STATE OF NEW HAMPSHIRE

Inter-Department Communication

DATE:

May 12, 2017

AT (OFFICE): NHPUC

FROM:

Randall Knepper, Director of Safety Randall Siller

SUBJECT:

Report of Investigation of August 10, 2015 Electric Fatality

Benton, New Hampshire

TO:

Commissioners

Debra A. Howland, Executive Director

Anne Ross, General Counsel

John S. Clifford, Hearings Examiner Tom Frantz, Director of Electric Division

Enclosed is the Safety Division's review and recommendations regarding the 2015 Benton, New Hampshire electric fatality investigation. RSAs 365.5, 374.37 and 374.38 authorize the Commission to investigate accidents, performance, conduct, and omissions of a utility to determine if it is in compliance with laws, rules, and Commission Orders. Please let us know if any further action is necessary.

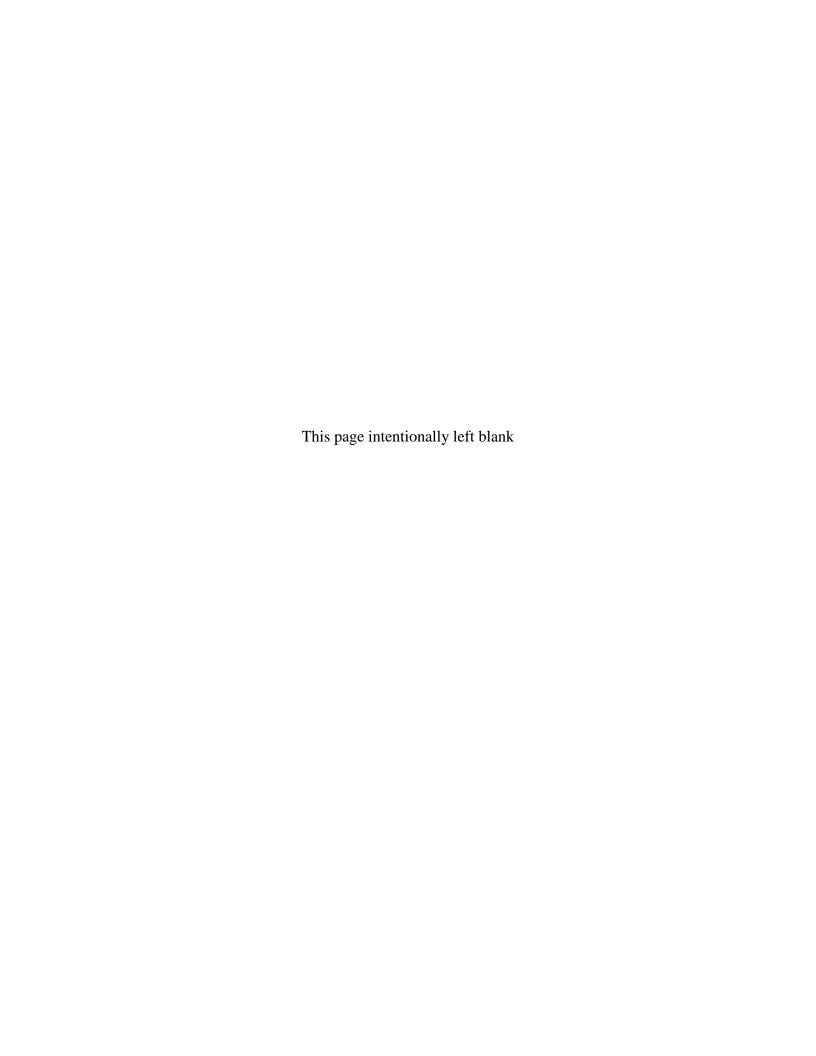
cc: Chris Aronson, National Grid Sr Counsel

Safety Division Findings of the August 10, 2015 Electrical Contact and Fatality with a New England Power/ National Grid 230 kV Transmission Line in Benton, NH



Safety Division Staff Final Report

May 12, 2017



Purpose

The Safety Division, as authorized by the Commission, hereby submits the results of its investigation stemming from an August 10, 2015 electrical accident in Benton, New Hampshire. The electrical accident occurred within the New England Power/National Grid (NGRID or the Company) right of way (ROW) beneath three high voltage electric transmission circuits and resulted fatality. In this evaluation, the Safety Division reviewed whether policies, procedures, or failure of internal systems used by NGRID contributed to the fatality and determined if any deficiencies exist related to NGRID's operations and maintenance procedures. The Safety Division further made recommendations for the Commission to consider that were associated with the events of the electric fatality.

Executive Summary of the Incident

Based on its investigation of the facts and the information provided in this report, Staff believes the Company had adequate maintenance policies and procedures in place to be able to operate and maintain its New Hampshire electric system in a safe and reliable manner. These were non-contributing factors to the accident.

A land owner hired Thompson Trucking Company as its contractor to conduct a logging operation on a parcel of land located adjacent to the NGRID electric transmission line ROW. Thompson Trucking Company used a private unpaved road on the opposite side of the transmission line ROW to access the land where the logging operation was to be conducted. (See Property Location Attachment 1 of this report for an overview of the ROW in relation to town of Benton and State Route 25.) The logging operation was performed using mobile commercial motor vehicles and associated logging equipment to transverse the ROW numerous times to store and transport the cut logs. Photos taken after the accident show a logging operation staging area where logs were being dropped off by two logging skidders and stacked in temporary piles by a logging truck equipped with a mechanical arm and grapple. The staging area for this logging operation was located directly below the NGRID 230 kV electrical transmission lines in Benton near the Haverhill town line west of State Route 25. (See Area Overview Attachment 2 and Access View Attachment 3 of this report for access road depictions.)

The unfortunate and tragic accident of Monday, August 10, 2015, occurred when the operator of the logging truck raised the mechanical arm while lifting a log, making direct contact with one of the conductors on the Company's B-202 transmission line. Electrical current from the conductor instantaneously traveled through the logging truck to ground. The current found a conductor path to one of the skidders (parked approximately 90 feet away) where another logger happened to be using an air compressor to add air to one of the skidder tires. After receiving the electrical shock, the logger collapsed immediately, went into cardiac arrest and subsequently died prior to being transported to the nearest hospital. Two other workers who witnessed the

¹ RSAs 365.5, 374.37 and 374.38 authorize the Commission to investigate accidents, performance, conduct, and omissions of a utility to determine if it is in compliance with laws, rules, and Commission Orders.

event, did not receive shocks and tried to provide assistance to their fallen colleague. No utility personnel from NGRID were present. (See Detail View Attachment 4 of this report for incident location depictions.)

Description of Incident

Staff has reviewed the information related to this incident, which consists of the following elements:

Investigation of the facts collected by Staff related to the August 10, 2015 accident:

- 1. The NGRID SCADA system detected a momentary Trip/Reset, somewhere along the B-202 circuit on 8/10/15, 8:31 AM.ⁱ
- 2. At the time of the incident (8:31 AM) two of three employees of Thompson Trucking were standing near each of the two logging skidders parked approximately 90 feet away from the logging truck. One of the two aforementioned employees experienced a fatal electrical shock while using an air compressor to add air to one of the skidder tires. It was assumed he was in contact with the metal chains on the tires of the furthest skidder. Both skidders were using heavy duty steel tire chains on each tire.
- 3. The second employee was standing near the second logging skidder but was not in immediate contact. The third worker was in the logging truck in an insulated chair atop the truck whose boom had inadvertently come into contact with a non-shielded conductor that was spanning two electrical support structures.ⁱⁱ
- 4. Both men unsuccessfully tried to provide medical assistance to their colleague who experienced cardiac arrest. A cell phone call to 911 was partially placed but poor cell reception interfered with the call.
- 5. One of the co-workers used a pickup truck to transport their 49 year old colleague to the nearest town emergency safety center (Warren/Wentworth) which was located approximately 9 miles south on State Route 25 in Warren.
- 6. The victim was subsequently transported for professional medical assistance via ambulance to Speare Memorial Hospital in Plymouth approximately 20 miles south but was pronounced clinically deceased upon arrival.
- 7. The electrical shock occurred when stray current reached the skidder, likely traveling through/across the ground and passed through the tire chain at the moment the logging truck boom made contact with the westerly "A" phase conductor of the 230 kV circuit B-202. The truck was operating directly below the high voltage transmission line grabbing previously cut logs and placing them in the open logging truck. The conductor was approximately 32 feet above the ground at this location. iii
- 8. State Police responded to Warren/Wentworth EMS Building for a reported walk-in medical emergency, conducted its own investigation, and filed its own separate report. iv

Public Utility Involvement

- 1. NGRID dispatched a helicopter aerial patrol in response to the Trip/Reset alarm which was completed between 2:00 PM and 5:00 PM on August 10, 2015.
- The Thompson Trucking Company logging truck and other equipment and a logging operation staging area were observed below the transmission lines, within the NGRID ROW at the Benton location. No personnel from the Trucking Company were present.
- 3. NGRID observations and related field notes were taken on Wednesday, August 12, 2015 by a group of Company technicians that drove to the site from Massachusetts and who later completed a written debriefing to Company officials. v

Public Utility Notification and Reporting

- 1. NGRID failed to notify the New Hampshire PUC Safety Division within 2 hours of learning of the accident. This is not in compliance with Puc 306.06 (d).
- 2. NGRID failed to file a written New Hampshire PUC Safety Division E5 Report within 10 days of the occurrence of the accident. This is not in compliance with Puc 306.06 (f) (1).
- 3. NGRID failed to file a written New Hampshire PUC Safety Division E5 Supplemental and completed Report within 60 days of the occurrence of the accident. This is not in compliance with Puc 306.06 (f) (2).
- 4. NRID had to be notified by Safety Division on September 29, 2015 of the reporting requirements.
- 5. The Safety Division submitted written data requests on October 5, 2015 with responses due October 19, 2015. N Grid did not respond until November 19, 2015.

Staff Conclusions from the Investigation

- 1. NGRID ROW easements do not prohibit logging operations from occurring within the ROW. The easement for this location was silent regarding types of uses and activities that are allowed within the ROW.
- 2. NGRID had no advance knowledge of the active logging operation that was in place at the Benton, NH site on Aug 10, 2015.
 - a. The logging operators set up a staging area in NGRID's transmission line ROW.
 - b. A logging truck was operating directly below the B-202 alternating current high voltage electric transmission system conductors. These are located furthest east within the ROW. Circuit A202 and the high voltage DC 451 circuit are other circuits located within the ROW.

- c. Normal operation of the mechanical arm and grapple attached to the logging truck was capable of extending to and making contact with NGRID circuit B-202 high voltage conductor.
- d. The extender arm with log grabber was approximately 35 feet in length and the logging truck height was approximately 15 feet (at the chair level).
- 3. NGRID had no records regarding recorded winds or wind gusts in the area at the time of the incident. The Safety Division estimated the nearest recorded winds were 0 mph and the ambient temperature was approximately 60 degrees at 8:35 am by using the conditions recorded at Plymouth General Aviation Airport. The Safety Division felt this was an appropriate proxy for conditions in Benton.
- 4. NGRID Operations and Maintenance Policies and Procedures for its New England transmission circuits conform to National Electrical Safety Code (NESC) requirements as the minimum standard to safely be able operate and maintain high voltage transmission circuits. This meets Puc 306.01 (b).
 - a. Ground level inspections are performed at 5-year intervals.
 - Foot patrol inspections were completed on the entire circuit in May 2015, June 2011 and December 2006. No issues were identified between structures 193 and 198 at this Benton location. vii
 - b. NGRID maintenance procedures call for aerial inspections to be performed at bi-annual intervals. NGRID's provided specific dates indicating that two aerial inspections were performed each year between 2006 and 2015, with no issues reported between structures 193 and 198. viii
 - c. Infrared Electrical Connector Inspections and Maintenance are performed at 1-year intervals. Some lines may be inspected twice per year.
 - The most recent aerial infrared inspection was completed on June 25, 2015. No issues were identified between structures 193 and 198 at this location. ix
 - ii. NGRID performed aerial infrared inspections each year between 2006 and 2015, with no issues reported between structures 193 and 198.^x
 - d. Steel Structure Foundation/Footer Inspection and Repair is performed at 20-year intervals.
 - e. Steel Lattice Tower Inspections are performed upon request by Transmission Network Asset Management, Transmission Line Management or Transmission Line Services. These inspections are triggered by issues that are reported by any employee or contractor performing various inspection or maintenance work assignments along the transmission lines.
 - i. Structures 193 through 198 were repainted during July and August, 2007. xi
 - ii. No previous repairs have been made between structures 193 and 198xii

- 5. The engineering design and construction of the transmission circuit B-202 conform to the requirements of NESC.
 - a. NGRID provided the detailed August 14, 1929 engineering specifications for construction of this circuit. xiii
 - b. The conductor type and size used for the B-202 circuit is 795 MCM ACSR Condor.
 - i. Strands = 54/7 (AL/STL),
 - ii. Diameter = 1.092 O.D.,
 - iii. Weight = 1.023 Lbs/Ft.
 - iv. Strength Rating = 28,200 Lbs.

Based on its review of the information provided by the Company, or obtained through other sources, Staff concludes that this fatality was caused by the following:

- Human error on the part of the logging truck boom operator, by operating the mechanical arm and grapple in such a way as to make contact with a high voltage conductor of the B-202 circuit located directly above the logging truck.
- The Thompson Trucking Company used poor judgment in allowing its operators to set up the staging area for the logging operation directly below the high voltage transmission circuits at the Benton site.

Staff also concludes:

- That the transmission line operator, NGRID, maintained and operated the electric transmission line in accordance with Puc Rules and good engineering practice.
- There is no evidence that the transmission line operator and/or NGRID, contributed to this accident by failing to maintain their overhead infrastructure.
- The accident did not cause an interruption of voltage on the B202 electric transmission line although it did cause a momentary (milliseconds) drop in voltage.
- There was no failure of transmission facilities or equipment that caused this accident.
- The vertical clearance of the conductor above the ground at the point of contact was approximately 32 feet.
- The conductor clearance met NESC requirements which are 22.5 feet for this location.

Staff Recommendations for Minimizing Reoccurrence System Wide

- 1. Staff recommends the Commission hold NGRID accountable including considerations of any penalties available under RSA's 374:3 and 365:41 for improperly following PUC rules for notifications and reporting.
- 2. To the extent loggers use transmission line ROW for access, staging and transporting timber harvests, the Safety Division recommends NGRID extend public outreach efforts to include safety awareness and focus on Safety Training to the New Hampshire Timber Harvesting Council and the New Hampshire division of the Northeastern Logger's Association. Additional outlets to consider include New Hampshire Timberland Owners Association and The New Hampshire Division of Forests and Lands.
- 3. The Safety Division recommends NGRID consider posting hazard warning signage at the entrances and egresses of the ROW that commercial mobile vehicles can access with a notification contact number to National Grid's operating or control center.

Attachments, Photo Documentation and Reports Reviewed

Attachment 1: Property Location and overview of the ROW in relation to town of Benton

and Route 25. by PUC

Attachment 2: Area Overview by PUC

Attachment 3: Access Overview by PUC

Attachment 4: Incident Location depictions. by PUC

Attachment 5: National Grid photos 1 - 4

Attachment 6: NH State Police Incident Report (Redacted), dated September 2, 2015, pages 1-10

see NGRID data response Attachment 3A.

ii see NGRID data response 12.

iii see NGRID data responses 4, 7 and Attachment 18.

iv see NH State Police.

^v see NGRID data response Attachment 18.

vi see NGRID data response 22.

vii see NGRID response 19(a).

viii see NGRID data response 23.

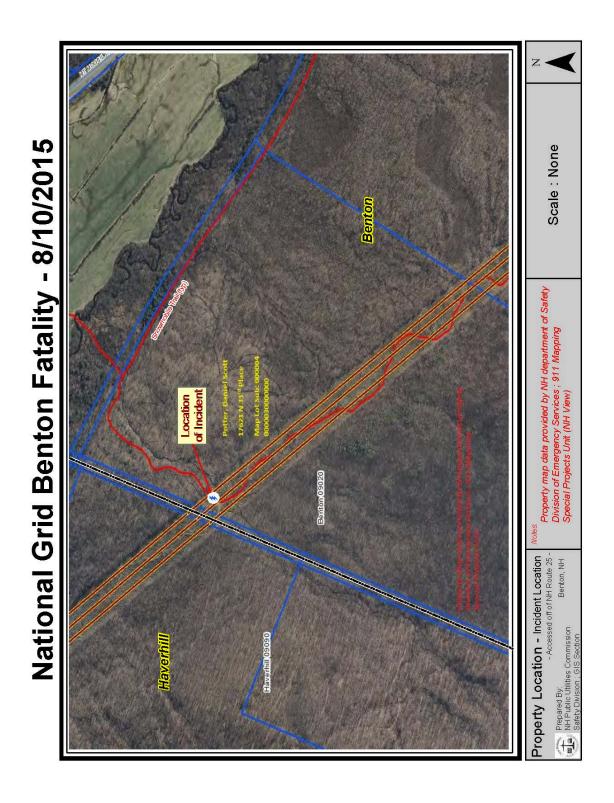
ix see NGRID data response 19(b).

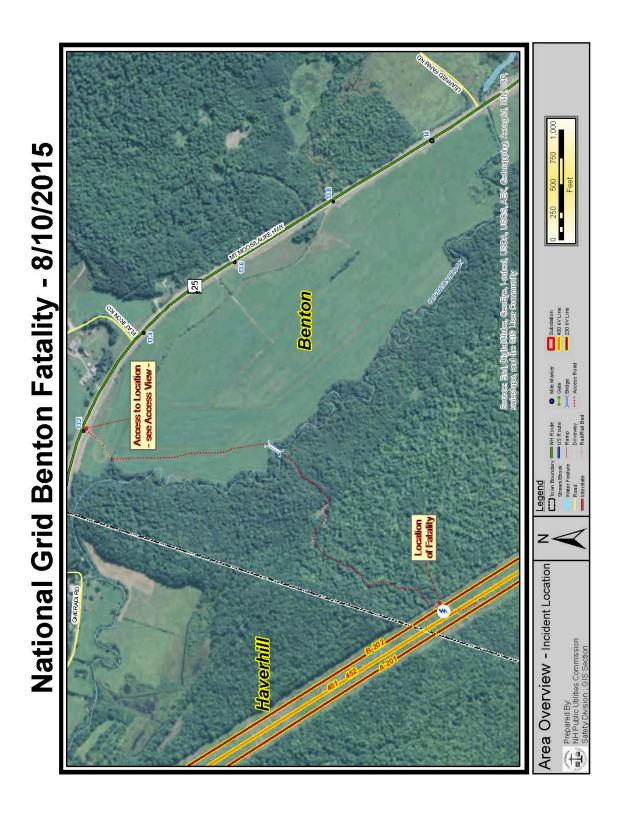
x see NGRID data response 23

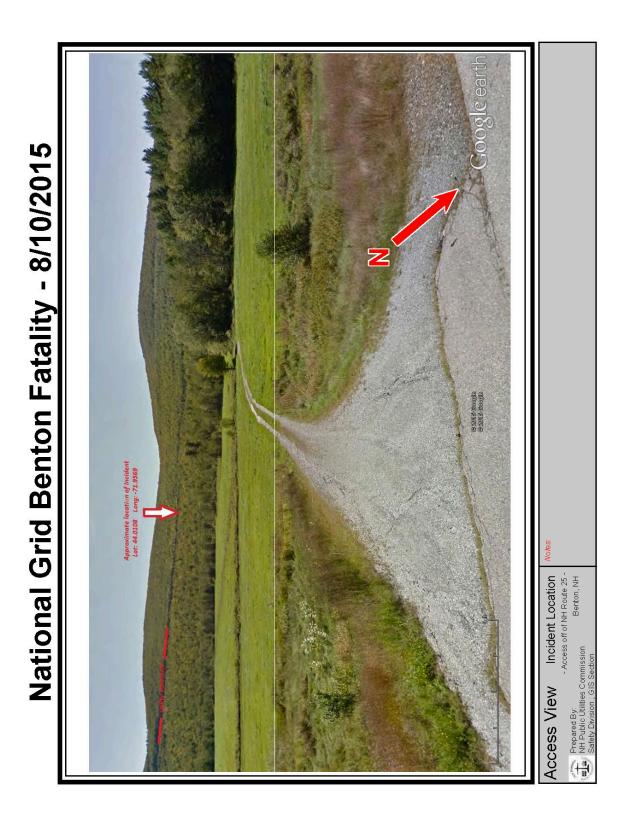
xi see NGRID data response 19(c).

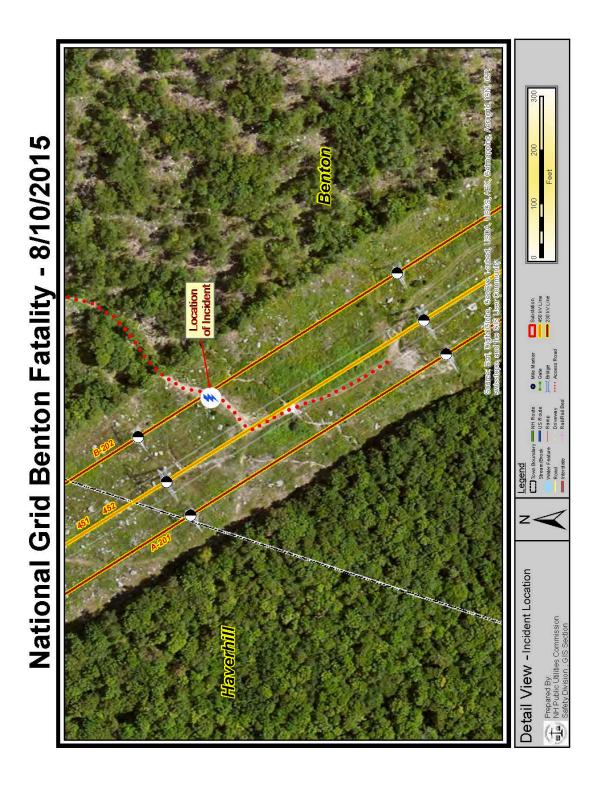
xii see NGRID data response 19(d).

xiii See NGRID data response 8, Attachment s (a) and (b)



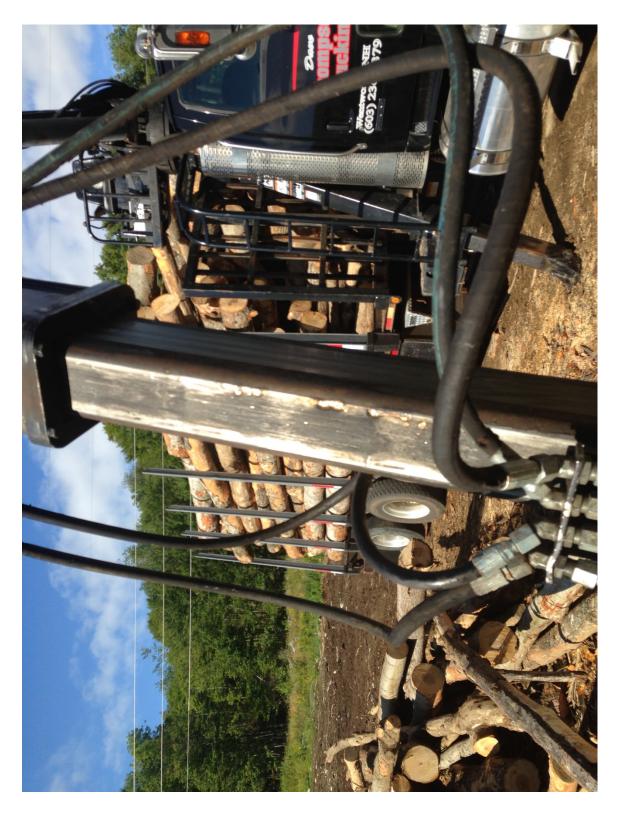






Attachment 5

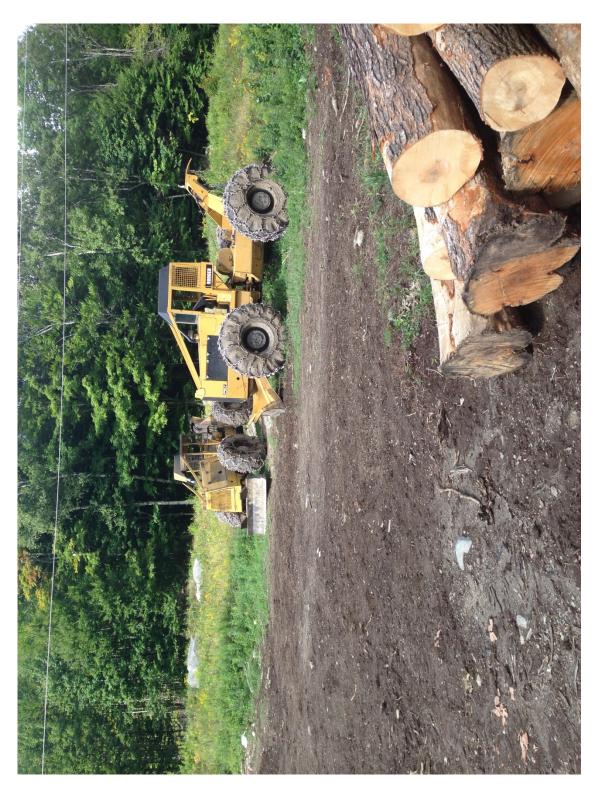
National Grid Photos – Page 1 of 4



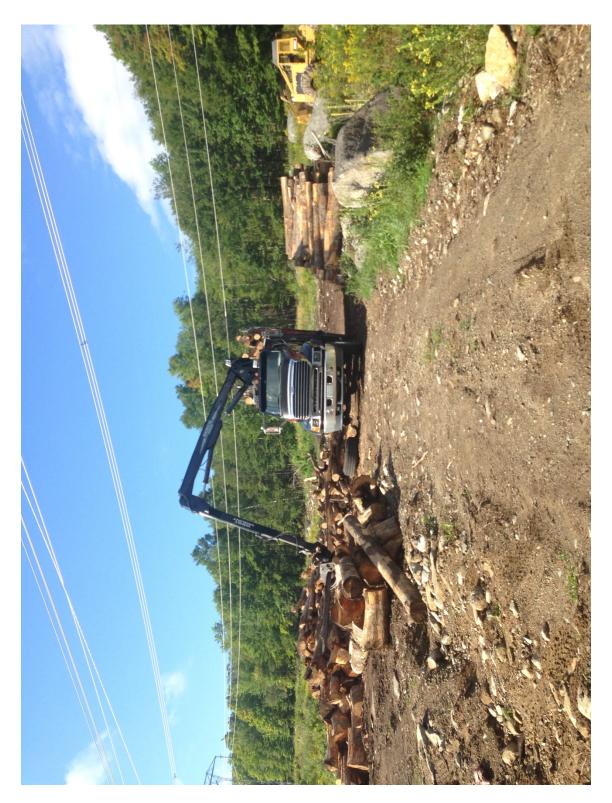
Attachment 5
National Grid Photos – Page 2 of 4



Attachment 5
National Grid Photos – Page 3 of 4



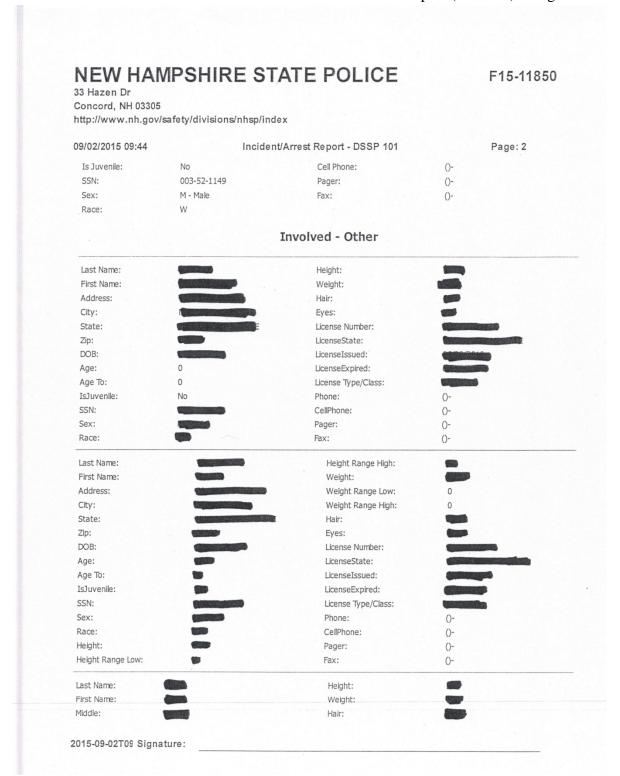
Attachment 5 National Grid Photos – Page 4 of 4



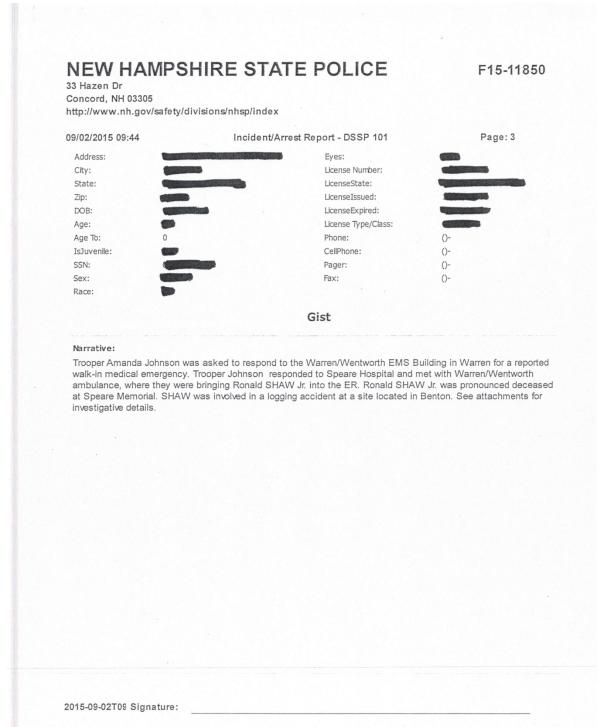
NH State Police Incident Report (redacted) – Page 1 of 10

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|--|----------------------------|--------------|---------------|------------|----------------------|
| http://www.nh.gov/sa | fety/divisions/nhsp/index | | | | |
| 09/02/2015 09:44 | Incident/Arre | est Report - | DSSP 101 | | Page: 1 |
| | 1 | Police RM | is | | |
| Case #: | F15-11850 | Generic Loc | cation: | WARREN/W | ENTWORTH EMS STAT |
| Event #: | 15-48258 | Address: | | 446 ROUTE | 25 |
| CAD Event Type: | 27 - Ambulance needed | City: | | | arren, 03279 Grafton |
| Last Modified LoginId: | 961 | State: | | NH - NEW H | AMPSHIRE |
| Workflow Status: | APR - Approved | Troop: | | F Troop | |
| Date Event Reported: | 08/10/2015 09:03 | Other Ager | | No | |
| Cleared Exceptionally: | N - Not Applicable | Cargo Thef | ft: | No | |
| Primary Trooper: | 1110 - JOHNSON, AMANDA | No Report | Required: | No | |
| Case/Incident Status: | CLO - CLOSED | | | | |
| | | Personne | el | | |
| Personnel: | 229 - MUZZEY, VICTOR | 7 | Type: | Assis | sting Trooper |
| | Inci | ident/Off | ense | | |
| Other Non-RSA: | 01 - UNTIMELY OR UNATTEND | DED DEATH | Offense State | e: | NH - NEW HAMPS |
| Suspected Using: | N - Not Applicable | | Offense Zip: | | 03279 |
| Forceable Entry: | No | | Offense Atte | mpted: | С |
| Offense Location: | WARREN/WENTWORTH EMS | STATION | Bias: | | 88 |
| Offense Street Address: | 446 ROUTE 25 | | # Of Premise | s Entered: | 0 |
| Offense City: | Warren - Warren, 03279 Gra | | | | |
| | | Victim | | | |
| Last Name: | SHAW | Height: | | 508 | |
| First Name: | RONALD | Weight: | | 170 | |
| Middle: | E | Hair: | | BRO | |
| Address: | 100 EVANS ROAD | Eyes: | | BLU | |
| City: | MOULTONBORO | License Nur | | | R65161 |
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NH State Police Incident Report (redacted) – Page 2 of 10



NH State Police Incident Report (redacted) – Page 3 of 10



NH State Police Incident Report (redacted) – Page 4 of 10

NEW HAMPSHIRE STATE POLICE CONTINUATION OF INVESTIGATION REPORT

| 1. CASE NO. | 2. INVESTIGATING TROOPER | 3. I.D. NO. | 4. TOWN OF CRIME | 5. TN. CD. | 6. DATE OF REPORT |
|-------------|--------------------------|-------------|------------------|------------|-------------------|
| F15-11850 | Trooper Amanda Johnson | #1110 | BENTON | * | 08-10-15 |

10th AUGUST 2015

APPROXIMATELY 0900 HOURS

On the above mentioned date and time I was asked to respond to the Warren/Wentworth Ambulance Station in Warren for a report of a walk-in medical of a male subject in cardiac arrest.

I met the ambulance at Speare Memorial Hospital, where they were tending to a male subject in the trauma room. I identified this individual through his NH Driver's License as,

RONALD SHAW Jr. 12-16-65 100 EVANS ROAD MOULTONBORO, NH

Ambulance personnel advised me that two males drove SHAW to their facility and stated something to the extent of "Is my friend dead? SHAW was placed in the front passenger seat of a small pick-up truck and appeared to be lifeless. Ambulance personnel were not able to get any names or information, and the friends did not follow the ambulance to the hospital. They did state that they drove him from a logging site "down the road".

A short time later, I was advised that SHAW was pronounced dead, and it looked as if he had injuries to his right arm and face.

I waited at Speare Memorial Hospital to see if anyone would be coming to inquire about SHAW. A male eventually arrived to Speare and advised that he was looking for his friend, and identified the friend as SHAW. I went out into the lobby and met with this individual,



told me that he and SHAW were in Benton, at a logging site off of Route 25 where SHAW had been electrocuted and went into cardiac arrest. explained to me that SHAW was putting air in a skidder tire, while



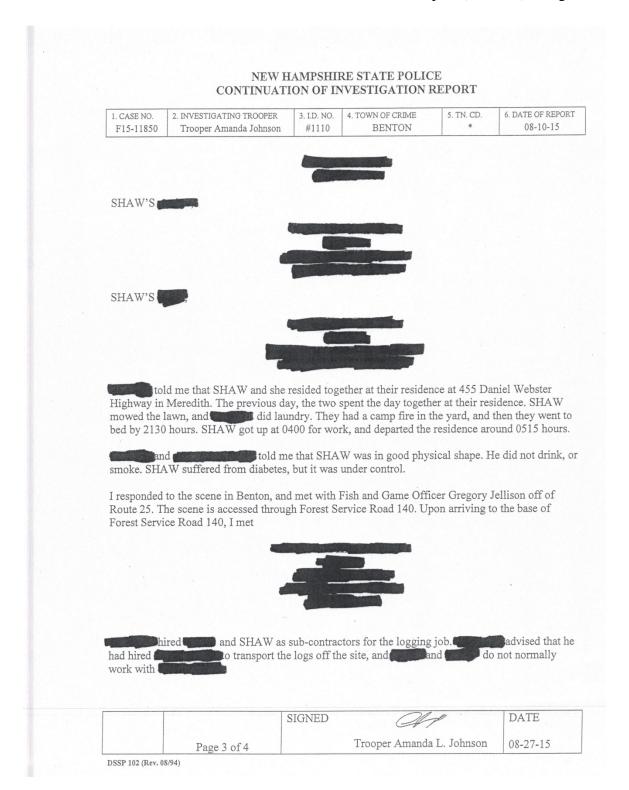
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| Page 1 of 4 | | Trooper Amanda L. Johnson | 08-27-15 |

DSSP 102 (Rev. 08/94)

NH State Police Incident Report (redacted) – Page 5 of 10

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| 1. CASE NO. F15-11850 | 2. INVESTIGATING TROOPER Trooper Amanda Johnson | 3. I.D. NO. #1110 | 4. TOWN OF CRIME BENTON | 5. TN. CD. | 6. DATE OF REPORT 08-10-15 |
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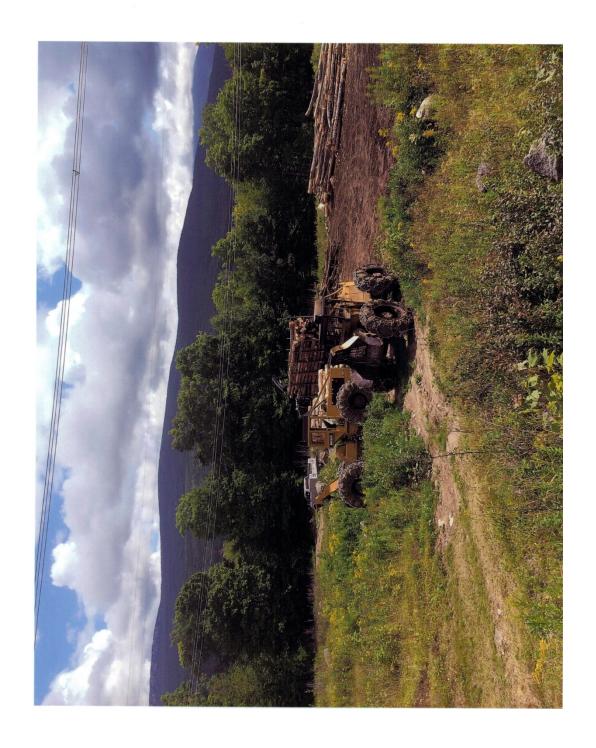
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NH State Police Incident Report (redacted) – Page 7 of 10

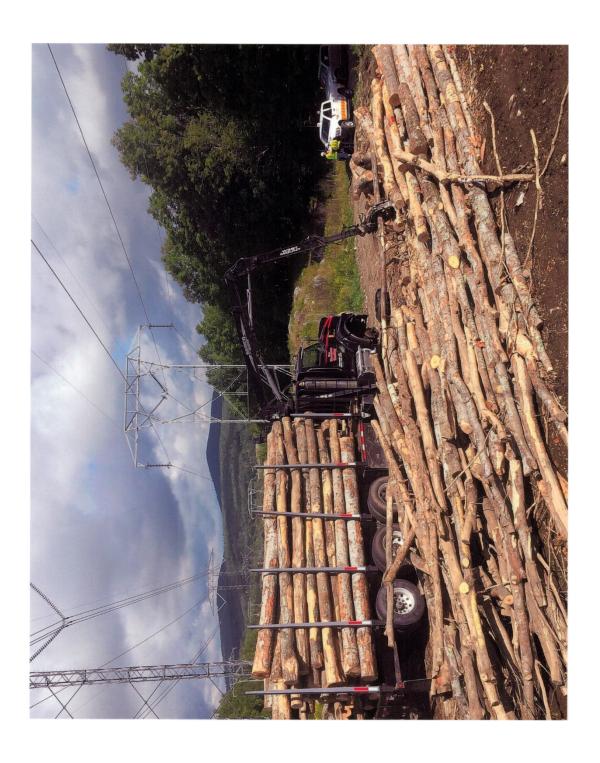
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| | was performed on SHAW | on August | 11 th , 2015 by Deput | y Chief Med | ical Examiner |
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Attachment 6
NH State Police Incident Report (redacted) – Page 8 of 10



Attachment 6

NH State Police Incident Report (redacted) – Page 9 of 10



Attachment 6
NH State Police Incident Report (redacted) – Page 10 of 10

