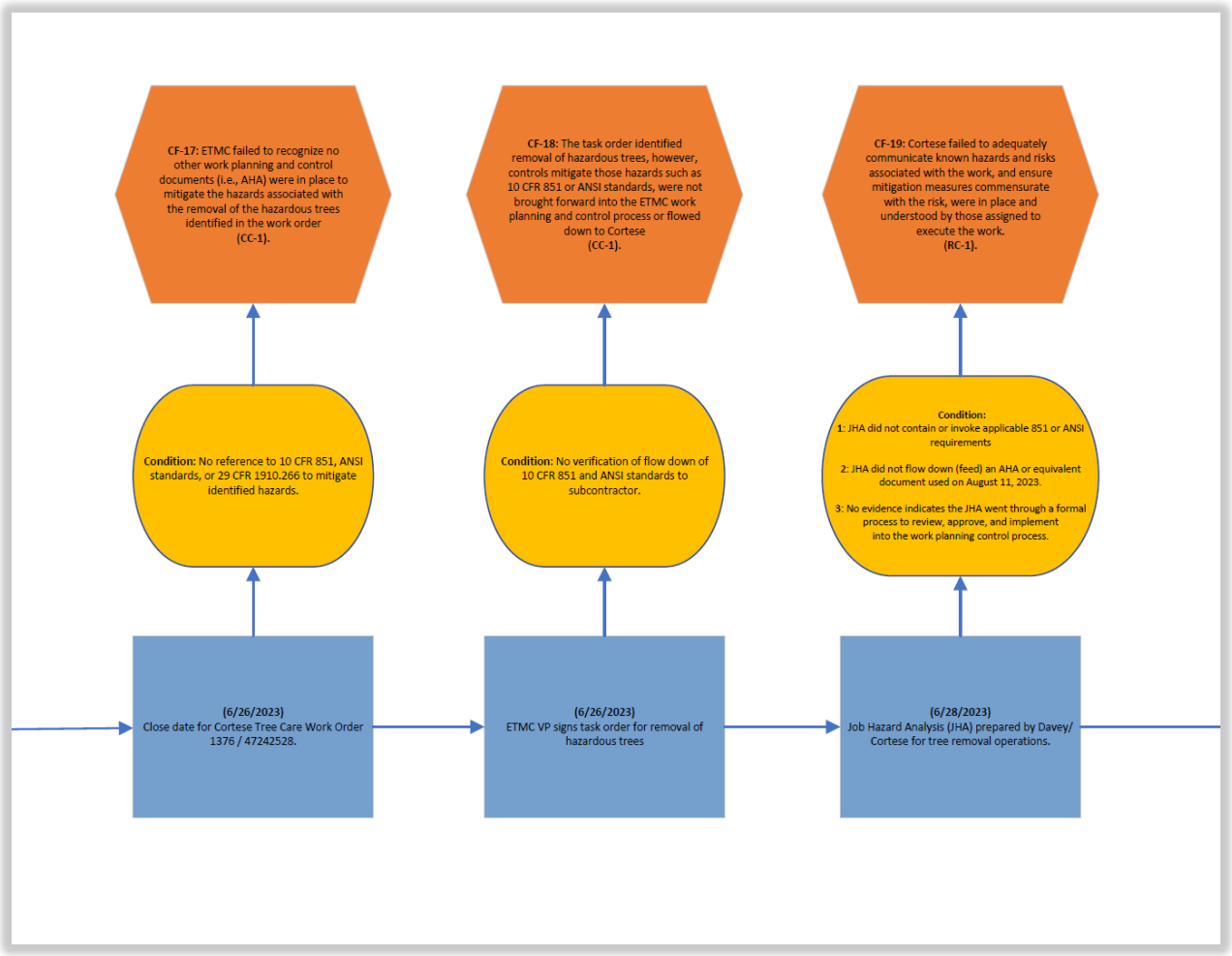


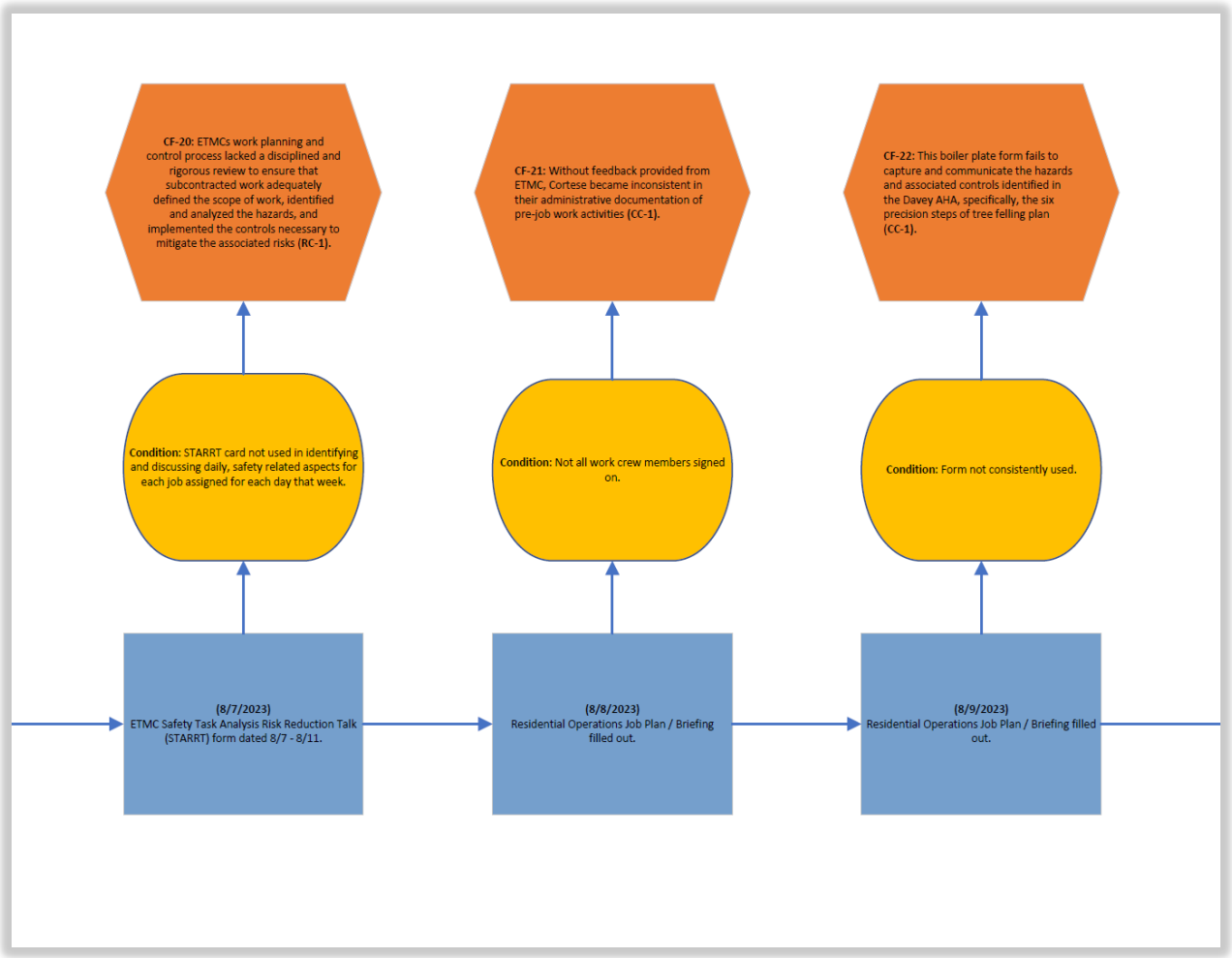

CF-4: Clear roles for DOE RM Engineers were not defined to establish effective oversight of ORR Contractors, subcontractors and the associated planning and control of work. (CC-4).
CF-5: OSO and ORR failed to verify that ETMC and their subcontractors were implementing 851 requirements during the performance of work. (CC-3).
CF-6: Minimal oversight of ETMC and their subcontractors (CC-4).
CF-7: Unclear R2A2s for the RM Manager to provide safety oversight once they transitioned to the OSO. Since the RM Manager was an SES, OSO did not feel the need to provide specific direction, therefore there was no regular ongoing oversight of RM operations by OSO safety staff. Safety oversite conducted only when requested. (CC-4).
Condition: Expectations regarding roles and responsibilities were not defined
Condition: No annual review of ETMCs WSHP conducted
Condition: No specifics provided to direct oversight
Condition: Expectations for RM were not specified
(10/28/2019) ORR Services transfers from Consolidated Service Center (CSC) to Oak Ridge Site Office (OSO).
(3/30/2020) ORNL Site office procedure (OSOP 226 Rev 4) approved by ORNL Site manager
(2/15/2021) ORNL Site Office (OSO) Field Monitoring Expectations memo released by OSO Site Office Manager to ORNL Site Office Staff.

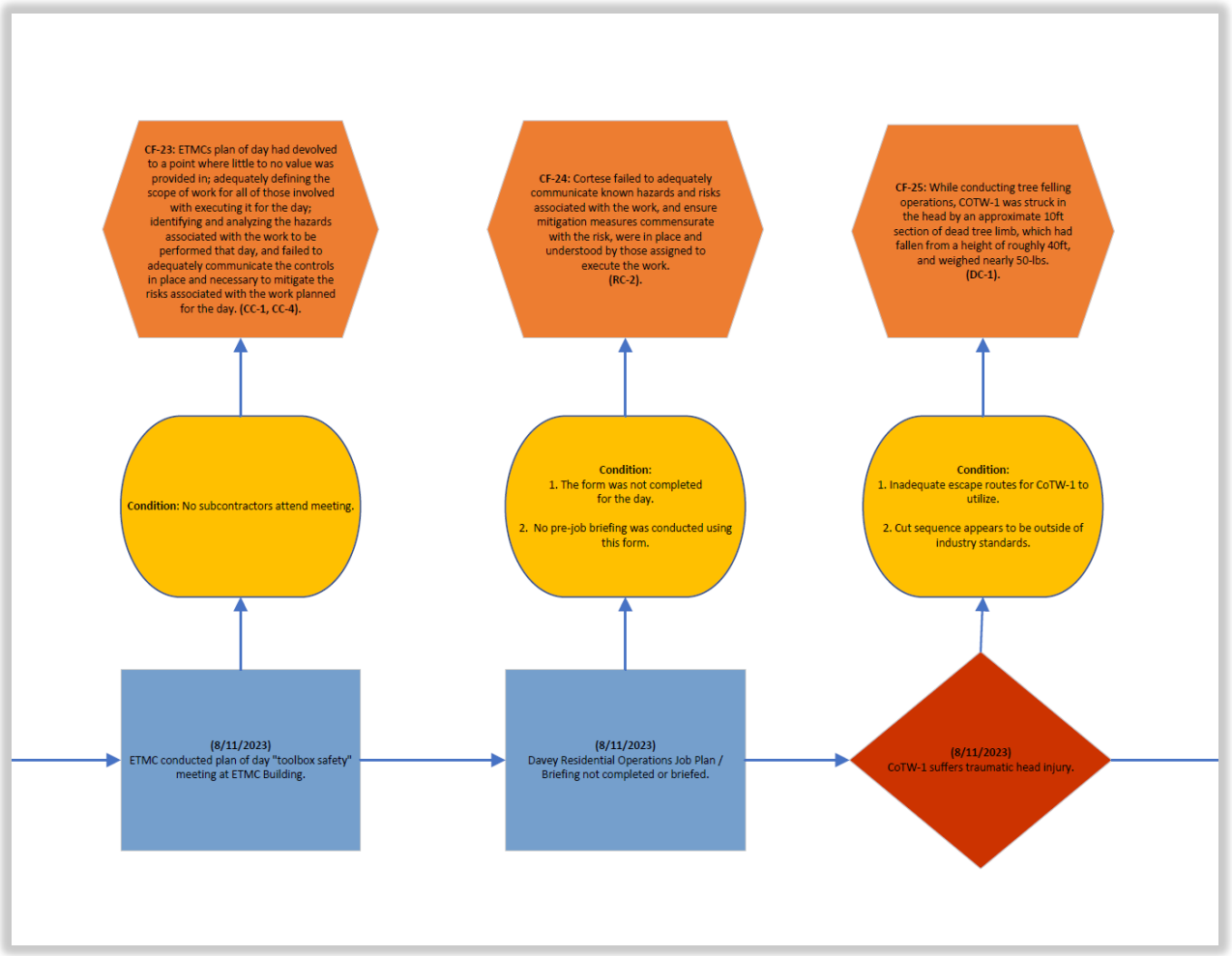

CF-8: Increase in scope of work resulted in additional hazards being introduced to the task without adequate hazard analysis (CC-2).
CF-9: The walkdown identified and located specific hazards, however there was no mechanism in place to allow for mitigation of those hazards via the work planning and control process (CC-1).
CF-10: Risks identified in the report, were not collectively managed by OSO, RM and ETMC. The resulted in the less than adequate planning and execution of the work commensurate with the risk (CC-1).
Condition: Chipper related work was introduced into the work plan without updating AHA or JHA.
Condition: Trees with observable defects were identified.
Condition: Trees assessed in the report (including QUCO2) identified as presenting an imminent or likely risk of failure.
(9/28/2021) Cortese near miss with chipper. E-stop activated. Contracting Officer issues Stop Work
(3/6/2023-4/28/2023) TBC Solutions personnel performed a walking field assessment of selected cemeteries on the ORR between March 6 and April 28, 2023.
(~5/15/2023) DRAFT Cemetery Hazard Tree Designation Oak Ridge Reservation Report: May 2023: TBC Solutions, Inc.

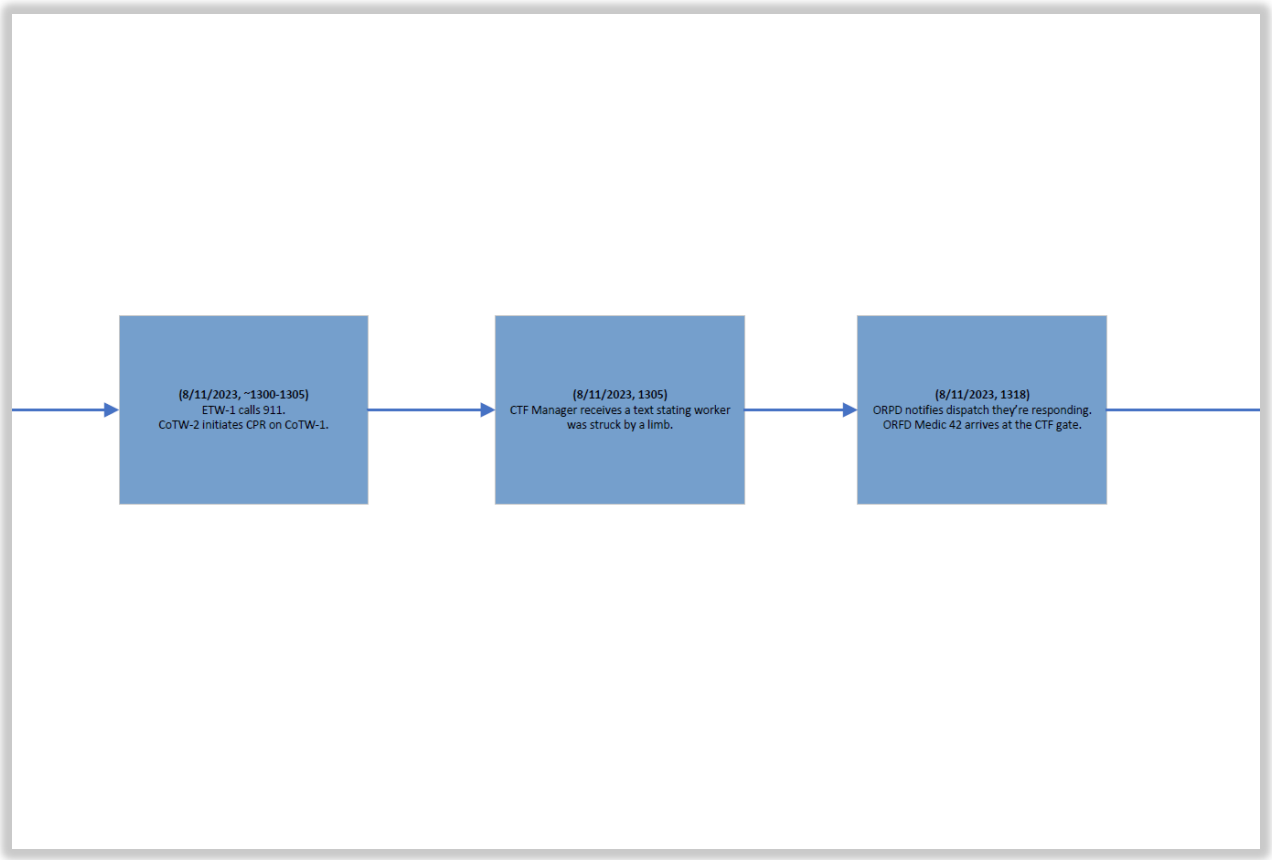

CF-11: Though hazards were identified, controls to mitigate those hazards were not brought forward into a work planning and control process (CC-1).
CF-12: Hazards and requirements were identified, however, neither were formally brought into work planning and control processes (CC-1).
CF-13: Hazards and requirements were identified, however neither were formally brought into the work planning and control processes (CC-1).
Condition: Hazardous trees identified as being in need of felling and disposal.
Condition: Work called out be performed in accordance with ANSI standard practices for tree care operations.
Condition: Work called out be performed in accordance with ANSI standard practices for tree care operations.
(5/19/2023) Statement of Work prepared, Oak Ridge Reservation (ORR) FY 2023 Hazardous Trees.
(5/22/2023) Cortese sub-contract with ETMC Proposal Number: 20046737-1684755212 signed.
(6/15/2023) Cortese sub-contract with ETMC Proposal Number: 20046737-1686825036 signed.

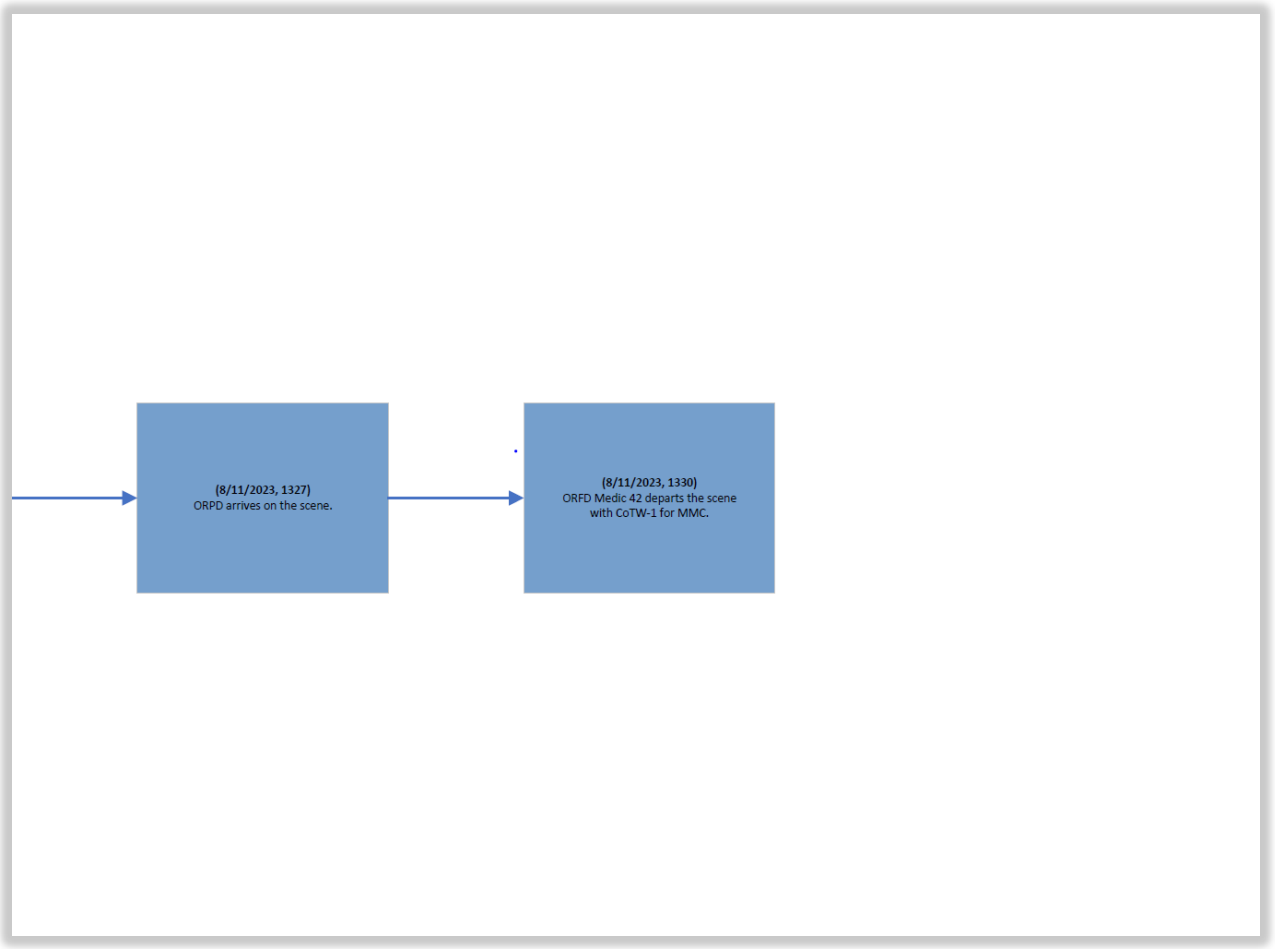

CF-14: Though hazards were identified by Cortese, ETMC failed to seek additional guidance or strengthen controls to ensure those hazards were appropriately mitigated. This resulted in Cortese utilizing a broad Job Hazard Analysis as their work planning and control process (CC-1).
CF-15: Hazards and requirements were identified, however neither were formally brought into the work planning and control processes (CC-2, CC-3).
CF-16: The work order identified removal of hazardous trees, however, Cortese had no other available controls in place to mitigate those hazards through any other work planning and control process (CC-1).
Condition: Scope of work expanded in that additional hazardous trees were identified.
Condition:
1. Task order did not go back through a safety review
2. OSO and ETMC failed to recognize removal of hazardous trees fell outside of ETMC WSHP
Condition: No reference to 10 CFR 851, ANSI standards, or 29 CFR 1910.266 to mitigate identified hazards.
(6/16/2023)
ETMC PRICE PROPOSAL-06 16 2023. FY 2023-Hazardous Trees/ Removal of Approximately 35 Trees Various ORR Cemetery Sites. ETMC price proposal for removal of 35 trees.
(6/23/2023)
Task Order (Req. # 23SC001178) for the removal of Hazardous Trees throughout the ORR, in accordance with the SOW and spreadsheet attached.
(6/26/2023)
Close date for Cortese Tree Care Work Order 1376 / 47242531.


CF-17: ETMC failed to recognize no other work planning and control documents (i.e., AHA) were in place to mitigate the hazards associated with the removal of the hazardous trees identified in the work order (CC-1).
CF-18: The task order identified removal of hazardous trees, however, controls mitigate those hazards such as 10 CFR 851 or ANSI standards, were not brought forward into the ETMC work planning and control process or flowed down to Cortese (CC-1).
CF-19: Cortese failed to adequately communicate known hazards and risks associated with the work, and ensure mitigation measures commensurate with the risk, were in place and understood by those assigned to execute the work. (RC-1).
Condition: No reference to 10 CFR 851, ANSI standards, or 29 CFR 1910.266 to mitigate identified hazards.
Condition: No verification of flow down of 10 CFR 851 and ANSI standards to subcontractor.
Condition:
1: JHA did not contain or invoke applicable 851 or ANSI requirements
2: JHA did not flow down (feed) an AHA or equivalent document used on August 11, 2023.
3: No evidence indicates the JHA went through a formal process to review, approve, and implement into the work planning control process.
(6/26/2023)
Close date for Cortese Tree Care Work Order 1376 / 47242528.
(6/26/2023)
ETMC VP signs task order for removal of hazardous trees
(6/28/2023)
Job Hazard Analysis (JHA) prepared by Davey/ Cortese for tree removal operations.

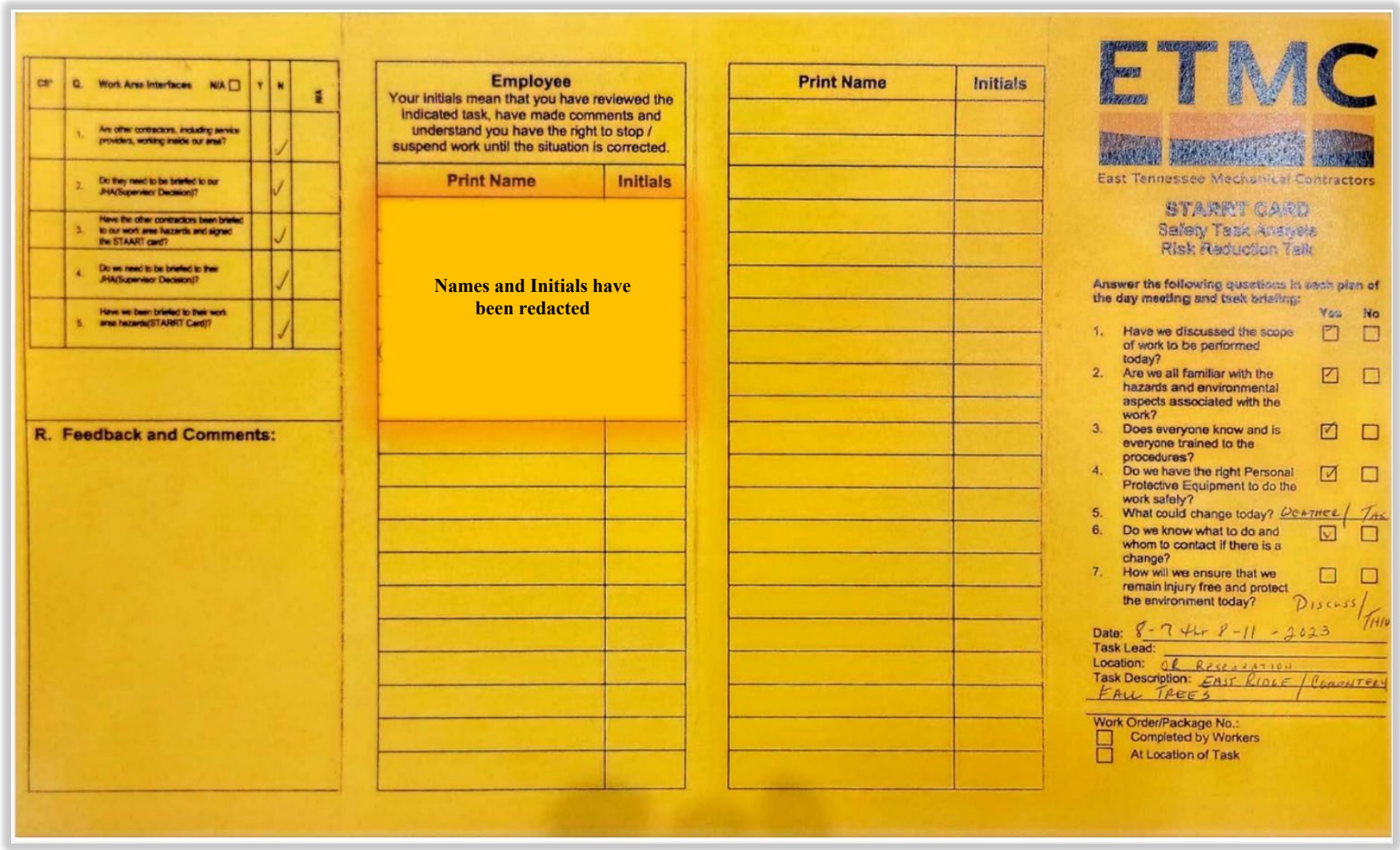

CF-20: ETMCs work planning and control process lacked a disciplined and rigorous review to ensure that subcontracted work adequately defined the scope of work, identified and analyzed the hazards, and implemented the controls necessary to mitigate the associated risks (RC-1).
CF-21: Without feedback provided from ETMC, Cortese became inconsistent in their administrative documentation of pre-job work activities (CC-1).
CF-22: This boiler plate form fails to capture and communicate the hazards and associated controls identified in the Davey AHA, specifically, the six precision steps of tree felling plan (CC-1).
Condition: STARRT card not used in identifying and discussing daily, safety related aspects for each job assigned for each day that week.
Condition: Not all work crew members signed on.
Condition: Form not consistently used.
(8/7/2023) ETMC Safety Task Analysis Risk Reduction Talk (STARRT) form dated 8/7 - 8/11.
(8/8/2023) Residential Operations Job Plan / Briefing filled out.
(8/9/2023) Residential Operations Job Plan / Briefing filled out.


CF-23: ETMCs plan of day had devolved to a point where little to no value was provided in; adequately defining the scope of work for all of those involved with executing it for the day; identifying and analyzing the hazards associated with the work to be performed that day, and failed to adequately communicate the controls in place and necessary to mitigate the risks associated with the work planned for the day. (CC-1, CC-4).
CF-24: Cortese failed to adequately communicate known hazards and risks associated with the work, and ensure mitigation measures commensurate with the risk, were in place and understood by those assigned to execute the work. (RC-2).
CF-25: While conducting tree felling operations, COTW-1 was struck in the head by an approximate 10ft section of dead tree limb, which had fallen from a height of roughly 40ft, and weighed nearly 50-lbs. (DC-1).
Condition: No subcontractors attend meeting.
Condition: 1. The form was not completed for the day. 2. No pre-job briefing was conducted using this form.
Condition: 1. Inadequate escape routes for CoTW-1 to utilize. 2. Cut sequence appears to be outside of industry standards.
(8/11/2023) ETMC conducted plan of day "toolbox safety" meeting at ETMC Building.
(8/11/2023) Davey Residential Operations Job Plan / Briefing not completed or briefed.
(8/11/2023) CoTW-1 suffers traumatic head injury.


(8/11/2023, ~1300-1305)
ETW-1 calls 911.
CoTW-2 initiates CPR on CoTW-1.
(8/11/2023, 1305)
CTF Manager receives a text stating worker was struck by a limb.
(8/11/2023, 1318)
ORPD notifies dispatch they're responding.
ORFD Medic 42 arrives at the CTF gate.


(8/11/2023, 1327)
ORPD arrives on the scene.
(8/11/2023, 1330)
ORFD Medic 42 departs the scene
with CoTW-1 for MMC.

# APPENDIX G. STARRT Card



| CS* | Q. | Work Area Interfaces N/A ☐ | Y | N | N/A |
|---|---|---|---|---|---|
| | 1. | Are other contractors, including service providers, working inside our area? | | ✓ | |
| | 2. | Do they need to be briefed to our JHA(Supervisor Decision)? | | ✓ | |
| | 3. | Have the other contractors been briefed to our work area hazards and signed the STAART card? | | ✓ | |
| | 4. | Do we need to be briefed to their JHA(Supervisor Decision)? | | ✓ | |
| | 5. | Have we been briefed to their work area hazards(STARRT Card)? | | ✓ | |

**R. Feedback and Comments:**

**Employee**
Your initials mean that you have reviewed the indicated task, have made comments and understand you have the right to stop / suspend work until the situation is corrected.

| Print Name | Initials |
|---|---|
| Names and Initials have been redacted | |

| Print Name | Initials |
|---|---|
| | |

ETMC

East Tennessee Mechanical Contractors

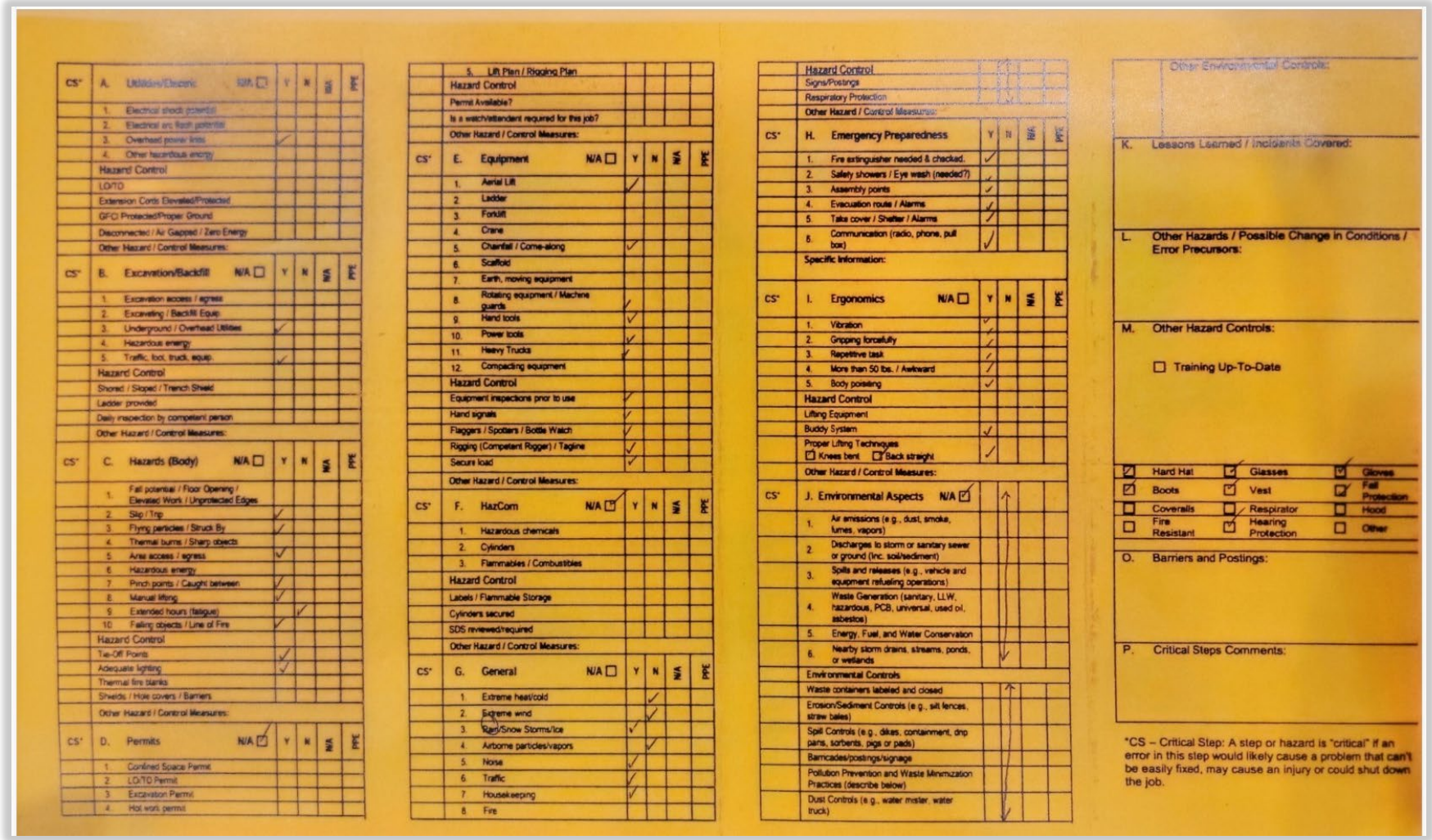
STARRT CARD
Safety Task Analysis
Risk Reduction Talk

Answer the following questions in each plan of the day meeting and task briefing:

| | | Yes | No |
|---|---|---|---|
| 1. | Have we discussed the scope of work to be performed today? | ☑ | ☐ |
| 2. | Are we all familiar with the hazards and environmental aspects associated with the work? | ☑ | ☐ |
| 3. | Does everyone know and is everyone trained to the procedures? | ☑ | ☐ |
| 4. | Do we have the right Personal Protective Equipment to do the work safely? | ☑ | ☐ |
| 5. | What could change today? WEATHER / TASK | | |
| 6. | Do we know what to do and whom to contact if there is a change? | ☑ | ☐ |
| 7. | How will we ensure that we remain injury free and protect the environment today? DISCUSS / THINK | ☐ | ☐ |

Date: 8-7 4hr 8-11 -2023
Task Lead:
Location: OR RESERVATION
Task Description: EAST RIDGE / COUNTRY FALL TREES

Work Order/Package No.:
☐ Completed by Workers
☐ At Location of Task



| CS* | A. Utilities/Electric N/A ☐ | Y | N | N/A | PPE |
|---|---|---|---|---|---|
| | 1. Electrical shock (overhd) | | | | |
| | 2. Electrical arc flash potential | | | | |
| | 3. Overhead power lines | ✓ | | | |
| | 4. Other hazardous energy | | | | |
| | Hazard Control | | | | |
| | LO/TO | | | | |
| | Extension Cords Elevated/Protected | | | | |
| | GFCI Protected/Proper Ground | | | | |
| | Disconnected / Air Gapped / Zero Energy | | | | |
| | Other Hazard / Control Measures: | | | | |

| CS* | B. Excavation/Backfill N/A ☐ | Y | N | N/A | PPE |
|---|---|---|---|---|---|
| | 1. Excavation access / egress | | | | |
| | 2. Excavating / Backfill Equip | | | | |
| | 3. Underground / Overhead Utilities | ✓ | | | |
| | 4. Hazardous energy | | | | |
| | 5. Traffic, foot, truck, equip. | ✓ | | | |
| | Hazard Control | | | | |
| | Shored / Sloped / Trench Shield | | | | |
| | Ladder provided | | | | |
| | Daily inspection by competent person | | | | |
| | Other Hazard / Control Measures: | | | | |

| CS* | C. Hazards (Body) N/A ☐ | Y | N | N/A | PPE |
|---|---|---|---|---|---|
| | 1. Fall potential / Floor Opening / Elevated Work / Unprotected Edges | | | | |
| | 2. Slip / Trip | ✓ | | | |
| | 3. Flying particles / Struck By | ✓ | | | |
| | 4. Thermal burns / Sharp objects | | | | |
| | 5. Area access / egress | ✓ | | | |
| | 6. Hazardous energy | | | | |
| | 7. Pinch points / Caught between | ✓ | | | |
| | 8. Manual lifting | ✓ | | | |
| | 9. Extended hours (fatigue) | | ✓ | | |
| | 10. Falling objects / Line of Fire | ✓ | | | |
| | Hazard Control | | | | |
| | Tie-Off Points | ✓ | | | |
| | Adequate lighting | ✓ | | | |
| | Thermal fire blanks | | | | |
| | Shields / Hole covers / Barriers | | | | |
| | Other Hazard / Control Measures: | | | | |

| CS* | D. Permits N/A ☑ | Y | N | N/A | PPE |
|---|---|---|---|---|---|
| | 1. Confined Space Permit | | | | |
| | 2. LO/TO Permit | | | | |
| | 3. Excavation Permit | | | | |
| | 4. Hot work permit | | | | |
| | 5. Lift Plan / Rigging Plan | | | | |
| | Hazard Control | | | | |
| | Permit Available? | | | | |
| | Is a watch/attendant required for this job? | | | | |
| | Other Hazard / Control Measures: | | | | |

| CS* | E. Equipment N/A ☐ | Y | N | N/A | PPE |
|---|---|---|---|---|---|
| | 1. Aerial Lift | ✓ | | | |
| | 2. Ladder | | | | |
| | 3. Forklift | | | | |
| | 4. Crane | | | | |
| | 5. Chainfall / Come-along | ✓ | | | |
| | 6. Scaffold | | | | |
| | 7. Earth, moving equipment | | | | |
| | 8. Rotating equipment / Machine guards | ✓ | | | |
| | 9. Hand tools | ✓ | | | |
| | 10. Power tools | ✓ | | | |
| | 11. Heavy Trucks | ✓ | | | |
| | 12. Compacting equipment | | | | |
| | Hazard Control | | | | |
| | Equipment inspections prior to use | ✓ | | | |
| | Hand signals | ✓ | | | |
| | Flaggers / Spotters / Bottle Watch | ✓ | | | |
| | Rigging (Competent Rigger) / Tagline | ✓ | | | |
| | Secure load | ✓ | | | |
| | Other Hazard / Control Measures: | | | | |

| CS* | F. HazCom N/A ☑ | Y | N | N/A | PPE |
|---|---|---|---|---|---|
| | 1. Hazardous chemicals | | | | |
| | 2. Cylinders | | | | |
| | 3. Flammables / Combustibles | | | | |
| | Hazard Control | | | | |
| | Labels / Flammable Storage | | | | |
| | Cylinders secured | | | | |
| | SDS reviewed/required | | | | |
| | Other Hazard / Control Measures: | | | | |

| CS* | G. General N/A ☐ | Y | N | N/A | PPE |
|---|---|---|---|---|---|
| | 1. Extreme heat/cold | | ✓ | | |
| | 2. Extreme wind | | ✓ | | |
| | 3. Rain/Snow Storms/Ice | ✓ | | | |
| | 4. Airborne particles/vapors | | ✓ | | |
| | 5. Noise | ✓ | | | |
| | 6. Traffic | ✓ | | | |
| | 7. Housekeeping | ✓ | | | |
| | 8. Fire | | | | |
| | Hazard Control | | | | |
| | Signs/Postings | | | | |
| | Respiratory Protection | | | | |
| | Other Hazard / Control Measures: | | | | |

| CS* | H. Emergency Preparedness | Y | N | N/A | PPE |
|---|---|---|---|---|---|
| | 1. Fire extinguisher needed & checked. | ✓ | | | |
| | 2. Safety showers / Eye wash (needed?) | ✓ | | | |
| | 3. Assembly points | ✓ | | | |
| | 4. Evacuation route / Alarms | ✓ | | | |
| | 5. Take cover / Shelter / Alarms | ✓ | | | |
| | 6. Communication (radio, phone, pull box) | ✓ | | | |
| | Specific Information: | | | | |

| CS* | I. Ergonomics N/A ☐ | Y | N | N/A | PPE |
|---|---|---|---|---|---|
| | 1. Vibration | ✓ | | | |
| | 2. Gripping forcefully | ✓ | | | |
| | 3. Repetitive task | ✓ | | | |
| | 4. More than 50 lbs. / Awkward | ✓ | | | |
| | 5. Body positing | ✓ | | | |
| | Hazard Control | | | | |
| | Lifting Equipment | | | | |
| | Buddy System | ✓ | | | |
| | Proper Lifting Techniques ☑ Knees bent ☐ Back straight | ✓ | | | |
| | Other Hazard / Control Measures: | | | | |

| CS* | J. Environmental Aspects N/A ☑ | ↑ | ↓ |
|---|---|---|---|
| | 1. Air emissions (e.g., dust, smoke, fumes, vapors) | | |
| | 2. Discharges to storm or sanitary sewer or ground (inc. soil/sediment) | | |
| | 3. Spills and releases (e.g., vehicle and equipment refueling operations) | | |
| | 4. Waste Generation (sanitary, LLW, hazardous, PCB, universal, used oil, asbestos) | | |
| | 5. Energy, Fuel, and Water Conservation | | |
| | 6. Nearby storm drains, streams, ponds, or wetlands | | |
| | Environmental Controls | | |
| | Waste containers labeled and closed | ↑ | |
| | Erosion/Sediment Controls (e.g., silt fences, straw bales) | | |
| | Spill Controls (e.g., dikes, containment, drip pans, sorbents, pigs or pads) | | |
| | Barricades/postings/signage | | |
| | Pollution Prevention and Waste Minimization Practices (describe below) | | |
| | Dust Controls (e.g., water mister, water truck) | | ↓ |

Other Environmental Controls:

K. Lessons Learned / Incidents Covered:

L. Other Hazards / Possible Change in Conditions / Error Precursors:

M. Other Hazard Controls:

☐ Training Up-To-Date

| | | | |
|---|---|---|---|
| ☑ Hard Hat | ☑ Glasses | ☑ Gloves | |
| ☑ Boots | ☑ Vest | ☑ Fall Protection | |
| ☐ Coveralls | ☐ Respirator | ☐ Hood | |
| ☐ Fire Resistant | ☑ Hearing Protection | ☐ Other | |

O. Barriers and Postings:

P. Critical Steps Comments:

*CS – Critical Step: A step or hazard is "critical" if an error in this step would likely cause a problem that can't be easily fixed, may cause an injury or could shut down the job.

# APPENDIX H. Crosswalk of Event

| Event from E&CF Chart | Associated Condition(s) | Causal Factor | Associated Contributing/Root/Direct Cause # | Conclusions |
|---|---|---|---|---|
| **~9/15/2016**: DRAFT Cemetery Hazard Tree Designation Oak Ridge Reservation Report: September 2016: TBC Solutions, Inc. released | **CONDITION**: Trees assessed in the report (including QUCO2) identified as presenting an imminent or likely risk of failure | **CF-1**: Though hazards were identified, controls to mitigate those hazards were not brought forward into the work planning and control process | ***CC-1*** : Mitigation of identified hazards were not brought into the work planning and control process. | ***CON-1*** : Existing work control processes failed to incorporate the five core functions of ISMS. |
| **6/24/2018**: ETMC Roads and Grounds performance work statement (PWS) Revised by Contract Modification P00001 | **CONDITION**: Added an increased to the scope of work being performed | **CF-2**: As the scope of work increased, no additional measures were taken to identify or assess the increased risk associated with the additional work and previously identified hazards | ***CC-2*** : Increase in scope of work resulted in additional hazards being introduced to the task without adequate hazard analysis | ***CON-2*** : Further developments in work scope failed to trigger a corresponding assessment of existing or newly created hazards/risk. |
| **1/11/2019:** ETMC Environment, Safety & Health Program / 851 Worker Safety & Health Plan, 9-12-2018 Rev 3, approved by Site Manager for Consolidated Service Center - CSC. | **CONDITION**: 10 CFR 851 requirements were not flowed down to subcontractors | **CF-3**: ETMC had no controls or other avenues in place to ensure their subcontractors were implementing 10 CFR 851 requirements during the performance of work | ***CC-3*** : Failure to ensure or verify implementation of 10 CFR 851 requirements during the performance of work. | ***CON-3*** : There was a systemic failure in ensuring essential work requirements were flowed down and implemented into the work control process. |
| **10/28/2019**: ORR Services transfers from Consolidated Service Center (CSC) to Oak Ridge Site Office (OSO). | **CONDITION 1**: Expectations regarding roles and responsibilities were not defined | **CF-4**: Clear roles for RM DOE Engineers were not defined to establish effective oversight of ORR Contractors, subcontractors and the associated planning and control of work | ***CC-4*** : Clearly defined roles and responsibilities were less than adequate (LTA) | ***CON-4*** : OSO failed to establish defined roles and responsibilities for the RM work. |
| | **CONDITION 2**: No annual review of ETMCs WSHP conducted | **CF-5**: OSO and ORR failed to verify that ETMC and their subcontractors were implementing 10 CFR 851 requirements during the performance of work | ***CC-3*** : Failure to ensure or verify implementation of 10 CFR 851 requirements during the performance of work. | ***CON-3*** : There was a systemic failure in ensuring essential work requirements were flowed down and implemented into the work control process. |
| **3/30/2020**: ORNL Site office procedure (OSOP 226 Rev 4) approved by ORNL Site manager | **CONDITION**: No specifics provided to direct oversight | **CF-6**: Minimal oversight of ETMC and their subcontractors | ***CC-4*** : Clearly defined roles and responsibilities were less than adequate (LTA) | ***CON-4*** : OSO failed to establish defined roles and responsibilities for the RM work. |
| **2/15/2021**: ORNL Site Office (OSO) Field Monitoring Expectations memo released by OSO Site Office Manager to ORNL Site Office Staff. | **CONDITION**: Expectations for RM were not specified | **CF-7**: Unclear R2A2s for the RM Manager to provide safety oversight once they transitioned to the OSO. Since the RM Manager was an SES, OSO did not feel the need to provide specific direction, therefore there was no regular ongoing oversight of RM operations by OSO safety staff. Safety oversite conducted only when requested | ***CC-4*** : Clearly defined roles and responsibilities were less than adequate (LTA) | ***CON-4*** : OSO failed to establish defined roles and responsibilities for the RM work. |
| 9/28/2021: Davey near miss with chipper. E-stop activated. Contracting Officer issues Stop Work | **CONDITION**: Chipper related work was introduced into the work plan without updating AHA or JHA | **CF-8**: Increase in scope of work resulted in additional hazards being introduced to the task without adequate hazard analysis | ***CC-2*** : Increase in scope of work resulted in addtional hazards being introduced to the task without adequate hazard analysis | ***CON-2*** : Further developments in work scope failed to trigger a corresponding assessment of existing or newly created hazards/risk. |
| ***3/6/2023 - 4/28/2023*** : TBC Solutions personnel performed a walking field assessment of selected cemeteries on the ORR between March 6 and April 28, 2023 | **CONDITION**: Trees with observable defects were identified | **CF-9**: The walkdown identified and located specific hazards, however there was no mechanism in place to allow for mitigation of those hazards via the work planning and control process | ***CC-1*** : Mitigation of identified hazards were not brought in to the work planning and control process. | ***CON-1*** : Existing work control processes failed to incorporate the five core functions of ISMS. |
| **~5/15/2023**: DRAFT Cemetery Hazard Tree Designation Oak Ridge Reservation Report: May 2023: TBC Solutions, Inc. released | **CONDITION**: Trees assessed in the report (including QUCO2) identified as presenting an imminent or likely risk of failure | **CF-10**: Risks identified in the report, were not collectively managed by OSO, RM and ETMC. This resulted in the less than adequate planning and execution of the work commensurate with the risk | ***CC-1*** : Mitigation of identified hazards were not brought in to the work planning and control process. | **CON-1**: Existing work control processes failed to incorporate the five core functions of ISMS. |
| **5/19/2023**: Statement of Work prepared, Oak Ridge Reservation (ORR) FY 2023 Hazardous Trees. | **CONDITION**: Hazardous trees identified as being in need of felling and disposal | **CF-11**: Though hazards were identified, controls to mitigate those hazards were not brought forward into the work planning and control process | ***CC-1*** : Mitigation of identified hazards were not brought in to the work planning and control process. | ***CON-1*** : Existing work control processes failed to incorporate the five core functions of ISMS. |

| Event from E&CF Chart | Associated Condition(s) | Causal Factor | Associated Contributing/Root/Direct Cause # | Conclusions |
|---|---|---|---|---|
| 5/22/2023: Davey sub-contract with ETMC Proposal Number: 20046737-1684755212 signed. | **CONDITION**: Work called out be performed in accordance with ANSI standard practices for tree care operations. | **CF-12**: Hazards and requirements were identified, however neither were formally brought into the work planning and control processes | ***CC-1*** : Mitigation of identified hazards were not brought in to the work planning and control process. | ***CON-1*** : Existing work control processes failed to incorporate the five core functions of ISMS. |
| 6/15/2023: Davey sub-contract with ETMC Proposal Number: 20046737-1686825036 signed | **CONDITION**: Work called out be performed in accordance with ANSI standard practices for tree care operations. | **CF-13**: Hazards and requirements were identified, however neither were formally brought into the work planning and control processes | ***CC-1*** : Mitigation of identified hazards were not brought in to the work planning and control process. | ***CON-1*** : Existing work control processes failed to incorporate the five core functions of ISMS. |
| **6/16/2023**: ETMC PRICE PROPOSAL-06 16 2023. FY 2023-Hazardous Trees/ Removal of Approximately 35 Trees Various ORR Cemetery Sites released | **CONDITION**: Scope of work expanded in that additional hazardous trees were identified. | CF-14: Though hazards were identified by Davey, ETMC failed to seek additional guidance or strengthen controls to ensure those hazards were appropriately mitigated. This resulted in Davey utilizing a broad Job Hazard Analysis as their work planning and control process | ***CC-1*** : Mitigation of identified hazards were not brought in to the work planning and control process. | ***CON-1*** : Existing work control processes failed to incorporate the five core functions of ISMS. |
| **6/23/2023**: Task Order (Req. # 23SC001178) for the removal of Hazardous Trees throughout the ORR, in accordance with the SOW and spreadsheet attached signed by DOE Contracting Officer | **CONDITION 1**: Task order did not go back through a safety review<br><br>**CONDITION 2**: OSO and ETMC failed to recognize removal of hazardous trees fell outside of ETMC WSHP | CF-15: The task order identified the need for removal of hazardous trees, however, OSO failed to verify that adequate controls to mitigate those hazards had been identified through the ETMC work planning and control process and appropiately flowed down to Davey | ***CC-2*** : Increase in scope of work resulted in addtional hazards being introduced to the task without adequate hazard analysis<br><br>***CC-3*** : Failure to ensure or verify implementation of 10 CFR 851 requirements during the performance of work. | **CON-2**: Further developments in work scope failed to trigger a corresponding assessment of existing or newly created hazards/risk.<br><br>***CON-3*** : There was a systemic failure in ensuring essential work requirements were flowed down and implemented into the work control process. |
| 6/26/2023: Close date for Davey Tree Care Work Order 1376 / 47242531 | **CONDITION**: No reference to 10 CFR 851, ANSIstandards, or 29 CFR 1910.266 to mitigate identified hazards | CF-16: The work order identified removal of hazardous trees, however, Davey had no other available controls in place to mitigate those hazards through any other work planning and control process | ***CC-1*** : Mitigation of identified hazards were not brought in to the work planning and control process. | ***CON-1*** : Existing work control processes failed to incorporate the five core functions of ISMS. |
| 6/26/2023: Close date for Davey Tree Care Work Order 1376 / 47242528 | **CONDITION**: No reference to 10 CFR 851, ANSIstandards, or 29 CFR 1910.266 to mitigate identified hazards | **CF-17**: ETMC failed to recognize no other work planning and control documents (i.e., AHA) were in place to mitigate the hazards associated with the removal of the hazardous trees identified in the work order | ***CC-1*** : Mitigation of identified hazards were not brought in to the work planning and control process. | ***CON-1*** : Existing work control processes failed to incorporate the five core functions of ISMS. |
| **6/26/2023**: ETMC VP signs task order for removal of hazardous trees | **CONDITION**: No verification of flow down of 10 CFR 851 and ANSI standards to subcontractor | CF-18: The task order identified removal of hazardous trees, however, controls to mitigate those hazards such as 10 CFR 851 or ANSI standards, were not brought forward into the ETMC work planning and control process or flowed down to Davey | ***CC-1*** : Mitigation of identified hazards were not brought in to the work planning and control process. | ***CON-1*** : Existing work control processes failed to incorporate the five core functions of ISMS. |
| 6/28/2023: Job Hazard Analysis (JHA) prepared by Davey/Davey for tree removal operations. | **CONDITION 1**: JHA did not contain or invoke applicable 851 or ANSI requirements<br><br>**CONDITION 2**: JHA did not flow down (feed) an AHA or equivalent document used on August 11, 2023.<br><br>**CONDITION 3**: No evidence indicates the JHA went through a formal process to review, approve, and implement into the work planning control process. | CF-19: Davey failed to adequately communicate known hazards and risks associated with the work, and ensure mitigation measures commensurate with the risk, were in place and understood by those assigned to execute the work | ***RC-1*** : The work planning and control lacked a disciplined and rigorous review process to ensure subcontracted work adequately defined the scope of work, identified and analyzed the hazards, and implemented the controls necessary to mitigate the associated risks. | ***CON-1*** : Existing work control processes failed to incorporate the five core functions of ISMS. |
| **8/7/2023**: ETMC Safety Task Analysis Risk Reduction Talk (STARRT) form dated 8/7 - 8/11 | **CONDITION 1**: STARRT card not used in identifying and discussing daily, safety related aspects for each job assigned for each day that week. | **CF-20**: ETMCs work planning and control process lacked a disciplined and rigorous review to ensure that subcontracted work adequately defined the scope of work, identified and analyzed the hazards, and implemented the controls necessary to mitigate the associated risks | ***RC-1*** : The work planning and control lacked a disciplined and rigorous review process to ensure subcontracted work adequately defined the scope of work, identified and analyzed the hazards, and implemented the controls necessary to mitigate the associated risks. | ***CON-1*** : Existing work control processes failed to incorporate the five core functions of ISMS. |
| ***8/8/2023*** : Residential Operations Job Plan / Briefing filled out. | **CONDITION**: Not all work crew members signed on. | CF-21: Without feedback provided from ETMC, Davey became inconsistent in their administrative documentation of pre-job work activities | ***CC-1*** : Mitigation of identified hazards were not brought into the work planning and control process. | ***CON-1*** : Existing work control processes failed to incorporate the five core functions of ISMS. |

| Event from E&CF Chart | Associated Condition(s) | Causal Factor | Associated Contributing/Root/Direct Cause # | Conclusions |
|---|---|---|---|---|
| ***8/9/2023:*** Residential Operations Job Plan / Briefing filled out. | **CONDITION 1**: Form not consistently used<br><br>**CONDITION 2**: Form lacks sufficient detail to adequately communicate all hazards and controls identified in the AHA. | **CF-22**: This boiler plate form fails to capture and communicate the hazards and associated controls identified in the Davey AHA, specifically, the six precision steps of tree felling plan. | ***CC-1 :*** Mitigation of identified hazards were not brought into the work planning and control process. | ***CON-1*** : Existing work control processes failed to incorporate the five core functions of ISMS. |
| **8/11/2023**: ETMC conducted plan of day "toolbox safety" meeting at ETMC Building. | **CONDITION**: No subcontractors attend meeting. | **CF-23**: ETMCs plan of day had devolved to a point where little to no value was provided in; adequately defining the scope of work for all of those involved with executing it for the day; identifying and analyzing the hazards associated with the work to be performed that day, and failed to adequately communicate the controls in place and necessary to mitigate the risks associated with the work planned for the day | ***CC-1 :*** Mitigation of identified hazards were not brought in to the work planning and control process.<br><br>***CC-4 :*** Clearly defined roles and responsibilities were less than adequate (LTA) | ***CON-1*** : Existing work control processes failed to incorporate the five core functions of ISMS.<br><br>***CON-4*** : OSO failed to establish defined roles and responsibilities for the RM work. |
| **8/11/2023:** Davey Residential Operations Job Plan / Briefing not completed or briefed | **CONDITION 1**: The form was not completed for the day<br><br>**CONDITON 2**: No pre-job briefing was conducted using this form. | CF-24: Davey failed to adequately communicate known hazards and risks associated with the work, and ensure mitigation measures commensurate with the risk, were in place and understood by those assigned to execute the work | ***RC-2:*** Davey failed to adequately evaluate and communicate known hazards and risks associated with the work, and ensure mitigation measures commensurate with the risk, were in place and understood by those assigned to execute the work. | ***CON-1*** : Existing work control processes failed to incorporate the five core functions of ISMS. |
| ***8/11/2023*** : CoTW-1 suffers traumatic head injury | ***CONDITION 1*** : Inadequate escape routes available for CoTW-1 to utilize<br><br>***CONDITION 2*** : Cut sequence appears to be outside of industry standards | **CF-25**: While conducting tree felling operations, COTW-1 was struck in the head by an approximate 10ft section of dead tree limb, which had fallen from a height of roughly 40ft, and weighed nearly 50-lbs. | ***DC-1:*** While conducting tree felling operations, COTW-1 was struck in the head by an approximate 10ft section of dead tree limb, which had fallen from a height of roughly 40ft, and weighed nearly 50-lbs. | |

# APPENDIX I. ORPD Incident Report

## Oak Ridge Police Department

Officer Report for Incident 23-19693

**Nature:** Traumatic Injur

**Address:** 1200 Bear Creek RD; DOE CENTRAL TRAINING FACILITY Oak Ridge TN 37830

**Location:** P3-35

**Offense Codes:** X04
**Received By:** [redacted] **How Received:** T **Agency:** ORPD
**Responding Officers:** [redacted]
**Responsible Officer:** [redacted] **Disposition:** CLO 08/12/23
**When Reported:** 13:07:28 08/11/23 **Occurred Between:** 13:07:28 08/11/23 and 13:10:02 08/11/23

**Assigned To:** **Detail:** **Date Assigned:** **/**/**
**Status:** **Status Date:** **/**/** **Due Date:** **/**/**

**Complainant:**
**Last:** **First:** **Mid:**
**DOB:** **/**/** **Dr Lic:** **Address:**
**Race:** **Sex:** **Phone:** **City:** ,

### Offense Codes

**Reported:** **Observed:**
**Additional Offense:** X04 All Other Incidents/Non-Crimes

### Circumstances

**Responding Officers:** **Unit :**
[redacted] [redacted]

**Responsible Officer:** [redacted]
**Received By:**
**How Received:** T Telephone
**When Reported:** 13:07:28 08/11/23
**Judicial Status:**
**Misc Entry:**

**Agency:** ORPD
**Last Radio Log:** **:**:** **/**/**
**Clearance:** RPT Report Taken
**Disposition:** CLO **Date:** 08/12/23
**Occurred between:** 13:07:28 08/11/23
**and:** 13:10:02 08/11/23

**Modus Operandi:** **Description :** **Method :**

### Involvements

08/17/23

| Date | Type | Description | |
|---|---|---|---|
| 08/11/23 | Name | [redacted] | Other |
| 08/11/23 | Name | | Deceased |
| 08/11/23 | Name | | Other |
| 08/11/23 | Cad Call | 13:07:28 08/11/23 Traumatic Injur | Initiating Call |

**Narrative**

On Friday, August 11, 2023, at approximately 13:07, Oak Ridge Emergency Communications Center received a 911 medical call from the Department of Energy (DOE) Central Training Facility (CTF), located at 1200 Bear Creek Rd, reference a traumatic injury. It was reported that a [redacted] that had cut a tree limb had been struck by the limb, and was barely breathing.

I, Sergeant [redacted] began to monitor Oak Ridge Fire Department's radio channel reference the call. Dispatch received additional information that the individual may be pinned under a tree. Based on the severity of the call, I began towards the location, should a police investigation be needed. As I continued to monitor ORFD's radio traffic, I heard ORFD Engine Company 4 arrive on scene (13:18), and advised that CPR was in progress. I notified dispatch that I would be responding the location.

At 13:27, I arrived on scene at DOE CTF, and proceeded to the south east area of the facility, where Gallaher Cemetery, area 59, is marked. I observed numerous Y-12 Fire Department and ORFD personnel around ORFD Medic 42 apparatus, where the injured individual, identified as [redacted] was loaded into the back, and life saving measures were administered.

I approached the area where ORFD personnel were located, within the cemetery boundaries, and spoke with ORFD Captain [redacted]. As I spoke with [redacted], I observed a specialty tree service trucked marked "Cortese Tree Specialists." [redacted] advised [redacted] had significant injuries, and would be transported emergency traffic via ORFD Medic 42 to Methodist Medical Center (MMC ER) within the city. [redacted] stated the injuries were severe enough that it could result in a fatality.

Based on the information provided to me, I contacted Roane County Medical Examiner, [redacted], and explained the circumstances of the call to him. The main purpose of the phone call was to inform him of the situation, and to see if he wanted to respond to the location for any investigation needed. [redacted] stated he would be satisfied with scene pictures and an incident report completed by our agency.

Upon completion of the phone call, I began taking photos of the work area setup by the Cortese employees. I noted an anchor line set and ran towards a large tree, which had red spray paint on a large limb, to indicate it would be cut and removed. I observed various tree climbing and cutting gear in the area, to include a chainsaw, chainsaw chaps, pole extensions, rope for rigging, and helmets and communication devices. I did not note anything out of the ordinary for a work environment that would indicate suspicious circumstances.

After walking the work area and taking photos, I made contact with [redacted], manager of the DOE CTF, as he responded for the liaison for DOE operations. I advised [redacted] that ORPD would author an incident report on the situation, due to the severity of the injuries, which could result in a fatality. I provided [redacted] with the case number, along with my business card, should DOE need any further information. [redacted] stated he made his required phone calls to management, but did not need anything further, as the injured individual was a subcontractor, and not a DOE employee.

I cleared the scene at DOE CTF and responded to MMC ER to check on the status of [redacted]. Upon my arrival to MMC ER, I was advised staff continued life saving measures in a trauma bay, and that [redacted] was prepared for University of Tennessee Medical Center Lifestar Air Ambulance to transport him to that facility.

I was advised by nursing staff that [redacted] co-worker, also an employee of Cortese, was in the waiting area. I went to that area and spoke with the individual, identified as [redacted]. I asked [redacted] to detail the events for me. [redacted] stated that [redacted] was on the ground, at the base of the tree, and had cut a large limb. [redacted] stated his task was to hold a "tag line," connected to the large limb, and he was several yards into the woods

as he held the line. [redacted] stated he saw [redacted] make the cut, and the limb was on the ground. [redacted] thought the limb was secured on the ground, however it moved, and struck [redacted] in the head. [redacted] stated that [redacted] wore a protective helmet, however the impact from the limb split the helmet in the rear (see picture attached).

Also in the waiting room was another individual, identified as [redacted] employed with East Tennessee Mechanical Contractors (ETMC). ETMC is also a sub-contractor for DOE, and was tasked with assisting in the tree removal. [redacted] stated he was close to the tree, and witnessed the limb move, striking [redacted] in the head. [redacted] was visibly upset regarding the course of events.

At the time of report, [redacted] had been transported via air ambulance to UT hospital, in an effort to save his life. I will follow up with staff of the hospital for an updated condition of [redacted].

Photos of the work area have been digitally attached to the Spillman case file.

Based on the physical evidence presented at the scene, in addition to the statements made by the two (2) witnesses, there is nothing to indicate that the situation constitutes any criminal violations. This is a work place incident/accident that resulted in the significant injuries.

Status: Follow Up

08/17/23

**Supplement**

Incident Supplement // [redacted] // 8-12-2023

On Saturday, August 12, 2023, I, [redacted] was notified by the Knox County Regional Medical Examiner's Office that [redacted] succumbed to his injuries and was pronounced deceased at UT Medical Center. I have provided the ME's office a copy of this incident report via email. There is nothing further to report at this time.

08/17/23

**Name Involvements:**

**Names, addresses, etc. have been redacted.**

08/17/23