

SNL/CA East Avenue Vehicle-Pedestrian Accident (LLNL Property)

OCCURRENCE NA-SS-SNL-8000-2019-0017

Causal Analysis Report
Date: 1/7/2020



Sandia National Laboratories is a multimission laboratory managed and operated by National Technology & Engineering Solutions of Sandia, LLC, a wholly owned subsidiary of Honeywell International, Inc., for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-NA0003525.
SAND No. 201X-XXXX.



Causal Analysis Report

Date Number: January 7, 2020

1. Report Number: NA-SS-SNL-8000-2019-0017

2. Subject/Title of Report: SNL/CA East Avenue Vehicle-Pedestrian Accident (LLNL Property)

3. Responsible Manager (RM): Orlando Casiano, 8158

4. Causal Analysis Info

4(a). Causal Analysis Lead/Level: Robert Pedersen

4(b). Type of Analysis Performed: Timeline, Barrier

5. Location: North of Lima 1 gate on East Avenue (LLNL property)

6. Short Description of Event:

On 12/2/2019 at approximately 1747 hours, a vehicle headed east along East Avenue (LLNL property) made contact with a Sandia subcontractor on foot headed north through the marked crosswalk. The Sandia subcontractor required hospitalization as a result of the incident.

7. Problem Statement:

An injury occurred as a result of a vehicle collision with a pedestrian.

8. Executive Summary:

On 12/2/2019 at approximately 1747 hours, a vehicle headed east along East Avenue (LLNL property) made contact with a Sandia subcontractor on foot headed north through the marked crosswalk. The Sandia subcontractor required hospitalization as a result of the incident.

As a result of the incident, the Livermore Police Department responded to the scene to conduct an accident investigation.

An analysis determined that weather and roadway conditions contributed to the accident.

9. Description of the Event

9(a). Event Narrative:

On 12/2/2019 at approximately 1747 hours, a vehicle headed east along East Avenue (LLNL property) made contact with a Sandia subcontractor on foot headed north through the marked crosswalk.

Rain fell in the area approximately thirty minutes prior to this incident occurring, but there was no rain at the time of the incident. However, the sky was dark due to the late winter afternoon and cloud coverage. The ground was wet from the recent rainfall. No abnormal conditions presented themselves, such as ongoing construction projects or roadwork.

A witness, driving west on East Avenue after turning from South Gate Drive (LLNL property) stated she was driving along at a normal rate of speed. As she drove through the crosswalk, she was startled by a "figure" in the crosswalk approximately four feet away from her left (the driver's side door), indicating that the "figure" was south of her vehicle. (Note: the witness quickly realized the "figure" was a person, so the report will describe the "figure" moving forward as the victim) The witness described the victim as wearing dark clothing. Please refer to Figures 1-3 below for contextual information regarding the incident location.

The witness was startled enough by the victim to keep an eye on her rearview mirror, as she noticed a vehicle headed east along East Avenue approaching the crosswalk and wanted to see if the other vehicle took any driving precautions. The witness stated that she saw, from her rearview mirrors, the

Causal Analysis Report

vehicle's brake lights illuminate, and then the vehicle come to a stop. The witness saw the victim was now on the ground.

Fearing an accident just occurred, the witness pulled her vehicle to the side of the road and exited her vehicle to provide assistance. The witness stated that others must have observed the incident, since a man appeared with a blanket to provide head support for the victim now on the ground. The witness said that the driver of the vehicle involved in this incident already dialed emergency services.

Both SNL and LLNL's Protective Forces arrived on scene (Report #120219-001 and #191202-25, respectively). Alameda County Fire Department arrived on scene, transporting the victim to a regional emergency care hospital for medical evaluation and treatment (CAD #341941336).

Due to the injurious nature of the accident, the Livermore Police Department responded to both the incident location and hospital to conduct an accident investigation. In this report, the victim states that while vehicles were observed approaching the crosswalk in both directions, the victim couldn't determine how far away the vehicles were in either direction. Notably, the victim decided to cross the street in the crosswalk prior to determining each vehicles' general distance from the crosswalk. Please refer to Livermore Police Department case #19-7338 for further information.

The SNL/CA Central Alarm Station contacted the Responsible Manager at around 1900 hours to inform him of the incident. The Responsible Manager stated that the CAS only stated that one of his subcontractors was involved in a vehicle accident on site and was now at a regional hospital.

Following discharge from the regional hospital later that night, the hospital provided the victim with a voucher for a free ride via ride-sharing service. The victim used this voucher to return to the staffed, 24-hour gate to the DOE-owned portion of East Avenue, presumably to pick up the victim's personal vehicle to go home. A Protective Force member (unknown if LLNL or SNL) provided a ride in a Protective Force vehicle to the victim's personal vehicle. At this point, the victim drove home.

The victim informed the Responsible Manager of the incident at approximately 0100 hours on 12/3/2019.

The victim regularly parks in a LLNL-owned parking lot near a building along East Avenue that used to be a cafeteria.

Upon analyzing the incident, it was determined that the accident diagram included in the Livermore Police Department's report was inaccurate. The diagram appears to depict an intersection due east of the crosswalk area in question. Please refer to Figure 3 below for an aerial view of this discrepancy.

Further information regarding analysis results are found below in this document.

9(b). Operating Conditions of Facility at Time of Event:

The roadway was wet, the sky was dark due to evening hours and cloud coverage, and the south side of the East Avenue roadway didn't have any dedicated street light illumination. A handful of vehicles used the road in either direction, but no other pedestrians were noted in the area at the time of the accident.

9(c). Immediate Actions:

Multiple witnesses stopped to assist the victim by providing a blanket for head support and jacket for warmth. The driver of the vehicle contacted emergency services right away, which brought to the location the Sandia Protective Force, LLNL Protective Force, and the Livermore Police Department.

Following the incident, LLNL installed portable, temporary lighting at the crosswalk. This lighting will remain in place until a longer-term solution is implemented.

Safety Engineering provided pedestrian safety reminders in SNL's California Daily Announcements following the incident.

9(d). Extent of Condition Review: (OPTIONAL for Informational Report Level)

Causal Analysis Report

Roadway lighting along the LLNL-controlled East Avenue corridor is mixed. Westbound traffic (north side of the roadway) enjoys bright light from street lights designed to illuminate the roadway, but eastbound traffic (south side of the roadway) has no street lights designed for a similar purpose. The only lighting equipment along the south side of East Avenue are meant for walkway illumination or to point out parking lot entrances – not for vehicular traffic purposes. The crosswalk in question shared these lighting qualities: the north side of the crosswalk had a street light, while the south side didn't. Please refer to Figures 1 and 2 (below) for photographs of this crosswalk.

A previous accident occurred on LLNL property about ten years ago. LLNL personnel were unable to provide more specific information regarding this incident, but a collective memory among LLNL participants recalled the incident occurring.

A search of previous vehicle/pedestrian-related reports from the SNL/NM site uncovered three incidents. Please refer to these reports for further information:

- NA--SS-SNL-9000-2019-0001, Tricycle Accident Resulting in Elbow Fracture (09131, Human Factors)
- NA--SS-SNL-6000-2014-0003, Bicycle Incident Results in Tears to Tendons in the Left Rotator Cuff Requiring Surgery (06533, Intelligent Systems Controls)
- NOTE-2013-04230-1, Vehicle/Pedestrian Incident (4230, Safeguards & Security Ops)

10. Cause Analysis

10(a). Date Critique meeting was performed: December 4, 2019

10(b). Analysis Results:

General safety issues dominated the analysis discussion. The analysis reviewed concerns ranging from pedestrian safety considerations to engineered safety solutions. Some of these topics included:

- 1) The intersection of individual responsibility for pedestrian safety with parking availability and personal parking choices.
- 2) The crosswalk in question sits at a point where eastbound/westbound traffic either expand into two lanes or merge into one, respectively.
- 3) The crosswalk itself isn't reflective, nor are warning signs posted at the crosswalk reflective.
- 4) Lighting is inadequate along the south side of East Avenue.

All parties ended in agreement with the proposed corrective actions.

Other points of discussion involved the Livermore Police Department's report containing an inaccurate diagram of the incident location, and the fact that an injured employee who required hospitalization felt the need to drive home in a personal vehicle immediately after being discharged from the hospital.

These topics are addressed below through agreed-upon corrective actions.

10(c). Personnel Interviewed, Documents Reviewed, Any Other Analysis Conducted, if needed:

LLNL witness – 12/18/2019

LLLNL Protective Force report #191202-25

SNL Protective Force report #120219-001

Livermore Police Department report #19-7338

10(d). Corrective Action Development and Documentation:

Causal Analysis Report

Table 1: Corrective Action(s) Development for NA-SS-SNL-8000-2019-0017, SNL/CA East Avenue Vehicle-Pedestrian Accident (LLNL Property)

Fact(s)	Issue	(C#) Cause and Cause Code	(CM#) Compensatory Measure Action	Action Owner – Due Date	(LT#) Long Term Corrective Action	Action Owner – Due Date
<p>F1 – Victim wore dark clothing</p> <p>F2 – No dress code for pedestrians during dark or low-light hours</p> <p>F3 – Weather decreased visibility (dark, cloudy, wet)</p> <p>F4 – Victim crossed street without determining vehicle distances</p> <p>F5 – Victim regularly parks vehicle at LLNL</p> <p>F6 – Close SNL parking not readily available by all buildings on SNL property</p> <p>F7 – East Avenue is open for pedestrian access at all hours of the day or night</p> <p>F8 – Sandia personnel cross East Avenue for both work and personal reasons</p> <p>F9 – Administrative controls designed to prevent accidents didn't mitigate the accident</p>	I1 – Environmental conditions made the pedestrians presence difficult to see.	<p>C#1 – Crossing the street during dark hours post-rain requires a heightened awareness regarding personal safety.</p> <p><i>Incorrect performance due to mental lapse (A3B1C03)</i></p> <p><i>Natural environment less than adequate (A1B5C03)</i></p> <p>C#2 – Crosswalk can be hard to see in the dark or during inclement weather</p> <p>C#3 - Crosswalk sits at a location that can unintentionally distract drivers based on lane changes</p> <p>C#4 – Eastbound lanes of traffic are not lit properly when compared to westbound lanes of traffic</p> <p><i>Design output scope less than adequate (A1B2C01)</i></p>	<p>CM#1 – By end of Q1, provide site-wide reminder regarding pedestrian safety while crossing East Avenue</p> <p>CM#2 – In coordination with LLNL, verify compensatory actions taken to mitigate lighting and signage concerns related to the crosswalk are effective by end of Q2.</p>	<p>H. Armijo – 12/18/2019</p> <p>H. Armijo – 3/31/2020</p>	<p>LT#1 – By end of Q2, communicate a theme of traffic safety to the site by multiple media platforms (CDAs, electronic poster boards, et cetera) that highlights personal responsibility for both pedestrians and drivers, and references ES&H resources for further guidance.</p> <p>LT#2 – By end of Q2, recommend that SNL participate in a traffic safety study with LLNL to review at minimum East Avenue corridor safety measures, to include crosswalks; lighting; signage; reflectivity; ADA considerations; roadway design; signaling; and other engineered safety features.</p>	<p>H. Armijo – 3/31/2020</p> <p>L. Tidwell – 3/31/2020</p>

Causal Analysis Report

Fact(s)	Issue	(C#) Cause and Cause Code	(CM#) Compensatory Measure Action	Action Owner – Due Date	(LT#) Long Term Corrective Action	Action Owner – Due Date
F10 – Posted speed limit not a factor in this incident F11 – Multiple drivers couldn’t comply with 21949 CVC, failure to yield to pedestrian in a marked crosswalk F12 – Crosswalk not reflective during dark hours F13 – Crosswalk signage has low visibility F14 – Crosswalk sits at lane merge/expansion point F15 – South side of East Avenue has no street lights designed for roadway illumination F16 – Lighting along south side of East Avenue designed for walkway illumination and parking lot entrance visibility						
F17 – Hospital provided victim with a ride voucher F18 – Protective Force drove victim to vehicle F19 – Victim drove personal vehicle home	I6 – Sandia personnel are not adequately trained regarding SNL’s Guaranteed Ride Home policy.	C#5 – Victim wasn’t offered a guaranteed ride home by SNL after being hit by a vehicle. <i>Inadequate training (A6B2C04)</i>	N/A	N/A	LT#3 – By end of Q2, review SNL’s Guaranteed Ride Home policy to ensure knowledge of situations covered by the policy, request to include injury accidents as a covered situation if necessary, and present findings to Responsible Manager’s group	O. Casiano – 3/31/2020

Causal Analysis Report

Fact(s)	Issue	(C#) Cause and Cause Code	(CM#) Compensatory Measure Action	Action Owner – Due Date	(LT#) Long Term Corrective Action	Action Owner – Due Date
F20 – Livermore Police Department report diagrams the incorrect crosswalk	I7 – Livermore Police Department report contains inaccurate information	C#6 – No cause is known for this event (A7B4C01)	N/A	N/A	LT#4 – By end of Q2, inform Livermore Police Department of inaccurate diagram found in report #19-7338	D. Baker – 3/31/2020

Causal Analysis Report

Table 2: Corrective Action Verification and Validation Evidence

Corrective Action (CM# or LT#)	Required evidence of completion (Verification)	Required evidence of effectiveness (Validation)
CM#1 – By end of Q1, provide site-wide reminder regarding pedestrian safety while crossing East Avenue	Copy of CDA email to include one of the dates the site-wide safety message ran	No pedestrian accidents along East Avenue corridor involving SNL personnel before end of Q2
CM#2 – In coordination with LLNL, verify compensatory actions taken to mitigate lighting and signage concerns related to the crosswalk are effective by end of Q2	Note or written statement from SNL/CA Safety Engineering to indicate that the compensatory actions are verified and determined to be effective	No pedestrian accidents along East Avenue corridor involving SNL personnel before end of Q2
LT#1 – By end of Q2, communicate a theme of traffic safety to the site by multiple media platforms (CDAs, electronic poster boards, et cetera) that highlights personal responsibility for both pedestrians and drivers, and references ES&H resources for further guidance	Copy of at least three messages put out across various media platforms before end of Q2 discussing a traffic safety theme	No pedestrian accidents along East Avenue corridor involving SNL personnel before end of Q2
LT#2 – By end of Q2, recommend that SNL participate in a traffic safety study with LLNL to review at minimum East Avenue corridor safety measures, to include crosswalks; lighting; signage; reflectivity; ADA considerations; roadway design; signaling; and other	Note or memorandum that includes the recommendation to participate in a traffic safety study with LLNL to review at minimum the specific measures as described in the corrective action	Responses from SNL leadership and LLNL stakeholders documenting the decision made

Causal Analysis Report

engineered safety features		
LT#3 – By end of Q2, review SNL’s Guaranteed Ride Home policy to ensure knowledge of situations covered by the policy, request to include injury accidents as a covered situation if necessary, and present findings to Responsible Manager’s group	Email or note with a summary of a request to the Guaranteed Ride Home program owner seeking clarification on situations covered by the program, and whether an injury accident is specifically covered	Clarification from the Guaranteed Ride Home program owner on general circumstances covered by the program, and a determination as to whether an injury accident can be included to the list of covered events (if necessary) Copy of presentation material demonstrating the situations covered by the program
LT#4 – By end of Q2, inform Livermore Police Department of inaccurate diagram found in report #19-7338	Email or note to Livermore Police Department noting the factual inaccuracy in report #19-7338	Email or note to Livermore Police Department noting the factual inaccuracy in report #19-7338

11. Supporting Documentation:



Fact Finding Report
NP19-347.pdf



Barrier.xlsx

Causal Analysis Report



Figure 1. Photograph of crosswalk and light fixtures (facing north)

Causal Analysis Report



Figure 2. Photograph of intersection and light fixtures (facing northeast)



Figure 3. Portion of East Avenue. Red circle indicates area of accident (in front of Lima 1). Yellow circle indicates area diagrammed in Livermore Police Department report #19-7338 (South Gate Drive to north, A Street to south).

Causal Analysis Report

12. Causal Analysis Team:

Role	Org
Responsible Manager (RM)	8158
Safety Engineering	8517
Safety Engineering	8517
ES&H Coordinator	8517
Facilities Portfolio Manager	8549
Occurrence Reporting	635
LLNL Assurance	LLNL
LLNL Assurance	LLNL
LLNL Assurance	LLNL
LLNL ES&H	LLNL
Witness	LLNL